

Product Selector
Industrial controls
Circuit protective devices

Power and productivity
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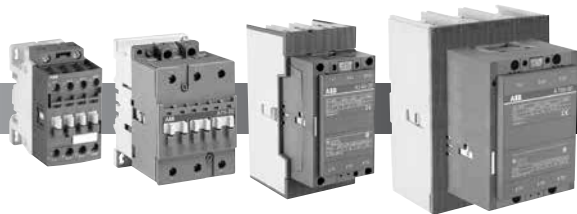
Product Selector

Industrial controls

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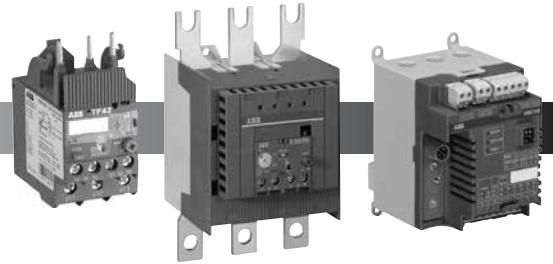
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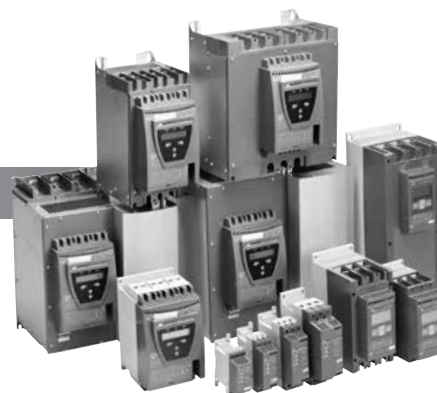
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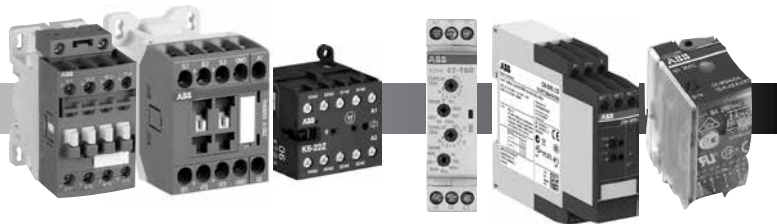
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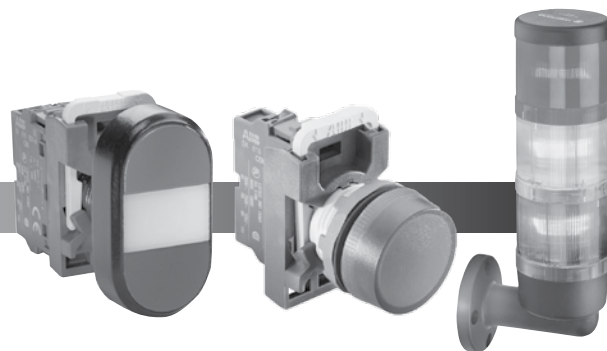
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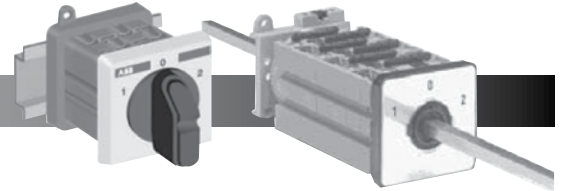
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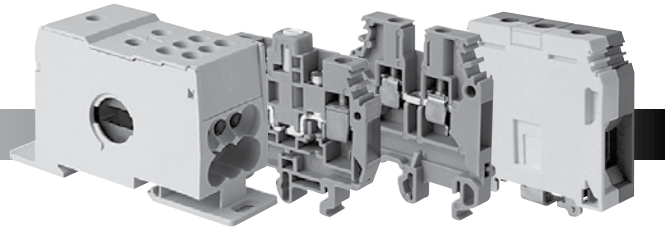


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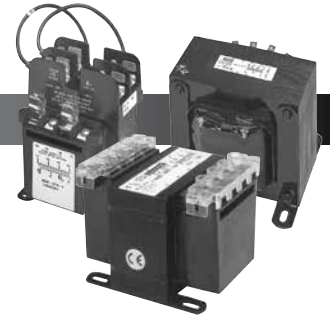
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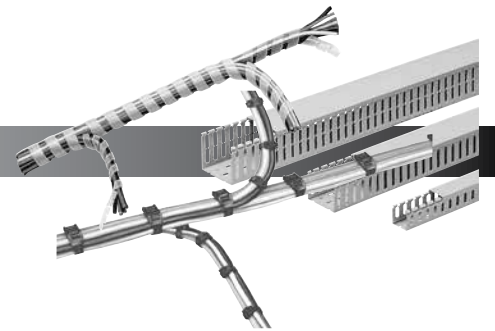
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DIN Rail circuit protective devices

Molded case circuit breakers



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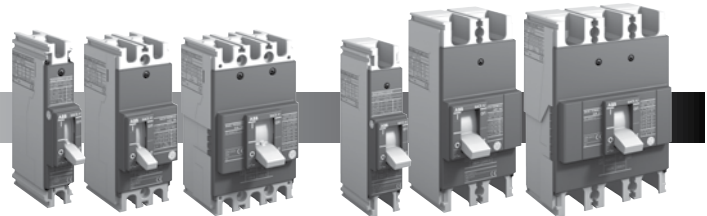
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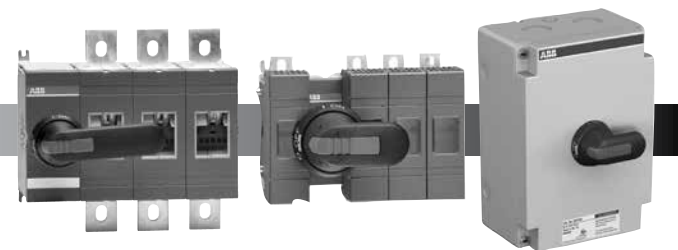
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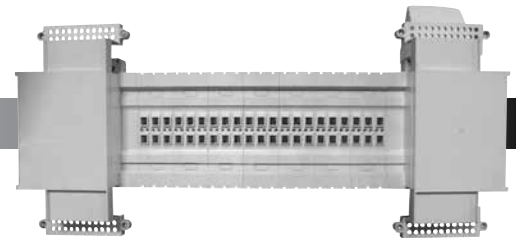
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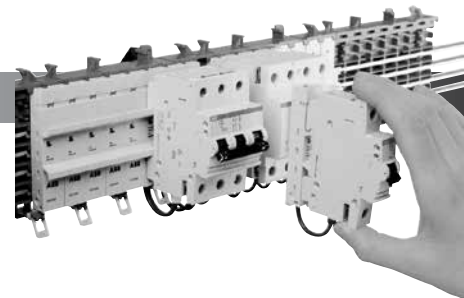
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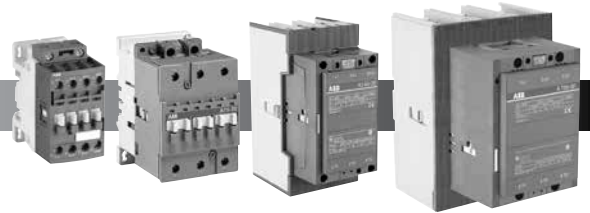


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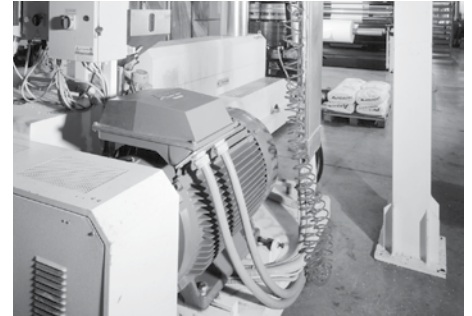
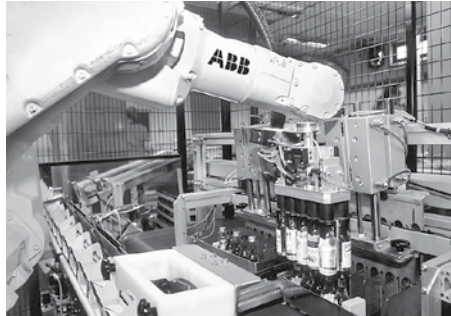
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Miniature contactors for compact equipment up to 5 hp / 5.5 kW
Standard contactors for all industrial applications up to 2700 A
Motor starting up to 1150 hp / 900 kW
Contactors for heavy duty applications up to 5000 A, 1500V

Simple, sustainable integration

- Complete 3- & 4-pole ranges
- High performance and quality
- Ease of installation
- AF contactors with electronic coils:
 - Wide input ranges
 - Unified AC/DC voltages
 - Chatter-proof / hum-free
 - Dips withstand
 - Integral surge suppression
- Global certification and approvals

The right choice for many applications

- Pumps & compressors
- HVAC equipment
- Power supplies and batteries
- Material handling
- Alternative energy
- Traction / rail
- Mobile equipment

Motor starting solutions

- Simple, compact assembly
- Close couplers, busbar and terminal accessories
- Systems concept:
 - Reduced panel space
 - Time / cost saving
 - Secure assembly

3-pole contactors

1

Mini contactors



Contactors for all industrial applications and motor starting



IEC	AC-3 Rated operational power	$\theta \leq 55^\circ\text{C}^*$, 400 V	kW	4	5.5	4	5.5	7.5	4	5.5	7.5	11	15	18.5	
UL/CSA	3-phase motor rating	480 V	hp	3	5	5	7.5	10	5	7.5	10	15	20	—	
	AC Control supply		Type	B6	B7	AS09	AS12	AS16	AF09 AF09Z	AF12 AF12Z	AF16 AF16Z	AF26 AF26Z	AF30 AF30Z	AF38 AF38Z	
	DC Control supply		Type	BC6	BC7	ASL09	ASL12	ASL16	AF09 AF09Z	AF12 AF12Z	AF16 AF16Z	AF26 AF26Z	AF30 AF30Z	AF38 AF38Z	
	AC / DC Control supply		Type	—	—	—	—	—	AF09 AF09Z	AF12 AF12Z	AF16 AF16Z	AF26 AF26Z	AF30 AF30Z	AF38 AF38Z	
IEC	AC-3 Rated operational current	$\theta \leq 55^\circ\text{C}^*$, 400 V	A	9	12	9	12	15.5	9	12	18	26	32	38	
	AC-1 Rated operational current	$\theta \leq 40^\circ\text{C}$, 690 V	A	16	20	22	24	24	25	28	30	45	50	50	
UL/CSA	General use rating	600 V	A	12 (300 V)	16	20	20	20	25	28	30	45	50	50	
NEMA	NEMA Size			—	—	—	—	—	00	0	—	1	—	—	
* $\theta \leq 60^\circ\text{C}$ for AS(L)09 ... AS(L)16 and AF09 ... AF38 contactors				Pages 1.26...1.27			Pages 1.24...1.25			Pages 1.14...1.17					

Main accessories

Auxiliary contact blocks Pages 1.46...1.51	Front mounting	CAF6	CA3-10 (1 x N.O.), CA3-01 (1 x N.C.)	CA4-10 (1 x N.O.), CA4-01 (1 x N.C.)
Timers Page 1.59	Side mounting	CA6	TEF3-ON, TEF3-OFF	CAL4-11 (1 x N.O. + 1 x N.C.)
Interlocking units (1) Pages 1.56...1.57	Electronic		VM3	TEF4-ON, TEF4-OFF
Connection kits Page 1.62	Mechanical			VM4
Surge suppressors Pages 1.52...1.53	Mechanical / Electrical	BSM6-30	BER16C-3	VEM4
	For reversing contactors	RV-BC6	RV5 (24...440 V)	BER16-4
	Varistor (AC/DC)		RC5-1 (24...440 V)	BER38-4
	RC type (AC)		RT5 (12...264 V)	
	Transil diode (DC)	RD7		

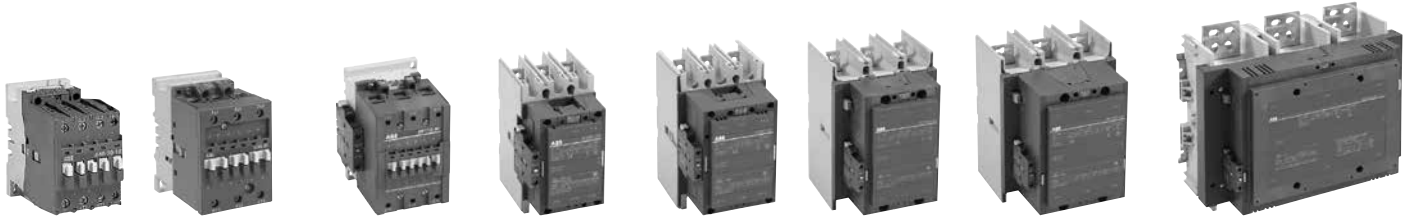
(1) See available reversing contactors VB6, VB7 and VAS09 ... VAS16

Overload relays – Chapter 2

Thermal relays	Class 10 (10A or 20 for TA42DU to TA80DU)	T16 (0.10...16 A)	T16 (0.10...16 A)	TF42 (0.10...38 A)
Electronic relays	Class 10E, 20E, 30E	E16DU (0.10...18.9 A)		EF19 (0.10...18.9 A), EF45 (9...45 A)
Accessories for thermal overload relays	Wall/separate mounting kit	DB16 (T16 only), DB16E (E16DU only)		DB42 (TF42 only)

Manual motor starters – Chapter 4

	Thermal / magnetic protection	Class 10	MS116 for class 10A (0.16...32 A)	MS116 for class 10A (0.16...32 A)
		Class 20	MS132 (0.10...32 A)	MS132 (0.10...32 A)
	Magnetic only types			MO132 (0.10...32 A)
Accessories	For contactor mounting		BEA7/132	BEA16-3
	Auxiliary trip units, auxiliary contacts, busbars		HKF1, HK1, UA1, AA1, PS1, S1, SK1, CK1	BEA16-4
				BEA38-4
				HKF1, HK1, UA1, AA1, PS1, S1, SK1, CK1



18.5	22	30	37	45	55	75	90	110	140	160	200	250	315	400	—	475	560	—
30	40	50	60	60	75	100	125	150	200	250	350	400	500	600	—	800	900	—
A40	A50	A63	A75	A95	A110	A145	A185	A210	A260	A300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
AL40	AE50	AE63	AE75	AF95	AF110	AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
—	AF50	AF63	AF75	AF95	AF110	AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
37	50	65	75	96	110	145	185	210	260	305	400	460	580	750	—	860	1050	—
60	100	115	125	145	160	250	275	350	400	500	600	700	800	1050	1260	1350	1650	2050
60	80	90	105	125	150	230	250	300	350	400	550	650	750	900	1210	1350	1650	2100
—	2	—	3	—	—	4	—	—	5	—	—	6	—	7	—	—	8	—

AF Series - pages 1.14...1.15; A Series - pages 1.18...1.19; AE Series - pages 1.20...1.21;
AL Series - pages 1.22...1.23; NEMA rated contactors - pages 1.28...1.31

NEW!!
AF2650
General use: 2700A
AC-1: 2650A

CA5-10 (1 x N.O.), CA5-01 (1 x N.C.)			CAL18-11 (1 x N.O. + 1 x N.C.)					
CAL5-11 (1 x N.O. + 1 x N.C.)								
TEF5-ON, TEF5-OFF								
VM5-1	VE5-2		VM300H / VM300V		VM750H / VM750V		VM1650H	
VE5-1	VE5-2		VM300H / VM300V		VM750H / VM750V		VM1650H	
BER40V	BEM75-30	BEM110-30	BEM185-30	BEM300-30	BEM460-30	BEM750-30		
RV5 (24...440 V)								
RC5-1 (24...440 V)	RC5-2 (24...440 V)		RC5-3 (250...440V)					
RT5 (12...264 V)								

TA42DU (18...42 A)	TA75DU (18...80 A)	TA80DU (29...80 A) TA110DU (65...110 A)	TA200DU (66...200 A)	TA450DU/SU (130...310 A) class 30 for SU			
E45DU (9...45 A)	E80DU (27...80 A)	E140DU (50...140 A)	E200D-U (60...200 A)	E320DU (100...320 A)	E500DU (150...500 A)	E800DU (250...800 A)	E1250DU (375...1250 A)
DB80, DB45E, DB80E		DB80, DB200, D140E	DB200				

Circuit breakers – Chapter 17

MS450 (28...50 A)	MS495 (28...100 A)	Tmax Circuit breaker and accessories
MS451 (28...50 A)	MS496 (28...100 A)	
BEA40/450	BEA50/450, BEA75/495	
HK4, HKS4, UA4, AA4, PS4, S4, SK4		



IEC	AC-1 Rated operational current	$\theta \leq 40\text{ }^{\circ}\text{C}$, 690 V	A
UL/CSA	General use rating	600 V	A
	AC Control supply		Type
	DC Control supply		Type
	AC / DC Control supply		Type

16	20
12 (300 V)	16
B6	B7
BC6	BC7
—	—

Page 1.34

Control relays
Chapter 6

Mini control relays - Chapter 6

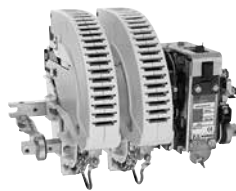


IEC	AC-15 Rated operational current	400 V	A
UL/CSA	Pilot duty		
	AC Control supply		Type
	DC Control supply		Type
	AC / DC Control supply		Type

3		
A 600		
K6-22Z	K6-31Z	K6-40E
KC6-22Z	KC6-31Z	KC6-0E
—	—	—

Specialty contactors
Pages 1.167...1.224

Bar contactors – Pages 1.215...1.224



DC-1 Rated current up to 5000 A
DC-3/DC-5 Rated current up to 2000 A
1500 V with poles in series

IOR.. 63...-CC to IOR.. 5100...-CC

AC-1 Rated current up to 5000 A
AC-3 Rated power up to 1500 kW
(1520 A - 440 V)
IOR.. 63...-MT to IOR.. 5100...-MT

AC/DC Coupling: LOR.. contactors
Slip ring motor control: FOR .. contactors
Field discharge: AM(F)-CC-JORE contactors
AC/DC Switching (N.C./N.O. main poles): NOR & JOR contactors
Latching contactors for energy saving and safety requirements: AMA or AME contactors

DC Circuit switching
Pages 1.207...1.214



100 A, 440 V, DC-1
GA75, GAE75 types
275...2050A, 1000V, DC-1
GAF185...GAF2050 types

Definite purpose
Pages 1.175...1.182



20...90 FLA
DP20...DP90 types

Contactors



1

25	30	45	55	70	100	125	200	250	300	350	550	800	1000
25	30	45	55	80	80	105	170	200	250	300	420	540	—
AF09 AF09Z	AF16 AF16Z	AF26 AF26Z	AF38 AF38Z	A45	A50	A75	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
AF09 AF09Z	AF16 AF16Z	AF26 AF26Z	AF38 AF38Z	AE45	AE50	AE75	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
AF09 AF09Z	AF16 AF16Z	AF26 AF26Z	AF38 AF38Z	AF45	AF50	AF75	—	—	—	—	—	—	—
Page 1.32				Page 1.32...1.33			Page 1.32						

Control relays - Chapter 6



3 A 600, Q 300			3 A 600, Q 600		
NS22E	NS31E	NS40E	NF22E	NF31E	NF40E
NSL22E	NSL31E	NSL40E	NF22E	NF31E	NF40E
—	—	—	NF22E	NF31E	NF40E

Lighting contactors – Pages 1.195...1.200



For tungsten and ballast loads up to 400 A.
Up to 12 poles, open and enclosed (UL Type 1)

Railway applications – Pages 1.201...1.206



Traction-specific (rail) devices with low-smoke plastic and ring-tongue termination

Capacitive switching

Pages 1.167...1.174



12.5 to 80 kvar
UA16..RA to UA110..RA types
UA16 to UA110 types

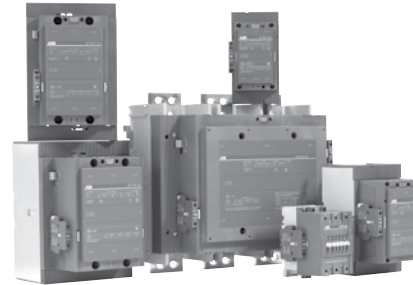
Dynamic braking / DC drive – Pages 1.185...1.194



2 DC-rated N.O. power poles
with optional 3rd N.C. pole for dynamic braking

Notes

1



Across the line Contactors

AF series contactors (9...2650)

- 3- & 4-pole contactors
- General purpose up to 2700 A
- Motor applications up to 1150 hp, 900 kW
- NEMA Sizes 00...8
- DC switching up to 600V
- Electronic AC/DC coil input voltages
- PLC interface (AF400...AF2650)
- Wide variety of accessories
- Systems concept coupling units & bus kits
- Additional ratings including definite purpose, elevator duty & capacitive switching

AS / ASL contactors (9...16)

- 3-pole contactors
- For high-volume applications up to 10 hp
- Bulk packaging available
- AC or DC coil input voltages

A-line contactors (9...300)

- 3- & 4-pole contactors
- General purpose up to 400 A
- Motor applications up to 300 hp, 250 kW
- NEMA Sizes 00...5
- Additional ratings including definite purpose & elevator duty
- AC or DC coil input voltages

B / BC contactors

- 3 & 4 pole contactors
- Compact solutions up to 5 hp, 5.5 kW
- Quick-connect & PCB mount options
- AC or DC coil input voltages

EK contactors

- 4-pole contactors
- AC-1 up to 1000 A
- AC or DC coil input voltages

3-pole contactors

Standards & approvals	AF09(Z)... AF38(Z)	A/E/L9... A/E/L40	A/E/F50... A/E/F75	A/F95... A/F110	A/F145... AF750, AF1350, AF1650	AF1250, AF2050, AF2650	AS/L09... AS/L16	B/C6... B/C7
	E312527	E312527	E312527	E312527	E36588	E73397	E312527	E191658
		LR56745	LR56745					LR16332
	✓	✓	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓	✓	✓

Note: B/C6...7 quick-connect and PCB-mount are UL recognized.

4-pole contactors

Standards & approvals	AF09(Z)... AF38(Z)	A/E/L9... A/E/L26	A/E/F45... A/E/F75	EK110... EK550	EK1000	B/C6... B/C7
	E319322	E312527	E312527	E36588	-	E191658
		LR56745	LR56745		-	LR15332
	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓

Note: B/C6...7 quick-connect and PCB-mount are UL recognized.

General information

Technical terms and definitions

Altitude

Refers to the height of the site where the equipment is located, expressed in meters above the sea level.

Ambient temperature

Temperature of the air surrounding the unit.

Circuits

• Auxiliary circuit

All the conducting parts of a contactor, intended to be included in a circuit different from the main circuit and the control circuit of the contactor e.g. signalization, interlocking circuits etc ...

• Control circuit

All the conducting parts of a contactor (other than the main circuit) included in a circuit used for the closing operation, or opening operation, or both, of the contactor.

• Main circuit

All the conducting parts of a contactor included in the circuit which it is designed to close or open.

Coil operating range

Expressed as a multiple of the rated control circuit voltage U_c for the lower and upper limits.

Cycle duration

Total time of the on-load + off-load period.

Endurance / durability

• Electrical endurance

Number of on-load operating cycles (i.e. with current on the main contacts) a contactor can achieve, varies depending on the utilization category.

• Mechanical endurance

Number of off-load operating cycles (i.e. without current on the main contacts) a contactor can achieve.

Inching

Energizing a motor once or repeatedly for short periods to obtain small movements of the driven mechanism.

Insulation class according to the VDE 0110 and NFC 20-040

Characterizes contactors suitability in accordance with environment and utilization conditions. A contactor can be classified depending on its own clearance and creepage distances in the insulation classes A, B, C, D which correspond to different insulation voltage values.

The insulation class C is applicable to most of the industrial applications. Equipment described in this catalogue correspond to insulation class C.

Intermittent duty

Duty in which the main contacts of a contactor remain closed for periods of time insufficient to allow the contactor to reach thermal equilibrium, the current-carrying periods being separated by off-load periods of sufficient duration to restore equality of temperature with the cooling medium.

Mounting positions

Stated by the manufacturer. Please note restrictions when applicable.

On-load factor

Ratio of the current flow time to the total time of the cycle x 100.

Plugging

Stopping or reversing a motor quickly by interchanging two supply leads whilst the motor is running.

Rated breaking capacity; Rated making capacity

Value of r.m.s current a contactor can break or make at a fixed voltage value, within the conditions specified by the standards, depending on the utilization category.

Rated control circuit voltage U_c

Control voltage value for which the control circuit of the unit is sized.

Rated insulation voltage U_i

Voltage value which designates the unit and to which dielectric tests, clearance and creepage distances are referred.

Rated impulse withstand voltage U_{imp}

The highest peak value of an impulse voltage of prescribed form 1.2/50, which does not cause breakdown under specified conditions of test.

Rated operating current I_e

Current value stated by the manufacturer and taking into account the rated operating voltage U_e , the rated frequency, the rated duty, the utilization category, the electrical contact life and the type of the protective enclosure.

Rated operating voltage U_e

Voltage value to which utilization characteristics of the contactor are referred, i.e. phase to phase voltage in 3 phase circuits.

Conventional thermal current I_{th}

Value of current the contactor can withstand with poles in closed position, in free air for an eight hour duty, without the temperature rise of its various parts exceeding the limits specified by the standards.

Resistance to shocks

Requirements applicable for instance to vehicles, crane operation or switchgear slide-in module systems.

At the quoted permissible «g» values, contactors must not undergo a change in switching state and O/L relays must not trip.

Resistance to vibrations

Requirements applicable to all the vehicles, vessels and other similar transport systems. At the quoted amplitude and vibration frequency values, the unit must be capable to achieve the required duty.

Short-circuit protection coordination

Achieved by using back-up protection devices such as circuit-breakers, H.R.C. fuses or standard fuses.

Co-ordination types a, b, c are defined in IEC 292-1 publication, VDE 0660, NFC 63-650 standards. Co-ordination types "1" and "2" are defined in IEC 947-4-1.

• Type 1 co-ordination

There has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable.

• Type 2 co-ordination

No damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts is permitted, if they are easily separated.

Switching frequency

Number of operating cycles per hour.

Time

• Closing time

Time between energization of the coil until the moment the contacts of the first current path to be closed actually close.

• Opening time

Time from the beginning of state causing breaking until the moment when the contacts of the last current path to be opened are open.

• Minimal operation time

Shortest control duration to ensure complete closing or opening of a contactor.

• Short time current permissible

Value of current which the contactor can withstand in closed position for a short time period and within specified conditions.

• Time constant

Ratio of inductance to the resistance : $L/R = \text{mH}/\text{Ohm} = \text{ms}$.

General information

IEC Standards, utilization categories

Standards

• IEC standards 158-1: "Contactors" and series IEC 292 :
 "Motor-starters" have been revised and replaced by the new IEC 947-4-1 (1990-05): "Contactors and Motor-starters" referring to IEC 947-1 (1988): "General rules"
 The new standards will constitute the basis of the future European and National standards, not yet revised.

Therefore the ratings indicated in this catalog are established according to the former and the future standards.

- Main changes and additions in the new standards are:
- Revision and extension of the utilization categories (see hereafter)
- Replacement of the coordination classes types a, b, c by new types: "1" (approximately equivalent to former class "a") and "2" (approximately equivalent to former class "c") with additional requirements.
- Classification of the thermal overload relays in tripping classes: 10 A; 10; 20 and 30 depending on their tripping times, at 1.5 and 7.2 times their setting current, in order to cover motor applications depending on their starting times. Class 10 A is adapted for motors according to IEC 34-1.
- Introduction of tests to verify the connecting capability and the mechanical strength of terminals.

Utilization categories

A contactor duty is characterized by the utilization category plus indication of the rated operating voltage and the rated operating current (see at Rated ...), or the motor characteristics.

Utilization categories for contactors according to IEC 947-4-1

Alternating current:	AC-1	Non-inductive or slightly inductive loads, resistance furnaces. Power factor 0.7 - 0.8 (slightly inductive).
	AC-2	Slip-ring motors: starting, switching-off.
	AC-3	Squirrel-cage motors: starting, switching-off motors during running. Power factor 0.4 - 0.5 (AC-3).
	AC-4	Squirrel-cage motors: starting, plugging, inching.
	AC-5a	Switching of electric discharge lamp controls.
	AC-5b	Switching of incandescent lamps.
	AC-6a	Switching of transformers.
	AC-6b	Switching of capacitor banks
	AC-8a AC-8b	Hermetic refrigerant compressor motor control with manual resetting of overload releases Hermetic refrigerant compressor motor control with automatic resetting of overload releases.
Direct current:	DC-1	Non-inductive or slightly inductive loads, resistance furnaces.
	DC-3	Shunt motors: starting, plugging, inching. Dynamic breaking of d.c. motors.
	DC-5	Series motors: starting, plugging, inching. Dynamic breaking of d.c. motors.
	DC-6	Switching of incandescent lamps

Utilization categories for contactor relays according to IEC 947-5-1

Alternating current:	AC-12	Control of resistive loads and solid state loads with isolation by opto couplers.
	AC-13	Control of solid state loads with transformer isolation.
	AC-14	Control of small electromagnetic loads (≤ 72 VA).
	AC-15	Control of electromagnetic loads (> 72 VA).
Direct current:	DC-12	Control of resistive loads and solid state loads with isolation by opto couplers.
	DC-13	Control of electromagnets.
	DC-14	Control of electromagnetic loads having economy resistors in circuit.

Utilization categories AC-1, AC-2, AC-3, AC-4 and DC-1, DC-3, DC-5 are maintained with slightly more severe tests.

Other categories have been added in order to standardize specific applications. In fact some contactor applications and the specific criteria characterizing the types of load controlled can modify the recommended utilization characteristics. These major applications are, for example :

Switching of capacitor banks

This application is characterized by high current peaks when switching-on the contactor and presence of harmonic currents on uninterrupted duty. For this application, IEC 947-4-1 has defined an utilization category AC-6b. Practical ratings have to be defined according to tests or, in absence of tests, by a calculation indicated in IEC 947-4-1.

Switching of transformers

This application is characterized by high current peaks on contactor closing due to magnetization phenomena. The corresponding utilization category according to IEC 947-4-1 is AC-6a. Ratings are derived from test-values for AC-3 or AC-4 according to formula given in IEC 947-4-1.

Switching of lighting circuits

The current peaks on contactor closing and power factor vary depending on the type of lamps, the switching method used and if compensation systems are fitted or not.

IEC 947-4-1 contains two standard utilization categories

- AC-5a for switching of the electric discharge lamps.
- AC-5b for switching of incandescent lamp.

General information

Motor ratings

Horsepower to full-load Amperes for AC induction motors

Horsepower (hp)	Full Load Amperes (FLA)													
	110...120 v ac		200 v ac		208 v ac		220...240 v ac		380...415 v ac		440...480 v ac		550...600 v ac	
	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase
1/10	3.0	-	-	-	-	-	1.5	-	1.0	-	-	-	-	-
1/8	3.8	-	-	-	-	-	1.9	-	1.2	-	-	-	-	-
1/6	4.4	-	2.5	-	2.4	-	2.2	-	1.4	-	-	-	-	-
1/4	5.8	-	3.3	-	3.2	-	2.9	-	1.8	-	-	-	-	-
1/3	7.2	-	4.1	-	4.0	-	3.6	-	2.3	-	-	-	-	-
1/2	9.8	4.4	5.6	2.5	5.4	2.4	4.9	2.2	3.2	1.3	2.5	1.1	2.0	0.9
3/4	13.8	6.4	7.9	3.7	7.6	3.5	6.9	3.2	4.5	1.8	3.5	1.6	2.8	1.3
1	16.0	8.4	9.2	4.8	8.8	4.6	8.0	4.2	5.1	2.3	4.0	2.1	3.2	1.7
1-1/2	20.0	12.0	11.5	6.9	11.0	6.6	10.0	6.0	6.4	3.3	5.0	3.0	4.0	2.4
2	24.0	13.6	13.8	7.8	13.2	7.5	12.0	6.8	7.7	4.3	6.0	3.4	4.8	2.7
3	34.0	19.2	19.6	11.0	18.7	10.6	17.0	9.6	10.9	6.1	8.5	4.8	6.8	3.9
5	56.0	30.4	32.2	17.5	30.8	16.7	28.0	15.2	17.9	9.7	14.0	7.6	11.2	6.1
7-1/2	80.0	44.0	45.0	25.3	44.0	24.2	40.0	22.0	27.0	14.0	21.0	11.0	16.0	9.0
10	100.0	56.0	57.5	32.2	55.0	30.8	50.0	28.0	33.0	18.0	26.0	14.0	20.0	11.0
15	135.0	84.0	-	48.3	-	46.2	68.0	42.0	44.0	27.0	34.0	21.0	27.0	17.0
20	-	108.0	-	62.1	-	59.4	88.0	54.0	56.0	34.0	44.0	27.0	35.0	22.0
25	-	136.0	-	78.2	-	74.8	110.0	68.0	70.0	44.0	55.0	34.0	44.0	27.0
30	-	160.0	-	92.0	-	88.0	136.0	80.0	87.0	51.0	68.0	40.0	54.0	32.0
40	-	208.0	-	120.0	-	114.0	176.0	104.0	112.0	66.0	88.0	52.0	70.0	41.0
50	-	260.0	-	150.0	-	143.0	216.0	130.0	139.0	83.0	108.0	65.0	86.0	52.0
60	-	-	-	177.0	-	169.0	-	154.0	-	103.0	-	77.0	-	62.0
75	-	-	-	221.0	-	211.0	-	192.0	-	128.0	-	96.0	-	77.0
100	-	-	-	285.0	-	273.0	-	248.0	-	165.0	-	124.0	-	99.0
125	-	-	-	359.0	-	343.0	-	312.0	-	208.0	-	156.0	-	125.0
150	-	-	-	414.0	-	396.0	-	360.0	-	240.0	-	180.0	-	144.0
200	-	-	-	552.0	-	528.0	-	480.0	-	320.0	-	240.0	-	192.0
250	-	-	-	-	-	-	-	604.0	-	403.0	-	302.0	-	242.0
300	-	-	-	-	-	-	-	722.0	-	482.0	-	361.0	-	289.0
350	-	-	-	-	-	-	-	828.0	-	560.0	-	414.0	-	336.0
400	-	-	-	-	-	-	-	954.0	-	636.0	-	477.0	-	382.0
450	-	-	-	-	-	-	-	1030.0	-	-	-	515.0	-	412.0
500	-	-	-	-	-	-	-	1180.0	-	786.0	-	590.0	-	472.0

Full-load motor-running currents in Amperes corresponding to various AC horsepower ratings as published in Table 50.1 of UL 508.

General information

Pilot duty ratings and overload trip classes

Pilot duty ratings for AC control circuit contacts

Contact rating designation	Continuous thermal, test current (A)	Maximum current, 50/60 Hz (A)									
		120 v ac		240 v ac		480 v ac		600 v ac		Volt-amperes	
		Make	Break	Make	Break	Make	Break	Make	Break	Make	Break
A150	10	60	6.00	-	-	-	-	-	-	7200	720
A300	10	60	6.00	30	3.00	-	-	-	-	7200	720
A600	10	60	6.00	30	3.00	15	1.50	12	1.20	7200	720
B150	5	30	3.00	-	-	-	-	-	-	3600	360
B300	5	30	3.00	15	1.50	-	-	-	-	3600	360
B600	5	30	3.00	15	1.50	7.5	0.75	6	0.60	3600	360
C150	2.5	15	1.5	-	-	-	-	-	-	1800	180
C300	2.5	15	1.5	7.5	0.75	-	-	-	-	1800	180
C600	2.5	15	1.5	7.5	0.75	3.75	0.375	3.00	0.30	1800	180
D150	1.0	3.60	0.60	-	-	-	-	-	-	432	72
D300	1.0	3.60	0.60	1.80	0.30	-	-	-	-	432	72
E150	0.5	1.80	0.30	-	-	-	-	-	-	216	36

Mechanical switching ratings and test values as published in Table 1-4-1 of NEMA ICS 5-2000 (R2005, R2010)

Pilot duty ratings for DC control circuit contacts

Contact rating designation	Continuous thermal, test current (A)	Maximum current, 50/60 Hz (A)			
		120 v dc	250 v dc	301 to 600 v dc	Volt-amperes
		Make / Break	Make / Break	Make / Break	Make / Break
N150	10	2.2	-	-	275
N300	10	2.2	1.1	-	275
N600	10	2.2	1.1	0.40	275
P150	5.0	1.1	-	-	138
P300	5.0	1.1	0.55	-	138
P600	5.0	1.1	0.55	0.20	138
Q150	2.5	0.55	-	-	69
Q300	2.5	0.55	0.27	-	69
Q600	2.5	0.55	0.27	0.10	69
R150	1.0	0.22	-	-	28
R300	1.0	0.22	0.11	-	28

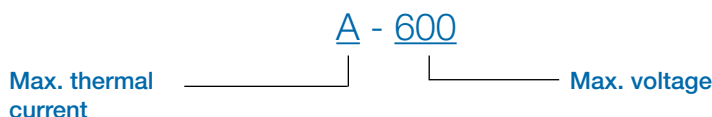
Mechanical switching ratings and test values as published in Table 1-4-1 of NEMA ICS 5-2000 (R2005, R2010)

Overload trip classes

Trip class	Tripping time T_p (seconds)
10A	$2 < T_p \leq 10$
10	$4 < T_p \leq 10$
20	$6 < T_p \leq 20$
30	$9 < T_p \leq 30$

Trip classes as published in Table 2 of UL 60947-4-1A.

Pilot duty rating explanation



General information

AF Series contactors

AF09 - AF110

Application

AF series contactors (9...110) are primarily used for controlling single and three phase motors and switching power circuits up to 600V AC, 240V DC

Description

AF series contactors are provided in either three or four power pole configurations with a variety of accessories including auxiliary contacts, close coupling adaptors, interlocks, and busbars.

Control circuit types

AF series contactor coils are designed to utilize both AC (50/60 Hz) and DC control circuit inputs ranging from 12...500V. Surge suppression is included.

Contactor types

3 NO pole:	AF09...AF110
4 NO pole:	AF09...AF75
2 NO / 2 NC pole:	AF09...AF75

Mounting hole pattern identical from AF09...AF38. Only three different patterns for contactors AF09...AF110

Quick DIN-rail mount & dismount (no tools required AF09...AF38)

- 35 x 7.5mm for AF09...AF38
- 35 x 15mm for AF09...AF75
- 75mm for AF45...AF110

Integral surge suppression AF09...AF110

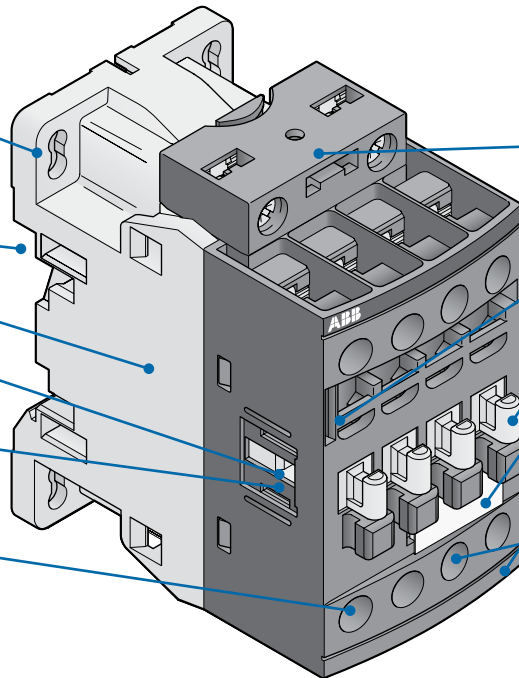
Actuator for side-mount accessories

Mechanical interlocks with no additional width for AF09...AF38

Contoured sides for easy access to panel mounting holes

Terminals on AF09...AF110 contactors are delivered in open position with captive screws (screws of unused terminals must be tightened)

IP20 degree protection according to IEC/EN 60947-1; protection from live parts according to VDE0106 Part. 100.



Detachable coil terminals (AF09...AF38)

- Can be pre-wired prior to installation
- Can easily be rotated from top (standard) to bottom

Front-mount coil termination available

Stops for attaching front-mount accessories

Function markers included as standard on AF09...AF38; available as accessory AF50...AF110

Clear indication of coil voltages and frequencies

Terminal screws:

- Posidrive (+,-) No 2 AF09...AF75
- M8 hex threaded socket screw for AF95...AF110

Catalog number explanation

For reference only – not all combinations will produce valid catalog numbers

AF09 - 30 - 10 - 13

Contactor series & frame size

Power pole configuration

- 30 = 3 NO
- 40 = 4 NO
- 22 = 2 NO / 2 NC

Coil voltage code

(see product selection pages)

Auxiliary pole configuration

- 00 - No auxiliary provided
- 10 = 1 NO
- 01 = 1 NC
- 11 = 1 NO / 1 NC
- 22 = 2 NO / 2 NC

General information

AF Series contactors

AF145 - AF2650

Application

AF series contactors (145...2650) are primarily used for controlling single and three phase motors and switching power circuits up to 1000V AC, 600V DC.

Description

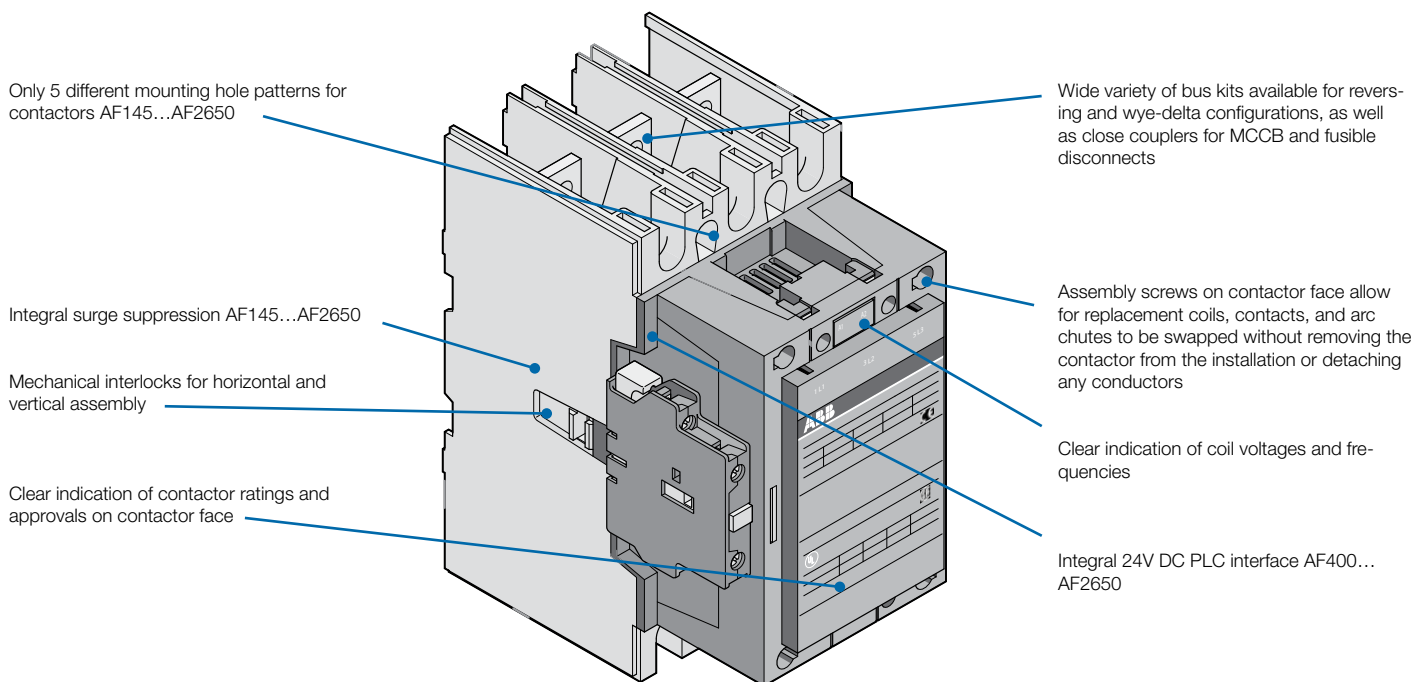
AF series contactors are provided in a three power pole configuration with a variety of accessories including auxiliary contacts, close coupling adaptors, interlocks, and busbars.

Control circuit types

AF series contactor coils are designed to utilize both AC (50/60 Hz) and DC control circuit inputs ranging from 24...500V. Surge suppression is included.

Contactor types

3 NO pole: AF145...AF2650



Catalog number explanation

For reference only – not all combinations will produce valid catalog numbers

AF2650 - 30 - 11 - 70

Contactor series & frame size

Power pole configuration

- 30 = 3 NO

Coil voltage code

(see product selection pages)

Auxiliary pole configuration

- 00 - No auxiliary provided
- 11 = 1 NO / 1 NC
- 22 = 2 NO / 2 NC

AF non-reversing, 3-pole

For applications up to 1150 hp, 900 kW
Electronic AC/DC operated coils



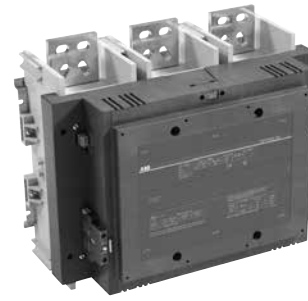
AF09...AF16



AF95...AF110



AF210...AF300



AF1350...AF2650

Electrical ratings ①

IEC/EN 60947-4-1					UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07		UL SP c US		Non-reversing		Standard auxiliary contacts ③		Catalog number
Rated operational current I _e , AC-1, AC-3 (A)		Rated operational power P _e , AC-3, 55°C (kW) ②			AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				NO	NC	
AC-1 40°C	AC-3 55°C ②	220... 240V	380... 400V	690V	600V	200... 208V	220... 240V	440... 480V	550... 600V				
25	9	2.2	4	5.5	25	9	2	2	5	7.5	1	-	AF09-30-10-Δ
											-	1	AF09-30-01-Δ
28	12	3	5.5	7.5	28	11	3	3	7.5	10	1	-	AF12-30-10-Δ
											-	1	AF12-30-01-Δ
30	18	4	7.5	9	30	17	5	5	10	15	1	-	AF16-30-10-Δ
											-	1	AF16-30-01-Δ
45	26	6.5	11	15	45	24.2	7.5	7.5	15	20	-	-	AF26-30-00-Δ
50	32	9	15	18.5	50	30.8	10	10	20	25	-	-	AF30-30-00-Δ
50	38	11	18.5	22	50	-	-	-	-	-	-	-	AF38-30-00-Δ
100	50	15	22	30	80	54	15	20	40	50	1	1	AF50-30-11-Δ
115	65	18.5	30	37	90	68	20	25	50	60	1	1	AF63-30-11-Δ
125	75	22	37	40	105	80	25	30	60	75	1	1	AF75-30-11-Δ
145	96	25	45	55	150	88	30	30	60	75	1	1	AF95-30-11-Δ
160	110	30	55	75	150	104	30	40	75	100	1	1	AF110-30-11-Δ
250	145	45	75	110	230	130	40	50	100	125	1	1	AF145-30-11-Δ
275	185	55	90	132	250	156	50	60	125	150	1	1	AF185-30-11-Δ
350	210	59	110	160	300	192	60	75	150	200	1	1	AF210-30-11-Δ
400	260	80	140	200	350	248	75	100	200	250	1	1	AF260-30-11-Δ
500	305	90	160	250	400	302	100	100	250	300	1	1	AF300-30-11-Δ
600	400	110	200	315	550	414	125	150	350	400	1	1	AF400-30-11-Δ
700	460	132	250	355	650	480	150	200	400	500	1	1	AF460-30-11-Δ
800	580	160	315	500	750	604	250	250	500	600	1	1	AF580-30-11-Δ
1050	750	220	400	600	900	722	250	300	600	700	1	1	AF750-30-11-Δ
1260	-	-	-	-	1210	-	-	-	-	-	1	1	AF1250-30-11-Δ
1350	860	257	475	750	1350	954	-	400	800	1000	1	1	AF1350-30-11-Δ
1650	1050	315	560	900	1650	1050	-	450	900	1150	1	1	AF1650-30-11-Δ
2050	-	-	-	-	2100	-	-	-	-	-	1	1	AF2050-30-11-Δ
2650	-	-	-	-	2700	-	-	-	-	-	1	1	AF2650-30-11-Δ

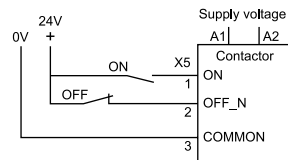
Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ④	AF09... AF38	AF50... AF300	AF400... AF750	AF1250	AF1350... AF2650
20...60V DC	11	72	-	-	-
24...60V AC	11	-	-	-	-
24...60V DC	-	-	68	68	-
48...130V AC/DC	12	69	69	69	-
100...250V AC/DC	13	70	70	70	70
250...500V AC/DC	14	-	71	71	-

Example(s):
24V DC input voltage: AF16-30-10-11
120V AC input voltage: AF300-30-11-Z0

Control inputs

AF400...AF2650 are equipped with integral low voltage inputs, allowing for direct PLC control:

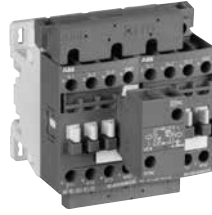


① For selection purposes; for complete electrical ratings, see Technical Data.
② AF09... AF38 at 60°C.
③ Auxiliary contacts integral for AF09...AF16; all others side-mount.
④ AC coil input voltage(s) at 50/60 Hz unless specified.

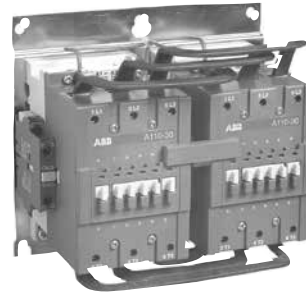
AF mechanically interlocked, reversing, 3-pole

For applications up to 700 hp, 600 kW
Electronic AC/DC operated coils

Across the line
Contactors 1



AF09R...AF16R



AF95R...AF110R

Electrical ratings ①②

UL 508, 60947-4-1A
CSA C22.2 No.14, 60947-4-1-07



AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Mechanically interlocked		Catalog number ③	Reversing		Catalog number ③
		200... 208V	220... 240V	440... 480V	550... 600V	NO	NC		NO	NC	
25	9	2	2	5	7.5	2	2	AF09M-30-22-Δ	2	2	AF09R-30-22-Δ
-	-	-	-	-	-	-	-	-	-	-	-
28	11	3	3	7.5	10	2	2	AF12M-30-22-Δ	2	2	AF12R-30-22-Δ
-	-	-	-	-	-	-	-	-	-	-	-
30	17	5	5	10	15	2	2	AF16M-30-22-Δ	2	2	AF16R-30-22-Δ
-	-	-	-	-	-	-	-	-	-	-	-
45	24.2	7.5	7.5	15	20	-	2	AF26M-30-02-Δ	-	2	AF26R-30-02-Δ
50	30.8	10	10	20	25	-	2	AF30M-30-02-Δ	-	2	AF30R-30-02-Δ
-	-	-	-	-	-	-	-	-	-	-	-
80	54	15	20	40	50	2	2	AF50M-30-11-Δ	2	2	AF50R-30-11-Δ
90	68	20	25	50	60	2	2	AF63M-30-11-Δ	2	2	AF63R-30-11-Δ
105	80	25	30	60	75	2	2	AF75M-30-11-Δ	2	2	AF75R-30-11-Δ
150	88	30	30	60	75	2	2	AF95M-30-11-Δ	2	2	AF95R-30-11-Δ
150	104	30	40	75	100	2	2	AF110M-30-11-Δ	2	2	AF110R-30-11-Δ
230	130	40	50	100	125	2	2	AF145M-30-11-Δ	2	2	AF145R-30-11-Δ
250	156	50	60	125	150	2	2	AF185M-30-11-Δ	2	2	AF185R-30-11-Δ
300	192	60	75	150	200	2	2	AF210M-30-11-Δ	2	2	AF210R-30-11-Δ
350	248	75	100	200	250	2	2	AF260M-30-11-Δ	2	2	AF260R-30-11-Δ
400	302	100	100	250	300	2	2	AF300M-30-11-Δ	2	2	AF300R-30-11-Δ
550	414	125	150	350	400	2	2	AF400M-30-11-Δ	2	2	AF400R-30-11-Δ
650	480	150	200	400	500	2	2	AF460M-30-11-Δ	2	2	AF460R-30-11-Δ
750	604	250	250	500	600	2	2	AF580M-30-11-Δ	2	2	AF580R-30-11-Δ
900	722	250	300	600	700	2	2	AF750M-30-11-Δ	2	2	AF750R-30-11-Δ
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ④	AF09...AF30	AF50...AF300	AF400...AF750
20...60V DC	11	72	-
24...60V AC	11	-	-
24...60V DC	-	-	68
48...130V AC/DC	12	69	69
100...250V AC/DC	13	70	70
250...500V AC/DC	14	-	71

Example(s):

24V DC input voltage: AF16M-30-22-11

120V AC input voltage: AF300R-30-11-70

Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes; for complete electrical ratings, see Technical Data.

② For ratings according to IEC/EN 60947-4-1, refer to AF non-reversing selection table or Technical Data.

③ AF09R(M)...AF30R(M) assembled using connection clips, AF50R(M)...AF750R(M) mounted on common baseplate.

④ AC coil input voltage(s) at 50/60 Hz unless specified.

AFZ non-reversing, 3-pole

For applications up to 25 hp, 22 kW
Low power consumption, electronic AC/DC operated coils



AF09Z... AF16Z



AF26Z... AF38Z

Electrical ratings ①

IEC/EN 60947-4-1						UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07						Non-reversing		Catalog number
Rated operational current I _e AC-1, AC-3 (A)		Rated operational power P _e , AC-3, 60°C (kW)			AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Standard auxiliary contacts ②			
AC-1, 40°C	AC-3, 60°C	220... 240V	380... 400V	690V	600V		200... 208V	220... 240V	440... 480V	550... 600V	NO	NC		
25	9	2.2	4	5.5	25	9	2	2	5	7.5	1	-	AF09Z-30-10-Δ	
											-	1	AF09Z-30-01-Δ	
28	12	3	5.5	7.5	28	11	3	3	7.5	10	1	-	AF12Z-30-10-Δ	
											-	1	AF12Z-30-01-Δ	
30	18	4	7.5	9	30	17	5	5	10	15	1	-	AF16Z-30-10-Δ	
											-	1	AF16Z-30-01-Δ	
45	26	6.5	11	15	45	24.2	7.5	7.5	15	20	-	-	AF26Z-30-00-Δ	
50	32	9	15	18.5	50	30.8	10	10	20	25	-	-	AF30Z-30-00-Δ	
50	38	11	18.5	22	50	-	-	-	-	-	-	-	AF38Z-30-00-Δ	

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ③	AF09Z... AF38Z
12...20V DC	20
24...60V AC	21
20...60V DC	21
48...130V AC/DC	22
100...250V AC/DC	23

Example(s):
24V DC input voltage: AF16Z-30-10-21
120V AC input voltage: AF30Z-30-00-23

① For selection purposes, for complete electrical ratings, see Technical Data

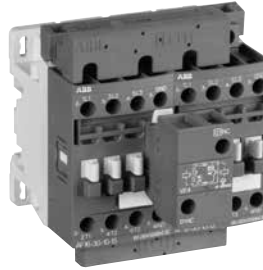
② Auxiliary contacts integral for AF09Z... AF16Z

③ AC coil input voltage(s) at 50/60 Hz unless specified.

AFZ mechanically interlocked, reversing, 3-pole

For applications up to 25 hp, 18.5 kW
Low power consumption, electronic AC/DC operated coils

Across the line
Contactors



AF09ZR... AF16ZR

Electrical ratings ①②

UL 508, 60947-4-1A
CSA C22.2 No. 14, 60947-4-1-07

AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Mechanically interlocked		Catalog number ③	Reversing		Catalog number ③
		200... 208V	220... 240V	440... 480V	550... 600V	Standard auxiliary contacts	Standard auxiliary contacts				
600V						NO	NC		NO	NC	
25	9	2	2	5	7.5	2	2	AF09MZ-30-22-Δ	2	2	AF09RZ-30-22-Δ
-	-	-	-	-	-	-	-	-	-	-	-
28	11	3	3	7.5	10	2	2	AF12MZ-30-22-Δ	2	2	AF12RZ-30-22-Δ
-	-	-	-	-	-	-	-	-	-	-	-
30	17	5	5	10	15	2	2	AF16MZ-30-22-Δ	2	2	AF16RZ-30-22-Δ
-	-	-	-	-	-	-	-	-	-	-	-
45	24.2	7.5	7.5	15	20	-	2	AF26MZ-30-02-Δ	-	2	AF26RZ-30-02-Δ
50	30.8	10	10	20	25	-	2	AF30MZ-30-02-Δ	-	2	AF30RZ-30-02-Δ
-	-	-	-	-	-	-	-	-	-	-	-

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ④	AF09Z... AF38Z
12...20V DC	20
24...60V AC	21
20...60V DC	21
48...130V AC/DC	22
100...250V AC/DC	23

Example(s):
24V DC input voltage: AF16ZM-30-22-21
120V AC input voltage: AF30ZR-30-02-23

Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes, for complete electrical ratings, see Technical Data
② For ratings according to IEC/EN 60947-4-1, refer to AFZ non-reversing selection table or Technical Data.
③ AF09ZR(M)...AF30ZR(M) assembled using connection clips.
④ AC coil input voltage(s) at 50/60 Hz unless specified.

A non-reversing, 3-pole

For applications up to 300 hp, 250 kW
AC operated coils



A30... A40



A50... A75



A145... A185

Electrical ratings ①

IEC/EN 60947-4-1



UL 508, 60947-4-1A
CSA C22.2 No.14, 60947-4-1-07



Rated operational current I _e AC-1, AC-3 (A)		Rated operational power P _e , AC-3, 55°C (kW)			AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Standard auxiliary contacts ②		Catalog number
AC-1, 40°C	AC-3, 55°C	220... 240V	380... 400V	690V	600V		200... 208V	220... 240V	440... 480V	550... 600V	NO	NC	
25	9	2.2	4	5.5	21	9	2	2	5	7.5	1	-	▼A9-30-10-Δ
											-	1	▼A9-30-01-Δ
27	12	3	5.5	7.5	25	11	3	3	7.5	10	1	-	▼A12-30-10-Δ
											-	1	▼A12-30-01-Δ
30	17	4	7.5	9	30	17	5	5	10	15	1	-	▼A16-30-10-Δ
											-	1	▼A16-30-01-Δ
45	26	6.5	11	15	40	28	7.5	10	20	25	1	-	▼A26-30-10-Δ
											-	1	▼A26-30-01-Δ
55	32	9	15	18.5	50	34	10	10	25	30	1	-	A30-30-10-Δ
											-	1	A30-30-01-Δ
60	37	11	18.5	22	60	42	10	15	30	40	1	-	A40-30-10-Δ
											-	1	A40-30-01-Δ
100	50	15	22	30	80	54	15	20	40	50	1	1	A50-30-11-Δ
115	65	18.5	30	37	90	68	20	25	50	60	1	1	A63-30-11-Δ
125	75	22	37	40	105	80	25	30	60	75	1	1	A75-30-11-Δ
145	96	25	45	55	150	88	30	30	60	75	1	1	A95-30-11-Δ
160	110	30	55	75	150	104	30	40	75	100	1	1	A110-30-11-Δ
250	145	45	75	110	230	130	40	50	100	125	1	1	A145-30-11-Δ
275	185	55	90	132	250	156	50	60	125	150	1	1	A185-30-11-Δ
350	210	59	110	160	300	192	60	75	150	200	1	1	A210-30-11-Δ
400	260	80	140	200	350	248	75	100	200	250	1	1	A260-30-11-Δ
500	305	90	160	250	400	302	100	100	250	300	1	1	A300-30-11-Δ

▼ Planned legacy product; recommend AF series contactors.

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ③	A9...A300
24V AC	81
48V AC	83
110...120V AC, 60 Hz	84
230...240V AC, 60 Hz	80
480V AC, 60 Hz	51
600V AC, 60 Hz	55

Example(s):

24V AC input voltage: A16-30-10-81

120V AC input voltage: A300-30-11-84

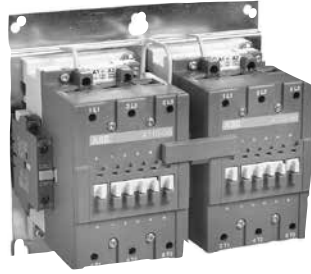
① For selection purposes, for complete electrical ratings, see Technical Data

② Auxiliary contacts integral for A9... A40

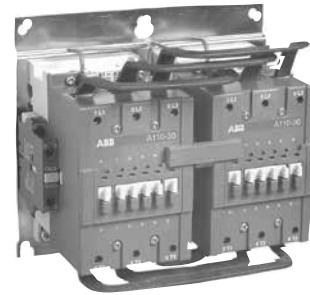
③ AC coil input voltage(s) at 50/60 Hz unless specified. For additional coil voltages, see page 1.35.

A mechanically interlocked, reversing, 3-pole For applications up to 300 hp, 250 kW AC operated coils

Across the line
1
Contactors



A95M... A110M



A95R... A110R

Electrical ratings ①②

UL 508, 60947-4-1A
CSA C22.2 No.14, 60947-4-1-07



AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Standard auxiliary contacts		Catalog number ③	Reversing		Catalog number ③
		200... 208V	220... 240V	440... 480V	550... 600V	NO	NC		Standard auxiliary contacts	NO	
600V											
21	9	2	2	5	7.5	2	2	▼A9M-30-10-Δ	2	2	▼A9R-30-10-Δ
-	-	-	-	-	-	-	-	-	-	-	-
25	11	3	3	7.5	10	2	2	▼A12M-30-10-Δ	2	2	▼A12R-30-10-Δ
-	-	-	-	-	-	-	-	-	-	-	-
30	17	5	5	10	15	2	2	▼A16M-30-10-Δ	2	2	▼A16R-30-10-Δ
-	-	-	-	-	-	-	-	-	-	-	-
40	28	7.5	10	20	25	2	2	▼A26M-30-10-Δ	2	2	▼A26R-30-10-Δ
-	-	-	-	-	-	-	-	-	-	-	-
50	34	10	10	25	30	2	2	A30M-30-10-Δ	2	2	A30R-30-10-Δ
-	-	-	-	-	-	-	-	-	-	-	-
60	42	10	15	30	40	2	2	A40M-30-10-Δ	2	2	A40R-30-10-Δ
-	-	-	-	-	-	-	-	-	-	-	-
80	54	15	20	40	50	2	2	A50M-30-11-Δ	2	2	A50R-30-11-Δ
90	68	20	25	50	60	2	2	A63M-30-11-Δ	2	2	A63R-30-11-Δ
105	80	25	30	60	75	2	2	A75M-30-11-Δ	2	2	A75R-30-11-Δ
150	88	30	30	60	75	2	2	A95M-30-11-Δ	2	2	A95R-30-11-Δ
150	104	30	40	75	100	2	2	A110M-30-11-Δ	2	2	A110R-30-11-Δ
230	130	40	50	100	125	2	2	A145M-30-11-Δ	2	2	A145R-30-11-Δ
250	156	50	60	125	150	2	2	A185M-30-11-Δ	2	2	A185R-30-11-Δ
300	192	60	75	150	200	2	2	A210M-30-11-Δ	2	2	A210R-30-11-Δ
350	248	75	100	200	250	2	2	A260M-30-11-Δ	2	2	A260R-30-11-Δ
400	302	100	100	250	300	2	2	A300M-30-11-Δ	2	2	A300R-30-11-Δ

▼ Planned legacy product; recommend AF series contactors.

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ④	A9...A300
24V AC	81
48V AC	83
110...120V AC, 60 Hz	84
230...240V AC, 60 Hz	80
480V AC, 60 Hz	51
600V AC, 60 Hz	55

Example(s):
24V AC input voltage: A16M-30-10-81
120V AC input voltage: A300R-30-11-84

Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes, for complete electrical ratings, see Technical Data
② For ratings according to IEC/EN 60947-4-1, refer to A non-reversing selection table or Technical Data.
③ A9R(M)...A16R(M) mounted on 35mm DIN rail, A26R(M)...A300R(M) mounted on common baseplate.
④ AC coil input voltage(s) at 50/60 Hz unless specified. For additional coil voltages, see page 1.35.

AE non-reversing, 3-pole

For applications up to 75 hp, 40 kW
DC operated, double-wound coils



A50... AE75

Electrical ratings ①

IEC/EN 60947-4-1						UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07				Non-reversing		Catalog number	
Rated operational current I _e AC-1, AC-3 (A)		Rated operational power P _e , AC-3, 55°C (kW)			AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Standard auxiliary contacts ②		
AC-1, 40°C	AC-3, 55°C	220... 240V	380... 400V	690V	600V	200... 208V	220... 240V	440... 480V	550... 600V	NO	NC		
25	9	2.2	4	5.5	21	9	2	2	5	7.5	1	1	▼ AE9-30-11-Δ
27	12	3	5.5	7.5	25	11	3	3	7.5	10	1	1	▼ AE12-30-11-Δ
30	17	4	7.5	9	30	17	5	5	10	15	1	1	▼ AE16-30-11-Δ
45	26	6.5	11	15	40	28	7.5	10	20	25	1	1	▼ AE26-30-11-Δ
55	32	9	15	18.5	50	34	10	10	25	30	1	1	AE30-30-11-Δ
60	37	11	18.5	22	60	42	10	15	30	40	1	1	AE40-30-11-Δ
100	50	15	22	30	80	54	15	20	40	50	1	1	AE50-30-11-Δ
115	65	18.5	30	37	90	68	20	25	50	60	1	1	AE63-30-11-Δ
125	75	22	37	40	105	80	25	30	60	75	1	1	AE75-30-11-Δ

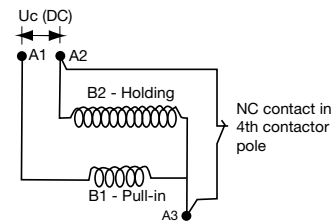
▼ Planned legacy product; recommend AF series contactors.

Coil voltage selection chart (Δ)

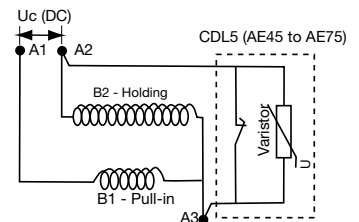
Rated control circuit voltage U _c ③	AE9...AE75
12V DC	80
24V DC	81
48V DC	83
125V DC	87
220V DC	88
240V DC	89

Example: 125V DC input voltage: AE75-30-11-87

Double wound coils



AE9 to AE40



AE45 to AE75

① For selection purposes, for complete electrical ratings, see Technical Data

② All auxiliary contacts are side-mount.

③ For additional coil voltages, see page 1.35.

AE mechanically interlocked, reversing, 3-pole

For applications up to 75 hp, 40 kW
DC operated, double-wound coils



AE50M...AE75M



AE50R...AE75R

Electrical ratings ①②

UL 508, 60947-4-1A
CSA C22.2 No.14, 60947-4-1-07



AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Mechanically interlocked		Catalog number ③	Reversing		Catalog number ③
		200...208V	220...240V	440...480V	550...600V	Standard auxiliary contacts	NO		NC	Standard auxiliary contacts	
600V						NO	NC		NO	NC	
21	9	2	2	5	7.5	2	2	▼ AE9M-30-11-Δ	2	2	▼ AE9R-30-11-Δ
25	11	3	3	7.5	10	2	2	▼ AE12M-30-11-Δ	2	2	▼ AE12R-30-11-Δ
30	17	5	5	10	15	2	2	▼ AE16M-30-11-Δ	2	2	▼ AE16R-30-11-Δ
40	28	7.5	10	20	25	2	2	▼ AE26M-30-11-Δ	2	2	▼ AE26R-30-11-Δ
50	34	10	10	25	30	2	2	AE30M-30-11-Δ	2	2	AE30R-30-11-Δ
60	42	10	15	30	40	2	2	AE40M-30-11-Δ	2	2	AE40R-30-11-Δ
80	54	15	20	40	50	2	2	AE50M-30-11-Δ	2	2	AE50R-30-11-Δ
90	68	20	25	50	60	2	2	AE63M-30-11-Δ	2	2	AE63R-30-11-Δ
105	80	25	30	60	75	2	2	AE75M-30-11-Δ	2	2	AE75R-30-11-Δ

▼ Planned legacy product; recommend AF series contactors.

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ④	AE9...AE75
12V DC	80
24V DC	81
48V DC	83
125V DC	87
220V DC	88
240V DC	89

Example: 125V DC input voltage: AE75R-30-11-87

Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes, for complete electrical ratings, see Technical Data
 ② For ratings according to IEC/EN 60947-4-1, refer to AE non-reversing selection table or Technical Data.
 ③ AE9R(M)...AE16R(M) mounted on 35mm DIN rail, AE26R(M)...AE75R(M) mounted on common baseplate.
 ④ For additional coil voltages, see page 1.35.

AL non-reversing, 3-pole

For applications up to 40 hp, 18.5 kW
Low power consumption, DC operated coils



AL9-30-10-81



AL26-30-10-81



AL40-30-10-81

Electrical ratings ①

IEC/EN 60947-4-1

UL 508, 60947-4-1A
CSA C22.2 No.14, 60947-4-1-07

Rated operational current I _e AC-1, AC-3 (A)		Rated operational power P _e , AC-3, 55°C (kW)			AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Standard auxiliary contacts ②		Catalog number
AC-1, 40°C	AC-3, 55°C	220... 240V	380... 400V	690V	600V		200... 208V	220... 240V	440... 480V	550... 600V	NO	NC	
25	9	2.2	4	5.5	21	9	2	2	5	7.5	1	-	▼AL9-30-10-Δ
											-	1	▼AL9-30-01-Δ
27	12	3	5.5	7.5	25	11	3	3	7.5	10	1	-	▼AL12-30-10-Δ
											-	1	▼AL12-30-01-Δ
30	17	4	7.5	9	30	17	5	5	10	15	1	-	▼AL16-30-10-Δ
											-	1	▼AL16-30-01-Δ
45	26	6.5	11	11	40	28	7.5	10	20	25	1	-	▼AL26-30-10-Δ
											-	1	▼AL26-30-01-Δ
55	32	9	15	15	50	34	10	10	25	30	1	-	AL30-30-10-Δ
											-	1	AL30-30-01-Δ
60	37	11	18.5	18.5	60	42	10	15	30	40	1	-	AL40-30-10-Δ
											-	1	AL40-30-01-Δ

▼ Planned legacy product; recommend AF series contactors.

Non-reversing & reversing

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ③	AL9... AL40
12V DC	80
24V DC	81
48V DC	83
125V DC	87
220V DC	88
240V DC	89

Example(s):
24V DC input voltage: AL30-30-10-81
125V DC input voltage: AL40-30-10-87

① For selection purposes, for complete electrical ratings, see Technical Data

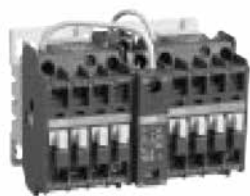
② Auxiliary contacts integral for AL9... AL40.

③ For additional coil voltages, see page 1.35.

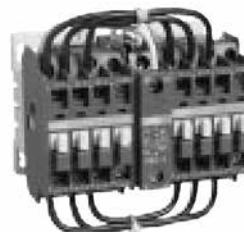
AL mechanically interlocked, reversing, 3-pole

For applications up to 40 hp, 18.5 kW

Low power consumption, DC operated coils



AL9M...AL16M



AL9R...AL16R

Electrical ratings ①②

UL 508, 60947-4-1A
CSA C22.2 No.14, 60947-4-1-07



AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Mechanically interlocked		Catalog number	Reversing		Catalog number
		200... 208V	220... 240V	440... 480V	550... 600V	Standard auxiliary contacts	NO		NC	Standard auxiliary contacts	
600V						NO	NC				
21	9	2	2	5	7.5	2	2	▼AL9M-30-10-Δ	2	2	▼AL9R-30-10-Δ
-	-	-	-	-	-	-	-	-	-	-	-
25	11	3	3	7.5	10	2	2	▼AL12M-30-10-Δ	2	2	▼AL12R-30-10-Δ
-	-	-	-	-	-	-	-	-	-	-	-
30	17	5	5	10	15	2	2	▼AL16M-30-10-Δ	2	2	▼AL16R-30-10-Δ
-	-	-	-	-	-	-	-	-	-	-	-
40	28	7.5	10	20	25	2	2	▼AL26M-30-10-Δ	2	2	▼AL26R-30-10-Δ
-	-	-	-	-	-	-	-	-	-	-	-
50	34	10	10	25	30	2	2	AL30M-30-10-Δ	2	2	AL30R-30-10-Δ
-	-	-	-	-	-	-	-	-	-	-	-
60	42	10	15	30	40	2	2	AL40M-30-10-Δ	2	2	AL40R-30-10-Δ
-	-	-	-	-	-	-	-	-	-	-	-

▼ Planned legacy product; recommend AF series contactors.

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ③	AL9... AL40
12V DC	80
24V DC	81
48V DC	83
125V DC	87
220V DC	88
240V DC	89

Example(s):

24V DC input voltage: AL30M-30-10-81

125V DC input voltage: AL40R-30-10-87

Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes, for complete electrical ratings, see Technical Data

② For ratings according to IEC/EN 60947-4-1, refer to AL non-reversing selection table or Technical Data.

③ AL9R(M)...AL16R(M) mounted on 35mm DIN rail, AL26R(M)...AL40R(M) mounted on common baseplate.

④ For additional coil voltages, see page 1.35.

AS / ASL non-reversing, reversing 3-pole

For applications up to 10 hp, 7.5 kW

AC or DC operated coils, bulk packaged for high volume



AS(L)09...AS(L)16 single stack



AS(L)09...AS(L)16 double stack



VAS(L)09...VAS(L)

Electrical ratings ①

IEC/EN 60947-4-1

UL 508, 60947-4-1A
CSA C22.2 No.14, 60947-4-1-07

Non-reversing and reversing

Rated operational current I _e AC-1, AC-3 (A)		Rated operational power P _e , AC-3, 60°C (kW)			AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Standard auxiliary contacts ②		Catalog number
AC-1, 40°C	AC-3, 60°C	220... 240V	380... 400V	690V	600V	200... 208V	220... 240V	440... 480V	550... 600V	NO	NC		

Type AS, AC controlled, non-reversing

22	9	2.2	4	4	20	9	2	2	5	7.5	1	-	AS09-30-10-ΔM
											-	1	AS09-30-01-ΔM
											3	2	AS09-30-32-ΔM
24	12	3	5.5	5.5	20	11	2	3	7.5	10	1	-	AS12-30-10-ΔM
											-	1	AS12-30-01-ΔM
											3	2	AS12-30-32-ΔM
24	15.5	4	7.5	7.5	20	15.2	3	5	10	10	1	-	AS16-30-10-ΔM
											-	1	AS16-30-01-ΔM
											3	2	AS16-30-32-ΔM

Type ASL, DC controlled, non-reversing

22	9	2.2	4	4	20	9	2	2	5	7.5	1	-	ASL09-30-10-ΔM
											-	1	ASL09-30-01-ΔM
											3	2	ASL09-30-32-ΔM
24	12	3	5.5	5.5	20	11	2	3	7.5	10	1	-	ASL12-30-10-ΔM
											-	1	ASL12-30-01-ΔM
											3	2	ASL12-30-32-ΔM
24	15.5	4	7.5	7.5	20	15.2	3	5	10	10	1	-	ASL16-30-10-ΔM
											-	1	ASL16-30-01-ΔM
											3	2	ASL16-30-32-ΔM

Type AS, AC controlled, reversing

22	9	2.2	4	4	20	9	2	2	5	7.5	-	2	VAS09EM-ΔM
24	12	3	5.5	5.5	20	11	2	3	7.5	10	-	2	VAS12EM-ΔM
24	15.5	4	7.5	7.5	20	15.2	3	5	10	10	-	2	VAS16EM-ΔM

Type ASL, DC controlled, reversing

22	9	2.2	4	4	20	9	2	2	5	7.5	-	2	VASL09EM-ΔM
24	12	3	5.5	5.5	20	11	2	3	7.5	10	-	2	VASL12EM-ΔM
24	15.5	4	7.5	7.5	20	15.2	3	5	10	10	-	2	VASL16EM-ΔM

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ③	AS09... AS16	ASL09... ASL16	VAS09... VAS16	VASL09... VASL16
12V DC	-	80	-	-
24V AC	20	-	20	-
24V DC	-	81	-	81
48V DC	-	83	-	83
115V AC	24	-	24	-
120V AC, 60 Hz	16	-	16	-
125V DC	-	87	-	87
220V DC	-	88	-	88
230V AC	26	-	26	-
400V AC	28	-	28	-

Example(s):

24V DC input voltage: ASL09-30-10-81M; 115V AC input voltage: AS16-30-01-24M

Standard bulk pack quantities (M)

Contactors	Quantity
AS(L)09...16-30-10	40
AS(L)09...16-30-01	40
AS(L)09...16-30-32	20
VAS09...VAS16	18

① For selection purposes, for complete electrical ratings, see Technical Data

② 3/2 auxiliary configurations include 1 NO integral contact with permanently attached 2/2 front-mount accessory.

③ AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.

AS / ASL non-reversing, spring-terminated, 3 pole

For applications up to 10 hp, 7.5 kW
AC or DC operated coils, bulk packaged for high volume

Across the line
Contactors



AS(L)09...AS(L)16 spring terminated, single stack



AS(L)09...AS(L)16 spring terminated, double stack

Electrical ratings ①

IEC/EN 60947-4-1					UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07				Non-reversing		Catalog number	
Rated operational current I _e AC-1, AC-3 (A)		Rated operational power P _e , AC-3, 60°C (kW)			AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)					Standard auxiliary contacts ②
AC-1, 40°C	AC-3, 60°C	220... 240V	380... 400V	690V	600V		200... 208V	220... 240V	440... 480V	550... 600V	NO	NC

Type AS, AC controlled, spring-terminated, non-reversing

20	9	2.2	4	4	12	9	2	2	5	7.5	1	-	AS09-30-10S-ΔM
											-	1	AS09-30-01S-ΔM
											3	2	AS09-30-32S-ΔM
22	12	3	5.5	5.5	12	11	2	3	7.5	10	1	-	AS12-30-10S-ΔM
											-	1	AS12-30-01S-ΔM
											3	2	AS12-30-32S-ΔM
22	15.5	4	7.5	7.5	15.2	15.2	3	5	10	10	1	-	AS16-30-10S-ΔM
											-	1	AS16-30-01S-ΔM
											3	2	AS16-30-32S-ΔM

Type ASL, DC controlled, spring-terminated, non-reversing

20	9	2.2	4	4	12	9	2	2	5	7.5	1	-	ASL09-30-10S-ΔM
											-	1	ASL09-30-01S-ΔM
											3	2	ASL09-30-32S-ΔM
22	12	3	5.5	5.5	12	11	2	3	7.5	10	1	-	ASL12-30-10S-ΔM
											-	1	ASL12-30-01S-ΔM
											3	2	ASL12-30-32S-ΔM
22	15.5	4	7.5	7.5	15.2	15.2	3	5	10	10	1	-	ASL16-30-10S-ΔM
											-	1	ASL16-30-01S-ΔM
											3	2	ASL16-30-32S-ΔM

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ③	AS09... AS16	ASL09... ASL16
12V DC	-	80
24V AC	20	-
24V DC	-	81
48V DC	-	83
115V AC	24	-
120V AC, 60 Hz	16	-
125V DC	-	87
220V DC	-	88
230V AC	26	-
400V AC	28	-

Example(s):

24V DC input voltage: ASL09-30-10S-81M

115V AC input voltage: AS16-30-01S-24M

Standard bulk pack quantities (M)

Contactors	Quantity
AS(L)09...16-30-10	40
AS(L)09...16-30-01	40
AS(L)09...16-30-32	20
VAS09...VAS16	18

① For selection purposes, for complete electrical ratings, see Technical Data

② 3/2 auxiliary configurations include 1 NO integral contact with permanently attached 2/2 front-mount accessory.

③ AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.

B miniature non-reversing, mechanically interlocked, 3-pole

For applications up to 5 hp, 5.5 kW
AC operated coils, screw, quick-connect & PCB mount termination



B6...B7



B6(-F)...B7(-F)



B6(-P)...B7(-P)



VB6...VB7

Electrical ratings ①

Non-reversing & mechanically interlocked

IEC/EN 60947-4-1					UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07							Standard auxiliary contacts		Catalog number
Rated operational current I _e AC-1, AC-3 (A)		Rated operational power P _e , AC-3, 55°C (kW)			AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				NO	NC		
AC-1, 40°C	AC-3, 55°C	220... 240V	380... 400V	690V	600V		200... 208V	220... 240V	440... 480V	550... 600V				

Type B, screw terminated, non-reversing

20	8	2.2	4	3	12 ②	6.8	1	2	3	1	1	-	B6-30-10-Δ
											-	1	B6-30-01-Δ
20	12	3	5.5	3	16	9.6	2	3	5	5	1	-	B7-30-10-Δ
											-	1	B7-30-01-Δ

Type B, quick-connect (flat pin), non-reversing

16	8	2.2	4	3	12 ②	6.8	1	2	3	1	1	-	B6-30-10-FΔ
											-	1	B6-30-01-FΔ
16	12	3	5.5	3	16	9.6	2	3	5	5	1	-	B7-30-10-FΔ
											-	1	B7-30-01-FΔ

Type B, printed circuit board mount (solder pin), non-reversing

12	8	2.2	4	3	8 ②	6.8	1	2	3	1	1	-	B6-30-10-PΔ
											-	1	B6-30-01-PΔ
12	12	3	5.5	3	16	9.6	2	3	5	5	1	-	B7-30-10-PΔ
											-	1	B7-30-01-PΔ

Type B, screw terminated, mechanically interlocked

20	8	2.2	4	3	12 ②	6.8	1	2	3	1	2	-	VB6-30-10-Δ
											-	2	VB6-30-01-Δ
20	12	3	5.5	3	16	9.6	2	3	5	5	2	-	VB7-30-10-Δ
											-	2	VB7-30-01-Δ

Type B, quick-connect (flat pin), mechanically interlocked

16	8	2.2	4	3	12 ②	6.8	1	2	3	1	2	-	VB6-30-10-FΔ
											-	2	VB6-30-01-FΔ
16	12	3	5.5	3	16	9.6	2	3	5	5	2	-	VB7-30-10-FΔ
											-	2	VB7-30-01-FΔ

Type B, printed circuit board mount (solder pin), mechanically interlocked

12	8	2.2	4	3	8 ②	6.8	1	2	3	1	2	-	VB6-30-10-PΔ
											-	2	VB6-30-01-PΔ
12	12	3	5.5	3	16	9.6	2	3	5	5	2	-	VB7-30-10-PΔ
											-	2	VB7-30-01-PΔ

NOTE: Quick-connect and PCB mount versions are UL recognized only.

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ③	(V)B6...(V)B7
24V AC	01
48V AC	03
110...127V AC	84
220...240V AC	80
380...415V AC	85

Example(s):

24V AC input voltage: B6-30-10-01
120V AC input voltage: VB7-30-10-84

- ① For selection purposes, for complete electrical ratings, see Technical Data
- ② 300V AC max.
- ③ AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.

BC miniature non-reversing, mech. interlocked, 3 pole

For applications up to 5 hp, 5.5 kW
DC operated coils, screw, quick-connect & PCB mount termination

Across the line
1



BC6...BC7



BC6(-F)...BC7(-F)



BC6(-P)...BC7(-P)



VBC6(-P)...VBC7(-P)

Electrical ratings ①

Non-reversing & mechanically interlocked

IEC/EN 60947-4-1					UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07				Standard auxiliary contacts		Catalog number		
Rated operational current I _e AC-1, AC-3 (A)		Rated operational power P _e , AC-3, 55°C (kW)			AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				NO	NC	
AC-1, 40°C	AC-3, 55°C	220... 240V	380... 400V	690V	600V		200... 208V	220... 240V	440... 480V	550... 600V			
Type BC, screw terminated, non-reversing													
20	8	2.2	4	3	12 ⊙	6.8	1	2	3	1	1	-	BC6-30-10-Δ
											-	1	BC6-30-01-Δ
20	12	3	5.5	3	16	9.6	2	3	5	5	1	-	BC7-30-10-Δ
											-	1	BC7-30-01-Δ
Type BC, quick-connect (flat pin), non-reversing													
16	8	2.2	4	3	12 ⊙	6.8	1	2	3	1	1	-	BC6-30-10-FA
											-	1	BC6-30-01-FA
16	12	3	5.5	3	16	9.6	2	3	5	5	1	-	BC7-30-10-FA
											-	1	BC7-30-01-FA
Type BC, printed circuit board mount (solder pin), non-reversing													
12	8	2.2	4	3	8 ⊙	6.8	1	2	3	1	1	-	BC6-30-10-PA
											-	1	BC6-30-01-PA
12	12	3	5.5	3	16	9.6	2	3	5	5	1	-	BC7-30-10-PA
											-	1	BC7-30-01-PA
Type BC, screw terminated, mechanically interlocked													
20	8	2.2	4	3	12 ⊙	6.8	1	2	3	1	2	-	VBC6-30-10-Δ
											-	2	VBC6-30-01-Δ
20	12	3	5.5	3	16	9.6	2	3	5	5	2	-	VBC7-30-10-Δ
											-	2	VBC7-30-01-Δ
Type BC, quick-connect (flat pin), mechanically interlocked													
16	8	2.2	4	3	12 ⊙	6.8	1	2	3	1	2	-	VBC6-30-10-FA
											-	2	VBC6-30-01-FA
16	12	3	5.5	3	16	9.6	2	3	5	5	2	-	VBC7-30-10-FA
											-	2	VBC7-30-01-FA
Type BC, printed circuit board mount (solder pin), mechanically interlocked													
12	8	2.2	4	3	8 ⊙	6.8	1	2	3	1	2	-	VBC6-30-10-PA
											-	2	VBC6-30-01-PA
12	12	3	5.5	3	16	9.6	2	3	5	5	2	-	VBC7-30-10-PA
											-	2	VBC7-30-01-PA

NOTE: Quick-connect and PCB mount versions are UL recognized only.

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ③	(M)BC6...(M)BC7
12V DC	07
24V DC	01
48V DC	16
110...125V DC	04
220...240V DC	05

Example(s):

24V DC input voltage: BC6-30-10-01

125V DC input voltage: VBC7-30-10-04

① For selection purposes, for complete electrical ratings, see Technical Data

② 300V AC max.

③ For additional coil voltages, see page 1.35.

AF / AFZ NEMA rated, non-reversing, 3-pole Class A controllers Sizes 00...8 Electronic AC/DC operated coils



AF26N1(Z)

AF50N2...AF75N3

AF260N5

AF1650N

Electrical ratings ①

NEMA size	Continuous current rating (A)	NEMA ICS 2-2000 (R2005) NEMA AC motor ratings, breaking all lines (hp)								Non-reversing Standard auxiliary contacts ②		Catalog number
		Single phase, 50/60 Hz		Three phase, 60 Hz						NO	NC	
		120V	230V	200V	230V	380... 415V ③	460V	575V				
Type AF												
00	9	1/3	1	1.5	1.5	1.5	2	2	1	-	AF09N00-30-10-Δ	
									-	1	AF09N00-30-10-Δ	
0	18	1	2	3	3	5	5	5	1	-	AF12N0-30-10-Δ	
									-	1	AF12N0-30-10-Δ	
1	27	2	3	7.5	7.5	10	10	10	-	-	AF26N1-30-00-Δ	
2	45	3	7.5	10	15	25	25	25	1	1	AF50N2-30-11-Δ	
3	90	-	-	25	30	50	50	50	1	1	AF75N3-30-11-Δ	
4	135	-	-	40	50	75	100	100	1	1	AF145N4-3011-Δ	
5	270	-	-	75	100	150	200	200	1	1	AF260N5-3011-Δ	
6	540	-	-	150	200	300	400	400	1	1	AF460N6-3011-Δ	
7	810	-	-	-	300	-	600	600	1	1	AF750N7-3011-Δ	
8	1215	-	-	-	450	-	900	900	1	1	AF1650N83011-Δ	

Type AFZ, low-consumption coils

00	9	1/3	1	1.5	1.5	1.5	2	2	1	-	AF09N00Z-30-10-Δ
									-	1	AF09N00Z-30-01-Δ
0	18	1	2	3	3	5	5	5	1	-	AF12N0Z-30-10-Δ
									-	1	AF12N0Z-30-01-Δ
1	27	2	3	7.5	7.5	10	10	10	-	-	AF26N1Z-30-00-Δ

Coil voltage selection chart (Δ)

Rated control circuit voltage Uc 3	AF09N00... AF26N1	AF09N00Z... AF26N1Z	AF50N2... AF260N5	AF460N6... AF750N7	AF1650N8
12...20V DC	-	20	-	-	-
20...60V DC	11	21	72	-	-
24...60V AC	11	21	-	-	-
24...60V DC	-	-	-	68	-
48...130V AC/DC	12	22	69	69	-
100...250 V AC/DC	13	23	70	70	70
250...500 V AC/DC	14	-	-	71	-

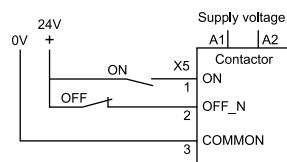
Example(s):

24V DC input voltage: AF26N1-30-00-11

120V AC input voltage: AF750N7-3011-70

Control inputs

AF460N6...AF1650N8 are equipped with integral low voltage inputs, allowing for direct PLC control.



① For selection purposes, for complete electrical ratings, see Technical Data.

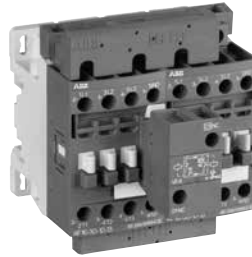
② Auxiliary contacts integral for AF09N00...AF16N0; side-mount for AF50N2...AF1650N

③ 50 Hz.

④ AC coil input voltage(s) at 50/60 Hz unless specified.

AF / AFZ NEMA rated, mech. interlocked, reversing, 3P Class A controllers Sizes 00...7 Electronic AC/DC operated coils

Across the line
Contactors



AF09N00R...AF16N0R

Electrical ratings ①②

NEMA ICS 2-2000 (R2005)



AC motor ratings, breaking all lines,
Three phase, 60 Hz (hp)

Mechanically interlocked

Reversing

NEMA size	Continuous current rating (A)	AC motor ratings, breaking all lines, Three phase, 60 Hz (hp)			Standard auxiliary contacts		Catalog number ②	Standard auxiliary contacts		Catalog number ②
		200V	230V	460...575V	NO	NC		NO	NC	
Type AF										
00	9	1.5	1.5	2	2	2	AF09N00M-3022-Δ	2	2	AF09N00R-3022-Δ
0	18	3	3	5	2	2	AF12N0M-3022-Δ	2	2	AF12N0R-3022-Δ
1	27	7.5	7.5	10	-	2	AF26N1M-3002-Δ	-	2	AF26N1R-3002-Δ
2	45	10	15	25	2	2	AF50N2M-3011-Δ	2	2	AF50N2R-3011-Δ
3	90	25	30	50	2	2	AF75N3M-3011-Δ	2	2	AF75N3R-3011-Δ
4	135	40	50	100	2	2	AF145N4M-11-Δ	2	2	AF145N4R-11-Δ
5	270	75	100	200	2	2	AF260N5M-11-Δ	2	2	AF260N5R-11-Δ
6	540	150	200	400	2	2	AF460N6M-11-Δ	2	2	AF460N6R-11-Δ
7	810	-	300	600	2	2	AF750N7M-11-Δ	2	2	AF750N7R-11-Δ
Type AFZ, low-consumption coils										
00	9	1.5	1.5	2	2	2	AF09N00MZ-3022-Δ	2	2	AF09N00RZ-3022-Δ
0	18	3	3	5	2	2	AF12N0MZ-3022-Δ	2	2	AF12N0RZ-3022-Δ
1	27	7.5	7.5	10	-	2	AF26N1MZ-3002-Δ	-	2	AF26N1RZ-3002-Δ

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c 3	AF09N00... AF26N1	AF09N00Z... AF26N1Z	AF50N2... AF260N5	AF460N6... AF750N7
12...20V DC	-	20	-	-
20...60V DC	11	21	72	-
24...60V AC	11	21	-	-
24...60V DC	-	-	-	68
48...130V AC/DC	12	22	69	69
100...250 V AC/DC	13	23	70	70
250...500 V AC/DC	14	-	-	71

Example(s):

24V DC input voltage: AF26N1R-3002-11
120V AC input voltage: AF750N7R-11-70

Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes, for complete electrical ratings, see Technical Data.

② For ratings according to IEC/EN 60947-4-1, refer to AF NEMA rated, non-reversing selection table or Technical Data.

③ AF09N00R(M)...AF26N1R(M) assembled using connection clips, AF50N2R(M)...AF750N7R(M) mounted on common baseplate.

④ AC coil input voltage(s) at 50/60 Hz unless specified.

A, AL, AE NEMA rated, non-reversing, 3-pole Class A controllers Sizes 00...5 AC or DC operated coils



A26N1



A145N4

Electrical ratings ①

NEMA size	Continuous current rating (A)	NEMA ICS 2-2000 (R2005) NEMA								Non-reversing		Catalog number
		AC motor ratings, breaking all lines (hp)								Standard auxiliary contacts ②		
		Single phase, 50/60 Hz				Three phase, 60 Hz				NO	NC	
		120V	230V	200V	230V	380... 415V ③	460V	575V				
Type A, AC operated coils												
00	9	1/3	1	1.5	1.5	1.5	2	2	1	-	▼ A9N00-30-10-Δ	
0	18	1	2	3	3	5	5	5	1	-	▼ A16N0-30-10-Δ	
1	27	2	3	7.5	7.5	10	10	10	1	-	▼ A26N1-30-10-Δ	
2	45	3	7.5	10	15	25	25	25	1	1	A50N2-30-11-Δ	
3	90	-	-	25	30	50	50	50	1	1	A75N3-30-11-Δ	
4	135	-	-	40	50	75	100	100	1	1	A145N4-30-11-Δ	
5	270	-	-	75	100	150	200	200	1	1	A260N5-30-11-Δ	
Type AL, DC operated coils												
00	9	1/3	1	1.5	1.5	1.5	2	2	1	-	▼ AL9N00-30-10-Δ	
0	18	1	2	3	3	5	5	5	1	-	▼ AL16N0-30-10-Δ	
1	27	2	3	7.5	7.5	10	10	10	1	-	▼ AL26N1-30-10-Δ	
Type AE, double-wound DC operated coils												
00	9	1/3	1	1.5	1.5	1.5	2	2	1	-	▼ AE9N00-30-11-Δ	
0	18	1	2	3	3	5	5	5	1	-	▼ AE16N0-30-11-Δ	
1	27	2	3	7.5	7.5	10	10	10	1	-	▼ AE26N1-30-11-Δ	
2	45	3	7.5	10	15	25	25	25	1	1	AE50N2-30-11-Δ	
3	90	-	-	25	30	50	50	50	1	1	AE75N3-30-11-Δ	

▼ Planned legacy product; recommend AF series contactors.

Coil voltage selection chart (Δ)

Rated control circuit voltage Uc ④	A9N00... A260N5	AL9N00... AL26N1	AE9N00... AE75N3
12V DC	-	80	80
24V AC	81	-	-
24V DC	-	81	81
110...120V AC, 60Hz	84	-	-
125V DC	-	87	87
220V DC	-	88	88
230...240V AC, 60 Hz	80	-	-
240V DC	-	89	89
480V AC, 60 Hz	51	-	-
600V AC, 60 Hz	55	-	-

Example(s):

24V DC input voltage: AL26N1-30-10-81
120V AC input voltage: A260N5-3011-84

① For selection purposes, for complete electrical ratings, see Technical Data.

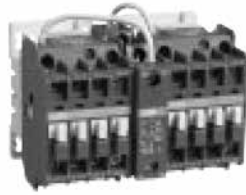
② Auxiliary contacts integral for A9N00...A26N1 & AL9N00...AL26N1; side-mount for A50N2...A260N5 & AE9N00...AE75N3.

③ 50 Hz.

④ AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.

A, AL, AE NEMA rated, mech. interlocked, reversing Class A controllers Sizes 00...5; AC or DC operated coils

Across the line
Contactors



A9N00M...A16N0



A/E50N2...A/E75N3

Electrical ratings ①②

NEMA ICS 2-2000 (R2005) **NEMA**

Mechanically interlocked

Reversing

NEMA size	Continuous current rating (A)	AC motor ratings, breaking all lines, Three phase, 60 Hz (hp)			Standard auxiliary contacts		Catalog number ②	Standard auxiliary contacts		Catalog number ②
		200V	230V	460...575V	NO	NC		NO	NC	

Type A, AC operated coils

00	9	1.5	1.5	2	2	2	▼ A9N00M-10-Δ	2	2	▼ A9N00R-10-Δ
0	18	3	3	5	2	2	▼ A16N0M-10-Δ	2	2	▼ A16N0R-10-Δ
1	27	7.5	7.5	10	2	2	▼ A26N1M-10-Δ	2	2	▼ A26N1R-10-Δ
2	45	10	15	25	2	2	A50N2M-11-Δ	2	2	A50N2R-11-Δ
3	90	25	30	50	2	2	A75N3M-11-Δ	2	2	A75N3R-11-Δ
4	135	40	50	100	2	2	A145N4M-11-Δ	2	2	A145N4R-11-Δ
5	270	75	100	200	2	2	A260N5M-11-Δ	2	2	A260N5R-11-Δ

Type AL, DC operated coils

00	9	1.5	1.5	2	2	2	▼ AL9N00M-10-Δ	2	2	▼ AL9N00R-10-Δ
0	18	3	3	5	2	2	▼ AL16N0M-10-Δ	2	2	▼ AL16N0R-10-Δ
1	27	7.5	7.5	10	2	2	▼ AL26N1M-10-Δ	2	2	▼ AL26N1R-10-Δ

Type AE, double-wound DC operated coils

00	9	1.5	1.5	2	2	2	▼ AE9N00M-11-Δ	2	2	▼ AE9N00R-11-Δ
0	18	3	3	5	2	2	▼ AE16N0M-11-Δ	2	2	▼ AE16N0R-11-Δ
1	27	7.5	7.5	10	2	2	▼ AE26N1M-11-Δ	2	2	▼ AE26N1R-11-Δ
2	45	10	15	25	2	2	AE50N2M-11-Δ	2	2	AE50N2R-11-Δ
3	90	25	30	50	2	2	AE75N3M-11-Δ	2	2	AE75N3R-11-Δ

▼ Planned legacy product; recommend AF series contactors.

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ③	A9N00... A260N5	AL9N00... AL26N1	AE9N00... AE75N3
12V DC	-	80	80
24V AC	81	-	-
24V DC	-	81	81
110...120V AC, 60Hz	84	-	-
125V DC	-	87	87
220V DC	-	88	88
230...240V AC, 60 Hz	80	-	-
240V DC	-	89	89
480V AC, 60 Hz	51	-	-
600V AC, 60 Hz	55	-	-

Example(s):

24V DC input voltage: AL26N1M-10-81

120V AC input voltage: A260N5R-11-84

Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes, for complete electrical ratings, see Technical Data.

② For ratings according to IEC/EN 60947-4-1, refer to A, AL, AE NEMA rated, non-reversing selection table or Technical Data.

③ A(E)(L)9N00R(M)...A(E)(L)16N0R(M) mounted on 35mm DIN rail, A(E)(L)26N1R(M)...A260N5R(M) mounted on common baseplate.

④ AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.

AF, AFZ, and EK 4-pole

For resistive & slightly inductive applications up to 1000 A
AC & DC control



AF09(Z)...AF16(Z)



AF26(Z)...AF38(Z)



AF45...AF75



EK175...EK210

Electrical ratings ①

4-pole (4 NO & 2 NO / 2 NC)

Rated operational current I _e , AC-1 (A)	UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07	Main (power) pole configuration ②		Standard auxiliary contacts		Catalog number
		NO	NC	NO	NC	
Type AF, electronic AC/DC controlled						
25	25	4	-	-	-	AF09-40-00-Δ
		2	2	-	-	AF09-22-00-Δ
30	30	4	-	-	-	AF16-40-00-Δ
		2	2	-	-	AF16-22-00-Δ
45	45	4	-	-	-	AF26-40-00-Δ
		2	2	-	-	AF26-22-00-Δ
55	55	4	-	-	-	AF38-40-00-Δ
		2	2	-	-	AF38-22-00-Δ
70	65	4	-	-	-	AF45-40-00-Δ
		2	2	-	-	AF45-22-00-Δ
100	80	4	-	-	-	AF50-40-00-Δ
125	105	4	-	-	-	AF75-40-00-Δ
		2	2	-	-	AF75-22-00-Δ
Type EK, AC or DC controlled						
200	170	4	-	1	1	EK110C4P-ΔL
250	200	4	-	1	1	EK150C4P-ΔL
300	250	4	-	1	1	EK175C4P-ΔL
350	300	4	-	1	1	EK210C4P-ΔL
550	420	4	-	1	1	EK370C4P-ΔL
800	540	4	-	1	1	EK550C4P-ΔL
1000	-	4	-	1	1	EK1000C4P-ΔL
Type AFZ, electronic AC/DC controlled, low consumption						
25	25	4	-	-	-	AF09Z-40-00-Δ
		2	2	-	-	AF09Z-22-00-Δ
30	30	4	-	-	-	AF16Z-40-00-Δ
		2	2	-	-	AF16Z-22-00-Δ
45	45	4	-	-	-	AF26Z-40-00-Δ
		2	2	-	-	AF26Z-22-00-Δ
55	55	4	-	-	-	AF38Z-40-00-Δ
		2	2	-	-	AF38Z-22-00-Δ

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ③	AF09... AF38	AF09Z... AF38Z	AF45... AF75	EK110... EK1000
12...20V DC	-	20	-	-
20...60V DC	11	21	72	-
24...60V AC	11	21	-	-
24V AC, 60 Hz	-	-	-	F
24V DC	-	-	-	Y
48...130V AC/DC	12	22	69	-
110V 50 Hz, 120V 60 Hz	-	-	-	1
125V DC	-	-	-	Q
100...250 VAC/DC	13	23	70	-
220V DC	-	-	-	R
240V AC, 60 Hz	-	-	-	2
250...500 V AC/DC	14	-	-	-
480V AC, 60 Hz	-	-	-	4
600V AC, 60 Hz	-	-	-	6

Example(s):

24V DC input voltage: EK110C4P-YL
120V AC input voltage: AF75-40-11-70

- ① For selection purposes, for complete electrical ratings, see Technical Data.
- ② 2 NO & 2 NC contactors are not suitable for a reversing starter or wye-delta starter or for controlling a single load from 2 separate supplies. Please see technical data.
- ③ AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.

A, AL, and AE 4-pole

For resistive & slightly inductive applications up to 125 A
AC or DC control

Across the line
Contactors



A9...A16



A45...A75

Electrical ratings ①

IEC/EN 60947-4-1	UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07	Main (power) pole configuration ②		Standard auxiliary contacts		Catalog number
		NO	NC	NO	NC	
Rated operational current I _e , AC-1 (A)	AC general purpose ratings, 600V (A)					
Type A, AC controlled						
25	21	4	-	-	-	▼ A9-40-00-Δ
		2	2	-	-	▼ A9-22-00-Δ
		4	-	-	-	▼ A16-40-00-Δ
30	30	2	2	-	-	▼ A16-22-00-Δ
		-	4	-	-	A16-04-00-Δ
45	40	4	-	-	-	▼ A26-40-00-Δ
		2	2	-	-	▼ A26-22-00-Δ
70	65	4	-	-	-	A45-40-00-Δ
100	80	2	2	-	-	A45-22-00-Δ
125	105	4	-	-	-	A50-40-00-Δ
		2	2	-	-	A75-40-00-Δ
						A75-22-00-Δ
Type AL, DC controlled						
25	21	4	-	-	-	▼ AL9-40-00-Δ
		2	2	-	-	▼ AL9-22-00-Δ
30	30	4	-	-	-	▼ AL16-40-00-Δ
		2	2	-	-	▼ AL16-22-00-Δ
45	40	4	-	-	-	▼ AL26-40-00-Δ
		2	2	-	-	▼ AL26-22-00-Δ
Type AE, DC controlled						
70	65	4	-	-	-	AE45-40-00-Δ
		2	2	-	-	AE45-22-00-Δ
100	80	4	-	-	-	AE50-40-00-Δ
125	105	4	-	-	-	AE75-40-00-Δ
		2	2	-	-	AE75-22-00-Δ

▼ Planned legacy product; recommend AF series contactors.

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ③	A9...A75	AL9...AL26	AE9...AE75
12V DC	-	80	80
24V AC	81	-	-
24V DC	-	81	81
110...120V AC, 60Hz	84	-	-
125V DC	-	87	87
220V DC	-	88	88
230...240V AC, 60 Hz	80	-	-
240V DC	-	89	89
480V AC, 60 Hz	51	-	-
600V AC, 60 Hz	55	-	-

Example(s):

24V DC input voltage: AL26-40-00-81
120V AC input voltage: A75-40-00-84

① For selection purposes, for complete electrical ratings, see Technical Data.

② 2 NO & 2 NC contactors are not suitable for a reversing starter or wye-delta starter or for controlling a single load from 2 separate supplies. Please see technical data.

③ AC coil input voltage(s) at 50/60 Hz unless specified. For additional voltages, see page 1.35.

B, BC miniature, 4-pole

For resistive & slightly inductive applications up to 20 A
AC or DC control



B(C)6...B(C)7



B(C)6(-F)...B(C)7(-F)



B(C)6(-P)...B(C)7(-P)

Electrical ratings ①

IEC/EN 60947-4-1	UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07	Main (power) pole configuration		Standard auxiliary contacts		Catalog number
		NO	NC	NO	NC	
Rated operational current I _e , AC-1 (A)	AC general purpose ratings, 600V (A)					
Type B, AC controlled, screw terminated						
20	12 ③	4	-	-	-	B6-40-00-Δ
		2	2	-	-	B6-22-00-Δ
20	16	4	-	-	-	B7-40-00-Δ
		2	2	-	-	B7-22-00-Δ
Type B, AC controlled, quick-connect (flat pin)						
16	12 ③	4	-	-	-	B6-40-00-FΔ
		2	2	-	-	B6-22-00-FΔ
16	16	4	-	-	-	B7-40-00-FΔ
		2	2	-	-	B7-22-00-FΔ
Type B, AC controlled, printed circuit board mount (solder pin)						
12	8 ③	4	-	-	-	B6-40-00-PΔ
		2	2	-	-	B6-22-00-PΔ
12	16	4	-	-	-	B7-40-00-PΔ
		2	2	-	-	B7-22-00-PΔ
Type BC, DC controlled, screw terminated						
20	12 ③	4	-	-	-	BC6-40-00-Δ
		2	2	-	-	BC6-22-00-Δ
20	16	4	-	-	-	BC7-40-00-Δ
		2	2	-	-	BC7-22-00-Δ
Type BC, DC controlled, quick-connect (flat pin)						
16	12 ③	4	-	-	-	BC6-40-00-FΔ
		2	2	-	-	BC6-22-00-FΔ
16	16	4	-	-	-	BC7-40-00-FΔ
		2	2	-	-	BC7-22-00-FΔ
Type BC, DC controlled, printed circuit board mount (solder pin)						
12	8 ③	4	-	-	-	BC6-40-00-PΔ
		2	2	-	-	BC6-22-00-PΔ
12	16	4	-	-	-	BC7-40-00-PΔ
		2	2	-	-	BC7-22-00-PΔ

NOTE: Quick connect and PCB mount versions are UL recognized only.

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c ②	B6...B7	BC6...BC7
12V AC	-	07
24V AC	01	-
24V DC	-	01
48V AC	03	-
48V DC	-	16
110...127V AC	84	-
110...125V DC	-	04
220...240V AC	80	-
220...240V DC	-	05
380...415V AC	85	-

Example(s):
24V DC input voltage: BC6-40-00-01
120V AC input voltage: B7-22-00-84

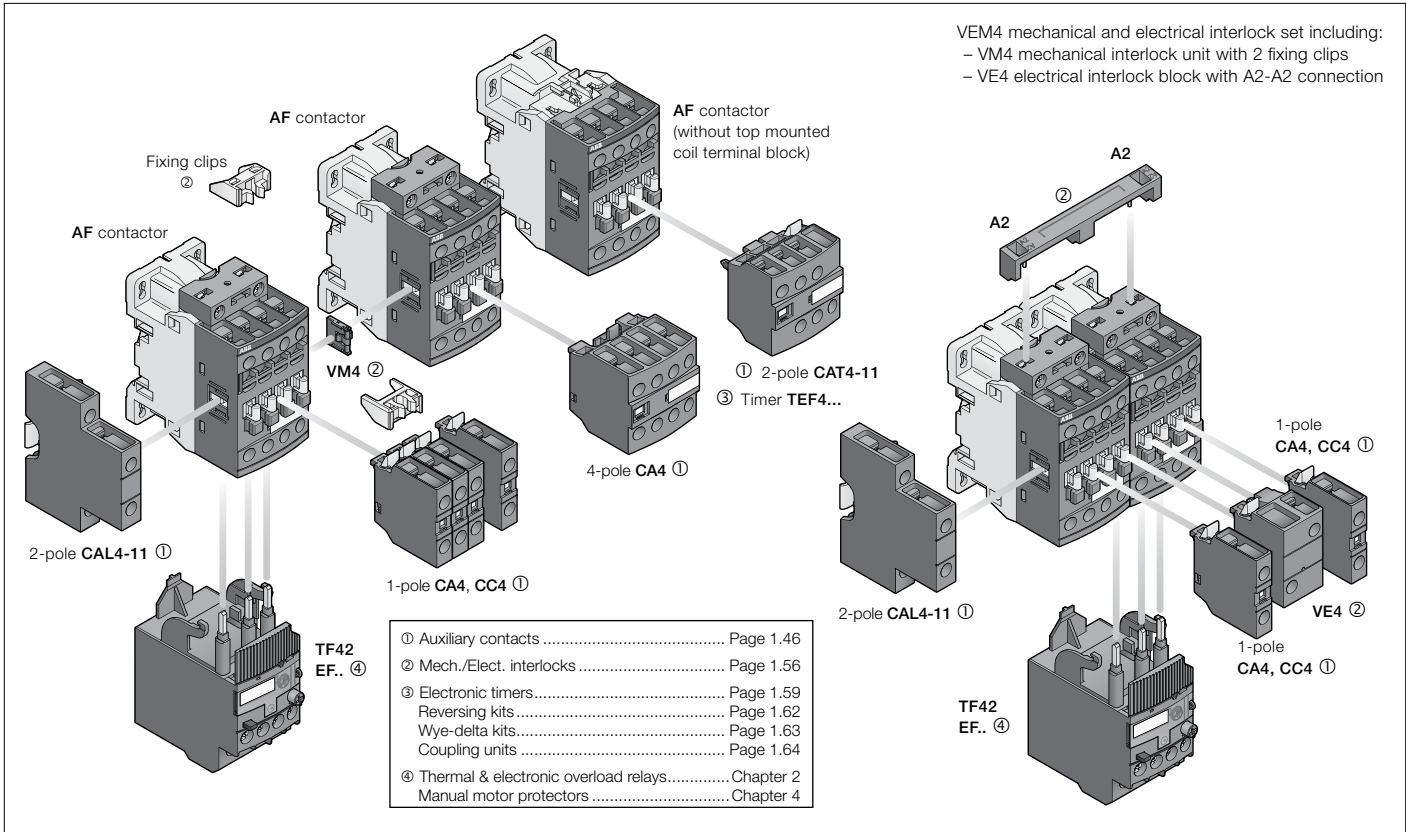
① For selection purposes, for complete electrical ratings, see Technical Data.
② AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.
③ 300V AC max.

Additional coil voltages 3 & 4 pole contactors AC & DC operated coils

For contactors	Coils for AC operated contactors (Δ)						Coils for DC operated contactors (Δ)			
	AC voltages		Coil code	For contactors	AC voltages		Coil code	For contactors	DC voltages V - DC	Coil code
	V - 50 Hz	V - 60 Hz			V - 50 Hz	V - 60 Hz				
A9...A300, A9N00... A260N5	24	24	81	(V)B6... (V)B7	24	24	01	AE9...AE75, AE9N00... AE75N3, AL9...AL40, AL9N00... AL26N1	12	80
	26	28	16		42	42	02		24	81
	28	32	17		48	48	03		42	82
	42	42	82		110...127	110...127	84		48	83
	48	48	83		220...240	220...240	80		50	21
	60	60	73		380...415	380...415	85		60	84
	100	100...110	74 ②	-	24	F	75		85	
	110	110...120	84	24	-	N	110		86	
	110...115	115...127	89 ③	-	48	G	125		87	
	120	140	29	110	120	1	220		88	
	125...127	150	30	-	208	B	240		89	
	175	208	34	-	240	2	250		38	
	190	220	36	EK110... EK1000	220...230	-	J		12	07
	220...230	230...240	80	-	380	Z	24		01	
	230...240	240...260	88	380...400	440	3	(V)BC6... (V)BC7	42	02	
	230...240	277	42	400...415	-	M	48	16		
	230/400	-	62 ①	-	480	4	60	03		
	-	230/400	63 ①	500	-	5	110...125	04		
	380...400	400...415	85	-	600	6	220...240	05		
	400...415	415...440	86	24	24	20	24	Y		
	400...415	480	51	42	42	21	48	W		
	415...440	440...460	87	48	48	22	110	P		
	440	500	53	110	110	23	125	Q		
	500	600	55	115	115	24	220	R		
	550	-	56	-	120	16	440	T		
	660...690	-	58	(V)AS09... (V)AS16	220	220	25	12	80	
				230	230	26	24	81		
				240	240	27	48	83		
			-	277	17	60	84			
			380	-	13	110	86			
			400	400	28	125	87			
			415	415	29	220	88			
						240	89			

AF09(Z)...AF38(Z), AF09N00(Z)...AF26N1(Z), 3-pole Accessory fitting details

Contactor and main accessories (other accessories available)



Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories				Electrical and mechanical interlock set (between 2 contactors)		Side-mounted accessories	
			Auxiliary contact blocks & electronic timers				VEM4	Left side	Right side	
			1-pole CA4 / CC4	2-pole CAT4-11	TEF4... or 4-pole CA4		2-pole CAL4-11			
Max. N.C. built-in and add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5										
AF09 ... AF16 Sz. 00...0	3	0	0	1	4 max. or 1	or 1	-	+	1	-
					2 max.	-	-	+	1	+ 1
					3 max.	-	+ 1	+	1	or 1
AF09 ... AF16	3	0	1	0	4 max. or 1	or 1	-	-	+ 1	-
AF26 ... AF38 Sz. 00...1	3	0	0	0	2 max. or 1	-	-	+	1	+ 1
					3 max.	-	+ 1	+	1	or 1

NOTE: Fitting details same for AF...Z contactors

Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
AF09 ... AF38, Sz. 00...1	TF42 (0.10...38 A)	EF19 (0.10...18.9 A)
AF26 ... AF38, Sz. 1	-	EF45 (9...38 A)

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.

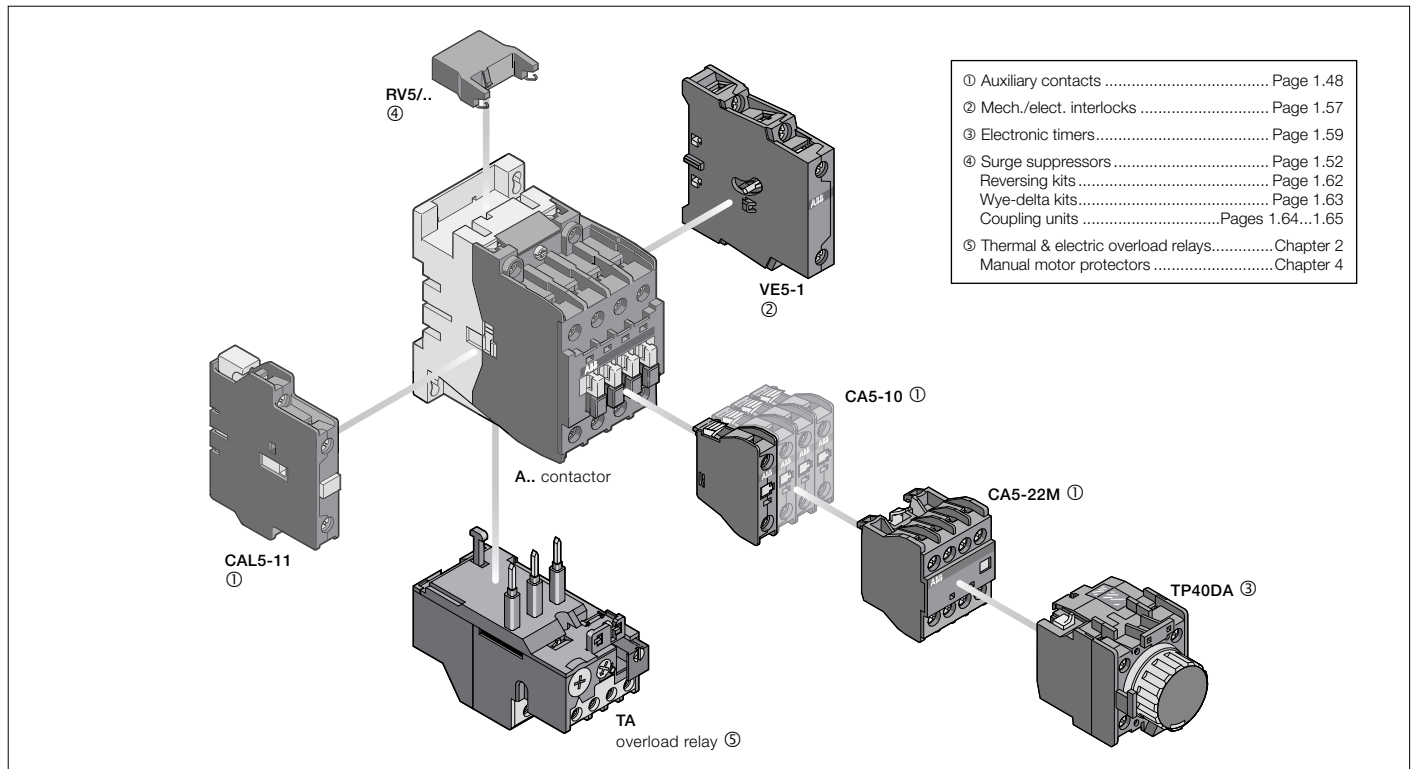
(1) Direct mounting - No kit required.

A/E/L30...A/E/L40; A/E/F50...A/E/F75; A/E/F50NZ...A/E/F75N3

3-pole contactors

Accessory fitting details

Contactor and main accessories (other accessories available)



Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories			Side-mounted accessories		
			Auxiliary contact blocks		Electronic timer	Auxiliary contact blocks	Interlock unit blocks	
			1-pole CA5-..	4-pole CA5-..	TEF5	2-pole CAL5-11	VM5-.. or VE5-..	
A30...A40	3 0 1 0 3 0 0 1 (2)		1 to 5 x CA5-..	or 1 x CA5-.. (4-pole) + 1 x 1-pole CA5-..	or 1 x TEF5 + 1 x CA5-.. (1-pole)	+	1 to 2 x CAL5-11	or 1 x VM5-1 or VE5-1 + 1 x CAL5-11
A50 ... A75 Sz. 2...3	3 0 0 0		1 to 6 x CA5-..	or 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	or 1 x TEF5 + 2 x CA5-.. (1-pole)	+	1 to 2 x CAL5-11	or 1 x VE5-2 + 1 x CAL5-11
AL30...AL40	3 0 1 0 3 0 0 1		1 to 5 x CA5-.. (2)	or 1 x CA5-.. (4-pole) (2) + 1 x 1-pole CA5-..	–	or	1 x CAL5-11 (3)	+ 1 x VM5-1 or VE5-1 (1)
AE50 ... AE75 Sz. 2...3	3 0 0 0		1 to 6 x CA5-..	or 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	or 1 x TEF5 + 2 x CA5-.. (1-pole)	+	1 x CAL5-11	or 1 x VE5-2
AF50 ... AF75 Sz. 2...3	3 0 0 0		1 to 6 x CA5-..	or 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	or 1 x TEF5 + 2 x CA5-.. (1-pole)	+	1 to 2 x CAL5-11	or 1 x VE5-2 + 1 x CAL5-11

(1) With VE5-1 interlock unit, a maximum of 3 N.O. auxiliary contacts are permitted. VE5-1, VM5-1 not allowed in mounting position 1 ±30°.

(2) 2 N.C. CA5-.. auxiliary contacts maximum in mounting position 5.

(3) CAL5-11 not allowed in mounting position 1±30°.

Overload relays fitting details (4)

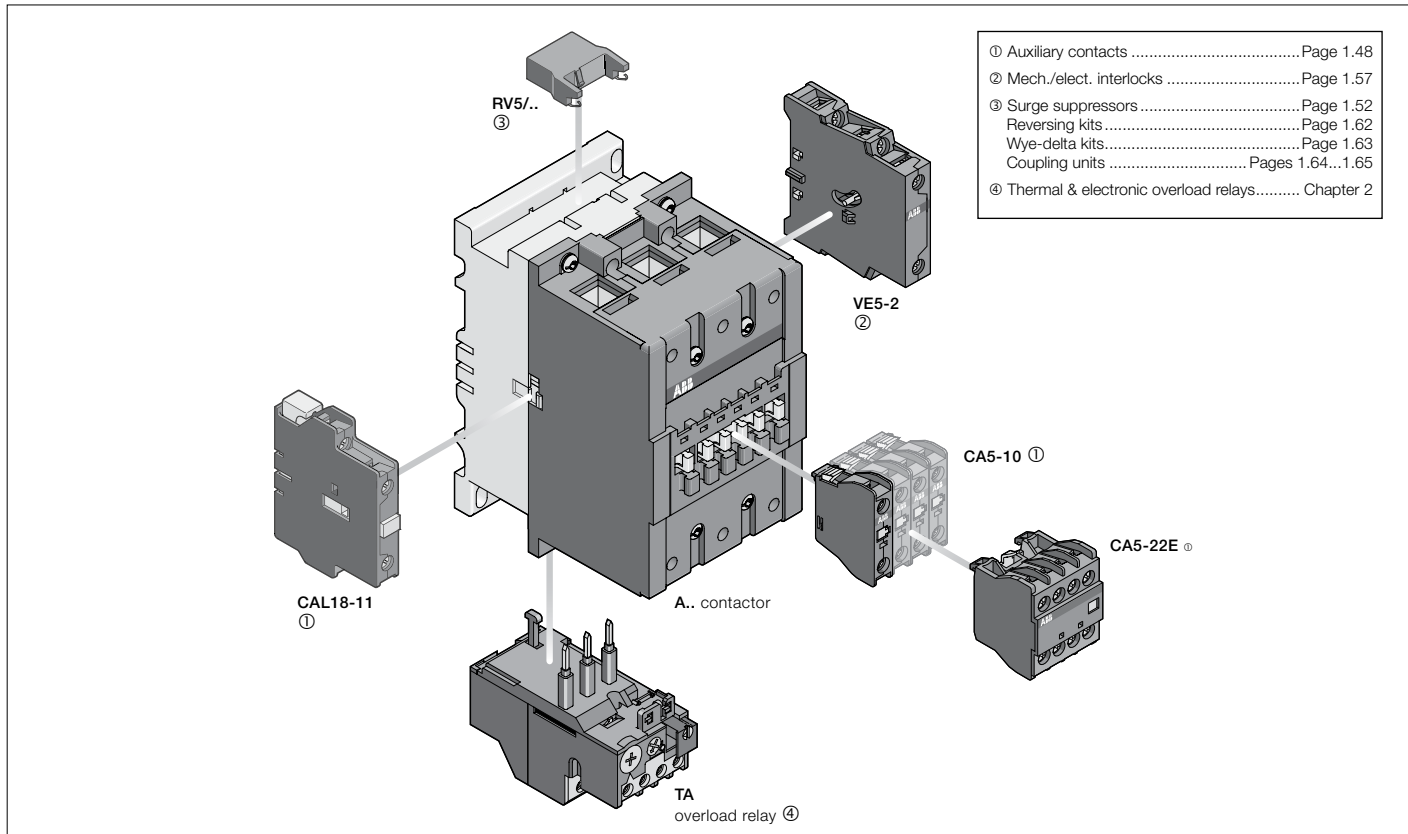
Contactor types	Thermal overload relays	Electronic overload relays
A30...A40, AL30...AL40	TA25DU (0.1...32 A) or TA42DU (18...42 A)	E45DU (9...45 A)
A50 ... A75, AE50 ... AE75, AF50 ... AF75, Sz. 2...3	TA75DU (18...80 A)	E80DU (27...80 A)

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.

(4) Direct mounting - No kit required.

A/F95...A/F110, 3-pole Accessory fitting details

Contactor and main accessories (other accessories available)



Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor types	Main poles		Available auxiliary contacts		Front-mounted accessories		Side-mounted accessories		
	3	0	0	0	Auxiliary contact blocks	Auxiliary contact blocks	Interlock unit		
A95, A110	3	0	0	0	1-pole CA5- .. 1 to 6 x CA5-..	4-pole CA5- .. 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	+	2-pole CAL.. 1 to 2 x CAL18-11	VE5-2 1 x VE5-2 +1 x CAL18-11
AF95, AF110	3	0	0	0	1 to 6 x CA5-..	1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	+	1 to 2 x CAL18-11	1 x VE5-2 +1 x CAL18-11

Overload relays fitting details (1)

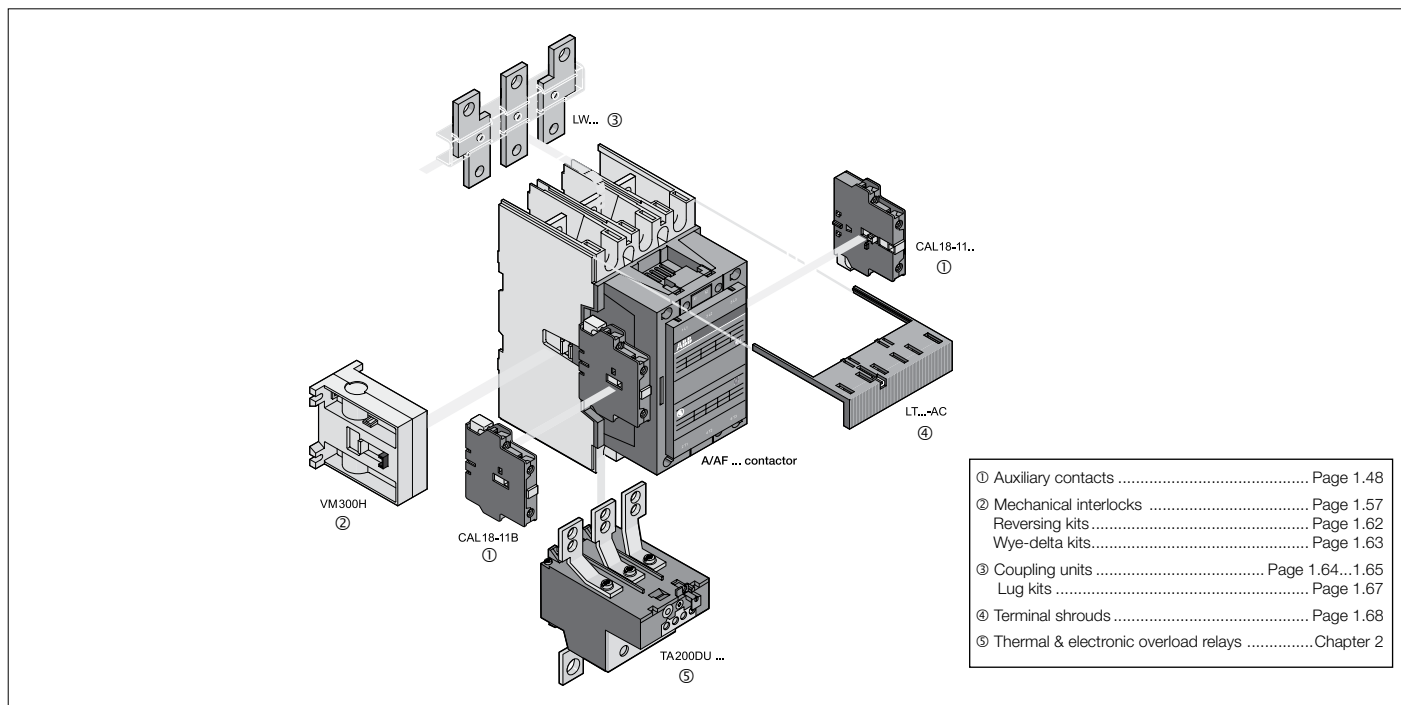
Contactor types	Thermal overload relays	Electronic overload relays
A95, A110	TA80DU (29...80 A) or TA110DU (65...110 A)	E140DU (50...140 A)
AF95, AF110		

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.

(1) Direct mounting - No kit required.

A/F145...AF2050; A/F145N4...AF1650N8, 3-pole Accessory fitting details

Main accessories (other accessories available) AF185 shown on picture



Main accessory fitting details

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories Add-on auxiliary contact blocks	Mechanical interlock units (for two horizontal mounted contactors)	Mounting and positioning Factory mounted auxiliary contacts Add-on CAL18-11 auxiliary contacts Add-on CAL18-11B auxiliary contacts
			CAL18-11, CAL18-11B (3)		

Contactors + auxiliary contact blocks

A145 ... A300 AF145 ... AF2050 Sz. 4...8	3	0	1	1	1 x CAL18-11 + 2 x CAL18-11B	-	
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Contactors with mechanical interlocking + auxiliary contact blocks

A145 ... A185 AF145 ... AF185 Sz. 4	3	0	1	1	2 x CAL18-11 (1) + 3 x CAL18-11B (1)	+ VM...H (2)	
A210 ... A300 AF210 ... AF2050 Sz. 5...8	3	0	1	1	2 x CAL18-11 (1) + 4 x CAL18-11B (1)	+ VM...H (2)	

(1) Total number of auxiliary contact blocks for the two contactors. (2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CAL18-... auxiliary contact blocks can replace the CAL18-11 and CAL18-11B. Though, no auxiliary contact block can be mounted outside the CAL18-...

Overload relays fitting details

Contactor types	Thermal overload relays	Electronic overload relays
A145, A185, Sz. 4	TA200DU (80...200 A) (4)	E200DU (60...200 A) (4)
A210, A300, Sz. 5	TA450DU (100...310 A) (4) or TA450SU (130...310 A) (5)	E320DU (100...320 A) (4)
AF400, AF460, Sz. 6	-	E500DU (150...500 A) (5)
AF580, AF750, Sz. 7	-	E800DU (250...800 A) (5)
AF1350, AF1650, Sz. 8	-	E1250DU (375...1250 A) (5)

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.

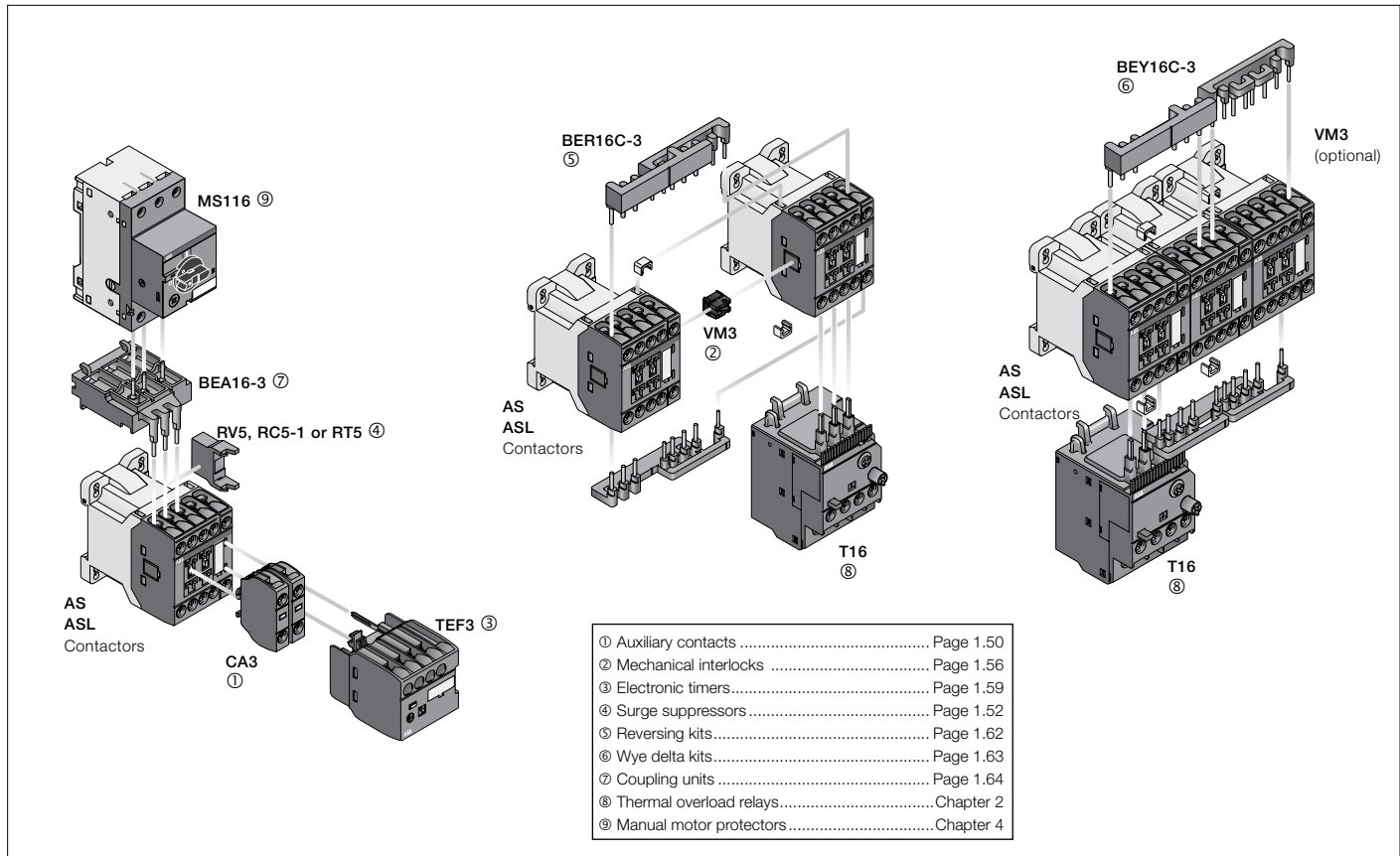
(4) Direct mounting - No kit required.

(5) Mounting kit required (see "Motor protection").

AS/L09...AS/L16, 3 pole, w/screw terminals

Accessory fitting details

Contactor and main accessories (other accessories available)



Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories			Side-mounted accessories	
			Auxiliary contact blocks	Electronic timer	Mechanical interlock unit (between 2 contactors)	Surge suppressors	
AS09 ... AS16	3 0	1 0	2 max.	or 1	+ 1	+ RV5	or RC5-1
AS09 ... AS16	3 0	3 2	-	-	1	+ RV5	or RC5-1
ASL09 ... ASL16	3 0	1 0	2 max.	or 1	+ 1	+ RV5	or RT5
ASL09 ... ASL16	3 0	0 1	-	-	1	+ RV5	or RT5

Overload relays fitting details (1)

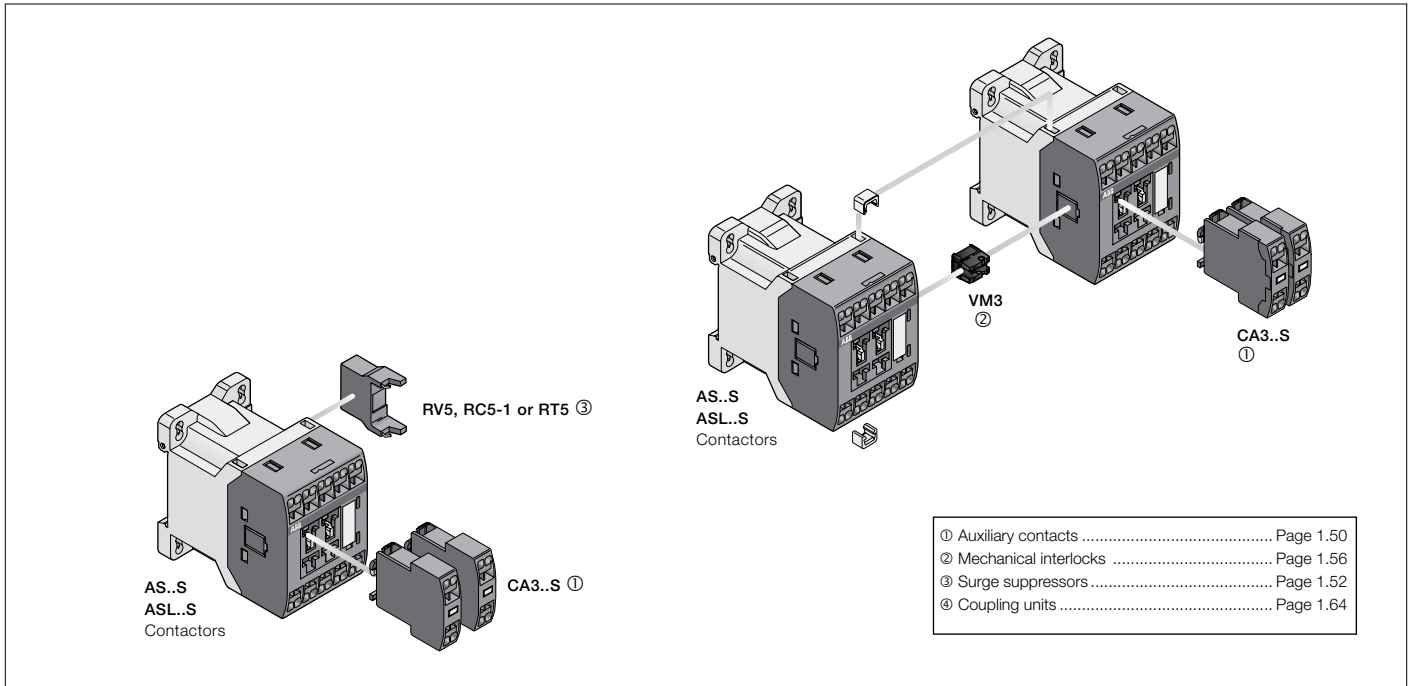
Contactor types	Thermal overload relays
AS09 ... AS16	T16 (0.10...16 A)
ASL09 ... ASL16	

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.

(1) Direct mounting - No kit required.

AS/L09...AS/L16, 3-pole w/spring terminals Accessory fitting details

Contactor and main accessories (other accessories available)

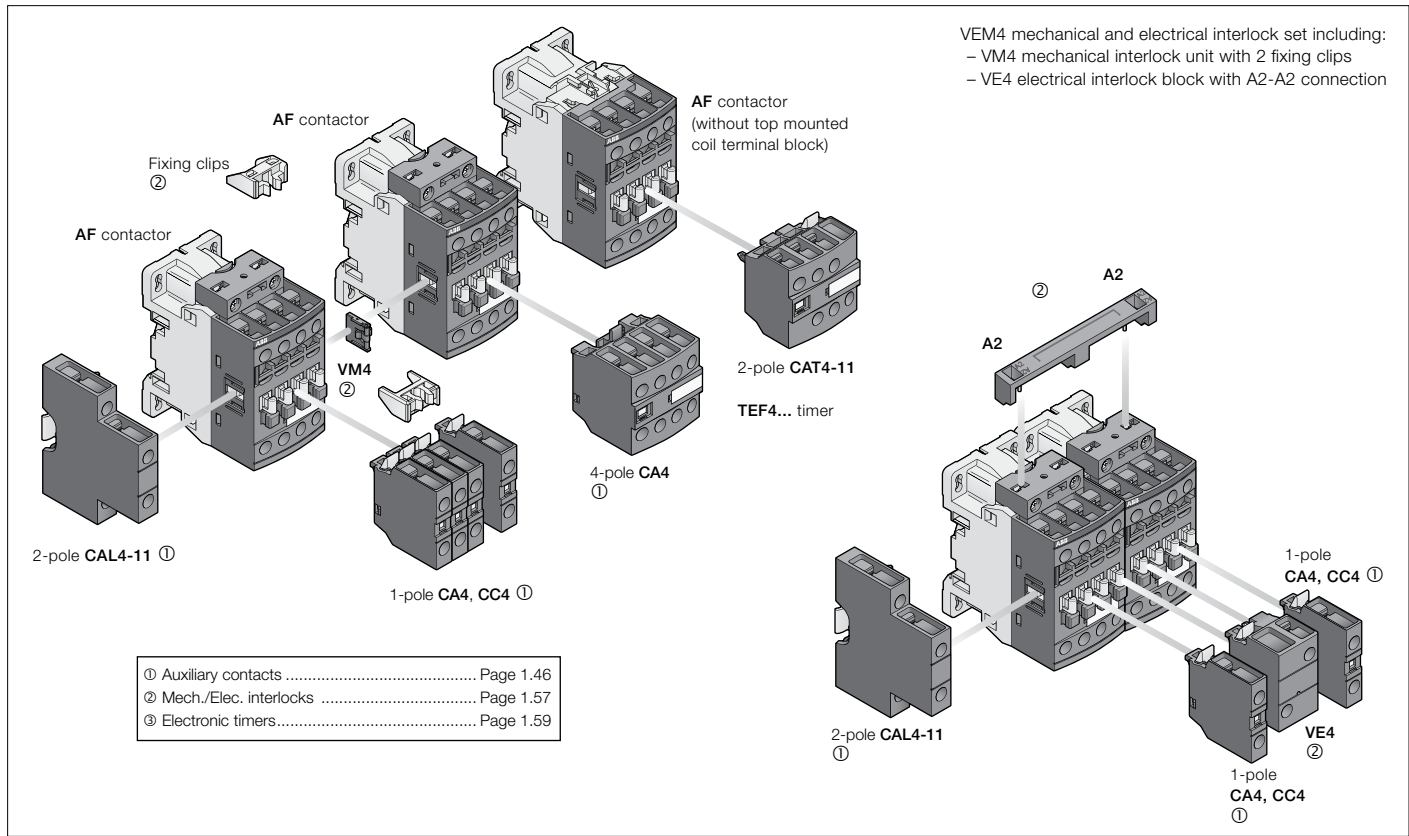


Main accessory fitting details

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories		Side-mounted accessories	
			Auxiliary contact blocks	Mechanical interlock unit (between 2 contactors)	Surge suppressors	
			1-pole CA3..S	VM3		
AS09..S ... AS16..S	3 0	1 0	2 max.	+ 1	+	RV5 or RC5-1
AS09..S ... AS16..S	3 0	0 1				
AS09..S ... AS16..S	3 0	3 2	–	1	+	RV5 or RC5-1
ASL09..S ... ASL16..S	3 0	1 0	2 max.	+ 1	+	RV5 or RT5
ASL09..S ... ASL16..S	3 0	0 1				
ASL09..S ... ASL16..S	3 0	3 2	–	1	+	RV5 or RT5

AF09(Z)...AF38(Z), 4-pole Accessory fitting details

Contactor and main accessories (other accessories available)



Main accessory fitting details

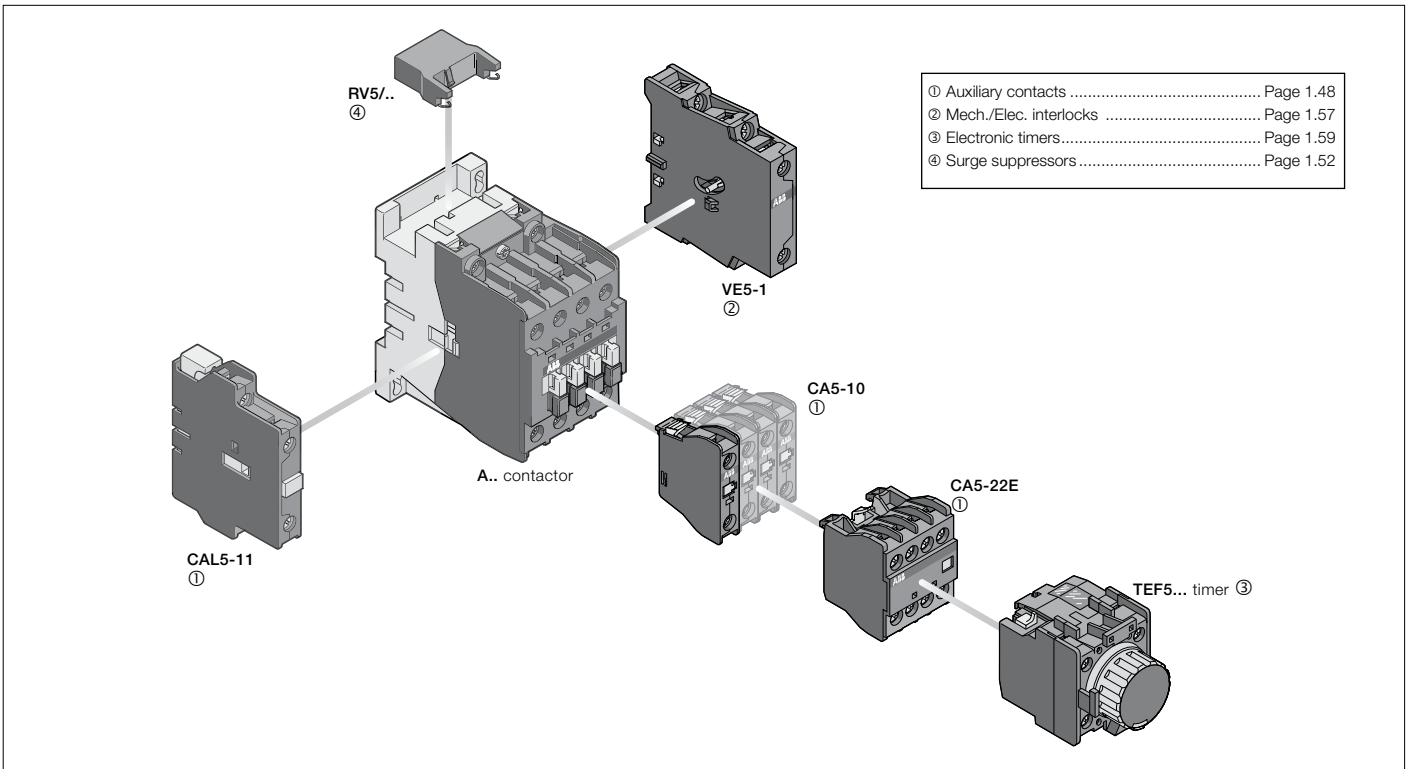
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories			Electrical and mechanical interlock set (between 2 contactors)		Side-mounted accessories	
			Auxiliary contact blocks & electronic timers			VEM4		Auxiliary contact blocks	
			1-pole CA4 / CC4	2-pole CAT4-11	TEF4... or 4-pole CA4		Left side 2-pole CAL4-11	Right side	
Max. add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5									
AF09, AF16	4	0	4 max.	or 1	or 1	–	+ 1	–	
			2 max.	or 1	–	–	+ 1	+ 1	
			3 max.	–	–	+ 1	+ 1	or 1	
Max. add-on N.C. auxiliary contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5									
AF26, AF38	4	0	4 max.	or 1	or 1	–	+ 1	–	
			2 max.	or 1	–	–	+ 1	+ 1	
			3 max.	–	–	+ 1	+ 1	or 1	
AF09, AF16	2	2	4 max.	or 1	or 1	–	+ 1	–	
AF26, AF38	2	2	2 max.	or 1	–	–	+ 1	+ 1	

NOTE: Fitting details same for AF...Z contactors.

A/E/F45...A/E/F75, 4-Pole Accessory fitting details

Contactor and main accessories (other accessories available)



Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor types	Main poles	Available auxiliary contacts	Front-mounted accessories		Electronic timer	Side-mounted accessories	
			Auxiliary contact blocks	Auxiliary contact blocks		Auxiliary contact blocks	Interlock unit
			1-pole CA5-..	4-pole CA5-..	TP. A	2-pole CAL5-11	VE5-..
A45 ... A75	4	0 0 0	1 to 6 x CA5-..	or 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	or 1 x TEF5... + 2 x CA5-.. (1-pole)	+ 1 to 2 x CAL5-11	or 1 x VE5-2 + 1 x CAL5-11
	2	2 0 0 (1)	1 to 6 x CA5-..	or 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	or 1 x TEF5... + 2 x CA5-.. (1-pole)	+ 1 to 2 x CAL5-11	-
AE45 ... AE75	4	0 0 0	1 to 6 x CA5-..	or 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	or 1 x TEF5... + 2 x CA5-.. (1-pole)	+ 1 x CAL5-11	or 1 x VE5-2
	2	2 0 0 (1)	1 to 6 x CA5-..	or 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	or 1 x TEF5... + 2 x CA5-.. (1-pole)	+ 1 x CAL5-11	-
AF50 ... AF75	4	0 0 0	1 to 6 x CA5-..	or 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	or 1 x TEF5... + 2 x CA5-.. (1-pole)	+ 1 to 2 x CAL5-11	or 1 x VE5-2 + 1 x CAL5-11
	2	2 0 0 (1)	1 to 6 x CA5-..	or 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	or 1 x TEF5... + 2 x CA5-.. (1-pole)	+ 1 to 2 x CAL5-11	-

(1) 2 x N.C. CA 5-.. auxiliary contacts maximum.

EK110... EK1000, 4-pole Accessory fitting details

Main accessory fitting details

Mounting positions of the auxiliary contact

Auxiliary contact types and connecting diagrams

(1) Contact 35-36 used for some types of EK... contactors

Auxiliary contacts..... Page 1.48

EK... 4-pole contactors

Contactor types	Main poles	Available auxiliary contacts	Add-on auxiliary contact blocks	Mounting and positioning
			2-pole CAL16-11 ...	Factory mounted auxiliary contacts Add-on CAL16-11 auxiliary contacts
AC operated, 50 Hz, 60 Hz or 50/60 Hz				
EK110 ... EK1000	4	0 1 1	+ 1 x CAL16-11B + 1 x CAL16-11C + 1 x CAL16-11D	
AC operated, 40...400 Hz				
EK110 ... EK210	4	0 2 1	+ 1 x CAL16-11C	
DC operated				
EK110 ... EK1000	4	0 2 1	+ 1 x CAL16-11C	

EK ... 4-pole reversing contactors with VH... mechanical and electrical interlock units

"Left hand" contactors	Interlocking	"Right hand" contactors	Add-on auxiliary contact blocks	Mounting and positioning
			2-pole CAL16-11 ...	Factory mounted auxiliary contacts Add-on CAL16-11 auxiliary contacts
AC operated, 50 Hz, 60 Hz or 50/60 Hz				
EK110 ... EK150 EK175, EK210 EK370 ... EK1000	VH145 VH300 VH800	EK110, EK150 EK175, EK210 EK370 ... EK1000	+ 1 x CAL16-11C + 1 x CAL16-11D	
AC operated, 40...400 Hz				
EK110 ... EK150 EK175, EK210 EK370 ... EK1000	VH145 VH300 VH800	EK110, EK150 EK175, EK210 EK370 ... EK1000	-	
DC operated, 50 Hz, 60 Hz or 50/60 Hz				
EK110 ... EK150 EK175, EK210 EK370 ... EK1000	VH145 VH300 VH800	EK110, EK150 EK175, EK210 EK370 ... EK1000	-	

A motor starter is typically made up of a switching device (contactor) and an overload protection device (see opposite page "Basic functions").

These two devices **must** be coordinated with an equipment capable of providing protection against short circuit (SCPD: Short-Circuit Protection Device).

A complete data base of coordination tables, according to **IEC 60947-4-1** (EN 60947-4-1) or **UL 508 / UL 60947-4-1**, is available on the ABB Website: see below.

Selection

The screenshot shows the ABB web application interface for selecting coordination tables. The URL is <http://applications.it.abb.com/SOC/Page/Selection.aspx>. The page title is "Coordination tables for motor protection". Below the title, there is a section for "Selected Optimized Coordination" with a "Selection" link. A "Clear selection" button is also present. The main part of the page is a table with columns: Protection Device, Rated Voltage [V], Short Circuit Current [kA], Starter Type, Coordination type, and Motor Rated Power [kW]/[HP]. The table shows various options for protection devices (All, ACB, Fuses, MCB, MCCB, MMS), rated voltages (All, 240, 400, 415, 440, 460, 480, 500, 525, 600, 690), short circuit currents (42 to 200), starter types (All, DOL-NS, DOL-HD, SD-NS, SS-NS-IL, SS-NS-ID, UL), coordination types (All, IEC Type 1, IEC Type 2, UL Component, UL Type A-F), and motor rated power (0.06 to 1.1 kW/HP). At the bottom, it shows "Result 8 records. (0.17 seconds)" and "Enable Smart Current Search" checkbox.

Short-circuit protection devices

- Air circuit breakers
- Fuses
- Miniature circuit breaker
- Moulded case circuit breaker
- Manual motor starter

Starter type

- Direct-on-line normal start
- Direct-on-line heavy duty
- Star-delta normal start
- Soft starter normal start

Coordination

- IEC type 1 or type 2
- UL type A to Type F

Results

- Search results displayed at the bottom of the selection page.
- Only the most appropriate solutions to your application, will be displayed at the bottom of the page. "Enable Smart Current Search" function featured for the short-circuit current where "near to" selected values also are included in the result.
- Possible to print the page to a pdf file or from your printer.
- "Clear selection" function to deselect all selected.

Fuses, 400 V, 80 kA, DOL-NS, Coordination type IEC Type 2									
Motor		Fuses IEC			Contactor	Overload Relay		Max allowed load current	
Rated Power [kW]	Rated Current [A]	Switch-Fuse Type	Rating gG / aM [A]	Type and Size	Type	Type	Current setting range [A]	Table	
0.37	1.1	OS32D_	2	OFAM 00aM	A9	E16DU2.7 10 *	0.90 - 2.70	1.4	>>
0.37	1.1	OS32D_	2	OFAM 00aM	A9	TA25DU 1.4	1.00 - 1.40	1.4	>>
0.37	1.1	OS32D_	2	OFAM 00aM	A9	UMC22/100 10 *	0.24 - 63.00	1.4	>>
0.37	1.1	OS32D_	4	OFAA 00H	A9	UMC22/100 10 *	0.24 - 63.00	1.3	>>
0.37	1.1	OS32D_	4	OFAA 00H	A9	E16DU2.7 10 *	0.90 - 2.70	1.3	>>
0.37	1.1	OS32D_	4	OFAA 00H	A9	TA25DU 1.4	1.00 - 1.40	1.4	>>

Fuses, 400 V, 80 kA, DOL-NS, Coordination type IEC Type 2, Overload Relay TOL									
Motor		Fuses IEC			Contactor	Overload Relay		Max allowed load current	
Rated Power [kW]	Rated Current [A]	Switch-Fuse Type	Rating gG / aM [A]	Type and Size	Type	Type	Current setting range [A]	Table	
0.25	0.85	OS32GD_	2	OFAF 000aM	AF09	TF42-1.0	0.74 - 1.00	1	>>
0.12	0.44	OS32GD_	2	OFAF 000H	AF09	TF42-0.55	0.42 - 0.55	0.55	>>

Access

To find the coordination tables for motor protection, please see:

www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools" then select "Coordination Tables for motor protection"

Auxiliary contact blocks

AF09(Z)...AF38(Z); AF09N00(Z)...AF26N1(Z)



CA4-10



CAL4-11



CA4-22M



CAT4-11E

Ordering details (1)

For contactors	Auxiliary contacts			Catalog number
Front-mounted instantaneous auxiliary contact blocks				
AF09 ... AF38	1	0	- -	CA4-10
4-pole NF	0	1	- -	CA4-01
AF09 ... AF16...-30-10	2	2	- -	CA4-22M
	3	1	- -	CA4-31M
	1	3	- -	CA4-13M
	0	4	- -	CA4-04M
AF26 ... AF38...-30-00	2	2	- -	CA4-22E
AF09 ... AF38...-40-00	3	1	- -	CA4-31E
AF09 ... AF38...-22-00	4	0	- -	CA4-40E
AF26 ... AF38...-30-00	0	4	- -	CA4-04E
AF09 ... AF16...-40-00	2	2	- -	CA4-22U
	3	1	- -	CA4-31U
	4	0	- -	CA4-40U
4-pole NF	4	0	- -	CA4-40N
	3	1	- -	CA4-31N
	2	2	- -	CA4-22N
	1	3	- -	CA4-13N
NF..40E	0	4	- -	CA4-04N

Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact

AF09 ... AF38	- -	1	0	CC4-10
4-pole NF	- -	0	1	CC4-01

Side-mounted instantaneous auxiliary contact blocks

AF09 ... AF38, NF	1	1	- -	CAL4-11
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Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks

AF09 ... AF16...-30-10	1	1	- -	CAT4-11M
AF26 ... AF38...-30-00	1	1	- -	CAT4-11E
AF09 ... AF38...-40-00				
AF09 ... AF38...-22-00				
AF09 ... AF16...-30-01	1	1	- -	CAT4-11U





(1) For each contactor or contactor relay type, refer to "Accessory fitting details" table.

Note: CAT4 not fittable on AF..Z contactors with DC control voltage 12...20 V DC.
Auxiliary contacts same for AF...Z contactors

Auxiliary contact blocks

AF09(Z)... AF38(Z); AF09N00(Z)...AF26N1(Z)

Technical data

Types	1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4	
Contact utilization characteristics according to IEC		
Standards	IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage U_i acc. to IEC 60947-5-1	690 V	
Rated impulse withstand voltage U_{imp}	6 kV	
Rated operational voltage U_e max.	24...690 V	
Conventional thermal current I_{th} - $\leq 40^\circ\text{C}$	16 A	
Rated frequency limits	25...400 Hz	
I_e / Rated operational current AC-15	24-127 V 50/60 Hz	6 A
acc. to IEC 60947-5-1	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Making capacity acc. to IEC 60947-5-1	10 x I_e AC-15	
Breaking capacity acc. to IEC 60947-5-1	10 x I_e AC-15	
I_e / Rated operational current DC-13	24 V DC	6 A / 144 W
acc. to IEC 60947-5-1	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
	400 V DC	0.15 A / 60 W
	500 V DC	0.13 A / 65 W
	600 V DC	0.1 A / 60 W
Short-circuit protection device gG type fuse	10 A	
Rated short-time withstand current I_{sc}	for 1.0 s	100 A
$\theta = 40^\circ\text{C}$	for 0.1 s	140 A
Minimum switching capacity	12 V / 3 mA	
with failure rate acc. to IEC 60947-5-4	10 ⁻⁷	
Heat dissipation per pole at 6 A	0.1 W	
Mechanical durability Number of operating cycles	10 million operating cycles	
Max. switching frequency	3600 cycles/h	
Max. electrical switching frequency	AC-15	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contact acc. to annex L of IEC 60947-5-1	Yes for N.O. and N.C. contacts	
Mirror contacts acc. to annex F of IEC 60947-4-1	Yes for N.C. contacts	
Contact utilization characteristics according to UL / CSA		
Standards	UL 508, CSA C22.2 N°14	
Max. operational voltage	600 V AC, 600 V DC	
Pilot duty	A600, Q600	
AC thermal rated current	10 A	
AC maximum volt-ampere making	7200 VA	
AC maximum volt-ampere breaking	720 VA	
DC thermal rated current	2.5 A	
DC maximum volt-ampere making-breaking	69 VA	
Connecting characteristics		
Screw terminals (Delivered in open position, screws of unused terminals must be tightened)		
All terminals	M3.5	
Connection capacity (min...max.)		
 Rigid solid	1 x	1...2.5 mm ²
	2 x	1...2.5 mm ²
 Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²
	2 x	0.75...2.5 mm ²
 Flexible with insulated ferrule	1 x	0.75...2.5 mm ²
	2 x	0.75...1.5 mm ²
 Lug	$L \leq$	8 mm
	$l >$	-
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14, solid / stranded
Stripping length	10 mm	
Degree of protection	IP20	
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
Screwdriver type	Flat \varnothing 5.5 / Pozidriv 2	
Tightening torque	1.2 Nm / 11 lb.in	

Auxiliary contact blocks

A/E/L9...A/E/L40; A/E/F50...AF2050; A/E/F50N2... AF1650N8



CA5-10

Ordering details

For contactors	Number of blocks (1)	Auxiliary contacts				Catalog number

Front-mounted instantaneous auxiliary contact blocks, 1-pole

For contactors	Number of blocks (1)					Catalog number
A9...A40, T/AL9...T/AL40	1-5	1	0	-	-	CA5-10
A45 ... A110	1-6	0	1	-	-	CA5-01
AF45, AF110	1-6	-	-	1	0	CC5-10
AE45 ... AE75, TAE45 ... TAE75	1-6	-	-	0	1	CC5-01



CA5-40E

Front-mounted instantaneous auxiliary contact blocks, 4-pole

For contactors	Number of blocks (1)					Catalog number
A45 ... A110	1	4	0	-	-	CA5-40E
AE45 ... AE75		3	1	-	-	CA5-31E
AF45 ... AF110		2	2	-	-	CA5-22E
TAE45 ... TAE75		0	4	-	-	CA5-04E
		1	1	1	1	CA5-11/11E
A40-30-10	1	3	1	-	-	CA5-31M
AL40-30-10		2	2	-	-	CA5-22M
TAL40-30-10		1	3	-	-	CA5-13M
		0	4	-	-	CA5-04M
		1	1	1	1	CA5-11/11M
A40-30-10	1	4	0	-	-	CA5-40U
AL40-30-10		3	1	-	-	CA5-31U
TAL40-30-10		2	2	-	-	CA5-22U
		0	4	-	-	CA5-04U



CAL5-11

Side-mounted instantaneous auxiliary contact blocks, 2-pole

For contactors	Number of blocks (1)					Catalog number
A9...A75	1-2	1	1	-	-	CAL5-11
T/AL9...T/AL40	1					
AE9...T/AE75	1					
AF45 ... AF75	1-2					
UA16 ... UA75	1-2					
A95 ... A300	1-2	1	1	-	-	CAL18-11
AF95 ... AF2050						
UA95, UA110						
A145 ... A300	1-2(2)	1	1	-	-	CAL18-11B
AF145 ... AF2050		1	1	-	-	

(1) For each contactor type, refer to "Accessory fitting details" table.

(2) 2 blocks CAL18-11 + 2 blocks CAL18-11B.

Note:

- The front-mounted auxiliary contact blocks provided for the A... contactors can be used for the UA..., GA... and GAE... types
- The CAL... auxiliary contact blocks can be used for GA... contactors:
 - GA75-10-00: 2 x CAL5-11 blocks
 - GA75-10-11: 1 x CAL5-11 block
 - GAE75-10-00: 1 x CAL5-11 block
 - GAE75-10-11: no add-on block.
- The CAL... auxiliary contact blocks can be used for UA..RA contactors. See "Accessory fitting details" for this contactor type.



CAL18-11








Low-energy side-mounted contact blocks, 1-pole

For contactors	Number of blocks (1)					Catalog number
A145...A300	1-2	1	0	-	-	CEL18-10
AF145...AF2050	1-2	0	1	-	-	CEL18-01

Auxiliary contact blocks

A/E/L9...A/E/L40; A/E/F50...AF2050; A/E/F50N2...AF1650N8

Technical data

Types	1-pole CA5, 4-pole CA5, 1-pole CC5, 2-pole CAL5	2-pole CAL18	1-pole CEL18
Contact utilization characteristics according to IEC			
Standards	IEC 60947-5-1 and EN 60947-5-1		
Rated insulation voltage U_i acc. to IEC 60947-5-1	690 V		250 V
Rated impulse withstand voltage U_{imp}	6 kV		-
Rated operational voltage U_e max.	24...690 V		125 V
Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$	16 A		0.1
Rated frequency limits	Consult factory		
I_e / Rated operational current AC-15	24-127 V 50/60 Hz	6 A	0.1 A (AC-14)
acc. to IEC 60947-5-1	220-240 V 50/60 Hz	4 A	-
	400-440 V 50/60 Hz	3 A	-
	500 V 50/60 Hz	2 A	-
	690 V 50/60 Hz	2 A	-
Making capacity acc. to IEC 60947-5-1		10 x I_e AC-15	10 x I_e AC-14
Breaking capacity acc. to IEC 60947-5-1		10 x I_e AC-15	10 x I_e AC-14
I_e / Rated operational current DC-13	24 V DC	6 A / 144 W	0.1 A (DC-12)
acc. to IEC 60947-5-1	48 V DC	2.8 A / 134 W	0.1 A (DC-12)
	72 V DC	1 A / 72 W	0.1 A (DC-12)
	110 V DC	0.55 A / 60 W	0.1 A (DC-12)
	125 V DC	0.55 A / 69 W	-
	220 V DC	0.27 A / 60 W	-
	250 V DC	0.27 A / 68 W	-
Short-circuit protection device gG type fuse		10 A	0.1 (FF type HRC fuses)
Rated short-time withstand current I_{cw}	for 1.0 s	100 A	-
$\theta = 40^\circ\text{C}$	for 0.1 s	140 A	-
Minimum switching capacity		17 V / 1 mA (24 V / 50 mA for A/F95...110)	24 V / 50 mA (0.5M of operating cycles)
with failure rate acc. to IEC 60947-5-4		10 ⁻⁷	-
Heat dissipation per pole at 6 A		0.1 W	0.15 W
Mechanical durability Number of operating cycles		10 million (3M for A/F95...110)	"5M (A/F95...185), 3M (A/F210...750), 0.5M (AF1350...2050)"
Max. switching frequency		3600 cycles/h	1200 cycles per hour
Max. electrical switching frequency	AC-15	1200 cycles/h	1200 cycles per hour (AC-14)
	DC-13	900 cycles/h	-
Mechanically linked contact acc. to annex L of IEC 60947-5-1		Yes for N.O. and N.C. contacts	-
Mirror contacts acc. to annex F of IEC 60947-4-1		Yes for N.C. contacts	-
Contact utilization characteristics according to UL / CSA			
Standards	UL 508, CSA C22.2 N°14		
Max. operational voltage	600 V AC, 250 V DC		125 V AC, 24 V DC
Pilot duty	A600, Q300		0.1 A (AC), 5 mA (DC)
AC thermal rated current	10 A		0.1 A
AC maximum volt-ampere making	7200 VA		12.5 VA
AC maximum volt-ampere breaking	720 VA		12.5 VA
DC thermal rated current	2.5 A		5 mA
DC maximum volt-ampere making-breaking	69 VA		1.2 VA
Connecting characteristics			
Screw terminals (Delivered in open position, screws of unused terminals must be tightened)			
All terminals	M3.5		
Connection capacity (min...max)			
 Rigid solid	1 x	1...4 mm ²	
 Rigid solid	2 x	1...4 mm ²	
 Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²	
 Flexible with non insulated ferrule	2 x	0.75...2.5 mm ²	
 Flexible with insulated ferrule	1 x	-	
 Flexible with insulated ferrule	2 x	-	
 Lugs	L ≤	8 mm	
	I >	3.7 mm	
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...12, solid / stranded	
Stripping length	10 mm		
Degree of protection	IP20		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
Screwdriver type	Flat Ø 5.5 / Pozidriv 2		
Tightening torque	1 Nm / 9 lb.in		

Auxiliary contact blocks

(M)AS/L09...(M)AS/L16; (M)B/C6...(M)B/C7; EK

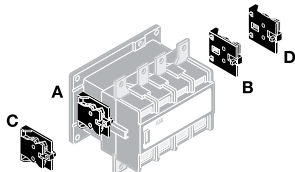
Ordering details



CA3-10



CA3-10S



Mounting positions
of the CAL16-11

For contactors	For contactor relays	Contact blocks	Catalog number

1-pole auxiliary contact blocks with screw terminals

AS09 ... AS16	NS, NSL	1 -	CA3-10
ASL09 ... ASL16		- 1	CA3-01

For contactors	For contactor relays	Contact blocks	Catalog number

1-pole auxiliary contact blocks with spring terminals

AS09..S ... AS16..S	NS..S, NSL..S	1 -	CA3-10S
ASL09..S ... ASL16..S		- 1	CA3-01S

For contactors	Number of blocks	Auxiliary contacts	Catalog number

2-pole auxiliary contacts N.O. + N.C.

EK	1	1 1 - -	CAL16-11A
	1	1 1 - -	CAL16-11B
	1	1 1 - -	CAL16-11C
	1	1 1 - -	CAL16-11D
	1	1 - - 1	CCL16-11E (1)

(1) Mounting of CCL16-11E blocks does not allow an additional second block to be added on top of it.

All DC operated EK... contactors are equipped with one CCL16-11E on the right side.

For contactors	Auxiliary contacts	Catalog number

Front-mounted instantaneous auxiliary contact blocks (not allowed for mounting on TBC, B6S, B7S, interface contactors) ¹⁾

B6-, B7-40-00, BC6-, BC7-40-00	1 1	CAF6-11E
VB6, VB7, VBC6, VBC7, VB6A, VB7A	2 0	CAF6-20E
VBC6A, VBC7A	0 2	CAF6-02E
B6-, B7-30-10, BC6-, BC7-30-10	1 1	CAF6-11M
VB6, VB7, VBC6, VBC7, VB6A, VB7A	2 0	CAF6-20M
VBC6A, VBC7A	0 2	CAF6-02M
B6-, B7-30-01, BC6-, BC7-30-01	1 1	CAF6-11N
VB6, VB7, VBC6, VBC7, VB6A, VB7A	2 0	CAF6-20N
VBC6A, VBC7A	0 2	CAF6-02N

Side-mounted instantaneous auxiliary contact block ¹⁾

B6-, B7-40-00, BC6-, BC7-40-00	1 1	CA6-11E
B6-, B7-30-10, BC6-, BC7-30-10	1 1	CA6-11M
B6-, B7-30-01, BC6-, BC7-30-01	1 1	CA6-11N

Side-mounted instantaneous auxiliary contact block with soldering pins ¹⁾

B6-, B7-40-00-P, BC6-, BC7-40-00-P	1 1	CA6-11E-P
B6-, B7-30-10-P, BC6-, BC7-30-10-P	1 1	CA6-11M-P
B6-, B7-30-01-P, BC6-, BC7-30-01-P	1 1	CA6-11N-P



CA6-11E










CA6-11E-P

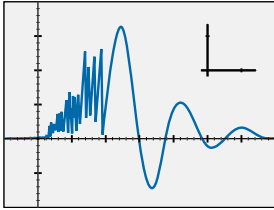
Auxiliary contact blocks

(M)AS/L09...(M)AS/L16

Technical data

Types	1-pole CA3	1-pole CA3...S
Contact utilization characteristics according to IEC		
Standards	IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage U_i acc. to IEC 60947-5-1	690 V	
Rated impulse withstand voltage U_{imp}	6 kV	
Rated operational voltage U_e max.	690 V	
Conventional thermal current I_{th} - ≤ 40 °C	10 A	
Rated frequency limits	25...400 Hz	
I_e / Rated operational current AC-15	24-127 V 50/60 Hz	6 A
acc. to IEC 60947-5-1	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Making capacity acc. to IEC 60947-5-1	10 x I_e AC-15	
Breaking capacity acc. to IEC 60947-5-1	10 x I_e AC-15	
I_e / Rated operational current DC-13	24 V DC	6 A / 144 W
acc. to IEC 60947-5-1	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
	400 V DC	-
	500 V DC	-
	600 V DC	-
Short-circuit protection device gG type fuse	10 A	
Rated short-time withstand current I_{sc}	for 1.0 s	100 A
$\theta = 40$ °C	for 0.1 s	140 A
Minimum switching capacity	12 V / 3 mA	
with failure rate acc. to IEC 60947-5-4	10 ⁻⁷	
Heat dissipation per pole at 6 A	0.1 W	
Mechanical durability Number of operating cycles	10 million operating cycles	
Max. switching frequency	3600 cycles/h	
Max. electrical switching frequency	AC-15	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contact acc. to annex L of IEC 60947-5-1	Yes for N.O. and N.C. contacts	
Mirror contacts acc. to annex F of IEC 60947-4-1	Yes for N.C. contacts	
Contact utilization characteristics according to UL / CSA		
Standards	UL 508, CSA C22.2 N°14	
Max. operational voltage	600 V AC, 250 V DC	
Pilot duty	A600, Q300	
AC thermal rated current	10 A	
AC maximum volt-ampere making	7200 VA	
AC maximum volt-ampere breaking	720 VA	
DC thermal rated current	2.5 A	
DC maximum volt-ampere making-breaking	69 VA	
Connecting characteristics		
Screw terminals (Delivered in open position, screws of unused terminals must be tightened)		
All terminals	M3	N/a - Spring terminals
Connection capacity (min...max.)	0.75...2.5 mm ²	
 Rigid solid	1 x	
 Rigid solid	2 x	0.75...2.5 mm ²
 Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²
 Flexible with non insulated ferrule	2 x	0.75...2.5 mm ²
 Flexible with insulated ferrule	1 x	0.75...2.5 mm ² 0.75...1.5 mm ²
 Flexible with insulated ferrule	2 x	0.75...1.5 mm ²
 Lugs	L \leq	7.7 mm
	L $>$	3.2 mm
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14, solid / stranded
Stripping length	9 mm 10 mm	
Degree of protection	IP20	
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
Screwdriver type	Flat \varnothing 5.5 / Pozidriv 2	Flat \varnothing 3.5
Tightening torque	1 Nm / 9 lb.in	-

Surge suppressors for contactor coils



NOTE: AF Series contactors include integral surge suppressor

Description

The operation of inductive circuits causes overvoltages, in particular on opening of the contactor coil.

The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to breakdown of insulators and even destruction of certain sensitive components.

The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

Following a burst of discharges with a very steep slope a damped oscillation emerges with a peak value of 3500 V.

Overvoltage Factor

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value \hat{U}_s to the peak value \hat{U}_c of the coil rated control voltage U_c :

$$k = \frac{\hat{U}_s \text{ max.}}{\hat{U}_c} \quad \text{in DC: } k = \frac{\hat{U}_s \text{ max.}}{U_c} \quad \text{or in AC: } k = \frac{\hat{U}_s \text{ max.}}{U_c \sqrt{2}}$$

For example the following is obtained for the above graph: $k = \frac{3500}{42 \sqrt{2}} \approx 60$

To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

Each case is different, but the technical data tolerances and the generous sizing of parts have enabled us to reduce the number of variants.

We have chosen the following solutions: transil diodes, varistors and RC blocks.

Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.



RV5



RC5-1



RT5

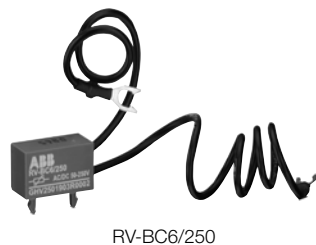


RC-EH300/48

Ordering details

For contactors	Rated control circuit voltage U_c			Catalog number
	V	AC	DC	
AS09...AS16; A9 ... A110, AL9...AL40, ASL09...ASL16 AE9 ... AE75, TAL9...TAL40, TAE45 ... TAE75	24...50	●	●	RV5/50
	50...133	●	●	RV5/133
	110...250	●	●	RV5/250
	250...440	●	●	RV5/440
AS09...AS16 A9...A40	24...50	●	-	RC5-1/50
	50...133	●	-	RC5-1/133
	110...250	●	-	RC5-1/250
	250...440	●	-	RC5-1/440
A45 ... A110	24...50	●	-	RC5-2/50
	50...133	●	-	RC5-2/133
	110...250	●	-	RC5-2/250
	250...440	●	-	RC5-2/440
A145 ... A300	250...440	●	-	RC5-3/440
AL9...AL40 AE9 ... AE75, TAL9...TAL40, TAE45 ... TAE75 ASL09...ASL16	12...32	-	●	RT5/32
	25...65	-	●	RT5/65
	50...90	-	●	RT5/90
	77...150	-	●	RT5/150
	150...264	-	●	RT5/264
EK110 ... EK210	24...48	●	-	RC-EH300/48
	110...415	●	-	RC-EH300/415
EK370 ... EK1000	48...110	●	-	RC-EH800/110
EK110 ... EK1000	24...125	-	●	RC-EH800/110
EK370 ... EK1000	220...600	●	-	RC-EH800/600

Surge suppressors for contactor coils



RV-BC6/250

For contactors	Rated control circuit voltage U_c V DC	Connection type	Catalog number
BC6, BC7	24 ... 60	Cable lug	RV-BC6/60
		Flat pin, 2.8 mm	RV-BC6-F/60
	50 ... 250	Cable lug	RV-BC6/250
		Flat pin, 2.8 mm	RV-BC6-F/250
	380	Cable lug	RV-BC6/380
		Flat pin, 2.8 mm	RV-BC6-F/380

Surge suppressors for contactor coils

Note: Mini contactors for AC operation have an integrated protective circuit

Technical data

Varistor

	RV5/50	RV5/133	RV5/250	RV5/440
Rated control circuit voltage U_c	24...50 V AC 24...50 V DC	50...133 V AC 50...133 V DC	110...250 V AC 110...250 V DC	250...440 V AC 250...440 V DC
Residual overvoltage (clipping voltage)	132 V AC 132 V DC	270 V AC 270 V DC	480 V AC 480 V DC	825 V AC 825 V DC
Opening time growth factor	none			
Operating temperature	-20...+70 °C			
Advantages	High energy absorption: good damping - Unpolarized system.			
Drawback	Clipping as from U_{vdr}^* , thus voltage front up to this point. * U_{vdr} = Varistor operating voltage (voltage dependent resistor), tolerance $\pm 10\%$.			

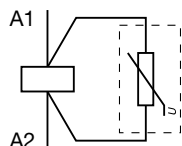
RC type

	RC5-1/50	RC5-1/133	RC5-1/250	RC5-1/440
Rated control circuit voltage U_c	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
Residual overvoltage (clipping voltage)	2 to 3 x U_c max.			
Opening time growth factor	2...3			
Operating temperature	-20...+70 °C			
Advantages	Very fast clipping - Attenuation of steep fronts and thus of high frequencies.			

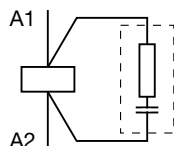
Transil diode

	RT5/32	RT5/65	RT5/90	RT5/150	RT5/264
Rated control circuit voltage U_c	12...32 V DC	25...65 V DC	50...90 V DC	77...150 V DC	150...264 V DC
Residual overvoltage (clipping voltage)	50 V DC	100 V DC	150 V DC	210 V DC	390 V DC
Opening time growth factor	1.1...1.2				
Operating temperature	-20...+70 °C				
Advantages	Good energy absorption - Unpolarized system - Simple, reliable system.				
Drawback	Delay on drop out which does not however reduce contactor breaking capacity.				

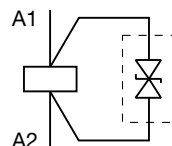
Wiring diagrams



Varistor



RC type



Transil diode

Interface relays A/E/L9...A110

Interface relays

Mounting on contactor types	Control voltage U_c	Coil voltages	Catalog number
N, A9 – A110	24 VDC	24 – 250V, 50, 60 Hz	RA5-1

NOTE: The interface relays provided for the A contactors can also be used for UA, UA..., RA and GA types.

Application

RA 5-1 interface relays are designed to receive 24 VDC signals delivered by PLC's or other sources with a low output power and restore them with sufficient power to operate the coils of the relevant A9 - A110 contactors or the N control relays.

- IEC only

Description

RA5 interface relays are made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 VDC coil.

The interface relay coil is controlled by the PLC while the N.O. contact ensures switching of the power contactor.

Coil switching gives rise to overvoltages which have adverse effects on the electronic devices, insulators and, more generally, on component lifetime. The RA 5-1 is equipped with surge suppressors:

- on the 24 VDC relay coil via a diode
- on the power contactor coil via a varistor.

Furthermore, the RA 5-1 are protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.

Connection

The "E1+" and "E2-" input terminals must be connected, according to their polarity, to the PLC output.

The RA 5 is equipped with two terminal pads for connection to the A1 and A2 terminals of the contactor coil. This coil is supplied between the A0 and A2 terminals of the RA 5.

Mounting

- RA5: terminal pads clamped inside the contactor coil terminals.

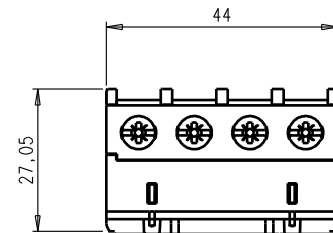
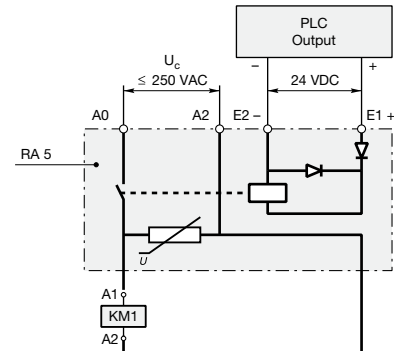


A30-30-10 + RA 5



RA 5

RA 5-1 interface relay for the A 9 – A 110 contactors and N control relays



Interface relays

Technical data

General technical data

Compliance with standards		IEC 60255-5
Rated insulation voltage U_i according to IEC 60947-4-1	V a.c.	250
Permissible ambient temperature:		
– for free air operation:		
– at $U_c = 24$ V d.c. (between E1 and E2)	°C	-25 ... +70
– from 0.85 to 1.1 U_c	°C	-25 ... +55
– for storage	°C	-40 ... +70
Climatic withstand		Complies with that of associated contactors
Operating altitude	m	≤ 3000
Mounting position		No limitation
Fixing		Using the contactor A1 and A2 terminal connecting parts
Connecting terminals (delivered in open position)		M3.5 (+,-) pozidriv 2 screws with cable clamp
Connecting capacity (min. ... max.)		
– rigid solid	2 x mm²	1 ... 4
– flexible with cable end	2 x mm²	0.75 ... 2.5
Tightening torque		
– recommended	Nm	1.00
– max.	Nm	1.20
Degree of protection according to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		Protection against direct contact in acc. with EN 50274 RA5-1 wired and mounted on the associated contactor

Working data

Surge suppression:		
– for contactor coil		Varistor
– for interface relay coil		Diode
Protection against polarity reversal between terminals E1 and E2		Diode
Interface relay operating time	ms	Closing and drop-out ≤ 10
Total operating time, interface relay + contactor:		
– between energization and:		
N.O. contact closing	ms	20 ... 37
N.C. contact opening	ms	17 ... 32
– between de-energization and:		
N.O. contact opening	ms	17 ... 25
N.C. contact closing	ms	20 ... 28

Electrical input data

Control voltage (E1 and E2 terminals) U_c		
– rated value	V d.c.	24
– max. range at ambient temperature 20 °C	V d.c.	19 ... 30
Max. consumption for $U_c = 24$ V d.c., $\theta = 20$ °C	W	0.3
"0" status (relay open) for U_c	V d.c.	≤ 2.4
or I_c	mA	< 1
"1" status (relay closed) for U_c	V d.c.	≥ 19
Max. short supply interruption immunity time	ms	2

Electrical output data

Switching voltage (A0 and A2 terminals)	V a.c.	≤ 250
Electrical durability million of operating cycles		2 (600 cycles/h) on A 9 ... A 75 contactors or N... contactor relay 0.5 (600 cycles/h) on A 95 and A 110 contactors

Mechanical & electrical interlocks

AF09(Z)...AF38(Z), AF09N00(Z)...AF26N1(Z); AS/L09...AS/L16



VM4




VM3

Mechanical interlock unit

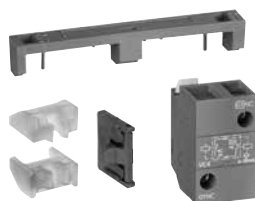
For contactors	Catalog number
AF09 ... AF38..-30-..	VM4
AF09 ... AF38..-40-00	VM3
ASL	VM3

Note: Includes two fixing clips.

Mechanical and electrical interlock set

For contactors	Auxiliary contacts	Catalog number
AF09 ... AF16..-30-.. AF26 ... AF38..-30-00 AF09, AF16..-40-00 AF26, AF38..40-00		VEM4

Note: VEM4 not fittable on AF..Z contactors with DC control voltage 12...20 V DC.

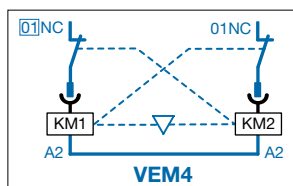


VEM4

Fixing clips

For contactors	Catalog number
AF09 ... AF38	BB4
AS, ASL	BB3

Note: Set of 50 pieces each



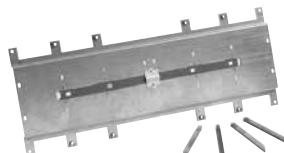
BB4

Mechanical & electrical interlocks

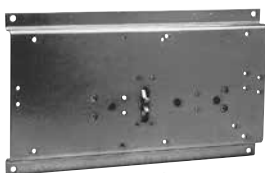
A/E/L9...A/E/L40; A/E/F50...AF2050
A/E/F50N2...AF1650N8; EK



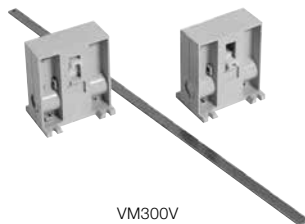
VM300H



VM1650H



VH800



VM300V



VE5-1



VH145

Ordering details (1)

Left side contactor	Right side contactor	Mounting	Catalog number
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Mechanical interlock units for two horizontal mounted contactors (1)

A9...A40	A9...A40	Rail mounting	VM5-1
A30...A40	A45 ... A110	See table below with VE5-.. type	-
A45 ... A75	A45 ... A110		-
A95 ... A185	A45 ... A110		-
A95 ... A185	A145 ... A300	PN.. mounting plate to be ordered separately	VM300H
A210 ... A300	A145 ... A300		VM300H
A210 ... A300	AF400 ... AF460		VM300/460H
AF400 ... AF1250	AF400 ... AF1250		VM750H
AF1350 ... AF2050	AF1350 ... AF2050	Plate included	VM1650H
EK370...EK1000	EK370...EK1000	Plate included	VH800

(1) Mechanical durability: VM5-1 = 5 millions cycles, VM300H ... VM750H = 1 million cycles.

The interlock units provided for A... contactors can be used for AF types, AE types & AL types.

The interlock units provided for A40.. contactors can be used for AL40.. and TAL40.. types.

Top contactor	Bottom contactor	Mounting	Catalog number
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Mechanical interlock units for two vertical mounted contactors (2)

A95 ... A185	A145 ... A300	Additional plate (not supplied)	VM300V
A210 ... A300	A145 ... A300		VM300V
A210 ... A300	AF400 ... AF460		VM300/460V
AF400 ... AF1250	AF400 ... AF1250		VM750V

(2) Mechanical durability: VM300V ... VM750V = 1 million cycles.

Left side contactor	Right side contactor	Mounting	Catalog number
---------------------	----------------------	----------	----------------

Mechanical and electrical interlock units for two horizontal mounted contactors

A9...A40	A9...A40	Rail mounting	VE5-1
A30 ... A75	A45 ... A75		VE5-2
A45 ... A75	A30 ... A75		VE5-2
A45 ... A75	A95 ... A110	PN.. mounting plate to be ordered separately	VE5-2 (3)
A95 ... A110	A45 ... A75		VE5-2 (3)
A95 ... A110	A95 ... A110		VE5-2
EK110, EK150	EK110, EK150		VH145
EK175, EK210	EK110, EK150		VH300

(3) The combination of A45 ... A75 contactors interlocked with A95, A110 contactors cannot be mounted on symmetrical rail (75 mm, IEC/EN 60715).

The interlock units provided for A... contactors can be used for AE, TAE, AF, GA and GAE types.

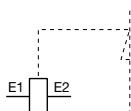
The interlock units provided for A40.. contactors can be used for AL40.. and TAL40.. types.

Mechanical latching unit

AF(Z), AE & AL



WB75-A



Terminal marking

Description

For converting standard contactors into latched contactors.

The WB75 block contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching.

Captive screw type connecting terminals, built-in cable clamps, M3.5 (+, -) pozidriv 2 screw with screw-driver guidance; delivered untightened and protected against accidental direct contact.

Operation

After closing, the contactor continues to be held in the closed position by the latching mechanism should the supply voltage fail at the contactor coil terminals.

Contactor opening can be controlled:

- electrically by an impulse* (AC or DC) on the WB75-A block coil.
 - * the coil is not designed to be permanently energized.
- manually by pressing the pushbutton on the front face of the WB75-A block.

Mounting

The WB75-A block is clipped onto the front face of the 1-stack contactor where it takes up two slots. The two other slots may accept CA5... single pole auxiliary contacts (1 block on each side of the mechanical latch).

Ordering details

For contactors	Rated control circuit voltage U_c		Catalog number
	V 50 Hz or DC	V 60 Hz	
A40 ... A75,	24	24...28	WB75A-01
AF45 ... AF75,	42	42...48	WB75A-02
AL40,	48	48...55	WB75A-03
AE45 ... AE75,	110	110...127	WB75A-04
TAL40,	220...230	220...255	WB75A-06
TAE45 ... TAE75,	230...240	230...277	WB75A-05
UA16 ... UA75,	380...415	380...440	WB75A-07
GA75, GAE75	415...440	440...480	WB75A-08
AF09(Z)...AF38(Z)			
NF, NFZ			

Electronic timers

AF09(Z)...AF38(Z), AS(L)09...AS(L)16, A/E/L40...A/E/F75



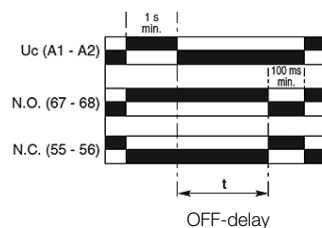
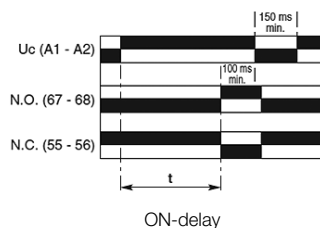
TEF3-ON



TEF5

Ordering details

For contactors, contactor relays	Time delay range selected by switch	Delay type	Rated control circuit voltage U_c V 50/60 Hz or DC	Auxiliary contacts		Catalog number
AS/L09...AS/L16, NS(L)	0.1...1 s	ON-delay	24...240	1	1	TEF3-ON
		OFF-delay	24...240	1	1	TEF3-OFF
AF09(Z)...AF38(Z), NF(Z)	1...10 s	ON-delay	24...240	1	1	TEF4-ON
		OFF-delay	24...240	1	1	TEF4-OFF
A/E/L9...A/E/L40, A/E/F45...A/EF75	10...100 s	ON-delay	24...240	1	1	TEF5-ON
		OFF-delay	24...240	1	1	TEF5-OFF

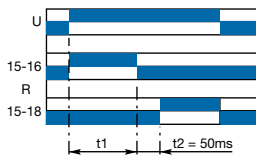


Electronic timers for wye-delta starters

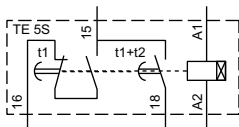
Electronic timer



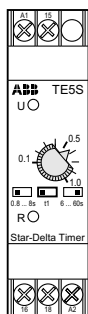
TE5S-*



Chart



Equivalent diagram



Front face

For contactors	Rated control voltage U_c V	Packing piece	Unit weight kg	Catalog number
A9 – AF750 ①	24 AC/D	1	0.080	TE5S-24
	110 – 120 AC	1	0.080	TE5S-120
	220 – 240 AC	1	0.080	TE5S-240
	380 – 440 AC	1	0.080	TE5S-440

Application

Utilization

When used in wye-delta starters, the **TE5S** lags the wye connection and provides a lapse of 50 ms before the switchover to the delta connection.

Description

According to the type of device chosen, the electronic circuit has a 24 VAC/VDC, 110 – 120 VAC or 220 – 230 VAC supply. An output relay with reversing contact ensures high current switching. A two-position switch allows selection of one of the two time delay ranges: 0.8 to 8 s or 6 to 60 s. The 0.1 to 1.0 adjustable knob allows an initial setting without steps within the previously selected range which can then be adjusted using a stopwatch.

Note: We recommend that you allow for temperature drift for the final adjustment of the time delay setting. Drift: -0.2% per $^{\circ}\text{C}$. For example, a setting made at 20°C will yield a time delay shorter by 7% at 55°C in an enclosure. (-0.2% per $^{\circ}\text{C}$ i.e. $-0.2 \times 35 = -7\%$).

The TE5S, which is not affected by these settings, establishes a fixed “lapse” of 50 ms between the opening of contact 15 – 16 and the closing of contact 15 – 18. It is this time delay that prevents from arc short-circuit during wye to delta switching.

Operation

On energization, the green U indicator light (voltage applied) comes on. Contact 15 – 16 then immediately moves to the closed position.

Count-down of the programmed time immediately commences.

When the time delay has elapsed, contact 15 – 16 opens and at the same time the 50 ms lapse, t_2 , begins after which contact 15 – 18 moves to the closed position. The yellow R indicator light comes on.

On de-energization, the U and R indicator lights go out and, after the 250 ms resetting time, the device is ready for a new cycle.

Mounting

Mounts on 35mm DIN rail.

① Types AF09(Z)...AF38(Z); AF09N00(Z)...AF26N1(Z) and AS/L09...AS/L16 use Type CT-ERS... timers. See Chapter 6.

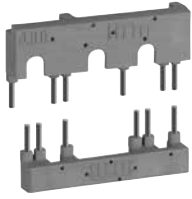
Electronic timers for wye-delta starters

Technical data

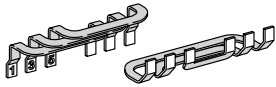
Types	TE5S-24	TE5S-120	TE5S-240	TE5S-440
Compliance with standards	IEC 60947-5-1, EN 60947-5-1			
Rated insulation voltage U_i according to IEC 60947-5-1	V	440		
Rated operational voltage U_e according to IEC 60947-5-1	V d.c. V a.c.	24 24 ... 240		– 440
Conventional free air thermal current I_{th}	A	10		
Rated operational current I_e acc. to IEC 60947-5-1				
AC-15	24-120 V a.c. 220-240 V a.c. 380-440 V a.c.	A A A	5 4 –	– – 3
DC-13	24 V d.c.	A	4	–
Short-circuit protection - gG type fuses	A	10		
Rated supply voltage U_c	V d.c. V a.c.	24 24	– 110 ... 120	– 220 ... 240 380 ... 440
– Rated frequency limits	Hz	48 ... 63		
– Supply voltage range		0.85 ... 1.1 U_c		
– Overvoltage protection		Built-in varistor		
– Load factor	%	100		
– Average consumption	– in d.c. – in a.c.	W VA	0.7 1.5	– 12.5
Time delay range (t_d) selected by switch	s	0.8 ... 8 and 6 ... 60		
– Temperature drift	% per °C	-0.2		
– Mechanical setting accuracy		±15 % of the setting range		
– On-load reiteration accuracy under constant conditions		±2 % after 1 million operating cycles		
Minimum time lapse (t_2)	ms	50		
Min. time lapse after 1 million operating cycles	ms	40		
Resetting time (maximum)	ms	250		
Front panel display:	– green indicator light – yellow indicator light	Energization Output relay activated		
Permissible air temperature				
– for operation	°C	-25 ... +60		
– for storage	°C	-40 ... +85		
Vibration withstand acc. to IEC 60068-2-6, EN 60068-2-6		3 g from 10 to 300 Hz in the 3 directions		
Shock withstand acc. to IEC 60068-2-27, EN 60068-2-27		20 g / 11 ms in directions A and C 15 g / 11 ms in direction B		
Electrical durability	in millions of op. cycles	1		
Mechanical durability	in millions of op. cycles	5		
On-load maximum switching frequency	cycles/h	720		600
Fixing on mounting rail acc. to IEC/EN 60715	35 x 7.5	35 x 15		
Connecting terminals		(+, -) pozidriv 1 screw		
Connecting capacity				
– rigid solid	1 or 2 x mm ²	1 ... 2.5		
– flexible with cable end	1 or 2 x mm ²	0.75 ... 2.5		
Tightening torque	Nm	0.6 ... 0.8 max.		
Degree of protection	Terminals	IP 20		
according to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				

Connection kits

Reversing and phase-to-phase



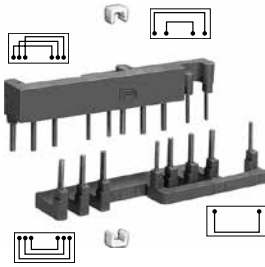
BER16-4



BEM75-30



BEM300-30



BER16C-3



BES...



BSM6-30

Reversing connection kits for 3-pole contactors

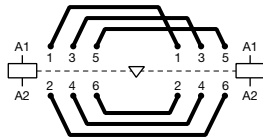
Left side contactor	Right side contactor	Catalog number
AF09(Z)...AF16(Z)	AF09(Z)...AF16(Z)	BER16-4
AF26(Z)...AF38(Z)	AF26(Z)...AF38(Z)	BER38-4
A/E/L9...A/E/L16	A/E/L9...A/E/L16	BER16V
A/E/L26...A/E/L40	A/E/L26...A/E/L40	BER40V
A/E/F50...A/E/F75	A/E/F50...A/E/F75	BEM75-30
A/F95...A/F110	A/F95...A/F110	BEM110-30
A/F145...A/F185	A/F145...A/F185	BEM185-30
A/F210...A/F300	A/F210...A/F300	BEMA300-30
AF400...AF460	AF400...AF460	BEM460-30
AF580...AF750	AF580...AF750	BEM750-30
AS/L09...AS/L16	AS/L09...AS/L16	BER16C-3
VB/C6...VB/C7	-	BSM6-30

Phase-to-phase connection kits for 3-pole contactors

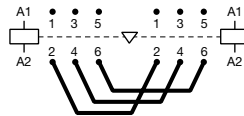
Left side contactor	Right side contactor	Catalog number
A/E/F50...A/E/F75	A/E/F50...A/E/F75	BES75-30
A/F95...A/F110	A/F95...A/F110	BES110-30
A/F145...A/F185	A/F145...A/F185	BES185-30
A/F210...A/F300	A/F210...A/F300	BESA300-30
AF400...AF460	AF400...AF460	BES460-30
AF580...AF750	AF580...AF750	BES750-30

Phase-to-phase connection kits for 4-pole contactors

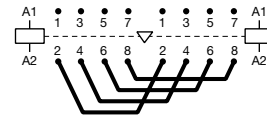
Left side contactor	Right side contactor	Catalog number
A/E/F45...A/E/F75	A/E/F45...A/E/F75	BES75-40



BER, BEM connection sets



BES... for 3-pole connections



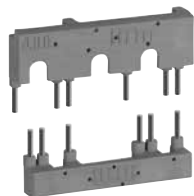
BES... for 4 N.O. main pole connections

Connection sets

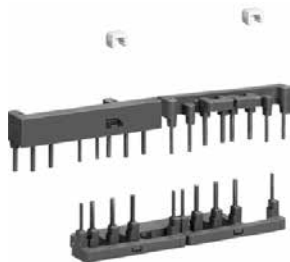
Wye-delta

Wye-delta connection kits for 3-pole contactors

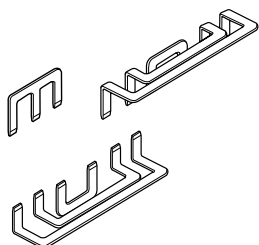
Line contactor 1M	Delta contactor 2M	Shorting (wye) contactor 1S	Mechanical / electrical interlock between 2M-1S	Catalog number
AF09(Z)-30	AF09(Z)-30	AF09(Z)-30	VM4 / VEM4 ①	BEY16-4
AF12(Z)-30	AF12(Z)-30	AF09(Z)-30		
AF16(Z)-30	AF16(Z)-30	AF09(Z)-30		
AF26(Z)-30	AF26(Z)-30	AF26(Z)-30		
AF30(Z)-30	AF30(Z)-30	AF26(Z)-30	VM4 / VEM4 ①	BEY38-4
AF38(Z)-30	AF38(Z)-30	AF26(Z)-30		
AS/L09-30	AS/L09-30	AS/L09-30	VM3 ①	BEY16C-3
AS/L12-30	AS/L12-30	AS/L09-30		
AS/L16-30	AS/L16-30	AS/L12-30		
A/E/L9-30	A/E/L9-30	A/E/L9-30		
A/E/L12-30	A/E/L12-30	A/E/L9-30	VE5-1	BEY16V-2
A/E/L16-30	A/E/L16-30	A/E/L12-30		
A/E/L26-30	A/E/L26-30	A/E/L16-30	VE5-1	BEY26-2
A/E/L30-30	A/E/L30-30	A/E/L26-30		
A/E/L40-30	A/E/L40-30	A/E/L26-30	VE5-1	BEY40-2
A/E/F50-30	A/E/F50-30	A/E/L30-30		
A/E/F63-30	A/E/F63-30	A/E/L40-30	VE5-2	BED50U
A/E/F75-30	A/E/F75-30	A/E/F50-30		
A/F95-30	A/F95-30	A/E/F75-30	VE5-2	BED95U
A/F110-30	A/F110-30	A/F95-30		
A/F145-30	A/F145-30	A/F110-30	VM300H	BED145U
A/F185-30	A/F185-30	A/F145-30		
A/F210-30	A/F210-30	A/F185-30	VM300H	BED210U
A/F260-30	A/F260-30	A/F210-30		
A/F300-30	A/F300-30	A/F260-30	VM300H	BED300U
AF400-30	AF400-30	A/F260-30		
AF460-30	AF460-30	A/F300-30	VM300/460H	BED400U
		AF400-30		
AF580-30	AF580-30	AF400-30	VM750H	BED460U
		AF460-30		
AF750-30	AF750-30	AF580-30	VM750H	BED580U
			VM750H	BED750U



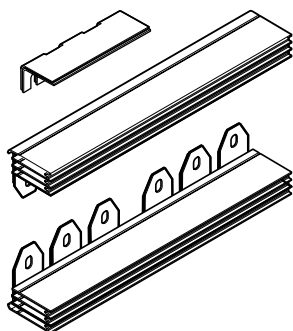
BEY16-4



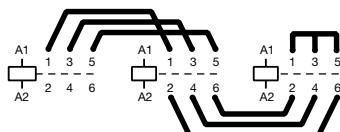
BEY16C-3



BED 110



BED 400



BEY / BED connection kits

① Mechanical/electrical interlock optional.

Coupling units

Manual motor protectors

Close couplers for contactors

	Miniature contactors		AF contactors					AS contactors		A / AE Contactors		Catalog number
	B6...B7	BC6...BC7	AF09...AF16	AF09Z...AF16Z	AF26...AF38	AF26Z...AF38Z	AF50...AF75	AF95...AF110	AS09...AS16	ASL09...ASL16	A50...A75, AE50...AE75	
Manual motor protector	•	•										
MS116-0.16...16			•	•	•	•			•	•		
MS116-20...25			•	•	•	•						
MS116-32					•	•						
MS132-0.16...10	•	•	•	•	•	•						
MS132-12...16	•	•	•	•	•	•			•	•		
MS132-20...25			•	•	•	•						
MS132-32					•	•						
MS45x-40...50							•			•		
MS49x-40...100							•			•		
MS495-40...100								•			•	

Note: For spring terminated AS/ASL, use part number BEA16-3U with integral wire leads for spring terminals.



MS132 + AF Contactor



BEA16-4



BEA16-3

Coupling units MCCB/MCP/Fusible disconnects

Ordering details

For contactors	MCCB/MCP	Catalog number
----------------	----------	----------------

Vertical assembly

A145, A185, AF145, AF185	T3	BEA185/T3
A145, A185, AF145, AF185	T4	BEA185/T4
A210, AF210	T4	BEA210/T4
A210 ... A300, AF210 ... AF300	T5	BEA300/T5
AF400 ... AF750	T6	BEA750/T6
AF400 ... AF750	T5	BEA750/T5

Vertical assembly with control wire terminals (also suitable when using busbar kits for starter combinations)

A145, A185, AF145, AF185	T3	BEA185D/T3
A145, A185, AF145, AF185	T4	BEA185D/T4
A210, AF210	T4	BEA210D/T4
A210 ... A300, AF210 ... AF300	T5	BEA300D/T5
AF400 ... AF750	T6	BEA750D/T6
AF400 ... AF750	T5	BEA750D/T5

Horizontal assembly (also suitable when using busbar kits for starter combinations)

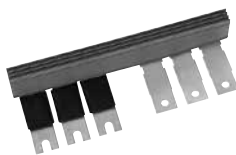
A210 ... A300, AF210 ... AF300	T5	BEA300H/T5
AF400, AF460	T4	BEA460H/T4



BEA300



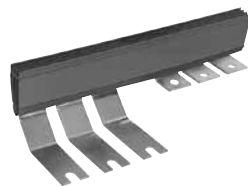
BEA...D



BEA300H



BEF300/OESA400



BEF300H/OESA400

Ordering details

For contactors	Switch	Catalog number
----------------	--------	----------------

Vertical assembly

A145 ... A185	OESA250	BEF185/OESA250
A210 ... A300	OESA250 to OESA400	BEF300/OESA400
AF400, AF460	OESA400	BEF460/OESA400
AF460 ... AF750	OESA630 to OESA800	BEF750/OESA800

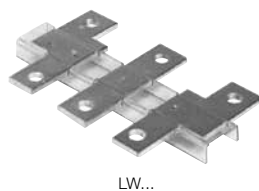
Horizontal assembly

A145, A185	OESA250...LR	BEF185H/OESA250
A210 ... A300	OESA250...LR to OESA400...LR	BEF300H/OESA400
AF400, AF460	OESA400...LR	BEF460H/OESA400

Note: The BEF... connection bars provided for the A145 ... A300 contactors can be used for the AF145 ... AF300 contactors.

Terminal enlargements/extensions & Shorting bars

LW... Terminal enlargements

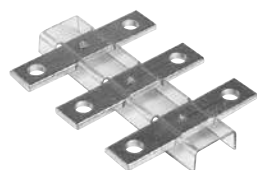


LW...

For contactors	Dimensions		Catalog number
	hole Ø mm	bar mm	
A95, A110	6.5	15 x 3	LW110
A145, A185	10.5	20 x 5	LW185
A210 ... A300	10.5	25 x 5	LW300
AF400, AF460	10.5	25 x 5	LW460
AF580, AF750	13	40 x 6	LW750
AF1250	13	50 x 10	LW1250

Note: The LW... pieces provided for the A... contactors can be used for the AF, AE, TAE and UA types.

LX... Terminal extension



LW...

For contactors	Dimensions		Catalog number
	hole Ø mm	bar mm	
A145, A185	8.5	20 x 5	LX185
A210 ... A300	10.5	20 x 5	LX300
AF400, AF460	10.5	25 x 5	LX460
AF580, AF750	13	40 x 6	LX750

Note: The LX... pieces provided for the A... contactors can be used for the AF types.

Shorting bars



LP185



LY185



LH...

LF...

Poles	For contactors	max. nominal continuous current with "n" poles A	Cable cross-sectional area mm ²	Catalog number ①
2-Pole	A145, A185	300	-	LP185
	A210 ... A300	475	-	LP300
	AF400, AF460	725	-	LP460
	AF580, AF750	1200	-	LP750
	A45 ... A75	200	95	LH75
3-Pole	A95, A110	240	-	LY110
	A145, A185	400	-	LY185
	A210 ... A300	670	-	LY300
	AF400, AF460	1000	-	LY460
	AF580, AF750	1650	-	LY750
	A40	140	50	LF40
	A45 ... A75	275	150	LF75

Note: The strips and shorting bars provided for the A... contactors can be used for the AF, AL, AL...Z, AE, TAL and TAE types.

Terminal connecting strips and shorting bars



LY16-4

For contactors	max. nominal continuous current with "n" poles				Cable cross-sectional area	Catalog number
	in parallel		in series			
	2 poles	3 poles	4 poles	2 poles	mm ²	
AF09	30	33	-	25	6	LY16-4
AF12	32	36	-	27	-	
AF16	34	40	-	30	-	
AF26	50	60	-	45	10	LY38-4

① LP460 ... LP750, LY185 ... LY750 not insulated. Use terminal shrouds. Types LH... and LF..., not insulated, includes terminal.

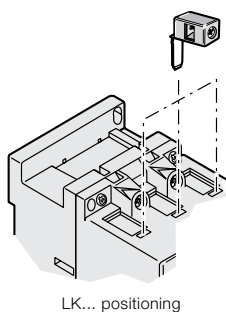
Terminal control leads, blocks & lug kits



LK75-L



LK75-F



LK... positioning



ATK185



ATK750/3



LD75



LD110

Ordering details

For contactors	Catalog number
Right and left on A45 ... A75	LK75-L
Opposite on A45 ... A75	LK75-F
Right and left on A95 ... A110	LK110

Note: The LK... terminals provided for the A... contactors can be used for the AF, AE, AM, TAE, UA, GA and GAE types.

Terminal lug kits

For contactors	Wire		Tightening torque To conductor	Spare terminal hardware included ⊙	Catalog number
	Range	Capacity			
AF145...AF185 A145...A185	4 AWG...300 MCM	1	275 in.-lb	•	ATK185
					ATK185HK
AF210...AF300 A210...A300	4 AWG...400 MCM	1	375 in.-lb	•	ATK300
					ATK300HK
AF400...AF580	4 AWG...500 MCM	2	375 in.-lb	•	ATK300/2
					ATK300/2HK
AF580...AF750	2/0 AWG...500 MCM	2	275 in.-lb	•	ATK580/2
					ATK580/2HK
AF1350	2/0 AWG...500 MCM	3	375 in.-lb	•	ATK750/3
					ATK750/3HK
AF1350...AF1650	4/0 AWG...500 MCM	4	375 in.-lb	•	ATK1350/4
					ATK1350/4HK
AF1350...AF1650	1/0 AWG...750 MCM	4	500 in.-lb	•	ATK1650/4
					ATK1650/4HK
AF1350...AF1650	1/0 AWG...750 MCM	6	500 in.-lb	•	ATK1650/6
					ATK1650/6HK

Note: AF1250, AF2050 & AF2650 intended for busbar connection only. Terminal hardware supplied separately. Use of lug kits for AF1350 & AF1650 in general purpose applications reduces the ratings to 1050A and 1350A respectively. Recommend busbar connection for full ratings.

Spare terminal hardware kits

For contactors	Catalog number
A/F145...A/F185	LE185
A/F210...A/F300	LE300
AF400...AF460	LE460
AF580...AF750	LE750

Terminal blocks

For contactors	Catalog number
A45, A75	LD-75
A95, A110	LD-110

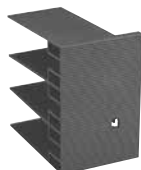
Note: The LD... terminal blocks provided for the A... contactors can be used for the AF, AL, AE, TAL, TAE and UA types.

⊙ Terminal hardware include with A(F)145...AF750 contactors; hardware for AF1350 & AF1650 available only with purchase of lug kit.

Terminal shrouds



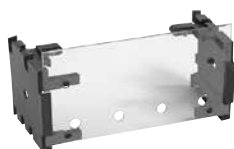
LT...-AC



LT...-AL



LT...-AY



LT210-EK

Ordering details

For contactors	Catalog number
A145 ... A185 with connectors/busbar	LT185-AC
A145 ... A185 with lugs	LT185-AL
A145 ... A185 with short. bar LY185 or between A145 and TA200DU or between A185 and TA200DU	LT185-AY
A210 ... A300 with connectors/busbar	LT300-AC
A210 ... A300 with lugs $\text{\textcircled{O}}$	LT300-AL
A210 ... A300 with short. bar LY300	LT300-AY
AF400 ... AF460 with connectors/busbar	LT460-AC
AF400 ... AF460 with lugs	LT460-AL
AF580 ... AF750 with connectors/busbar	LT750-AC
AF580 ... AF1250 with lugs	LT750-AL

Note: The shrouds provided for the A... contactors can be used for the AF... types.

EK shrouds

For contactors	Catalog number
EK110, EK150	LT150-EK
EK175, EK210	LT210-EK
EK370, EK550	LT550-EK
EK1000	LT1000-EK

$\text{\textcircled{O}}$ Cannot be used with lug kit ATK300/2.

Function markers, protective covers & coil terminal blocks

Ordering details



LDC4

For contactors	Catalog number
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Additional coil terminal block

Additional coil terminal block for a bottom access to the coil terminals of contactors or contactor relays.

AF09 ... AF38, NF	LDC4
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BX4

Protective covers

Sealable and transparent protective covers BX4 and non-removable BX4-CA to protect the devices against accidental contact.

All 1-stack contactors and contactor relays	BX4
For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks	BX4-CA
For contactors B/C6...B/C7	LT6-B



LT6-B

Function markers

Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.

Marker dimensions: 7 x 20 mm (.276" x .787").

Box of 16 blank cards - for AF09/Z...AF38/Z, (V)AS/L09...(V)ASL16, NF/Z, NS/L	BA4
AMS 500 support plate for 8 BA4	XUSP02633
HTP500 support plate	1SNA235712R2400
50 pcs. - for A9...A110, AF50...AF110, AL9...AL40, AE9...AE75	BA5-50

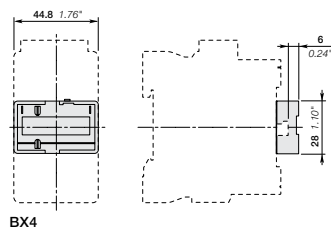


BA4

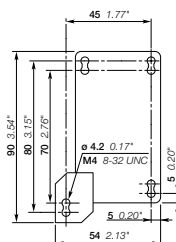


BA5-50

Main dimensions mm, inches



BX4



BP38-4

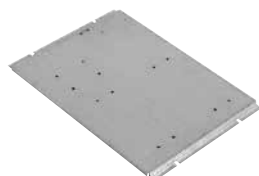
Mounting plates

Description

Mounting plates with fixing holes for the specified contactors and overload relays.



PN300A-11



PN300-21

Ordering details

For contactors		For overload relays	Catalog number
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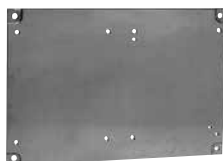
Mounting plates for Direct on line starters

A145, A185		TA200DU, E200DU	PN185-11
A210 ... A300		TA450DU, E320DU	PN300A-11
AF400, AF460		E500DU	PN460-11
AF580, AF750		E800DU	PN750-11

For two contactors side by side with space for mechanical interlock		For one or two overload relays	Catalog number
---------------------------------------------------------------------	--	--------------------------------	----------------

Mounting plates for mechanical interlocked contactors, reversing starters and two speed starters for double windings

A95, A110		TA80DU, TA110DU	PN110-21
A145, A185		TA200DU, E200DU	PN185-21
A210 ... A300		TA450DU, E320DU	PN300-21
AF400, AF460		E500DU	PN460-21
AF580, AF750		E800DU	PN750-21



PN...

Mounting plates for two horizontal mounted contactors with or without a mechanical interlock unit.

To use with: Left hand contactor	Mechanical interlock	Right hand contactor	Catalog number
EK110, EK150	VH145	EK110, EK150	PN210-22
EK175, EK210	VH300	EK175, EK210	PN300-22

(1) Space for mechanical interlock included.

Adapter plates & accessories

Description

Adapter plates with fixing holes for specified old contactors to new contactors.



PR300-1



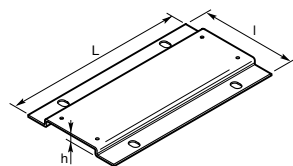
PR400-2

Ordering details

From old contactors	To new contactor	Catalog number
EH65, EH75, EH80, EH90, EG80	A95, A110	PR110-1
EH100, EH145	A110, A145	PR145-1
EH150, EH160, EH175, EH210, EG160	A185, A210	PR210-1
EH250, EH260, EH300	A210 ... A300	PR300-1
EH370, EH550, EG315	AF400 ... AF580	PR460-1
EH700, EH800	AF750	PR750-1
OKYM150, OKYM175	A185	PR185-2
OKYM200, OKYM250	A210 ... A300	PR300-2
OKYM315	AF400, AF460	PR400-2
OKYM400	AF400, AF460	PR460-2
OKYM500	AF580	PR580-2
EH550, EG630, OKYM630	AF580, AF750	PR750-2

Note: The adapter plates provided for the A... contactors can also be used for the AF... contactors.

Dimensions (mm)



Type of the plate	Dimensions			Fixing holes mm
	L	l	h	
PR110-1	151	106	11.2	2 x \varnothing 7
PR145-1	180	122	11.5	4 x \varnothing 7
PR210-1	200	132	11.5	4 x \varnothing 7
PR300-1	200	172	11.5	4 x \varnothing 7
PR460-1	278	198	11.5	4 x \varnothing 7
PR750-1	283	244	11.5	4 x \varnothing 7
PR185-2	202	152	11.2	4 x \varnothing 11
PR300-2	202	152	11.2	4 x \varnothing 11
PR400-2	278	151	11.5	4 x \varnothing 11
PR460-2	278	176	11.5	4 x \varnothing 11
PR580-2	283	176	11.5	4 x \varnothing 11
PR750-2	283	255	11.5	4 x \varnothing 14

Note: The adapter plates provided for the A... contactors can also be used for the AF... contactors.
Fixing holes according to the plate types



BP38-4

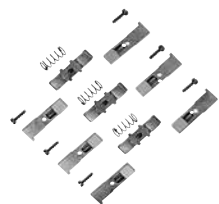
Mounting piece

Mounting piece for replacement of A / AL26 ... A / AL40 contactors mounted by screws by AF contactors in 45 mm width.

AF09 ... AF38	BP38-4
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Replacement parts

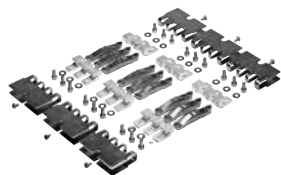
Contact kits & arc chutes



ZL50



ZL185



ZL1650



ZW...



KZK370

3-pole contact kits

For contactors	Catalog number
A/AF/AE/TAE50-30	ZL50
A/AF/AE/TAE63-30	ZL63
A/AF/AE/TAE75-30	ZL75
A/AF95-30	ZL95
A/AF110-30	ZL110
A/AF145	ZL145
A/AF185	ZL185
A/AF210	ZL210
A/AF260	ZL260
A/AF300	ZL300
AF400	ZL400
AF460	ZL460
AF580	ZL580
AF750	ZL750
AF1250	ZL1250
AF1350	ZL1350
AF1650	ZL1650
AF2050	ZL2050
UA50	ZLU50
UA63	ZLU63
UA75	ZLU75
UA95	ZLU95
UA110	ZLU110

4-pole contact kits

A/E/F45	ZLT45
A/E/F50	ZLT50
A/E/F75	ZLT75
EK110	KZK110
EK150	KZK150
EK175	KZK175
EK210	KZK210
EK370	KZK370
EK550	KZK550
EK1000	KZK1000

Arc chutes

For contactors	Catalog number
3-pole	
A145 ... A185 and AF145 ... AF185	ZW185
A210 ... A300 and AF210 ... AF300	ZW300
AF400, AF460	ZW460
AF580, AF750, AF1250	ZW750
AF1350, AF1650, AF2050	ZW1650
4-pole	
EK110	KWK110
EK150	KWK150
EK175	KWK175
EK210	KWK210
EK370	KWK370
EK550	KWK550
EK1000	KWK1000

Replacement parts

Coils

Coils, AC operated



ZA16-81

For contactors	Catalog number
A9...A16, A9N00...A16N0, UA16	ZA16-Δ
A26...A40, A26N1, UA26	ZA40-Δ
A45...A75, A50N2...A75N3, UA50...UA75, GA75	ZA75-Δ
A95...A110, UA95...UA110	ZA110-Δ
A145...A185, A145N4	ZA185-Δ
A210...A300, A260N5	ZA300-Δ

Coils, DC operated

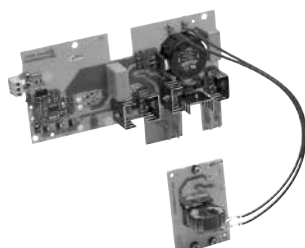
AE9...AE16, AE9N00...AE16N0	ZAE16-Δ
AE26...AE40, AE26N1	ZAE40-Δ
AE45...AE75, AE50N2...AE75N3, GAE75	ZAE75-Δ

Coils, AC/DC operated (coil and printed circuit board except ZAF1650)

AF45...AF75, AF50N2...AF75N3	ZAF75-Δ
AF95...AF110	ZAF110-Δ
AF145...AF185, AF145N4, GAF185	ZAF185-Δ
AF210...AF300, AF260N5, GAF300	ZAF300-Δ
AF400...AF460, AF460N6, GAF460	ZAF460-Δ
AF580...AF1250, AF750N5, GAF750...GAF1250	ZAF750-Δ
AF1350...AF2050, AF1650N8, GAF1650...GAF2050	ZAF1650-Δ
Printed circuit board (G/AF1350...2050)	ZP1650



ZAF1650



ZP1650

Coils, AC operated for A/UA/GA (Δ)

For contactors	AC voltages		Coil code
	V - 50 Hz	V - 50 Hz	
	24	24	81
	26	28	16
	28	32	17
	42	42	82
	48	48	83
	60	60	73
	100	100...110	74 ⊕
	105	110...127	26
	110	110...120	84
	110...115	115...127	89 ⊕
	120	140	29
A9...A300, A9N00...A260N5, UA16...UA110, GA75	125...127	150	30
	175	208	34
	190	220	36
	220...230	230...240	80
	230...240	240...260	88
	230...240	277	42
	230/400	-	62 ⊕
	-	230/400	63 ⊕
	380...400	400...415	85
	400...415	415...440	86
	400	440	50
	400...415	480	51
	415...440	440...460	87
	440	500	53
	500	600	55
	550	-	56
	660...690	-	58

Coils, DC operated for AE/GAE (Δ)

For contactors	DC voltages V DC	Coil code
	12	80
	24	81
	42	82
	48	83
AE9...AE75, AE9N00...AE75N3, GAE75	50	21
	60	84
	75	85
	110	86
	125	87
	220	88
	240	89
	250	38

Coils, DC operated for AE/GAE (Δ)

AC / DC voltages V - 50/60 Hz or DC	AF50...AF300, AF50N2...AF260N5, GAF185...GAF300	AF400...AF750, AF460N6...AF750N7, GAF460...GAF570	AF1250, GAF1250	AF1350...AF2050, AF1650N8, GAF1650...GAF2050
20...60V DC	72	-	-	-
24...60V DC	-	68	68	-
48...130V AC/DC	69	69	69	-
100...250V AC/DC	70	70	70	70
250...500V AC/DC	-	71	-	-

⊕ For A9...A16, A9N00...A16N0, UA16 only

⊙ Excludes A145...A300, A145N4

⊙ A145...A300, A145N4 at 60 Hz, 115V only

Replacement parts

Coils

Coils, AC or DC operated



KH300

For contactors	Catalog number
EK110...EK150	KH210-Δ
EK175...EK210	KH300-Δ
EK370...EK1000	KH800-Δ

Note: AC and DC operated contactors DO NOT have the same magnetic structure. Therefore, DC coils will not fit on an AC magnetic structure and vice versa.

Coils, AC operated for EK (Δ)

For contactors	AC voltages		Coil code
	V - 50 Hz	V - 50 Hz	
EK110... EK1000 (AC operated)	-	24	F
	24	-	N
	-	48	G
	110	120	1
	-	208	B
	-	240	2
	220...230	-	J
	-	380	Z
	380...400	440	3
	400...415	-	M
	-	480	4
	500	-	5
	-	600	6

Coils, DC operated for EK (Δ)

For contactors	DC voltages V DC	Coil code
EK110... EK1000 (DC operated)	24	Y
	48	W
	110	P
	125	Q
	220	R
	440	T

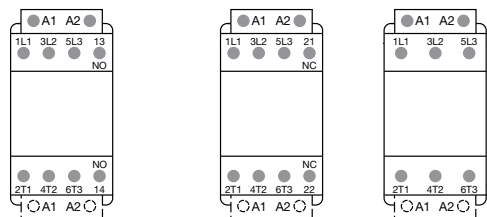
Terminal marking and positioning

AF09/Z...AF38/Z, AF09N00/Z...AF26N1/Z

3-pole contactors

Standard devices without addition of auxiliary contacts

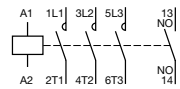
Note: Terminal markings for AF09 & AF16 apply to AF NEMA Sz. 00 & 0; terminal markings for AF26 apply to AF NEMA Sz. 1. AF09...AF38 terminal markings apply to AF.Z type.



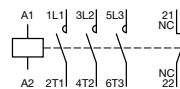
AF09...AF16...-30-10

AF09...AF16...-30-01

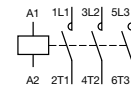
AF26...AF38...-30-00



AF09...AF16...-30-10

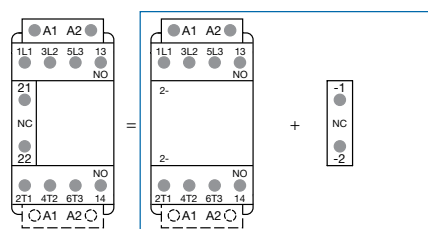


AF09...AF16...-30-01

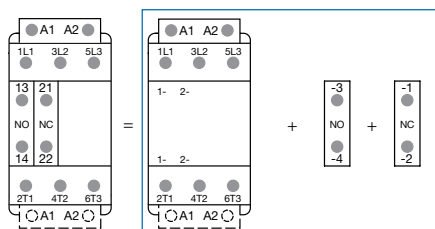


AF26...AF38...-30-00

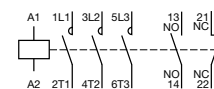
Other possible contact combinations with auxiliary contacts



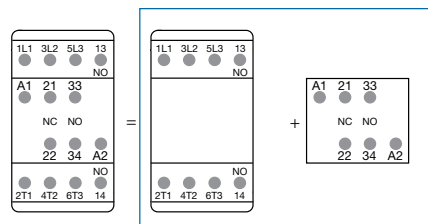
Combination 11 = AF09...AF16...-30-10 + CA4-01



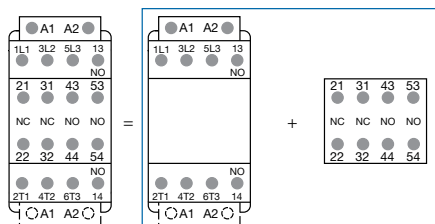
Combination 11 = AF26...AF38...-30-00 + CA4-10 + CA4-01



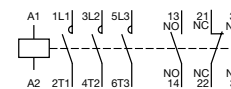
Combination 11



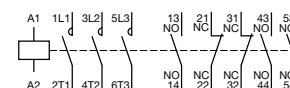
Combination 21 = AF09...AF16...-30-10 + CAT4-11M



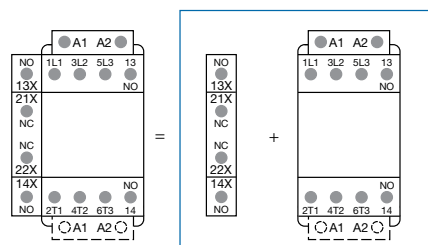
Combination 32 = AF09...AF16...-30-10 + CA4-22M



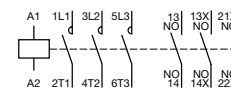
Combination 21



Combination 32



Combination 21 = CAL4-11 + AF09...AF16...-30-10



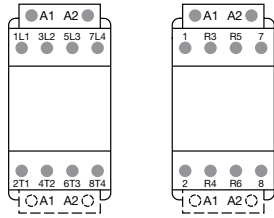
Combination 21

Note: Only AF.Z contactor with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

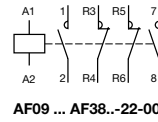
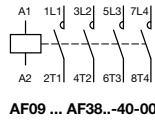
Terminal marking and positioning AF09/Z...AF38/Z 4-pole contactors

Note: AF09...AF38 terminal markings apply to AF.Z type.

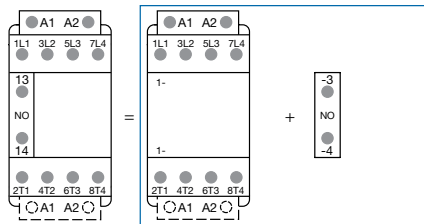
Standard devices without addition of auxiliary contacts



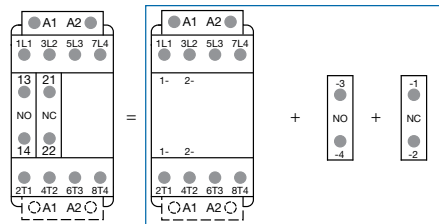
AF09 ... AF38.-40-00 AF09 ... AF38.-22-00



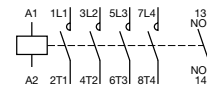
Other possible contact combinations with auxiliary contacts



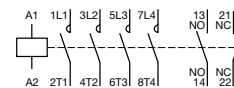
Combination 10 = AF09 ... AF38.-40-00 + CA4-10



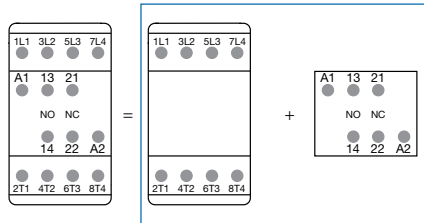
Combination 11 = AF09 ... AF38.-40-00 + CA4-10 + CA4-01



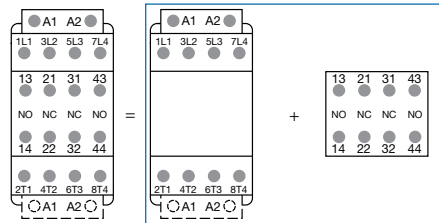
Combination 10



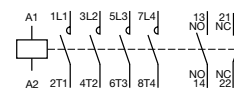
Combination 11



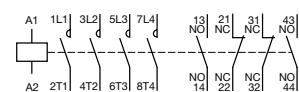
Combination 11 = AF09 ... AF38.-40-00 + CAT4-11E



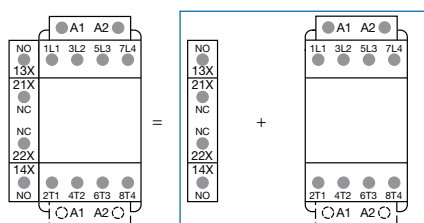
Combination 22 = AF09 ... AF38.-40-00 + CA4-22E



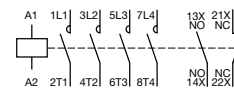
Combination 11



Combination 22



Combination 11 = CAL4-11 + AF09 ... AF38-40-00



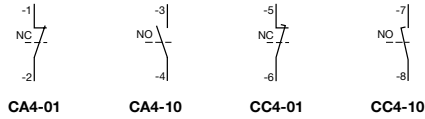
Combination 11

Note: Only AF.Z contactor with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

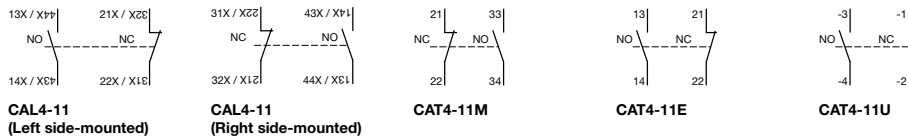
Terminal markings and positioning

Add-on auxiliary contacts for AF09/Z...AF38/Z

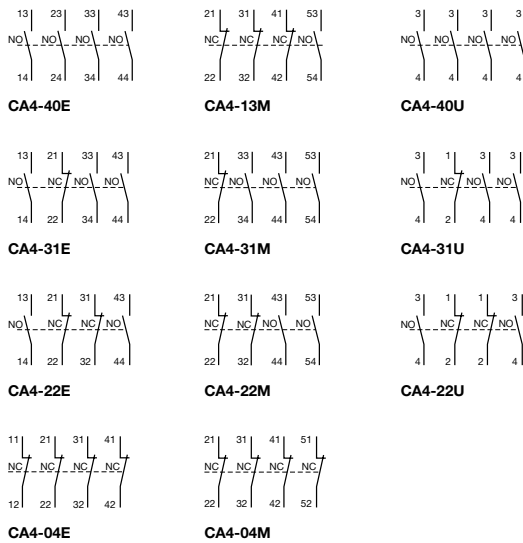
1-pole auxiliary contacts



2-pole auxiliary contacts



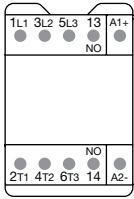
4-pole auxiliary contacts



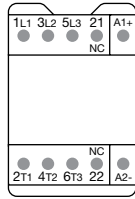
Terminal markings and positioning AS/L09../S...AS/L16../S & CA3 auxiliary contacts

ASL../S contactors - DC operated (the polarity A1+, A2- must be respected)

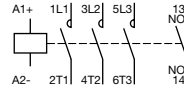
Standard devices without addition of auxiliary contacts



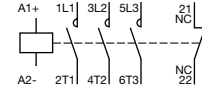
AS/L09...AS/L16-30-10/S



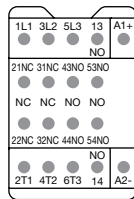
AS/L09...AS/L16-30-01/S



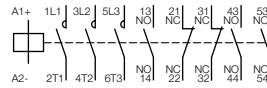
AS/L09...AS/L16-30-10/S



AS/L09...AS/L16-30-01/S

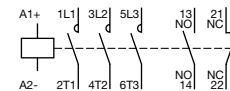
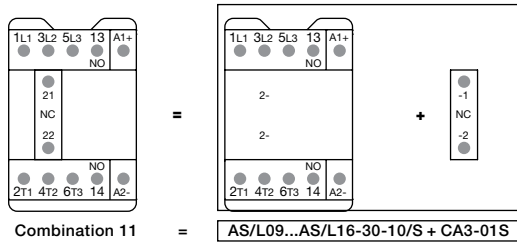


AS/L09...AS/L16-30-32/S

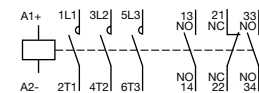
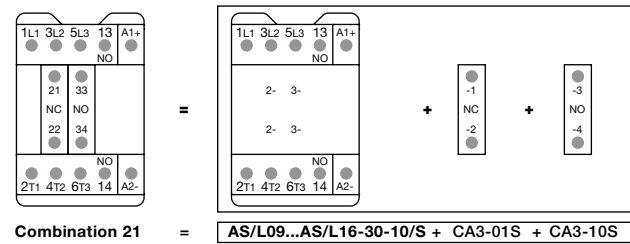


AS/L09...AS/L16-30-32/S

Other possible contact combinations with auxiliary contact blocks added by the user

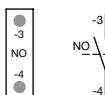


Combination 11



Combination 21

CA3..S 1-pole auxiliary contact blocks



CA3-10/S

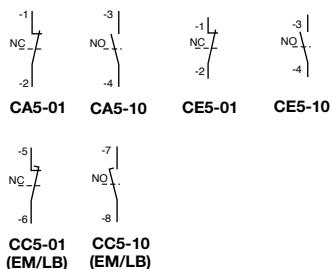


CA3-01/S

Terminal markings and positioning

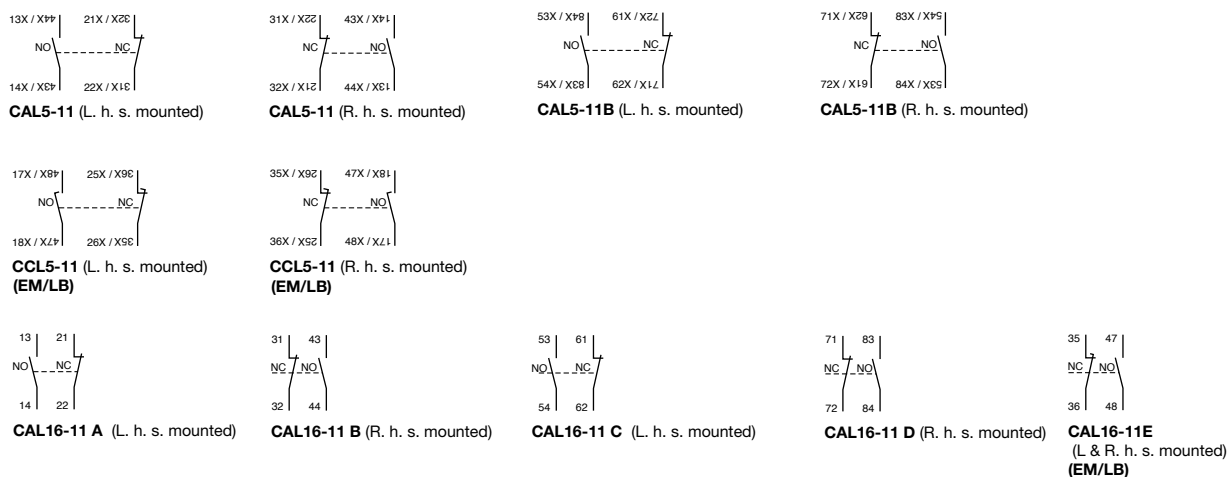
Add-on auxiliary contacts CA5 / CAL5 / CC5 / CAL16

One pole auxiliary contacts (top mounted)

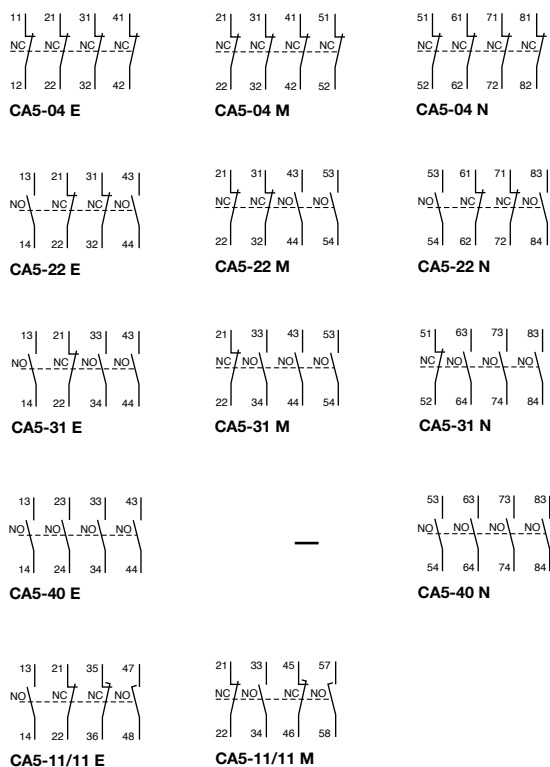


Legend
L.H.S. = Left hand side mounted
R.H.S. = Right hand side mounted
EM/LB = Early make / Late break

Two pole auxiliary contacts

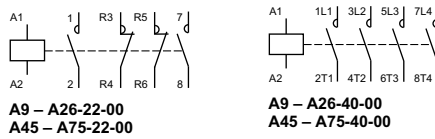
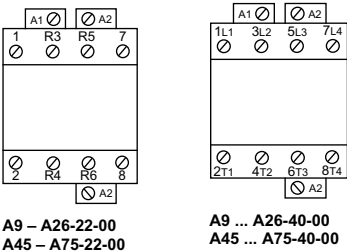
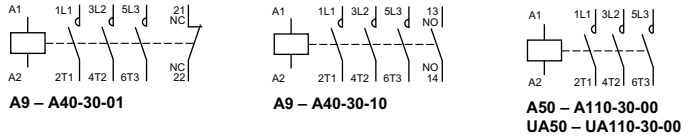
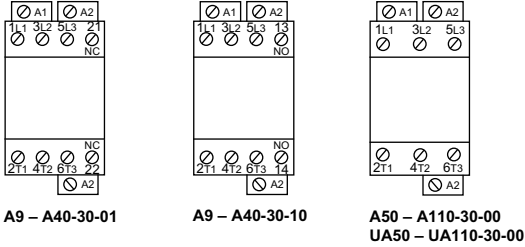


Four pole auxiliary contacts (Top mounted)

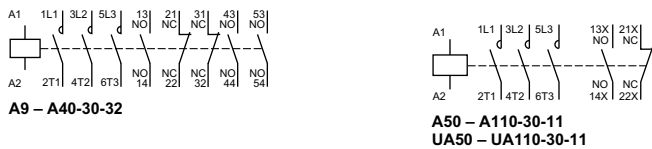
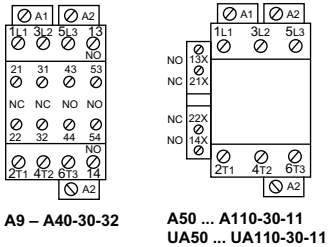
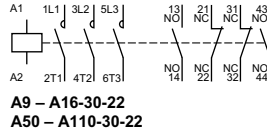
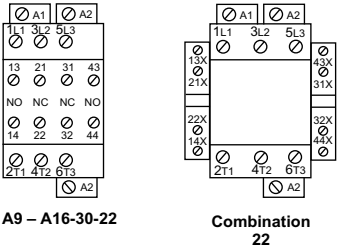


Terminal markings and positioning A9...A75

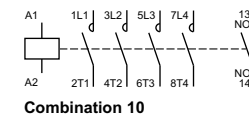
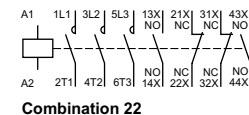
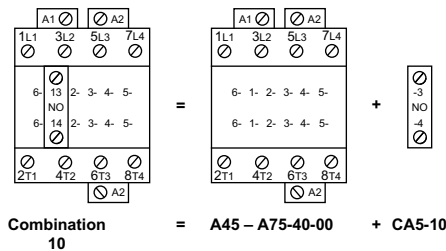
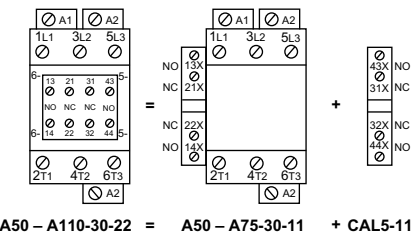
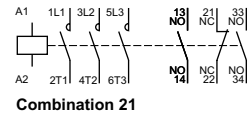
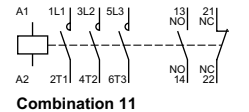
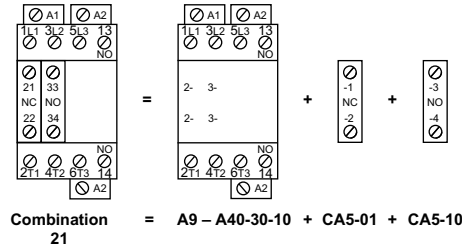
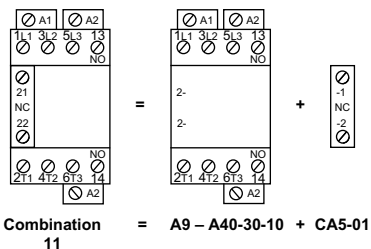
Standard devices without addition of auxiliary contacts



Standard 3 pole devices with factory mounted auxiliary contacts

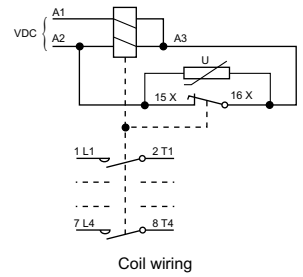
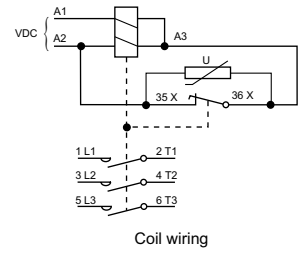
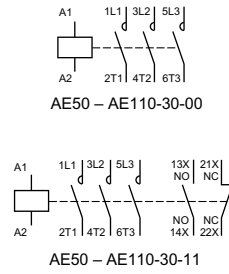
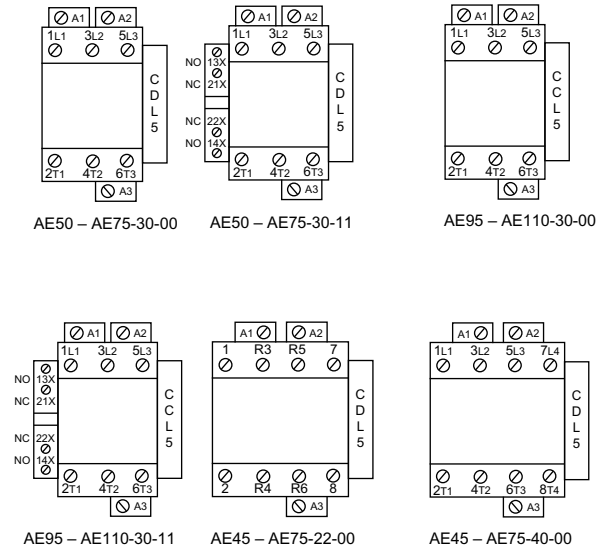


Other possible contact combinations with auxiliary contacts added by the user



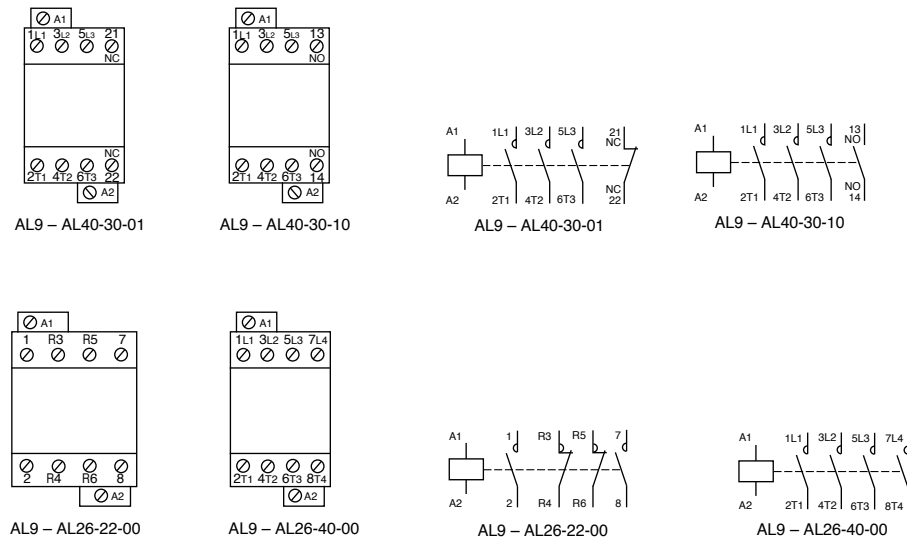
Terminal markings and positioning AE9...AE75, AL9...AL40

AE Contactors – D.C. operated

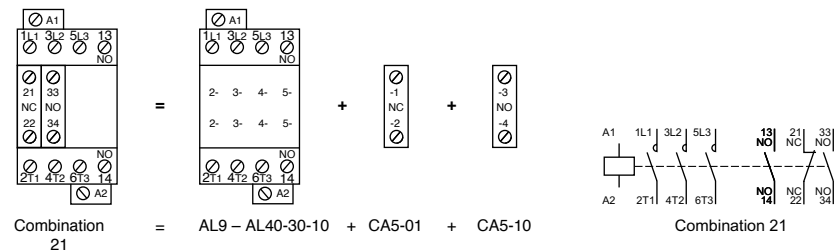


AL Contactors – D.C. operated

Standard devices without addition of auxiliary contacts

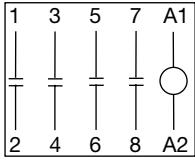


Other possible contact combinations with auxiliary contacts added by the user

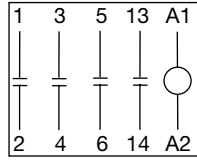


Terminal markings and positioning B/C6...B/C7, CA6 & CAF6 auxiliary contacts

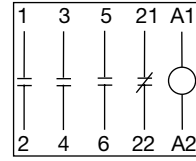
Miniature contactors



B6(7)-40-00 ...
BC6(7)-40-00 ...

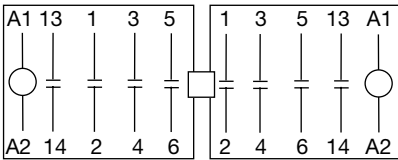


B6(7)-30-10 ...
BC6(7)-30-10 ...

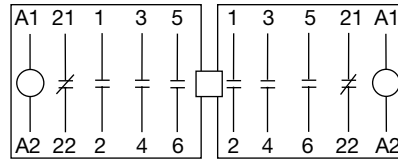


B6(7)-30-01 ...
BC6(7)-30-01 ...

Miniature mechanically interlocked contactors

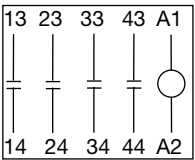


VB6(7)-30-10 ...
VBC6(7)-30-10 ...

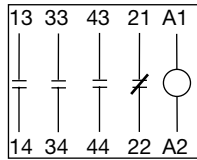


VB6(7)-30-01 ...
VBC6(7)-30-01 ...

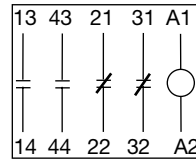
Miniature control relays



K6-40 E ...
KC6-40 E ...

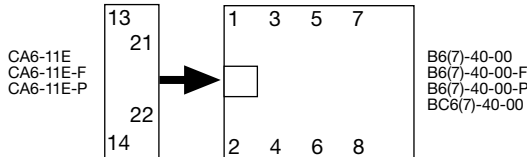


K6-31 Z ...
KC6-31 Z ...

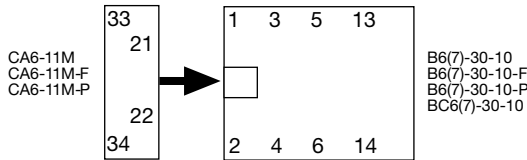


K6-22 Z ...
KC6-22 Z ...

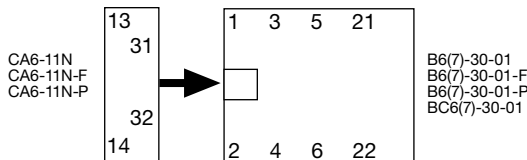
Side mounted auxiliary contact blocks



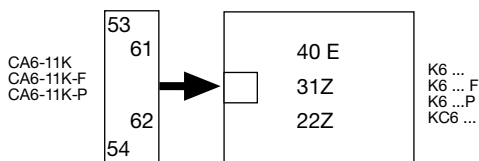
B6(7)-40-00
B6(7)-40-00-F
B6(7)-40-00-P
BC6(7)-40-00



B6(7)-30-10
B6(7)-30-10-F
B6(7)-30-10-P
BC6(7)-30-10

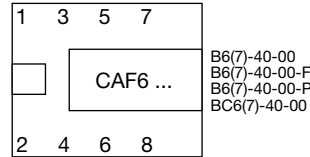


B6(7)-30-01
B6(7)-30-01-F
B6(7)-30-01-P
BC6(7)-30-01

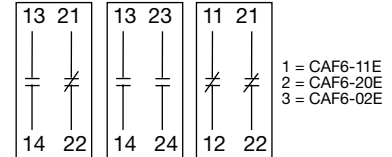


K6 ...
K6 ... F
K6 ... P
KC6 ...

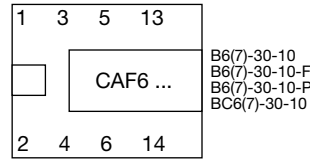
Front mounted auxiliary contact blocks



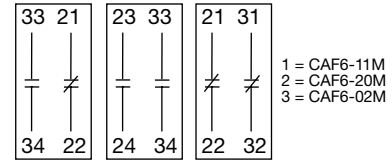
B6(7)-40-00
B6(7)-40-00-F
B6(7)-40-00-P
BC6(7)-40-00



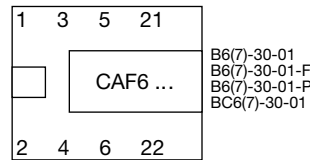
1 = CAF6-11E
2 = CAF6-20E
3 = CAF6-02E



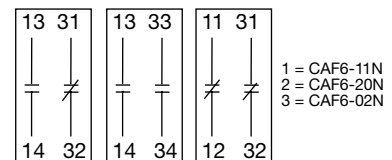
B6(7)-30-10
B6(7)-30-10-F
B6(7)-30-10-P
BC6(7)-30-10



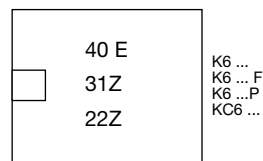
1 = CAF6-11M
2 = CAF6-20M
3 = CAF6-02M



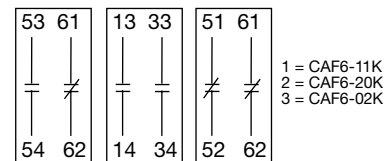
B6(7)-30-01
B6(7)-30-01-F
B6(7)-30-01-P
BC6(7)-30-01



1 = CAF6-11N
2 = CAF6-20N
3 = CAF6-02N



K6 ...
K6 ... F
K6 ... P
KC6 ...



1 = CAF6-11K
2 = CAF6-20K
3 = CAF6-02K

NOTE: Only side mounted type or front mounted type auxiliary contact blocks can be used at one time. Auxiliary contact blocks must not be mounted on Interface contactors, Interface control relays or contactors for connection to PLCs. Two CAF 6 front mounted auxiliary contact blocks can be installed on the mechanically interlocked contactors VB(C)6(7).

IEC Technical data

AF09(Z)...AF38(Z), 3-pole

Utilization characteristics

Across the line
Contactors

1

Main pole - Utilization characteristics according to IEC

Contactors types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38	
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1						
Rated operational voltage U _e max.		690 V						
Rated frequency (without derating)		50 / 60 Hz						
Conventional free-air thermal current I _{th}								
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$		35 A	35 A	35 A	50 A	50 A	50 A	
With conductor cross-sectional area		6 mm ²	6 mm ²	6 mm ²	10 mm ²	10 mm ²	10 mm ²	
AC-1 Utilization category								
For air temperature close to contactor								
I_e / Rated operational current AC-1								
$\theta \leq 40^\circ\text{C}$		25 A	28 A	30 A	45 A	50 A	50 A	
U _e max. $\leq 690\text{ V}$, 50/60 Hz		$\theta \leq 60^\circ\text{C}$	25 A	28 A	30 A	40 A	42 A	42 A
		$\theta \leq 70^\circ\text{C}$	22 A	24 A	26 A	32 A	37 A	37 A
With conductor cross-sectional area		4 mm ²	6 mm ²	6 mm ²	10 mm ²	10 mm ²	10 mm ²	
AC-3 Utilization category								
For air temperature close to contactor $\theta \leq 60^\circ\text{C}$								
I_e / Max. rated operational current AC-3 (1)								
		220-230-240 V	9 A	12 A	18 A	26 A	33 A	40 A
		380-400 V	9 A	12 A	18 A	26 A	32 A	38 A
		415 V	9 A	12 A	18 A	26 A	32 A	38 A
		440 V	9 A	12 A	18 A	26 A	32 A	38 A
		500 V	9.5 A	12.5 A	15 A	23 A	28 A	33 A
		690 V	7 A	9 A	10.5 A	17 A	21 A	24 A
		220-230-240 V	2.2 kW	3 kW	4 kW	6.5 kW	9 kW	11 kW
		380-400 V	4 kW	5.5 kW	7.5 kW	11 kW	15 kW	18.5 kW
		415 V	4 kW	5.5 kW	9 kW	11 kW	15 kW	18.5 kW
		440 V	4 kW	5.5 kW	9 kW	15 kW	18.5 kW	22 kW
		500 V	5.5 kW	7.5 kW	9 kW	15 kW	18.5 kW	22 kW
		690 V	5.5 kW	7.5 kW	9 kW	15 kW	18.5 kW	22 kW
Rated making capacity AC-3		10 x I _e AC-3 acc. to IEC 60947-4-1						
Rated breaking capacity AC-3		8 x I _e AC-3 acc. to IEC 60947-4-1						
AC-8a Utilization category								
(without thermal overload relay - U _e 400 V 50/60 Hz - $\theta \leq 40^\circ\text{C}$)								
I_e / Rated operational current AC-8a		12 A	16 A	22 A	30 A	40 A	50 A	
Rated operational power AC-8a		5.5 kW	7.5 kW	11 kW	15 kW	20 kW	25 kW	
Short-circuit protection device for contactors								
without thermal overload relay - Motor protection excluded (2)								
U _e $\leq 500\text{ V AC}$ - gG type fuse		25 A	32 A	32 A	50 A	63 A	63 A	
Rated short-time withstand current I_{cw}								
at 40 °C ambient temperature,		1 s	300 A	300 A	300 A	700 A	700 A	700 A
in free air from a cold state		10 s	150 A	150 A	150 A	350 A	350 A	350 A
		30 s	80 A	80 A	80 A	225 A	225 A	225 A
		1 min	60 A	60 A	60 A	150 A	150 A	150 A
		15 min	35 A	35 A	35 A	50 A	50 A	50 A
Maximum breaking capacity								
cos $\phi = 0.45$		at 440 V	250 A	250 A	250 A	500 A	500 A	500 A
		at 690 V	106 A	106 A	106 A	200 A	200 A	200 A
Power dissipation per pole								
		I _e / AC-1	0.8 W	1 W	1.2 W	1.8 W	2.4 W	2.4 W
		I _e / AC-3	0.1 W	0.2 W	0.35 W	0.6 W	0.9 W	1.3 W
Max. electrical switching frequency								
		AC-1	600 cycles/h					
		AC-3	1200 cycles/h					
		AC-2, AC-4	300 cycles/h			150 cycles/h		

Note: total power loss = power dissipation per pole x number of poles + coil consumption.

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
 (2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

IEC Technical data

A/E/L40, A/E/F50.../AF110, 3-pole

Utilization characteristics

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	A40	A50	A63	A75	A95	A110
	DC operated	AL40	AE50	AE63	AE75	–	–
		TAL40	TAE50	–	TAE75	–	–
	AC / DC operated	–	AF50	AF63	AF75	AF95	AF110
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1						
Rated operational voltage U_e max.	690 V		1000 V (690 V for AF.. contactors)			1000 V	
Rated frequency (without derating)	50/60 Hz						
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$		65 A	100 A	125 A	125 A	145 A	160 A
With conductor cross-sectional area		16 mm ²	35 mm ²	50 mm ²	50 mm ²	50 mm ²	70 mm ²
AC-1 Utilization category For air temperature close to contactor							
I_e / Rated operational current AC-1	$\theta \leq 40^\circ\text{C}$	60 A	100 A	115 A	125 A	145 A	160 A
U _e max. $\leq 690\text{ V}, 50/60\text{ Hz}$	$\theta \leq 55^\circ\text{C}$	60 A	85 A	95 A	105 A	135 A	145 A
	$\theta \leq 70^\circ\text{C}$ (3)	42 A	70 A	80 A	85 A	115 A	130 A
With conductor cross-sectional area		16 mm ²	35 mm ²	50 mm ²	50 mm ²	50 mm ²	70 mm ²
AC-3 Utilization category For air temperature close to contactor $\theta \leq 55^\circ\text{C}$							
I_e / Max. rated operational current AC-3 (1)							
	220-230-240 V	40 A	53 A	65 A	75 A	96 A	110 A
	380-400 V	37 A	50 A	65 A	75 A	96 A	110 A
	415 V	37 A	50 A	65 A	75 A	96 A	110 A
	440 V	37 A	45 A	65 A	70 A	93 A	100 A
	500 V	33 A	45 A	55 A	65 A	80 A	100 A
	690 V	25 A (4)	35 A	43 A	46 A	65 A	82 A
	1000 V	–	23 A (6)	25 A (6)	28 A (6)	30 A	30 A
Rated operational power AC-3 (1)							
	220-230-240 V	11 kW	15 kW	18.5 kW	22 kW	25 kW	30 kW
	380-400 V	18.5 kW	22 kW	30 kW	37 kW	45 kW	55 kW
	415 V	18.5 kW	25 kW	37 kW	40 kW	55 kW	59 kW
	440 V	22 kW	25 kW	37 kW	40 kW	55 kW	59 kW
	500 V	22 kW	30 kW	37 kW	45 kW	55 kW	59 kW
	690 V	22 kW (4)	30 kW	37 kW	40 kW	55 kW	75 kW
	1000 V	–	30 kW (6)	33 kW (6)	37 kW (6)	40 kW	40 kW
Rated making capacity AC-3	10 x I _e AC-3 acc. to IEC 60947-4-1						
Rated breaking capacity AC-3	8 x I _e AC-3 acc. to IEC 60947-4-1						
AC-8a Utilization category (without thermal overload relay - U _e 400 V 50/60 Hz - $\theta \leq 40^\circ\text{C}$)							
I_e / Rated operational current AC-8a		50 A	63 A	85 A	95 A	120 A	140 A
Rated operational power AC-8a		22 kW	30 kW	45 kW	45 kW	55 kW	75 kW
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded (2)							
U _e $\leq 500\text{ V AC}$ - gG type fuse		63 A	100 A	125 A	160 A	160 A	200 A
Rated short-time withstand current I_{cw} at 40 °C ambient temperature, in free air from a cold state	1 s	600 A	1000 A			1320 A	
	10 s	400 A	650 A			800 A	
	30 s	225 A	370 A			500 A	
	1 min	150 A	250 A			350 A	
	15 min	65 A	110 A	135 A	135 A	160 A	175 A
Maximum breaking capacity cos $\phi = 0.45$	at 440 V	820 A (5)	1300 A			1160 A	
(cos $\phi = 0.35$ for I _e > 100 A)	at 690 V	340 A (5)	630 A			800 A	
Power dissipation per pole	I_e / AC-1	3 W	5 W	6.5 W	7 W	6.5 W	7.5 W
	I_e / AC-3	1.3 W	1.3 W	1.5 W	2 W	2.7 W	3.6 W
Max. electrical switching frequency	AC-1	600 cycles/h	600 cycles/h (300 for AF., AE., TAE.)			300 cycles/h	
	AC-3	1200 cycles/h	600 cycles/h (300 for AF., AE., TAE.)			300 cycles/h	
	AC-2, AC-4	300 cycles/h	150 cycles/h				

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m. 50 Hz or 1800 r.p.m. 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

(3) Unauthorized for TAL., TAE.. contactors.

(4) AC-3, 690 V values for AL40 and TAL40 contactors: 18.5 kW, I_e = 21 A.

(5) Max. breaking capacity for AL40 and TAL40 contactors: 470 A at 440 V, 175 A at 690 V.

(6) AF contactors excluded.

IEC Technical data

A/F145...AF300, 3-pole

Utilization characteristics

Across the line
Contactors

1

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	A145	A185	A210	A260	A300
	AC / DC operated	AF145	AF185	AF210	AF260	AF300
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1				
Rated operational voltage U_e max.		1000 V		690 V		
Rated frequency (without derating)		50/60 Hz				
Conventional free-air thermal current I_{th}						
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$		250 A	275 A	350 A	400 A	500 A (4)
With conductor cross-sectional area (3)		120 mm ²	150 mm ²	185 mm ²	240 mm ²	300 mm ² (4)
AC-1 Utilization category						
For air temperature close to contactor						
I_e / Rated operational current AC-1	$\theta \leq 40^\circ\text{C}$	250 A	275 A	350 A	400 A	500 A (4)
U _e max. $\leq 690\text{ V}$, 50/60 Hz	$\theta \leq 55^\circ\text{C}$	230 A	250 A	300 A	350 A	400 A (4)
	$\theta \leq 70^\circ\text{C}$	180 A	180 A	240 A	290 A	325 A (4)
I_e / Rated operational current AC-1	$\theta \leq 40^\circ\text{C}$	180 A	200 A	–	–	–
U _e max. $\leq 1000\text{ V}$, 50/60 Hz	$\theta \leq 55^\circ\text{C}$	180 A	200 A	–	–	–
	$\theta \leq 70^\circ\text{C}$	180 A	180 A	–	–	–
With conductor cross-sectional area		120 mm ²	150 mm ²	185 mm ²	240 mm ²	300 mm ² (4)
AC-3 Utilization category						
For air temperature close to contactor $\theta \leq 55^\circ\text{C}$						
I_e / Max. rated operational current AC-3 (1)						
	220-230-240 V	145 A	185 A	210 A	260 A	305 A
	380-400 V	145 A	185 A	210 A	260 A	305 A
	415 V	145 A	185 A	210 A	260 A	300 A
	440 V	145 A	185 A	210 A	240 A	280 A
	500 V	145 A	170 A	210 A	240 A	280 A
	690 V	120 A	170 A	210 A	220 A	280 A
	1000 V	80 A	95 A	–	–	–
Rated operational power AC-3 (1)						
	220-230-240 V	45 kW	55 kW	59 kW	80 kW	90 kW
	380-400 V	75 kW	90 kW	110 kW	140 kW	160 kW
	415 V	75 kW	90 kW	110 kW	140 kW	160 kW
	440 V	75 kW	90 kW	110 kW	140 kW	160 kW
	500 V	90 kW	110 kW	132 kW	180 kW	200 kW
	690 V	110 kW	132 kW	160 kW	200 kW	250 kW
	1000 V	110 kW	132 kW	–	–	–
Rated making capacity AC-3		10 x I _e AC-3 acc. to IEC 60947-4-1				
Rated breaking capacity AC-3		8 x I _e AC-3 acc. to IEC 60947-4-1				
Short-circuit protection device for contactors						
without thermal overload relay - Motor protection excluded (2)						
U _e $\leq 500\text{ V}$ AC - gG type fuse		315 A	355 A	400 A	500 A	500 A
Rated short-time withstand current I_{cw}						
at 40 °C ambient temperature,	1 s	1800 A	2000 A	2500 A	3500 A	3500 A
in free air from a cold state	10 s	1200 A	1500 A	1700 A	2400 A	2400 A
	30 s	800 A	1000 A	1200 A	1500 A	1500 A
	1 min	600 A	800 A	1000 A	1100 A	1100 A
	15 min	280 A	320 A	400 A	500 A	500 A
Maximum breaking capacity						
cos $\phi = 0.45$	at 440 V	1500 A	2000 A	2300 A	2600 A	3000 A
(cos $\phi = 0.35$ for I _e > 100 A)	at 690 V	1200 A	1600 A	2000 A	2400 A	2500 A
Power dissipation per pole	I _e / AC-1	13 W	16 W	18 W	25 W	32 W
	I _e / AC-3	5 W	8 W	9 W	14 W	18 W
Max. electrical switching frequency						
	AC-1	300 cycles/h		300 cycles/h		
	AC-3	300 cycles/h		300 cycles/h		
	AC-2, AC-4	150 cycles/h		150 cycles/h		



3-phase motors



1500 r.p.m. 50 Hz
1800 r.p.m. 60 Hz
3-phase motors

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m. 50 Hz or 1800 r.p.m. 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

(3) Conductors with preparation.

(4) Use terminal extension / enlargement pieces (LX 300 / LW 300).

IEC Technical data

AF400...AF2050, 3-pole

Utilization characteristics

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage U _e max.		1000 V							
Rated frequency (without derating)		50/60 Hz							
Conventional free-air thermal current I _{th}									
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		600 A	700 A	800 A	1050 A	1260 A	1350 A	1650 A	2050 A
With conductor cross-sectional area (3)		2x185 mm ²	2x240 mm ²	2x240 mm ²	800 mm ² (4)	1000 mm ² (4)	1000 mm ² (5)	1500 mm ² (5)	2000 mm ² (5)
AC-1 Utilization category									
For air temperature close to contactor									
I_e / Rated operational current AC-1	θ ≤ 40 °C	600 A	700 A	800 A	1050 A	1260 A	1350 A	1650 A	2050 A
U _e max. ≤ 690 V, 50/60 Hz	θ ≤ 55 °C	500 A	600 A	700 A	875 A	1040 A	1150 A	1450 A	1750 A
	θ ≤ 70 °C	400 A	480 A	580 A	720 A	875 A	1000 A	1270 A	1500 A
I_e / Rated operational current AC-1	θ ≤ 40 °C	600 A	700 A	800 A	1000 A	1260 A	1350 A	1650 A	2050 A
U _e max. ≤ 1000 V, 50/60 Hz	θ ≤ 55 °C	500 A	600 A	700 A	875 A	1040 A	1150 A	1450 A	1750 A
	θ ≤ 70 °C	400 A	480 A	580 A	720 A	875 A	1000 A	1270 A	1500 A
With conductor cross-sectional area		2x185 mm ²	2x240 mm ²	2x240 mm ²	800 mm ² (4)	1000 mm ² (4)	1000 mm ² (5)	1500 mm ² (5)	2000 mm ² (5)
AC-3 Utilization category									
For air temperature close to contactor θ ≤ 55 °C									
I_e / Max. rated operational current AC-3 (1)									
	220-230-240 V	400 A	460 A	580 A	750 A	–	860 A	1050 A	–
	380-400 V	400 A	460 A	580 A	750 A	–	860 A	1050 A	–
	415 V	400 A	460 A	580 A	750 A	–	860 A	1050 A	–
	440 V	400 A	460 A	580 A	750 A	–	860 A	1050 A	–
	500 V	400 A	460 A	580 A	750 A	–	800 A	950 A	–
	690 V	350 A	400 A	500 A	650 A	–	800 A	950 A	–
	1000 V	155 A	200 A	250 A	300 A	–	–	–	–
Rated operational power AC-3 (1)									
	220-230-240 V	110 kW	132 kW	160 kW	220 kW	–	257 kW	315 kW	–
	380-400 V	200 kW	250 kW	315 kW	400 kW	–	475 kW	560 kW	–
	415 V	220 kW	250 kW	355 kW	425 kW	–	500 kW	600 kW	–
	440 V	220 kW	250 kW	355 kW	450 kW	–	560 kW	670 kW	–
	500 V	250 kW	315 kW	400 kW	520 kW	–	560 kW	700 kW	–
	690 V	315 kW	355 kW	500 kW	600 kW	–	750 kW	900 kW	–
	1000 V	220 kW	280 kW	355 kW	400 kW	–	–	–	–
Rated making capacity AC-3		10 x I _e AC-3 acc. to IEC 60947-4-1							
Rated breaking capacity AC-3		8 x I _e AC-3 acc. to IEC 60947-4-1							
Short-circuit protection device for contactors									
without thermal overload relay - Motor protection excluded (2)									
U _e ≤ 500 V AC - gG type fuse		630 A	800 A	1000 A	1000 A	Please consult us for coordination with circuit-breaker			
Rated short-time withstand current I_{cw}									
at 40 °C ambient temperature, in free air from a cold state									
	1 s	4600 A	4600 A	7000 A	7000 A	8000 A	10000 A	12000 A	12000 A
	10 s	4400 A	4400 A	6400 A	6400 A	7200 A	8000 A	10000 A	10000 A
	30 s	3100 A	3100 A	4500 A	4500 A	5200 A	6000 A	7500 A	7500 A
	1 min	2500 A	2500 A	3500 A	3500 A	4000 A	4500 A	5500 A	5500 A
	15 min	840 A	840 A	1300 A	1300 A	1500 A	1600 A	2200 A	2200 A
Maximum breaking capacity									
cos φ = 0.45									
	at 440 V	4000 A	5000 A	6000 A	7500 A	–	10000 A	12000 A	8400 A
(cos φ = 0.35 for I _e > 100 A)	at 690 V	3500 A	4500 A	5000 A	7000 A	–	–	–	–
Power dissipation per pole									
	I _e / AC-1	30 W	42 W	32 W	50 W	80 W	80 W	80 W	125 W
	I _e / AC-3	16 W	21 W	17 W	28 W	–	50 W	50 W	–
Max. electrical switching frequency									
	AC-1	300 cycles/h		300 cycles/h		300 cycles/h	60 cycles/h		60 cycles/h
	AC-3	300 cycles/h		300 cycles/h		–	60 cycles/h		–
	AC-2, AC-4	60 cycles/h		60 cycles/h		–	60 cycles/h		–



3-phase motors



1500 r.p.m. 50 Hz
1800 r.p.m. 60 Hz
3-phase motors

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

(3) Conductors with preparation.

(4) Max. connection bar width 50 mm.

(5) Max. connection bar width 100 mm.

UL/NEMA/CSA Technical data

AF09(Z)...AF38(Z); AF09N00(Z)...AF26N1(Z), 3-pole

Utilization characteristics

Across the line
Contactors

1

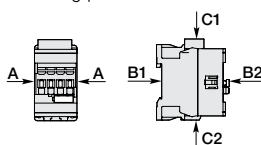
Main pole - Utilization characteristics according to UL / NEMA / CSA

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Standards		UL 508, CSA C22.2 N°14					
Max. operational voltage		600 V					
NEMA size		00	0	-	1	-	-
NEMA continuous amp rating	Thermal current	9 A	18 A		27 A		
NEMA maximum horse power ratings 1-phase, 60 Hz	115 V AC	1/3 hp	1 hp		2 hp		
	230 V AC	1 hp	2 hp		3 hp		
NEMA maximum horse power ratings 3-phase, 60 Hz	200 V AC	1-1/2 hp	3 hp		7-1/2 hp		
	230 V AC	1-1/2 hp	3 hp		7-1/2 hp		
	460 V AC	2 hp	5 hp		10 hp		
	575 V AC	2 hp	5 hp		10 hp		
UL / CSA general use rating							
600 V AC		25 A	28 A	30 A	45 A	50 A	50 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 10	AWG 8	AWG 8	AWG 8
UL / CSA maximum 1-phase motor rating							
Full load current	120 V AC	13.8 A	16 A	20 A	24 A	24 A	24 A
	240 V AC	10 A	12 A	17 A	17 A	28 A	28 A
Horse power rating	120 V AC	3/4 hp	1 hp	1-1/2 hp	2 hp	2 hp	2 hp
	240 V AC	1-1/2 hp	2 hp	3 hp	3 hp	5 hp	5 hp
UL / CSA maximum 3-phase motor rating							
Full load current (1)	200-208 V AC	7.8 A	11 A	17.5 A	25.3 A	32.2 A	32.2 A
	220-240 V AC	6.8 A	9.6 A	15.2 A	22 A	28 A	28 A
	440-480 V AC	7.6 A	11 A	14 A	21 A	27 A	27 A
	550-600 V AC	9 A	11 A	17 A	22 A	27 A (2)	27 A (2)
Horse power rating (1)	200-208 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp
	220-240 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp
	440-480 V AC	5 hp	7-1/2 hp	10 hp	15 hp	20 hp	20 hp
	550-600 V AC	7-1/2 hp	10 hp	15 hp	20 hp	25 hp (2)	25 hp (2)
Max. electrical switching frequency							
For general use		600 cycles/h					
For motor use		1200 cycles/h					

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
 (2) For contactors produced since week 49-2011.

General technical data

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Rated insulation voltage Ui		690 V					
acc. to IEC 60947-4-1		600 V					
acc. to UL / CSA		6 kV					
Rated impulse withstand voltage Uimp.		6 kV					
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A					
Ambient air temperature close to contactor							
Operation	Fitted with thermal overload relay	-25...+60 °C					
	Without thermal overload relay	-40...+70 °C					
Storage		-60...+80 °C					
Climatic withstand		Category B according to IEC 60947-1 Annex Q					
Maximum operating altitude (without derating)		3000 m					
Mechanical durability							
Number of operating cycles		10 millions operating cycles					
Max. switching frequency		3600 cycles/h					
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27							
Mounting position 1							
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position					
	A	30 g					
	B1	25 g closed position / 5 g open position					
	B2	15 g					
	C1	25 g					
	C2	25 g					
Vibration withstand		5...300 Hz					
acc. to IEC 60068-2-6		4 g closed position / 2 g open position					



UL/NEMA/CSA Technical data

A/E/L40; A/E/F50...A/F110, A/E/F50N2...A/E/F75N3, 3-pole Utilization characteristics

Main pole - Utilization characteristics according to UL / NEMA / CSA

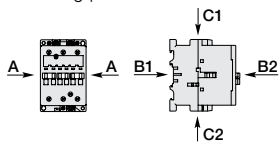
Contactor types	AC operated	A40	A50	A63	A75	A95	A110
	DC operated	AL40, TAL40	AE50, TAE50	AE63	AE75, TAE75	-	-
	AC / DC operated	-	AF50	AF63	AF75	AF95	AF110
Standards		UL 508, CSA C22.2 N°14					
Max. operational voltage		600 V					
NEMA size		-	2	-	3	-	-
NEMA continuous amp rating	Thermal current	-	45 A	-	90 A	-	-
NEMA maximum horse power ratings 1-phase, 60 Hz							
	115 V AC	-	3 hp	-	-	-	-
	230 V AC	-	7-1/2	-	-	-	-
NEMA maximum horse power ratings 3-phase, 60 Hz							
	200 V AC	-	10 hp	-	25 hp	-	-
	230 V AC	-	15 hp	-	30 hp	-	-
	460 V AC	-	25 hp	-	50 hp	-	-
	575 V AC	-	25 hp	-	50 hp	-	-
UL / CSA general use rating							
600 V AC		60 A	80 A	90 A	105 A	125 A	150 A
With conductor cross-sectional area		AWG 6	AWG 4	AWG 3	AWG 2	AWG 1	AWG 1/0
UL / CSA maximum 1-phase motor rating							
Full load current	120 V AC	34 A	34 A	56 A	80 A	80 A	100 A
	240 V AC	40 A	40 A	50 A	68 A	88 A	110 A
Horse power rating	120 V AC	3 hp	3 hp	5 hp	7.5 hp	7.5 hp	10 hp
	240 V AC	7.5 hp	7.5 hp	10 hp	15 hp	20 hp	25 hp
UL / CSA maximum 3-phase motor rating							
Full load current (1)	200-208 V AC	32.2 A	48.3 A	62.1 A	78.2 A	92 A	92 A
	220-240 V AC	42 A	54 A	68 A	80 A	80 A	104 A
	440-480 V AC	40 A	52 A	77 A	77 A	77 A	96 A
	550-600 V AC	41 A	52 A	77 A	77 A	77 A	99 A
Horse power rating (1)	200-208 V AC	10 hp	15 hp	20 hp	25 hp	30 hp	30 hp
	220-240 V AC	15 hp	20 hp	25 hp	30 hp	30 hp	40 hp
	440-480 V AC	30 hp	40 hp	60 hp	60 hp	60 hp	75 hp
	550-600 V AC	40 hp	50 hp	75 hp	75 hp	75 hp	100 hp
Max. electrical switching frequency							
For general use		600 cycles/h	600 cycles/h (300 for AF..., AE...)			300 cycles/h	-
For motor use		1200 cycles/h	600 cycles/h (300 for AF..., AE...)			300 cycles/h	-

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

Contactor types	AC operated	A40	A50	A63	A75	A95	A110
	DC operated	AL40, TAL40	AE50, TAE50	AE63	AE75, TAE75	-	-
	AC / DC operated	-	AF50	AF63	AF75	AF95	AF110
Rated insulation voltage Ui		1000 V					
acc. to IEC 60947-4-1		600 V					
acc. to UL		8 kV					
Rated impulse withstand voltage Uimp.		8 kV					
Electromagnetic compatibility		AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A					
Ambient air temperature close to contactor							
Operation	Fitted with thermal overload relay	-25...+55 °C					
	Without thermal overload relay	-40...+70 °C (55 °C max. for TAL..., and TAE... contactor)					
Storage		-60...+80 °C					-40...+70 °C
Climatic withstand		acc. to IEC 60068-2-30 and 60068-2-11 UTE C 63-100 specification II					acc. to IEC 60068-2-30
Maximum operating altitude (without derating)		3000 m					
Mechanical durability							
Number of operating cycles		10 millions operating cycles (5 millions for AE... and TAE...)					
Max. switching frequency		3600 cycles/h (300 for AF contactors)					
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27							
Mounting position 1							
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position (2)					
	A	20 g					For AL40, TAL40 A : 20 g closed position / 10 g open position B1 : 15 g closed position / 5 g open position B2 : 10 g closed position / 10 g open position C1 : 20 g closed position / 8 g open position C2 : 14 g closed position / 8 g open position
	B1	10 g closed position / 5 g open position					
	B2	15 g					
	C1	20 g					
	C2	20 g					

(2) These values are not valid for rail mounting with contactors A95 ... A110 and AF95 ... AF110.



UL/NEMA/CSA Technical data

A/F145...A/F300; A/F145N4...A/F260N5, 3-pole

Utilization characteristics

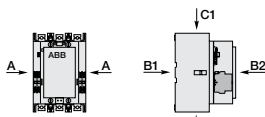
Main pole - Utilization characteristics according to UL / NEMA / CSA

Contactor types	AC operated	A145	A185	A210	A260	A300
	AC / DC operated	AF145	AF185	AF210	AF260	AF300
Standards		UL 508, CSA C22.2 N°14				
Max. operational voltage		600 V				
NEMA size		4	-	-	5	-
NEMA maximum horse power ratings 1-phase, 60 Hz	115 V AC	-	-	-	-	-
	230 V AC	-	-	-	-	-
NEMA maximum horse power ratings 3-phase, 60 Hz	200 V AC	40 hp			75 hp	
	230 V AC	50 hp			100 hp	
	460 V AC	100 hp			200 hp	
	575 V AC	200 hp			200 hp	
UL / CSA general use rating						
600 V AC		230 A	250 A	300 A	350 A	400 A
UL / CSA maximum 1-phase motor rating						
Full load current	240 V AC	-	-	-	-	-
Horse power rating	240 V AC	-	-	-	-	-
UL / CSA maximum 3-phase motor rating						
Full load current (1)	200-208 V AC	119.6 A	149.5 A	166.8 A	220.8 A	285.2 A
	220-240 V AC	130 A	145 A	192 A	248 A	248 A
	440-480 V AC	124 A	156 A	180 A	240 A	302 A
	550-600 V AC	125 A	144 A	192 A	242 A	289 A
Horse power rating (1)	200-208 V AC	40 hp	50 hp	60 hp	75 hp	100 hp
	220-240 V AC	50 hp	60 hp	75 hp	100 hp	100 hp
	440-480 V AC	100 hp	125 hp	150 hp	200 hp	250 hp
	550-600 V AC	125 hp	150 hp	200 hp	250 hp	300 hp
Max. electrical switching frequency						
For general use		300 cycles/h				
For motor use		300 cycles/h				

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

Contactor types	AC operated	A145	A185	A210	A260	A300
	AC / DC operated	AF145	AF185	AF210	AF260	AF300
Rated insulation voltage Ui		1000 V				
acc. to IEC 60947-4-1		1000 V				
acc. to UL		600 V				
Rated impulse withstand voltage Uimp.		8 kV				
Electromagnetic compatibility		AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A				
Ambient air temperature close to contactor						
Operation	Fitted with thermal overload relay	-25 to +55 °C				
	Fitted with electronic overload relay	-25 to +70 °C				
	Without electronic overload relay	-40 to +70 °C				
Storage		-40 to +70 °C				
Climatic withstand		acc. to IEC 60068-2-30				
Maximum operating altitude (without derating)		3000 m				
Mechanical durability						
Number of operating cycles		5 millions operating cycles				
Max. switching frequency		3600 cycles/h (300 for AF... contactors)				
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27						
Mounting position 1						
	Shock direction	1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position				
	A	5 g				
	B1	5 g				
	B2	5 g				
	C1	5 g				
	C2	5 g				



UL/NEMA/CSA Technical data

AF400...AF2050; AF460N6...AF1650N8, 3-pole

Utilization characteristics

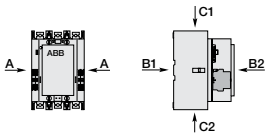
Main pole - Utilization characteristics according to UL / NEMA / CSA

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	
Standards		UL 508, CSA C22.2 N°14								
Max. operational voltage		600 V								
NEMA size		-	6	-	7	-	-	8	-	
NEMA maximum horse power ratings 1-phase, 60 Hz										
	115 V AC	-	-	-	-	-	-	-	-	
	230 V AC	-	-	-	-	-	-	-	-	
NEMA maximum horse power ratings 3-phase, 60 Hz										
	200 V AC	-	150 hp	-	-	-	-	-	-	
	230 V AC	-	200 hp	-	300 hp	-	-	450 hp	-	
	460 V AC	-	400 hp	-	600 hp	-	-	900 hp	-	
	575 V AC	-	400 hp	-	600 hp	-	-	900 hp	-	
UL / CSA general use rating										
600 V AC		550 A	650 A	750 A	900 A	1210 A	1350 A	1650 A	2100 A	
UL / CSA maximum 1-phase motor rating										
Full load current	120 V AC	-	-	-	-	-	-	-	-	
	240 V AC	-	-	-	-	-	-	-	-	
Horse power rating	120 V AC	-	-	-	-	-	-	-	-	
	240 V AC	-	-	-	-	-	-	-	-	
UL / CSA maximum 3-phase motor rating										
Full load current (1)	200-208 V AC	358.8 A	414 A	552 A	692.3 A	-	954 A	1030 A	-	
	220-240 V AC	360 A	480 A	604 A	722 A	-	954 A	1030 A	-	
	440-480 V AC	414 A	477 A	590 A	722 A	-	954 A	1030 A	-	
	550-600 V AC	382 A	472 A	578 A	672 A	-	944 A	1050 A	-	
Horse power rating (1)	200-208 V AC	125 hp	150 hp	200 hp	250 hp	-	-	-	-	
	220-240 V AC	150 hp	200 hp	250 hp	300 hp	-	400 A	450 hp	-	
	440-480 V AC	350 hp	400 hp	500 hp	600 hp	-	800 A	900 hp	-	
	550-600 V AC	400 hp	500 hp	600 hp	700 hp	-	1000 A	1150 hp	-	
Short-circuit protection device for contactors										
without thermal overload relay - Motor protection excluded										
Fuse rating		1000 A		1200 A		Please consult us for coordination with circuit-breaker				
Fuse type, 600 V		L								
Max. electrical switching frequency										
For general use		300 cycles/h					60 cycles/h			
For motor use		300 cycles/h					60 cycles/h			

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m., 50 Hz or 1800 r.p.m., 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	
Rated insulation voltage Ui										
acc. to IEC 60947-4-1		1000 V								
acc. to UL		600 V								
Rated impulse withstand voltage Uimp		8 kV								
Electromagnetic compatibility		AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A								
Ambient air temperature close to contactor										
Operation	Fitted with electronic overload relay	-25 to +70 °C								
	Without electronic overload relay	-40 to +70 °C								
Storage		-40 to +70 °C								
Climatic withstand		acc. to IEC 60068-2-30								
Maximum operating altitude (without derating)		3000 m								
Mechanical durability										
Number of operating cycles		3 millions operating cycles				0.5 million operating cycles				
Max. switching frequency		300 cycles/h					60 cycles/h			
Shock withstand										
acc. to IEC 60068-2-27 and EN 60068-2-27										
Mounting position 1										
	Shock direction	1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position								
	A	5 g				-				
	B1	5 g				-				
	B2	5 g				-				
	C1	5 g				-				
	C2	5 g				-				



General technical data

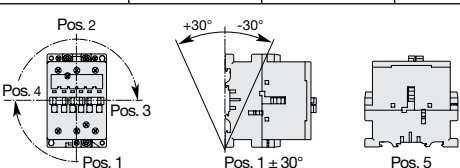
AF09(Z)...AF38(Z), 3-pole

Coil & mounting characteristics

Magnet system characteristics

Contactor types		AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Coil operating limits acc. to IEC 60947-4-1		AC supply	At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$ At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min...} U_c \text{ max.}$					
		DC supply	At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$ At $\theta \leq 70^\circ\text{C}$ (AF) $0.85 \times U_c \text{ min...} U_c \text{ max.}$ - (AF..Z) $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$					
AC control voltage 50/60 Hz	Rated control circuit voltage U_c		24...500 V AC					
	Coil consumption	Average pull-in value	(AF) 50 VA - (AF..Z) 16 VA					
		Average holding value	(AF) 2.2 VA / 2 W - (AF..Z) 1.7 VA / 1.5 W					
DC control voltage	Rated control circuit voltage U_c		12...500 V DC					
	Coil consumption	Average pull-in value	(AF) 50 W - (AF..Z) 12...16 W					
		Average holding value	(AF) 2 W - (AF..Z) 1.7 W					
PLC-output control			(AF..Z) $\geq 500 \text{ mA}$ 24 V DC					
Drop-out voltage			$\leq 60\%$ of $U_c \text{ min.}$					
Voltage sag immunity acc. to SEMI F47-0706			(AF..Z) conditions of use on request					
Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$			(AF..Z) 22 ms average					
Operating time	Between coil energization and:	N.O. contact closing	40...95 ms					
		N.C. contact opening	38...90 ms					
	Between coil de-energization and:	N.O. contact opening	11...95 ms					
		N.C. contact closing	13...98 ms					

Mounting characteristics and conditions for use

Contactor types		AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Mounting positions								
Mounting distances			Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF09 ... AF38					
Fixing	On rail according to IEC 60715, EN 60715		The contactors can be assembled side by side 35 x 7.5 mm or 35 x 15 mm					
	By screws (not supplied)		2 x M4 screws placed diagonally					

General technical data

A40...A110, 3-pole

Coil & mounting characteristics

Magnet system characteristics

Contactor types	AC operated	A40	A50	A63	A75	A95	A110	
Coil operating limits acc. to IEC 60947-4-1	AC supply	At $\theta \leq 55^\circ\text{C}$ $0.85...1.1 \times U_c$					at $\theta \leq 70^\circ\text{C}$ $0.85...1.1 \times U_c$	
AC control voltage	Rated control circuit voltage U_c	at 50 Hz 24...690 V						
		at 60 Hz 24...690 V						
Coil consumption	Average pull-in value	50 Hz	120 VA	180 VA			350 VA	
		60 Hz	140 VA	210 VA			450 VA	
	50/60 Hz (1)	125 VA / 120 VA	190 VA / 180 VA			410 VA / 365 VA		
	Average holding value	50 Hz	12 VA / 3 W	18 VA / 5.5 W			22 VA / 6.5 W	
		60 Hz	12 VA / 3 W	18 VA / 5.5 W			26 VA / 8 W	
50/60 Hz (1)		12 VA / 3 W	18 VA / 5.5 W			27 VA / 7.5 W		
Drop-out voltage		Approx. 40...65 % of U_c						
Operating time								
Between coil energization and:	N.O. contact closing	8...21 ms	8...27 ms			10...25 ms		
	N.C. contact opening	6...18 ms	7...22 ms			7...22 ms		
Between coil de-energization and:	N.O. contact opening	4...11 ms	4...11 ms			7...15 ms		
	N.C. contact closing	7...14 ms	7...14 ms			10...18 ms		

(1) 50/60 Hz coils: see "Voltage code table".

Mounting characteristics and conditions for use

Contactor types	AC operated	A40	A50	A63	A75	A95	A110
Mounting positions							
Control voltage / Ambient temperature		Max. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor A40 ... A110					
Mounting positions	1, $1\pm 30^\circ$, 2, 3, 4, 5	at $\theta \leq 55^\circ\text{C}$	$0.85...1.1 \times U_c$			$0.85...1.1 \times U_c$	
		at $\theta \leq 70^\circ\text{C}$	U_c			$0.85...1.1 \times U_c$	
	6	at $\theta \leq 55^\circ\text{C}$	$0.95...1.1 \times U_c$			Unauthorized	
		at $\theta \leq 70^\circ\text{C}$	Unauthorized			Unauthorized	
Mounting distances		The contactors can be assembled side by side					
Fixing	On rail according to IEC 60715, EN 60715	35 x 7.5 mm or 35 x 15 mm	35 x 15 mm or 75 x 25 mm				-
	By screws (not supplied)	2 x M4 screws placed diagonally	2 x M6 screws placed diagonally			2 x M6 screws placed diagonally	

General technical data

AL40, AE50...AE75, 3-pole

Coil & mounting characteristics

Magnet system characteristics

Contactor types		DC operated	AL40	AE50	AE63	AE75
Coil operating limits <small>acc. to IEC 60947-4-1</small>		DC supply	at $\theta \leq 55\text{ °C}$ $0.85 \dots 1.1 \times U_c$ Please also refer to "Mounting characteristics and conditions for use"			
DC control voltage	Rated control circuit voltage U_c		12...250 V DC			
	Coil consumption	Average pull-in value	3.5 W	200 W		
		Average holding value	3.5 W	4 W		
Drop-out voltage			approx. 10...30 % of U_c	approx. 15...40 % of U_c		
Coil time constant	Open	L/R	38 ms	3 ms		
	Closed	L/R	62 ms	15 ms		
Operating time						
Between coil energization and:		N.O. contact closing	55...110 ms	13...30 ms		
		N.C. contact opening	25...75 ms	10...27 ms		
Between coil de-energization and:		N.O. contact opening (1)	12...18 ms	5...15 ms		
		N.C. contact closing (1)	18...28 ms	8...18 ms		

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a RV5 surge suppressor and a factor of 1.5 to 3 for a RT5 surge suppressor.

Mounting characteristics and conditions for use

Contactor types		DC operated	AL40	AE50	AE63	AE75
Mounting positions						
Control voltage / Ambient temperature			Max. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AL40, AE50 ... AE75			
Mounting positions	1, $1 \pm 30^\circ$, 2, 3, 4, 5	at $\theta \leq 55\text{ °C}$	0.85 x $U_c \dots 1.1 \times U_c$			
		at $\theta \leq 70\text{ °C}$	U_c			
	6	at $\theta \leq 55\text{ °C}$	Unauthorized		0.95 x $U_c \dots 1.1 \times U_c$	
		at $\theta \leq 70\text{ °C}$	Unauthorized			
Mounting distances			The contactors can be assembled side by side			
Fixing	On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm	35 x 15 mm or 75 x 25 mm		
	By screws (not supplied)		2 x M4 screws placed diagonally	2 x M6 screws placed diagonally		

General technical data

AF50...AF110, 3-pole

Coil & mounting characteristics

Magnet system characteristics

Contactor types		AC / DC operated	AF50	AF63	AF75	AF95	AF110	
Coil operating limits acc. to IEC 60947-4-1		AC or DC supply	At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c$ min... $1.1 \times U_c$ max. Please also refer to "Mounting characteristics and conditions for use"					
AC control voltage 50/60 Hz	Rated control circuit voltage U_c		48...250 V 50/60 Hz					
	Coil consumption	Average pull-in value	210 VA					350 VA
		Average holding value	7 VA / 2.8 W					7 VA / 3.5 W
DC control voltage	Rated control circuit voltage U_c		20...250 V DC					
	Coil consumption	Average pull-in value	190 W					400 W
		Average holding value	2.8 W					2 W
Drop-out voltage			55 % of U_c min.					
Voltage sag immunity acc. to SEMI F47			Conditions of use on request					
Dips withstand			≥ 20 ms					
Operating time								
	Between coil energization and:	N.O. contact closing	30...100 ms				30...80 ms	
		N.C. contact opening	27...95 ms				27...77 ms	
	Between coil de-energization and:	N.O. contact opening	30...110 ms				55...125 ms	
		N.C. contact closing	35...115 ms				60...130 ms	

Mounting characteristics and conditions for use

Contactor types		AC / DC operated	AF50	AF63	AF75	AF95	AF110	
Mounting positions								
Control voltage / Ambient temperature			Max. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF50 ... AF110					
Mounting positions	1, 1±30°, 2, 3, 4, 5	at $\theta \leq 70^\circ\text{C}$	0.85 x U_c min...1.1 x U_c max.					
	6		Unauthorized					
Mounting distances			The contactors can be assembled side by side					
Fixing	On rail according to IEC 60715, EN 60715		35 x 15 mm or 75 x 25 mm					-
	By screws (not supplied)		2 x M6 screws placed diagonally					

General technical data

A145...A300, 3-pole

Coil & mounting characteristics

Magnet system characteristics

Contactor types	AC operated	A145	A185	A210	A260	A300	
Coil operating limits	AC supply	At $\theta \leq 70^\circ\text{C}$ $0.85 \dots 1.1 \times U_c$					
acc. to IEC 60947-4-1		Please also refer to "Mounting characteristics and conditions for use"					
AC control voltage	Rated control circuit voltage U_c	at 50 Hz	24...690 V				
		at 60 Hz	24...690 V				
Coil consumption	Average pull-in value	50 Hz	550 VA		1350 VA		
		60 Hz	600 VA		1550 VA		
		50/60 Hz (1)	700 VA / 650 VA		1700 VA / 1550 VA		
		Average holding value	50 Hz	35 VA / 11 W		60 VA / 16 W	
			60 Hz	40 VA / 12 W		65 VA / 19 W	
50/60 Hz (1)	44 VA / 13 W		80 VA / 21 W				
Drop-out voltage		Approx. 40...65 % of U_c min.					
Operating time	Between coil energization and:	N.O. contact closing	13...27 ms		17...35 ms		
		N.C. contact opening	8...22 ms		12...30 ms		
	Between coil de-energization and:	N.O. contact opening	5...10 ms		7...13 ms		
		N.C. contact closing	9...13 ms		10...16 ms		

(1) 50/60 Hz coils: see "Voltage code table".

Mounting characteristics and conditions for use

Contactor types	AC operated	A145	A185	A210	A260	A300	
Mounting positions							
Control voltage / Ambient temperature		Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor A145 ... A300					
Mounting positions	1, $1 \pm 30^\circ$, 2, 3, 4, 5 6	at $\theta \leq 70^\circ\text{C}$	0.85 x $U_c \dots 1.1 \times U_c$			Unauthorized	
			The contactors can be assembled side by side				
Mounting distances	On rail according to IEC 60715, EN 60715	-					
	By screws (not supplied)	4 x M5					

General technical data

AF145...AF300, 3-pole

Coil & mounting characteristics

Magnet system characteristics

Contactor types	AC / DC operated	AF145	AF185	AF210	AF260	AF300
Coil operating limits acc. to IEC 60947-4-1	AC or DC supply	At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. Please also refer to "Mounting characteristics and conditions for use"				
AC control voltage 50/60 Hz	Rated control circuit voltage U_c	48...250 V AC				
	Coil consumption	Average pull-in value 430 VA		470 VA		
		Average holding value 12 VA / 3.5 W		10 VA / 2.5 W		
DC control voltage	Rated control circuit voltage U_c	20...250 V DC				
	Coil consumption	Average pull-in value 500 W		520 W		
		Average holding value 2 W		2 W		
Drop-out voltage		55 % of $U_c \text{ min}$.				
Voltage sag immunity acc. to SEMI F47		Conditions of use on request				
Dips withstand		$\geq 20 \text{ ms}$				
Operating time						
Between coil energization and:	N.O. contact closing	30...115 ms				
	N.C. contact opening	30...115 ms				
Between coil de-energization and:	N.O. contact opening	25...80 ms				
	N.C. contact closing	25...80 ms				

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF145	AF185	AF210	AF260	AF300
Mounting positions						
Control voltage / Ambient temperature		Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF145 ... AF2050				
Mounting positions	1, 1±30°, 2, 3, 4, 5 6	at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. Unauthorized				
Mounting distances		The contactors can be assembled side by side				
Fixing	On rail according to IEC 60715, EN 60715	-				
	By screws (not supplied)	4 x M5				

General technical data

AF400...AF2050, 3-pole

Coil & mounting characteristics

Magnet system characteristics

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	
Coil operating limits acc. to IEC 60947-4-1	AC or DC supply	At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c$ min... $1.1 \times U_c$ max. Please also refer to "Mounting characteristics and conditions for use"								
AC control voltage 50/60 Hz	Rated control circuit voltage U_c	48...500 V AC					100...250 V			
	Coil consumption	Average pull-in value	890 VA		850 VA		1900 VA			
		Average holding value	12 VA / 4 W		12 VA / 4.5 W		48 VA / 17 W			
DC control voltage	Rated control circuit voltage U_c	24...500 V DC					100...250 V			
	Coil consumption	Average pull-in value	990 W		950 W		1700 W			
		Average holding value	4 W		4.5 W		16 W			
Drop-out voltage		55 % of U_c min.								
Voltage sag immunity acc. to SEMI F47		Conditions of use on request								
Dips withstand		≥ 20 ms								
Operating time										
Coil supply between A1 - A2 Between coil energization and:	N.O. contact closing	50...120 ms					50...80 ms			
	N.C. contact opening	50...120 ms					50...80 ms			
Between coil de-energization and:	N.O. contact opening	33...70 ms					35...55 ms			
	N.C. contact closing	33...70 ms					35...55 ms			
Control input for PLC's Between coil energization and:	N.O. contact closing	40...60 ms		40...90 ms		40...65 ms				
	N.C. contact opening	40...60 ms		40...90 ms		40...65 ms				
Between coil de-energization and:	N.O. contact opening	10...30 ms				10...30 ms				
	N.C. contact closing	10...30 ms				10...30 ms				

Mounting characteristics and conditions for use










Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
Mounting positions									
Control voltage / Ambient temperature	Mounting positions 1, $1 \pm 30^\circ$, 2, 3, 4, 5 6	at $\theta \leq 70^\circ\text{C}$							
		0.85 x U_c min... $1.1 \times U_c$ max. Unauthorized							
Mounting distances		The contactors can be assembled side by side							
Fixing	On rail according to IEC 60715, EN 60715	-							
	By screws (not supplied)	4 x M5		4 x M6		4 x M8			

General technical data

AF09(Z)...AF38(Z), 3-pole

Terminal characteristics

Connecting characteristics














Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Main terminals		 Screw terminals with cable clamp					
Connection capacity (min. ... max.)							
Main conductors (poles)							
	Rigid	Solid ($\leq 4 \text{ mm}^2$) Stranded ($\geq 6 \text{ mm}^2$)	1 x	1...6 mm ²	2.5...10 mm ²		
			2 x	1...6 mm ²	2.5...10 mm ²		
	Flexible with non insulated ferrule	1 x	0.75...6 mm ²	1.5...10 mm ²			
		2 x	0.75...6 mm ²	1.5...10 mm ²			
	Flexible with insulated ferrule	1 x	0.75...4 mm ²	1.5...10 mm ²			
		2 x	0.75...2.5 mm ²	1.5...4 mm ²			
	Bars or lugs	L <	9.6 mm	12.5 mm			
Connection capacity acc. to UL/CSA (solid/stranded)		1 or 2 x	AWG 16...10	AWG 14...8			
Stripping length			10 mm	14 mm			
Tightening torque			1.5 Nm / 13 lb.in	2.5 Nm / 22 lb.in			
Auxiliary conductors (built-in auxiliary terminals + coil terminals)							
	Rigid solid	1 x	1...2.5 mm ²				
		2 x	1...2.5 mm ²				
	Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²				
		2 x	0.75...2.5 mm ²				
	Flexible with insulated ferrule	1 x	0.75...2.5 mm ²				
		2 x	0.75...1.5 mm ²				
	Lugs	L <	8 mm				
Connection capacity acc. to UL/CSA (solid/stranded)		1 or 2 x	AWG 18...14				
Stripping length			10 mm				
Tightening torque							
Coil terminals			1.2 Nm / 11 lb.in				
Built-in auxiliary terminals			1.2 Nm / 11 lb.in				
Degree of protection							
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529							
Main terminals			IP20				
Coil terminals			IP20				
Built-in auxiliary terminals			IP20				
Screw terminals		Delivered in open position, screws of unused terminals must be tightened					
Main terminals			M3.5	M4			
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2	Flat Ø 6.5 / Pozidriv 2			
Coil terminals			M3.5				
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2				
Built-in auxiliary terminals			M3.5				
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2				

General technical data

A/E/L40, A/E/F50...A/F110, 3-pole

Terminal characteristics

Connecting characteristics

Contactor types	AC operated	A40	A50	A63	A75	A95	A110
	DC operated	AL40	AE50	AE63	AE75	–	–
		TAL40	TAE50	–	TAE75	–	–
	AC / DC operated	–	AF50	AF63	AF75	AF95	AF110
Main terminals		 Screw terminals with double connector 2 x (5.6 x 6.5 mm)	 Screw terminals with single connector (13 x 10 mm)			 Screw terminals with single connector (14 x 14 mm)	
Connection capacity (min. ... max.)							
Main conductors (poles)							
 Rigid	Solid ($\leq 4 \text{ mm}^2$)	} 1 x	2.5...16 mm ²	6...50 mm ²		10...95 mm ²	
 Stranded ($\geq 6 \text{ mm}^2$)			2 x	2.5...16 mm ²	6...25 mm ²		6...35 mm ²
 Flexible with ferrule		1 x	2.5...10 mm ²	6...35 mm ²		10...70 mm ² (1)	
 Flexible with ferrule		2 x	2.5...10 mm ²	6...16 mm ²		6...35 mm ² (1)	
 Bars or lugs		L \leq	–	–		30 mm (2)	
		L $>$	–	–		6 mm	
Connection capacity acc. to UL/CSA (solid/stranded)		1 or 2 x	AWG 8...4	AWG 8...1		AWG 6...2/0	
Tightening torque	Recommended		2.30 Nm / 20 lb.in	4.00 Nm / 35 lb.in		8 Nm / 71 lb.in	
	Max.		2.60 Nm	4.50 Nm		9 Nm	
Auxiliary conductors (built-in auxiliary terminals + coil terminals)							
 Rigid solid		1 x	1...4 mm ²			0.75...2.5 mm ²	
 Rigid solid		2 x	1...4 mm ²			0.75...2.5 mm ²	
 Flexible with ferrule		1 x	0.75...2.5 mm ²	1...2.5 mm ²		0.75...2.5 mm ²	
 Flexible with ferrule		2 x	0.75...2.5 mm ²			0.75...2.5 mm ²	
 Lugs		L \leq	8 mm				
		L $>$	3.7 mm				
Connection capacity acc. to UL/CSA (solid/stranded)		1 or 2 x	AWG 18...14				
Tightening torque							
Coil terminals	Recommended		1.00 Nm / 9 lb.in				
	Max.		1.20 Nm				
Built-in auxiliary terminals	Recommended		1.00 Nm / 9 lb.in	–		–	
	Max.		1.20 Nm	–		–	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529							
Main terminals			IP20	IP10			
Coil terminals			IP20				
Built-in auxiliary terminals			IP20	–		–	
Screw terminals			Delivered in open position, screws of unused terminals must be tightened				
Main terminals			M5	M6		M8	
	Screwdriver type		Flat \varnothing 6.5 / Pozidriv 2			Hexagon socket (s = 4 mm)	
Coil terminals			M3.5				
	Screwdriver type		Flat \varnothing 5.5 / Pozidriv 2				
Built-in auxiliary terminals			M3.5	–			
	Screwdriver type		Flat \varnothing 5.5 / Pozidriv 2				

(1) A(F)95 / A(F)110: use flexible without ferrule.

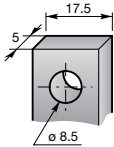
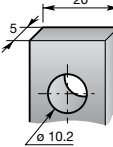









(2) With LW110 enlargement piece, see "Accessories".

General technical data

A/F145...A/F300, 3-pole

Terminal characteristics

Connecting characteristics

Contactor types	AC operated		A145	A185	A210	A260	A300	
	AC / DC operated		AF145	AF185	AF210	AF260	AF300	
Main terminals Flat type								
Connection capacity (min. ... max.)								
Main conductors (poles)								
	Rigid with connector	Single for Cu cable	6...185 mm ²		16...240 mm ²			
		Single for Al/Cu cable	25...150 mm ²		120...240 mm ²			
		Double for Al/Cu cable	-		2 x 95...120 mm ²			
	Bars or lugs	L ≤	24 mm		32 mm			
		Ø >	8 mm		10 mm			
Connection capacity acc. to UL/GSA			6 - 250 MCM x 1		4 - 500 MCM x 1 (1)			
Tightening torque		Recommended	18 Nm / 160 lb.in		28 Nm / 247 lb.in			
		Max.	20 Nm		30 Nm			
Auxiliary conductors (coil terminals)								
	Rigid solid	1 x	1...4 mm ²					
		2 x	1...4 mm ²					
	Flexible with ferrule	1 x	0.75...2.5 mm ²					
		2 x	0.75...2.5 mm ²					
	Lugs	L ≤	8 mm					
		l >	3.7 mm					
Connection capacity acc. to UL/CSA (solid/stranded)			1 or 2 x		AWG 18...14			
Tightening torque		Recommended	1.00 Nm / 9 lb.in					
		Max.	1.20 Nm					
Degree of protection								
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals			IP00					
Coil terminals			IP20					
Screw terminals								
Main terminals			M8		M10			
			Screws and bolts					
Coil terminals (delivered in open position)			M3.5					
			Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2			

(1) With LW110 enlargement piece: see "Accessories".

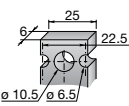
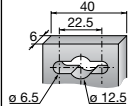
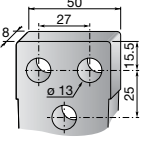
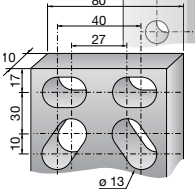
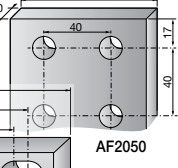







General technical data

AF400...AF2050, 3-pole

Terminal characteristics

Across the line
1

Connecting characteristics

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
Main terminals Flat type									
Connection capacity (min. ... max.)									
Main conductors (poles)									
 Rigid with connector	Single for Cu cable	240 mm ²		300 mm ²					
 Rigid with connector	Single for Al/Cu cable	240 mm ²		300 mm ²					
 Rigid with connector	Double for Al/Cu cable	2 x 240 mm ²		3 x 185 mm ²					
 Bars or lugs	L ≤	47 mm		52 mm			100 mm		
	Ø >	10 mm		12 mm			12 mm		
Connection capacity acc. to UL/CSA		250 - 500 MCM x 2		2/0 - 500 MCM x 2			1/0 - 750 MCM x 4		
Tightening torque	Recommended	35 Nm / 310 lb.in		45 Nm / 398 lb.in			45 Nm / 398 lb.in		
	Max.	40 Nm		49 Nm			49 Nm		
Auxiliary conductors (coil terminals)									
 Rigid solid	1 x	1...4 mm ²							
	2 x	1...4 mm ²							
 Flexible with ferrule	1 x	0.75...2.5 mm ²							
	2 x	0.75...2.5 mm ²							
 Lugs	L ≤	8 mm							
	L >	3,7 mm							
Connection capacity acc. to UL/CSA (solid/stranded)	1 or 2 x	AWG 18...14							
Tightening torque	Recommended	1.00 Nm / 9 lb.in							
	Max.	1.20 Nm							
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529									
Main terminals		IP00							
Coil terminals		IP20							
Screw terminals									
Main terminals		M10		M12					
		Screws and bolts							
Coil terminals (delivered in open position)		M3,5							
	Screwdriver type	Flat Ø 5.5 mm / Pozidriv 2							

General technical data

AF09(Z)...AF38(Z), 3-pole

Built-in auxiliary contacts

Built-in auxiliary contacts according to IEC

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Rated operational voltage U _e max.		690 V					
Rated frequency (without derating)		50 / 60 Hz					
Conventional free air thermal current I _{th} - θ ≤ 40 °C		16 A					
I _e / Rated operational current AC-15		10 x I _e AC-15 acc. to IEC 60947-5-1					
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A					
	220-240 V 50/60 Hz	4 A					
	400-440 V 50/60 Hz	3 A					
	500 V 50/60 Hz	2 A					
	690 V 50/60 Hz	2 A					
Making capacity AC-15		10 x I _e AC-15 acc. to IEC 60947-5-1					
Breaking capacity AC-15		10 x I _e AC-15 acc. to IEC 60947-5-1					
I _e / Rated operational current DC-13		10 x I _e DC-13 acc. to IEC 60947-5-1					
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W					
	48 V DC	2.8 A / 134 W					
	72 V DC	1 A / 72 W					
	110 V DC	0.55 A / 60 W					
	125 V DC	0.55 A / 69 W					
	220 V DC	0.27 A / 60 W					
	250 V DC	0.27 A / 68 W					
	400 V DC	0.15 A / 60 W					
	500 V DC	0.13 A / 65 W					
	600 V DC	0.1 A / 60 W					
Short-circuit protection device gG type fuse		10 A					
Rated short-time withstand current I _{cw}	for 1.0 s	100 A					
	for 0.1 s	140 A					
Minimum switching capacity		12 V / 3 mA					
with failure rate acc. to IEC 60947-5-4		10 ⁻⁷					
Non-overlapping time between N.O. and N.C. contacts		≥ 2 ms					
Power dissipation per pole at 6 A		0.1 W					
Max. electrical switching frequency	AC-15	1200 cycles/h					
	DC-13	900 cycles/h					
Mechanically linked contacts		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mechanically linked contacts.					
acc. to annex L of IEC 60947-5-1							
Mirror contacts		Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mirror contacts.					
acc. to annex F of IEC 60947-4-1							

Built-in auxiliary contacts according to UL / CSA

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Max. operational voltage		600 V AC, 600 V DC					
Pilot duty		A600, Q600					
AC thermal rated current		10 A					
AC maximum volt-ampere making		7200 VA					
AC maximum volt-ampere breaking		720 VA					
DC thermal rated current		2.5 A					
DC maximum volt-ampere making-breaking		69 VA					

General technical data

A/E/L40, 3-pole

Built-in auxiliary contacts

Built-in auxiliary contacts according to IEC

Contactor types	AC operated	A40
	DC operated	AL40, TAL40
Rated operational voltage U_e max.		690 V
Rated frequency (without derating)		50/60 Hz
Conventional free air thermal current $I_{th} - \theta \leq 40^\circ\text{C}$		16 A
I_e / Rated operational current AC-15		
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A
	220-240 V 50/60 Hz	4 A
	380-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Making capacity AC-15		10 x I_e AC-15 acc. to IEC 60947-5-1
Breaking capacity AC-15		10 x I_e AC-15 acc. to IEC 60947-5-1
I_e / Rated operational current DC-13		
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	2 A / 144 W
	110 V DC	1.1 A / 121 W
	125 V DC	1.1 A / 138 W
	220 V DC	0.55 A / 121 W
	250 V DC	0.55 A / 138 W
Short-circuit protection device gG type fuse		10 A
Rated short-time withstand current I_{sw}	for 1.0 s	100 A
	for 0.1 s	140 A
Minimum switching capacity		17 V / 5 mA
with failure rate acc. to IEC 60947-5-4		$\leq 10^{-7}$ for AL40 and TAL40 contactors
Non-overlapping time between N.O. and N.C. contacts		≥ 2 ms
Power dissipation per pole at 6 A		0.1 W
Max. electrical switching frequency	AC-15	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts of 4-pole CA5 are mechanically linked contacts.
acc. to annex L of IEC 60947-5-1		
Mirror contacts		Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA5, CAL5-11) are mirror contacts.
acc. to annex F of IEC 60947-4-1		

Built-in auxiliary contacts according to UL / CSA

Contactor types	AC operated	A40
	DC operated	AL40, TAL40
Max. operational voltage		600 V AC, 600 V DC
Pilot duty		A600, P300
AC thermal rated current		10 A
AC maximum volt-ampere making		7200 VA
AC maximum volt-ampere breaking		720 VA
DC thermal rated current		5 A
DC maximum volt-ampere making-breaking		138 VA

IEC technical data

AS/L09...AS/L16, 3-pole, screw terminated

Utilization characteristics

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	AS09	AS12	AS16
	DC operated	ASL09	ASL12	ASL16
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1			
Rated operational voltage U_e max.	690 V			
Rated frequency (without derating)	50 / 60 Hz			
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40\text{ °C}$	22 A	25 A	25 A	25 A
With conductor cross-sectional area	2.5 mm ²	4 mm ²		4 mm ²
AC-1 Utilization category For air temperature close to contactor				
I_e / Rated operational current AC-1				
U _e max. $\leq 690\text{ V}$, 50/60 Hz	$\theta \leq 40\text{ °C}$	22 A	24 A	24 A
	$\theta \leq 60\text{ °C}$	18 A	20 A	20 A
	$\theta \leq 70\text{ °C}$	15 A	16 A	16 A
With conductor cross-sectional area	2.5 mm ²			
AC-3 Utilization category For air temperature close to contactor $\theta \leq 60\text{ °C}$				
I_e / Max. rated operational current AC-3 (1)				
	220-230-240 V	9 A	12 A	15.7 A
	400 V	9 A	12 A	15.5 A
	415 V	9 A	12 A	15.5 A
	440 V	8 A	11 A	13.6 A
	500 V	8 A	11 A	12.5 A
	690 V	5 A	7 A	9 A
Rated operational power AC-3 (1)				
	220-230-240 V	2.2 kW	3 kW	4 kW
	400 V	4 kW	5.5 kW	7.5 kW
	415 V	4 kW	5.5 kW	7.5 kW
	440 V	4 kW	5.5 kW	7.5 kW
	500 V	4 kW	5.5 kW	7.5 kW
	690 V	4 kW	5.5 kW	7.5 kW
Rated making capacity AC-3	10 x I _e AC-3 acc. to IEC 60947-4-1			
Rated breaking capacity AC-3	8 x I _e AC-3 acc. to IEC 60947-4-1			
AC-8a Utilization category (without thermal overload relay - U _e 400 V 50/60 Hz - $\theta \leq 40\text{ °C}$)				
I_e / Rated operational current AC-8a	12 A	16 A	22 A	
Rated operational power AC-8a	5.5 kW	7.5 kW	11 kW	
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded (2) U _e $\leq 500\text{ V}$ AC - gG type fuse	25 A			
Rated short-time withstand current I_{cw} at 40 °C ambient temperature, in free air from a cold state	1 s	230 A	250 A	250 A
	10 s	100 A	124 A	124 A
	30 s	65 A	75 A	75 A
	1 min	50 A	55 A	55 A
	15 min	22 A	24 A	24 A
Maximum breaking capacity cos $\varphi = 0.45$	at 440 V	155 A		
	at 690 V	90 A		
Power dissipation per pole	I _e / AC-1	1 W	1.2 W	1.2 W
	I _e / AC-3	0.16 W	0.3 W	0.5 W
Max. electrical switching frequency	AC-1	600 cycles/h		
	AC-3	1200 cycles/h		
	AC-4	300 cycles/h		

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m., 50 Hz or 1800 r.p.m., 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

UL/CSA Technical data

AS/L09...AS/L16, 3-pole, screw terminated

Utilization characteristics

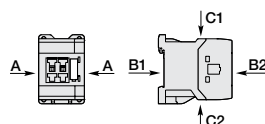
Main pole - Utilization characteristics according to UL / CSA

Contactor types	AC operated	AS09	AS12	AS16
	DC operated	ASL09	ASL12	ASL16
Standards	UL 508, CSA C22.2 N°14			
Max. operational voltage	690 V			
UL / CSA general use rating				
600 V AC	20 A	20 A	20 A	20 A
With conductor cross-sectional area	AWG 12	AWG 12	AWG 12	AWG 12
UL / CSA maximum 1-phase motor rating				
Full load current	120 V AC 7.2 A	9.8 A	13.8 A	
	240 V AC 8 A	10 A	12 A	
Horse power rating	120 V AC 1/3 hp	1/2 hp	3/4 hp	
	240 V AC 1 hp	1-1/2 hp	2 hp	
UL / CSA maximum 3-phase motor rating				
Full load current (1)	200-208 V AC 7.8 A	7.8 A	11 A	
	220-240 V AC 6.8 A	9.6 A	15.2 A	
	440-480 V AC 7.6 A	11 A	14 A	
	550-600 V AC 9 A	11 A	11 A	
Horse power rating (1)	200-208 V AC 2 hp	2 hp	3 hp	
	220-240 V AC 2 hp	3 hp	5 hp	
	440-480 V AC 5 hp	7-1/2 hp	10 hp	
	550-600 V AC 7-1/2 hp	10 hp	10 hp	
Max. electrical switching frequency				
For general use	600 cycles/h			
For motor use	1200 cycles/h			

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

Contactor types	AC operated	AS09	AS12	AS16
	DC operated	ASL09	ASL12	ASL16
Rated insulation voltage Ui				
acc. to IEC 60947-4-1	690 V			
acc. to UL / CSA	600 V			
Rated impulse withstand voltage Uimp.	6 kV			
Ambient air temperature close to contactor				
Operation	Fitted with thermal overload relay	-25...+60 °C		
	Without thermal overload relay	-40...+70 °C		
Storage		-60...+80 °C		
Climatic withstand	Category B according to IEC 60947-1 Annex Q			
Maximum operating altitude (without derating)	3000 m			
Mechanical durability				
Number of operating cycles	10 millions operating cycles			
Max. switching frequency	3600 cycles/h			
Shock withstand	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position			
acc. to IEC 60068-2-27 and EN 60068-2-27	Shock direction	AS contactors - AC operated	ASL contactors - DC operated	
Mounting position 1	A	20 g	20 g closed position / 10 g open position	
	B1	10 g closed position / 5 g open position	15 g closed position / 5 g open position	
	B2	15 g	10 g	
	C1	20 g closed position / 9 g open position	15 g closed position / 8 g open position	
	C2	20 g closed position / 14 g open position	14 g closed position / 8 g open position	
Vibration withstand acc. to IEC 60068-2-6	5...300 Hz / 3 g closed position / 2 g open position			



General technical data

AS/L09...AS/L16, 3-pole, screw terminated

Coil & mounting characteristics

Magnet system characteristics for AS09 ... AS16 contactors

Contactor types	AC operated	AS09	AS12	AS16	
Coil operating limits	AC supply	0.85...1.1 x U _c (at $\theta \leq 60\text{ °C}$); U _c (at $\theta \leq 70\text{ °C}$)			
acc. to IEC 60947-4-1					
AC control voltage	Rated control circuit voltage U _c	at 50 Hz	24...415 V		
		at 60 Hz	24...415 V		
Coil consumption	Average pull-in value	50 Hz	33 VA		
		60 Hz	33 VA		
		50/60 Hz	33 VA		
		Average holding value	50 Hz	6.5 VA / 1.5 W	
			60 Hz	5 VA / 1.2 W	
50/60 Hz	6.5 VA / 1.5 W				
Drop-out voltage		Approx. 30...50 % of U _c			
Operating time					
Between coil energization and:	N.O. contact closing	9...24 ms			
	N.C. contact opening	6...18 ms			
Between coil de-energization and:	N.O. contact opening (1)	5...19 ms			
	N.C. contact closing (1)	7...22 ms			
(1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3					

Magnet system characteristics for ASL09 ... ASL16 contactors

Contactor types	DC operated	ASL09	ASL12	ASL16
Coil operating limits	DC supply	0.85...1.1 x U _c (at $\theta \leq 60\text{ °C}$); U _c (at $\theta \leq 70\text{ °C}$)		
acc. to IEC 60947-4-1				
DC control voltage	Rated control circuit voltage U _c	12...240 V DC		
		Coil consumption	Average pull-in value	
		3 W		
		Average holding value		
		3 W		
Drop-out voltage		Approx. 10...40 % of U _c		
Coil time constant	Open	L/R	12 ms	
	Closed	L/R	40 ms	
Operating time				
Between coil energization and:	N.O. contact closing	36...59 ms		
	N.C. contact opening	31...53 ms		
Between coil de-energization and:	N.O. contact opening (1)	13...17 ms		
	N.C. contact closing (1)	15...20 ms		
(1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2				

Mounting characteristics and conditions for use


















Contactor types	AC operated	AS09	AS12	AS16
	DC operated	ASL09	ASL12	ASL16
Mounting positions				
Mounting distances		The contactors can be assembled side by side.		
Fixing	On rail according to IEC 60715, EN 60715	35 x 7.5 mm or 35 x 15 mm		
	By screws (not supplied)	2 x M4 screws placed diagonally		

General technical data

ASL09 ... ASL16 3-pole, screw terminated

Terminal characteristics

Connecting characteristics

Contactor types	AC operated	AS09	AS12	AS16
	DC operated	ASL09	ASL12	ASL16
Main terminals	 Screw terminals with cable clamp			
Connection capacity (min. ... max.)				
Main conductors (poles)				
	Rigid solid	1 x	0.75...4 mm ²	
	Flexible with non insulated ferrule	2 x	0.75...4 mm ²	
		1 x	0.75...2.5 mm ²	
	Flexible with insulated ferrule	2 x	0.75...2.5 mm ²	
		1 x	0.75...2.5 mm ²	
	Flexible with insulated ferrule	2 x	0.75...1.5 mm ²	
		1 x	0.75...1.5 mm ²	
	Bars or lugs	L ≤	7.7 mm	
		I >	3.2 mm	
	Connection capacity acc. to UL / CSA (Sol/Str)	1 or 2 x	AWG 18...12	
	Stripping length		9 mm	
	Tightening torque	Recommended	1.00 Nm / 9 lb.in	
		Max.	1.20 Nm	
Auxiliary conductors				
(built-in auxiliary terminals + coil terminals)				
	Rigid solid	1 x	0.75...2.5 mm ²	
	Flexible with non insulated ferrule	2 x	0.75...2.5 mm ²	
		1 x	0.75...2.5 mm ²	
	Flexible with insulated ferrule	2 x	0.75...2.5 mm ²	
		1 x	0.75...2.5 mm ²	
	Flexible with insulated ferrule	2 x	0.75...1.5 mm ²	
		1 x	0.75...1.5 mm ²	
	Lugs	L ≤	7.7 mm	
		I >	3.2 mm	
	Connection capacity acc. to UL / CSA (Sol/Str)	1 or 2 x	AWG 18...14	
	Stripping length			
	Tightening torque	Coil terminals	Recommended	1.00 Nm / 9 lb.in
		Max.	1.20 Nm	
	Built-in auxiliary terminals	Recommended	1.00 Nm / 9 lb.in	
		Max.	1.20 Nm	
Degree of protection				
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
	All terminals		IP20	
Screw terminals				
	All terminals		Delivered in open position, screws of unused terminals must be tightened	
			M3	
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2	

General technical data

ASL09 ... ASL16, 3-pole, screw terminated

Built-in auxiliary contacts

Built-in auxiliary contacts according to IEC

Contactor types	AC operated	AS09	AS12	AS16
	DC operated	ASL09	ASL12	ASL16
Rated operational voltage U _e max.		690 V		
Rated frequency (without derating)		50 / 60 Hz		
Conventional free-air thermal current I _{th} - 0 ≤ 40 °C		10 A		
le / Rated operational current AC-15				
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A		
	220-240 V 50/60 Hz	4 A		
	400-440 V 50/60 Hz	3 A		
	500 V 50/60 Hz	2 A		
	690 V 50/60 Hz	2 A		
Making capacity AC-15		10 x I _e AC-15 acc. to IEC 60947-5-1		
Breaking capacity AC-15		10 x I _e AC-15 acc. to IEC 60947-5-1		
le / Rated operational current DC-13				
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W		
	48 V DC	2.8 A / 134 W		
	72 V DC	1 A / 72 W		
	110 V DC	0.55 A / 60 W		
	125 V DC	0.55 A / 69 W		
	220 V DC	0.27 A / 60 W		
	250 V DC	0.27 A / 68 W		
Short-circuit protection device gG type fuse		10 A		
Rated short-time withstand current I _{cw}	for 1.0 s	100 A		
	for 0.1 s	140 A		
Minimum switching capacity		12 V / 3 mA		
with failure rate acc. to IEC 60947-5-4		10 ⁷		
Non-overlapping time between N.O. and N.C. contacts		1.5 ms		
Power dissipation per pole at 6 A		0.1 W		
Max. electrical switching frequency	AC-15	1200 cycles/h		
	DC-13	900 cycles/h		
Mechanically linked contacts		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts.		
acc. to annex L of IEC 60947-5-1				
Mirror contacts		Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA3 aux. contact blocks) are mirror contacts.		
acc. to annex F of IEC 60947-4-1				

Built-in auxiliary contacts according to UL / CSA



Contactor types	AC operated	AS09	AS12	AS16
	DC operated	ASL09	ASL12	ASL16
Max. operational voltage		600 V AC, 250 V DC		
Pilot duty		A600, Q300		
AC thermal rated current		10 A		
AC maximum volt-ampere making		7200 VA		
AC maximum volt-ampere breaking		720 VA		
DC thermal rated current		2.5 A		
DC maximum volt-ampere making-breaking		69 VA		

IEC Technical data

AS/L09...AS/L16, 3-pole, spring terminated

Utilization characteristics

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1			
Rated operational voltage U_e max.	690 V			
Rated frequency (without derating)	50 / 60 Hz			
Conventional free-air thermal current I_{th}				
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40\text{ }^{\circ}\text{C}$	20 A	22 A	22 A	22 A
With conductor cross-sectional area	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²
AC-1 Utilization category				
For air temperature close to contactor				
I_e / Rated operational current AC-1				
U _e max. $\leq 690\text{ V}$, 50/60 Hz	$\theta \leq 40\text{ }^{\circ}\text{C}$	20 A	22 A	22 A
	$\theta \leq 60\text{ }^{\circ}\text{C}$	15 A	17 A	17 A
	$\theta \leq 70\text{ }^{\circ}\text{C}$	12 A	14 A	14 A
With conductor cross-sectional area	2.5 mm ²			
AC-3 Utilization category				
For air temperature close to contactor $\theta \leq 60\text{ }^{\circ}\text{C}$				
I_e / Max. rated operational current AC-3 (1)				
	220-230-240 V	9 A	12 A	15.7 A
	400 V	9 A	12 A	15.5 A
	415 V	9 A	12 A	15.5 A
	440 V	8 A	11 A	13.6 A
	500 V	8 A	11 A	12.5 A
	690 V	5 A	7 A	9 A
	 3-phase motors			
Rated operational power AC-3 (1)				
	220-230-240 V	2.2 kW	3 kW	4 kW
	400 V	4 kW	5.5 kW	7.5 kW
	415 V	4 kW	5.5 kW	7.5 kW
	440 V	4 kW	5.5 kW	7.5 kW
	500 V	4 kW	5.5 kW	7.5 kW
	690 V	4 kW	5.5 kW	7.5 kW
	 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors			
Rated making capacity AC-3	10 x I _e AC-3 acc. to IEC 60947-4-1			
Rated breaking capacity AC-3	8 x I _e AC-3 acc. to IEC 60947-4-1			
AC-8a Utilization category				
(without thermal overload relay - U _e 400 V 50/60 Hz - $\theta \leq 40\text{ }^{\circ}\text{C}$)				
I_e / Rated operational current AC-8a				
		12 A	16 A	22 A
Rated operational power AC-8a				
		5.5 kW	7.5 kW	11 kW
Short-circuit protection device for contactors				
without thermal overload relay - Motor protection excluded (2)				
U _e $\leq 500\text{ V AC}$ - gG type fuse	25 A			
Rated short-time withstand current I_{cw}				
at 40 °C ambient temperature,	1 s	230 A	250 A	250 A
in free air from a cold state	10 s	100 A	124 A	124 A
	30 s	65 A	75 A	75 A
	1 min	50 A	55 A	55 A
	15 min	20 A	22 A	22 A
Maximum breaking capacity				
cos $\phi = 0.45$	at 440 V	155 A		
	at 690 V	90 A		
Power dissipation per pole				
	I _e / AC-1	0.9 W	1.1 W	1.1 W
	I _e / AC-3	0.18 W	0.33 W	0.55 W
Max. electrical switching frequency				
	AC-1	600 cycles/h		
	AC-3	1200 cycles/h		
	AC-4	300 cycles/h		

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m., 50 Hz or 1800 r.p.m., 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

UL/CSA Technical data

AS/L09...AS/L16, 3-pole, spring terminated

Utilization characteristics

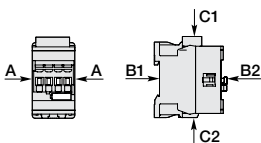
Main pole - Utilization characteristics according to UL /CSA

Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Standards	UL 508, CSA C22.2 N°14			
Max. operational voltage	690 V			
UL / CSA General use rating				
600 V AC		12 A	12 A	15.2 A
With conductor cross-sectional area		AWG 14	AWG 14	AWG 12
UL / CSA maximum 1-phase motor rating				
Full load current	120 V AC	7.2 A	9.8 A	13.8 A
	240 V AC	8 A	10 A	12 A
Horse power rating	120 V AC	1/3 hp	1/2 hp	3/4 hp
	240 V AC	1 hp	1-1/2 hp	2 hp
UL / CSA maximum 3-phase motor rating				
Full load current (1)	200-208 V AC	7.8 A	7.8 A	11 A
	220-240 V AC	6.8 A	9.6 A	15.2 A
	440-480 V AC	7.6 A	11 A	14 A
	550-600 V AC	9 A	11 A	11 A
Horse power rating (1)	200-208 V AC	2 hp	2 hp	3 hp
	220-240 V AC	2 hp	3 hp	5 hp
	440-480 V AC	5 hp	7-1/2 hp	10 hp
	550-600 V AC	7-1/2 hp	10 hp	10 hp
Max. electrical switching frequency				
For general use	600 cycles/h			
For motor use	1200 cycles/h			

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Rated insulation voltage Ui				
acc. to IEC 60947-4-1	690 V			
acc. to UL / CSA	600 V			
Rated impulse withstand voltage Uimp.	6 kV			
Ambient air temperature close to contactor				
Operation	-40...+70 °C			
Storage	-60...+80 °C			
Climatic withstand	Category B according to IEC 60947-1 Annex Q			
Maximum operating altitude (without derating)	3000 m			
Mechanical durability				
Number of operating cycles	10 millions operating cycles			
Max. switching frequency	3600 cycles/h			
Shock withstand	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position			
acc. to IEC 60068-2-27 and EN 60068-2-27				
Mounting position 1	Shock direction	AS contactors - AC operated	ASL contactors - DC operated	
	A	20 g	20 g closed position / 10 g open position	
	B1	10 g closed position / 5 g open position	15 g closed position / 5 g open position	
	B2	15 g	10 g	
	C1	20 g closed position / 9 g open position	15 g closed position / 8 g open position	
	C2	20 g closed position / 14 g open position	14 g closed position / 8 g open position	
Vibration withstand acc. to IEC 60068-2-6	5...300 Hz / 3 g closed position / 2 g open position			



General technical data

AS/L09...AS/L16, 3-pole, spring terminated

Coil & mounting characteristics

Magnet system characteristics for AS09..S ... AS16..S contactors

Contactor types	AC operated	AS09..S	AS12..S	AS16..S	
Coil operating limits	AC supply	0.85...1.1 x U _c (at $\theta \leq 60\text{ }^\circ\text{C}$); U _c (at $\theta \leq 70\text{ }^\circ\text{C}$)			
acc. to IEC 60947-4-1					
AC control voltage	Rated control circuit voltage U _c	at 50 Hz	24...415 V		
		at 60 Hz	24...415 V		
Coil consumption	Average pull-in value	50 Hz	33 VA		
		60 Hz	33 VA		
		50/60 Hz	33 VA		
		Average holding value	50 Hz	6.5 VA / 1.5 W	
			60 Hz	5 VA / 1.2 W	
			50/60 Hz	6.5 VA / 1.5 W	
Drop-out voltage		Approx. 30...50 % of U _c			
Operating time					
Between coil energization and:	N.O. contact closing	9...24 ms			
	N.C. contact opening	6...18 ms			
Between coil de-energization and:	N.O. contact opening (1)	5...19 ms			
	N.C. contact closing (1)	7...22 ms			
		(1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3.			

Magnet system characteristics for ASL09..S ... ASL16..S contactors

Contactor types	DC operated	ASL09..S	ASL12..S	ASL16..S	
Coil operating limits	DC supply	0.85...1.1 x U _c (at $\theta \leq 60\text{ }^\circ\text{C}$); U _c (at $\theta \leq 70\text{ }^\circ\text{C}$)			
acc. to IEC 60947-4-1					
DC control voltage	Rated control circuit voltage U _c	12...240 V DC			
		Coil consumption	Average pull-in value		3 W
		Average holding value		3 W	
Drop-out voltage		Approx. 10...40 % of U _c			
Coil time constant	Open	L/R	12 ms		
	Closed	L/R	40 ms		
Operating time					
Between coil energization and:	N.O. contact closing	36...59 ms			
	N.C. contact opening	31...53 ms			
Between coil de-energization and:	N.O. contact opening (1)	13...17 ms			
	N.C. contact closing (1)	15...20 ms			
		(1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2			

Mounting characteristics and conditions for use














Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Mounting positions				
Mounting distances	The contactors can be assembled side by side.			
Fixing	On rail according to IEC 60715, EN 60715	35 x 7.5 mm or 35 x 15 mm		
	By screws (not supplied)	2 x M4 screws placed diagonally		

General technical data

AS/L09...AS/L16, 3-pole, spring terminated

Terminal characteristics

Connecting characteristics

Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Main terminals				
	Spring terminals			
Connection capacity (min. ... max.)				
Main conductors (poles)				
 Rigid	1 x	0.75...2.5 mm ²		
 Rigid	2 x	0.75...2.5 mm ²		
 Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²		
 Flexible with non insulated ferrule	2 x	0.75...2.5 mm ²		
 Flexible with insulated ferrule	1 x	0.75...1.5 mm ²		
 Flexible with insulated ferrule	2 x	0.75...1.5 mm ²		
Connection capacity acc. to UL / CSA (Sol/Str)	1 or 2 x	AWG 18...12		
Stripping length	10 mm			
Auxiliary conductors (built-in auxiliary terminals + coil terminals)				
 Rigid solid	1 x	0.75...2.5 mm ²		
 Rigid solid	2 x	0.75...2.5 mm ²		
 Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²		
 Flexible with non insulated ferrule	2 x	0.75...2.5 mm ²		
 Flexible with insulated ferrule	1 x	0.75...1.5 mm ²		
 Flexible with insulated ferrule	2 x	0.75...1.5 mm ²		
Connection capacity acc. to UL / CSA (Sol/Str)	1 or 2 x	AWG 18...14		
Stripping length	10 mm			
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
All terminals	IP20			
Screwdriver type	Flat Ø 3.5			

General technical data

AS/L09...AS/L16, 3-pole, spring terminated

Built-in auxiliary contacts

Built-in auxiliary contacts according to IEC

Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Rated operational voltage Ue max.		690 V		
Rated frequency (without derating)		50 / 60 Hz		
Conventional free air thermal current Ith - 0 ≤ 40 °C		10 A		
le / Rated operational current AC-15				
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A		
	220-240 V 50/60 Hz	4 A		
	400-440 V 50/60 Hz	3 A		
	500 V 50/60 Hz	2 A		
	690 V 50/60 Hz	2 A		
Making capacity AC-15		10 x le AC-15 acc. to IEC 60947-5-1		
Breaking capacity AC-15		10 x le AC-15 acc. to IEC 60947-5-1		
le / Rated operational current DC-13				
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W		
	48 V DC	2.8 A / 134 W		
	72 V DC	1 A / 72 W		
	110 V DC	0.55 A / 60 W		
	125 V DC	0.55 A / 69 W		
	220 V DC	0.27 A / 60 W		
	250 V DC	0.27 A / 68 W		
Short-circuit protection device gG type fuse		10 A		
Rated short-time withstand current Icw	for 1.0 s	100 A		
	for 0.1 s	140 A		
Minimum switching capacity		12 V / 3 m		
with failure rate acc. to IEC 60947-5-4		10 ⁷		
Non-overlapping time between N.O. and N.C. contacts		1.5 ms		
Power dissipation per pole at 6 A		0.1 W		
Max. electrical switching frequency	AC-15	1200 cycles/h		
	DC-13	900 cycles/h		
Mechanically linked contacts		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts.		
acc. to annex L of IEC 60947-5-1				
Mirror contacts		Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA3 aux. contact blocks) are mirror contacts.		
acc. to annex F of IEC 60947-4-1				

Built-in auxiliary contacts according to UL / CSA



Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Max. operational voltage		600 V AC, 250 V DC		
Pilot duty		A600, Q300		
AC thermal rated current		10 A		
AC maximum volt-ampere making		7200 VA		
AC maximum volt-ampere breaking		720 VA		
DC thermal rated current		2.5 A		
DC maximum volt-ampere making-breaking		69 VA		

IEC Technical data

VASL09 ... VASL16, 3-pole, reversing

Utilization characteristics

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	VAS09	VAS12	VAS16
	DC operated	VASL09	VASL12	VASL16
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1			
Rated operational voltage U_e max.	690 V			
Rated frequency (without derating)	50 / 60 Hz			
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40$ °C		22 A	25 A	25 A
With conductor cross-sectional area		2.5 mm ²	4 mm ²	4 mm ²
AC-3 Utilization category For air temperature close to contactor $\theta \leq 60$ °C I_e / Max. rated operational current AC-3 (1)				
	220-230-240 V	9 A	12 A	15.7 A
	400 V	9 A	12 A	15.5 A
	415 V	9 A	12 A	15.5 A
	440 V	8 A	11 A	13.6 A
	500 V	8 A	11 A	12.5 A
	690 V	5 A	7 A	9 A
 3-phase motors				
Rated operational power AC-3 (1)				
	220-230-240 V	2.2 kW	3 kW	4 kW
	400 V	4 kW	5.5 kW	7.5 kW
	415 V	4 kW	5.5 kW	7.5 kW
	440 V	4 kW	5.5 kW	7.5 kW
	500 V	4 kW	5.5 kW	7.5 kW
	690 V	4 kW	5.5 kW	7.5 kW
 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors				
Rated making capacity AC-3	10 x I _e AC-3 acc. to IEC 60947-4-1			
Rated breaking capacity AC-3	8 x I _e AC-3 acc. to IEC 60947-4-1			
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded (2) U _e ≤ 500 V AC - gG type fuse		25 A		
Rated short-time withstand current I_{cw} at 40 °C ambient temperature, in free air from a cold state	1 s	230 A	250 A	250 A
	10 s	100 A	124 A	124 A
	30 s	65 A	75 A	75 A
	1 min	50 A	55 A	55 A
	15 min	22 A	24 A	24 A
Maximum breaking capacity cos ϕ = 0.45	at 440 V	155 A		
	at 690 V	90 A		
Power dissipation per pole	I _e / AC-3	0.16 W	0.3 W	0.5 W
Max. electrical switching frequency	AC-3	600 cycles/h		

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m. 50 Hz or 1800 r.p.m. 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

UL/CSA Technical data

VAS/L09 ... VAS/L16, 3-pole, reversing

Utilization characteristics

Main pole - Utilization characteristics according to UL / CSA

Contactor types	AC operated	VAS09	VAS12	VAS16
	DC operated	VASL09	VASL12	VASL16
Standards	UL 508, CSA C22.2 N°14			
Max. operational voltage	690 V			
UL / CSA maximum 1-phase motor rating				
Full load current	120 V AC	7.2 A	9.8 A	13.8 A
	240 V AC	8 A	10 A	12 A
Horse power rating	120 V AC	1/3 hp	1/2 hp	3/4 hp
	240 V AC	1 hp	1-1/2 hp	2 hp
UL / CSA maximum 3-phase motor rating				
Full load current (1)	200-208 V AC	7.8 A	7.8 A	11 A
	220-240 V AC	6.8 A	9.6 A	15.2 A
	440-480 V AC	7.6 A	11 A	14 A
	550-600 V AC	9 A	11 A	11 A
Horse power rating (1)	200-208 V AC	2 hp	2 hp	3 hp
	220-240 V AC	2 hp	3 hp	5 hp
	440-480 V AC	5 hp	7-1/2 hp	10 hp
	550-600 V AC	7-1/2 hp	10 hp	10 hp
Max. electrical switching frequency				
For motor use	600 cycles/h			

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m., 50 Hz or 1800 r.p.m., 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

Contactor types	AC operated	VAS09	VAS12	VAS16
	DC operated	VASL09	VASL12	VASL16
Rated insulation voltage Ui				
acc. to IEC 60947-4-1	690 V			
acc. to UL / CSA	600 V			
Rated impulse withstand voltage Uimp.	6 kV			
Ambient air temperature close to contactor				
Operation	Fitted with thermal overload relay	-25...+60 °C		
	Without thermal overload relay	-40...+70 °C		
Storage	-60...+80 °C			
Climatic withstand	Category B according to IEC 60947-1 Annex Q			
Maximum operating altitude (without derating)	3000 m			
Mechanical durability				
Number of operating cycles	5 millions operating cycles			
Max. switching frequency	1800 cycles/h			

General technical data

VAS/L09 ... VAS/L16, 3-pole, reversing

Coil & mounting characteristics

Magnet system characteristics for VAS09 ... VAS16 contactors

Contactor types	AC operated	VAS09	VAS12	VAS16
Coil operating limits acc. to IEC 60947-4-1	AC supply	0.85...1.1 x U _c (at θ ≤ 60 °C); U _c (at θ ≤ 70 °C)		
AC control voltage	Rated control circuit voltage U _c	at 50 Hz 24...415 V		
		at 60 Hz 24...415 V		
Coil consumption	Average pull-in value	50 Hz	33 VA	
		60 Hz	33 VA	
		50/60 Hz	33 VA	
	Average holding value	50 Hz	6.5 VA / 1.5 W	
		60 Hz	5 VA / 1.2 W	
	50/60 Hz	6.5 VA / 1.5 W		
Drop-out voltage		Approx. 30...50 % of U _c		
Operating time				
Between coil energization and:	N.O. contact closing	9...24 ms		
	N.C. contact opening	6...18 ms		
Between coil de-energization and:	N.O. contact opening (1)	5...19 ms		
	N.C. contact closing (1)	7...22 ms		
		(1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3.		

Magnet system characteristics for VASL09 ... VASL16 contactors

Contactor types	DC operated	VASL09	VASL12	VASL16
Coil operating limits acc. to IEC 60947-4-1	DC supply	0.85...1.1 x U _c (at θ ≤ 60 °C); U _c (at θ ≤ 70 °C)		
DC control voltage	Rated control circuit voltage U _c	12...240 V DC		
	Coil consumption	Average pull-in value	3 W	
		Average holding value	3 W	
Drop-out voltage		Approx. 10...40 % of U _c		
Coil time constant	Open	L/R	12 ms	
	Closed	L/R	40 ms	
Operating time				
Between coil energization and:	N.O. contact closing	36...59 ms		
	N.C. contact opening	31...53 ms		
Between coil de-energization and:	N.O. contact opening (1)	13...17 ms		
	N.C. contact closing (1)	15...20 ms		
		(1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2		

Mounting characteristics and conditions for use








Contactor types	AC operated	VAS09	VAS12	VAS16
	DC operated	VASL09	VASL12	VASL16
Mounting positions				
Mounting distances	The reversing contactors can be assembled side by side.			
Fixing	On rail according to IEC 60715, EN 60715	35 x 7.5 mm or 35 x 15 mm		
	By screws (not supplied)	2 x M4 screws placed diagonally		

General technical data

VAS/L09 ... VAS/L16, 3-pole, reversing

Terminal characteristics

Connecting characteristics



Contactor types	AC operated	VAS09	VAS12	VAS16
	DC operated	VASL09	VASL12	VASL16
Main terminals				
 <p>Screw terminals with cable clamp</p>				
Connection capacity (min. ... max.)				
Main conductors (poles)				
	Rigid solid	1 x	0.75...4 mm ²	
	Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²	
	Flexible with insulated ferrule	1 x	0.75...1.5 mm ²	
Connection capacity acc. to UL / CSA (Sol/Str)		1 x	AWG 18...12	
Stripping length			9 mm	
Tightening torque		Recommended	1.00 Nm / 9 lb.in	
		Max.	1.20 Nm	
Auxiliary conductors (built-in auxiliary terminals + coil terminals)				
	Rigid solid	1 x	0.75...2.5 mm ²	
	Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²	
	Flexible with insulated ferrule	1 x	0.75...1.5 mm ²	
Connection capacity acc. to UL / CSA (Sol/Str)		1 x	AWG 18...14	
Stripping length			9 mm	
Tightening torque				
Coil terminals		Recommended	1.00 Nm / 9 lb.in	
		Max.	1.20 Nm	
Built-in auxiliary terminals		Recommended	1.00 Nm / 9 lb.in	
		Max.	1.20 Nm	
Degree of protection				
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
All terminals			IP20	
Screw terminals				
All terminals			Delivered in open position, screws of unused terminals must be tightened	
			M3	
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2	

IEC Technical data

(V)B/C6...(V)B/C7, 3 & 4-pole

Utilization characteristics

Main pole – Utilization characteristics according to IEC

Contactor types	AC operated	B6, VB6, VB6A	B7, VB7, VB7A
	DC operated	BC6, VBC6, VBC6A	BC7, TBC7, VBC7, VBC7A
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1		
Rated operational voltage $U_{e,max}$	690 V AC		
Rated frequency (without derating)	DC or 50 / 60 Hz		
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$, with conductor cross-sectional area	20 A		
AC-1 Utilization category for air temperature close to contactor $\theta \leq 40^\circ\text{C}$			
I_b / Rated operational current AC-1	220-230-240 V	Screw terminal types: 20 A Soldering pin types: 12 A Flat pin types: 16 A	
$U_{e,max} \leq 690\text{ V, } 50/60\text{ Hz}$	380-400 V	Screw terminal types: 20 A Soldering pin types: 12 A Flat pin types: 16 A	
	440 V	Screw terminal types: 20 A Soldering pin types: 12 A Flat pin types: 16 A	
	500 V	12 A	
	690 V	6 A	
AC-1 Utilization category for air temperature close to contactor $\theta \leq 55^\circ\text{C}$			
I_b / Rated operational current AC-1	220-230-240 V	Screw terminal types: 16 A Soldering pin types: 12 A Flat pin types: 16 A	Screw terminal types: 20 A Soldering pin types: 12 A Flat pin types: 16 A
$U_{e,max} \leq 690\text{ V, } 50/60\text{ Hz}$	380-400 V	Screw terminal types: 16 A Soldering pin types: 12 A Flat pin types: 16 A	Screw terminal types: 20 A Soldering pin types: 12 A Flat pin types: 16 A
	440 V	Screw terminal types: 16 A Soldering pin types: 12 A Flat pin types: 16 A	Screw terminal types: 20 A Soldering pin types: 12 A Flat pin types: 16 A
	500 V	12 A	
	690 V	6 A	
AC-3 Utilization category for air temperature close to contactor $\theta \leq 55^\circ\text{C}$			
I_b / Rated operational current AC-3	220-230-240 V	9 A	12 A
	380-400 V	8 A	12 A
	440 V	8 A	12 A
	500 V	6.5 A	9 A
	690 V	3.5 A	3.5 A
Rated operational power AC-3	220-230-240 V	2.2 kW	3 kW
	380-400 V	4 kW	5.5 kW
	440 V	4 kW	5.5 kW
	500 V	3 kW	4 kW
	690 V	3 kW	3 kW
DC-1 Utilization category for air temperature close to contactor $\theta \leq 55^\circ\text{C}$			
I_b / Rated operational current DC-1	110 V	-	4 A
	220 V	-	0.6 A
DC-3 Utilization category for air temperature close to contactor $\theta \leq 55^\circ\text{C}$			
I_b / Rated operational current DC-3	110 V	-	1.5 A
	220 V	-	0.25 A
DC-5 Utilization category for air temperature close to contactor $\theta \leq 55^\circ\text{C}$			
I_b / Rated operational current DC-5	110 V	-	0.4 A
	220 V	-	0.2 A
Rated making capacity AC-3	$10 \times I_b$, AC-3 acc. to IEC 60947-4-1		
Rated breaking capacity AC-3	$8 \times I_b$, AC-3 acc. to IEC 60947-4-1		
Short-circuit protection device for contactors without thermal O/L relay - motor protection excluded $U_{e,max} \leq 500\text{ V AC - gG type fuse}$	Coordination type 1: 25 A / Coordination type 2: 20 A		
Rated short-time withstand current I_{cw} at 40°C ambient temperature, in free air from a cold state	10 s	64 A	96 A
Maximum breaking capacity $\cos \phi = 0.45$	at 400 V	64 A	96 A
Maximum electrical switching frequency	AC-1	300 cycles/h	
	AC-3	600 cycles/h	
	DC-1, DC-3, DC-5	600 cycles/h	

UL/CSA Technical data

(M)B/C6...(M)B/C7, 3 & 4-pole

Utilization characteristics

Main pole – Utilization characteristics according to UL/CSA

Contactor types	AC operated	B6, VB6, VB6A	B7, VB7, VB7A
	DC operated	BC6, VBC6, VBC6A	BC7, TBC7, VBC7, VBC7A
Standards	UL 508, CSA C22.2 N° 14		
Maximum operational voltage	600 V		
UL/CSA general use rating	12 A		16 A
UL/CSA maximum 1-phase motor rating			
Full load current	120 V AC	8.4 A	13.8 A
	240 V AC	6.8 A	10.0 A
Horse power rating	120 V AC	1 hp (screw termination only)	0.75 hp
	240 V AC	2 hp (screw termination only)	1.5 hp
UL/CSA maximum 3-phase motor rating			
Full load current ¹⁾	200-208 V AC	4.6 A	7.5 A
	220-240 V AC	6.8 A	9.6 A
	440-480 V AC	3.4 A	7.6 A
	550-600 V AC	1.7 A	6.1 A
Horse power rating ¹⁾	200-208 V AC	1 hp	2 hp
	220-240 V AC	2 hp	3 hp
	440-480 V AC	3 hp	5 hp
	550-600 V AC	1 hp	5 hp
Maximum electrical switching frequency			
For resistive loads AC-1	300 cycles/h		
For motor loads AC-3	600 cycles/h		

¹⁾ For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

Contactor types	AC operated	B6, VB6, VB6A	B7, VB7, VB7A
	DC operated	BC6, VBC6, VBC6A	BC7, TBC7, VBC7, VBC7A
Rated insulation voltage U_i			
acc. to IEC 60947-4-1	690 V		
acc. to UL/CSA	600 V		
Rated impulse withstand voltage U_{imp}	6 kV		
Ambient air temperature, close to contactor			
Operation	Fitted with thermal overload relay	-25 ... +55 °C	
	Without thermal overload relay	-25 ... +55 °C	
Storage	-40 ... +80 °C		
Climatic withstand	acc. to IEC 60947-1 Annex Q		
Maximum operating altitude (without derating)	2000 m		
Mechanical durability	10 ⁷ operating cycles		
Resistance to shock	Half-sine		
acc. to IEC 60068-2-27 and EN 60068-2-27	15 g / 11 ms		
acc. to IEC/EN 60947-1 Annex. Q	Category E		
Resistance to vibrations	Sinusoidal		
acc. to IEC 60068-2-27 and EN 60068-2-27	5 g / 3 ... 150 Hz		
acc. to IEC/EN 60947-1 Annex. Q	Category E		

General technical data

(M)B/C6...(M)B/C7, 3 & 4-pole

Coil & mounting characteristics

Magnet system characteristics for B6, B7 contactors

Contactor types	AC operated	B6, VB6	B7, VB7
Coil operating limits acc. to IEC 60947-4-1	AC supply	0.85 ... 1.1 x U _c	
AC control voltage			
Rated control circuit voltage U _c		See ordering tables	
Coil consumption	Average pull-in value	3.5 VA / 3.5 W	
	Average holding value	3.5 VA / 3.5 W	
Drop-out voltage		0.20 ... 0.75 % of U _c	

Magnet system characteristics for BC6, BC7 contactors

Contactor types	DC operated	BC6, VBC6	BC7, VBC7
Coil operating limits acc. to IEC 60947-4-1	DC supply	0.85 ... 1.1 x U _c	
DC control voltage			
Rated control circuit voltage U _c		See ordering tables	
Coil consumption ¹⁾	Average pull-in value	3.5 VA / 3.5 W	
	Average holding value	3.5 VA / 3.5 W	
Drop-out voltage in % of U _{c,min}		0.10 ... 0.75 x U _c	

¹⁾ Interface mini-contactors: see coil consumption on ordering details pages

Magnet system characteristics for TBC7 contactors

Contactor types	DC operated	TBC7	
Coil operating limits acc. to IEC 60947-4-1	DC supply	Wide range voltage supply see ordering tables, U _{c,min} ... U _{c,max}	
AC control voltage			
Rated control circuit voltage U _c		See ordering tables	
Coil consumption	Average pull-in value	5 VA / 5 W	
	Average holding value	5 VA / 5 W	
Drop-out voltage in % of U _{c,min}		≤ 0.20 % of U _{c,min}	

Mounting characteristics and conditions for use

Contactor types	AC operated	B6, VB6, VB6A	B7, VB7, VB7A
	DC operated	BC6, VBC6, VBC6A	BC7, TBC7, VBC7, VBC7A
Mounting positions			
Mounting distances		The contactors can be assembled side by side	
Fixing			
On rail acc. to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm	
By screws (not supplied)		2 x M4 screws placed diagonally	

General technical data

(V)B/C6...(V)B/C7, 3 & 4-pole

Built-in auxiliary contacts

Built-in auxiliary contacts according to IEC

Contactor types	AC operated	B6, VB6, VB6A	B7, VB7, VB7A
	DC operated	BC6, VBC6, VBC6A	BC7, TBC7, VBC7, VBC7A
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1		
Rated operational voltage U _e max	690 V		
Rated frequency (without derating)	DC or 50 / 60 Hz		
Conventional free-air thermal current I _{th} 0 ≤ 40 °C	6 A		
I _e / Rated operational current AC-15 acc. to IEC 60947-5-1	24 V 50/60 Hz	4 A	
	110-120 V 50/60 Hz	4 A	
	220-230-240 V 50/60 Hz	4 A	
	380-400 V 50/60 Hz	3 A	
	440 V 50/60 Hz	3 A	
I _e / Rated operational current DC-13 acc. to IEC 60947-5-1	24 V DC	2.5 A	
	110 V DC	0.7 A	
	220 - 240 V DC	0.4 A	
Short-circuit protection device	6 A, Type gG		
Minimum switching capacity with failure rate acc. to IEC 60947-5-4	17 V / 5 mA		
Maximum electrical switching frequency	AC-15	600 cycles/h	
	DC-13	600 cycles/h	

Built-in auxiliary contacts according to UL/CSA






Contactor types	AC operated	B6, VB6, VB6A	B7, VB7, VB7A
	DC operated	BC6, VBC6, VBC6A	BC7, VBC7, VBC7A
Max. operational voltage	600 V AC		
Pilot duty	A600		
AC thermal rated current	5 A		

General technical data

(M)B/C6...(M)B/C7, 3 & 4 pole

Terminal characteristics

Connection characteristics

Contactor types	AC operated	B6, VB6, VB6A	B7, VB7, VB7A
	DC operated	BC6, VBC6, VBC6A	BC7, TBC7, VBC7, VBC7A
Main terminals ¹⁾	 Screw terminals with cable clamp		
Connection capacity			
Main conductors (poles)			
 Rigid: solid	1 or 2 x	1 ... 4 mm ²	
 Flexible without ferrule	1 or 2 x	1 ... 2.5 mm ²	
Connection capacity acc. to UL/CSA (Sol/Str)	1 or 2 x	AWG 22 ... 10	
Stripping length		9 mm	
Tightening torques		0.8 ... 1.1 Nm / 7 lb.in	
Connection capacity – auxiliary conductors (built-in auxiliary terminals + coil terminals)			
 Rigid: solid	1 or 2 x	1 ... 4 mm ²	
 Flexible without ferrule	1 or 2 x	1 ... 2.5 mm ²	
Connection capacity acc. to UL/CSA (Sol/Str)	1 or 2 x	AWG 22 ... 10	
Stripping length		9 mm	
Tightening torques			
Coil terminals		0.8 ... 1.1 Nm / 7 lb.in	
Built-in auxiliary terminals		0.8 ... 1.1 Nm / 7 lb.in	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
Main terminals		IP20	
Coil terminals		IP20	
Built-in auxiliary terminals		IP20	
Screw terminals (Delivered in open position, screws of unused terminals must be tightened)			
All terminals		M3	
Screwdriver type Flat Ø 5.5 mm / Pozidriv 1			

¹⁾ Soldering pin connection acc. to DIN 40801: 0.8 x 1 mm / 0.8 x 2.54 mm
 Flat pin connection acc. to DIN 46248: 1 x 6.3 mm / 1 x 2.8 mm

IEC/UL/CSA Technical data

AF09(Z)...AF38(Z), 4-pole

Utilization characteristics

Main pole - Utilization characteristics according to IEC

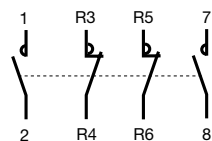
Contactor types	AC / DC operated	AF09(Z)	AF16(Z)	AF26(Z)	AF38(Z)
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1			
Rated operational voltage Ue max.		690 V			
Rated frequency (without derating)		50 / 60 Hz			
Conventional free-air thermal current Ith acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$		35 A	35 A	55 A	55 A
With conductor cross-sectional area		6 mm ²	6 mm ²	16 mm ²	16 mm ²
AC-1 Utilization category					
For air temperature close to contactor					
Ie / Rated operational current AC-1	$\theta \leq 40^\circ\text{C}$	25 A	30 A	45 A	55 A
Ue max. $\leq 690\text{ V}$, 50/60 Hz	$\theta \leq 60^\circ\text{C}$	25 A	30 A	40 A	45 A
	$\theta \leq 70^\circ\text{C}$	22 A	26 A	32 A	37 A
With conductor cross-sectional area		4 mm ²	6 mm ²	10 mm ²	16 mm ²
Short-circuit protection device for contactors					
Without thermal overload relay - Motor protection excluded					
Ue $\leq 500\text{ V AC}$ - gG type fuse		25 A	32 A	50 A	63 A
Rated short-time withstand current Icw	1 s	300 A	300 A	450 A	450 A
At 40 °C ambient temperature, in free air from a cold state	10 s	150 A	150 A	300 A	300 A
	30 s	80 A	80 A	225 A	225 A
	1 min	60 A	60 A	150 A	150 A
	15 min	35 A	35 A	55 A	55 A
Power dissipation per pole	Ie / AC-1	0.8 W	1.2 W	1.6 W	2.3 W
Max. electrical switching frequency	AC-1	600 cycles/h			

Main pole - Utilization characteristics according to UL / CSA

Contactor types		AF09(Z)	AF16(Z)	AF26(Z)	AF38(Z)
Standards		UL 508, CSA C22.2 N°14			
Max. operational voltage		600 V			
UL / CSA general use rating					
600 V AC		25 A	30 A	45 A	55 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 8	AWG 6
Max. electrical switching frequency		600 cycles/h			
For general use		600 cycles/h			

Remark for 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles

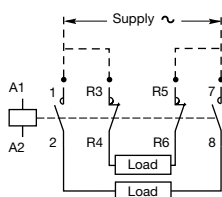
These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK before MAKE.



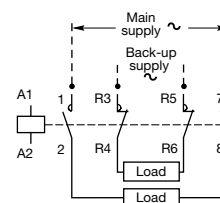
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

Block diagrams

– Single supply and 2 separate loads



– 2 separate supplies and 2 separate loads



IEC/UL/CSA Technical data

A/E/F45...A/E/F75, 4-pole

Utilization characteristics

Main pole - Utilization characteristics according to IEC

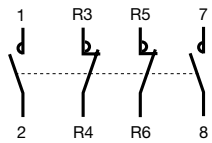
Contactor types	AC operated	A45	A50	A75
	DC operated	AE45	AE50	AE75
		TAE45	TAE50	TAE75
	AC / DC operated	AF45	AF50	AF75
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1		
Rated operational voltage U_e max.		1000 V (690 V for AF.. contactors)		
Rated frequency (without derating)		50 / 60 Hz		
Conventional free-air thermal current I_{th}				
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$		100 A	100 A	125 A
With conductor cross-sectional area		35 mm ²	35 mm ²	50 mm ²
AC-1 Utilization category				
For air temperature close to contactor				
I_e / Rated operational current AC-1	$\theta \leq 40^\circ\text{C}$	70 A	100 A	125 A
U _e max. $\leq 690\text{ V}$, 50/60 Hz	$\theta \leq 55^\circ\text{C}$	60 A	85 A	105 A
	$\theta \leq 70^\circ\text{C}$ (1)	50 A	70 A	85 A
With conductor cross-sectional area		25 mm ²	35 mm ²	50 mm ²
Short-circuit protection device for contactors				
without thermal overload relay - Motor protection excluded				
U _e $\leq 500\text{ V AC}$ - gG type fuse		80 A	100 A	160 A
Rated short-time withstand current I_{cw}				
At 40 °C ambient temperature,	1 s	1000 A		
in free air from a cold state	10 s	650 A		
	30 s	370 A		
	1 min	250 A		
	15 min	110 A	110 A	135 A
Power dissipation per pole	I_e / AC-1	2.5 W	5 W	7 W
Max. electrical switching frequency	AC-1	600 cycles/h (300 for AF.., AE.., TAE..)		

(1) Unauthorized for TAE.. contactors

Main pole - Utilization characteristics according to UL / CSA

Contactor types	AC operated	A45	A50	A75
	DC operated	AE45	AE50	AE75
		TAE45	TAE50	TAE75
	AC / DC operated	AF45	AF50	AF75
Standards		UL 508, CSA C22.2 N°14		
Max. operational voltage		600 V		
UL / CSA general use rating				
600 V AC		65 A	80 A	105 A
With conductor cross-sectional area		AWG 6	AWG 4	AWG 2
Max. electrical switching frequency				
For general use		600 cycles/h (300 for AF.., AE.., TAE..)		

Remark for 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles



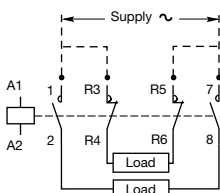
These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK before MAKE.



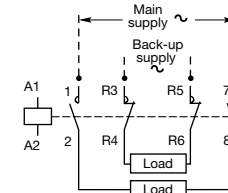
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

Block diagrams

– Single supply and 2 separate loads



– 2 separate supplies and 2 separate loads



IEC/UL/CSA Technical data

EK110...EK1000, 4-pole

Utilization characteristics

Across the line
Contactors

1

Main pole - Utilization characteristics according to IEC

Contactor types	AC or DC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1						
Rated operational voltage U_e max.		1000 V						
Rated frequency (without derating)		50 / 60 Hz						
Conventional free-air thermal current I_{th}								
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$		200 A	250 A	300 A	350 A	550 A	800 A	1000 A
With conductor cross-sectional area		95 mm ²	150 mm ²	185 mm ²	240 mm ²	2x 185 mm ²	2x 240 mm ²	2x 300 mm ²
AC-1 Utilization category								
For air temperature close to contactor								
I_e / Rated operational current AC-1								
$\theta \leq 40^\circ\text{C}$		200 A	250 A	300 A	350 A	550 A	800 A	1000 A
$\theta \leq 55^\circ\text{C}$		180 A	230 A	270 A	310 A	470 A	650 A	800 A
$\theta \leq 70^\circ\text{C}$		155 A	200 A	215 A	250 A	400 A	575 A	720 A
With conductor cross-sectional area		95 mm ²	150 mm ²	185 mm ²	240 mm ²	2x 185 mm ²	2x 240 mm ²	2x 300 mm ²
AC-3 Utilization category								
For air temperature close to contactor $\theta \leq 55^\circ\text{C}$								
I_e / Max. rated operational current AC-3 (1)								
	220-230-240 V	120 A	145 A	210 A	210 A	400 A	550 A	-
	380-400 V	120 A	145 A	210 A	210 A	400 A	550 A	-
	415 V	120 A	145 A	210 A	210 A	400 A	550 A	-
	440 V	120 A	145 A	210 A	210 A	370 A	550 A	-
	500 V	120 A	145 A	210 A	210 A	370 A	550 A	-
	690 V	120 A	120 A	210 A	210 A	370 A	550 A	-
	1000 V	64 A	80 A	113 A	113 A	155 A	175 A	-
Rated operational power AC-3 (1)								
	220-230-240 V	30 kW	45 kW	59 kW	59 kW	110 kW	160 kW	-
	380-400 V	55 kW	75 kW	110 kW	110 kW	200 kW	280 kW	-
	415 V	55 kW	75 kW	110 kW	110 kW	220 kW	315 kW	-
	440 V	59 kW	75 kW	110 kW	110 kW	220 kW	315 kW	-
	500 V	75 kW	90 kW	132 kW	132 kW	250 kW	400 kW	-
	690 V	110 kW	110 kW	160 kW	160 kW	355 kW	500 kW	-
	1000 V	90 kW	110 kW	160 kW	160 kW	220 kW	250 A	-
Rated making capacity AC-3		10 x I_e AC-3 acc. to IEC 60947-4-1						
Rated breaking capacity AC-3		8 x I_e AC-3 acc. to IEC 60947-4-1						
Short-circuit protection device for contactors								
without thermal overload relay - Motor protection excluded								
$U_e \leq 500$ V AC - gG type fuse		250 A	250 A	355 A	355 A	630 A	800 A	1000 A
Rated short-time withstand current I_{cw}								
at 40°C ambient temperature,	1 s	1700 A	1800 A	2300 A	2300 A	5500 A	5500 A	6800 A
in free air from a cold state	10 s	900 A	1200 A	1680 A	1680 A	5300 A	5300 A	6400 A
	30 s	600 A	700 A	1000 A	1000 A	3700 A	3700 A	4400 A
	1 min	450 A	550 A	800 A	800 A	3000 A	3000 A	3400 A
	15 min	210 A	250 A	320 A	320 A	1000 A	1000 A	1200 A
Maximum breaking capacity								
$\cos \phi = 0.45$	at 440 V	1400 A	1500 A	2000 A	2000 A	5000 A	5400 A	-
($\cos \phi = 0.35$ for $I_e > 100$ A)	at 690 V	1100 A	1200 A	1700 A	1700 A	5000 A	5400 A	-
Power dissipation per pole								
	I_e / AC-1	10 W	13 W	18 W	18 W	40 W	60 W	80 W
	I_e / AC-3	3 W	5 W	9 W	9 W	15 W	25 W	-
Max. electrical switching frequency								
	AC-1	300 cycles/h						
	AC-3	300 cycles/h						
	AC-2, AC-4	150 cycles/h		120 cycles/h				



3-phase motors



1500 r.p.m. 50 Hz
1800 r.p.m. 60 Hz
3-phase motors

Main pole - Utilization characteristics according to UL / CSA

Contactor types	AC or DC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Standards		UL 508, CSA C22.2 N°14						
Max. operational voltage		600 V						
UL / CSA general use rating								
600 V AC		170 A	200 A	250 A	300 A	420 A	540 A	-
Max. electrical switching frequency								
For general use		300 cycles/h						

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

AF09(Z)...AF38(Z)

Coil & mounting characteristics

Magnet system characteristics

Contactor types	AC / DC operated	AF09(Z)	AF16(Z)	AF26(Z)	AF38(Z)
Coil operating limits acc. to IEC 60947-4-1	AC supply	At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$ At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min...} U_c \text{ max.}$			
	DC supply	At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$ At $\theta \leq 70^\circ\text{C}$ (AF) $0.85 \times U_c \text{ min...} U_c \text{ max.}$ - (AF..Z) $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$			
AC control voltage 50/60 Hz	Rated control circuit voltage U_c	24...500 V AC			
	Coil consumption	Average pull-in value	(AF) 50 VA - (AF..Z) 16 VA		
		Average holding value	(AF) 2.2 VA / 2 W - (AF..Z) 1.7 VA / 1.5 W		
DC control voltage	Rated control circuit voltage U_c	12...500 V DC			
	Coil consumption	Average pull-in value	(AF) 50 W - (AF..Z) 12...16 W		
		Average holding value	(AF) 2 W - (AF..Z) 1.7 W		
PLC-output control		(AF..Z) $\geq 500 \text{ mA}$ 24 V DC			
Drop-out voltage		$\leq 60\%$ of $U_c \text{ min.}$			
Voltage sag immunity	acc. to SEMI F47-0706	(AF..Z) conditions of use on request			
Dips withstand -20 °C $\leq \theta \leq$ +60 °C		(AF..Z) 22 ms average			
Operating time	Between coil energization and:	N.O. contact closing	40...95 ms		
		N.C. contact opening	38...90 ms		
	Between coil de-energization and:	N.O. contact opening	11...95 ms		
		N.C. contact closing	13...98 ms		

Mounting characteristics and conditions for use

Contactor types	AF09(Z)	AF16(Z)	AF26(Z)	AF38(Z)
Mounting positions				
Mounting distances	Max. add-on N.C. auxiliary contacts: see accessory fitting details for a 4-pole contactor AF09 ... AF38			
Fixing	On rail according to IEC 60715, EN 60715	35 x 7.5 mm or 35 x 15 mm		
	By screws (not supplied)	2 x M4 screws placed diagonally		

General technical data

A45...A75

Coil & mounting characteristics

Magnet system characteristics

Contactor types	AC operated	A45	A50	A75	
Coil operating limits acc. to IEC 60947-4-1	AC supply	At $\theta \leq 55\text{ °C}$ $0.85...1.1 \times U_c$ Please also refer to "Mounting characteristics and conditions for use"			
AC control voltage	Rated control circuit voltage U_c	at 50 Hz	24...690 V		
		at 60 Hz	24...690 V		
	Coil consumption	Average pull-in value	50 Hz	180 VA	
			60 Hz	210 VA	
		Average holding value	50/60 Hz (1)	190 VA / 180 VA	
			50 Hz	18 VA / 5.5 W	
60 Hz	18 VA / 5.5 W				
50/60 Hz (1)	18 VA / 5.5 W				
Drop-out voltage		approx. 40...65 % of U_c			
Operating time					
Between coil energization and:	N.O. contact closing	8...27 ms			
	N.C. contact opening	7...22 ms			
Between coil de-energization and:	N.O. contact opening	4...11 ms			
	N.C. contact closing	7...14 ms			

(1) 50/60 Hz coils: see "Coil voltage code table".

Mounting characteristics and conditions for use

Contactor types	AC operated	A45	A50	A75
Mounting positions				
		Pos. 5 unauthorized for A45-22-00, A75-22-00		
		Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor A45 ... A75		
Control voltage / Ambient temperature	Mounting positions (1) 1, $1 \pm 30^\circ$, 2, 3, 4, 5	at $\theta \leq 55\text{ °C}$	$0.85...1.1 \times U_c$	
		at $\theta \leq 70\text{ °C}$	U_c	
	6	at $\theta \leq 55\text{ °C}$	$0.95...1.1 \times U_c$	
		at $\theta \leq 70\text{ °C}$	Unauthorized	
Mounting distances		The contactors can be assembled side by side		
Fixing	On rail according to IEC 60715, EN 60715	35 x 15 mm or 75 x 25 mm		
	By screws (not supplied)	2 x M6 screws placed diagonally		

(1) For 60 Hz coil voltage: (only for devices fitted with CA 5-.. and CAL 5-11 auxiliary contacts or TP timer).
 – A45-40-00, A50-40-00 and A75-40-00 contactors.
 Mounting positions 1 to 5 and ambient temperature $\leq 55\text{ °C}$: tolerance reduced to $0.9...1.1 U_c$ (instead of $0.85...1.1 U_c$) for coil voltage codes 70 to 79 and 80 to 89.
 – A45-22-00 and A75-22-00 contactors.
 Mounting positions 1 to 4 and ambient temperature $\leq 55\text{ °C}$: tolerance reduced to $0.9...1.1 U_c$ (instead of $0.85...1.1 U_c$) for coil voltage codes 70 to 79 and 80 to 89.
 For mounting position 6 or ambient temperature of 55 to 70 °C the information given on this page remains applicable.

General technical data

AE45...AE75

Coil & mounting characteristics

Magnet system characteristics

Contactor types	DC operated	AE45	AE50	AE75
Coil operating limits acc. to IEC 60947-4-1	DC supply	At $\theta \leq 55^\circ\text{C}$ $0.85 \dots 1.1 \times U_c$ Please also refer to "Mounting characteristics and conditions for use"		
DC control voltage	Rated control circuit voltage U_c	12...250 V DC		
	Coil consumption	Average pull-in value	200 W	
		Average holding value	4 W	
Drop-out voltage		approx. 15...40 % of U_c		
Coil time constant	Open	L/R	3 ms	
	Closed	L/R	15 ms	
Operating time	Between coil energization and:	N.O. contact closing	13...30 ms	
		N.C. contact opening	10...27 ms	
	Between coil de-energization and:	N.O. contact opening (1)	5...15 ms	
		N.C. contact closing (1)	8...18 ms	

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for RV5 surge suppressor and a factor of 1.5 to 3 for RT5 surge suppressor.

Mounting characteristics and conditions for use

Contactor types	DC operated	AE45	AE50	AE75
Mounting positions		<p>Pos. 5 unauthorized for AE45-22-00, AE75-22-00</p> <p>Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor AE45 ... AE75 (1)(2)</p>		
Control voltage / Ambient temperature	Mounting positions 1, 1±30°, 2, 3, 4, 5	at $\theta \leq 55^\circ\text{C}$	$0.85 \dots 1.1 \times U_c$	
		at $\theta \leq 70^\circ\text{C}$	U_c	
	6	at $\theta \leq 55^\circ\text{C}$	$0.95 \dots 1.1 \times U_c$	
		at $\theta \leq 70^\circ\text{C}$	Unauthorized	
Mounting distances		The contactors can be assembled side by side		
Fixing	On rail according to IEC 60715, EN 60715	35 x 15 mm or 75 x 25 mm		
	By screws (not supplied)	2 x M6 screws placed diagonally		

General technical data

AF45...AF75

Coil & mounting characteristics

Magnet system characteristics

Contactor types	AC / DC operated	AF45	AF50	AF75
Coil operating limits acc. to IEC 60947-4-1	AC or DC supply	At $\theta \leq 70\text{ °C}$ $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$ Please also refer to "Mounting characteristics and conditions for use"		
AC control voltage 50/60 Hz	Rated control circuit voltage U_c	48...250 V		
	Coil consumption	210 VA		
		Average pull-in value	7 VA / 2.8 W	
DC control voltage	Rated control circuit voltage U_c	20...250 V DC		
	Coil consumption	Average pull-in value	190 W	
		Average holding value	2.8 W	
Drop-out voltage		55 % of $U_c \text{ min.}$		
Voltage sag immunity acc. to SEMI F47		Conditions of use on request		
Dips withstand		$\geq 20 \text{ ms}$		
Operating time				
Between coil energization and:	N.O. contact closing	30...100 ms		
	N.C. contact opening	27...95 ms		
Between coil de-energization and:	N.O. contact opening	30...110 ms		
	N.C. contact closing	35...115 ms		

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF45	AF50	AF75
Mounting positions				
		Pos. 5 unauthorized for AF45-22-00, AF75-22-00 contactors Max. and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor AF45 ... AF110		
Control voltage / Ambient temperature				
Mounting positions 1, 1±30°, 2, 3, 4, 5	at $\theta \leq 70\text{ °C}$	0.85 x $U_c \text{ min...} 1.1 \times U_c \text{ max.}$		
positions 6		Unauthorized		
Mounting distances		The contactors can be assembled side by side		
Fixing	On rail according to IEC 60715, EN 60715	35 x 15 mm or 75 x 25 mm		
	By screws (not supplied)	2 x M6 screws placed diagonally		

General technical data

EK110...EK1000

Coil & mounting characteristics

Magnet system characteristics

Contactor types	AC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Coil operating limits acc. to IEC 60947-4-1	AC supply	At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. Please also refer to "Mounting characteristics and conditions for use"						
AC control voltage	Rated control circuit voltage	50 Hz	24...500 V			48...500 V		
		60 Hz	24...600 V			110...600 V		
	Coil consumption	Average pull-in value	50 Hz	800 VA	1100 VA	3500 VA		
			60 Hz	900 VA	1200 VA	4000 VA		
	Average holding value	50/60 Hz (1)	500 / 500 VA	630 / 630 VA		3800 / 3400 VA		
		50 Hz	44 VA / 15 W	52 VA / 18 W		125 VA / 50 W		
Drop-out voltage in % of $U_c \text{ min}$.	Operating time	60 Hz	52 VA / 18 W	65 VA / 22 W		140 VA / 60 W		
		50/60 Hz (1)	2.5 VA / 2.5 W	2.5 VA / 2.5 W		140 VA / 60 W		
		approx. 45...65 % (20...50 % for "E" coil voltage codes)						
Between coil energization and:	N.O. contact closing	20...40 (1) / 30...50 (2) ms		30...60 ms				
		15...35 (1) / 25...45 (2) ms		25...55 ms				
		7.5...15 (1) / 9.5...120 (2) ms		10...20 ms				
		10...18 (1) / 100...125 (2) ms		13...23 ms				

(1) "A" coil voltage: see "Coil voltage code table".

(2) 50/60 Hz "E" coil voltage codes, see "Coil voltage code table".

Magnet system characteristics

Contactor types	DC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000	
Coil operating limits acc. to IEC 60947-4-1	DC supply	At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. Please also refer to "Mounting characteristics and conditions for use"							
DC control voltage	Rated control circuit voltage	12...220				24...220			
		Coil consumption	Average pull-in value	500 W		630 W		1100 W	
				Average holding value		2.5 W		2.5 W	
Drop-out voltage		approx. 15...50 % of $U_c \text{ min}$.							
Coil time constant	Open	L/R	8 ms			12 ms			
	Closed	L/R	50 ms			60 ms			
Between coil energization and:	N.O. contact closing	30...50 ms		60...80 ms					
		27...47 ms		55...75 ms					
		10...35 ms							
		13...38 ms							

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Mounting positions								
Max. N.O. or N.C. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor EK110 ... EK1000								
Control voltage / Ambient temperature	Mounting positions	1, 1±30°, 2, 3, 4, 5	at $\theta \leq 70^\circ\text{C}$		0.85...1.1 x U_c			
		2	at $\theta \leq 70^\circ\text{C}$		Unauthorized		0.85...1.1 x U_c	
		6	at $\theta \leq 70^\circ\text{C}$		Unauthorized			
Mounting distances								
Fixing	On rail according to IEC 60715, EN 60715		The contactors can be assembled side by side					
	By screws (supplied)		4 x M6			4 x M6 (1)		

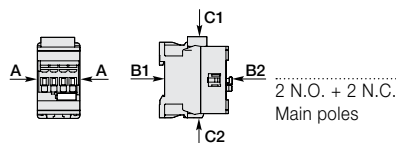
(1) Damping elements are supplied.

General technical data

AF09(Z)...AF38(Z), 4-pole

General technical data

Contactor types	AF09(Z)	AF16(Z)	AF26(Z)	AF38(Z)
Rated insulation voltage Ui acc. to IEC 60947-4-1 acc. to UL / CSA	690 V 600 V			
Rated impulse withstand voltage Uimp.	6 kV			
Electromagnetic compatibility	Devices complying with IEC 60947-1 / EN 60947-1 - Environment A			
Ambient air temperature close to contactor				
Operation	-40...+70 °C			
Storage	-60...+80 °C			
Climatic withstand	Category B according to IEC 60947-1 Annex Q			
Maximum operating altitude (without derating)	3000 m			
Mechanical durability				
Number of operating cycles	10 millions operating cycles			
Max. switching frequency	3600 cycles/h			
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 Mounting position 1				
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position		
	A	30 g		
	B1	25 g closed position / 5 g open position		
	B2	15 g		
	C1	25 g		
	C2	25 g		
	A	30 g		30 g closed position / 25 g open position
	B1	25 g closed position / 5 g open position		25 g closed position / 5 g open position
	B2	15 g		15 g closed position / 10 g open position
	C1	25 g		25 g closed position / 20 g open position
	C2	25 g		25 g closed position / 20 g open position
Vibration withstand acc. to IEC 60068-2-6		5...300 Hz		
		4 g closed position / 2 g open position		



General technical data

A/E/F45...A/E/F75, 4-pole

General technical data

Contactor types	AC operated	A45	A50	A75
	DC operated	AE45	AE50	AE75
		TAE45	TAE50	TAE75
AC / DC operated	AF45	AF50	AF75	
Rated insulation voltage U_i				
acc. to IEC 60947-4-1		1000 V		
acc. to UL / CSA		600 V		
Rated impulse withstand voltage U_{imp}				
8 kV				
Electromagnetic compatibility				
AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A				
Ambient air temperature close to contactor				
Operation		-40...+70 °C (1)		
Storage		-60...+80 °C		
Climatic withstand				
acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II				
Maximum operating altitude (without derating)				
3000 m				
Mechanical durability				
Number of operating cycles		10 millions operating cycles (5 millions for AE... and TAE... contactors)		
Max. switching frequency		3600 cycles/h (300 for AF..)		
Shock withstand				
acc. to IEC 60068-2-27 and EN 60068-2-27				
Mounting position 1				
<p>4 N.O. Main poles</p> <p>2 N.O. + 2 N.C. Main poles</p>		Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position	
		A	20 g	
		B1	10 g closed position / 5 g open position	
		B2	15 g	
		C1	20 g	
		C2	20 g	
		A	20 g	
		B1	10 g closed position / 5 g open position (2)	
		B2	15 g (3)	
		C1	20 g	
C2	20 g			

(1) 55 °C max. for TAE... contactors.

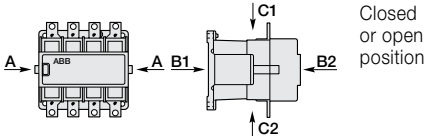
(2) 3 g in open position for AF 45-22, AE 45-22, AF 75-22 and AE 75-22.

(3) 10 g for AF 45-22, AE 45-22, AF 75-22 and AE 75-22.

General technical data

EK110...EK1000, 4-pole

General technical data


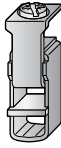









Contactor types	AC or DC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Rated insulation voltage U_i acc. to IEC 60947-4-1		1000 V						
acc. to UL		600 V						
Rated impulse withstand voltage U_{imp}		8 kV						
Electromagnetic compatibility		EK contactors complying with IEC 60947-1 / EN 60947-1 - Environment A						
Ambient air temperature close to contactor								
Operation	Fitted with thermal overload relay	-25 to +55 °C						-
	Without thermal overload relay	-40 to +70 °C						-
Storage		-50 to +70 °C						-
Climatic withstand		Category B acc. to IEC 60068-2-30						
Maximum operating altitude (without derating)		≤ 3000 m						
Mechanical durability								
Number of operating cycles		10 millions operating cycles				5 millions operating cycles		3 millions operating cycles
Max. switching frequency		3600 cycles/h				60 cycles/h		
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27								
Mounting position 1								
								
	Shock direction	1/2 sinusoidal shock for 15 ms: no change in contact position, closed or open position						
	A	10 g						
	B1	10 g						
	B2	10 g						
	C1	10 g						
	C2	10 g						

General technical data

AF09(Z)...AF38(Z), 4-pole

Terminal characteristics

Connecting characteristics












Contactor types	AF09(Z)	AF16(Z)	AF26(Z)	AF38(Z)
Main terminals				
	Screw terminals with cable clamp		Screw terminals with double connector 2 x (5.5 width x 6.8 depth)	
Connection capacity (min. ... max.)				
Main conductors (poles)				
 Rigid	Solid ($\leq 4 \text{ mm}^2$)	} 1 x 1...6 mm ² 2 x 1...6 mm ²	1.5...16 mm ²	
 Rigid	Stranded ($\geq 6 \text{ mm}^2$)		1.5...16 mm ²	
 Flexible with non insulated ferrule		1 x 0.75...6 mm ² 2 x 0.75...6 mm ²	1.5...16 mm ² 1.5...16 mm ²	
 Flexible with insulated ferrule		1 x 0.75...4 mm ² 2 x 0.75...2.5 mm ²	1.5...16 mm ² 1.5...16 mm ²	
 Bars or lugs		L < 9.6 mm	-	
Connection capacity acc. to UL/CSA (Sol/Str)	1 or 2 x	AWG 16...10	AWG 16...6	
Stripping length		10 mm	12 mm	
Tightening torque		1.5 Nm / 13 lb.in	2.5 Nm / 22 lb.in	
Auxiliary conductors (coil terminals)				
 Rigid solid		1 x 1...2.5 mm ² 2 x 1...2.5 mm ²		
 Flexible with non insulated ferrule		1 x 0.75...2.5 mm ² 2 x 0.75...2.5 mm ²		
 Flexible with insulated ferrule		1 x 0.75...2.5 mm ² 2 x 0.75...1.5 mm ²		
 Lugs		L < 8 mm		
Connection capacity acc. to UL/CSA (Sol/Str)	1 or 2 x	AWG 18...14		
Stripping length		10 mm		
Tightening torque		1.2 Nm / 11 lb.in		
Degree of protection				
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
Main terminals		IP20		
Coil terminals		IP20		
Screw terminals				
Delivered in open position, screws of unused terminals must be tightened				
Main terminals		M3.5	M4.5	
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2		
Coil terminals		M3.5		
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2		

General technical data

A/E/F45...A/E/F75

Terminal characteristics

Connecting characteristics

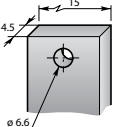
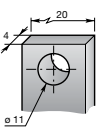
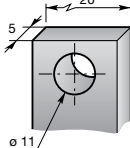
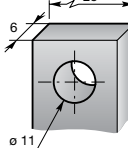
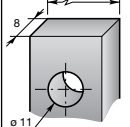





Contactor types	AC operated	A45	A50	A75
	DC operated	AE45	AE50	AE75
		TAE45	TAE50	TAE75
	AC / DC operated	AF45	AF50	AF75
Main terminals		 Screw terminals with single connector (13 x 10 mm)		
Connection capacity (min. ... max.)				
Main conductors (poles)				
 Rigid	Solid ($\leq 4 \text{ mm}^2$)	} 1 x	6...50 mm ²	
 Stranded ($\geq 6 \text{ mm}^2$)			2 x	6...25 mm ²
 Flexible with ferrule		1 x	6...35 mm ²	
 Flexible with ferrule		2 x	6...16 mm ²	
 Bars or lugs		L \leq	-	
		L $>$	-	
Connection capacity acc. to UL/CSA (Sol/Str)		1 or 2 x	AWG 8...1	
Tightening torque	Recommended		4.00 Nm / 35 lb.in	
	Max.		4.50 Nm	
Auxiliary conductors (built-in auxiliary terminals + coil terminals)				
 Rigid solid		1 x	1...4 mm ²	
 Rigid solid		2 x	1...4 mm ²	
 Flexible with ferrule		1 x	1...2.5 mm ²	
 Flexible with ferrule		2 x	0.75...2.5 mm ²	
 Lugs		L \leq	8 mm	
		L $>$	3.7 mm	
Connection capacity acc. to UL/CSA (Sol/Str)		1 or 2 x	AWG 18...14	
Tightening torque	Recommended		1.00 Nm / 9 lb.in	
	Max.		1.20 Nm	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
Main terminals			IP10	
Coil terminals			IP20	
Screw terminals			Delivered in open position, screws of unused terminals must be tightened	
Main terminals			M6	
	Screwdriver type		Flat \varnothing 6.5 / Pozidriv 2	
Coil terminals			M3.5	
	Screwdriver type		Flat \varnothing 5.5 / Pozidriv 2	

General technical data

EK110...EK1000

Terminal characteristics

Connecting characteristics

Contactor types	AC or DC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Main terminals Flat type								
Connection capacity (min. ... max.)								
Main conductors (poles)								
	Rigid with connector	Single for Cu cable	25...120 mm ²	25...185 mm ²	25...185 mm ²	70...300 mm ²		-
		Single for Al/Cu cable	10...70 mm ²	35...120 mm ²	35...120 mm ²	70...300 mm ²		95...300 mm ²
		Double for Al/Cu cable	-	-	-	2 x 35...185		2 x 95...300
	Bars or lugs	L ≤	30 mm	30 mm	33 mm	33 mm	55 mm	55 mm
		Ø >	6 mm	10 mm	10 mm	10 mm	10 mm	10 mm
	Connection capacity acc. to UL/CSA	1 or 2 x	8 - 3/0 AWG		6 - 250 MCM	2 x 4 - 500 MCM	3 x 4 - 500 MCM	-
	Tightening torque	Recommended	5 Nm/44 lb.in	18 Nm / 160 lb.in				
		Max.	6 Nm	22 Nm				
Auxiliary conductors (coil terminals)								
	Rigid solid	1 x	0.5...2.5 mm ²					
		2 x	0.5...2.5 mm ²					
	Flexible with ferrule	1 x	0.5...2.5 mm ²					
		2 x	0.5...2.5 mm ²					
	Bars or lugs	L ≤	8 mm					
		l >	3.7 mm					
	Connection capacity acc. to UL/CSA (Sol/Str)	1 or 2 x	18...14 AWG					
	Tightening torque	Recommended	1.00 Nm / 9 lb.in					
		Max.	1.20 Nm					
Degree of protection								
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
	Main terminals		IP00					
	Coil terminals		IP20					
Screw terminals								
	Main terminals		M6		M10			
			Screws and bolts					
	Coil terminals (delivered in open positions)		M3.5					
		Screwdriver type	Flat Ø 5.5 mm / Pozidriv 2					

IEC Technical data

AF09(Z)...AF38(Z), 3 & 4-pole

DC circuit switching

General

The arc switching on DC is more difficult than on AC.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces (L/R ≈ 1 ms), inductive loads such as shunt motors (L/R ≈ 2 ms) or series motors (L/R ≈ 7.5 ms).
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

Technical Data

- The tables indicate for the standard contactors the le max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 60947-4-1 publication, the operating voltage Ue and the pole coupling details.




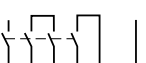
Ampere values quoted in these tables are valid for a -25 ... +70 °C temperature close to the contactors, as long as these values do not exceed the AC-1 Ampere values for the corresponding ambient temperature.

- Max. switching frequency: 300 cycles/h.




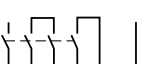
Selection table

Contactor types	AF09	AF12	AF16	AF26		AF30	AF38	
	3 or 4-pole			3-pole	4-pole	3-pole	3-pole	4-pole




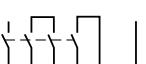
Utilization category DC-1, L/R ≤ 1 ms

	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	110 V	10 A	15 A	20 A	—	—	—	—	—
	220 V	—	—	—	—	—	—	—	—
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	220 V	10 A	15 A	20 A	—	—	—	—	—
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	220 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	≤ 72 V	25 A	—	30 A	—	45 A	—	—	55 A
	110 V	25 A	—	30 A	—	45 A	—	—	55 A
	220 V	25 A	—	30 A	—	45 A	—	—	55 A
	440 V	10 A	—	20 A	—	—	—	—	—

Utilization category DC-3, L/R ≤ 2 ms

	≤ 72 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	6 A	7 A	8 A	—	—	—	—	—
	220 V	—	—	—	—	—	—	—	—
	≤ 72 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	220 V	6 A	7 A	8 A	—	—	—	—	—
	≤ 72 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	220 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	≤ 72 V	25 A	—	30 A	—	—	—	—	—
	110 V	25 A	—	30 A	—	—	—	—	—
	220 V	25 A	—	30 A	—	—	—	—	—
	440 V	6 A	—	8 A	—	—	—	—	—

Utilization category DC-5, L/R ≤ 7.5 ms

	≤ 72 V	9 A	12 A	16 A	20 A	—	25 A	25 A	—
	110 V	4 A	4 A	4 A	—	—	—	—	—
	220 V	—	—	—	—	—	—	—	—
	≤ 72 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	10 A	15 A	20 A	45 A	—	50 A	50 A	—
	220 V	4 A	4 A	4 A	—	—	—	—	—
	≤ 72 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	220 V	9 A	12 A	16 A	20 A	—	25 A	25 A	—
	≤ 72 V	25 A	—	30 A	—	—	—	—	—
	110 V	25 A	—	30 A	—	—	—	—	—
	220 V	10 A	—	20 A	—	—	—	—	—
	440 V	4 A	—	4 A	—	—	—	—	—

IEC technical data


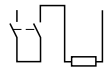
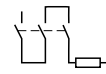
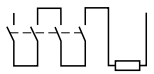

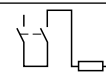
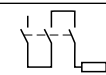
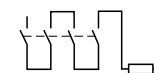

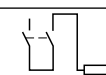
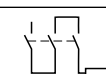

A/E/L9...A/E/F75, GA/E75, 3 & 4-pole

DC Circuit switching

General

The arc switching on d.c. is more difficult than on a.c.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non-inductive loads such as resistance furnaces ($L/R \approx 1$ ms), inductive loads such as shunt motors ($L/R \approx 2$ ms) or series motors ($L/R \approx 7.5$ ms).
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

a.c. operated contactors a.c. / d.c. operated (electronic coil interface) d.c. operated contactors	A9 - AE9	A12 - AE12	A16 - AE16	A26 - AE26	A30 - AE30	A40 - AE40	A45 AF45 AE45	A50 AF50 AE50	A63 AF63 AE63	A75 AF75 AE75	GA75 - GAE75	
Utilization category DC-1, L/R ≤ 1 ms												
	≤ 72 V	A 25	27	30	45	55	60	70	100	110	120	120
	110 V	A 10	15	20	-	-	-	-	-	-	-	120
	220 V	A -	-	-	-	-	-	-	-	-	-	120
	440 V	A -	-	-	-	-	-	-	-	-	-	100
	600 V	A -	-	-	-	-	-	-	-	-	-	75
	≤ 72 V	A 25	27	30	45	55	60	70	100	110	120	-
	110 V	A 25	27	30	45	55	60	70	100	110	120	-
	220 V	A 10	15	20	-	-	-	-	-	-	-	-
	≤ 72 V	A 25	27	30	45	55	60	70	100	110	120	-
	110 V	A 25	27	30	45	55	60	70	100	110	120	-
	220 V	A 25	27	30	45	55	60	70	100	110	120	-
	≤ 72 V	A 25	27	30	45	-	-	70	100	-	120	-
	110 V	A 25	27	30	45	-	-	70	100	-	120	-
	220 V	A 25	27	30	45	-	-	70	100	-	120	-
	440 V	A 10	15	20	-	-	-	-	-	-	-	-
Utilization category DC-3, L/R ≤ 2 ms												
	≤ 72 V	A 25	27	30	45	55	60	70	100	110	120	120
	110 V	A 6	7	8	-	-	-	-	-	-	-	120
	220 V	A -	-	-	-	-	-	-	-	-	-	100
	440 V	A -	-	-	-	-	-	-	-	-	-	85
	≤ 72 V	A 25	27	30	45	55	60	70	100	110	120	-
	110 V	A 25	27	30	45	55	60	70	100	110	120	-
	220 V	A 6	7	8	-	-	-	-	-	-	-	-
	≤ 72 V	A 25	27	30	45	55	60	70	100	110	120	-
	110 V	A 25	27	30	45	55	60	70	100	110	120	-
	220 V	A 25	27	30	45	55	60	70	100	110	120	-
	≤ 72 V	A 25	27	30	45	-	-	70	100	-	120	-
	110 V	A 25	27	30	45	-	-	70	100	-	120	-
	220 V	A 25	27	30	45	-	-	70	100	-	120	-
	440 V	A 6	7	8	-	-	-	-	-	-	-	-
Utilization category DC-5, L/R ≤ 7.5 ms												
	≤ 72 V	A 9	12	16	25	30	40	50	50	63	75	85
	110 V	A 4	4	4	-	-	-	-	-	-	-	85
	220 V	A -	-	-	-	-	-	-	-	-	-	85
	440 V	A -	-	-	-	-	-	-	-	-	-	35
	≤ 72 V	A 25	27	30	45	55	60	70	100	110	120	-
	110 V	A 10	15	20	30	45	50	70	80	90	100	-
	220 V	A 4	4	4	-	-	-	-	-	-	-	-
	≤ 72 V	A 25	27	30	45	55	60	70	100	110	120	-
	110 V	A 25	27	30	45	55	60	70	100	110	120	-
	220 V	A 9	12	16	25	30	40	50	50	63	75	-
	≤ 72 V	A 25	27	30	45	-	-	70	100	-	120	-
	110 V	A 25	27	30	45	-	-	70	100	-	120	-
	220 V	A 10	15	20	30	-	-	70	70	-	100	-
	440 V	A 4	4	4	-	-	-	-	-	-	-	-

IEC Technical data










A/F95...AF750, B/C6...B/C7, 3-pole

DC circuit switching

Technical Data

- The tables indicate for the standard contactors the I_n max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 60947-4-1 publication, the operating voltage U_o and the pole coupling details. See page 1.81.
Ampere values quoted in the tables below are valid for a -25 ... +70 °C temperature close to the contactors, as long as the AC-1 Ampere values (see pages 1.45 - 146) for the corresponding ambient temperature are not exceeded.
- Max. switching frequency: 300 ops/h.
- For switching higher d.c. ratings, we recommend the use of bar mounted contactors, R series (63 ... 2000 A).

The selection table for AE 50 ... AE 110 contactors can be used for the TAE 50 ... TAE 110 types.

a.c. operated contactors a.c. / d.c. operated (electronic coil interface) d.c. operated contactors		A95 AF95	A110 AF110	A145 AF145	A185 AF185	A210 AF210	A260 AF260	A300 AF300	- AF400	- AF460	- AF580	- AF750	
Utilization category DC-1, L/R ≤ 1 ms													
	≤110 V	A	-	-	-	-	-	-	600	700	800	1050	
	≤110 V	A	145	160	250	275	350	400	450	600	700	800	1050
	220 V	A	-	-	-	-	-	-	600	700	800	1050	
	≤110 V	A	145	160	250	275	350	400	450	600	700	800	1050
	220 V	A	145	160	250	275	350	400	450	600	700	800	1050
	440 V	A	-	-	-	-	-	-	600	700	800	1050	
	600 V	A	-	-	-	-	-	-	600	700	800	1050	
Utilization category DC-3, L/R ≤ 2.5 ms													
	≤110 V	A	-	-	-	-	-	-	600	700	800	1050	
	≤110 V	A	145	160	250	275	350	400	450	600	700	800	1050
	220 V	A	-	-	-	-	-	-	600	700	800	1050	
	≤110 V	A	145	160	250	275	350	400	450	600	700	800	1050
	220 V	A	145	160	250	275	350	400	450	600	700	800	1050
	440 V	A	-	-	-	-	-	-	600	700	800	1050	
	600 V	A	-	-	-	-	-	-	600	700	800	1050	
Utilization category DC-5, L/R ≤ 15 ms													
	≤110 V	A	-	-	-	-	-	-	600	700	800	1050	
	≤110 V	A	145	160	250	275	350	400	450	600	700	800	1050
	220 V	A	-	-	-	-	-	-	600	700	800	1050	
	≤110 V	A	145	160	250	275	350	400	450	600	700	800	1050
	220 V	A	145	160	250	275	350	400	450	600	700	800	1050
	440 V	A	-	-	-	-	-	-	600	700	800	1050	
	600 V	A	-	-	-	-	-	-	600	700	800	1050	

D.C. Power circuit switching

Utilization category		DC-1 L/R ≤ 1 ms	DC-3 L/R ≤ 2 ms	DC-5 L/R ≤ 7.5 ms
24 V	A	16.0	16.0	16.0
48 V	A	16.0	8.0	2.0
60 V	A	16.0	4.0	1.25
110 V	A	7.0	1.5	0.4
220 V	A	0.8	0.25	0.2
<hr/>				
24 V	A	16.0	16.0	16.0
48 V	A	16.0	16.0	16.0
60 V	A	16.0	15.0	12.0
110 V	A	16.0	7.0	2.0
220 V	A	5.0	1.5	0.5
<hr/>				
24 V	A	16.0	16.0	16.0
48 V	A	16.0	16.0	16.0
60 V	A	16.0	16.0	16.0
110 V	A	16.0	15.0	8.0
220 V	A	14.0	4.0	2.0

IEC Technical data

AL9 – AL40




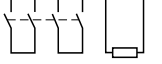



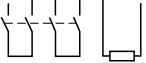




DC circuit switching

General

The arc switching on d.c. is more difficult than on a.c.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces ($L/R \approx 1$ ms), inductive loads such as shunt motors ($L/R \approx 2$ ms) or series motors ($L/R \approx 7.5$ ms).
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

A.C. operated contactors

		AL9	AL12	AL16	AL26	AL30	AL40
Utilization category DC-1, $L/R \leq 1$ ms							
	≤ 72 V	A 25	27	30	45	55	60
	110 V	A 10	15	20	–	–	–
	220 V	A –	–	–	–	–	–
	440 V	A –	–	–	–	–	–
	600 V	A –	–	–	–	–	–
	≤ 72 V	A 25	27	30	45	55	60
	110 V	A 25	27	30	45	55	60
	220 V	A 10	15	20	–	–	–
	≤ 72 V	A 25	27	30	45	55	60
	110 V	A 25	27	30	45	55	60
	220 V	A 25	27	30	45	55	60
	≤ 72 V	A 25	27	30	45	–	–
	110 V	A 25	27	30	45	–	–
	220 V	A 25	27	30	45	–	–
	440 V	A 10	15	20	–	–	–
Utilization category DC-3, $L/R \leq 2$ ms							
	≤ 72 V	A 25	27	30	45	55	60
	110 V	A 6	7	8	–	–	–
	220 V	A –	–	–	–	–	–
	440 V	A –	–	–	–	–	–
	≤ 72 V	A 25	27	30	45	55	60
	110 V	A 25	27	30	45	55	60
	220 V	A 6	7	8	–	–	–
	≤ 72 V	A 25	27	30	45	55	60
	110 V	A 25	27	30	45	55	60
	220 V	A 25	27	30	45	55	60
	≤ 72 V	A 25	27	30	45	–	–
	110 V	A 25	27	30	45	–	–
	220 V	A 25	27	30	45	–	–
	440 V	A 6	7	8	–	–	–
Utilization category DC-5, $L/R \leq 7.5$ ms							
	≤ 72 V	A 9	12	16	25	30	40
	110 V	A 4	4	4	–	–	–
	220 V	A –	–	–	–	–	–
	440 V	A –	–	–	–	–	–
	≤ 72 V	A 25	27	30	45	55	60
	110 V	A 10	15	20	30	45	50
	220 V	A 4	4	4	–	–	–
	≤ 72 V	A 25	27	30	45	55	60
	110 V	A 25	27	30	45	55	60
	220 V	A 9	12	16	25	30	40
	≤ 72 V	A 25	27	30	45	–	–
	110 V	A 25	27	30	45	–	–
	220 V	A 10	15	20	30	–	–
	440 V	A 4	4	4	–	–	–

IEC Technical data

EK110 – EK1000

DC circuit switching

General

The arc switching on d.c. is more difficult than on a.c.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces ($L/R \approx 1$ ms), inductive loads such as shunt motors ($L/R \approx 2$ ms) or series motors ($L/R \approx 7.5$ ms).
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

Technical Data




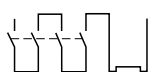



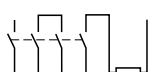


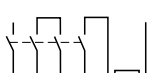
- The tables indicate for the standard contactors the I_o max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 60947-4-1 publication (see page 1.75 for more details), the operating voltage U_o and the pole coupling details.

Ampere values quoted in the tables below are valid for a $-25 \dots +70$ °C temperature close to the contactors, as long as the AC-1 Ampere values (see page 1.61) for the corresponding ambient temperature are not exceeded.

- Max. switching frequency: 300 ops/h.
- For switching higher d.c. ratings, we recommend the use of bar mounted contactors, R series (63 ... 2000 A).

Selection Table

a.c. / d.c. operated contactors

			EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Utilization category DC-1, $L/R \leq 1$ ms									
	≤ 72 V	A	120	145	210	210	370	550	–
	110 V	A	120	145	210	210	370	550	–
	≤ 72 V	A	200	200	300	300	550	800	–
	110 V	A	200	200	300	300	550	800	–
	220 V	A	200	200	300	300	550	800	–
	≤ 72 V	A	200	200	300	300	550	800	–
	110 V	A	200	200	300	300	550	800	–
	220 V	A	200	200	300	300	550	800	–
	440 V	A	–	–	210	210	450	650	–
	600 V	A	–	–	–	–	450	650	–
	≤ 72 V	A	200	200	300	300	550	800	–
	110 V	A	200	200	300	300	550	800	–
	220 V	A	200	200	300	300	550	800	–
	440 V	A	200	200	260	300	450	650	–
	600 V	A	–	–	260	300	450	650	–
Utilization category DC-3, $L/R \leq 2$ ms									
	≤ 72 V	A	120	145	210	210	370	550	–
	≤ 72 V	A	135	145	210	210	450	650	–
	110 V	A	135	135	210	210	450	650	–
	220 V	A	135	135	210	210	450	650	–
	≤ 72 V	A	135	145	210	210	450	650	–
	110 V	A	135	135	210	210	450	650	–
	220 V	A	135	135	210	210	450	650	–
	440 V	A	–	–	210	210	450	650	–
	600 V	A	–	–	–	–	450	650	–
	≤ 72 V	A	135	145	210	210	450	650	–
	110 V	A	135	135	210	210	450	650	–
	220 V	A	135	135	210	210	450	650	–
	440 V	A	135	135	210	210	450	650	–
	600 V	A	–	–	170	210	450	650	–
Utilization category DC-5, $L/R \leq 7.5$ ms									
	≤ 72 V	A	135	145	210	210	450	650	–
	110 V	A	135	135	210	210	450	650	–
	220 V	A	135	135	210	210	450	650	–
	≤ 72 V	A	135	145	210	210	450	650	–
	110 V	A	135	135	210	210	450	650	–
	220 V	A	135	135	210	210	450	650	–
	440 V	A	–	–	210	210	450	650	–
	600 V	A	–	–	–	–	450	650	–
	≤ 72 V	A	135	145	210	210	450	650	–
	110 V	A	135	135	210	210	450	650	–
	220 V	A	135	135	210	210	450	650	–
	440 V	A	135	135	210	210	450	650	–
	600 V	A	–	–	170	210	450	650	–

IEC Technical data

3-pole contactors

Electrical durability and utilization categories

General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.

If I_c is the current to be broken by the contactor and I_e the rated operational current normally drawn by the load, then:

- Categories AC-1 and AC-3: $I_c = I_e$
- Category AC-2: $I_c = 2.5 \times I_e$
- Category AC-4: $I_c = 6 \times I_e$

Generally speaking $I_c = m \times I_e$ where m is a multiple of the load operational current.

On next pages, the curves corresponding to categories AC-1, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current I_c .

Electrical durability is expressed in millions of operating cycles.

Curve utilization mode

Electrical durability forecast and contactor selection for categories AC-1, AC-2, AC-3 or AC-4

- Note the characteristics of the load to be controlled:
 - Operational voltage U_e
 - Current normally drawn I_e (U_e / I_e / kW relation for motors, see "Motor rated operational powers and currents").
 - Utilization category AC-1, AC-2, AC-3 or AC-4
 - Breaking current $I_c = I_e$ for AC-1 and for AC-3 ; $I_c = 2.5 \times I_e$ for AC-2 ; $I_c = 6 \times I_e$ for AC-4
- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point (I_c ; N).

Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 ($I_c = I_e$) type switching off while "motor running" and, occasionally, AC-4 ($I_c = 6 \times I_e$) type switching off while "motor accelerating"

- Note the characteristics of the motor to be controlled:
 - Operational voltage U_e
 - Current normally drawn while "motor running" I_e (U_e / I_e / kW relation for motors, see "Motor rated operational powers and currents")
 - Breaking current for AC-3 $I_c = I_e$
 - Breaking current for AC-4 while "motor accelerating" $I_c = 6 \times I_e$
 - Percentage of AC-4 operating cycles K (on the basis of the total number of operating cycles)
- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (U_e / I_e) on Main pole utilization characteristic table (see "Technical data").
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
 - The number of operating cycles A for $I_c = I_e$ (AC-3)
 - The number of operating cycles B for $I_c = 6 \times I_e$ (AC-4)
- Calculate the estimated number of cycles N' (N' is always below A)

$$N' = \frac{A}{1 + 0.01 K (A/B - 1)}$$

- If N' is too low in relation to the target N , calculate the estimated number of cycles for a higher contactor rating.

Case of uninterrupted duty

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

The combined effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

IEC Technical data

3-pole contactors

Electrical durability (AC-1)

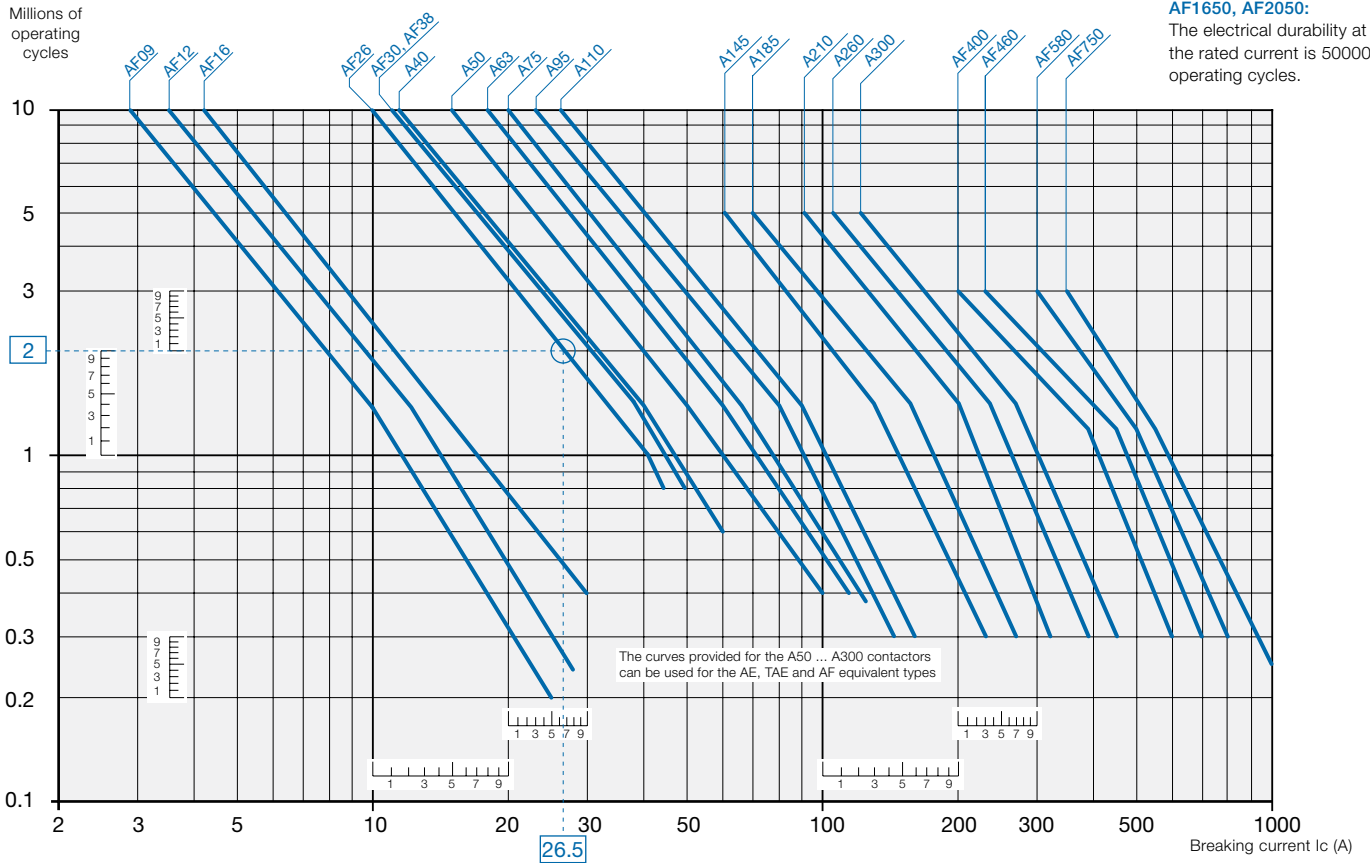
Electrical durability for AC-1 utilization category - $U_e \leq 690\text{ V}$

Ambient temperature $\leq 60\text{ }^\circ\text{C}$ for AF09(Z)...AF38(Z), $\leq 55\text{ }^\circ\text{C}$ for A40 ... AF2050

Switching non-inductive or slightly inductive loads. The breaking current I_c for AC-1 is equal to the rated operational current of the load.

Maximum electrical switching frequency: see "Technical data".

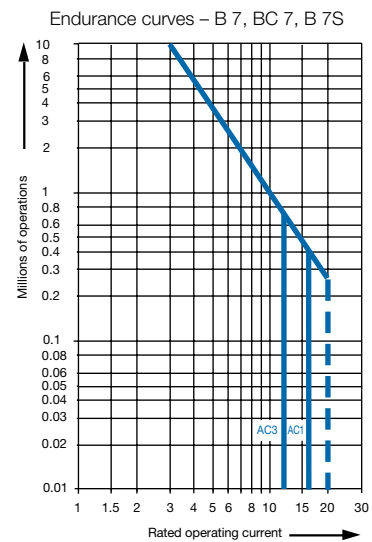
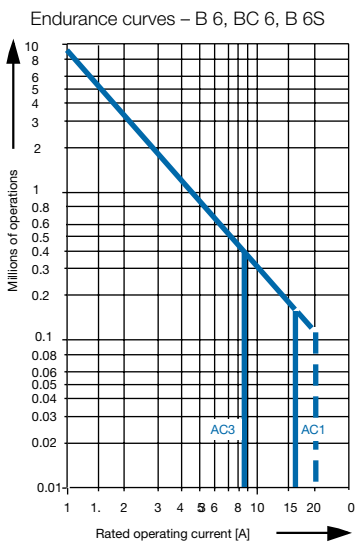
AF1250, AF1350, AF1650, AF2050:
The electrical durability at the rated current is 50000 operating cycles.



Example:

$I_c / \text{AC-1} = 26.5\text{ A}$ – Electrical durability required = 2 millions operating cycles.

Using the AC-1 curves above select the AF26 contactor at intersection "O" (26.5 A / 2 millions operating cycles).



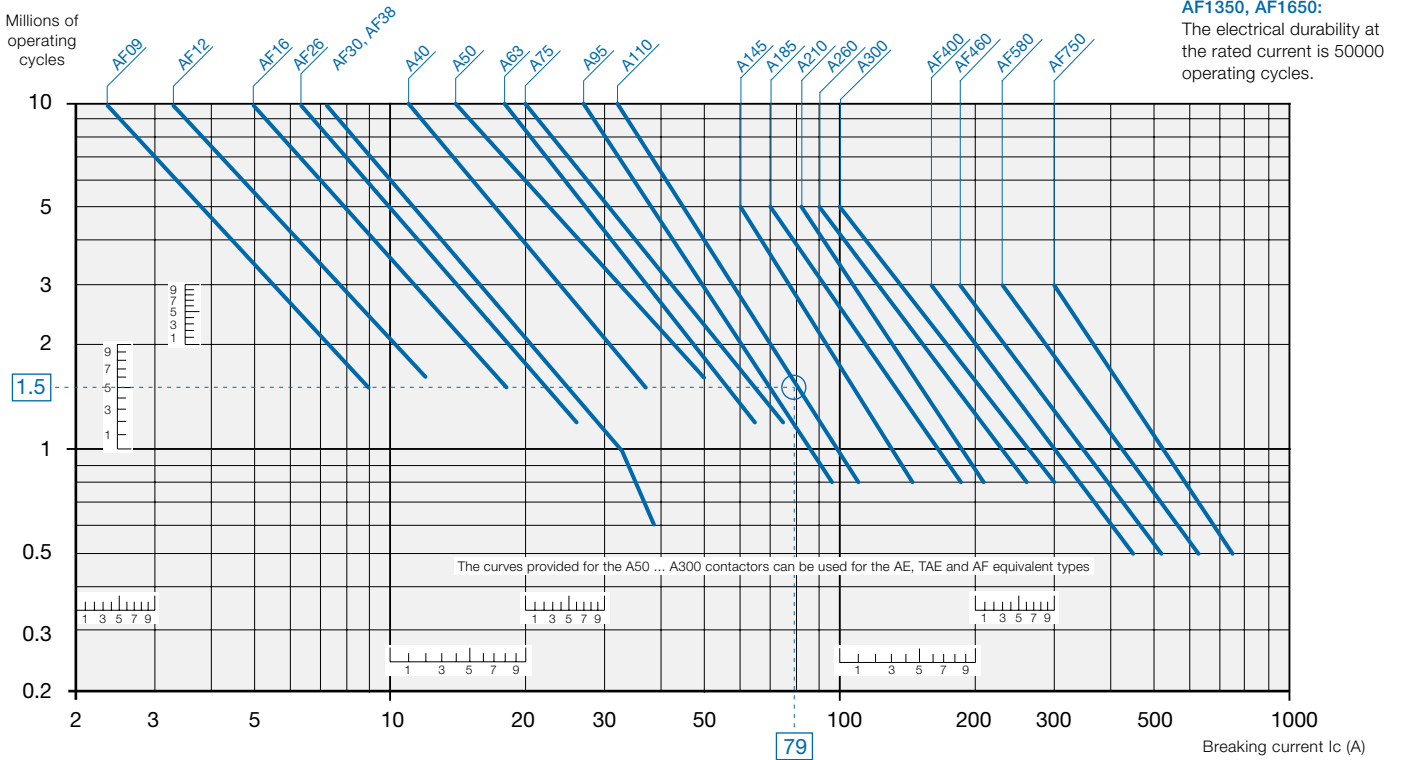
IEC Technical data

3-pole contactors

Electrical durability (AC-3)

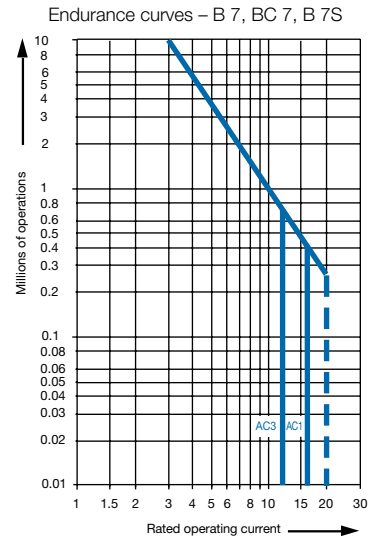
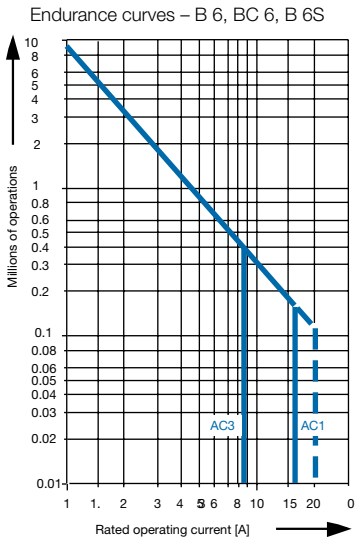
Electrical durability for AC-3 utilization category - $U_e \leq 440\text{ V}$
 Ambient temperature $\leq 60\text{ }^\circ\text{C}$ for AF09(Z)...AF38(Z), $\leq 55\text{ }^\circ\text{C}$ for A40 ... AF1650

Switching cage motors: starting and switching off running motors. The breaking current I_c for AC-3 is equal to the rated operational current I_e (I_e = motor full load current). Maximum electrical switching frequency: see "Technical data".



Example:

Motor power 40 kW for AC-3 - $U_e = 400\text{ V}$ and $I_e = 79\text{ A}$ utilization – Electrical durability required = 1.5 million operating cycles. For AC-3: $I_c = I_e$. Select the A110 contactor at intersection "O" (79 A / 1.5 million operating cycles) on the curves (AC-3 - $U_e \leq 440\text{ V}$).



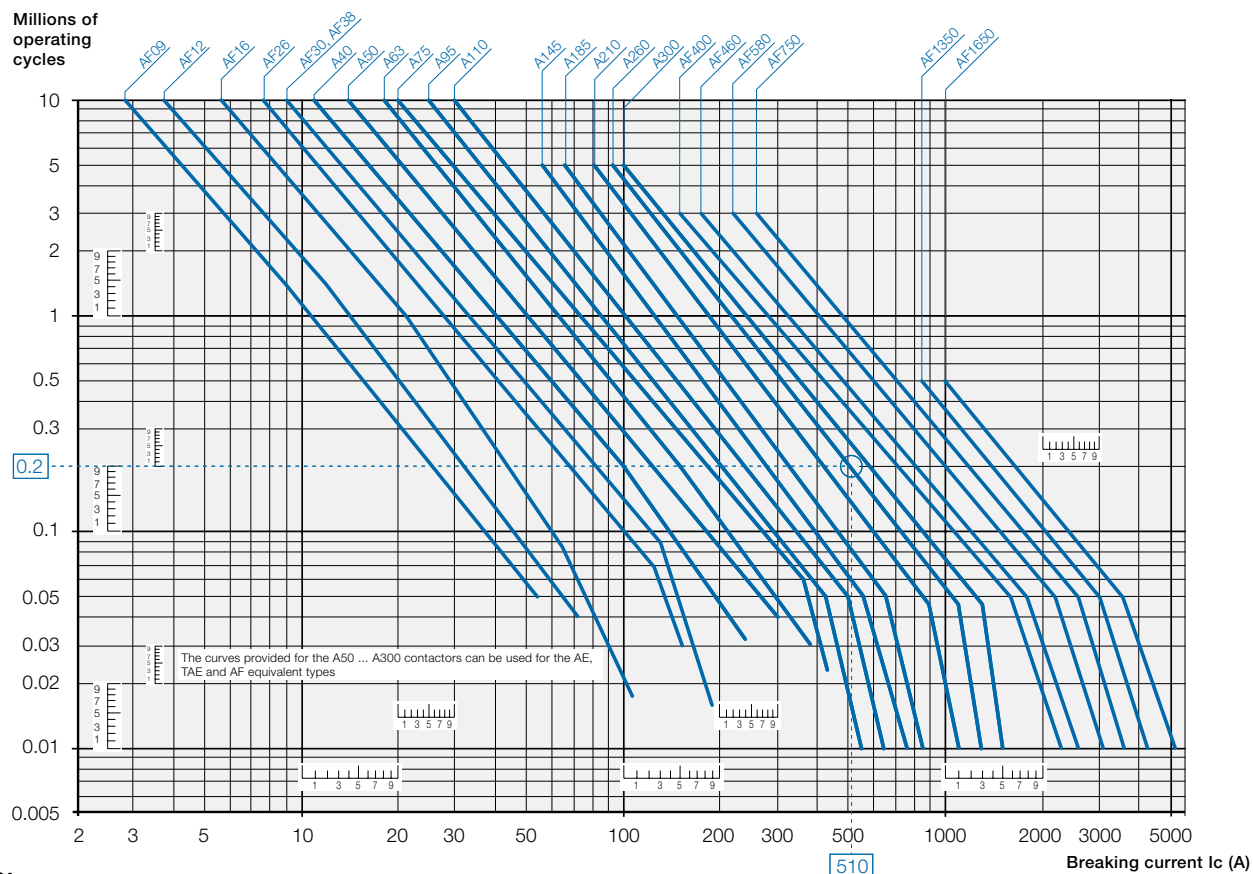
IEC Technical data

3-pole contactors

Electrical durability (AC-2, AC-4)

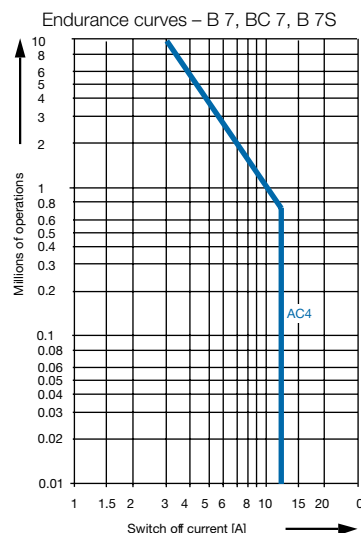
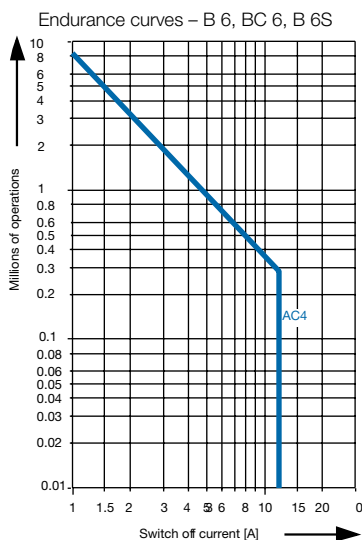
Electrical durability for AC-2 or AC-4 utilization category - $U_e < 440\text{ V}$
Ambient temperature $\leq 60\text{ }^\circ\text{C}$ for AF09(Z)...AF38(Z), $\leq 55\text{ }^\circ\text{C}$ for A40 ... AF1650

Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current I_c is equal to $2.5 \times I_e$ for AC-2 and $6 \times I_e$ for AC-4, keeping in mind that I_e is the motor rated operational current (I_e = motor full-load current).
 Maximum electrical switching frequency: see "Technical data".



Example:

Motor power 45 kW for AC-4 - $U_e = 400\text{ V}$ and $I_e = 85\text{ A}$ utilization – Electrical durability required = 0.2 million operating cycles.
 For AC-4: $I_c = 6 \times I_e = 510\text{ A}$ - Select the A260 contactor at intersection "O" (510 A / 0.2 million operating cycles) on the curves (AC-4 - $U_e \leq 440\text{ V}$).



IEC Technical data

4-pole contactors

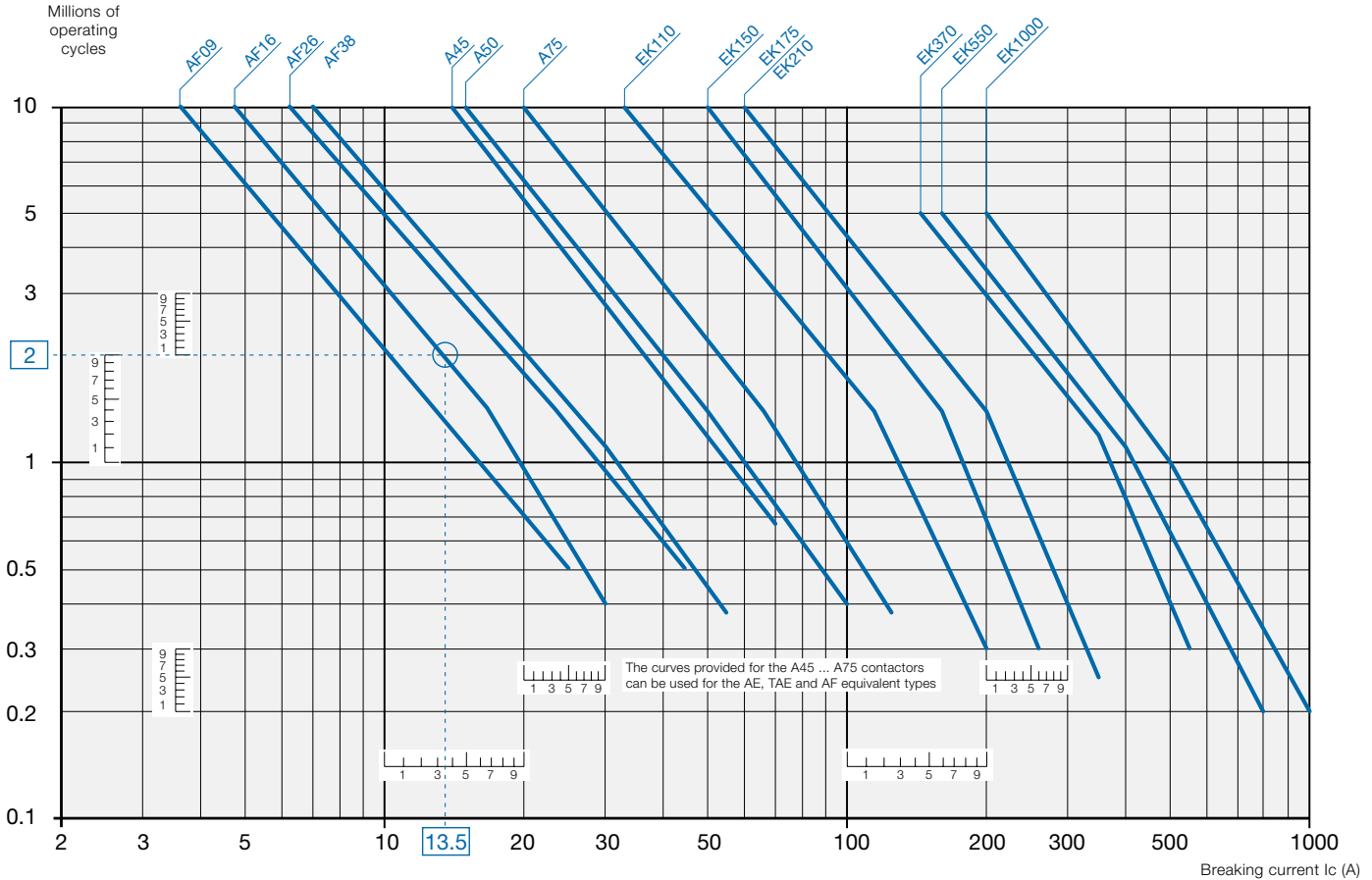
Electrical durability (AC-1)

Electrical durability for AC-1 utilization category - $U_e \leq 690\text{ V}$
Ambient temperature $\leq 60\text{ }^\circ\text{C}$ for AF09 ... AF38, $\leq 55\text{ }^\circ\text{C}$ for A45 ... EK1000

Switching non-inductive or slightly inductive loads. The breaking current I_c for AC-1 is equal to the rated operational current of the load.

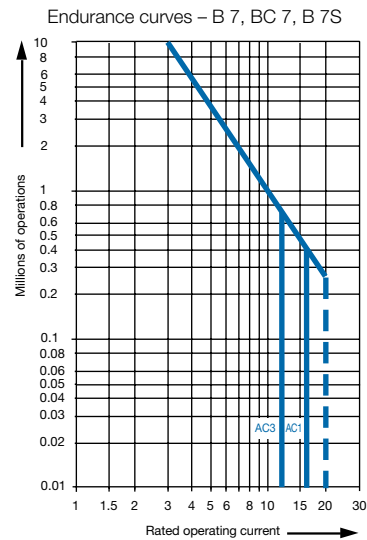
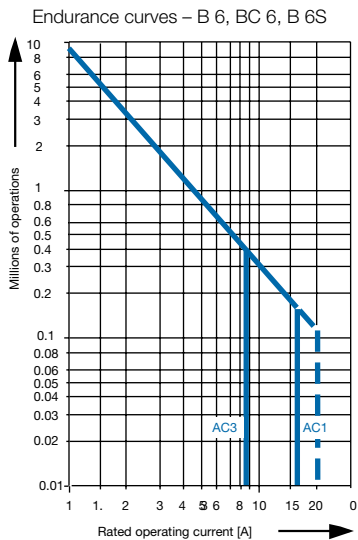
Maximum electrical switching frequency: see "Technical data".

Example:



$I_c / \text{AC-1} = 13.5\text{ A}$ – Electrical durability required = 2 millions operating cycles.

Using the AC-1 curves above select the AF16 contactor at intersection "O" (13.5 A / 2 millions operating cycles).

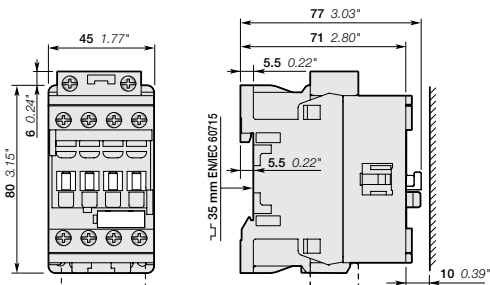


Approximate dimensions

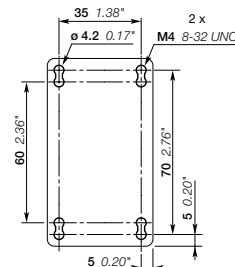
AF09/Z...AF16/Z, AF09N00/Z...AF16N0/Z, 3-pole contactors

Note: Approximate dimensions for AF09 & AF16 apply to AF NEMA Sz. 00 & 0. AF09...AF16 dimensions apply to AF.Z type.

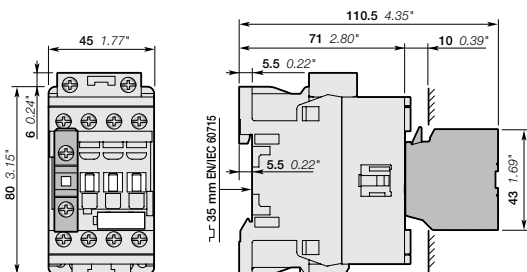
Dimensions mm, inches



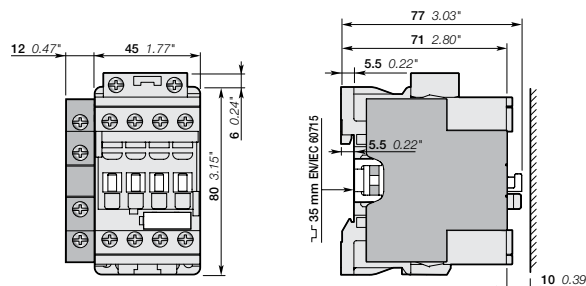
AF09, AF12, AF16



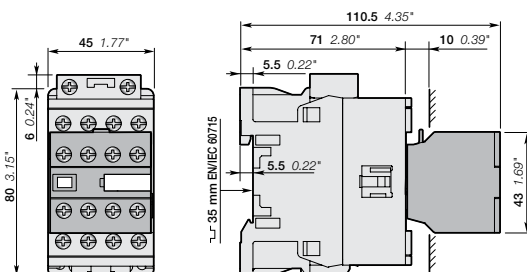
AF09, AF12, AF16



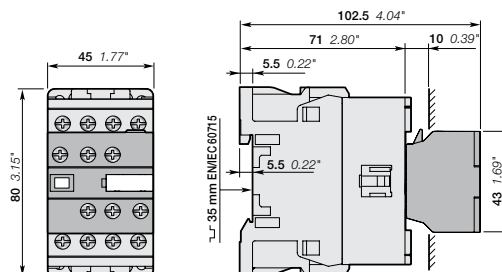
AF09, AF12, AF16
+ CA4, CC4 1-pole auxiliary contact block



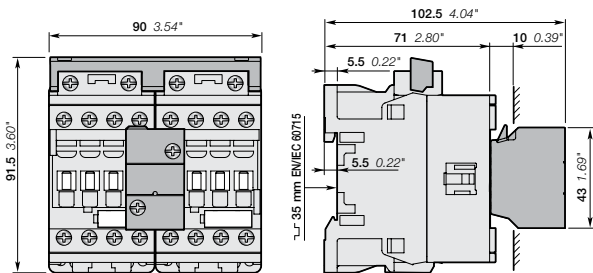
AF09, AF12, AF16
+ CAL4-11 2-pole auxiliary contact block



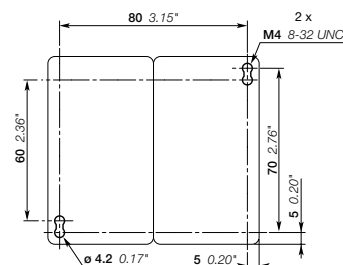
AF09, AF12, AF16
+ CA4 4-pole auxiliary contact block



AF09, AF12, AF16
+ CAT4 2-pole auxiliary contact and coil terminal block



AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set



AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set

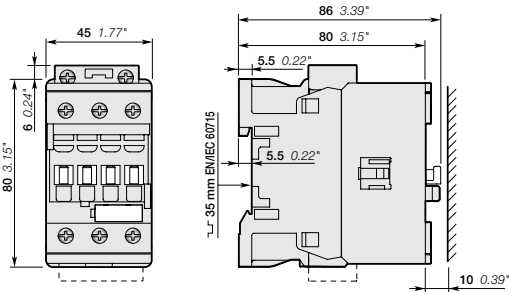
Note: contactor lateral distance to grounded component 2 mm 0.08" min.

Approximate dimensions

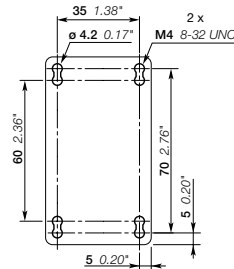
AF09/Z...AF16/Z, AF09N00/Z...AF16N0/Z, 3-pole contactors

Note: Approximate dimensions for AF26 apply to AF NEMA Sz. 1. AF26...AF38 dimensions apply to AF.Z type.

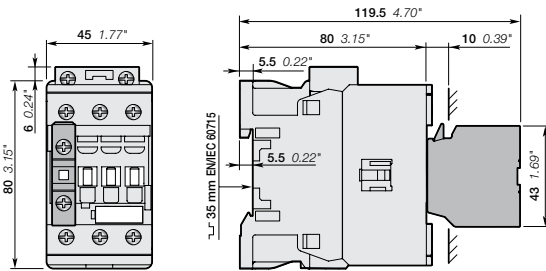
Dimensions mm, inches



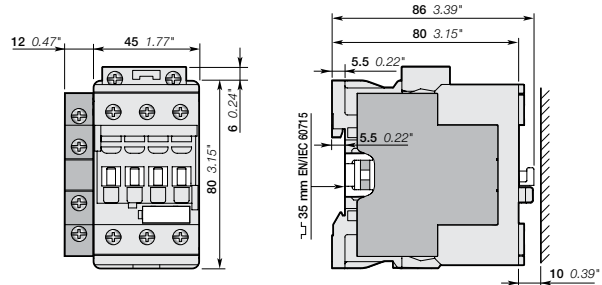
AF26, AF30, AF38



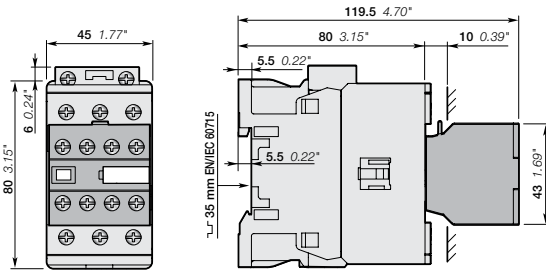
AF26, AF30, AF38



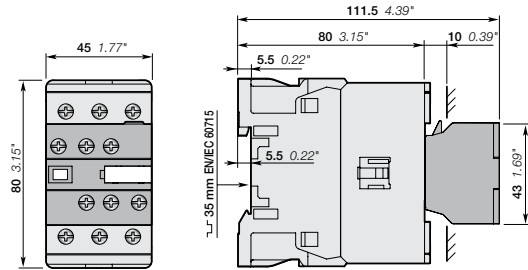
AF26, AF30, AF38
+ CA4, CC4 1-pole auxiliary contact block



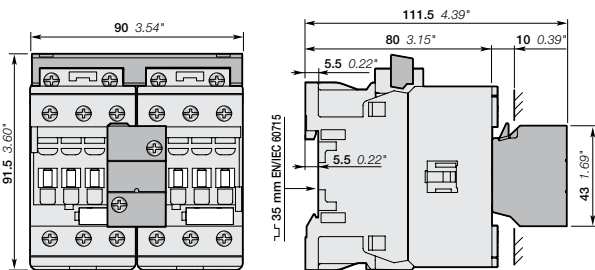
AF26, AF30, AF38
+ CAL4-11 2-pole auxiliary contact block



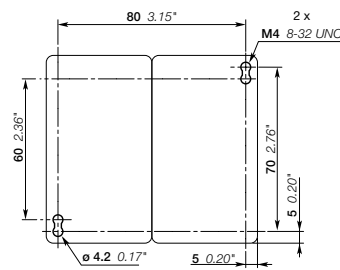
AF26, AF30, AF38
+ CA4 4-pole auxiliary contact block



AF26, AF30, AF38
+ CAT4 2-pole auxiliary contact and coil terminal block



AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set



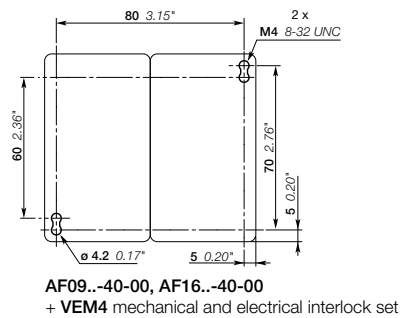
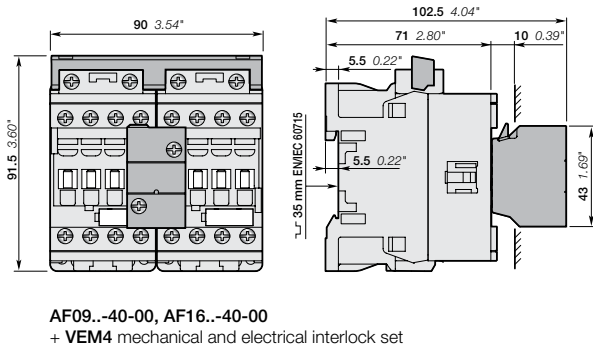
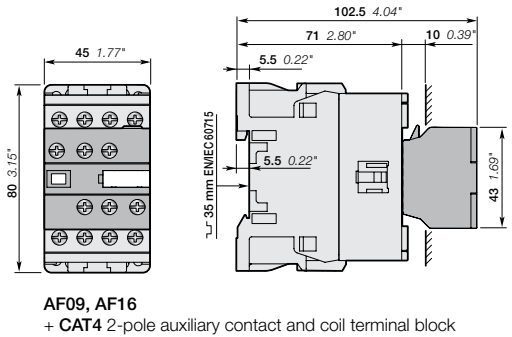
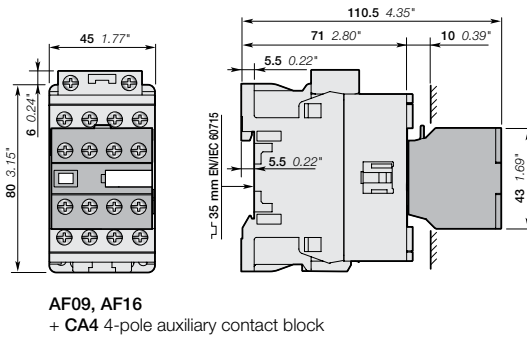
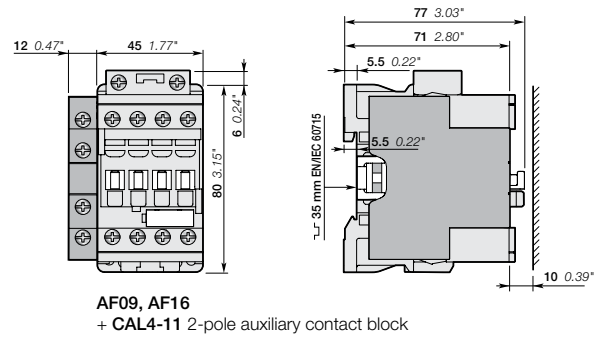
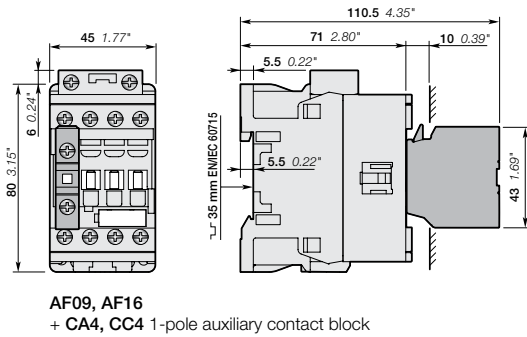
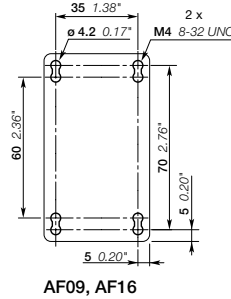
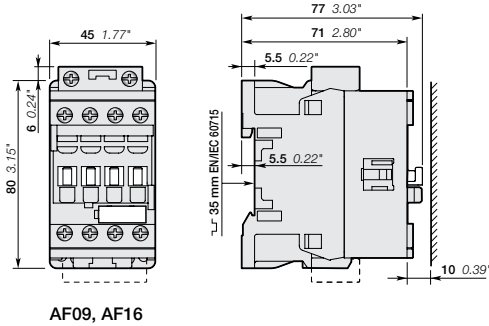
AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

Approximate dimensions AF09/Z & AF16/Z 4-pole contactors

Note: AF09 & AF16 dimensions apply to AF..Z type.

Dimensions mm, inches

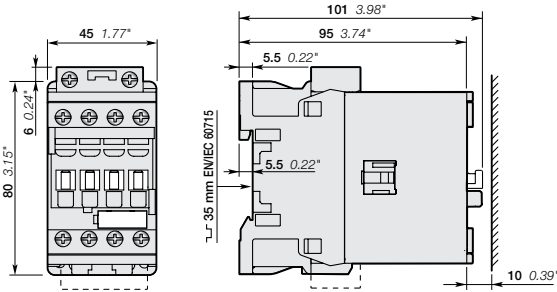


Note: contactor lateral distance to grounded component 2 mm 0.08" min.

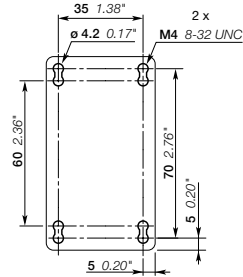
Approximate dimensions AF26/Z & AF38/Z 4-pole contactors

Note: AF26 & AF38 dimensions apply to AF..Z type.

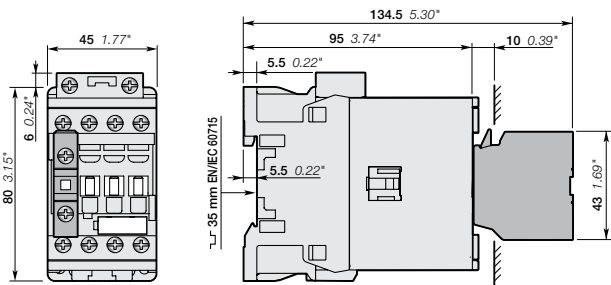
Dimensions mm, inches



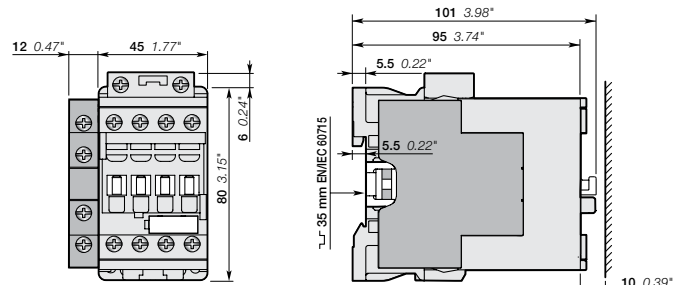
AF26, AF38



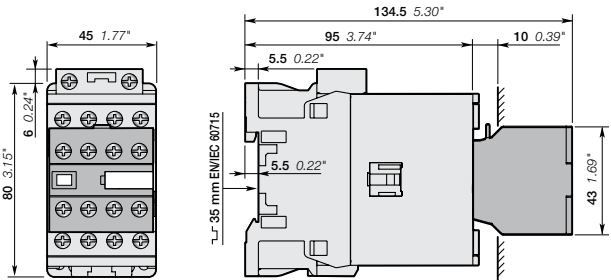
AF26, AF38



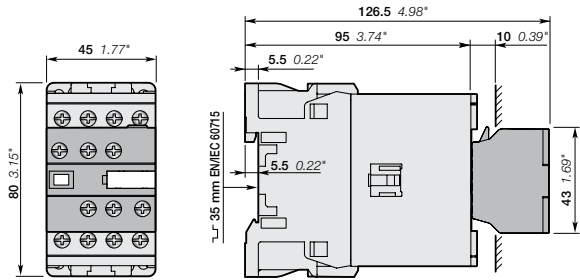
AF26, AF38
+ CA4, CC4 1-pole auxiliary contact block



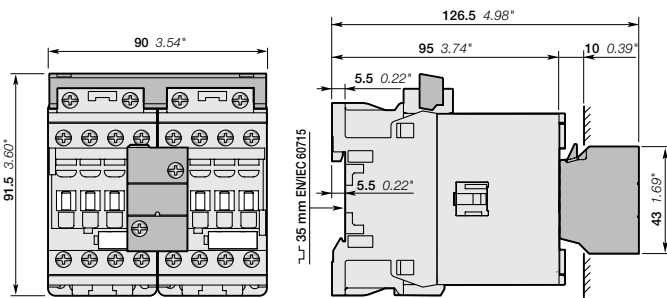
AF26, AF38
+ CAL4-11 2-pole auxiliary contact block



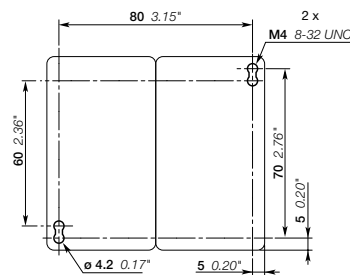
AF26, AF38
+ CA4 4-pole auxiliary contact block



AF26, AF38
+ CAT4 2-pole auxiliary contact and coil terminal block



AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set



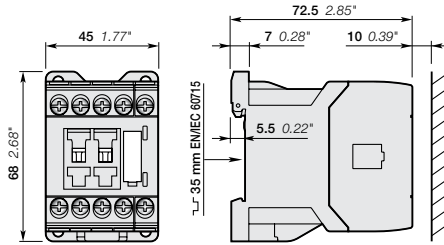
AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set

Note: contactor lateral distance to grounded component 2 mm 0.08 inches min.

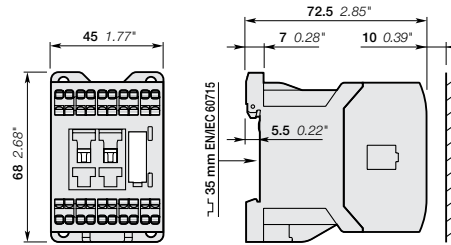
Approximate dimensions

AS09..S ... AS16..S 3-pole contactors w/spring terminals
AC/DC operated, with screw terminals

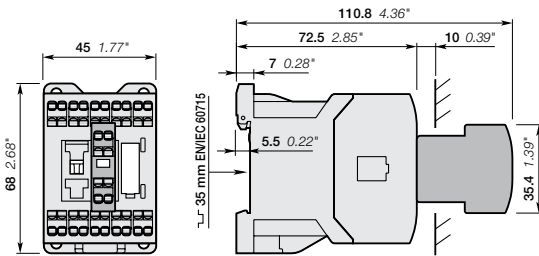
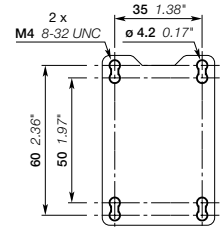
Main dimensions mm, inches



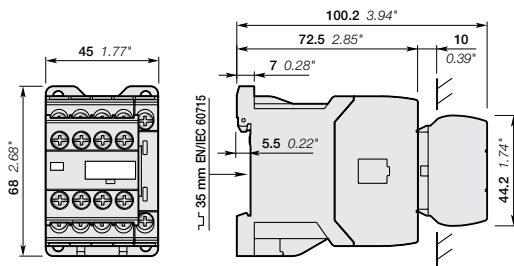
AS/L09, AS/L12, AS/L16



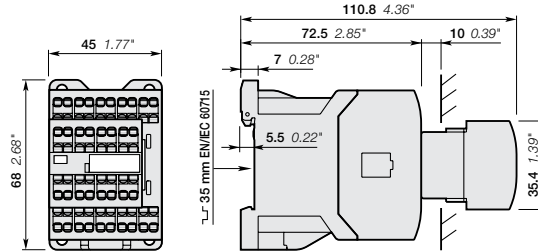
AS/L09..S, AS/L12..S, AS/L16..S



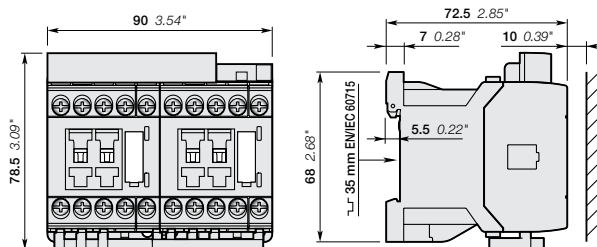
AS/L09..S, AS/L12..S, AS/L16..S
+ CA3..S front-mounted 1-pole auxiliary contact block



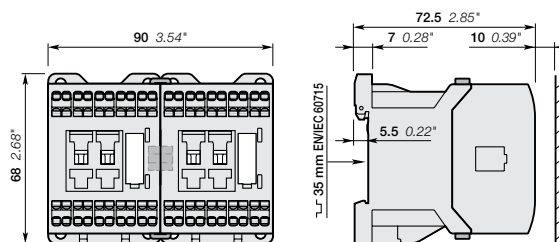
AS/L09...16-30-32



AS/L09...16-30-32S



AS/L09, AS/L12, AS/L16

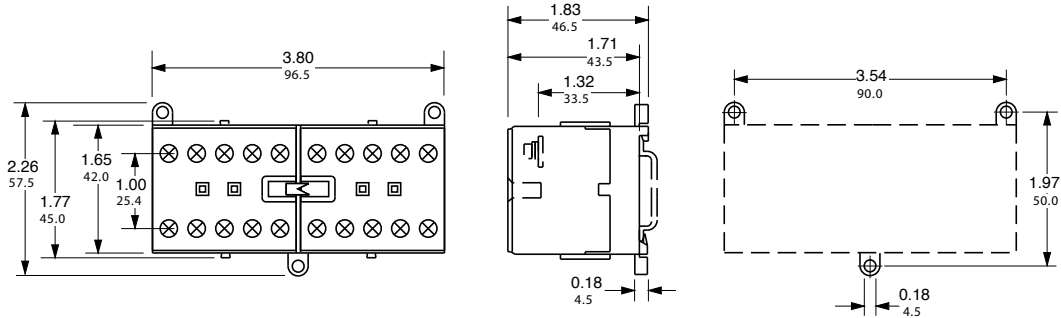


AS/L09..S, AS/L12..S, AS/L16..S
+ VM3 mechanical interlock unit including two BB3 fixing clips

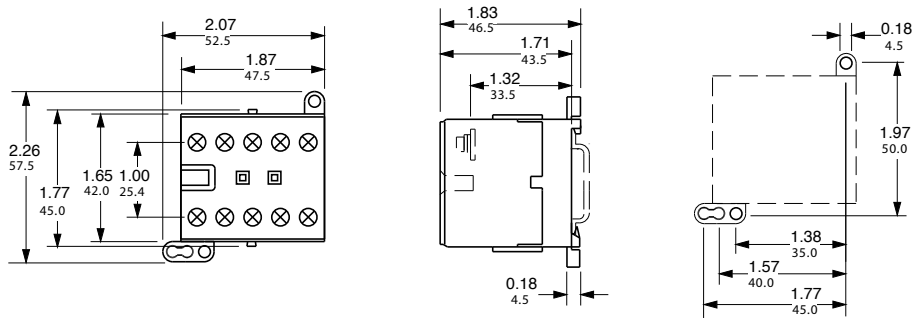
Approximate dimensions B/C6...B/C7

00.00 → Inches
00.00 → [Millimeters]

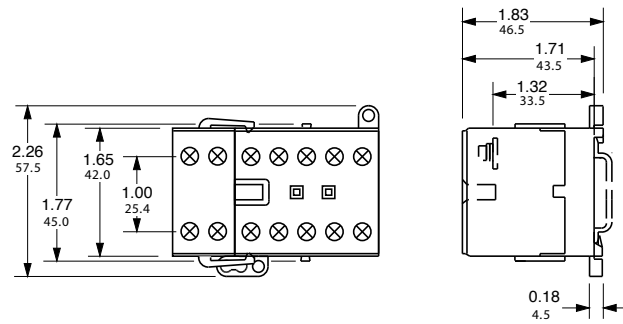
VB/C6...VB/C7



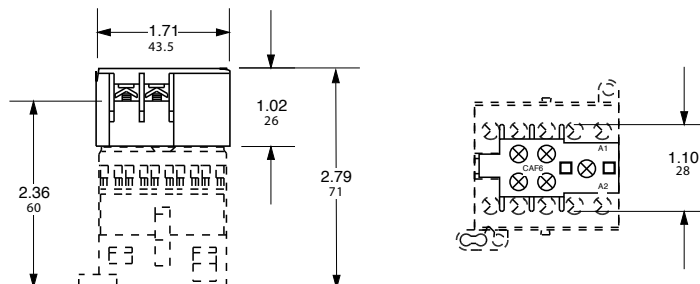
B/C6...B/C7



B/C6...B/C7 + CA6



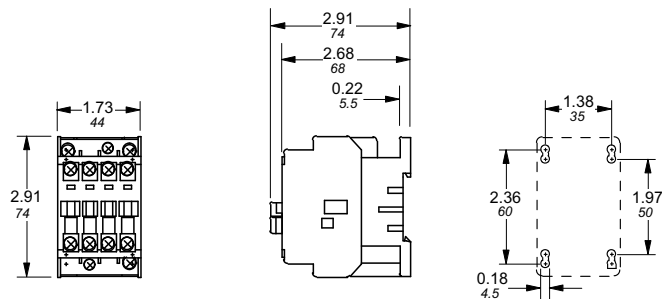
B/C6...B/C7 + CAF6



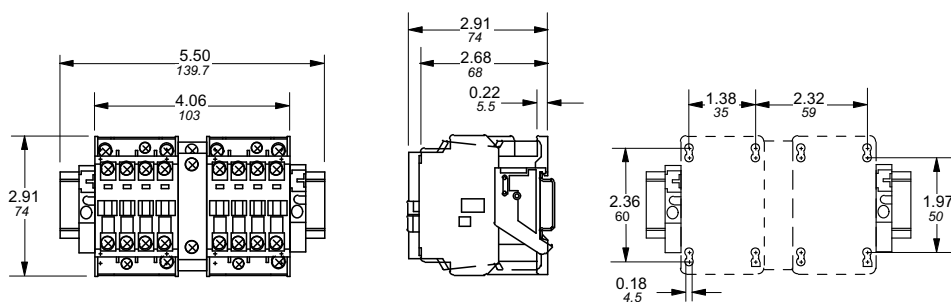
Approximate dimensions A/AE9 – A/AE26, 3 pole

00.00 — Inches
00.00 — [Millimeters]

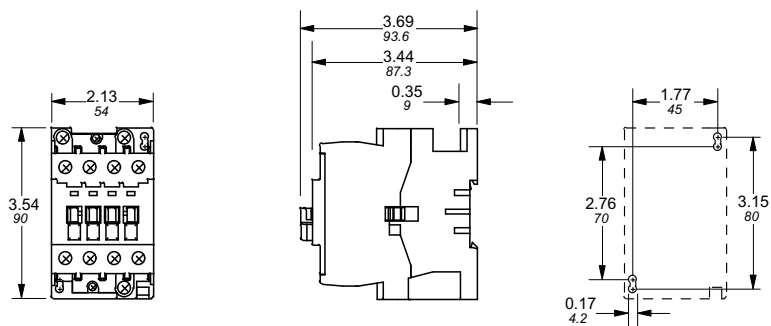
A/AE9 – A/AE16 — Contactor, 3 pole



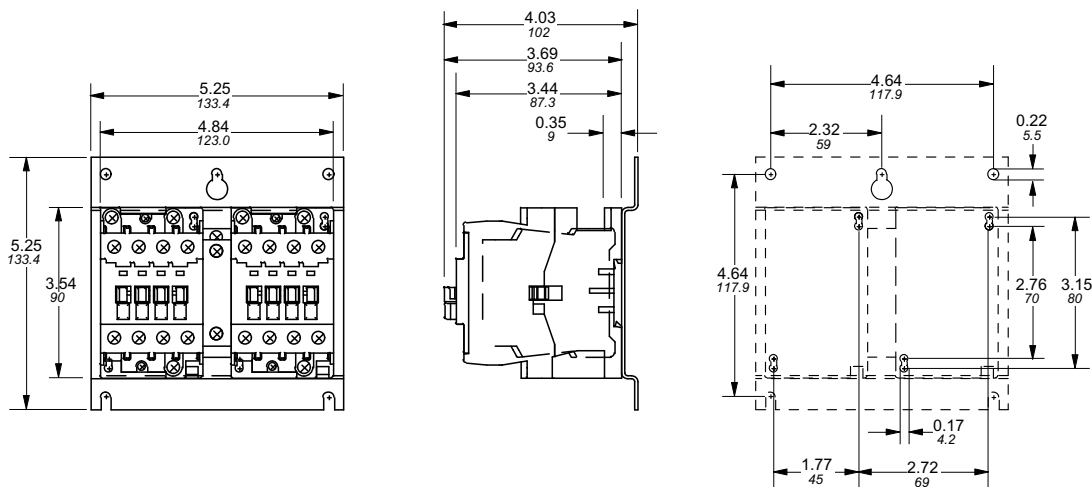
A/AE9 – A/AE16 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole



A/AE26 — Contactor, 3 pole



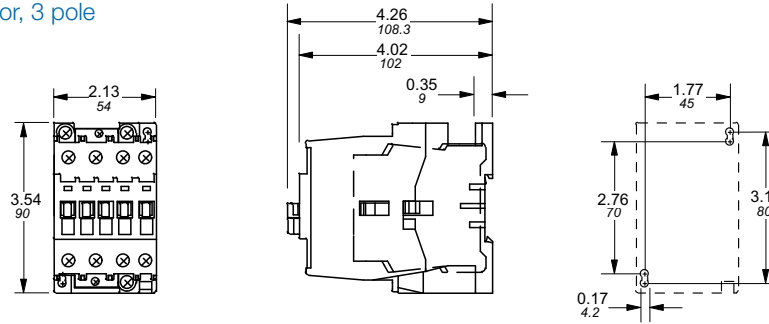
A/AE26 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole



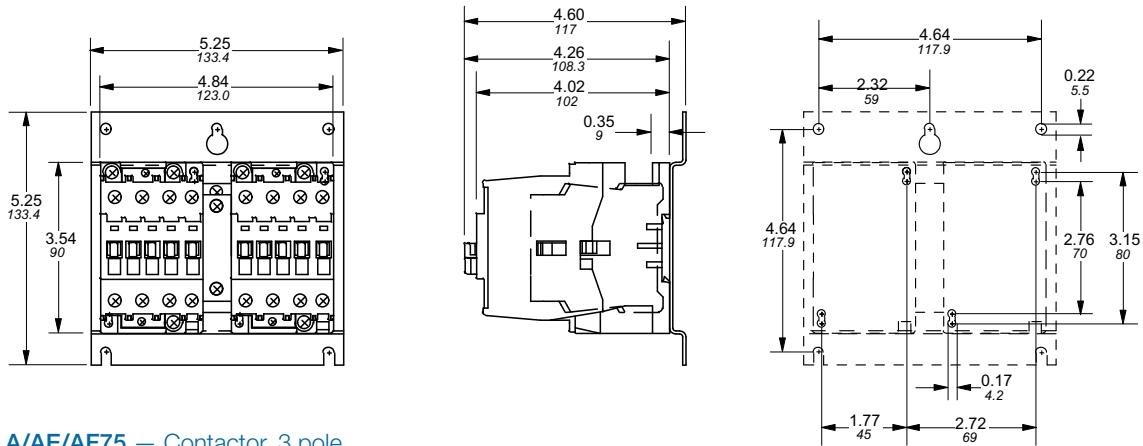
Approximate dimensions A/AE30 – A/AE/AF75, 3 pole

00.00 Inches
00.00 [Millimeters]

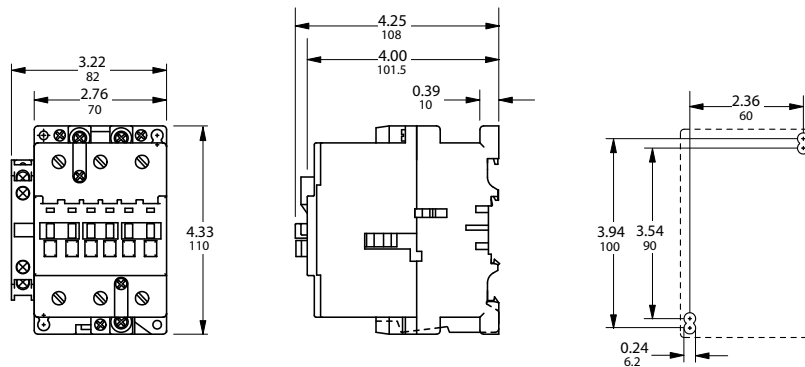
A/AE30 & A/AE40 – Contactor, 3 pole



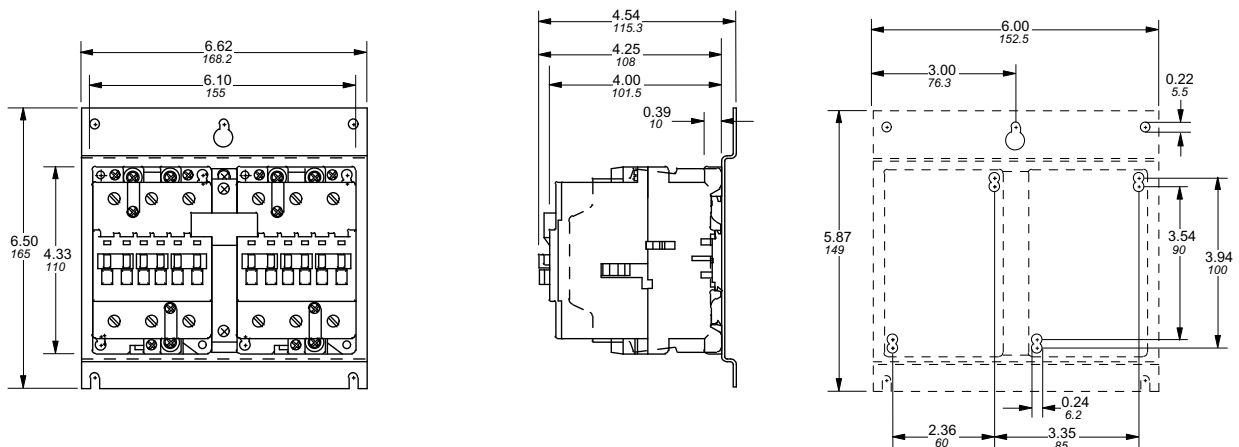
A/AE30 & A/AE40 + VM5 or VE5 – Mechanically interlocked contactor, 3 pole



A/AE/AF50 – A/AE/AF75 – Contactor, 3 pole



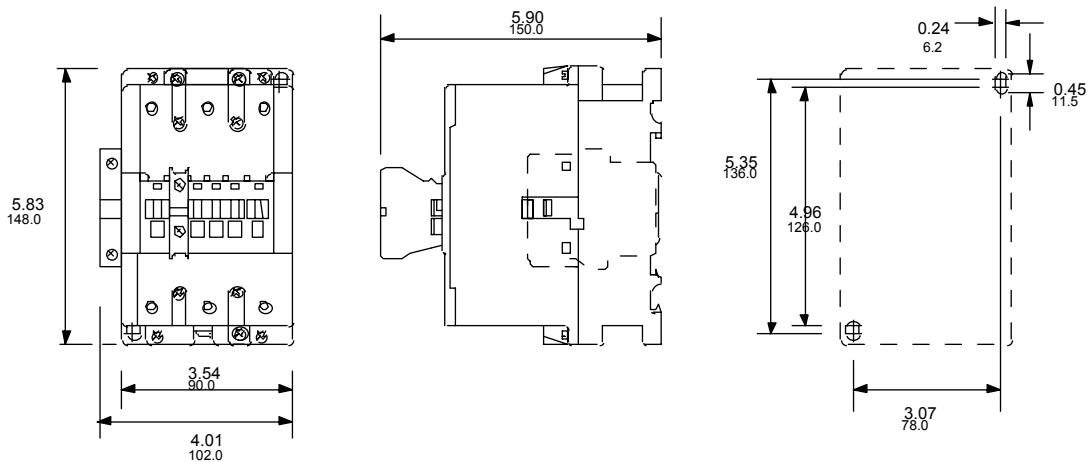
A/AE/AF50 – A/AE/AF75 + VM5 or VE5 – Mechanically interlocked contactor, 3 pole



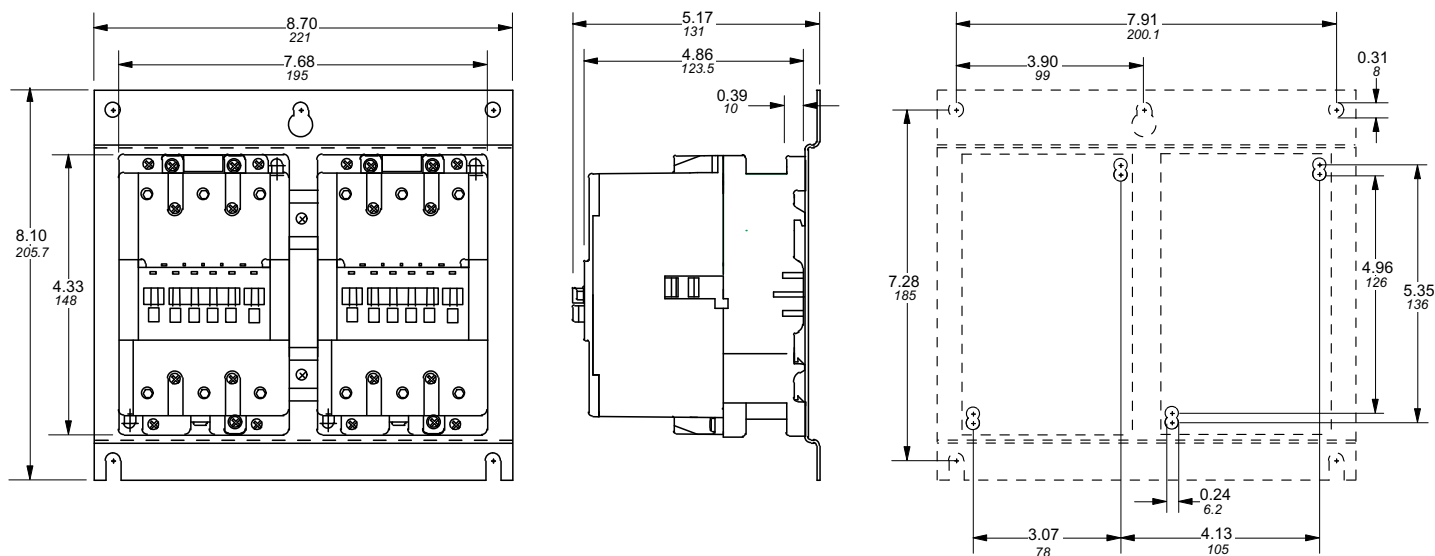
Approximate dimensions A/AE/AF95 & A/AE/AF110, 3 pole

00.00 Inches
00.00 [Millimeters]

A/AE/AF95 & A/AE/AF110 — Contactor, 3 pole



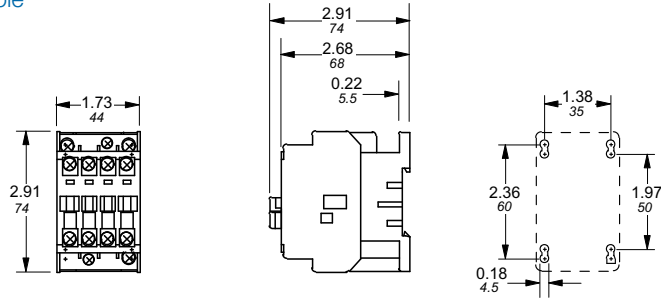
A/AE/AF95 & A/AE/AF110 + VE5 — Mechanically interlocked contactor, 3 pole



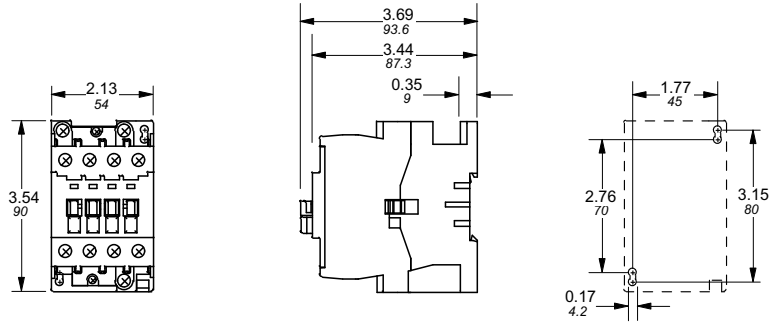
Approximate dimensions A/AE9 – A/AE/AF75, 4 pole

00.00 Inches
00.00 [Millimeters]

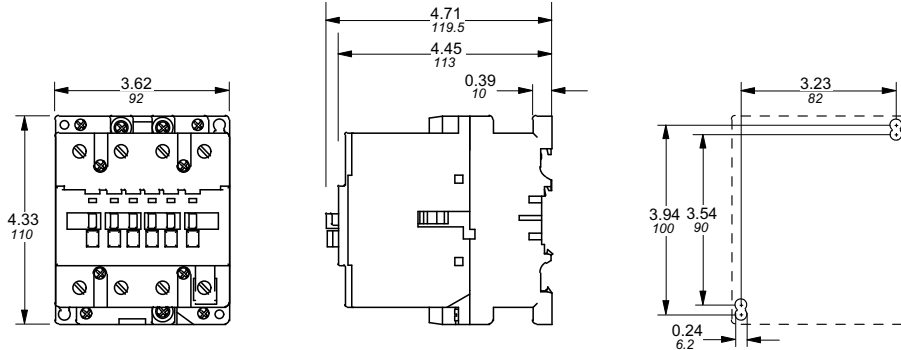
A/AE9 – A/AE16 — Contactor, 4 pole



A/AE26 — Contactor, 4 pole



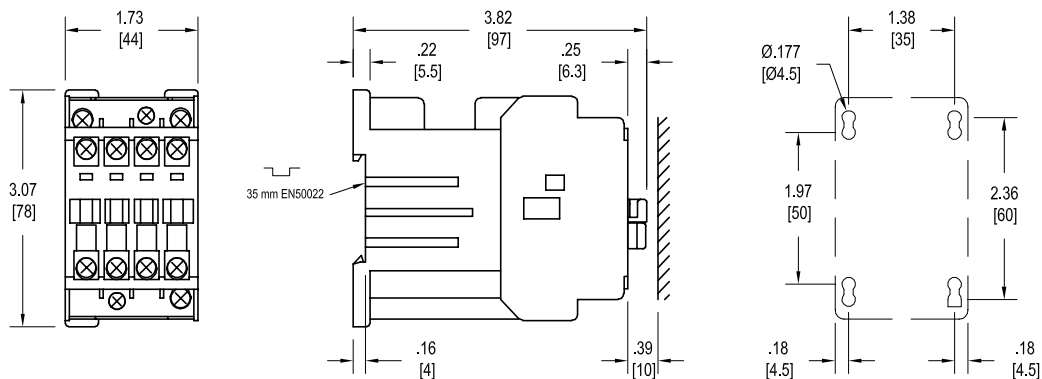
A/AE/AF45 – A/AE/AF75 — Contactor, 4 pole



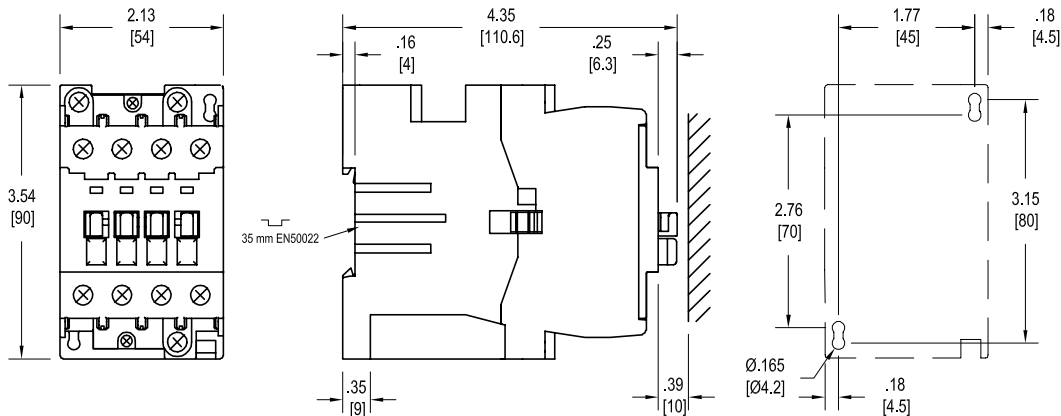
Approximate dimensions AL9 – AL40, 3 & 4 pole

00.00 Inches
00.00 [Millimeters]

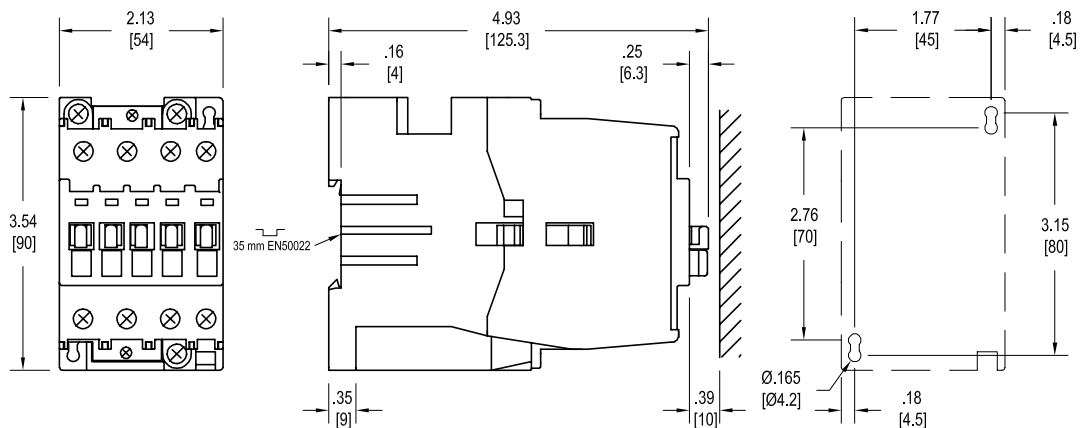
AL9, AL12., AL16 – Contactor, 3 & 4 pole



AL26 – Contactor, 3 & 4 pole



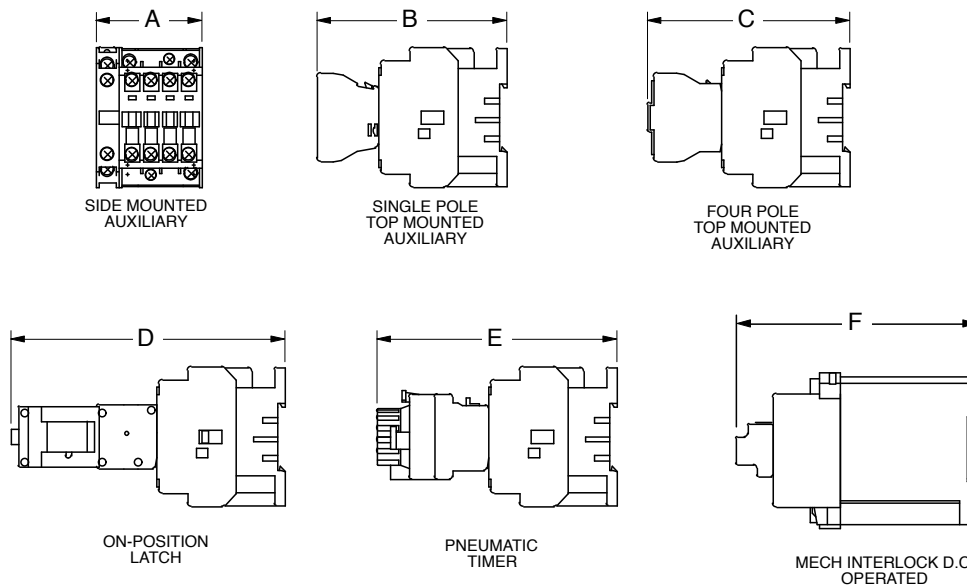
AL30, AL40 – Contactor, 3 pole



Approximate dimensions Accessories for A/AE9 – A/AE/AF110

00.00 → Inches
00.00 → [Millimeters]

A/AE9 – A/AE40
A/AE/AF50 – A/AE/AF110

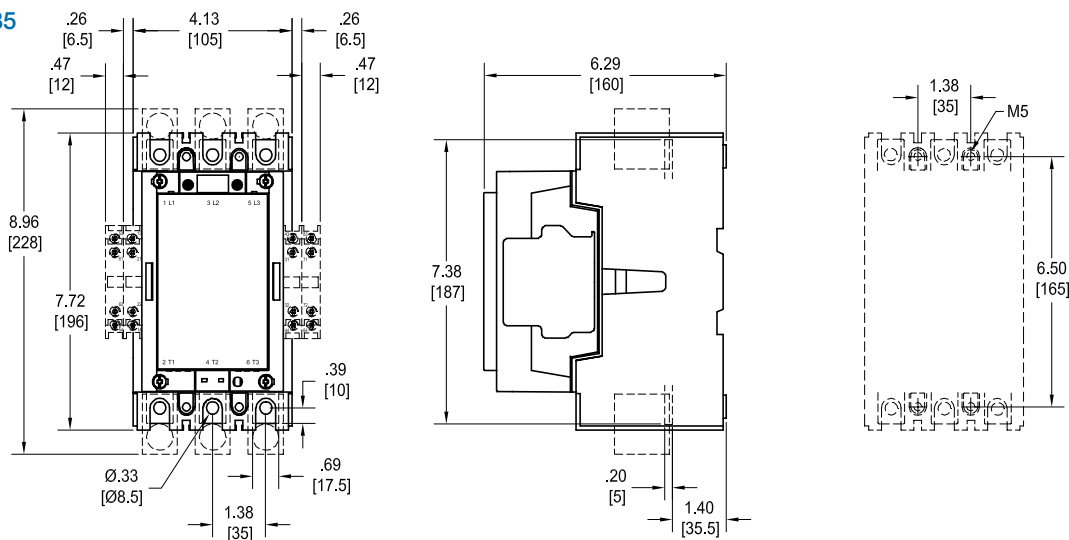


TYPE		A	B	C	D	E	F
A/AE9-16	IN	2.20	3.96	4.21	5.71	5.00	–
	MM	56	100.5	107	145	127	–
A/AE26	IN	2.20	4.72	4.97	6.47	5.76	–
	MM	56	119.8	126.3	164.3	146.3	–
A/AE30-40	IN	2.20	5.30	5.55	7.05	6.34	–
	MM	56	134.5	141	179	161	–
A/AE/AF50-75	IN	3.23	5.27	5.52	7.03	6.32	–
	MM	82	133.9	140.3	178.5	160.4	–
A/AE/AF45	IN	4.09	5.73	5.98	7.48	6.77	–
	MM	104	145.5	152	190	172	–
A/AE/AF95-110	IN	4.02	5.91	6.16	–	–	–
	MM	102	150	156.5	–	–	–

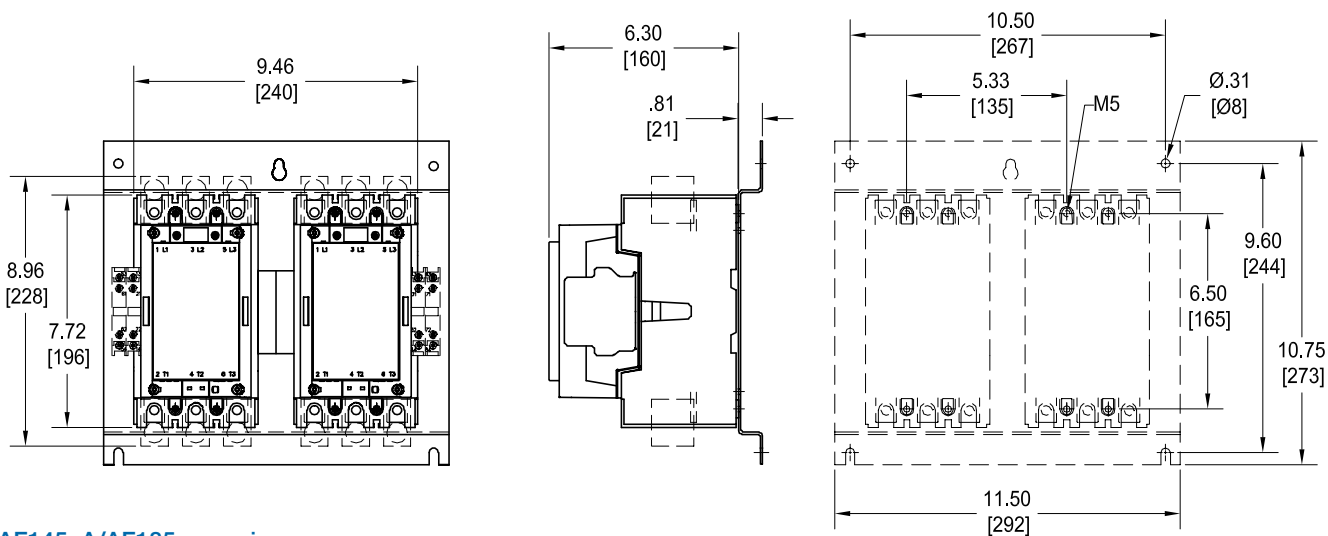
Approximate dimensions A/AF145 – A/AF185

00.00 Inches
00.00 [Millimeters]

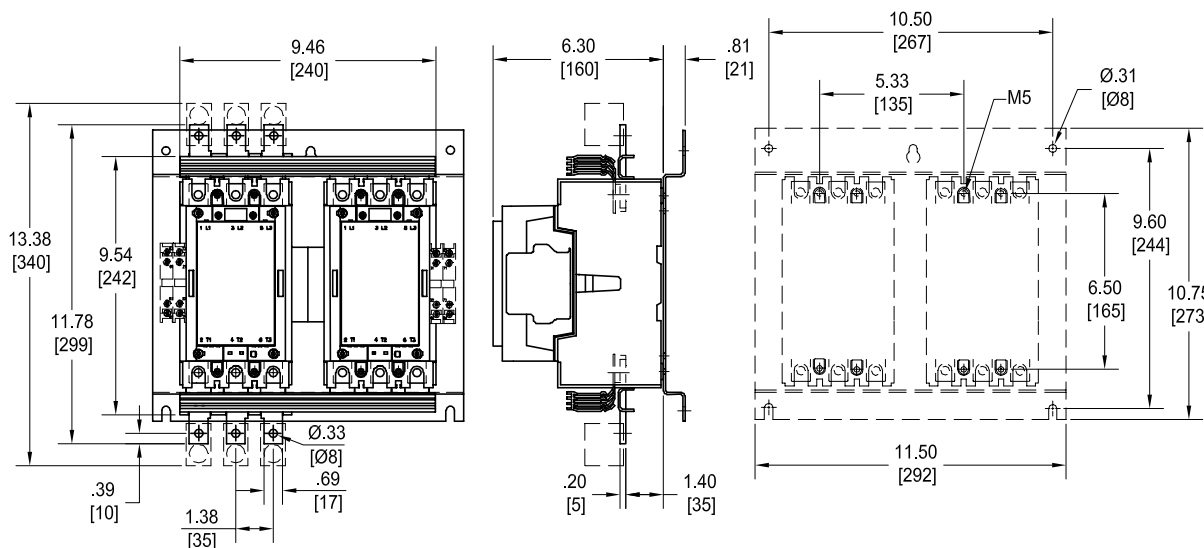
A/AF145 & A/AF185



A/AF145, A/AF185 with mechanical interlock



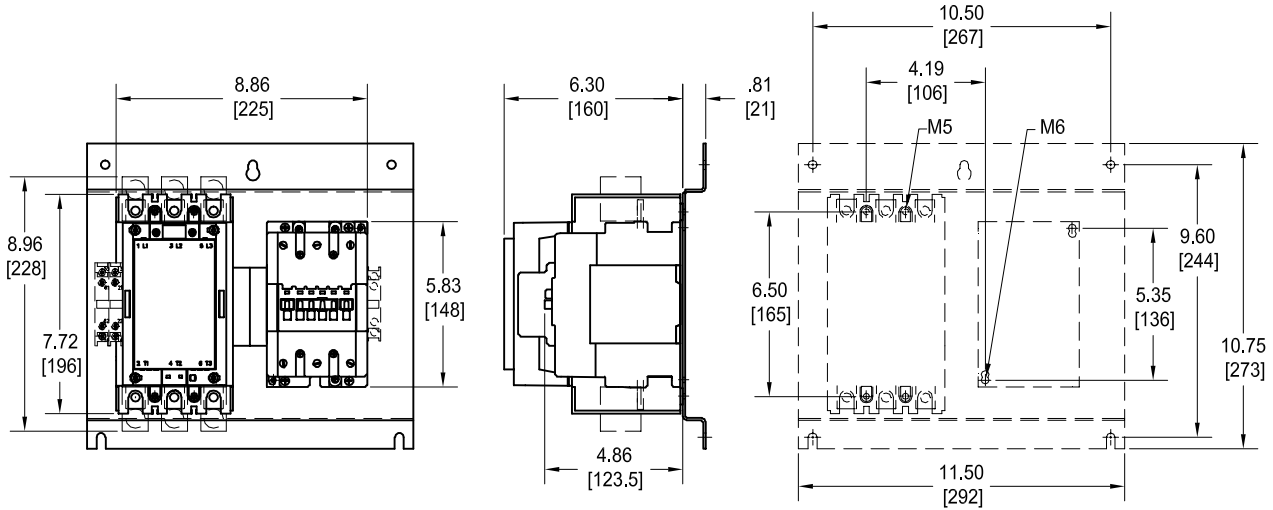
A/AF145, A/AF185 reversing



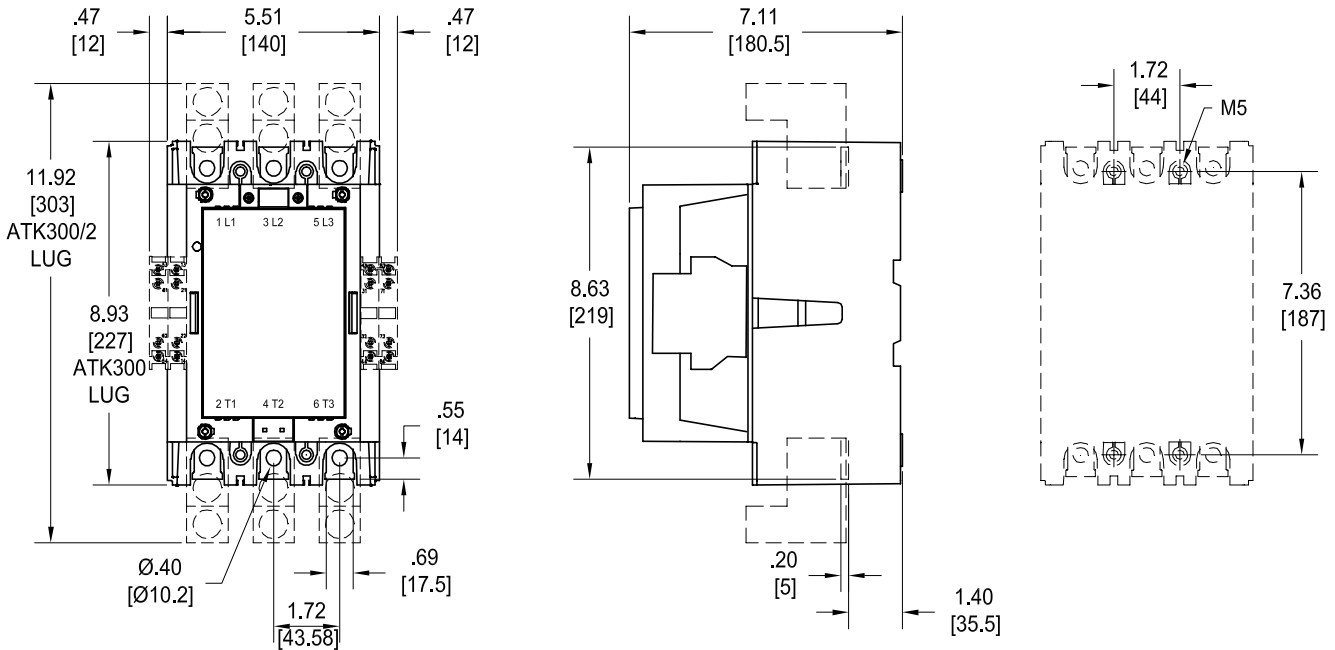
Approximate dimensions A/AF145 – A/AF300

00.00 Inches
00.00 [Millimeters]

A/AF145 – A/AE/AF95-110 mechanically interlocked



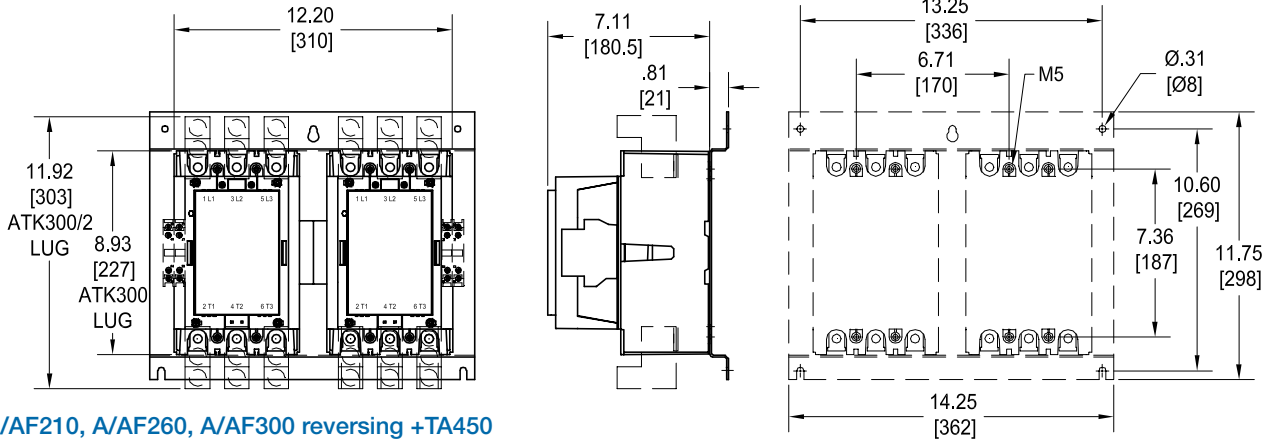
A/AF210, A/AF260, A/AF300



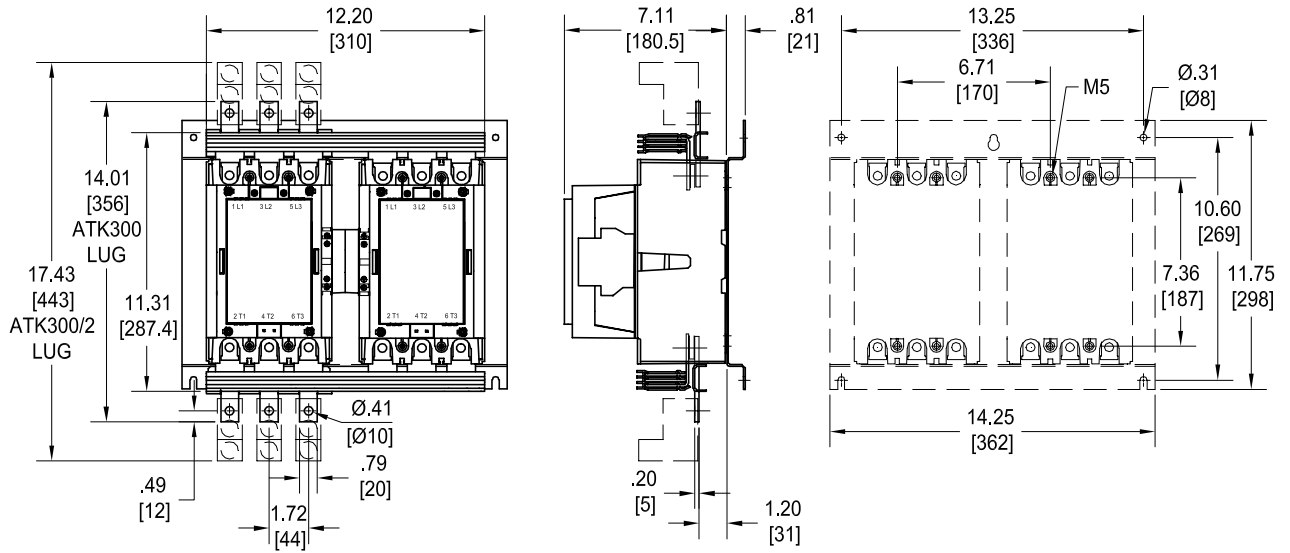
Approximate dimensions A/AF210 – A/AF300

00.00 Inches
00.00 [Millimeters]

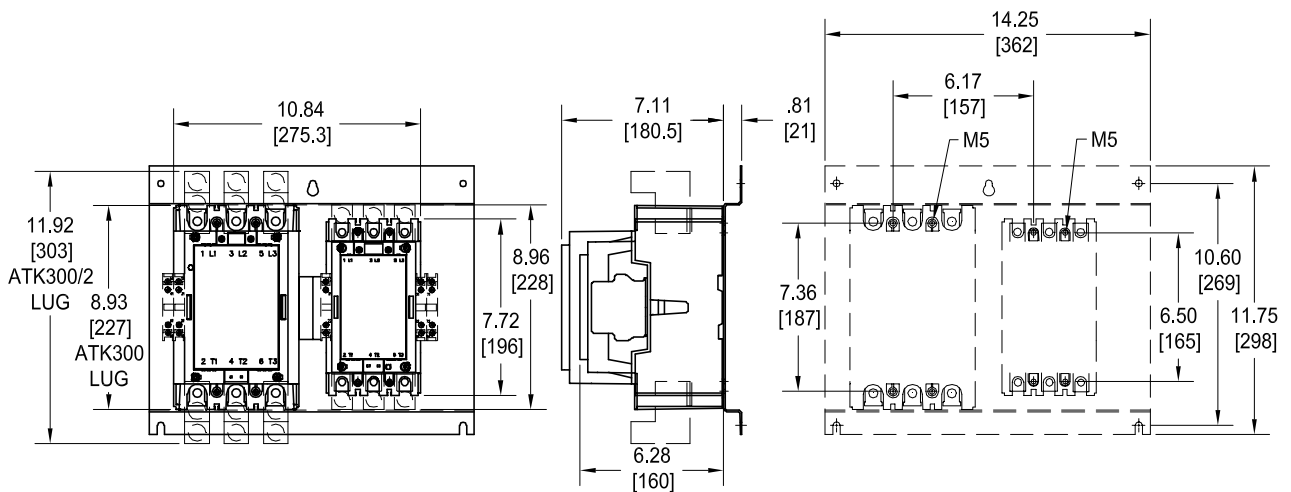
A/AF210, A/AF260, A/AF300 with mechanical interlock



A/AF210, A/AF260, A/AF300 reversing +TA450



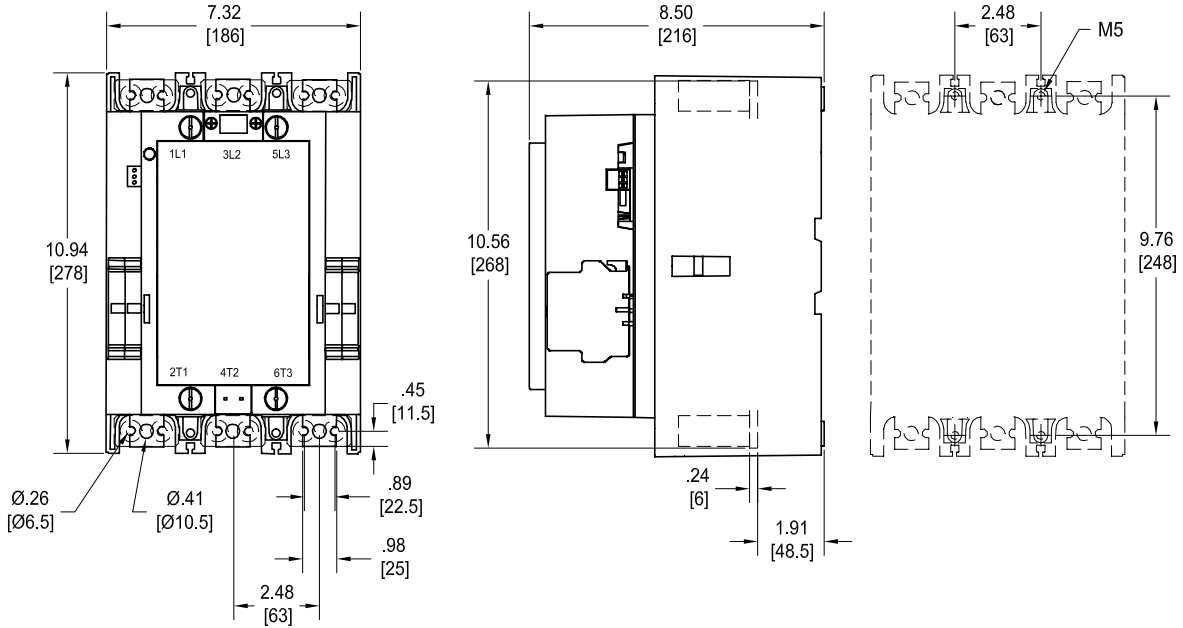
A/AF210, A/AF145 with mechanical interlock



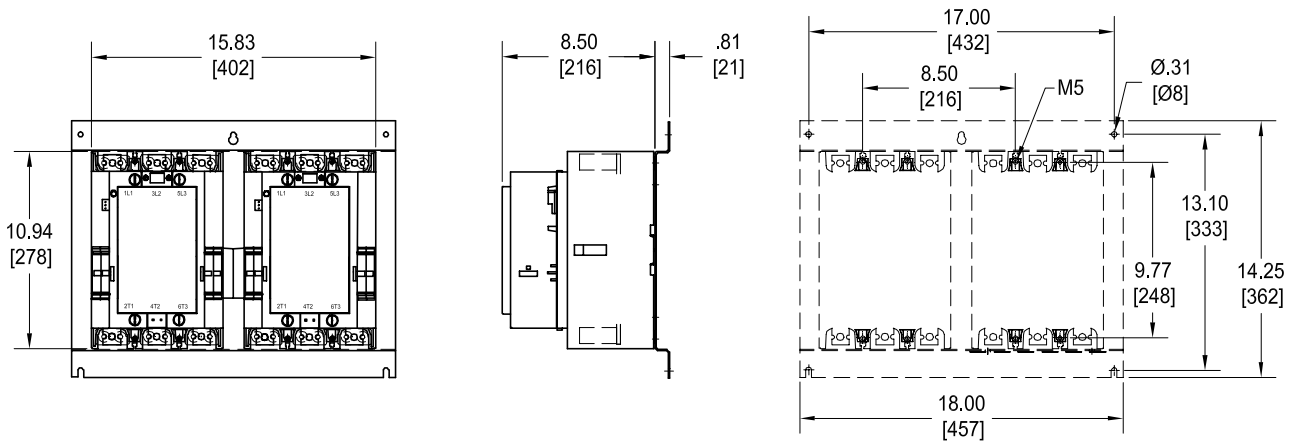
Approximate dimensions AF400 – AF460

00.00 Inches
00.00 [Millimeters]

AF400, AF460



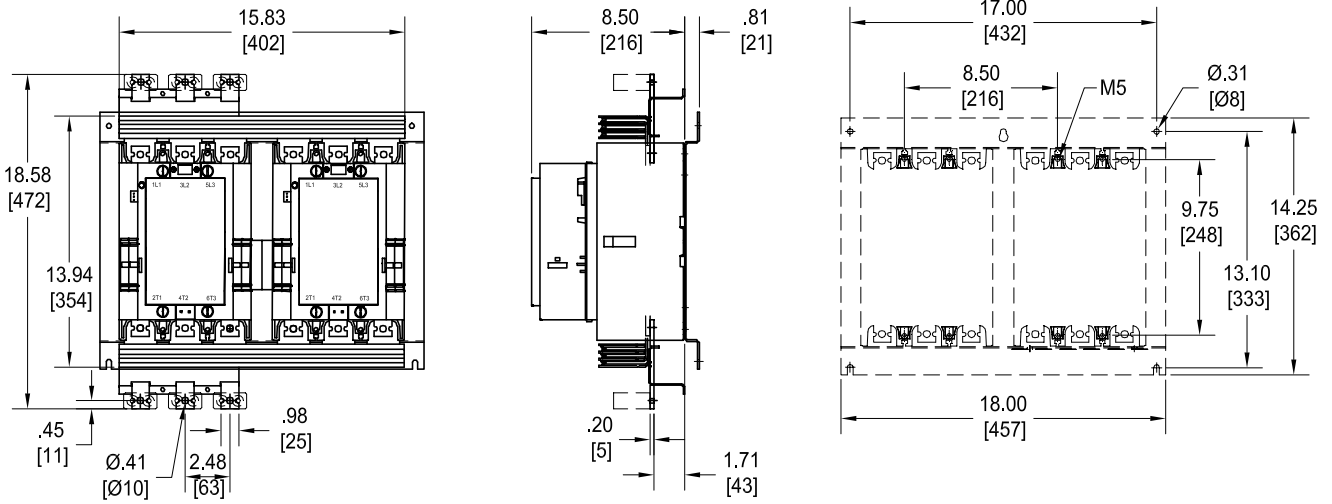
AF400, AF460 with mechanical interlock



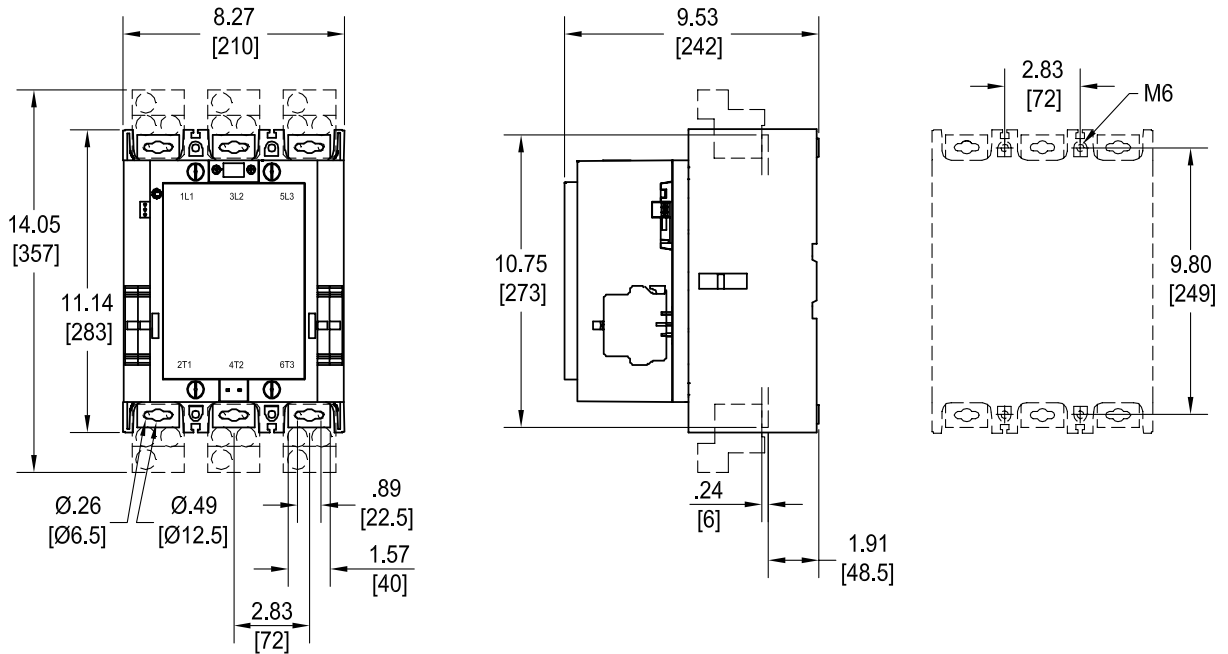
Approximate dimensions AF400 – AF750

00.00 Inches
00.00 [Millimeters]

AF400, AF460 reversing



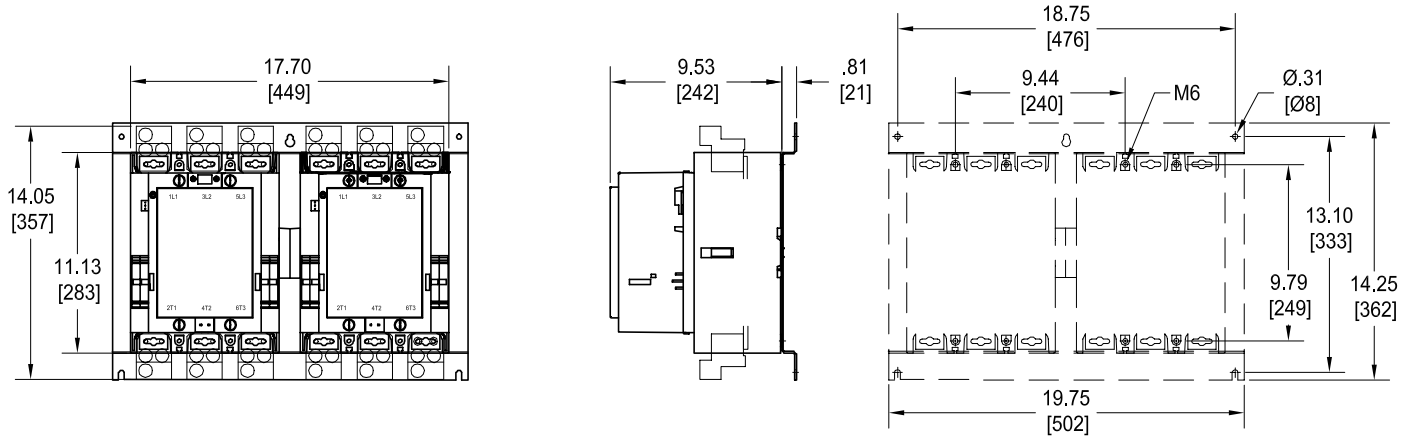
AF580 – AF750



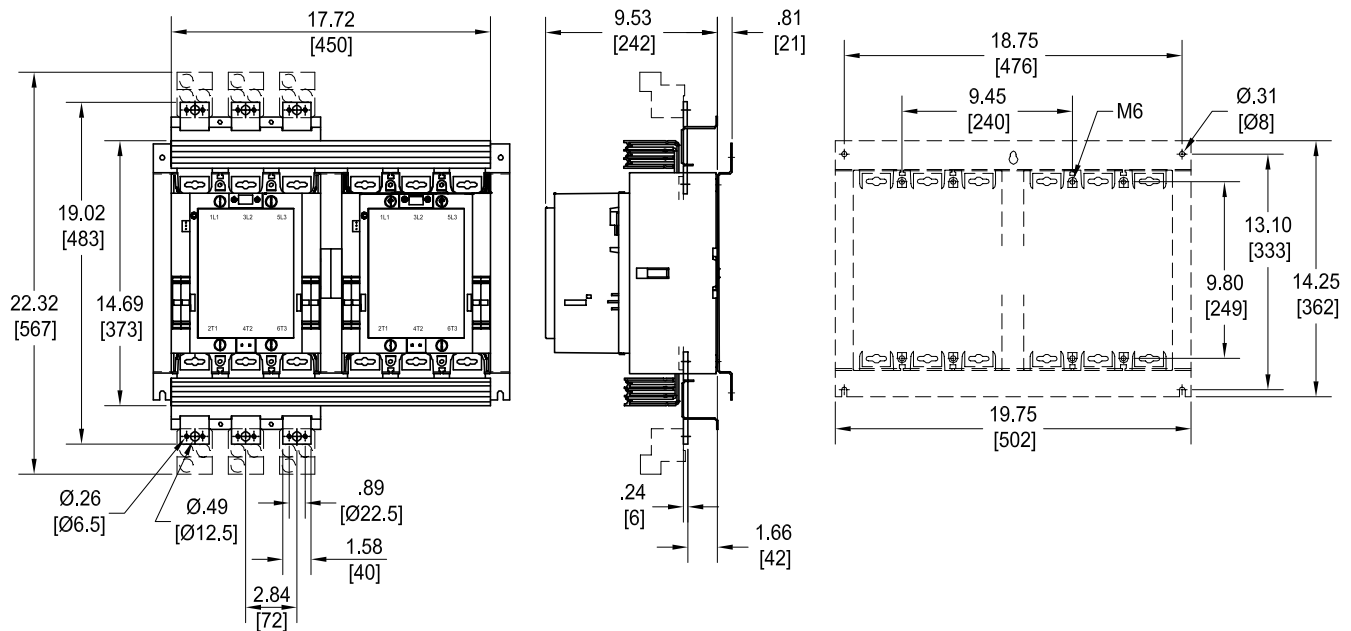
Approximate dimensions AF580 – AF750

00.00 Inches
00.00 [Millimeters]

AF580 – AF750 with mechanical interlock



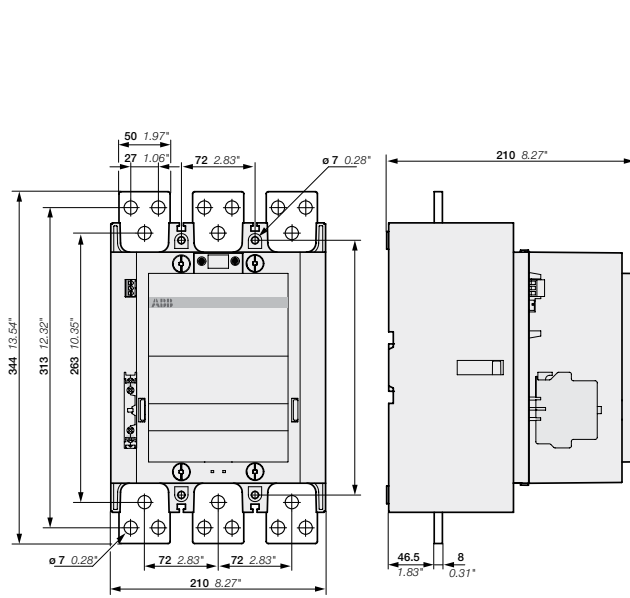
AF580 – AF750 reversing



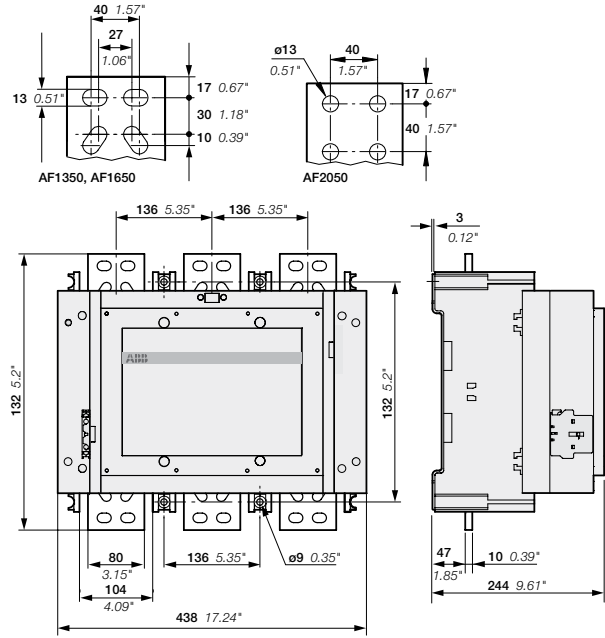
Approximate dimensions AF1250 – AF2050

00.00 Inches
00.00 [Millimeters]

AF1250 – AF2050

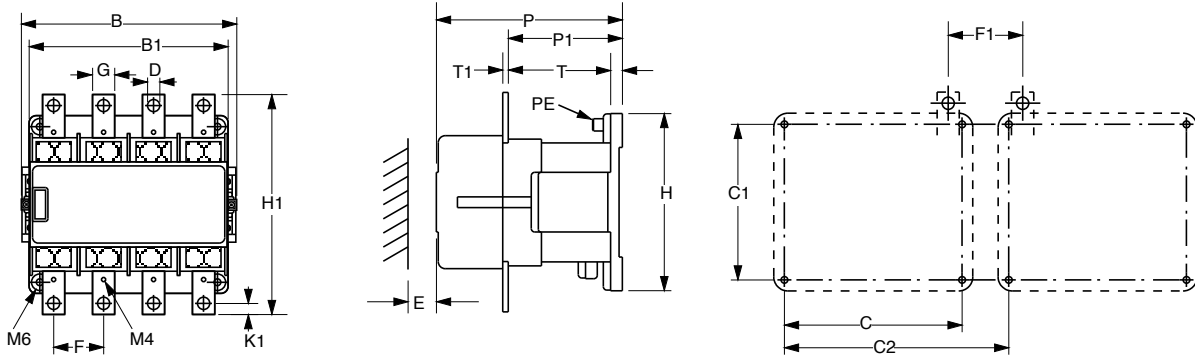


AF1250



AF1350 ... AF2050

Approximate dimensions EK110 – EK550, 4 pole



		B	B1	C	C1	D	E	F	F1	G	H	H1	K1	P	P1	T	T1
EK 110	in	6.50	5.35	4.72	5.51	0.26	1.57	1.61	1.69	0.59	6.14	6.14	0.30	6.08	4.03	0.39	0.16
	mm	165	136	120	140	6.6	40	41	43	15	156	156	7.5	154.5	102.3	10	4
EK 150	in	6.50	5.35	4.72	5.51	0.43	1.57	1.65	1.65	0.79	6.14	6.77	0.39	6.08	4.03	0.39	0.16
	mm	165	136	120	140	11	40	42	42	20	156	172	10	154.5	102.3	10	4
EK 175	in	7.91	6.93	6.30	5.51	0.43	0.59	1.77	2.64	0.79	6.14	7.80	0.39	6.77	4.20	0.39	0.20
	mm	201	176	160	140	11	15	45	67	20	156	198	10	172	106.7	10	5
EK 210	in	7.91	6.93	6.30	5.51	0.43	0.59	1.77	2.64	0.79	6.14	7.80	0.39	6.77	4.20	0.39	0.20
	mm	201	176	160	140	11	15	45	67	20	156	198	10	172	106.7	10	5
EK 370	in	10.63	9.61	8.66	7.87	0.43	1.57	2.64	2.76	0.98	8.78	10.71	0.49	8.88	5.49	0.91	0.24
	mm	270	244	220	200	11	40	67	70	25	223	272	12.5	225.5	139.5	23	6
EK 550	in	10.63	9.61	8.66	7.87	0.43	1.57	2.64	2.76	0.98	8.78	10.71	0.49	8.88	5.49	0.91	0.24
EK 1000	mm	270	244	220	200	11	40	67	70	25	223	272	12.5	225.5	139.5	23	6

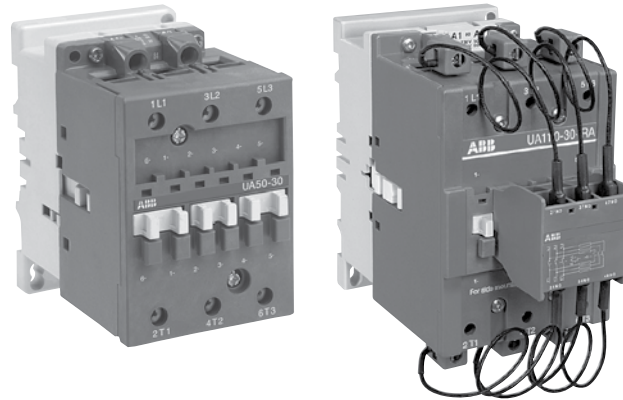


ABB offers 3 contactor types for capacitive switching:

- **UA...RA contactors for capacitor switching (UA16...RA to UA110...RA)** with preinstalled damping resistors. The insertion of damping resistors protects the contactor and the capacitor from the highest inrush currents.
- **UA contactors for capacitor switching (UA16 to UA110)** Maximum permissible peak current $\hat{i} \leq 100$ times the nominal rms current of the switched capacitor.
- **A and AF standard contactors** Maximum permissible peak current $\hat{i} \leq 30$ times the nominal rms current of the switched capacitor.

Please contact Technical Support for more information.

UA...RA description

These devices intended for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances. The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

- The UA...RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
- Their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
- The insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
- Control circuit: AC operated
- Add-on auxiliary contact blocks for side mounting and a wide range of accessories.
- CE mark
- UL file #E312527 (16...75), #E36588 (95...110)
- CSA file #LR56745 (16...75), cULus (95...110)

UA description

UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less than or equal to 100 times nominal rms current. The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making. These contactors are of the block type design with:

- Control circuit: AC operated
- Add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.
- CE mark
- UL file #E312527 (26...75), #E36588 (95...110)
- CSA file #LR56745 (26...75), cULus (95...110)

Contactors for capacitive switching

AC-6b utilization category according to IEC 60947-4-1

Capacitor transient conditions

In Low Voltage industrial installations, capacitors are mainly used for reactive energy correction (raising the power factor). When these capacitors are energized, overcurrents of high amplitude and high frequencies (3 to 15 kHz) occur during the transient period (1 to 2 ms).

The amplitude of these current peaks, also known as "inrush current peaks", depends on the following factors:

- The network inductances.
- The transformer power and short-circuit voltage.
- The type of power factor correction.

There are 2 types of power factor correction: fixed or automatic.

Fixed power factor correction consists of inserting, in parallel on the network, a capacitor bank whose total power is provided by the assembly of capacitors of identical or different ratings.

The bank is energized by a contactor that simultaneously supplies all the capacitors (a single step).

The inrush current peak, in the case of fixed correction, can reach 30 times the nominal current of the capacitor bank.

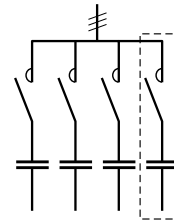


Single-step capacitor bank scheme
Use the A/AF... contactor ranges.

An automatic power factor correction system, on the other hand, consists of several capacitor banks of identical or different ratings (several steps), energized separately according to the value of the power factor to be corrected.

An electronic device automatically determines the power of the steps to be energized and activates the relevant contactors.

The inrush current peak, in the case of automatic correction, depends on the power of the steps already on duty, and can reach 100 times the nominal current of the step to be energized.



Multi-step capacitor bank scheme
Use the UA... or UA..RA contactor ranges.

Steady state condition data

The presence of harmonics and the network's voltage tolerance lead to a current, estimated to be 1.3 times the nominal current I_n of the capacitor, permanently circulating in the circuit.

Taking into account the manufacturing tolerances, the exact power of a capacitor can reach 1.15 times its nominal power.

Standard IEC 60831-1 Edition 2002 specifies that the capacitor must therefore have a maximum thermal current I_T of:

$$I_T = 1.3 \times 1.15 \times I_n = 1.5 \times I_n$$

Consequences for the contactors

To avoid malfunctions (welding of main poles, abnormal temperature rise, etc.), contactors for capacitor bank switching must be sized to withstand:

- **A permanent current that can reach 1.5 times the nominal current of the capacitor bank.**
- **The short but high peak current on pole closing** (maximum permissible peak current \hat{I}).

Contactor selection tool for capacitor switching

In a given application, if the user does not know the value of the inrush current peak, this value can be approximately calculated using the formulas given on the pages "Calculation and dimensioning".

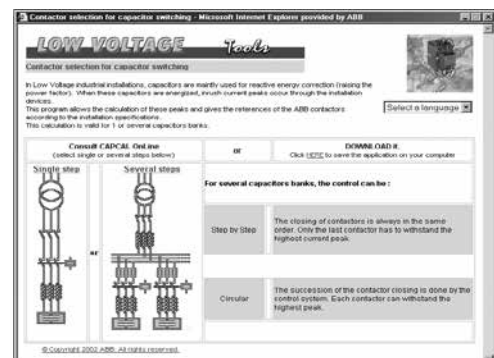
Alternatively by the **CAPCAL selection tool**, available on the ABB Website: www.abb.com/lowvoltage

right hand side menu

search: "Online product selection tools"

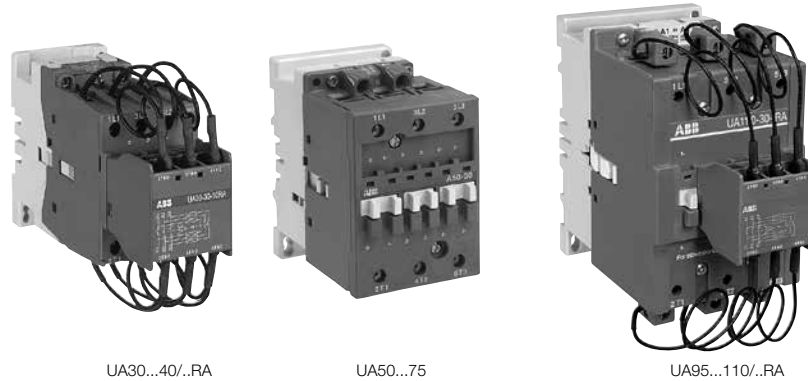
select: "Contactors: AC-6b capacitor switching"

This program allows the calculation of these peaks and gives the references of the ABB contactors according to the installation specifications. This calculation is valid for one or several capacitor banks.



UA, UA...RA 3 pole

For capacitive switching applications up to 130 kVar
AC operated coils



Electrical ratings

IEC/EN 60947-1
IEC/EN 60947-4-1

UL 508/60947-4-1A
CSA C22.2 No.14, 60947-4-1-07

Capacitive switching

Rated operational power AC-6b, three phase, 50 Hz, 40°C (kVar)					AC capacitive switching ratings			Standard auxiliary contacts		Catalog number
230... 240V	400... 415V	440V	500... 550V	690V	Power, three phase, 60 Hz (kVar)			NO	NC	
					220... 240V	440... 480V	550... 600V			

UA...RA – rated for capacitors with peak (inrush) current $\hat{i} > 100$ times the rms current (unlimited peak current)

8	12.5	15	18	22	8	16	20	1	-	UA16-30-10-RAΔ
12.5	22	24	30	35	11	22	27	1	-	UA26-30-10-RAΔ
16	30	32	34	45	14	28	35	1	-	UA30-30-10-RAΔ
25	40	50	55	72	25	50	62	-	-	UA50-30-00-RAΔ
								1	1	UA50-30-11-RAΔ
30	50	55	65	80	27.5	55	70	-	-	UA63-30-00-RAΔ
								1	1	UA63-30-11-RAΔ
35	60	65	75	100	32	64	80	-	-	UA75-30-00-RAΔ
								1	1	UA75-30-11-RAΔ
40	70	75	85	120	40	80	100	-	-	UA95-30-00-RAΔ
								1	1	UA95-30-11-RAΔ
45	80	85	95	130	45	95	120	-	-	UA110-30-00-RAΔ
								-	1	UA110-30-11-RAΔ

UA – rated for capacitors with peak (inrush) current $\hat{i} \leq 100$ times the rms current (see technical data for values)

7.5	12.5	13.7	15.5	21.5	IEC/EN applications only – use UA...RA type			1	-	UA16-30-10-Δ
12	20	22	22	30	12.5	25	30	1	-	UA26-30-10-Δ
16	27.5	30	34	45	16	32	40	1	-	UA30-30-10-Δ
20	33	36	40	55	20	40	50	-	-	UA50-30-00-Δ
								1	1	UA50-30-11-Δ
25	45	50	50	70	IEC/EN applications only – use UA...RA type			-	-	UA63-30-00-Δ
								1	1	UA63-30-11-Δ
30	50	55	62	75	27.5	55	70	-	-	UA75-30-00-Δ
								1	1	UA75-30-11-Δ
35	65	65	70	80	35	70	75	-	-	UA95-30-00-Δ
								1	1	UA95-30-11-Δ
40	75	75	80	90	40	80	85	-	-	UA110-30-00-Δ
								-	1	UA110-30-11-Δ

Coil voltage selection chart (Δ)

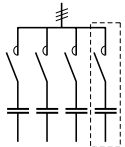
Rated control circuit voltage U_c	UA16... UA110	UA16RA... UA110RA
24V 50/60	81	81
48V 50/60	83	83
110V/50, 110...120V/60	84	84
230...240V/60	80	80
400...415V/50, 480V/60	51	51
500V/50, 600V/60	55	55

UA16/RA...UA110/RA 3-pole contactors

Unlimited peak current \hat{I}

IEC & UL/CSA Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA	UA63..RA	UA75..RA	UA95..RA	UA110..RA	
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1								
Rated operational voltage U_e max.		690 V								
Rated frequency (without derating)		50 / 60 Hz								
AC-6b Utilization category										
Rated operational power AC-6b										
For air temperature close to contactor $\theta \leq 40\text{ }^\circ\text{C}$  Multi-step capacitor bank scheme	230-240 V	8 kvar	12.5 kvar	16 kvar	25 kvar	30 kvar	35 kvar	40 kvar	45 kvar	
		400-415 V	12.5 kvar	22 kvar	30 kvar	40 kvar	50 kvar	60 kvar	70 kvar	80 kvar
		440 V	15 kvar	24 kvar	32 kvar	50 kvar	55 kvar	65 kvar	75 kvar	85 kvar
	500-550 V	18 kvar	30 kvar	34 kvar	55 kvar	65 kvar	75 kvar	85 kvar	95 kvar	
		690 V	22 kvar	35 kvar	45 kvar	72 kvar	80 kvar	100 kvar	120 kvar	130 kvar
		$\theta \leq 55\text{ }^\circ\text{C}$	230-240 V	7.5 kvar	11.5 kvar	16 kvar	24 kvar	27 kvar	30 kvar	35 kvar
	400-415 V		12.5 kvar	20 kvar	27.5 kvar	40 kvar	45 kvar	50 kvar	60 kvar	70 kvar
	440 V		13 kvar	20 kvar	30 kvar	43 kvar	48 kvar	53 kvar	65 kvar	75 kvar
	500-550 V	16 kvar	25 kvar	34 kvar	50 kvar	60 kvar	65 kvar	75 kvar	82 kvar	
		690 V	21 kvar	31 kvar	45 kvar	65 kvar	75 kvar	80 kvar	105 kvar	110 kvar
		$\theta \leq 70\text{ }^\circ\text{C}$	230-240 V	6 kvar	9 kvar	11 kvar	20 kvar	23 kvar	25 kvar	30 kvar
	400-415 V		10 kvar	15.5 kvar	19.5 kvar	35 kvar	39 kvar	41 kvar	53 kvar	60 kvar
440 V	11 kvar		17 kvar	20.5 kvar	37 kvar	42.5 kvar	45 kvar	58 kvar	70 kvar	
500-550 V	12.5 kvar	20 kvar	25 kvar	46 kvar	50 kvar	55 kvar	70 kvar	78 kvar		
690 V	17 kvar	26 kvar	32 kvar	60 kvar	65 kvar	70 kvar	85 kvar	100 kvar		
Max. permissible peak current \hat{I}		Unlimited								
Short-circuit protection device for contactors		80 A			125 A	200 A	250 A			
gG type fuse (1)		80 A			125 A	200 A	250 A			
Max. electrical switching frequency		240 cycles/h								
Electrical durability AC-6b	$U_e \leq 440\text{ V}$	250 000 operating cycles								
	$500\text{ V} \leq U_e \leq 690\text{ V}$	100 000 operating cycles								

(1) The fuse ratings given represent the maximum ratings ensuring type 1 coordination according to the definition of standard IEC 60947-4-1.

Main pole - Utilization characteristics according to UL / CSA

Contactor types	AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA	UA63..RA	UA75..RA	UA95..RA	UA110..RA	
Power - 60 Hz										
For air temperature close to contactor	$\theta \leq 40\text{ }^\circ\text{C}$	240 V	8 kvar	11 kvar	14 kvar	25 kvar	27.5 kvar	32 kvar	40 kvar	45 kvar
		480 V	16 kvar	22 kvar	28 kvar	50 kvar	55 kvar	64 kvar	80 kvar	95 kvar
		600 V	20 kvar	27 kvar	35 kvar	62 kvar	70 kvar	80 kvar	100 kvar	120 kvar
Max. permissible peak Current \hat{I}		Unlimited								

Operating principle

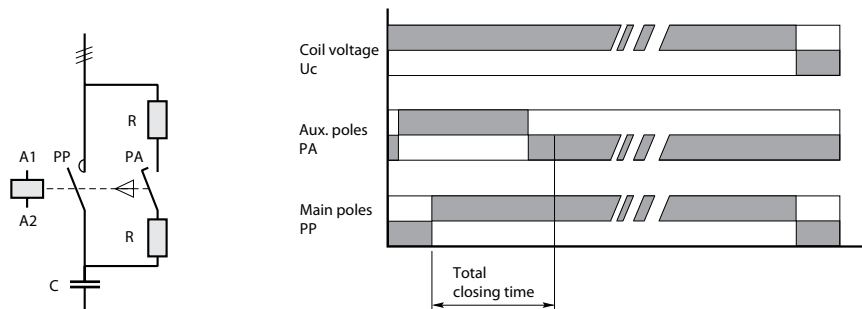
The front-mounted block mechanism of the UA..RA contactors ensures:

- early making of the auxiliary "PA" poles with respect to the main "PP" poles
- automatic return to the open position of the auxiliary "PA" poles after the main poles are closed.

When the coil is energized, the early making auxiliary poles connect the capacitor to the network via the set of 3 resistors. The damping resistors attenuate the first current peak and the second inrush current when the main contacts begin to make. Once the main poles are in the closed position, the auxiliary poles automatically break.

When the coil is de-energized, the main poles break ensuring the breaking of the capacitor bank.

The contactor can then begin a new cycle.



The insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.

UA16/RA...UA110/RA 3-pole contactors











Unlimited peak current \hat{I}

General technical data

Capacitive
switching

1

Connecting characteristics

Contactor types	AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA UA63..RA UA75..RA	UA95..RA UA110..RA			
Connection capacity (min. ... max.)									
Main conductors (poles)									
	Rigid	Solid ($\leq 4 \text{ mm}^2$)	1 x	1...4 mm ²	1.5...6 mm ²	2.5...16 mm ²	6...50 mm ²	10...95 mm ²	
		Stranded ($\geq 6 \text{ mm}^2$)	2 x	-	-	2.5...16 + 2.5...6 mm ²	6...25 + 6...16 mm ²	6...35 mm ²	
	Flexible with ferrule		1 x	0.75...2.5 mm ²	1.5...4 mm ²	2.5...10 mm ²	6...35 mm ²	10...70 mm ²	
			2 x	-	-	2.5...10 + 2.5...4 mm ²	6...16 + 6...10 mm ²	6...35 mm ²	
	Bars or lugs		L \leq	7.7 mm	10 mm	-	-	-	
			L $>$	3.7 mm	4.2 mm	-	-	-	
Connection capacity acc. to UL/CSA									
			1 or 2 x	AWG 18...10	AWG 12...8	AWG 8...4	AWG 8...1	AWG 6...2/0	
Tightening torque		Recommended		1 Nm / 9 lb.in	1.7 Nm / 15 lb.in	2.3 Nm / 20 lb.in	4 Nm / 35 lb.in	8 Nm / 53 lb.in	
		Max.		1.2 Nm	2.2 Nm	2.6 Nm	4.5 Nm	9 Nm	
Auxiliary conductors (built-in auxiliary terminals + coil terminals)									
	Rigid solid		1 x	1...4 mm ²				0.75...2.5 mm ²	
			2 x	1...4 mm ²				0.75...2.5 mm ²	
	Flexible with ferrule		1 x	0.75...2.5 mm ²			1...2.5 mm ²	0.75...2.5 mm ²	
			2 x	0.75...2.5 mm ²				0.75...2.5 mm ²	
	Lugs	Coil terminals	L \leq	8 mm					
			L $>$	3.7 mm					
		Built-in auxiliary terminals	L \leq	7.7 mm	10 mm	8 mm	-	-	
			L $>$	3.7 mm	4.2 mm	3.7 mm	-	-	
Connection capacity acc. to UL/CSA									
			1 or 2 x	AWG 18...14					
Tightening torque									
Coil terminals		Recommended		1 Nm / 9 lb.in					
		Max.		1.2 Nm					
Built-in auxiliary terminals		Recommended		1 Nm / 9 lb.in					
		Max.		1.2 Nm					
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529									
Main terminals				IP20		IP10			
Coil terminals				IP20					
Built-in auxiliary terminals				IP20			-	-	
Screw terminals									
Main terminals									
				Delivered in open position, screws of unused terminals must be tightened					
			Screwdriver type	M 3.5	M 4	M 5	M 6	M 8	
				Flat \varnothing 5.5 / Pozidriv 2				Flat \varnothing 6.5 / Pozidriv 2	Hexagon socket (s = 4 mm)
Coil terminals									
			Screwdriver type	M 3.5					
				Flat \varnothing 5.5 / Pozidriv 2					
Built-in auxiliary terminals									
			Screwdriver type	M 3.5	M 4	M 3.5	-	-	
				Flat \varnothing 5.5 / Pozidriv 2				-	

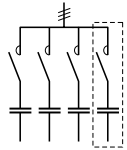
Other technical characteristics are the same as those of standard A contactors.

UA16...UA110 3-pole contactors

Peak current $\hat{I} \leq 100$ times the rms current
IEC & UL/CSA technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	UA16	UA26	UA30	UA50	UA63	UA75	UA95	UA110	
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1									
Rated operational voltage U_e max.	690 V									
Rated frequency (without derating)	50 / 60 Hz									
AC-6b Utilization category										
Rated operational power AC-6b (1)										
For air temperature close to contactor	$\theta \leq 40^\circ\text{C}$	230-240 V	7.5 kvar	12 kvar	16 kvar	20 kvar	25 kvar	30 kvar	35 kvar	40 kvar
		400-415 V	12.5 kvar	20 kvar	27.5 kvar	33 kvar	45 kvar	50 kvar	65 kvar	75 kvar
	$\theta \leq 55^\circ\text{C}$	440 V	13.7 kvar	22 kvar	30 kvar	36 kvar	50 kvar	55 kvar	65 kvar	75 kvar
		500-550 V	15.5 kvar	22 kvar	34 kvar	40 kvar	50 kvar	62 kvar	70 kvar	80 kvar
	$\theta \leq 70^\circ\text{C}$	690 V	21.5 kvar	30 kvar	45 kvar	55 kvar	70 kvar	75 kvar	80 kvar	90 kvar
		230-240 V	6.7 kvar	11 kvar	16 kvar	20 kvar	25 kvar	30 kvar	35 kvar	40 kvar
		400-415 V	11.7 kvar	18.5 kvar	27.5 kvar	33 kvar	43 kvar	50 kvar	65 kvar	70 kvar
		440 V	13 kvar	20 kvar	30 kvar	36 kvar	48 kvar	53 kvar	65 kvar	75 kvar
		500-550 V	14.7 kvar	22 kvar	34 kvar	40 kvar	50 kvar	62 kvar	70 kvar	80 kvar
		690 V	20 kvar	30 kvar	45 kvar	55 kvar	70 kvar	75 kvar	80 kvar	90 kvar
		230-240 V	6 kvar	8.5 kvar	11 kvar	19 kvar	21 kvar	22 kvar	30 kvar	35 kvar
		400-415 V	10 kvar	14.5 kvar	19 kvar	32 kvar	37 kvar	39 kvar	55 kvar	65 kvar
		440 V	11 kvar	16 kvar	20 kvar	35 kvar	41 kvar	43 kvar	55 kvar	70 kvar
		500-550 V	12.5 kvar	19.5 kvar	23.5 kvar	40 kvar	45 kvar	47.5 kvar	60 kvar	75 kvar
		690 V	17 kvar	25 kvar	32 kvar	52 kvar	60 kvar	65 kvar	70 kvar	85 kvar
		$U_e \leq 500$ V	1.8 kA	3 kA	3.5 kA	5 kA	6.5 kA	7.5 kA	9.3 kA	10.5 kA
Max. permissible peak current \hat{I}		$U_e > 500$ V	1.6 kA	2.7 kA	3.1 kA	4.5 kA	5.8 kA	6.75 kA	8 kA	9 kA
Short-circuit protection device for contactors	gG type fuse sized 1.5...1.8 In of the capacitor									
Max. electrical switching frequency	240 cycles/h									
Electrical durability AC-6b	$U_e \leq 690$ V	100 000 operating cycles								



Multi-step capacitor bank scheme

(1) For 220 V and 380 V, multiply by 0.9 the rated values at 230 V and 400 V respectively.
Example: 50 kvar / 400 V corresponding to $0.9 \times 50 = 45$ kvar/380 V.

If, in an application, the current peak is greater than the maximum peak current \hat{I} specified in the tables above, select a higher rating, refer to the UA..RA contactors, or add inductances. (see application guide "Contactors for capacitor switching").

Main pole - Utilization characteristics according to UL / CSA

Contactor types	AC operated	UA16	UA26	UA30	UA50	UA63	UA75	UA95	UA110	
Power - 60 Hz										
For air temperature close to contactor	$\theta \leq 40^\circ\text{C}$	240 V	-	12.5 kvar	16 kvar	20 kvar	-	27.5 kvar	35 kvar	40 kvar
		480 V	-	25 kvar	32 kvar	40 kvar	-	55 kvar	70 kvar	80 kvar
		600 V	-	30 kvar	40 kvar	50 kvar	-	70 kvar	75 kvar	85 kvar











If, in an application, the current peak is greater than the maximum peak current \hat{I} specified in the tables above, select a higher rating, refer to the UA..RA contactors, or add inductances. (see application guide "Contactors for capacitor switching").

UA16 ... UA110 3-pole contactors

Peak current $\hat{I} \leq 100$ times the rms current

General technical data

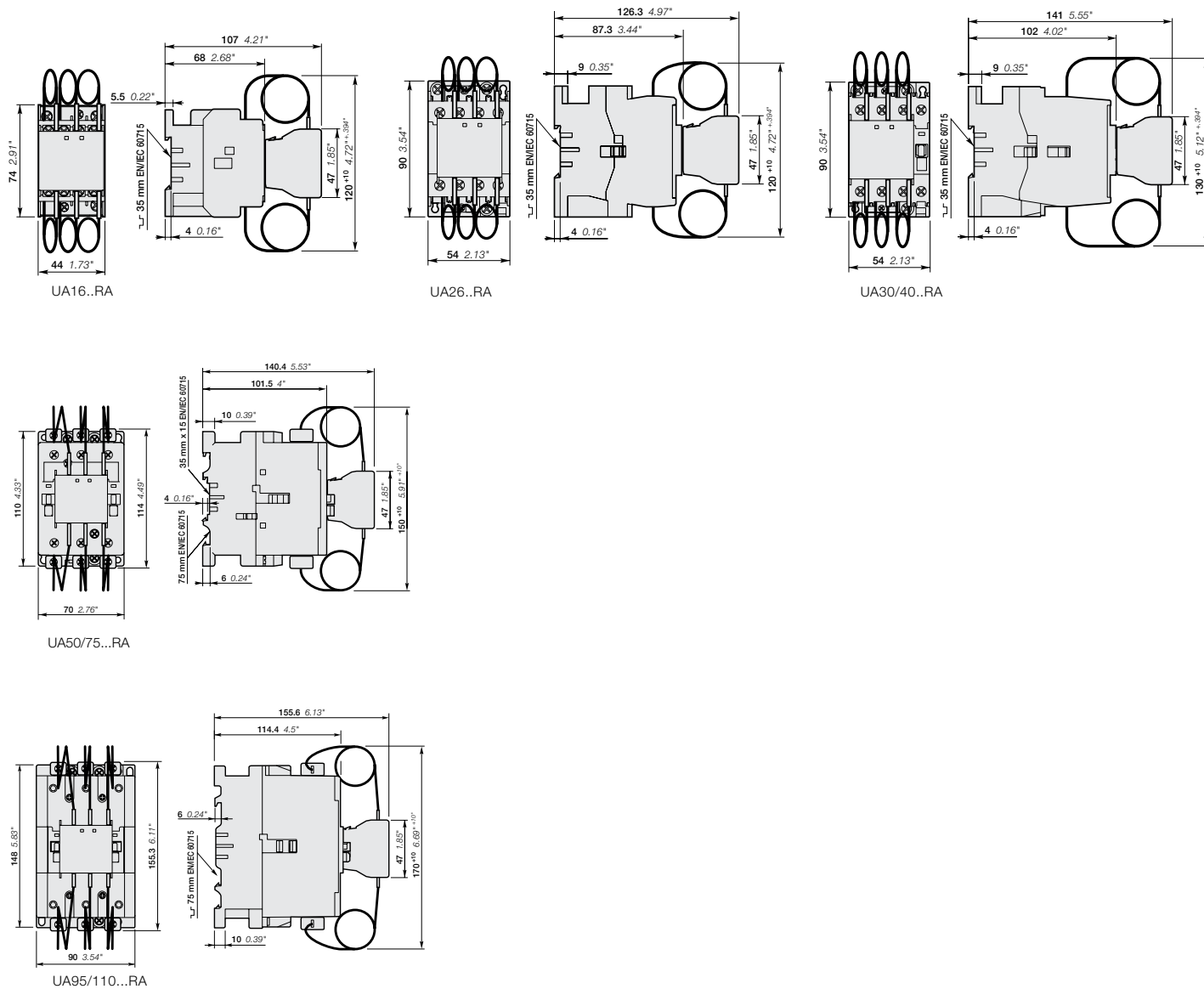
Connecting characteristics

Contactor types	AC operated	UA16		UA26	UA30	UA50 UA63 UA75	UA95 UA110	
		Connection capacity (min. ... max.)						
Main conductors (poles)								
	Rigid	Solid ($\leq 4 \text{ mm}^2$)	1 x	1...4 mm ²	1.5...6 mm ²	2.5...16 mm ²	6...50 mm ²	10...95 mm ²
		Stranded ($\geq 6 \text{ mm}^2$)	2 x	1...4 mm ²	1.5...6 mm ²	2.5...16 mm ²	6...25 mm ²	6...35 mm ²
	Flexible with ferrule		1 x	0.75...2.5 mm ²	0.75...4 mm ²	2.5...10 mm ²	6...35 mm ²	10...70 mm ²
			2 x	0.75...2.5 mm ²	0.75...4 mm ²	2.5...10 mm ²	6...16 mm ²	6...35 mm ²
	Bars or lugs		L	$\leq 7.7 \text{ mm}$	10 mm	-	-	-
			I	$> 3.7 \text{ mm}$	4.2 mm	-	-	-
Connection capacity acc. to UL/CSA			1 or 2 x	AWG 18...10	AWG 12...8	AWG 8...4	AWG 8...1	AWG 6...2/0
Tightening torque		Recommended		1 Nm / 9 lb.in	1.7 Nm / 15 lb.in	2.3 Nm / 20 lb.in	4 Nm / 35 lb.in	8 Nm / 71 lb.in
		Max.		1.2 Nm	2.2 Nm	2.6 Nm	4.5 Nm	9 Nm
Auxiliary conductors (built-in auxiliary terminals + coil terminals)								
	Rigid solid		1 x	1...4 mm ²				0.75...2.5 mm ²
			2 x	1...4 mm ²				0.75...2.5 mm ²
	Flexible with ferrule		1 x	0.75...2.5 mm ²			1...2.5 mm ²	0.75...2.5 mm ²
			2 x	0.75...2.5 mm ²				0.75...2.5 mm ²
	Lugs	Coil terminals	L	$\leq 8 \text{ mm}$				
		Built-in auxiliary terminals	I	$\leq 3.7 \text{ mm}$				
			L	$\leq 7.7 \text{ mm}$	10 mm	8 mm	-	-
			I	$> 3.7 \text{ mm}$	4.2 mm	3.7 mm	-	-
Connection capacity acc. to UL/CSA				AWG 18...14				
Tightening torque		Recommended		1 Nm / 9 lb.in				
		Max.		1.2 Nm				
Built-in auxiliary terminals		Recommended		1 Nm / 9 lb.in				
		Max.		1.2 Nm				
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals				IP20			IP10	
Coil terminals				IP20				
Built-in auxiliary terminals				IP20			-	-
Screw terminals Delivered in open position, screws of unused terminals must be tightened								
Main terminals				M3.5	M4	M5	M6	M8
		Screwdriver type		Flat $\varnothing 5.5$ / Pozidriv 2		Flat $\varnothing 6.5$ / Pozidriv 2		Hexagon socket (s = 4 mm)
Coil terminals				M3.5				
		Screwdriver type		Flat $\varnothing 5.5$ / Pozidriv 2				
Built-in auxiliary terminals				M3.5	M4	M3.5	-	-
		Screwdriver type		Flat $\varnothing 5.5$ / Pozidriv 2			-	-

Other technical characteristics are the same as those of standard A contactors.

Approximate dimensions

Main dimensions mm, inches

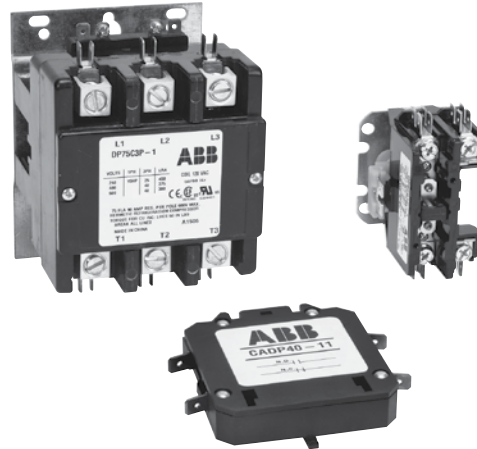


Note: dimensions for UA... contactor identical to UA...RA types less front-mount dampening resistors.



Definite purpose contactors

For applications up to 90 FLA



Definite purpose Contactors

Applications

Type DP contactors provide high performance with flexibility and reliability, designed to match numerous applications including:

- Motors
- Power supplies
- Food service equipment
- Compressors
- Business machines
- Resistive heating
- Air conditioning
- Refrigeration equipment
- Welding

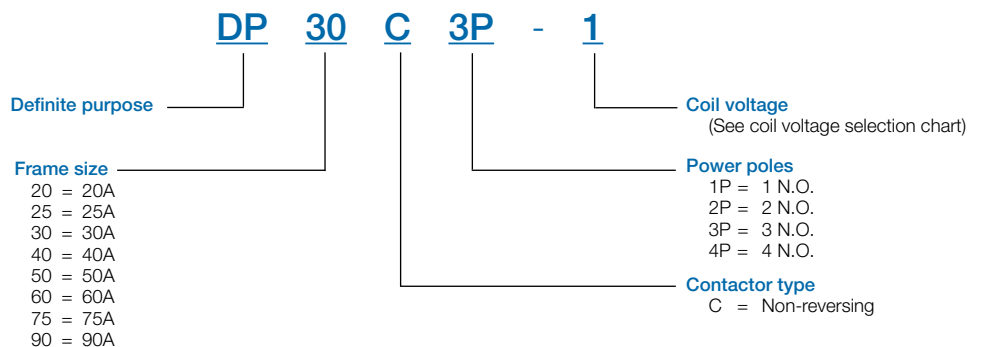
Agency approvals

- UL 508 Guide No. NLDX2, File # E224401
- CSA C22.2 No. 221260 (1456104)
Class 3211 04 / 3211 84
- CE/Semko Certified, EN60947-4-1:2001

Features

- Available as:
 - 20A, 25A, 1, 2 or 3 pole
 - 30A, 1, 2, 3 or 4 pole
 - 40A, 2, 3 or 4 pole
 - 50-90A, 3 pole
- Industry standard mounting plate provides easily accessible mounting holes
- Coil terminals are provided with #6-32 screws and (1) .250 quick connect or dual .250 quickconnect terminals
- Exclusive hex, slotted, phillips #10-32 terminal screws for main terminals
- Coil is class B (130° C) insulation system with a wide range of voltages and 50/60 Hz ratings
- Double E magnet assembly provides optimal performance with reduced power consumption
- Snap-in auxiliary switch with 1 SPDT or 2 SPDT contacts available as an option
- 1 N.O. & 1 N.C. auxiliary contact block with 600 VAC rating available as an option
- Base assembly is made from high arc-resistant polyesterplastic

Catalog number explanation



DP non-reversing 1, 2, 3 & 4 pole

For definite purpose applications up to 90 FLA
AC operated coils



DP20C1P...
DP40C1P



DP20C3P...
DP30C3P



DP40C4P

Electrical ratings

AC definite purpose controller ratings				AC resistance air heating, per pole (A)	AC motor ratings, breaking all lines (hp)					N.O. power poles	Catalog number	Catalog number (bulk pack)	Bulk qty.	
Full load amperes (FLA)	Locked rotor Amperes, breaking all lines (LRA) ①				Single phase	Three phase								
	220...240 / 277V	440... 480V	550... 600V			110... 120V	220... 240V	220... 240V	440... 480V					550... 600V
20	120	100	80	30	-	-	-	-	-	1	DP20C1P-Δ	DP20C1P-Δ/B	50	
25	150	125	100	35	-	-	-	-	-		DP25C1P-Δ	DP25C1P-Δ/B		
30	180	125	100	40	-	-	-	-	-		DP30C1P-Δ	DP30C1P-Δ/B		
40	240	160	120	50 ④	-	-	-	-	-		DP40C1P-Δ	DP40C1P-Δ/B		
20	120	100	80	30	-	-	-	-	-	2	DP20C2P-Δ	DP20C2P-Δ/B	50	
25	150	125	100	35	-	-	-	-	-		DP25C2P-Δ	DP25C2P-Δ/B		
30	180	125	100	40	-	-	-	-	-		DP30C2P-Δ	DP30C2P-Δ/B		
40	240	160	120	50 ④	-	-	-	-	-		DP40C2P-Δ	DP40C2P-Δ/B		
20	120	100	80	30	1.5	3	7.5	7.5	7.5	3	DP20C3P-Δ	DP20C3P-Δ/B	25	
25	150	125	100	35	2	5	7.5	15	20		DP25C3P-Δ	DP25C3P-Δ/B		
30	180	150	120	40	2	5	10	15	20		DP30C3P-Δ	DP30C3P-Δ/B		
40	240	200	160	50 ⑤	3	7.5	10	20	25		DP40C3P-Δ	DP40C3P-Δ/B		
50	300 ③	250	200	65	3	7.5 ⑥	15 ⑥	25	25		DP50C3P-Δ	-		-
60	360 ③	300	240	75	5	10 ⑥	25 ⑥	30	30		DP60C3P-Δ	-		-
75	450 ③	375	300	90	5	15	25 ⑥	40	40		DP75C3P-Δ	-		-
90	540 ③	450	360	120	7.5	20	30 ⑥	50	50		DP90C3P-Δ	-		-
20	120	100	80	30	1.5	3	7.5	7.5	7.5	4	DP20C4P-Δ	DP20C4P-Δ/B	25	
25	150	125	100	35	2	5	7.5	15	20		DP25C4P-Δ	DP25C4P-Δ/B		
30	180	150	120	40	2	5	10	15	20		DP30C4P-Δ	DP30C4P-Δ/B		
40	240	200	160	50 ⑤	3	7.5	10	20	25		DP40C4P-Δ	DP40C4P-Δ/B		

Note: 1-pole devices in 2-pole frame with shunt included.

Coil voltage selection chart (Δ)

Control circuit voltage	Control circuit voltage
24V 60 Hz	F
120V/60	1
208/240V AC	2
277V AC	C
480V AC	4
575/600V 60 Hz	6

DP ratings for AF & AS/ASL

ABB has additionally performed definite purpose testing for air conditioning (h.r.c.) applications with AF and AS/ASL series contactors. Please contact Technical Support regarding the use of these devices for applications 20...900 FLA, 80...5600 LRA.

① 1- & 2-pole devices rated per pole
 ② DP20...DP30 intended for single phase resistive applications only above 277V
 ③ 220...240V only
 ④ Max. 277V
 ⑤ Breaking all lines
 ⑥ Suitable at 208V

Accessories



Auxiliary contact blocks

Description	DP20 to DP40, 3 pole and 4 pole configurations	DP50 to DP60	DP75 to DP90*
Form C SPDT	CADP40-10	CADP40-10	-
Double Form C SPDT	CADP40-20	CADP40-20	-
Form Z SPDT (1NO & 1NC)**	CADP40-11	CADP40-11	CADP90-11

** Must be the same polarity on both poles. For a complete description on contact types, please refer to page 1.78.

Mechanical interlock

Application	Catalog number
DP30C3P-*	VM DP-1
DP40C3P-*	VM DP-1

Protective cover

Application	Catalog number
DP20C2P-*	DP-2-AC
DP25C2P-*	DP-2-AC
DP30C2P-*	DP-2-AC

Din-rail mounting bracket

Application	Catalog number
DP20C1P-*	DP/DIN1-2
DP25C1P-*	DP/DIN1-2
DP30C1P-*	DP/DIN1-2
DP20C2P-*	DP/DIN1-2
DP25C2P-*	DP/DIN1-2
DP30C2P-*	DP/DIN1-2

Note: Replace "*" with appropriate coil voltage as per previous page

Technical data

Contact rating of SPDT auxiliary contacts

Voltage	Current rating
125 VAC	10 A, 1/3 HP
120 VAC	4 A on lamp load
250 VAC	10 A, 1/3 HP
125 VDC	0.5 A
250 VDC	0.25 A

Contact rating of 1 N.O. & 1 N.C. auxiliary contacts

	120V	240V	480V	600V
Break (A)	3.0	1.5	0.75	0.6
Make (A)	30	15	7.5	6
Continuous (A)	10	10	10	10

DP20 to DP40, 1 & 2 poles

Coil technical data		DP20 to DP30, 1 pole				DP20 to DP40, 2 poles			
Nominal coil voltage		24	120	208/240	277	24	120	208/240	277
Maximum pickup volts		18	88	177	221	18	88	177	221
Drop out volts range		6 - 15	20 - 70	40 - 140	50 - 165	6 - 15	20 - 70	40 - 170	50 - 165
Nominal inrush VA	50 Hz	31	31	31	31	33	33	33	33
Nominal inrush VA	60 Hz	28	28	28	28	30	30	30	30
Nominal closed VA	50 Hz	6	6	6	6	8	8	8	8
Nominal closed VA	60 Hz	5	5	5	5	6.5	6.5	6.5	6.5
Nominal coil resistance	Ohms	18	420	1800	2500	11	237	1000	1600

Other specifications

Specifications	DP20 to DP30, 1 and 2 poles	DP40, 2 poles
Line and load terminals	# 10 - 32 screw	Box lug
Wire size AWG (min - max)	16 - 8	14 - 4 Cu/Al
Tightening torque (recommended)	25 in. lbs.	40 in. lbs.
Coil terminals	Dual .250" QC	Dual .250" QC
Power Terminals	1 Pole: Quad .250" QC 2 Pole: Dual or Quad .250" QC	Quad Dual or quad
Covers	Optional	Standard
Insulation System	130° C class B	130° C class B

DP20 to DP60, 3 poles

Coil technical data		DP20 to DP40, 3 poles					DP50 to DP60, 3 poles				
Nominal coil voltage		24	120	208/240	277	480	24	120	208/240	277	480
Maximum pickup volts		18	88	177	220	384	18	88	177	220	374
Drop out volts range		6 - 15	20 - 70	40 - 140	50 - 140	150 - 270	6 - 15	20 - 70	40 - 140	50 - 185	150 - 286
Nominal inrush VA	50 Hz	65	65	65	65	65	62	62	62	62	62
Nominal inrush VA	60 Hz	60	60	60	60	60	59	59	59	59	59
Nominal closed VA	50 Hz	7.5	7.5	7.5	7.5	7.5	9	9	9	9	9
Nominal closed VA	60 Hz	6	6	6	6	6	7	7	6	7	7
Nominal coil resistance	Ohms	7	180	720	900	1320	2.4	150	600	750	1452

Other specifications

Specifications	DP20 to DP30, 3 poles	DP40, 3 poles	DP50 to DP60, 3 poles
Line and load terminals	# 10 - 32 screw ①	Box lug ①	Box lug ①
Wire size AWG (min - max)	16 - 8 2	14 - 4 Cu/Al	14 - 2 Cu/Al
Tightening torque (recommended)	22 in. lbs.	40 in. lbs.	50 in. lbs.
Quick connects (power terminals)	Dual .250 QC	Dual .250 QC	Dual .250 QC
Coil terminals	Dual .250 QC ②	Dual .250 QC ②	# 6 - 32 screw & dual .250 QC ②
Covers	Standard	Standard	Standard
Insulation system	130° C class B	130° C class B	130° C class B

① See diagram on page 1.183 for approximate dimensions and description.

② Stranding must be split for # 8 wire.

DP20 to DP40, 4 poles

Coil technical data		DP20 to DP40, 4 poles				
Nominal coil voltage		24	120	208/240	277	480
Maximum pickup volts		18	88	177	220	384
Drop out volts range		6 - 15	20 - 70	40 - 140	65 - 185	150 - 270
Nominal inrush VA	50 Hz	62	62	62	62	62
Nominal inrush VA	60 Hz	59	59	59	59	59
Nominal closed VA	50 Hz	9	9	9	9	9
Nominal closed VA	60 Hz	7	7	6	7	6
Nominal coil resistance	Ohms	6	148	600	750	2100

Other specifications

Specifications	DP20 to DP30, 4 poles	DP40, 4 poles
Line and load terminals	# 10 - 32 screw ①	Box lug ①
Wire size AWG (min - max)	16 - 8 2	14 - 4 Cu/Al
Tightening torque (recommended)	22 in. lbs.	40 in. lbs.
Quick connects (power terminals)	Dual .250 QC	Dual .250 QC
Coil terminals	Dual .250 QC ②	Dual .250 QC ②
Covers	Standard	Standard
Insulation system	130° C class B	130° C class B

DP75 to DP90, 3 poles

Coil technical data		DP75 to DP90, 3 poles				
Nominal coil voltage		24	120	208/240	277	480
Maximum pickup volts		18	88	177	220	384
Drop out volts range		6-15	20-70	40-10	65-185	150 - 270
Nominal inrush VA	50 Hz	285	285	285	285	62
Nominal inrush VA	60 Hz	240	240	240	240	59
Nominal closed VA	50 Hz	42	42	42	42	9
Nominal closed VA	60 Hz	27	27	27	27	6
Nominal coil resistance	Ohms	0.65	16	64	85	2100

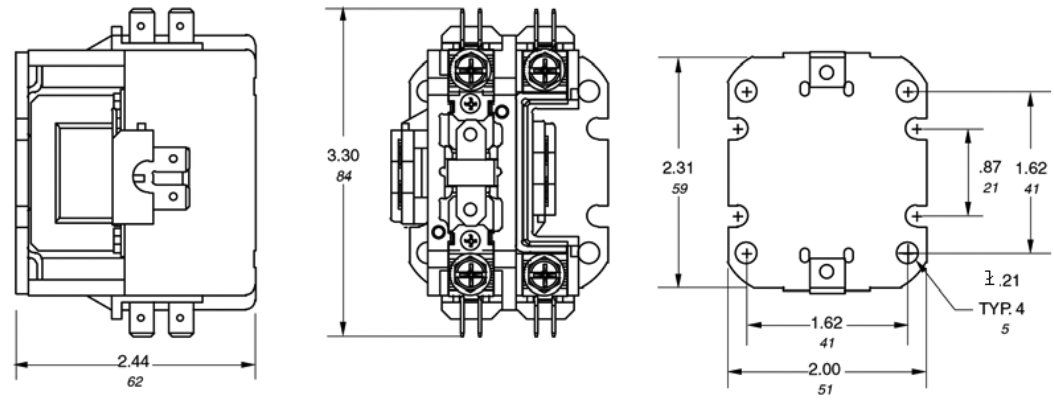
Other specifications

Specifications	DP75 to DP90, 3 poles
Line and load terminals	Box lug (1)
Wire size AWG (min-max)	14-1 Cu/Al
Tightening torque (recommended)	50 in. lbs
Quick connects (power terminals)	Dual .250" QC
Coil terminals	Dual .250" QC
Covers	Standard
Insulation system	130°C Class B

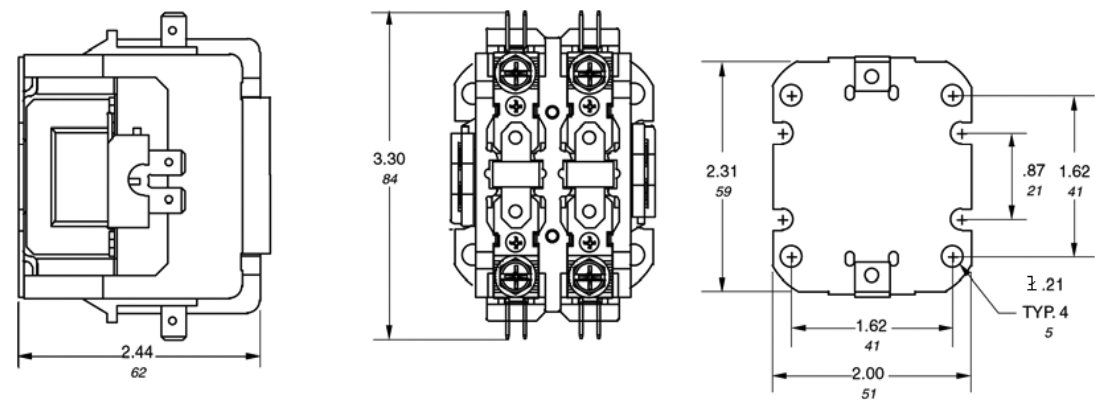
① See diagram on page 1.183 for approximate dimensions and description.
 ② Stranding must be split for # 8 wire.

Approximate dimensions

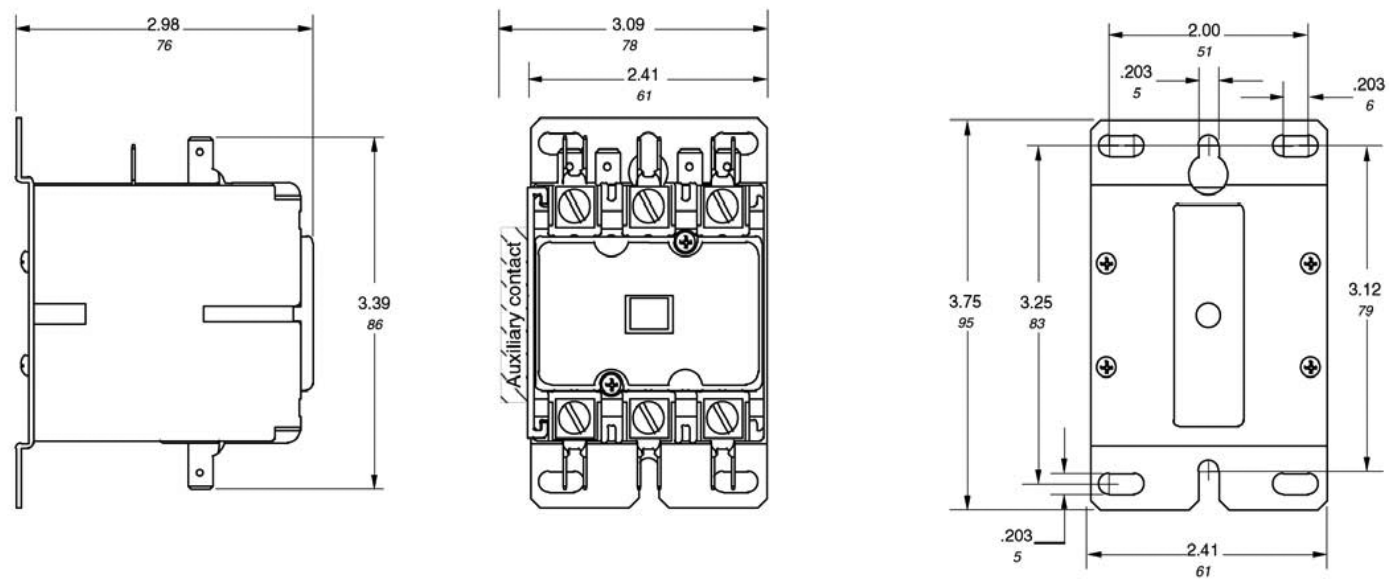
DP20 to DP30, 1 pole



DP20 to DP30, 2 poles



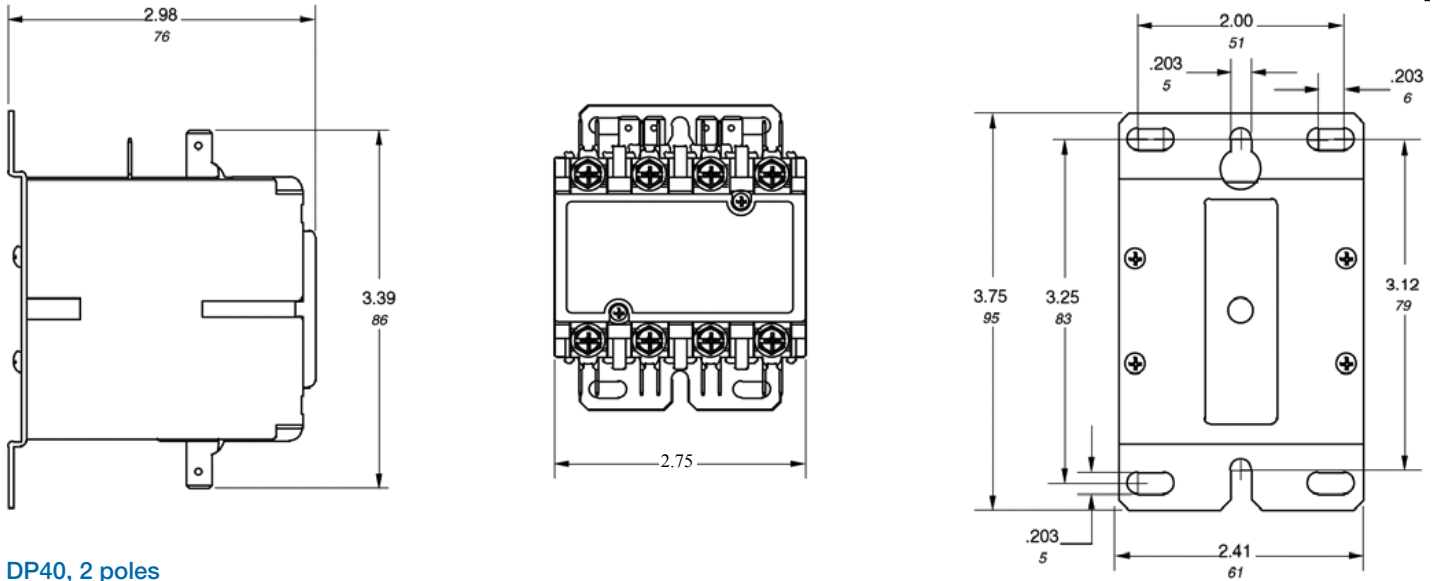
DP20 to DP30, 3 poles



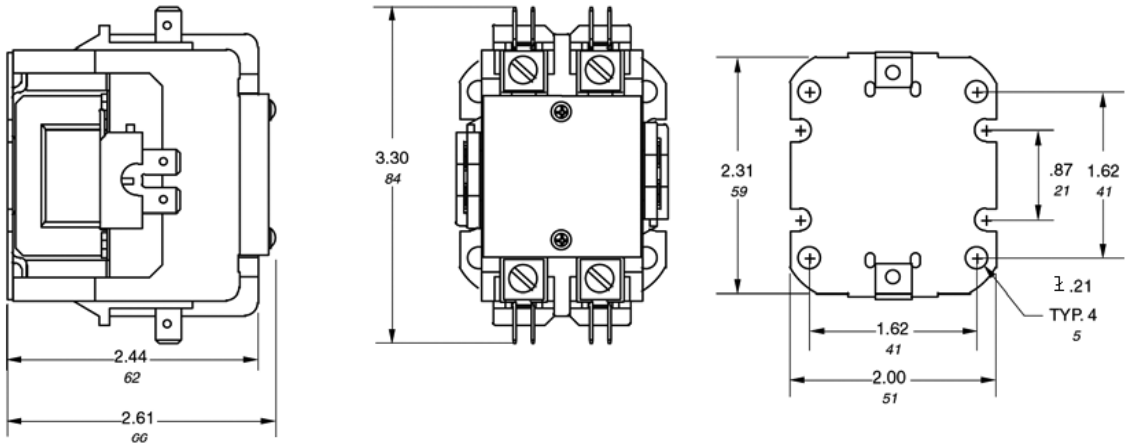
Approximate dimensions

Definite purpose
contactors 1

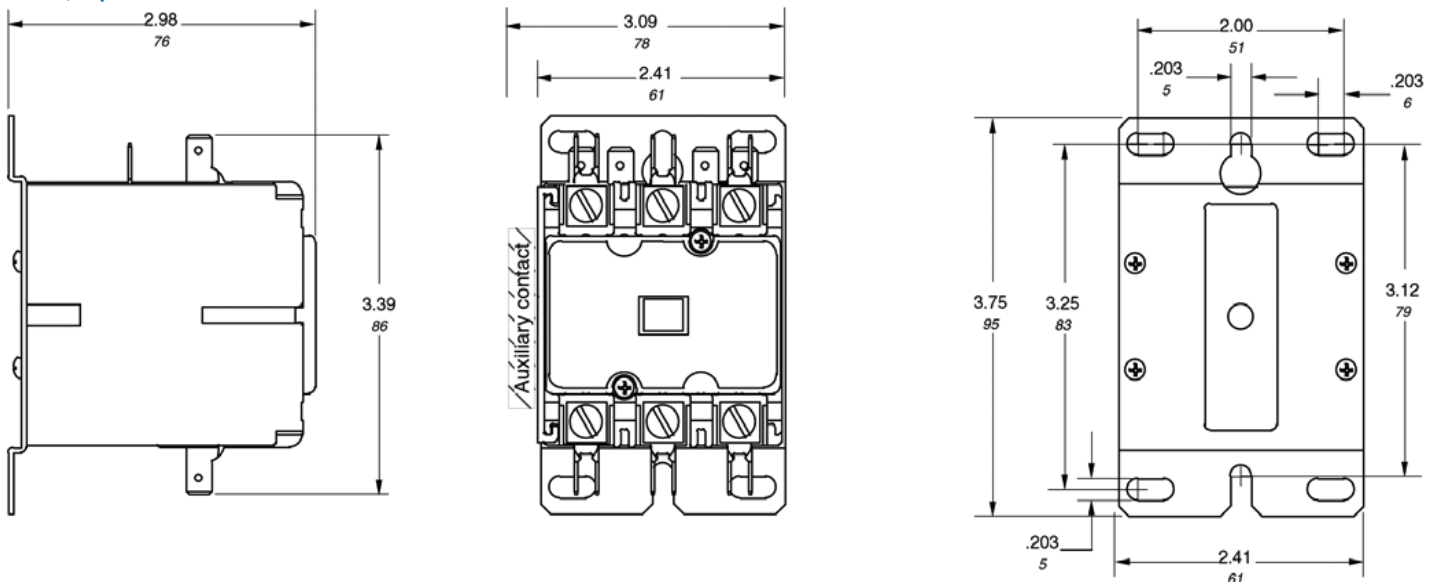
DP30, 4 poles



DP40, 2 poles

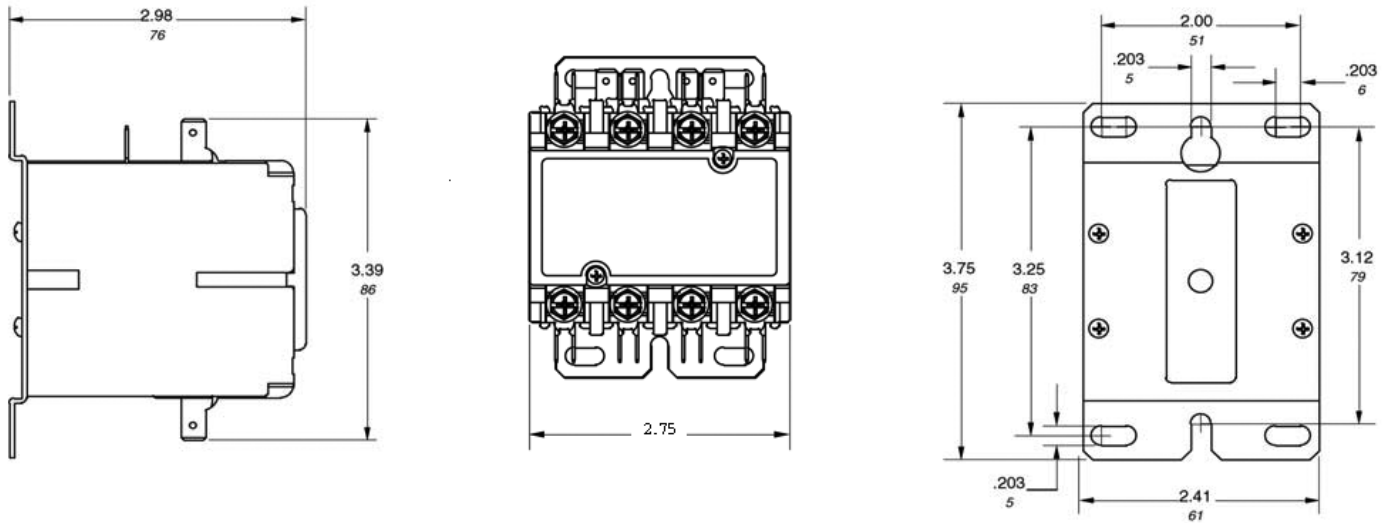


DP40, 3 poles

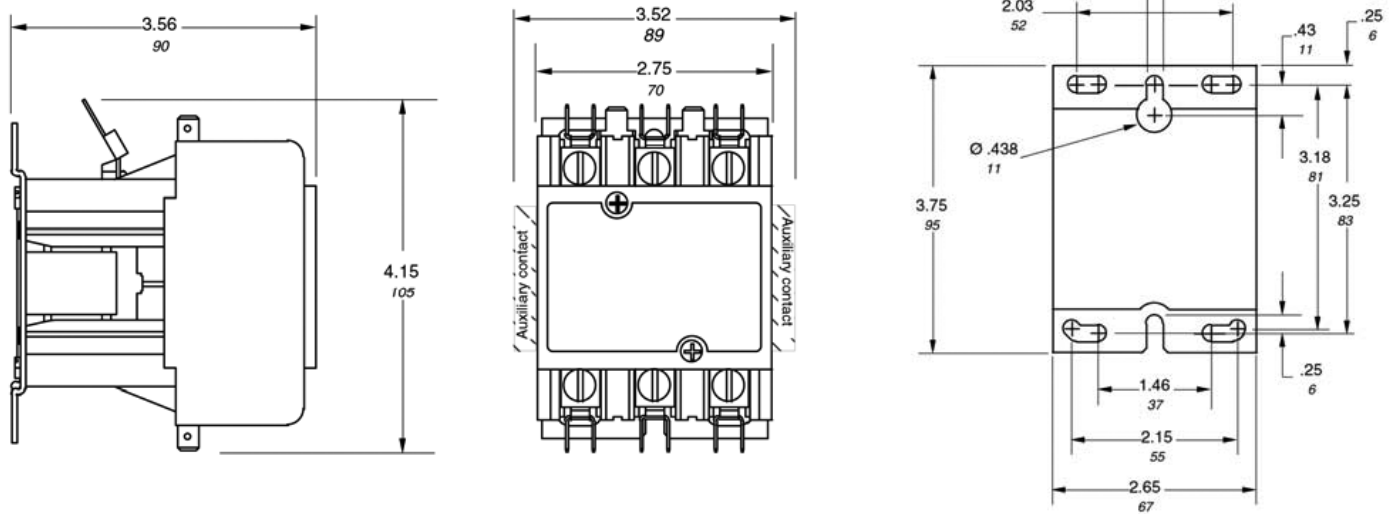


Approximate dimensions

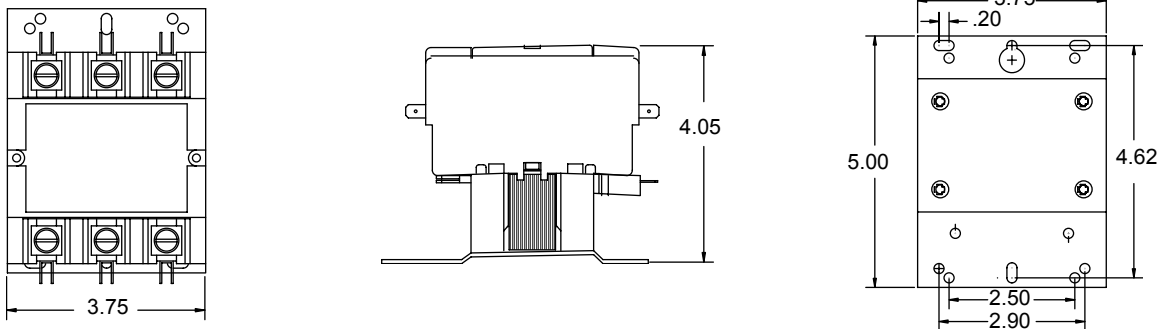
DP40, 4 poles



DP50 to DP60, 3 poles



DP75 to DP90, 3 poles



Approximate dimensions

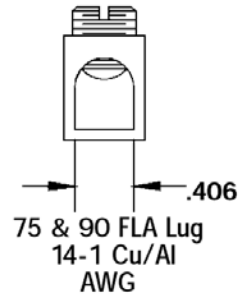
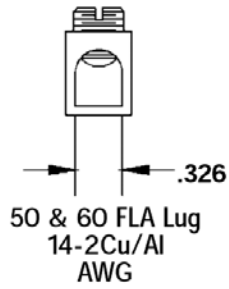
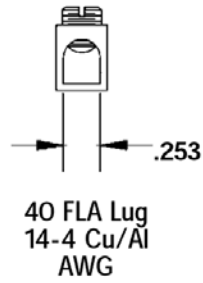
Terminals

Standard on DP 20 to DP30

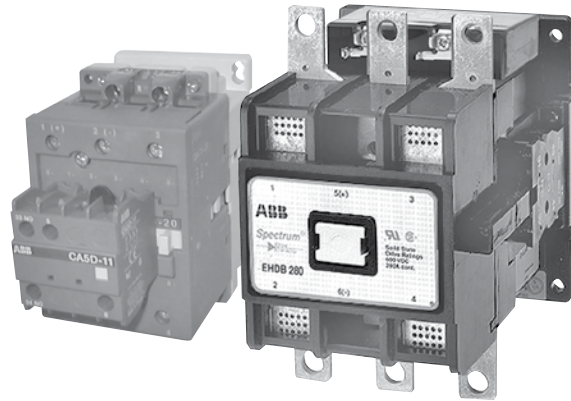
Standard on DP40

Standard on DP 60

Standard on DP 90



Notes



Description

Drive contactors are specifically designed for use with solid state D.C. adjustable speed drive systems. In drive applications, the contactor is not required to make or break the load during normal operation. The N.C. contact is used for dynamic braking applications. EHDB contactors are provided less terminal lugs. Additionally, EHDB contactors carry elevator service ratings.

Type DA

- 60 A continuous
- 160...300V DC dynamic braking
- Double-break contacts
- Identical H/W dimensions to standard A-line
- DIN rail and panel mount
- cULus Recognized – File # E312527
- Motor Controllers, Magnetic – Component (NLDX2, NLDX8)

Type EHDB

- 220..960 A continuous
- 600V DC dynamic braking
- Double-break contacts with magnetic arc chutes
- Elevator service rated
- Replacement parts available
- cULus Recognized – File # E36588
- Motor Controllers, Magnetic – Component (NLDX2, NLDX8)

EHDB, DA75 2- & 3-pole, non-reversing

For DC drive applications up to 960 A
AC or DC operated coils



DA75-21A-11-84



EHDB280C-1L



EHDB520C2P-1L

Electrical ratings

DC continuous current (A)	N.O. power poles	N.C. dynamic braking pole			Standard auxiliary contacts		Catalog number 2-pole 2 N.O.	Catalog number 3-pole 2 N.O. + 1 N.C.
	DC make/break	DC make	DC break		N.O.	N.C.		
500V	500V	500V	150V	300V	N.O.	N.C.		
Type DA75, 2 & 3 pole								
60	60	-	-	-	1	1	DA75-20-11-Δ	-
60	60	90	55	-	2	1	-	DA75-21-21-Δ
60	60	90	-	55	1	1	-	DA75-21A-11-Δ

Note: DA75 2 & 3 pole contactors are equipped with polarity-dependent N.O. contacts.

DC continuous current (A)	N.O. power poles	N.C. dynamic braking pole		Standard auxiliary contacts		Catalog number 2-pole 2 N.O.	Catalog number 3-pole 2 N.O. + 1 N.C.
	DC make/break	DC make	DC break	N.O.	N.C.		
600V	600V	600V	300V	N.O.	N.C.		
Type EHDB, 2 & 3 pole							
220	333	450	285	1	1	EHDB220C2P-ΔL	EHDB220C-ΔL
280	425	565	363	1	1	EHDB280C2P-ΔL	EHDB280C-ΔL
360	556	728	472	1	1	EHDB360C2P-ΔL	EHDB360C-ΔL
520	780	1040	680	1	1	EHDB520C2P-ΔL	EHDB520C-ΔL
650	975	1300	850	1	1	EHDB650C2P-ΔL	EHDB650C-ΔL
800	1200	1600	1050	1	1	EHDB800C2P-ΔL	EHDB800C-ΔL
960	1440	1920	1250	1	1	EHDB960C2P-ΔL	EHDB960C-ΔL

Note: The polarity of the N.C. dynamic braking pole must be respected; 5/L2 (+) – 6/T2 (-).

Coil voltage selection chart (Δ)

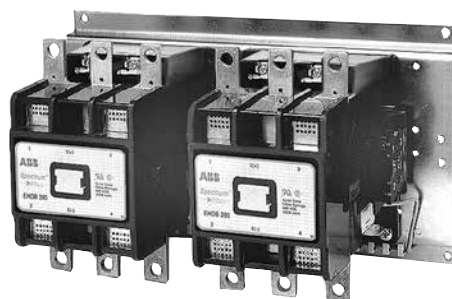
Rated control circuit voltage U _c	DA75	EHDB220... EHDB360	EHDB520... EHDB960
24V/50	81	N	-
24V/60	81	F	-
24V DC	-	Y	Y
48V/60	83	G	-
48V DC	-	W	W
110/50, 110...120/60	84	1	1
125V DC	-	Q	Q
208V/60	34	B	B
220V DC	-	R	R
240V/60	80	2	2
277V/60	42	C	C
480V/60	51	4	4
600V/60	55	6	6

Example:
24V DC input voltage: EHDB280C-YL
120V AC input voltage: DA75-21-21-84

EHDB, DA75 2 & 3 pole, mechanically-interlocked

DC drive applications up to 960 A

AC or DC operated coils



EHDB280M-1L

Electrical ratings

2 & 3 pole mechanically interlocked

DC continuous current (A)	N.O. power poles	N.C. dynamic braking pole		Standard auxiliary contacts		Catalog number 2-pole 2 N.O.	Catalog number 3-pole 2 N.O. + 1 N.C.
	DC make/break	DC make	DC break	N.O.	N.C.		
500V	500V	500V	150V	300V	N.O.	N.C.	

Type DA75, 2 & 3 pole

60	60	-	-	-	1	1	DA75M-20-11-Δ	-
60	60	90	-	55	1	1	-	DA75M-21A-11-Δ

Note: DA75 2 & 3 pole contactors are equipped with polarity-dependent N.O. contacts.

DC continuous current (A)	N.O. power poles	N.C. dynamic braking pole		Standard auxiliary contacts		Catalog number 2-pole 2 N.O.	Catalog number 3-pole 2 N.O. + 1 N.C.
	DC make/break	DC make	DC break	N.O.	N.C.		
600V	600V	600V	300V		N.O.	N.C.	

Type EHDB, 2 & 3 pole

220	333	450	285	1	1	EHDB220M2P-ΔL	EHDB220M-ΔL
280	425	565	363	1	1	EHDB280M2P-ΔL	EHDB280M-ΔL
360	556	728	472	1	1	EHDB360M2P-ΔL	EHDB360M-ΔL
520	780	1040	680	1	1	EHDB520M2P-ΔL	EHDB520M-ΔL
650	975	1300	850	1	1	EHDB650M2P-ΔL	EHDB650M-ΔL
800	1200	1600	1050	1	1	EHDB800M2P-ΔL	EHDB800M-ΔL
960	1440	1920	1250	1	1	EHDB960M2P-ΔL	EHDB960M-ΔL

Note: The polarity of the N.C. dynamic braking pole must be respected; 5/L2 (+) – 6/T2 (-).

Coil voltage selection chart (Δ)

Rated control circuit voltage U_c	DA75	EHDB220... EHDB360	EHDB520... EHDB960
24V/50	81	N	-
24V/60	81	F	-
24V DC	-	Y	Y
48V/60	83	G	-
48V DC	-	W	W
110/50, 110...120/60	84	1	1
125V DC	-	Q	Q
208V/60	34	B	B
220V DC	-	R	R
240V/60	80	2	2
277V/60	42	C	C
480V/60	51	4	4
600V/60	55	6	6

Example:

24V DC input voltage: EHDB280M-YL

120V AC input voltage: DA75M-21A-11-84

Replacement parts



EHDRC280-1

Coils

	Contactor type	Catalog number
	DA75 EHD220, EHD280 EHD350	ZA75-Δ ① EHDRC280-Δ EHDRC360-Δ
	Withdrawable type	
	EHDB220, EHDB280 EHDB360	EHDBRC280-Δ EHDBRC360-Δ
	EHDB520, EHDB650 EHDB800, EHDB960	EHDBRC650-Δ EHDBRC960-Δ

Δ Substitute the Δ for a coil voltage suffix found in the Coil Voltage Selection Chart. EHDB coils can be used as replacement parts in EHD contactors.

Coil voltage selection chart – DA contactors ①

Hz	Cntr type	Volts														
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500
60	A	81	83	84	84		34	36	80	42		86	86	51	53	55
50	A	81	83	84				80				85	86			55

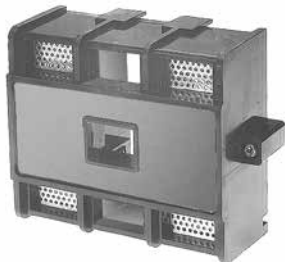
NOTE: DC coils are available for DA75 contactors only.

Coil voltage selection chart – EHDB contactors

	Volts														
	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	F	G		1		B	2	2	C				3	4	6
50	N		1				J			3	4			6	
DC	Y	W	P		Q		R								

NOTE: For other voltages, consult factory. • 24VAC coils are not available for sizes EHDB520 – EHDB960. • 48VAC coils are not available for sizes EHDB520 – EHDB960. For these 24V and 48V applications, use an interposing control relay. • 12VDC coils are not available for EHDB520 – EHDB960.

Arc shields



EHDBAS280

	Contactor size	Catalog number
3 Pole	EHDB220	EHDBAS220
	EHDB280	EHDBAS280
	EHDB360	EHDBAS360
	EHDB520	EHDBAS520
	EHDB650	EHDBAS650
	EHDB800	EHDBAS800
	EHDB960	EHDBAS960
2 Pole	EHDB220	EHDBAS220-2
	EHDB280	EHDBAS280-2
	EHDB360	EHDBAS360-2
	EHDB520	EHDBAS520-2
	EHDB650	EHDBAS650-2
	EHDB800	EHDBAS800-2
	EHDB960	EHDBAS960-2

Auxiliary contact blocks – EHDB220 to EHDB960

Contactor size	Description	Terminal markings		Catalog number	
EHDB130 to EHDB960	Standard 1 N.O. & 1 N.C.	13, 14	21, 22	CAL16-11A	L
	Standard 1 N.O. & 1 N.C.	43, 44	31, 32	CAL16-11B	R
EHDB960	Standard 1 N.O. & 1 N.C.	53, 54	61, 62	CAL16-11C	L
	Standard 1 N.O. & 1 N.C.	83, 84	71, 72	CAL16-11D	R
	Late break 1 N.O. & 1 N.C.	47, 48	35, 36	CAL16-11E	L,R

EHDB130 to EHDB960 contactors are provided with a 1 N.O. & 1 N.C. auxiliary contact block mounted on each contactor. One additional 1 N.O. & 1 N.C. auxiliary contact block can be mounted on the left side of the contactor and two additional 1 N.O. & 1 N.C. contact blocks can be mounted on the right side.

Positive driven action auxiliary contact blocks – EHDB220 to EHDB360

Contactor size	Description	Terminal markings		Catalog number	
EHDB220 to EHDB360	Standard 1 N.O. & 1 N.C.	13, 14	21, 22	CAL16-11A	L
	Standard 1 N.O. & 1 N.C.	43, 44	31, 32	CAL16-11B	R

Only one of these auxiliary contact blocks can be mounted on each side of the contactor. They fulfil the mirror contacts IEC609 47-1 Annex F, positive driven action IEC609 47-1, Chapter 4. They also fulfil the elevator standard ASME A17-1-2000.

① For other voltages, see page 1.26.

Replacement parts

Contact kits – 2 Pole, N.O.



EHDBCK280-2

Contactor size	Catalog number
DA75	ZL75
EHDB220	EHDBCK220-2
EHDB280	EHDBCK280-2
EHDB360	EHDBCK360-2
EHDB520	EHDBCK520-2
EHDB650	EHDBCK650-2
EHDB800	EHDBCK800-2
EHDB960	EHDBCK960-2

N.C. DB Kit only



EHDBCK280-NC

Contactor size	Contact rating	Auxiliary interlocks	Catalog number
DA75	55A/160V; 28A/300V	1 NO	CA5D-11
DA75	300V	—	CA5D-01
EHDB220	300V	—	EHDBCK220-NC
EHDB280	300V	—	EHDBCK280-NC
EHDB360	300V	—	EHDBCK360-NC
EHDB520	300V	—	EHDBCK520-NC
EHDB650	300V	—	EHDBCK650-NC
EHDB800	300V	—	EHDBCK800-NC
EHDB960	300V	—	EHDBCK960-NC

Lug kits – 2 & 3 Pole

Contactor size	Wire size	Catalog number
EHDB220 – EHDB280	6-250	EHTK210
EHDB360 – EHDB650	4-500	EHTK550N
EHDB800	(2) 4-500	EHTK700
EHDB960	(3) 2-600	EHTK800

Technical data

Type DA

Contactor		DA75-21	DA75-21A
Center pole			
N.C. Pole, 150V Make	Max. Amps	90	—
N.C. Pole, 150V Break	Max. Amps	55	—
N.C. Pole, 300V Make	Max. Amps	—	90
N.C. Pole, 300V Break	Max. Amps	—	55
DC rating			
Maximum thermal current	A	60	60
Peak interrupting current	A	90	90
Connectable wire size			
Main poles with lugs		8 – 1	8 – 1
Auxiliary contacts, min/max		18 – 10	18 – 10
Main contacts (contactor life)			
Mechanical endurance @ no load	mil.	5	5
Electrical endurance, main poles	mil.	1.5	1.5
Frequency of operations per hour	600	600	600
Auxiliary contacts			
NEMA rating		A600	A600
AC rated voltage	V	600	600
AC thermal rated current	A	10	10
AC maximum making	VA	7200	7200
AC maximum breaking	VA	720	720
NEMA rating		P600	P600
DC rated voltage	V	600	600
DC thermal rated current	A	5	5
DC maximum make-break	A	0.2	0.2
Min. breakdown AC RMS voltage between live parts and ground	V	2200	2200
Minimum permissible load, 17V	A	0.005	0.005
Max. wire size on terminals @ 2/term		10 AWG	10 AWG
Max. operations per hour		600	600
Min. expected mechanical life	mil.	10	10
Min. expected electrical life	mil.	2	2
Coil operating data			
AC power consumption			
Inrush 60 Hz	VA	200	200
Holding 60 Hz	VA	20	20
Holding 60 Hz	W	5.5	5.5
AC operating time (in milliseconds)			
Closing time	ms	20 – 25	20 – 15
Opening time	ms	10 – 15	10 – 15
General data			
Approximate weight	lbs	2.4	2.4
Temperature limits			
Maximum operating temperature	°C	50	50
Minimum operating temperature	°C	-25	-25
Minimum storage temperature	°C	-40	-40
Maximum storage temperature	°C	70	70
Min. breakdown AC RMS voltage	V	2200	2200
Operating altitude			
Maximum operating altitude	feet	10,000	10,000

Technical data

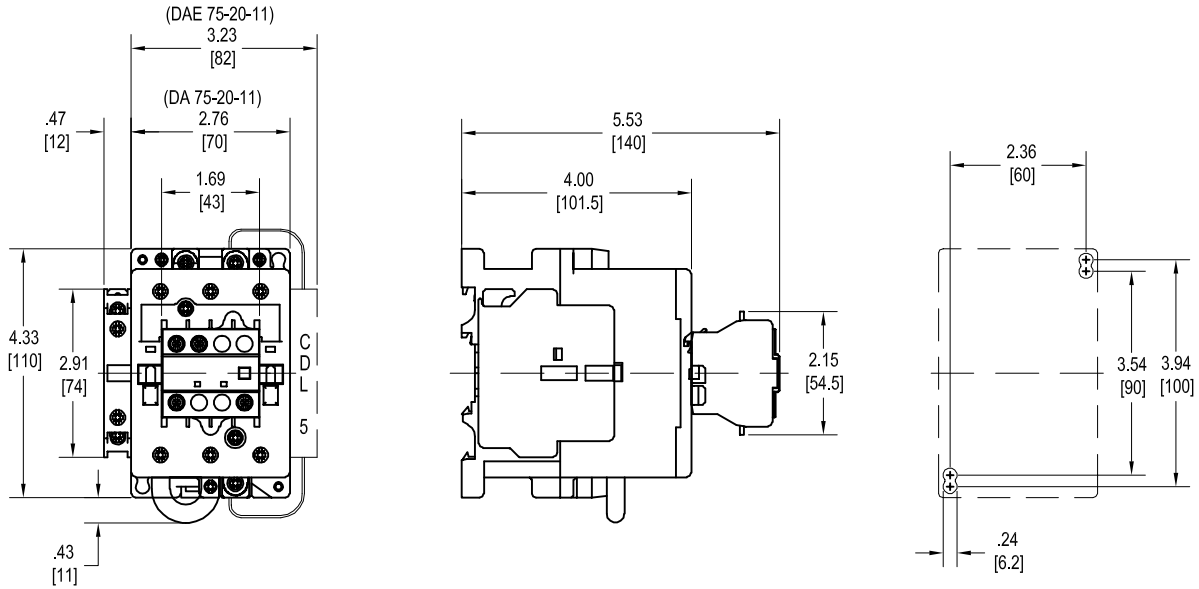
Type EHDB

Contactor model number		EHDB220	EHDB280	EHDB360	EHDB520	EHDB650	EHDB800	EHDB960
N.O. poles, Amps	600 VDC	220	280	360	520	650	800	960
N.C. pole, 600V Make	Max. amps	456	565	728	1040	1300	1600	1920
N.C. pole, 300V Break	Max. amps	285	363	472	680	850	1050	1250
Connectable wire size								
Main poles with lugs		8 – 30	5 – 250 kcmils	4 – 500 kcmils	(2) 4 – 500 kcmils	(2) 4 – 500 kcmils	(3) 2 – 600 kcmils	(3) 2 – 600 kcmils
Auxiliary contacts	min./max.	16/10	16/10	16/10	16/10	16/10	16/10	16/10
DC rating information								
	No. Poles							
Peak interrupting current	A	330	420	540	780	975	1200	1440
Maximum thermal current	A	220	280	360	520	650	800	960
Main contacts (contactor life)								
Mechanical endurance @ no load	mil.	5	5	5	5	5	5	5
Electrical endurance	mil.	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Frequency of operations	per hour	300	300	300	300	300	300	300
Auxiliary contacts								
NEMA rating		A600	A600	A600	A600	A600	A600	A600
AC rated voltage	V	600	600	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10	10
AC maximum making	VA	7200	7200	7200	7200	7200	7200	7200
AC maximum breaking	VA	720	720	720	720	720	720	720
NEMA rating								
DC rated voltage	V	600	600	600	600	600	600	600
DC thermal rated current	A	5	5	5	5	5	5	5
DC maximum make-break	A	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Min. breakdown AC RMS voltage between live parts and ground		2200	2200	2200	2200	2200	2200	2200
Min. permissible load, 17V	A	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Expected mechanical life	mil.	5	5	5	5	5	5	5
Max. operations per hour		300	300	300	300	300	300	300
Coil operating data								
AC power consumption								
Inrush 60 Hz	VA	900	900	1200	2900	2900	400	4000
Holding 60 Hz	VA	52	52	65	105	105	140	140
Holding 60 Hz	W	18	18	22	44	44	60	60
DC power consumption								
Inrush	W	500	500	630	800	800	1100	1100
Holding	W	3.6	3.6	4	20	20	20	20
AC operating time								
Closing time	ms	20 – 30	20 – 30	20 – 30	30 – 50	30 – 50	30 – 50	30 – 50
Opening time	ms	7 – 15	7 – 15	7 – 15	10 – 20	10 – 20	10 – 20	10 – 20
DC operating time								
Closing time	ms	30 – 40	30 – 40	30 – 40	60 – 80	60 – 80	60 – 80	60 – 80
Opening time	ms	27 – 37	27 – 37	27 – 37	10 – 20	55 – 75	55 – 75	55 – 75
General data								
Approximate weight	lbs	9.2	9.2	13	27.3	27.3	37	38
Temperature limits								
Maximum operating temperature	°C	70	70	70	70	70	70	70
Minimum operating temperature	°C	-40	-40	-40	-40	-40	-40	-40
Minimum storage temperature	°C	-50	-50	-50	-50	-50	-50	-50
Maximum storage temperature	°C	70	70	70	70	70	70	70
Min. Breakdown AC	RMS Voltage	2200	2200	2200	2200	2200	2200	2200
Operating altitude								
Maximum operating altitude	feet	10,000	10,000	10,000	10,000	10,000	10,000	10,000

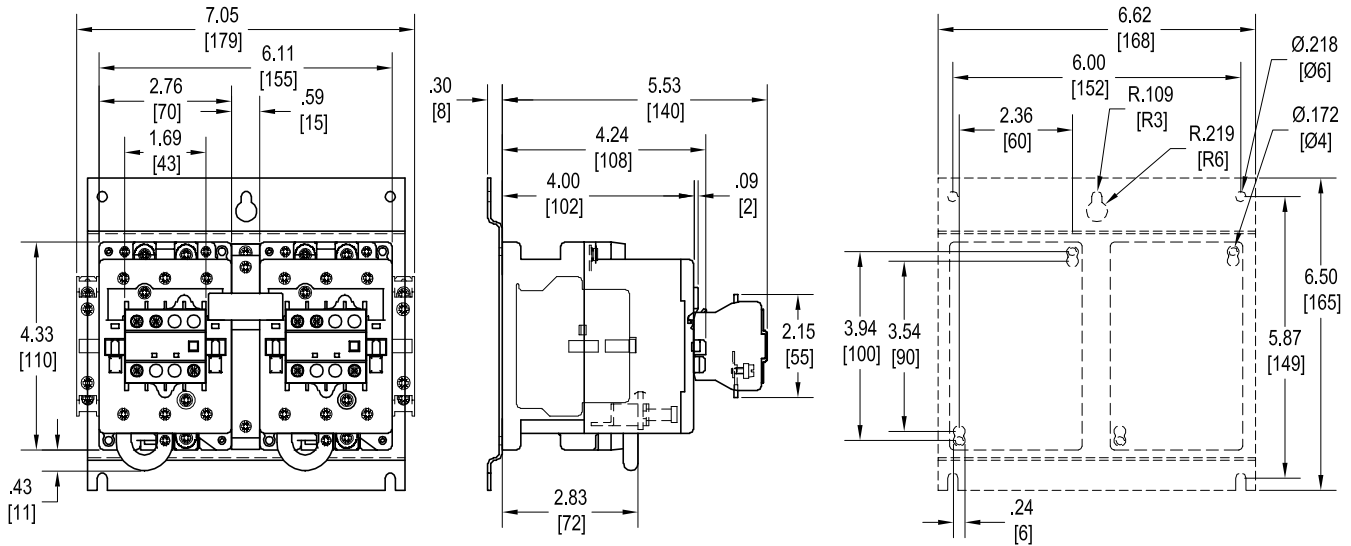
Approximate dimensions

Type DA, 2 & 3 pole

DA75



DA75M

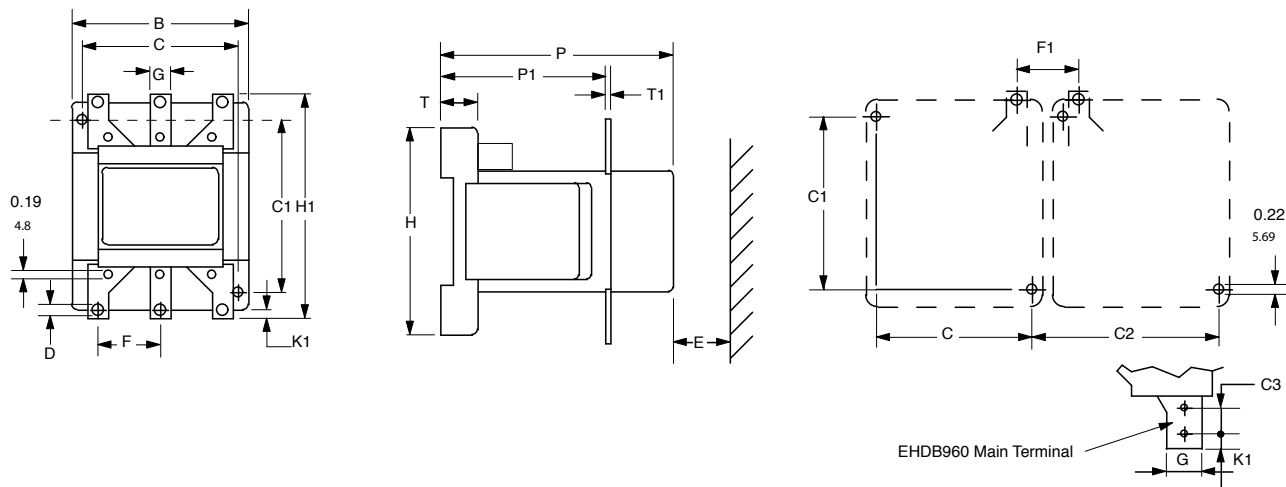


Approximate dimensions

Type EHDB, 2 & 3 pole

Mounting positions

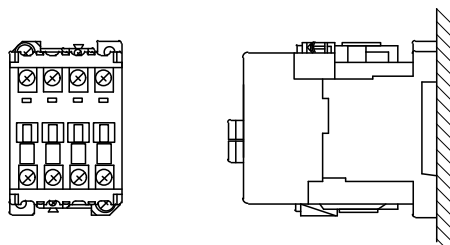
EHDB220 – EHDB960



DIM.	B			B2	C	C1				C2	E	D	F	G	H	H1	K1	P	P1	T	T1	C3	
	1, 2	3	4	①		②	③	④															
	Aux. contact block																						
EHDB220in mm	5.35 136	5.83 148	6.30 160	6.46 164	4.72 120	5.51 140	5.39 137	5.39 137	5.87 149	6.34 161	0.59 15	0.24 6	1.77 45	0.79 20	6.14 156	7.79 198	0.39 10	6.65 169	4.06 103	0.41 10.5	0.20 5	—	—
EHDB280in mm	5.35 136	5.83 148	6.30 160	6.46 164	4.72 120	5.51 140	5.39 137	5.39 137	5.87 149	6.34 161	0.59 15	0.24 6	1.77 45	0.79 20	6.14 156	7.79 198	0.39 10	6.65 169	4.06 103	0.41 10.5	0.20 5	—	—
EHDB360in mm	6.92 176	7.44 189	7.72 196	8.11 206	6.30 160	5.51 140	7.20 183	7.32 186	7.48 190	7.76 197	1.18 30	0.24 6	2.44 62	0.98 25	6.14 156	8.14 207	0.49 12.5	6.88 175	4.21 107	0.7 19	0.20 5	—	—
EHDB520in mm	7.80 198	8.23 209	8.62 219	8.90 226	6.69 170	7.87 200	7.91 201	7.91 201	8.19 208	8.54 217	1.57 40	0.24 6	2.64 67	0.98 25	8.78 223	10.71 272	0.49 12.5	8.90 226	5.51 140	0.9 23	0.24 6	—	—
EHDB650in mm	7.80 198	8.23 209	8.62 219	8.90 226	6.69 170	7.87 200	7.91 201	7.91 201	8.19 208	8.54 217	1.57 40	0.24 6	2.64 67	0.98 25	8.78 223	10.71 272	0.49 12.5	8.90 226	5.51 140	0.9 23	0.24 6	—	—
EHDB800in mm	9.61 244	9.96 253	10.31 262	10.63 270	8.66 220	7.87 200	9.69 246	9.69 246	10.00 254	10.35 263	1.57 40	0.24 6	3.23 82	1.57 40	8.78 223	11.57 294	0.79 20	8.90 226	5.51 140	0.9 23	0.24 6	—	—
EHDB960in mm	9.61 244	9.96 253	10.31 262	10.63 270	8.66 220	7.87 200	9.69 246	9.69 246	10.00 254	10.35 263	1.57 40	0.24 6	3.23 82	1.57 40	8.78 223	11.57 294	0.79 20	8.90 226	5.51 140	0.9 23	0.24 6	1.36 34.5	—

- ① Minimum dimension
 - ② Makes distance F1 = F
 - ③ Includes space for three auxiliary contact blocks between the contactors.
 - ④ Includes space for four auxiliary contact blocks between the contactors.
 - ⑤ Damping elements are included.
- NOTE: Screw, nut and washer are included for terminal hardware.

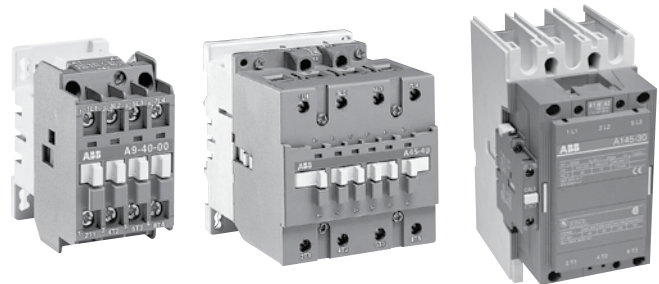
Type DA & EHDB mounting positions



Notes



Lighting contactors A9 – A300



Features

- CE mark
- Compact space saving design
- Standard auxiliary contact configurations:
 - A9 - A40 1 NO or 1 NC
 - A50 - A110 1 NO & 1 NC
- Additional auxiliary contact blocks are available
- Panel mounting with screws or fast, snap-on DIN rail mounting
- Silver alloy double break contact design
- Snap-on front mounted accessories include mechanical latch, pneumatic timer, and 1 & 4 pole auxiliary contact blocks
- Contactors ensure positive safety between their auxiliary contact blocks.
- Easy coil change
- Captive terminal screws
- NEMA, UL, IEC, CSA, VDE and most other international standards
- Touch safe design: All connection terminals are protected against accidental touch
- Terminals supplied open for ease of wiring
- Operates over an extended voltage range of 85% to 110% of rated control voltage
- Screwdriver guide holes
- UL File No: E39231 (A9 - A75); (AE9 - AE75); (AL9 - AL40); (AF50 - AF75)
- UL File No: E36588 (A95 - A110); (AE95 - AE110); (AF145 - AF750)
- CSA File No: LR56745 (A9 - A75); (AE9 - AE75); (AF50 - AF75)
- CSA File No: LR19700 (A95 - A110); (AE95 - AE110); (AF145 - AF750)

Applications

Lighting contactors can be used to control a variety of lighting loads including:

- Tungsten filament lighting loads (incandescent), iodine lamps, quartz-iodine and infrared lamps
- Electric discharge lighting loads (ballast), high intensity discharge (HID), mercury vapor, metal halide and high pressure sodium and fluorescent lamps

Typical applications

- Parking lots
- Industrial plants
- Office buildings
- Theaters and auditoriums
- Stadiums
- Shopping centers
- Airports
- Hospitals
- Transportation lighting
- Institutions

Description

The A-Line lighting contactors are available with or without an enclosure.

- Maximum operating voltage of 600VAC 60Hz
- Includes 3, 4, 8 or 12 pole versions, other versions on request
- Electrically or mechanically held contactors
- IP 20 protection for connection terminals
- Can be mounted onto a mounting plate or a 35 x 7.5mm DIN rail
- UL/CSA Approved

Lighting Contactors

A9 - A300

Electrically & mechanically held



A9-40-00



A45-40-00



A145-30-11

Normally Open Power Poles			Electrically Held			Mechanically Held		
Ballast Amp Rating	Incandescent (Tungsten) Amp Rating	Number of Power Poles	Open Type	UL Type 1 Enclosed		Open Type	UL Type 1 Enclosed	
			Catalog number	Enclosure Size	Catalog number	Catalog number	Enclosure Size	Catalog number
15	15	4	A9-40-00-84	A	A9C4P1-84	A9L-40-00-84	B	A9LC4P1-84
15	15	8	A9-80-00-84	A	A9C8P1-84	A9L-80-00-84	B	A9LC8P1-84
15	15	12	A9-120-00-84	A	A9C12P1-84	A9L-120-00-84	B	A9LC12P1-84
30	20	4	A16-40-00-84	A	A16C4P1-84	A16L-40-00-84	B	A16LC4P1-84
30	20	8	A16-80-00-84	A	A16C8P1-84	A16L-80-00-84	B	A16LC8P1-84
30	20	12	A16-120-00-84	A	A16C12P1-84	A16L-120-00-84	B	A16LC12P1-84
30	30	4	A16-40L-00-84	A	A16C4PL1-84	A16L-40L-00-84	B	A16LC4PL1-84
30	30	8	A16-80L-00-84	A	A16C8PL1-84	A16L-80L-00-84	B	A16LC8PL1-84
30	30	12	A16-120L-00-84	A	A16C12PL1-84	A16L-120L-00-84	B	A16LC12PL1-84
35	35	4	A26-40-00-84	B	A26C4P1-84	A26L-40-00-84	B	A26LC4P1-84
35	35	8	A26-80-00-84	B	A26C8P1-84	A26L-80-00-84	B	A26LC8P1-84
35	35	12	A26-120-00-84	B	A26C12P1-84	A26L-120-00-84	B	A26LC12P1-84
50	50	3	A30-30-10-84	B	A30C3P1-84	A30L-30-10-84	C	A30LC3P1-84
60	60	3	A40-30-10-84	B	A40C3P1-84	A40L-30-10-84	C	A40LC3P1-84
60	60	4	A45-40-00-84	B	A45C4P1-84	A45L-40-00-84	C	A45LC4P1-84
65	65	3	A50-30-00-84	B	A50C3P1-84	A50L-30-00-84	C	A50LC3P1-84
65	65	4	A50-40-00-84	B	A50C4P1-84	A50L-40-00-84	C	A50LC4P1-84
85	85	3	A63-30-00-84	B	A63C3P1-84	A63L-30-00-84	C	A63LC3P1-84
105	105	3	A75-30-00-84	B	A75C3P1-84	A75L-30-00-84	C	A75LC3P1-84
105	105	4	A75-40-00-84	B	A75C4P1-84	A75L-40-00-84	C	A75LC4P1-84
120	120	3	A95-30-00-84	B	A95C3P1-84	---	---	---
200	200	3	A145-30-00-84	E	A145C3P1-84	---	---	---
300	300	3	A210-30-00-84	F	A210C3P1-84	---	---	---
400	400	3	A300-30-00-84	F	A300C3P1-84	---	---	---

Normally Closed Power Poles			Electrically Held			Mechanically Held		
Ballast Amp Rating	Incandescent (Tungsten) Amp Rating	Number of Power Poles	Open Type	UL Type 1 Enclosed		Open Type	UL Type 1 Enclosed	
			Catalog number	Enclosure Size	Catalog number	Catalog number	Enclosure Size	Catalog number
30	20	4	A16-04-00-84	B	A16C4NCP1-84	A16L-04-00-84	B	A16LC4NCP1-84
30	20	8	A16-08-00-84	B	A16C8NCP1-84	A16L-08-00-84	B	A16LC8NCP1-84
30	20	12	A16-012-00-84	B	A16C12NCP1-84	A16L-012-00-84	B	A16LC12NCP1-84

Coil voltage selection

All catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A75-30-00-80

Control transformer option

Contactors size	VA rating
A9 - A40	50
A50 - A75	75
A95	100
A145	150
A210 - A300	250

Control transformer voltage selection chart

		Volts			
Hz	Type	208/120	230 - 240/120	460 - 480/120	575 - 600/120
50/60	A	0	7	8	9

For other voltages, consult factory

Coil voltage selection

Hz	Cntr Type	Volts															
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, consult factory

A9 - A300

Electrically & mechanically held

2 Normally Open & 2 Normally Closed Power Poles			Electrically Held			Mechanically Held		
			Open Type	UL Type 1 Enclosed		Open Type	UL Type 1 Enclosed	
Ballast Amp Rating	Incandescent (Tungsten) Amp Rating	Number of Power Poles	Catalog number	Enclosure Size	Catalog number	Catalog number	Enclosure Size	Catalog number
15	15	2 NO / 2 NC	A9-22-00-84	A	A9C22P1-84	A9L-22-00-84	A	A9LC22P1-84
30	20	2 NO / 2 NC	A16-22-00-84	B	A16C22P1-84	A16L-22-00-84	B	A16LC22P1-84
35	35	2 NO / 2 NC	A26-22-00-84	B	A26C22P1-84	A26L-22-00-84	B	A26LC22P1-84
60	60	2 NO / 2 NC	A45-22-00-84	B	A45C22CP1-84	A45L-22-00-84	C	A45LC22CP1-84
105	105	2 NO / 2 NC	A75-22-00-84	B	A75C22CP1-84	A75L-22-00-84	C	A75LC22CP1-84

NEMA rated

Normally open Power Poles 600 VAC Max.			Electrically held Open type
Ballast Amp Rating	Incandescent (Tungsten) Amp rating	Number of Power poles 1	Catalog number
30	30	3	L30A3010Δ
60	60	3	L60A3010Δ
100	100	3	L100A3000Δ
200	200	3	L200A3000Δ

Control transformer option

Contactor size	VA rating
A9 - A40	50
A50 - A75	75
A95	100
A145	150
A210 - A300	250

Control transformer voltage selection chart

Hz	Type	Volts			
		208/120	230 - 240/120	460 - 480/120	575 - 600/120
50/60	A	0	7	8	9

For other voltages, consult factory

Coil voltage selection

All catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A75-30-00-80

Coil voltage selection

Hz	Cntr Type	Volts															
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84					80			85	86			55

For other voltages, consult factory

Accessories Factory modifications



CAL5-11

CA5-10





WB75-01



RV5/50

Accessories

Auxiliary contact blocks

Mounting on contactors	Positioning	Contacts		Catalog number
				
A 9 ... A 95	Front face	1	-	CA5-10
		-	1	CA5-01
A 9 ... A 40	Front face	3	1	CA5-31M
		2	2	CA5-22M
A 9 ... A 75	Side	1	1	CAL5-11
A 95 ... A 300	Side	1	1	CAL18-11
A145... A 300	Side	1	1	CAL18-11B

Mechanical latch

For contactors	Voltage	Catalog number
A 9 ... A 75	24 ... 28 V a.c./d.c.	WB75A-01
	48 ... 55 V a.c./d.c.	WB75A-03
	110 ... 127V a.c./d.c.	WB75A-04
	230 ... 277 V a.c./d.c.	WB75A-05
	380 ... 440 V a.c./d.c.	WB75A-07
	440 ... 480 V a.c./d.c.	WB75A-08

Surge suppressor, varistor

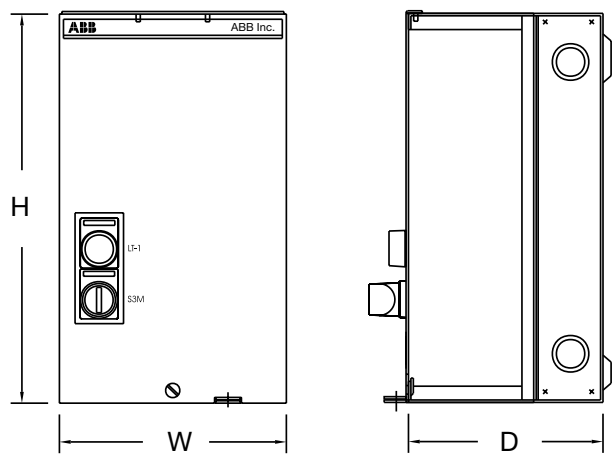
For contactors	Voltage range	Catalog number
A 9 ... A 110	24 ... 50 V a.c./d.c.	RV5/50
	50 ... 133 V a.c./d.c.	RV5/133
	110 ... 250 V a.c./d.c.	RV5/250
	250 ... 440 V a.c./d.c.	RV5/440

Factory modifications for enclosed contactors

Pilot devices

Description	Suffix code
Selector - 2 position maintained OFF - ON	C
Selector - 3 position maintained HAND OFF - AUTO	D
Pilot light - ON (green)	R

Approximate dimensions



Enclosure dimensions (in)

Type	H	W	D
A	11	6	5
B	13	9	7
C	14	12	8
D	24	12	8
E	30	24	9

Notes

Railway application Contactors

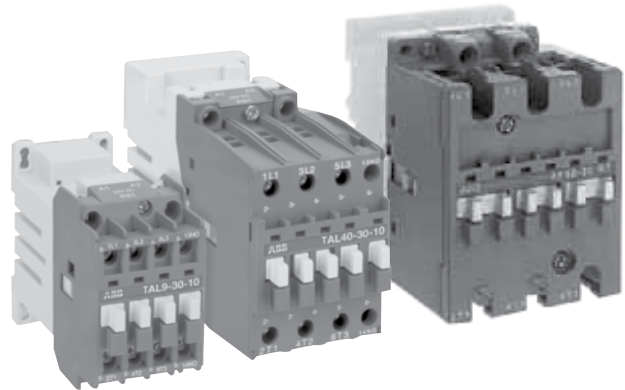


Railway application contactors

Types TBC, TAL & TAE

TNL, ring-tongue termination

1



Description

Rolling stock applications necessitate compliance to national and international standards tailored to railway environments (see "Reference Standards" on the following page). In order to improve reliability and durability, most railway applications employ specific connection methods, such as ring-tongue termination.

Coil surge suppression is also popular among rail applications. ABB's AF Series contactors are equipped with integral surge suppression in the form of a free-wheel diode, eliminating the need for additional accessories. AF Series devices are also immune to short time voltage interruption (or voltage dips) up to 20 ms.

Contactors and contactor relays are used in versatile rolling stock applications:

- Lighting
- Heating
- Braking
- Air conditioning
- Ventilation
- Door control

Requirements of railway applications

- Control networks typically utilizing DC (battery source) with wide voltage ranges:
 - 0.7 U_c ... 1.25 U_c (Operating limits included as U_c)
- Wide temperature range: -40 °C... +70 °C
- Shock & vibration withstand
- Fire-retardant / low smoke materials required

Reference standards

The contactor and control relays described in the following pages are in accordance with the following standards:

- IEC 60077-1 and IEC 60077-2 : Railway applications - Electric equipment for rolling stock.
- IEC 61373 : Railway applications - Rolling stock - Shocks and vibration tests.
- NF F 60002 : French standard - Vibration tests.
- IEC 60947-4-1 / EN 60947-4-1 : Low voltage controlgear - Contactors and motor starters.
- IEC 60947-5-1 / EN 60947-5-1 : Low voltage controlgear - Control circuit devices and switching elements.
- NF F 62000 : French standard - Functional tests for French railways (SNCF).

"Fire and Smoke" classification

According to ASTM standards:

ASTM standards, mainly used in North America, device products into two categories:

- For surfaces < 16 inch² the products are tested in accordance with:
 - ASTM E1354 : flammability and visible smoke
- For surfaces > 16 inch² the products are tested in accordance with:
 - E662 (97): density of smoke,
 - E162 (98): flammability of surface and
 - BSS 7239: toxicity of smoke (CO, HF, NO₂, HCl, HCN, SO₂).

Most of contactors, contactor relays and accessories have been tested according to the above standards. Certificates are available on request.

According to NF F standards:

French standards NF F (Normes Francaises Ferroviaires) are mainly used in Europe and Asia.

- NF F 16101: Fire behavior - Material choosing.
- NF F 16102: Fire behavior - Application to electrical equipment.

The contactors and accessories are at severity level 2 or 3 (classification level from 1 to 4) according to flammability (mark l) on the one hand, the opacity and toxicity of smoke (mark F) (CO, CO₂, HCl, HBr, HCN, HF, SO₂) in other hand.

Note: French standards are still used as references in some international railways because they were used for a long time and were alone to qualify the fire and smoke problem. There is no links between ASTM and NFF standards. A plastic material acceptable in NF F frame doesn't mean the acceptability in ASTM frame.

Technical data

Technical data for the following devices is provided in Literature no. 1SBC104032D0201. Please reference this document number at ABB.com to download or contact Technical Support at 1 (888) 385.1221, Option 4

Standard devices, ring-tongue, 3-pole A/L9...A/F75 AC or DC controlled



A26..RT



A50...A75..RT

Electrical ratings

AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Standard auxiliary contacts		Catalog number, AC controlled	Catalog number, DC controlled
		200... 208V	220... 240V	440... 480V	550... 600V	NO	NC		
600V	9	2	2	5	7.5	1	-	A93010RT-Δ	AL93010RT-Δ
						-	1	A93001RT-Δ	AL93001RT-Δ
25	11	3	3	7.5	10	1	-	A123010RT-Δ	AL123010RT-Δ
						-	1	A123001RT-Δ	AL123001RT-Δ
30	17	5	5	10	15	1	-	A163010RT-Δ	AL163010RT-Δ
						-	1	A163001RT-Δ	AL163001RT-Δ
40	28	7.5	10	20	25	1	-	A263010RT-Δ	AL263010RT-Δ
						-	1	A263001RT-Δ	AL263001RT-Δ
50	34	10	10	25	30	1	-	A303010RT-Δ	AL303010RT-Δ
						-	1	A303001RT-Δ	AL303001RT-Δ
60	42	10	15	30	40	1	-	A403010RT-Δ	AL403010RT-Δ
						-	1	A403001RT-Δ	AL403001RT-Δ
80	54	15	20	40	50	1	1	A503011RT-Δ	AF503011RT-Δ
						1	1	A633011RT-Δ	AF633011RT-Δ
105	80	25	30	60	75	1	1	A753011RT-Δ	AF753011RT-Δ

Note: devices with ring-tongue termination UL recognized

Coil voltage selection chart (Δ)

Rated control circuit voltage U_c	A9... A75	AL9... AL40	AF50... AF75
12V DC	-	80	80
24V AC	81	-	-
24V DC	-	81	81
20...60V DC	-	-	72
110V/50, 110...120V/60	84	-	-
48...130V AC/DC	-	-	69
100...250V AC/DC	-	-	70
125V DC	-	87	87
220V DC	-	88	88
230...240V/60	80	-	-
240V DC	-	89	89
480V/60	51	-	-
600V/60	55	-	-

Example:

24V DC input voltage: AL303010RT-81

120V AC input voltage: A753011RT-84

Traction-specific, ring-tongue, 3-pole TBC7, TAL9...AF300B DC controlled, standard & ring-tongue termination



TBC7-30



TAL26..RT



TAE50...TAE75..RT



AF210B...AF300B

Electrical ratings

AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Standard auxiliary contacts		Catalog number, Standard termination	Catalog number, Ring-tongue termination
		200... 208V	220... 240V	440... 480V	550... 600V	NO	NC		
600V	9.6	2	3	5	5	1	-	TBC7-30-10-Δ	-
						-	1	TBC7-30-01-Δ	-
21	9	2	2	5	7.5	1	-	TAL9-30-10-Δ	TAL9-30-10RT-Δ
						-	1	TAL9-30-01-Δ	TAL9-30-01RT-Δ
25	11	3	3	7.5	10	1	-	TAL12-30-10-Δ	TAL12-30-10RT-Δ
						-	1	TAL12-30-01-Δ	TAL12-30-01RT-Δ
30	17	5	5	10	15	1	-	TAL16-30-10-Δ	TAL16-30-10RT-Δ
						-	1	TAL16-30-01-Δ	TAL16-30-01RT-Δ
40	28	7.5	10	20	25	1	-	TAL26-30-10-Δ	TAL26-30-10RT-Δ
						-	1	TAL26-30-01-Δ	TAL26-30-01RT-Δ
50	34	10	10	25	30	1	-	TAL30-30-10-Δ	TAL30-30-10RT-Δ
						-	1	TAL30-30-01-Δ	TAL30-30-01RT-Δ
60	42	10	15	30	40	1	-	TAL40-30-10-Δ	TAL40-30-10RT-Δ
						-	1	TAL40-30-01-Δ	TAL40-30-01RT-Δ
80	54	15	20	40	50	1	1	TAE50-30-11-Δ	TAE50-30-11RT-Δ
105	80	25	30	60	75	1	1	TAE75-30-11-Δ	TAE75-30-11RT-Δ
150	88	30	30	60	75	1	1	AF95B-30-11-Δ	AF95B-30-11RT-Δ
150	104	30	40	75	100	1	1	AF110B-30-11-Δ	AF110B-30-11RT-Δ
230	130	40	50	100	125	1	1	AF145B-30-11-Δ	AF145B-30-11RT-Δ
250	156	50	60	125	150	1	1	AF185B-30-11-Δ	AF185B-30-11RT-Δ
300	192	60	75	150	200	1	1	AF210B-30-11-Δ	AF210B-30-11RT-Δ
350	248	75	100	200	250	1	1	AF260B-30-11-Δ	AF260B-30-11RT-Δ
400	302	100	100	250	300	1	1	AF300B-30-11-Δ	AF300B-30-11RT-Δ

Note: devices with ring-tongue termination UL recognized

Coil voltage selection chart (Δ)

Rated control circuit voltage U_c	TBC7	TAL9... TAL40	TAE50... TAE75	AF95B... AF300B
17...32V DC	51	51	51	-
24...45V DC	52	52	52	-
20...60V DC	-	-	-	72
36...65V DC	54	54	54	-
42...78V DC	58	58	58	-
50...90V DC	55	55	55	-
48...130V AC/DC	-	-	-	69
77...143V DC	62	62	62	-
90...150V DC	66	66	66	-
100...250V AC/DC	-	-	-	70
152...264V DC	68	68	68	-

Example:
24V DC input voltage: TAL9-30-10-52
120V AC input voltage: AF300B-30-11RT-70

Coil operating limits

For traction-specific catalog numbers starting with "T", the coil operating limits are included in the coil voltage range (U_c min... U_c max.). For AF..B devices, the coil range is nominal with operating limits 15% below and 10% above the range specified.

Traction-specific, ring-tongue, 4-pole & relays

TBC7, TAL9...TAE75, TNL

DC controlled



TBC7-30

TAL26-40..RT

TAE50-40...TAE75-40..RT

TNL80E

4-pole contactors – Electrical ratings

AC general purpose ratings (A)	Main (power) pole Configuration		Standard auxiliary contacts		Catalog number, Standard termination	Catalog number, Ring-tongue termination
	NO	NC	NO	NC		
600V	4	-	-	-	TBC7-40-00-Δ	-
16	2	2	-	-	TBC7-22-00-Δ	-
21	4	-	-	-	TAL9-40-00-Δ	TAL9-40-00RT-Δ
	2	2	-	-	TAL9-22-00-Δ	TAL9-22-00RT-Δ
30	4	-	-	-	TAL16-40-00-Δ	TAL16-40-00RT-Δ
	2	2	-	-	TAL16-22-00-Δ	TAL16-22-00RT-Δ
40	4	-	-	-	TAL26-40-00-Δ	TAL26-40-00RT-Δ
	2	2	-	-	TAL26-22-00-Δ	TAL26-22-00RT-Δ
65	4	-	-	-	TAL45-40-00-Δ	TAL40-40-00RT-Δ
80	4	-	-	-	TAE50-40-00-Δ	TAE50-40-00RT-Δ
105	4	-	-	-	TAE75-40-00-Δ	TAE75-40-00RT-Δ

Note: devices with ring-tongue termination UL recognized

Control relays

Pilot duty ratings	Number of contacts				Catalog number, Standard termination	Catalog number, Ring-tongue termination
	1st stack		2nd stack			
	NO	NC	NO	NC		
A600, Q300	2	2	-	-	TNL22E-Δ	TNL22ERT-Δ
	3	1	-	-	TNL31E-Δ	TNL31ERT-Δ
	4	-	-	-	TNL40E-Δ	TNL40ERT-Δ
	4	-	-	4	TNL44E-Δ	TNL44ERT-Δ
	4	-	2	2	TNL62E-Δ	TNL62ERT-Δ
	4	-	4	-	TNL80E-Δ	TNL80ERT-Δ

Note: devices with ring-tongue termination UL recognized

Coil voltage selection chart (Δ)

Rated control circuit voltage U_c	TBC7	TAL9... TAL40	TAE50... TAE75	AF95B... AF300B
17...32V DC	51	51	51	51
24...45V DC	52	52	52	52
36...65V DC	54	54	54	54
42...78V DC	58	58	58	58
50...90V DC	55	55	55	55
77...143V DC	62	62	62	62
90...150V DC	66	66	66	66
152...264V DC	68	68	68	68

Example:

24V DC input voltage: TAL9-22-00-52

120V AC input voltage: TAE75-40-00RT-62

Coil operating limits

For traction-specific catalog numbers starting with "T", the coil operating limits are included in the coil voltage range ($U_c \text{ min.} \dots U_c \text{ max.}$).

Load / supply requirements

4-pole devices can be utilized for controlling either 2 separate loads from 2 separate supplies, or 2 separate loads from 1 supply. These devices are not suitable for controlling 1 load from 2 separate supplies. There is no mechanical overlapping (NO poles will break before NC poles make).

Accessories

Devices in this section of the catalog utilize the same accessories as ABB's standard across-the-line motor switching devices. Please see the below page references for accessories:

Accessory type	Page reference
Surge suppressors	1.52...1.53
Mechanical / electrical interlocks	1.57
Electronic timers	1.59
Replacement coils	1.73

DC Circuit switching Contactors

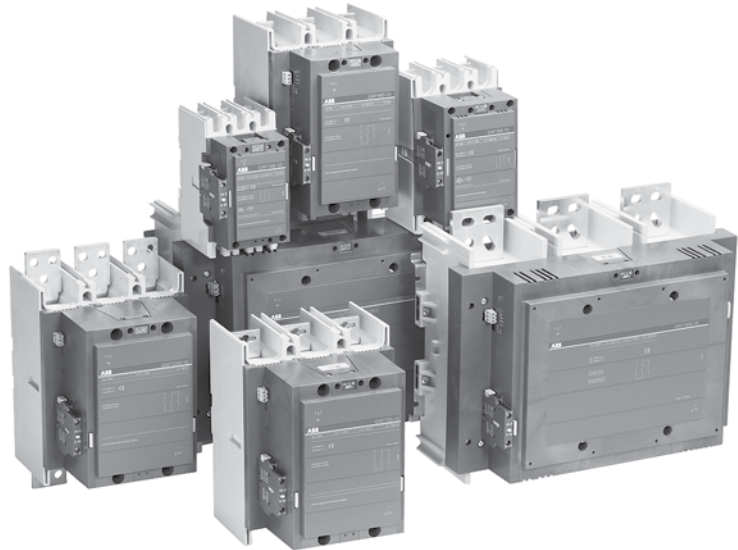


DC Circuit switching contactors

Up to 2050A, 1000V DC

Type GA/E, GAF, AF

1



Description

The new GAF range contactors are the latest addition to ABB's well established A/AF range. This further extends our offering of contactors for DC switching at voltages up to 1000 V DC. The GAF contactors utilize all the well known features of the existing A/AF range such as modern and compact design. In addition all the benefits from the AF coil technology and reliability of a proven contactor design. These contactors are rated for DC-1 or DC general purpose applications according to IEC 1000V DC or cULus 600V DC. The new GAF contactors share the external dimensions of its corresponding standard AF contactor.

Applications

- Solar / Photovoltaic power
- Traction / rolling-stock
- Power distribution
- Switchgear
- Battery systems
- Telecom

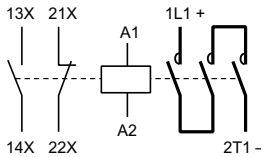
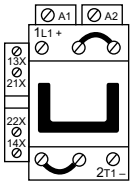
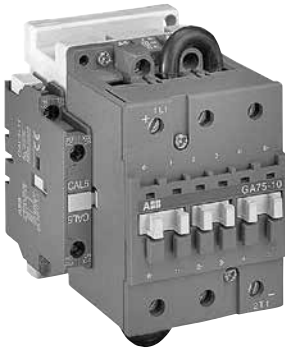
Type GA / GAE

- DC general use up to 1000V DC, 35A
- AC or DC input voltages
- Pre-wired 3-poles-in-series
- Permanent magnets for high DC breaking
- cULus Listed – File # E319322
 - Switches, Industrial Control (NRNT, NRNT7)

Type AF / GAF

- DC general use up to 600V, 1900A
- DC-1 up to 1000V DC, 2050A
- Electronic AC/ DC coil input voltages
- PLC interface (GAF460...GAF2050)
- Series busbar kits available
- Permanent magnets for high DC breaking
- GAF185...GAF300 cULus Listed – File # E73397
 - Switches, Industrial Control (NRNT, NRNT7)
- GAF460...GAF2050 IEC/EN only
- AF145...AF2650 cULus Listed – File # E73397
 - Switches, Industrial Control (NRNT, NRNT7)

GA75 - GAE75



GA75-10-00-84

Electrical ratings

UL/CSA DC general use (A)			IEC / EN DC-1, $\theta \leq 40^\circ$ (A)			Standard auxiliary contacts		Catalog number
440V	600V	1000V	440V	600V	1000V	N.O.	N.C.	
100	75	35	100	75	35	-	-	GA75-10-00-Δ
100	75	35	100	75	35	1	1	GAE75-10-11-Δ

Rated insulation voltage $U_i = 1000V$ d.c. according to IEC 947-4-1.
Maximum switching frequencies: 300 operating cycles/

Additional IEC/EN electrical ratings for GA/E75

Utilization category	Maximum voltage	Rated operational current I_n (A)
DC-3	440V	85
DC-5	220V	85
	440V	35

Coil voltage selection chart (Δ)

Hz	Cntr type	Volts																
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600	
60	GA		81	83	84	84		34	75	80	42	48	86	86				
50	GA		81	83	84			80				85	86			55		
DC	GAE	80	81	83	86		87		88	89								

For other voltages, see page 1.35.

Accessories

Standard **A** and **AE40 - 75** contactor accessories are suitable for **GA75** and **GAE75** contactors. Coils are the standard coils for **A** and **AE50 - 75** contactors. Contacts cannot be changed.

Wiring diagrams

In D.C. circuits, the source to earth (or frame) connection mode is an important element.

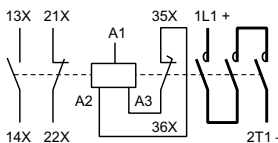
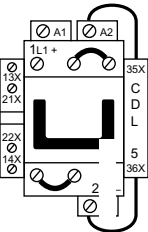
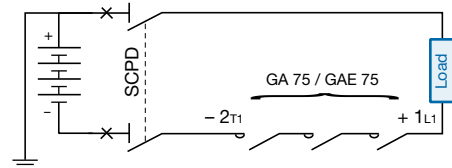
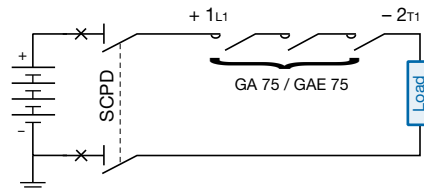
Three modes are mainly used:

- A** – insulated source, i.e. unearthed (or not connected to the frame).
- B** – source earthed via its central point.
- C** – source earthed via one of its outer poles.

Modes **A** and **B** do not impose any constraints with regard to the distribution of the contactor poles between the two source/load connecting branches. Mode **C** requirements are therefore suitable for modes **A** and **B**.

For mode **C**, all the poles necessary for breaking must be installed in series between the load and the ungrounded source polarity. We recommend this solution for all connection modes.

The above provisions relate to power circuit switching, the SCPD (Short-Circuit Protection Device) must comply with protection rules.



GAE75-10-00-84

GAF185 - GAF2050

DC circuit switching GAF & AF

3 contacts in series

GAF - 1000 V DC max. (IEC)



GAF185
AF145, AF185



GAF300
AF210 ... AF300



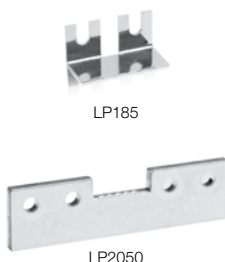
GAF460
AF400, AF460



GAF750, GAF1250
AF580 ... AF1250



GAF1650, GAF 2050
AF1350 ... AF2050



LP185

LP2050

L/R 1 ms, air temperature close to contactor					Catalog number	Reference code	Pkg qty	Weight (1 pce) kg
40 °C	55 °C	60 °C	65 °C	70 °C				
A								
275	250	230	205	180	GAF185-10-11-Δ	1SFL497025RΔ11		3.60
500	400	375	350	325	GAF300-10-11-Δ	1SFL557025RΔ11		6.20
700	600	560	520	480	GAF460-10-11-Δ	1SFL597025RΔ11		12.00
1050	875	800	760	720	GAF750-10-11-Δ	1SFL637025RΔ11		15.00
1250	1040	970	920	875	GAF1250-10-11-Δ	1SFL647025RΔ11		16.00
1650	1450	1380	1325	1270	GAF1650-10-11-Δ	1SFL677025RΔ11		35.00
2050	1750	1650	1575	1500	GAF2050-10-11-Δ	1SFL707025RΔ11		35.00

GAF & AF - 600 V DC max. (UL/CSA) & 850...1000 V DC max. (IEC)

UL/CSA general use, 40 °C			IEC DC-1, 40 °C					
A			A					
250			250			GAF185-10-11-Δ	1SFL497025RΔ11	3.60
400			500			GAF300-10-11-Δ	1SFL557025RΔ11	6.20
Use GAF185 - GAF300			See next page for IEC data at various voltages.			AF145-30-11-Δ	1SFL477001RΔ11	3.60
						AF185-30-11-Δ	1SFL497001RΔ11	3.60
						AF210-30-11-Δ	1SFL517001RΔ11	6.20
						AF260-30-11-Δ	1SFL537001RΔ11	6.20
						AF300-30-11-Δ	1SFL597001RΔ11	6.20
						AF400-30-11-Δ	1SFL637001RΔ11	12.00
						AF460-30-11-Δ	1SFL597001RΔ11	12.00
						AF580-30-11-Δ	1SFL617001RΔ11	15.00
						AF750-30-11-Δ	1SFL637001RΔ11	15.00
						AF1250-30-11-Δ	1SFL647001RΔ11	16.00
550			AF1350-30-11-Δ	1SFL657001RΔ11	34.00			
650			AF1650-30-11-Δ	1SFL677001RΔ11	35.00			
750			AF2050-30-11-Δ	1SFL707001RΔ11	35.00			
900								
1210								
-								
1350								
1900								

Connection bar for contactor ①

GAF185, AF145, AF185	LP185	1SFN074712R1000	2	0.30
GAF300, AF210 ... AF300	LP300	1SFN075112R1000	2	0.40
GAF460, AF400, AF460	LP460	1SFN075712R1000	4	0.55
GAF750, AF580, AF750	LP750	1SFN076112R1000	4	0.95
GAF1250, AF1250	LP1250	1SFN076412R1000	2	1.90
GAF1650, GAF2050, AF1350, AF1650, AF2050	LP2050	1SFN076512R1000	4	2.90

① Not included with the contactor; connection diagrams must be respected

Auxiliary contact blocks, low energy microswitch 0.1 A, N.O or N.C.

AF145...AF2050	N.C.	CEL18-01	1SFN010716R1001		0.05
GAF185...GAF2050	N.O.	CEL18-10	1SFN010716R1010		0.05

AC / DC coils with electronic coil interface

Contactors GAF185 ... GAF300, AF145 ... AF300

Voltage	Voltage	Code	
		Δ	Δ
V - 50/60Hz	V - DC		
—	20 ... 60	7	2
48 ... 130	48 ... 130	6	9
100...250	100 ... 250	7	0

Contactors GAF460 ... GAF1250, AF400 ... AF1250

Voltage	Voltage	Code	
		Δ	Δ
V - 50/60Hz	V - DC		
—	24 ... 60	6	8
48 ... 130	48 ... 130	6	9
100 ... 250	100 ... 250	7	0
250 ... 500	250 ... 500	7	1

Contactors GAF1650, GAF2050, AF1350, AF1650, AF2050

100 ... 250	100 ... 250	7	0
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Technical data

DC switching ratings AF contactors

IEC

		AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
Utilization category DC-1		A	A	A	A	A	A	A	A	A	A	A	A	A
Contacts in series	L/R 1 ms													
1 contact	110 V						600	700	800	1050				
2 contacts	110 V	250	275	350	400	450	600	700	800	1050				
3 contacts	220 V	250	275	350	400	450	600	700	800	1050	1250	1350	1650	2050
3 contacts	600 V						600	700	800	1050	1250	1350	1650	2050
3 contacts	850 V								800	1050	1250	1350	1650	2050
Conductor cross-sectional area	mm ²	120	150	185	240	300 ¹⁾	2x185	2x240		2 x 50x8 ²⁾	1000 ³⁾	2 x 100x5 ²⁾	3 x 100x5 ²⁾	4 x 100x5 ²⁾

		AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
Utilization category DC-3														
Contacts in series	L/R 2.5 ms													
1 contact	110 V						600	700	800	1050				
2 contacts	110 V	250	275	350	400	450	600	700	800	1050				
3 contacts	220 V	250	275	350	400	450	600	700	800	1050				
3 contacts	600 V						600	700	800	1050				
Conductor cross-sectional area	mm ²	120	150	185	240	300 ¹⁾	2x185	2x240		2 x 50x8 ²⁾	1000 ³⁾	2 x 100x5 ²⁾	3 x 100x5 ²⁾	4 x 100x5 ²⁾

		AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
Utilization category DC-5														
Contacts in series	L/R 15 ms													
1 contact	110 V						600	700	800	1050				
2 contacts	110 V	250	275	350	400	450	600	700	800	1050				
3 contacts	220 V	250	275	350	400	450	600	700	800	1050				
3 contacts	600 V						600	700	800	1050				
Conductor cross-sectional area	mm ²	120	150	185	240	300 ¹⁾	2x185	2x240		2 x 50x8 ²⁾	1000 ³⁾	2 x 100x5 ²⁾	3 x 100x5 ²⁾	4 x 100x5 ²⁾

¹⁾ For currents above 450 A use 300 mm² and terminal extension / enlargement pieces (LW300: see www.abb.com/lowvoltage or local ABB catalog)

²⁾ Dimension of the bars (mm)

³⁾ Max connection bar width 50 mm

cULus

		AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
Intended device application general purpose														
Contacts in series														
3 contacts	240 V		250				550	650	750	900	1210		1350	1900
3 contacts	600 V						550	650	750	900	1210		1350	1900

General

- When selecting a contactor for DC switching it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- The loads are defined by the time constant L/R: non inductive loads such as resistance furnaces (L/R ≈ 1 ms), inductive loads such as shunt motors (L/R ≈ 2 ms) or series motors (L/R ≈ 7.5 ms).
- In addition to the block contactors shown in this document:
 - 1) ABB also offers bar mounted contactors (R-series). Bar contactors can typically be used for higher amps and voltages or other configurations or number of main poles (contacts).

Technical data

DC contactors GAF and AF

Main technical data

IEC60947-4-1

Contactor type GAF		GAF185		GAF300		GAF460		GAF750	GAF1250	GAF1650	GAF2050
Rated operational voltage U_e max	V DC	1000									
IEC 60947-4-1, DC-1, $\theta \leq 40$ °C	A	275		500		700		1050	1250	1650	2050
Conductor cross-sectional area	mm ²	150		300 ¹⁾		2x240		2 x 50x8 ²⁾	1000 ³⁾	3 x 100x5 ²⁾	4 x 100x5 ²⁾

¹⁾ For currents above 450 A use 300 mm² and terminal extension / enlargement pieces (LW300: see www.abb.com/lowvoltage or local ABB catalog)

²⁾ Dimension of the bars (mm)

³⁾ Max connection bar width 50 mm

cULus

Contactor type GAF		GAF185		GAF300
Rated operational voltage U_e max	V DC	600		
Amp-ratings general purpose	A	250		400

General technical data

Contactor type	GAF185												GAF300		GAF460		GAF750		GAF1250		GAF1650		GAF2050	
	AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050											
Rated making capacity DC-1															1.5 x I_e acc. to IEC60947-4-1									
Rated breaking capacity DC-1															1.5 x I_e acc. to IEC60947-4-1									
Rated frequency limits	Hz														25 ... 400									
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded															On request or see www.abb.com/lowvoltage or local ABB catalog									
Rated short-time withstand current, I_{sw}															On request or see www.abb.com/lowvoltage or local ABB catalog									
Heat dissipation per pole I_e /DC-1	W	13	16	18	25	32	30	42	32	50	80	80	125											
Rated impulse withstand voltage, U_{imp}	kV	8																						
Ambient temperature close to contactor - during operation / storage	°C	see "Conditions for use", for control voltage limits and authorized mounting																						
Operating altitude	m	≤3000 without derating																						

Magnet system characteristics

Rated control circuit voltage U_c														
- at 50 Hz and 60 Hz	V	48 ... 250				48 ... 500				100 ... 250				
- d.c.	V	20 ... 250				24 ... 500				100 ... 250				
Coil operating limits acc. IEC60947-4-1		0.85 x U_c min. ... 1.1 x U_c max. (at $\theta \leq 70$ °C) Please also refer to "Mounting characteristics"												
Drop-out voltage in % of U_c min.	%	55												
Coil consumption														
Average pull-in value	50 Hz and 60 Hz	VA	430		470		890		850		850		1900	
	d.c.	W	500		520		990		950		950		1700	
Average holding value	50 Hz and 60 Hz	VA/W	12/3.5		10/2.5		12/4		12/4.5		12/4		48/17	
	d.c.	W	2		2		4		4.5		4		16	
Operating time coil supply between A1-A2	On request or see www.abb.com/lowvoltage or local ABB catalog													

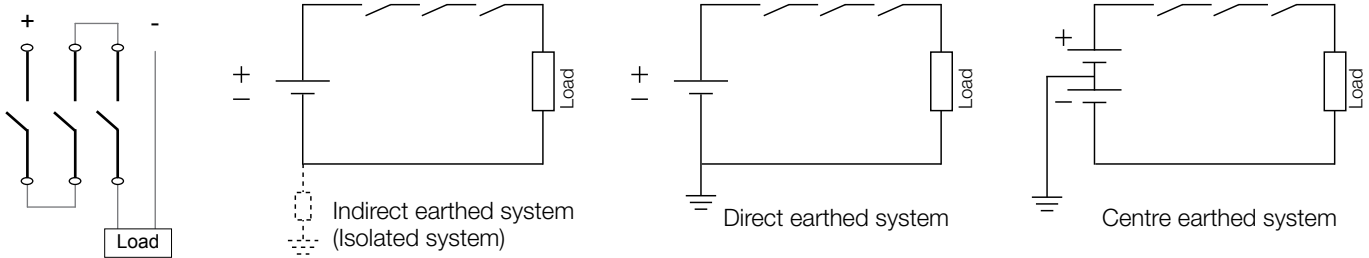
Mounting characteristics

Mounting positions	- mounting on a vertical plane: any position with a tilt up to $\pm 30^\circ$ - mounting on a horizontal plane: any position with a tilt up to $\pm 30^\circ$, except up-side down			
Fixing				
- by screws (not supplied)	4 x M5		4 x M6	4 x M8

Connections

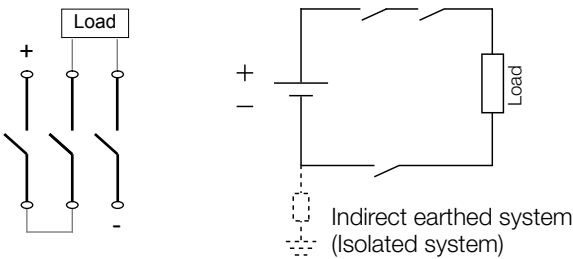
Recommended connection

All three contacts connected in series without the load in between. This connection is recommended in systems according to the configurations below.



Alternative connection

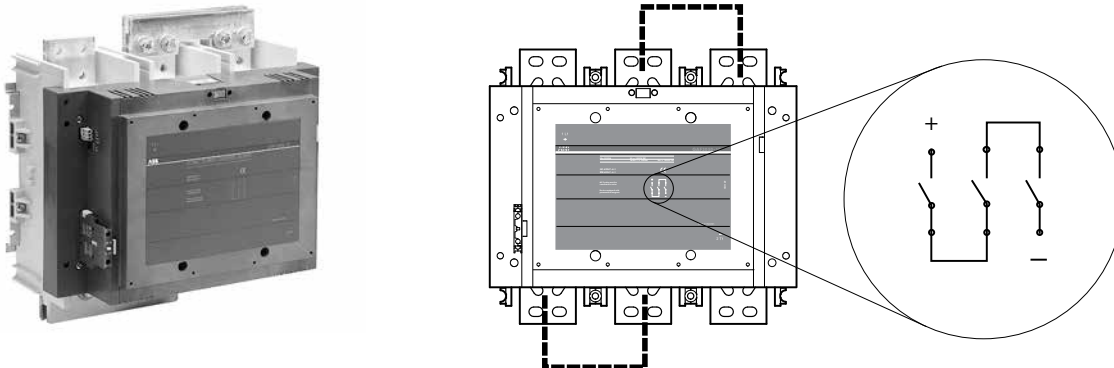
The load is placed in between the three contacts in an indirect earthed system or in a fully isolated system. If not connected according to the configuration below, a fault to earth could result in one or two contacts breaking the full load which the contactor is not approved for.



Points to consider

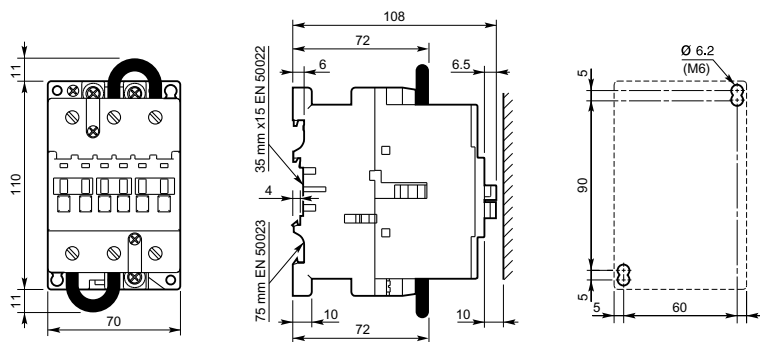
- The above relates to power circuit switching. The SCPD (Short Circuit Protection Device) must comply with applicable protection rules.
- The direction of the current must be as shown on the contactor front label.
- Connection bars for connecting three contacts in series are not delivered with the contactor as standard, but are available as accessories.

For further information regarding connections see Technical paper.

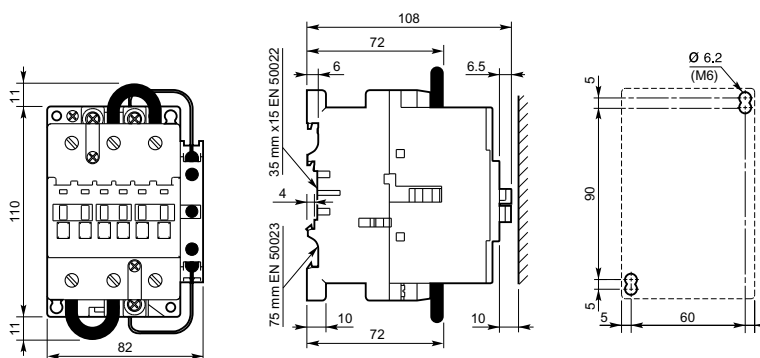


Approximate dimensions (mm)

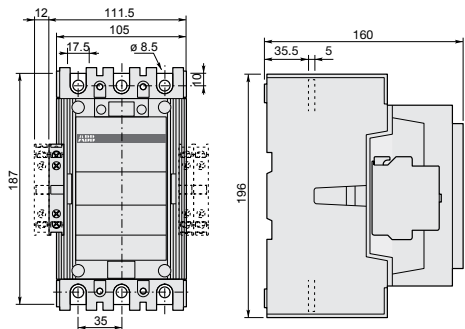
GA75



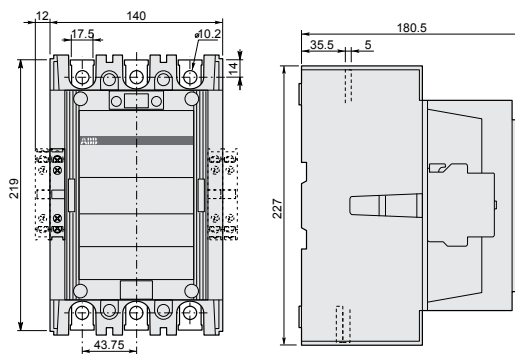
GAE75



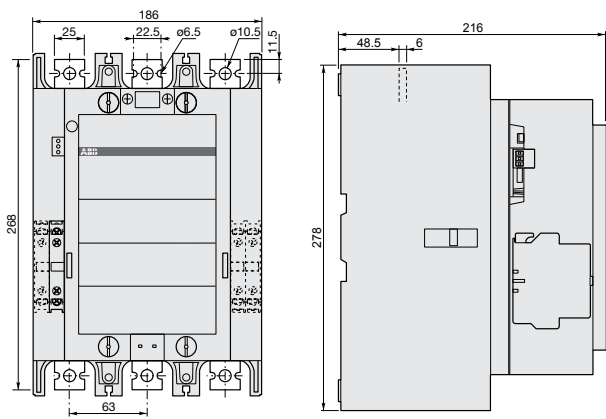
Approximate dimensions



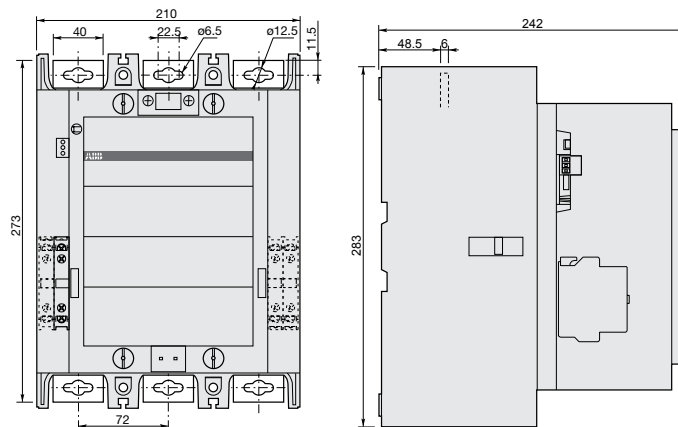
GAF185
AF145, AF185



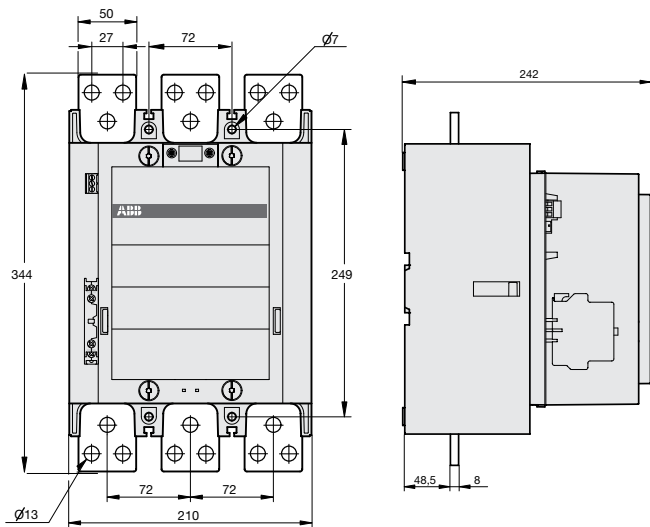
GAF300
AF210 ... AF300



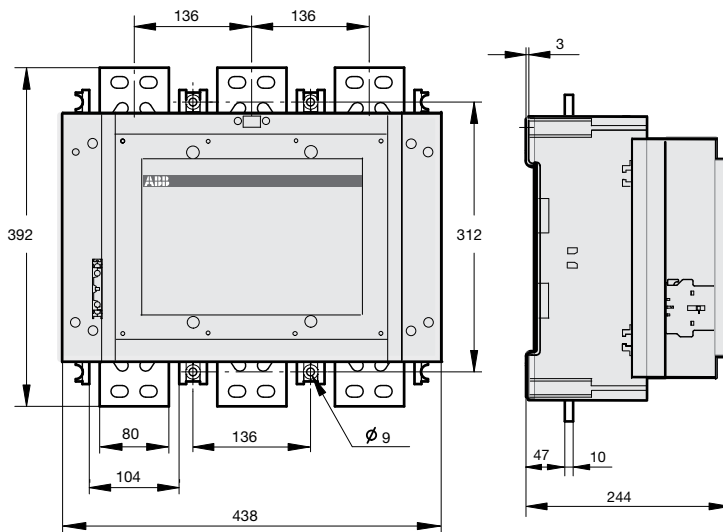
GAF460
AF400, AF460



GAF750
AF580, AF750

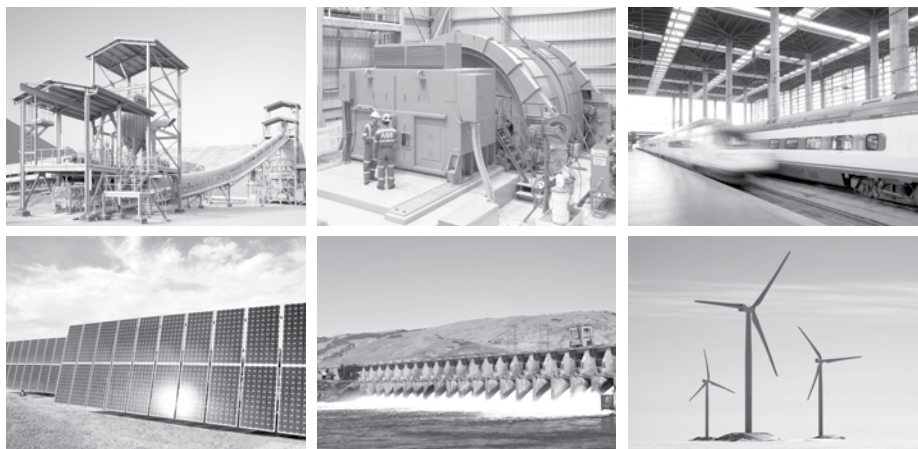


GAF1250,
AF1250



GAF1650, GAF2050
AF1350, AF1650, AF2050

Dimensions in mm
Inch converter: 1 mm = 0.0394 in



R contactors with variable number of poles and their variants (contactors with N.C. + N.O. poles, couplers...) are used for controlling power circuits up to 1000 V AC or 1500 V DC. They are designed with common standard components. With the combination of these elements and the adaptation possibilities, special versions can be provided. Designed for long-lasting operation and demanding applications, the ABB R contactors are used for many applications all over the world.

Flexibility of design

- Variable number of poles
- Adjustable number of auxiliary contacts
- Optional combination of N.O. & N.C. poles
- Mechanical or magnetic latching available.

Easy maintenance

- Direct access to all the components of the contactor
- Complete and didactic instruction manual
- Spare parts available
- Dedicated service for bar contactors.

Exceptional durability

- Mechanical durability up to 10 millions operating cycles
- Mechanical switching frequency up to 1200 cycles per hour
- Electrical durability up to 350 000 operating cycles.

Ideal for heavy duty applications

- High making and breaking capacity
- Fully compatible with the requirements of utilization categories AC-3, DC-3 and DC-5 (control of AC / DC motors for mining, iron and steel industries...).

Custom-made solutions

- More than 60 years' experience in dealing with customers projects
- Development of solutions from specifications
- Pre-sales support to identify and define customer requirements
- Specialists available to help you, select your product or optimize your configuration.

Bar Contactors

Bar contactors

For heavy duty applications

Bar contactors meet the particular requirements of each AC / DC control application up to 5000 A, where the demands are increasing:

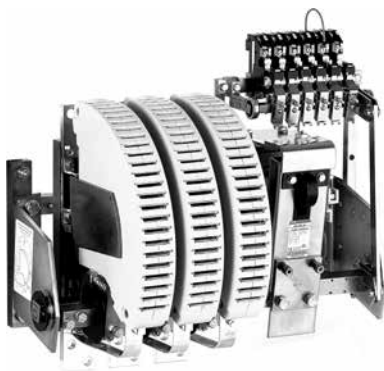
- Power distribution
- Photovoltaic, hydroelectric power stations
- Batteries
- Mining
- Railway networks and rolling stock
- Induction furnaces
- Pump stations
- Travelling cranes.



Control your AC applications up to 5000 A

AC-1 Rated operational current up to 5000 A

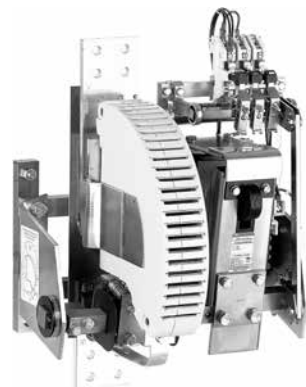
AC-3 Rated power up to 1500 kW (1520 A - 440 V)



Control your DC applications up to 5000 A

DC-1 Rated operational current up to 5000 A

DC-3 / DC-5 Rated operational current up to 2000 A
1500 V with poles in series



Special applications

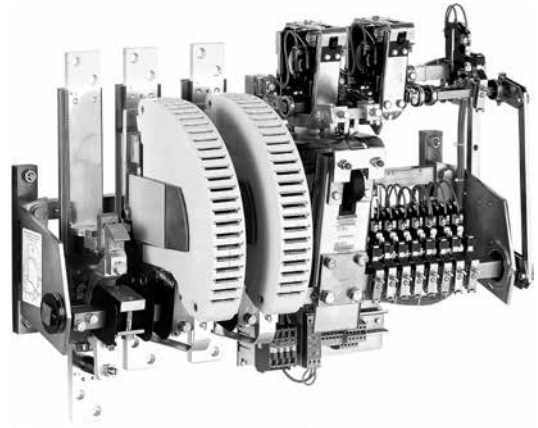
AC / DC coupling: LOR.. contactors

Slip ring motor control: FOR.. contactors

AC / DC switching (N.C. / N.O. main poles): NOR & JOR.. contactors

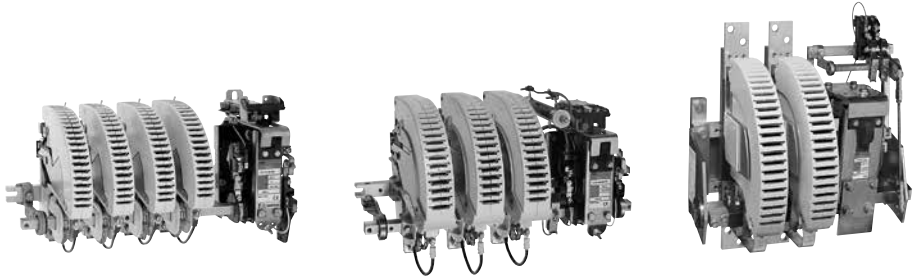
Latching contactors for energy saving and safety requirements: AMA or AME contactors

Field discharge: AM(F)-CC-JORE.. contactors



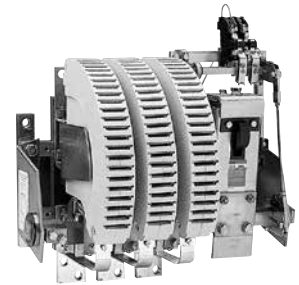
Bar contactors for the AC circuits switching

Voltage U_e up to 1000 V AC
Current I_e up to 4500 A



Contactor type	AC control circuit	~	IORR63..-MT	IORR125..-MT	IORR200..-MT	IORR400..-MT	IORR500..-MT	IORR800..-MT
	DC control circuit	≡	IORE63..-MT	IORE125..-MT	IORE200..-MT	IORE400..-MT	IORE500..-MT	IORE800..-MT
Categories		U_e						
AC-1	at 40 °C		I_e : 85 A	170 A	260 A	400 A	550 A	800 A
AC-3	690 V AC		I_e : 85 A	160 A	260 A	400 A	550 A	800 A
	1000 V AC max.		I_e : 56 A	105 A	180 A	280 A	380 A	580 A
AC-3	690 V AC	Power	80 kW	150 kW	240 kW	400 kW	540 kW	780 kW

Voltage U_e up to 500 V AC
Current I_e up to 5000 A



Contactor type	AC control circuit	~	-					IORR800
	DC control circuit	≡	-					IORE800
Categories		U_e						
AC-1	at 40 °C		I_e :	From 85 A to 550 A, select above IOR..-MT				900 A
AC-3	380-415-440 V AC		I_e :	-				800 A
	500 V AC max.		I_e :	-				800 A
AC-3	400 V AC	Power	-					450 kW

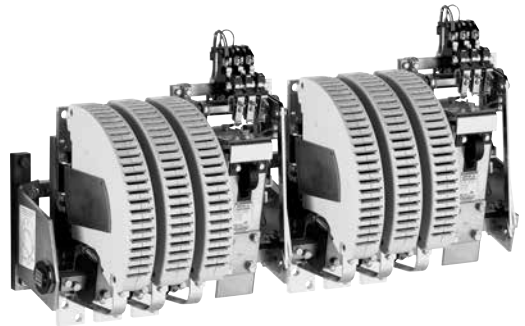
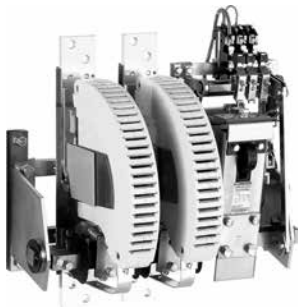
Recap:

All contactors fulfill the IEC 60947-4-1 / EN 60947-4-1 standards.

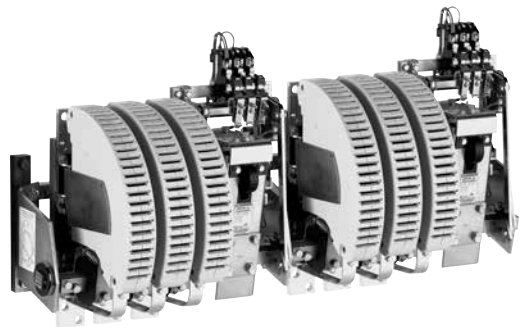
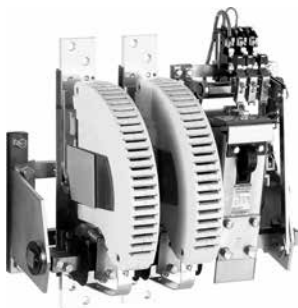
Utilization category AC-1: max. breaking current = 1.5 x I_e ,
max. making current = 1.5 x I_e .

Utilization category AC-3: max. breaking current = 8 x I_e ,
max. making current = 10 x I_e .

Contactors with NC poles, magnetic or mechanical latching devices on request.



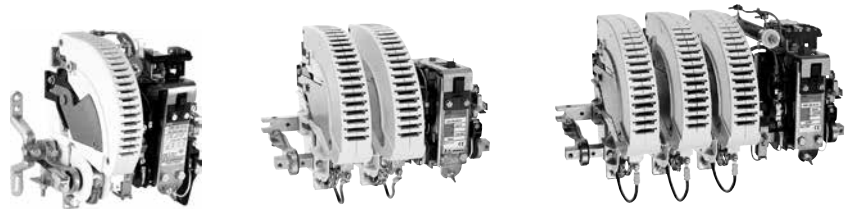
IORR1400..-MT	IORR1700..-MT	IORR2100..-MT	IORR2500..-MT	IORR3200..-MT	IORR3800..-MT	IORR4500..-MT	IORR5100..-MT
IORE1400..-MT	IORE1700..-MT	IORE2100..-MT	IORE2500..-MT	IORE3200..-MT	IORE3800..-MT	IORE4500..-MT	IORE5100..-MT
1250 A	1650 A	1850 A	2200 A	3000 A	3500 A	4000 A	4500 A
970 A	1170 A	1270 A	-	-	-	-	-
610 A	680 A	810 A	-	-	-	-	-
1000 kW	1200 kW	1300 kW	-	-	-	-	-



IORR1000	IORR1400	IORR1700	IORR2100	IORR2500	IORR3200	IORR3800	IORR4500	IORR5100
IORE1000	IORE1400	IORE1700	IORE2100	IORE2500	IORE3200	IORE3800	IORE4500	IORE5100
1000 A	1350 A	1650 A	2000 A	2400 A	3200 A	3800 A	4500 A	5000 A
800 A	1060 A	1260 A	1520 A	-	-	-	-	-
800 A	1080 A	1220 A	1340 A	-	-	-	-	-
450 kW	630 kW	750 kW	900 kW	-	-	-	-	-

Bar contactors for the DC circuits switching

Voltage U_e up to 1500 V DC
Current I_e up to 5000 A



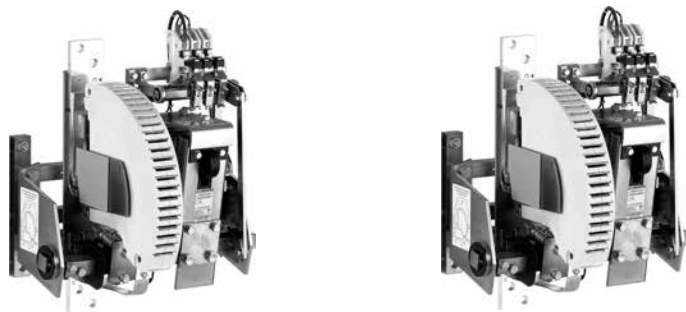
Contactor type	AC control circuit	~	IORR63..-CC	IORR125..-CC	IORR200..-CC	IORR400..-CC	IORR500..-CC
	DC control circuit	≡	IORE63..-CC	IORE125..-CC	IORE200..-CC	IORE400..-CC	IORE500..-CC
Number of poles in series*	Categories	U _e max.					
	1 pole	DC-1	500 V DC	I _e 85 A	170 A	275 A	400 A
DC-3 / DC-5		500 V DC	I _e 68 A	140 A	205 A	350 A	500 A
2 poles	DC-1	1000 V DC	I _e 85 A	170 A	275 A	400 A	550 A
	DC-3 / DC-5	1000 V DC	I _e 68 A	140 A	205 A	350 A	500 A
3 poles	DC-1	1500 V DC	I _e 85 A**	170 A**	275 A**	400 A**	550 A**
	DC-3 / DC-5	1500 V DC	I _e 68 A**	140 A**	205 A**	350 A**	500 A**

*Number of poles to be fitted in series according to the operational voltage and the utilization categories.

**Version with increased insulation for 1000 V DC < U_e ≤ 1500 V DC, please consult us.

Contactors
UL / CSA approved 

Voltage U_e up to 600 V DC
Current I_e up to 2000 A



Contactor type	AC control circuit	~	IORR800-10-CC	IORR1000-10-CC	IORR1400-10-CC	IORR1700-10-CC	IORR2100-10-CC
	DC control circuit	≡	IORE800-10-CC	IORE1000-10-CC	IORE1400-10-CC	IORE1700-10-CC	IORE2100-10-CC
		U _{max} .					
1 pole	General use	600 V DC	I _e 800 A	1000 A	1300 A	1700 A	2000 A

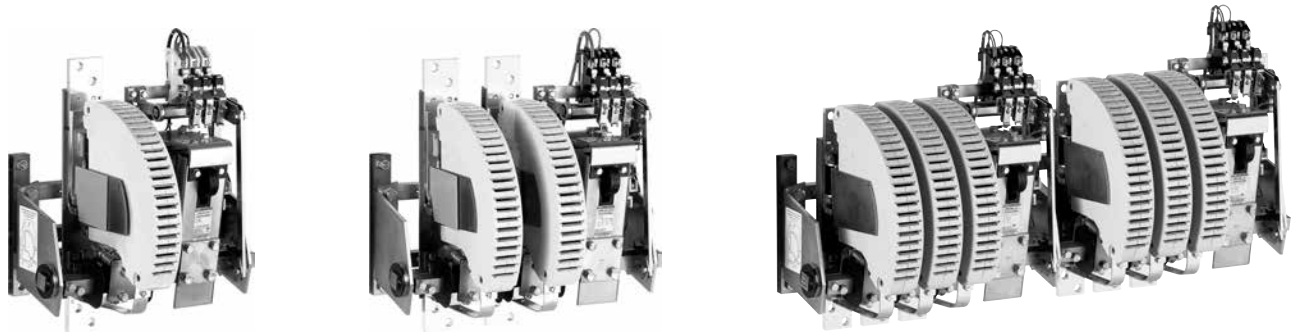
Recap:

All contactors fulfill the IEC 60947-4-1 / EN 60947-4-1 standards.

Utilization category DC-1: max. breaking current = 1.5 x I_e,
max. making current = 1.5 x I_e.

Utilization categories DC-3 / DC-5: max. breaking current = 4 x I_e,
max. making current = 4 x I_e.

Contactors with NC poles, magnetic or mechanical latching devices on request.



IORR800.-CC IORR1000.-CC IORR1400.-CC IORR1700.-CC IORR2100.-CC IORR2500.-CC IORR3200.-CC IORR3800.-CC IORR4500.-CC IORR5100.-CC
IORE800.-CC IORE1000.-CC IORE1400.-CC IORE1700.-CC IORE2100.-CC IORE2500.-CC IORE3200.-CC IORE3800.-CC IORE4500.-CC IORE5100.-CC

Ue max.	IORR800.-CC	IORR1000.-CC	IORR1400.-CC	IORR1700.-CC	IORR2100.-CC	IORR2500.-CC	IORR3200.-CC	IORR3800.-CC	IORR4500.-CC	IORR5100.-CC
750 V DC	800 A	1000 A	1250 A	1600 A	2000 A	2300 A	3200 A	3800 A	4500 A	5000 A
600 V DC	720 A	1000 A	1250 A	1600 A	2000 A	On request	On request	On request	On request	On request
1500 V DC	800 A	1000 A	1250 A	1600 A	2000 A	2300 A	3200 A	3800 A	4500 A	5000 A
1000 V DC	720 A	1000 A	1250 A	1600 A	2000 A	On request	On request	On request	On request	On request
1500 V DC	800 A	1000 A	1250 A	1600 A	2000 A	2300 A	3200 A	3800 A	4500 A	5000 A
1500 V DC	720 A	1000 A	1250 A	1600 A	2000 A	On request	On request	On request	On request	On request

Product overview

Upper terminal plate for power circuit (network)

2 N.O. main poles with arc chutes

Main frame for contactor fixing

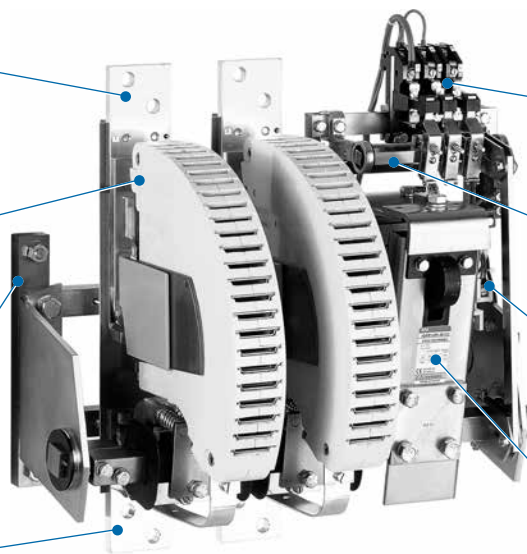
Lower terminal plate for power circuit (utilization)

CA15.. auxiliary contacts 1 N.O. + 1 N.C. fitted as standard (extra auxiliary contacts on request)

Auxiliary frame for auxiliary contacts

Connecting terminals for coil supply

Electro-magnet (RR type), laminated magnetic circuit, AC coil, direct supply



Questionnaire

Specification for R contactors

Customer
 Contact person Date
 Tel. e-mail

ABB
 Contact person
 Tel.

Quantity Requested delivery date
 Project / Application

Power circuit

AC switching

Application type
 AC-1 (resistive load)
 AC-3 (direct starting, switching off running motors)
 No load breaking
 Other

Number of poles: N.O. N.C.
 Rated operational current I_e A
 Max. making current A
 Max. breaking current A
 Rated operational voltage U_e V Hz

or

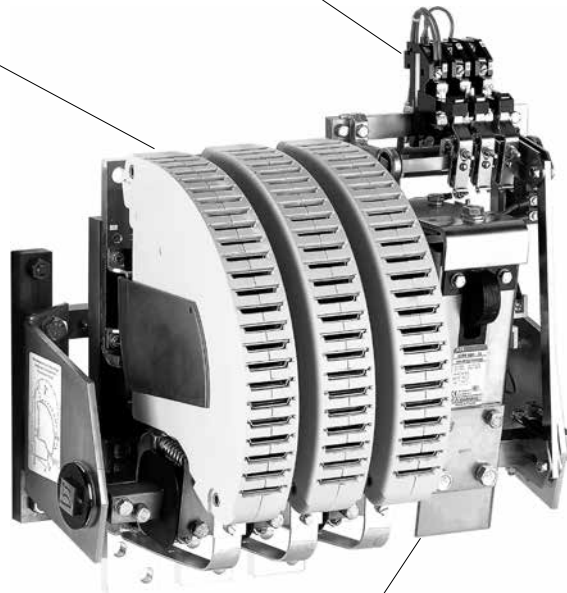
DC switching

Application type
 DC-1 (resistive load)
 DC-3 (shunt motors)
 DC-5 (series motors)
 No load breaking
 Other L/R ms

Number of poles: N.O. N.C.
 Rated operational current I_e A
 Making current A
 Breaking current min. A max. A
 Rated operational voltage U_e V DC

Auxiliary contacts

Number of N.O. auxiliary contacts
 Number of N.C. auxiliary contacts



Control circuit (coil)

AC Voltage V Hz
 DC Voltage V DC

Options

- Magnetical latching
- Mechanical latching

Operating conditions

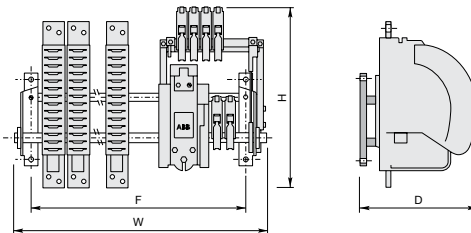
Switching frequency cycles/h
 Mech. durability required (millions of operating cycles)
 Remarks

Accessories

Please add any other useful documents for further information e.g. technical specification, drawing, wiring diagram, etc.

Replacement of an existing contactor

Brand
 Type
 Fixing dimension F = mm
 Overall dimensions W = mm
 H = mm
 D = mm

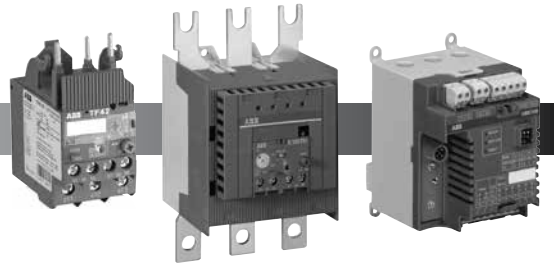


Please photocopy and forward. Questionnaire also available on the ABB Website:

www.abb.com/lowvoltage Section: Our offering Select: Control Products > Contactors > Bar mounted contactors

Notes

2 - Motor overload protection



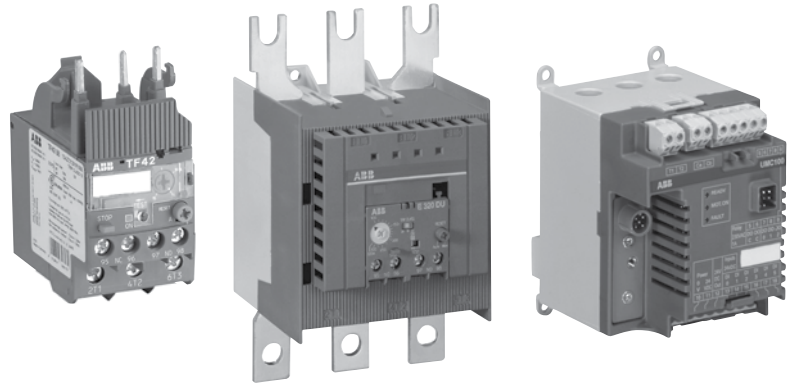
Features and benefits	2.1
General information	
Panorama	2.2 - 2.3
Motor ratings.....	2.4
Pilot duty ratings and overload trip classes.....	2.5
Thermal overload relays.....	2.6
Electronic overload relays.....	2.7
Actuation tables & connection diagrams.....	2.8
Universal motor controllers.....	2.9
Ordering details	
Thermal & electronic overload relays.....	2.10 - 2.14
Electronic overload relays.....	2.15
Universal motor controllers.....	2.16 - 2.17
Panel adaptors, coupling units, shrouds & lug kits.....	2.18
Remote function coils.....	2.19
FSB FieldBusPlug	2.20 - 2.23
Technical data	2.24 - 2.49
Approximate dimensions	2.50 - 2.58

Notes

Motor overload protection



Motor overload protection & Universal motor controller



Thermal overload relays

- Economic overload protection
- Motor applications up to 310 A
- For single and three phase motors
- Automatic and manual reset
- RESET, TEST, and STOP functions
- Direct contactor mounting up to 200 A
- Classes 10A, 10, and 20 available

Electronic overload relays

- Flexible overload protection
- Motor applications up to 1250 A
- For three phase motors
- Automatic and manual reset
- RESET, TEST, and STOP functions
- Direct contactor mounting up to 320 A
- Class 10E, 20E, 30E selectable

Universal motor controllers

- For control, protection, and diagnostics
- Up to 63 A w/o accessories
- Digital & analog input/output
- Direct PLC control
- FieldBusPlug communication
- Programmable via key pad or software
- Expansion modules and monitors available

Motor overload protection & universal motor controllers

Standards & approvals	T16 TF42	TA25DU TA42DU TA75DU TA80DU	TA110DU TA200DU TA450DU	EF19 EF45	E16DU E45DU E80DU E140DU	E200DU E320DU E500DU	E1250DU	UMC100
	E48139	E48139	E48139	E48139	E48139	E48139	E76003	E48139
	c	c	c	c	c	c	c	c
	✓	✓	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓	✓	✓

General information

Panorama

2

3-pole contactors

Chapter 1

Mini contactors

Contactors for all industrial applications and motor starting



IEC	AC-3 Rated operational power	$\theta \leq 55^\circ\text{C}^*$, 400 V	kW	4	5.5	4	5.5	7.5	4	5.5	7.5	11	15	18.5
UL/CSA	3-phase motor rating	480 V	hp	3	5	5	7.5	10	5	7.5	10	15	20	-
AC Control supply		Type		B6	B7	AS09	AS12	AS16	AF09	AF12	AF16	AF26	AF30	AF38
						AF09Z	AF12Z	AF16Z	AF26Z	AF30Z	AF38Z			
DC Control supply		Type		BC6	BC7	ASL09	ASL12	ASL16	AF09	AF12	AF16	AF26	AF30	AF38
						AF09Z	AF12Z	AF16Z	AF26Z	AF30Z	AF38Z			
AC / DC Control supply		Type		-	-	-	-	-	AF09	AF12	AF16	AF26	AF30	AF38
									AF09Z	AF12Z	AF16Z	AF26Z	AF30Z	AF38Z
IEC	AC-3 Rated operational current	$\theta \leq 55^\circ\text{C}^*$, 400 V	A	9	12	9	12	15.5	9	12	18	26	32	38
	AC-1 Rated operational current	$\theta \leq 40^\circ\text{C}$, 690 V	A	16	20	22	24	24	25	28	30	45	50	50
UL/CSA	General use rating	600 V	A	12 (300 V)	16	20	20	20	25	28	30	45	50	50
NEMA	NEMA Size			-	-	-	-	-	00	0	-	1	-	-

* $\theta \leq 60^\circ\text{C}$ for AS(L)09 ... AS(L)16 and AF09 ... AF38 contactors

Overload relays



See page 2.18



See page 2.10



See page 2.10



See page 2.11

Thermal relays	Class 10 (10A for TA42DU to TA80DU)	T16 (0.10...16 A)	T16 (0.10...16 A)	TF42 (0.10...38 A)
Electronic relays	Class 10E, 20E, 30E	E16DU (0.10...18.9 A)	E16DU (0.10...18.9 A)	EF19 (0.10...18.9 A)
				EF19 (0.10...18.9 A), EF45 (9...45 A)
Accessories for overload relays	Wall/separate mounting kit	DB16 (T16 only), DB16E (E16DU only)		DB42 (TF42 only)

Universal motor controllers

Motor protection, control & diagnostics

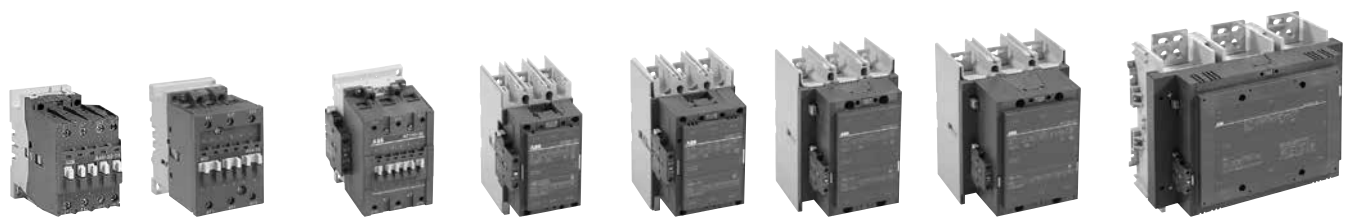
See pages 2.16 - 2.17



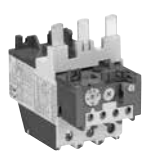
Universal motor controllers	Expansion modules	Operating panel	Ground fault monitors	FieldBusPlugs & accessories
UMC100 (0.24...63 A)	I/O & voltage	UMC100-PAN	CEM11	See pages 2.20...2.23

General information

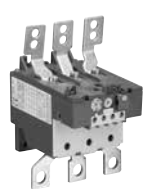
Panorama



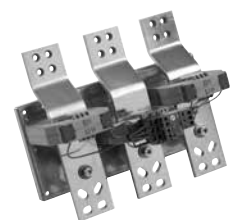
	18.5	22	30	37	45	55	75	90	110	140	160	200	250	315	400	—	475	560	—
	30	40	60	60	60	75	100	125	150	200	250	350	400	500	600	—	800	900	—
	A40	A50	A63	A75	A95	A110	A145	A185	A210	A260	A300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
	AL40	AE50	AE63	AE75	AF95	AF110	AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
	—	AF50	AF63	AF75	AF95	AF110	AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
	37	50	65	75	96	110	145	185	210	260	305	400	460	580	750	—	860	1050	—
	60	100	115	125	145	160	250	275	350	400	500	600	700	800	1050	1260	1350	1650	2050
	60	80	90	105	125	140	230	250	300	350	400	550	650	750	900	1210	1350	1650	2100
	—	2	—	3	—	—	4	—	—	5	—	—	6	—	7	—	—	8	—



See page 2.13

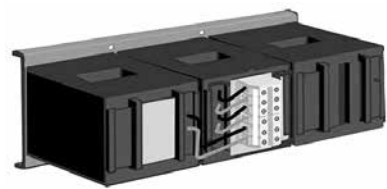


See page 2.14



See page 2.15

See page 2.12	TA42DU (18...42 A)	TA75DU (18...80 A)	TA80DU (29...80 A) TA110DU (65...110 A)	TA200DU (66...200 A)	TA450DU/SU (130...310 A) class 30 for SU			
	E45DU (9...45 A)	E80DU (27...80 A)	E140DU (50...140 A)	E200D-U (60...200 A)	E320DU (100...320 A)	E500DU (150...500 A)	E800DU (250...800 A)	E1250DU (375...1250 A)
	DB80, DB45E, DB80E		DB80, DB200, D140E	DB200	DT450/A			



KORC current transformers (60...850A)

See pages 2.17

General information

Motor ratings

Horsepower to full-load Amperes for AC induction motors

Horsepower (hp)	Full Load Amperes (FLA)													
	110...120 v ac		200 v ac		208 v ac		220...240 v ac		380...415 v ac		440...480 v ac		550...600 v ac	
	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase
1/10	3.0	-	-	-	-	-	1.5	-	1.0	-	-	-	-	-
1/8	3.8	-	-	-	-	-	1.9	-	1.2	-	-	-	-	-
1/6	4.4	-	2.5	-	2.4	-	2.2	-	1.4	-	-	-	-	-
1/4	5.8	-	3.3	-	3.2	-	2.9	-	1.8	-	-	-	-	-
1/3	7.2	-	4.1	-	4.0	-	3.6	-	2.3	-	-	-	-	-
1/2	9.8	4.4	5.6	2.5	5.4	2.4	4.9	2.2	3.2	1.3	2.5	1.1	2.0	0.9
3/4	13.8	6.4	7.9	3.7	7.6	3.5	6.9	3.2	4.5	1.8	3.5	1.6	2.8	1.3
1	16.0	8.4	9.2	4.8	8.8	4.6	8.0	4.2	5.1	2.3	4.0	2.1	3.2	1.7
1-1/2	20.0	12.0	11.5	6.9	11.0	6.6	10.0	6.0	6.4	3.3	5.0	3.0	4.0	2.4
2	24.0	13.6	13.8	7.8	13.2	7.5	12.0	6.8	7.7	4.3	6.0	3.4	4.8	2.7
3	34.0	19.2	19.6	11.0	18.7	10.6	17.0	9.6	10.9	6.1	8.5	4.8	6.8	3.9
5	56.0	30.4	32.2	17.5	30.8	16.7	28.0	15.2	17.9	9.7	14.0	7.6	11.2	6.1
7-1/2	80.0	44.0	45.0	25.3	44.0	24.2	40.0	22.0	27.0	14.0	21.0	11.0	16.0	9.0
10	100.0	56.0	57.5	32.2	55.0	30.8	50.0	28.0	33.0	18.0	26.0	14.0	20.0	11.0
15	135.0	84.0	-	48.3	-	46.2	68.0	42.0	44.0	27.0	34.0	21.0	27.0	17.0
20	-	108.0	-	62.1	-	59.4	88.0	54.0	56.0	34.0	44.0	27.0	35.0	22.0
25	-	136.0	-	78.2	-	74.8	110.0	68.0	70.0	44.0	55.0	34.0	44.0	27.0
30	-	160.0	-	92.0	-	88.0	136.0	80.0	87.0	51.0	68.0	40.0	54.0	32.0
40	-	208.0	-	120.0	-	114.0	176.0	104.0	112.0	66.0	88.0	52.0	70.0	41.0
50	-	260.0	-	150.0	-	143.0	216.0	130.0	139.0	83.0	108.0	65.0	86.0	52.0
60	-	-	-	177.0	-	169.0	-	154.0	-	103.0	-	77.0	-	62.0
75	-	-	-	221.0	-	211.0	-	192.0	-	128.0	-	96.0	-	77.0
100	-	-	-	285.0	-	273.0	-	248.0	-	165.0	-	124.0	-	99.0
125	-	-	-	359.0	-	343.0	-	312.0	-	208.0	-	156.0	-	125.0
150	-	-	-	414.0	-	396.0	-	360.0	-	240.0	-	180.0	-	144.0
200	-	-	-	552.0	-	528.0	-	480.0	-	320.0	-	240.0	-	192.0
250	-	-	-	-	-	-	-	604.0	-	403.0	-	302.0	-	242.0
300	-	-	-	-	-	-	-	722.0	-	482.0	-	361.0	-	289.0
350	-	-	-	-	-	-	-	828.0	-	560.0	-	414.0	-	336.0
400	-	-	-	-	-	-	-	954.0	-	636.0	-	477.0	-	382.0
450	-	-	-	-	-	-	-	1030.0	-	-	-	515.0	-	412.0
500	-	-	-	-	-	-	-	1180.0	-	786.0	-	590.0	-	472.0

Full-load motor-running currents in Amperes corresponding to various AC horsepower ratings as published in Table 50.1 of UL 508.

General information

Pilot duty ratings and overload trip classes

Pilot duty ratings for AC control circuit contacts

Contact rating designation	Continuous thermal, test current (A)	Maximum current, 50/60 Hz (A)									
		120 v ac		240 v ac		480 v ac		600 v ac		Volt-amperes	
		Make	Break	Make	Break	Make	Break	Make	Break	Make	Break
A150	10	60	6.00	-	-	-	-	-	-	7200	720
A300	10	60	6.00	30	3.00	-	-	-	-	7200	720
A600	10	60	6.00	30	3.00	15	1.50	12	1.20	7200	720
B150	5	30	3.00	-	-	-	-	-	-	3600	360
B300	5	30	3.00	15	1.50	-	-	-	-	3600	360
B600	5	30	3.00	15	1.50	7.5	0.75	6	0.60	3600	360
C150	2.5	15	1.5	-	-	-	-	-	-	1800	180
C300	2.5	15	1.5	7.5	0.75	-	-	-	-	1800	180
C600	2.5	15	1.5	7.5	0.75	3.75	0.375	3.00	0.30	1800	180
D150	1.0	3.60	0.60	-	-	-	-	-	-	432	72
D300	1.0	3.60	0.60	1.80	0.30	-	-	-	-	432	72
E150	0.5	1.80	0.30	-	-	-	-	-	-	216	36

Mechanical switching ratings and test values as published in Table 1-4-1 of NEMA ICS 5-2000 (R2005, R2010)

Pilot duty ratings for DC control circuit contacts

Contact rating designation	Continuous thermal, test current (A)	Maximum current, 50/60 Hz (A)			
		120 v dc	250 v dc	301 to 600 v dc	Volt-amperes
		Make / Break	Make / Break	Make / Break	Make / Break
N150	10	2.2	-	-	275
N300	10	2.2	1.1	-	275
N600	10	2.2	1.1	0.40	275
P150	5.0	1.1	-	-	138
P300	5.0	1.1	0.55	-	138
P600	5.0	1.1	0.55	0.20	138
Q150	2.5	0.55	-	-	69
Q300	2.5	0.55	0.27	-	69
Q600	2.5	0.55	0.27	0.10	69
R150	1.0	0.22	-	-	28
R300	1.0	0.22	0.11	-	28

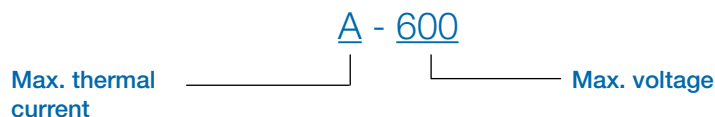
Mechanical switching ratings and test values as published in Table 1-4-1 of NEMA ICS 5-2000 (R2005, R2010)

Overload trip classes

Trip class	Tripping time T_p (seconds)
10A	$2 < T_p \leq 10$
10	$4 < T_p \leq 10$
20	$6 < T_p \leq 20$
30	$9 < T_p \leq 30$

Trip classes as published in Table 2 of UL 60947-4-1A.

Pilot duty rating explanation



General information

Thermal overload relays

Types T, TF & TA

2

Description

Thermal overload relays are electromechanical protection devices for the power circuit. They offer reliable protection for motors in the event of overload or phase failure. The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bend as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

Application

Three pole devices for single and three phase motor overload protection. These devices are either directly connected in the motor circuit, or are fed through a linear type (current) transformer.

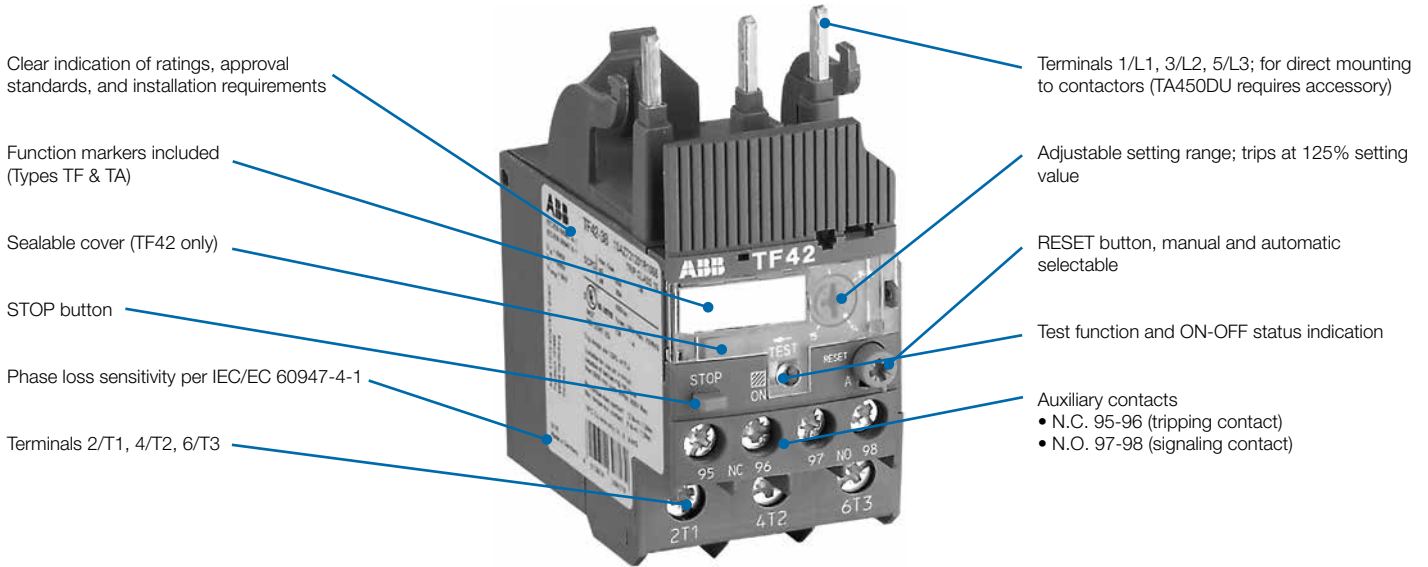
Thermal overload relay types

Directly connected to circuit:

T16, TF42, TA25DU, TA42DU,
TA75DU, TA80DU, TA110DU,
TA200DU

Linear transformer-fed:

TA450DU



Catalog number explanation

TF42 - 20

Overload relay type

Current setting range
Upper limit

General information

Electronic overload relays

Types E & EF

Description

An alternative to conventional bimetallic overload protection, electronic overload relays offer magnetic trip functionality for reliable protection for motors in the event of overload or phase failure. Simple to use and apply, the electronic overload relay is valued for its wide setting range, high accuracy, high operational temperature range and selectable trip classes (10E, 20E, 30E)

Application

Three pole devices for single and three phase motor overload protection. These devices are either directly connected in the motor circuit, or are fed through a linear type (current) transformer.

Electronic overload relay types

Directly connected to circuit:

EF19, EF45, E16DU, E45DU, E80DU, E140DU, E200DU, E320DU

Linear transformer-fed:

E500DU, E800DU, E1250DU

Clear indication of ratings, approval standards, and installation requirements
* Label on reverse side of photo shown

Function markers included (Types TF & TA)

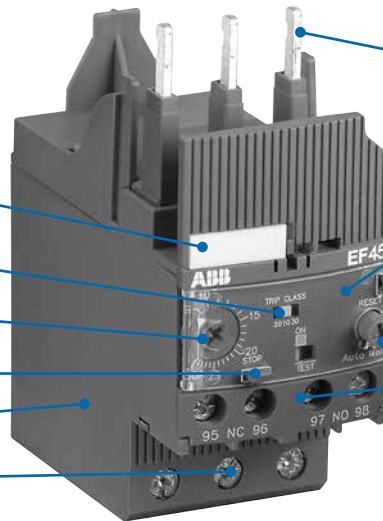
Adjustable trip class (10E, 20E, 30E)

Adjustable setting range; Trips at 125% setting value

STOP button

Phase loss sensitivity per IEC/EC 60947-4-1

Terminals 2/T1, 4/T2, 6/T3



Terminals 1/L1, 3/L2, 5/L3; for direct mounting to contactors (E500DU, E800DU, E1250DU require accessory)

Sealable cover (EF19, EF45 only)

RESET button, manual and automatic selectable

Test function and ON-OFF status indication

Auxiliary contacts
• N.C. 95-96 (tripping contact)
• N.O. 97-98 (signaling contact)

Catalog number explanation

EF45 - 45

Overload relay type

Current setting range
Upper limit

General information

Actuation tables & connection diagrams

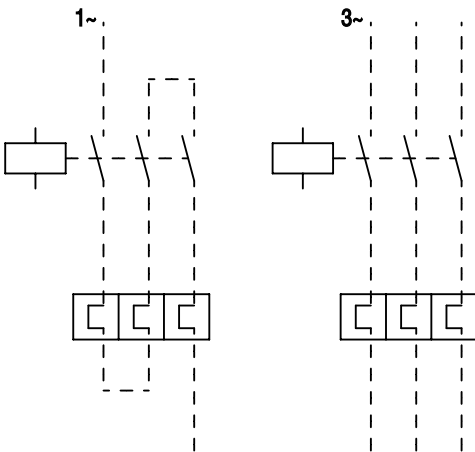
Thermal & electronic overload relays

Actuation table for auxiliary contacts

Condition	N.C. contact 95-96	N.O. contact 95-96	Status indication	Comment
ON / normal conditions	X	O	ON	-
Trip state / motor overload conditions	O	X	-	-
TEST (manual reset mode)	O	X	-	-
TEST (automatic reset mode)	O	X	-	while TEST is actuated
RESET while device is ON	O	X	-	while RESET button is actuated
RESET while device is in trip state	X	O	-	Return to ON state
STOP while device is ON	O	O	-	while STOP button is actuated
STOP while device is in trip state	O	X	-	STOP button has no effect

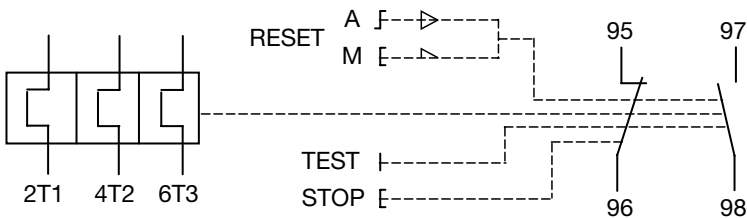
Note: Global and NAM standards require that a control circuits incorporating an overload relay be wired such that power is not automatically introduced to the power circuit following RESET.

Wiring diagram for the power circuit



Note: Single phase configuration not applicable for electronic overload relays.

Wiring diagram for the control circuit



General information

Universal motor controllers

UMC100-FBP

UMC100-FBP is a flexible, modular and expandable motor management system for constant-speed low-voltage range motors.

It's most important tasks include motor protection, prevention of plant standstills and the reduction of down time. This is made possible by early information relating to possible motor problems which avoids unplanned plant standstills. Even if a motor trips, quick diagnosis of the cause of the fault serves to reduce downtime.

UMC100-FBP combines multiple functions in a very compact unit:



Motor protection

- Overload, underload
- Overvoltage, undervoltage
- Blocked rotor, low / high current
- Phase failure, imbalance, phase sequence
- Earth leakage
- Thermistor protection
- Limitation of starts per time
- One single version with integrated measuring system covers the rated
- Motor current from 0,24 to 63 A

Motor control

- Integrated motor starter functions like direct, reverse, star-delta, etc. with easy to set parameters
- Additional free programmable logic for application specific control functions
- Expansion modules DX111, DX122 for more I/Os
- Expansion modules VI150, VI155 for 3-phase voltage measuring
- Custom programming possible with ABB DTM software

Motor diagnostics

- Quick and comprehensive access to all relevant data via fieldbus and/or operator panel
- Current, thermal load
- Phase voltages
- Power factor
- Energy

Further information

UMC & FBP Catalogue 2CDC 190 022 D0204
UMC & FBP Brochure 2CDC 135 011 B0202

Communication platforms

- Communication-independent basic device
- Freely selectable fieldbus protocol with FieldBusPlug
- Profibus DP
- DeviceNet
- Modbus
- CANopen

Typical application segments

- Oil & gas
- Cement
- Paper
- Mining
- Steel
- Chemical industry

Thermal & electronic overload relays

For use with B/C6...B/C7, AS/L09...AS/L16
Types T16 & E16DU

Ordering details

T16 thermal overload relays

For contactors	Setting range (A)	Trip class	Catalog number
B/C6...B/C7, AS/L09...AS/L16 VAS/L09... VAS/L16	0.10...0.13	10	T16-0.13
	0.13...0.17	10	T16-0.17
	0.17...0.23	10	T16-0.23
	0.23...0.31	10	T16-0.31
	0.31...0.41	10	T16-0.41
	0.41...0.55	10	T16-0.55
	0.55...0.74	10	T16-0.74
	0.74...1.00	10	T16-1.0
	1.00...1.30	10	T16-1.3
	1.30...1.70	10	T16-1.7
	1.70...2.30	10	T16-2.3
	2.30...3.10	10	T16-3.1
	3.10...4.20	10	T16-4.2
	4.20...5.70	10	T16-5.7
	5.70...7.60	10	T16-7.6
	7.60...10.0	10	T16-10
10.0...13.0	10	T16-13	
13.0...16.0	10	T16-16	

E16DU electronic overload relays

B/C6...B/C7	0.10...0.32	10E, 20E, 30E	E16DU0.32
	0.30...1.00	10E, 20E, 30E	E16DU1.0
	0.80...2.70	10E, 20E, 30E	E16DU2.7
	1.90...6.30	10E, 20E, 30E	E16DU6.3
	5.70...18.9	10E, 20E, 30E	E16DU18.9



T16



E16DU

Thermal & electronic overload relays

For use with AF09(Z)...AF38(Z); AF09N00(Z)...AF26N1(Z)
Types TF42, EF19 & EF45



TF42



EF19



EF45

Ordering details

For contactors	Setting range (A)	Trip class	Catalog number
TF42 thermal overload relays			
AF09(Z)...AF38(Z), AF09N00(Z)... AF26N1(Z)	0.10...0.13	10	TF42-0.13
	0.13...0.17	10	TF42-0.17
	0.17...0.23	10	TF42-0.23
	0.23...0.31	10	TF42-0.31
	0.31...0.41	10	TF42-0.41
	0.41...0.55	10	TF42-0.55
	0.55...0.74	10	TF42-0.74
	0.74...1.00	10	TF42-1.0
	1.00...1.30	10	TF42-1.3
	1.30...1.70	10	TF42-1.7
	1.70...2.30	10	TF42-2.3
	2.30...3.10	10	TF42-3.1
	3.10...4.20	10	TF42-4.2
	4.20...5.70	10	TF42-5.7
	5.70...7.60	10	TF42-7.6
	7.60...10.0	10	TF42-10
	10.0...13.0	10	TF42-13
	13.0...16.0	10	TF42-16
	16.0...20.0	10	TF42-20
	20.0...24.0	10	TF42-24
24.0...29.0	10	TF42-29	
29.0...35.0	10	TF42-35	
35.0...38.0	10	TF42-38	
EF19 electronic overload relays			
AF09(Z)...AF38(Z), AF09N00(Z)... AF26N1(Z)	0.10...0.32	10E, 20E, 30E	EF19-0.32
	0.30...1.00	10E, 20E, 30E	EF19-1.0
	0.80...2.70	10E, 20E, 30E	EF19-2.7
	1.90...6.30	10E, 20E, 30E	EF19-6.3
	5.70...18.9	10E, 20E, 30E	EF19-18.9
EF45 electronic overload relays			
AF26(Z)...AF38(Z), AF26N1(Z)	9.00...30.0	10E, 20E, 30E	EF45-30
	15.0...45.0	10E, 20E, 30E	EF45-45

Thermal & electronic overload relays

For use with A/E/L9...A/E/L40, A/E/L9N00...A/E/L26N1

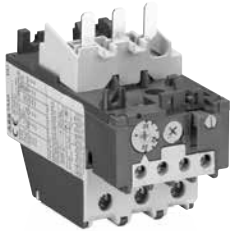
Types TA25DU, TA42DU, E16DU & E45DU

Ordering details

For contactors	Setting range (A)	Trip class	Catalog number (Class 10A)
TA25DU thermal overload relays			
A/E/L9...A/E/L40, A/E/L9N00... A/E/L26N1	0.10...0.16	10A	TA25DU0.16
	0.16...0.25	10A	TA25DU0.25
	0.25...0.40	10A	TA25DU0.4
	0.40...0.63	10A	TA25DU0.63
	0.63...1.00	10A	TA25DU1.0
	1.00...1.40	10A	TA25DU1.4
	1.30...1.80	10A	TA25DU1.8
	1.70...2.40	10A	TA25DU2.4
	2.20...3.10	10A	TA25DU3.1
	2.80...4.00	10A	TA25DU4.0
	3.50...5.00	10A	TA25DU5.0
	4.50...6.50	10A	TA25DU6.5
	6.00...8.50	10A	TA25DU8.5
	7.50...11.00	10A	TA25DU11
	10.00...14.00	10A	TA25DU14
	13.00...19.00	10A	TA25DU19
	18.00...25.00	10A	TA25DU25
24.00...32.00	10A	TA25DU32	
TA42DU thermal overload relays			
A/E/L30...A/E/L40	18.0...25.0	10A	TA42DU25
	22.0...32.0	10A	TA42DU32
	29.0...42.0	10A	TA42DU42
E16DU electronic overload relays			
A/E/L9...A/E/L16, A/E/L9N00... A/E/L16N0	0.10...0.32	10E, 20E, 30E	E16DU0.32
	0.30...1.00	10E, 20E, 30E	E16DU1.0
	0.80...2.70	10E, 20E, 30E	E16DU2.7
	1.90...6.30	10E, 20E, 30E	E16DU6.3
	5.70...18.9	10E, 20E, 30E	E16DU18.9
E45DU electronic overload relays			
A/E/L26...A/E/L40, A/E/L26N1	9.00...30.0	10E, 20E, 30E	E45DU30
	15.0...45.0	10E, 20E, 30E	E45DU45



TA25DU



TA42DU



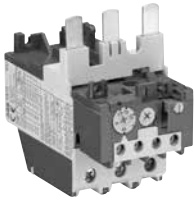
E16DU



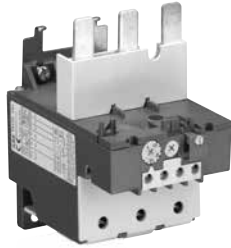
E45DU

Thermal & electronic overload relays

For use with A/E/F50...A/F110, A/E/F50N2...A/E/F75N3
Types TA75DU, TA80DU, TA110DU, E80DU & E140DU



TA75DU



TA110DU



E80DU



E140DU

Ordering details

For contactors	Setting range (A)	Trip class	Catalog number (Class 10A)
TA75DU thermal overload relays			
A/E/F50...A/E/F75, A/E/F50N2... A/E/F75N3	18...25	10A	TA75DU25
	22...32	10A	TA75DU32
	29...42	10A	TA75DU42
	36...52	10A	TA75DU52
	45...63	10A	TA75DU63
	30...80	10A	TA75DU80
TA80DU thermal overload relays			
A/F95...A/F110	29...42	10A	TA80DU42
	36...52	10A	TA80DU52
	45...63	10A	TA80DU63
	60...80	10A	TA80DU80
TA110DU thermal overload relays			
A/F95...A/F110	66...90	10A	TA110DU90
	80...110	10A	TA110DU110
E80DU electronic overload relays			
A/E/F50...A/E/F75, Sz. 2...3	27...80	10E, 20E, 30E	E80DU80
E140DU electronic overload relays			
A/F95...A/F110	50...140	10E, 20E, 30E	E140DU140

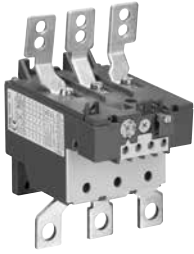
Thermal & electronic overload relays

For use with A/F145...A/F300, A/F145N4...A/F260N5

Types TA200DU, TA450DU, E200DU & E320DU

Ordering details

For contactors	Setting range (A)	Trip class	Catalog number
TA200DU thermal overload relays			
A/F145...A/F185, A/F145N4	66...90	10A	TA200DU90
	80...110	10A	TA200DU110
	100...135	10A	TA200DU135
	110...150	10A	TA200DU150
	130...175	10A	TA200DU175
	150...200	10A	TA200DU200
TA450DU thermal overload relays			
A/F210...A/F300, A/F260N5	130...185	10A	TA450DU185
	165...235	10A	TA450DU235
	220...310	10A	TA450DU310
E200DU electronic overload relays			
A/F145...A/F185, Sz. 4	60...200	10E, 20E, 30E	E200DU200
E320DU electronic overload relays			
A/F210...A/F300, Sz. 5	100...320	10E, 20E, 30E	E320DU320



TA200DU-200



TA450DU



E200DU



E320DU

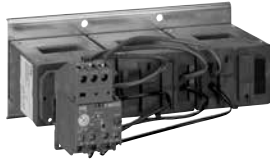
Electronic overload relays

For use with AF400...AF1650, AF460N6...AF1650N8

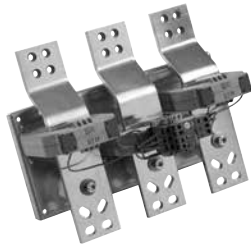
Types E500DU, E800DU & E1250DU



E500DU



E800DU



E1250DU

Ordering details

For contactors	Setting range (A)	Trip class	Catalog number
E500DU electronic overload relays			
AF400...AF460, Sz. 6	150...500	10E, 20E, 30E	E500DU500
E800DU electronic overload relays			
AF580...AF750, Sz. 7	250...800	10E, 20E, 30E	E800DU800
E1250DU electronic overload relays			
AF1350...AF1650, Sz. 8	375...1250	10E, 20E, 30E	E1250DU1250

Terminal shrouds for E500DU and E800DU electronic overload relay

For electronic overload relays	Description	Catalog number
E500DU	LT500E Terminal shroud for E500DU	LT500E
E800DU	LT800E Terminal shroud for E800DU	LT800E

Universal motor controllers

Motor protection, control & diagnostics

UMC100-FBP & accessories

The UMC100-FBP is a flexible, modular and expandable motor management system for constant-speed, low-voltage range motors. Functions include motor protection, control, and diagnostics. Simple, text-based, multilingual diagnosis of motor fault conditions can reduce downtime and improve efficiency.

For more detailed information, please see Publication no. 2CDC135011B0202

Universal motor controller – 0.24...63 A

Type	Description	Catalog number
UMC100-FBP.0	Universal Motor Controller	1SAJ520000R0101
UMC100-FBP.2	Universal Motor Controller, ATEX	1SAJ520000R0201

Note: For applications larger than 63 A, please contact Technical Support regarding the use of current transformers. For power supplies, see Chapter 11.



UMC100-FBP

The UMC100-FBP can be expanded to include one (1) I/O expansion module DX111 or DX122 and one (1) voltage module VI150 or VI155. Expansion modules are connected via 2-wire bus. The maximum distance allowed between the UMC100-FBP and the expansion modules is 3 m.

Voltage expansion modules

Type	Description	Catalog number
VI150-FBP.0	3 analog inputs 150...690V AC, 1 relay output, for 3-phase networks (grounded)	1SAJ650000R0100
VI155-FBP.0	3 analog inputs 150...690V AC, 1 relay output, for 3-phase networks (all)	1SAJ655000R0100

Voltage modules for determining phase voltages, power factor (cos φ), active power, apparent power, energy, harmonic content (THD)



DX111-FBP.0

Operating panel

Type	Description	Catalog number
UMC100-PAN	Operating, diagnostics and parameter setting panel; direct UMC mounting	1SAJ590000R0102
UMCPAN-CAB.070	0.7 m ext. cable with door mounting set	1SAJ510003R0001
UMCPAN-CAB.150	1.5 m ext. cable with door mounting set	1SAJ510004R0001
UMCPAN-CAB.30	3 m ext. cable with door mounting set	1SAJ510002R0001
DTM software	Advanced programming, parameter assignment	1SAJ924012R0004

- For direct installation on UMC100-FBP or panel door (accessory required)
- Graphics-enabled, backlit display, 3 LEDs for status indication
- Configurable error messages, simple programming using key pad
- Multilingual: English, German, French, Italian, Portuguese, Spanish, and Russian



VI155-FBP.0



UMC100-PAN

Universal motor controllers

Motor protection, control & diagnostics

Accessories for UMC100-FBP



CEM11-FBP

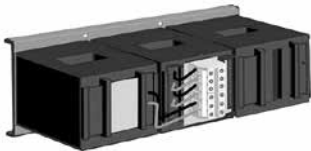
Ground fault monitors

Type	Ground fault currents (mA)	Through-hole diameter	Catalog number
CEM11-FBP.20	80, 300, 550, 750, 1000, 1200, 1500, 1700	20 mm	1SAJ929200R0020
CEM11-FBP.35	100, 500, 1000, 1400, 2000, 2400, 3000, 3400	35 mm	1SAJ929200R0035
CEM11-FBP.60	120, 1000, 2000, 2500, 4000, 4800, 6000, 6800	60 mm	1SAJ929200R0060
CEM11-FBP.120	300, 2000, 4000, 5900, 8000, 9600, 12000, 13600	120 mm	1SAJ929200R0120

Note: lower values have higher inaccuracy

Current transformers KORC

Type	Designation	Recommended current range	Catalog number
KORC 4L 185 R/4	Current transformer	60...185 A	1SCA022193R7830
KORC 4L 310 R/4	Current transformer	180...310 A	1SCA022181R0760
KORC 5L 500 R/4	Current transformer	300...500 A	1SCA022208R1010
KORC 5L 850 R/4	Current transformer	500...850 A	1SCA022208R1440



KORC 5L

KORC connection kit for contactors

Type	Designation	For contactors	Catalog number
DT 450 / A185	Connection kit	A/F145...A/F185	1SAZ501901R1001
DT 450 / A300	Connection kit	A/F210...A/F300	1SAZ501902R1001
DT 500 / AF460L	Connection kit, wye-delta starter	AF400...AF460	1SAX701902R1001
DT 800 / AF750L	Connection kit, wye-delta starter	AF580...AF750	1SAX801902R1001

Panel adaptors, coupling units, shrouds & lug kits

For thermal & electronic OLRs

2



DB16



DB42



ATK185



ATK750/3

Panel mounting adaptors

For overload relays	Catalog number
T16	DB16
TF42	DB42
TA25DU0.16...25	DB25/25A
TA25DU32	DB25/32A
TA42DU, TA75DU, TA80DU	DB80
TA110DU, TA200DU	DB200
E16DU	DB16E
E45DU	DB45E
E80DU	DB80E
E140DU	DB140E

Note: TA450DU, E200DU...E1250DU are panel-mount standard.

Panel mounting adaptors

For overload relays	To contactors	Catalog number
TA450DU	A/F145...A/F185	DT450/A185
	A/F210...A/F300	DT450/A300
E500DU	AF400...AF460	DT500/AF460S
	AF400...AF460 w/ reversing bus	DT500/AF460L
E800DU	AF580...AF750	DT800/AF750S
	AF580...AF750 w/ reversing bus	DT800/AF750L

Note: T16, TF42, EF19/45, and E16DU...E320DU couple directly to contactors w/o accessory.

Terminal shrouds

For overload relays	Catalog number
TA200DU (load side)	LT200A185
E200DU200	LT200E
E320DU320	LT300E
E500DU500	LT500E
E800DU800	LT800E

Panel mounting adaptors

For overload relays	Wire		Catalog number
	Range	Capacity	
TA110DU, TA200DU	6 AWG...250 MCM	1	EHTK210
TA450DU185...235	4 AWG...400 MCM	1	ATK300HK
TA450DU310	4 AWG...500 MCM	2	ATK300/2HK
E200DU200	4 AWG...300 MCM	1	ATK185
	4 AWG...400 MCM	1	ATK300
E320DU320	4 AWG...500 MCM	2	ATK300/2
	2/0 AWG...500 MCM	2	ATK580/2HK
E500DU500	2/0 AWG...500 MCM	2	ATK580/2HK
E800DU800	2/0 AWG...500 MCM	3	ATK750/3HK
E1250DU1250	4/0 AWG...500 MCM	4	ATK1350/4

Remote function coils

For Type TA25DU overload relays



DS25A



DR25A

Remote tripping coils

U voltage at 50/60 Hz		Catalog number ①
DS25-A remote tripping coil		
	24V	DS25-A-24
	48V	DS25-A-48
	110V	DS25-A-110
	220/380V	DS25-A-220/380
	500V	DS25-A-500
DS25-A remote resetting coil		
	24V	DR25-A-24
	48V	DR25-A-48
	110V	DR25-A-110
	220/380V	DR25-A-220/380
	500V	DR25-A-500

Application

- The DS25-A coil is used for remote electrical tripping of the TA25 DU thermal O/L relay and is connected to the relay's normally closed 95-96 auxiliary contact.
- The DR 25-A coil is used for remote electrical resetting of the TA25DU thermal O/L relay which is adjusted for "Manual resetting;" it is connected to the relay's normally open 97-98 auxiliary contact.

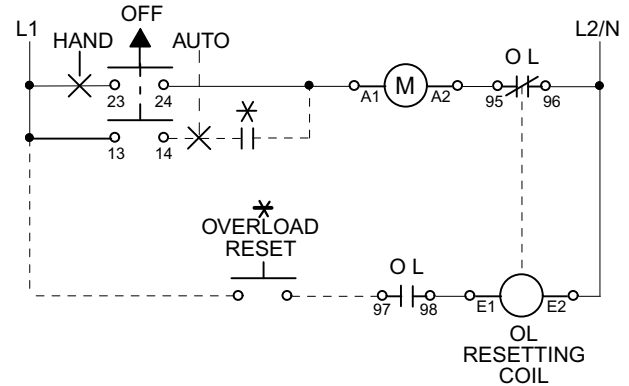
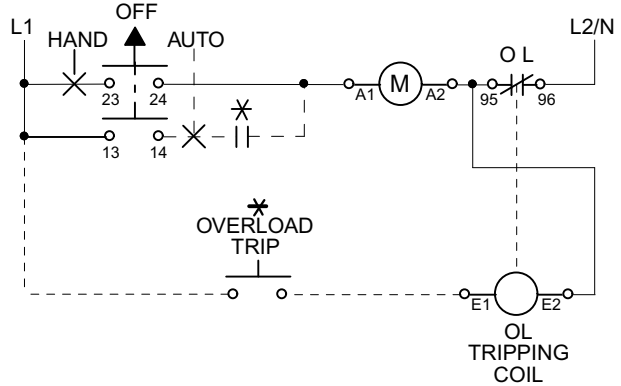
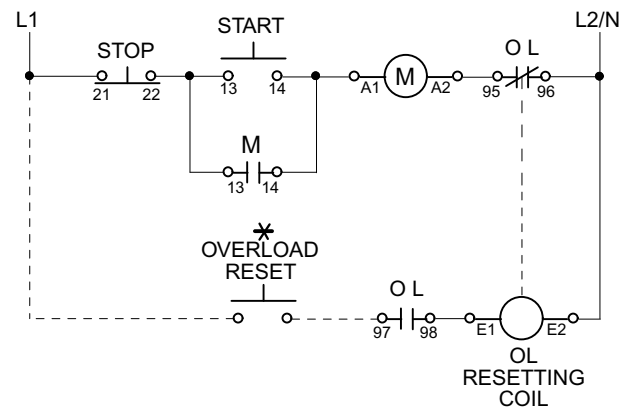
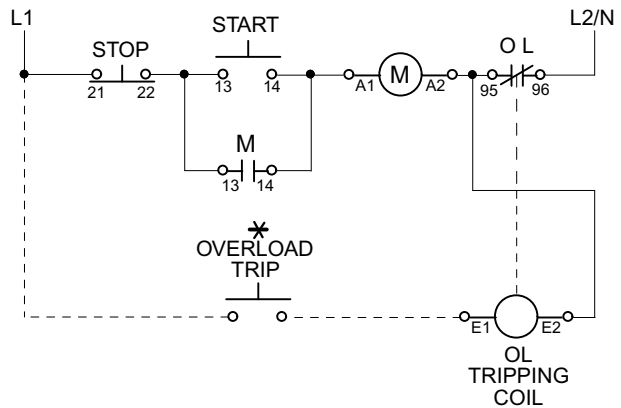
The coils are not designed for continuous duty. Impulse duration: 0.2 to 0.35 s.

Set the button to "Man" (Manual resetting).

Mounting: clipped on to TA25DU thermal O/L relay.

Installation diagrams

For connection of DS25-A to TA25DU relay For connection of DR25-A to TA25DU relay



① Cannot be used with TA42, TA75, or TA200 overload relays.

FBP FieldBusPlug

DeviceNet, MODBUS-RTU and CANopen, ordering details

For use with UMC100

DeviceNet FieldBusPlug

Ready-made DeviceNet fieldbus interface with various cable lengths.

- Applicable on all FBP motor starters and other devices
- Degree of protection IP65, diagnostic LED

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
DeviceNet-FBP	0.25 m (0.82 ft)	DNP21-FBP.025	1	0.09 (0.198)	1SAJ230000R1003
DeviceNet-FBP	0.50 m (1.64 ft)	DNP21-FBP.050	1	0.10 (0.220)	1SAJ230000R1005
DeviceNet-FBP	1.00 m (3.28 ft)	DNP21-FBP.100	1	0.13 (0.287)	1SAJ230000R1010
DeviceNet-FBP	5.00 m (16.40 ft)	DNP21-FBP.500	1	0.36 (0.794)	1SAJ230000R1050



DNP21-FBP
MRP21-FBP
COP21-FBP

MODBUS-RTU FieldBusPlug

Ready-made MODBUS-RTU fieldbus interface with various cable lengths.

- Applicable on all FBP motor starters and other devices
- Degree of protection IP65, diagnostic LED

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
MODBUS-RTU-FBP	0.25 m (0.82 ft)	MRP21-FBP.025	1	0.09 (0.198)	1SAJ250000R0003
MODBUS-RTU-FBP	0.50 m (1.64 ft)	MRP21-FBP.050	1	0.10 (0.220)	1SAJ250000R0005
MODBUS-RTU-FBP	1.00 m (3.28 ft)	MRP21-FBP.100	1	0.13 (0.287)	1SAJ250000R0010
MODBUS-RTU-FBP	5.00 m (16.40 ft)	MRP21-FBP.500	1	0.36 (0.794)	1SAJ250000R0050

CANopen FieldBusPlug

Ready-made CANopen fieldbus interface with various cable lengths.

- Applicable on all FBP motor starters and other devices
- Degree of protection IP65, diagnostic LED

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
CANopen-FBP	0.25 m (0.82 ft)	COP21-FBP.025	1	0.09 (0.198)	1SAJ230100R1003
CANopen-FBP	0.50 m (1.64 ft)	COP21-FBP.050	1	0.10 (0.220)	1SAJ230100R1005
CANopen-FBP	1.00 m (3.28 ft)	COP21-FBP.100	1	0.13 (0.287)	1SAJ230100R1010

FBP FieldBusPlug

DeviceNet, MODBUS-RTU and CANopen accessories,
For use with UMC100

Accessories for the DeviceNet, MODBUS-RTU and CANopen bus connector



DNF11-FBP.050



DNM11-FBP.050

DeviceNet, MODBUS-RTU and CANopen round cable for bus junctions

Ready-made bus cable with an M12 connector and an open cable end.

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Round cable with female connector	0.50 m (1.64 ft)	DNF11-FBP.050	1	0.04 (0.088)	1SAJ923002R0005
Round cable with male connector	0.50 m (1.64 ft)	DNM11-FBP.050	1	0.04 (0.088)	1SAJ923003R0005



DNX11-FBP

DeviceNet, MODBUS-RTU and CANopen round cable for bus extension

Ready-made bus cable with M12 male and female connectors

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Extension cable	1.00 m (3.28 ft)	DNX11-FBP.100	1	0.08 (0.176)	1SAJ923001R0010
Extension cable	3.00 m (9.84 ft)	DNX11-FBP.300	1	0.20 (0.441)	1SAJ923001R0030
Extension cable	5.00 m (16.40 ft)	DNX11-FBP.500	1	0.31 (0.683)	1SAJ923001R0050
Round cable	100.00 m (328 ft)	DNC11-FBP.999	1	5.60 (12.346)	1SAJ923004R1000



DNM11-FBP.0

DNF11-FBP.0



DNR11-FBP.120

DeviceNet, MODBUS-RTU and CANopen round cable connectors

Bus cable and coupling accessories

Designation	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Male connector for round cable	DNM11-FBP.0	5	0.15 (0.331)	1SAJ923005R0001
Female connector for round cable	DNF11-FBP.0	5	0.15 (0.331)	1SAJ923006R0001

DeviceNet, MODBUS-RTU and CANopen termination resistor

Designation	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Termination Resistor, 120 Ohm	DNR11-FBP.120	1	0.02 (0.044)	1SAJ923007R0001

FBP FieldBusPlug

Profibus DP

For use with UMC100



PDP22-FBP

Profibus DP FieldBusPlug

Ready-made Profibus DP fieldbus interface with various cable lengths.

- Supports PROFIBUS DP V0 and V1
- Applicable on all FBP motor starters and other devices
- Degree of protection IP65, diagnostic LED

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Profibus DP FBP	0.25 m (0.82 ft)	PDP22-FBP.025	1	0.09 (0.198)	1SAJ240100R1003
Profibus DP FBP	0.50 m (1.64 ft)	PDP22-FBP.050	1	0.10 (0.220)	1SAJ240100R1005
Profibus DP FBP	1.00 m (3.28 ft)	PDP22-FBP.100	1	0.13 (0.287)	1SAJ240100R1010
Profibus DP FBP	2.00 m (6.56 ft)	PDP22-FBP.200	1	0.20 (0.441)	1SAJ240100R1020
Profibus DP FBP	5.00 m (16.40 ft)	PDP22-FBP.500	1	0.36 (0.794)	1SAJ240100R1050



PDQ22-FBP

Profibus DP FieldBusPlug for 4 devices

PDQ22 is a member of the ABB FieldBusPlug family of bus connectors. It allows the connection of up to four devices to Profibus DP by just using one Profibus node access. This allows a cost efficient device integration for devices that are located physically nearby. PDQ22 supports DP-V0 and DP-V1. The degree of protection is IP66. There are separate diagnosis LEDs for bus and device status.

Note that the accessory PDQ22-FBP only works with the PSR and PSE and not with the PST(B) softstarter.

Designation	Type	Packing piece	Catalog number
Quadruple bus connector	PDQ22-FBP	1	1SAJ240200R0050
DINrail adapter for PDQ22-FBP	CDA11-FBP.0	1	1SAJ929300R0001
Fixing bracket for passive plug of connection cable	CDP11-FBP.0	1	1SAJ929100R0001



Configuration software

This cable and software can be used for set-up and commissioning of the softstarter as well as to keep back-up of the parameter settings.

Designation	Type	Packing piece	Catalog number
USB to FBP interface cable	UTF21-FBP	1	1SAJ929400R0002
PDP22/PDQ22 Device Type Manager (DTM) incl. FDT/DTM frame application	PBDM-FBP	1	1SAJ924012R0003

FBP FieldBusPlug

Profibus DP accessories

For use with UMC100

Accessories for the Profibus DP Bus Connector

Profibus DP Round Cable for Bus Junctions

Ready-made bus cable with an M12 connector and an open cable end.

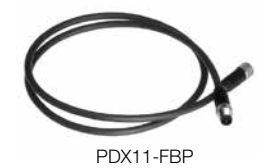
- Application on bus junctions such as e.g. Profibus DB couplers or devices with an integrated Profibus DB interface



Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Round Cable with female connector	0.50 m (1.64 ft)	PDF11-FBP.050	1	0.04 (0.088)	1SAJ924002R0005
Round Cable with male connector	0.50 m (1.64 ft)	PDM11-FBP.050	1	0.04 (0.088)	1SAJ924003R0005

Profibus DP Round Cable for Bus Extension

Ready-made bus cable with M12 male and female connectors
Round cable on coil



Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Extension Cable	0.50 m (1.64 ft)	PDX11-FBP.050	1	0.04 (0.088)	1SAJ924001R0005
Extension Cable	1.00 m (3.28 ft)	PDX11-FBP.100	1	0.08 (0.176)	1SAJ924001R0010
Extension Cable	3.00 m (9.84 ft)	PDX11-FBP.300	1	0.20 (0.441)	1SAJ924001R0030
Extension Cable	5.00 m (16.40 ft)	PDX11-FBP.500	1	0.31 (0.683)	1SAJ924001R0050
Round Cable	100.00 m (328 ft)	PDC11-FBP.999	1	5.60 (12.346)	1SAJ924004R1000



Profibus DP Accessories for Bus Extension

Designation	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Male Connector for round cable	PDM11-FBP.0	5	0.03 (0.066)	1SAJ924005R0001
Female Connector for round cable	PDF11-FBP.0	5	0.03 (0.066)	1SAJ924006R0001



Profibus DP Termination Resistor, Miscellaneous Accessories

Designation	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Termination Resistor, 150 Ohm	PDR11-FBP.150	1	0.03 (0.066)	1SAJ924007R0001
Feeding connector 24V DC, Code B-A	PDV11-FBP.0	1	0.04 (0.088)	1SAJ924008R0001
Feeding connector 24V DC, Code A-A	PDV12-FBP.0	1	0.04 (0.088)	1SAJ924011R0001
Adaptor M12-Dsub9-M12 Cable length 0.50m	PDA11-FBP.050	1	0.04 (0.088)	1SAJ924009R0005
Adaptor M12-Dsub9-M12 Cable length 2 x 0.50m	PDA12-FBP.050	1	0.04 (0.088)	1SAJ924010R0005

Extension cable

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Extension cable (female/male), shielded	0.3 m (0.98 ft)	CDP15-FBP.030	1		1SAJ929140R0003
Extension cable (female/male), shielded	0.6 m (1.97 ft)	CDP15-FBP.060	1		1SAJ929140R0006
Extension cable (female/male), shielded	1.5 m (4.92 ft)	CDP15-FBP.150	1	0.20 (0.441)	1SAJ929140R0015
Extension cable (male/open), shielded	1.5 m (4.92 ft)	CDP16-FBP.150	1	0.20 (0.441)	1SAJ929150R0015

IEC technical data

T16 & TF42 thermal OLRs

Utilization & auxiliary characteristics

2

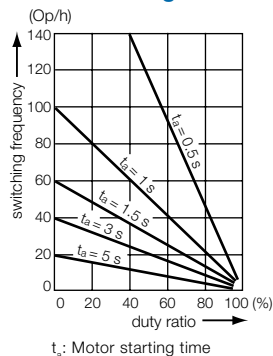
Main circuit – Utilization characteristics according to IEC/EN

Type	T16 & TF42
Standards	IEC/EN 60947-4-1, IEC/EN 60947-5-1, IEC/EN 60947-1
Rated operational voltage U_n	690 V AC
Rated frequency	50/60 Hz
Trip class	10
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type		T16
Rated operational voltage U_n		600 V
Conventional free air thermal current I_n	N.C., 95-96	6 A
	N.O., 97-98	4 A
Rated frequency		DC, 50/60 Hz
Number of poles		1 N.O. + 1 N.C.
I_g / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	N.C., 95-96	3.00 A
	N.O., 97-98	0.75 A
220-230-240 V	N.C., 95-96	3.00 A
	N.O., 97-98	0.75 A
440 V	N.C., 95-96	0.75 A
	N.O., 97-98	0.75 A
480-500 V	N.C., 95-96	0.75 A
	N.O., 97-98	0.75 A
I_g / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category		
24 V	N.C., 95-96	1.25 A
	N.O., 97-98	1.25 A
60 V	N.C., 95-96	0.55 A
	N.O., 97-98	0.55 A
110-120-125 V	N.C., 95-96	0.55 A
	N.O., 97-98	0.55 A
250 V	N.C., 95-96	0.27 A
	N.O., 97-98	0.27 A
Minimum switching capacity		17 V / 3 mA
Short-circuit protective device	N.C., 95-96	6 A, Fuse type gG
	N.O., 97-98	4 A, Fuse type gG
Rated impulse withstand voltage U_{imp}		6 kV
Rated insulation voltage U_i		690 V

Technical diagram – Intermittent periodic duty



UL / CSA technical data

T16 thermal OLRs

Utilization & auxiliary characteristics

Main circuit – Utilization characteristics according to UL/CSA

Type	T16
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC
Trip rating	125 % of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		T16
Contact rating	N.C., 95-96	B600, Q300
	N.O., 97-98	D300, Q300
Conventional thermal current	N.C., 95-96	5 A
	N.O., 97-98	2.5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device			
		480 / 600 V AC		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type
T16-0.13	0.13 A	18 kA	1 A, K5	100 kA	30 A, Class J
T16-0.17	0.17 A	18 kA	1 A, K5	100 kA	30 A, Class J
T16-0.23	0.23 A	18 kA	1 A, K5	100 kA	30 A, Class J
T16-0.31	0.31 A	18 kA	3 A, K5	100 kA	30 A, Class J
T16-0.41	0.41 A	18 kA	3 A, K5	100 kA	30 A, Class J
T16-0.55	0.55 A	18 kA	3 A, K5	100 kA	30 A, Class J
T16-0.74	0.74 A	18 kA	3 A, K5	100 kA	30 A, Class J
T16-1.0	1.00 A	18 kA	6 A, K5	100 kA	30 A, Class J
T16-1.3	1.30 A	18 kA	6 A, K5	100 kA	30 A, Class J
T16-1.7	1.70 A	18 kA	6 A, K5	100 kA	30 A, Class J
T16-2.3	2.30 A	18 kA	10 A, K5	100 kA	30 A, Class J
T16-3.1	3.10 A	18 kA	10 A, K5	100 kA	30 A, Class J
T16-4.2	4.20 A	18 kA	15 A, K5	100 kA	30 A, Class J
T16-5.7	5.70 A	18 kA	20 A, K5	100 kA	30 A, Class J
T16-7.6	7.60 A	18 kA	25 A, K5	100 kA	30 A, Class J
T16-10	10.0 A	18 kA	35 A, K5	100 kA	45 A, Class J
T16-13	13.0 A	18 kA	40 A, K5	100 kA	45 A, Class J
T16-16	16.0 A	18 kA	60 A, K5	100 kA	45 A, Class J

UL / CSA technical data

TF42 thermal OLRs

Utilization & auxiliary characteristics

2

Main circuit – Utilization characteristics according to UL/CSA

Type	TF42
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC
Trip rating	125 % of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		TF42
Contact rating	N.C., 95-96	B600, Q300
	N.O., 97-98	D300, Q300
Conventional thermal current	N.C., 95-96	5 A
	N.O., 97-98	2.5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device			
		480 / 600 V AC		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type
TF42-0.13	0.13 A	18 kA	1 A, K5	100 kA	30 A, Class J
TF42-0.17	0.17 A	18 kA	1 A, K5	100 kA	30 A, Class J
TF42-0.23	0.23 A	18 kA	1 A, K5	100 kA	30 A, Class J
TF42-0.31	0.31 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-0.41	0.41 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-0.55	0.55 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-0.74	0.74 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-1.0	1.00 A	18 kA	6 A, K5	100 kA	30 A, Class J
TF42-1.3	1.30 A	18 kA	6 A, K5	100 kA	30 A, Class J
TF42-1.7	1.70 A	18 kA	6 A, K5	100 kA	30 A, Class J
TF42-2.3	2.30 A	18 kA	10 A, K5	100 kA	30 A, Class J
TF42-3.1	3.10 A	18 kA	10 A, K5	100 kA	30 A, Class J
TF42-4.2	4.20 A	18 kA	15 A, K5	100 kA	30 A, Class J
TF42-5.7	5.70 A	18 kA	20 A, K5	100 kA	30 A, Class J
TF42-7.6	7.60 A	18 kA	25 A, K5	100 kA	30 A, Class J
TF42-10	10.0 A	18 kA	35 A, K5	100 kA	45 A, Class J
TF42-13	13.0 A	18 kA	40 A, K5	100 kA	45 A, Class J
TF42-16	16.0 A	18 kA	60 A, K5	100 kA	45 A, Class J
TF42-20	20.0 A	18 kA	80 A, K5	100 kA	60 A, Class J
TF42-24	24.0 A	18 kA	80 A, K5	100 kA	60 A, Class J
TF42-29	29.0 A	18 kA	100 A, K5	100 kA	100 A, Class J
TF42-35	35.0 A	18 kA	150 A, K5	100 kA	175 A, Class J
TF42-38	38.0 A	18 kA	150 A, K5	100 kA	175 A, Class J

General technical data

T16 thermal OLRs



Terminal & operating characteristics

General technical data

Type	T16	
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +60 °C
	Open	-25 ... +60 °C
Storage		-50 ... +80 °C
Ambient air temperature compensation	Continuous	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	25 g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6	3 g / 3 ... 150 Hz	
Mounting position	Position 1-5	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)	
Degree of protection	IP20	





Electrical connection

Main circuit

Type	T16	
Connecting capacity		
 Rigid	1 x 2 x	0.75 ... 4 mm ² 0.75 ... 1.5 mm ² or 1.5 ... 4 mm ² ¹⁾
 Flexible	1 x or 2 x	0.75 ... 4 mm ²
Stranded acc. to UL/CSA	1 x or 2 x	AWG 18-10
Flexible acc. to UL/CSA	1 x or 2 x	AWG 18-10
Stripping length	12 mm	
Tightening torques	1.1 ... 1.5 Nm / 9 ... 13 lb.in	
Connection screw	M4 (Pozi driv 2)	

¹⁾ Combination of different wires not possible

Auxiliary circuit

Type	T16	
Connecting capacity		
 Rigid	1 x or 2 x	0.75 ... 4 mm ²
 Flexible with ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x 2 x	0.75 ... 2.5 mm ² 0.75 ... 1.5 mm ²
 Flexible	1 x or 2 x	0.75 ... 1 mm ² or 1 ... 2.5 mm ²
Stranded acc. to UL/CSA	1 x or 2 x	AWG 18-12
Flexible acc. to UL/CSA	1 x or 2 x	AWG 18-12
Stripping length	9 mm	
Tightening torques	1.1 ... 1.5 Nm / 9 ... 13 lb.in	
Connection screw	M3 (Pozi driv 2)	

General technical data

TF42 thermal OLRs

Terminal & operating characteristics



2

General technical data

Type	TF42
Pollution degree	3
Phase loss sensitive	Yes
Ambient air temperature	
Operation	
Open - compensated without derating	-25 ... +60 °C
Open	-25 ... +60 °C
Storage	-50 ... +80 °C
Ambient air temperature compensation	Continuous
Maximum operating altitude permissible	2000 m
Resistance to shock acc. to IEC 60068-2-27	25 g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6	3 g / 3 ... 150 Hz
Mounting position	Position 1-5
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)
Degree of protection	IP20





Electrical connection

Main circuit

Type	TF42 (TF42-0.13 ... TF42-16)	TF42 (TF42-20 ... TF42-38)
Connecting capacity		
 Rigid	1 x or 2 x 0.75 ... 4 mm ²	1.5 ... 2.5 mm ² or 2.5 ... 10 mm ² ¹⁾
 Flexible with insulated ferrule	1 x or 2 x 0.75 ... 4 mm ²	2.5 ... 4 mm ² or 4 ... 6 mm ²
Stranded acc. to UL/CSA	1 x or 2 x AWG 18-10	AWG 14-6
Flexible acc. to UL/CSA	1 x or 2 x AWG 18-10	AWG 14-6
Stripping length		12 mm
Tightening torques	1.5 - 2.5 Nm / 13 ... 22 lb.in	2.5 - 2.7 Nm / 22 lb.in
Connection screw		M4 (Pozidriv 2)

¹⁾ Combination of different wires not possible

Auxiliary circuit

Type	TF42
Connecting capacity	
 Rigid	1 x or 2 x 0.75 ... 4 mm ²
 Flexible with ferrule	1 x or 2 x 0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x 0.75 ... 2.5 mm ²
Flexible	2 x 0.75 ... 1.5 mm ²
 Flexible	1 x or 2 x 0.75 ... 1 mm ² or 1 ... 2.5 mm ²
Stranded acc. to UL/CSA	1 x or 2 x AWG 18-12
Flexible acc. to UL/CSA	1 x or 2 x AWG 18-12
Stripping length	9 mm
Tightening torques	1.1 ... 1.5 Nm / 9 ... 13 lb.in
Connection screw	M3 (Pozidriv 2)

IEC technical data

EF19 & EF45 electronic OLRs

Utilization & auxiliary characteristics

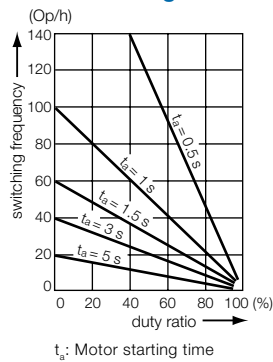
Main circuit – Utilization characteristics according to IEC/EN

Type	EF19	EF45
Standards	IEC 60947-1 / 60947-4-1 / 60947-5-1 and EN 60947-1 / 60947-4-1 / 60947-5-1	
Rated operational voltage U_e	690 V AC	
Rated frequency	50/60 Hz	
Trip class	10E, 20E, 30E, selectable	
Number of poles	3	
Duty time	100 %	
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"	
Rated impulse withstand voltage U_{imp}	6 kV	
Rated insulation voltage U_i	690 V AC	

Auxiliary circuit according to IEC/EN

Type	EF19	EF45
Rated operational voltage U_e	600 V AC / DC	
Conventional free air thermal current I_{th}	6 A	
Rated frequency	DC, 50/60 Hz	
Number of poles	1 N.C. + 1 N.O.	
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	50/60 Hz	3.00 A
220-230-240 V	50/60 Hz	3.00 A
440 V	50/60 Hz	1.10 A
480-500 V	50/60 Hz	0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category		
24 V		1.50 A
60 V		0.55 A
110-120-125 V		0.55 A
250 V		0.27 A
Minimum switching capacity	12 V / 3 mA	
Short-circuit protective device	6 A, Fuse type gG	
Rated impulse withstand voltage U_{imp}	6 kV	
Rated insulation voltage U_i	690 V	

Technical diagram – Intermittent periodic duty



UL / CSA technical data

EF19 & EF45 electronic OLRs

Utilization & auxiliary characteristics

2

Main circuit – Utilization characteristics according to UL/CSA

Type	EF19	EF45
Standards	UL 508, CSA 22.2 No. 14	
Maximum operational voltage	600 V AC	
Trip rating	125 % of FLA	
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"	
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"	
Short-circuit protective device	See table "Full load amps and short-circuit protective device"	

Auxiliary circuit according to UL/CSA

Type	EF19	EF45
Contact rating	N.C., 95-96 N.O., 97-98	B600, Q600 B600, Q600
Conventional thermal current	5 A	

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
EF19-0.32	0.32 A	50 kA	2 A, Class J	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
EF19-1.0	1.00 A	50 kA	2 A, K5 / RK5	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
EF19-2.7	2.70 A	50 kA	4 A, K5 / RK5	5 kA	4 A, K5 / RK5	100 kA	4 A, Class J
EF19-6.3	6.30 A	50 kA	15 A, K5 / RK5	5 kA	15 A, K5 / RK5	100 kA	15 A, Class J
EF19-18.9	18.90 A	50 kA	30 A, K5 / RK5	5 kA	30 A, K5 / RK5	100 kA	30 A, Class J

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
EF45-30	30 kA	18 kA	150 A, K5 / RK5	18 kA	150 A, K5 / RK5	100 kA	150 A, Class J
EF45-45	45 kA	18 kA	200 A, K5 / RK5	18 kA	200 A, K5 / RK5	100 kA	200 A, Class J

General technical data

EF19 & EF45 electronic OLRs



Terminal & operating characteristics

General data





Type	EF19	EF45
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +70 °C
Storage		-50 ... +85 °C
Ambient air temperature compensation		Continuous
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		15 g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6		1 g / 3 ... 150 Hz
Mounting position		Position 1-6
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals	
Degree of protection		IP20

Electrical connection

Main circuit

Type	EF19	EF45
Connecting capacity		
 Rigid	1 or 2 x 1 ... 4 mm ²	2.5 ... 16 mm ²
 Flexible with insulated ferrule	1 or 2 x 0.75 ... 2.5 mm ²	2.5 ... 10 mm ²
Stranded acc. to UL/CSA	1 or 2 x AWG 16-10	AWG 14-6
Flexible acc. to UL/CSA	1 or 2 x AWG 16-10	AWG 14-6
Stripping length	9 mm	13 mm
Tightening torques	0.8 ... 1.5 Nm / 7 ... 13 lb.in	2.3 ... 2.6 Nm / 20 ... 22 lb.in
Connection screw	M3.5 (Pozi driv 2)	

Auxiliary circuit

Type	EF19	EF45
Connecting capacity		
 Rigid	1 or 2 x 1 ... 4 mm ²	
 Flexible with ferrule	1 or 2 x 0.75 ... 2.5 mm ²	
 Flexible with insulated ferrule	1 or 2 x 0.75 ... 2.5 mm ²	
 Flexible	1 or 2 x 0.75 ... 2.5 mm ²	
Stranded acc. to UL/CSA	1 or 2 x AWG 18-10	
Flexible acc. to UL/CSA	1 or 2 x AWG 18-10	
Stripping length	9 mm	
Tightening torques	0.8 ... 1.2 Nm / 7 ... 11 lb.in	
Connection screw	M3 (Pozi driv 2)	

IEC technical data

TA25DU, TA42DU, TA75DU, TA80DU & TA110DU thermal OLRs Utilization & auxiliary characteristics

2

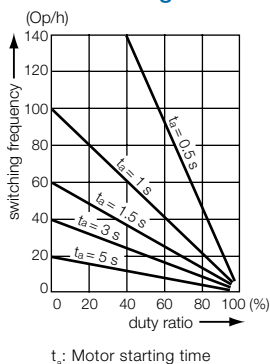
Main circuit – Utilization characteristics according to IEC/EN

Type	TA25DU	TA42DU	TA75DU	TA80DU	TA110DU
Standards	IEC/EN 60947-4-1, IEC/EN 60947-5-1, IEC/EN 60947-1				
Rated operational voltage U_e	690 V AC				
Rated frequency	DC, 50/60 Hz				
Frequency range	0 ... 400 Hz				
Trip class	10A				
Number of poles	3				
Duty time	100 %				
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"				
Rated impulse withstand voltage U_{imp}	6 kV				
Rated insulation voltage U_i	690 V AC				

Auxiliary circuit according to IEC/EN

Type	TA25DU	TA42DU	TA75DU	TA80DU	TA110DU
Rated operational voltage U_e	500 V AC, 440 V DC				
Conventional free air thermal current I_n	N.C., 95-96 N.O., 97-98		10 A 6 A		
Rated frequency	DC, 50/60 Hz				
Number of poles	1 N.O. + 1 N.C.				
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category					
110-120 V	N.C., 95-96 N.O., 97-98		3.00 A 3.00 A		
220-230-240 V	N.C., 95-96 N.O., 97-98		3.00 A 3.00 A		
440 V	N.C., 95-96 N.O., 97-98		1.90 A 1.00 A		
480-500 V	N.C., 95-96 N.O., 97-98		1.00 A 1.00 A		
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category					
24 V	N.C., 95-96 N.O., 97-98		1.25 A 1.25 A		
60 V	N.C., 95-96 N.O., 97-98		0.25 A 0.25 A		
110-120-125 V	N.C., 95-96 N.O., 97-98		0.25 A 0.25 A		
250 V	N.C., 95-96 N.O., 97-98		0.12 A 0.04 A		
Minimum switching capacity	17 V / 3 mA				
Short-circuit protective device	N.C., 95-96 N.O., 97-98		10 A, Fuse type gG 6 A, Fuse type gG		
Rated impulse withstand voltage U_{imp}	6 kV				
Rated insulation voltage U_i	690 V				

Technical diagram – Intermittent periodic duty



UL / CSA technical data

TA25DU & TA42DU thermal OLRs

Utilization & auxiliary characteristics

Main circuit – Utilization characteristics according to UL/CSA

Type	TA25DU	TA42DU
Standards	UL 508, CSA 22.2 No. 14	
Maximum operational voltage	600 V AC	
Trip rating	125 % of FLA	
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"	
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"	
Short-circuit protective device	See table "Full load amps and short-circuit protective device"	

Auxiliary circuit according to UL/CSA

Type	TA25DU	TA42DU
Contact rating	N.C., 95-96 N.O., 97-98	C600 B600
Conventional thermal current	5 A	

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device						
		480 / 600 V AC		480 / 600 V AC		480 / 600 V AC		Fuse type
		Short circuit rating RMS symmetrical	Fuse type	Listed circuit breaker	Short circuit rating RMS symmetrical	Listed circuit breaker	Short circuit rating RMS symmetrical	
TA25DU OLRs								
TA25DU-0.16	0.16 A	5 kA	1.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-0.25	0.25 A	5 kA	1.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-0.4	0.40 A	5 kA	3.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-0.63	0.63 A	5 kA	3.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-1.0	1.0 A	5 kA	6.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-1.4	1.4 A	5 kA	6.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-1.8	1.8 A	5 kA	6.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-2.4	2.4 A	5 kA	10 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-3.1	3.1 A	5 kA	10 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-4.0	4.0 A	5 kA	15 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-5.0	5.0 A	5 kA	20 A, K5 / RK5	20 A	35 / 18 kA	20 A	50 kA	30 A, Class J
TA25DU-6.5	6.5 A	5 kA	25 A, K5 / RK5	20 A	35 / 18 kA	20 A	50 kA	30 A, Class J
TA25DU-8.5	8.5 A	5 kA	35 A, K5 / RK5	20 A	35 / 18 kA	20 A	50 kA	30 A, Class J
TA25DU-11	11 A	5 kA	45 A, K5 / RK5	50 A	35 / 18 kA	50 A	50 kA	35 A, Class J
TA25DU-14	14 A	5 kA	60 A, K5 / RK5	50 A	35 / 18 kA	50 A	50 kA	60 A, Class J
TA25DU-19	19 A	5 kA	60 A, K5 / RK5	50 A	35 / 18 kA	50 A	50 kA	60 A, Class J
TA25DU-25	25 A	5 kA	70 A, K5 / RK5	70 A	35 / 18 kA	70 A	50 kA	100 A, Class J
TA25DU-32	32 A	5 kA	100 A, K5 / RK5	100 A	35 / 18 kA	100 A	50 kA	100 A, Class J
TA42DU OLRs								
TA42DU-25	25 A	5 kA	80 A, K5 / RK5	80 A	35 / 18 kA	80 A	50 kA	100 A, Class J
TA42DU-32	32 A	5 kA	100 A, K5 / RK5	80 A	35 / 18 kA	80 A	50 kA	100 A, Class J
TA42DU-42	42 A	5 kA	150 A, K5 / RK5	80 A	35 / 18 kA	80 A	50 kA	200 A, Class J

UL / CSA technical data

TA75DU, TA80DU & TA110DU thermal OLRs

Utilization & auxiliary characteristics

2

Main circuit – Utilization characteristics according to UL/CSA

Type	TA75DU	TA80DU	TA110DU
Standards	UL 508, CSA 22.2 No. 14		
Maximum operational voltage	600 V AC		
Trip rating	125 % of FLA		
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"		
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"		
Short-circuit protective device	See table "Full load amps and short-circuit protective device"		

Auxiliary circuit according to UL/CSA

Type	TA75DU	TA80DU	TA110DU
Contact rating	N.C., 95-96	C600	
	N.O., 97-98	B600	
Conventional thermal current	5 A		

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device						
		480 / 600 V AC						
		Short circuit rating RMS symmetrical	Fuse type	Listed circuit breaker	Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Listed circuit breaker
TA75DU OLRs								
TA75DU-25	25 A	5 kA	80 A, K5 / RK5	80 A	-	-	-	-
TA75DU-32	32 A	5 kA	100 A, K5 / RK5	80 A	-	-	-	-
TA75DU-42	42 A	5 kA	150 A, K5 / RK5	80 A	-	-	-	-
TA75DU-52	52 A	5 kA	175 A, K5 / RK5	125 A	-	-	-	-
TA75DU-63	63 A	10 kA	200 A, K5 / RK5	125 A	-	-	-	-
TA75DU-80	80 A	10 kA	250 A, K5 / RK5	125 A	-	-	-	-
TA80DU OLRs								
TA80DU-42	42 A	5 kA	150 A, K5 / RK5	80 A	-	-	-	-
TA80DU-52	52 A	5 kA	175 A, K5 / RK5	125 A	-	-	-	-
TA80DU-63	63 A	10 kA	200 A, K5 / RK5	125 A	-	-	-	-
TA80DU-80	80 A	10 kA	250 A, K5 / RK5	125 A	-	-	-	-
TA110DU OLRs								
TA110DU-90	90 A	10 kA	250 A, K5 / RK5	150 A	65 kA	200 A, Class J	65 / 25 kA	150 A
TA110DU-110	110 A	10 kA	250 A, K5 / RK5	250 A	65 kA	200 A, Class J	65 / 25 kA	150 A

General technical data

TA25DU thermal OLRs



Terminal & operating characteristics

General technical data

Type		TA25DU
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +55 °C
	Open	-25 ... +55 °C
Storage		-40 ... +70 °C
Ambient air temperature compensation		Continuous
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		12 g / 15 ms
Mounting position		Position 1-6
Mounting		Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)
Degree of protection		IP20



Electrical connection

Main circuit

Type		TA25DU (0.16-11 A)	TA25DU (14-25 A)	TA25DU (32 A)
Connecting capacity				
 Rigid	1 x	0.75 ... 4 mm ²	1.5 ... 6 mm ²	1.5 ... 10 mm ²
	2 x	0.75 ... 4 mm ²	1.5 ... 6 mm ²	-
 Flexible with insulated ferrule	1 x or 2 x ¹⁾	0.75 ... 4 mm ²	1.5 ... 4 mm ²	1.5 ... 6 mm ²
Stranded acc. to UL/CSA	1 x	AWG 16-8	AWG 16-8	AWG 10-8
	2 x	AWG 16-8	AWG 16-8	-
Flexible acc. to UL/CSA	1 x	AWG 16-8	AWG 16-8	AWG 10-8
	2 x	AWG 16-8	AWG 16-8	-
Stripping length		12 mm	12 mm	15 mm
Tightening torques		1.4 - 2.0 Nm / 12 lb.in	1.4 - 2.0 Nm / 12 lb.in	2.5 - 3.2 Nm / 20 lb.in
Connection screw		M4 (Pozidriv 2)	M4 (Pozidriv 2)	M5 (Pozidriv 2)

¹⁾ Combination of different wires not possible

Auxiliary circuit

Type		TA25DU
Connecting capacity		
 Rigid	1 x or 2 x	0.75 ... 4 mm ²
 Flexible	1 x or 2 x	0.75 ... 2.5 mm ²
Stranded acc. to UL/CSA	1 x or 2 x	AWG 18-14
Flexible acc. to UL/CSA	1 x or 2 x	AWG 18-14
Stripping length		9 mm
Tightening torques		0.8 ... 1.3 Nm / 12 lb.in
Connection screw		M3.5 (Pozidriv 2)

General technical data

TA42DU thermal OLRs

Terminal & operating characteristics



2

General technical data





Type	TA42DU	
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +55 °C
	Open	-25 ... +55 °C
Storage	-40 ... +70 °C	
Ambient air temperature compensation	Continuous	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	12 g / 15 ms	
Mounting position	Position 1-6	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)	
Degree of protection	IP20	

Electrical connection

Main circuit

Type	TA42DU	
Connecting capacity		
 Rigid	1 x	2.5 ... 25 mm ²
	2 x	2.5 ... 16 mm ²
 Flexible with insulated ferrule	1 x	2.5 ... 25 mm ²
	2 x	2.5 ... 10 mm ²
	Stranded acc. to UL/CSA	1 x or 2 x
	Flexible acc. to UL/CSA	1 x or 2 x
		AWG 8-1
		AWG 8-1
Stripping length	14 mm	
Tightening torques	4.5 Nm / 40 lb.in	
Connection screw	M6 (Pozi driv 2)	

Auxiliary circuit

Type	TA42DU	
Connecting capacity		
 Rigid	1 x or 2 x	0.75 ... 4 mm ²
 Flexible with ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible	1 x or 2 x	0.75 ... 2.5 mm ²
	Stranded acc. to UL/CSA	1 x or 2 x
	Flexible acc. to UL/CSA	1 x or 2 x
		AWG 18-14
		AWG 18-14
Stripping length	9 mm	
Tightening torques	0.8 ... 1.3 Nm / 12 lb.in	
Connection screw	M3.5 (Pozi driv 2)	

General technical data

TA75DU thermal OLRs



Terminal & operating characteristics

General technical data





Type	TA75DU	
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +55 °C
	Open	-25 ... +55 °C
Storage		-40 ... +70 °C
Ambient air temperature compensation	Continuous	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	12 g / 15 ms	
Mounting position	Position 1-6	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)	
Degree of protection	IP20	

Electrical connection

Main circuit

Type	TA75DU	
Connecting capacity		
 Rigid	1 x 2 x	2.5 ... 25 mm ² 2.5 ... 16 mm ²
 Flexible with insulated ferrule	1 x 2 x	2.5 ... 25 mm ² 2.5 ... 10 mm ²
	Stranded acc. to UL/CSA	1 x or 2 x AWG 8-1
	Flexible acc. to UL/CSA	1 x or 2 x AWG 8-1
Stripping length	14 mm	
Tightening torques	4.5 Nm / 40 lb.in	
Connection screw	M6 (Pozi driv 2)	

Auxiliary circuit

Type	TA75DU	
Connecting capacity		
 Rigid	1 x or 2 x	0.75 ... 4 mm ²
 Flexible with ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible	1 x or 2 x	0.75 ... 2.5 mm ²
	Stranded acc. to UL/CSA	1 x or 2 x AWG 18-14
	Flexible acc. to UL/CSA	1 x or 2 x AWG 18-14
Stripping length	9 mm	
Tightening torques	0.8 ... 1.3 Nm / 12 lb.in	
Connection screw	M3.5 (Pozi driv 2)	

General technical data

TA80DU thermal OLRs

Terminal & operating characteristics



2

General technical data





Type	TA80DU	
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +55 °C
	Open	-25 ... +55 °C
Storage		-40 ... +70 °C
Ambient air temperature compensation	Continuous	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	12 g / 15 ms	
Mounting position	Position 1-6	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)	
Degree of protection	IP20	

Electrical connection

Main circuit

Type	TA80DU	
Connecting capacity		
 Rigid	1 x	2.5 ... 25 mm ²
	2 x	2.5 ... 16 mm ²
 Flexible with insulated ferrule	1 x	2.5 ... 25 mm ²
	2 x	2.5 ... 10 mm ²
	Stranded acc. to UL/CSA	1 x or 2 x
	Flexible acc. to UL/CSA	1 x or 2 x
		AWG 8-1
		AWG 8-1
Stripping length	14 mm	
Tightening torques	4.5 Nm / 40 lb.in	
Connection screw	M6 (Pozi driv 2)	

Auxiliary circuit

Type	TA80DU	
Connecting capacity		
 Rigid	1 x or 2 x	0.75 ... 4 mm ²
 Flexible with ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible	1 x or 2 x	0.75 ... 2.5 mm ²
	Stranded acc. to UL/CSA	1 x or 2 x
	Flexible acc. to UL/CSA	1 x or 2 x
		AWG 18-14
		AWG 18-14
Stripping length	9 mm	
Tightening torques	0.8 ... 1.3 Nm / 12 lb.in	
Connection screw	M3.5 (Pozi driv 2)	

General technical data

TA110DU thermal OLRs



Terminal & operating characteristics

General technical data





Type	TA110DU	
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +55 °C
	Open	-25 ... +55 °C
Storage		-40 ... +70 °C
Ambient air temperature compensation	Continuous	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	12 g / 15 ms	
Mounting position	Position 1-6	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit	
Degree of protection	IP20	

Electrical connection

Main circuit

Type	TA110DU	
Connecting capacity		
 Rigid	1 x	16 ... 35 mm ²
	2 x	-
 Flexible	1 x	16 ... 35 mm ²
	2 x	-
	Stranded acc. to UL/CSA	1 x or 2 x
	Flexible acc. to UL/CSA	1 x or 2 x
		AWG 6-2/0
		AWG 6-2/0
Stripping length	25 mm	
Tightening torques	7.2 ... 9.6 Nm / 40 lb.in	
Connection screw	M8 (Hexagon)	

Auxiliary circuit

Type	TA110DU	
Connecting capacity		
 Rigid	1 x or 2 x	0.75 ... 4 mm ²
 Flexible with ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible	1 x or 2 x	0.75 ... 2.5 mm ²
	Stranded acc. to UL/CSA	1 x or 2 x
	Flexible acc. to UL/CSA	1 x or 2 x
		AWG 18-14
		AWG 18-14
Stripping length	9 mm	
Tightening torques	0.8 ... 1.3 Nm / 12 lb.in	
Connection screw	M3.5 (Pozi driv 2)	

IEC technical data

E16DU, E45DU, E80DU electronic OLRs

Utilization & auxiliary characteristics

2

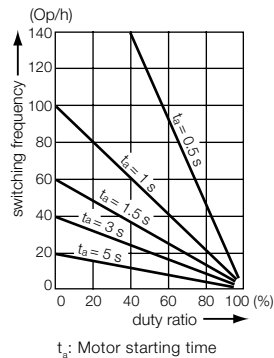
Main circuit – Utilization characteristics according to IEC/EN

Type	E16DU	E45DU	E80DU	E140DU
Standards	IEC 60947-1 / 60947-4-1 / 60947-5-1 and EN 60947-1 / 60947-4-1 / 60947-5-1			
Rated operational voltage U_n	690 V AC		1000 V AC	
Rated frequency	50/60 Hz			
Trip class	10E, 20E, 30E, selectable			
Number of poles	3			
Duty time	100 %			
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"			
Rated impulse withstand voltage U_{imp}	6 kV			
Rated insulation voltage U_i	690 V AC		1000 V AC	

Auxiliary circuit according to IEC/EN

Type	E16DU	E45DU	E80DU	E140DU
Rated operational voltage U_n	600 V AC / DC			
Conventional free air thermal current I_{th}	6 A			
Rated frequency	DC, 50/60 Hz			
Number of poles	1 N.C. + 1 N.O.			
I_n / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category				
110-120 V	50/60 Hz		3.00 A	
220-230-240 V	50/60 Hz		3.00 A	
440 V	50/60 Hz		1.10 A	
480-500 V	50/60 Hz		0.72 A	
I_n / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category				
24 V			1.50 A	
60 V			0.55 A	
110-120-125 V			0.55 A	
250 V			0.27 A	
Minimum switching capacity	12 V / 3 mA			
Short-circuit protective device	6 A, Fuse type gG			
Rated impulse withstand voltage U_{imp}	6 kV			
Rated insulation voltage U_i	690 V			

Technical diagram – Intermittent periodic duty



UL / CSA technical data

E16DU, E45DU, E80DU, E110DU electronic OLRs

Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	E16DU	E45DU	E80DU	E140DU
Standards	UL 508, CSA 22.2, No. 14			
Maximum operational voltage	600 V AC			
Trip rating	125 % of FLA			
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"			
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"			
Short-circuit protective device	See table "Full load amps and short-circuit protective device"			

Auxiliary circuit according to UL/CSA

Type	E16DU	E45DU	E80DU	E140DU
Contact rating	B600, Q300			
Conventional thermal current	5 A			

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
E16DU-0.32	0.32 A	50 kA	2 A, Class J	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
E16DU-1.0	1.00 A	50 kA	2 A, K5 / RK5	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
E16DU-2.7	2.70 A	50 kA	4 A, K5 / RK5	5 kA	4 A, K5 / RK5	100 kA	4 A, Class J
E16DU-6.3	6.30 A	50 kA	15 A, K5 / RK5	5 kA	15 A, K5 / RK5	100 kA	15 A, Class J
E16DU-18.9	18.90 A	50 kA	30 A, K5 / RK5	5 kA	30 A, K5 / RK5	100 kA	30 A, Class J

Type	Full load amps (FLA)	Short-circuit protective device			
		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type
E45DU-30	30 A	18 kA	150 A, K5 / RK5	100 kA	150 A, Class J
E45DU-45	45 A	18 kA	200 A, K5 / RK5	100 kA	200 A, Class J

Type	Full load amps (FLA)	Short-circuit protective device	
		600 V AC	
		SCCR	Fuse type
E80DU-80	80 A	18 kA	300 A, K5 / RK5

Type	Full load amps (FLA)	Short-circuit protective device	
		600 V AC	
		SCCR	Fuse type
E140DU-140	140 A	18 kA	400 A, K5 / RK5

General technical data

E16DU, E45DU, E80DU, E140DU electronic OLRs

Technical data



2

General data





Type	E16DU	E45DU	E80DU	E140DU
Pollution degree			3	
Phase loss sensitive			Yes	
Ambient air temperature				
Operation	Open - compensated without derating		-25 ... +70 °C	
Storage			-50 ... +85 °C	
Ambient air temperature compensation			Continuous	
Maximum operating altitude permissible			2000 m	
Resistance to shock acc. to IEC 60068-2-27			15 g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6			5 g / 3 ... 150 Hz	
Mounting position			Position 1-6	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit			
Degree of protection			IP20	

Electrical connection

Main circuit

Type		E16DU	E45DU	E80DU	E140DU
Connecting capacity					
 Rigid	1 x	1 ... 4 mm ²	2.5 ... 16 mm ²	6 ... 95 mm ²	6 ... 95 mm ²
	2 x	1 ... 4 mm ²	2.5 ... 16 mm ²	6 ... 35 mm ²	6 ... 35 mm ²
 Flexible with insulated ferrule	1 x	0.75 ... 2.5 mm ²	2.5 ... 10 mm ²	6 ... 70 mm ²	6 ... 70 mm ²
	2 x	0.75 ... 2.5 mm ²	2.5 ... 10 mm ²	6 ... 35 mm ²	6 ... 35 mm ²
Stranded acc. to UL/CSA	1 x	AWG 16-10	AWG 14-6	AWG 10-0	AWG 8-0
	2 x	AWG 16-10	AWG 14-6	-	-
Flexible acc. to UL/CSA	1 x	AWG 16-10	AWG 14-6	AWG 10-0	AWG 8-0
	2 x	AWG 16-10	AWG 14-6	-	-
Stripping length		9 mm	13 mm	-	-
Tightening torques		0.8 - 1.5 Nm / 7 lb.in	2.3 - 2.6 Nm / 22 lb.in	6 - 6.5 Nm / 53 lb.in	6 - 6.5 Nm / 53 lb.in
Connection screw		M3.5 (Pozidriv 2)	M5 (Pozidriv 2)	M8 (inbus 4)	M8 (inbus 4)

Auxiliary circuit

Type		E16DU	E45DU	E80DU	E140DU
Connecting capacity					
 Rigid	1 or 2 x		1 ... 4 mm ²		
 Flexible with ferrule	1 or 2 x		0.75 ... 2.5 mm ²		
 Flexible with insulated ferrule	1 or 2 x		0.75 ... 2.5 mm ²		
 Flexible	1 or 2 x		0.75 ... 2.5 mm ²		
Stranded acc. to UL/CSA	1 or 2 x		AWG 16-10		
Flexible acc. to UL/CSA	1 or 2 x		AWG 16-10		
Stripping length			9 mm		
Tightening torques			0.8 ... 1.2 Nm / 7 lb.in		
Connection screw			M3.5 (Pozidriv 2)		

IEC technical data

TA200DU & TA450DU thermal OLRs

Utilization & auxiliary characteristics

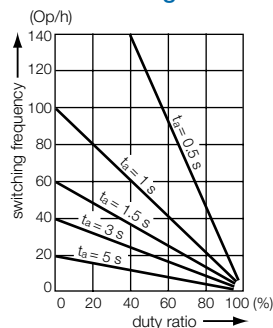
Main circuit – Utilization characteristics according to IEC/EN

Type	TA200DU	TA450DU
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1	
Rated operational voltage U_n	690 V AC	
Rated frequency	DC, 50/60 Hz	
Frequency range	0 ... 400 Hz	
Trip class	10A	
Number of poles	3	
Duty time	100 %	
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"	
Rated impulse withstand voltage U_{imp}	6 kV	
Rated insulation voltage U_i	690 V AC	

Auxiliary circuit according to IEC/EN

Type	TA200DU	TA450DU		
Rated operational voltage U_n	500 V AC, 440 V DC			
Conventional free air thermal current I_{th}	N.C., 95-96	10 A		
	N.O., 97-98	6 A		
Rated frequency	DC, 50/60 Hz			
Number of poles	1 N.O. + 1 N.C.			
I_g / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category	110-120 V	N.C., 95-96	3.00 A	
		N.O., 97-98	3.00 A	
	220-230-240 V	N.C., 95-96	3.00 A	
		N.O., 97-98	3.00 A	
	440 V	N.C., 95-96	1.90 A	
		N.O., 97-98	1.00 A	
	480-500 V	N.C., 95-96	1.00 A	
		N.O., 97-98	1.00 A	
	I_g / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category	24 V	N.C., 95-96	1.25 A
			N.O., 97-98	1.25 A
60 V		N.C., 95-96	0.25 A	
		N.O., 97-98	0.25 A	
110-120-125 V		N.C., 95-96	0.25 A	
		N.O., 97-98	0.25 A	
250 V		N.C., 95-96	0.12 A	
		N.O., 97-98	0.04 A	
Minimum switching capacity		17 V / 3 mA		
Short-circuit protective device		N.C., 95-96	10 A, Fuse type gG	
	N.O., 97-98	6 A, Fuse type gG		
Rated impulse withstand voltage U_{imp}	6 kV			
Rated insulation voltage U_i	690 V			

Technical diagram – Intermittent periodic duty



t_s : Motor starting time

UL / CSA technical data

TA200DU & TA450DU thermal OLRs

Utilization & auxiliary characteristics

2

Main circuit – Utilization characteristics according to UL/CSA

Type	TA200DU	TA450DU
Standards	UL 508, CSA 22.2 No. 14	
Maximum operational voltage	600 V AC	
Trip rating	125 % of FLA	
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"	
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"	
Short-circuit protective device	See table "Full load amps and short-circuit protective device"	

Auxiliary circuit according to UL/CSA

Type	TA200DU	TA450DU
Contact rating	N.C., 95-96	C600
	N.O., 97-98	B600
Conventional thermal current	5 A	

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device							
		480 / 600 V AC							
		Short circuit rating RMS symmetrical	Fuse type	Listed circuit breaker	Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Listed circuit breaker	
TA200DU OLRs									
TA200DU-90	90 A	10 kA	250 A, K5 / RK5	225 A	-	-	-	-	
TA200DU-110	110 A	10 kA	250 A, K5 / RK5	225 A	-	-	18 kA	125 A	
TA200DU-135	135 A	10 kA	300 A, K5 / RK5	225 A	50 kA	400 A, Class J	35 / 18 kA	225 A	
TA200DU-150	150 A	10 kA	300 A, K5 / RK5	225 A	65 kA	400 A, Class J	35 / 18 kA	225 A	
TA200DU-175	175 A	10 kA	300 A, K5 / RK5	225 A	65 kA	400 A, Class J	35 / 18 kA	225 A	
TA200DU-200	200 A	10 kA	400 A, K5 / RK5	400 A	65 kA	400 A, Class J	35 / 18 kA	225 A	
TA450DU OLRs									
TA450DU-185	185 A	10 kA	na	na	-	-	-	-	
TA450DU-235	235 A	10 kA	na	na	-	-	-	-	
TA450DU-310	310 A	18 kA	na	na	-	-	-	-	

General technical data

TA200DU thermal OLRs




Terminal & operating characteristics

General technical data





Type			TA200DU
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
Operation	Open - compensated without derating		-25 ... +55 °C
	Open		-25 ... +55 °C
Storage			-40 ... +70 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			12 g / 15 ms
Mounting position			Position 1-6
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit		
Degree of protection			IP20

Electrical connection

Main circuit

Type			TA200DU
Connecting capacity			
 Rigid	1 x		25 ... 120 mm ²
 Flexible	1 x		16 ... 35 mm ²
 Lugs			L ≤ 12 mm / l > 6 mm
Tightening torques			4 Nm
Connection screw			M6

Auxiliary circuit

Type			TA200DU
Connecting capacity			
 Rigid	1 x or 2 x		0.75 ... 4 mm ²
 Flexible with ferrule	1 x or 2 x		0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x or 2 x		0.75 ... 2.5 mm ²
 Flexible	1 x or 2 x		0.75 ... 2.5 mm ²
Stranded acc. to UL/CSA	1 x or 2 x		AWG 18-14
Flexible acc. to UL/CSA	1 x or 2 x		AWG 18-14
Stripping length			9 mm
Tightening torques			0.8 ... 1.3 Nm / 12 lb.in
Connection screw			M3.5 (Pozidriv 2)

General technical data

TA450 DU thermal OLRs

Terminal & operating characteristics

2

General technical data





Type			TA450DU
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
Operation	Open - compensated without derating		-25 ... +55 °C
Storage	Open		-25 ... +55 °C
Storage			-40 ... +70 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			12 g / 15 ms
Mounting position			Position 1-6
Degree of protection			IP20

Electrical connection

Main circuit

Type			TA450DU
Connecting capacity			
Bar			Max. 21 x 28.4 mm

Auxiliary circuit

Type			TA450DU
Connecting capacity			
 Rigid	1 x or 2 x		0.75 ... 4 mm ²
 Flexible with ferrule	1 x or 2 x		0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x or 2 x		0.75 ... 2.5 mm ²
 Flexible	1 x or 2 x		0.75 ... 2.5 mm ²
Stranded acc. to UL/CSA	1 x or 2 x		AWG 18-14
Flexible acc. to UL/CSA	1 x or 2 x		AWG 18-14
Stripping length			9 mm
Tightening torques			0.8 ... 1.3 Nm / 12 lb.in
Connection screw			M3.5 (Pozidriv 2)

IEC technical data

E200DU, E320DU, E500DU, E800DU & E1250DU electronic OLRs Utilization & auxiliary characteristics

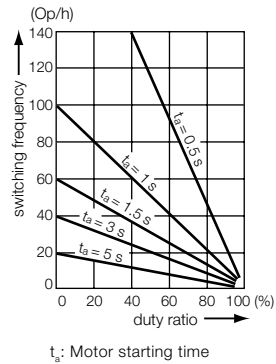
Main circuit – Utilization characteristics according to IEC/EN

Type	E200DU	E320DU	E500DU	E800DU	E1250DU
Standards	IEC 60947-1 / 60947-4-1 / 60947-5-1 and EN 60947-1 / 60947-4-1 / 60947-5-1				
Rated operational voltage U_n	1000 V AC				
Rated frequency	50/60 Hz				
Trip class	10E, 20E, 30E, selectable				
Number of poles	3				
Duty time	100 %				
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"				
Rated impulse withstand voltage U_{imp}	8 kV				
Rated insulation voltage U_i	1000 V AC				

Auxiliary circuit according to IEC/EN

Type	E200DU	E320DU	E500DU	E800DU	E1250DU
Rated operational voltage U_n	600 V AC / DC				
Conventional free air thermal current I_n	6 A				
Rated frequency	DC, 50/60 Hz				
Number of poles	1 N.C. + 1 N.O.				
I_a / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category					
110-120 V		50/60 Hz			3.00 A
220-230-240 V		50/60 Hz			3.00 A
440 V		50/60 Hz			1.10 A
480-500 V		50/60 Hz			0.72 A
I_d / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category					
24 V					1.50 A
60 V					0.55 A
110-120-125 V					0.55 A
250 V					0.27 A
Minimum switching capacity	12 V / 3 mA				
Short-circuit protective device	6 A, Fuse type gG				
Rated impulse withstand voltage U_{imp}	8 kV				
Rated insulation voltage U_i	690 V				

Technical diagram – Intermittent periodic duty



UL / CSA technical data

E200DU, E320DU, E500DU, E800DU & E1250DU electronic OLRs Utilization, auxiliary, operating & terminal characteristics

2

Main circuit – Utilization characteristics according to UL/CSA

Type	E200DU	E320DU	E500DU	E800DU	E1250DU
Standards	UL 508, CSA 22.2 No. 14				
Maximum operational voltage	600 V AC				
Trip rating	125 % of FLA				

Auxiliary circuit according to UL/CSA





Type	E200DU	E320DU	E500DU	E800DU	E1250DU
Contact rating	N.C., 95-96		B600, Q300		
	N.O., 97-98		B600, Q300		
Conventional thermal current	5 A				

General data

Type	E200DU	E320DU	E500DU	E800DU	E1250DU
Pollution degree	3				
Phase loss sensitive	Yes				
Ambient air temperature					
Operation	Open - compensated without derating		-25 ... +70 °C		
Storage	-50 ... +85 °C				
Ambient air temperature compensation	Continuous				
Maximum operating altitude permissible	2000 m				
Resistance to shock acc. to IEC 60068-2-27	15 g / 11 ms				
Resistance to vibrations acc. to IEC 60068-2-6	5 g / 3 ... 150 Hz				
Mounting position	Position 1-6 (E200/320 only)				
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals (E200/320 only)				
Degree of protection	IP20				

Electrical connection

Auxiliary circuit

Type	E200DU	E320DU	E500DU	E800DU	E1250DU
Connecting capacity					
 Rigid	1 or 2 x		1 ... 4 mm ²		
 Flexible with ferrule	1 or 2 x		0.75 ... 2.5 mm ²		
 Flexible with insulated ferrule	1 or 2 x		0.75 ... 2.5 mm ²		
 Flexible	1 or 2 x		0.75 ... 2.5 mm ²		
Stranded acc. to UL/CSA	1 or 2 x		AWG 16-10		
Flexible acc. to UL/CSA	1 or 2 x		AWG 16-10		
Stripping length	9 mm				
Tightening torques	0.8 ... 1.2 Nm / 7 lb.in				
Connection screw	M3.5 (Pozi driv 2)				

IEC / UL / CSA technical data

UMC100-FBP & accessories

Motor
overload
protection

2

Basic devices UMC100-FBP

Main power

Voltage	max. 1000 V AC
Frequency	45...65 Hz
Rated motor current	0.24...63 A, without accessories Greater currents with external transformer
Tripping classes	5E, 10E, 20E, 30E, 40E in acc. With IEC/EN 60947-4-1
Short-circuit protection	Separate fuse on network side

Control unit

Supply voltage	24 V DC
Inputs	6 digital inputs 24 V DC 1 PTC input
Outputs	3 digital relay outputs 1 digital transistor output
Interfaces	1 for ABB FieldBusPlug 1 for UMC100-PAN control station 1 for expansion module

Expansion modules

The UMC100-FBP can be expanded to include one (1) I/O expansion module DX111 or DX122 and one (1) voltage module VI150 or VI155. Expansion modules are connected via 2-wire bus. The maximum distance allowed between the UMC100-FBP and the expansion modules is 3 m.

Digital expansion modules DX111 / DX122

Expands the UMC100 to include additional digital inputs and outputs and an analog output

Supply voltage	24 V DC
Inputs	DX111 8 digital inputs 24 V DC DX122 8 digital inputs 110/230V DC
Outputs	4 digital relay outputs 1 analog output, 0/4...20 mA or 0...10V configurable

Voltage modules VI150 / VI155

Voltage modules for determining phase voltages, power factor (cos θ), active power, apparent power, energy, harmonic content (THD)

Application	VI150 for use in grounded networks VI155 for use in grounded and ungrounded networks
Supply voltage	24 V DC
Voltage inputs	L1, L2, L3
Rated voltage range	150...690 V AC
Outputs	1 digital relay output

UMC100-PAN control panel

For direct installation on UMC100-FBP or panel door (accessory required)

Graphics-enabled, backlit display, 3 LEDs for status indication

Configurable error messages

Multilingual: English, German, French, Italian, Portuguese, Spanish, and Russian

UMC100-PAN control panel

Only required for rated motor currents > 63 A

Linear transformer, 3-phase with terminal block, designed for connecting leads Cu 2.5 mm² / 14 AWG

UMC100-PAN control panel

Summation current transformer for connecting to a digital input

Mounting with bracket on DIN busbar

Models

CEM11-FBP.20	80...1,700mA	20mm Ø
CEM11-FBP.35	100...3,400mA	35mm Ø
CEM11-FBP.60	120...6,800mA	60mm Ø
CEM11-FBP.120	300...13,600mA	120mm Ø

Fieldbus connector FBP

For communication with fieldbus systems, supply with 24 V DC via fieldbus cable

Installation won the UMC100; for plug-in systems, the fieldbus connector is mounted externally

Assembled connectors with various cable lengths, M12 connection technology for reliable contacting

Extensive range of accessories available

Models

PDP22-FBP	Profibus DP V0/V1
DNP21-FBP	Devicenet
MRP21-FBP	Modbus RTU
COP21-FBP	CANopen
PDQ22-FBP	Profibus DP V0/V1 (for the connection of 1 to 4 UMC100s)

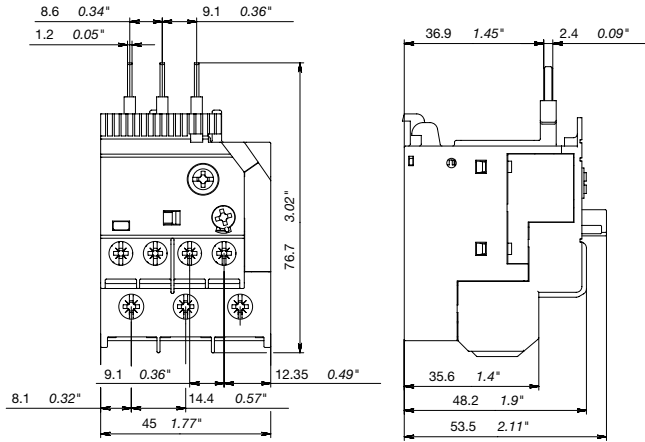
Approximate dimensions

Thermal overload relays

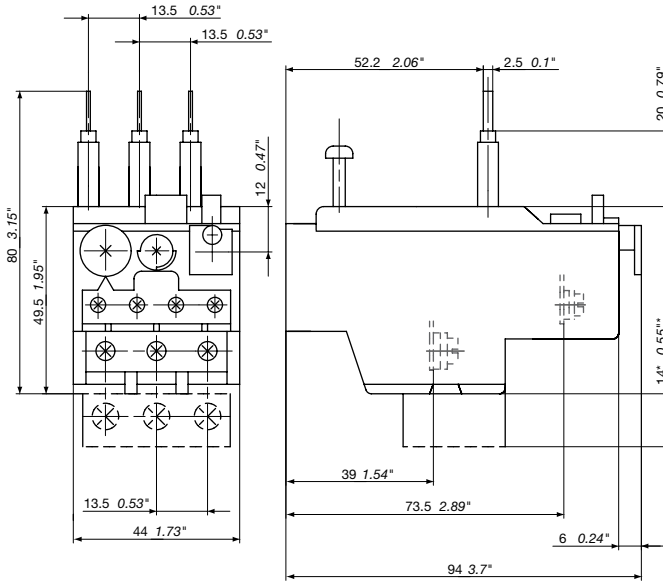
T16...T42DU

2

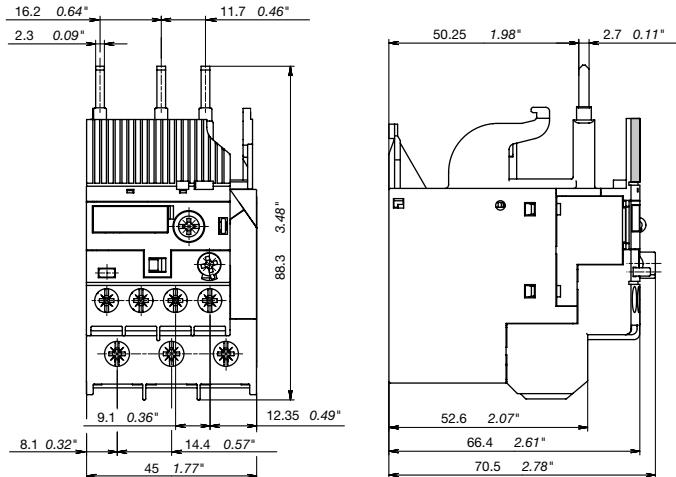
T16DU



TA25DU



TF42DU

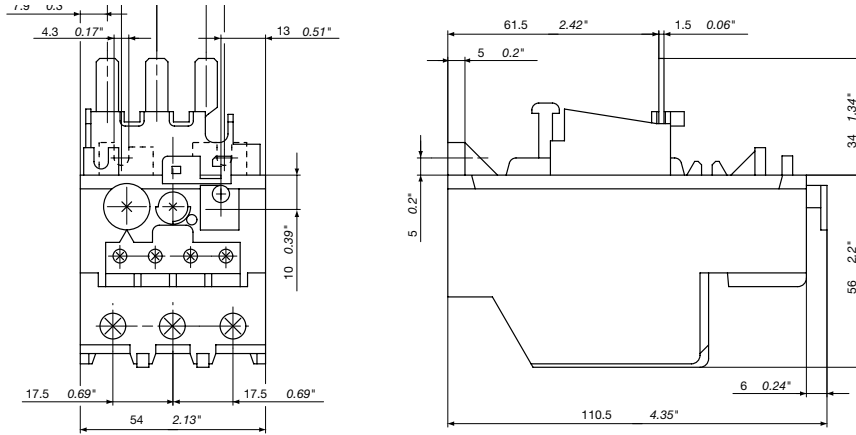


Approximate dimensions

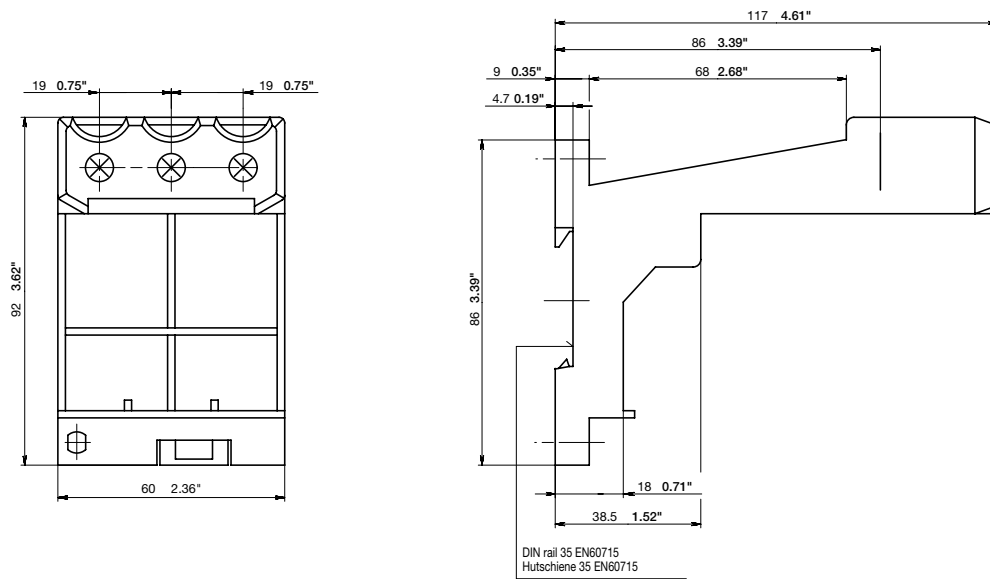
Thermal overload relays

TA42DU...TA80DU

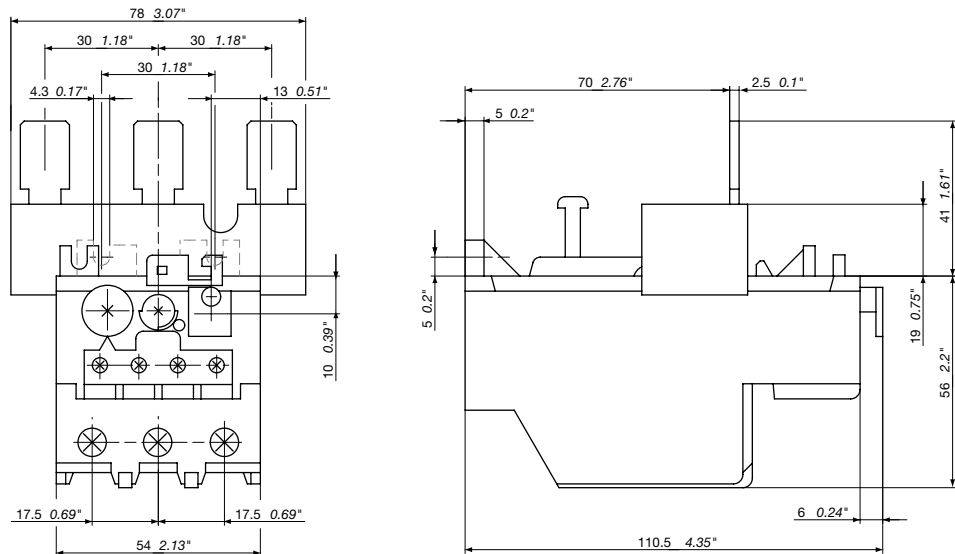
TA42DU



TA75DU



TA80DU

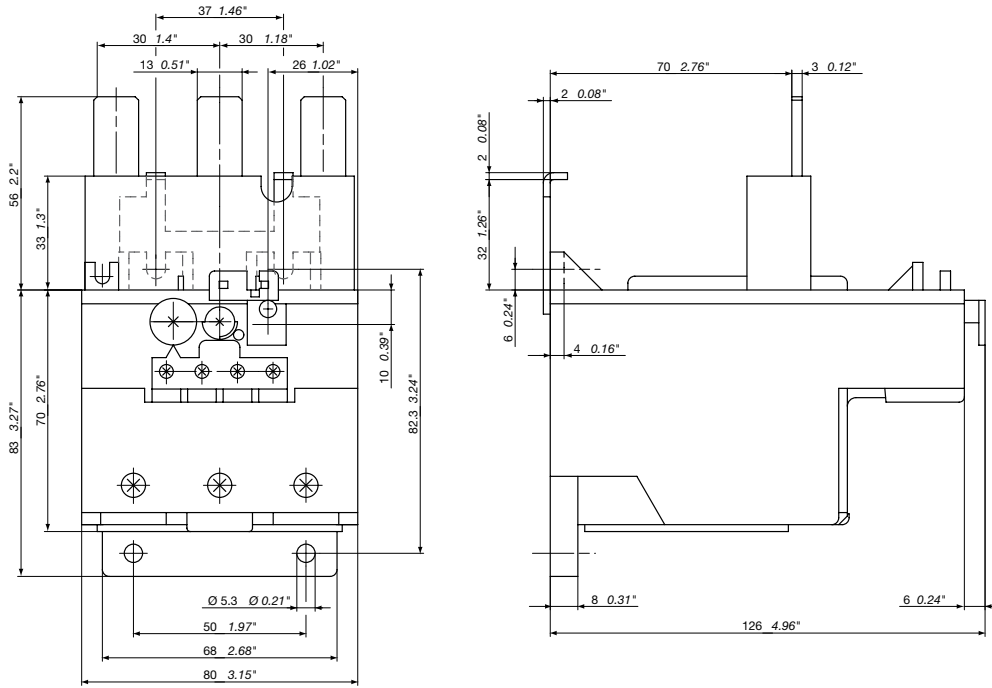


Approximate dimensions

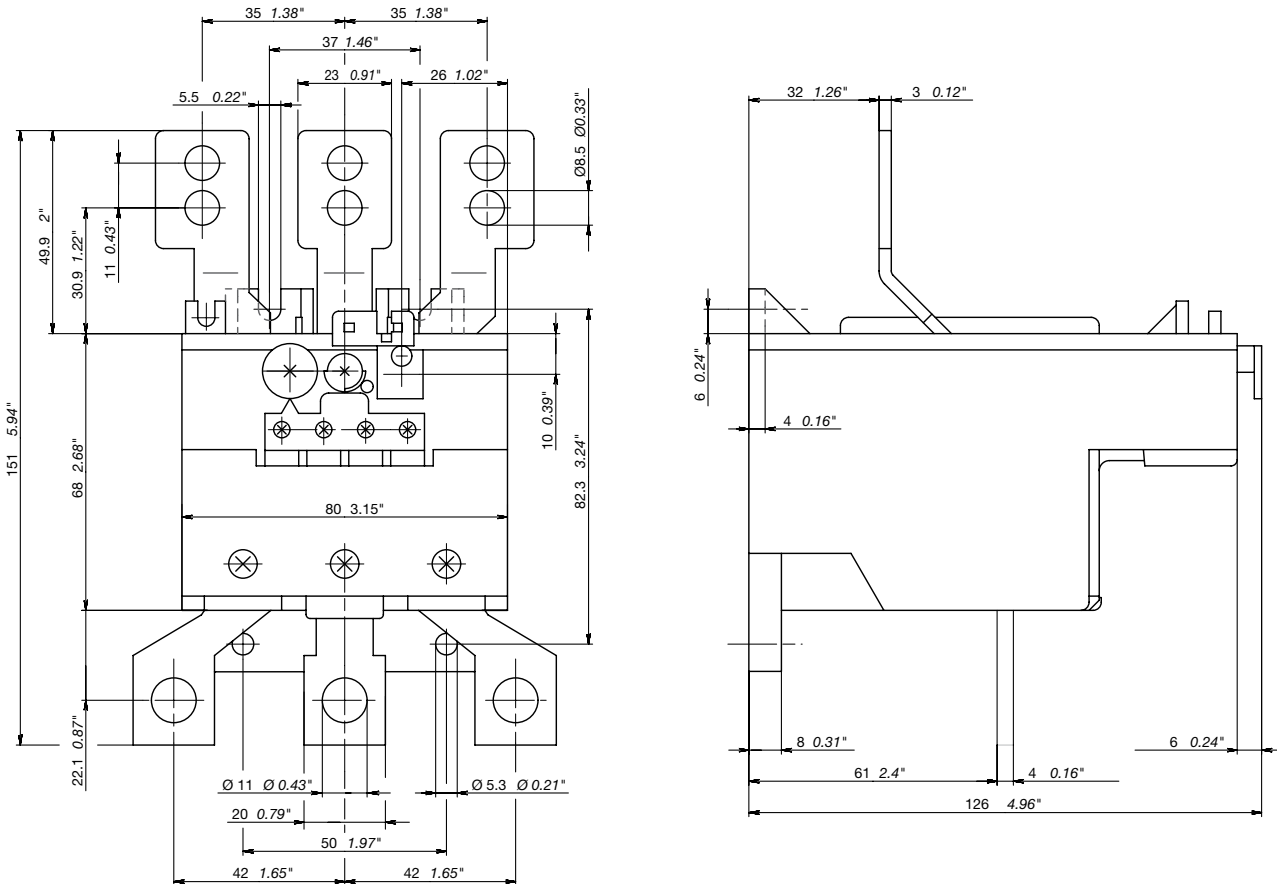
Thermal overload relays TA110DU & TA200DU

2

TA110DU

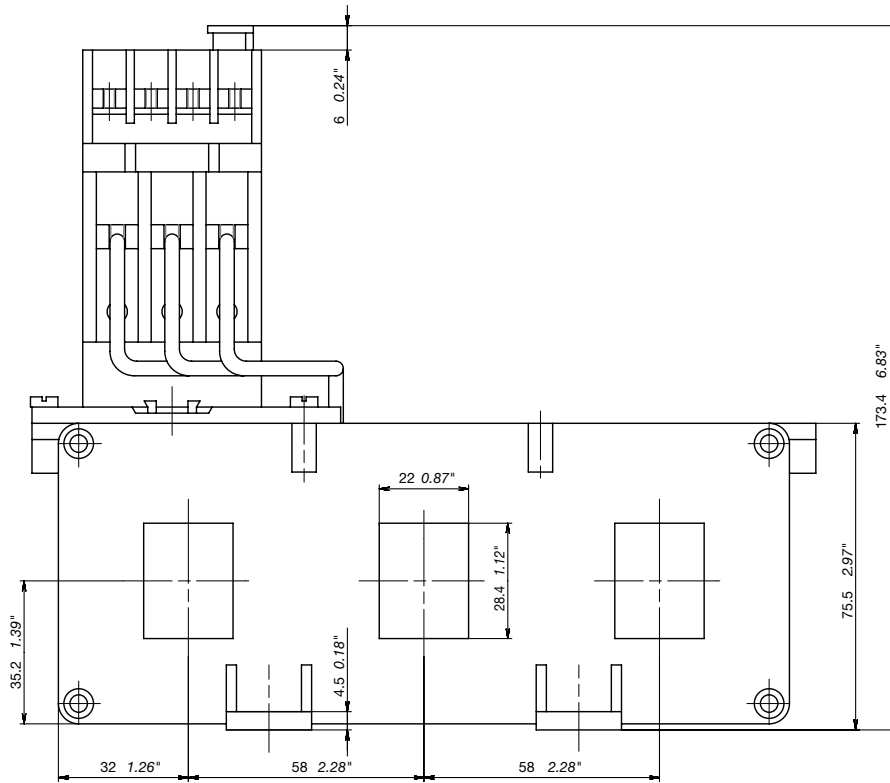
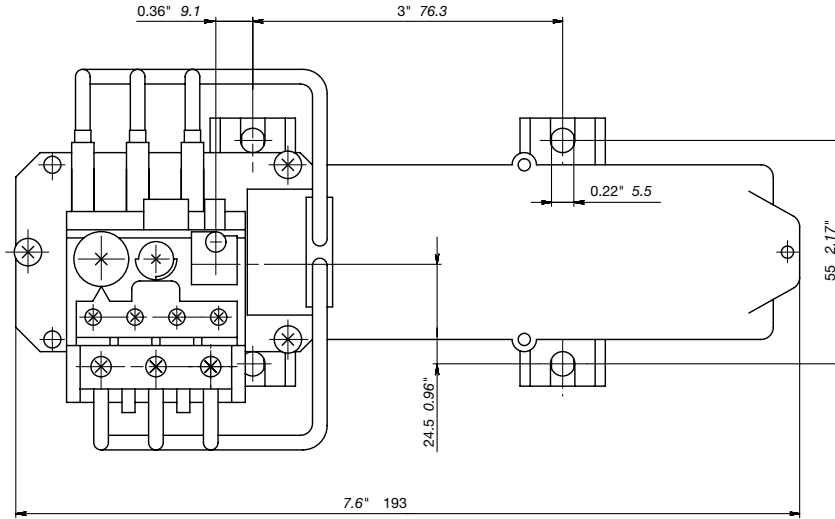


TA200DU



Approximate dimensions
Thermal overload relays
TA110DU & TA200DU

TA450DU



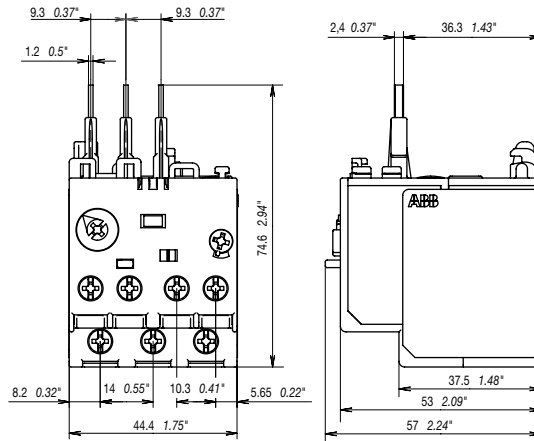
Approximate dimensions

Electronic overload relays

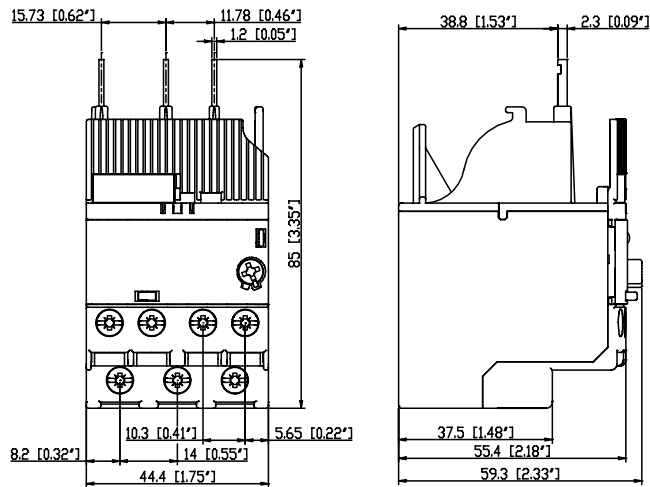
E16DU...EF45DU

2

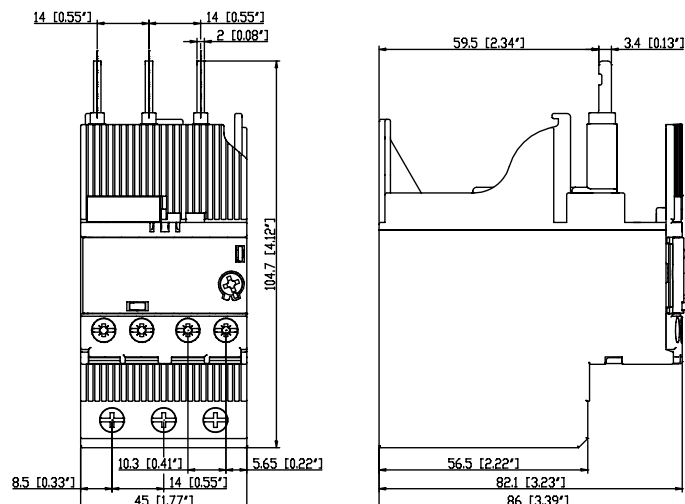
E16DU



EF19DU



EF45DU

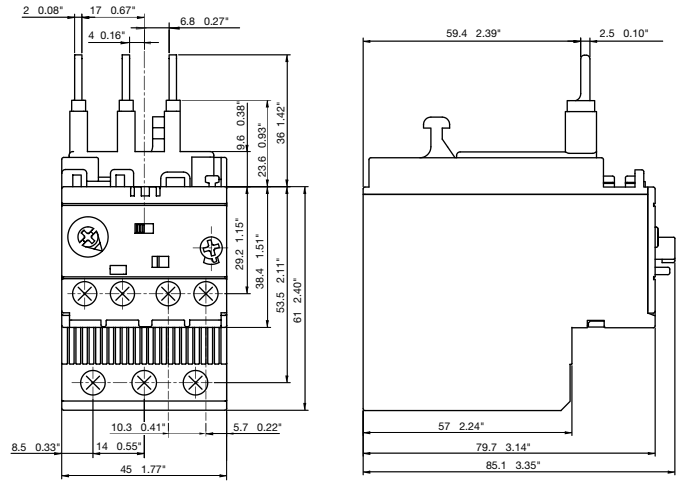


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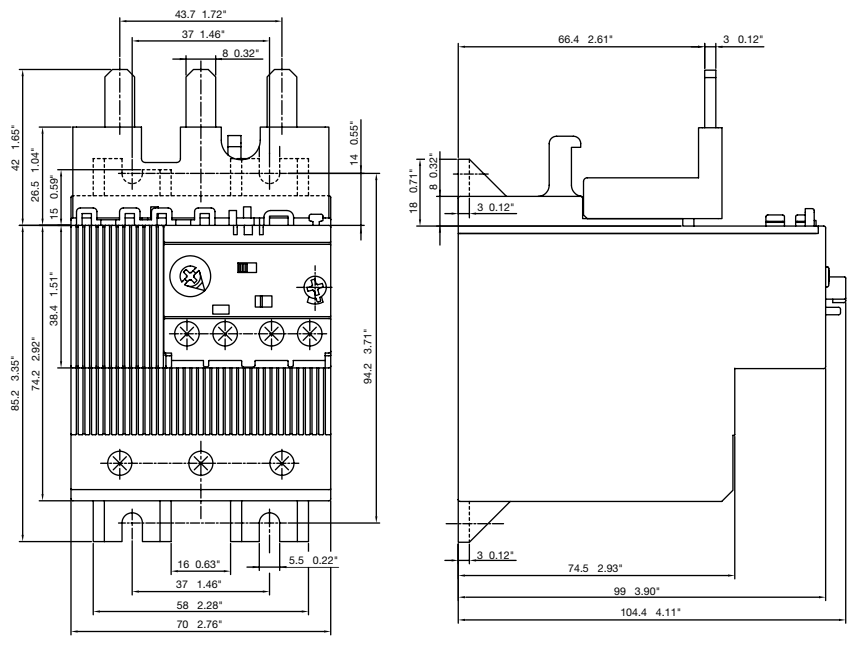
Electronic overload relays

E45DU...E80DU

E45DU



E80DU



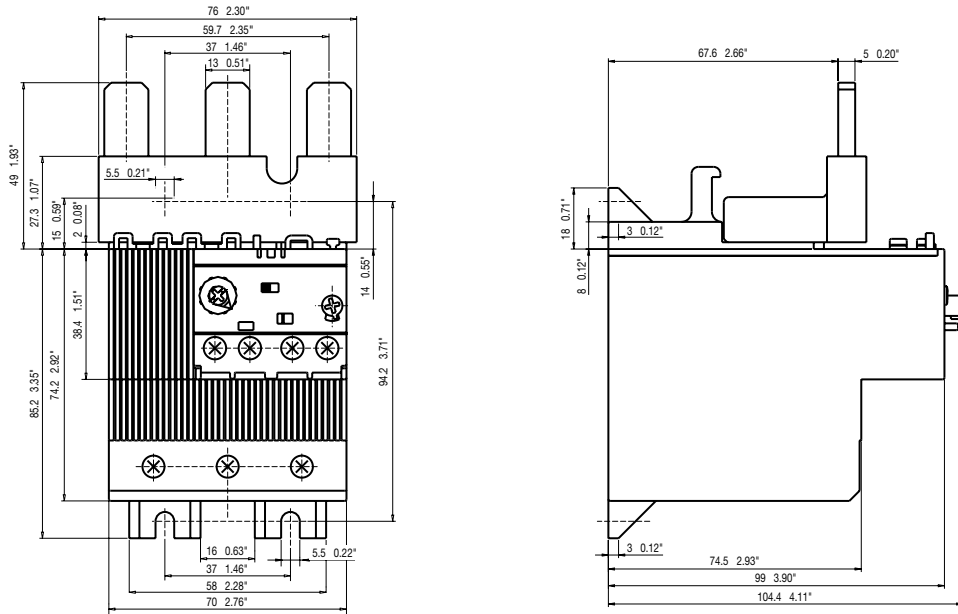
Approximate dimensions

Electronic overload relays

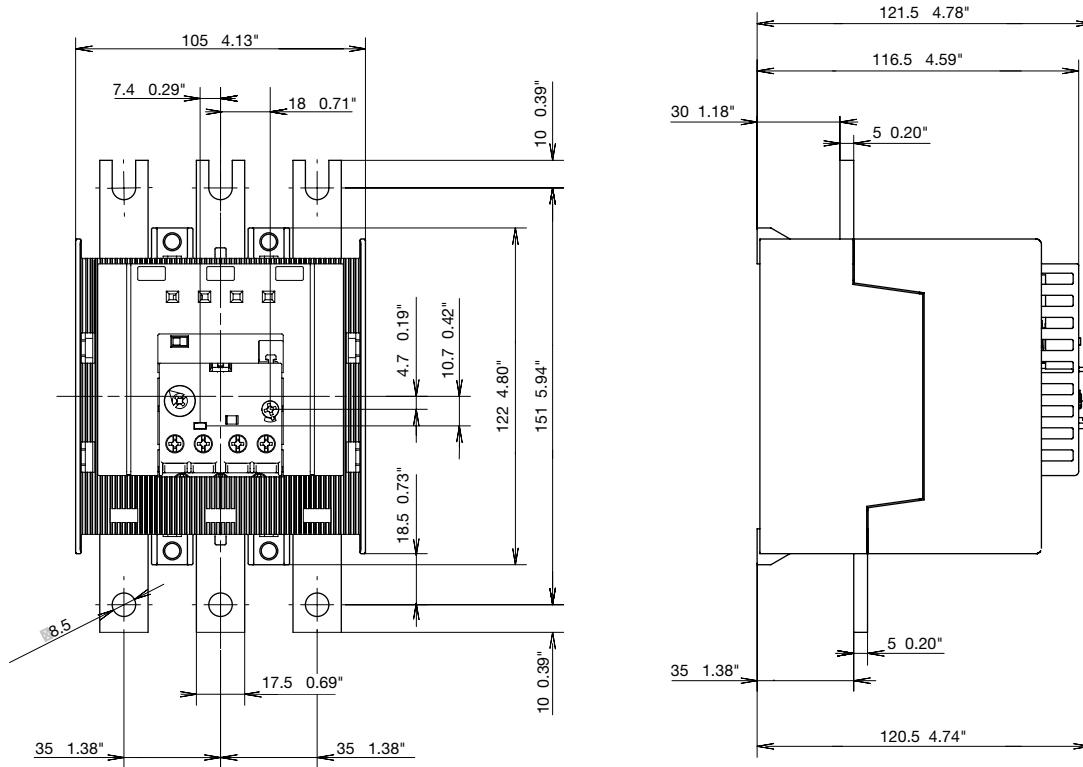
E140DU...E200DU

2

E140DU



E200DU

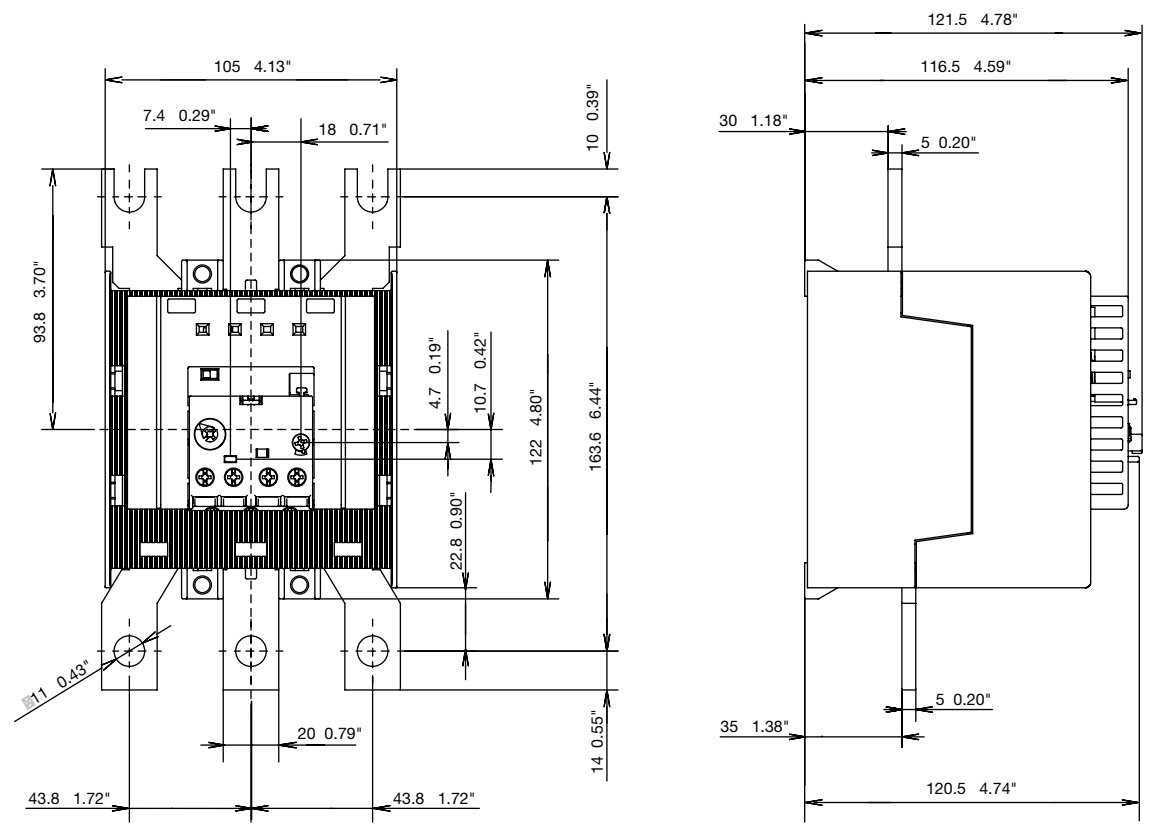


Approximate dimensions

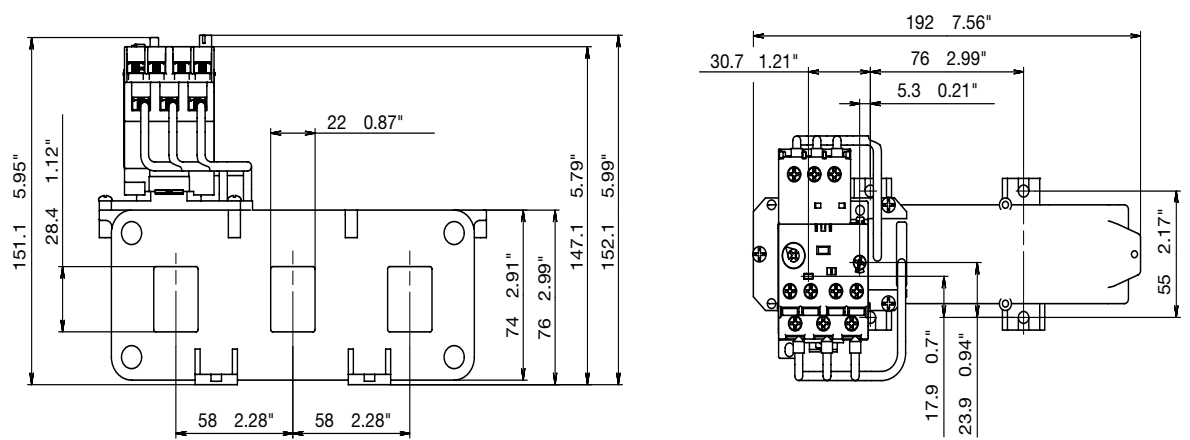
Electronic overload relays

E320DU...E500DU

E320DU



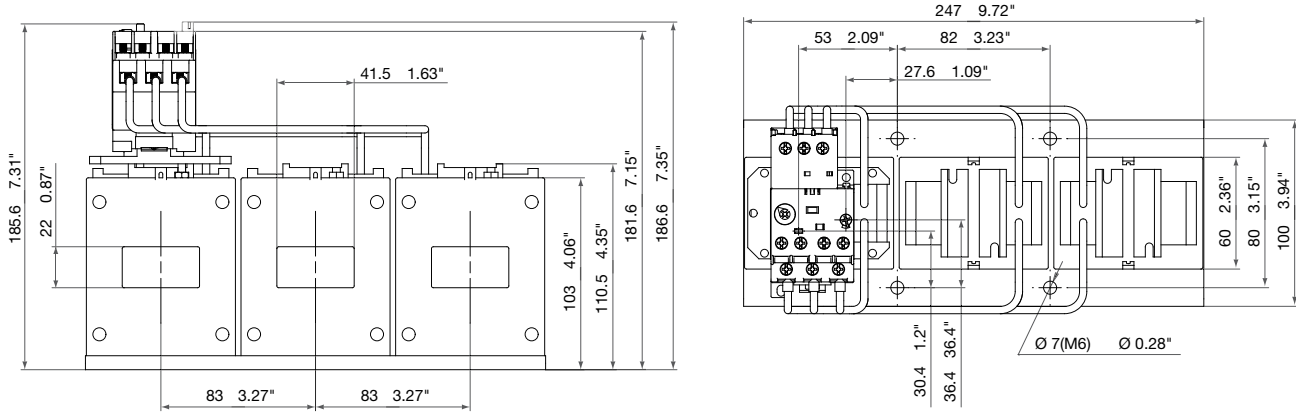
E500DU



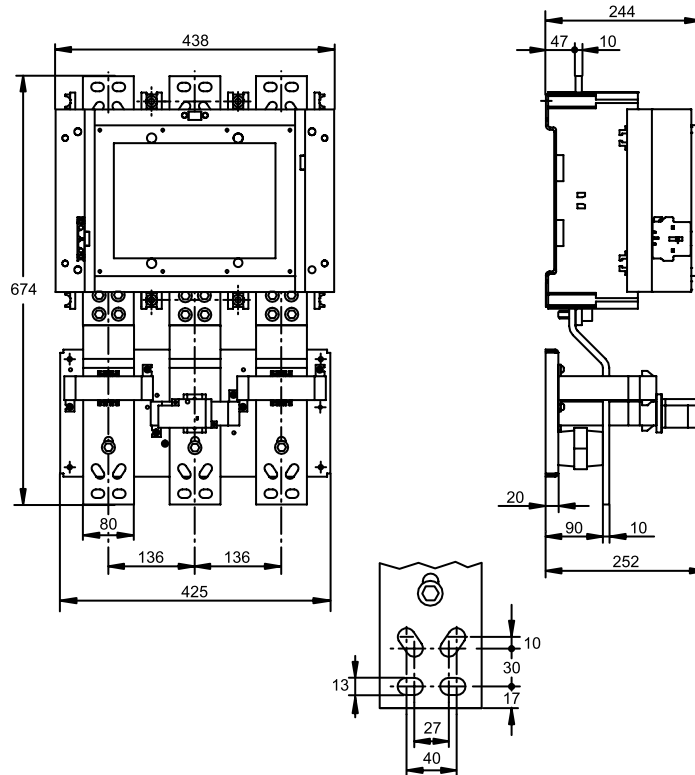
Approximate dimensions E800DU...E200DU

2

E800DU



AF1350 / AF1650 + E1250DU





3 - Starters



IEC & NEMA Enclosed starters 3.1 – 3.48

Ordering information

- Description 3.1
- Features and benefits 3.2
- Product configurator 3.3
- Catalog number explanation 3.4 - 4.5
- IEC & NEMA Non-combination, non-reversing 3.6 - 3.7
- IEC & NEMA Non-fusible disconnect switch, non-reversing 3.8 - 3.9
- IEC & NEMA fusible disconnect switch, non-reversing 3.10 - 3.11
- IEC Circuit breaker type, non-reversing 3.12 - 3.13
- IEC & NEMA Circuit breaker disconnect, non-reversing 3.14
- IEC Non-combination, reversing 3.15
- IEC & NEMA Non-fusible disconnect switch, reversing 3.16
- IEC & NEMA Fusible disconnect switch, reversing 3.17
- IEC Circuit breaker type, reversing 3.18 - 3.19
- IEC Non-combination, 2 speed, 1 winding 3.20
- IEC Non-fusible disconnect switch, 2 speed, 1 winding 3.21
- Fusible disconnect switch, 2 speed, 1 winding 3.22
- IEC Circuit breaker type, 2 speed, 1 winding 3.23
- IEC Non-combination, 2 speed, 2 winding 3.24
- IEC Non-fusible disconnect switch, 2 speed, 2 winding 3.25
- IEC Fusible disconnect switch, 2 speed, 2 winding 3.26
- IEC Circuit breaker type, 2 speed, 2 winding 3.27

General information

- Factory installed options 3.28 - 3.29
- Field modifications 3.30 - 3.31
- Motor data 3.32
- Standard thermal overload relays 3.33
- Electronic overload relays 3.34
- Thermal overload relays 3.35
- Approximate dimensions 3.37 - 3.38
- Circuit diagrams 3.39 - 3.45
- Enclosure rating definitions 3.46
- Short circuit current ratings 3.47

Single phase manual starters 3.49 – 3.52

- Description 3.49
- Type MSSP single phase manual starters ordering information 3.50 - 3.51
- Approximate dimensions 3.52



IEC & NEMA Enclosed starters



Description

AF09 – AF750 and AFN00 - AFN4

- Maximum UL/CSA horsepower ratings
- Available with non-reversing, reversing, two speed one winding and two speed two winding
- Available in non-combination and combination
- Available in UL type 1,3R,12, 4, and 4X stainless steel enclosures
- Available with non-fusible or fusible disconnect switches and thermal magnetic circuit breaker
- Compact space saving design
- Standard auxiliary contact configurations:
AF09 – AF750 (AFN00-AFN4)
1 N.O. & 1 N.C.
- Double break contact design
- Lowest possible contact bounce
- Operates over an extended voltage range of 85% to 110% of rated control voltage

Overload relay protection

Starters, sizes AF09 – AF300 (AFN00-AFN4), have Class 10 adjustable thermal bimetallic overload relay protection as standard.

Sizes AF400 – AF750, have selectable Class 10, 20, 30 adjustable electronic overload relay protection as standard.

Optional electronic overload relay protection is available for all starter sizes.

Field modification kits

Offers a wide variety of pilot device kits for non-reversing, reversing, two speed one winding and two speed two winding starters.

Control circuit transformer kits are also available with the following voltages:

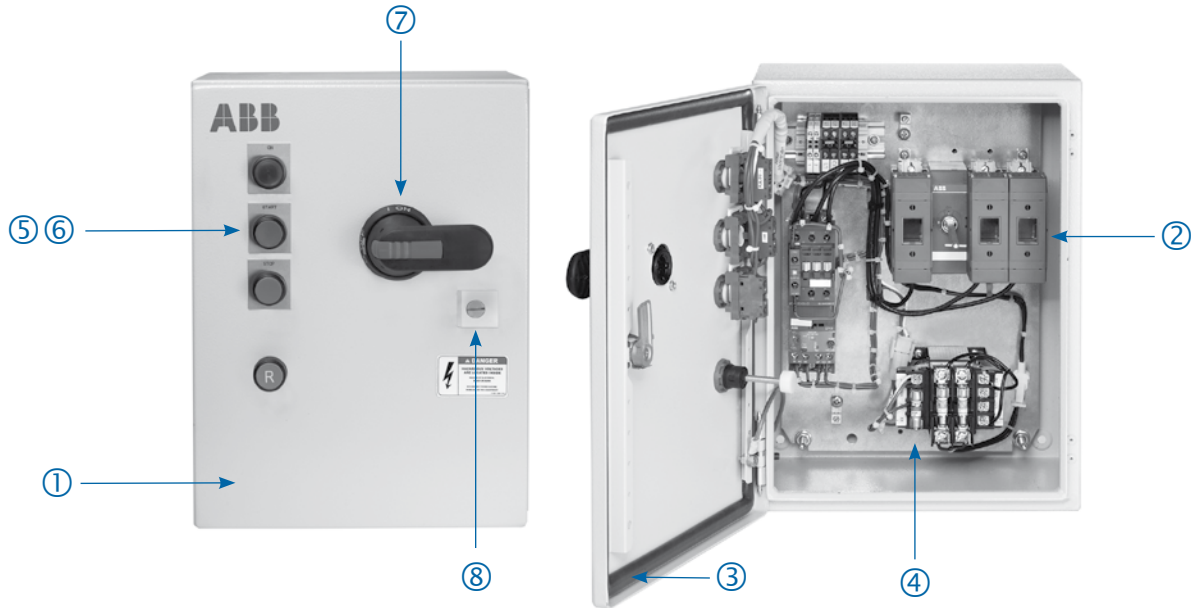
Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

The field kits are pre-wired, ready to operate, making installation easy and reliable

General information

Features and benefits

3



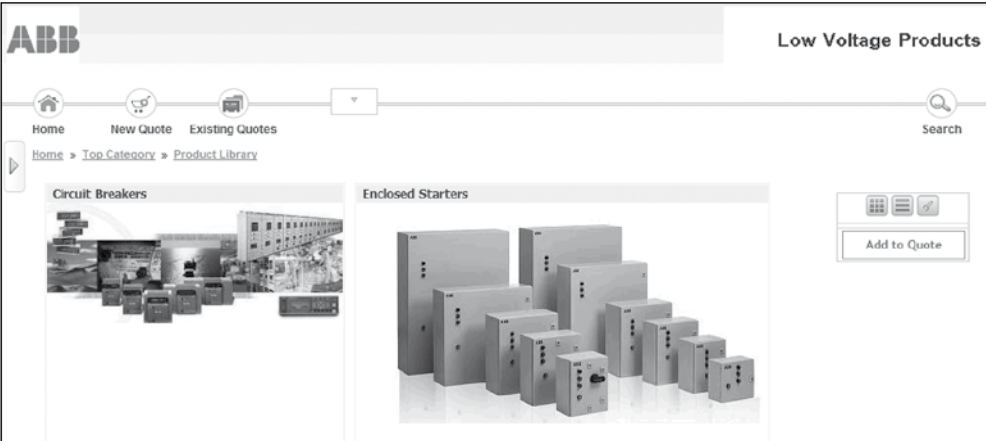
Features and benefits

1. Durable protective finish (carbon steel enclosures)
 - Industry exclusive electrophoretic dip coat prime
 - Powder coated surface for added protection
2. Flange trough collar opening
 - Channels liquids and dust away from enclosure gasket and enclosure interior
3. Seamless foamed-in-place gasket
 - Provide secure seal against contaminants
 - Ensures a dust tight and water tight seal
4. Pre-drilled mounting plate
 - Easy mounting for control circuit transformer kit
5. Rugged and compact 22 mm pilot devices
 - Meets UL/NEMA Type 1, 3R, 4, 4X, 12, 13
6. Convenient hole plugs for pilot device control
 - Allows for quick installation of pilot device kit
7. Disconnect handle accepts 3 -3/8" padlocks in off position for safe maintenance
8. Quarter turn enclosure latches
 - Allows for quick entry and proper sealing of enclosure

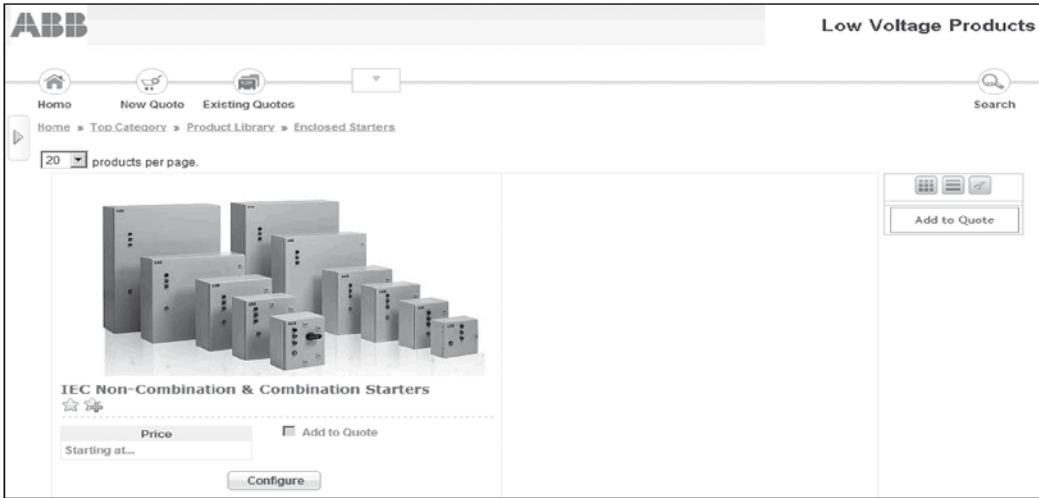
Product configurator

IEC & NEMA
Enclosed starters

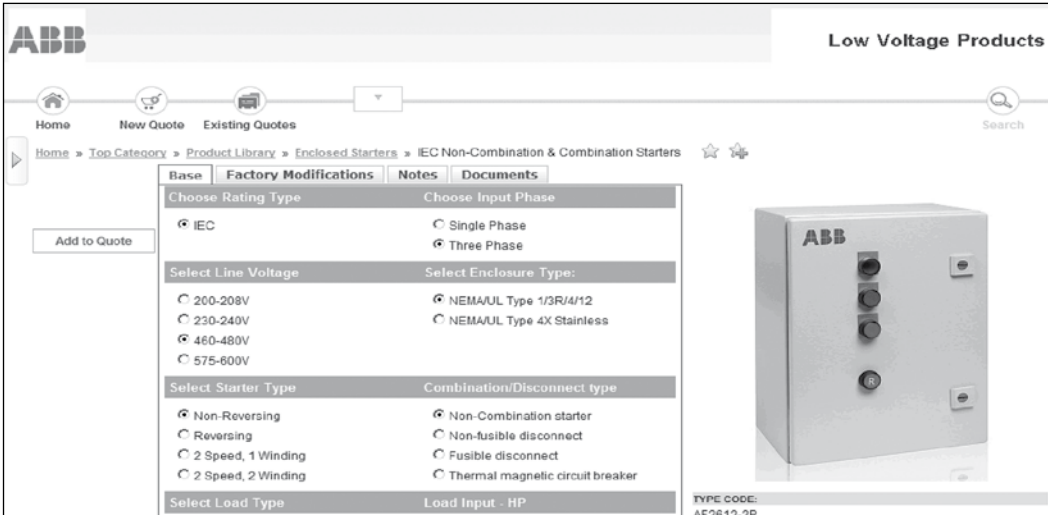
1. Login to the LVP CPQ guest login.



2. Configure product.



3. Configure the catalog number using radial buttons and pull down menus to generate a valid catalog number and list price.



Catalog number explanation

Non-combination starter

3

AF26 1 S N 1 - 2 H A

Contactor size

AF26	AF210	AFN00
AF30	AF260	AFN0
AF50	AF300	AFN1
AF63	AF400	AFN2
AF75	AF460	AFN3
AF110	AF580	AFN4
AF145	AF750	
AF185		

Starter type

- 1 - Non reversing
- 2 - Reversing
- 3 - 2 Speed, 1 winding
- 4 - 2 Speed, 2 winding

Single phase

S - Single phase (insert only for single phase)

Disconnect type

- Blank - Non-combination (starter only)
- N - Non-fusible disconnect

Enclosure type

- 2 - NEMA/UL Type 1, 3R, 4, 12
- X - NEMA/UL Type 4X (Stainless steel)

Coil voltage CCT

Option 1

See factory installed modifications on pages 3.29 & 3.30

Overload selection

See overload relay selection on pages 3.34 - 3.37

Coil voltage selection

AC Volts, 40-60 Hz		
24 AC	100 - 250 AC	250 - 500 AC
1	2	3

CCT Selection

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

Catalog number explanation

Combination starter

IEC & NEMA
Enclosed starters

3

AF09 1 S F 1 - 2 H 1 A

Contactor size

AF09	AF145	AFN00
AF12	AF185	AFN0
AF16	AF210	AFN1
AF26	AF260	AFN2
AF30	AF300	AFN3
AF63	AF460	AFN4
AF75	AF580	
AF110	AF750	

Starter type

- 1 - Non reversing
- 2 - Reversing
- 3 - 2 Speed, 1 winding
- 4 - 2 Speed, 2 winding

Single phase

- S - Single phase (insert only for single phase)

Disconnect type

- B - Thermal magnetic circuit breaker (MCCB)
- F - Fusible disconnect

IEC Enclosure type

- 2 - NEMA/UL Type 1, 3R, 4, 12
- X - NEMA/UL Type 4X (Stainless steel)

Coil voltage CCT

Coil voltage selection

AC Volts, 40-60 Hz		
24 AC	100 - 250 AC	250 - 500 AC
1	2	3

CCT Selection

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

Overload selection

See Overload Relay Selection Chart on pages 3.34 - 3.37

Option 1

See factory installed modifications on pages 3.29 & 3.30

Fuse clip rating / voltage fuse type

- 1 - 30A, 600V Class J
- 2 - 60A, 600V Class J
- 3 - 100A, 600V Class J
- 4 - 200A, 600V Class J
- 5 - 400A, 600V Class J
- 6 - 600A, 600V Class J
- 7 - 800A, 600V Class L
- 8 - 1200A, 600V Class L

Circuit breaker amp rating (200 - 600V)

- | | | |
|----------|----------|-----------|
| 1 - 15A | B - 150A | M - 800A |
| 2 - 20A | C - 200A | N - 1000A |
| 3 - 25A | D - 250A | P - 1200A |
| 4 - 30A | E - 300A | |
| 5 - 35A | F - 350A | |
| 6 - 40A | G - 400A | |
| 7 - 50A | H - 450A | |
| 8 - 80A | J - 500A | |
| 9 - 100A | K - 600A | |
| A - 125A | L - 700A | |

IEC & NEMA Non-combination

AF26 - AF750; AFN00 - AFN4

Non-reversing, three phase

3 IEC Non-combination

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings				General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V	Catalog number	Catalog number
28	AF26	7.5	7.5	15	20	AF2612-2Δ	AF261X-2Δ
34	AF30	10	10	20	25	AF3012-2Δ	AF301X-2Δ
54	AF50	15	20	40	50	AF5012-2Δ	AF501X-2Δ
68	AF63	20	25	50	60	AF6312-2Δ	AF631X-2Δ
80	AF75	25	30	60	75	AF7512-2Δ	AF751X-2Δ
110	AF110	30	40	75	100	AF11012-2Δ	AF1101X-2Δ
130	AF145	40	50	100	125	AF14512-2Δ	AF1451X-2Δ
156	AF185	50	60	125	150	AF18512-2Δ	AF1851X-2Δ
192	AF210	60	75	150	200	AF21012-2Δ	AF2101X-2Δ
248	AF260	75	100	200	250	AF26012-2Δ	AF2601X-2Δ
302	AF300	100	-	250	300	AF30012-2Δ	AF3001X-2Δ
414	AF400	125	150	350	400	AF40012-2Δ	AF4001X-2Δ
480	AF460	150	200	400	500	AF46012-2Δ	AF4601X-2Δ
590	AF580	200	250	500	600	AF58012-2Δ	AF5801X-2Δ
722	AF750	250	300	600	700	AF75012-2Δ	AF7501X-2Δ

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.34 & 3.35.

NEMA Non-combination

NEMA size	Contactor	Continuous	Maximum ratings - UL Listed			UL Type 1, 3R, 4, 12	UL Type 4X
			Maximum motor horsepower ratings			General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
			200V	230V	460/575V	Catalog number	Catalog number
00	AFN00	9	1.5	1.5	2	AFN0012-2Δ	AFN001X-2Δ
0	AFN0	18	3	3	5	AFN012-2Δ	AFN01X-2Δ
1	AN1	27	7.5	7.5	10	AFN112-2Δ	AFN11X-2Δ
2	AFN2	45	10	15	25	AFN212-2Δ	AFN21X-2Δ
3	AFN3	90	25	30	50	AFN312-2Δ	AFN31X-2Δ
4	AFN4	135	40	50	100	AFN412-2Δ	AFN41X-2Δ

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.36 & 3.37.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF2612-1K

Coil voltage selection chart

Coil voltage		
AC Volts, 40-60 Hz		
24 AC	100 - 250 AC	250 - 500 AC
1	2	3

Control transformer voltage selection

To select starter with control transformer, substitute the code from the control transformer voltage selector chart after the dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF2612-CK

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF26 & AF30, AFN00 - AFN1, For factory modifications, see pages 3.29 & 3.30.

IEC & NEMA Non-combination

AF26 - AF110; AFN00 - AFN2

Non-reversing, single phase

IEC Non-combination

UL motor switching current	Contactor Size	Maximum ratings - UL Listed		UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings		General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		120V	240V	Catalog number	Catalog number
28	AF26	2	3	AF261S2-2Δ	AF261SX-2Δ
34	AF30	-	5	AF301S2-2Δ	AF301SX-2Δ
54	AF50	-	10	AF501S2-2Δ	AF501SX-2Δ
80	AF75	-	15	AF751S2-2Δ	AF751SX-2Δ
110	AF110	-	25	AF1101S2-2Δ	AF1101SX-2Δ

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.34.

NEMA Non-combination

NEMA size	Contactor	Continuous	Maximum ratings - UL Listed		UL Type 1, 3R, 4, 12	UL Type 4X
			Maximum motor horsepower ratings		General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
			120V	230V	Catalog number	Catalog number
00	AFN00	9	1/3	1	AFN001S2-2Δ	AFN001SX-2Δ
0	AFN0	18	1	2	AFN01S2-2Δ	AFN01SX-2Δ
1	AN1	27	2	3	AFN11S2-2Δ	AFN11SX-2Δ
2	AFN2	45	-	7.5	AFN21S2-2Δ	AFN21SX-2Δ

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.36.

Coil voltage selection ¹⁾

All rated AC catalog numbers include a 120V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF261S2-1S

Control transformer voltage selection

To select starter with control transformer, substitute the code from the control transformer voltage selector chart after the dash in the catalog number. Ex.: A 230V primary voltage with a 120V secondary voltage is required for an AF12 starter: AF121S2-BS

Coil voltage selection chart

Coil voltage	
AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection chart

Control Voltage	230-240
120V AC @ 50/60 Hz	B
24V AC @ 50/60 Hz	F

1) 24 AC coil voltage is available only with AF26 & AF30, AFN00 - AFN1.
For factory modifications, see page 3.29 & 3.30.

IEC & NEMA Non-fusible disconnect switch

AF26 - AF750; AFN00 - AFN4

Non-reversing, three phase

IEC Non-fusible disconnect switch

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UL motor switching current	Contactor Size	Maximum ratings - UL Listed				UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings				General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V	Catalog number	Catalog number
28	AF26	5	7.5	15	20	AF261N2-2Δ	AF261NX-2Δ
34	AF30	10	10	20	25	AF301N2-2Δ	AF301NX-2Δ
54	AF50	15	20	40	50	AF501N2-2Δ	AF501NX-2Δ
68	AF63	20	25	50	60	AF631N2-2Δ	AF631NX-2Δ
80	AF75	25	30	60	75	AF751N2-2Δ	AF751NX-2Δ
110	AF110	30	40	75	100	AF110N2-2Δ	AF1101NX-2Δ
130	AF145	40	50	100	125	AF1451N2-2Δ	AF1451NX-2Δ
156	AF185	50	60	125	150	AF1851N2-2Δ	AF1851NX-2Δ
192	AF210	60	75	150	200	AF2101N2-2Δ	AF2101NX-2Δ
248	AF260	75	100	200	250	AF2601N2-2Δ	AF2601NX-2Δ
302	AF300	100	-	250	300	AF3001N2-2Δ	AF3001NX-2Δ
414	AF400	125	150	350	400	AF4001N2-2Δ	AF4001NX-2Δ
480	AF460	150	200	400	500	AF4601N2-2Δ	AF4601NX-2Δ
590	AF580	200	250	500	600	AF5801N2-2Δ	AF5801NX-2Δ
722	AF750	250	300	600	700	AF7501N2-2Δ	AF7501NX-2Δ

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.34 & 3.35.

NEMA Non-fusible disconnect switch

NEMA size	Contactor	Continuous	Maximum ratings - UL Listed			UL Type 1, 3R, 4, 12	UL Type 4X
			Maximum motor horsepower ratings			General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
			200V	230V	460/575V	Catalog number	Catalog number
00	AFN00	9	1.5	1.5	2	AFN001N2-2Δ	AFN001NX-2Δ
0	AFN0	18	3	3	5	AFN01N2-2Δ	AFN01NX-2Δ
1	AFN1	27	7.5	7.5	10	AFN11N2-2Δ	AFN11NX-2Δ
2	AFN2	45	10	15	25	AFN21N2-2Δ	AFN21NX-2Δ
3	AFN3	90	25	30	50	AFN31N2-2Δ	AFN31NX-2Δ
4	AFN4	135	40	50	100	AFN41N2-2Δ	AFN41NX-2Δ

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.36 & 3.37.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF261N2-1K

Control transformer voltage selection

To select starter with control transformer, substitute the code from the control transformer voltage selector chart after the dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF261N2-CK

Coil voltage selection chart

Coil voltage		
AC Volts, 40-60 Hz		
24 AC	100 - 250 AC	250 - 500 AC
1	2	3

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF26 & AF30, AFN00 - AFN1. For factory modifications, see pages 3.29 & 3.30.

IEC & NEMA Non-fusible disconnect switch

AF26 - AF110; AFN00 - AFN2

Non-reversing, single phase

IEC Non-fusible disconnect switch

UL motor switching current	Contactor Size	Maximum ratings - UL Listed		UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings		General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		120V	240V	Catalog number	Catalog number
28	AF26	2	3	AF261SN2-2Δ	AF261SNX-2Δ
34	AF30	-	5	AF301SN2-2Δ	AF301SNX-2Δ
54	AF50	-	10	AF501SN2-2Δ	AF501SNX-2Δ
80	AF75	-	15	AF751SN2-2Δ	AF751SNX-2Δ
110	AF110	-	25	AF1101SN2-2Δ	AF1101SNX-2Δ

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.34.

NEMA Non-fusible disconnect switch

NEMA size	Contactor	Continuous	Maximum ratings - UL Listed		UL Type 1, 3R, 4, 12	UL Type 4X
			Maximum motor horsepower ratings		General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
			120V	230V	Catalog number	Catalog number
00	AFN00	9	1/3	1	AFN001SN2-2Δ	A9N001SNX-2Δ
0	AFN0	18	1	2	AFN01SN2-2Δ	A16N01SNX-2Δ
1	AN1	27	2	3	AFN11SN2-2Δ	A26N11SNX-2Δ
2	AFN2	45	-	7.5	AFN21SN2-2Δ	A50N21SNX-2Δ

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.36.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF12 starter: AF261SN2-1S

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 230V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF261SN2-BS

Coil voltage selection chart

Coil voltage	
AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection chart

Control Voltage	230-240
120V AC @ 50/60 Hz	B
24V AC @ 50/60 Hz	F

1) 24 AC coil voltage is available only with AF26 & AF30, AFN00 - AFN1.
For factory modifications, see page 3.29 & 3.30.

IEC & NEMA Fusible disconnect switch

AF09 - AF750; AFN00 - AFN4

Non-reversing, three phase

IEC Fusible disconnect switch

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UL motor switching current	Contactor Size	Maximum ratings - UL Listed				Fuse clip rating amp/volts	UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings					General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V		Catalog number	Catalog number
9	AF09	2	2	5	7.5	30/600	AF091F2-2Δ1	AF091FX-2Δ1
11	AF12	3	3	7.5	10	30/600	AF121F2-2Δ1	AF121FX-2Δ1
17	AF16	5	5	10	15	30/600	AF161F2-2Δ1	AF161FX-2Δ1
28	AF26	7.5	7.5	15	20	60/600	AF261F2-2Δ2	AF261FX-2Δ2
34	AF30	10	10	20	25	60/600	AF301F2-2Δ2	AF301FX-2Δ2
54	AF50	15	20	40	50	100/600	AF501F2-2Δ3	AF501FX-2Δ3
68	AF63	20	25	50	60	200/600	AF631F2-2Δ4	AF631FX-2Δ4
80	AF75	25	30	60	75	200/600	AF751F2-2Δ4	AF751FX-2Δ4
110	AF110	30	40	75	100	200/600	AF1101F2-2Δ4	A1101FX-2Δ4
130	AF145	40	50	100	125	400/600	AF1451F2-2Δ5	AF1451FX-2Δ5
156	AF185	50	60	125	150	400/600	AF1851F2-2Δ5	AF1851FX-2Δ5
192	AF210	60	75	150	200	400/600	AF2101F2-2Δ5	AF2101FX-2Δ5
248	AF260	75	-	-	-	400/600	AF2601F2-2Δ5	AF2601FX-2Δ5
248	AF260	-	100	200	250	600/600	AF2601F2-2Δ6	AF2601FX-2Δ6
302	AF300	100	-	250	300	600/600	AF3001F2-2Δ6	AF3001FX-2Δ6
414	AF400	125	150	350	400	800/600	AF4001F2-2Δ7	AF4001FX-2Δ7
480	AF460	150	200	400	500	800/600	AF4601F2-2Δ7	AF4601FX-2Δ7
590	AF580	200	250	500	600	1200/600	AF5801F2-2Δ8	AF5801FX-2Δ8
720	AF750	250	300	600	700	1200/600	AF7501F2-2Δ8	AF7501FX-2Δ8

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.34 & 3.35.

NEMA Fusible disconnect switch

NEMA size	Contactor	Continuous	Maximum ratings - UL Listed			Fuse clip rating amp/volts	UL Type 1, 3R, 4, 12	UL Type 4X
			Maximum motor horsepower ratings				General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
			200V	230V	460/575V		Catalog number	Catalog number
00	AFN00	9	1.5	1.5	2	30/600	AFN001F2-2Δ1	AFN001FX-2Δ1
0	AFN0	18	3	3	5	30/600	AFN01F2-2Δ1	AFN01FX-2Δ1
1	AFN1	27	—	—	10	30/600	AFN11F2-2Δ1	AFN11FX-2Δ1
1	AFN1	27	7.5	7.5	—	60/600	AFN11F2-2Δ2	AFN11FX-2Δ2
2	AFN2	45	10	—	25	60/600	AFN21F2-2Δ2	AFN21FX-2Δ2
2	AFN2	45	—	15	—	100/600	AFN21F2-2Δ3	AFN21FX-2Δ3
3	AFN3	90	25	30	50	200/600	AFN31F2-2Δ4	AFN31FX-2Δ4
4	AFN4	135	40	50	100	400/600	AFN41F2-2Δ5	AFN41FX-2Δ5

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.36 & 3.37.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF12 starter: AF121F2-1R1

Coil voltage selection chart

Coil voltage		
AC Volts, 40-60 Hz		
24 AC	100 - 250 AC	250 - 500 AC
1	2	3

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF12 starter: AF121F2-CR1

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF09 - AF30, AFN00 - AFN1.
For factory modifications, see page 3.29 & 3.30.

IEC & NEMA Fusible disconnect

AF09 - AF110; AFN00 - AFN2

Non-reversing, single phase

IEC Fusible disconnect switch

UL motor switching current	Contactor Size	Maximum ratings - UL Listed		UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings		General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		120V	240V	Catalog number	Catalog number
9	AF09	1/2	1	AF091SF2-2Δ1	AF91SFX-2Δ1
11	AF12	-	2	AF121SF2-2Δ1	AF121SFX-2Δ1
17	AF16	3/4, 1	-	AF161SF2-2Δ1	AF161SFX-2Δ1
28	AF26	-	3	AF261SF2-2Δ1	AF261SFX-2Δ1
28	AF26	2	-	AF261SF2-2Δ2	AF261SFX-2Δ2
34	AF30	-	5	AF301SF2-2Δ2	AF301SFX-2Δ2
54	AF50	-	10	AF501SF2-2Δ3	AF501SFX-2Δ3
80	AF75	-	15	AF751SF2-2Δ4	AF751SFX-2Δ4
110	AF110	-	25	AF1101SF2-2Δ4	AF1101SFX-2Δ4

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.34.

NEMA Fusible disconnect switch

NEMA size	Contactor	Continuous	Maximum ratings - UL Listed		UL Type 1, 3R, 4, 12	UL Type 4X
			Maximum motor horsepower ratings		General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
			120V	230V	Catalog number	Catalog number
00	AFN00	9	1/3	1	AFN001SF2-2Δ1	AFN001SFX-2Δ1
0	AFN0	18	1	2	AFN01SF2-2Δ1	AFN01SFX-2Δ1
1	AFN1	27	-	3	AFN11SF2-2Δ1	AFN11SFX-2Δ1
1	AFN1	27	2	-	AFN11SF2-2Δ2	AFN11SFX-2Δ2
2	AFN2	45	-	7.5	AFN21SF2-2Δ2	AFN21SFX-2Δ2

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.36.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF12 starter: AF121SF2-2R1

Coil voltage selection chart

Coil voltage	
AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 230V primary voltage with a 120V secondary voltage is required for an AF12 starter: AF121SF2-BR1

Control transformer voltage selection chart

Control Voltage	230-240
120V AC @ 50/60 Hz	B
24V AC @ 50/60 Hz	F

1) 24 AC coil voltage is available only with AF09 - AF30, AFN00 & AFN1. For factory modifications, see pages 3.29 & 3.30.

IEC Circuit breaker type

AF26 - AF750

Non-reversing, three phase

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UL motor switching current	Contactor Size	Maximum ratings - UL Listed				Circuit Breaker Amp Rating	UL Type 1, 3R, 4, 12		UL Type 4X	
		Maximum motor horsepower ratings					General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel		
		200/208V	230/240V	460V/480V	575/600V				Catalog number	Catalog number
28	AF26	2	3	5	7.5	15 A	AF261B2-2Δ1	AF261BX-2Δ1		
28	AF26	3	-	7.5	10	20 A	AF261B2-2Δ2	AF261BX-2Δ2		
28	AF26	-	5	10	-	25 A	AF261B2-2Δ3	AF261BX-2Δ3		
28	AF26	5	-	-	15	30 A	AF261B2-2Δ4	AF261BX-2Δ4		
28	AF26	-	7.5	15	20	35 A	AF261B2-2Δ5	AF261BX-2Δ5		
34	AF30	7.5	-	-	-	40 A	AF301B2-2Δ6	AF301BX-2Δ6		
34	AF30	10	10	20	25	50 A	AF301B2-2Δ7	AF301BX-2Δ7		
54	AF50	-	-	-	30	50 A	AF501B2-2Δ7	AF501BX-2Δ7		
54	AF50	15	15	40	50	80 A	AF501B2-2Δ8	AF501BX-2Δ8		
68	AF63	20	20	50	60	100 A	AF631B2-2Δ9	AF631BX-2Δ9		
80	AF75	25	30	60	75	125 A	AF751B2-2ΔA	AF751BX-2ΔA		
110	AF110	30	-	75	100	150 A	AF1101B2-2ΔB	AF1101BX-2ΔB		
110	AF110	-	40	-	-	200 A	AF1101B2-2ΔC	AF1101BX-2ΔC		
130	AF145	40	50	100	125	200 A	AF1451B2-2ΔC	AF1451BX-2ΔC		
156	AF185	50	60	125	150	250 A	AF1851B2-2ΔD	AF1851BX-2ΔD		
192	AF210	60	-	-	-	250 A	AF2101B2-2ΔD	AF2101BX-2ΔD		
192	AF210	-	75	150	200	300 A	AF2101B2-2ΔE	AF2101BX-2ΔE		
248	AF260	75	-	-	-	350 A	AF2601B2-2ΔF	AF2601BX-2ΔF		
248	AF260	-	100	200	250	400 A	AF2601B2-2ΔG	AF2601BX-2ΔG		
302	AF300	100	-	-	300	450 A	AF3001B2-2ΔH	AF3001BX-2ΔH		
302	AF300	-	-	250	-	500 A	AF3001B2-2ΔJ	AF3001BX-2ΔJ		
414	AF400	-	125	-	-	500 A	AF4001B2-2ΔJ	AF4001BX-2ΔJ		
414	AF400	125	150	300	400	600 A	AF4001B2-2ΔK	AF4001BX-2ΔK		
414	AF400	-	-	350	-	700 A	AF4001B2-2ΔL	AF4001BX-2ΔL		
480	AF460	150	-	-	-	600 A	AF4601B2-2ΔK	AF4601BX-2ΔK		
480	AF460	-	200	400	500	800 A	AF4601B2-2ΔM	AF4601BX-2ΔM		
590	AF580	200	-	-	-	800 A	AF5801B2-2ΔM	AF5801BX-2ΔM		
590	AF580	-	250	500	600	1000 A	AF5801B2-2ΔN	AF5801BX-2ΔN		
722	AF750	250	-	-	-	1000 A	AF7501B2-2ΔN	AF7501BX-2ΔN		
722	AF750	-	300	600	700	1200 A	AF7501B2-2ΔP	AF7501BX-2ΔP		

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.34 & 3.35.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF261B2-1K1

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF261B2-CK1

Coil voltage selection chart

Coil voltage		
AC Volts, 40-60 Hz		
24 AC	100 - 250 AC	250 - 500 AC
1	2	3

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF26 & AF30, For factory modifications, see pages 3.29 & 3.30.

NEMA Circuit breaker type

AFN00 - AFN4

Non-reversing, three phase

IEC & NEMA
Enclosed starters

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NEMA size	Contactor	Continuous	Maximum ratings - UL Listed				Circuit Breaker Amp Rating	UL Type 1, 3R, 4, 12	UL Type 4X
			Maximum motor horsepower ratings					General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
			208V	230V	460V	575V		Catalog number	Catalog number
00	AFN00	9	1.5	1.5	2	2	15 A	AFN001B2-2Δ1	AFN001BX-2Δ1
0	AFN0	18	2	3	5	5	15 A	AFN01B2-2Δ1	AFN01BX-2Δ1
			3	-	-	-	20 A	AFN01B2-2Δ2	AFN01BX-2Δ2
1	AFN1	27	-	-	-	7.5	15 A	AFN11B2-2Δ1	AFN11BX-2Δ1
			-	-	7.5	10	20 A	AFN11B2-2Δ2	AFN11BX-2Δ2
			-	5	10	-	25 A	AFN11B2-2Δ3	AFN11BX-2Δ3
			5	-	-	-	30 A	AFN11B2-2Δ4	AFN11BX-2Δ4
			-	7.5	-	-	35 A	AFN11B2-2Δ5	AFN11BX-2Δ5
			7.5	-	-	-	40 A	AFN11B2-2Δ6	AFN11BX-2Δ6
2	AFN2	45	-	-	15	20	35 A	AFN21B2-2Δ5	AFN21BX-2Δ5
			10	10	20	25	40 A	AFN21B2-2Δ6	AFN21BX-2Δ6
			-	-	25	-	80 A	AFN21B2-2Δ8	AFN21BX-2Δ8
			-	15	-	-	80 A	AFN21B2-2Δ8	AFN21BX-2Δ8
3	AFN3	90	-	-	-	30	50 A	AFN31B2-2Δ7	AFN31BX-2Δ7
			-	-	30	-	80 A	AFN31B2-2Δ8	AFN31BX-2Δ8
			15	-	-	40	80 A	AFN31B2-2Δ8	AFN31BX-2Δ8
			-	-	40	50	80 A	AFN31B2-2Δ8	AFN31BX-2Δ8
			-	-	50	-	100 A	AFN31B2-2Δ9	AFN31BX-2Δ9
			25	30	-	-	125 A	AFN31B2-2ΔA	AFN31BX-2ΔA
4	AFN4	135	-	-	60	75	125 A	AFN41B2-2ΔA	AFN41BX-2ΔA
			30	-	75	100	150 A	AFN41B2-2ΔB	AFN41BX-2ΔB
			40	50	100	-	200 A	AFN41B2-2ΔC	AFN41BX-2ΔC

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.36 & 3.37.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AFN1B2-1R1

Coil voltage selection chart

Coil voltage	
AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 230V primary voltage with a 120V secondary voltage is required for an AFN1B2-CR1

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AFN00 - AFN1.
For factory modifications, see pages 3.29 & 3.30.

IEC & NEMA Circuit breaker disconnect

AF26 - AF110; AFN00 - AFN2

Non-reversing, single phase

IEC Circuit breaker disconnect

3

UL motor switching current	Contactor Size	Maximum ratings - UL Listed		Circuit breaker amp rating	UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings			General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		120V	240V		Catalog number	Catalog number
28	AF26	1/2	1	15 A	AF261SB2-2Δ1	AF261SBX-2Δ1
28	AF26	-	2	20 A	AF261SB2-2Δ2	AF261SBX-2Δ2
28	AF26	1	-	25 A	AF261SB2-2Δ3	AF261SBX-2Δ3
28	AF26	1.5	3	30 A	AF261SB2-2Δ4	AF261SBX-2Δ4
28	AF26	2	-	40 A	AF261SB2-2Δ6	AF261SBX-2Δ6
34	AF30	-	5	50 A	AF301SB2-2Δ7	AF301SBX-2Δ7
54	AF50	-	10	80 A	AF501SB2-2Δ8	AF501SBX-2Δ8
80	AF75	-	15	125 A	AF751SB2-2ΔA	AF751SBX-2ΔA
110	AF110	-	20	150 A	AF1101SB2-2ΔB	AF1101SBX-2ΔB
110	AF110	-	25	200 A	AF1101SB2-2ΔC	AF1101SBX-2ΔC

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.34.

NEMA Circuit breaker disconnect

NEMA size	Contactor	Continuous	Maximum ratings - UL Listed		Circuit breaker amp rating	UL Type 1, 3R, 4, 12	UL Type 4X
			Maximum motor horsepower ratings			General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
			120V	230V		Catalog number	Catalog number
00	AFN00	9	1/3	1	15 A	AFN001SB2-2Δ1	AFN001SBX-2Δ1
0	AFN0	18	1/2	1.5	15 A	AFN01SB2-2Δ1	AFN01SBX-2Δ1
0	AFN0	18	-	2	20 A	AFN01SB2-2Δ2	AFN01SBX-2Δ2
0	AFN0	18	1	-	25 A	AFN01SB2-2Δ3	AFN01SBX-2Δ3
1	AFN1	27	-	3	30 A	AFN11SB2-2Δ4	AFN11SBX-2Δ4
1	AFN1	27	2	-	40 A	AFN11SB2-2Δ6	AFN11SBX-2Δ6
2	AFN2	45	-	7.5	80 A	AFN21SB2-2Δ8	AFN21SBX-2Δ8

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.36.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF261SB2-1R1

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 230V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF261SB2-BR1

Coil voltage selection chart

Coil voltage	
AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection chart

Control Voltage	230-240
120V AC @ 50/60 Hz	B
24V AC @ 50/60 Hz	F

¹⁾ 24 AC coil voltage is available only with AF26 & AF30, AFN00 - AFN1.
For factory modifications, see pages 3.29 & 3.30.

IEC & NEMA Non-combination

AF26 - AF750; AFN00 - AFN4

Reversing, three phase

IEC & NEMA
Enclosed starters

3

IEC Non-combination

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings				General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V	Catalog number	Catalog number
28	AF26	7.5	7.5	15	20	AF2622-2Δ	AF262X-2Δ
34	AF30	10	10	20	25	AF3022-2Δ	AF302X-2Δ
54	AF50	15	20	40	50	AF5022-2Δ	AF502X-2Δ
68	AF63	20	25	50	60	AF6322-2Δ	AF632X-2Δ
80	AF75	25	30	60	75	AF7522-2Δ	AF752X-2Δ
110	AF110	30	40	75	100	AF11022-2Δ	AF1102X-2Δ
130	AF145	40	50	100	125	AF14522-2Δ	AF1452X-2Δ
156	AF185	50	60	125	150	AF18522-2Δ	AF1852X-2Δ
192	AF210	60	75	150	200	AF21022-2Δ	AF2102X-2Δ
248	AF260	75	100	200	250	AF26022-2Δ	AF2602X-2Δ
302	AF300	100	-	250	300	AF30022-2Δ	AF3002X-2Δ
414	AF400	125	150	350	400	AF40022-2Δ	AF4002X-2Δ
480	AF460	150	200	400	500	AF46022-2Δ	AF4602X-2Δ
590	AF580	200	250	500	600	AF58022-2Δ	AF5802X-2Δ
720	AF750	250	300	600	700	AF75022-2Δ	AF7502X-2Δ

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.34 & 3.35.

NEMA Non-combination

NEMA size	Contactor	Continuous	Maximum ratings - UL Listed			UL Type 1, 3R, 4, 12	UL Type 4X
			Maximum motor horsepower ratings			General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
			200V	230V	460/575V	Catalog number	Catalog number
00	AFN00	9	1.5	1.5	2	AFN0022-2Δ	AFN002X-2Δ
0	AFN0	18	3	3	5	AFN022-2Δ	AFN02X-2Δ
1	AN1	27	7.5	7.5	10	AFN122-2Δ	AFN12X-2Δ
2	AFN2	45	10	15	25	AFN222-2Δ	AFN22X-2Δ
3	AFN3	90	25	30	50	AFN322-2Δ	AFN32X-2Δ
4	AFN4	135	40	50	100	AFN422-2Δ	AFN42X-2Δ

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.36 & 3.37.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF2622-1K

Coil voltage selection chart

Coil voltage		
AC Volts, 40-60 Hz		
24 AC	100 - 250 AC	250 - 500 AC
1	2	3

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF2622-CK

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF26 & AF30, AFN00 - AFN1.
For factory modifications, see pages 3.29 & 3.30.

IEC & NEMA Non-fusible disconnect switch

AF26 - AF750; AFN00 - AFN4

Reversing, three phase

3 IEC Non-combination

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings				General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V	Catalog number	Catalog number
28	AF26	7.5	7.5	15	20	AF262N2-2Δ	AF262NX-2Δ
24	AF30	10	10	20	25	AF302N2-2Δ	AF302NX-2Δ
54	AF50	15	20	40	50	AF502N2-2Δ	AF502NX-2Δ
68	AF63	20	25	50	60	AF632N2-2Δ	AF632NX-2Δ
80	AF75	25	30	60	75	AF752N2-2Δ	AF752NX-2Δ
110	AF110	30	40	75	100	AF110N2-2Δ	AF1102NX-2Δ
130	AF145	40	50	100	125	AF1452N2-2Δ	AF1452NX-2Δ
156	AF185	50	60	125	150	AF1852N2-2Δ	AF1852NX-2Δ
192	AF210	60	75	150	200	AF2102N2-2Δ	AF2102NX-2Δ
248	AF260	75	100	200	250	AF2602N2-2Δ	AF2602NX-2Δ
302	AF300	100	-	250	300	AF3002N2-2Δ	AF3002NX-2Δ
414	AF400	125	150	350	400	AF4002N2-2Δ	AF4002NX-2Δ
480	AF460	150	200	400	500	AF4602N2-2Δ	AF4602NX-2Δ
590	AF580	200	250	500	600	AF5802N2-2Δ	AF5802NX-2Δ
722	AF750	250	300	600	700	AF7502N2-2Δ	AF7502NX-2Δ

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.34 & 3.35.

NEMA Non-combination

NEMA size	Contactor	Continuous	Maximum ratings - UL Listed			UL Type 1, 3R, 4, 12	UL Type 4X
			Maximum motor horsepower ratings			General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
			200V	230V	460/575V	Catalog number	Catalog number
00	AFN00	9	1.5	1.5	2	AFN002N2-2Δ	AFN002NX-2Δ
0	AFN0	18	3	3	5	AFN02N2-2Δ	AFN02NX-2Δ
1	AN1	27	7.5	7.5	10	AFN12N2-2Δ	AFN12NX-2Δ
2	AFN2	45	10	15	25	AFN22N2-2Δ	AFN22NX-2Δ
3	AFN3	90	25	30	50	AFN32N2-2Δ	AFN32NX-2Δ
4	AFN4	135	40	50	100	AFN42N2-2Δ	AFN42NX-2Δ

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.36 & 3.37.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF262N2-1K

Coil voltage selection chart

Coil voltage		
AC Volts, 40-60 Hz		
24 AC	100 - 250 AC	250 - 500 AC
1	2	3

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF262N2-CK

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF26 & AF30, AFN00 - AFN1. For factory modifications, see pages 3.29 & 3.30.

IEC & NEMA Fusible disconnect switch

AF09 - AF750; AFN00 - AFN4

Reversing, three phase

IEC & NEMA
Enclosed starters

3

IEC Fusible disconnect switch

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				Fuse clip rating amp/volts	UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings					General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V		Catalog number	Catalog number
9	AF9	2	2	5	7.5	30/600	AF092F2-2Δ1	AF092FX-2Δ1
11	AF12	3	3	7.5	10	30/600	AF122F2-2Δ1	AF122FX-2Δ1
17	AF16	5	5	10	15	30/600	AF162F2-2Δ1	AF162FX-2Δ1
28	AF26	7.5	7.5	15	20	60/600	AF262F2-2Δ2	AF262FX-2Δ2
34	AF30	10	10	20	25	60/600	AF302F2-2Δ2	AF302FX-2Δ2
54	AF50	15	20	40	50	100/600	AF502F2-2Δ3	AF502FX-2Δ3
68	AF63	20	25	50	60	200/600	AF632F2-2Δ4	AF632FX-2Δ4
80	AF75	25	30	60	75	200/600	AF752F2-2Δ4	AF752FX-2Δ4
110	AF110	30	40	75	100	200/600	AF1102F2-2Δ4	AF1102FX-2Δ4
130	AF145	40	50	100	125	400/600	AF1452F2-2Δ5	AF1452FX-2Δ5
156	AF185	50	60	125	150	400/600	AF1852F2-2Δ5	AF1852FX-2Δ5
192	AF210	60	75	150	200	400/600	AF2102F2-2Δ5	AF2102FX-2Δ5
248	AF260	75	-	-	-	400/600	AF2602F2-2Δ5	AF2602FX-2Δ5
248	AF260	-	100	200	250	600/600	AF2602F2-2Δ6	AF2602FX-2Δ6
302	AF300	100	100	250	300	600/600	AF3002F2-2Δ6	AF3002FX-2Δ6
414	AF400	125	150	350	400	800/600	AF4002F2-2Δ7	AF4002FX-2Δ7
480	AF460	150	200	400	500	800/600	AF4602F2-2Δ7	AF4602FX-2Δ7
590	AF580	200	250	500	600	1200/600	AF5802F2-2Δ8	AF5802FX-2Δ8
722	AF750	250	300	600	700	1200/600	AF7502F2-2Δ8	AF7502FX-2Δ8

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.34 & 3.35.

NEMA Fusible disconnect switch

NEMA size	Contactor	Continuous	Maximum ratings - UL Listed			Fuse clip rating amp/volts	UL Type 1, 3R, 4, 12	UL Type 4X
			Maximum motor horsepower ratings				General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
			200V	230V	460/575V		Catalog number	Catalog number
00	AFN00	9	1.5	1.5	2	30/600	AFN002F2-2Δ1	AFN002FX-2Δ1
0	AFN0	18	3	3	5	30/600	AFN02F2-2Δ1	AFN02FX-2Δ1
1	AFN1	27	—	—	10	30/600	AFN12F2-2Δ1	AFN12FX-2Δ1
1	AFN1	27	7.5	7.5	—	60/600	AFN12F2-2Δ2	AFN12FX-2Δ2
2	AFN2	45	10	—	25	60/600	AFN22F2-2Δ2	AFN22FX-2Δ2
2	AFN2	45	—	15	—	100/600	AFN22F2-2Δ3	AFN22FX-2Δ3
3	AFN3	90	25	30	50	200/600	AFN32F2-2Δ4	AFN32FX-2Δ4
4	AFN4	135	40	50	100	400/600	AFN42F2-2Δ5	AFN42FX-2Δ5

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.36 & 3.37.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF12 starter: AF122F2-1K1

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF12 starter: AF122F2-CR1

Coil voltage selection chart

Coil voltage		
AC Volts, 40-60 Hz		
24 AC	100 - 250 AC	250 - 500 AC
1	2	3

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF09 - AF30, AFN00 - AFN1.
For factory modifications, see pages 3.29 & 3.30.

IEC Circuit breaker type AF26 - AF750 Reversing, three phase

3

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				Circuit Breaker Amp Rating	UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings					General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V		Catalog number	Catalog number
28	AF26	2	3	5	7.5	15 A	AF262B2-2Δ1	AF262BX-2Δ1
28	AF26	3	-	7.5	10	20 A	AF262B2-2Δ2	AF262BX-2Δ2
28	AF26	-	5	10	-	25 A	AF262B2-2Δ3	AF262BX-2Δ3
28	AF26	5	-	-	15	30 A	AF262B2-2Δ4	AF262BX-2Δ4
28	AF26	-	7.5	15	20	35 A	AF262B2-2Δ5	AF262BX-2Δ5
34	AF30	7.5	-	-	-	40 A	AF302B2-2Δ6	AF302BX-2Δ6
34	AF30	10	10	20	25	50 A	AF302B2-2Δ7	AF302BX-2Δ7
54	AF50	-	-	-	30	50 A	AF502B2-2Δ7	AF502BX-2Δ7
54	AF50	15	15	40	50	80 A	AF502B2-2Δ8	AF502BX-2Δ8
68	AF63	20	20	50	60	100 A	AF632B2-2Δ9	AF632BX-2Δ9
80	AF75	25	30	60	75	125 A	AF752B2-2ΔA	AF752BX-2ΔA
110	AF110	30	-	75	100	150 A	AF1102B2-2ΔB	AF1102BX-2ΔB
110	AF110	-	40	-	-	200 A	AF1102B2-2ΔC	AF1102BX-2ΔC
130	AF145	40	50	100	125	200 A	AF1452B2-2ΔC	AF1452BX-2ΔC
156	AF185	50	60	125	150	250 A	AF1852B2-2ΔD	AF1852BX-2ΔD
192	AF210	60	-	-	-	250 A	AF2102B2-2ΔD	AF2102BX-2ΔD
192	AF210	-	75	150	200	300 A	AF2102B2-2ΔE	AF2102BX-2ΔE
248	AF260	75	-	-	-	350 A	AF2602B2-2ΔF	AF2602BX-2ΔF
248	AF260	-	100	200	250	400 A	AF2602B2-2ΔG	AF2602BX-2ΔG
302	AF300	100	-	-	300	450 A	AF3002B2-2ΔH	AF3002BX-2ΔH
302	AF300	-	-	250	-	500 A	AF3002B2-2ΔJ	AF3002BX-2ΔJ
414	AF400	-	125	-	-	500 A	AF4002B2-2ΔJ	AF4002BX-2ΔJ
414	AF400	125	150	300	400	600 A	AF4002B2-2ΔK	AF4002BX-2ΔK
414	AF400	-	-	350	-	700 A	AF4002B2-2ΔL	AF4002BX-2ΔL
480	AF460	150	-	-	-	600 A	AF4602B2-2ΔK	AF4602BX-2ΔK
480	AF460	-	200	400	500	800 A	AF4602B2-2ΔM	AF4602BX-2ΔM
590	AF580	200	-	-	-	800 A	AF5802B2-2ΔM	AF5802BX-2ΔM
590	AF580	-	250	500	600	1000 A	AF5802B2-2ΔN	AF5802BX-2ΔN
722	AF750	250	-	-	-	1000 A	AF7502B2-2ΔN	AF7502BX-2ΔN
722	AF750	-	300	600	700	1200 A	AF7502B2-2ΔP	AF7502BX-2ΔP

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.34 & 3.35.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF262B2-1K1

Coil voltage selection chart

Coil voltage		
AC Volts, 40-60 Hz		
24 AC	100 - 250 AC	250 - 500 AC
1	2	3

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF261B2-CK1

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF26 & AF30.
For factory modifications, see page 3.29 & 3.30.

NEMA Circuit breaker type

AFN00 - AFN4

Reversing, three phase

IEC & NEMA
Enclosed starters

3

NEMA size	Contactor	Continuous	Maximum ratings - UL Listed				Circuit breaker rating Amps	UL Type 1, 3R, 4, 12	
			Maximum motor horsepower ratings					General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
			208V	230V	460V	575V		Catalog number	Catalog number
00	AFN00	9	1.5	1.5	2	2	15 A	AFN002B2-2Δ1	AFN002BX-2Δ1
0	AFN0	18	2	3	5	5	15 A	AFN02B2-2Δ1	AFN02BX-2Δ1
			3	-	-	-	20 A	AFN02B2-2Δ2	AFN02BX-2Δ2
1	AFN1	27	-	-	-	7.5	15 A	AFN12B2-2Δ1	AFN12BX-2Δ1
			-	-	7.5	10	20 A	AFN12B2-2Δ2	AFN12BX-2Δ2
			-	5	10	-	25 A	AFN12B2-2Δ3	AFN12BX-2Δ3
			5	-	-	-	30 A	AFN12B2-2Δ4	AFN12BX-2Δ4
			-	7.5	-	-	35 A	AFN12B2-2Δ5	AFN11BX-2Δ5
			7.5	-	-	-	40 A	AFN12B2-2Δ6	AFN11B2X-2Δ6
2	AFN2	45	-	-	15	20	35 A	AFN22B2-2Δ5	AFN22BX-2Δ5
			10	10	20	25	40 A	AFN22B2-2Δ6	AFN22BX-2Δ6
			-	15	25	-	80 A	AFN22B2-2Δ8	AFN22BX-2Δ8
3	AFN3	90	-	-	-	30	50 A	AFN32B2-2Δ7	AFN32BX-2Δ7
			-	-	30	-	80 A	AFN32B2-2Δ8	AFN32BX-2Δ8
			15	-	-	40	80 A	AFN32B2-2Δ8	AFN32BX-2Δ8
			-	-	40	50	80 A	AFN32B2-2Δ8	AFN32BX-2Δ8
			-	-	50	-	100 A	AFN32B2-2Δ9	AFN32BX-2Δ9
			25	30	-	-	125 A	AFN32B2-2ΔA	AFN32BX-2ΔA
4	A145N4	135	-	-	60	75	125 A	AFN42B2-2ΔA	AFN42BX-2ΔA
			30	-	75	100	150 A	AFN42B2-2ΔB	AFN42BX-2ΔB
			40	50	100	-	200 A	AFN42B2-2ΔC	AFN42BX-2ΔC

Δ Overload relay suffix code. Select from the overload relay selection chart on pages 3.36 & 3.37.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AFN0 starter: AFN12B2-1K1.

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AFN0 starter: AFN12B2-CK1.

Coil voltage selection chart

Coil voltage		
AC Volts, 40-60 Hz		
24 AC	100 - 250 AC	250 - 500 AC
1	2	3

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AFN00 - AFN1.
For factory modifications, see pages 3.29 & 3.30.

IEC Non-combination

AF26 - AF75

2 Speed, 1 winding; three phase

3

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings				General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V	Catalog number	Catalog number
28	AF26	7.5	7.5	15	20	AF2632-2ΔΔ	AF263X-2ΔΔ
34	AF30	10	10	20	25	AF3032-2ΔΔ	AF303X-2ΔΔ
54	AF50	15	20	40	50	AF5032-2ΔΔ	AF503X-2ΔΔ
68	AF63	20	25	50	60	AF6332-2ΔΔ	AF633X-2ΔΔ
80	AF75	25	30	60	75	AF7532-2ΔΔ	AF753X-2ΔΔ

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.34. 1st Δ low speed; 2nd Δ high speed.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF2632-1KP

Coil voltage selection chart

Coil voltage	
AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF2632-CKP

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF26 & AF30.
For factory modifications, see pages 3.29 & 3.30.

IEC Non-fusible disconnect switch

AF26 - AF75

2 Speed, 1 winding; three phase

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings				General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V	Catalog number	Catalog number
28	AF26	7.5	7.5	15	20	AF263N2-2ΔΔ	AF263NX-2ΔΔ
34	AF30	10	10	20	25	AF303N2-2ΔΔ	AF303NX-2ΔΔ
54	AF50	15	20	40	50	AF503N2-2ΔΔ	AF503NX-2ΔΔ
68	AF63	20	25	50	60	AF633N2-2ΔΔ	AF633NX-2ΔΔ
80	AF75	25	30	60	75	AF753N2-2ΔΔ	AF753NX-2ΔΔ

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.34. 1st Δ low speed; 2nd Δ high speed.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF263N2-1KP

Coil voltage selection chart

Coil voltage	
AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF263N2-CKP

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF26 & AF30.
For factory modifications, see pages 3.29 & 3.30.

Fusible disconnect switch

AF09 - AF75

2 Speed, 1 winding; three phase

3

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				Fuse clip rating amp/volts	UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings					General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V		Catalog number	Catalog number
9	AF09	2	2	5	7.5	30/600	AF093F2-2ΔΔ1	AF093FX-2ΔΔ1
11	AF12	3	3	7.5	10	30/600	AF123F2-2ΔΔ1	AF123FX-2ΔΔ1
17	AF16	5	5	10	15	30/600	AF163F2-2ΔΔ1	AF163FX-2ΔΔ1
28	AF26	7.5	7.5	15	20	60/600	AF263F2-2ΔΔ2	AF263FX-2ΔΔ2
34	AF30	10	10	20	25	60/600	AF303F2-2ΔΔ2	AF303FX-2ΔΔ2
54	AF50	15	20	40	50	100/600	AF503F2-2ΔΔ3	AF503FX-2ΔΔ3
68	AF63	20	25	50	60	200/600	AF633F2-2ΔΔ4	AF633FX-2ΔΔ4
80	AF75	25	30	60	75	200/600	AF753F2-2ΔΔ4	AF753FX-2ΔΔ4

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.34. 1st Δ low speed; 2nd Δ high speed.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF09 starter: AF093F121KP1

Coil voltage selection chart

Coil voltage	
AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF09 starter: AF093F2-CKP1

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF09 - AF30, For factory modifications, see pages 3.29 & 3.30.

IEC Circuit breaker type AF26 - AF75 2 Speed, 1 winding; three phase

3

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				Circuit Breaker Amp Rating	UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings					General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V		Catalog number	Catalog number
28	AF26	2	3	5	7.5	15 A	AF263B2-2ΔΔ1	AF263BX-2ΔΔ1
28	AF26	3	-	7.5	10	20 A	AF263B2-2ΔΔ2	AF263BX-2ΔΔ2
28	AF26	-	5	10	-	25 A	AF263B2-2ΔΔ3	AF263BX-2ΔΔ3
28	AF26	5	-	-	15	30 A	AF263B2-2ΔΔ4	AF263BX-2ΔΔ4
28	AF26	-	7.5	15	20	35 A	AF263B2-2ΔΔ5	AF263BX-2ΔΔ5
34	AF30	7.5	-	-	-	40 A	AF303B2-2ΔΔ6	AF303BX-2ΔΔ6
34	AF30	10	10	20	25	50 A	AF303B2-2ΔΔ7	AF303BX-2ΔΔ7
54	AF50	-	-	-	30	50 A	AF503B2-2ΔΔ7	AF503BX-2ΔΔ7
54	AF50	15	15	40	50	80 A	AF503B2-2ΔΔ8	AF503BX-2ΔΔ8
68	AF63	20	20	50	60	100 A	AF633B2-2ΔΔ9	AF633BX-2ΔΔ9
80	AF75	25	30	60	75	125 A	AF753B2-2ΔΔA	AF753BX-2ΔΔA

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.34. 1st Δ low speed; 2nd Δ high speed.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF263B2-1KP1

Coil voltage selection chart

Coil voltage	
AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection

To select starter with control transformer, substitute the code from the control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF263B2-CKP1

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF26 & AF30.
For factory modifications, see pages 3.29 & 3.30.

IEC Non-combination

AF26 - AF75

2 Speed, 2 winding; three phase

3

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings				General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V	Catalog number	Catalog number
28	AF26	7.5	7.5	15	20	AF2642-2ΔΔ	AF264X-2ΔΔ
34	AF30	10	10	20	25	AF3042-2ΔΔ	AF304X-2ΔΔ
54	AF50	15	20	40	50	AF5042-2ΔΔ	AF504X-2ΔΔ
68	AF63	20	25	50	60	AF6342-2ΔΔ	AF634X-2ΔΔ
80	AF75	25	30	60	75	AF7542-2ΔΔ	AF754X-2ΔΔ

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.34. 1st Δ low speed; 2nd Δ high speed.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF2642-1KP

Coil voltage selection chart

Coil voltage	
AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF2642-CKP

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF26 & AF30, For factory modifications, see pages 3.29 & 3.30.

IEC Non-fusible disconnect switch

AF26 - AF75

2 Speed, 2 winding; three phase

IEC & NEMA
Enclosed starters

3

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings				General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V	Catalog number	Catalog number
28	AF26	7.5	7.5	15	20	AF264N2-2ΔΔ	AF264NX-2ΔΔ
34	AF30	10	10	20	25	AF304N2-2ΔΔ	AF304NX-2ΔΔ
54	AF50	15	20	40	50	AF504N2-2ΔΔ	AF504NX-2ΔΔ
68	AF63	20	25	50	60	AF634N2-2ΔΔ	AF634NX-2ΔΔ
80	AF75	25	30	60	75	AF754N2-2ΔΔ	AF754NX-2ΔΔ

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.34. 1st Δ low speed; 2nd Δ high speed.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF264N2-1KP

Coil voltage selection chart

Coil voltage	
AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF264N2-CKP

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF26 & AF30,
For factory modifications, see pages 3.29 & 3.30.

IEC Fusible disconnect switch AF09 - AF75 2 Speed, 2 winding; three phase

3

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				Fuse clip rating amp/volts	UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings					General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V		Catalog number	Catalog number
9	AF09	2	2	5	7.5	30/600	AF094F2-2ΔΔ1	AF094FX-2ΔΔ1
11	AF12	3	3	7.5	10	30/600	AF124F2-2ΔΔ1	AF124FX-2ΔΔ1
17	AF16	5	5	10	15	30/600	AF164F2-2ΔΔ1	AF164FX-2ΔΔ1
28	AF26	7.5	7.5	15	20	60/600	AF264F2-2ΔΔ2	AF264FX-2ΔΔ2
34	AF30	10	10	20	25	60/600	AF304F2-2ΔΔ2	AF304FX-2ΔΔ2
54	AF50	15	20	40	50	100/600	AF504F2-2ΔΔ3	AF504FX-2ΔΔ3
68	AF63	20	25	50	60	200/600	AF634F2-2ΔΔ4	AF634FX-2ΔΔ4
80	AF75	25	30	60	75	200/600	AF754F2-2ΔΔ4	AF754FX-2ΔΔ4

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.34. 1st Δ low speed; 2nd Δ high speed.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF12 starter: AF124F2-1KP1

Coil voltage selection chart

Coil voltage AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF12 starter: AF124F2-CKP1

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF09 - AF30.
For factory modifications, see pages 3.29 & 3.30.

IEC Circuit breaker type

AF26 - AF75

2 Speed, 2 winding; three phase

UL motor switching current	Contactor Size	Maximum ratings - UL Listed				Circuit Breaker Amp Rating	UL Type 1, 3R, 4, 12	UL Type 4X
		Maximum motor horsepower ratings					General Purpose, Rainproof, Waterproof, Dusttight	Watertight Corrosion Resistant Stainless steel
		200/208V	230/240V	460V/480V	575/600V		Catalog number	Catalog number
28	AF26	2	3	5	7.5	15 A	AF264B2-2ΔΔ1	AF264BX-2ΔΔ1
28	AF26	3	-	7.5	10	20 A	AF264B2-2ΔΔ2	AF264BX-2ΔΔ2
28	AF26	-	5	10	-	25 A	AF264B2-2ΔΔ3	AF264BX-2ΔΔ3
28	AF26	5	-	-	15	30 A	AF264B2-2ΔΔ4	AF264BX-2ΔΔ4
28	AF26	-	7.5	15	20	35 A	AF264B2-2ΔΔ5	AF264BX-2ΔΔ5
34	AF30	7.5	-	-	-	40 A	AF304B2-2ΔΔ6	AF304BX-2ΔΔ6
32	AF30	10	10	20	25	50 A	AF304B2-2ΔΔ7	AF304BX-2ΔΔ7
54	AF50	-	-	-	30	50 A	AF504B2-2ΔΔ7	AF504BX-2ΔΔ7
54	AF50	15	15	40	50	80 A	AF504B2-2ΔΔ8	AF504BX-2ΔΔ8
68	AF63	20	20	50	60	100 A	AF634B2-2ΔΔ9	AF634BX-2ΔΔ9
80	AF75	25	30	60	75	125 A	AF754B2-2ΔΔA	AF754BX-2ΔΔA

Δ Overload relay suffix code. Select from the overload relay selection chart on page 3.34. 1st Δ low speed; 2nd Δ high speed. Overload relays are required for all combination starters.

Coil voltage selection ¹⁾

All AC operated catalog numbers include a 100-250V AC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the suffix code after the last dash in the catalog number. Ex.: A 24V AC coil is required for an AF26 starter: AF264B2-1KP1

Coil voltage selection chart

Coil voltage	
AC Volts, 40-60 Hz	
24 AC	100 - 250 AC
1	2

Control transformer voltage selection

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits after the last dash in the catalog number. Ex.: A 480V primary voltage with a 120V secondary voltage is required for an AF26 starter: AF264B2-CKP1

Control transformer voltage selection chart

Control Voltage	200-208	230-240	460-480	575-600
120V AC @ 50/60 Hz	A	B	C	D
24V AC @ 50/60 Hz	E	F	G	H

1) 24 AC coil voltage is available only with AF26 & AF30. For factory modifications, see pages 3.29 & 3.30.

General information

Factory installed options

Control cover factory modifications - NEMA/UL Type 1, 3R, 4, 4X & 12

3 Pilot device kits

	Starter type	Description	Nameplate	Suffix code
One operator	DOL	2-Position Switch	OFF-ON	C
	DOL	3-Position Switch	HAND-OFF-AUTO	D
	DOL	Pilot Light	"ON" Green pilot light	E
	REV	3-Position Switch	FOR-OFF-REV	L
	2 Speed	3-Position Switch	SLOW-OFF-FAST	M
Two operators	DOL	Push Buttons	START/STOP	A
	DOL	Push Buttons	START/ EMERGENCY STOP	N
	DOL	2 Position Switch & Pilot Light	OFF-ON/"ON"	H
	DOL	3 Position Switch & Pilot Light	HAND-OFF-AUTO/"ON"	J
Three operators	DOL	Push Buttons & Pilot Light	START/STOP/"ON"	F
	DOL	2 Position Switch & Pilot Lights	OFF-ON/"ON"/"FAULT"	P
	DOL	3 Position Switch & Pilot Lights	HAND-OFF-AUTO/"ON"/"FAULT"	Q
	REV	Push Buttons	FORWARD- REVERSE-STOP	B
	REV	3 Position Switch & Pilot Lights	FOR-OFF-REV/"FORWARD"/"REVERSE"	G
	2 Speed	Push Buttons	FAST-SLOW-STOP	K
	2 Speed	3 Position Switch & Pilot Lights	SLOW-OFF-FAST/"SLOW"/"FAST"	R

General information

Factory installed options

IEC & NEMA
Enclosed starters

3

Control circuit transformers

Contactor size	Description	Option
AF09 - AF30 AFN00 & AFN1	50VA, 200-208/120 VAC	A
	50VA, 230-240/120 VAC	B
	50VA, 460-480/120 VAC	C
	50VA, 575-600/120 VAC	D
	50VA, 200-208/24 VAC	E
	50VA, 230-240/24 VAC	F
	50VA, 460-480/24 VAC	G
	50VA, 575-600/24 VAC	H
AF50 - AF75 AFN2 & AFN3	75VA, 200-208/120 VAC	A
	75VA, 230-240/120 VAC	B
	75VA, 460-480/120 VAC	C
	75VA, 575-600/120 VAC	D
AF110	100VA, 200-208/120 VAC	A
	100VA, 230-240/120 VAC	B
	100VA, 460-480/120 VAC	C
	100VA, 575-600/120 VAC	D
AF145 - AF185 AF400-AF460 AFN4	150VA, 200-208/120 VAC	A
	150VA, 230-240/120 VAC	B
	150VA, 460-480/120 VAC	C
	150VA, 575-600/120 VAC	D
AF210 - AF300 AF580-AF750	250VA, 200-208/120 VAC	A
	250VA, 230-240/120 VAC	B
	250VA, 460-480/120 VAC	C
	250VA, 575-600/120 VAC	D

General information

Field modification kits

Pilot device field modifications kits- NEMA/UL Type 1, 3R, 4, 4X & 12

3

	Starter type	Description	Nameplate	Catalog number
One operator	DOL	2-Position Switch	OFF-ON	SS2P-1
	DOL	3-Position Switch	HAND-OFF-AUTO	SS3P-2
	DOL	Pilot Light (120V AC)	"ON" Green pilot light	PL-120VAC
	DOL	Pilot Light (24V AC)	"ON" Green pilot light	PL-24VAC
	REV	3-Position Switch	FOR-OFF-REV	SS3P-3
	2 Speed	3-Position Switch	SLOW-OFF-FAST	SS3P-4
Two operators	DOL	Push Buttons	START/STOP	PB-SS
	DOL	Push Buttons	START/ EMERGENCY STOP	PB-SES
	DOL	2 Position Switch & Pilot Light (120V AC)	OFF-ON/"ON"	SS2PPL-120VAC
	DOL	2 Position Switch & Pilot Light (24V AC)	OFF-ON/"ON"	SS2PPL-24VAC
	DOL	3 Position Switch & Pilot Light (120V AC)	HAND-OFF-AUTO/"ON"	SS3PPL-120VAC
	DOL	3 Position Switch & Pilot Light (24V AC)	HAND-OFF-AUTO/"ON"	SS3PPL-24VAC
Three operators	DOL	Push Buttons & Pilot Light (120V AC)	START/STOP/"ON"	PBPL-SS120VAC
	DOL	Push Buttons & Pilot Light (24V AC)	START/STOP/"ON"	PBPL-SS24VAC
	DOL	2 Position Switch & Pilot Lights (120V AC)	OFF-ON/"ON"/"FAULT"	SS2PPL-FLT-120VAC
	DOL	2 Position Switch & Pilot Lights (24V AC)	OFF-ON/"ON"/"FAULT"	SS2PPL-FLT-24VAC
	DOL	3 Position Switch & Pilot Lights (120V AC)	HAND-OFF-AUTO/"ON"/"FAULT"	SS3PPL-FLT-120VAC
	DOL	3 Position Switch & Pilot Lights (24V AC)	HAND-OFF-AUTO/"ON"/"FAULT"	SS3PPL-FLT-24VAC
	REV	Push Buttons	FORWARD- REVERSE-STOP	PB-FRS
	REV	3 Position Switch & Pilot Lights (120V AC)	FOR-OFF-REV/"FORWARD"/"REVERSE"	SS3PPL-FR-120VAC
	REV	3 Position Switch & Pilot Lights (24V AC)	FOR-OFF-REV/"FORWARD"/"REVERSE"	SS3PPL-FR-24VAC
	2 Speed	Push Buttons	FAST-SLOW-STOP	PB-FSS
	2 Speed	3 Position Switch & Pilot Lights(120V AC)	SLOW-OFF-FAST/"SLOW"/"FAST"	SS3PPL-SF-120VAC
2 Speed	3 Position Switch & Pilot Lights (24V AC)	SLOW-OFF-FAST/"SLOW"/"FAST"	SS3PPL-SF-24VAC	

General information

Field modification kits

IEC & NEMA
Enclosed starters

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Control circuit transformer field modifications kits

Contactor size	Description	Catalog number
AF9 - AF30 AFN00 - AFN1	50VA, 200-208/120 VAC	CCT50-208/120
	50VA, 230-240/120 VAC	CCT50-240/120
	50VA, 460-480/120 VAC	CCT50-480/120
	50VA, 575-600/120 VAC	CCT50-600/120
	50VA, 200-208/24 VAC	CCT50-208/24
	50VA, 230-240/24 VAC	CCT50-240/24
	50VA, 460-480/24 VAC	CCT50-480/24
AF50 - AF75 AFN2 & AFN3	75VA, 200-208/120 VAC	CCT75-208/120
	75VA, 230-240/120 VAC	CCT75-240/120
	75VA, 460-480/120 VAC	CCT75-480/120
	75VA, 575-600/120 VAC	CCT75-600/120
AF110	100VA, 200-208/120 VAC	CCT100-208/120
	100VA, 230-240/120 VAC	CCT100-240/120
	100VA, 460-480/120 VAC	CCT100-480/120
	100VA, 575-600/120 VAC	CCT100-600/120
AF145 - AF185 AF400 - AF460 AFN4	150VA, 200-208/120 VAC	CCT150-208/120
	150VA, 230-240/120 VAC	CCT150-240/120
	150VA, 460-480/120 VAC	CCT150-480/120
	150VA, 575-600/120 VAC	CCT150-600/120
AF210 - AF300 AF580 - AF750	250VA, 200-208/120 VAC	CCT250-208/120
	250VA, 230-240/120 VAC	CCT250-240/120
	250VA, 460-480/120 VAC	CCT250-480/120
	250VA, 575-600/120 VAC	CCT250-600/120

General information

Motor data

Ampere ratings of 3 phase, AC induction motors

3

Horse power	110 – 120V			200 – 208V			220 – 240V			380 – 415V ^①		440 – 480V			550 – 600V		
	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase	Single phase	Three phase	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase
1/10	3.0	—	—	1.65	—	—	1.5	—	—	1.0	—	—	—	—	—	—	—
1/8	3.8	—	—	2.1	—	—	1.9	—	—	1.2	—	—	—	—	—	—	—
1/6	4.4	—	—	2.4	—	—	2.2	—	—	1.4	—	—	—	—	—	—	—
1/4	5.8	—	—	3.2	—	—	2.9	—	—	1.8	—	—	—	—	—	—	—
1/3	7.2	—	—	4.0	—	—	3.6	—	—	2.3	—	—	—	—	—	—	—
1/2	9.8	4.0	4.4	5.4	2.2	2.4	4.9	2.0	2.2	3.2	1.3	2.5	1.0	1.1	2.0	0.8	0.9
3/4	13.8	4.8	6.4	7.6	2.6	3.5	6.9	2.4	3.2	4.5	1.8	3.5	1.2	1.6	2.8	1.0	1.3
1	16.0	6.4	8.4	8.8	3.6	4.6	8.0	3.2	4.2	5.1	2.3	4.0	1.6	2.1	3.2	1.3	1.7
1 1/2	20.0	9.0	12.0	11.0	5.0	6.6	10.0	4.5	6.0	6.4	3.3	5.0	2.3	3.0	4.0	1.8	2.4
2	24.0	11.8	13.6	13.2	6.5	7.5	12.0	5.9	6.8	7.7	4.3	6.0	3.0	3.4	4.8	2.4	2.7
3	34.0	16.6	19.2	18.7	9.2	10.6	17.0	8.3	9.6	10.9	6.1	8.5	4.2	4.8	6.8	3.3	3.9
5	56.0	26.4	30.4	30.8	14.5	16.8	28.0	13.2	15.2	17.9	9.7	14.0	6.6	7.6	11.2	5.3	6.1
7 1/2	80.0	38.0	44.0	44.0	21.0	24.2	40.0	19.0	22.0	27.0	14.0	21.0	9.0	11.0	16.0	8.0	9.0
10	100.0	48.0	56.0	55.0	26.4	30.8	50.0	24.0	28.0	33.0	18.0	26.0	12.0	14.0	20.0	10.0	11.0
15	135.0	72.0	84.0	75.0	39.6	46.2	68.0	36.0	42.0	44.0	27.0	34.0	18.0	21.0	27.0	14.0	17.0
20	—	94.0	108.0	96.8	52.0	60.0	88.0	47.0	54.0	56.0	34.0	44.0	23.0	27.0	35.0	19.0	22.0
25	—	118.0	136.0	121.0	65.0	75.0	110.0	59.0	68.0	70.0	44.0	55.0	29.0	34.0	44.0	24.0	27.0
30	—	138.0	160.0	150.0	76.0	88.0	136.0	69.0	80.0	87.0	51.0	68.0	35.0	40.0	54.0	28.0	32.0
40	—	180.0	208.0	194.0	100.0	115.0	176.0	90.0	104.0	112.0	66.0	88.0	45.0	52.0	70.0	36.0	41.0
50	—	226.0	260.0	238.0	125.0	143.0	216.0	113.0	130.0	139.0	83.0	108.0	56.0	65.0	86.0	45.0	52.0
60	—	—	—	—	147.0	160.0	—	133.0	154.0	—	103.0	—	67.0	77.0	—	53.0	62.0
75	—	—	—	—	183.0	212.0	—	166.0	192.0	—	128.0	—	83.0	96.0	—	66.0	77.0
100	—	—	—	—	240.0	273.0	—	218.0	248.0	—	165.0	—	109.0	124.0	—	87.0	99.0
125	—	—	—	—	—	344.0	—	—	312.0	—	208.0	—	135.0	156.0	—	108.0	125.0
150	—	—	—	—	—	396.0	—	—	360.0	—	240.0	—	156.0	180.0	—	125.0	144.0
200	—	—	—	—	—	528.0	—	—	480.0	—	320.0	—	208.0	240.0	—	167.0	192.0
250	—	—	—	—	—	663.0	—	—	602.0	—	403.0	—	—	302.0	—	—	242.0
300	—	—	—	—	—	—	—	—	—	—	482.0	—	—	361.0	—	—	289.0
350	—	—	—	—	—	—	—	—	—	—	560.0	—	—	414.0	—	—	336.0
400	—	—	—	—	—	—	—	—	—	—	636.0	—	—	477.0	—	—	382.0
500	—	—	—	—	—	—	—	—	—	—	786.0	—	—	590.0	—	—	472.0

General information - IEC Starter

Standard thermal overload relays

IEC & NEMA
Enclosed starters

Standard - Thermal, Type TF and TA, Class 10
Correct sizing of overload relay per motor HP

3

1-phase		3-phase				Catalog Number	Code	Setting Range (A)	Contactor Size
120V	240V	208V	240V	480V	600V				
-	-	-	-	-	-	TF42-0.13	A	0.10-0.13	AF09/AF26*
-	-	-	-	-	-	TF42-0.17	B	0.13-0.17	
-	-	-	-	-	-	TF42-0.23	C	0.17-0.23	
-	-	-	-	-	-	TF42-0.41	D	0.31- 0.41	
-	-	-	-	-	-	TF42-0.55	E	0.41-0.55	
-	-	-	-	-	-	TF42-0.74	F	0.55-0.74	
-	-	-	-	-	1/2	TF42-1.0	G	0.74-1.0	
-	-	-	-	1/2	3/4	TF42-1.3	H	1.0-1.3	
-	1/10	-	-	3/4	1	TF42-1.7	J	1.3-1.7	
-	1/8, 1/6	-	1/2	1	-	TF42-2.3	K	1.7-2.3	
1/10	1/4	1/2	-	1 1/2	1 1/2, 2	TF42-3.1	L	2.3-3.1	
1/8	1/3	3/4	3/4,1	2	3	TF42-4.2	M	3.1-4.2	
1/6	1/2	1	-	3	-	TF42-5.7	N	4.2-5.7	
1/4, 1/3	3/4	1 1/2, 2	1 1/2, 2	5	5	TF42-7.6	P	5.7-7.6	
1/2	1	-	-	-	7.5	TF42-10	Q	7.6-10	
-	-	-	3	-	-	TF42-13	R	10-13	
3/4,1	1 1/2, 2	3	-	7.5	10	TF42-16	S	13-16	
-	3	-	5	10	-	TF42-20	T	16-20	
-	-	5	-	-	15	TF42-24	U	20-24	
1 1/2, 2	-	-	7.5	15	20	TF42-29	V	24-29	
-	5	7.5	10	20	25	TF42-35	W	29-35	
-	-	10	-	-	-	TA75DU25	A	18-25	
-	-	-	-	-	-	TA75DU32	B	22-32	
-	7 1/2	-	15	25, 30	30, 40	TA75DU42	C	29-42	
-	10	15	-	40	50	TA75DU52	D	36-52	
-	-	-	20	-	-	TA75DU63	E	45-63	
-	-	-	25	50	-	TA75DU80	F	60-80	
-	15	25	30	60	75	TA110DU90	A	65-90	
-	20	30	-	-	-	TA110DU110	B	80-110	
-	25	-	40	75	100	TA200DU90	A	65-90	
-	-	-	-	-	-	TA200DU110	B	80-110	
-	-	40	50	100	125	TA200DU135	C	100-135	
-	-	-	-	-	-	TA200DU150	D	110-150	
-	-	50	60	125	150	TA200DU175	E	130-175	
-	-	60	-	150	-	TA450DU185	A	130-185	
-	-	-	75	-	200	TA450DU235	B	165-235	
-	-	-	100	200	250	TA450DU310	C	220-310	
-	-	100	-	250	300			AF300	
-	-	-	125	300	350			AF400	
-	-	125	150	350	400			AF460	
-	-	-	200	400	500			AF580	
-	-	200	250	500	600			AF750	
-	-	250	300	600	700			AF750	

* Note: AF26 contactor used with non-combination and circuit breaker disconnect.

General information - IEC Starter Electronic overload relays

Optional - Electronic, Type E, Class 10, 20 & 30 Selectable
Correct sizing of overload relay per motor HP

3

3-phase				Catalog Number	Code	Setting Range (A)	Contactor Size
208V	240V	480V	600V				
-	-	-	-	EF19-0.32	A1	0.10-0.32	AF09/AF26*
-	-	-	-	EF19-1.0	B1	0.3-1.0	
-	-	1/2	1/2, 3/4	EF19-2.7	C1	0.80-2.7	
-	-	3/4	1				
-	1/2	1	1 1/2				
1/2	-	1 1/2	2	EF19-6.3	D1	1.9-6.3	
3/4	3/4	2	3				
1	1	3	-	EF19-18.9	E1	5.7-18.9	
1 1/2	1 1/2	-	5				
2	2	5	7.5				
3	3	7.5	10				
-	5	10	-				
5	7.5	15	15, 20	EF45-30	E2	9-30	
7.5	10	20	25				
10	-	-	-	EF45-45	E3	15-45	
-	-	25	30	E80DU80	E1	27-80	
-	15	30	40				
15	20	40	50				
20	25	50	60				
25	30	60	75				
30	40	75	100	E140DU140	E1	50-140	
40	50	100	125	E200DU200	E2	65-200	
50	60	125	150				
60	75	150	200	E320DU320	E3	105-320	
75	100	200	250				
100	-	250	300				
-	125	300	350	E500DU500	E5	170-500	
125	150	350	400				
150	200	400	500				
200	250	500	600				
250	300	600	700	E800DU800	E8	270-800	

* Note: AF26 contactor used with non-combination and circuit breaker disconnect.

General information - NEMA Starter

Standard thermal overload relays

IEC & NEMA
Enclosed starters

Standard - Thermal, Type TF and TA, Class 10

Correct sizing of overload relay per motor HP

3

1-phase		3-phase				Catalog Number	Code	Setting Range (A)	Contactor Size
120V	240V	208V	240V	480V	600V				
-	-	-	-	-	-	TF42-0.13	A	0.10-0.13	AFN00
-	-	-	-	-	-	TF42-0.17	B	0.13-0.17	
-	-	-	-	-	-	TF42-0.23	C	0.17-0.23	
-	-	-	-	-	-	TF42-0.41	D	0.31-0.41	
-	-	-	-	-	-	TF42-0.55	E	0.41-0.55	
-	-	-	-	-	-	TF42-0.74	F	0.55-0.74	
-	-	-	-	-	1/2	TF42-1.0	G	0.74-1.0	
-	-	-	-	1/2	3/4	TF42-1.3	H	1.0-1.3	
-	1/10	-	-	3/4	1	TF42-1.7	J	1.3-1.7	
-	1/8	-	1/2	1	-	TF42-2.3	K	1.7-2.3	
1/10	1/6, 1/4	1/2	-	1 1/2	1 1/2, 2	TF42-3.1	L	2.3-3.1	
1/8	1/3	3/4	3/4	2	-	TF42-4.2	M	3.1-4.2	
1/6	1/2	1	1	-	-	TF42-5.7	N	4.2-5.7	
1/4	3/4	1 1/2	1 1/2	-	-	TF42-7.6	P	5.7-7.6	
1/3	1	-	-	-	-	TF42-10	Q	7.6-10	
-	-	-	-	-	3	TF42-4.2	M	3.1-4.2	
-	-	-	-	3	-	TF42-5.7	N	4.2-5.7	
-	-	2	2	5	5	TF42-7.6	P	5.7-7.6	
1/2	1 1/2	-	3	-	-	TF42-10	Q	7.6-10	
-	2	3	-	-	-	TF42-13	R	10-13	
3/4, 1	-	-	-	-	-	TF42-16	S	13-16	
-	-	-	-	-	7.5	TF42-10	Q	7.6-10	
-	-	-	-	7.5	10	TF42-13	R	10-13	
-	-	-	5	10	-	TF42-16	S	13-16	
-	3	5	-	-	-	TF42-20	T	16-20	
2	-	-	7.5	-	-	TF42-24	U	20-24	
-	-	7.5	-	-	-	TF42-29	V	24-29	
-	-	-	-	15	20	TA75DU25	A	18-25	
-	-	10	10	20	25	TA75DU32	B	22-32	
3	7 1/2	-	15	25	-	TA75DU42	C	29-42	
-	-	-	-	-	30	TA75DU42	C	29-42	
-	-	15	-	30	40	TA75DU52	D	36-52	
-	-	20	20	40	50	TA75DU63	E	45-63	
-	-	25	25, 30	50	-	TA75DU80	F	60-80	
-	-	30	-	60	75	TA200DU90	A	65-90	
-	-	-	40	75	100	TA200DU110	B	80-110	
-	-	40	50	100	-	TA200DU135	C	100-135	

1) AFN1 contactor can use AFN00 and AFN0 overloads.

General information - NEMA Starter

Electronic overload relays

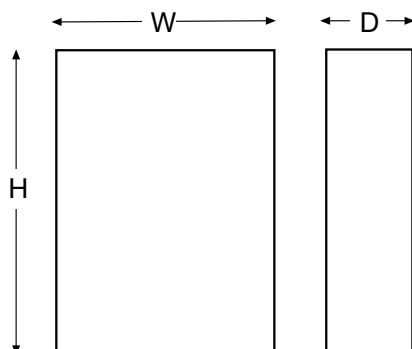
Optional - Electronic, Type E, Class 10, 20, & 30 Selectable

3 Correct sizing of overload relay per motor HP

3-phase				Catalog Number	Code	Setting Range (A)	Contactor Size
208V	240V	480V	600V				
-	-	-	-	EF19-0.32	A1	0.10-0.32	AFN00
-	-	-	-	EF19-1.0	B1	0.3-1.0	
-	-	3/4, 1/2	3/4, 1/2	EF19-2.7	C1	0.9-2.7	
-	1/2	1	1, 1.5				
1/2	-	-	-	EF19-6.3	D1	1.9-6.3	
3/4	3/4	-	-				
1	1	1.5, 2	2	EF19-18.9	E1	5.7 -18.9	
1.5	1.5	-	-				
-	-	3	3				
2	2	-	-				
3	3	5	5				
5	5	7.5	7.5				
7.5	7.5	10	10	E45DU30	E1	9-30	AFN1 1)
-	10,15	20	20	E80DU80	E1	27-80	AFN2
10	-	25	25				
15	20, 25	30, 40	30, 40				
20, 25	30	50	50				
30	40	60	-	E200DU200	E2	40-140	AFN3
40	50	75, 100	75, 100				
							AFN4

1) AFN1 contactor can use AFN00 and AFN0 overloads.

Approximate dimensions Non-combination starters



IEC and NEMA starters Non reversing and reversing

Contactor Size	Enclosure Type	H (in)	H (mm)	W (in)	W (mm)	D (in)	D (mm)
AF09-AF30, AFN00-AFN1	1, 3R, 4, 4X, 12	12	300	12	300	6	150
AF50-AF75, AFN3		16	400	12	300	8	200
AF110		24	600	20	500	10	250
AF145-AF185, AFN4		36	900	30	760	10	250
AF210-AF300		48	1200	36	900	12	300
AF400-AF460		48	1200	36	900	16	400
AF580-AF750		60	1500	60	1500	18	449

Two speed 1 winding & 2 winding

AF09-AF30	1, 3R, 4, 4X, 12	16	400	12	300	8	200
AF50-AF75		20	500	16	400	8	200
AF110		24	600	20	500	10	250
AF145-AF185		36	900	30	760	10	250
AF210-AF300		48	1200	36	900	12	300
AF400-AF460		48	1200	36	900	16	400
AF580-AF750		60	1500	60	1500	18	449

Enclosure accessories for non-combination and combination controllers

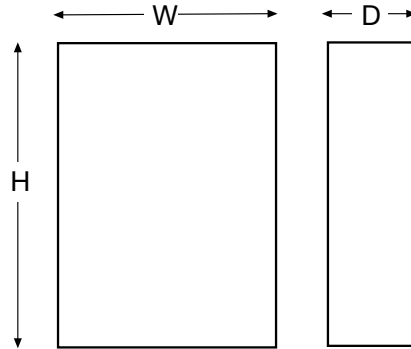
Description	Catalog number
12Hx16D Floormount Kit	RC-FSK1212C
12Hx16D Floormount Kit	RC-FSK1216C
12Hx12D Floormount Kit Type 304 SS	RC-FSK12124
12Hx12D Floormount Kit Type 304 SS	RC-FSK12164
Padlock lockout carbon steel 1)	RC-WMPADRCS
Padlock lockout stainless steel 1)	RC-WMPADRS6
Wallmount Bracket Kit	RC-2508.200
Wallmount Bracket Kit Type 304 SS	RC-2433.000

Exact dimensions can be obtained using the on line configurator

1) Used on enclosures below 36" in height.

Approximate dimensions Combination starters

3



IEC and NEMA starters

Non reversing

Contactor Size	Enclosure Type	H	H	W	W	D	D
		(in)	(mm)	(in)	(mm)	(in)	(mm)
AF09-AF30, AFN00-AFN1	1, 3R, 4, 4X, 12	16	400	12	300	8	200
AF50-AF75, AFN2-AFN3		20	500	16	400	8	200
AF110		24	600	20	500	10	250
AF145-AF185, AFN4		36	900	30	760	10	250
AF210-AF460		48	1200	36	900	16	400
AF580-AF750		60	1500	60	1500	18	449

Reversing

AF09-AF30, AFN00-AFN1	1, 3R, 4, 4X, 12	20	500	16	400	8	200
AF50-AF75, AFN2-AFN3		24	600	20	500	10	250
AF110-AF185, AFN4		30	760	30	760	10	250
AF210-AF300		36	900	48	1200	12	300
AF400-AF460		60	1500	60	1500	18	449
AF580-AF750		60	1500	60	1500	18	449

Two speed 1 winding & 2 winding

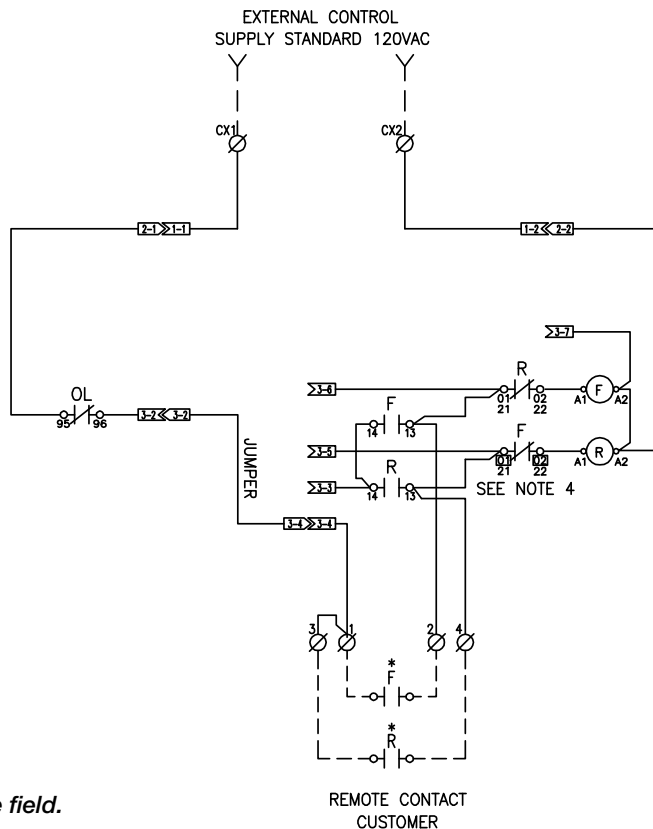
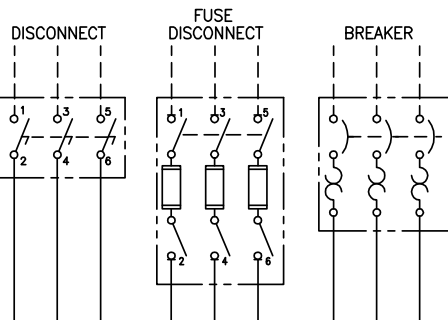
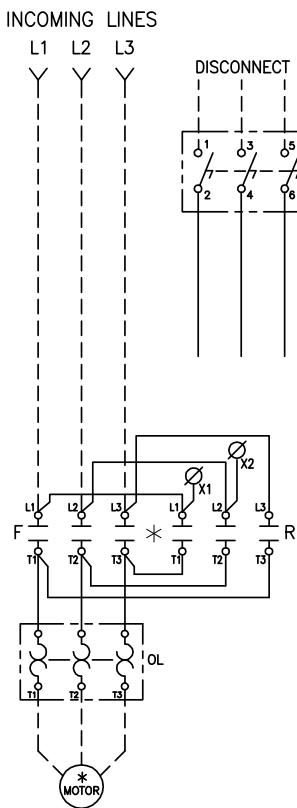
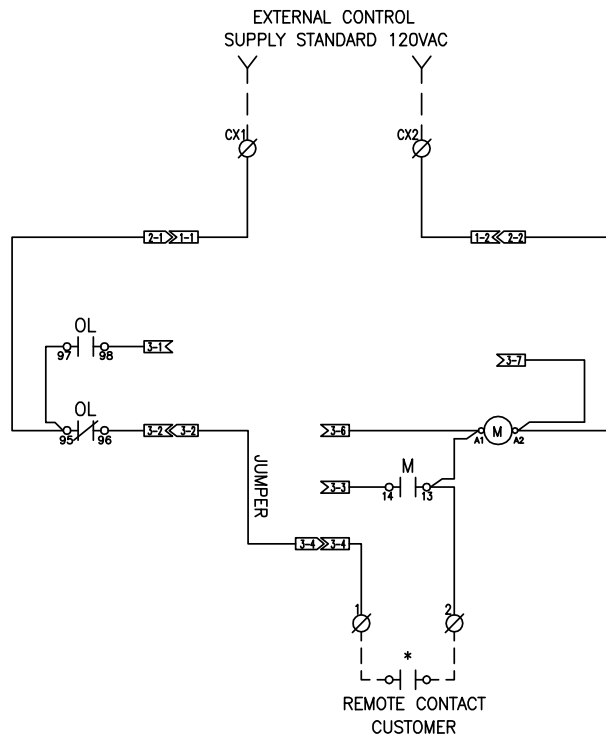
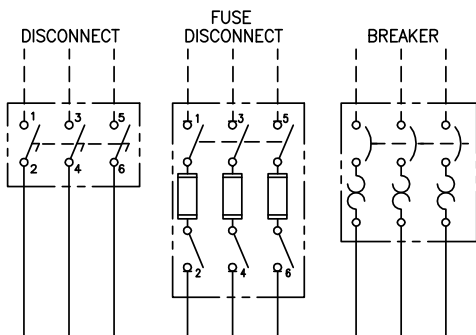
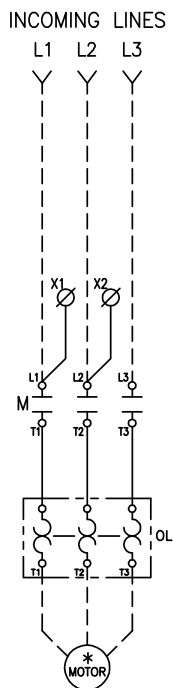
AF09-AF30	1, 3R, 4, 4X, 12	24	600	20	500	10	250
AF50-AF110		30	760	30	760	10	250
AF145-AF300		36	900	48	1200	12	300
AF400-AF460		72	900	60	1500	18	449
AF580-AF750		72	900	60	1500	18	449

Exact dimensions can be obtained using the on line configurator

Circuit diagrams

Non-reversing, reversing

AF09 - AF750, AFN00 - AFN4

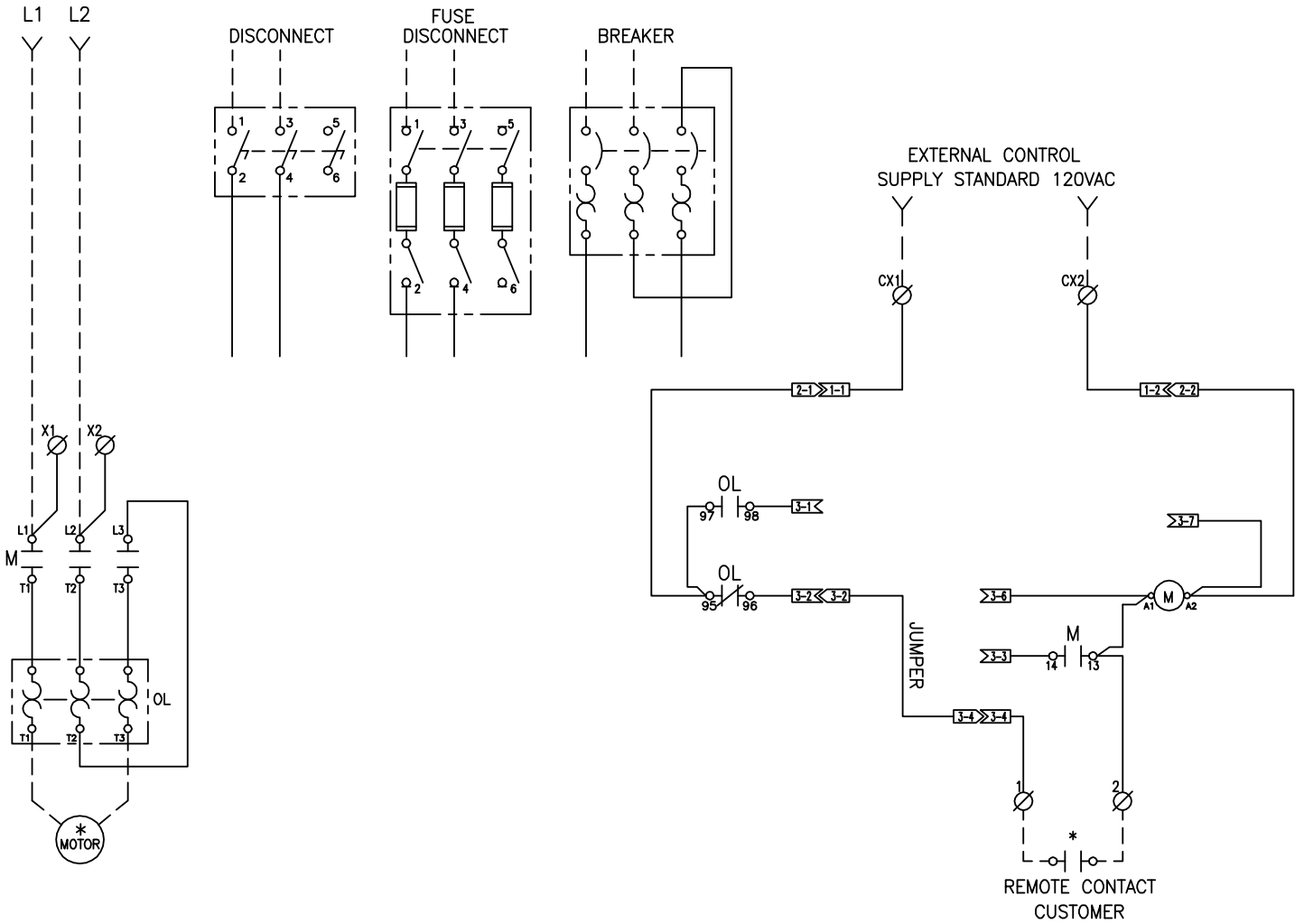


All units ship with a NO & NC contacts.
Additional contacts can be added in the field.

Circuit diagrams

Non-reversing, single phase AF09 - AF110, AFN00 - AFN2

3 INCOMING LINES

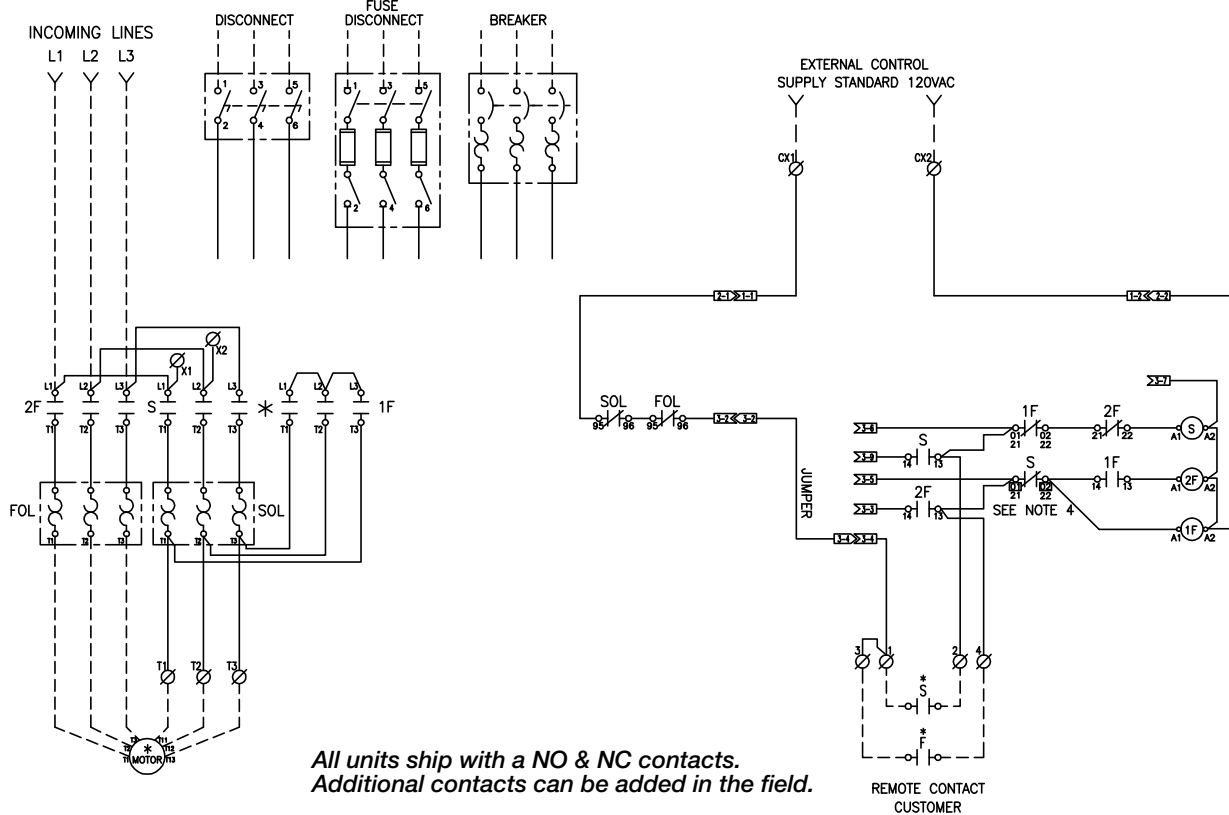
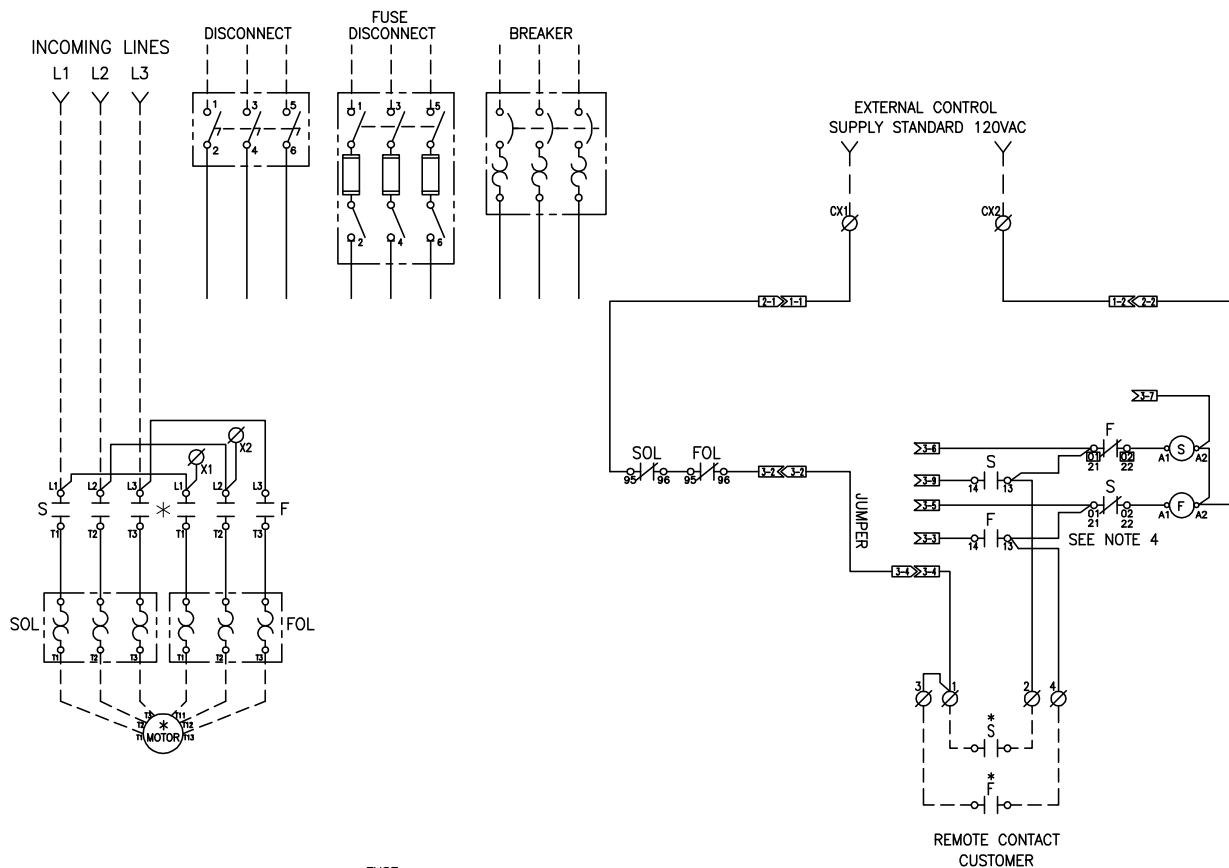


*All units ship with a NO & NC contacts.
Additional contacts can be added in the field.*

Circuit diagrams

2 Speed, 1 winding; 2 speed, 2 winding

AF09 - AF75



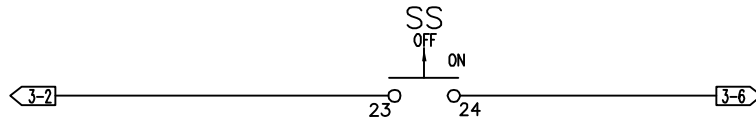
**All units ship with a NO & NC contacts.
Additional contacts can be added in the field.**

Circuit diagrams

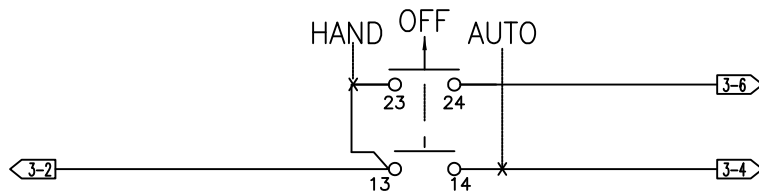
Pilot device kits, one operator

3

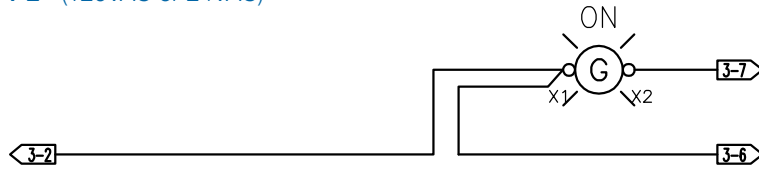
SS2P-1



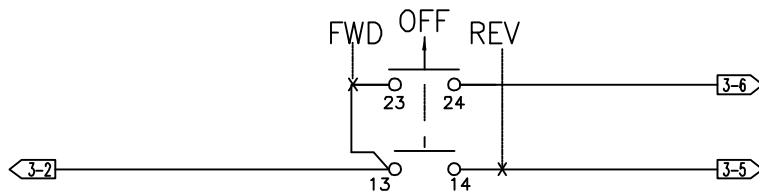
SS3P-2



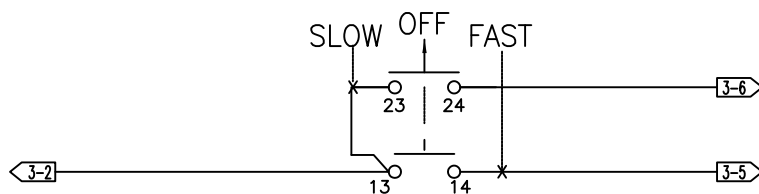
PL - (120VAC or 24VAC)



SS3P-3



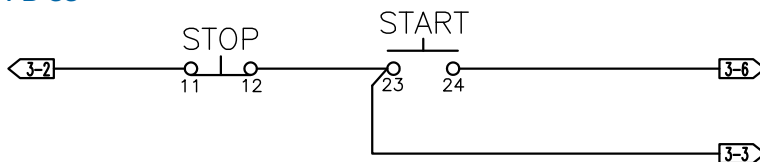
SS3P-4



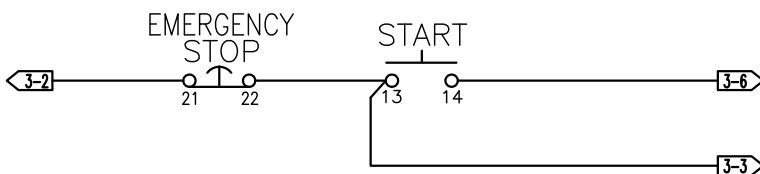
Circuit diagrams

Pilot device kits, two operators

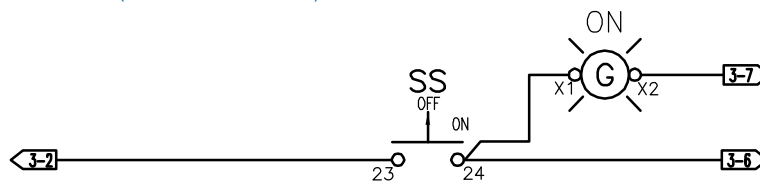
PB-SS



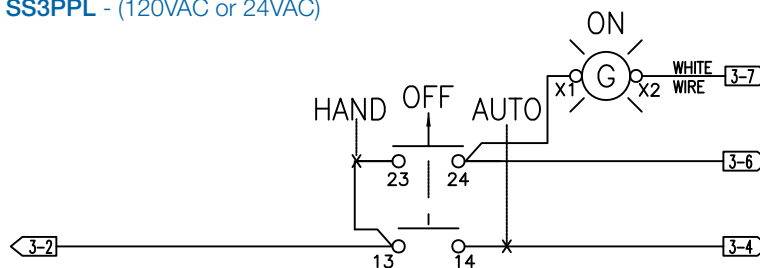
PB-SES



SS2PPL - (120VAC or 24VAC)



SS3PPL - (120VAC or 24VAC)

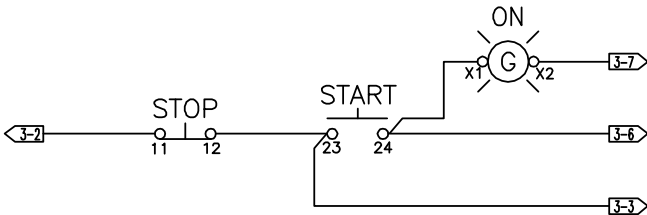


Circuit diagrams

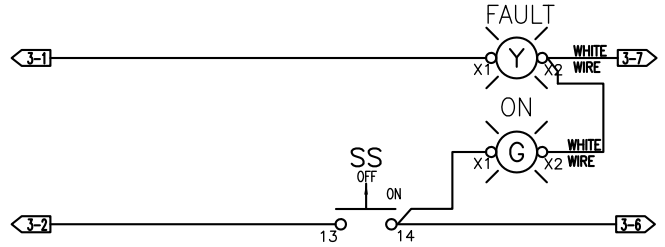
Pilot device kits, three operators

3

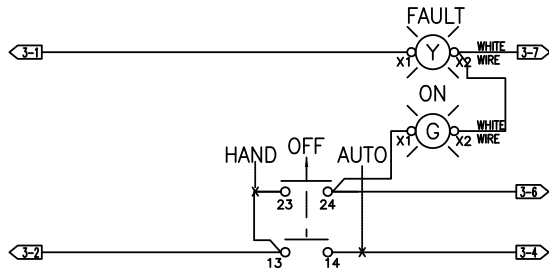
PBPL-SS - (120VAC or 24VAC)



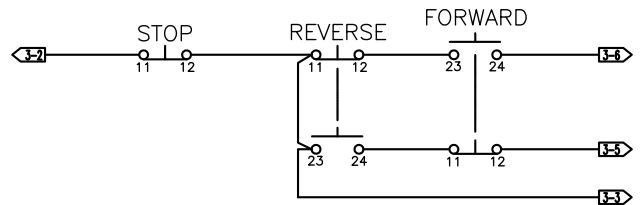
SS2PPL-FLT - (120VAC or 24VAC)



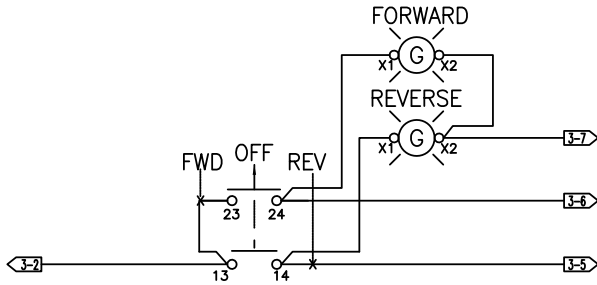
SS3PPL-FLT - (120VAC or 24VAC)



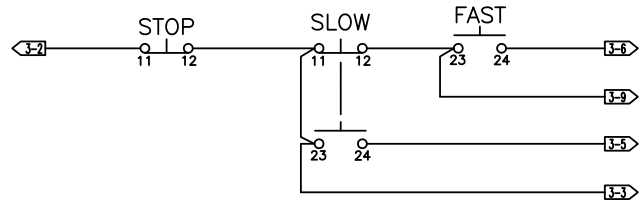
PB-FRS



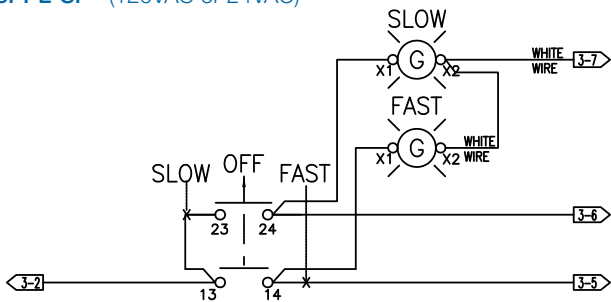
SS3PPL-FR - (120VAC or 24VAC)



PB-FSS



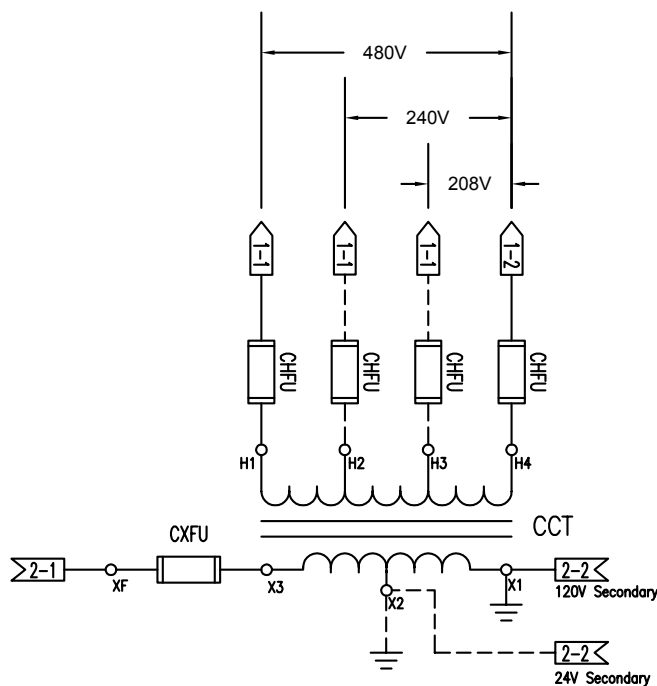
SS3PPL-SF - (120VAC or 24VAC)



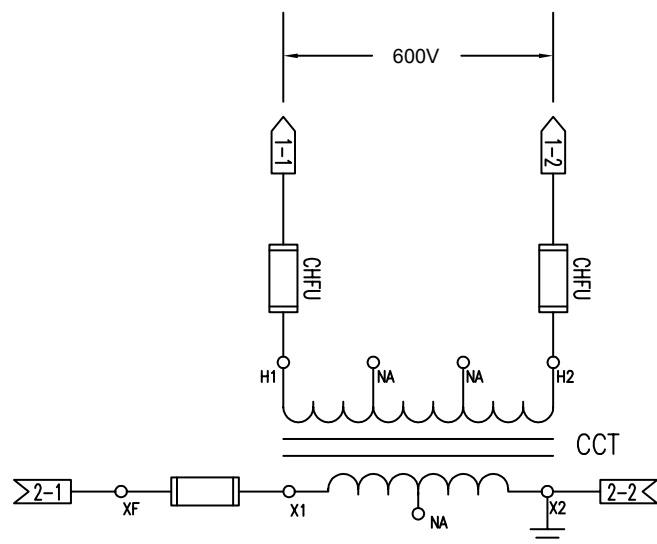
Circuit diagrams

Control circuit transformer

Primary voltages: 208V, 240V & 480V



Primary voltages: 600V



Enclosure rating definitions

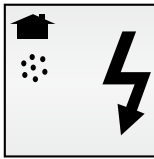
Introduction

3 An enclosure is a surrounding case constructed to provide a degree of protection to personnel against accidental contact with the enclosed equipment and to provide a degree of protection to the enclosed equipment against specified environmental conditions.

A brief description of the more common types of enclosures used by the electrical industry relating to their environmental capabilities follows. Refer to NEMA Standards Publication for more information regarding applications, features and design tests.

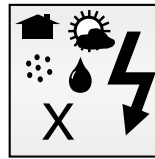
Individual NEMA product Standards Publications or third party certification standards may contain additional requirements for product testing and performance.

Definitions pertaining to nonhazardous locations



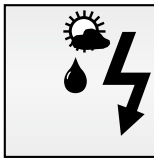
Type 1

Enclosures are intended for indoor use primarily to provide a degree of protection against limited amounts of falling dirt. (NEMA Standard 7-15-1991.)



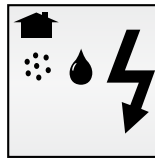
Type 4X

Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water and damage from external ice formation. (NEMA Standard 1-10-1979)



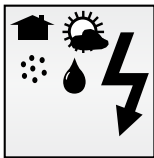
Type 3R

Enclosures are intended for outdoor use primarily to provide a degree of protection against rain, sleet and damage from external ice formation. (NEMA Standard 7-15-1991.)



Type 12






Enclosures are intended for indoor use primarily to provide a degree of protection against circulating dust, falling dirt, and dripping noncorrosive liquids. (NEMA Standard 7-15-1991.)



Type 4

Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water and damage from external ice formation. (NEMA Standard 1-10-1979.)

Legend

-  – Indoors
-  – Outdoors
-  – Water
-  – Dirt/dust
-  – Corrosion

Short circuit current ratings

Maximum short circuit current ratings for combination starters

IEC & NEMA
Enclosed starters

3

Fusible disconnect

Contactor Size	Switch @ 600 VAC	Fuse size (A)	UL Fuse type @ 600 VAC	kA @ 600 VAC	
AF09, AFN00	OS30	30	J	100	
AF12					
AF16, AFN0					
AF26, AFN1	OS60GJ12	60			
AF30					
AF50, AFN2					
AF63	OS200J12	200			
AF75, AFN3					
AF110					
AF145, AFN4	OS400J12	400			
AF185					
AF210					
AF260	OS600J12	600			
AF300					
AF400					
AF460	OS800L12	800	L	30	
AF580					
AF750					
	OS1200L12	1200			42

Circuit breaker disconnect

Contactor Size	Circuit breaker	kA @ 480 VAC	kA @ 600 VAC
AF26, AFN00-AFN1	Ts3L040TW	65	25
AF30	Ts3L050TW		
AF50, AFN2	Ts3L090TW	50	25
AF63	Ts3L100TW		
AF75, AFN3	Ts3L125TW		
AF110	T4H200TW	65	25
AF145, AFN4	T4H200TW		
AF185	T4H250TW		35
AF210	T5L300TW		
AF260	T5L400TW	100	42
AF300	T6L600TW		
AF400	T6L800TW		
AF460	T6L800TW		
AF580	T7L1000BW	30	30
AF750	T7L1200BW	42	42

Notes

Type MSSP Single phase manual starters



Single phase manual starters Type MSSP

3



MSSP

Starting and overload protection of small 1Ø AC/DC motors used on the following:

- Unit heater stokers
- Refrigeration compressors
- Fans
- Pumps

MSSP manual switches consist of a snap switch combined with a thermal overload device operating on the solder-ratchet principle. The switch is designed to prevent being held closed under a sustained motor overload. To reset the overload mechanism, the switch lever is moved to the OFF position. The motor can be restarted by pushing the switch lever to the ON position. Applications include compressors, fans and pumps.

Standards compliance and certifications

- UL Listed — Enclosed Products (File No. E137861; Guide No. NLRV)
- UL – Open Style
- Products (File No. E137861; Guide No. NLRV2)
- CSA Certified LR 1234
- American Bureau of Shipping
- CE Marked (Per 60947)

Product Selection

Your order must include:

- Cat. No. of the switch
- Cat. No. of the heater element(s)
- If required, Cat. No. of any accessories.

Single phase manual starters Type MSSP

3



MSSP1-T2P



MSSP-T2P



MSSP-PL



MSSP-LA

Ratings

Single pole — 1 HP 115...230V AC, 1 HP 277V AC, Open Type without Enclosure or Type 1 General Purpose Enclosure

Two pole — 1 Hp 115...230V AC, 1 HP 277 AC, Open Type without enclosure or Type 1 General Purpose Enclosure, 3/4 HP 115...230V DC

Description	Open type without enclosure - includes legend plate	Type 1 General purpose enclosure - surface mount	Type 1 General purpose enclosure - flush mounting includes flush plate but not switch box
	Catalog number	Catalog number	Catalog number

Switch only

Toggle type	1 pole	MSSP-T1	MSSP1-T1	MSSP-T1S
	2 pole	MSSP-T2	MSSP1-T2	MSSP-T2S
Key type	2 pole	MSSP-K2	MSSP1-K2	MSSP-K2S
Lever type	1 pole	MSSP-L1	MSSP1-L1	—

Switch with neon pilot light (115 or 230V)

Toggle type	1 pole	MSSP-T1P	MSSP1-T1P	MSSP-T1PS
	2 pole	MSSP-T2P	MSSP1-T2P	MSSP-T2PS
Key type	2 pole	MSSP-K2P	MSSP1-K2P	MSSP-K2PS

Switch and "hand-off-auto" selector switch (for use on AC only)

Toggle type	2 pole	—	MSSP1-T2H	MSSP-T2SH
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Switch with neon pilot light and "hand-off-auto" selector switch (115 or 230V AC only)

Toggle type	2 pole	—	MSSP1-T2HP	MSSP-T2SHP
Key type	2 pole	—	MSSP1-K2HP	—

Two switch units in one enclosure

Toggle type	2 pole	—	MSSP1-T2T2	—
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Two switch units in one enclosure neon pilot light on both units (115 or 230V)

Toggle type	2 pole	—	MSSP1-T2PT2P	MSSP-T2PT2P
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Two speed switch

Toggle type	2 pole	—	MSSP1-22	—
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Two speed switch with neon pilot lights (115 or 230V)

Toggle type	2 pole	—	MSSP1-22P	MSSP-22P
-------------	--------	---	-----------	----------

Accessories

Description	Catalog number
Pilot light replacement bulb incandescent Note: Pilot lights as used on MSSP switches indicate whether the motor is running only if the switch is used to control the motor directly. If a thermostat, pressure switch, or some other pilot device controls the operation of the motor, the light on the MSSP switch merely indicates whether the power is ON or OFF	MSSP-PL
Locking attachment (for toggle operated only)	MSSP-LA

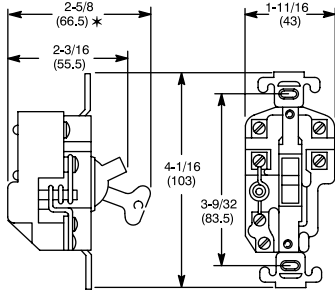
Single phase manual starters Type MSSP

Full load amperes	Catalog number
0.17	MSSP-P1
0.21	MSSP-P2
0.25	MSSP-P3
0.32	MSSP-P4
0.39	MSSP-P5
0.46	MSSP-P6
0.57	MSSP-P7
0.71	MSSP-P8
0.79	MSSP-P9
0.87	MSSP-P10
0.98	MSSP-P11
1.08	MSSP-P12
1.19	MSSP-P13
1.30	MSSP-P14
1.43	MSSP-P15
1.58	MSSP-P16
1.75	MSSP-P17
1.88	MSSP-P18
2.13	MSSP-P19
2.40	MSSP-P20
2.58	MSSP-P21
2.92	MSSP-P22
3.09	MSSP-P23
3.32	MSSP-P24
3.37	MSSP-P25
4.16	MSSP-P26
4.51	MSSP-P27
4.93	MSSP-P28
5.43	MSSP-P29
6.03	MSSP-P30
6.83	MSSP-P31
7.72	MSSP-P32
8.24	MSSP-P33
8.90	MSSP-P34
9.60	MSSP-P35
10.8	MSSP-P36
12.0	MSSP-P37
13.5	MSSP-P38
15.2	MSSP-P39

Approximate dimensions

Dimensions are shown in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.

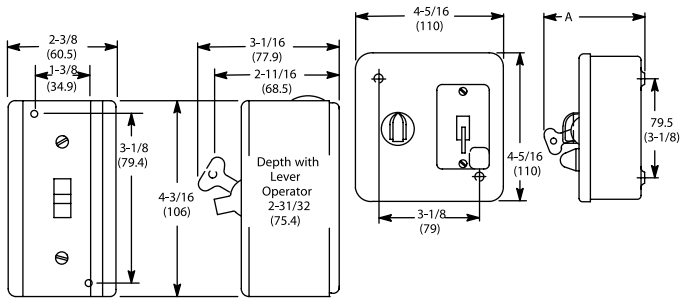
3 Open type without enclosure



Catalog number

MSSP-T1	MSSP-T2P	MSSP-T1
MSSP-T2	MSSP-K2P	
MSSP-K2	MSSP-L2	

Type 1 general purpose enclosure surface mounting



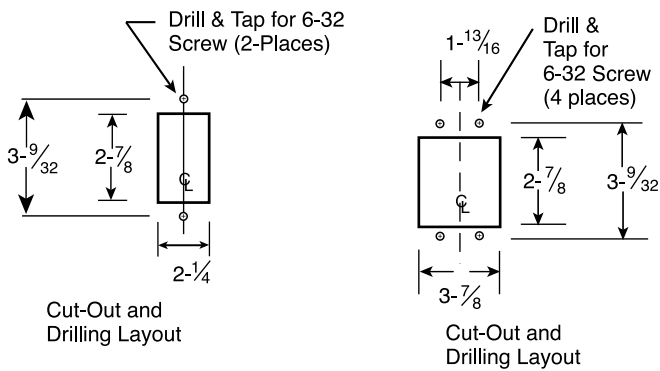
Catalog number

MSSP-T1	MSSP-T2P	MSSP-T1P
MSSP-T2	MSSP-K2P	MSSP1-K2HP
MSSP-K2	MSSP-L1	
MSSP1-T2H	MSSP1-T2HP	
MSSP1-T2T2	MSSP1-T2PT2P	

Dimension A (inches / millimeters)

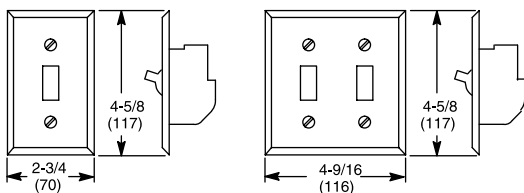
Key inserted	1-1/8 (79.5)
Selector switch	2-3/4 (70)
Toggle operator	2-9/16 (65)

Type 1 general purpose enclosure flush mounting



Catalog number

MSSP-T1S	MSSP-T2PS
MSSP-T2	MSSP-K2PS
MSSP-K2S	MSSP-T1PS
MSSP-T2SH	MSSP-T2PT2P
MSSP-T2SHP	





4 - Manual motor protectors



Manual motor protectors 4.1 – 4.34

Features and benefits	4.1
General information	
Suitable applications	4.2 - 4.3
Motor ratings	4.4
Pilot duty ratings and overload trip classes	4.5
Ordering details	
Type MS116	4.6
Type MS132	4.7
Type MS450 /MS451	4.8
Type MS495 / MS496	4.9
Accessories	4.10, 4.12 - 4.16
Actuation tables	4.11
Connection diagrams	4.17
General accessory mounting layout	4.18
Technical data	4.19 - 4.31
Approximate dimensions	4.32 - 4.33

Manual motor Protectors



Manual motor protectors Types MS116, MS132, MS45x, MS49x

4

Manual motor protectors are electromechanical devices for motor and circuit protection. These devices offer local motor disconnect means, manual ON/OFF control, and protection against short circuit, overload, and phase loss conditions. Manual motor protection saves cost, panel space, and ensures quick and reliable short-circuit protection by reacting within milliseconds. Close coupling adaptors are available for combination with ABB contactors in various applications.



Type MS116

- Manual motor protectors suitable for use with single and three phase motors up to 25 hp
- Suitable as motor disconnect in single motor applications and group motor installations as outlined in NEC Article 430.53(C)
- 15 thermal setting ranges from 0.16 to 32 Amperes, overload Class 10A
- Phase loss sensitivity per IEC/EN 60947-4-1
- Short circuit current ratings up to 30 kA
- Motor controllers, manual (NLRV, NLRV7), UL file E137861



Type MS132

- Manual motor protectors suitable for use with single and three phase motors up to 25 hp
- Suitable as motor disconnect in single motor applications and group motor installations as outlined in NEC Article 430.53(C)
- Suitable for Tap conductor protection as outlined in NEC Article 430.53(D)(3)
- Suitable as self-protected combination motor controllers Types E and F as outlined in UL 508 and UL 60947-4-1A
- 15 thermal setting ranges from 0.16 to 32 Amperes, overload Class 10
- Phase loss sensitivity per IEC/EN 60947-4-1
- Short circuit current ratings up to 65 kA
- Motor controllers, manual (NLRV, NLRV7), UL file E137861
- Combination motor controllers (NKJH, NKJH7), UL file E345003



Type MS45x

- Manual motor protectors suitable for use with single and three phase motors up to 50 hp
- Suitable as motor disconnect in single motor applications and group motor installations as outlined in NEC Article 430.53(C)
- Suitable as self-protected combination motor controller Type E as outlined in UL 508 and UL 60947-4-1A
- Phase loss sensitivity per IEC/EN 60947-4-1
- 3 thermal setting ranges from 28 to 50 Amperes, overload Classes 10 and 20
- Short circuit current ratings up to 65 kA
- Motor controllers, manual (NLRV), UL file E167205
- Combination motor controllers (NKJH, NKJH7), UL file E195536



Type MS49x

- Manual motor protectors suitable for use with single and three phase motors up to 100 hp
- Suitable as motor disconnect in single motor applications and group motor installations as outlined in NEC Article 430.53(C)
- Suitable as self-protected combination motor controller Types E as outlined in UL 508 and UL 60947-4-1A
- Phase loss sensitivity per IEC/EN 60947-4-1
- 6 thermal setting ranges from 28 to 100 Amperes, overload Classes 10 and 20
- Short circuit current ratings up to 65 kA
- Motor controllers, manual (NLRV), UL file E167205
- Combination motor controllers (NKJH, NKJH7), UL file E195536

General information

Suitable applications

Single motor applications, suitable as motor disconnect

A manual motor protector is a simple, compact and economical alternative to conventional magnetic motor controllers for local control of a single motor.

4 Upstream short-circuit and overcurrent protection in the form of either fuses or a circuit breaker is still required. Manual motor protectors can replace the overload relay, contactor, and any wiring or components necessary for controlling a contactor (i.e. pushbuttons) by utilizing the integral rotary handle for manual ON/OFF control.

Manual motor protectors also offer instantaneous (magnetic only) short-circuit trip functionality, allowing for these devices to be utilized as UL 508/60947-4-1A circuit protectors.

MS Series Manual Motor Protectors are marked as "suitable as motor disconnect", with the Types MS132 and MS4xx not requiring additional accessories. This marking allows the devices to be utilized as local disconnects within line-of-sight of the motor.

Group motor installation

Group motor installations utilize a single branch circuit protective device to protect multiple loads. Per NEC Article 430.53(C), this branch circuit protection must be in the form of either fuses or an inverse-time (thermal magnetic, MCCB) circuit breaker. Individual overload protection must be provided for each load. Devices utilized in group motor installations must be marked as suitable in such applications.

Branch circuit protection for group motor installations is sized based on the sum of:

1. 250% (MCCB) or 175% (fuses) of the full-load current of the largest load in the group, plus
2. The sum of the full-load current of all additional loads

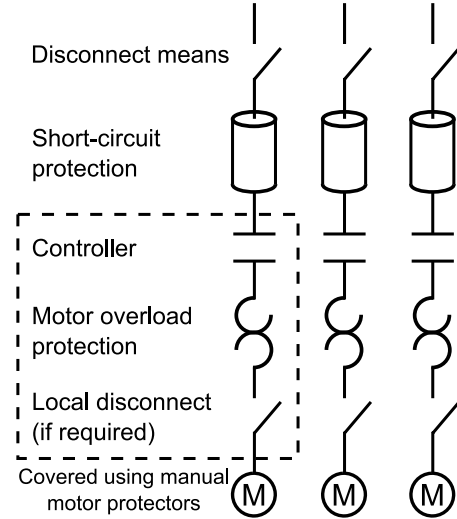
Conductors on the load side of the branch circuit protective device are sized in accordance with the full-load current rating of said device.

In addition to meeting the requirements outlined above, Type MS132 devices are also suitable for tap conductor protection in group installations as outlined in NEC Article 430.53(D), allowing the conductors on the load-side of the branch circuit protective device to be sized no less than one-tenth (1/10) of the full-load current rating of the protective device.

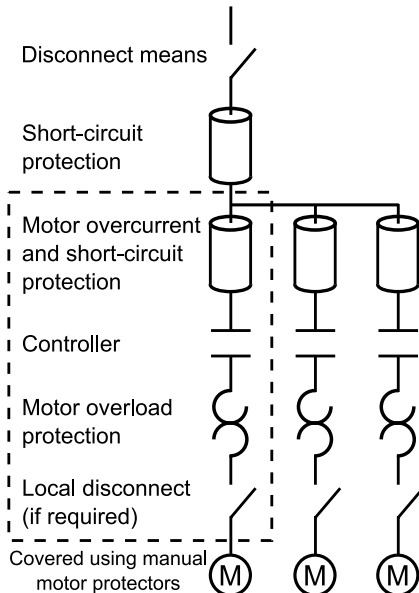
Devices suitable for these applications

Application	Manual motor protector type			
	MS116	MS132	MS45x	MS49x
Motor disconnect	•	•	•	•
Group motor installation	•	•	•	•
Tap conductor protection		•		

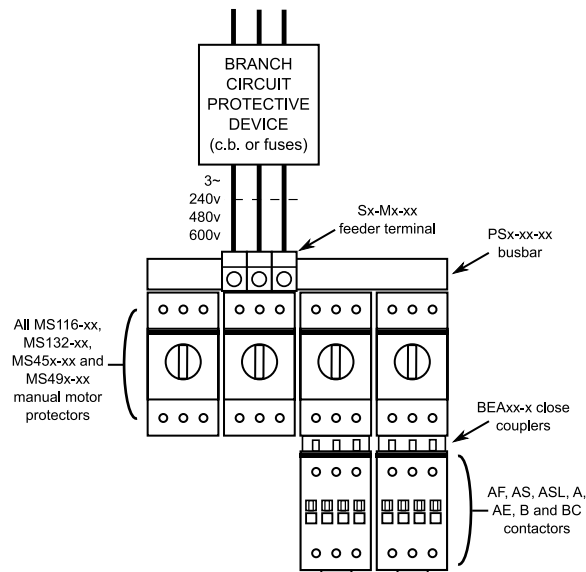
Typical Single-motor Branch Circuits



Typical Group Motor Circuit



Group Motor Installations



General information

Suitable applications

MS Series
Manual motor
protectors

Combination motor controllers Types E & F

Combination motor controllers, as outlined in UL 508 Section 76, are a manufacturer's tested combination of either individual discrete components or a single controller. Fulfilling all the necessary components for a motor branch circuit, combination motor controllers provide a disconnecting and load switching means, as well as overload and short-circuit protection. These devices offer additional flexibility when selecting components for motor control and protection.

Combination motor controllers can also utilize busbar for self-protected, multiple motor installations. Busbar must be selected and sized in accordance with the full-load current rating of the feeder circuit protective device.

Definitions

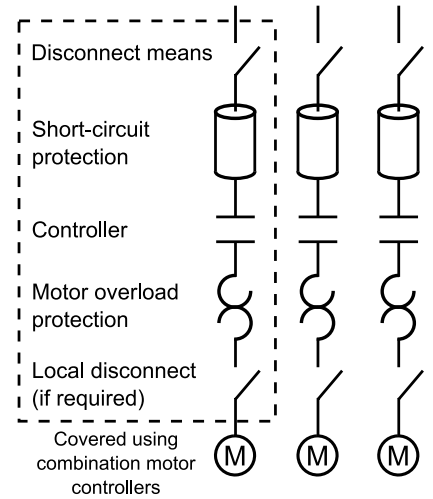
Type E Combination Motor Controllers are comprised of a UL 508 Disconnect, Branch Circuit Protector Device, Motor Controller and Motor Overload typically included in a single Self-protected Control Device (manual motor protector). Following a short-circuit fault, Type E Combination Motor Controllers are tested to operate for 6,000 electrical cycles, plus an additional 4,000 mechanical cycles, as outlined in UL 508 Table 83.1.

Type F Combination Motor Controllers are comprised of a UL 508 Disconnect, Branch Circuit Protector Device, and Motor Overload typically included in a single Manual Self-protected Combination Controller with additional Magnetic or Solid State Motor Controller utilized for remote operation (manual motor protector + contactor). The operational requirements following a short-circuit fault differ for the manual motor protector and contactor.

Devices suitable for these applications

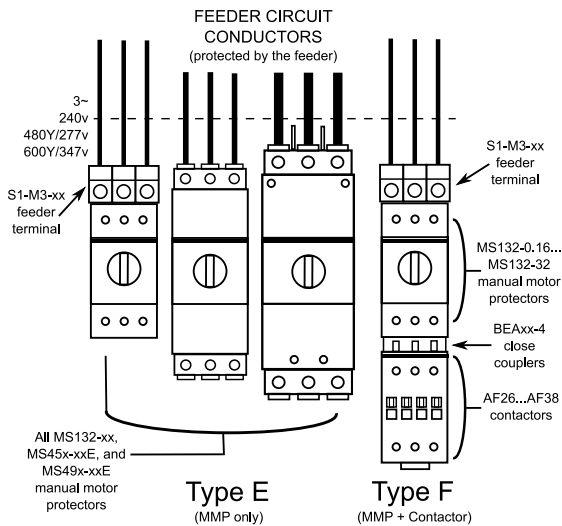
Combination motor controller	Manual motor protector type			
	MS116	MS132 + S1-M3-xx	MS45x-xxE	MS49x-xxE
Self-protected, Type E		•	•	•
Self-protected, Type F		•		

Typical Self-protected Branch Circuits

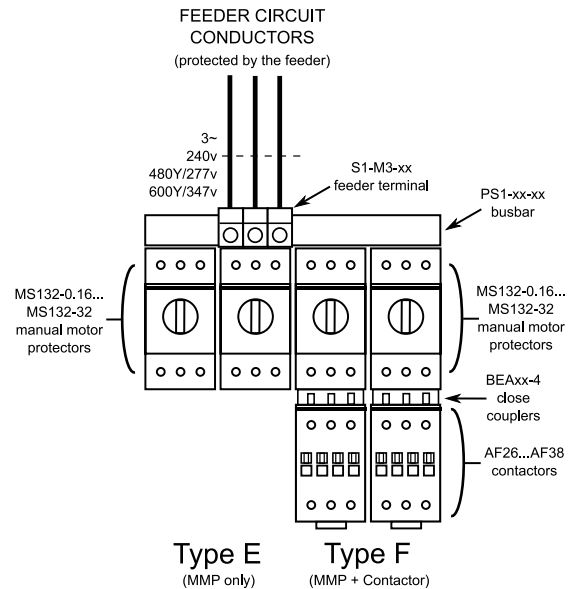


4

Combination Motor Controllers



Combination Motor Controllers (for multiple motors)



General information

Motor ratings

Horsepower to full-load Amperes for AC induction motors

Horsepower (hp)	Full Load Amperes (FLA)													
	110...120 v ac		200 v ac		208 v ac		220...240 v ac		380...415 v ac		440...480 v ac		550...600 v ac	
	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase	Single phase	Three phase
1/10	3.0	-	-	-	-	-	1.5	-	1.0	-	-	-	-	-
1/8	3.8	-	-	-	-	-	1.9	-	1.2	-	-	-	-	-
1/6	4.4	-	2.5	-	2.4	-	2.2	-	1.4	-	-	-	-	-
1/4	5.8	-	3.3	-	3.2	-	2.9	-	1.8	-	-	-	-	-
1/3	7.2	-	4.1	-	4.0	-	3.6	-	2.3	-	-	-	-	-
1/2	9.8	4.4	5.6	2.5	5.4	2.4	4.9	2.2	3.2	1.3	2.5	1.1	2.0	0.9
3/4	13.8	6.4	7.9	3.7	7.6	3.5	6.9	3.2	4.5	1.8	3.5	1.6	2.8	1.3
1	16.0	8.4	9.2	4.8	8.8	4.6	8.0	4.2	5.1	2.3	4.0	2.1	3.2	1.7
1-1/2	20.0	12.0	11.5	6.9	11.0	6.6	10.0	6.0	6.4	3.3	5.0	3.0	4.0	2.4
2	24.0	13.6	13.8	7.8	13.2	7.5	12.0	6.8	7.7	4.3	6.0	3.4	4.8	2.7
3	34.0	19.2	19.6	11.0	18.7	10.6	17.0	9.6	10.9	6.1	8.5	4.8	6.8	3.9
5	56.0	30.4	32.2	17.5	30.8	16.7	28.0	15.2	17.9	9.7	14.0	7.6	11.2	6.1
7-1/2	80.0	44.0	45.0	25.3	44.0	24.2	40.0	22.0	27.0	14.0	21.0	11.0	16.0	9.0
10	100.0	56.0	57.5	32.2	55.0	30.8	50.0	28.0	33.0	18.0	26.0	14.0	20.0	11.0
15	135.0	84.0	-	48.3	-	46.2	68.0	42.0	44.0	27.0	34.0	21.0	27.0	17.0
20	-	108.0	-	62.1	-	59.4	88.0	54.0	56.0	34.0	44.0	27.0	35.0	22.0
25	-	136.0	-	78.2	-	74.8	110.0	68.0	70.0	44.0	55.0	34.0	44.0	27.0
30	-	160.0	-	92.0	-	88.0	136.0	80.0	87.0	51.0	68.0	40.0	54.0	32.0
40	-	208.0	-	120.0	-	114.0	176.0	104.0	112.0	66.0	88.0	52.0	70.0	41.0
50	-	260.0	-	150.0	-	143.0	216.0	130.0	139.0	83.0	108.0	65.0	86.0	52.0
60	-	-	-	177.0	-	169.0	-	154.0	-	103.0	-	77.0	-	62.0
75	-	-	-	221.0	-	211.0	-	192.0	-	128.0	-	96.0	-	77.0
100	-	-	-	285.0	-	273.0	-	248.0	-	165.0	-	124.0	-	99.0
125	-	-	-	359.0	-	343.0	-	312.0	-	208.0	-	156.0	-	125.0
150	-	-	-	414.0	-	396.0	-	360.0	-	240.0	-	180.0	-	144.0
200	-	-	-	552.0	-	528.0	-	480.0	-	320.0	-	240.0	-	192.0
250	-	-	-	-	-	-	-	604.0	-	403.0	-	302.0	-	242.0
300	-	-	-	-	-	-	-	722.0	-	482.0	-	361.0	-	289.0
350	-	-	-	-	-	-	-	828.0	-	560.0	-	414.0	-	336.0
400	-	-	-	-	-	-	-	954.0	-	636.0	-	477.0	-	382.0
450	-	-	-	-	-	-	-	1030.0	-	-	-	515.0	-	412.0
500	-	-	-	-	-	-	-	1180.0	-	786.0	-	590.0	-	472.0

Full-load motor-running currents in Amperes corresponding to various AC horsepower ratings as published in Table 50.1 of UL 508.

General information

Pilot duty ratings and overload trip classes

Pilot duty ratings for AC control circuit contacts

Contact rating designation	Continuous thermal, test current (A)	Maximum current, 50/60 Hz (A)									
		120 v ac		240 v ac		480 v ac		600 v ac		Volt-amperes	
		Make	Break	Make	Break	Make	Break	Make	Break	Make	Break
A150	10	60	6.00	-	-	-	-	-	-	7200	720
A300	10	60	6.00	30	3.00	-	-	-	-	7200	720
A600	10	60	6.00	30	3.00	15	1.50	12	1.20	7200	720
B150	5	30	3.00	-	-	-	-	-	-	3600	360
B300	5	30	3.00	15	1.50	-	-	-	-	3600	360
B600	5	30	3.00	15	1.50	7.5	0.75	6	0.60	3600	360
C150	2.5	15	1.5	-	-	-	-	-	-	1800	180
C300	2.5	15	1.5	7.5	0.75	-	-	-	-	1800	180
C600	2.5	15	1.5	7.5	0.75	3.75	0.375	3.00	0.30	1800	180
D150	1.0	3.60	0.60	-	-	-	-	-	-	432	72
D300	1.0	3.60	0.60	1.80	0.30	-	-	-	-	432	72
E150	0.5	1.80	0.30	-	-	-	-	-	-	216	36

Mechanical switching ratings and test values as published in Table 1-4-1 of NEMA ICS 5-2000 (R2005, R2010)

Pilot duty ratings for DC control circuit contacts

Contact rating designation	Continuous thermal, test current (A)	Maximum current, 50/60 Hz (A)			
		120 v dc	250 v dc	301 to 600 v dc	Volt-amperes
		Make / Break	Make / Break	Make / Break	Make / Break
N150	10	2.2	-	-	275
N300	10	2.2	1.1	-	275
N600	10	2.2	1.1	0.40	275
P150	5.0	1.1	-	-	138
P300	5.0	1.1	0.55	-	138
P600	5.0	1.1	0.55	0.20	138
Q150	2.5	0.55	-	-	69
Q300	2.5	0.55	0.27	-	69
Q600	2.5	0.55	0.27	0.10	69
R150	1.0	0.22	-	-	28
R300	1.0	0.22	0.11	-	28

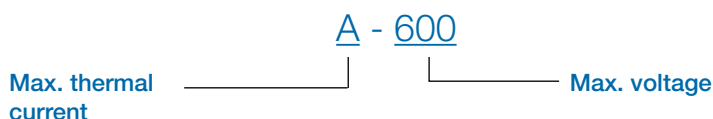
Mechanical switching ratings and test values as published in Table 1-4-1 of NEMA ICS 5-2000 (R2005, R2010)

Overload trip classes

Trip class	Tripping time T_p (seconds)
10A	$2 < T_p \leq 10$
10	$4 < T_p \leq 10$
20	$6 < T_p \leq 20$
30	$9 < T_p \leq 30$

Trip classes as published in Table 2 of UL 60947-4-1A.

Pilot duty rating explanation



Type MS116

For applications up to 32A

Suitable applications:

- Single motor, suitable as motor disconnect
- Group motor installation



Frame Sz. 1
MS116-0.16...MS116-16



Frame Sz. 2
MS116-20...MS116-32

MS116 Electrical ratings ①

Thermal setting range (A)	Trip class	Rated operational current I_b (A)	Rated instantaneous short-circuit current setting I_i (A)	AC Motor ratings, breaking all lines, 50/60 Hz (hp)					Catalog number	
				Single phase ②		Three phase				
				120V	240V	240V	480V	600V		
0.10...0.16	10A	0.16	1.56	Horsepower not applicable; use upper limit of the device thermal setting range for rated full-load current in Amperes					MS116-0.16	
0.16...0.25	10A	0.25	2.44						MS116-0.25	
0.25...0.40	10A	0.40	3.90						MS116-0.4	
0.40...0.63	10A	0.63	6.14						MS116-0.63	
0.63...1.0	10A	1.00	11.5					1/2	MS116-1.0	
1.0...1.6	10A	1.60	18.4		1/10			3/4	MS116-1.6	
1.6...2.5	10A	2.50	28.8		1/6	1/2		1	1.5	MS116-2.5
2.5...4.0	10A	4.00	50.0	1/8	1/3	1		2	3	MS116-4.0
4.0...6.3	10A	6.30	78.8	1/4	1/2	1.5		3	5	MS116-6.3
6.3...10.0	10A	10.0	150	1/2	1.5	3		5	7.5	MS116-10
8.0...12.0	10A	12.0	180	1/2	2	3		7.5	10	MS116-12
10.0...16.0	10A	16.0	240	1	2	5		10	10	MS116-16
16.0...20.0	10A	20.0	300	1.5	3	5		10	15	MS116-20
20.0...25.0	10A	25.0	375	2	3	7.5		15	20	MS116-25
25.0...32.0	10A	32.0	480	2	5	10		20	25	MS116-32

MS116 Short circuit current ratings (kA)

Catalog number	UL 508 - Motor controllers, manual (NLRV)				UL 508 - Combination motor controllers (NKJH)							
	Max. fuse size (A)	Fuse class	Circuit breaker	Motor disconnect ③		Group motor installation		Self-protected Type E		Self-protected Type F		
				240V / 480V	600V	240V / 480V	600V	480Y / 277V	600Y / 347V	480Y / 277V	600Y / 347V	Type F contactors
MS116-0.16	200	J	No rating	30	5	30	5	Use Type MS132				
MS116-0.25				30	5	30	5					
MS116-0.4				30	5	30	5					
MS116-0.63				30	5	30	5					
MS116-1.0				30	5	30	5					
MS116-1.6				30	5	30	5					
MS116-2.5				30	5	30	5					
MS116-4.0				18	5	18	5					
MS116-6.3				18	5	18	5					
MS116-10				18	5	18	5					
MS116-12				18	5	18	5					
MS116-16				18	5	18	5					
MS116-20				18	5	18	5					
MS116-25				18	5	18	5					
MS116-32				18	5	18	5					

① Always size manual motor protectors based on the full-load current of the motor.

② For single phase connection diagram see page 4.17.

③ Suitable as motor disconnect only when provide with padlock adaptor SA1 or SA3; see accessories section.

Type MS132

For applications up to 32A

MS Series
Manual motor
protectors



Frame Sz. 1
MS132-0.16...MS132-10

Frame Sz. 2
MS132-12...MS132-32

Suitable applications:

- Single motor, suitable as motor disconnect
- Group motor installation
- Tap conductor protection
- Combination motor controllers
 - Type E
 - Type F

4

MS132 Electrical ratings ①

Thermal setting range (A)	Trip class	Rated operational current I _b (A)	Rated instantaneous short-circuit current setting I _n (A)	AC Motor ratings, breaking all lines, 50/60 Hz (hp)					Catalog number
				Single phase ②		Three phase			
				120V	240V	240V	480V	600V	
0.10...0.16	10A	0.16	1.56	Horsepower not applicable; use upper limit of the device thermal setting range for rated full-load current in Amperes					MS132-0.16
0.16...0.25	10	0.25	2.44						MS132-0.25
0.25...0.40	10	0.40	3.90						MS132-0.4
0.40...0.63	10	0.63	6.14						MS132-0.63
0.63...1.0	10	1.00	11.5						MS132-1.0
1.0...1.6	10	1.60	18.4		1/10		3/4	3/4	MS132-1.6
1.6...2.5	10	2.50	28.8		1/6	1/2	1	1.5	MS132-2.5
2.5...4.0	10	4.00	50.0	1/8	1/3	1	2	3	MS132-4.0
4.0...6.3	10	6.30	78.8	1/4	1/2	1.5	3	5	MS132-6.3
6.3...10.0	10	10.0	150	1/2	1.5	3	5	7.5	MS132-10
8.0...12.0	10	12.0	180	1/2	2	3	7.5	10	MS132-12
10.0...16.0	10	16.0	240	1	2	5	10	10	MS132-16
16.0...20.0	10	20.0	300	1.5	3	5	10	15	MS132-20
20.0...25.0	10	25.0	375	2	3	7.5	15	20	MS132-25
25.0...32.0	10	32.0	480	2	5	10	20	25	MS132-32

MS132 Short circuit current ratings (kA) ③

Catalog number	UL 508 - Motor controllers, manual (NLRV)							UL 508 - Combination motor controllers (NKJH)				
	Max. fuse size (A)	Fuse class	Circuit breaker	Motor disconnect		Group motor installation ④		Self-protected Type E ⑤		Self-protected Type F ⑥		
				240V 480V	600V	240V 480V	600V	480Y / 277V	600Y / 347V	480Y / 277V	600Y / 347V	Type F contactors
MS132-0.16	Size per NEC ⑥	Any fuse class	MCCB, size per NEC ⑥ ⑦	65	47	65	47	65	47	47	47	AF26...AF38
MS132-0.25				65	47	65	47	65	47	47	47	AF26...AF38
MS132-0.4				65	47	65	47	65	47	47	47	AF26...AF38
MS132-0.63				65	47	65	47	65	47	47	47	AF26...AF38
MS132-1.0				65	47	65	47	65	47	47	47	AF26...AF38
MS132-1.6				65	47	65	47	65	47	47	47	AF26...AF38
MS132-2.5				65	47	65	47	65	47	47	47	AF26...AF38
MS132-4.0				65	47	65	47	65	47	47	47	AF26...AF38
MS132-6.3				65	18	65	18 [35]	65	18	47	47	AF26...AF38
MS132-10				65	18	65	18 [35]	65	18	47	47	AF26...AF38
MS132-12				30	18	30 [35]	18 [35]	30	-	30	-	AF26...AF38
MS132-16				30	18	30 [35]	18 [35]	30	-	30	-	AF26...AF38
MS132-20				30	18	30 [35]	18 [35]	30	-	30	-	AF26...AF38
MS132-25				30	18	30 [35]	18 [35]	30	-	30	-	AF26...AF38
MS132-32				30	18	30 [35]	18 [35]	30	-	30	-	AF26...AF38

① Always size manual motor protectors based on the full-load current of the motor.

② For single phase connection diagram see page 4.17.

③ For higher ratings using S803W current limiters see accessories section.

④ Also suitable for tap conductor protection. Group ratings increased to [x] kA using Class RK5 fuses.

⑤ Requires the use of line-side feeder terminal S1-M3-xx: see accessories section.

⑥ NEC refers to the National Electric Code.

⑦ MCCB interrupting rating must be equal to or greater than the rating of the device.

Type MS450 / MS451

For applications up to 50A

Suitable applications:

- Single motor, suitable as motor disconnect
- Group motor installation
- Combination motor controller
- Type E



Frame Sz. 3
MS450-40...MS450-50



Frame Sz. 3
MS451-16...MS451-50

MS450 / MS451 Electrical ratings ①

Thermal setting range (A)	Trip class	Rated operational current I_n (A)	Rated instantaneous short-circuit current setting I_s (A)	AC Motor ratings, breaking all lines, 50/60 Hz (hp)					Catalog number ③
				Single phase ②		Three phase			
				120V	240V	240V	480V	600V	
28.0...40.0	10	40.0	520	3	7.5	15	30	40	MS450-40 MS450-40E
36.0...45.0	10	45.0	585	5	7.5	15	30	40	MS450-45 MS450-45E
40.0...50.0	10	50.0	650	5	10	20	40	50	MS450-50 MS450-50E
11.0...16.0	20	16.0	208	1	3	5	10	15	MS451-16 MS451-16E
14.0...20.0	20	20.0	260	1.5	3	7.5	15	20	MS451-20 MS451-20E
18.0...25.0	20	25.0	325	2	5	10	20	25	MS451-25 MS451-25E
22.0...32.0	20	32.0	416	3	5	10	25	30	MS451-32 MS451-32E
28.0...40.0	20	40.0	520	3	7.5	15	30	40	MS451-40 MS451-40E
36.0...45.0	20	45.0	585	5	7.5	15	30	40	MS451-45 MS451-45E
40.0...50.0	20	50.0	650	5	10	20	40	50	MS451-50 MS451-50E

MS450 / MS451 Short circuit current ratings (kA)

Catalog number ④	UL 508 - Motor controllers, manual (NLRV)						UL 508 - Combination motor controllers (NKJH)					
	Max. fuse size (A)	Fuse class	Circuit breaker	Motor disconnect		Group motor installation		Self-protected Type E ⑤		Self-protected Type F		
				240V / 480V	600V	480V / 277V	600V / 347V	480V / 277V	600V / 347V	480V / 277V	600V / 347V	Type F contactors
MS450-40x	500	Any fuse class	MCCB, 500A max. ⑥	65	25	65	25	65	25	-	-	-
MS450-45x				65	25	65	25	25	25	-	-	-
MS450-50x				65	25	65	25	25	25	-	-	-
MS451-16x				65	25	65	25	25	25	-	-	-
MS451-20x				65	25	65	25	25	25	-	-	-
MS451-25x				65	25	65	25	25	25	-	-	-
MS451-32x				65	25	65	25	65	25	-	-	-
MS451-40x				65	25	65	25	65	25	-	-	-
MS451-45x				65	25	65	25	65	25	-	-	-
MS451-50x				65	25	65	25	65	25	-	-	-

① Always size manual motor protectors based on the full-load current of the motor.

② For single phase connection diagram see page 4.17.

③ MS45x-xxE part numbers include the necessary components for Type E applications – Self-protected Type E ratings apply only to these devices.

④ Replace "x" in part number with "E" for self-protected Type E ratings. All other ratings leave blank.

⑤ MCCB interrupting rating must be equal to or greater than the rating of the device.

Type MS495 / MS496

For applications up to 100A

MS Series
Manual motor
protectors



Frame Sz. 4
MS495-40...MS495-100



Frame Sz. 4
MS496-40...MS496-100

Suitable applications:

- Single motor, suitable as motor disconnect
- Group motor installation
- Combination motor controller - Type E

4

MS495 / MS496 Electrical ratings ①

Thermal setting range (A)	Trip class	Rated operational current I_n (A)	Rated instantaneous short-circuit current setting I_s (A)	AC Motor ratings, breaking all lines, 50/60 Hz (hp)					Catalog number ③
				Single phase ②		Three phase			
				120V	240V	240V	480V	600V	
28.0...40.0	10	40.0	520	3	7.5	15	30	40	MS495-40 MS495-40E
36.0...50.0	10	50.0	650	5	10	20	40	50	MS495-50 MS495-50E
45.0...63.0	10	63.0	819	5	15	25	50	60	MS495-63 MS495-63E
57.0...75.0	10	75.0	975	7.5	15	25	60	75	MS495-75 MS495-75E
70.0...90.0	10	90.0	1170	10	20	30	75	100	MS495-90 MS495-90E
80.0...95.0	10	100.0	1235	10	20	40	75	100	MS495-100 MS495-100E
28.0...40.0	20	40.0	520	3	7.5	15	30	40	MS496-40 MS496-40E
36.0...50.0	20	50.0	650	5	10	20	40	50	MS496-50 MS496-50E
45.0...63.0	20	63.0	819	5	15	25	50	60	MS496-63 MS496-63E
57.0...75.0	20	75.0	975	7.5	15	25	60	75	MS496-75 MS496-75E
70.0...90.0	20	90.0	1170	10	20	30	75	100	MS496-90 MS496-90E
80.0...95.0	20	95.0	1235	10	20	40	75	100	MS496-100 MS496-100E

MS495 / MS496 Short circuit current ratings (kA)

Catalog number ④	UL 508 - Motor controllers, manual (NLRV)						UL 508 - Combination motor controllers (NKJH)					
	Max. fuse size (A)	Fuse class	Circuit breaker	Motor disconnect		Group motor installation		Self-protected Type E ⑤		Self-protected Type F		
				240V / 480V	600V	480Y / 277V	600Y / 347V	480Y / 277V	600Y / 347V	480Y / 277V	600Y / 347V	Type F contactors
MS495-40x	500	Any fuse class	MCCB, 500A max. ⑥	65	30	65	30	65	30	-	-	-
MS495-50x				65	30	65	30	65	30	-	-	-
MS495-63x				65	30	65	30	65	30	-	-	-
MS495-75x				65	30	65	30	65	30	-	-	-
MS495-90x				65	30	65	30	65	-	-	-	-
MS495-100x				65	30	65	30	65	-	-	-	-
MS496-40x				65	30	65	30	65	30	-	-	-
MS496-50x				65	30	65	30	65	30	-	-	-
MS496-63x				65	30	65	30	65	30	-	-	-
MS496-75x				65	30	65	30	65	30	-	-	-
MS496-90x				65	30	65	30	65	-	-	-	-
MS496-100x				65	30	65	30	65	-	-	-	-

① Always size manual motor protectors based on the full-load current of the motor.

② For single phase connection diagram see page 4.17.

③ MS49x-xxE part numbers include the necessary components for Type E applications – Self-protected Type E ratings apply only to these devices.

④ Replace "x" in part number with "E" for self-protected Type E ratings. All other ratings leave blank.

⑤ MCCB interrupting rating must be equal to or greater than the rating of the device.

Accessories

For Types MS116, MS132, MS45x, MS49x

4



HKF1-11



HK4-11



HK1-11

HKS4-20

Auxiliary contacts

For use with MS...				Mounting position / max. quantity	Pilot duty rating		Auxiliary contacts				Catalog number		
116	132	45x	49x		ac	dc	Instantaneous		Lagging / leading				
							NO	NC	NO	NC			
•	•			Right / 2	B600	Q600	1	1	-	-	HK1-11		
•	•						2	-	-	-	-	-	HK1-20
•	•						-	2	-	-	-	-	HK1-02
•	•			Front / 1	B300	Q300	1	1	-	-	HKF1-11		
•	•						2	-	-	-	-	-	HKF1-20
		•	•	Left / 1	A600	Q300	1	1	-	-	HKS4-11		
		•	•				2	-	-	-	-	-	HKS4-20
		•	•				-	2	-	-	-	-	HKS4-02
		•	•	Front / 1	C300	R300	1	1	-	-	HK4-11		
		•	•				-	1	-	1	-	-	HK4-W



SK1-11

CK1-11

SK4-11

Signalling contacts

For use with MS...				Description	Mounting position / max. quantity	Pilot duty rating		Contacts		Catalog number		
116	132	45x	49x			ac	dc	NO	NC			
•	•			Trip (bell) alarm	Right / 1	B600	Q600	1	1	SK1-11		
•	•							2	-	-	2	SK1-20
•	•							-	-	-	2	SK1-02
		•	•	Short-circuit trip alarm	Right / 1	B600	Q600	1	1	CK1-11		
		•	•					2	-	-	2	CK1-20
		•	•					-	2	CK1-02		

Note(s):

CK1-xx contacts must mount flush on the right side of the MS132; these devices are supplementary and not required for use in UL 508 Type E & F applications

SK4-11 contacts are required for UL 508 Type E applications using types MS4xx; included when purchasing types MS4xx-xxE



AA1-24



UA1-24



AA4-24

Trip units

For use with MS...				Description	Mounting position / max. quantity	Voltage rating; continuous		Brief voltage rating; 5 seconds max.		Catalog number
116	132	45x	49x			50 Hz	60 Hz	50/60	dc	
•	•			Shunt trip	Left / 1	24 v		20...70 v		AA1-24
•	•					110 v		70...190 v		AA1-110
•	•					200...240 v		190...330 v		AA1-230
		•	•			350...415 v		330...500 v		AA1-400
		•	•	Shunt trip	Right / 1	20...24 v		20...70 v		AA4-24
		•	•			30...110 v		70...190 v		AA4-110
		•	•			210...240 v		190...330 v		AA4-240
		•	•			350...415 v		330...500 v		AA4-400
•	•			Undervoltage release	Left / 1	-	24 v	-	-	UA1-24
•	•					110 v	120 v	-	-	UA1-120
•	•					-	208 v	-	-	UA1-208
•	•					230 v	240 v	-	-	UA1-230
•	•					415 v	480 v	-	-	UA1-415
•	•					-	575 v	-	-	UA1-575
		•	•			24 v		-		-
		•	•	110...120 v		-		-	UA4-120	
		•	•	230...240 v		-		-	UA4-240	
		•	•	400 v		-		-	UA4-400	

Actuation tables

For Types MS116, MS132, MS45x, MS49x

Auxiliary and signaling contact actuation tables

Catalog number	Description	Condition / state						Terminal numbers	For use with MS...			
		Off	On	Thermal overload trip	Short-circuit trip	Under-voltage trip	Shunt trip		116	132	45x	49x
HK1-11	1 NO	O	X	X	X	X	X	33...34	•	•		
	1 NC	X	O	O	O	O	O	41...42				
HK1-20	2 NO	O	X	X	X	X	X	33...34, 43...44	•	•		
HK1-02	2 NC	X	O	O	O	O	O	31...32, 41...42	•	•		
HK1-20L	2 NO leading contacts	O	X	X	X	X	X	33...34, 43...44	•	•		
HKF1-11	1 NO	O	X	X	X	X	X	13...14	•	•		
	1 NC	X	O	O	O	O	O	21...22				
HKF1-20	2 NO	O	X	X	X	X	X	13...14, 23...24	•	•		
HKS4-11	1 NO	O	X	X	X	X	X	33...34			•	•
	1 NC	X	O	O	O	O	O	41...42				
HKS4-20	2 NO	O	X	X	X	X	X	33...34, 43...44			•	•
HKS4-02	2 NC	X	O	O	O	O	O	31...32, 41...42			•	•
HK4-11	1 NO	O	X	X	X	X	X	13...14			•	•
	1 NC	X	O	O	O	O	O	21...22				
HK4-W	1 NO, leading (form C)	O	X	X	X	X	X	11...14			•	•
	1 NC (form C)	X	O	O	O	O	O	11...12				
SK1-11	1 NO	O	O	X	X	X	X	57...58	•	•		
	1 NC	X	X	O	O	O	O	65...66				
SK1-20	2 NO	O	O	X	X	X	X	57...58, 67...68	•	•		
SK1-02	2 NC	X	X	O	O	O	O	55...56, 65...66	•	•		
SK4-11	1 NO	O	O	X	X	X	X	57...58				
	1 NC	X	X	O	O	O	O	65...66			•	•
	1 NO	O	O	O	X	O	O	77...78				
	1 NC	X	X	X	O	X	X	85...86				
CK1-11	1 NO	O	O	O	X	O	O	77...78		•		
	1 NC	X	X	X	O	X	X	85...86				
CK1-20	2 NO	O	O	O	X	O	O	77...78, 87...88		•		
CK1-02	2 NC	X	X	X	O	X	X	75...76, 85...86		•		

Note:

X = Indicates closed state

O = Indicates open state

For connection diagrams, see page 4.17.

Operator positions

Type	Operator position						Key
	Off	On	Thermal overload trip	Short-circuit trip	Undervoltage trip	Shunt trip	
MS116-...	←	↑	←	←	←	←	
MS132-...	←	↑	↘	↘ [⊕]	↘	↘	
MS45x-...	←	↑	↘	↘	↘	↘	
MS49x-...	←	↑	↘	↘	↘	↘	

⊕ + I >> indicator window = red.

Accessories

For Types MS116, MS132, MS45x, MS49x



PS1-2-0-65



PS1-3-1-100

4

Three phase busbar

For use with MS...				Description	Rated current (A)		Max. quantity of auxiliary and signaling contacts per MMP	Max. quantity of shunt trips or U.V. releases per MMP	Catalog number	
116	132	45x	49x		600 v ac	Max. quantity of MMP's				
•	•			2-position busbar	65	2	-	-	PS1-2-0-65	
•	•					2	1	-	-	PS1-2-1-65
•	•				108	2	2	or	1	PS1-2-2-65
		•	•			2	-	-	-	PS4-2-0
						2	1	or	PS4-2-2	
•	•			3-position busbar	65	3	-	-	PS1-3-0-65	
•	•					3	1	-	-	PS1-3-1-65
•	•				92	3	2	or	1	PS1-3-2-65
•	•					3	-	-	-	PS1-3-0-100
•	•				108	3	1	-	-	PS1-3-1-100
		•	•			3	2	or	1	PS1-3-2-100
						3	-	-	PS4-3-0	
						3	1	or	PS4-3-2	
•	•			4-position busbar	65	4	-	-	PS1-4-0-65	
•	•					4	1	-	-	PS1-4-1-65
•	•				92	4	2	or	1	PS1-4-2-65
•	•					4	-	-	-	PS1-4-0-100
•	•				108	4	1	-	-	PS1-4-1-100
		•	•			4	-	-	-	PS4-4-0
						4	1	or	PS4-4-2	
•	•			5-position busbar	65	5	-	-	PS1-5-0-65	
•	•					5	1	-	-	PS1-5-1-65
•	•				92	5	2	or	1	PS1-5-2-65
•	•					5	-	-	-	PS1-5-0-100
•	•				5	1	-	-	PS1-5-1-100	
•	•			Empty position busbar cover					BS1-3	
		•		Empty position busbar cover					BS4-3	

Note: Use of PS1 or PS4 busbar in group motor or self-protected Type E or F applications does not inhibit or alter the short-circuit current ratings for the devices utilized.



S1-M3-25



DX495

Three phase feeder terminals

For use with MS...				Description	Rated current (A) 600 v ac	Connecting capacity (AWG)	Required for UL 508 Types E or F applications	Catalog number	
116	132	45x	49x						
•	•			Feeder terminal	65	10...4		S1-M1-25	
•	•				65	10...4			S1-M2-25
•	•				65	10...4	•		S1-M3-25
•	•				92	8...2	•		S1-M3-35
		•			108	10...1/0			S4-M1
			•	Type E terminal ins. barrier	140	10...1/0	•		DX495

Note(s): Only the S1-M3-xx terminals are acceptable for UL 508 Type E or F applications using type MS132. The DX495 terminal is included when purchasing type MS49x-xxE devices.

Terminal shrouds

For use with MS...				Description	Catalog number
116	132	45x	49x		
		•		Terminal shroud, short	KA450
			•		KA495
			•	Terminal shroud, long	KA495C



KA450

Accessories

For Types MS116, MS132

ABB Manual motor protectors can also be connected to the SMISLINE power distribution bus system, which provides a versatile and flexible means of distributing power to a wide variety of electrical devices. For complete system information, see Section 24.

SMISLINE busbar adaptors for types MS116 / MS132

For use with MS...				Description	Catalog number
116	132	45x	49x		
•	•			Adaptor, L1,L2,L3 bottom feed	ZMS930
•	•			Adaptor, L1,L2,L3 top feed	ZMS932
•	•			Adaptor, without feed wires	ZMS139
				9 mm wide additional housing	ZMS935

Note(s):

The 9 mm wide additional housing is needed when an odd number of combi modules are plugged on the socket; required to fill space into a full module (18 mm).

The 9 mm wide additional housing must also be used when a side-mount auxiliary contact is used.

SMISLINE busbar combi modules for types MS116 / MS132 + AF Contactors

For use with MS...				Description	Catalog number
116	132	45x	49x		
•	•			Combi module, L1,L2,L3 top feed	ZMS930
•	•			Combi module, without feed wires	ZMS137
				Connection pin set for mounting two combi modules side-by-side	E210-SPV

Accessories

For Types MS116, MS132, MS45x, MS49x

4



SA1

SA2

Locking accessories

For use with MS...

116	132	45x	49x	Description	Catalog number
•				Lock adapter	SA1
•	•	•	•	Padlock + 2 keys	SA2
•				Lock adapter + padlock + 2 keys	SA3

Note: Types MS132 and MS4xx have integral locking mechanisms



DMS132-G

Door mount kits - Type 12 & IP 65

For use with MS...

116	132	45x	49x	Description	Rotary positions	Catalog number
•	•			Door mount w/ handle, black/gray	On / Trip / Off	DMS132-G
•	•			Door mount w/ handle, red/yellow	On / Trip / Off	DMS132-Y

Note(s): Type MS116 devices trip to the "Off" position
Max. 3 padlocks with bail diameter Ø 4...6.5 mm

Through-door hardware - Types 1, 3R, 12 and IP 64

For use with MS...

116	132	45x	49x	Description	Rotary positions	Catalog number
•	•	•	•	Selector handle, black, defeatable, padlockable	On / Off	MSHD-LB
					On / Trip / Off	MSHD-LTB
•	•	•	•	Selector handle, red/yellow, defeatable, padlockable	On / Off	MSHD-LY
					On / Trip / Off	MSHD-LTY
•	•	•	•	Shaft coupler, coded, 6 mm, MSMN	-	1SAM101923R0002
•	•	•	•	Shaft coupler, un-coded, 6 mm, MSMNO	-	1SAM101923R0012
•	•	•	•	Drive spindle, 6 x 30 mm, for horizontal mounting, MSOX-30	-	1SAM101924R0013
•	•	•	•	Drive spindle, 6 x 32 mm, for vertical (standard) mounting, MSOX-32	-	1SAM101924R0003
•	•	•	•	Shaft, 6 x 85 mm	-	OXS6X85
•	•	•	•	Shaft, 6 x 105 mm	-	OXS6X105
•	•	•	•	Shaft, 6 x 130 mm	-	OXS6X130
•	•	•	•	Shaft, 6 x 180 mm	-	OXS6X180
•	•	•	•	Shaft alignment ring, MSH-AR	-	1SAM201920R1000

Note(s): Through-door selector handles are rated Type 1, 3R and 12; IP 64 degree of protection
Max. 3 padlocks with bail diameter Ø 5...8 mm
For coded shaft couplers, the "On" position is dependent on the mounting orientation of the MMP
Must have handle, shaft coupler and shaft for through-door operation. Drive spindles can replace both shaft coupler and shaft.



MSHD-LY

MSHD-LTY



1SAM101923R0002

1SAM101924R0013



1SAM201920R1000

Enclosures - Type 12 & IP 65

For use with MS...

116	132	45x	49x	Description	Rotary positions	Catalog number
•	•			Molded plastic enclosure, black/gray	On / Trip / Off	IB132-G
•	•			Molded plastic enclosure, red/yellow	On / Trip / Off	IB132-Y
•	•			Adaptor, PG16 to 1/2 NPT	-	PG16-1/2NPT

Note(s): Type E rating for MS132 derated when using IB132 enclosures. Please contact technical support.
Type MS116 devices trip to the "Off" position
Max. 3 padlocks with bail diameter Ø 4...6.5 mm
For UL enclosure type ratings, contact technical support.



IB132-G

Accessories

For Types MS116, MS132, MS45x, MS49x

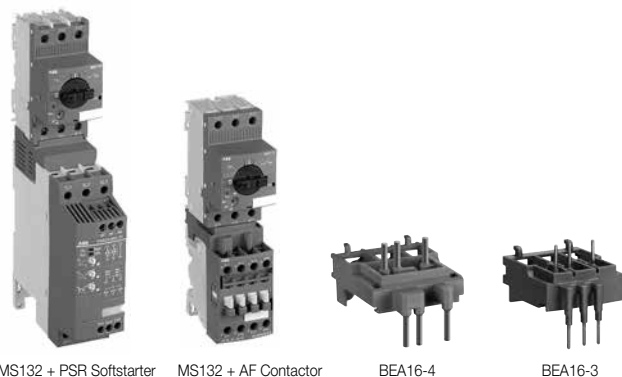
MS Series
Manual motor
protectors

4

Close couplers for contactors

	Miniature contactors		AF contactors						AS contactors		A / AE Contactors		Catalog number
	B6...B7	BC6...BC7	AF09...AF16	AF09Z...AF16Z	AF26...AF38	AF26Z...AF38Z	AF50...AF75	AF95...AF110	AS09...AS16	ASL09...ASL16	A50...A75, AE50...AE75	A95...A110	
Manual motor protector													
MS116-0.16...16	•	•	•	•	•	•			•	•			BEA7/132 BEA16-4 BEA26-4 BEA16-3
MS116-20...25			•	•	•	•							BEA16-4 BEA38-4
MS116-32					•	•							BEA38-4
MS132-0.16...10	•	•	•	•	•	•			•	•			BEA7/132 BEA16-4 BEA26-4 BEA16-3
MS132-12...16	•	•	•	•	•	•			•	•			BEA7/132 BEA16-4 BEA38-4 BEA16-3
MS132-20...25			•	•	•	•							BEA16-4 BEA38-4
MS132-32					•	•							BEA38-4
MS45x-40...50								•			•		BEA50/450
MS49x-40...100								•			•		BEA75/495
MS495-40...100									•			•	BEA110/495

Note: For spring terminated AS/ASL, use part number BEA16-3U with integral wire leads for spring terminals.



Close couplers for softstarters

Manual motor protector	PSR Softstarters				Catalog number
	PSR3...PSR16	PSR25...PSR30	PSR37...PSR45	PSR60...PSR105	
MS116-0.16...16	•				PSR16-MS116
MS116-20...32		•			PSR30-MS132
MS132-0.16...10	•				PSR16-MS116
MS132-12...32		•			PSR30-MS132
MS45x-40...50			•		PSR45-MS450
MS49x-40...100				•	PSR105-MS495

Accessories For Type MS132

Rated for use with the type MS132, the S803W current limiters can provide selective coordination for individual downstream SCPDs, and can be utilized in combination for short-circuit protection up to 65 kA at 600 v ac. For more information, see Section 17 - S800 Series.

4



S803W-SCL32-SR

Current limiters

For use with MS...

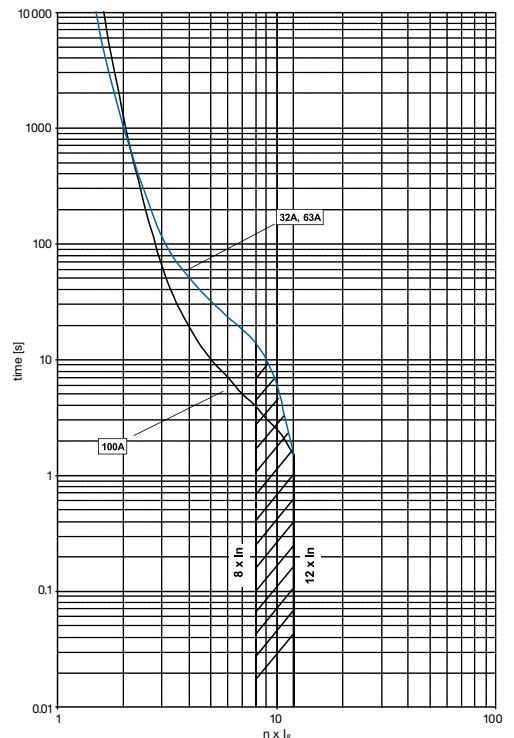
116	132	45x	49x	Description	Rated current (A) 600 v ac	Connecting capacity (AWG)	Catalog number
	•			Current limiter, 3-pole	32	14...1	S803W-SCL32-SR
	•				63	14...1	S803W-SCL63-SR
	•				100	14...1	S803W-SCL100-SR

Note(s): The sum of the rated currents of all downstream motor protectors shall not exceed the rated current of the S803W.
The sum of all load currents including inrush currents shall not exceed the maximum permissible load of the S803W.

MS132 Short circuit current ratings using S803W current limiters (kA)

Catalog number	UL 508 - Motor controllers, manual (NLRV)			UL 508 - Combination motor controllers (NKJH)				
	Circuit breaker	Group motor installation ①		Self-protected Type E ②		Self-protected Type F ②		
		240V 480V	600V	480Y/ 277V	600Y/ 347V	480Y/ 277V	600Y/ 347V	Type F contactors
MS132-0.16	MCCB, 400A max. ③	65	65	65	47	65	47	AF26...AF38
MS132-0.25		65	65	65	47	65	47	AF26...AF38
MS132-0.4		65	65	65	47	65	47	AF26...AF38
MS132-0.63		65	65	65	47	65	47	AF26...AF38
MS132-1.0		65	65	65	47	65	47	AF26...AF38
MS132-1.6		65	65	65	47	65	47	AF26...AF38
MS132-2.5		65	65	65	47	65	47	AF26...AF38
MS132-4.0		65	65	65	47	65	47	AF26...AF38
MS132-6.3		65	65	65	18	65	47	AF26...AF38
MS132-10		65	65	65	18	65	47	AF26...AF38
MS132-12		65	65	65	-	65	-	AF26...AF38
MS132-16		65	65	65	-	65	-	AF26...AF38
MS132-20		65	65	65	-	65	-	AF26...AF38
MS132-25		65	65	65	-	65	-	AF26...AF38
MS132-32		65	65	65	-	65	-	AF26...AF38

Maximum load



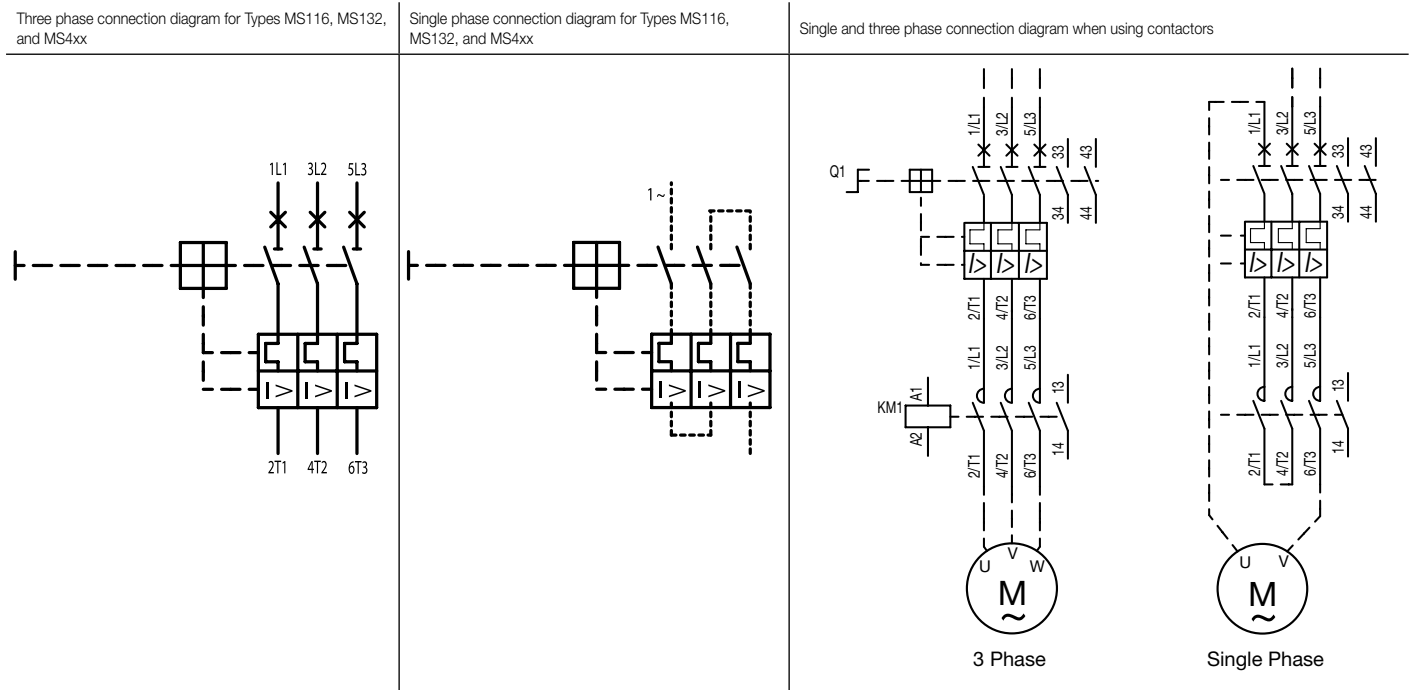
① Also suitable for Tap Conductor protection.
② Requires the use of a line-side feeder terminal S1-M3-xx; see accessories section.
③ MCCB interrupting rating must be equal to or greater than the rating of the device.

Connection diagrams

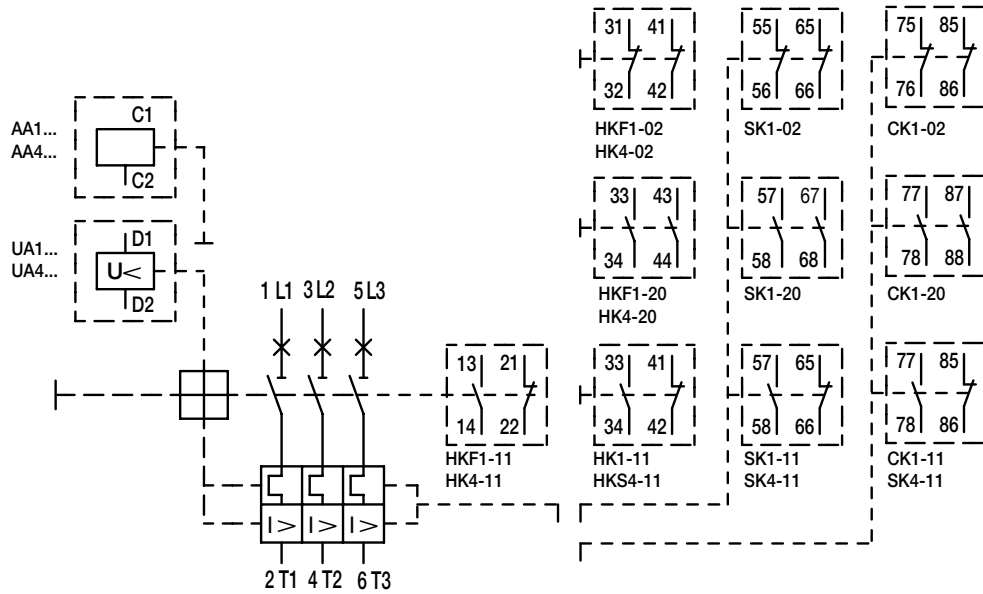
For Types MS116, MS132, MS45x, MS49x

MS Series
Manual motor
protectors

Connection diagrams

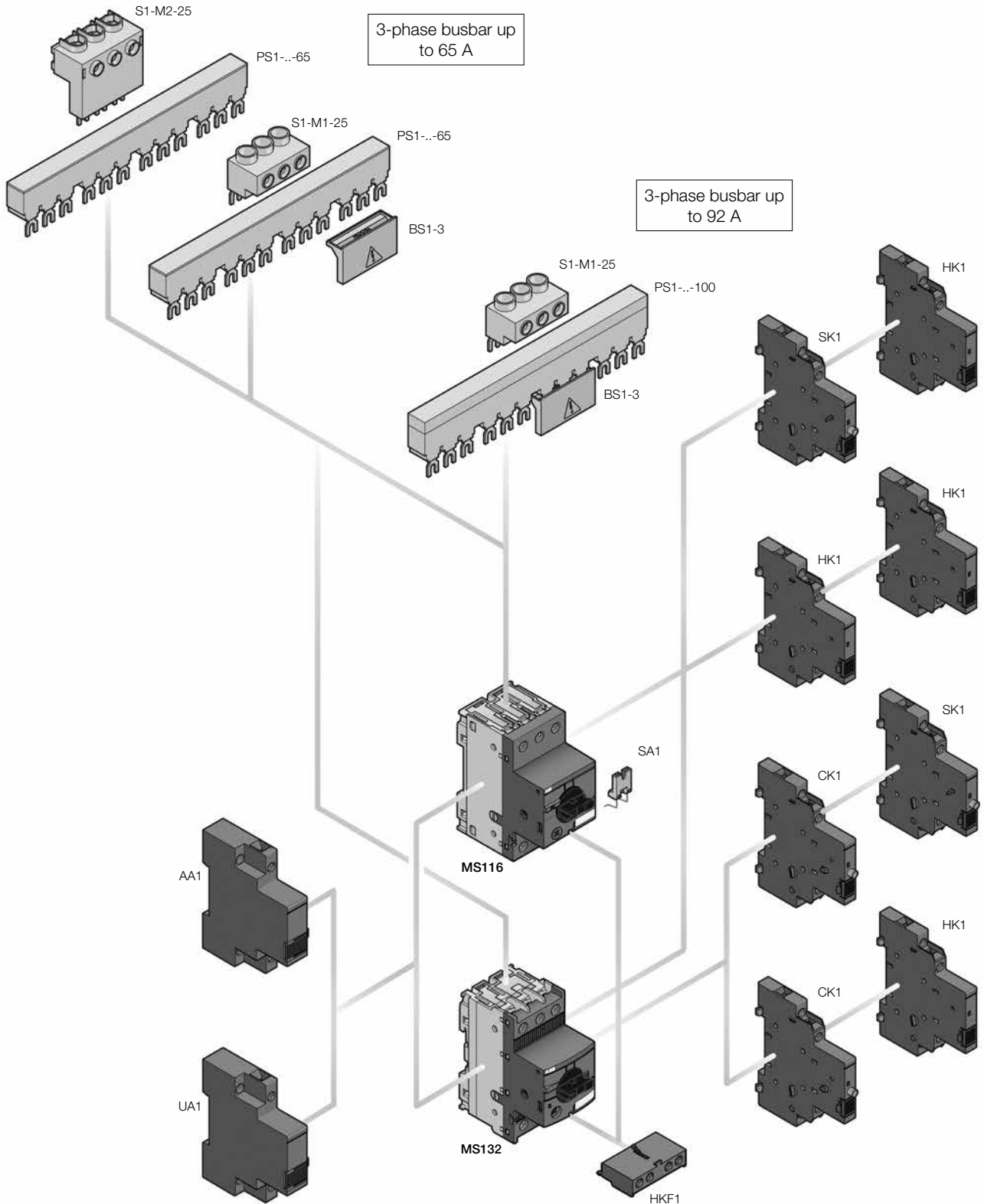


Accessories for use with Type MS116, MS132 & MS4xx



General accessory mounting layout MS116 & MS132

4



Technical data - IEC/EN MS116

Main circuit – Utilization characteristics according to IEC/EN

Type	MS116
Standards	IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_g	690 V AC
Rated frequency	50/60 Hz
Trip class	10A
Number of poles	3
Duty time	100 %
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC
Rated operational current I_a	See ordering details
Rated instantaneous short-circuit current setting I_i	See ordering details
Rated service short-circuit breaking capacity I_{CS}	See table "Short-circuit breaking capacity and back-up fuses"
Rated ultimate short-circuit breaking capacity I_{CU}	See table "Short-circuit breaking capacity and back-up fuses"

Short-circuit breaking capacity and back-up fuses

I_{CS} Rated service short-circuit breaking capacity

I_{CU} Rated ultimate short-circuit breaking capacity

I_{CC} Prospective short-circuit current at installation location

Note: Maximum rated current of the back-up fuses if $I_{CC} > I_{CS}$

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A
MS116-0.16	No back-up fuse required up to $I_{CC} = 50$ kA									No back-up fuse required up to $I_{CC} = 30$ kA					
MS116-0.25															
MS116-0.4															
MS116-0.63															
MS116-1.0															
MS116-1.6															
MS116-2.5							10	10	25	10	10	25	5	5	25
MS116-4.0							6	6	25	6	6	25	2	2	25
MS116-6.3							6	6	63	6	6	63	2	2	40
MS116-10							6	6	63	6	6	63	2	2	50
MS116-12	25	25	80	25	25	80	6	6	63	6	6	63	2	2	50
MS116-16	16	16	80	16	16	80	6	6	63	4	4	63	2	2	63
MS116-20	10	15	-	10	15	-	3	6	-	3	4	-	2	2	-
MS116-25	10	15	-	10	15	-	3	6	-	3	4	-	2	2	-
MS116-32	10	10	-	10	10	-	3	6	-	3	4	-	2	2	-

MS116-10: No need for back-up fuse in networks with a prospective current of up to 50 kA at 400 V.

MS116-16: No need for back-up fuse in networks with a prospective current of up to 16 kA at 400 V.

With an appropriate 80 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA.

MS116-32: No need for back-up fuse in networks with a prospective current of up to 15 kA at 400 V.

Technical data - UL/CSA MS116

Main circuit – Utilization characteristics according to UL/CSA

Type	MS116
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC
Manual motor controller ratings	See table "UL 508 – Manual motor controller"
Trip rating	125 % FLA
Motor ratings	See table "Motor rating, three phase"
Horse power	See table "Motor rating, three phase"
Full load amps (FLA)	See table "Motor rating, three phase"
Locked rotor amps (LRA)	See table "Motor rating, three phase"

Motor rating, three phase

hp Horse power

FLA Full load amps

LRA Locked rotor amps

Type	110-120 V AC			220-240 V AC			440-480 V AC			550-600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MS116-0.16	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96
MS116-0.25	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5
MS116-0.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4
MS116-0.63	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78
MS116-1.0	-	1.0	6.0	-	1.0	6.0	-	1.0	6.0	1/2	0.9	8
MS116-1.6	-	1.6	9.6	-	1.6	9.6	3/4	1.6	12.5	3/4	1.3	10
MS116-2.5	-	2.5	15.0	1/2	2.2	20	1	2.1	15	1-1/2	2.4	16
MS116-4.0	-	4.0	16.0	1	4.2	30	2	3.4	25	3	3.9	25.6
MS116-6.3	1/2	4.4	40	1-1/2	6.4	40	3	4.8	32	5	6.1	36.8
MS116-10	1	8.4	60	3	9.6	64	5	7.6	46	7-1/2	9	50.8
MS116-12	1-1/2	12	80	3	9.6	64	7-1/2	11	63.5	10	11	64.8
MS116-16	2	13.6	100	5	15.2	92	10	14	81	10	11	64.8
MS116-20	3	19.2	128	5	15.2	92	10	14	81	15	17	93
MS116-25	3	19.2	128	7-1/2	22	127	15	21	116	20	22	116
MS116-32	5	30.4	184	10	28	162	20	27	145	25	27	146

① Suitable as motor disconnect only when provided with padlock SA1 or SA3..

Technical data



MS116

General technical data

Type	MS116	
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +55 °C
	Open	-25 ... +70 °C
	Enclosed (IB132)	0 ... +40 °C
Storage	-50 ... +80 °C	
Ambient air temperature compensation	Continuous	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	25 g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6	5 g / 3 ... 150 Hz	
Mounting position	Position 1-6 (optional for single mounting)	
Mounting	DIN-rail (EN 60715)	
Group mounting	On request	
Minimum distance to other units same type	Horizontal	0 mm
	Vertical	150 mm
Minimum distance to electrical conductive board	Horizontal, up to 400 V	0 mm
	Horizontal, up to 690 V	> 1.5 mm
	Vertical	75 mm
Degree of protection	Enclosure / terminals	IP20

4

Main circuit – Connecting characteristics

Type	MS116 ≤ 16 A		MS116 ≥ 20 A	
Connecting capacity				
 Solid	1 or 2 x	1 ... 4 mm ²	2.5 ... 6 mm ²	
 Flexible	1 or 2 x	0.75 ... 2.5 mm ²	1 ... 6 mm ²	
Stranded acc. to UL/CSA	1 or 2 x	AWG 16-12	AWG 12-8	
Flexible acc. to UL/CSA	1 or 2 x	AWG 16-12	AWG 12-8	
Stripping length	9 mm		10 mm	
Tightening torques	0.8 ... 1.2 Nm / 10 ... 12 lb.in		2.0 Nm / 18 lb.in	
Connection screw	M3.5 (Pozi driv 2 / 5.5 mm)		M4 (Pozi driv 2 / 6.5 mm)	

Main circuit – Utilization characteristics according to IEC/EN

Type	MS132
Standards	IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC / 250 V DC
Rated frequency	DC, 50/60 Hz
Trip class	10 (10A for MS132-0.16)
Number of poles	3
Duty time	100 %
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC
Rated operational current I_a	See ordering details
Rated instantaneous short-circuit current setting I_{cs}	See ordering details
Rated service short-circuit breaking capacity I_{cs}	See table "Short-circuit breaking capacity and back-up fuses"
Rated ultimate short-circuit breaking capacity I_{cu}	See table "Short-circuit breaking capacity and back-up fuses"

Short-circuit breaking capacity and back-up fuses

I_{cs} Rated service short-circuit breaking capacity

I_{cu} Rated ultimate short-circuit breaking capacity

I_{cc} Prospective short-circuit current at installation location

Note: Maximum rated current of the back-up fuses if $I_{cc} > I_{cs}$

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A
MS132-0.16															
MS132-0.25															
MS132-0.4															
MS132-0.63															
MS132-1.0	No back-up fuse required up to														
MS132-1.6	$I_{cc} = 100$ kA														
MS132-2.5															
MS132-4.0							20	20	*	20	20	*	3	3	*
MS132-6.3							20	20	*	20	20	*	3	3	*
MS132-10							20	20	*	20	20	*	3	3	*
MS132-12							20	20	*	20	20	*	3	3	*
MS132-16							20	20	*	20	20	*	3	3	*
MS132-20							20	20	*	20	20	*	3	3	*
MS132-25	50	50	100	50	50	100	20	20	*	10	10	*	3	3	*
MS132-32	25	50	125	25	50	125	20	20	*	10	10	*	3	3	*

MS132-16: No need for back-up fuse in networks with a prospective current of up to 100 kA at 400 V.

MS132-32: No need for back-up fuse in networks with a prospective current of up to 50 kA at 400 V.

With an appropriate 125 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA

* not available yet

Technical data - UL/CSA MS132

MS Series
Manual motor
protectors

Main circuit – Utilization characteristics according to UL/CSA

Type	MS132
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC
Manual motor controller ratings	See table "UL 508 – Manual motor controller"
Trip rating	125 % FLA
Motor ratings	
Horse power	See table "Motor rating, three phase"
Full load amps (FLA)	See table "Motor rating, three phase"
Locked rotor amps (LRA)	See table "Motor rating, three phase"

Motor rating, three phase

hp Horse power

FLA Full load amps



LRA Locked rotor amps

Type	110-120 V AC			220-240 V AC			440-480 V AC			550-600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MS132-0.16	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96
MS132-0.25	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5
MS132-0.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4
MS132-0.63	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78
MS132-1.0	-	1.0	6.0	-	1.0	6.0	-	1.0	6.0	1/2	1.0	6.0
MS132-1.6	-	1.6	9.6	-	1.6	9.6	3/4	1.6	9.6	3/4	1.6	9.6
MS132-2.5	-	2.5	15.0	1/2	2.5	15.0	1	2.5	15.0	1-1/2	2.5	15.0
MS132-4.0	-	4.0	24.0	1	4.0	24.0	2	4.0	24.0	3	3.9	26.0
MS132-6.3	1/2	6.3	37.8	1-1/2	6.3	37.8	3	4.8	32.0	5	6.1	37.0
MS132-10	3/4	10.0	60.0	3	9.6	64.0	5	7.6	46.0	7-1/2	9.0	51.0
MS132-12	1-1/2	12.0	72.0	3	9.6	64.0	7-1/2	11.0	64.0	10	11.0	65.0
MS132-16	2	16.0	84.0	5	15.2	92.0	10	14.0	81.0	10	11.0	65.0
MS132-20	3	19.2	128.0	5	15.2	92.0	10	14.0	81.0	15	17.0	93.0
MS132-25	3	19.2	128.0	7-1/2	22.0	127.0	15	21.0	116.0	20	22.0	116.0
MS132-32	5	30.4	184.0	10	28.0	162.0	20	27.0	145.0	25	27.0	146.0

General technical data

Type		MS132
Pollution degree		3
Phase loss sensitive		Yes
4 Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +60 °C
	Open	-25 ... +70 °C
	Enclosed (IB132)	0 ... +40 °C
Storage		-50 ... +80 °C
Ambient air temperature compensation		Continuous
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		25 g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6		5 g / 3 ... 150 Hz
Mounting position		Position 1-6 (optional for single mounting)
Mounting		DIN-rail (EN 60715)
Group mounting		On request
Minimum distance to other units same type	Horizontal	0 mm
	Vertical	150 mm
Minimum distance to electrical conductive board	Horizontal, up to 400 V	0 mm
	Horizontal, up to 690 V	> 1.5 mm
	Vertical	75 mm
Degree of protection	Enclosure / terminals	IP20

Main circuit – Connecting characteristics

Type	MS132-0.16 ... MS132-10	MS132-12 ... MS132-16	MS132-20 ... MS132-32
Connecting capacity			
 Solid	1 or 2 x 1 ... 4 mm ²	1 ... 4 mm ²	2.5 ... 6 mm ²
 Flexible	1 or 2 x 0.75 ... 2.5 mm ²	0.75 ... 2.5 mm ²	1 ... 6 mm ²
	Stranded acc. to UL/CSA	AWG 16-12	AWG 12-8
	Flexible acc. to UL/CSA	AWG 16-12	AWG 12-8
Stripping length			
	9 mm	10 mm	10 mm
Tightening torques			
	0.8 ... 1.2 Nm / 10 ... 12 lb.in	1.5 Nm / 14 lb.in	2.0 Nm / 18 lb.in
Connection screw			
	M3.5 (Pozidriv 2)	M4 (Pozidriv 2)	M4 (Pozidriv 2)



Technical data

MS116 & MS132 Accessories

General technical data

Type	PS1-x-x-65	PS1-x-x-100	S1-M1-25	S1-M2-25	S1-M3-25	S1-M3-35
Standards	IEC/EN 60947-1, UL 508/60947-4-1A, CAN/CSA C22.2 No.14/60947-4-1-07					
Rated operational voltage U_e	690 V AC					
Rated voltage UL/CSA	600 V AC					
Rated operational current I_e	65 A	100 A	65 A			100 A
Rated current UL/CSA	65 A	92 A	65 A			92 A
Rated frequency	50/60 Hz					
Rated impulse withstand voltage U_{imp}	6 kV					
Rated insulation voltage U_i	690 V AC					
Pollution degree	3					
Cross-section	5 mm ²			5 mm ²		
Ambient air temperature	Operation	-25...+70 °C				
	Storage	-50...+80 °C				



Connecting characteristics

Type	S1-M1-25	S1-M2-25	S1-M3-25	S1-M3-35
Connecting capacity				
 Solid	1 x	6mm2...25 mm2		10...35 mm ²
 Flexible	1 x	6mm2...16mm2		10...35 mm ²
Stranded acc. to UL/CSA	1 x	AWG 10-4		AWG 8-2
Flexible acc. to UL/CSA	1 x	AWG 10-4		AWG 8-2
Tightening torques	2.5 Nm / 22 lb.in			4.5 Nm / 40 lb.in
Connection screw	Pozidriv 2 / M3.5			Hexgon SW4

General technical data

Type	UA1	AA1
Standards	IEC/EN 60947-1, UL 508/60947-4-1A, CAN/CSA C22.2 No.14/60947-4-1-07	
Pick-up value	% of U_c	≥ 85
Drop-out value	% of U_c	35...70
Power consumption	Pick-up VA	9
	Holding VA	3
Ambient air temperature	Operation	-20...+55 °C
	Storage	-50...+80 °C

Connecting characteristics

Type	UA1	AA1
Connecting capacity		
 Solid	1 x	0.5...1.5 mm ²
	2 x	0.5...1.5 mm ²
 Flexible	1 x	0.5...1.5 mm ²
	2 x	0.5...1.5 mm ²
Stranded acc. to UL/CSA	1 or 2 x	AWG 18-14
Flexible acc. to UL/CSA	1 or 2 x	AWG 18-14
Stripping length	8 mm	
Tightening torques	0.8...1.2 Nm / 7...10.3 lb.in	
Connection screw	Pozidriv 2 / M3	

Technical data

MS116 & MS132 Accessories

Contact utilization characteristics per IEC

Type	HKF1-xx	HK1-xx	HK1-20L	SK1-xx	CK1-xx
Standards	IEC/EN 60947-5-1				
Rated operational voltage U_e	250 V AC/ 250 V DC	690 V AC/ 600 V DC			
Conventional free-air thermal current I_n	5 A	6 A			
Rated frequency	50/60 Hz				
Rated impulse withstand voltage U_{imp}	6 kVA				
Rated insulation voltage U_i	230 V	690 V			
Pollution degree	3				
Ambient air temperature	Operation	-20...+55 °C			
	Storage	-50...+80 °C			
Resistance to shock acc. to IEC 60068-2-27	25 g / 11 ms				
Resistance to vibrations acc. to IEC 60068-2-6	2 g / 5...150 Hz				
Number of poles	1 N.C. + 1 N.O. or 2 N.O. or 2 N.C.		2 leading N.O.	1 N.C. + 1 N.O. or 2 N.O. or 2 N.C.	
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category					
	24 V, 50/60 Hz	3	6		
	120 V, 50/60 Hz	3	6		
	230 V, 50/60 Hz	1.5	4		
	400 V, 50/60 Hz	-	3		
	690 V, 50/60 Hz	-	1		
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category					
	24 V	1.0	2		
	125 V	0.27	0.55		
	250 V	0.10	0.27		
	600 V	-	0.15		
Minimum switching capacity	17 V / 5 mA				
Short-circuit protective device	10 A Type gG				
Duty time	100 %				
Mounting	Front of MMS	Right side of MMS			
Mounting positions	1-6				
Mechanical durability	100000 cycles				
Electrical durability	100000 cycles				

Contact utilization characteristics per UL/CSA

Type	HKF1-xx	HK1-xx	HK1-20L	SK1-xx	CK1-xx
Standards	UL 508/60947-4-1A, CAN/CSA C22.2 No.14/60947-4-1-07				
Rated voltage UL/CSA	240 V AC/ 250 V DC	600 V AC/ 600 V DC			
Pilot duty	B300, Q300	B600, Q600			
AC thermal rated current	5				
AC maximum volt-ampere making	3600				
AC maximum volt-ampere breaking	360				
DC thermal rated current	2.5				
DC maximum volt-ampere make/break	69				

Connecting characteristics

Type	HKF1-xx	HK1-xx	HK1-20L	SK1-xx	CK1-xx
Connecting capacity					
Solid	1 or 2 x	1...1.5 mm ²			
Flexible	1 or 2 x	0.75...1.5 mm ²			
Flexible with non-insulated ferrule	1 or 2 x	0.75...1.5 mm ²			
Flexible with insulated ferrule	1 or 2 x	0.75...1.5 mm ²			
Stranded acc. to UL/CSA	1 or 2 x	AWG 16-14			
Flexible acc. to UL/CSA	1 or 2 x	AWG 16-14			
Stripping length	8 mm				
Tightening torques	0.8...1.2 Nm / 7...10.3 lb.in				
Connection screw	Pozidriv 2 / M3				

Technical data - IEC/EN MS45x & MS49x

Main circuit – Utilization characteristics according to IEC/EN

Type	MS45x, MS49x
Standards	IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_n	690 V AC / 450 V DC
Rated frequency	50/60 Hz
Trip class	10, 20
Number of poles	3
Duty time	100 %
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC
Rated operational current I_n	See ordering details
Rated instantaneous short-circuit current setting I_{cs}	See ordering details
Rated service short-circuit breaking capacity I_{cs}	See table "Short-circuit breaking capacity and back-up fuses"
Rated ultimate short-circuit breaking capacity I_{cu}	See table "Short-circuit breaking capacity and back-up fuses"

Short-circuit breaking capacity and back-up fuses

I_{cs} Rated service short-circuit breaking capacity

I_{cu} Rated ultimate short-circuit breaking capacity

I_{cc} Prospective short-circuit current at installation location

Note: Maximum rated current of the back-up fuses if $I_{cc} > I_{cs}$

Type	240 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A

Short-circuit protection MS45x

MS45x-40	No back-up fuse required up to $I_{cc} = 100$ kA	25	50	160	15	50	125	5	10	100	2	4	63
MS45x-45		25	50	160	15	50	125	5	10	100	2	4	63
MS45x-50		25	50	160	15	50	125	5	10	100	2	4	80

MS45x: No need for back-up fuse in networks with a prospective current of up to 50 kA at 400 V.
With an appropriate 160 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA.

Short-circuit protection MS49x

MS49x-40	No back-up fuse required up to $I_{cc} = 100$ kA	25	50	125	20	50	125	6	12	125	3	6	63
MS49x-50		25	50	125	20	50	125	6	12	125	3	6	80
MS49x-63		25	50	160	20	50	160	6	12	160	3	6	80
MS49x-75		25	50	160	20	50	160	6	8	160	3	5	100
MS49x-90		25	50	160	20	50	160	6	8	160	3	5	125
MS49x-100		25	50	160	20	50	160	6	8	160	3	5	125

MS49x-40: No need for back-up fuse in networks with a prospective current of up to 50 kA at 400 V.
With an appropriate 125 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA.
MS49x-100: No need for back-up fuse in networks with a prospective current of up to 50 kA at 400 V.
With an appropriate 160 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA.

Technical data - UL/CSA MS45x & MS49x

Main circuit – Utilization characteristics according to UL/CSA

Type	MS45x, MS49x
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC
Manual motor controller ratings	See table "UL 508 – Manual motor controller"
Trip rating	125 % FLA
Motor ratings	Horsepower
	Full load amps (FLA)
	Locked rotor amps (LRA)

Motor rating, three phase

hp Horsepower

FLA Full load amps (FLA)

LRA Locked rotor amps (LRA)

Type	208 V AC			220-240 V AC			440-480 V AC			550-600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
Types MS450 / MS451												
MS451-16	5	16.7	102.0	5	15.2	92.0	10	14.0	81.0	15	17.0	93.0
MS451-20	5	16.7	102.0	7.5	22.0	92.0	15	21.0	116.0	20	22.0	116.0
MS451-25	7.5	24.2	140.0	10	28.0	127.0	20	27.0	145.0	25	27.0	146.0
MS451-32	10	30.8	179.0	10	28.0	162.0	25	34.0	183.0	30	32.0	174.0
MS45x-40	15	46.2	257.0	15	42.0	232.0	30	40.0	218.0	40	41.0	232.0
MS45x-45	15	46.2	257.0	15	42.0	232.0	30	40.0	218.0	40	41.0	232.0
MS45x-50	15	46.2	257.0	20	54.0	232.0	40	52.0	290.0	50	52.0	290.0
Types MS495 / MS496												
MS49x-40	15	46.2	257.0	15	42.0	232.0	30	40.0	218.0	40	41.0	232.0
MS49x-50	15	46.2	257.0	20	54.0	232.0	40	52.0	290.0	50	52.0	290.0
MS49x-63	20	59.4	321.0	25	68.0	290.0	50	65.0	363.0	60	62.0	348.0
MS49x-75	25	74.8	404.0	25	68.0	365.0	60	77.0	435.0	75	77.0	434.0
MS49x-90	30	88.0	481.0	30	80.0	435.0	75	96.0	543.0	100	99.0	580.0
MS49x-100	40	114.0	641.0	40	104.0	580.0	75	96.0	543.0	100	99.0	580.0

Technical data



MS45x & MS49x

MS Series
Manual motor
protectors

General technical data

Type	MS45x	MS49x
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation		
Open - compensated without derating	-20 ... +60 °C	
Open	-20 ... +70 °C	
Enclosed	-20 ... +35 °C	
Storage	-50 ... +80 °C	
Ambient air temperature compensation	Continuous	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	25 g / 11 ms	-
Resistance to vibrations acc. to IEC 60068-2-6	2 g / 5-150 Hz	
Mounting position	Position 1-6 (optional for single mounting)	
Mounting	DIN-rail 35 mm (EN 60715)	DIN-rail 15 mm / 75 mm (EN 60715)
Minimum distance to other units same type		
Horizontal	0 mm	0 mm
Vertical - up to 240 V	-	50 mm
Vertical - up to 440 V	-	70 mm
Vertical - up to 500 V	-	110 mm
Vertical - up to 690 V	-	150 mm
Vertical	50 mm	-
Minimum distance to electrical conductive board		
Horizontal	10 mm	-
Horizontal - up to 500 V	-	10 mm
Horizontal - up to 690 V	-	30 mm
Vertical - up to 240 V	-	50 mm
Vertical - up to 440 V	-	70 mm
Vertical - up to 500 V	-	110 mm
Vertical - up to 690 V	-	150 mm
Vertical	50 mm	-
Degree of protection	Enclosure / terminals	IP20

Main circuit – Connecting characteristics

Type	MS45x	MS49x
Connecting capacity		
 Solid	1 or 2 x 0.75 ... 16 mm ²	2.5 ... 16 mm ²
 Flexible	1 x 0.75 ... 35 mm ²	10 ... 70 mm ²
	2 x 0.75 ... 25 mm ²	10 ... 50 mm ²
Stranded acc. to UL/CSA	1 x AWG 18-2	AWG 10-2/0
	2 x AWG 18-2	AWG 10-1/0
Flexible acc. to UL/CSA	1 x AWG 18-2	AWG 10-2/0
	2 x AWG 18-2	AWG 10-1/0
Stripping length	13 mm	17 mm
Tightening torques	3 - 4.5 Nm / 27 ... 40 lb.in	4 - 6 Nm / 35 - 53 lb.in
Connection screw	Pozidriv 2	Hexagon 4



Technical data

MS45x & MS49x Accessories

General technical data

Type	PS4-xxx	S4-M1
Standards	IEC/EN 60947-1	
Rated operational voltage U_e	690 V AC	
Rated operational current I_e	108 A	
Rated frequency	50/60 Hz	
Rated impulse withstand voltage U_{imp}	6 kV	
Rated insulation voltage U_i	690 V AC	
Pollution degree	3	
Cross-section	10 mm ²	25 mm ²
Ambient air temperature	Operation	-25... +70°C
	Storage	-50... +80°C



Main circuit – Connection characteristics

Type	S4-M1
Connecting capacity	
 Solid	1x 2.5... 50 mm ²
 Flexible	1x 4... 16 mm ²
Stranded acc. to UL/CSA	1x AWG 14-4
Flexible acc. to UL/CSA	1x AWG 14-4
Tightening torques	4 Nm
Connection screw	Pozidriv 2

General technical data

Type	UA4	AA4
Standards	IEC/EN 60947-1, UL 508/60947-4-1A, CAN/CSA C22.2 No.14/60947-4-1-07	
Pick-up value	% of U_c ≥ 85	≥ 70
Drop-out value	% of U_c 35... 70	-
Power consumption	Pick-up VA 20.2	Consult factory
	Holding VA 7.2	Consult factory

Connection characteristics

Type	UA4	AA4
Connecting capacity		
 Solid	1 x 0.5... 2.5 mm ²	
	2 x 0.5...1.5 mm ² or 0.75...2.5 mm	
 Flexible	1 x 0.5...2.5 mm ²	
	2 x 0.5...1.5 mm ² or 0.75...2.5 mm	
Stranded acc. to UL/CSA	1 or 2 x AWG 18-14	
Flexible acc. to UL/CSA	1 or 2 x AWG 18-14	
Stripping length	10 mm	
Tightening torques	0.8...1.2 Nm / 7...10.3 lb.in	
Connection screw	Pozidriv 2 / M3	

Technical data



MS45x & MS49x Accessories

MS Series
Manual motor
protectors

General technical data

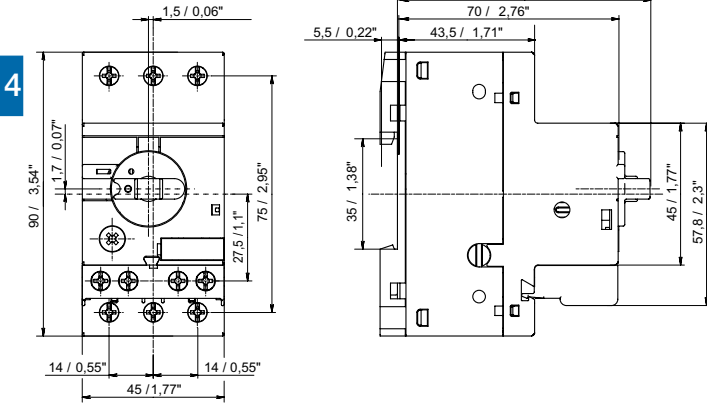
Type	HK4-11	HK4-W	HKS4	SK4
Standards	IEC/EN 60947-1, IEC/EN 60947-5-1, UL 508, CSA22.2 No. 14			
Rated operational voltage U_e	230 V AC/220 V DC	690 V AC / 220 V DC	690 V AC	690 V AC
Conventional free-air thermal current I_{th}	2.5 A	5 A	10 A	10 A
Rated frequency	DC, 50/60 Hz			
Rated impulse withstand voltage U_{imp}	6 kV			
Rated insulation voltage U_i	300 V	300 V	690 V	690V
Pollution degree	3			
Ambient air temperature	Operation -20 ... +70°C Storage -50 ... +80°C			
Resistance to shock acc. to IEC 60068-2-27	25 g/11 ms			
Resistance to vibrations acc. to IEC 60068-2-6	2 g / 5 ... 150 Hz			
Number of poles	1 N.C. + 1 N.O.	Changeover	1 N.C. + 1 N.O. / 2 N.O. / 2 N.C.	2 N.C. + 2 N.O.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category				
	24 V, 50/60 Hz	2 A	4 A	6 A
	230 V, 50/60 Hz	0.5 A	3 A	4 A
	400 V, 50/60 Hz	–	1.5 A	3 A
	690 V, 50/60 Hz	–	0.5 A	1 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category				
	24 V	1 A	1 A	2 A
	48 V	0.3 A	–	–
	60 V	0.15 A	–	–
	110 V	–	0.22 A	0.5 A
	230 V	–	0.1 A	0.25 A
Minimum switching capacity	17 V / 1 mA			
Short-circuit protective device	10 A Type gG			
Duty time	100%			
Mounting	Front of MMS	Front of MMS	Left side of MMS	Left side of MMS
Mounting positions	1-6			
Mechanical durability	100,000 cycles			
Electrical durability	100,000 cycles			

Main circuit – Connecting characteristics

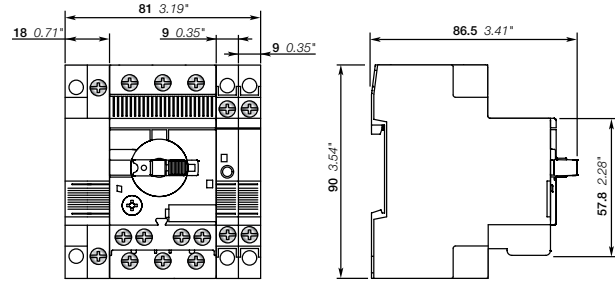
Type	HK4-11	HK4-W	HKS4	SK4
Connecting capacity	 Solid	1x	0.5... 2.5 mm ²	
		2x	0.5... 1.5 mm ² or 0.75... 2.5 mm	
	 Flexible	1x	0.5... 2.5 mm ²	
		2x	0.5... 1.5 mm ² or 0.75... 2.5 mm	
Stranded acc. to UL/CSA	1 or 2x	AWG 18-14		
Flexible acc. to UL/CSA	1 or 2x	AWG 18-14		
Stripping length	10 mm			
Tightening torques	0.8... 1.2 Nm / 7... 10.3 lb.in.			
Connection screw	Pozidriv 2			

Approximate dimensions

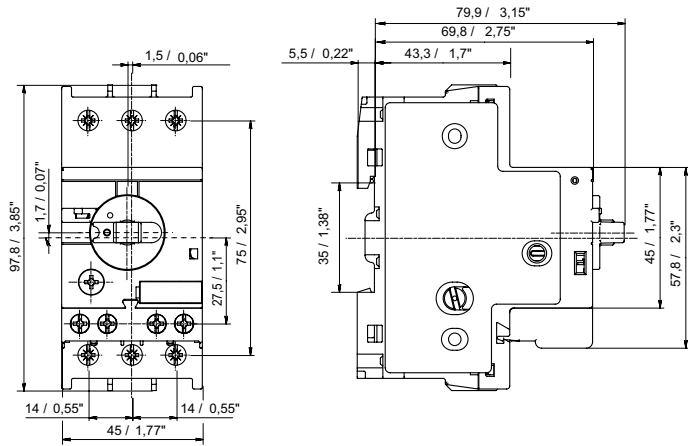
MS116-0.16... MS116-16, MS132-0.16...MS132-10



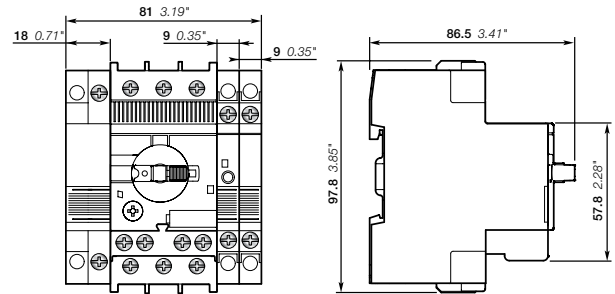
MS116-0.16...MS116-16 or MS132-0.16...MS132-10 + UA1, AA1, SK1, HK1, CK1, HKF1-11



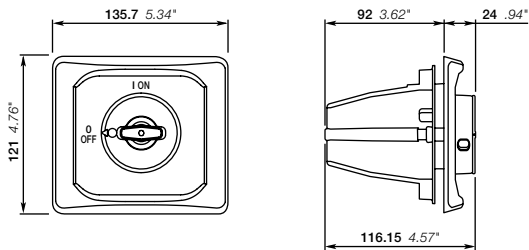
MS116-20... MS116-32, MS132-12... MS132-32



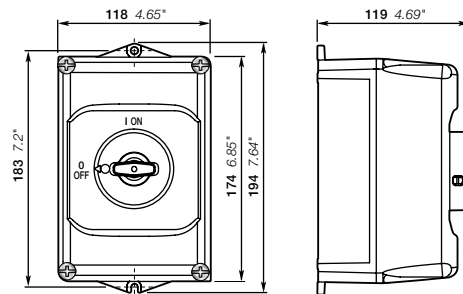
MS116-20... MS116-32 or MS132-12... MS132-32 + UA1, AA1, SK1, HK1, CK1, HKF1-11



DMS132-x



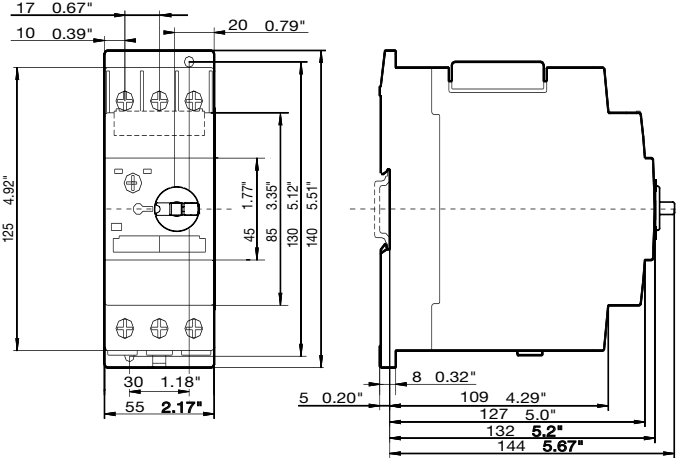
IB132-x



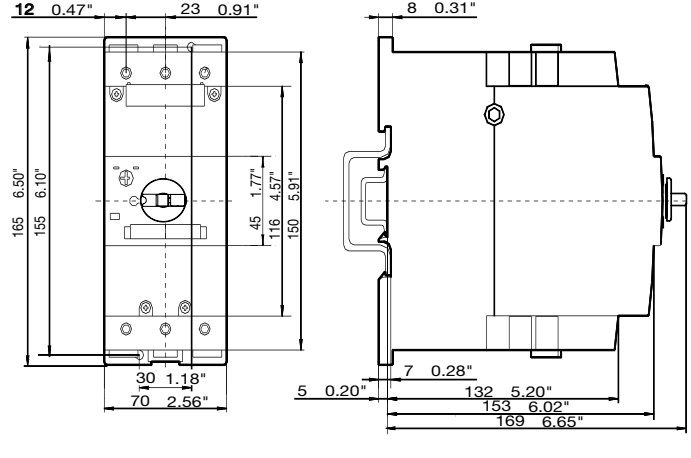
Approximate dimensions

MS Series
Manual motor
protectors

MS450-40...MS450-50, MS451-16...MS451-50



MS495-40...MS495-100, MS496-40...MS496-100



4

Notes



5 - Softstarters



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PSR - The compact range

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PSE - The efficient range

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PST Enclosed Products

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PST Extreme Duty

Description.....	5.63
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Softstarters

Type PSR, PSE, PST
General information

5

The complete range of Softstarters

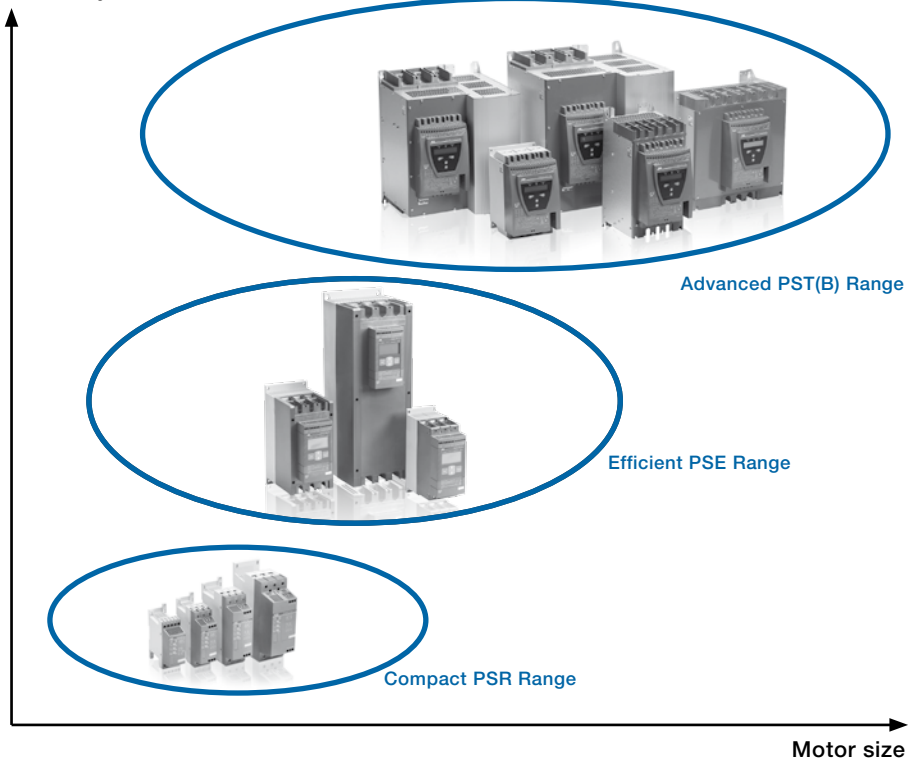
The ABB softstarter portfolio now consists of 3 different ranges making it possible to find a suitable softstarter for almost all possible applications and motor sizes all the way up to 1800A. The softstarter family consists of the Compact PSR, the Efficient PSE and the Advanced PST(B) range.

Efficient PSE Range – World's first compact softstarter with Torque control

The latest addition to the ABB softstarter family is the efficient PSE range. This softstarter has been equipped with all the most important features making it a very efficient choice. During the development process, great focus has been put into making sure that both the softstarter and the process are even more reliable. Furthermore, the softstarter has been equipped with built-in by-pass to reduce the wiring and a back-lit display to provide easy set-up and monitoring.

Type PSR, PSE & PST Softstarters

Functionality



Softstarter overview

5

From the moment the first electrical motors were developed, engineers have been searching for a way to avoid electrical and mechanical problems that usually occur when starting the motor. These problems include high inrush current and current spikes as well as excessive mechanical wear. One traditional way to avoid this is to use a star delta starter. This starting method in many applications is insufficient, as problems with current spikes and torque peaks will remain. In addition, it does not provide any way to perform a soft stop. A softstarter on the other hand will provide far better performance during the start and also the possibility to soft stop the motor.

ABB has been producing softstarters since the beginning of the 1980's. The valuable experience gained since the early 80's has been incorporated into the design of today's product ranges. Matching modern power electronics with smart circuitry and software, the ABB softstarters offer superior control of the current and voltage during motor start-up and stop, in addition to several state of the art design features.

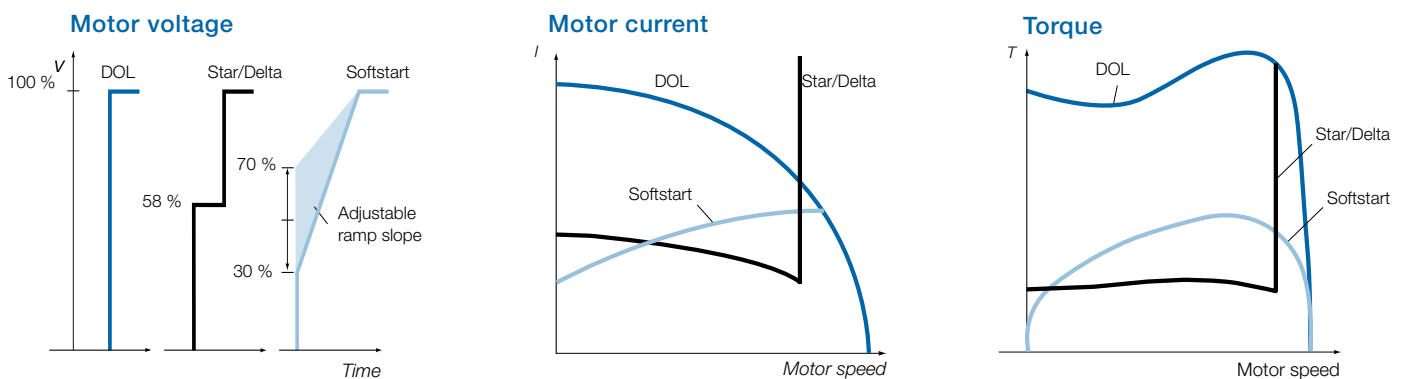
The solution to both mechanical and electrical problems AC motors, "the workhorse of the industry", are used to drive fans, crushers, agitators, pumps, conveyors, etc. Depending

on how it is installed, too often unnecessary and unwanted torque and current peaks are an everyday reality in production plants all over the world, causing damage in several ways. Among them are:

- Electrical problems due to voltage and current transients arising from Direct-On-Line or Star-Delta starts. Such transients may overload the local supply network and cause unacceptable voltage variations that interfere with other electrical equipment connected to the network.
- Mechanical problems that address the entire drive chain, from motor to driven equipment, causing a big need for service and repair as well as unwanted down time.
- Operational problems, such as damage to products on conveyor belts.
- Water hammering and pressure surges in pipe systems when starting and stopping pumps.

The financial consequences are considerable; every technical problem and every breakdown costs money in terms of repairs as well as lost production.

The easy solution to all of these problems is to install an ABB Softstarter type PSR, PSE or PST(B). With ABB Softstarters, it is possible to start and stop smoothly while keeping mechanical and electrical stresses to a minimum.



Graphs showing the basic differences between direct-on-line starting (DOL), star-delta starting and soft starting in terms of the motor voltage (V), motor current (I) and motor torque (T).

Softstarter overview

ABB softstarters – The complete range

ABB offers three different ranges of softstarters to cover every customer need for solutions for motor sizes up to 1800 A. This page describes the main characteristics of the different softstarter ranges

PSR – The compact range

The PSR softstarter is the most compact of all the softstarter ranges, thereby making it possible to design compact starting equipment. The system concept with Manual Motor Starters and the PSR provides a far more compact starting solution than for instance a star delta starter.

The built-in by-pass reduces the energy loss and makes the connection easier. With only three potentiometers, the set-up couldn't be any easier. Still, the optimized ramping characteristics will ensure a very smooth start and stop for all applications.

PSE – The efficient range

The PSE softstarter is the world's first compact softstarter with both built-in electronic overload for motor protection and torque control for an excellent control of pumps. The compact design with the most important functionality integrated provides a very efficient starting solution.

The illuminated language neutral display and the four button keypad make it easy to take advantage of all the advanced functionality in the softstarter. The display will also provide all the necessary information both during ramping and continuous operation.

PST(B) – The advanced range

The PST(B) softstarter is the most advanced softstarter in the range with almost all imaginable functionality included. All the advanced protections for the motor, the softstarter and the load ensure a trouble free operation. Pre-warnings even allow problems to be detected before the motor needs to be stopped and thereby avoiding unnecessary downtime.

The torque control function has been developed and tested together with well known pump manufacturers to ensure the best possible start/stop of pumps without water hammering and pressure surges.

With the full text LCD display in your own language, pre-programmed application settings and event logging, it couldn't be easier to set-up and operate.

By using the ABB FieldBusPlug, you can decide at any time which bus protocol to use. The fieldbus system will allow you to set-up, control and monitor the softstarter.

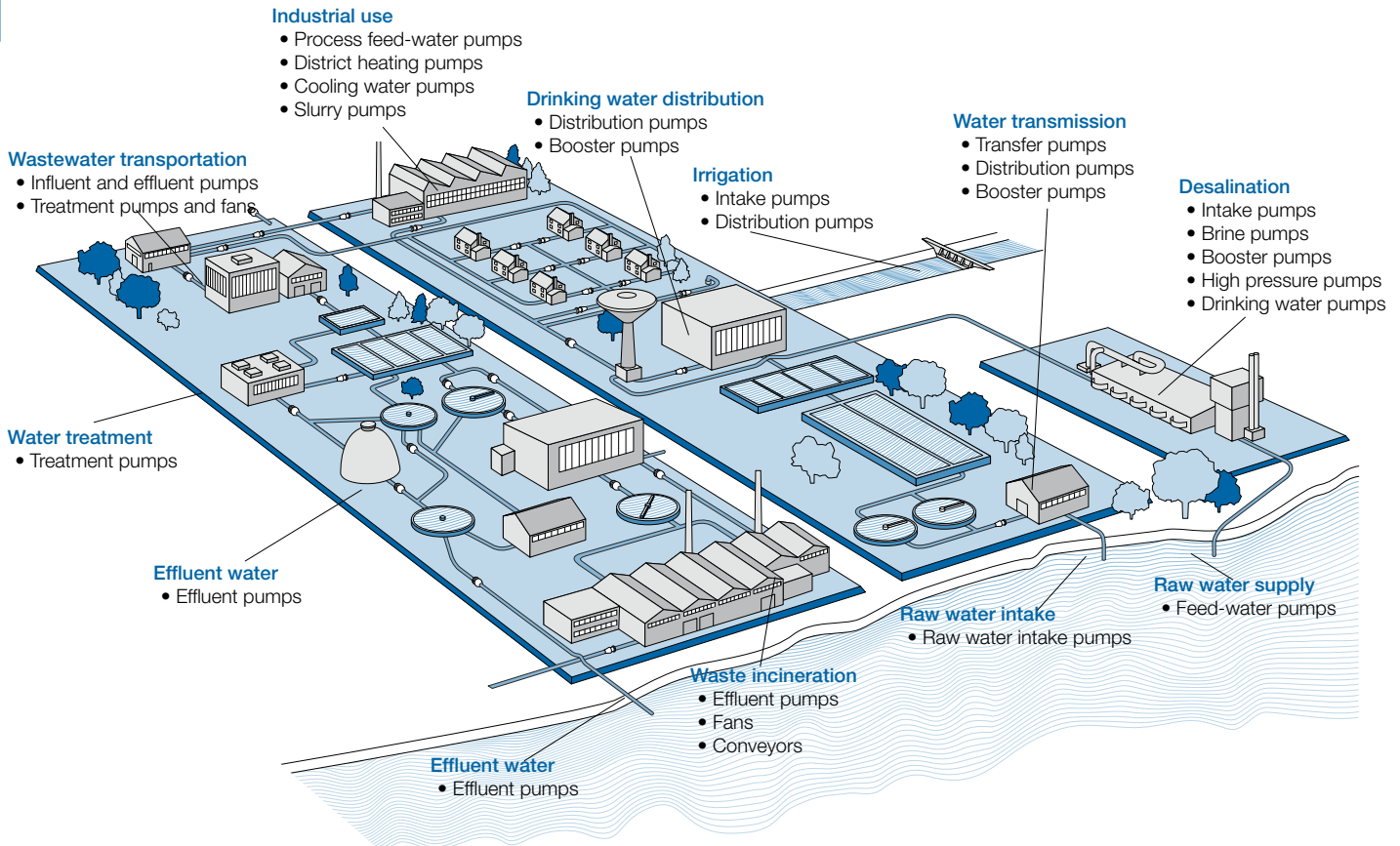
PSR	PSE	PST(B)	• Standard	O Optional	– Not available
•	•	• 1)	Built-in by-pass	1) on PSTB	
–	–	•	Inside delta connection		
–	•	O	Coated PCBs		
–	•	•	Display and keypad		
–	•	•	Torque control		
–	•	•	Settable current limit function		
–	•	•	Electronic motor overload protection		
–	–	•	PTC input for motor protection		
–	–	•	Phase imbalance protection		
–	–	•	Phase reversal protection		
–	•	•	Locked rotor protection		
–	•	•	Thyristor overtemperature protection		
–	•	•	Underload protection		
–	–	•	Programmable warning functions		
–	•	•	Analog output		
O	O	•	FieldBus communication		
–	O	•	Event log		
–	O	O	External keypad		

- Standard
- O Optional
- Not available

Pumps

Water is the world's most important resource and water facilities can be found all over the world. Examples of water applications are freshwater and wastewater systems, circulating water for heating or cooling and irrigation.

5

**Common questions:**

- How to avoid voltage drops on the network when starting?
- ABB softstarter will reduce the starting current and thereby avoid the voltage drops.
- How to avoid water hammering when stopping?
- Use our softstarters equipped with an optimized stop ramp or even better with torque control.
- How to ensure high reliability in harsh environments?
- Use our softstarters equipped with coated circuit boards to better withstand those environments.
- How to protect my pumping equipment in the best possible way?
- Use ABB softstarters equipped with our special designed protections such as overload, underload, and locked rotor protection.

Applications

Fans



Common questions:

- How to avoid extended voltage drops due to long starting time?
- Use an ABB softstarter equipped with current limit to keep control of the starting current.
- How to extend the life of the driving belts?
- Our softstarters will reduce the mechanical stress during start, thus avoiding slipping belts.
- How to ensure the operation of the fan?
- A softstarter with underload protection will detect broken belts, making the operator immediately aware of the problem.

5

Compressors



Common questions:

- How to ensure a long life of the compressor?
- Using a softstarter for starting will reduce the accelerating torque, thereby minimizing the mechanical stress.
- How to build a compact compressor unit?
- Using a compact softstarter like PSR or PSE will allow a much more compact starting equipment than for instance a star delta starter.

Conveyor belts



Common questions:

- How to reduce the need for service and repair of the conveyor belt?
- A softstarter from ABB will cause minimal mechanical stress on the conveyor belt.
- How to avoid that the conveyor belt is running in the wrong direction?
- Use a softstarter with phase reversal protection.
- How to improve the efficiency of the conveyor belt?
- Using softstarters with high and low current warnings allows you to load on and off the conveyor belt.
- How to ensure a successful start in high inertia loads?
- A softstarter with kick start function will provide sufficient torque to be able to overcome the initial high friction from a temporarily jammed belt.

Notes

5



Product description

- Wide rated operational voltage 208 – 600 V
- Rated control supply voltage 24 V DC or 100 – 240 V AC
- Rated operational current 3 – 105 A
- Wide ambient temperature range, -25 to +60 °C (-13 to 140 °F)
- Built-in by-pass on all sizes, saving energy and reducing installation time
- Potentiometer settings
- Run signal relay on all devices
- TOR signal relay on PSR25 ... PSR105
- Optional fieldbus communication using Profibus, Modbus, Devicenet or CANopen
- DIN rail mounting on PSR3 ... PSR45
- Screw mounting on all sizes
- Connection kits for easy connection with ABB manual motor starters
- Sophisticated algorithm eliminating the DC-component and thereby providing excellent starting performance.

PSR – The compact range Description

The PSR range is the most compact of all the ABB softstarter ranges, thereby making it possible to fit many devices into the same enclosure. The system concept with Manual Motor Starters provides a far more compact starting solution than for example a star delta starter.

5 Flexible mounting

PSR softstarters from 3 to 45 A are possible to mount on a din rail, ensuring quick and easy mounting. Naturally, all sizes can be screw mounted.

Few settings

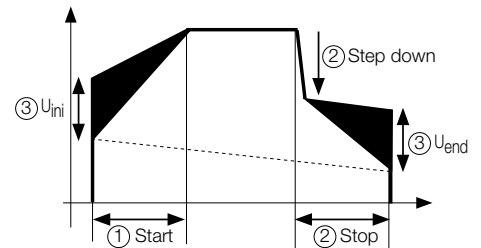
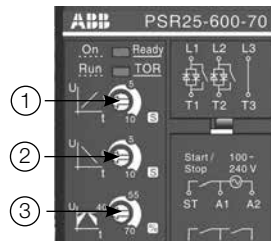
The set-up of the PSR is easily done and confirmed using the three clearly marked potentiometers on the front.

Built-in by-pass for energy saving

The built-in by-pass on all sizes does not only save energy; it will also ensure the most compact ABB softstarter design and reduce the installation time.

Settings

- ① Start = 1 ... 20 sec
Stop = 0 ... 20 sec - including the step down voltage.
- ② Step down = 2% reduction for each second increased stop ramp
Stop ramp 10 sec -> Step down 80% (20% reduction)
- ③ U_{ini} = 40 ... 70% results in End voltage = 30 ... 60%



Suitable for stopping pumps

Even without using torque control, the PSR range is designed to reduce water hammering and will allow a superior stop compared to the direct stop resulting from a star delta starter or a DOL starter. See the special designed stop ramp with step down voltage below.

System concept with manual motor starters

All PSR softstarter sizes can easily be connected to the corresponding manual motor starters from ABB, using the special designed connection kits. This will both make the mounting and the connection easier and will provide a very compact starting solution containing short circuit and thermal protection, isolation function and softstarter - everything that you need.

PSR – The compact range

Overview

Softstarters
Type PSR

5



PSR3 ... PSR16

PSR25 ... PSR30

PSR37 ... PSR45

PSR60 ... PSR105

Softstarter

Normal start In-line connected	PSR3	PSR6	PSR9	PSR12	PSR16	PSR25	PSR30	PSR37	PSR45	PSR60	PSR72	PSR85	PSR105
(480 V) hp	2	3	5	7.5	10	15	20	25	30	40	50	60	75
(600 V) hp	2	5	7.5	10	10	20	25	30	40	50	60	75	100
UL/CSA, Max FLA	3.4	6.1	9	11	15.2	24.2	28	34	46.2	59.4	68	80	104

Using manual motor starter, type 1 coordination will be achieved

Manual motor starter (5 kA, 600 V, 40 °C)

	MS116	MS132	MS450	MS495	–
--	-------	-------	-------	-------	---

Using J fuses, type 1 coordination will be achieved

J type fuse protection (85 kA)

175 % rating	5 A	10 A	15 A	15 A	25 A	40 A	45 A	50 A	80 A	100 A	110 A	125 A	175 A
Max rating	35 A	35 A	35 A	35 A	35 A	60 A	60 A	90 A	90 A	110 A	125 A	150 A	200 A
Minimum enclosure size ¹⁾	254 x 204 x 153 mm / 10 x 8 x 6 in					305 x 254 x 204 mm / 12 x 10 x 8 in				600 x 400 x 210 mm / 24 x 16 x 8 in			

Fusible disconnect switch for the above J fuses

Fusible disconnect switch

	OS30	OS60	OS100	OS200
--	------	------	-------	-------

Overload protection is used to protect the motor from over heating

Thermal overload relay

	TF42DU	TA75DU	TA110DU
--	--------	--------	---------

The line contactor is not required for the softstarter itself but often used to open if OL trips

Line contactor

	AF9	AF12	AF16	AF26	AF30	AF50	AF63	AF75	AF95	AF110
--	-----	------	------	------	------	------	------	------	------	-------

Using by-pass will reduce the power loss and allow more starts per hour

Bypass contacts

	Built-in
--	----------

¹⁾ Enclosure that has two latching points minimum. For use in pollution degree 2 environment.

PSR – The compact range

Ordering details

PSR3 ... PSR105

Rated operational voltage U_e , 208-600 V AC

Rated control supply voltage, U_s , 100 - 240 V AC

230 V kW	400 V kW	500 V kW	208 V hp	230 V hp	480 V hp	600 V hp	UL/CSA Max rated operational current I_o A	Weight kg (lb)	Catalog number
0.75	1.5	2.2	0.5	0.75	2	2	3.4	0.450 (0.99)	PSR3-600-70
1.5	3	4	1	1.5	3	5	6.1	0.450 (0.99)	PSR6-600-70
2.2	4	4	2	2	5	7.5	9	0.450 (0.99)	PSR9-600-70
3	5.5	5.5	3	3	7.5	10	11	0.450 (0.99)	PSR12-600-70
4	7.5	7.5	3	5	10	10	15.2	0.450 (0.99)	PSR16-600-70
5.5	11	15	7.5	7.5	15	20	24.2	0.650 (1.43)	PSR25-600-70
7.5	15	18.5	7.5	10	20	25	28	0.650 (1.43)	PSR30-600-70
7.5	18.5	22	10	10	25	30	34	1.000 (2.20)	PSR37-600-70
11	22	30	15	15	30	40	46.2	1.000 (2.20)	PSR45-600-70
15	30	37	20	20	40	50	59.4	2.200 (4.85)	PSR60-600-70
22	37	45	20	25	50	60	68	2.270 (5.00)	PSR72-600-70
22	45	55	25	30	60	75	80	2.270 (5.00)	PSR85-600-70
30	55	55	30	40	75	100	104	2.270 (5.00)	PSR105-600-70



PSR3 ... PSR16



PSR25 ... PSR30



PSR37 ... PSR45



PSR60 ... PSR105

Rated operational voltage U_e , 208-600 V AC

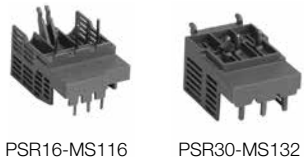
Rated control supply voltage, U_s , 24 V DC

0.75	1.5	2.2	0.5	0.75	2	2	3.4	0.450 (0.99)	PSR3-600-81
1.5	3	4	1	1.5	3	5	6.1	0.450 (0.99)	PSR6-600-81
2.2	4	4	2	2	5	7.5	9	0.450 (0.99)	PSR9-600-81
3	5.5	5.5	3	3	7.5	10	11	0.450 (0.99)	PSR12-600-81
4	7.5	7.5	3	5	10	10	15.2	0.450 (0.99)	PSR16-600-81
5.5	11	15	7.5	7.5	15	20	24.2	0.650 (1.43)	PSR25-600-81
7.5	15	18.5	7.5	10	20	25	28	0.650 (1.43)	PSR30-600-81
7.5	18.5	22	10	10	25	30	34	1.000 (2.20)	PSR37-600-81
11	22	30	15	15	30	40	46.2	1.000 (2.20)	PSR45-600-81
15	30	37	20	20	40	50	59.4	2.200 (4.85)	PSR60-600-81
22	37	45	20	25	50	60	68	2.270 (5.00)	PSR72-600-81
22	45	55	25	30	60	75	80	2.270 (5.00)	PSR85-600-81
30	55	55	30	40	75	100	104	2.270 (5.00)	PSR105-600-81

PSR – The compact range Accessories

5

Connection kit



PSR16-MS116

PSR30-MS132



PSR45-MS450

PSR105-MS495



PSR-FAN

PSR-FAN 60-105 A



PS-FBPA

PSLW

For softstarter type	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSR3...PSR16 with MS116	1	0.030 (0.07)	PSR16-MS116
PSR25...PSR30 with MS132	1	0.030 (0.07)	PSR30-MS132
PSR37...PSR45 with MS450	1	0.030 (0.07)	PSR45-MS450
PSR60...PSR105 with MS495	1	0.050 (0.11)	PSR105-MS495

Fan

For softstarter type	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSR3...PSR45	1	0.010 (0.02)	PSR-FAN
PSR60...PSR105	1	0.013 (0.03)	PSR-FAN 60-105 A

Terminal enlargements

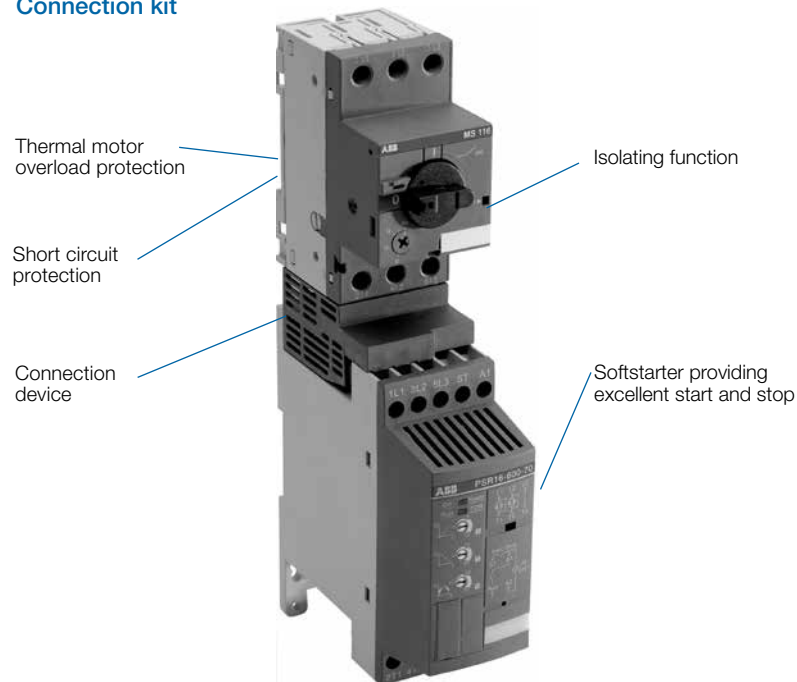
For softstarter type	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSR60...105 Wire range mm2 1x10...50, 2x10...25	1	0.150 (0.33)	PSLW-72

FieldBus plug connection accessory

For softstarter type	Packing piece	Weight kg (lb) 1 piece	Catalog number
The same accessory for all sizes	1	0.060 (0.13)	PS-FBPA

ABB Field Bus Plug suitable for all sizes. See page 5.40 - 5.43

Connection kit



PSR – The compact range

Technical data

Rated insulation voltage U_i	600 V												
Rated operational voltage U_o	208...600 V +10 %/-15 %, 50/60 Hz \pm 5 %												
Rated control supply voltage U_s	100...240 V AC, 50/60Hz \pm 5 % or 24 V DC, +10 %/-15 %												
Power consumption	PSR3	PSR6	PSR9	PSR12	PSR16	PSR25	PSR30	PSR37	PSR45	PSR60	PSR72	PSR85	PSR105
Supply circuit													
at 100-240 V AC	12 VA						10 VA						
at 24 V DC	5 W												
5 Max. Power loss at rated I_e	PSR3	PSR6	PSR9	PSR12	PSR16	PSR25	PSR30	PSR37	PSR45	PSR60	PSR72	PSR85	PSR105
	0.7 W	2.9 W	6.5 W	11.5 W	20.5 W	25 W	36 W	5.5 W	8.1 W	3.6 W	5.2 W	7.2 W	6.6 W
Starting capacity at I_e	4 x I_r for 6 sec.												
Number of starts per hour	See table on page 5.13.												
standard	10 ¹⁾												
with aux. fan	20 ¹⁾												
Service factor	100 %												
Ambient temperature													
during operation	-25 °C to + 60 °C (-13 to 140 °F) ²⁾												
during storage	-40 °C to + 70 °C (-40 to 158 °F)												
Maximum altitude	4000 m (13123 ft) ³⁾												
Degree of protection	PSR3	PSR6	PSR9	PSR12	PSR16	PSR25	PSR30	PSR37	PSR45	PSR60	PSR72	PSR85	PSR105
main circuit	IP20						IP10						
control circuit	IP20						IP20						
Connection	PSR3-PSR16			PSR25-PSR30			PSR37-PSR45			PSR60-PSR105			
main circuit													
cable area	1 x 2.5mm ²			1 x 2.5 - 10 mm ²			1 x 6 - 35 mm ²			1 x 10 - 95 mm ²			
	1 x 14 AWG			1 x 12 - 8 AWG			1 x 8 - 4 AWG			1 x 6 - 2/0 AWG			
tightening torque	1 Nm - 9 lb.in			2.3 Nm - 20 lb.in			4.0 Nm - 35 lb.in			8.0 Nm - 71 lb.in			
control circuit	PSR3-PSR16			PSR25-PSR105			PSR25-PSR105			PSR25-PSR105			
cable area	1 x 1.5 - 2.5 mm ²			1 x 1.5 - 2.5 mm ²			1 x 1.5 - 2.5 mm ²			1 x 1.5 - 2.5 mm ²			
	2 x 1.5 mm ²			2 x 1.5 mm ²			2 x 1.5 mm ²			2 x 1.5 mm ²			
	1 x 16 - 14 AWG			1 x 16 - 14 AWG			1 x 16 - 14 AWG			1 x 16 - 14 AWG			
	2 x 16 AWG			2 x 16 AWG			2 x 16 AWG			2 x 16 AWG			
tightening torque	1 Nm - 9 lb.in			0.6 Nm - 5 lb.in			0.6 Nm - 5 lb.in			0.6 Nm - 5 lb.in			
Signal relays	PSR3-PSR16			PSR25-PSR105			PSR25-PSR105			PSR25-PSR105			
for Run signal													
Resistive load	240 V AC, 3 A / 24 V DC, 3 A			240 V AC, 3 A / 24 V DC, 3 A			240 V AC, 3 A / 24 V DC, 3 A			240 V AC, 3 A / 24 V DC, 3 A			
AC-15 (Contactor)	240 V AC, 0.5 A / 24 V DC, 0.5 A			240 V AC, 0.5 A / 24 V DC, 0.5 A			240 V AC, 0.5 A / 24 V DC, 0.5 A			240 V AC, 0.5 A / 24 V DC, 0.5 A			
for Top ramp signal													
Resistive load	-			-			-			240 V AC, 3 A / 24 V DC, 3 A			
AC-15 (Contactor)	-			-			-			240 V AC, 0.5 A / 24 V DC, 0.5 A			
LED													
for On/Ready	Green			Green			Green			Green			
for Run/Top Of Ramp	Green			Green			Green			Green			
Settings													
Ramp time during start	1-20 sec.			1-20 sec.			1-20 sec.			1-20 sec.			
Ramp time during stop	0-20 sec.			0-20 sec.			0-20 sec.			0-20 sec.			
Initial- and End Voltage	40-70%			40-70%			40-70%			40-70%			

¹⁾ Valid for 50 % on time and 50 % off time. 4 x I_e for 6 sec., if other data is required, contact your sales office.

²⁾ Above 40 °C (104 °F) up to max. 60 °C (140 °F) reduce the rated current with 0.8 % per °C (0.44 % per °F).

³⁾ When used at high altitudes above 1000 meters (3281 ft) up to 4000 meters (13123 ft) you need to derate the rated current using the following formula.

$$\left[\% \text{ of } I_e = 100 - \frac{x - 1000}{150} \right] \quad x = \text{actual altitude for the softstarter in meter}$$

$$\left[\% \text{ of } I_e = 100 - \frac{x - 3280}{497} \right] \quad x = \text{actual altitude for the softstarter in feet}$$

PSR – The compact range

Technical data

Softstarters
Type PSR

Number of starts per hour using PSR softstarters

Motor current I_e	Starts/hour without auxiliary fan							
	10	20	30	40	50	60	80	100
3 A	PSR3							PSR6
6 A	PSR6				PSR9			
9 A	PSR9		PSR12		PSR16		PSR25	
12 A	PSR12		PSR16		PSR25		PSR30	
16 A	PSR16	PSR25		PSR30		PSR37		
25 A	PSR25	PSR30	PSR37		PSR45		PSR60	
30 A	PSR30	PSR37		PSR45		PSR60		PSR72
37 A	PSR37	PSR45		PSR60		PSR72	PSR85	PSR105
45 A	PSR45		PSR60		PSR72	PSR85	PSR105	
60 A	PSR60		PSR72	PSR85	PSR105		-	-
72 A	PSR72	PSR85	PSR105		-	-	-	-
85 A	PSR85	PSR105		-	-	-	-	-
105 A	PSR105	-	-	-	-	-	-	-

Starts/hour with auxiliary fan									
10	20	30	40	50	60	80	100		
PSR3									
PSR6								PSR9	
PSR9				PSR12				PSR16	PSR25
PSR12		PSR16		PSR25		PSR30		PSR37	
PSR16	PSR25			PSR30		PSR37			
PSR25	PSR30	PSR37				PSR45			
PSR30	PSR37		PSR45				PSR60		
PSR37	PSR45			PSR60		PSR72			
PSR45	PSR60		PSR72		PSR85		PSR105		
PSR60	PSR72	PSR85	PSR105		-	-	-	-	
PSR72	PSR85	PSR105		-	-	-	-	-	
PSR85	PSR105		-	-	-	-	-	-	
PSR105	-	-	-	-	-	-	-	-	

Data based on an ambient temperature of 40 °C (104 °F), starting current of $4 \times I_e$ and ramp time 6 seconds.
For more optimized selections, or to use PSR for heavy duty starts, please use the softstarter selection program, prosoft.

5

Notes

5



Product description

- Wide rated operational voltage 208 – 600 V AC
- Wide rated control supply voltage 100 – 250 V, 50/60 Hz
- Rated operational current 18 to 370 A
- Wide ambient temperature range, -25 to +60 °C (-13 to 140 °F)
- Coated circuit boards for reliable operation in harsh environment
- Built-in by-pass on all sizes, saving energy and reducing installation time
- User friendly HMI with illuminated language neutral display and four button keypad
- Optional external keypad, IP66
- Torque control for excellent control of pumps
- Current limit, adjustable between 1.5 – 7 x I_e
- Motor overload protection with classes 10A, 10, 20 and 30
- Motor underload protection to detect pumps running dry
- Locked rotor protection, detecting jammed pumps
- Kick start to start jammed pumps or conveyor belts
- Analog output showing operational current, 4 – 20 mA
- Optional fieldbus communication using Profibus, Modbus, Devicenet or CANopen
- Sophisticated algorithm eliminating the DC-component and thereby providing excellent starting performance.

PSE – The efficient range

Description

5

The PSE softstarter range is the world's first compact softstarters with Torque Control. This makes the PSE range an excellent choice for pumping application where water hammering normally is a big problem. With its compact design and advanced functionality, the PSE is also a very efficient solution for other common applications such as compressors and fans.

Torque control

The most important function when stopping pumps is torque control. Since the PSE softstarter is optimized for controlling pumps, this feature is a must.

Built-in by-pass for energy saving

Using the built-in by-pass after reaching full voltage will greatly reduce the power loss and thereby save energy. In the PSE softstarter range, the by-pass is built-in on all sizes, which will give the most compact starting solution and reduce the need for wiring during installation.

Coated circuit boards

All circuit boards in the new PSE softstarter have a protective coating to ensure a reliable operation even in tough environments like wastewater plants, where corrosive gases and acids may exist.

Motor protection

The PSE softstarter is equipped with built-in electronic overload protection, protecting the motor from overheating. Since no additional overload device is needed, our efficient design saves both space, installation time, and ultimately money.

Analog output

The analog output terminals can be connected to an analog current meter to show the current during operation and thereby eliminating the need for an additional current transformer. The analog output signal can also be used as an analog input to a PLC.

Display and keypad

The set-up of the PSE softstarter is done by using the four button keypad and the illuminated display, providing a quick and easy set-up. While operating, the display will also provide important status information such as current and voltage.

External keypad

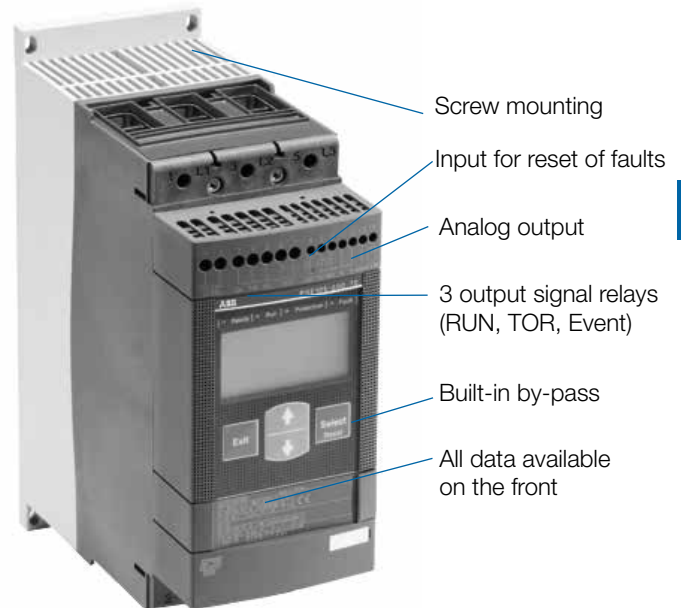
As an option the PSE softstarter can be equipped with an external keypad for easy set-up and monitoring of the unit without opening the enclosure door. The keypad can also be used to copy parameters between different softstarters.

PSE – The efficient range

Description

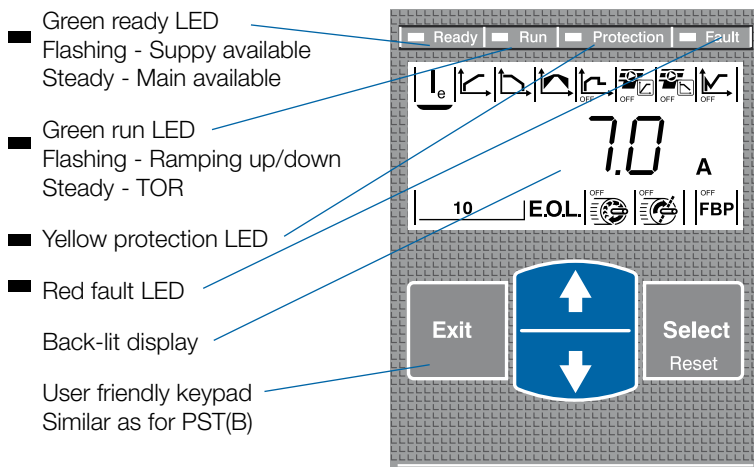
The PSE Softstarter can be selected according to the rated motor power in normal duty applications like pumps, compressors, elevators, escalators, short conveyor belts and bow thrusters. See page 5.20.

For heavy duty applications like centrifugal fans, crushers, mixers, mills, stirrers and long conveyor belts, select a softstarter from page 5.21. The softstarter selection tool prosoft can also be used for a more optimized selection.



5

Settings



Four digits showing values and messages

Icon's for showing functions. Language neutral

PSE – The efficient range

Overview

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PSE18 ... PSE105

		Softstarter								
Normal start In-line connected		PSE18	PSE25	PSE30	PSE37	PSE45	PSE60	PSE72	PSE85	PSE105
	(480 V) hp	10	15	20	25	30	40	50	60	75
	(600 V) hp	15	20	25	30	40	50	60	75	100
UL/CSA, Max FLA		18	25	28	34	42	60	68	80	104
Using MCCB only, type 1 coordination will be achieved		MCCB (25 kA/600V, 35 kA/480V, 40°C)								
		T3S070TW	T3S100TW	T3S125TW	T3S150TW	T3S225TW	T4S250TW	T5S300TW		
Using J fuses, type 1 coordination will be achieved		J type fuse protection (85 kA)								
175 % rating		30 A	40 A	45 A	50 A	70 A	100 A	110 A	125 A	175 A
Max rating		40 A	50 A	60 A	80 A	100 A	125 A	150 A	175 A	225 A
Minimum enclosure size ¹⁾		600 x 500 x 300 mm / 24 x 20 x 12 in								
Fusible disconnect switch for the above J fuses		Fusible disconnect switch								
		OS30	OS60		OS100		OS200			
The line contactor is not required for the softstarter itself but often used to open if OL trips		Line contactor								
		AF26	AF30	AF50		AF63	AF75	AF95	AF110	
Overload protection is used to protect the motor from over heating		Electronic overload relay								
		Built-in								
The by-pass will reduce the power loss of the softstarter		By-pass								
		Built-in								

¹⁾ Enclosure that has two latching points minimum. For use in pollution degree 2 environment.

PSE – The efficient range

Overview

Softstarters
Type PSE

5



PSE142 ... PSE170



PSE210 ... PSE370

		Softstarter					
Normal start In-line connected		PSE142	PSE170	PSE210	PSE250	PSE300	PSE370
	(480 V) hp	100	125	150	200	250	300
	(600 V) hp	125	150	200	250	300	350
	UL/CSA, Max FLA	130	169	192	248	302	361
Using MCCB only, type 1 coordination will be achieved		MCCB (25 kA/600V, 35 kA/480V, 40°C)			MCCB (25 kA/600V, 50 kA/480V, 40°C)		
	Max rating	T5S400BW	T6S600BW	T6S800BW			
Using J fuses, type 1 coordination will be achieved		J type fuse protection (85 kA)					
	175 % rating	225 A	250 A	300 A	400 A	500 A	600 A
	Max rating	300 A	350 A	450 A	500 A	600 A	700 A
	Minimum enclosure size ¹⁾	900 x 760 x 300 mm / 36 x 30 x 12 in		1200 x 900 x 300 mm / 48 x 36 x 12 in			
Fusible disconnect switch for the above J fuses		Fusible disconnect switch					
		OS400			OS600		
The line contactor is not required for the softstarter itself but often used to open if OL trips		Line contactor					
		AF145	AF185	AF210	AF260	AF300	AF400
Overload protection is used to protect the motor from over heating		Electronic overload relay					
		Built-in					
The by-pass will reduce the power loss of the softstarter		By-pass					
		Built-in					

How to select correct size

By using the guide here, you can quickly select a suitable softstarter for the most common applications.

If a more precise selection is required, you can use prosoft, a selection software available at www.abb.com/lowvoltage

Quick guide for selection	
Normal start Class 10	Heavy duty start class 30
Ordering - see page 5.20	Ordering - see page 5.21
Typical applications	
<ul style="list-style-type: none"> • Bow thruster • Compressor • Elevator 	<ul style="list-style-type: none"> • Centrifugal pump • Conveyor belt (short) • Escalator • Centrifugal fan • Crusher • Mixer • Conveyor belt (long) • Mill • Stirrer
<p>! If more than 10 starts/h Select <u>one</u> size larger than the standard selection</p>	

¹⁾ Enclosure that has two latching points minimum. For use in pollution degree 2 environment.

PSE – The efficient range

Normal starts, class 10, in-line, ordering details

PSE18 ... PSE370

Rated operational voltage, U_e , 208 - 600 V AC

Rated control supply voltage, U_s , 100 - 250 V AC, 50/60 Hz

5



PSE18 ... PSE105



PSE142 ... PSE170



PSE210 ... PSE370

230 V kW	400 V kW	500 V kW	208 V hp	230 V hp	480 V hp	600 V hp	UL/CSA Max rated operational current I_e A	Weight kg (lb)	Catalog number
4	7.5	11	5	5	10	15	18	2.4 (5.29)	PSE18-600-70
5.5	11	15	7.5	7.5	15	20	25	2.4 (5.29)	PSE25-600-70
7.5	15	18.5	7.5	10	20	25	28	2.4 (5.29)	PSE30-600-70
9	18.5	22	10	10	25	30	34	2.4 (5.29)	PSE37-600-70
11	22	30	10	15	30	40	42	2.4 (5.29)	PSE45-600-70
15	30	37	20	20	40	50	60	2.4 (5.29)	PSE60-600-70
18.5	37	45	20	25	50	60	68	2.5 (5.51)	PSE72-600-70
22	45	55	25	30	60	75	80	2.5 (5.51)	PSE85-600-70
30	55	75	30	40	75	100	104	2.5 (5.51)	PSE105-600-70
40	75	90	40	50	100	125	130	4.2 (9.26)	PSE142-600-70
45	90	110	60	60	125	150	169	4.2 (9.26)	PSE170-600-70
59	110	132	60	75	150	200	192	12.4 (27.34)	PSE210-600-70
75	132	160	75	100	200	250	248	13.9 (30.64)	PSE250-600-70
90	160	200	100	100	250	300	302	13.9 (30.64)	PSE300-600-70
110	200	250	125	150	300	350	361	13.9 (30.64)	PSE370-600-70

PSE – The efficient range

Heavy duty starts, class 30, in-line, ordering details

PSE18 ... PSE370

Rated operational voltage, U_e , 208 - 600 V AC

Rated control supply voltage, U_s , 100 - 250 V AC, 50/60 Hz



PSE18 ... PSE105



PSE142 ... PSE170



PSE210 ... PSE370

230 V kW	400 V kW	500 V kW	208 V hp	230 V hp	480 V hp	600 V hp	UL/CSA Max rated operational current I_e A	Weight kg (lb)	Catalog number
3	5.5	7.5	3	3	7.5	10	11	2.4 (5.29)	PSE18-600-70
4	7.5	11	5	5	10	15	18	2.4 (5.29)	PSE25-600-70
5.5	11	15	7.5	7.5	15	20	25	2.4 (5.29)	PSE30-600-70
7.5	15	18.5	7.5	7.5	20	25	28	2.4 (5.29)	PSE37-600-70
9	18.5	22	10	10	25	30	34	2.4 (5.29)	PSE45-600-70
11	22	30	15	15	30	40	42	2.4 (5.29)	PSE60-600-70
15	30	37	20	20	40	50	60	2.5 (5.51)	PSE72-600-70
18.5	37	45	25	25	50	60	68	2.5 (5.51)	PSE85-600-70
22	45	55	30	30	60	75	80	2.5 (5.51)	PSE105-600-70
30	55	75	40	40	75	100	104	4.2 (9.26)	PSE142-600-70
40	75	90	50	50	100	125	130	4.2 (9.26)	PSE170-600-70
45	90	110	60	60	125	150	169	12.4 (27.34)	PSE210-600-70
59	110	132	75	75	150	200	192	13.9 (30.64)	PSE250-600-70
75	132	160	75	75	200	250	248	13.9 (30.64)	PSE300-600-70
90	160	200	125	125	250	300	302	13.9 (30.64)	PSE370-600-70

PSE – The efficient range Accessories

5



ATK...

Cable connectors for Al and Cu cables

For softstarter type	Wire range mm ² (AWG)	Tightening torque max. Nm (lb-in)	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSE142 ...170	25-150 (4 AWG - 300 MCM)	13.5 (275 lb-in)	3	0.100 (0.220)	ATK185
PSE210 ... 370	25-185 (4 AWG - 400 MCM)	43 (375 lb-in)	3	0.168 (0.370)	ATK300
PSE210 ... 370	2 x 25-240 (2 x 4 AWG - 500 MCM)	43 (375 lb-in)	3	0.434 (0.957)	ATK300/2



LW...

Terminal enlargements

For softstarter type	Dimensions hole ø mm (in)	Bar mm (in)	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSE142...170	10.5 (0.413)	20 x 5 (0.787 x 0.197)	1	0.450 (0.992)	LW185
PSE210...370	13 (0.512)	40 x 6 (1.575 x 0.236)	1	1.230 (2.712)	LW300



LE185

Terminal nut washer kits ¹⁾

For softstarter type	Req. qty	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSE142...170	2	2	0.200 (0.441)	LE185
PSE210...370	2	2	0.300 (0.661)	LE300



LT ... -AL

Terminal shrouds

For softstarter type	Suitable for	Req. qty	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSE142...170	Compression lugs	2	2	0.220 (0.485)	LT185-AL
PSE210...370	Compression lugs	2	2	0.280 (0.617)	LT300-AL ²⁾



PSEEK

External keypad including a 3m cable

For softstarter type	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSE18...370	1	–	PSEEK



PS-FBPA

Fieldbus plug connection accessory

For softstarter type	Packing piece	Weight kg (lb) 1 piece	Catalog number
The same accessory for all sizes	1	0.060 (0.132)	PS-FBPA

ABB Field Bus Plug suitable for all sizes. See page 5.40 - 5.43

¹⁾ The terminal nut washer kits come standard with the PSE unit.

²⁾ The LT300-AL is not compatible with ATK300/2 cable connector.

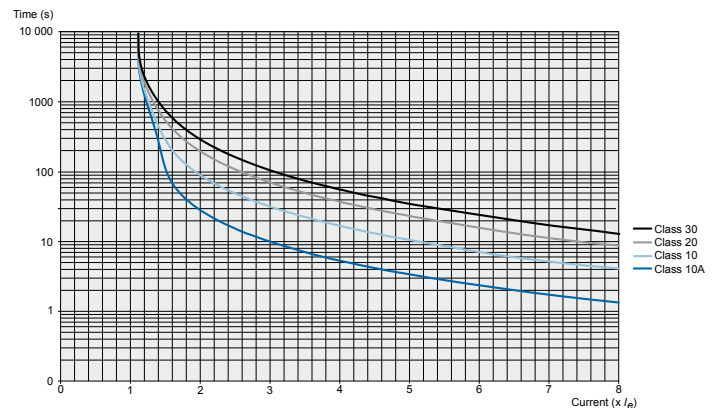
PSE – The efficient range

Technical data

Rated insulation voltage U_i	600 V
Rated operational voltage U_e	208 ... 600 V +10 %/-15 %
Rated control supply voltage U_s	100 ... 250 V +10 %/-15 %, 50/60 Hz ± 5 %
Rated control circuit voltage U_c	Internal 24 V DC
Starting capacity	$4xI_e$ for 10 sec.
Number of starts per hour	10^{-1}
Overload capability,	
Overload Class	10
Ambient temperature	
During operation	-25 ... +60 °C (-13 to 140 °F) ²⁾
During storage	-40 ... +70 °C (-40 to 158 °F)
Maximum Altitude	4000 m (13123 ft) ³⁾
Degree of protection	
Main circuit	IP00
Supply and Control circuit	IP20
Main circuit	
Built-in By-pass	Yes
Cooling system - Fan cooled (thermostat controlled)	Yes
HMI for settings	
Display	4 7-segments and icons. Illuminated
Keypad	2 selection keys and 2 navigation keys
Main settings	
Setting current	Size dependent
Ramp time during start	1-30 sec
Ramp time during stop	0-30 sec
Initial / end voltage	30-70%
Current limit	$1,5-7xI_e$
Torque control for start	Yes / No
Torque control for stop	Yes / No
Kick start	Off, 30-100%
Signal relays	
Number of signal relays	3
K2	Run signal
K3	TOR (By-pass) signal
K1	Event signal
Rated operational voltage U_e	250 V AC / 24 V DC ⁴⁾
Rated thermal current I_{th}	3 A
Rated operational current I_e at AC-15 ($U_e = 250$ V)	1.5 A

Analog output	
Output signal reference	4 ... 20 mA
Type of output signal	1 Amp
Scaling	Fixed at $1.2 \times I_e$
Control circuit	
Number of inputs	3 (start, stop, reset of faults)
Signal indication LED's	
On / Ready	Green flashing / steady
Run / TOR	Green flashing / steady
Protection	Yellow
Fault	Red
Protections	
Electronic overload	Yes (Class 10A, 10, 20, 30)
Locked rotor protection	Yes
Underload protection	Yes
Field bus connection	
Connection for ABB FieldBusPlug	Yes (option)
External keypad	
Display LCD type	
Ambient temperature	
during operation	-25 ... +60 °C (-13 to 140 °F)
during storage	-40 ... +70 °C (-40 to 158 °F)
Degree of protection	IP66

5



Tripping curves for electronic overload protection (Cold)

¹⁾ Valid for 50 % on time and 50 % off time, with $3.5 \times I_e$ for 7 seconds. If other data is required, please contact your sales office

²⁾ Above 40 °C (104 °F) up to max. 60 °C (140 °F) reduce the rated current with 0.6 % per °C (0.33 % per °F).

³⁾ When used at high altitudes above 1000 meters (3281 ft) up to 4000 meters (13123 ft) you need to derate the rated current using the following formula.

$$\left[\% \text{ of } I_e = 100 - \frac{x - 1000}{150} \right] \quad x = \text{actual altitude for the softstarter in meter}$$

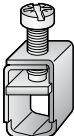
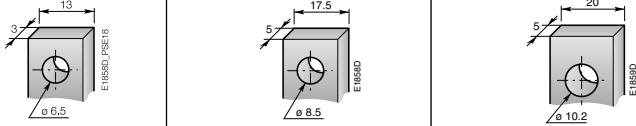
$$\left[\% \text{ of } I_e = 100 - \frac{x - 3280}{497} \right] \quad x = \text{actual altitude for the softstarter in feet}$$

⁴⁾ A common voltage needs to be used for all 3 signal relays.

PSE – The efficient range

Technical data

Cross section of connection cables

		Softstarter PSE18 ... PSE105	PSE142 ... PSE170	PSE210 ... PSE370
Main circuit				
Connection clamp				
				
Solid/stranded	1 x mm ² (AWG)	2.5 – 70 (14-1/0)	See accessories	
Solid/stranded	2 x mm ² (AWG)	2.5 – 70 (14-1/0)	See accessories	
Tightening torque (recommended)	Nm (lb-in)	9 (79.66)	See accessories	
Connection bar				
				
Width and thickness	mm (in)	13 (0.512) x 3 (0.118)	17.5 (0.689) x 5 (0.197)	20 (0.787) x 5 (0.197)
Hole diameter	mm (in)	6.5 (0.256)	8.5 (0.335)	10.2 (0.402)
Tightening torque (recommended)	Nm (lb-in)	9 (79.66)	18 (159.31)	28 (247.82)
Supply and control circuit				
Connection clamp				
Solid/stranded	1 x mm ² (AWG)	2.5 (14)	2.5 (14)	2.5 (14)
Solid/stranded	2 x mm ² (AWG)	1.5 (16)	1.5 (16)	1.5 (16)
Tightening torque (recommended)	Nm (lb-in)	0.5 (4.43)	0.5 (4.43)	0.5 (4.43)

Semi-conductor fuse ratings and power losses

For Softstarter	Overload protection		Max power loss at rated I _b (Internal by-pass)	Max semi-conductor fuse rating - main circuit Coordination type 2 (85 kA)			Supply circuit power requirements ¹⁾
	Type	Current range		Bussman Fuses, DIN43 620			
				Type	A	Type	Size
PSE							
PSE18	Integrated	5.4-18	0.2	40	170M1563	000	16
PSE25	Integrated	7.5-25	0.4	50	170M1564	000	16
PSE30	Integrated	9-30	0.5	80	170M1566	000	16
PSE37	Integrated	11.1-37	0.8	100	170M1567	000	16
PSE45	Integrated	13.5-45	1.2	125	170M1568	000	16
PSE60	Integrated	18-60	2.2	160	170M1569	000	16
PSE72	Integrated	21.6-72	3.1	250	170M1571	000	16
PSE85	Integrated	25.5-85	4.3	315	170M1572	000	16
PSE105	Integrated	31.8-106	6.6	400	170M3819	1	16
PSE142	Integrated	42.9-143	12.1	450	170M5809	2	16
PSE170	Integrated	51.3-171	17.6	500	170M5810	2	16
PSE210	Integrated	63-210	8.8	630	170M5812	2	23/350
PSE250	Integrated	75-250	12.5	700	170M5813	2	23/350
PSE300	Integrated	90.6-302	18	800	170M6812	3	23/350
PSE370	Integrated	111-370	27.4	900	170M6813	3	23/350

¹⁾ For the supply circuit use a maximum 6 A time-delay fuse or an MCB with type C characteristics.



Description

- Wide rated operational voltage 208 – 690 V AC
- Wide rated control supply voltage 100 – 250 V, 50/60 Hz
- Rated operational current 30 to 1050 A (Up to 1810 A inside delta)
- Wide ambient temperature range, -25 to +50 °C (-13 to 122 °F)
- Both in line and inside delta connection
- Coated circuit boards available, for reliable operation even in harsh environments
- Full text display in 14 languages and 4 button keypad for easy set-up and operation
- Optional external keypad, IP66
- Built-in by-pass contactor on PSTB (from 370 A) for energy saving and easy installation
- Prepared for external by-pass on PST (30 – 300 A)
- Torque Control for excellent control of pumps
- Current limit, adjustable between $1.5 - 7 \times I_e$
- Fieldbus communication using Profibus, Modbus, Devicenet or CANopen
- Dual motor overload protection with classes 10A, 10, 20 and 30
- Adaptable motor underload protection to detect pumps running dry
- Adaptable locked rotor protection to detect jammed pumps
- PTC protection to protect the motor from overheating
- Adjustable kick start to start jammed pumps
- Programmable output signal relays
- Programmable pre-warning functions
- Event log with time stamp
- Analog output showing current, voltage, power factor etc.
0 – 10 V, 0 – 20 mA, 4 – 20 mA

PST(B) – The advanced range Description

The PST(B) softstarter is the most advanced softstarter in the ABB product portfolio and is equipped with almost all imaginable features. This makes the PST(B) ideal for almost every application.

Torque Control

- 5** The ABB torque control function is developed together with pump manufacturers to ensure the best possible pump stop, eliminating problems with water hammering and pressure surges.

By-pass for energy saving

By-passing the softstarter after reaching full voltage, will save energy and reduce the heat generation. The PST softstarters are equipped with extra terminals making the connection of an external by-pass contactor easier and allowing all protections to be active during by-pass. On the PSTB softstarters, an ABB AF-contactor is already built-in, ensuring a compact starting solution with minimal wiring during installation.

Advanced protections

The PST(B) softstarters are equipped with almost all protections imaginable for protecting the motor, the softstarter and the application. To offer more flexibility, all protections can be tailored to your specific needs.

Flexible analog output

The analog output terminals can be connected to an analog current meter to show the current during operation and thereby eliminating the need for an additional current transformer. The analog output signal can also be used as an analog input to a PLC.

Fieldbus communication

Using the ABB FieldBusPlug, all the most common fieldbus protocols are supported. Using the PLC system it is possible to set-up the softstarter, read status information and also to control the softstarter.

Display and keypad

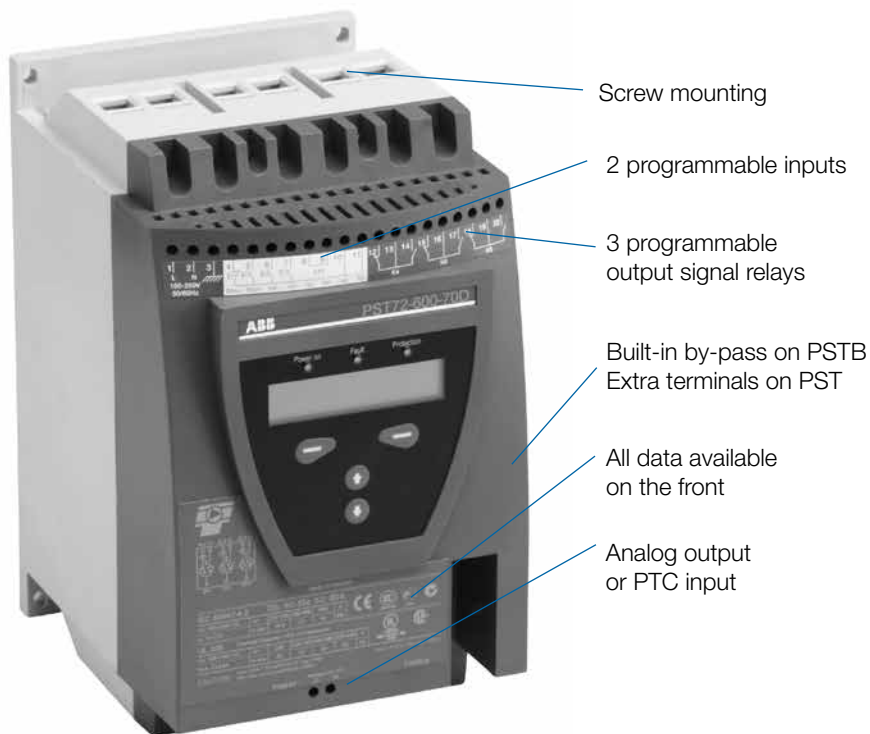
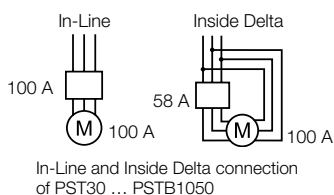
The PST(B) softstarter is equipped with a full text display showing all information in clear text in your own language. To make it even easier to set-up, there are standard settings for many common applications, such as centrifugal pump. Selecting this will automatically provide all required settings including torque control when stopping.

External keypad

As an option, the PST(B) softstarter can be equipped with an external keypad for easy set-up and monitoring of the unit without opening the enclosure door. The keypad can also be used to copy parameters between different softstarters.

PST(B) – The advanced range Description

The PST Softstarter can be selected according to the rated motor power in normal duty applications like pumps, compressors, elevators, escalators, short conveyor belts and bow thrusters. See page 5.30 - 5.31, For heavy duty applications like centrifugal fans, crushers, mixers, mills, stirrers and long conveyor belts, select a softstarter from page 5.32 - 5.33. The softstarter selection tool prosoft can also be used for a more optimized selection.



5



- Green on LED
- Yellow protection LED
- Red fault LED

Full text display in 14 languages

User friendly keypad

Pre set application settings



External keypad with same design as the fixed one

PST(B) – The advanced range

Overview

5



PST30 ... PST72

PST85 ... PST142

Softstarter

Normal start
In-Line connected

(480 V) hp
(600 V) hp
UL/CSA, Max FLA

	PST30	PST37	PST44	PST50	PST60	PST72	PST85	PST105	PST142
(480 V) hp	20	25	30	40	40	50	60	75	100
(600 V) hp	25	30	40	50	50	60	75	100	125
UL/CSA, Max FLA	28	34	42	54	60	68	80	104	130

Using MCCB only, type 1
coordination will be achieved

MCCB (10kA, 480-600 V, 40 °C)

	Ts3	T4
--	-----	----

Using J fuses, type 1
coordination will be
achieved 175 % rating

J type fuse protection (85 kA)

	45 A	50 A	70 A	90 A	100 A	110 A	125 A	175 A	225 A
Max rating	90 A	110 A	150 A	175 A	225 A		250 A	350 A	400 A

Minimum enclosure size ¹⁾

	500 x 500 x 300 mm / 20 x 20 x 12 in						600 x 500 x 300 mm / 24 x 20 x 12 in		
--	--------------------------------------	--	--	--	--	--	--------------------------------------	--	--

Fusible disconnect switch
for the above J fuses

Fusible disconnect switch

	OS60	OS100	OS200	OS400
--	------	-------	-------	-------

The line contactor is not
required for the softstarter
itself but often used to
open if OL trips

Line contactor

	AF30	AF50	AF63	AF75	AF95	AF110	AF145
--	------	------	------	------	------	-------	-------

Overload protection is used
to protect the motor from
over heating

Electronic overload relay

	Built-in							
--	----------	--	--	--	--	--	--	--

The bypass contactor will
reduce the power loss of
the softstarter. All softstart-
ers can be operated without
by-pass

By-pass contactor (AC-1)

	AF16	AF26	AF30	AF50	AF75	AF110
--	------	------	------	------	------	-------

¹⁾ Enclosure that has two latching points minimum. For use in pollution degree 2 environment.

PST(B) – The advanced range

Overview

Softstarters
Type PST



5

	PST175 ... PST300				PSTB370 ... PSTB470		PSTB570 ... PSTB1050				
Softstarter											
Normal start In-Line connected	PST175	PST210	PST250	PST300	PSTB370	PSTB470	PSTB570	PSTB720	PSTB840	PSTB1050	
	(480 V) hp	125	150	200	250	300	400	500	600	700	900
	(600 V) hp	150	200	250	300	350	500	600	700	800	1000
UL/CSA, Max FLA	156	192	248	302	361	480	590	720	840	1062	
Using MCCB only, type 1 coordination will be achieved	MCCB (18 kA, 480-600 V, 40 °C)				MCCB (30 kA, 480-600 V, 40 °C)		MCCB (42 kA, 480-600 V, 40 °C)				
	T4	T5			T6		T7		T8		
Using J or L fuses, type 1 coordination will be achieved	J or L type fuse protection (85 kA)										
	175 % rating	250 A	300 A	400 A	500 A	600 A	800 A	1000 A	1200 A	1400 A	1800 A
	Max rating	400 A		450 A	600 A	700 A	1200 A		-	-	
Minimum enclosure size ¹⁾	760 x 760 x 300 mm / 30 x 30 x 12 in				1220 x 915 x 407 mm / 48 x 36 x 16 in						
Fusible disconnect switch for the above J fuses	Fusible disconnect switch										
	OS400			OS600		OS800	OS1200		-	-	
The line contactor is not required for the softstarter itself but often used to open if OL trips	Line contactor										
	AF185	AF210	AF260	AF300	AF400	AF580		AF750	AF1350	AF1650	
Overload protection is used to protect the motor from over heating	Electronic overload relay										
	Built-in										
The bypass contactor will reduce the power loss of the softstarter. All softstarters can be operated without by-pass	By-pass contactor (AC-1)										
	AF145	AF185	AF210	Built-in							

How to select correct size

By using the guide here, you can quickly select a suitable softstarter for the most common applications.

If a more precise selection is required, you can use prosoft, a selection software available at www.abb.com/lowvoltage

Quick guide for selection

Normal start Class 10	Heavy duty start class 30
Ordering - see page 5.30 - 5.31	Ordering - see page 5.32 - 5.33
Typical applications	
<ul style="list-style-type: none"> • Bow thruster • Compressor • Elevator 	<ul style="list-style-type: none"> • Centrifugal pump • Conveyor belt (short) • Escalator
<ul style="list-style-type: none"> • Centrifugal fan • Crusher • Mixer 	
<ul style="list-style-type: none"> • Conveyor belt (long) • Mill • Stirrer 	
! If more than 10 starts/h Select one size larger than the standard selection	

¹⁾ Enclosure that has two latching points minimum. For use in pollution degree 2 environment.

PST(B) – The advanced range

Normal starts, class 10, In-Line, ordering details

PST30 ... PSTB1050

Rated operational voltage U_o , 208 - 600 V

Rated control supply voltage, U_s , 100 - 250 V AC, 50/60 Hz

5



PST30 ... PST72



PST85 ... PST142



PST175 ... PST300



PSTB370 ... PSTB470



PSTB570 ... PSTB1050

400 V kW	500 V kW	690 V kW	208 V hp	230 V hp	480 V hp	600 V hp	UL/CSA Max rated operational current I_o A	Weight kg (lb)	Catalog number *)
15	18.5	-	7.5	10	20	25	28	4.80 (10.58)	PST30-600-70□
18.5	22	-	10	10	25	30	34	4.80 (10.58)	PST37-600-70□
22	25	-	10	15	30	40	42	4.80 (10.58)	PST44-600-70□
25	30	-	15	20	40	50	54	4.80 (10.58)	PST50-600-70□
30	37	-	20	20	40	50	60	5.00 (11.02)	PST60-600-70□
37	45	-	20	25	50	60	68	5.00 (11.02)	PST72-600-70□
45	55	-	25	30	60	75	80	11.20 (24.69)	PST85-600-70□
55	75	-	30	40	75	100	104	13.00 (28.66)	PST105-600-70□
75	90	-	40	50	100	125	130	13.00 (28.66)	PST142-600-70□
90	110	-	50	60	125	150	156	21.50 (47.40)	PST175-600-70□
110	132	-	60	75	150	200	192	21.50 (47.40)	PST210-600-70□
132	160	-	75	100	200	250	248	23.00 (50.71)	PST250-600-70□
160	200	-	100	100	250	300	302	23.00 (50.71)	PST300-600-70□
200	257	-	125	150	300	350	361	31.00 (68.34)	PSTB370-600-70□
250	315	-	150	200	400	500	480	31.00 (68.34)	PSTB470-600-70□
315	400	-	200	250	500	600	590	52.00 (114.64)	PSTB570-600-70□
400	500	-	250	300	600	700	720	55.00 (121.25)	PSTB720-600-70□
450	600	-	300	350	700	800	840	60.00 (133.28)	PSTB840-600-70□
560	730	-	400	450	900	1000	1062	60.00 (133.28)	PSTB1050-600-70□

PST30 ... PSTB1050

Rated operational voltage U_o , 400 - 690 V

Rated control supply voltage, U_s , 100 - 250 V AC, 50/60 Hz

15	18.5	25	-	-	20	25	28	4.80 (10.58)	PST30-690-70□
18.5	22	30	-	-	25	30	34	4.80 (10.58)	PST37-690-70□
22	25	37	-	-	30	40	42	4.80 (10.58)	PST44-690-70□
25	30	45	-	-	40	50	54	4.80 (10.58)	PST50-690-70□
30	37	55	-	-	40	50	60	5.00 (11.02)	PST60-690-70□
37	45	59	-	-	50	60	68	5.00 (11.02)	PST72-690-70□
45	55	75	-	-	60	75	80	11.20 (24.69)	PST85-690-70□
55	75	90	-	-	75	100	104	13.00 (28.66)	PST105-690-70□
75	90	132	-	-	100	125	130	13.00 (28.66)	PST142-690-70□
90	110	160	-	-	125	150	156	21.50 (47.40)	PST175-690-70□
110	132	184	-	-	150	200	192	21.50 (47.40)	PST210-690-70□
132	160	220	-	-	200	250	248	23.00 (50.71)	PST250-690-70□
160	200	257	-	-	250	300	302	23.00 (50.71)	PST300-690-70□
200	257	355	-	-	300	350	361	31.00 (68.34)	PSTB370-690-70□
250	315	450	-	-	400	500	480	31.00 (68.34)	PSTB470-690-70□
315	400	560	-	-	500	600	590	52.00 (114.64)	PSTB570-690-70□
400	500	710	-	-	600	700	720	55.00 (121.25)	PSTB720-690-70□
450	600	800	-	-	700	800	840	60.00 (133.28)	PSTB840-690-70□
560	730	1000	-	-	900	1000	1062	60.00 (133.28)	PSTB1050-690-70□

*) Add code letter in Type acc. to below:

- No code letter = Normal
- T = Coated PCBs



PST(B) – The advanced range

Normal starts, class 10, Inside Delta, ordering details

PST30...PSTB1050

Rated operational voltage U_e , 208 - 600 V

Rated control supply voltage, U_s , 100 - 250 V AC, 50/60 Hz



PST30 ... PST72



PST85 ... PST142



PST175 ... PST300



PSTB370 ... PSTB470



PSTB570 ... PSTB1050

400 V kW	500 V kW	690 V kW	208 V hp	230 V hp	480 V hp	600 V hp	UL/CSA Max rated operational current I_b A	Weight kg (lb)	Catalog number *)
25	30	-	10	15	30	40	42	4.80 (10.58)	PST30-600-70□
30	37	-	15	20	40	50	54	4.80 (10.58)	PST37-600-70□
37	45	-	20	25	50	60	72	4.80 (10.58)	PST44-600-70□
45	55	-	25	30	60	75	80	4.80 (10.58)	PST50-600-70□
55	75	-	30	40	75	100	104	5.00 (11.02)	PST60-600-70□
59	80	-	30	40	75	100	104	5.00 (11.02)	PST72-600-70□
75	90	-	40	50	100	125	130	11.20 (24.69)	PST85-600-70□
90	110	-	50	60	125	150	156	13.00 (28.66)	PST105-600-70□
132	160	-	60	75	150	200	192	13.00 (28.66)	PST142-600-70□
160	200	-	75	100	200	250	248	21.50 (47.40)	PST175-600-70□
184	250	-	100	100	250	300	302	21.50 (47.40)	PST210-600-70□
220	295	-	125	150	300	350	361	23.00 (50.71)	PST250-600-70□
257	355	-	150	200	400	500	480	23.00 (50.71)	PST300-600-70□
355	450	-	200	250	500	600	590	31.00 (68.34)	PSTB370-600-70□
450	600	-	250	300	600	700	720	31.00 (68.34)	PSTB470-600-70□
540	700	-	300	350	700	800	840	52.00 (114.64)	PSTB570-600-70□
710	880	-	400	500	1000	1200	1247	55.00 (121.25)	PSTB720-600-70□
800	1000	-	500	600	1200	1500	1454	60.00 (133.28)	PSTB840-600-70□
1000	1250	-	600	700	1500	1800	1839	60.00 (133.28)	PSTB1050-600-70□

PST30 ... PSTB1050

Rated operational voltage U_e , 400 - 690 V

Rated control supply voltage, U_s , 100 - 250 V AC, 50/60 Hz

25	30	45	-	-	30	40	42	4.80 (10.58)	PST30-690-70□
30	37	55	-	-	40	50	54	4.80 (10.58)	PST37-690-70□
37	45	59	-	-	50	60	72	4.80 (10.58)	PST44-690-70□
45	55	75	-	-	60	75	80	4.80 (10.58)	PST50-690-70□
55	75	90	-	-	75	100	104	5.00 (11.02)	PST60-690-70□
59	80	110	-	-	75	100	104	5.00 (11.02)	PST72-690-70□
75	90	132	-	-	100	125	130	11.20 (24.69)	PST85-690-70□
90	110	160	-	-	125	150	156	13.00 (28.66)	PST105-690-70□
132	160	220	-	-	150	200	192	13.00 (28.66)	PST142-690-70□
160	200	257	-	-	200	250	248	21.50 (47.40)	PST175-690-70□
184	250	315	-	-	250	300	302	21.50 (47.40)	PST210-690-70□
220	295	400	-	-	300	350	361	23.00 (50.71)	PST250-690-70□
257	355	500	-	-	400	500	480	23.00 (50.71)	PST300-690-70□
355	450	600	-	-	500	600	590	31.00 (68.34)	PSTB370-690-70□
450	600	800	-	-	600	700	720	31.00 (68.34)	PSTB470-690-70□
540	700	960	-	-	700	800	840	52.00 (114.64)	PSTB570-690-70□
710	880	1200	-	-	1000	1200	1247	55.00 (121.25)	PSTB720-690-70□
800	1000	1400	-	-	1200	1500	1454	60.00 (133.28)	PSTB840-690-70□
1000	1250	1700	-	-	1500	1800	1839	60.00 (133.28)	PSTB1050-690-70□

*) Add code letter in Type acc. to below:
 No code letter = Normal
T = Coated PCBs



PST(B) – The advanced range

Heavy Duty, class 30, In-Line, ordering details

PST30...PSTB1050

Rated operational voltage U_e , 208 - 600 V

Rated control supply voltage, U_s , 100 - 250 V AC, 50/60 Hz

400 V kW	500 V kW	690 V kW	208 V hp	230 V hp	480 V hp	600 V hp	UL/CSA Max rated operational current I_s A	Weight kg (lb)	Catalog number ^{*)}
11	15	-	5	7.5	15	20	25	4.80 (10.58)	PST30-600-70□
15	18.5	-	7.5	10	20	25	28	4.80 (10.58)	PST37-600-70□
18.5	22	-	10	10	25	30	34	4.80 (10.58)	PST44-600-70□
22	25	-	10	15	30	40	42	4.80 (10.58)	PST50-600-70□
25	30	-	15	20	40	50	54	5.00 (11.02)	PST60-600-70□
30	37	-	20	20	40	50	60	5.00 (11.02)	PST72-600-70□
37	45	-	20	25	50	60	68	11.20 (24.69)	PST85-600-70□
45	55	-	25	30	60	75	80	13.00 (28.66)	PST105-600-70□
55	75	-	30	40	75	100	104	13.00 (28.66)	PST142-600-70□
75	90	-	40	50	100	125	130	21.50 (47.40)	PST175-600-70□
90	110	-	50	60	125	150	156	21.50 (47.40)	PST210-600-70□
110	132	-	60	75	150	200	192	23.00 (50.71)	PST250-600-70□
132	160	-	75	100	200	250	248	23.00 (50.71)	PST300-600-70□
160	200	-	100	100	250	300	302	31.00 (68.34)	PSTB370-600-70□
200	257	-	125	150	300	350	361	31.00 (68.34)	PSTB470-600-70□
250	315	-	150	200	400	500	480	52.00 (114.64)	PSTB570-600-70□
315	400	-	200	250	500	600	590	55.00 (121.25)	PSTB720-600-70□
400	500	-	250	300	600	700	720	60.00 (133.28)	PSTB840-600-70□
450	600	-	300	350	700	800	840	60.00 (133.28)	PSTB1050-600-70□



PST30 ... PST72



PST85 ... PST142



PST175 ... PST300



PSTB370 ... PSTB470



PSTB570 ... PSTB1050

PST30...PSTB1050

Rated operational voltage U_e , 400 - 690 V

Rated control supply voltage, U_s , 100 - 250 V AC, 50/60 Hz

11	15	18.5	-	-	15	20	25	4.80 (10.58)	PST30-600-70□
15	18.5	25	-	-	20	25	28	4.80 (10.58)	PST37-600-70□
18.5	22	30	-	-	25	30	34	4.80 (10.58)	PST44-600-70□
22	25	37	-	-	30	40	42	4.80 (10.58)	PST50-600-70□
25	30	45	-	-	40	50	54	5.00 (11.02)	PST60-600-70□
30	37	55	-	-	40	50	60	5.00 (11.02)	PST72-600-70□
37	45	59	-	-	50	60	68	11.20 (24.69)	PST85-600-70□
45	55	75	-	-	60	75	80	13.00 (28.66)	PST105-600-70□
55	75	90	-	-	75	100	104	13.00 (28.66)	PST142-600-70□
75	90	132	-	-	100	125	130	21.50 (47.40)	PST175-600-70□
90	110	160	-	-	125	150	156	21.50 (47.40)	PST210-600-70□
110	132	184	-	-	150	200	192	23.00 (50.71)	PST250-600-70□
132	160	220	-	-	200	250	248	23.00 (50.71)	PST300-600-70□
160	200	257	-	-	250	300	302	31.00 (68.34)	PSTB370-600-70□
200	257	355	-	-	300	350	361	31.00 (68.34)	PSTB470-600-70□
250	315	450	-	-	400	500	480	52.00 (114.64)	PSTB570-600-70□
315	400	560	-	-	500	600	590	55.00 (121.25)	PSTB720-600-70□
400	500	710	-	-	600	700	720	60.00 (133.28)	PSTB840-600-70□
450	600	800	-	-	700	800	840	60.00 (133.28)	PSTB1050-600-70□

^{*)} Add code letter in Type acc. to below:

- No code letter = Normal
- T = Coated PCBs



PST(B) – The advanced range

Heavy Duty, class 30, Inside Delta, ordering details

PST30...PSTB1050

Rated operational voltage U_o , 208 - 600 V

Rated control supply voltage, U_s , 100 - 250 V AC, 50/60 Hz



PST30 ... PST72



PST85 ... PST142



PST175 ... PST300



PSTB370 ... PSTB470



PSTB570 ... PSTB1050

400 V kW	500 V kW	690 V kW	208 V hp	230 V hp	480 V hp	600 V hp	UL/CSA Max rated operational current I_o A	Weight kg (lb)	Catalog number *)
18.5	25	-	7.5	10	25	30	34	4.80 (10.58)	PST30-600-70□
25	30	-	10	15	30	40	42	4.80 (10.58)	PST37-600-70□
30	37	-	15	20	40	50	54	4.80 (10.58)	PST44-600-70□
37	45	-	20	25	50	60	72	4.80 (10.58)	PST50-600-70□
45	55	-	25	30	60	75	80	5.00 (11.02)	PST60-600-70□
55	75	-	30	40	75	100	104	5.00 (11.02)	PST72-600-70□
59	80	-	40	40	75	100	104	11.20 (24.69)	PST85-600-70□
75	90	-	40	50	100	125	130	13.00 (28.66)	PST105-600-70□
90	110	-	50	60	125	150	156	13.00 (28.66)	PST142-600-70□
132	160	-	60	75	150	200	192	21.50 (47.40)	PST175-600-70□
160	200	-	75	100	200	250	248	21.50 (47.40)	PST210-600-70□
184	250	-	100	100	250	300	302	23.00 (50.71)	PST250-600-70□
220	295	-	125	150	300	350	361	23.00 (50.71)	PST300-600-70□
257	355	-	150	200	400	500	480	31.00 (68.34)	PSTB370-600-70□
355	450	-	200	250	500	600	590	31.00 (68.34)	PSTB470-600-70□
450	600	-	250	300	600	700	720	52.00 (114.64)	PSTB570-600-70□
540	700	-	300	350	700	800	840	55.00 (121.25)	PSTB720-600-70□
710	880	-	400	500	1000	1200	1247	60.00 (133.28)	PSTB840-600-70□
800	1000	-	500	600	1200	1500	1454	60.00 (133.28)	PSTB1050-600-70□

PST30...PSTB1050

Rated operational voltage U_o , 400 - 690 V

Rated control supply voltage, U_s , 100 - 250 V AC, 50/60 Hz

18.5	25	37	-	-	25	30	34	4.80 (10.58)	PST30-690-70□
25	30	45	-	-	30	40	42	4.80 (10.58)	PST37-690-70□
30	37	55	-	-	40	50	54	4.80 (10.58)	PST44-690-70□
37	45	59	-	-	50	60	72	4.80 (10.58)	PST50-690-70□
45	55	75	-	-	60	75	80	5.00 (11.02)	PST60-690-70□
55	75	90	-	-	75	100	104	5.00 (11.02)	PST72-690-70□
59	80	110	-	-	75	100	104	11.20 (24.69)	PST85-690-70□
75	90	132	-	-	100	125	130	13.00 (28.66)	PST105-690-70□
90	110	160	-	-	125	150	156	13.00 (28.66)	PST142-690-70□
132	160	220	-	-	150	200	192	21.50 (47.40)	PST175-690-70□
160	200	257	-	-	200	250	248	21.50 (47.40)	PST210-690-70□
184	250	315	-	-	250	300	302	23.00 (50.71)	PST250-690-70□
220	295	400	-	-	300	350	361	23.00 (50.71)	PST300-690-70□
257	355	500	-	-	400	500	480	31.00 (68.34)	PSTB370-690-70□
355	450	600	-	-	500	600	590	31.00 (68.34)	PSTB470-690-70□
450	600	800	-	-	600	700	720	52.00 (114.64)	PSTB570-690-70□
540	700	960	-	-	700	800	840	55.00 (121.25)	PSTB720-690-70□
710	880	1200	-	-	1000	1200	1247	60.00 (133.28)	PSTB840-690-70□
800	1000	1400	-	-	1200	1500	1454	60.00 (133.28)	PSTB1050-690-70□

*) Add code letter in Type acc. to below:
 No code letter = Normal
T = Coated PCBs



PST(B) – The advanced range Accessories

Terminal lug kits for Al and Cu cables

For PST(B)85...1050 without external bypass (line/load lugs and terminal nut washer)

For softstarter type	Wire range AWG	Tightening torque max. Nm (lb-in)	Packing piece	Catalog number
PST85 ...142	#6 - 250 MCM (1 per phase)	13.5 (275 lb-in)	6	PSLK-185
PST175 ...300	#4 - 400 MCM (1 per phase)	43 (375 lb-in)	6	PSLK-300
PST175...300	#4 - 500 MCM (2 per phase)	43 (375 lb-in)	6	PSLK-300/2
PSTB370...470	2/0 - 500 MCM (2 per phase)	43 (375 lb-in)	6	PSLK-580/2
PSTB570 ...1050	2/0 - 500 MCM (3 per phase)	43 (375 lb-in)	6	PSLK-750/3

For PST85...300 with external bypass (line/load lugs and terminal nut washer)

PST85 ...142	#6 - 250 MCM (1 per phase)	13.5 (275 lb-in)	9	PSLK-185-B
PST175 ...300	#4 - 400 MCM (1 per phase)	43 (375 lb-in)	9	PSLK-300-B
PST175 ...300	#4 - 500 MCM (2 per phase)	43 (375 lb-in)	9	PSLK-300/2-B

Terminal extensions

For softstarter type	Dimensions hole ø mm ² (in ²)	Bar mm (in)	Packing piece	Weight kg (lb) 1 piece	Catalog number
PST85 ...142	8.5 (0.0132)	17.5 x 5 (0.689 x 0.197)	1	0.250 (0.551)	LX185 ¹⁾
PST175 ...300	10.5 (0.0163)	20 x 5 (0.787 x 0.197)	1	0.350 (0.772)	LX300 ²⁾
PSTB370...470	10.5 (0.0163)	25 x 5 (0.984 x 0.197)	1	0.500 (1.102)	LX460
PSTB570...1050	13 (0.0202)	40 x 6 (1.575 x 0.236)	1	0.850 (1.874)	LX750

Terminal enlargements

For softstarter type	Dimensions hole ø mm ² (in ²)	Bar mm (in)	Packing piece	Weight kg (lb) 1 piece	Catalog number
PST30...72	6.5 (0.0101)	15 x 3 (0.591 x 0.118)	1	0.100 (0.220)	LW110 ¹⁾
PST85 ...142	10.5 (0.0163)	17.5 x 5 (0.689 x 0.197)	1	0.250 (0.551)	LW185 ¹⁾
PST175...300	10.5 (0.0163)	20 x 5 (0.787 x 0.197)	1	0.450 (0.992)	LW300 ¹⁾
PSTB370...470	10.5 (0.0163)	25 x 5 (0.984 x 0.197)	1	0.730 (1.609)	LW460
PSTB570...1050	13 (0.0202)	40 x 6 (1.575 x 0.236)	1	1.230 (2.712)	LW750

Terminal nut washer

For softstarter type	Req. qty	Packing piece	Weight kg (lb) 1 piece	Catalog number
PST85...142	1	2	0.200 (0.441)	LE185 ¹⁾
PST175...300	3	2	0.300 (0.661)	LE300 ²⁾
PSTB370...470	6	6	0.600 (1.323)	LE460
PSTB570...1050	6	6	0.750 (1.653)	LE750

Terminal shrouds

For softstarter type	Suitable for	Req. qty	Packing piece	Weight kg (lb) 1 piece	Catalog number
PST85...142	Compression lugs and cable connectors	1 pc	2	0.220 (0.485)	LT185-AL
	Compression lugs and cable connectors	1 pc	2	0.800 (1.764)	LT460-AL
PST175...300	Compression lugs and cable connectors	3 pcs	2	0.280 (0.617)	LT300-AL ^{2) 3)}
PSTB370...470	Compression lugs and cable connectors	2 pcs	2	0.800 (1.764)	LT460-AL
PSTB570...1050	Compression lugs and cable connectors	2 pcs	2	0.825 (1.819)	LT750-AL

External keypad including a 3m cable

For softstarter type	Packing piece	Weight kg (lb) 1 piece	Catalog number
PST30...300 PSTB370...1050	1	0.400 (0.882)	PSTEK

Marine Kit

For softstarter type	Packing piece	Weight kg (lb) 1 piece	Catalog number
PST85...142	1	0.240 (0.529)	PSTM-2

Fieldbus plug - ABB Fieldbus Plug suitable for all sizes. See page 5.40 - 5.43

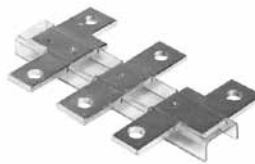
¹⁾ Only fits on the motor side.

²⁾ Use two sets of the accessories on the line side and one set on the motor side.

³⁾ The LT300-AL is not compatible with PSLK-300/2 cable connector.



LX...



LW...



LE185



LE460



LT ... -AL



PSTEK



PSTM-2

PST(B) – The advanced range

Technical data

Softstarters
Type PST

5

Rated insulation voltage U_i	690 V	
Rated operational voltage U_e	208...600 V, 400...690 V + 10 % / -15 % 50/60 Hz \pm 5%	
Rated control supply voltage U_s	100...250 V +10% / -15% 50/60 Hz \pm 5%	
Rated control circuit voltage U_c	Internal or external 24 V DC	
Starting capacity at I_r	3 x I_e for 15 sec.	
Number of starts per hour	PST30...300 30 ¹⁾	PSTB370...1050 10 ¹⁾
Overload capability		
Overload class	10	
Service factor	PST(B)30...840 115 %	PSTB1050 100 %
Ambient temperature		
during operation	\pm 0 ... +50 °C (32 to 122 °F) ²⁾	
during storage	-25 ... +70 °C (-13 to 158 °F)	
Maximum altitude	4000 m ³⁾	
Degree of protection	PST30...72	PST85...PSTB1050
main circuit	IP10	IP00
Supply and control circuit	IP20	
Main circuit	PST30...300	PSTB370...1050
Built-in By-pass contactor	No	Yes
Cooling system - Fan cooled	Yes (thermostat controlled)	
HMI for settings (Human Machine Interface)		
Display	Full text	
Languages	English, German, Italian, Dutch, Chinese, Finnish, Swedish, French, Spanish, Russian, Portugese, Turkish, Polish and Czech	
Keypad	2 selection keys and 2 navigating keys	
Signal relays		
Number of programmable signal relays	3 (each relay can be programmed to be Run, By-pass or Event signal)	
K4	Default as Run signal	
K5	Default as TOR (By-pass) signal	
K6	Default as Event signal	
Rated operational voltage, U_e	250 V AC / 24 V DC	
Rated thermal current I_{th}	5 A	
Rated operational current I_e at AC-15 ($U_e=250$ V)	1.5 A	
Analog output		
Output signal reference	0 ... 10 V, 0 ... 20 mA, 4 ... 20 mA	
Type of output signal	I Amp, U Volt, P kW, P hp, Q kVAR, S kVA, TmpMot, TmpSCR, cosPhi	

Control circuit	
Number of inputs	2 (start, stop)
Number of additional programmable inputs	2 (Each input can be programmed to be either: Non, Reset, Enable, Jog, DOL- On, Start motor 2, Start motor 3 or FB-Dis)

Signalling indication LED	
Power on	Green
Fault	Red
Protection	Yellow

Protections	
Electronic overload	Yes (Class 10A, 10, 20, 30)
Dual overload	Yes (separate overload function for start and run)
PTC connection	Yes
Locked rotor protection	Yes (Level and delay adjustable)
Underload protection	Yes (Level and delay adjustable)
Phase imbalance	Yes (Level and delay adjustable)
High current ($8 \times I_e$)	Yes
Phase reversal protection	Yes

Warnings (pre-warning)	
High current	Yes (Level and delay adjustable)
Low current (underload)	Yes (Level and delay adjustable)
Overload trip	Yes (Level and delay adjustable)
Overtemp, thyristor (SCR)	Yes

Start of several motors	
Possible to set-up and start three different motors	Yes (Different parameter sets)

Field bus connection	
Connection for ABB FieldBusPlug	Yes

PTC input	
Switch off resistance	2825 ohm \pm 20%
Switch on resistance	1200 ohm \pm 20%

External keypad	
Display	LCD type
Ambient temperature	
During operation	\pm 0 ... +50 °C (32 to 122 °F)
During storage	-25 ... +70 °C (-13 to 158 °F)
Degree of protection	IP66

PSTB Integrated by-pass ratings

Softstarter	PSTB370	PSTB470	PSTB570	PSTB720	PSTB840	PSTB1050
Integrated contactor	AF300		AF460	AF580		AF750
AC-3 rating (A)	305		460	580		750

¹⁾ Valid for 50 % on time and 50 % off time. $3.5 \times I_e$ for 7 sec., if other data is required, contact your sales office.

²⁾ Above 40 °C (104 °F) up to max. 50 °C (122 °F) reduce the rated current with 0.8 % per °C (0.44 % per °F).

³⁾ When used at high altitudes above 1000 meters (3281 ft) up to 4000 meters (13123 ft) you need to derate the rated current using the following formula.

$$\left[\% \text{ of } I_e = 100 - \frac{x - 1000}{150} \right] \quad x = \text{actual altitude for the softstarter in meter}$$

$$\left[\% \text{ of } I_e = 100 - \frac{x - 3280}{497} \right] \quad x = \text{actual altitude for the softstarter in feet}$$

PST(B) – The advanced range

Technical data

Major possible settings and the displayed text and the set default values

Description	Text on display	Values on display	Default value
Setting current for overload, locked rotor etc.	Setting I _e	9.0 ... 1207 A divided into 19 overlapping ranges.	See page 5.37
Time for start ramp	Start Ramp	1 ... 30 s, 1 ... 120 s (Range depends on Start Range)	10 s
Time for stop ramp	Stop Ramp	0 ... 30 s, 0 ... 120 s (Range depends on Stop Range)	0 s
Initial voltage for start ramp	Init Volt	30 ... 70 %	30 %
End voltage for stop ramp	End Volt	30 ... 70 %	30 %
Step down voltage	Step Down	30 ... 100 %	100 %
Level of the current limit.	Current Lim	1.5 ... 7.0 x I _e	4.0 x I _e
Selection of Kick start	Kick Start	Yes, No	No
Level of Kick start if selected	Kick Level	50 ... 100 %	50 %
Time for Kick start if selected	Kick Time	0.1 ... 1.5 s	0.2
Selectable range for start ramp	Start Range	1 ... 30 s, 1 ... 120 s	1 ... 30 s
Selectable range for stop ramp	Stop Range	0 ... 30 s, 0 ... 120 s	0 ... 30 s
Overload protection	Overload	No, Normal, Dual	Normal
Overload Class	OL Class	10 A, 10, 20, 30	10
Overload Class, Dual type, Start Class	OL Class S	10A, 10, 20, 30	10
Overload Class, Dual type, Run Class	OL Class R	10A, 10, 20, 30	10
Type of operation for overload protection	OL Op	Stop-M, Stop-A, Ind	Stop-M
Locked rotor protection	Locked Rotor	Yes, No	No
Trip level for locked rotor protection	Lock R Lev	0.5 ... 8.0 x I _e	4.0 x I _e
Trip time for locked rotor protection	Lock R Time	0.2 ... 10 s	1.0 s
Type of operation for locked rotor protection	Lock R Op	Stop-M, Stop-A, Ind	Stop-M
Underload protection	Underload	Yes, No	No
Trip level for Underload protection	Underl Lev	0.4 ... 0.8 x I _e	0.5 x I _e
Trip time for Underload protection	Underl Time	1 ... 30 s	10 s
Type of operation for Underload protection	Underl Op	Stop-M, Stop-A, Ind	Stop-M
Phase imbalance protection	Phase Imb	Yes, No	No
Trip level for phase imbalance protection	Ph Imb Lev	10 ... 80 %	80 %
Type of operation for phase imbalance protection	Ph Imb Op	Stop-M, Stop-A, Ind	Stop-M
High current protection	High I	Yes, No	No
Type of operation for high current protection	High I Op	Stop-M, Stop-A, Ind	Stop-M
Phase reversal protection	Phase Rev	Yes, No	No
Type of operation for phase reversal protection	Ph Rev Op	Stop-M, Stop-A, Ind	Stop-M
PTC protection	PTC	Yes, No	No
Type of operation for PTC protection	PTC Op	Stop-M, Stop-A	Stop-M
An external Bypass contactor is used	Ext ByPass	Yes, No	No
High current warning	Warn I=High	Yes, No	No
Trip level for high current warning	Wa I=H Lev	0.5 ... 5.0 x I _e	1.2 x I _e
Low current warning	Warn I=Low	Yes, No	No
Trip level for low current warning	Wa I=L Lev	0.4 ... 1.0 x I _e	0.8 x I _e
Overload warning	Warn OL	Yes, No	No
Trip level for overload warning	Wa OL Lev	40 ... 99 %	90 %
Thyristor overload warning	Warn SCR OL	Yes, No	No
Type of operation for phase loss fault	Ph Loss Op	Stop-M, Stop-A	Stop-M
Type of operation for by-pass doesn't close	BP open Op	Stop-M, Stop-A	Stop-M
Type of operation for by-pass doesn't open	BP closed Op	Stop-M, Stop-A	Stop-M
Type of operation for fieldbus fault	FB Fault Op	Stop-M, Stop-A	Stop-M
Type of operation for frequency fault	Freq F Op	Stop-M, Stop-A	Stop-M
Type of operation for heat sink over temperature fault	HS Temp Op	Stop-M, Stop-A	Stop-M
Type of operation for thyristor short circuit fault	SCR SC Op	Stop-M, Stop-A	Stop-M
Function of programmable input In_0	In0	None, Reset, Enable, Jog, DOL, Start 2, FB-Dis	Reset
Function of programmable input In_1	In1	None, Reset, Enable, Jog, DOL, Start 3, FB-Dis	Reset
Function of programmable relay output K4	Relay K4	Run, TOR, Event	Run
Function of programmable relay output K5	Relay K5	Run, TOR, Event	TOR
Function of programmable relay output K6	Relay K6	Run, TOR, Event	Event
Control of the softstarter with fieldbus	Fieldb Ctrl	Yes, No	No
Number of sequences for sequence start.	No of Seq	No, 2, 3	No
Language to use on display	Language	US/UK, FI, SE, PT, NL, IT, FR, ES, DE, CN, RU, TR, PL, CZ	US/UK

PST(B) – The advanced range

Technical data

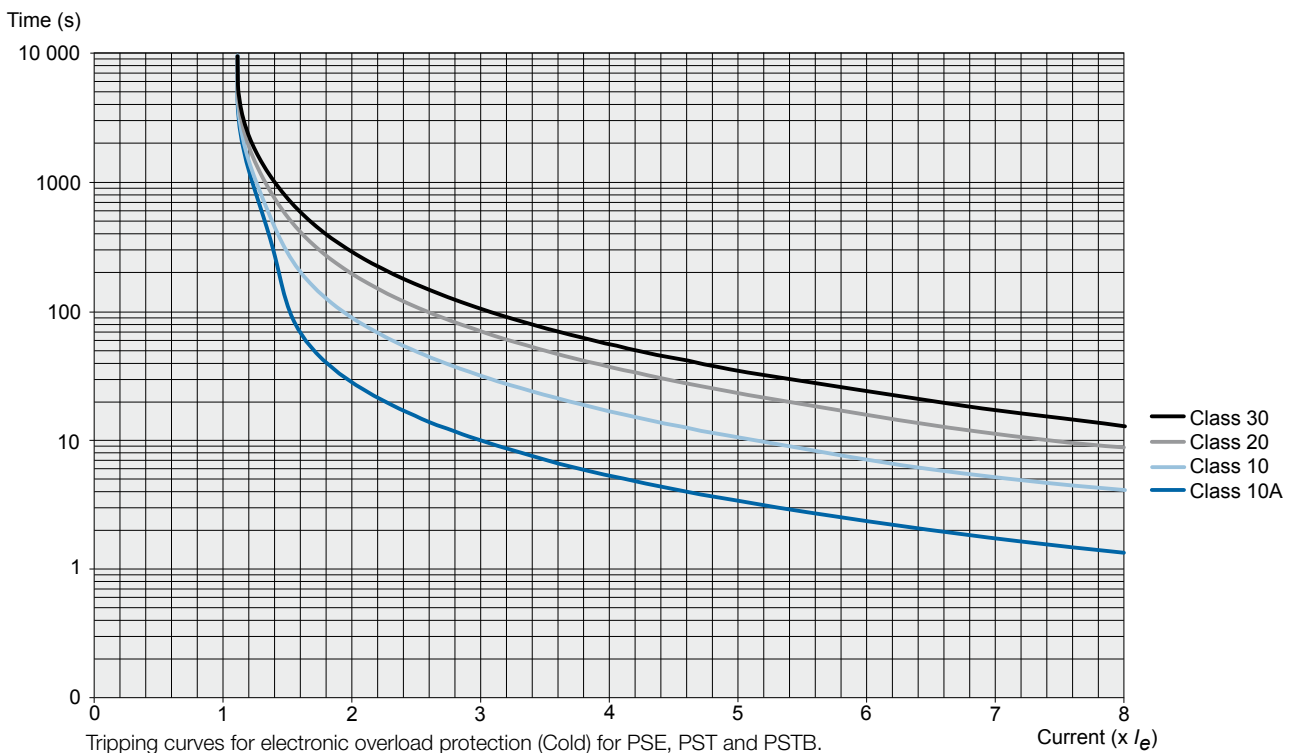
Softstarters
Type PST

Description	Text on display	Values on display	Default value
Password for display	Password	No, 1 ... 255	
Start mode	Start Mode	Volt, Torque	Volt
Stop mode	Stop Mode	Volt, Torque	Volt
Torque limit	Torque limit	20 ... 200 %	150 %
Analog output	Analogue Out	Yes, No	No
Analog output, reference	Anl Ref	0 ... 10 V, 0 ... 20 mA, 4 ... 20 mA	4 ... 20 mA
Analog output, type of value	Anl Type	I Amp, U Volt, P kW, P hp, Q kVAr, S kVA, TmpMot, TmpSCR, cosPhi	I Amp

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Tripping curves for the integrated electronic overload protection


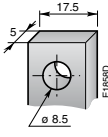
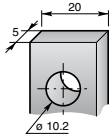
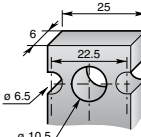
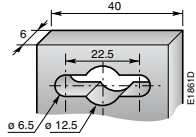
All units have an integrated electronic overload protection possible to set on four different tripping classes. Below you find a curve for each tripping class in cold state. These tripping curves are valid for PSE, PST and PSTB



PST(B) – The advanced range

Technical data

Cross section of connection cables

		Softstarter				
		PST30 ... 72	PST85 ... 142	PST175 ... 300	PSTB370 ... 470	PSTB570 ... 1050
Main circuit						
Available terminals:	L1, L2, L3	Yes	Yes	Yes	Yes	Yes
	T1, T2, T3	Yes	Yes	Yes	Yes	Yes
(For external by-pass)	B1, B2, B3	Yes	Yes	Yes	No	No
5 Connection clamp						
Solid/stranded	1 x mm ² (AWG)	10 ... 95 (8-3/0)	See accessories			
Solid/stranded	2 x mm ² (AWG)	6 ... 35 (10-2)	See accessories			
Tightening torque (recommended)	Nm (lb-in)	6.0 (53.10)	See accessories			
Connection bar						
Width and thickness	mm (in)	–	17.5 x 5 (0.689 x 0.197)	20 x 5 (0.787 x 0.197)	25 x 6 (0.984 x 0.236)	40 x 6 (1.575 x 0.236)
Hole diameter	mm (in)	–	8.5 (0.335)	10.2 (0.402)	10.5 (0.413)	6.5, 12.5 (0.256, 0.492)
Tightening torque (recommended)	Nm (lb-in)	–	18 (159.3)	28 (247.8)	35 (309.8)	45 (398.3)
Supply and control circuit						
Connection clamp				Yes		
Solid/stranded	1 x mm ² (AWG)			2.5 (14)		
Solid/stranded	2 x mm ² (AWG)			1.5 (16)		
Tightening torque (recommended)	Nm (lb-in)			0.5 (4.43)		

PST(B) – The advanced range

Technical data

Softstarters
Type PST

Fuse ratings and power losses

For Softstarter Type	Recommended ABB Overload protection		Max power loss at rated I_e		Max semi-conductor fuse rating - main circuit Coordination type 2 (65 kA) ³⁾			Supply circuit power requirements ¹⁾ VA/VA pull in
	Type	Current range A	without by-pass ²⁾ W	with by-pass W	Bussman Fuses, DIN43 620			
					A	Type	Size	
PST								
PST30	Integrated	9...35	100	9.5	80	170M1566	000	5
PST37	Integrated	11...43	120	10.5	125	170M1568	000	5
PST44	Integrated	13...51	140	13.5	160	170M1569	000	5
PST50	Integrated	15...58	160	13.5	160	170M1569	000	5
PST60	Integrated	18...69	190	15.5	200	170M1570	000	5
PST72	Integrated	22...83	230	17	250	170M1571	000	5
PST85	Integrated	25...98	270	30.5	315	170M1572	000	10
PST105	Integrated	32...120	325	35	400	170M3819	1	10
PST142	Integrated	43...163	435	37	450	170M5809	2	10
PST175	Integrated	53...201	540	62	500	170M5810	2	15
PST210	Integrated	63...241	645	67	630	170M5812	2	15
PST250	Integrated	75...288	765	67	700	170M5813	2	15
PST300	Integrated	90...345	920	90	900	170M6813	3	15
PSTB 600 V								
PSTB370	Integrated	111...425	N/A	90	700	170M5813	2	20/480
PSTB470	Integrated	141...540	N/A	110	900	170M6813	3	20/480
PSTB570	Integrated	171...655	N/A	105	900	170M6813	3	25/900
PSTB720	Integrated	216...828	N/A	110	1250	170M8554	3	25/860
PSTB840	Integrated	252...966	N/A	170	1500	170M8556	3	25/860
PSTB1050	Integrated	315...1207	N/A	170	1800	170M8558	3	25/860
PSTB 690 V								
PSTB370	Integrated	111...425	N/A	90	700	170M5813	2	20/480
PSTB470	Integrated	141...540	N/A	110	900	170M6813	3	20/480
PSTB570	Integrated	171...655	N/A	105	900	170M6813	3	25/900
PSTB720	Integrated	216...828	N/A	110	1250	170M8554	3	25/860
PSTB840	Integrated	252...966	N/A	170	1500	170M8556	3	25/860
PSTB1050	Integrated	315...1207	N/A	170	1600	170M8557	3	25/860

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¹⁾ For the supply circuit use a maximum 6 A time-delay fuse or an MCB with type C characteristics.

²⁾ Calculated power loss at operational current (I_{op}) without by-pass.

P_{tot} = 3 x I_{op} + VA value
Example: PST 60 running at 52 A
P_{tot} = 3 x 52 + 5 = 161 W

³⁾ Max fuse rating independent of In-Line or Inside Delta connection. In Inside Delta connections of PST, the fuses can be placed outside of the delta. For PSTB the fuses shall be placed inside the delta. Contact ABB for more information.

FBP FieldBusPlug

DeviceNet, MODBUS-RTU and CANopen, ordering details

DeviceNet FieldBusPlug

Ready-made DeviceNet fieldbus interface with various cable lengths.

- Applicable on all FBP motor starters and other devices
- Degree of protection IP65, diagnostic LED



Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
DeviceNet-FBP	0.25 m (0.82 ft)	DNP21-FBP.025	1	0.09 (0.198)	1SAJ230000R1003
DeviceNet-FBP	0.50 m (1.64 ft)	DNP21-FBP.050	1	0.10 (0.220)	1SAJ230000R1005
DeviceNet-FBP	1.00 m (3.28 ft)	DNP21-FBP.100	1	0.13 (0.287)	1SAJ230000R1010
DeviceNet-FBP	5.00 m (16.40 ft)	DNP21-FBP.500	1	0.36 (0.794)	1SAJ230000R1050

MODBUS-RTU FieldBusPlug

Ready-made MODBUS-RTU fieldbus interface with various cable lengths.

- Applicable on all FBP motor starters and other devices
- Degree of protection IP65, diagnostic LED

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
MODBUS-RTU-FBP	0.25 m (0.82 ft)	MRP21-FBP.025	1	0.09 (0.198)	1SAJ250000R0003
MODBUS-RTU-FBP	0.50 m (1.64 ft)	MRP21-FBP.050	1	0.10 (0.220)	1SAJ250000R0005
MODBUS-RTU-FBP	1.00 m (3.28 ft)	MRP21-FBP.100	1	0.13 (0.287)	1SAJ250000R0010
MODBUS-RTU-FBP	5.00 m (16.40 ft)	MRP21-FBP.500	1	0.36 (0.794)	1SAJ250000R0050



DNP21-FBP
MRP21-FBP
COP21-FBP

CANopen FieldBusPlug

Ready-made CANopen fieldbus interface with various cable lengths.

- Applicable on all FBP motor starters and other devices
- Degree of protection IP65, diagnostic LED

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
CANopen-FBP	0.25 m (0.82 ft)	COP21-FBP.025	1	0.09 (0.198)	1SAJ230100R1003
CANopen-FBP	0.50 m (1.64 ft)	COP21-FBP.050	1	0.10 (0.220)	1SAJ230100R1005
CANopen-FBP	1.00 m (3.28 ft)	COP21-FBP.100	1	0.13 (0.287)	1SAJ230100R1010

To connect the PST Softstarter to a DeviceNet or CANopen fieldbus system...

you need specific software for PLC set-up, (EDS file) which is available at www.abb.com/lowvoltage on the Softstarter pages. Look under the documentation-link named Software. If you need help or advice, please contact your local ABB office.

FBP FieldBusPlug

DeviceNet, MODBUS-RTU and CANopen accessories, ordering details

Accessories for the DeviceNet, MODBUS-RTU and CANopen bus connector



DNF11-FBP.050



DNM11-FBP.050

DeviceNet, MODBUS-RTU and CANopen round cable for bus junctions

Ready-made bus cable with an M12 connector and an open cable end.

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Round cable with female connector	0.50 m (1.64 ft)	DNF11-FBP.050	1	0.04 (0.088)	1SAJ923002R0005
Round cable with male connector	0.50 m (1.64 ft)	DNM11-FBP.050	1	0.04 (0.088)	1SAJ923003R0005

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DeviceNet, MODBUS-RTU and CANopen round cable for bus extension

Ready-made bus cable with M12 male and female connectors

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Extension cable	1.00 m (3.28 ft)	DNX11-FBP.100	1	0.08 (0.176)	1SAJ923001R0010
Extension cable	3.00 m (9.84 ft)	DNX11-FBP.300	1	0.20 (0.441)	1SAJ923001R0030
Extension cable	5.00 m (16.40 ft)	DNX11-FBP.500	1	0.31 (0.683)	1SAJ923001R0050
Round cable	100.00 m (328 ft)	DNC11-FBP.999	1	5.60 (12.346)	1SAJ923004R1000



DNX11-FDP



DNM11-FBP.0

DNF11-FBP.0



DNR11-FBP.120

DeviceNet, MODBUS-RTU and CANopen round cable connectors

Bus cable and coupling accessories

Designation	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Male connector for round cable	DNM11-FBP.0	5	0.15 (0.331)	1SAJ923005R0001
Female connector for round cable	DNF11-FBP.0	5	0.15 (0.331)	1SAJ923006R0001

DeviceNet, MODBUS-RTU and CANopen termination resistor

Designation	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Termination Resistor, 120 Ohm	DNR11-FBP.120	1	0.02 (0.044)	1SAJ923007R0001

FBP FieldBusPlug

Profibus DP, ordering details

5



PDP22-FBP

Profibus DP FieldBusPlug

Ready-made Profibus DP fieldbus interface with various cable lengths.

- Supports PROFIBUS DP V0 and V1
- Applicable on all FBP motor starters and other devices
- Degree of protection IP65, diagnostic LED



Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Profibus DP FBP	0.25 m (0.82 ft)	PDP22-FBP.025	1	0.09 (0.198)	1SAJ240100R1003
Profibus DP FBP	0.50 m (1.64 ft)	PDP22-FBP.050	1	0.10 (0.220)	1SAJ240100R1005
Profibus DP FBP	1.00 m (3.28 ft)	PDP22-FBP.100	1	0.13 (0.287)	1SAJ240100R1010
Profibus DP FBP	2.00 m (6.56 ft)	PDP22-FBP.200	1	0.20 (0.441)	1SAJ240100R1020
Profibus DP FBP	5.00 m (16.40 ft)	PDP22-FBP.500	1	0.36 (0.794)	1SAJ240100R1050



PDQ22-FBP

Profibus DP FieldBusPlug for 4 devices

PDQ22 is a member of the ABB FieldBusPlug family of bus connectors. It allows the connection of up to four devices to Profibus DP by just using one Profibus node access. This allows a cost efficient device integration for devices that are located physically nearby. PDQ22 supports DP-V0 and DP-V1. The degree of protection is IP66. There are separate diagnosis LEDs for bus and device status.

Note that the accessory PDQ22-FBP only works with the PSR and PSE and not with the PST(B) softstarter.

Designation	Type	Packing piece	Catalog number
Quadruple bus connector	PDQ22-FBP	1	1SAJ240200R0050
DINrail adapter for PDQ22-FBP	CDA11-FBP.0	1	1SAJ929300R0001
Fixing bracket for passive plug of connection cable	CDP11-FBP.0	1	1SAJ929100R0001



Configuration software

This cable and software can be used for set-up and commissioning of the softstarter as well as to keep back-up of the parameter settings.

Designation	Type	Packing piece	Catalog number
USB to FBP interface cable	UTF21-FBP	1	1SAJ929400R0002
PDP22/PDQ22 Device Type Manager (DTM) incl. FDT/DTM frame application	PBDTM-FBP	1	1SAJ924012R0003

To connect the PST Softstarter to a Profibus DP fieldbus system...

you need specific software for PLC set-up, (GSD file) which is available at www.abb.com/lowvoltage on the Softstarter pages. Look under the documentation-link named Software. If you need help or advice, please contact your local ABB office.

PDP21 is replaced by PDP22.
Use PDP22 with the GSD-file Abb_082d.gsd regardless if the PLC is a DP/V0 or DP/V1.

FBP FieldBusPlug

Profibus DP accessories, ordering details



Accessories for the Profibus DP Bus Connector

Profibus DP Round Cable for Bus Junctions

Ready-made bus cable with an M12 connector and an open cable end.

- Application on bus junctions such as e.g. Profibus DB couplers or devices with an integrated Profibus DB interface



PDF11-FBP.50



PDM11-FBP.50

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Round Cable with female connector	0.50 m (1.64 ft)	PDF11-FBP.050	1	0.04 (0.088)	1SAJ924002R0005
Round Cable with male connector	0.50 m (1.64 ft)	PDM11-FBP.050	1	0.04 (0.088)	1SAJ924003R0005

Profibus DP Round Cable for Bus Extension

Ready-made bus cable with M12 male and female connectors

Round cable on coil



PDX11-FBP



PDM11-FBP



PDF11-FBP



PDR11-FBP.150



PDV11-FBP,
PDV12-FBP



PDA11-FBP.050



PDA12-FBP.050

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Extension Cable	0.50 m (1.64 ft)	PDX11-FBP.050	1	0.04 (0.088)	1SAJ924001R0005
Extension Cable	1.00 m (3.28 ft)	PDX11-FBP.100	1	0.08 (0.176)	1SAJ924001R0010
Extension Cable	3.00 m (9.84 ft)	PDX11-FBP.300	1	0.20 (0.441)	1SAJ924001R0030
Extension Cable	5.00 m (16.40 ft)	PDX11-FBP.500	1	0.31 (0.683)	1SAJ924001R0050
Round Cable	100.00 m (328 ft)	PDC11-FBP.999	1	5.60 (12.346)	1SAJ924004R1000

Profibus DP Accessories for Bus Extension

Designation	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Male Connector for round cable	PDM11-FBP.0	5	0.03 (0.066)	1SAJ924005R0001
Female Connector for round cable	PDF11-FBP.0	5	0.03 (0.066)	1SAJ924006R0001

Profibus DP Termination Resistor, Miscellaneous Accessories

Designation	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Termination Resistor, 150 Ohm	PDR11-FBP.150	1	0.03 (0.066)	1SAJ924007R0001
Feeding connector 24V DC, Code B-A	PDV11-FBP.0	1	0.04 (0.088)	1SAJ924008R0001
Feeding connector 24V DC, Code A-A	PDV12-FBP.0	1	0.04 (0.088)	1SAJ924011R0001
Adaptor M12-Dsub9-M12 Cable length 0.50m	PDA11-FBP.050	1	0.04 (0.088)	1SAJ924009R0005
Adaptor M12-Dsub9-M12 Cable length 2 x 0.50m	PDA12-FBP.050	1	0.04 (0.088)	1SAJ924010R0005

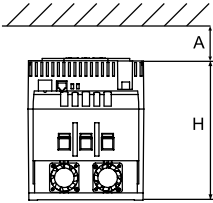
Extension cable

Designation	Cable length	Type	Packing piece	Weight kg (lb) 1 piece	Catalog number
Extension cable (female/male), shielded	0.3 m (0.98 ft)	CDP15-FBP.030	1		1SAJ929140R0003
Extension cable (female/male), shielded	0.6 m (1.97 ft)	CDP15-FBP.060	1		1SAJ929140R0006
Extension cable (female/male), shielded	1.5 m (4.92 ft)	CDP15-FBP.150	1	0.20 (0.441)	1SAJ929140R0015
Extension cable (male/open), shielded	1.5 m (4.92 ft)	CDP16-FBP.150	1	0.20 (0.441)	1SAJ929150R0015

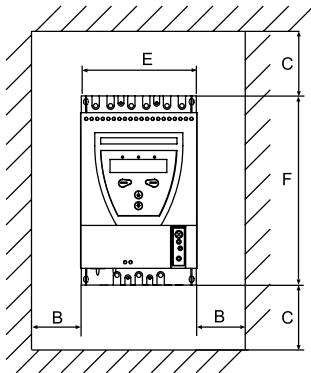
Wall mounting instructions

Softstarters

Minimum distance to wall/front



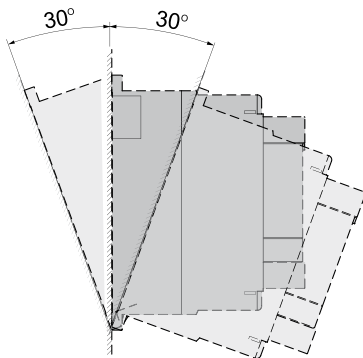
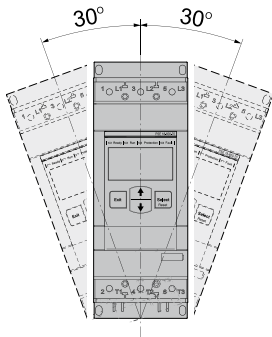
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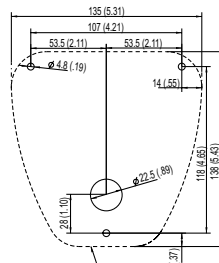
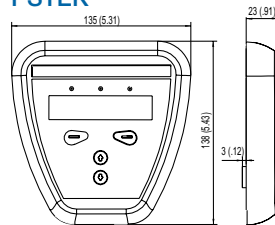
Dimensions (mm/in)

Softstarter	A	B	C	E	F	H
PSR						
PSR3 ... 16	25/0.984	0*	0	45/1.77	140/5.51	114/4.49
PSR25 ... 30	25/0.984	0*	0	45/1.77	160/6.30	128/5.04
PSR37 ... 45	25/0.984	0*	0	54/2.13	187/7.36	153/6.02
PSR60 ... 105	25/0.984	0*	0	70/2.76	220/8.66	180/7.09
PSE						
PSE18 ... 105	20/0.787	10/0.394	100/3.94	90/3.54	245/9.65	185.5/7.30
PSE142 ... 170	20/0.787	10/0.394	100/3.94	130/5.12	295/11.61	219.5/8.64
PSE210 ... 370	20/0.787	10/0.394	100/3.94	190/7.48	550/21.65	236.5/9.31
PST						
PST30 ... 72	20/0.787	10/0.394	100/3.94	160/6.30	260/10.24	196/7.72
PST85 ... 142	20/0.787	10/0.394	100/3.94	186/7.32	390/15.35	270/10.63
PST175 ... 300	20/0.787	10/0.394	100/3.94	360/14.17	420/16.54	270/10.63
PSTB						
PSTB370 ... 470	20/0.787	15/0.394	150/5.91	365/14.37	460/18.11	361/14.21
PSTB570 ... 1050	20/0.787	15/0.394	150/5.91	435/17.13	515/20.28	381/14.21

*) 5 mm/0.197 inch for the 24 V DC version



Dimensions PSTEK



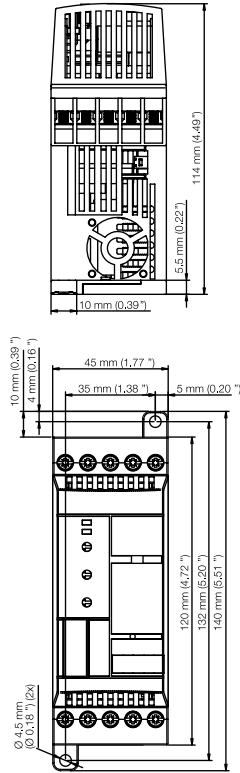
Dotted line denotes area covered by external keypad

Dimensions in mm (and inches)

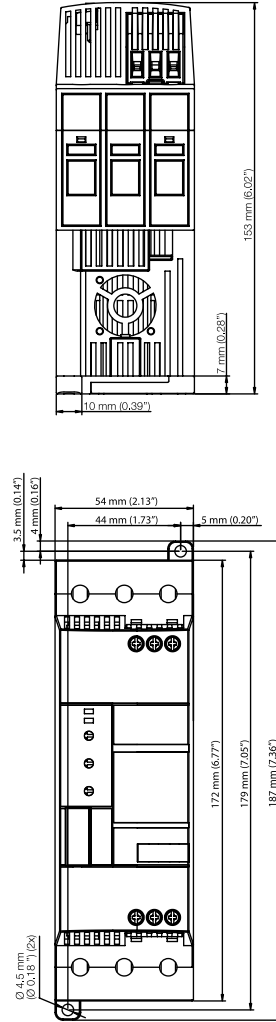
Dimensions PSR softstarters

Softstarters
Type PSR

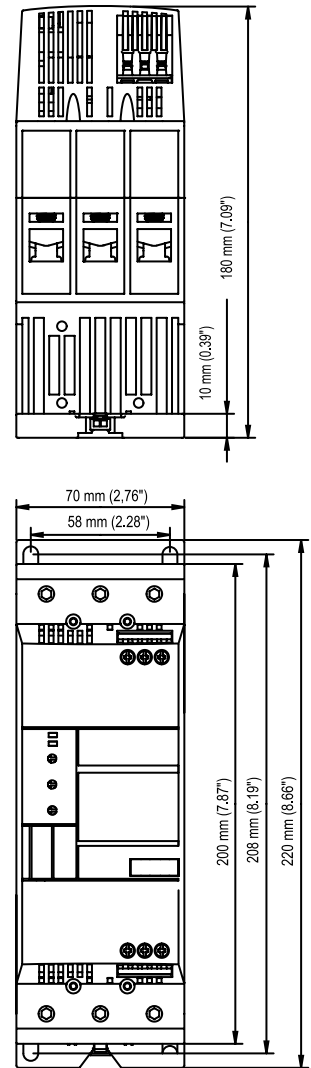
PSR3 ... 16



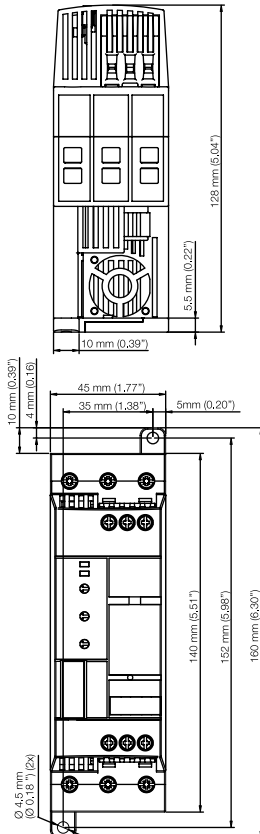
PSR37 ... 45



PSR60 ... 105



PSR25 ... 30



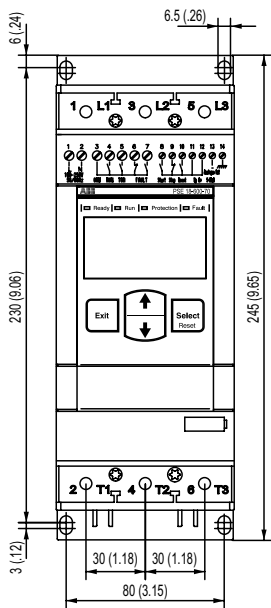
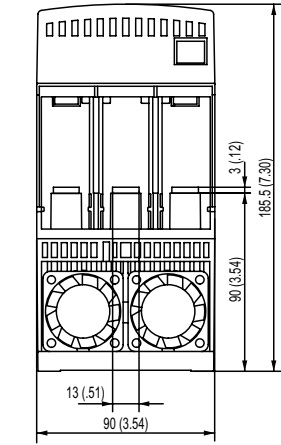
Dimensions in mm (and inches)

Dimensions

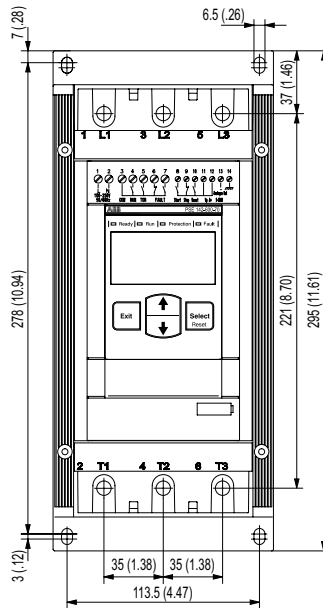
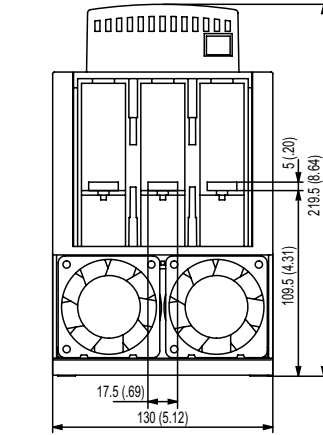
PSE softstarters

PSE18 ... 105

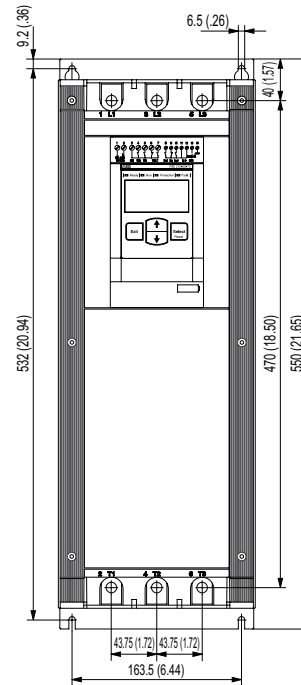
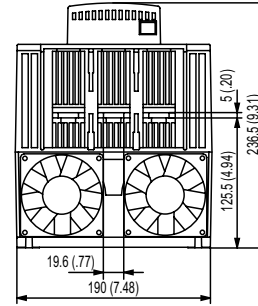
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PSE142 ...170



PSE210 ... 370



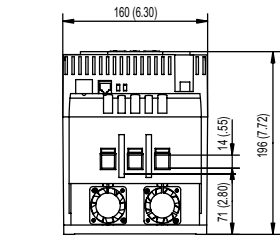
Dimensions in mm (and inches)

Dimensions

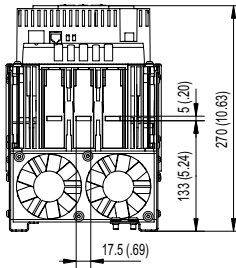
PST and PSTB softstarters

Softstarters
Type PST

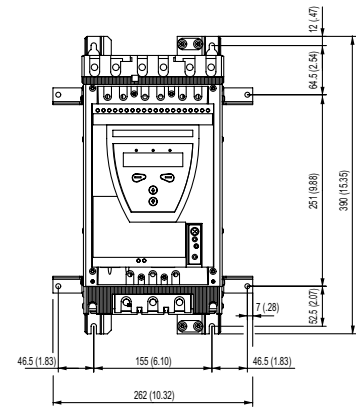
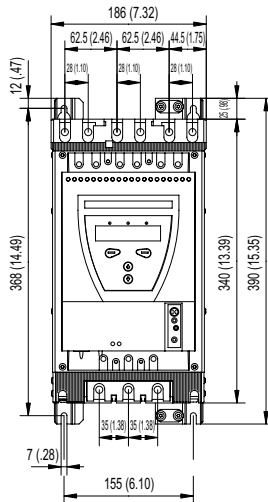
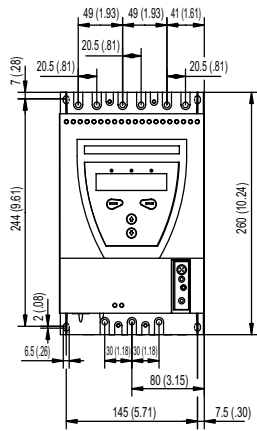
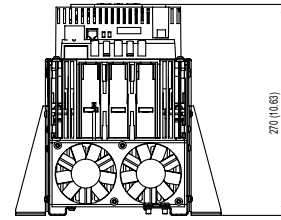
PST30 ... 72



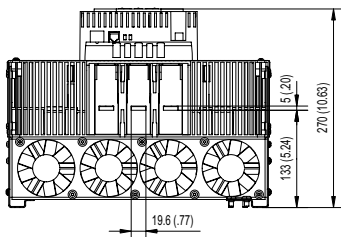
PST85 ...142



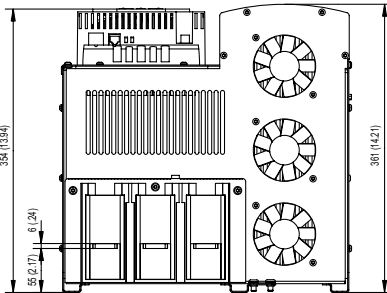
PST85 ...142 with marine kit



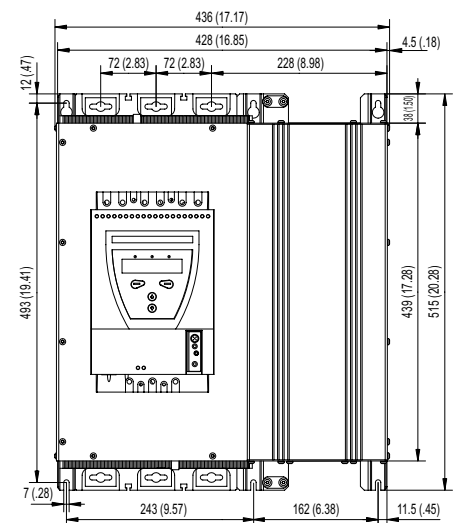
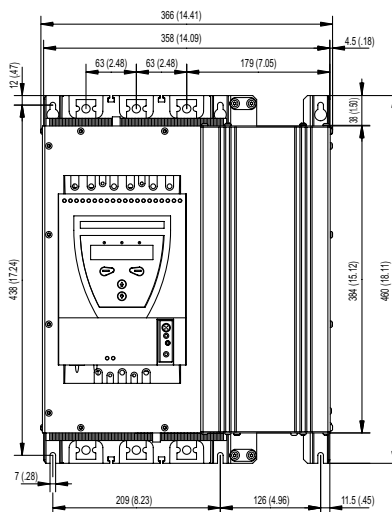
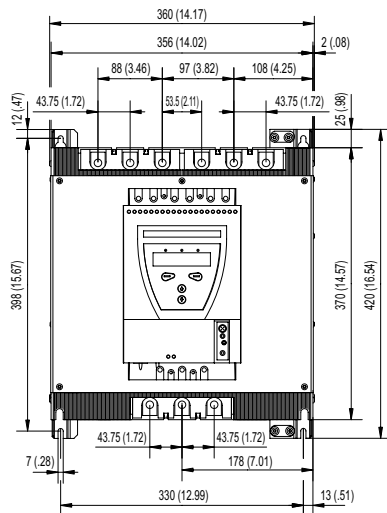
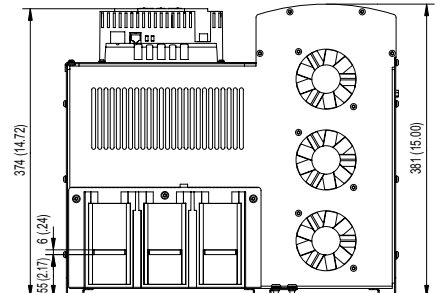
PST175 ... 300



PSTB370 ... 470



PSTB570 ... 1050



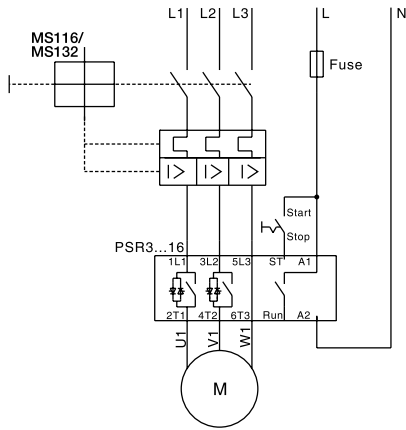
Dimensions in mm (and inches)
Low Voltage Products & Systems

Circuit diagrams

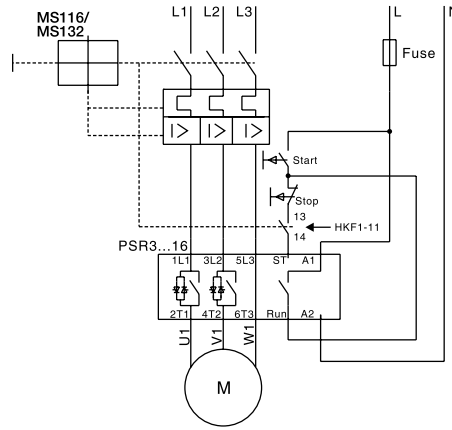
PSR softstarters

5

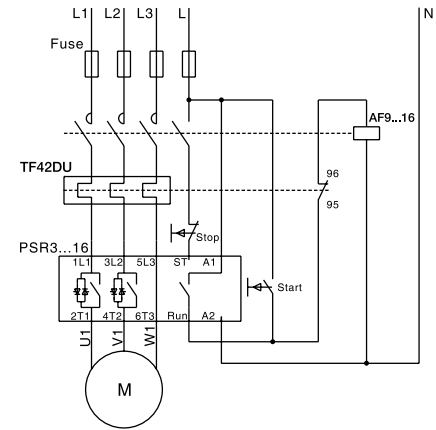
PSR3 ...16
A) With MMS



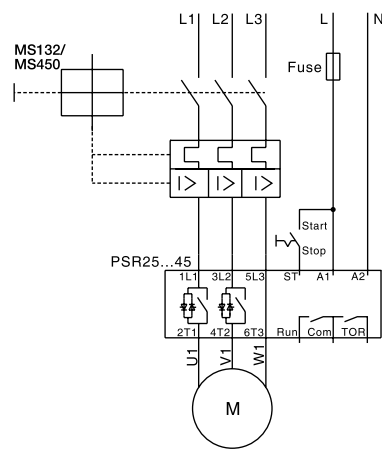
B) With MMS and auxiliary contact



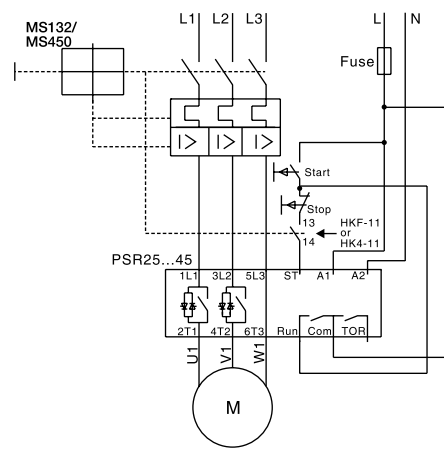
C) With fuses, contactor and O.L.



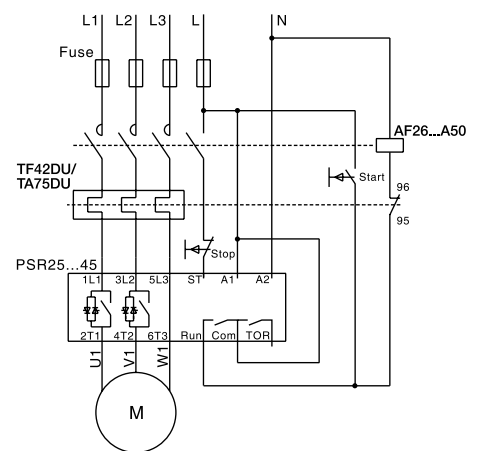
PSR25 ... 45
D) With MMS



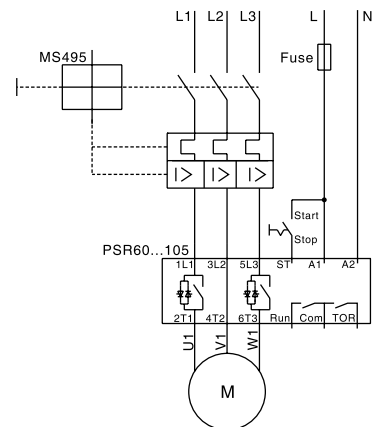
E) With MMS and auxiliary contact



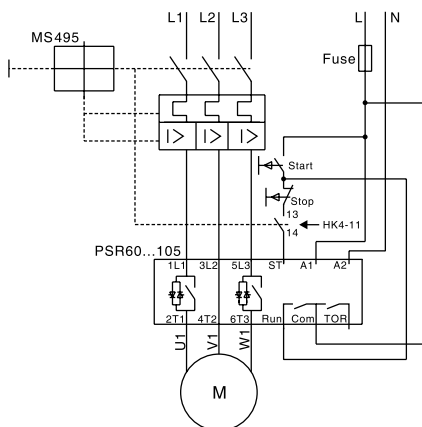
F) With fuses, contactor and O.L.



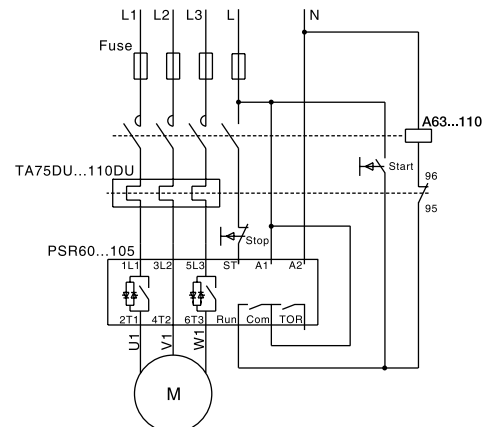
PSR60 ... 105
G) With MMS



H) With MMS and auxiliary contact



I) With fuses, contactor and O.L.

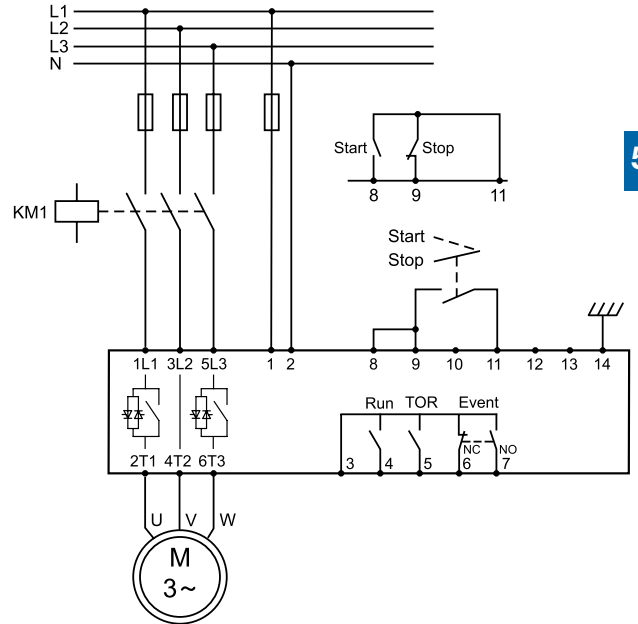
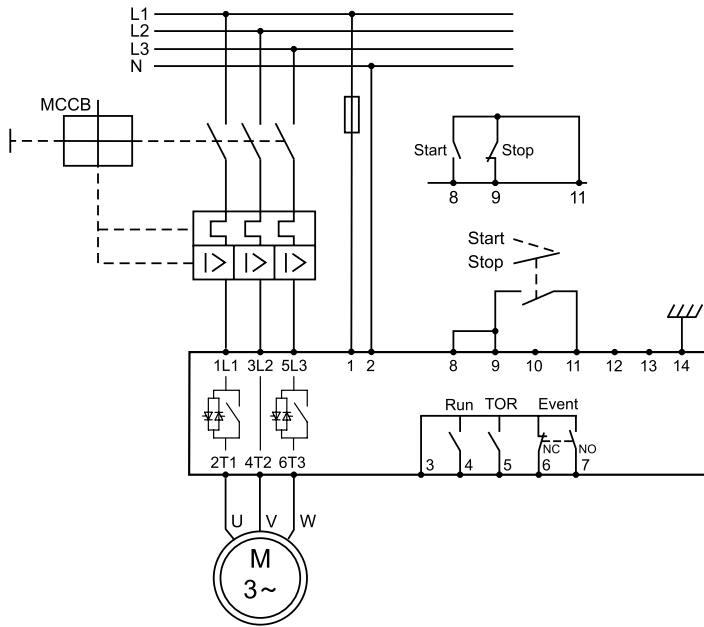


Circuit diagrams

PSE softstarters

Softstarters
Type PSE

PSE18 ... 370



5

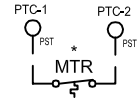
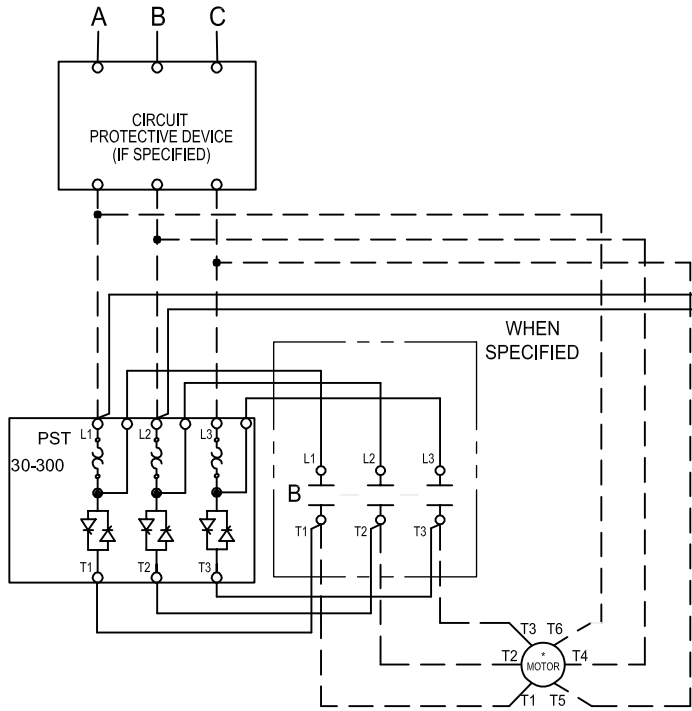
Circuit diagrams

PST30 – PST300

Inside Delta

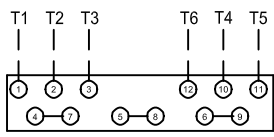
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INCOMING LINES

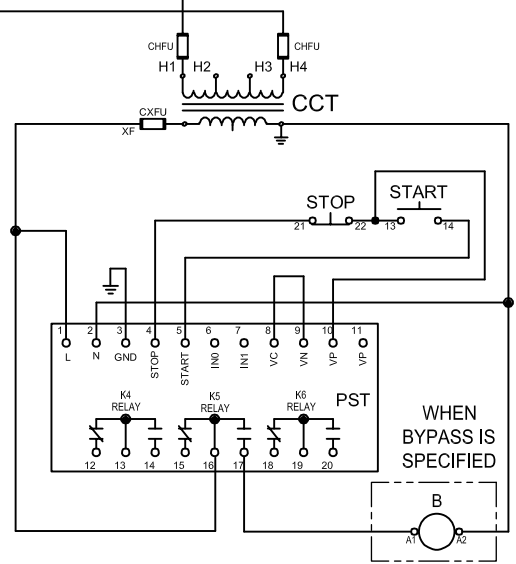
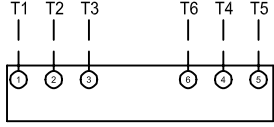


MOTOR MARKINGS ARE AS DEFINED BY NEMA MG1-2.62 FOR 12 LEAD WYE START, DELTA RUN MOTOR CONNECTIONS. ALWAYS CONFIRM CORRECT LEAD MARKINGS WITH NAMEPLATE DIAGRAMS.

12 LEAD MOTOR (High voltage)



6 LEAD MOTOR

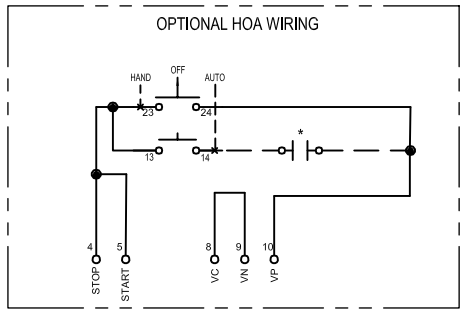


CONNECTION TORQUE: CONSULT SOFT STARTER MANUAL FOR WIRE TORQUE SPECIFICATIONS.

LEGEND	
CCT	CONTROL CIRCUIT TRANSFORMER
CHFV	CCT PRIMARY FUSE
CXFU	CCT SECONDARY FUSE
B	BYPASS CONTACTOR
PTC	THERMAL COUPLE
o 13	CONN POINT ON DEVICE WITH NUMBER
*	REMOTE DEVICE
⊗	CONNECTION POINT AT TERMINAL BLOCK

PST NOTES:

1. PROG. INPUT In0 FACTORY SET FOR RESET FAULT/OL.
2. PROG. RELAY K4 FACTORY SET FOR RUN.
3. PROG. RELAY K5 FACTORY SET FOR AT SPEED.
4. PROG. RELAY K6 FACTORY SET FOR EVENT.
5. FUNCTION MOT 1 Ie MUST BE SET TO MOTOR FLA.



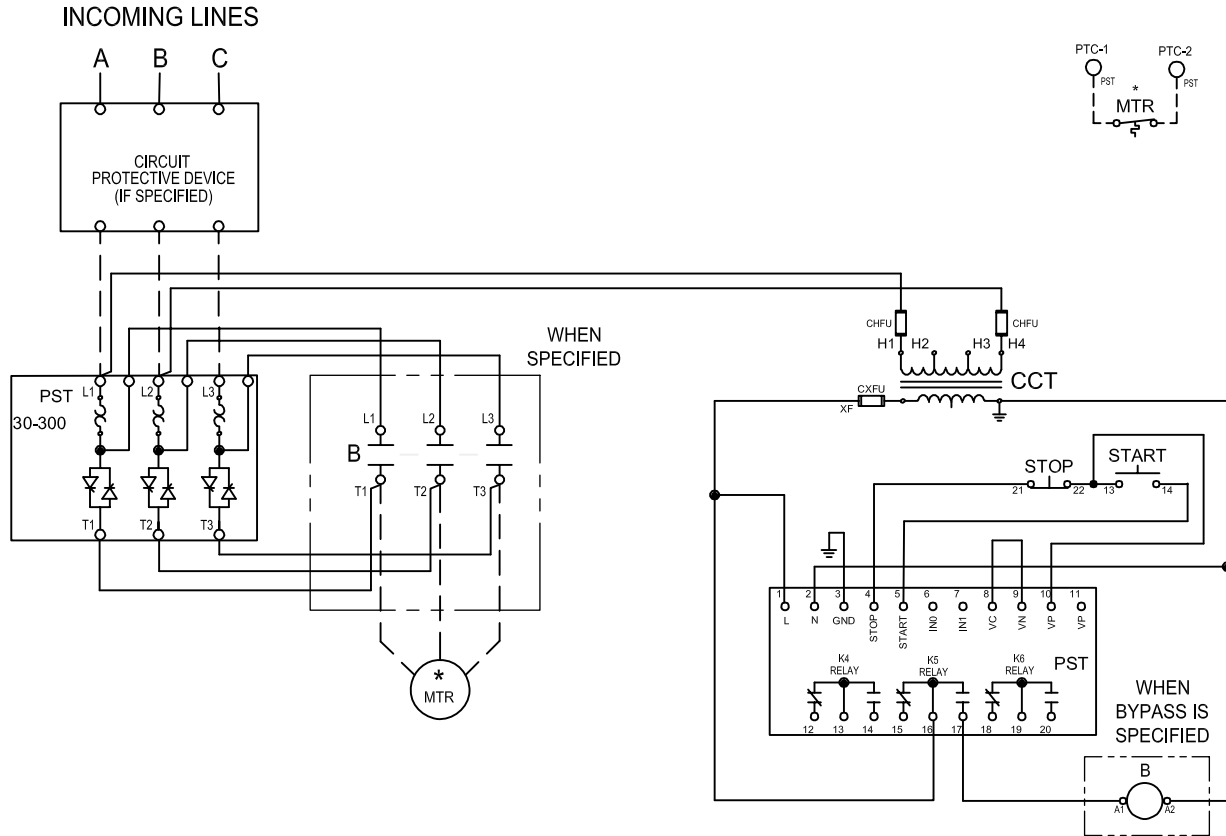
NOTES

1. ALL CONTROL WIRING TO BE 14 GA. COLOR OF CONTROL WIRE SHALL BE PER VOLTAGE ON CONTACTOR COILS:
RED-ALL AC VOLTAGES
WHITE MAY BE USED ON THE GROUNDED SIDE OF THE AC CIRCUIT IF SPECIFIED.
BLUE-ALL DC VOLTAGES
2. ALL DEVICES ARE SHOWN DE-ENERGIZED.
3. DO NOT USE SELECTOR SWITCHES WITH AUTO-RESET OVERLOAD RELAYS.

Circuit diagrams

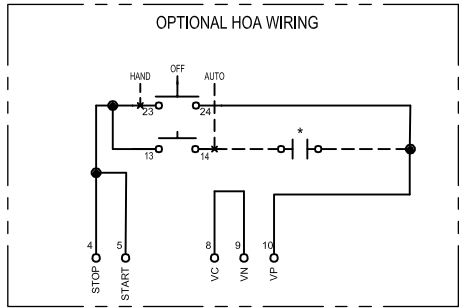
PST30 – PST300

In-Line



CONNECTION TORQUE: CONSULT SOFT STARTER MANUAL FOR WIRE TORQUE SPECIFICATIONS.

- PST NOTES:**
1. PROG. INPUT In0 FACTORY SET FOR RESET FAULT/OL.
 2. PROG. RELAY K4 FACTORY SET FOR RUN.
 3. PROG. RELAY K5 FACTORY SET FOR AT SPEED.
 4. PROG. RELAY K6 FACTORY SET FOR EVENT.
 5. FUNCTION MOT 1 Ie MUST BE SET TO MOTOR FLA.



LEGEND	
CCT	CONTROL CIRCUIT TRANSFORMER
CHFU	CCT PRIMARY FUSE
CXFU	CCT SECONDARY FUSE
B	BYPASS CONTACTOR
PTC	THERMAL COUPLE
o 13	CONN POINT ON DEVICE WITH NUMBER
*	REMOTE DEVICE
Ø	CONNECTION POINT AT TERMINAL BLOCK

NOTES

1. ALL CONTROL WIRING TO BE 14 GA. COLOR OF CONTROL WIRE SHALL BE PER VOLTAGE ON CONTACTOR COILS:

RED-ALL AC VOLTAGES
WHITE MAY BE USED ON THE GROUNDED SIDE OF THE AC CIRCUIT IF SPECIFIED.

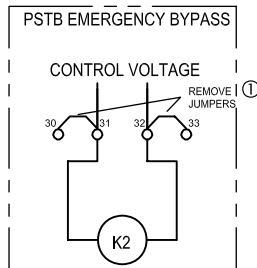
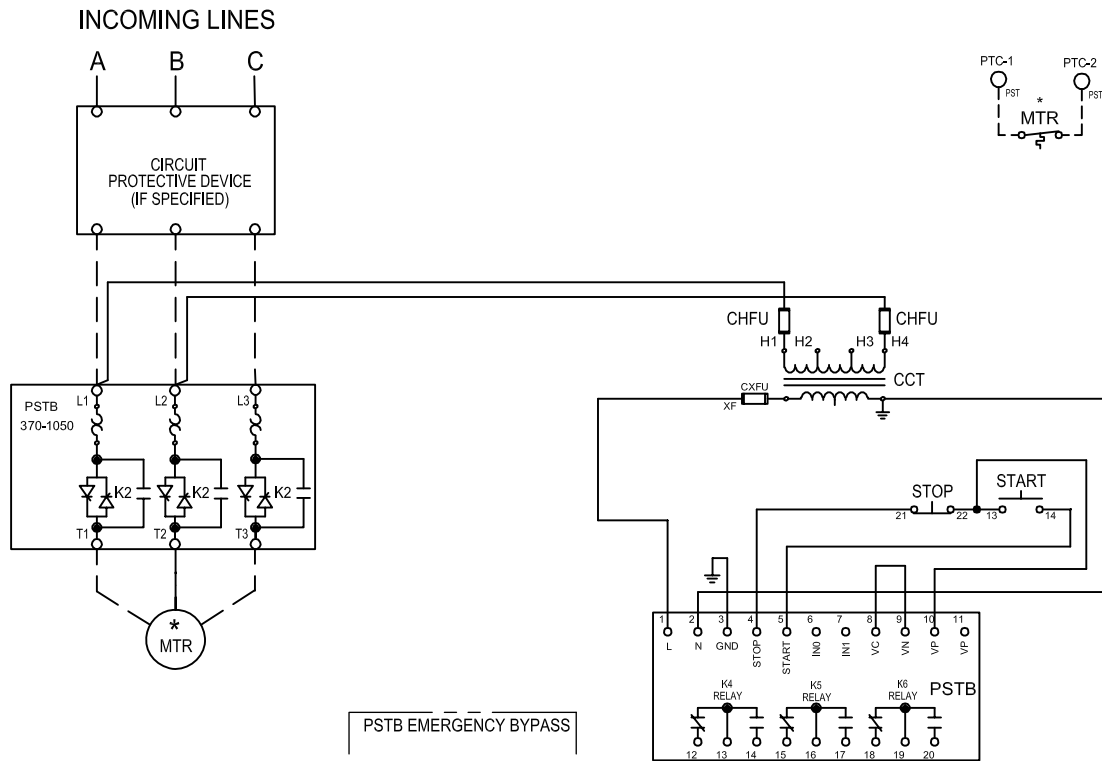
BLUE-ALL DC VOLTAGES
2. ALL DEVICES ARE SHOWN DE-ENERGIZED.
3. DO NOT USE SELECTOR SWITCHES WITH AUTO-RESET OVERLOAD RELAYS.

Circuit diagrams

PSTB370 – PSTB1050

In-Line

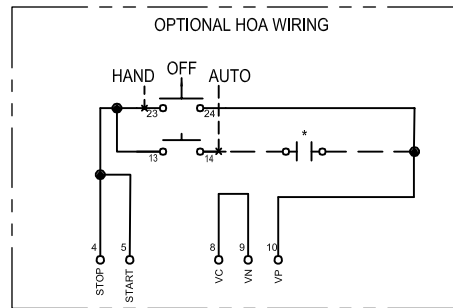
5



CONNECTION TORQUE: CONSULT SOFT STARTER MANUAL FOR WIRE TORQUE SPECIFICATIONS.

PST NOTES:

1. PROG. INPUT In0 FACTORY SET FOR RESET FAULT/OL.
2. PROG. RELAY K4 FACTORY SET FOR RUN.
3. PROG. RELAY K5 FACTORY SET FOR AT SPEED.
4. PROG. RELAY K6 FACTORY SET FOR EVENT.
5. FUNCTION MOT 1 le MUST BE SET TO MOTOR FLA.



NOTES

1. ALL CONTROL WIRING TO BE 14 GA. COLOR OF CONTROL WIRE SHALL BE PER VOLTAGE ON CONTACTOR COILS:

RED-ALL AC VOLTAGES
WHITE MAY BE USED ON THE GROUNDED SIDE OF THE AC CIRCUIT IF SPECIFIED.

BLUE-ALL DC VOLTAGES

2. ALL DEVICES ARE SHOWN DE-ENERGIZED.
3. DO NOT USE SELECTOR SWITCHES WITH AUTO-RESET OVERLOAD RELAYS.

LEGEND	
CCT	CONTROL CIRCUIT TRANSFORMER
CHF1	CCT PRIMARY FUSE
CXFU	CCT SECONDARY FUSE
B	BYPASS CONTACTOR
PTC	THERMAL COUPLE
o 13	CONN POINT ON DEVICE WITH NUMBER
*	REMOTE DEVICE
Ø	CONNECTION POINT AT TERMINAL BLOCK

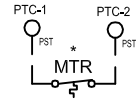
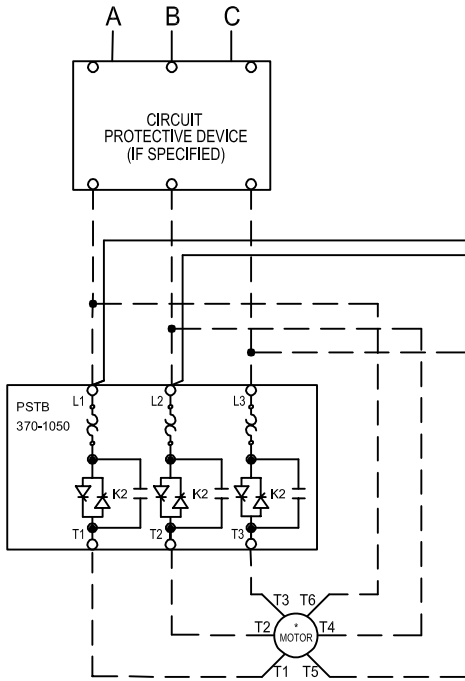
① See page 5.35 for across the line rated (AC3) contactor ratings..

Circuit diagrams

PSTB370 – PSTB1050

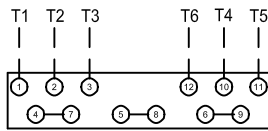
Inside Delta

INCOMING LINES

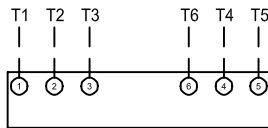


MOTOR MARKINGS ARE AS DEFINED BY NEMA MG1-2.62 FOR 12 LEAD WYE START, DELTA RUN MOTOR CONNECTIONS. ALWAYS CONFIRM CORRECT LEAD MARKINGS WITH NAMEPLATE DIAGRAMS.

12 LEAD MOTOR (High voltage)

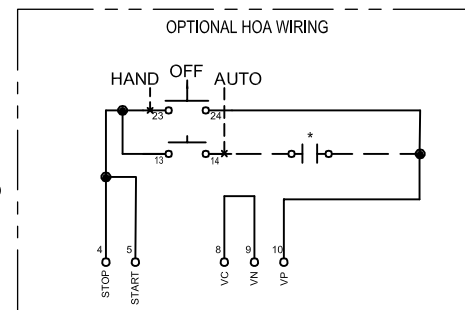
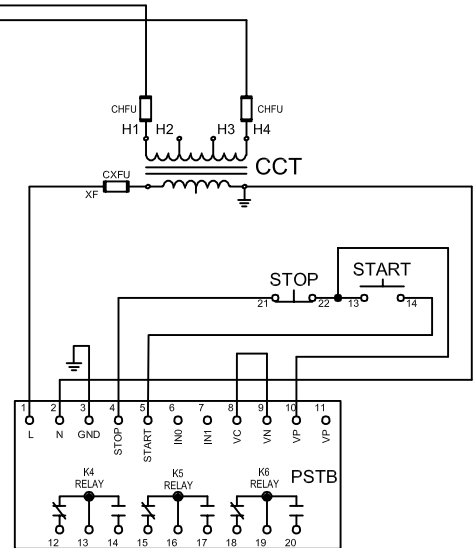
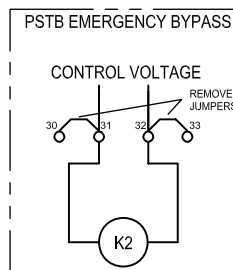


6 LEAD MOTOR



CONNECTION TORQUE: CONSULT SOFT STARTER MANUAL FOR WIRE TORQUE SPECIFICATIONS.

LEGEND	
CCT	CONTROL CIRCUIT TRANSFORMER
CHFUF	CCT PRIMARY FUSE
CXFUF	CCT SECONDARY FUSE
B	BYPASS CONTACTOR
PTC	THERMAL COUPLE
o 13	CONN POINT ON DEVICE WITH NUMBER
*	REMOTE DEVICE
Ø	CONNECTION POINT AT TERMINAL BLOCK



NOTES

1. ALL CONTROL WIRING TO BE 14 GA. COLOR OF CONTROL WIRE SHALL BE PER VOLTAGE ON CONTACTOR COILS:

RED-ALL AC VOLTAGES
WHITE MAY BE USED ON THE GROUNDED SIDE OF THE AC CIRCUIT IF SPECIFIED.

BLUE-ALL DC VOLTAGES

2. ALL DEVICES ARE SHOWN DE-ENERGIZED.
3. DO NOT USE SELECTOR SWITCHES WITH AUTO-RESET OVERLOAD RELAYS.

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4. PROG. RELAY K6 FACTORY SET FOR EVENT.
5. FUNCTION MOT 1 Ie MUST BE SET TO MOTOR FLA.

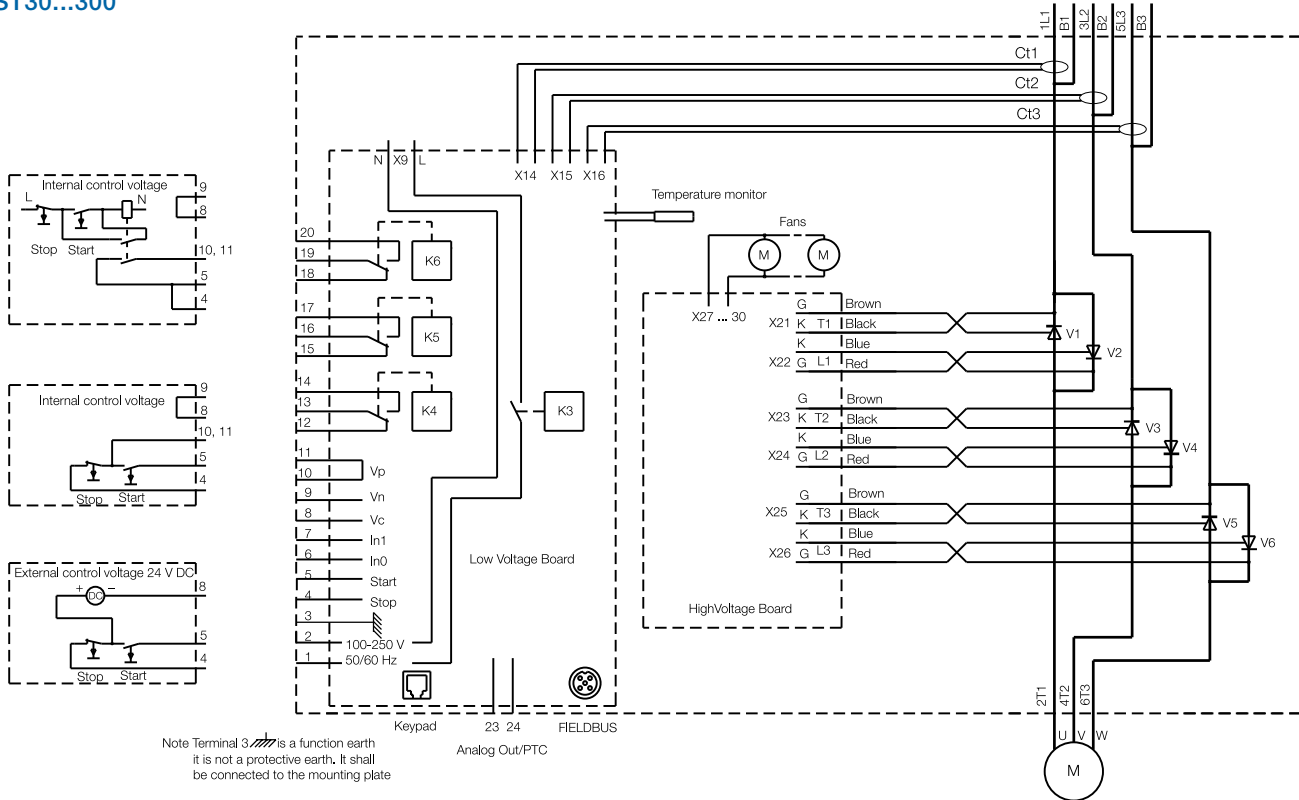
① See page 5.35 for across the line rated (AC3) contactor ratings.

Circuit diagrams

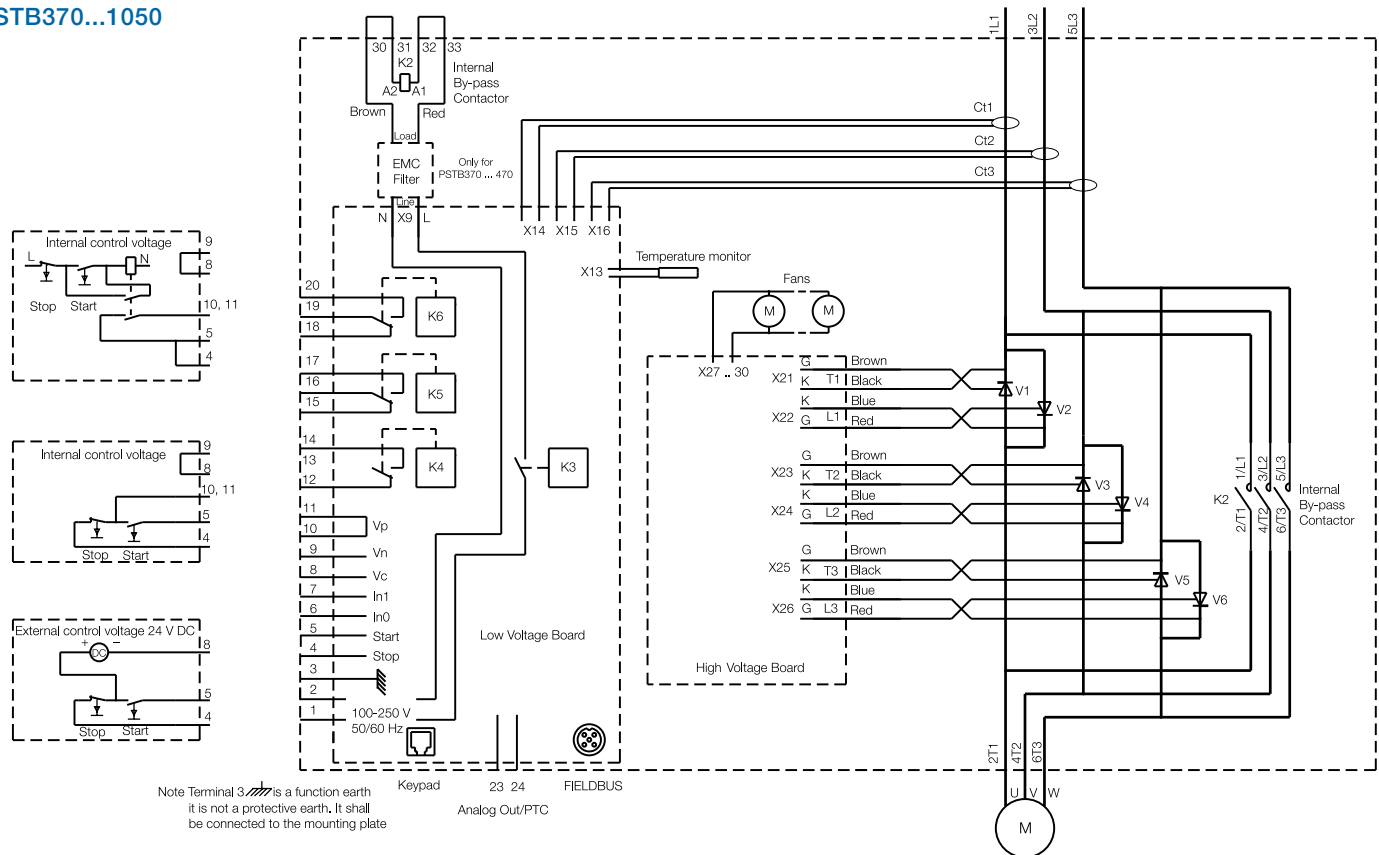
PST and PSTB softstarters

PST30...300

5



PSTB370...1050



prosoft5 - Softstarter selection tool

The selection of a softstarter can be done according to this catalog. This will work fine in the majority of cases but by using the softstarter selection tool prosoft, a more optimized selection will be achieved. Especially in extremely heavy duty applications with several minutes starting time, the use of prosoft is recommended.

When using prosoft, the selection is done in 3 steps, which can be seen as 3 different tabs in the program:

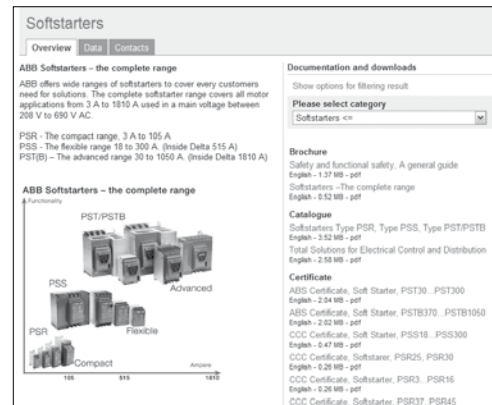
1. Input tab – Type in the general data and information about the motor and about the load. Try to use as accurate data as possible to get the most accurate results.
2. Calculation tab – Here it is possible to see how long the start will be depending on how high the current is. This tab will indicate which settings should be used and it might affect the selection.
3. The selection tab – Select which of the suggested softstarters to use. Here it is also possible to generate a report about the selection.



Marketing material available on www.abb.com/lowvoltage

The following material is a selection of all softstarter related material that is available on www.abb.com/lowvoltage. Just click on “Control Products”, then “Softstarters”.

- Product catalogs and brochures
- Certificates and approvals
- Circuit diagrams and application diagrams
- Dimension drawings (2D and 3D)
- Manuals
- eds- and gsd-files for fieldbus connection
- prosoft selection tool











Certifications and approvals

The table below shows the approvals and certifications for different softstarters.

For approvals and/or certificates not listed below, please contact your local ABB sales office.

Certifications and approvals

5

Abbreviation Approved in	Certifications						Approvals: ship classification societies	
								
	CE EU	cULus Canada USA	CCC China	GOST Russia	ANCE Mexico	C-tick Australia	ABS American Bureau of Shipping	GL Germany
PSR3 ... PSR105	•	•	•	•	–	•	–	–
PSE18 ... PSE370	•	•	•	•	•	•	–	–
PST30 ... PSTB1050	•	•	•	•	•	•	•	•

• **Standard design approved**, the company labels bear the certification mark when this is required.

Directives and standards

No. 2006/95/EC

No. 2004/108/EC

EN 60947-1

EN 60947-4-2

UL 508

CSA C22.2 No 14

Catalog number explanation Enclosed

T 100 D F 1 - 48 D M A

Soft starter settings

T – Type PST Enclosed

Horsepower

010 – 10	125 – 125	800 – 800
015 – 15	150 – 150	900 – 900
020 – 20	200 – 200	1000 – 1000
025 – 25	250 – 250	
030 – 30	300 – 300	
040 – 40	350 – 350	
050 – 50	400 – 400	
060 – 60	450 – 450	
075 – 75	500 – 500	
100 – 100	600 – 600	

Connection type

L – Inline

Combination type

No digit – non-combination
F – fusible disconnect
B – thermal magnetic circuit breaker

Enclosure

1 - NEMA/UL Type 1
2 - NEMA/UL Type 12
3 - NEMA/UL Type 3R
4 - NEMA/UL Type 4
X - NEMA/UL Type 4X stainless steel

For more factory installed options, see pages 5.60 and 5.61.

Bypass option ①

M – AC1 rated bypass contactor provided as standard

B – AC3 rated bypass contactor with emergency bypass control

Fuse clip

A – 30A, 600V, Class J	H – 1200A, 600V, Class L
B – 60A, 600V, Class J	J – 1600A, 600V, Class L
C – 100A, 600V, Class J	K – 2000A, 600V, Class L
D – 200A, 600V, Class J	
E – 400A, 600V, Class J	
F – 600A, 600V, Class J	
G – 800A, 600V, Class L	

Circuit breaker amp ratings

D – 15	M – 70	W – 225	E – 700
E – 20	N – 80	X – 250	F – 800
F – 25	P – 90	Y – 300	G – 900
G – 30	R – 100	Z – 350	H – 1000
H – 35	S – 125	A – 400	J – 1200
J – 40	T – 150	B – 450	K – 1600
K – 50	U – 175	C – 500	
L – 60	V – 200	D – 600	

Line voltage

20: 208V 120V control voltage
24: 240V 120V control voltage
48: 480V 120V control voltage
60: 600V 120V control voltage

① For more factory installed options, see pages 5.60 and 5.61.

Enclosed NEMA 1, 12, Non-combination In-Line, 5 – 1000 HP

Connected in-line 

5

Max. motor current		Maximum horsepower				NEMA1, 480V	NEMA1, 600V	NEMA12, 480V	NEMA12, 600V
UL	IEC	208V	240V	480V	600V	Catalog number	Catalog number	Catalog number	Catalog number
18	18	5	5	10	—	T010L1-48M	—	T010L2-48M	—
		—	—	—	15	—	T015L1-60M	—	T015L2-60M
28	30	7.5	10	20	—	T020L1-48M	—	T020L2-48M	—
		—	—	—	25	—	T025L1-60M	—	T025L2-60M
34	37	10	10	25	—	T025L1-48M	—	T025L2-48M	—
		—	—	—	30	—	T030L1-60M	—	T030L2-60M
42	44	10	15	30	—	T030L1-48M	—	T030L2-48M	—
		—	—	—	40	—	T040L1-60M	—	T040L2-60M
54	50	15	20	40	—	T040L1-48M	—	T040L2-48M	—
		—	—	—	50	—	T050L1-60M	—	T050L2-60M
68	72	20	25	50	—	T050L1-48M	—	T050L2-48M	—
		—	—	—	60	—	T060L1-60M	—	T060L2-60M
80	85	25	30	60	—	T060L1-48M	—	T060L2-48M	—
		—	—	—	75	—	T075L1-60M	—	T075L2-60M
104	105	30	40	75	—	T075L1-48M	—	T075L2-48M	—
		—	—	—	100	—	T100L1-60M	—	T100L2-60M
130	142	40	50	100	—	T100L1-48M	—	T100L2-48M	—
		—	—	—	125	—	T125L1-60M	—	T125L2-60M
156	175	50	60	125	—	T125L1-48M	—	T125L2-48M	—
		—	—	—	150	—	T150L1-60M	—	T150L2-60M
192	210	60	75	150	—	T150L1-48M	—	T150L2-48M	—
		—	—	—	200	—	T200L1-60M	—	T200L2-60M
248	250	75	100	200	—	T200L1-48M	—	T200L2-48M	—
		—	—	—	250	—	T250L1-60M	—	T250L2-60M
302	300	100	100	250	—	T250L1-48M	—	T250L2-48M	—
		—	—	—	300	—	T300L1-60M	—	T300L2-60M
361	370	125	150	300	—	T300L1-48MⓉ	—	T300L2-48MⓉ	—
		—	—	—	350	—	T350L1-60MⓉ	—	T350L2-60MⓉ
414	400	—	—	350	—	T350L1-48MⓉ	—	T350L2-48MⓉ	—
		—	—	—	400	—	T400L1-60MⓉ	—	T400L2-60MⓉ
480	470	150	200	400	—	T400L1-48MⓉ	—	T400L2-48MⓉ	—
		—	—	—	500	—	T500L1-60MⓉ	—	T500L2-60MⓉ
590	570	200	250	500	—	T500L1-48MⓉ	—	T500L2-48MⓉ	—
		—	—	—	600	—	T600L1-60MⓉ	—	T600L2-60MⓉ
720	720	250	300	600	—	T600L1-48MⓉ	—	T600L2-48MⓉ	—
		—	—	—	700	—	T700L1-60MⓉ	—	T700L2-60MⓉ
840	840	300	350	700	—	T700L1-48MⓉ	—	T700L2-48MⓉ	—
		—	—	—	800	—	T800L1-60MⓉ	—	T800L2-60MⓉ
960	—	350	400	800	—	T800L1-48MⓉ	—	T800L2-48MⓉ	—
		—	—	—	900	—	T900L1-60MⓉ	—	T900L2-60MⓉ
1062	1050	400	450	900	—	T900L1-48MⓉ	—	T900L2-48MⓉ	—
		—	—	—	1000	—	T1000L1-60MⓉ	—	T1000L2-60MⓉ

Ⓣ Includes integrated shunt rated (AC1) bypass contactor as standard. For across the line rated (AC3) bypass contactors, see page 5.60.

Enclosed NEMA 1, Combination In-Line, 5 – 1000 HP

Softstarters
Type PST

Connected in-line 

Max. motor current		Maximum horsepower				NEMA1, 480V Circuit breaker	NEMA1, 600V Circuit breaker	NEMA1, 480V Fused disconnect	NEMA1, 600V Fused disconnect
UL	IEC	208V	240V	480V	600V	Catalog number	Catalog number	Catalog number	Catalog number
18	18	5 —	5 —	10 —	— 15	T010LB1-48EM —	— T015LB1-60EM	T010LF1-48AM —	— T015LF1-60AM
28	30	7.5 —	10 —	20 —	— 25	T020LB1-48JM —	— T025LB1-60JM	T020LF1-48BM —	— T025LF1-60BM
34	37	10 —	10 —	25 —	— 30	T025LB1-48KM —	— T030LB1-60KM	T025LF1-48BM —	— T030LF1-60BM
42	44	10 —	15 —	30 —	— 40	T030LB1-48LM —	— T040LB1-60LM	T030LF1-48CM —	— T040LF1-60CM
54	50	15 —	20 —	40 —	— 50	T040LB1-48NM —	— T050LB1-60NM	T040LF1-48CM —	— T050LF1-60CM
68	72	20 —	25 —	50 —	— 60	T050LB1-48RM —	— T060LB1-60RM	T050LF1-48CM —	— T060LF1-60CM
80	85	25 —	30 —	60 —	— 75	T060LB1-48SM —	— T075LB1-60SM	T060LF1-48DM —	— T075LF1-60DM
104	105	30 —	40 —	75 —	— 100	T075LB1-48TM —	— T100LB1-60TM	T075LF1-48DM —	— T100LF1-60DM
130	142	40 —	50 —	100 —	— 125	T100LB1-48VM —	— T125LB1-60VM	T100LF1-48DM —	— T125LF1-60DM
156	175	50 —	60 —	125 —	— 150	T125LB1-48XM —	— T150LB1-60XM	T125LF1-48EM —	— T150LF1-60EM
192	210	60 —	75 —	150 —	— 200	T150LB1-48YM —	— T200LB1-60YM	T150LF1-48EM —	— T200LF1-60EM
248	250	75 —	100 —	200 —	— 250	T200LB1-48AM —	— T250LB1-60ZM	T200LF1-48EM —	— T250LF1-60EM
302	300	100 —	100 —	250 —	— 300	T250LB1-48BM —	— T300LB1-60BM	T250LF1-48FM —	— T300LF1-60FM
361	370	125 —	150 —	300 —	— 350	T300LB1-48DMⓉ —	— T350LB1-60CMⓉ	T300LF1-48FMⓉ —	— T350LF1-60FMⓉ
414	400	— —	— —	350 —	— 400	T350LB1-48EMⓉ —	— T400LB1-60DMⓉ	T350LF1-48FMⓉ —	— T400LF1-60FMⓉ
480	470	150 —	200 —	400 —	— 500	T400LB1-48FMⓉ —	— T500LB1-60EMⓉ	T400LF1-48GMⓉ —	— T500LF1-60GMⓉ
590	570	200 —	250 —	500 —	— 600	T500LB1-48GMⓉ —	— T600LB1-60GMⓉ	T500LF1-48HMⓉ —	— T600LF1-60HMⓉ
720	720	250 —	300 —	600 —	— 700	T600LB1-48JMⓉ —	— T700LB1-60JMⓉ	T600LF1-48HMⓉ —	— T700LF1-60HMⓉ
840	840	300 —	350 —	700 —	— 800	T700LB1-48KMⓉ —	— T800LB1-60JMⓉ	T700LF1-48JMⓉ —	— T800LF1-60JMⓉ
960	—	350 —	400 —	800 —	— 900	T800LB1-48KMⓉ —	— T900LB1-60KMⓉ	T800LF1-48JMⓉ —	— T900LF1-60JMⓉ
1062	1050	400 —	450 —	900 —	— 1000	T900LB1-48KMⓉ —	— T1000LB1-60KMⓉ	T900LF1-48KMⓉ —	— T1000LF1-60KMⓉ

5

Ⓣ Includes integrated shunt rated (AC1) bypass contactor as standard. For across the line rated (AC3) bypass contactors, see page 5.60.

Factory installed options

5

Item	Suffix code ①
Softstarters	
Door mounted reset	K
E-Stop	T
Start-stop pushbutton	A
2 position selector switch	C
3 position selector switch	D
Pilot light run	E
Start-stop pushbutton & pilot light	F
2 position selector switch & pilot light	H
3 position selector switch & pilot light	J
Isolation contactor	W
Across the line rated (AC3) contactor with emergency bypass control ②	B
Remote keypad	R
Service entrance, 3-wire	SE3
Service entrance, 4-wire	SE4
Lightning arrester	LA
Space heater, 100W with thermostat	SH

Auxiliary relays

Type N control relay (4 pole)	CR
Electronic timer	
1.5 – 30s On Delay	TN30
5 – 100s On Delay	TN100
1.5 – 30s Off Delay	TF30
5 – 100s Off Delay	TF100
Undervoltage relay	UV
Overvoltage relay	OV
Ground fault protection	GFP

Item	Suffix code ①
Meters & metering	
Current transformer	CT
Ammeter (including C.T.)	AM
Ammeter & ammeter switch	AMS
Voltmeter	VM
Voltmeter & voltmeter switch	VMS
Elapsed time meter	ETM
Operation counter	OC
Wattmeter	WM

Additional auxiliary contact blocks for bypass or isolation contactors

1 N.O. & 1 N.C.	11
2 N.O. & 2 N.C.	22
3 N.O. & 3 N.C.	33

① Add the suffix code after the last digit of the catalog number.

② Control includes panel mounted Norm/E-Bypass switch, START/STOP pushbutton & Class 10 external overload, unless otherwise specified.

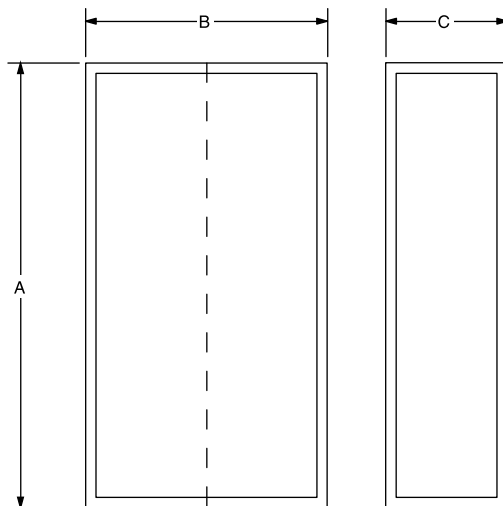
Horsepower to PST Softstarter cross-reference Enclosed

Maximum horsepower in-line

208V	240V	480V	600V	PST Type
5 —	5 —	10 —	— 15	PST30
7.5 —	10 —	20 —	— 25	PST30
10 —	10 —	25 —	— 30	PST37
10 —	15 —	30 —	— 40	PST44
15 —	20 —	40 —	— 50	PST50
20 —	25 —	50 —	— 60	PST72
25 —	30 —	60 —	— 75	PST85
30 —	40 —	75 —	— 100	PST105
40 —	50 —	100 —	— 125	PST142
50 —	60 —	125 —	— 150	PST175
60 —	75 —	150 —	— 200	PST210
75 —	100 —	200 —	— 250	PST250
100 —	100 —	250 —	— 300	PST300
125 —	150 —	300 —	— 350	PSTB370
— —	— —	350 —	— 400	PSTB470
150 —	200 —	400 —	— 500	PSTB470
200 —	250 —	500 —	— 600	PSTB570
250 —	300 —	600 —	— 700	PSTB720
300 —	350 —	700 —	— 800	PSTB840
350 —	400 —	800 —	— 900	PSTB1050
400 —	450 —	900 —	— 1000	PSTB1050

Approximate dimensions

Enclosed
208V – 600V



5

Enclosed, 208V – 600V

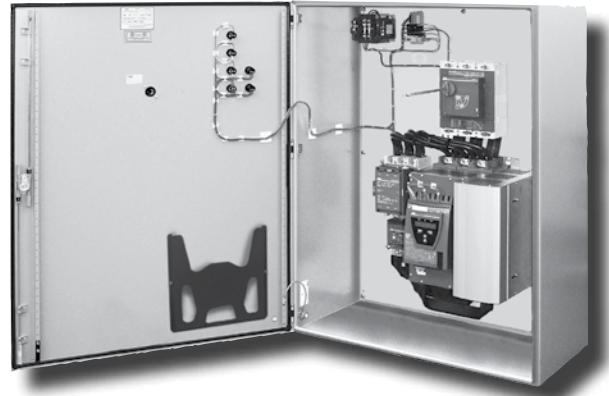
Combination	In-Line		
	A	B	C
PST30 – PST72 Softstarter only Softstarter with bypass Softstarter with fused disconnect Softstarter with circuit breaker	20	20	12
PST85 – PST142 Softstarter only Softstarter with bypass Softstarter with fused disconnect Softstarter with circuit breaker	24	20	12
PST175 – PST300 Softstarter only Softstarter with bypass Softstarter with fused disconnect Softstarter with circuit breaker	30	30	12

Combination	In-Line		
	A	B	C
PSTB370 – PSTB470 Softstarter with bypass, internal Softstarter with fused disconnect Softstarter with circuit breaker	48	36	16
PSTB570 – PSTB720 Softstarter with bypass, internal Softstarter with fused disconnect Softstarter with circuit breaker	48	36	24
PSTB840 – PSTB1050 Softstarter with bypass, internal Softstarter with fused disconnect Softstarter with circuit breaker	87	36	24

PST Extreme duty Softstarters

ABB

PST Softstarter Extreme duty



5

General information

Designed for high inertia load applications, such as rock crushers, mixers, hammer mills and chippers, the ABB PST Extreme Duty enclosed softstarters provides reliable reduced voltage starting. The PST Extreme Duty softstarter package provides the best of ABB's wide range of industrial control products integrated with the PST softstarter, packaged in a weatherproof (NEMA/UL Type 4) enclosure.

What's included:

Short circuit protection

To handle the role of short-circuit protection and disconnect, the PST Extreme Duty series uses the T-Max molded case circuit breakers (MCCB's).

Emergency start bypass

For routine bypass or starting in event of an emergency, the PST Extreme series relies on the AF contactor series. The AF series contactors are designed for reliable performance under the most adverse conditions. All AF contactors feature a wide voltage range electronic coil. In addition to extremely low pull-in and holding power requirement, the low (55%) dropout voltage prevents damaging chattering and insures consistent operation in poor power quality conditions.

Redundant electronic overload

Every PST softstarter features an adjustable electronic overload. The PST Extreme Series softstarters (50HP and larger) go one step further and come equipped with an ABB adjustable electronic overloads. Used only in the event of emergency bypass operation, these overload feature four classes of trip curves to insure the motor protection level matches the application demands.

The PST Softstarter

Designed for heavy-duty use and performance the ABB PST is optimized for extreme duty. While most softstarters offer voltage ramp starting, the PST series does more. By using closed loop current control in addition to voltage ramping the PST helps get every bit of performance from even weak power systems. Built and tested to provide 500% rated current for 30 seconds, using the PST means that typical applications can be sized based on Motor HP without resorting to complex, application based de-rate tables.

The often overlooked details

Overlooked little things can lead to big problems and so the PST Extreme Series pays attention to the details. Besides the major components every PST extreme series enclosed softstarter ships with:

- A UL 508A label
- A UL service entrance rating
- A door mounted ABB hand-off-auto switch (NEMA/UL Type 4)
- Three (3) vibration resistant, LED type pilot lights (NEMA/UL Type 4)
- A door interlocked disconnect handle (NEMA/UL Type 4)
- Padlockable and defeatable

480 & 240 V Extreme duty softstarters

480 V

HP @ 480VAC	Enclosure size H x W x D	SCCR ratings @ 600V	Weight	Catalog number
50	24x24x12	10kA	35	T050LB4-48/XD
75	24x24x12	10kA	50	T075LB4-48/XD
100	36x36x12	18kA	65	T100LB4-48/XD
125	36x36x12	18kA	80	T125LB4-48/XD
150	36x36x12	18kA	95	T150LB4-48/XD
200	36x36x12	18kA	170	T200LB4-48/XD
250	48x36x16	18kA	180	T250LB4-48/XD
300	48x36x16	30kA	300	T300LB4-48/XD
400 ①	60x36x16	30kA	450	T400LB4-48/XD
500 ①	60x36x16	42kA	570	T500LB4-48/XD
600 ①	72x37x24	42kA	630	T600LB4-48/XD

240 V

HP @ 240VAC	Enclosure size H x W x D	SCCR ratings @ 600V	Weight	Catalog number
25	24x24x12	10kA	35	T025LB4-24/XD
30	24x24x12	10kA	50	T030LB4-24/XD
40	24x24x12	10kA	65	T040LB4-24/XD
50	36x36x12	18kA	80	T050LB4-24/XD
60	36x36x12	18kA	95	T060LB4-24/XD
75	36x36x12	18kA	170	T075LB4-24/XD
100	36x36x12	18kA	180	T100LB4-24/XD
150	48x36x16	18kA	300	T150LB4-24/XD
200 ①	60x36x16	30kA	450	T200LB4-24/XD
250 ①	60x36x16	30kA	570	T250LB4-24/XD
300 ①	72x37x24	42kA	630	T300LB4-24/XD

5

Features

- Softstarter is one size larger than required full load amperes of the motor to get additional starting capacity (Extreme Duty).
- Short circuit protection
- Redundant electronic overload
- Emergency start bypass
- Torque control
- A door interlocked disconnect handle (NEMA/UL Type 4) -Padlockable/Defeatable
- Door mounted ABB Hand-OFF-Auto switch (NEMA/UL Type 4)
- Three (3) vibration resistant, LED type pilot lights (NEMA/UL Type 4)
- Pilot lights indicate the following: Power On, RUN and Bypass.
- A UL 508A Label
- Suitable for service entrance 3 wire
- (NEMA/UL Type 4) enclosure



250 HP
unit shown



Back panel view

① Larger horsepower units will include floor mounting kit.

6 - Control, timing & monitoring relays



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Control relays



Industrial control relays

Pilot duty rated for control circuits

Positively guided, AC & DC controlled



NF / NFZ control relays

- 4 & 8 pole control relays
- Pilot duty rated up to 10 A
- For AC & DC control circuit switching
- Electronic AC/DC coil input voltages
- NFZ with low power consumption coils
- Direct PLC control $\geq 24\text{VDC}$, 500mA (NFZ)
- Mechanically linked contacts for safety
- Wide variety of accessories

NS / NSL control relays

- 4 & 8 pole control relays
- For high-volume applications
- Pilot duty rated up to 10 A
- Bulk packaging available
- Screw & spring termination
- Mechanically linked contacts for safety
- AC or DC coil input voltages

K / KC control & interface relays

- 4 pole miniature control relays
- Compact solutions up to 10 A
- Quick-connect & PCB mount options
- Interface relays for PLC control
- Mechanically linked contacts for safety
- AC or DC coil input voltages

Standards & approvals	NF / NFZ	NS / NSL	K / KC
	E252354	E252354	E48139
			LR56745
	✓	✓	✓
	✓	✓	✓

NOTE: K/C6 quick-connect and PCB-mount versions are UL recognized.

General information

Panorama

Control relays

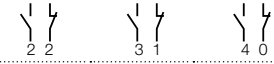
Mini control relays – 4 pole



6

IEC AC-15 Rated operational current 400 V A
 UL/CSA Pilot duty

3
 A 600



AC Control supply		Type	K6-22Z	K6-31Z	K6-40E
DC Control supply		Type	KC6-22Z	KC6-31Z	KC6-0E
AC / DC Control supply		Type	—	—	—

See pages 6.12...6.14

IEC AC-15 Rated operational current 400 V A
 UL/CSA Pilot duty

—
 —

AC Control supply		Type	—	—	—
DC Control supply		Type	—	—	—
AC / DC Control supply		Type	—	—	—

General information

Panorama

Control relays – 4 pole



3 A 600, Q 300			3 A 600, Q 600		
NS22E NS22ES	NS31E NS31ES	NS40E NS40ES	NF22E NFZ22E	NF31E NFZ31E	NF40E NFZ40E
NSL22E NSL22ES	NSL31E NSL31ES	NSL40E NSL40ES	NF22E NFZ22E	NF31E NFZ31E	NF40E NFZ40E
–	–	–	NF22E NFZ22E	NF31E NFZ31E	NF40E NFZ40E
See pages 6.10...6.11			See pages 6.8...6.9		

6

Control relays – 8 pole



3 A 600, Q 300					3 A 600, Q 600				
NS44E NS44ES	NS53E NS53ES	NS62E NS62ES	NS71E NS71ES	NS80E NS80ES	NF44E NFZ44E	NF53E NFZ53E	NF62E NFZ62E	NF71E NFZ71E	NF80E NFZ80E
NSL44E NSL44ES	NSL53E NSL53ES	NSL62E NSL62ES	NSL71E NSL71ES	NSL80E NSL80ES	NF44E NFZ44E	NF53E NFZ53E	NF62E NFZ62E	NF71E NFZ71E	NF80E NFZ80E
–	–	–	–	–	NF44E NFZ44E	NF53E NFZ53E	NF62E NFZ62E	NF71E NFZ71E	NF80E NFZ80E
See pages 6.10...6.11					See pages 6.8...6.9				

General information

Technical terms and definitions

Altitude

Refers to the height of the site where the equipment is located, expressed in meters above the sea level.

Ambient temperature

Temperature of the air surrounding the unit.

Circuits

• Auxiliary circuit

All the conducting parts of a contactor, intended to be included in a circuit different from the main circuit and the control circuit of the contactor e.g. signalization, interlocking circuits etc ...

• Control circuit

All the conducting parts of a contactor (other than the main circuit) included in a circuit used for the closing operation, or opening operation, or both, of the contactor.

• Main circuit

All the conducting parts of a contactor included in the circuit which it is designed to close or open.

Coil operating range

Expressed as a multiple of the rated control circuit voltage U_c for the lower and upper limits.

Cycle duration

Total time of the on-load + off-load period.

Endurance / durability

• Electrical endurance

Number of on-load operating cycles (i.e. with current on the main contacts) a contactor can achieve, varies depending on the utilization category.

• Mechanical endurance

Number of off-load operating cycles (i.e. without current on the main contacts) a contactor can achieve.

Inching

Energizing a motor once or repeatedly for short periods to obtain small movements of the driven mechanism.

Insulation class according to the VDE 0110 and NFC 20-040

Characterizes contactors suitability in accordance with environment and utilization conditions. A contactor can be classified depending on its own clearance and creepage distances in the insulation classes A, B, C, D which correspond to different insulation voltage values.

The insulation class C is applicable to most of the industrial applications. Equipment described in this catalogue correspond to insulation class C.

Intermittent duty

Duty in which the main contacts of a contactor remain closed for periods of time insufficient to allow the contactor to reach thermal equilibrium, the current-carrying periods being separated by off-load periods of sufficient duration to restore equality of temperature with the cooling medium.

Mounting positions

Stated by the manufacturer. Please note restrictions when applicable.

On-load factor

Ratio of the current flow time to the total time of the cycle x 100.

Plugging

Stopping or reversing a motor quickly by interchanging two supply leads whilst the motor is running.

Rated breaking capacity; Rated making capacity

Value of r.m.s current a contactor can break or make at a fixed voltage value, within the conditions specified by the standards, depending on the utilization category.

Rated control circuit voltage U_c

Control voltage value for which the control circuit of the unit is sized.

Rated insulation voltage U_i

Voltage value which designates the unit and to which dielectric tests, clearance and creepage distances are referred.

Rated impulse withstand voltage U_{imp}

The highest peak value of an impulse voltage of prescribed form 1.2/50, which does not cause breakdown under specified conditions of test.

Rated operating current I_e

Current value stated by the manufacturer and taking into account the rated operating voltage U_e , the rated frequency, the rated duty, the utilization category, the electrical contact life and the type of the protective enclosure.

Rated operating voltage U_e

Voltage value to which utilization characteristics of the contactor are referred, i.e. phase to phase voltage in 3 phase circuits.

Conventional thermal current I_{th}

Value of current the contactor can withstand with poles in closed position, in free air for an eight hour duty, without the temperature rise of its various parts exceeding the limits specified by the standards.

Resistance to shocks

Requirements applicable for instance to vehicles, crane operation or switchgear slide-in module systems.

At the quoted permissible «g» values, contactors must not undergo a change in switching state and O/L relays must not trip.

Resistance to vibrations

Requirements applicable to all the vehicles, vessels and other similar transport systems. At the quoted amplitude and vibration frequency values, the unit must be capable to achieve the required duty.

Short-circuit protection coordination

Achieved by using back-up protection devices such as circuit-breakers, H.R.C. fuses or standard fuses.

Co-ordination types a, b, c are defined in IEC 292-1 publication, VDE 0660, NFC 63-650 standards. Co-ordination types "1" and "2" are defined in IEC 947-4-1.

• Type 1 co-ordination

There has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable.

• Type 2 co-ordination

No damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts is permitted, if they are easily separated.

Switching frequency

Number of operating cycles per hour.

Time

• Closing time

Time between energization of the coil until the moment the contacts of the first current path to be closed actually close.

• Opening time

Time from the beginning of state causing breaking until the moment when the contacts of the last current path to be opened are open.

• Minimal operation time

Shortest control duration to ensure complete closing or opening of a contactor.

• Short time current permissible

Value of current which the contactor can withstand in closed position for a short time period and within specified conditions.

• Time constant

Ratio of inductance to the resistance : $L/R = \text{mH}/\text{Ohm} = \text{ms}$.

General information

IEC Standards, utilization categories

Standards

- IEC standards 158-1: "Contactors" and series IEC 292 :

"Motor-starters" have been revised and replaced by the new IEC 947-4-1 (1990-05): "Contactors and Motor-starters" referring to IEC 947-1 (1988): "General rules" The new standards will constitute the basis of the future European and National standards, not yet revised.

Therefore the ratings indicated in this catalog are established according to the former and the future standards.

- Main changes and additions in the new standards are:
- Revision and extension of the utilization categories (see hereafter)
- Replacement of the coordination classes types a, b, c by new types: "1" (approximately equivalent to former class "a") and "2" (approximately equivalent to former class "c") with additional requirements.
- Classification of the thermal overload relays in tripping classes: 10 A; 10; 20 and 30 depending on their tripping times, at 1.5 and 7.2 times their setting current, in order to cover motor applications depending on their starting times. Class 10 A is adapted for motors according to IEC 34-1.
- Introduction of tests to verify the connecting capability and the mechanical strength of terminals.

Utilization categories

A contactor duty is characterized by the utilization category plus indication of the rated operating voltage and the rated operating current (see at Rated ...), or the motor characteristics.

Utilization categories for contactors according to IEC 947-4-1

Alternating current:	AC-1	Non-inductive or slightly inductive loads, resistance furnaces. Power factor 0.7 - 0.8 (slightly inductive).
	AC-2	Slip-ring motors: starting, switching-off.
	AC-3	Squirrel-cage motors: starting, switching-off motors during running. Power factor 0.4 - 0.5 (AC-3).
	AC-4	Squirrel-cage motors: starting, plugging, inching.
	AC-5a	Switching of electric discharge lamp controls.
	AC-5b	Switching of incandescent lamps.
	AC-6a	Switching of transformers.
	AC-6b	Switching of capacitor banks
	AC-8a	Hermetic refrigerant compressor motor control with manual resetting of overload releases
AC-8b	Hermetic refrigerant compressor motor control with automatic resetting of overload releases.	
Direct current:	DC-1	Non-inductive or slightly inductive loads, resistance furnaces.
	DC-3	Shunt motors: starting, plugging, inching. Dynamic breaking of d.c. motors.
	DC-5	Series motors: starting, plugging, inching. Dynamic breaking of d.c. motors.
	DC-6	Switching of incandescent lamps

Utilization categories for contactor relays according to IEC 947-5-1

Alternating current:	AC-12	Control of resistive loads and solid state loads with isolation by opto couplers.
	AC-13	Control of solid state loads with transformer isolation.
	AC-14	Control of small electromagnetic loads (≤ 72 VA).
	AC-15	Control of electromagnetic loads (> 72 VA).
Direct current:	DC-12	Control of resistive loads and solid state loads with isolation by opto couplers.
	DC-13	Control of electromagnets.
	DC-14	Control of electromagnetic loads having economy resistors in circuit.

Utilization categories AC-1, AC-2, AC-3, AC-4 and DC-1, DC-3, DC-5 are maintained with slightly more severe tests.

Other categories have been added in order to standardize specific applications. In fact some contactor applications and the specific criteria characterizing the types of load controlled can modify the recommended utilization characteristics. These major applications are, for example :

Switching of capacitor banks

This application is characterized by high current peaks when switching-on the contactor and presence of harmonic currents on uninterrupted duty. For this application, IEC 947-4-1 has defined an utilization category AC-6b. Practical ratings have to be defined according to tests or, in absence of tests, by a calculation indicated in IEC 947-4-1.

Switching of transformers

This application is characterized by high current peaks on contactor closing due to magnetization phenomena. The corresponding utilization category according to IEC 947-4-1 is AC-6a. Ratings are derived from test-values for AC-3 or AC-4 according to formula given in IEC 947-4-1.

Switching of lighting circuits

The current peaks on contactor closing and power factor vary depending on the type of lamps, the switching method used and if compensation systems are fitted or not.

IEC 947-4-1 contains two standard utilization categories

- AC-5a for switching of the electric discharge lamps.
- AC-5b for switching of incandescent lamp.

General information

Pilot duty ratings and overload trip classes

Pilot duty ratings for AC control circuit contacts

Contact rating designation	Continuous thermal, test current (A)	Maximum current, 50/60 Hz (A)									
		120 v ac		240 v ac		480 v ac		600 v ac		Volt-amperes	
		Make	Break	Make	Break	Make	Break	Make	Break	Make	Break
A150	10	60	6.00	-	-	-	-	-	-	7200	720
A300	10	60	6.00	30	3.00	-	-	-	-	7200	720
A600	10	60	6.00	30	3.00	15	1.50	12	1.20	7200	720
B150	5	30	3.00	-	-	-	-	-	-	3600	360
B300	5	30	3.00	15	1.50	-	-	-	-	3600	360
B600	5	30	3.00	15	1.50	7.5	0.75	6	0.60	3600	360
C150	2.5	15	1.5	-	-	-	-	-	-	1800	180
C300	2.5	15	1.5	7.5	0.75	-	-	-	-	1800	180
C600	2.5	15	1.5	7.5	0.75	3.75	0.375	3.00	0.30	1800	180
D150	1.0	3.60	0.60	-	-	-	-	-	-	432	72
D300	1.0	3.60	0.60	1.80	0.30	-	-	-	-	432	72
E150	0.5	1.80	0.30	-	-	-	-	-	-	216	36

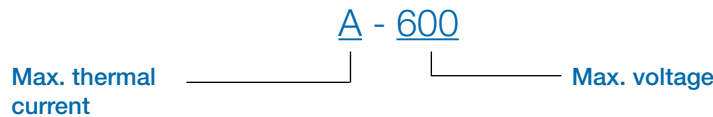
Mechanical switching ratings and test values as published in Table 1-4-1 of NEMA ICS 5-2000 (R2005, R2010)

Pilot duty ratings for DC control circuit contacts

Contact rating designation	Continuous thermal, test current (A)	Maximum current, 50/60 Hz (A)							
		120 v dc		250 v dc		301 to 600 v dc		Volt-amperes	
		Make / Break		Make / Break		Make / Break		Make / Break	
N150	10	2.2		-		-		275	
N300	10	2.2		1.1		-		275	
N600	10	2.2		1.1		0.40		275	
P150	5.0	1.1		-		-		138	
P300	5.0	1.1		0.55		-		138	
P600	5.0	1.1		0.55		0.20		138	
Q150	2.5	0.55		-		-		69	
Q300	2.5	0.55		0.27		-		69	
Q600	2.5	0.55		0.27		0.10		69	
R150	1.0	0.22		-		-		28	
R300	1.0	0.22		0.11		-		28	

Mechanical switching ratings and test values as published in Table 1-4-1 of NEMA ICS 5-2000 (R2005, R2010)

Pilot duty rating explanation



General information

NF/NFZ control relays

4 & 8 pole

Description

NF / NFZ control relays are provided in either four or eight auxiliary pole configurations with a variety of accessories including additional auxiliary contacts and electronic timers.

Application

NF / NFZ control relays are pilot duty rated and primarily used for switching both AC and DC control circuits.

Control circuit types

NF / NFZ coils are designed to utilize both AC (50/60 Hz) and DC control circuit inputs ranging from 12...500V. Surge suppression is included. NFZ types offer low power consumption coils.

Control relay types

4-pole:

NF(Z)22E, NF(Z)31E, NF(Z)40E

8-pole:

NF(Z)44E, NF(Z)53E, NF(Z)62E
NF(Z)71E, NF(Z)80E

Quick DIN-rail mount & dismount, no tools required

- 35 x 7.5mm &
- 35 x 15mm

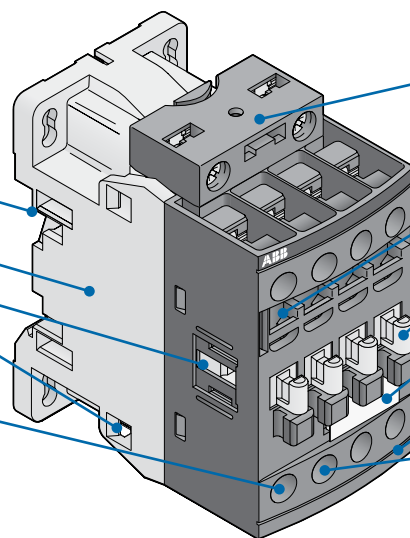
Integral surge suppression

Actuator for side-mount accessories

Contoured sides for easy access to panel mounting holes

Terminals on NF / NFZ control relays are delivered in open position with captive screws (screws of unused terminals must be tightened)

IP20 degree protection according to IEC/EN 60947-1; protection from live parts according to VDE0106 Part. 100.



Detachable coil terminals

- Can be pre-wired prior to installation
- Can easily be rotated from top (standard) to bottom

Front-mount coil termination available (4-pole only)

Stops for attaching front-mount accessories (4-pole only)

Function markers included as standard on NF / NFZ control relays

Clear indication of coil voltages and frequencies

Terminal screws:

- Posidrive (+,-) No 2

Catalog number explanation

For reference only – not all combinations will produce valid catalog numbers

NF 31 E - 13

Control relay type

Control relay type

- 22 = 2 NO / 2 NC
- 31 = 3 NO / 1 NC
- 40 = 4 NO
- 44 = 4 NO / 4 NC
- 53 = 5 NO / 3 NC
- 62 = 6 NO / 2 NC
- 71 = 7 NO / 1 NC
- 80 = 8 NO

Coil voltage code

(see product selection pages)

NF, 4 & 8 pole

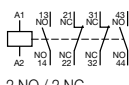
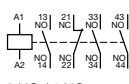
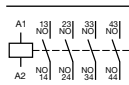
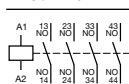

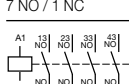
For pilot duty applications up to 10 A

Electronic AC/DC operated coils

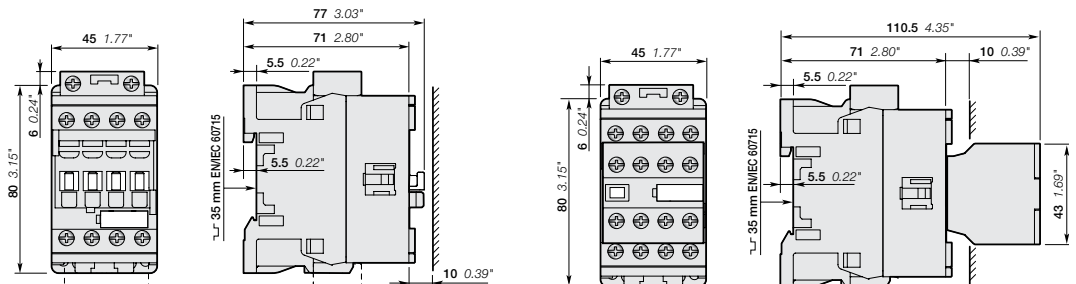
Description

- **NF** control relays include an electronic coil interface accepting a wide control voltage U_c min. ... U_c max. Only four coils cover control voltages between 24...500 V 50/60 Hz or 20...500 V DC
- **NF** control relays can manage large control voltage variations. One coil (i.e. 100...250 V 50/60 Hz - DC) can be used for different control voltages used worldwide without any coil change
- **NF** control relays have built-in surge protection and do not require additional surge suppressors
- The control relays have mechanically-linked auxiliary contacts compliant with Annex L of IEC 60947-5-1 and include the "Mechanically Linked" symbol on their side
- 8-pole control relays are mounted with a non-removable auxiliary contact block (2nd stack).

Ordering Details

Number of contacts	Control voltage		Catalog number
	1 st stack	2 nd stack	
	Range		
	U_c min. ... U_c max.		
	V 50/60 Hz	V DC	
 2 NO / 2 NC	24..60	20..60	NF22E-11
	48...130	48...130	NF22E-12
	100...250	100...250	NF22E-13
	250...500	250...500	NF22E-14
 3 NO / 1 NC	24..60	20..60	NF31E-11
	48...130	48...130	NF31E-12
	100...250	100...250	NF31E-13
	250...500	250...500	NF31E-14
 4 NO	24..60	20..60	NF40E-11
	48...130	48...130	NF40E-12
	100...250	100...250	NF40E-13
	250...500	250...500	NF40E-14
 4 NO / 4 NC	24..60	20..60	NF44E-11
	48...130	48...130	NF44E-12
	100...250	100...250	NF44E-13
	250...500	250...500	NF44E-14
 5 NO / 3 NC	24..60	20..60	NF53E-11
	48...130	48...130	NF53E-12
	100...250	100...250	NF53E-13
	250...500	250...500	NF53E-14
 6 NO / 2 NC	24..60	20..60	NF62E-11
	48...130	48...130	NF62E-12
	100...250	100...250	NF62E-13
	250...500	250...500	NF62E-14
 7 NO / 1 NC	24..60	20..60	NF71E-11
	48...130	48...130	NF71E-12
	100...250	100...250	NF71E-13
	250...500	250...500	NF71E-14
 8 NO	24..60	20..60	NF80E-11
	48...130	48...130	NF80E-12
	100...250	100...250	NF80E-13
	250...500	250...500	NF80E-14

Main dimensions mm, inches



NF...22E, NF...31E, NF...40E

NF...44E, NF...53E, NF...62E, NF...71E, NF...80E

NFZ, 4 & 8 pole

For pilot duty applications up to 10 A

Low power consumption, electronic AC/DC operated coils

Description

- NFZ control relays include an electronic coil interface accepting a wide control voltage U_c min. ... U_c max. and managing large control voltage variations.
- NFZ control relays cover control voltages between 24...250 V 50/60 Hz or 12...250 V DC
- NFZ control relays allow direct control by PLC-output ≥ 24 V DC 500 mA and obtain a reduced holding coil consumption.
- NFZ control relays withstand short dips and voltage interruptions (SEMI F47-0706 compliance)
- NFZ control relays have built-in surge protection and do not require additional surge suppressors
- The control relays have mechanically-linked auxiliary contacts compliant with Annex L of IEC 60947-5-1 and include the "Mechanically Linked" symbol on their side
- 8-pole control relays are mounted with a non-removable auxiliary contact block (2nd stack).



NFZ22E

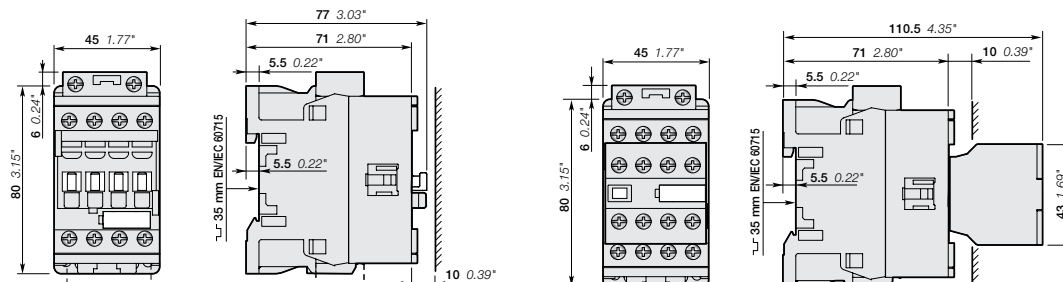


NFZ44E

Ordering Details

Number of contacts 1 st stack 2 nd stack	Control voltage Range		Catalog number
	U_c min. ... U_c max.		
	V 50/60 Hz	V DC	
 2 NO / 2 NC	-	12...20	NFZ22E-20
	24...60	20...60	NFZ22E-21
	48...130	48...130	NFZ22E-22
	100...250	100...250	NFZ22E-23
 3 NO / 1 NC	-	12...20	NFZ31E-20
	24...60	20...60	NFZ31E-21
	48...130	48...130	NFZ31E-22
	100...250	100...250	NFZ31E-23
 4 NO	-	12...20	NFZ40E-20
	24...60	20...60	NFZ40E-21
	48...130	48...130	NFZ40E-22
	100...250	100...250	NFZ40E-23
 4 NO / 4 NC	-	12...20	NFZ44E-20
	24...60	20...60	NFZ44E-21
	48...130	48...130	NFZ44E-22
	100...250	100...250	NFZ44E-23
 5 NO / 3 NC	-	12...20	NFZ53E-20
	24...60	20...60	NFZ53E-21
	48...130	48...130	NFZ53E-22
	100...250	100...250	NFZ53E-23
 6 NO / 2 NC	-	12...20	NFZ62E-20
	24...60	20...60	NFZ62E-21
	48...130	48...130	NFZ62E-22
	100...250	100...250	NFZ62E-23
 7 NO / 1 NC	-	12...20	NFZ71E-20
	24...60	20...60	NFZ71E-21
	48...130	48...130	NFZ71E-22
	100...250	100...250	NFZ71E-23
 8 NO	-	12...20	NFZ80E-20
	24...60	20...60	NFZ80E-21
	48...130	48...130	NFZ80E-22
	100...250	100...250	NFZ80E-23

Main dimensions mm, inches



NS/NSL 4 & 8 pole

For pilot duty applications up to 10 A

AC or DC operated coils, bulk packaged for high volume


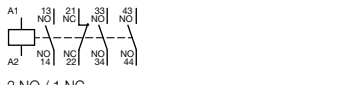
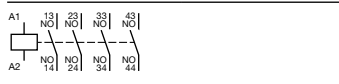
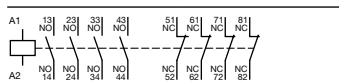
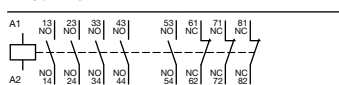
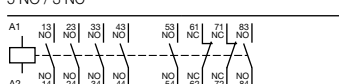
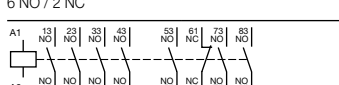
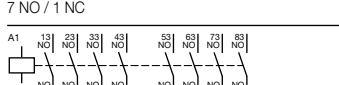
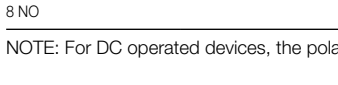

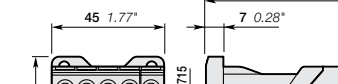
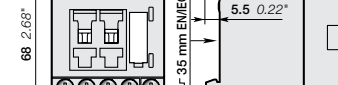


Description

NS/NSL contactor relays are used for switching auxiliary and control circuits.

These contactor relays are designed with:

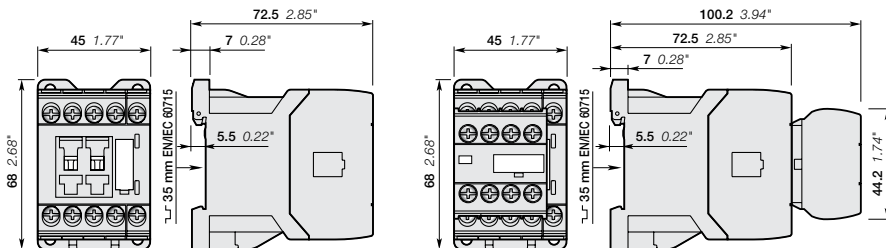
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Suitable for direct PLC control (DC 3W)
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Ordering details

Number of contacts	Rated control circuit voltage U_c	Catalog number, AC controlled	Rated control circuit voltage U_c	Catalog number, DC controlled
 2 NO / 2 NC	V 50 Hz	24	24	NSL22E-81M
	V 60 Hz	-	120	NSL22E-83M
 3 NO / 1 NC	V 50 Hz	230	230	NSL22E-86M
	V 60 Hz	400	400	NSL22E-88M
 4 NO	V 50 Hz	24	24	NSL31E-81M
	V 60 Hz	-	120	NSL31E-83M
 4 NO / 4 NC	V 50 Hz	230	230	NSL31E-86M
	V 60 Hz	400	400	NSL31E-88M
 5 NO / 3 NC	V 50 Hz	24	24	NSL40E-81M
	V 60 Hz	-	120	NSL40E-83M
 6 NO / 2 NC	V 50 Hz	230	230	NSL40E-86M
	V 60 Hz	400	400	NSL40E-88M
 7 NO / 1 NC	V 50 Hz	24	24	NSL44E-81M
	V 60 Hz	-	120	NSL44E-83M
 8 NO	V 50 Hz	230	230	NSL44E-86M
	V 60 Hz	400	400	NSL44E-88M
 8 NO	V 50 Hz	24	24	NSL53E-81M
	V 60 Hz	-	120	NSL53E-83M
 8 NO	V 50 Hz	230	230	NSL53E-86M
	V 60 Hz	400	400	NSL53E-88M
 8 NO	V 50 Hz	24	24	NSL62E-81M
	V 60 Hz	-	120	NSL62E-83M
 8 NO	V 50 Hz	230	230	NSL62E-86M
	V 60 Hz	400	400	NSL62E-88M
 8 NO	V 50 Hz	24	24	NSL71E-81M
	V 60 Hz	-	120	NSL71E-83M
 8 NO	V 50 Hz	230	230	NSL71E-86M
	V 60 Hz	400	400	NSL71E-88M
 8 NO	V 50 Hz	24	24	NSL80E-81M
	V 60 Hz	-	120	NSL80E-83M
 8 NO	V 50 Hz	230	230	NSL80E-86M
	V 60 Hz	400	400	NSL80E-88M

NOTE: For DC operated devices, the polarity of A1+ and A2- must be respected.

Main dimensions mm, inches



NS22E, NS31E, NS40E

NS44E, NS53E, NS62E, NS71E, NS80E

Standard bulk pack quantities (M)

Control relays	Quantity
NS/L22E NS/L31E NS/L40E	40
NS/L44E NS/L53E NS/L62E NS/L71E NS/L80E	20

Additional coil voltage codes

AC voltages		Coil code
V - 50 Hz	V - 60 Hz	
42	42	21
48	48	22
110	110	23
115	115	24
220	220	25
240	240	27
-	277	17
380	-	13
415	415	29

DC voltages		Coil code
V - DC		
12		80
60		84
125		87
240		89

NS/NSL 4 & 8 pole, spring terminated

For pilot duty applications up to 10 A
AC or DC operated coils, bulk packaged for high volume

Description

NS/NSL contactor relays are used for switching auxiliary and control circuits.

These contactor relays are designed with:

- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Suitable for direct PLC control (DC 3W)
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Ordering details

Number of contacts 1st stack 2nd stack	Rated control circuit voltage U_c		Catalog number, AC controlled	Rated control circuit voltage U_c	Catalog number, DC controlled
	V 50 Hz	V 60 Hz		V-DC	
 2 NO / 2 NC	24	24	NS22ES-20M	24	NSL22ES-81M
	-	120	NS22ES-16M	48	NSL22ES-83M
	230	230	NS22ES-26M	110	NSL22ES-86M
 3 NO / 1 NC	24	24	NS31ES-20M	24	NSL31ES-81M
	-	120	NS31ES-16M	48	NSL31ES-83M
	230	230	NS31ES-26M	110	NSL31ES-86M
 4 NO	24	24	NS40ES-20M	24	NSL40ES-81M
	-	120	NS40ES-16M	48	NSL40ES-83M
	230	230	NS40ES-26M	110	NSL40ES-86M
 4 NO / 4 NC	24	24	NS44ES-20M	24	NSL44ES-81M
	-	120	NS44ES-16M	48	NSL44ES-83M
	230	230	NS44ES-26M	110	NSL44ES-86M
 5 NO / 3 NC	24	24	NS53ES-20M	24	NSL53ES-81M
	-	120	NS53ES-16M	48	NSL53ES-83M
	230	230	NS53ES-26M	110	NSL53ES-86M
 6 NO / 2 NC	24	24	NS62ES-20M	24	NSL62ES-81M
	-	120	NS62ES-16M	48	NSL62ES-83M
	230	230	NS62ES-26M	110	NSL62ES-86M
 7 NO / 1 NC	24	24	NS71ES-20M	24	NSL71ES-81M
	-	120	NS71ES-16M	48	NSL71ES-83M
	230	230	NS71ES-26M	110	NSL71ES-86M
 8 NO	24	24	NS80ES-20M	24	NSL80ES-81M
	-	120	NS80ES-16M	48	NSL80ES-83M
	230	230	NS80ES-26M	110	NSL80ES-86M
		400	NS80ES-28M	220	NSL80ES-88M



4 pole



8 pole

Standard bulk pack quantities (M)

Control relays	Quantity
NS/L22ES NS/L31ES NS/L40ES	40
NS/L44ES NS/L53ES NS/L62ES NS/L71ES NS/L80ES	20

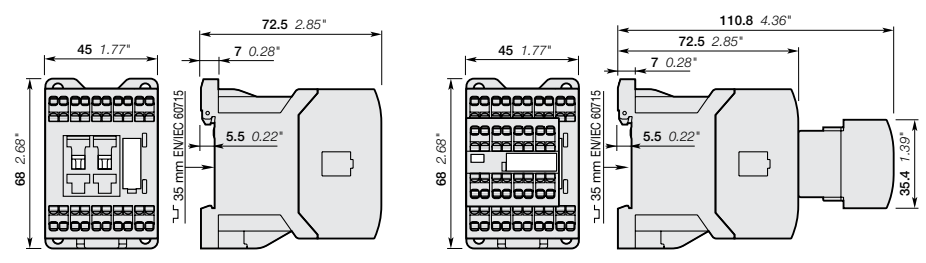
Additional coil voltage codes

AC voltages		Coil code
V - 50 Hz	V - 60 Hz	
42	42	21
48	48	22
110	110	23
115	115	24
220	220	25
240	240	27
-	277	17
380	-	13
415	415	29

DC voltages	Coil code
V - DC	
12	80
60	84
125	87
240	89

NOTE: For DC operated devices, the polarity of A1+ and A2- must be respected.

Main dimensions mm, inches



NSL22E, NSL31E, NSL40E

NSL44E, NSL53E, NSL62E, NSL71E, NSL80E

K6 miniature, 4 pole

For compact pilot duty applications up to 10 A
AC operated coils

Description

These contactors are designed with:

- 4 poles with various contact combinations
- control circuit: AC operated, low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting
- designed for rail or wall mounting

Ordering details

Number of contacts	Rated control circuit voltage U_c		Catalog number, screw termination	Catalog number, quick-connect termination	Catalog number, PCB-mount termination
	V-50 Hz	V-60 Hz			
 2 NO / 2 NC	24	24	K6-22Z-01	K6-22Z-F01	K6-22Z-P01
	42	42	K6-22Z-02	K6-22Z-F02	K6-22Z-P02
	48	48	K6-22Z-03	K6-22Z-F03	K6-22Z-P03
	110...127	110...127	K6-22Z-84	K6-22Z-F84	K6-22Z-P84
	220...240	220...240	K6-22Z-80	K6-22Z-F80	K6-22Z-P80
 3 NO / 1 NC	24	24	K6-31Z-01	K6-31Z-F01	K6-31Z-P01
	42	42	K6-31Z-02	K6-31Z-F02	K6-31Z-P02
	48	48	K6-31Z-03	K6-31Z-F03	K6-31Z-P03
	110...127	110...127	K6-31Z-84	K6-31Z-F84	K6-31Z-P84
	220...240	220...240	K6-31Z-80	K6-31Z-F80	K6-31Z-P80
 4 NO	24	24	K6-40E-01	K6-40E-F01	K6-40E-P01
	42	42	K6-40E-02	K6-40E-F02	K6-40E-P02
	48	48	K6-40E-03	K6-40E-F03	K6-40E-P03
	110...127	110...127	K6-40E-84	K6-40E-F84	K6-40E-P84
	220...240	220...240	K6-40E-80	K6-40E-F80	K6-40E-P80
380...415	380...415	K6-40E-85	K6-40E-F85	K6-40E-P85	



K6

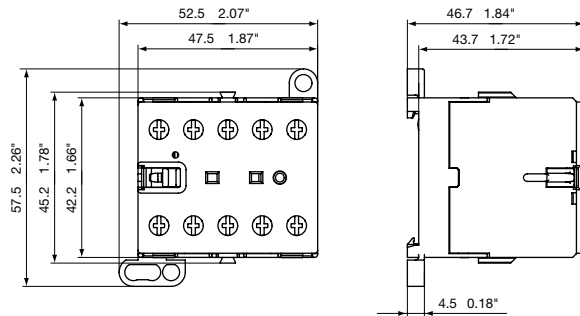


K6...F

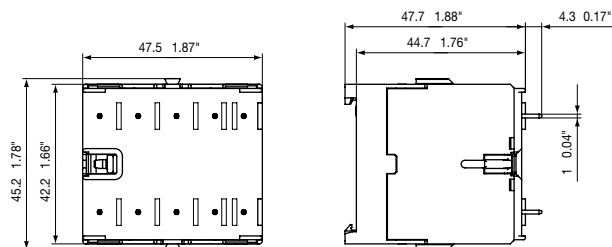


K6...P

Main dimensions mm, inches



K6, K6...F



K6...P

KC6 miniature, 4 pole

For compact pilot duty applications up to 10 A
DC operated coils



KC6



KC6...F

Description

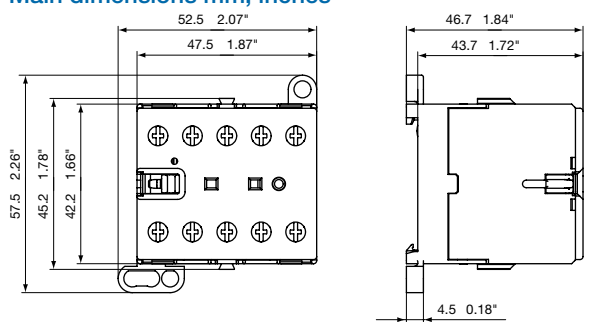
These contactors are designed with:

- 4 poles with various contact combinations
- control circuit: DC operated, low coil consumption (3,5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting
- designed for rail or wall mounting

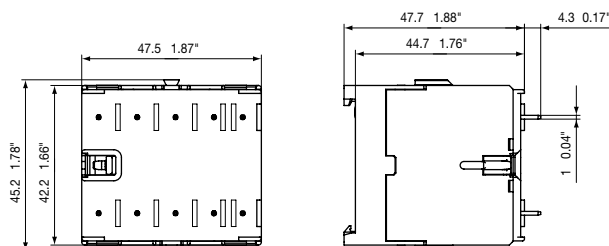
Ordering details

Number of contacts	Rated control circuit voltage U_c	Catalog number, screw termination	Catalog number, quick-connect termination	Catalog number, PCB-mount termination
	V-DC			
<p>2 NO / 2 NC</p>	12	KC6-22Z-07	KC6-22Z-F07	KC6-22Z-P07
	24	KC6-22Z-01	KC6-22Z-F01	KC6-22Z-P01
	48	KC6-22Z-16	KC6-22Z-F16	KC6-22Z-P16
	60	KC6-22Z-13	KC6-22Z-F13	KC6-22Z-P13
	110...125	KC6-22Z-04	KC6-22Z-F04	KC6-22Z-P04
	220...240	KC6-22Z-05	KC6-22Z-F05	KC6-22Z-P05
<p>3 NO / 1 NC</p>	12	KC6-31Z-07	KC6-31Z-F07	KC6-31Z-P07
	24	KC6-31Z-01	KC6-31Z-F01	KC6-31Z-P01
	48	KC6-31Z-16	KC6-31Z-F16	KC6-31Z-P16
	60	KC6-31Z-13	KC6-31Z-F13	KC6-31Z-P13
	110...125	KC6-31Z-04	KC6-31Z-F04	KC6-31Z-P04
	220...240	KC6-31Z-05	KC6-31Z-F05	KC6-31Z-P05
<p>4 NO</p>	12	KC6-40E-07	KC6-40E-F07	KC6-40E-P07
	24	KC6-40E-01	KC6-40E-F01	KC6-40E-P01
	48	KC6-40E-16	KC6-40E-F16	KC6-40E-P16
	60	KC6-40E-13	KC6-40E-F13	KC6-40E-P13
	110...125	KC6-40E-04	KC6-40E-F04	KC6-40E-P04
	220...240	KC6-40E-05	KC6-40E-F05	KC6-40E-P05

Main dimensions mm, inches



KC6, KC6...F



KC6...P

KC6 interface relays, 4 pole

For interface applications up to 4 A
Low power consumption, DC operated coils

Description

KC6 4-pole interface mini contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.



These contactors are designed with:

- 4 poles with various contact combinations
- control circuit: DC operated, low coil consumption (1.4 ... 2.8 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for rail or wall mounting



KC6

Ordering details

Rated control circuit voltage U _c	Auxiliary contacts fitted		Catalog number, screw termination	Catalog number, quick-connect termination	Catalog number, PCB-mount termination
					
DC operation 24 V / 1.4 W	3	1	KC6-31Z-1.4	KC6-31Z-F1.4	KC6-31Z-P1.4
	4	0	KC6-40E-1.4	KC6-40E-F1.4	KC6-40E-P1.4
DC operation 17...32 V / 2.4 W	3	1	KC6-31Z-2.4	KC6-31Z-F2.4	KC6-31Z-P2.4
	4	0	KC6-40E-2.4	KC6-40E-F2.4	KC6-40E-P2.4
DC operation 24 V / 1.7 W	2	2	K6S-22Z-1.7	K6S-22Z-F1.7	K6S-22Z-P1.7
	3	1	K6S-31Z-1.7	K6S-31Z-F1.7	K6S-31Z-P1.7
	4	0	K6S-40E-1.7	K6S-40E-F1.7	K6S-40E-P1.7
DC operation 17...32 V / 2.8 W	2	2	K6S-22Z-2.8	K6S-22Z-F2.8	K6S-22Z-P2.8
	3	1	K6S-31Z-2.8	K6S-31Z-F2.8	K6S-31Z-P2.8
	4	0	K6S-40E-2.8	K6S-40E-F2.8	K6S-40E-P2.8

(1) U_c min. and U_c max. limit values, including the voltage variation tolerances (-15 % and +10 %).

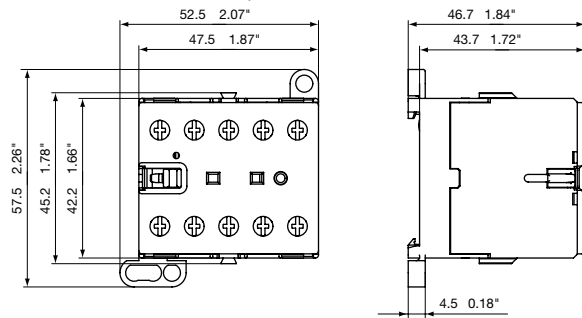


KC6...F

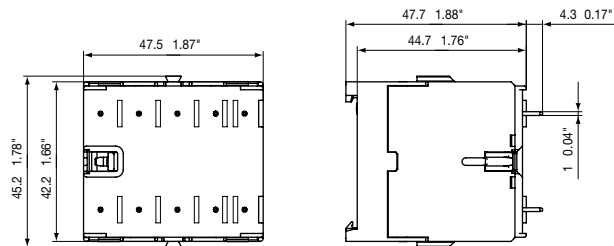


KC6...P

Main dimensions mm, inches



KC6, KC6...F

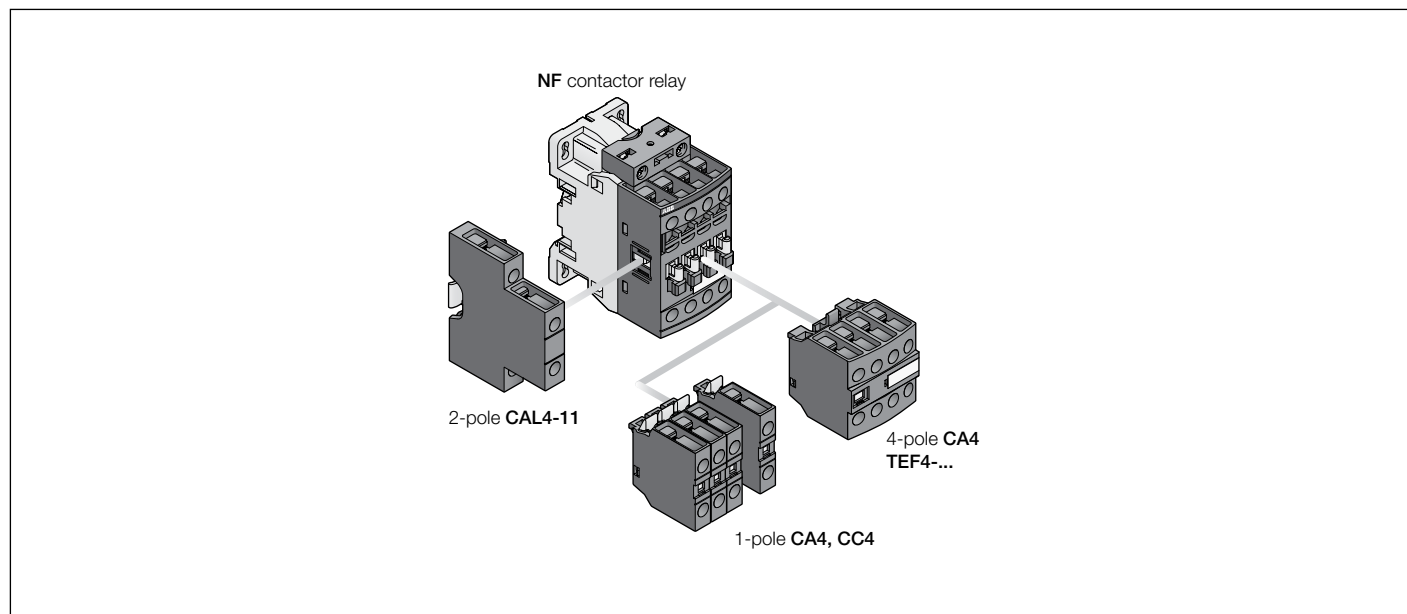


K6...P

NF(Z), 4 & 8 pole

Accessory fitting details

Contactor relays and main accessories (other accessories available)



6

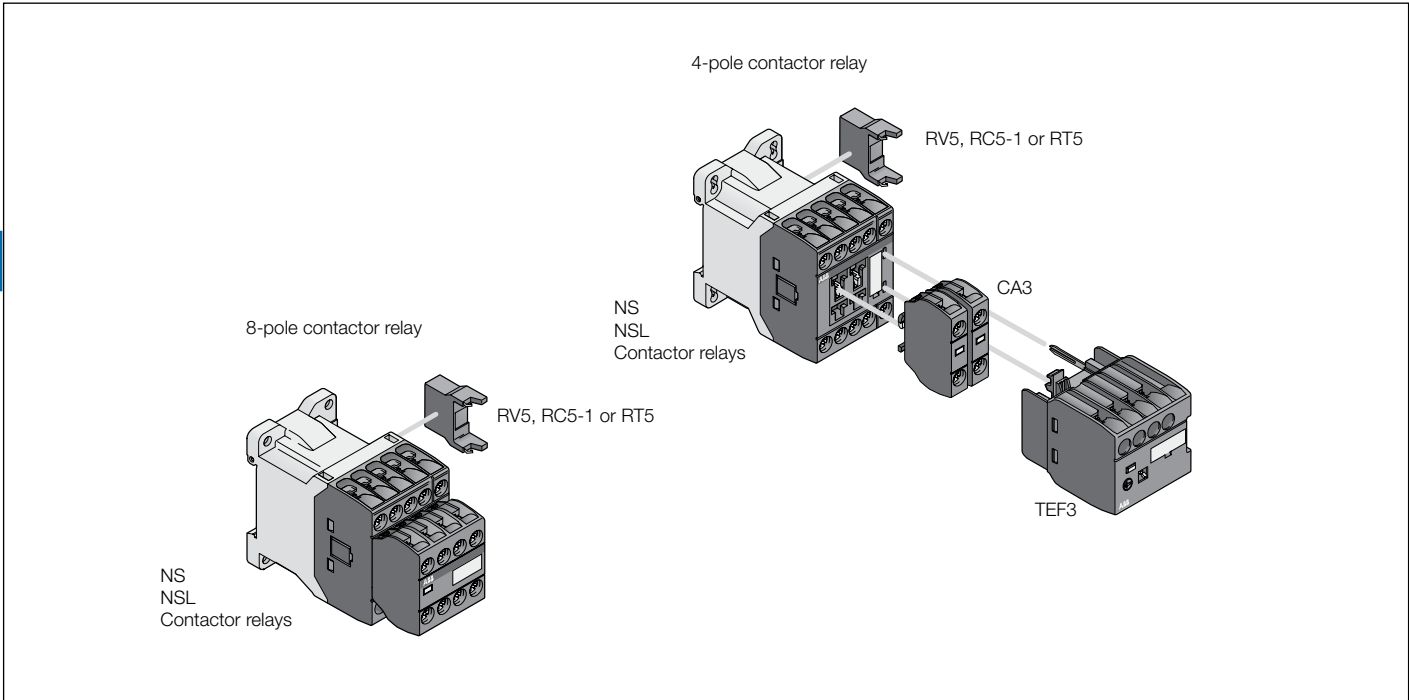
Accessory fitting details for a NF control relay

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Control relay types	Main poles	Front-mounted accessories			Side-mounted accessories	
		Auxiliary contact blocks		Timers	Auxiliary contact blocks	
		1-pole CA4 / 1-pole CC4	4-pole CA4	TEF4-...	Left side 2-pole CAL4-11	Right side
		Max. add-on N.C. auxiliary contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5				
NF..	2 2 E	4 max.	or 1	or 1	+ 1	-
NF..	3 1 E	2 max.	-	-	+ 1	+ 1
		Max. add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5				
NF..	4 0 E	4 max.	or 1	or 1	+ 1	-
		2 max.	-	-	+ 1	+ 1
NF..	4 4 E					
NF..	5 3 E					
NF..	6 2 E	-	-	-	1	-
NF..	7 1 E					
NF..	8 0 E					

NS/L 4 & 8 pole, screw terminated Accessory fitting details

Contactor relays and main accessories (other accessories available)



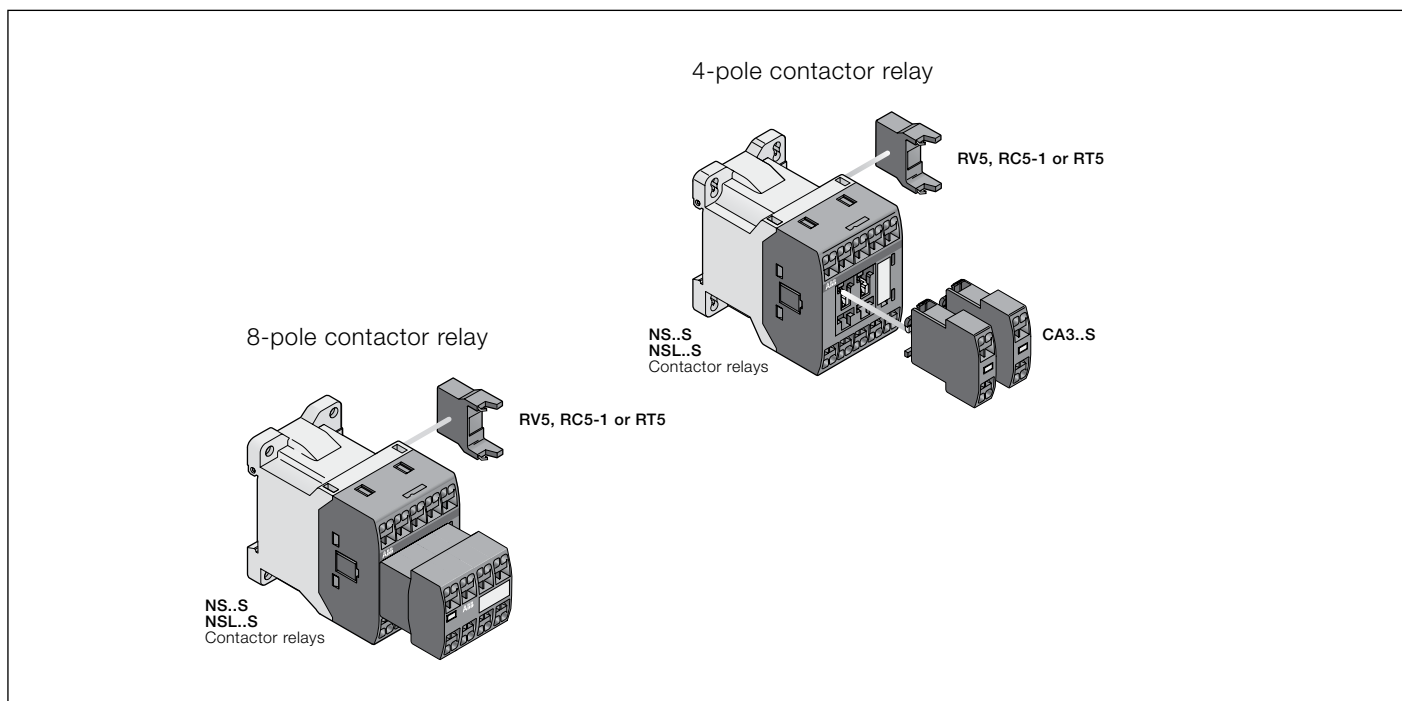
Main accessory fitting details

Contactor types	Main poles 	Front-mounted accessories			Side-mounted accessories	
		Auxiliary contact blocks	Electronic timer		Surge suppressors	
		1-pole CA3	TEF3			
NS..	2 2 E	2 max.	or 1	+	RV5	or RC5-1
NS..	3 1 E					
NS..	4 0 E					
NS..	4 4 E	-	-		RV5	or RC5-1
NS..	5 3 E					
NS..	6 2 E					
NS..	7 1 E					
NS..	8 0 E					
NSL..	2 2 E	2 max.	or 1	+	RV5	or RT5
NSL..	3 1 E					
NSL..	4 0 E					
NSL..	4 4 E	-	-		RV5	or RT5
NSL..	5 3 E					
NSL..	6 2 E					
NSL..	7 1 E					
NSL..	8 0 E					

NS/L 4 & 8 pole, spring terminated

Accessory fitting details

Contactor relays and main accessories



6

Main accessory fitting details

Contactor types	Main poles	Front-mounted accessories		Side-mounted accessories		
		Auxiliary contact blocks		Surge suppressors		
NS..S	2 2 E	1-pole CA3..S	2 max.	+	RV5	or RC5-1
NS..S	3 1 E					
NS..S	4 0 E					
NS..S	4 4 E					
NS..S	5 3 E				RV5	or RC5-1
NS..S	6 2 E					
NS..S	7 1 E					
NS..S	8 0 E					
NSL..S	2 2 E	1-pole CA3..S	2 max.	+	RV5	or RT5
NSL..S	3 1 E					
NSL..S	4 0 E					
NSL..S	4 4 E					
NSL..S	5 3 E				RV5	or RT5
NSL..S	6 2 E					
NSL..S	7 1 E					
NSL..S	8 0 E					

Auxiliary contact blocks & interlocks

NF(Z), NS/L & K/C6



CA4-10 CA4-22N



CAL4-11 CA3-10



CAF6-11K



CA6-11K



CA6-11K-P



VM4



BB4

Ordering details (1)

For contactor relays	Auxiliary contacts		Catalog number

Front-mounted instantaneous auxiliary contact blocks

	NF(Z)	NS/L	K/C6	Other	Catalog number
NF(Z), 4-pole	1	0	-	-	CA4-10
	0	1	-	-	CA4-01
	4	0	-	-	CA4-40N
	3	1	-	-	CA4-31N
	2	2	-	-	CA4-22N
	1	3	-	-	CA4-13N
NF(Z)40E only	0	4	-	-	CA4-04N
NS/L, 4-pole	1	0	-	-	CA3-10
	0	1	-	-	CA3-01
NS/L, 4-pole, spring terminated	1	0	-	-	CA3-10S
	0	1	-	-	CA3-01S
K/C6, 4-pole	1	1	-	-	CAF6-11K
	2	0	-	-	CAF6-20K
	0	2	-	-	CAF6-02K

Front-mounted auxiliary contact blocks with N.O. leading (early make) contact & N.C. lagging (late break) contact

NF(Z), 4-pole	N.O.	N.C.	Other	Catalog number
-	-	1	0	CC4-10
-	-	0	1	CC4-01

Side-mounted instantaneous auxiliary contact blocks

	NF(Z)	NS/L	K/C6	Other	Catalog number
NF(Z), 4- & 8-pole	1	1	-	-	CAL4-11
K/C6, 4-pole	1	1	-	-	CA6-11K
K/C6...F, 4-pole	1	1	-	-	CA6-11K-F
K/C6...P, 4-pole	1	1	-	-	CA6-11K-P

Mechanical interlocks

For control relays		Catalog number
Left side	Right side	
NF(Z)	NF(Z)	VM4
NS/L	NS/L	VM3

NOTE: Includes two fixing clips.

Mechanical & electrical interlocks

For control relays		Catalog number
Left side	Right side	
NF(Z)	NF(Z)	VEM4

Fixing clips

For control relays		Catalog number
NF(Z)		BB4
NS/L		BB3

1) See accessory fitting details for maximum quantities.

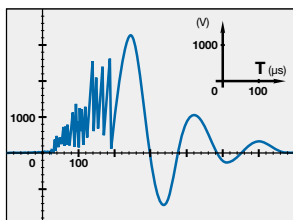
Surge suppression for control relay coils

NS/L & K/C6

NOTE: Surge suppression integral for NF / NFZ and AC operated K6 control relays; no accessory required.

Description

The operation of inductive circuits causes overvoltages, in particular on opening the contactor coil. The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to the breakdown of insulators and even the destruction of certain sensitive components. The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay. Following a burst of discharges with a very steep slope, a damped oscillation emerges with a peak value of 3500 V.



Overvoltage Factor

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value \hat{U}_s to the peak value \hat{U}_c of the coil rated control voltage U_c :

$$k = \frac{\hat{U}_s \text{ max.}}{\hat{U}_c} \quad \text{in DC} \quad k = \frac{\hat{U}_s \text{ max.}}{U_c} \quad \text{in AC} \quad k = \frac{\hat{U}_s \text{ max.}}{U_c \sqrt{2}}$$

For example the following is obtained for the above graph: $k = \frac{3500}{42 \sqrt{2}} \approx 60$

To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies. Each case is different, but the technical data tolerances and generous sizing of parts have enabled us to reduce the number of variants.

We have chosen the following solutions: transil diodes, varistors and RC blocks.

Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.



RV5



RC5-1



RT5

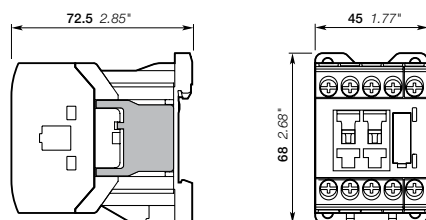
Ordering details

For contactor relays	Rated control circuit voltage - U_c			Catalog number
	V	AC	DC	
NS, NSL	24...50	●	●	RV5/50
	50...133	●	●	RV5/133
	110...250	●	●	RV5/250
	250...440	●	●	RV5/440
NS	24...50	●	-	RC5-1/50
	50...133	●	-	RC5-1/133
	110...250	●	-	RC5-1/250
	250...440	●	-	RC5-1/440
NSL	12...32	-	●	RT5/32
	25...65	-	●	RT5/65
	50...90	-	●	RT5/90
	77...150	-	●	RT5/150
KC6	150...264	-	●	RT5/264
	24...60	-	●	RV-BC6/60
KC6...F (2.8mm)	50...250	-	●	RV-BC6/250
	380	-	●	RV-BC6/380
	24...60	-	●	RV-BC6-F/60
	50...250	-	●	RV-BC6-F/250
	380	-	●	RV-BC6-F/380

Main dimensions mm, inches



RV-BC6/250



Easy connection to the coil terminals
(parallel mounting)
Clip-on for both fixing and connection.

No additional space
Clipped onto the right side part of the contactor base without changing contactor overall dimensions and keeping a free access to coil terminals.

Electronic timers NF(Z) & NS/L, 4 pole

Ordering details

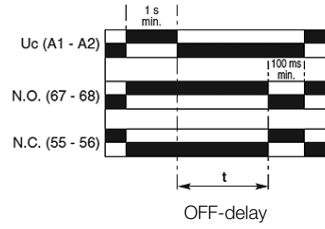
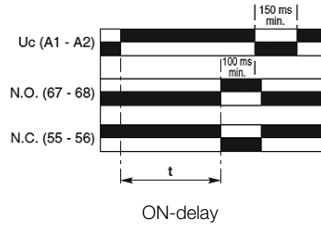
For contactors, contactor relays	Time delay range selected by switch	Delay type	Rated control circuit voltage U _c V 50/60 Hz or DC	Auxiliary contacts	Catalog number
NS(L)	0.1...1 s	ON-delay	24...240	1 1	TEF3-ON
		OFF-delay	24...240	1 1	TEF3-OFF
NF(Z)	1...10 s	ON-delay	24...240	1 1	TEF4-ON
		OFF-delay	24...240	1 1	TEF4-OFF



TEF3



TEF4



Function markers, protective covers & coil terminal blocks NF(Z), NS/L & K/C6



LDC4



BX4



LT6-B



BA4

Ordering details

For control relays	Catalog number
--------------------	----------------

Additional coil terminal block

Additional coil terminal block for a bottom access to the coil terminals of contactors or contactor relays.

NF	LDC4
----	------

Protective covers

Sealable and transparent protective covers BX4 and non-removable BX4-CA to protect the devices against accidental contact.

All 1-stack contactors and contactor relays	BX4
For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks	BX4-CA
For control relays K/C6	LT6-B

Function markers

Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.

Marker dimensions: 7 x 20 mm (.276" x .787").

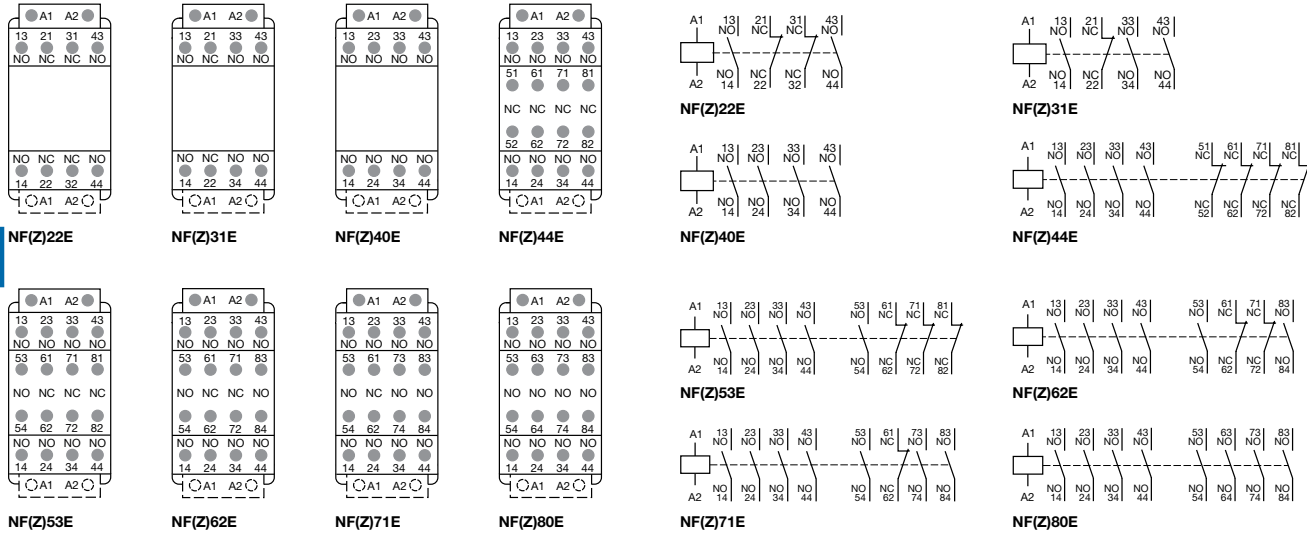
Box of 16 blank cards	BA4
AMS 500 support plate for 8 BA4	XUSP02633
HTP500 support plate	1SNA235712R2400

Terminal marking & positioning

NF(Z), 4 & 8 pole

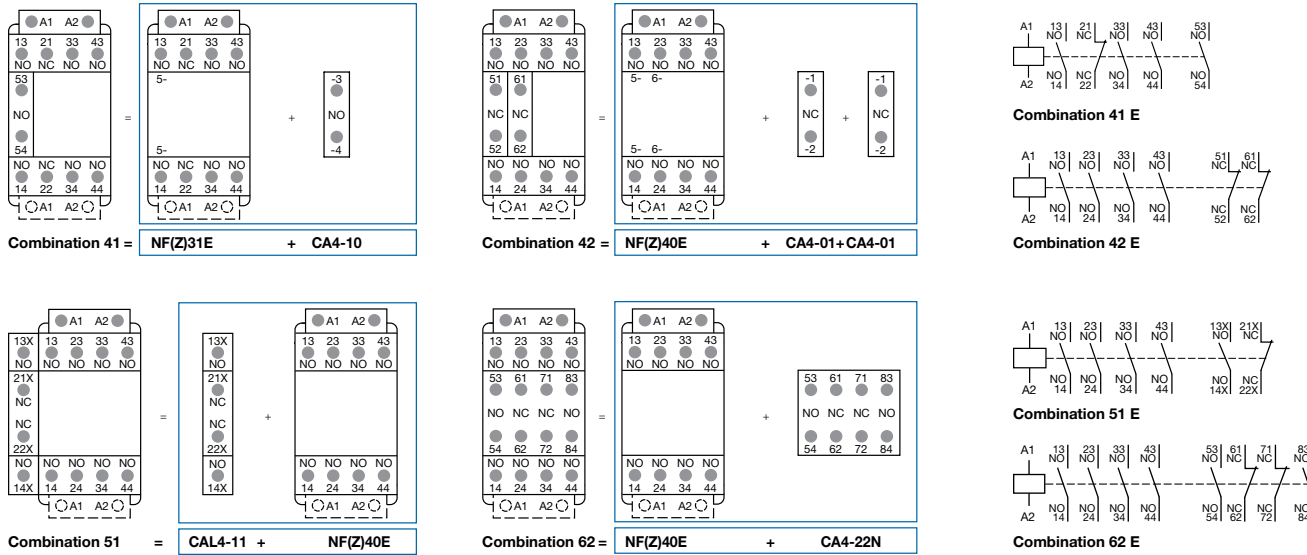
Control relays

Standard devices without addition of auxiliary contacts



6

Other possible contact combinations with auxiliary contacts



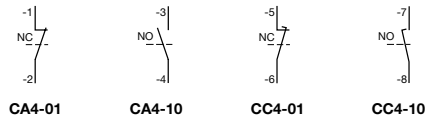
Note: Only NF(Z) contactor relays with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

Terminal marking & positioning

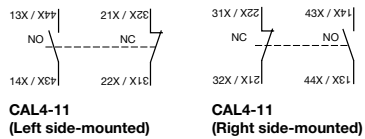
CA4, CC4, CAL4 & CAT4

Auxiliary contacts

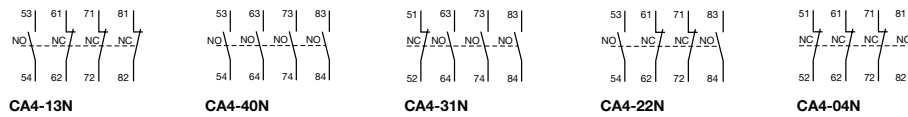
1-pole auxiliary contacts



2-pole auxiliary contacts



4-pole auxiliary contacts

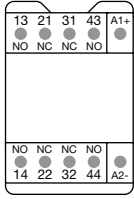


Terminal marking & positioning

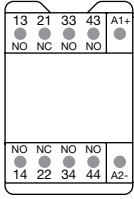
NS/L 4 & 8 pole & CA3

Control relays & auxiliary contacts

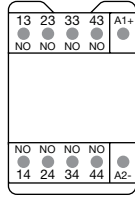
Standard devices without addition of auxiliary contact blocks



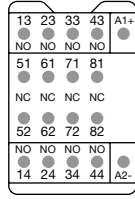
NS/L22E/S



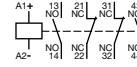
NS/L31E/S



NS/L40E/S



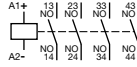
NS/L44E/S



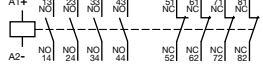
NS/L22E/S



NS/L31E/S

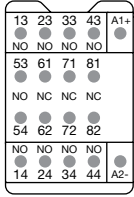


NS/L40E/S

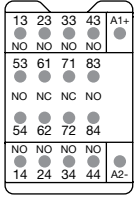


NS/L44E/S

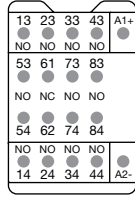
6



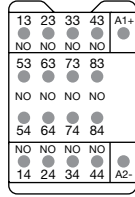
NS/L53E/S



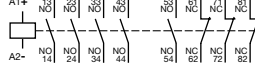
NS/L62E/S



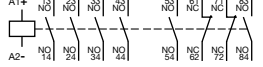
NS/L71E/S



NS/L80E/S



NS/L53E/S



NS/L62E/S



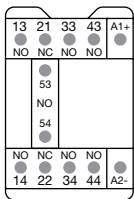
NS/L71E/S



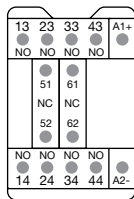
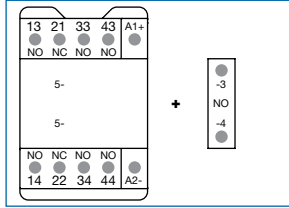
NS/L80E/S

NOTE: For DC operated devices, polarity A1+, A2- must be respected.

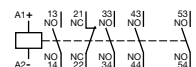
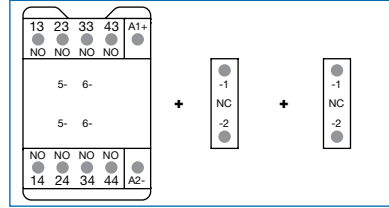
Other possible contact combinations with auxiliary contact blocks added by the user



Combination 41E = NS/L31E/S + CA3-10/S



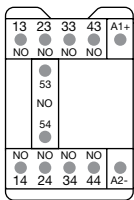
Combination 42E = NS/L40E/S + CA3-10/S + CA3-01/S



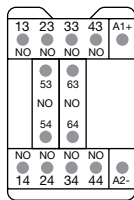
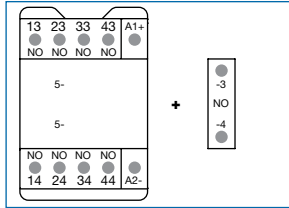
Combination 41E



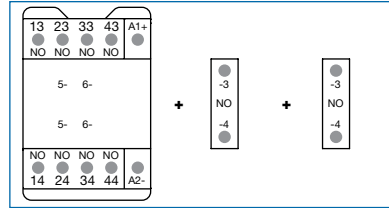
Combination 42E



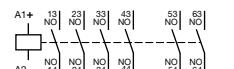
Combination 50E = NS/L40E/S + CA3-10/S



Combination 60E = NS/L40E/S + CA3-10/S + CA3-10/S

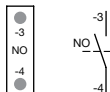


Combination 50E



Combination 60E

1-pole auxiliary contact blocks



CA3-10/S



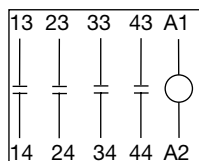
CA3-01/S

Terminal marking & positioning

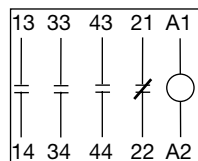
K/C6, CA6 & CAF6

Control relays & auxiliary contacts

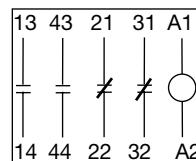
Miniature control relays



K6-40 E ...
KC6-40 E ...

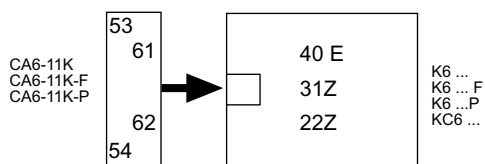


K6-31 Z ...
KC6-31 Z ...

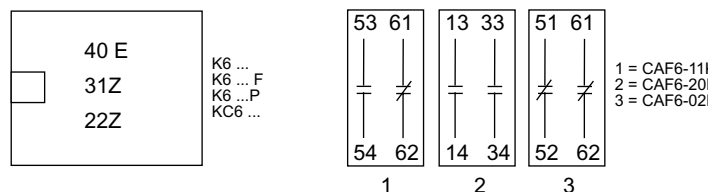


K6-22 Z ...
KC6-22 Z ...

Side mounted auxiliary contact blocks



Front mounted auxiliary contact blocks



NOTE: Only side mounted type or front mounted type auxiliary contact blocks can be used at one time. Auxiliary contact blocks must not be mounted on Interface contactors, Interface control relays or contactors for connection to PLCs. Two CAF 6 front mounted auxiliary contact blocks can be installed on the mechanically interlocked contactors VB(C)6(7).

IEC / UL / CSA technical data

NF(Z), 4 & 8 pole

Utilization characteristics

Contact utilization characteristics according to IEC

Contactor relay types	AC / DC operated	NF(Z)
Standards		IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1
Rated operational voltage U _e max.		690 V
Rated frequency (without derating)		50 / 60 Hz
Conventional free-air thermal current I _{th} θ ≤ 40 °C		16 A
I _e / Rated operational current AC-15		
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Rated making capacity AC-15		10 x I _e AC-15 acc. to IEC 60947-5-1
Rated breaking capacity AC-15		10 x I _e AC-15 acc. to IEC 60947-5-1
I _e / Rated operational current DC-13		
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
	400 V DC	0.15 A / 60 W
	500 V DC	0.13 A / 65 W
	600 V DC	0.1 A / 60 W
Short-circuit protection device gG type fuse		10 A
Rated short-time withstand current I _{sc}	for 1.0 s	100 A
	for 0.1 s	140 A
Minimum switching capacity		12 V / 3 mA
with failure rate acc. to IEC 60947-5-4		10 ⁻⁷
Non-overlapping time between N.O. and N.C. contacts		≥ 2 ms
Power dissipation per pole at 6 A		0.1 W
Max. electrical switching frequency	AC-15	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mechanically linked contacts.
acc. to annex L of IEC 60947-5-1		

Contact utilization characteristics according to UL / CSA

Contactor relay types	AC / DC operated	NF(Z)
Standards		UL 508, CSA C22.2 N°14
Max. operational voltage		600 V AC, 600 V DC
Pilot duty		A600, Q600
AC thermal rated current		10 A
AC maximum volt-ampere making		7200 VA
AC maximum volt-ampere breaking		720 VA
DC thermal rated current		2.5 A
DC maximum volt-ampere making-breaking		69 VA

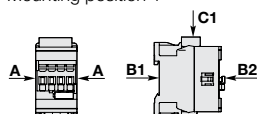
General technical data

NF(Z) 4 & 8 pole

Coil, mounting & operating characteristics

General technical data

Contactor types	AC / DC operated	NF(Z)
Rated insulation voltage U_i		
acc. to IEC 60947-5-1		690 V
acc. to UL / CSA		600 V
Rated impulse withstand voltage U_{imp}		6 kV
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A
Ambient air temperature close to contactor		
Operation in free air		-40...+70 °C
Storage		-60...+80 °C
Climatic withstand		Category B according to IEC 60947-1 Annex Q
Maximum operating altitude (without derating)		3000 m
Mechanical durability		
Number of operating cycles		20 millions operating cycles
Max. switching frequency		6000 cycles/h
Shock withstand		
acc. to IEC 60068-2-27 and EN 60068-2-27		
Mounting position 1		
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position
	A	30 g
	B1	25 g closed position / 5 g open position
	B2	15 g
	C1	25 g
	C2	25 g
Vibration withstand		
acc. to IEC 60068-2-6		5...300 Hz
		4 g closed position / 2 g open position



Magnet system characteristics

Contactor relay types	AC / DC operated	NF(Z)
Coil operating limits	AC supply	At $\theta \leq 60$ °C $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$
acc. to IEC 60947-5-1		At $\theta \leq 70$ °C $0.85 \times U_c \text{ min...} U_c \text{ max.}$
	DC supply	At $\theta \leq 60$ °C $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$
		At $\theta \leq 70$ °C (AF) $0.85 \times U_c \text{ min...} U_c \text{ max.}$ - (NFZ) $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$
AC control voltage	Rated control circuit voltage U_c	24...500 V AC
50/60 Hz	Coil consumption	Average pull-in value (NF) 50 VA - (NFZ) 16 VA
		Average holding value (NF) 2.2 VA / 2 W - (NFZ) 1.7 VA / 1.5 W
DC control voltage	Rated control circuit voltage U_c	12...500 V DC
	Coil consumption	Average pull-in value (NF) 50 W - (NFZ) 12...16 W
		Average holding value (NF) 2 W - (NFZ) 1.7 W
PLC-output control		(NFZ) ≥ 500 mA 24 V DC
Drop-out voltage		≤ 60 % of $U_c \text{ min.}$
Voltage sag immunity acc. to SEMI F47-0706		(NFZ) conditions of use on request
Dips withstand		
-20 °C $\leq \theta \leq$ +60 °C		(NFZ) 22 ms average
Operating time		
Between coil energization and:	N.O. contact closing	40...95 ms
	N.C. contact opening	38...90 ms
Between coil de-energization and:	N.O. contact opening	11...95 ms
	N.C. contact closing	13...98 ms

Mounting characteristics









Contactor types	AC / DC operated	NF(Z)
Mounting positions		
		Max. add-on N.C. auxiliary contacts: see accessory fitting details for a NF contactor relay
Mounting distances		The contactor relays can be assembled side by side.
Fixing	On rail according to IEC 60715, EN 60715	35 x 7.5 mm or 35 x 15 mm
	By screws (not supplied)	2 x M4 screws placed diagonally

General technical data

NF(Z), 4 & 8 pole

Terminal characteristics

Connecting characteristics

Contactor types	AC / DC operated	NF(Z)
Main terminals		
		Screw terminals with cable clamp
Connection capacity (min. ... max.)		
Pole and coil terminals		
	Rigid	1 x 1...2.5 mm ²
		2 x 1...2.5 mm ²
	Flexible with non insulated ferrule	1 x 0.75...2.5 mm ²
		2 x 0.75...2.5 mm ²
	Flexible with insulated ferrule	1 x 0.75...2.5 mm ²
		2 x 0.75...1.5 mm ²
	Lugs	L < 8 mm
Connection capacity acc. to UL/CSA		1 or 2 x AWG 18...14
Stripping length		10 mm
Tightening torque		
Pole terminals		1.2 Nm / 11 lb.in
Coil terminals		1.2 Nm / 11 lb.in
Degree of protection		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
All terminals		IP20
Screw terminals		
All terminals		Delivered in open position, screws of unused terminals must be tightened
		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2

IEC / UL / CSA technical data

NS/L, 4 & 8 pole, screw terminated

Utilization characteristics

Contact utilization characteristics according to IEC

Contactor relay types	AC operated	NS
	DC operated	NSL
Standards	IEC 60947-5-1 and EN 60947-5-1	
Rated operational voltage U_e max.	690 V	
Rated frequency (without derating)	50 / 60 Hz	
Conventional free-air thermal current $I_{th} - \theta \leq 40$ °C	10 A	
I_e / Rated operational current AC-15		
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Making capacity AC-15	10 x I_e AC-15 acc. to IEC 60947-5-1	
Breaking capacity AC-15	10 x I_e AC-15 acc. to IEC 60947-5-1	
I_e / Rated operational current DC-13		
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
Short-circuit protection device for contactors		
$U_e \leq 500$ V AC - gG type fuse	10 A	
Rated short-time withstand current I_{sw}	for 1.0 s	100 A
	for 0.1 s	140 A
Minimum switching capacity	12 V / 3 mA	
with failure rate acc. to IEC 60947-5-4	10 ⁻⁷	
Non-overlapping time between N.O. and N.C. contacts	1.5 ms	
Power dissipation per pole at 6 A	0.1 W	
Max. electrical switching frequency	AC-15	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts	Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts.	
acc. to annex L of IEC 60947-5-1		

Contact utilization characteristics according to UL / CSA

Contactor relay types	AC operated	NS
	DC operated	NSL
Standards	UL 508, CSA C22.2 N°14	
Max. operational voltage	600 V AC, 250 V DC	
Pilot duty	A600, Q300	
AC thermal rated current	10 A	
AC maximum volt-ampere making	7200 VA	
AC maximum volt-ampere breaking	720 VA	
DC thermal rated current	2.5 A	
DC maximum volt-ampere making-breaking	69 VA	

General technical data

NS/L, 4 & 8 pole, screw terminated

Coil & mounting characteristics

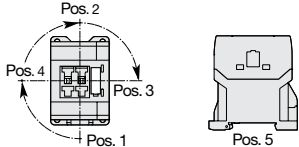
Magnet system characteristics for NS contactor relays

Contactor relay types	AC operated	NS	
Coil operating limits acc. to IEC 60947-5-1	AC supply		
AC control voltage	Rated control circuit voltage U_c	0.85...1.1 x U_c (at $\theta \leq 60^\circ\text{C}$); U_c (at $\theta \leq 70^\circ\text{C}$)	
	at 50 Hz	24...415 V	
	at 60 Hz	24...415 V	
Coil consumption	Average pull-in value	50 Hz	33 VA
		60 Hz	33 VA
		50/60 Hz	33 VA
	Average holding value	50 Hz	6.5 VA / 1.5 W
		60 Hz	5 VA / 1.2 W
50/60 Hz		6.5 VA / 1.5 W	
Drop-out voltage		Approx. 30...50 % of U_c	
Operating time			
Between coil energization and:	N.O. contact closing	9...24 ms	
	N.C. contact opening	6...18 ms	
Between coil de-energization and:	N.O. contact opening (1)	5...19 ms	
	N.C. contact closing (1)	7...22 ms	
(1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3.			

Magnet system characteristics for NSL contactor relays

Contactor relay types	DC operated	NSL	
Coil operating limits acc. to IEC 60947-5-1	DC supply		
DC control voltage	Rated control circuit voltage U_c	0.85...1.1 x U_c (at $\theta \leq 60^\circ\text{C}$); U_c (at $\theta \leq 70^\circ\text{C}$)	
	Coil consumption	12...240 V DC	
	Average pull-in value	3 W	
	Average holding value	3 W	
Drop-out voltage		Approx. 10...40 % of U_c	
Coil time constant	Open	L/R	12 ms
	Closed	L/R	40 ms
Operating time			
Between coil energization and:	N.O. contact closing	36...59 ms	
	N.C. contact opening	31...53 ms	
Between coil de-energization and:	N.O. contact opening (1)	13...17 ms	
	N.C. contact closing (1)	15...20 ms	
(1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2.			

Mounting characteristics and conditions for use

Contactor relay types	AC operated	NS
	DC operated	NSL
Mounting positions		
Mounting distances	The contactor relays can be assembled side by side.	
Fixing	On rail according to IEC 60715, EN 60715	35 x 7.5 mm or 35 x 15 mm
	By screws (not supplied)	2 x M4 screws placed diagonally

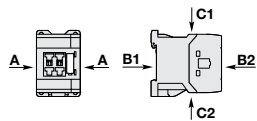
General technical data

NS/L, 4 & 8 pole, screw terminated






Operating & terminal characteristics

General technical data

Contactor relay types	AC operated	NS
	DC operated	NSL
Rated insulation voltage U_i		
acc. to IEC 60947-5-1		690 V
acc. to UL / CSA		600 V
Rated impulse withstand voltage U_{imp}		6 kV
Ambient air temperature close to contactor relay		
Operation in free air		-40...+70 °C
Storage		-60...+80 °C
Climatic withstand		Category B according to IEC 60947-1 Annex Q
Maximum operating altitude (without derating)		3000 m
Mechanical durability		
Number of operating cycles		20 millions operating cycles
Max. switching frequency		3600 cycles/h
Shock withstand		1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position
acc. to IEC 60068-2-27 and EN 60068-2-27	Shock direction	NS contactor relays - AC operated NSL contactor relays - DC operated
Mounting position 1	A	20 g 20 g closed position / 10 g open position
	B1	5 g 15 g closed position / 5 g open position
	B2	15 g 10 g
	C1	19 g closed position / 8 g open position 19 g closed position / 8 g open position
	C2	16 g closed position / 13 g open position 14 g closed position / 8 g open position
Vibration withstand acc. to IEC 60068-2-6		5...300 Hz / 3 g closed position / 2 g open position



Connecting characteristics

Contactor relay types	AC operated	NS
	DC operated	NSL
Main terminals		 <p>Screw terminals with cable clamp</p>
Connection capacity (min. ... max.)		
Pole and coil terminals		
 Rigid solid	1 x	0.75...2.5 mm ²
	2 x	0.75...2.5 mm ²
 Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²
	2 x	0.75...2.5 mm ²
 Flexible with insulated ferrule	1 x	0.75...2.5 mm ²
	2 x	0.75...1.5 mm ²
 Lugs	L ≤	7.7 mm
	L >	3.2 mm
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14
Stripping length		9 mm
Tightening torque	Recommended	1.00 Nm / 9 lb.in
	Max.	1.20 Nm
Degree of protection		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
All terminals		IP20
Screw terminals		Delivered in open position, screws of unused terminals must be tightened
All terminals		M3
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2

IEC / UL / CSA technical data

NS/L, 4 & 8 pole, spring terminated

Utilization characteristics

Contact utilization characteristics according to IEC

Contactor relay types	AC operated	NS..S
	DC operated	NSL..S
Standards	IEC 60947-5-1 and EN 60947-5-1	
Rated operational voltage U_e max.	690 V	
Rated frequency (without derating)	50 / 60 Hz	
Conventional free-air thermal current $I_{th} \theta \leq 40 \text{ }^\circ\text{C}$	10 A	
le / Rated operational current AC-15	24-127 V 50/60 Hz	6 A
acc. to IEC 60947-5-1	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Making capacity AC-15	10 x le AC-15 acc. to IEC 60947-5-1	
Breaking capacity AC-15	10 x le AC-15 acc. to IEC 60947-5-1	
le / Rated operational current DC-13	24 V DC	6 A / 144 W
acc. to IEC 60947-5-1	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
Short-circuit protection device for contactors	$U_e \leq 500 \text{ V AC}$ - gG type fuse	
	10 A	
Rated short-time withstand current I_{cw}	for 1.0 s	100 A
at 40 °C ambient temperature, in free air from a cold state	for 0.1 s	140 A
Minimum switching capacity	12 V / 3 mA	
with failure rate acc. to IEC 60947-5-4	10 ⁻⁷	
Non-overlapping time between N.O. and N.C. contacts	1.5 ms	
Power dissipation per pole at 6 A	0.1 W	
Max. electrical switching frequency	AC-15	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts	Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3..S aux. contact blocks) are mechanically linked contacts.	
acc. to annex L of IEC 60947-5-1		

Contact utilization characteristics according to UL / CSA

Contactor relay types	AC operated	NS..S
	DC operated	NSL..S
Standards	UL 508, CSA C22.2 N°14	
Max. operational voltage	600 V AC, 250 V DC	
Pilot duty	A600, Q300	
AC thermal rated current	10 A	
AC maximum volt-ampere making	7200 VA	
AC maximum volt-ampere breaking	720 VA	
DC thermal rated current	2.5 A	
DC maximum volt-ampere making-breaking	69 VA	

General technical data

NS/L, 4 & 8 pole, spring terminated

Coil & mounting characteristics

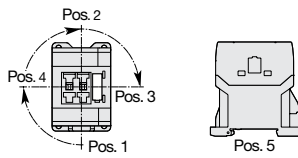
Magnet system characteristics for NS..S contactor relays

Contactor relay types	AC operated	NS..S
Coil operating limits	AC supply	
acc. to IEC 60947-5-1		0.85...1.1 x U _c (at $\theta \leq 60^\circ\text{C}$); U _c (at $\theta \leq 70^\circ\text{C}$)
AC control voltage	Rated control circuit voltage U _c	
	at 50 Hz	24...415 V
	at 60 Hz	24...415 V
Coil consumption	Average pull-in value	
	50 Hz	33 VA
	60 Hz	33 VA
	50/60 Hz	33 VA
	Average holding value	
50 Hz	6.5 VA / 1.5 W	
60 Hz	5 VA / 1.2 W	
50/60 Hz	6.5 VA / 1.5 W	
Drop-out voltage		Approx. 30...50 % of U _c
Operating time		
Between coil energization and:	N.O. contact closing	9...24 ms
	N.C. contact opening	6...18 ms
Between coil de-energization and:	N.O. contact opening (1)	5...19 ms
	N.C. contact closing (1)	7...22 ms
		(1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3.

Magnet system characteristics for NSL..S contactor relays

Contactor relay types	DC operated	NSL..S
Coil operating limits	DC supply	
acc. to IEC 60947-5-1		0.85...1.1 x U _c (at $\theta \leq 60^\circ\text{C}$); U _c (at $\theta \leq 70^\circ\text{C}$)
DC control voltage		
Rated control circuit voltage U _c		12...240 V DC
Coil consumption	Average pull-in value	3 W
	Average holding value	3 W
Drop-out voltage		Approx. 10...40 % of U _c
Coil time constant	Open	L/R 12 ms
	Closed	L/R 40 ms
Operating time		
Between coil energization and:	N.O. contact closing	36...59 ms
	N.C. contact opening	31...53 ms
Between coil de-energization and:	N.O. contact opening (1)	13...17 ms
	N.C. contact closing (1)	15...20 ms
		(1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2.

Mounting characteristics and conditions for use

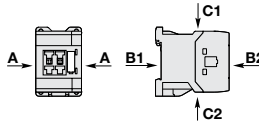
Contactor relay types	AC operated	NS..S
	DC operated	NSL..S
Mounting positions		
Mounting distances	The contactor relays can be assembled side by side.	
Fixing	On rail according to IEC 60715, EN 60715	35 x 7.5 mm or 35 x 15 mm
	By screws (not supplied)	2 x M4 screws placed diagonally

General technical data








NS/L, 4 & 8 pole, spring terminated

Operating & terminal characteristics

General technical data

Contactor relay types	AC operated	NS..S	
	DC operated	NSL..S	
Rated insulation voltage U_i acc. to IEC 60947-5-1 acc. to UL / CSA		690 V 600 V	
Rated impulse withstand voltage U_{imp}		6 kV	
Ambient air temperature close to contactor relay			
Operation in free air		-40...+70 °C	
Storage		-60...+80 °C	
6 Climatic withstand		Category B according to IEC 60947-1 Annex Q	
Maximum operating altitude (without derating)		3000 m	
Mechanical durability			
Number of operating cycles		20 millions operating cycles	
Max. switching frequency		3600 cycles/h	
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27		1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position	
Mounting position 1	Shock direction		
		NS contactor relays - AC operated	NSL contactor relays - DC operated
	A	20 g	20 g closed position / 10 g open position
	B1	5 g	15 g closed position / 5 g open position
	B2	15 g	10 g
	C1	19 g closed position / 8 g open position	19 g closed position / 8 g open position
	C2	16 g closed position / 13 g open position	14 g closed position / 8 g open position
Vibration withstand acc. to IEC 60068-2-6		5...300 Hz 3 g closed position / 2 g open position	

Connecting characteristics

Contactor relay types	AC operated	NS..S	
	DC operated	NSL..S	
Main terminals		 Spring terminals	
Connection capacity (min. ... max.)			
Pole and coil terminals			
 Rigid solid	1 x	0.75...2.5 mm ²	
 Rigid solid	2 x	0.75...2.5 mm ²	
 Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²	
 Flexible with non insulated ferrule	2 x	0.75...2.5 mm ²	
 Flexible with insulated ferrule	1 x	0.75...1.5 mm ²	
 Flexible with insulated ferrule	2 x	0.75...1.5 mm ²	
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14	
Stripping length		10 mm	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20	
All terminals		IP20	
Screwdriver type		Flat Ø 3.5	

IEC / UL / CSA technical data

K/C6, 4 pole

Utilization characteristics

Main pole – Utilization characteristics according to IEC

Contactor types	AC operated	K6
	DC operated	KC6, TKC6
Standards		IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1
Rated operational voltage $U_{e\max}$		690 V
Rated frequency (without derating)		DC or 50 / 60 Hz
Conventional free-air thermal current $I_{th} \leq 40^\circ\text{C}$		6 A
I_e / Rated operational current AC-15 acc. to IEC 60947-5-1	24 V 50/60 Hz	4 A
	110-120 V 50/60 Hz	4 A
	220-230-240 V 50/60 Hz	4 A
	380-400 V 50/60 Hz	3 A
	440 V 50/60 Hz	3 A
I_e / Rated operational current DC-13 acc. to IEC 60947-5-1	480-500 V 50/60 Hz	2 A
	24 V DC	2.5 A
	110 V DC	0.7 A
	220 - 240 V DC	0.4 A
Short-circuit protection device for contactors $U_e \leq 500$ V AC, gG fuse type		6 A
Minimum switching capacity		17 V / 5 mA
Maximum electrical switching frequency	AC-15	600 cycles/h
	DC-13	600 cycles/h

Main pole – Utilization characteristics according to UL / CSA

Contactor types	AC operated	K6
	DC operated	KC6
Standards		UL 508, CSA C22.2 No14
Maximum operational voltage		600 V AC
Pilot duty		A600

General technical data

K/C6, 4 pole

Coil & operating characteristics

General technical data

Contactor relay types	AC operated	K6
	DC operated	KC6
Rated insulation voltage U_i	acc. to IEC 60947-5-1	690 V
	acc. to UL/CSA	600 V
Rated impulse withstand voltage U_{imp}		6 kV
Electromagnetic compatibility		
Ambient air temperature close to contactor relay	Operation in free air	-25 ... +55 °C
	Storage	-40 ... +80 °C
Climatic withstand		acc. to IEC 60068-2-30
Maximum operating altitude (without derating)		2000 m
Mechanical durability		10 ⁷ operating cycles
Resistance to shock		Half-sine
	acc. IEC 60068-2-27 and EN 60068-2-27	15 g / 11ms
	acc. to IEC/EN 60947-1 Annex. Q	Category E
Resistance to vibrations		Sinusoidal
	acc. IEC 60068-2-27 and EN 60068-2-27	5 g / 3 ... 150 Hz
	acc. to IEC/EN 60947-1 Annex. Q	Kategorie E

Magnet system characteristics for K6 contactor relays

Contactor relay types	AC operated	K6
Coil operating limits acc. to IEC 60947-4-1	AC supply	0.85 ... 1.1 x U_C
AC control voltage		
Coil consumption	Average pull-in value	3.5 VA / 3.5 W
	Average holding value	3.5 VA / 3.5 W
Drop-out voltage in % of U_C min.		Approx. 20 ... 75%

Magnet system characteristics for KC6, TKC6 contactor relays

Contactor relay types	DC operated	KC6	TKC6
Coil operating limits acc. to IEC 60947-5-1	DC supply	0.85 ... 1.1 x U_C	See ordering details
DC control voltage			
Coil consumption	Average pull-in value	3.5 VA / 3.5 W	5 VA / 5 W
	Average holding value	3.5 VA / 3.5 W	5 VA / 5 W
Drop-out voltage in % of U_C min.		10 ... 75 %	10 ... 75 %

General technical data

K/C6, 4 pole

Terminal & mounting characteristics

Mounting characteristics and conditions for use

Contactor types	AC operated DC operated	K6 KC6
Mounting positions		
Mounting distances	The contactors can be assembled side by side.	
Fixing	On rail acc. to IEC 60715, EN 60715 By screws (not supplied)	
	35 x 7.5 mm or 35 x 15 mm 2 x M4 screws placed diagonally	

Connecting characteristics

Contactor relay types	AC operated DC operated	K6 KC6, TKC6
Main terminals ¹⁾	 Screw terminals with cable clamp	
Connection capacity		
Main conductors (poles)		
Rigid: solid	1 or 2 x	1 ... 4 mm ²
Flexible without ferrule	1 or 2 x	1 ... 2.5 mm ²
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 22 ... 10
Stripping length		9 mm
Tightening torques		0.8 ... 1.1 Nm / 7 lb.in
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
All	IP20	
Screw terminals	(Delivered in open position, screws of unused terminals must be tightened)	
All terminals	M3	
Screwdriver type	Flat Ø 5.5 / Pozidriv 1	

¹⁾ Soldering pin connection acc. to DIN 40801: 0.8 x 1 mm / 0.8 x 2.54 mm

Flat pin connection acc. to DIN 46248: 1 x 6.3 mm / 1 x 2.8 mm

Electronic timers



General information

Electronic timers

Overview



CT-D range

CT-E range

CT-S range

6

Timing function

		multifunctional	single-functional	multifunctional	single-functional	multifunctional	single-functional
	ON-delay	CT-MFD	CT-ERD	CT-MFE, CT-MKE	CT-ERE, CT-EKE	CT-MVS, CT-MFS, CT-MBS, CT-WBS	CT-ERS
	OFF-delay	CT-MFD	CT-AHD	CT-MFE	CT-AHE, CT-ARE, CT-AKE	CT-MVS, CT-MFS, CT-MBS	CT-APS, CT-AHS, CT-ARS, CT-VBS
	ON- and OFF-delay					CT-MVS, CT-MXS, CT-MFS, CT-MBS	
	Impulse-ON	CT-MFD	CT-VWD	CT-MFE, CT-MKE	CT-VWE	CT-MVS, CT-MFS, CT-MBS, CT-WBS	
	Impulse-OFF	CT-MFD			CT-AWE	CT-MVS, CT-MFS, CT-MBS	
	Impulse-ON and OFF					CT-MXS	
	Flasher starting with ON	CT-MFD	CT-EBD	CT-MFE, CT-MKE		CT-MFS, CT-MBS, CT-WBS	
	Flasher starting with OFF	CT-MFD		CT-MFE, CT-MKE	CT-EBE	CT-MFS, CT-MBS, CT-WBS	
	Flasher starting with ON or OFF					CT-MVS	
	Pulse generator starting with ON or OFF		CT-TGD			CT-MXS	
	Pulse former	CT-MFD		CT-MFE		CT-MVS, CT-MFS, CT-MBS	
	Star-delta change-over		CT-SDD, CT-SAD				CT-SDS
	Star-delta change-over with impulse				CT-SDE	CT-MVS.2x, CT-MFS, CT-MBS	
	Star-delta change-over twice ON-delayed				CT-YDE		
	Further functions (depending on device)					CT-MVS, CT-MXS, CT-MFS, CT-MBS, CT-WBS	
	Switching relay				CT-IRE		CT-IRS

Technical data (extract)

Time ranges	7 (0.05 s - 100 h) CT-SDD, CT-SAD: 4 (0.05 s - 10 min)	Multifunction devices: 8 (0.05 s - 100 h) Single-function devices: 5 single ranges (0.05-1 s, 0.1-10 s, 0.3-30 s, 3-300 s, 0.3-300 min)	10 (0.05 s - 300 h) CT-ARS, CT-SDS: 7 (0.05 s - 10 min)
Control supply voltage	Wide and multi ranges	Wide ranges Single and dual ranges	Wide, multi and single ranges
Type and number of contacts	1 or 2 c/o contacts CT-SDD, CT-SAD: 2 n/o contacts	1 c/ o contact CT-SDE: 1 n/o contact and 1 n/c contacts CT-MKE, CT-EKE, CT-AKE: 1 thyristor	1 or 2 c/o contacts CT-MVS.21, CT-MFS, CT-MBS: 2nd c/o contact selectable as inst. contact CT-SDS: 2 n/o contacts
Control inputs	voltage-related triggering, polarized, capable of switching a parallel load	voltage-related triggering, polarized CT-MFE, CT-AHE, CT-AWE: with auxiliary voltage	voltage-related triggering, non-polarized, capable of switching a parallel load CT-MFS, CT-MBS, CT-AHS: volt-free triggering

General information

Electronic timers

Approvals and marks

■ existing
□ pending

		CT-D																	
Approvals		CT-MFD.12	CT-MFD.21	CT-ERD.12	CT-ERD.22	CT-AHD.12	CT-AHD.22	CT-VWD.12	CT-EBD.12	CT-TGD.12	CT-TGD.22	CT-SDD.22	CT-SAD.22						
	UL 508, CAN/CSA C22.2 No.14	■	■	■	■	■	■	■	■	■	■	■	■						
	GOST	■	■	■	■	■	■	■	■	■	■	■	■						
	CB scheme	■	■	■	■	■	■	■	■	■	■	■	■						
	CCC	■	■	■	■	■	■	■	■	■	■	■	■						
Marks																			
	CE	■	■	■	■	■	■	■	■	■	■	■	■						
	C-Tick	■	□	■	□	■	□	■	■	■	□	□	□						

■ existing
□ pending

		CT-E																	
Approvals		CT-MFE	CT-ERE	CT-AHE	CT-ARE	CT-VWE	CT-AWE	CT-EBE	CT-YDE	CT-SDE	CT-IRE		CT-MKE	CT-EKE	CT-AKE				
	UL 508, CAN/CSA C22.2 No.14	■	■	■	■	■	■	■	■	■	■		■	■	■				
	GL	■	■	■	■	■	■	■	■	■	■		■	■	■				
	GOST	■	■	■	■	■	■	■	■	■	■		■	■	■				
	CB scheme	■	■	■	■	■	■	■	■	■	■								
	CCC	■	■	■	■	■	■	■	■	■	■								
	RMRS	■	■	■	■	■	■	■	■	■	■		■	■	■				
Marks																			
	CE	■	■	■	■	■	■	■	■	■	■		■	■	■				
	C-Tick	■	■	■	■	■	■	■	■	■	■		■	■	■				

■ existing
□ pending

		CT-S																		
Approvals		CT-MVS.12	CT-MVS.2x	CT-MXS.22	CT-MFS.21	CT-MBS.22	CT-WBS.22	CT-EFS.12	CT-EFS.2x	CT-APS.12	CT-APS.2x	CT-AHS.22	CT-ARS.11	CT-ARS.21	CT-VBS.1x	CT-SDS.2x		CT-IRS.1x	CT-IRS.2x	CT-IRS.3x
	UL 508, CAN/CSA C22.2 No.14	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	GL	■	■	■	■	■	■	■	■	■	■	■	□	□		■				
	GOST	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■
	CB scheme	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■
	CCC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■
Marks																				
	CE	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■
	C-Tick	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■

Notes



CT-D Range

CT-D Range Electronic timers



CT-D Range Benefits and advantages

Characteristics

- Diversity:
 - 2 multifunction timers
 - 10 single-function timers
- Control supply voltages:
 - Wide range: 12-240 V AC/DC
 - Multi range: 24-48 V DC, 24-240 V AC
- 7 time ranges from 0.05s to 100 h or 4 time ranges from 0.05 s - 10 min
- Width of only 17.5 mm
- Light-grey housing in RAL 7035
- Devices with:
 - 1 c/o contact (250 V / 6 A) or 2 c/o contacts (250 V / 5 A)
 - Control input: voltage-related triggering, polarized, capable of switching a parallel load
- Approvals / Marks (partly depending)



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Benefits

Direct reading scales ①

Direct setting of the time delay without any additional calculation provides accurate time delay adjustment.

LEDs for status indication ②

All actual operational states are displayed by front-face LEDs, thus simplifying commissioning and troubleshooting.

Switching currents

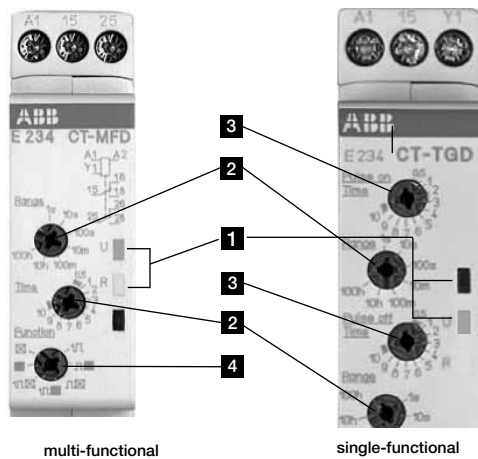
The CT-D range timers allow an output load of up to 6 A on devices with 1 c/o contact and up to 5 A on devices with 2 c/o contacts.

Connection terminals ③

Wide terminal spacing allows connection of wires: 2 x 1.5 mm² (2 x 16 AWG) with wire end ferrules or - 2 x 2.5 mm² (2 x 14 AWG) without ferrules.

Width 17,5 mm ④

With their width of 17.5 mm only, the CT-D range timers are ideally suited for installation in distribution panels.



Operating controls

1 LEDs for status indication

U - green LED:

— control supply voltage applied

▭ timing

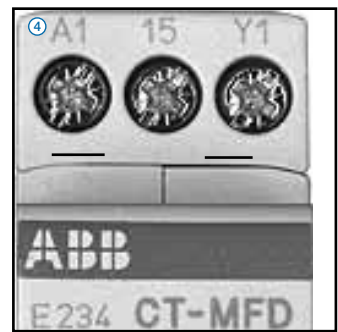
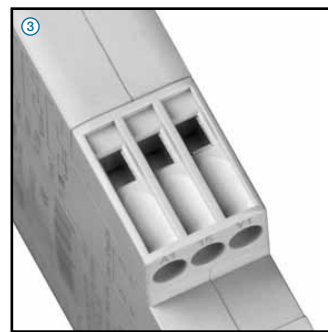
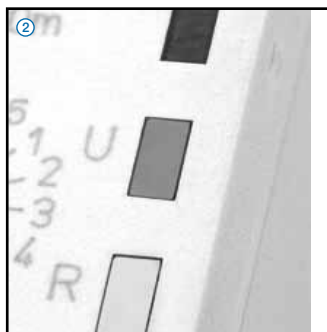
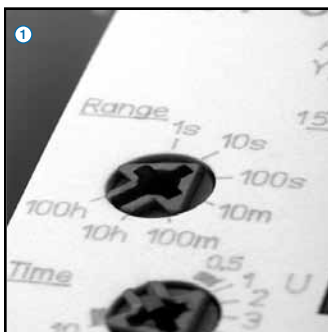
R, R1, R2 - yellow LED:

▭ output relay energized

2 Time range adjustment

3 Fine adjustment of the time delay

4 Timing range selector



CT-D Range Ordering details

Description

The CT-D range with a width of only 17.5 mm fits into all domestic installation and distribution panels.

For maximum flexibility in operation, 10 single-function as well as 2 multifunction devices with 7 timing functions are available. The devices offer 4 or 7 time ranges from 0.05 seconds up to 100 hours. Their wide input range allows the use in applications worldwide.



CT-MFD.12



CT-ERD.22

- ON-delay
- OFF-delay
- Impulse-ON
- Impulse-OFF
- Flasher starting with ON
- Flasher starting with OFF
- Pulse former
- Pulse generator
- Star-delta change-over

Ordering details

Time function	Rated control supply voltage	Time ranges	Control input	Output	Reference code	Catalog number	Weight (1 pce) kg (lb)		
 	24-240 V AC 24-48 V DC	7 (0.05 s - 100 h)	■	1 c/o	CT-MFD.12	1SVR500020R0000	0.060 (0.132)		
 	12-240 V AC/ DC	7 (0.05 s - 100 h)	■	2 c/o	CT-MFD.21	1SVR500020R1100	0.065 (0.143)		
	24-240 V AC 24-48 V DC	7 (0.05 s - 100 h)		1 c/o	CT-ERD.12	1SVR500100R0000	0.060 (0.132)		
				2 c/o	CT-ERD.22	1SVR500100R0100	0.065 (0.143)		
			■	1 c/o	CT-AHD.12	1SVR500110R0000	0.060 (0.132)		
			■	2 c/o	CT-AHD.22	1SVR500110R0100	0.065 (0.143)		
				1 c/o	CT-VWD.12	1SVR500130R0000	0.060 (0.132)		
				1 c/o	CT-EBD.12	1SVR500150R0000			
				2 x 7 (0.05 s - 100 h)	■	1 c/o	CT-TGD.12 ¹⁾	1SVR500160R0000	0.060 (0.132)
					■	1 c/o	CT-TGD.22 ¹⁾	1SVR500160R0100	0.065 (0.143)
		4 (0.05 s - 10 min)		2 n/o	CT-SDD.22 ²⁾	1SVR500211R0100	0.065 (0.143)		
				2 n/o	CT-SAD.22 ³⁾	1SVR500210R0100	0.065 (0.143)		

1) ON and OFF times adjustable independently: 2 x 7 time ranges 0.05 s - 100 h
 2) Transition time 50 ms fixed
 3) Transition time adjustable

Synonyms

used expression	alternative expression(s)	used expression	alternative expression(s)
1 c/o contact	SPDT	voltage-related	wet / non-floating
2 c/o contacts	DPDT	volt-free	dry / floating

CT-D range Function diagrams

Remarks

Legend

- Control supply voltage not applied / Output contact open
- Control supply voltage applied / Output contact closed
- A1-Y1/B1 Control input with voltage-related triggering

Terminal designations on the device and in the diagrams

- The 1st c/o contact is always designated **15-16/18**.
- The 2nd c/o contact is designated **25-26/28**.
- The n/o contacts of the star-delta timers are designated with **17-18** and **17-28**.
- Control supply voltage is always applied to terminals **A1-A2**.

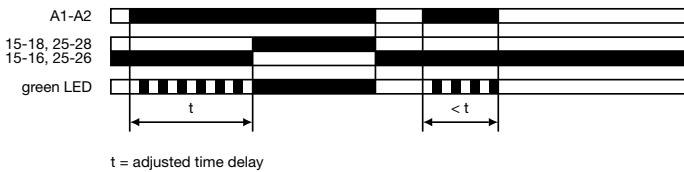
Function of the yellow LED

The yellow LED **R** glows as soon as the output relay energizes and turns off when the output relay de-energizes.

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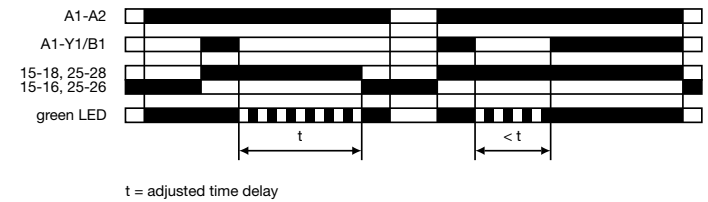
☒ ON-delay (Delay on make) CT-ERD, CT-MFD

This function requires continuous control supply voltage for timing. Timing begins when control supply voltage is applied. The green LED flashes during timing. When the selected time delay is complete, the output relay energizes and the flashing green LED turns steady. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. Control input **A1-Y1/B1** of the CT-MFD is disabled when this function is selected.



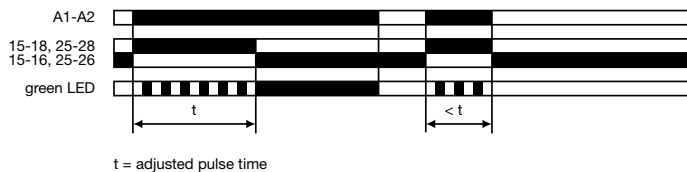
■ OFF-delay with auxiliary voltage (Delay on break) CT-AHD, CT-MFD

This function requires continuous control supply voltage for timing. If control input A1-Y1/B1 is closed, the output relay energizes immediately. If control input A1-Y1/B1 is opened, the time delay starts. The green LED flashes during timing. When the selected time delay is complete, the output relay de-energizes and the flashing green LED turns steady. If control input **A1-Y1/B1** recloses before the time delay is complete, the time delay is reset and the output relay does not change state. Timing starts again when control input **A1-Y1/B1** re-opens. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



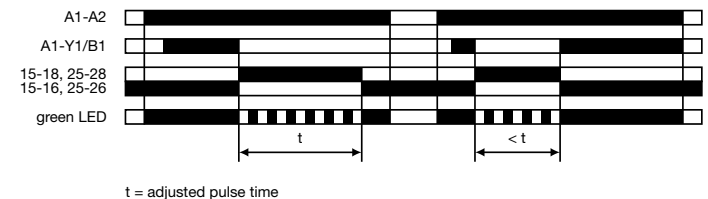
1┐☒ Impulse-ON (Interval) CT-VWD, CT-MFD

This function requires continuous control supply voltage for timing. The output relay energizes immediately when control supply voltage is applied and de-energizes after the set pulse time is complete. The green LED flashes during timing. When the selected pulse time is complete, the flashing green LED turns steady. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. Control input A1-Y1/B1 of the CT-MFD is disabled when this function is selected.




1┐■ Impulse-OFF with auxiliary voltage (Trailing edge interval) CT-MFD

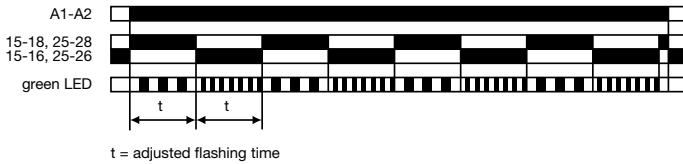
This function requires continuous control supply voltage for timing. If control supply voltage is applied, opening control input A1-Y1/B1 energizes the output relay immediately and starts timing. The green LED flashes during timing. When the selected pulse time is complete, the output relay de-energizes and the flashing green LED turns steady. Closing control input A1-Y1/B1, before the time delay is complete, de-energizes the output relay and resets the time delay. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.




CT-D range Function diagrams

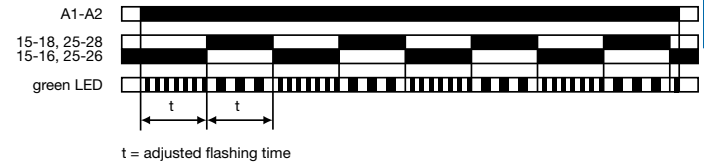
 **Flasher, starting with the ON time
(Recycling equal times, ON first)**
CT-EBD, CT-MFD

Applying control supply voltage starts timing with symmetrical ON & OFF times. The cycle starts with an ON time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. Control input **A1-Y1/B1** of the CT-MFD is disabled when this function is selected.



 **Flasher, starting with the OFF time
(Recycling equal times, OFF first)**
CT-MFD

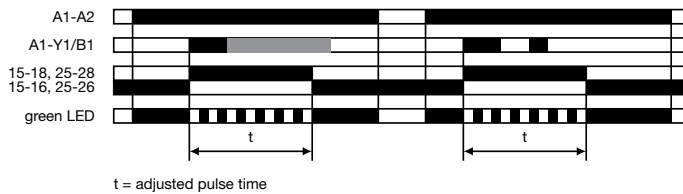
Applying control supply voltage starts timing with symmetrical ON & OFF times. The cycle starts with an OFF time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. Control input **A1-Y1/B1** of the CT-MFD is disabled when this function is selected.




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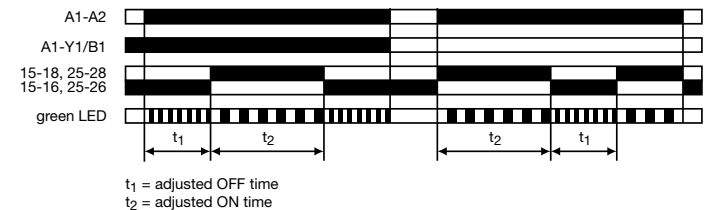
 **Pulse former (Single shot)**
CT-MFD

This function requires continuous control supply voltage for timing. Closing control input **A1-Y1/B1** energizes the output relay immediately and starts timing. Operating the control contact switch **A1-Y1/B1** during the time delay has no effect. The green LED flashes during timing. When the selected ON time is complete, the output relay de-energizes and the flashing green LED turns steady. After the ON time is complete, it can be restarted by closing control input **A1-Y1/B1**. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



 **Pulse generator, starting with the ON or OFF time
(Recycling unequal times, ON or OFF first)**
CT-TGD

This function requires continuous control supply voltage for timing. Applying control supply voltage, with open control input **A1-Y1/B1**, starts timing with an ON time first. Applying control supply voltage, with closed control input **A1-Y1/B1**, starts timing with an OFF time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time. The ON & OFF times are independently adjustable. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.

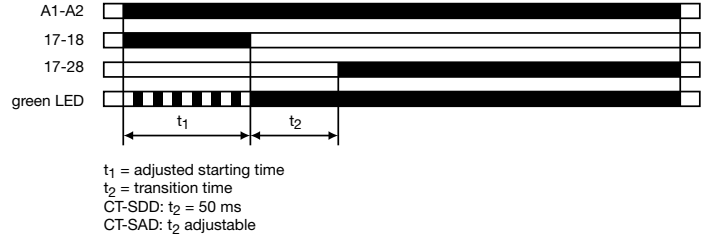


CT-D range Function diagrams

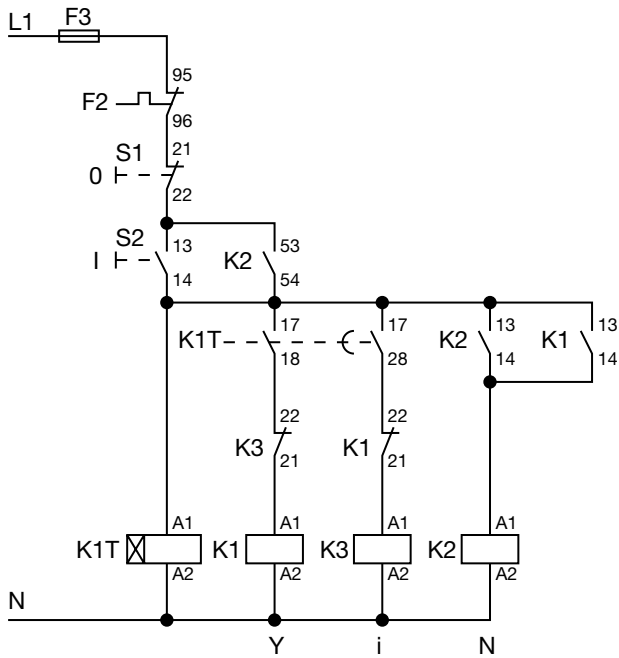
△ **Star-delta change-over
(Star-delta starting)
CT-SDD, CT-SAD**

This function requires continuous control supply voltage for timing.
Applying control supply voltage to terminals **A1-A2**, energizes the star contactor connected to terminals **17-18** and begins the set starting time t_1 . The green LED flashes during timing. When the starting time is complete, the first output contact de-energizes the star contactor.

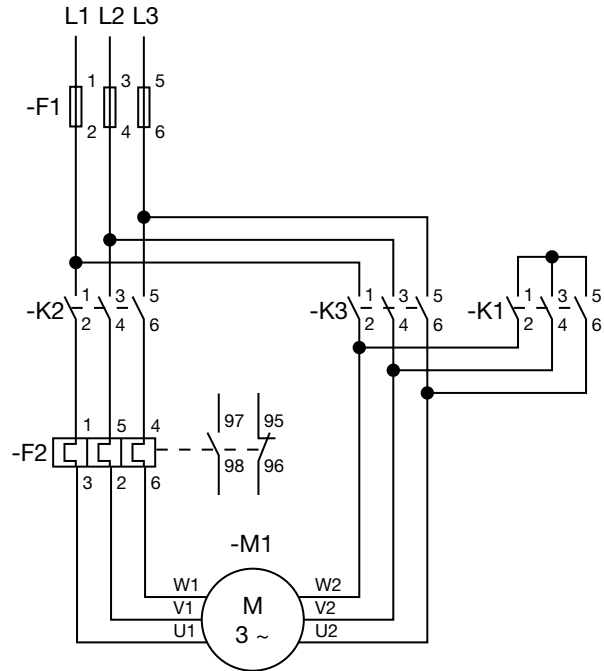
Now, the transition time t_2 starts. When the transition time is complete, the second output contact energizes the delta contactor connected to terminals **17-28**. The delta contactor remains energized as long as control supply voltage is applied to the unit.



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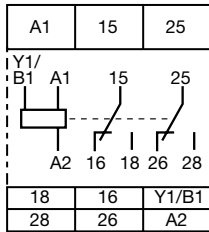
Control circuit diagram



Power circuit diagram

CT-D range Connection diagrams

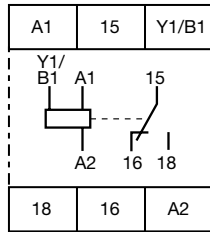
CT-MFD.21



A1-A2 Supply: 12-240 V AC/DC

15-16/18 1. c/o contact
25-26/28 2. c/o contact
A1-Y1/B1 Control input

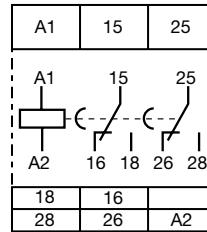
CT-MFD.12



A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
A1-Y1/B1 Control input

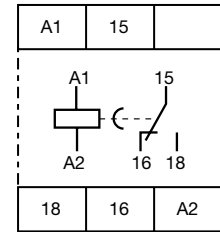
CT-ERD.22



A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
25-26/28 2. c/o contact

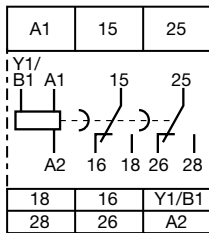
CT-ERD.12



A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact

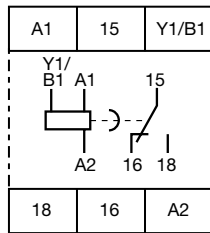
CT-AHD.22



A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
25-26/28 2. c/o contact
A1-Y1/B1 Control input

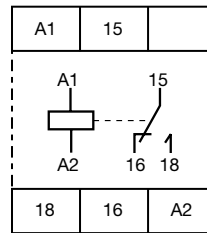
CT-AHD.12



A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
A1-Y1/B1 Control input

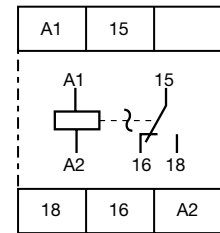
CT-VWD.12



A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact

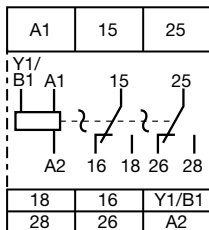
CT-EBD.12



A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact

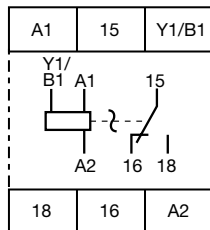
CT-TGD.22



A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
25-26/28 2. c/o contact
A1-Y1/B1 Control input

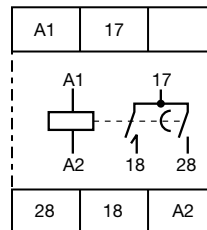
CT-TGD.12



A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
A1-Y1/B1 Control input

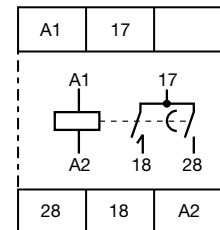
CT-SDD.22



A1-A2 Supply: 24-48 V DC or 24-240 V AC

17-18 1. n/o contact (star contactor)
17-28 2. n/o contact (delta contactor)

CT-SAD.22






A1-A2 Supply: 24-48 V DC or 24-240 V AC

17-18 1. n/o contact (star contactor)
17-28 2. n/o contact (delta contactor)

CT-D range

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

		CT-D with 1 c/o contact	CT-D with 2 c/o contacts	CT-MFD.21
Input circuit - Supply circuit				
Rated control supply voltage U_S		24-240 V AC / 24-48 V DC		12-240 V AC/DC
Rated control supply voltage U_S tolerance				-15...+10 %
Rated frequency		AC/DC versions	DC or 50/60 Hz	50/60 Hz
Frequency range		AC versions	DC or 47-63 Hz	see data sheet
Typical current / power consumption				
Power failure buffering time		min. 20 ms	min. 30 ms	
6 Input circuit - Control circuit				
Kind of triggering		voltage-related triggering		
Control input, Control function		A1-Y1/B1	start timing external	
Parallel load / polarized		yes / yes		
Rated operational voltage U_B		250 V		
Minimum switching voltage / minimum switching current		12 V / 100 mA		
Maximum switching voltage / maximum switching current		see load limit curves		
Minimum control pulse length		30 ms		
Control voltage potential		see rated control supply voltage		
Current consumption of the control input		max. 4 mA	see data sheet	
Timing circuit				
Time ranges		7 time ranges 0.05 s - 100 h		
		1.) 0.05-1 s 2.) 0.5-10 s 3.) 5-100 s 4.) 0.5-10 min		
		5.) 5-100 min 6.) 0.5-10 h 7.) 5-100 h		
		4 time ranges 0.05 s - 10 min (CT-SDD, CT-SAD)		
		1.) 0.05-1 s 2.) 0.5-10 s 3.) 5-100 s 4.) 0.5-10 min		
Recovery time		< 50 ms		
Accuracy within the rated control supply voltage tolerance		$\Delta t < 0.005\% / V$		
Accuracy within the temperature range		$\Delta t < 0.06\% / \text{°C}$		
Repeat accuracy (constant parameters)		$\Delta t \pm 0.5\%$		
Star-delta transition time		CT-SDD / CT-SAD	fixed 50 ms / adjustable: 20-100 ms in steps of 10 ms	
Star-delta transition time tolerance		CT-SDD / CT-SAD	$\pm 3\text{ ms}$	
Indication of operational states				
Control supply voltage / timing		U: green LED	 : control supply voltage applied  : timing	
Relay status		R: yellow LED	 : output relay energized	
Output circuit				
Kind of output		15-16/18 15-16/18; 25-26/28 17-18; 17-28	Relay, 1 c/o contact	- Relay, 2 c/o contacts relay, 2 n/o contacts (CT-SDD, CT-SAD)
Contact material		Cd-free, see data sheet		
Rated operational voltage U_B		IEC/EN 60947-1 250 V		
Minimum switching voltage / minimum switching current		12 V / 100 mA		
Maximum switching voltage / maximum switching current		see load limit curves		
Rated operational current I_B (IEC/EN 60947-5-1)		AC12 (resistive) at 230 V	6 A	5 A
		AC15 (inductive) at 230 V	3 A	3 A
		AC15 (inductive) at 230 V	6 A	5 A
		DC13 (inductive) at 24 V	2 A	2 A ¹⁾
		Utilization category (Rating Code)	B 300	
AC rating (UL 508)		max. rated operational voltage	300 V AC	
		Maximum continuous thermal current at B300	5 A	2.5 A
		max. making/breaking apparent power at B300	3600 VA / 360 VA	
Mechanical lifetime		30 x 10 ⁶ switching cycles		
Electrical lifetime		0.1 x 10 ⁶ switching cycles		
Max. fuse rating to achieve short-circuit protection (IEC/EN 60947-5-1)		n/c contact	6 A fast-acting	
		n/o contact	10 A fast-acting	

CT-D range

Technical data

	CT-D with 1 c/o contact	CT-D with 2 c/o contacts	CT-MFD.21
General data			
Duty time		100%	
Dimensions (W x H x D)	17.5 x 70 x 58 mm (0.69 x 2.76 x 2.28 in)	17.5 x 80 x 58 mm (0.69 x 3.15 x 2.28 in)	
Weight	see ordering details		
Mounting	DIN rail (IEC/EN 60715), snap-mounting without any tool		
Mounting position	any		
Minimum distance to other units	horizontal / vertical	no / no	
Degree of protection	housing / terminals	IP50 / IP20	
Electrical connection			
Wire size	fine-strand with(out) wire end ferrule	2 x 0.5-1.5 mm ² (2 x 20-16 AWG) 1 x 0.5-2.5 mm ² (1 x 20-14 AWG)	
	rigid	2 x 0.5-1.5 mm ² (2 x 20-16 AWG) 1 x 0.5-4 mm ² (1 x 20-12 AWG)	
Stripping length		7 mm (0.28 in)	
Tightening torque		0.5-0.8 Nm	
Environmental data			
Ambient temperature range	operation / storage	-20 ... +60 °C / -40 ... +85 °C	
Damp heat (cyclic)	IEC/EN 60068-2-30	6 x 24 h cycles, 55 °C, 95 % RH	
Vibration (sinusoidal)	IEC/EN 60068-2-6	40 m/s ² , 20 cycles, 10...150...10 Hz	
Shock (half-sine)	IEC/EN 60068-2-27	100 m/s ² , 11 ms	
Isolation data			
Rated impulse withstand voltage U _{imp} between all isolated circuits	VDE 0110, IEC/EN 60664-1	4 kV; 1.2/50 µs	
Pollution category	IEC/EN 60664-1, VDE 0110	3	
Overvoltage category	IEC/EN 60664-1, VDE 0110	III	
Rated insulation voltage U _i	input circuit / output circuit output circuit 1 / output circuit 2	300 V 300 V	
Basic insulation (IEC/EN 61140)	input circuit / output circuit	300 V	
Protective separation (VDE 0106 part 101 and part 101/A1; IEC/EN 61140)	input circuit / output circuit	250 V	
Power-frequency withstand voltage test (test voltage, routine test)	between all isolated circuits	2.5 kV, 50 Hz, 1 s	
Standards			
Product standard	IEC 61812-1, EN 61812-1 + A11, DIN VDE 0435 part 2021		
Low Voltage Directive	2006/95/EC		
EMC Directive	2004/108/EC		
RoHS Directive	2002/95/EC		
Electromagnetic compatibility			
Interference immunity to		IEC/EN 61000-6-1, IEC/EN 61000-6-2	
electronic discharge	IEC/EN 61000-4-2	Level 3 (6 kV / 8 kV)	
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V / m)	
electrical fast transient/burst	IEC/EN 61000-4-4	Level 3 (2 kV / 5 kHz)	
surge	IEC/EN 61000-4-5	Level 4	
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)	
Interference emissions		IEC/EN 61000-6-3, IEC/EN 61000-6-4	
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B	
high-frequency conducted	IEC/CISPR 22, EN 55022	Class	

CT-D range

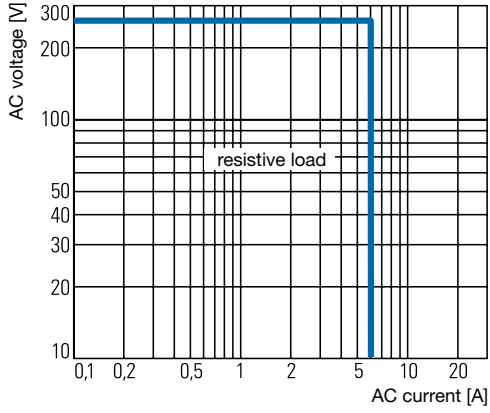
Technical data, Technical diagrams

Technical diagrams

Load limit curves

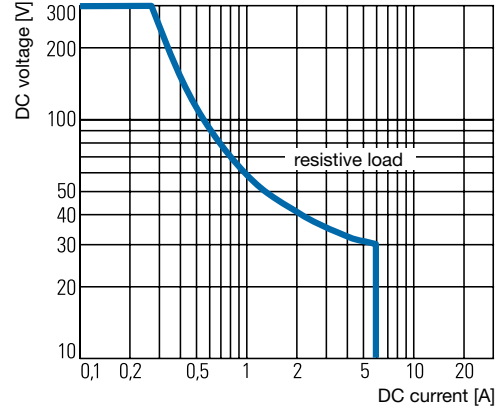
AC load (resistive)

6

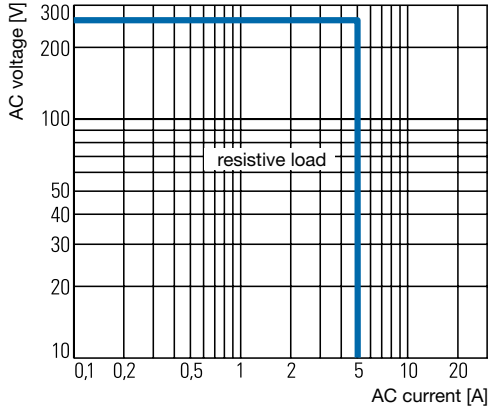


CT-D.1x

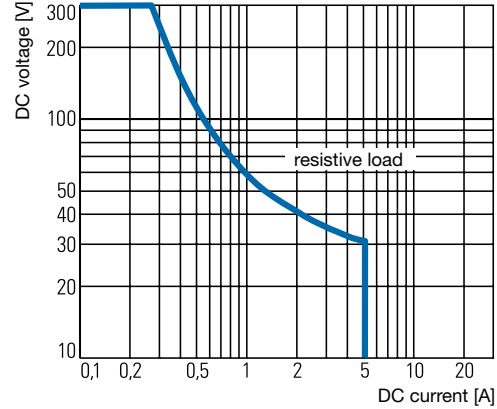
DC load (resistive)



CT-D.1x

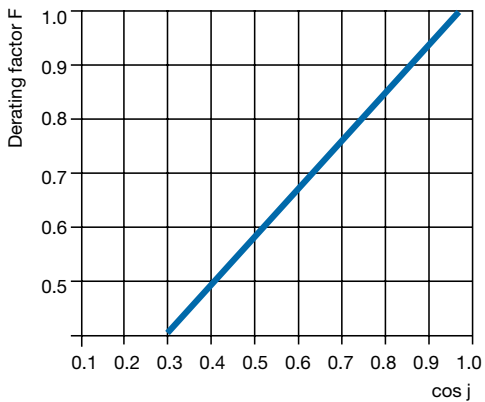


CT-D.2x

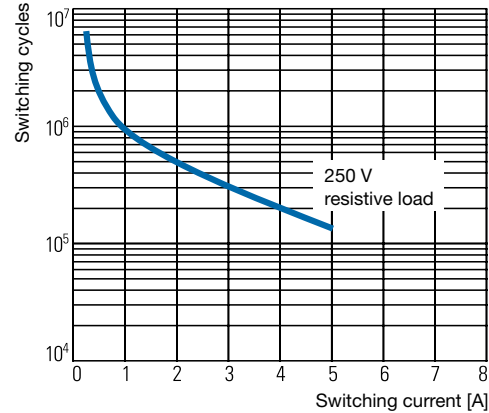


CT-D.2x

Derating factor F for inductive AC load



Contact lifetime

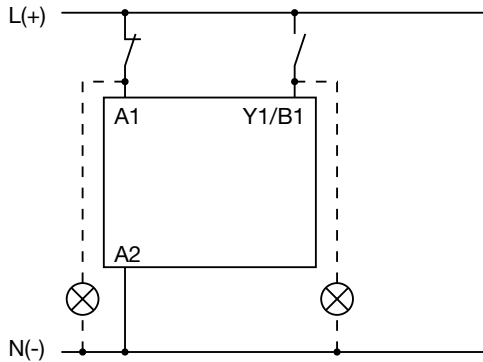


CT-D range

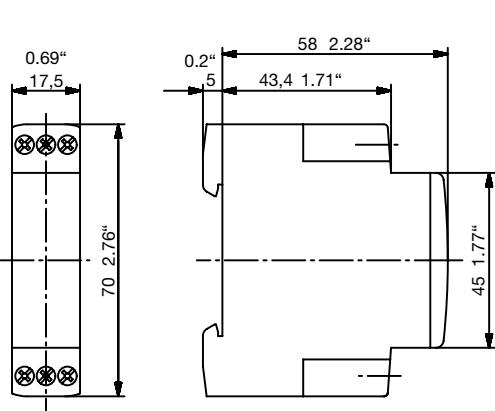
Approximate dimensions

Wiring notes for devices with control input

A parallel load to the control input is possible

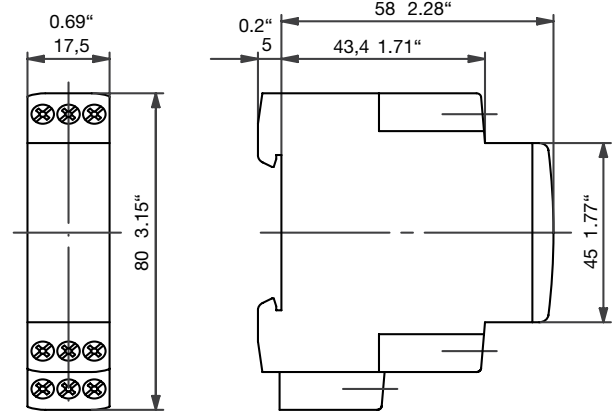


Dimensional drawings



CT-D devices with 1 c/o contact or 2 n/o contacts

dimensions in mm



CT-D devices with 2 c/o contacts

Notes

CT-E Range Electronic Timers



CT-E range

Benefits and advantages

Characteristics

- Diversity:
 - 2 multifunction timers
 - 56 single-function timers
 - 4 switching relays
- Control supply voltages:
 - Dual range: 24 V AC/DC
 - Single range: 110-130 V AC, 220-240 V AC
 - Wide range: 24-240 V AC/DC (CT-MFE)
- Time ranges
 - 5 single ranges: 0.05-1 s, 0.1-10 s, 0.3-30 s, 3-300 s, 0.3-30 min
 - 8 time ranges: 0.05 s - 100 h (CT-MFE)
- Devices with 1 c/o (SPDT) contact (250 V / 4 A) or solid-state output for high switching frequencies (thyristor 0.8 A)
- Switching relay CT-IRE for added switching contacts with either side-by-side or diagonally positioned connection terminals

6

Benefits

Direct reading scales ①

Direct setting of the time delay without any additional calculation provides accurate time delay adjustment.

LEDs for status indication ②

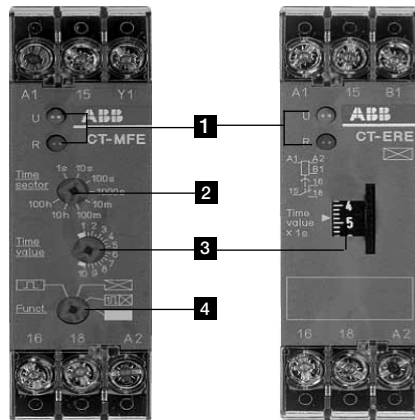
All actual operational states are displayed by front-face LEDs, thus simplifying commissioning and troubleshooting.

Connection screws in M3 (Poqidrive 1) ③

Easy and fast tightening and release of the connection screws with poqidrive, pan- or crosshead screwdriver.

Solid-state output ④

Devices with solid-state output are the perfect solution for high operation cycles.



Operating controls

1 LEDs for status indication

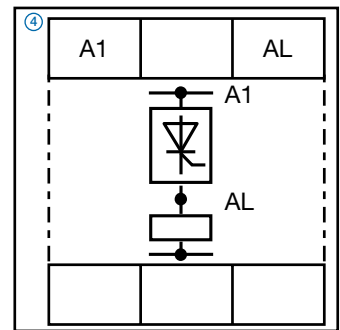
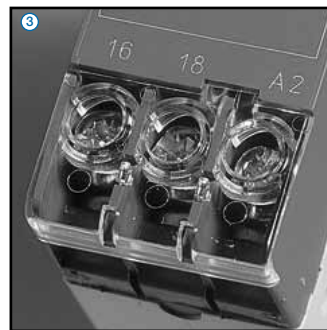
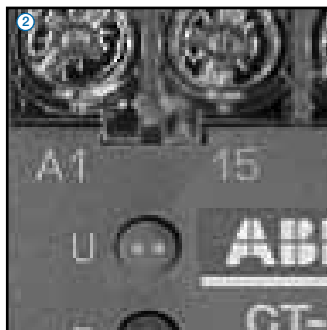
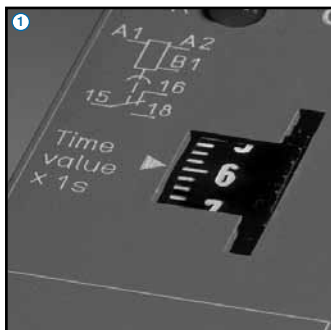
U - green LED: control supply voltage applied

R2: red LED: output relay energized

2 Time range adjustment (only multifunctional devices)

3 Fine adjustment of the time delay

4 Preselection of the timing function (only multifunctional devices)



CT-E range

Ordering details



Description

The CT-E range with its excellent price/performance ratio offers an ideal solution for serial applications. 56 single function devices with 5 different time ranges as well as 2 multifunction timers with 6 functions and 8 time ranges offer the highest possible flexibility for almost every application. For high operating cycles, contact-free CT-E timers with solid-state output are available.

Ordering details

Time function	Rated control supply voltage	Time ranges	Control Input	Output	Reference code	Catalog number	Weight (1 pce) kg (lb)	
	24-240 V AC/DC	8 (0.05 s - 100 h)	■	1 c/o	CT-MFE	1SVR550029R8100	0.08 (0.18)	
	24 V AC/DC, 220-240 V AC	0.1-10 s	■	1 c/o	CT-ERE	1SVR550107R1100	0.08 (0.18)	
		0.3-30 s				1SVR550107R4100		
		3-300 s				1SVR550107R2100		
	0.3-30 min	1SVR550107R5100						
	110-130 V AC	0.1-10 s				1SVR550100R1100		
		0.3-30 s				1SVR550100R4100		
3-300 s		1SVR550100R2100						
	24 V AC/DC	0.1-10 s	■	1 c/o	CT-AHE ²⁾	1SVR550118R1100	0.08 (0.18)	
		0.3-30 s				1SVR550118R4100		
		3-300 s				1SVR550118R2100		
	110-130 V AC	0.1-10 s				1SVR550110R1100		
		0.3-30 s				1SVR550110R4100		
		3-300 s				1SVR550110R2100		
220-240 V AC	0.1-10 s	1SVR550111R1100						
	0.3-30 s	1SVR550111R4100						
	3-300 s	1SVR550111R2100						
	24 V AC/DC, 220-240 V AC	0.1-10 s	■	1 c/o	CT-ARE	1SVR550127R1100	0.08 (0.18)	
		0.3-30 s				1SVR550127R4100		
	110-130 V AC	0.1-10 s				1SVR550120R1100		
		0.3-30 s				1SVR550120R4100		
	24 V AC/DC, 220-240 V AC	0.1-10 s	■	1 c/o	CT-VWE	1SVR550137R1100	0.08 (0.18)	
		0.3-30 s				1SVR550137R4100		
		3-300 s				1SVR550137R2100		
	110-130 V AC	0.1-10 s				1SVR550130R1100		
		0.3-30 s				1SVR550130R4100		
		3-300 s				1SVR550130R2100		
	24 V AC/DC	0.05-1 s	■	1 c/o	CT-AWE	1SVR550158R3100	0.08 (0.18)	
						110-130 V AC		1SVR550150R3100
								220-240 V AC

- ON-delay
- OFF-delay
- Impulse-ON
- Impulse-OFF
- Flasher starting with ON
- Flasher starting with OFF
- Pulse former

¹⁾ without auxiliary voltage, True Off-delay timer
²⁾ with control input

Synonyms

used expression	alternative expression(s)	used expression	alternative expression(s)
1 c/o contact	SPDT	voltage-related	wet / non-floating
2 c/o contacts	DPDT	volt-free	dry / floating

CT-E range Ordering details

Ordering details

Time function	Rated control supply voltage	Time ranges	Control Input	Output	Reference code	Catalog number	Weight (1 pce) kg (lb)		
1□■	24 V AC/DC	0.1-10 s 0.3-30 s 3-300 s	■	1 c/o	CT-AWE ²⁾	1SVR550148R1100	0.08 (0.18)		
	110-130 V AC	1SVR550148R4100							
		1SVR550148R2100							
		1SVR550140R1100							
	220-240 V AC	1SVR550140R4100							
		1SVR550140R2100							
		1SVR550141R1100							
		1SVR550141R4100							
		1SVR550141R2100							
□■	24 V AC/DC, 220-240 V AC	0.1-10 s		1 c/o	CT-EBE ⁷⁾	1SVR550167R1100	0.08 (0.18)		
	110-130 V AC					1SVR550160R1100			
△□	24 V AC/DC, 220-240 V AC	0.1-10 s		1 c/o	CT-YDE ¹⁾	1SVR550207R1100	0.08 (0.18)		
		0.3-30 s				1SVR550207R4100			
		3-300 s				1SVR550207R2100			
	110-130 V AC	0.1-10 s				1SVR550200R1100			
		0.3-30 s				1SVR550200R4100			
		3-300 s				1SVR550200R2100			
△1□	24 V AC/DC, 220-240 V AC	0.3-30 s		1 n/o + 1 n/c	CT-SDE ^{3) 8)}	1SVR550217R4100	0.08 (0.18)		
	110-130 V AC					1SVR550210R4100			
	380-415 V AC					1SVR550212R4100			
1□□ □□ □■	24-240 V AC/DC	0.1-10 s, 3-300 s		solid-state	CT-MKE ^{6) 9)}	1SVR550019R0000	0.08 (0.18)		
						□		CT-EKE	1SVR550509R1000
									1SVR550509R4000
■	24-240 V AC	0.1-10 s 0.3-30 s 3-300 s		CT-AKE	1SVR550509R2000	0.08 (0.18)			
					1SVR550519R1000				
□	24 V AC/DC			1 c/o	CT-IRE ⁴⁾	1SVR550519R4000	0.08 (0.18)		
	220-240 V AC/ DC					1SVR550519R2000			
□	24 V AC/DC			1 c/o	CT-IRE ⁵⁾	1SVR550228R9100	0.08 (0.18)		
	220-240 V AC/DC					1SVR550231R9100			

- ON-delay
- OFF-delay
- 1□□ Impulse-ON
- 1□■ Impulse-OFF
- Flasher starting with ON
- Flasher starting with OFF
- Pulse former
- Switching relay
- △□ Star-delta change-over twice ON-delayed
- △1□ Star-delta change-over with impulse
- Pulse generator starting with ON or OFF

- 1) without auxiliary voltage
- 2) with control input
- 3) with fixed transition time
- 4) A1/A2 diagonally
- 5) A1/A2 on top
- 6) solid-state output, functions and time range selection via external jumpers
- 7) symmetric ON & OFF times
- 8) common contact
- 9) Functions: ON-delay (AC/DC), Impuls-ON (AC only), Flasher starting with OFF (AC only)

Notice

CT...KE are solid-state timers with thyristor output for 2-wire applications. They are connected directly in series with the control coil of contactors or relays. Voltage should not be applied without a load connected, because there is no current limiting in the unit.

CT-E range Function diagrams

Remarks

Legend

- Control supply voltage not applied / Output contact open
- Control supply voltage applied / Output contact closed
- A1-Y1/B1 Control input with voltage-related triggering

Terminal designations on the device and in the diagrams

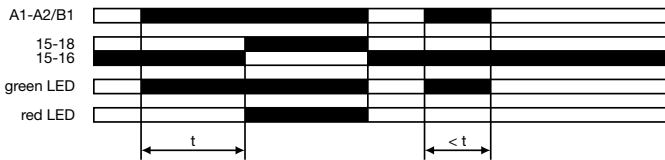
- The c/o contact is always designated **15-16/18**.
- The n/o contacts are designated with **15-16** and **15-18**.
- Control supply voltage is always applied to terminals **A1-A2/B1**.

Function of the red LED

The red LED **R** glows as soon as the output relay energizes and turns off when the output relay de-energizes.

☒ ON-delay (Delay on make) CT-ERE, CT-MFE

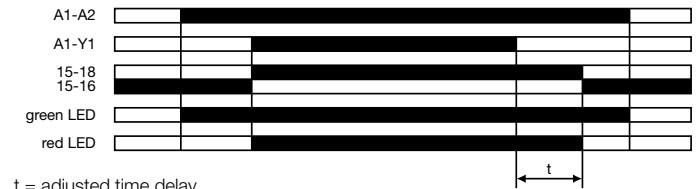
Timing begins when control supply voltage is applied. When the selected time delay is complete, the output relay energizes.
If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.
Interrupting control supply voltage before the time delay is complete, resets the time delay. The output relay does not energize.
Control input **A1-Y1** of the CT-MFE is disabled when this function is selected.



t = adjusted time delay

■ OFF-delay, with auxiliary voltage (Delay on break) CT-AHE, CT-MFE

This function requires continuous control supply voltage for timing.
Timing is controlled by a control input, connected to terminals **A1-Y1**. If the control contact is closed, the output relay energizes. If control input **A1-Y1** is opened, the selected time delay starts. When the time delay is complete, the output relay de-energizes.
If control input **A1-Y1** closes before the time delay is complete, the time delay is reset. Timing starts again when the control input re-opens.



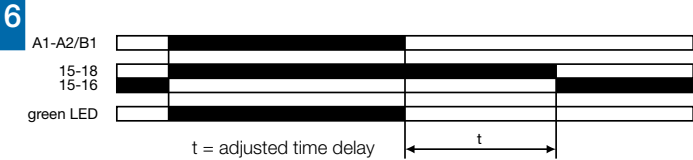
t = adjusted time delay

Minimum control pulse length: 20 ms

CT-E range Function diagrams

OFF-delay, without auxiliary voltage (true delay on break) CT-ARE

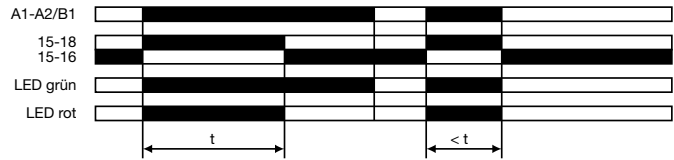
The OFF-delay function without auxiliary voltage does not require control supply voltage for timing.
Applying control supply voltage, energizes the output relay. If control supply voltage is interrupted, the OFF-delay starts. When timing is complete, the output relay de-energizes.
If control supply voltage is re-applied, before the time delay is complete, the time delay is reset and the output relay remains energized.
Control supply voltage must be applied for the minimum energizing time (200 ms), for proper operation.



Impulse-ON (Interval) CT-VVE, CT-MFE

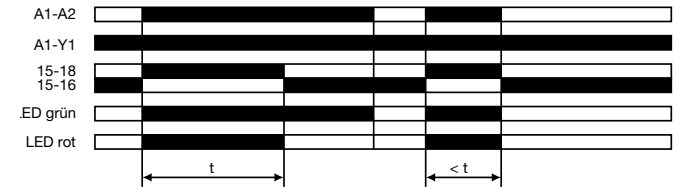
The output relay energizes immediately when control supply voltage is applied and de-energizes when the selected time delay is complete.
If control supply voltage is interrupted before the time delay is complete, the output relay de-energizes and the time delay is reset.
The control input **A1-Y1** of the CT-MFE has to be jumpered if this timing function is configured.

CT-VVE:



CT-MFE:

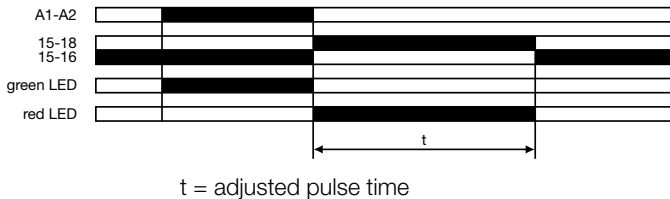
t = adjusted pulse time



t = adjusted pulse time

Impulse-OFF, without auxiliary voltage (True trailing edge interval) CT-AWE

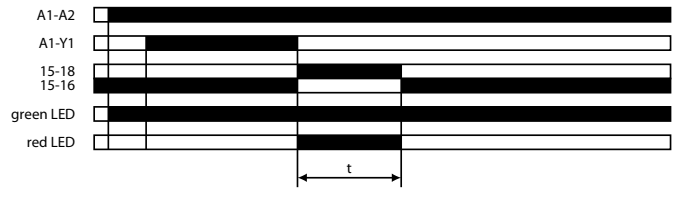
The Impulse-OFF function without auxiliary voltage does not require control supply voltage for timing.
If control supply voltage is interrupted, the output relay energizes and the OFF time starts. When timing is complete, the output relay de-energizes.
If control supply voltage is re-applied, before the time delay is complete, the time delay is reset and the output relay de-energizes.
Control supply voltage must be applied for the minimum energizing time (200 ms), for proper operation.



Impulse-OFF, with auxiliary voltage (Trailing edge interval) CT-AWE

This function requires continuous control supply voltage. Opening control input **A1-Y1**, energizes the output relay immediately and timing begins. When the selected time delay is complete, the output relay de-energizes.

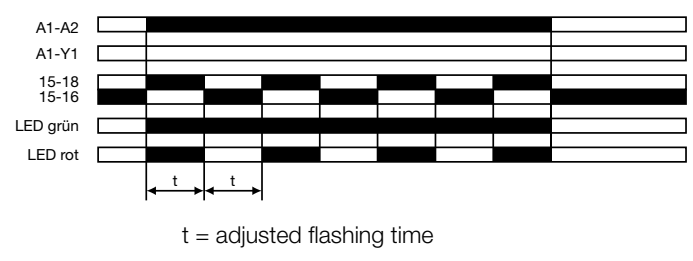
Interrupting control supply voltage or closing control input **A1-Y1**, before the time delay is complete, de-energizes the output relay and resets the time delay.



CT-E range Function diagrams

Flasher starting with ON (Recycling equal times, ON first) CT-MFE

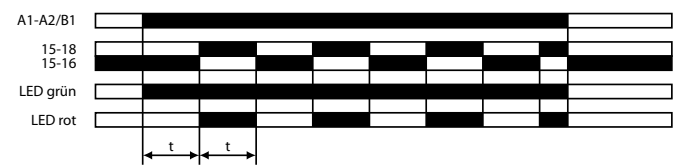
Applying control supply voltage, starts timing with symmetrical ON & OFF times. The cycle starts with an ON time first.
If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.
Control input **A1-Y1** of the CT-MFE has to be open when this function is selected.



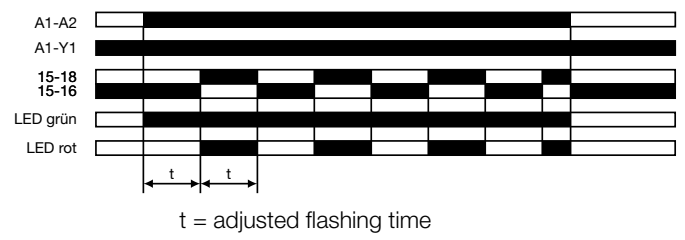
Flasher starting with OFF (Recycling equal times, OFF first) CT-EBE, CT-MFE

Applying control supply voltage, starts timing with symmetrical ON & OFF times. The cycle starts with an OFF time first.
If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.
Control input **A1-Y1** of the CT-MFE has to be jumpered when this function is selected.

CT-EBE:

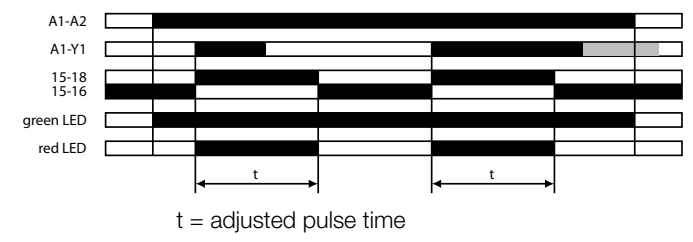


CT-MFE:



Pulse former (Single shot) CT-MFE

Closing the control input connected to terminals **A1-Y1**, with control supply voltage applied, energizes the output relay for the selected ON time. When the ON time is complete, the output relay de-energizes. Operating the control input switch **A1-Y1** during the time delay has no effect.
After the time delay is complete, it can be restarted by closing control input **A1-Y1**.
If control supply voltage is interrupted during timing, the output relay de-energizes and the ON time is reset.



Switching relay CT-IRE

The switching relay may be used to increase the number of available contacts or to reinforce contacts, or as a coupling/decoupling interface.
Applying control supply voltage, energizes the output relay. The output relay de-energizes if supply voltage is interrupted.



CT-E range Function diagrams

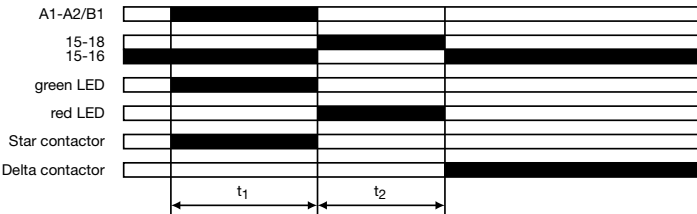
⚡ CT Range Star-delta change-over CT-YDE

Applying control supply voltage, energizes the star contactor (K1) and the line contactor (K2) and begins the set starting time.

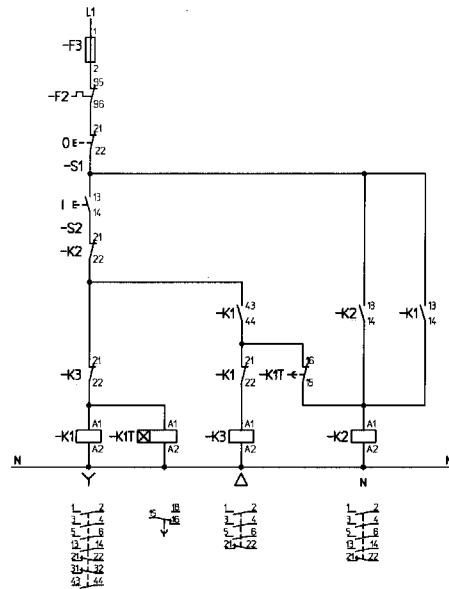
When the starting time is complete, contact 15-16 de-energizes the star contactor (K1) Now, the fixed transition time starts.

When the transition time is complete, contact 15-16 energizes the delta contactor (K3).

6



t_1 = adjustable starting time
 t_2 = fixed transition time of 50 ms



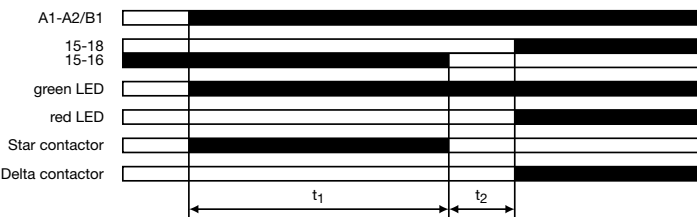
Control circuit diagram

⚡ CT Range Star-delta change-over CT-SDE

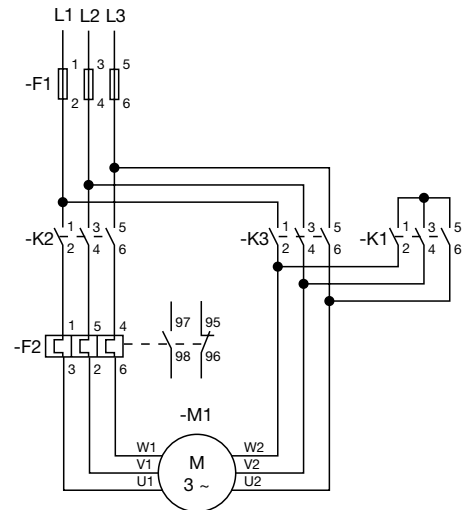
Applying control supply voltage, energizes the star contactor (K1) and the line contactor (K2) and begins the set starting time.

When the starting time is complete, contact 15-16 de-energizes the star contactor (K1). Now, the fixed transition time starts.

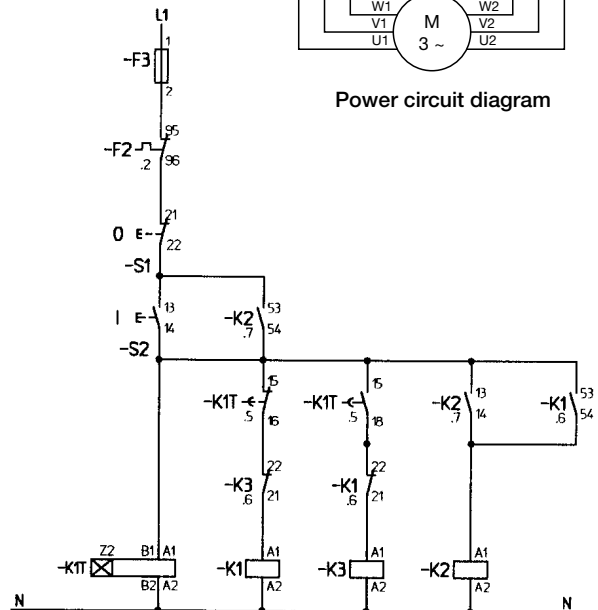
When the transition time is complete, contact 15-18 energizes the delta contactor (K3).



t_1 = adjustable starting time
 t_2 = fixed transition time of 30 ms



Power circuit diagram



Control circuit diagram

CT-E range Function diagrams

Multifunction timer CT-MKE

Functions and time ranges are programmed by simply plugging in external wire jumpers.

☒ ON-delay (Delay on Make)

Without external connection. Timing begins when control supply voltage is applied to terminal **A1** and the load connected in series with **A2**. When the selected time delay is complete, the load connected to **A1-A2** energizes. If control supply voltage is interrupted, the load de-energizes and the time delay is reset. Interrupting control supply voltage before the time delay is complete, resets the time delay. The load does not energize.

1⏏ Impulse-ON (Interval)

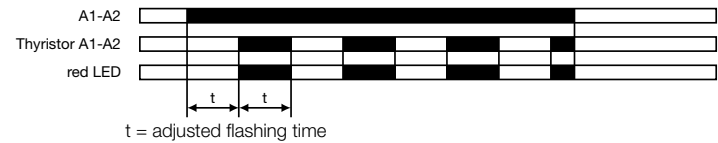
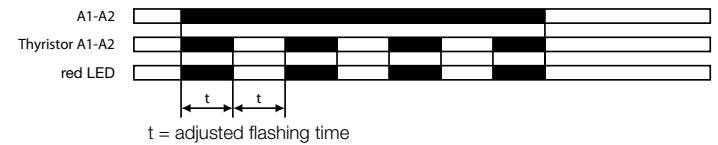
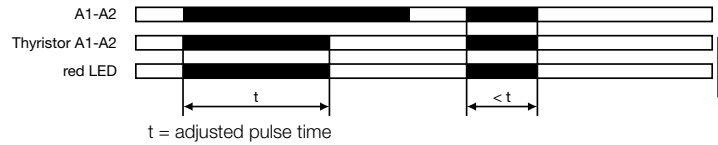
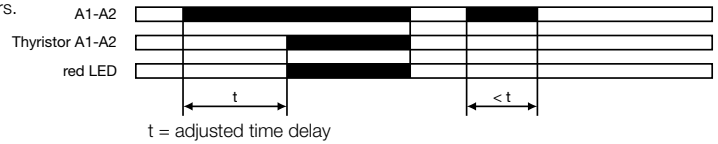
External connection **X1-X4** required. The load energizes and timing starts when control supply voltage is applied to terminal **A1** and the load connected in series with **A2**. When the selected time delay is complete, the load de-energizes. Interrupting control supply voltage before the time delay is complete, de-energizes the load and resets the time delay.

⏏ Flasher, starting with ON

External connection **X1-X4** and **X2-X4** required. When control supply voltage is applied to terminal **A1** and the load connected in series with **A2**, the load energizes and de-energizes with the selected ON & OFF times. The ON & OFF times are equal. The cycle starts with an ON time first (load energized). If control supply voltage is interrupted, the load de-energizes and the time delay is reset.

⏏ Flasher, starting with OFF

External connection **X2-X4** required. When control supply voltage is applied to terminal **A1** and the load connected in series with **A2**, the load energizes and de-energizes with the selected ON & OFF times. The ON & OFF times are equal. The cycle starts with an OFF time first (load de-energized). If control supply voltage is interrupted, the load de-energizes and the time delay is reset.



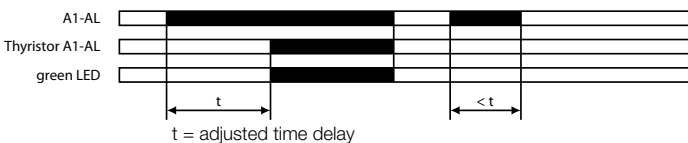
Programming the time ranges

X3-X4 jumpered: 0,1-10 s

X3-X4 open: 3-300 s

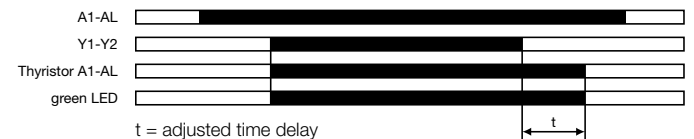
☒ ON-delay (Delay on make) CT-EKE

Timing begins when control supply voltage is applied to terminal **A1** and the load connected in series with **AL**. When the selected time delay is complete, the load energizes. The green LED glows as long as the load is energized. If control supply voltage is interrupted, the load de-energizes and the time delay is reset. Interrupting control supply voltage before the time delay is complete, resets the time delay. The load does not energize.



☐ OFF-delay, with auxiliary voltage (Delay on break) CT-AKE

The OFF-delay function with auxiliary voltage requires continuous control supply voltage at terminal **A1** and the load connected in series with **AL**, for timing. Timing is controlled by a control input, connected to terminals **Y2-A2**. When the control input closes, the load energizes. If the control input opens, the selected time delay starts (minimum control pulse length is 20 ms). The green LED glows as long as the load is energized. When the selected time delay is complete, the load de-energizes. If control input **Y2-A2** closes before the time delay is complete, the time delay is reset and the load remains energized. Timing starts again when the control input re-opens. Interrupting control supply voltage resets the time delay and de-energizes the load.



Notice:

CT...KE are solid-state timers with thyristor output for 2-wire applications. They are connected directly in series with the control coil of contactors or relays. Voltage should not be applied without a load connected, because there is no current limiting in the unit.

CT-E range

Connection diagrams

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<p>CT-MFE</p> <p>A1-A2 Supply: 24-240 V AC/DC A1-Y1 Control input 15-16/18 c/o contact</p>	<p>CT-ERE</p> <p>A1-A2 Supply: 220-240 V AC or 110-130 V AC A1-B1 Supply: 24 V AC/DC 15-16/18 c/o contact</p>	<p>CT-AHE 1)</p> <p>A1(+)-A2(-) Supply: 24 V AC/DC or 110-240 V AC or 220-240 V AC A1-Y1 Control input 15-16/18 c/o contact</p>	<p>CT-ARE</p> <p>A1-A2 Supply: 220-240 V AC or 110-130 V AC A1-B1 Supply: 24 V AC/DC 15-16/18 c/o contact</p>
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<p>CT-VWE</p> <p>A1-A2 Supply: 220-240 V AC or 110-130 V AC A1-B1 Supply: 24 V AC/DC 15-16/18 c/o contact</p>	<p>CT-AWE</p> <p>Device without aux. voltage A1(+)-A2(-) Supply: 24 V AC/DC or 110-240 V AC or 220-240 V AC 15-16/18 c/o contact</p>	<p>CT-AWE 1)</p> <p>Device with aux. voltage A1-A2 Supply: 24 V AC/DC or 110-240 V AC or 220-240 V AC A1-Y1 Control input 15-16/18 c/o contact</p>	<p>CT-EBE</p> <p>A1-A2 Supply: 220-240 V AC or 110-130 V AC A1-B1 Supply: 24 V AC/DC 15-16/18 c/o contact</p>
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<p>CT-YDE</p> <p>A1-A2 Supply: 220-240 V AC or 110-130 V AC A1-B1 Supply: 24 V AC/DC 15-16/18 c/o contact</p>	<p>CT-SDE</p> <p>Device: 1SVR 550 217 R4100 A1-A2 Supply: 220-240 V AC A1-B1 Supply: 24 V AC/DC 15-16/18 c/o contact</p>	<p>CT-SDE</p> <p>Devices: 1SVR 550 210 R4100, 1SVR 550 212 R4100 A1-A2 Supply: 110-130 V AC or 380-415 V AC 15-16/18 c/o contact</p>	<p>CT-IRE</p> <p>Supply terminals diagonally positioned A1-A2 Supply: 24 V AC/DC or 220-240 V AC/DC 11-12/14 c/o contact</p>
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<p>CT-IRE</p> <p>Supply terminals on one side of the device A1-A2 Supply: 24 V AC/DC or 220-240 V AC/DC 11-12/14 c/o contact</p>	<p>CT-MKE</p> <p>A1-A2 Supply: 24-240 V AC/DC A1-A2 Thyristor X1-X4 Timing function adjustment X2-X4 Timing function adjustment X3-X4 Time range adjustment (Details see function diagrams)</p>	<p>CT-EKE</p> <p>A1-AL Supply: 24-240 V AC/DC A1-AL Thyristor</p>	<p>CT-AKE</p> <p>A1-AL Supply: 24-240 V AC A1-AL Thyristor Y2-A2 Control input</p>
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CT-E range

Technical data

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

		CT-E (relays)	CT-E (solid-state)	
Input circuit - Supply circuit				
Rated control supply voltage U_s	A1-A2, A1-AL	24-240 V AC/DC		
	A1-A2, A1-AL	24-240 V AC		
	A1-A2	110-130 V AC	-	
	A1-A2	220-240 V AC	-	
	A1-A2	380-415 V AC	-	
Rated control supply voltage U_s tolerance	A1-B1	24 V AC/DC	-	
			-15...+10 %	
Rated frequency	AC/DC versions		DC or 50/60 Hz	
	AC versions		50/60 Hz	
Typical current / power consumption	24-240 V AC/DC, 24-240 V AC		approx. 1.0-2.0 VA/W	
	110-130 V AC, 220-240 V AC	approx. 2.0 VA	-	
	380-415 V AC	approx. 3.0 VA	-	
	24 V AC/DC	approx. 1.0 VA/W	-	
Current consumption while timing		-	$\leq 2\text{ mA}$ (24-60 V AC/DC)	
			$\leq 8\text{ mA}$ (60-240 V AC/DC)	
Input circuit - Control circuit				
Kind of triggering		voltage-related triggering	-	
Control input, Control function	A1-Y1	start timing external	-	
Parallel load / polarized		no / yes ¹⁾	-	
Minimum control pulse length		20 ms	-	
Control voltage potential		see rated control supply voltage	-	
Timing circuit				
Time ranges	1 of 5 time ranges per single function device	0.05-1 s / 0.1-10 s / 0.3-30 s / 3-300 s / 0.3-30 min		
	8 time ranges 0.05 s - 100 h (CT-MFE)	1.) 0.05-1 s	2.) 0.5-10 s	-
		3.) 5-100 s	4.) 50-1000 s	
		5.) 0.5-10 min	6.) 5-100 min	
		7.) 0.5-10 h	8.) 5-100 h	
	2 time ranges 0.1-300 s (CT-MKE)			1.) 0.1-10 s
				2.) 3-300 s
	Recovery time		<50 ms	
		CT-ARE: <200 ms	CT-MKE: <100 ms	
		CT-AWE, CT-SDE: <400 ms	CT-AKE: <300 ms	
		CT-YDE: <500 ms		
Accuracy within the rated control supply voltage tolerance		$\Delta t < 0.5\% / V$		
Accuracy within the temperature range		$\Delta t < 0.1\% / \text{°C}$		
Repeat accuracy (constant parameters)		CT-MFE: $\Delta t < 0.06\% / \text{°C}$		
Star-delta transition time	CT-YDE / CT-SDE	50 ms / 30 ms	-	
Minimum energizing time	CT-ARE	200 ms	-	
Output circuit				
Kind of output	15-16/18	Relay, 1 c/o contact	-	
	A1-A2, A1-AL	-	Thyristor	
Contact material		AgCdO	-	
Rated operational voltage U_b	VDE 0110, IEC/EN 60947-1		250 V	
Maximum switching voltage		250 V AC, 250 V DC		
Rated operational current I_b (IEC/EN 60947-5-1)	AC12 (resistive) at 230 V	4 A	-	
	AC15 (inductive) at 230 V	3 A	-	
	AC15 (inductive) at 230 V	4 A	-	
	DC13 (inductive) at 24 V	2 A	-	

¹⁾ CT-MFE: yes / no

CT-E range

Technical data

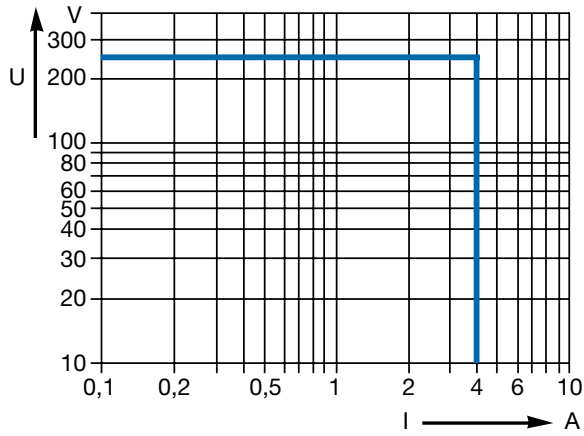
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		CT-E (relays)	CT-E (solid-state)
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)	B 300	-
	max. rated operational voltage	300 V AC	-
	Maximum continuous thermal current at B300	5 A	-
	max. making/breaking apparent power at B300	3600 VA / 360 VA	-
Mechanical lifetime		30 x 10 ⁶ switching cycles	-
Electrical lifetime	at AC12, 230 V, 4 A	0.1 x 10 ⁶ switching cycles	-
Max. fuse rating to achieve short-circuit protection (IEC/EN 60947-5-1)	n/c contact	10 A fast-acting, CT-ARE: 5 A	-
	n/o contact	10 A fast-acting, CT-ARE: 5 A	-
Minimum load current		-	CT-MKE: 20 mA CT-EKE, CT-AKE: 10 mA
Maximum load current		-	CT-MKE: ≤ 0.8 A at Ta = ≤ 20 °C CT-EKE, CT-AKE: ≤ 0.7 A
Load current reduction / Derating		-	10 mA/°C
Maximum surge current		-	CT-MKE: 20 A for t 20 ms CT-EKE, CT-AKE: 15 A
Voltage drop in connected state		-	≤ 3 V
		-	220 m / 22 nF
Cable length between solid-state timer and connected load at 50 Hz and a cable capacity of 100 pF/m :	at 24 V AC	-	100 m / 10 nF
	at 42 V AC	-	65 m / 6.5 nF
	at 60 V AC	-	50 m / 5 nF
	at 110 V AC	-	22 m / 2.2 nF
	at 240 V AC	-	
General data			
Duty time		100%	
Dimensions (W x H x D)		22.5 x 78.5 x 78 mm (0.886 x 3.09 x 3.07 in)	
Weight		approx. 80 g (0.176 lb)	
Mounting		DIN rail (IEC/EN 60715)	
Mounting position		any	
Minimum distance to other units	horizontal / vertical	no / no	
Degree of protection	housing / terminals	IP50 / IP20	
Electrical connection			
Wire size	fine-strand with wire end ferrule	2 x 0.75-1.5 mm ² (2 x 18-16 AWG)	
	fine-strand without wire end ferrule	2 x 1-1.5 mm ² (2 x 18-16 AWG)	
	rigid	2 x 0.75-1.5 mm ² (2 x 18-16 AWG)	
Stripping length		10 mm (0.39 in)	
Tightening torque		0.6-0.8 Nm	
Environmental data			
Ambient temperature ranges	operation / storage	-20...+60 °C / -40...+85 °C	
Damp heat	IEC 68-2-30	24 h cycles, 55 °C, 93 % rel., 96 h	
Operational reliability	IEC 68-2-6	6 g	
Mechanical resistance	IEC 68-2-6	10 g	
Isolation data			
Rated impulse withstand voltage U _{imp} between all isolated circuits	VDE 0110, IEC/EN 664	4 kV; 1.2/50 µs	
Pollution category	VDE 0110, IEC 664, IEC 255-5	III/C	
Overvoltage category	VDE 0110, IEC 664, IEC 255-5	III/C	
Rated insulation voltage U _i between supply circuit, control circuit and output circuit	input circuit / output circuit	300 V (supply up to 240 V)	
	type test	500 V (supply up to 440 V)	
Test voltage between all isolated circuits		2.5 kV, 50 Hz, 1 s	
Standards			
Product standard		IEC 61812-1, EN 61812-1 + A11, DIN VDE 0435 Teil 201	
Low Voltage Directive		2006/95/EC	
EMC Directive		2004/108/EC	
Electromagnetic compatibility			
Interference immunity to		IEC/EN 61000-6-2	
electronic discharge	IEC/EN 61000-4-2	Level 3 (6 kV / 8 kV)	
radiated, radio-frequency electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)	
electrical fast transient/burst surge	IEC/EN 61000-4-4	Level 3 (2 kV / 5 kHz)	
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-5	Level 3 (2 kV L-L)	
	IEC/EN 61000-4-6	Level 3 (10 V)	
Interference emissions		IEC/EN 61000-6-4	

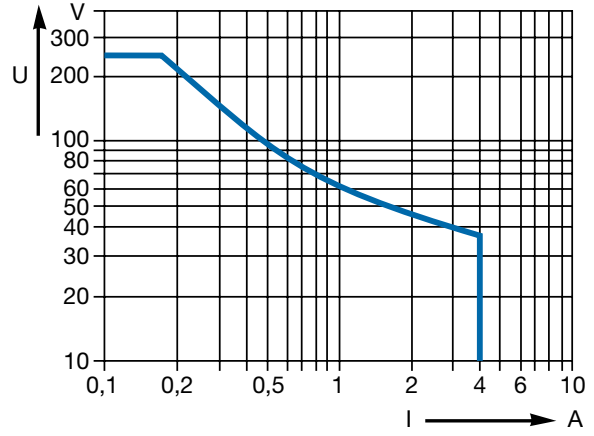
CT-E range Technical diagrams

Technical diagrams

Load limit curves
AC load (resistive)

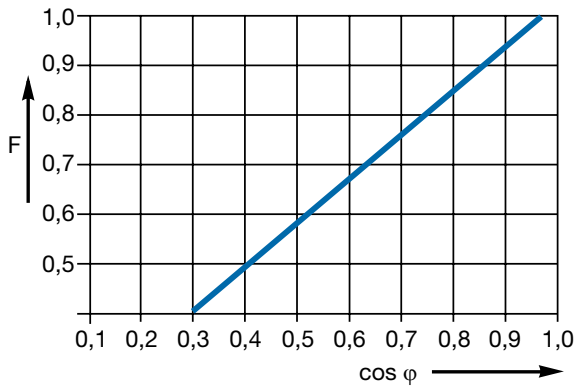


DC load (resistive)

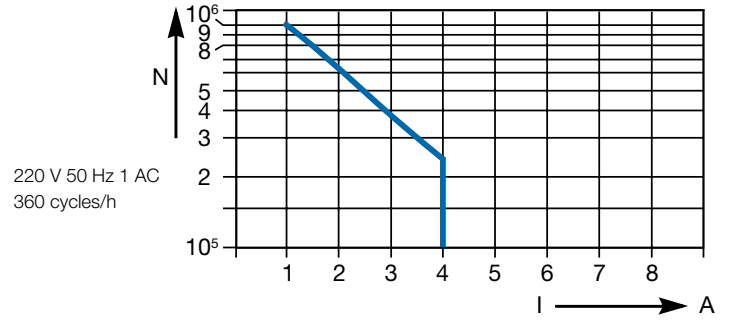


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Derating factor F for inductive AC load



Contact lifetime



CT-E range

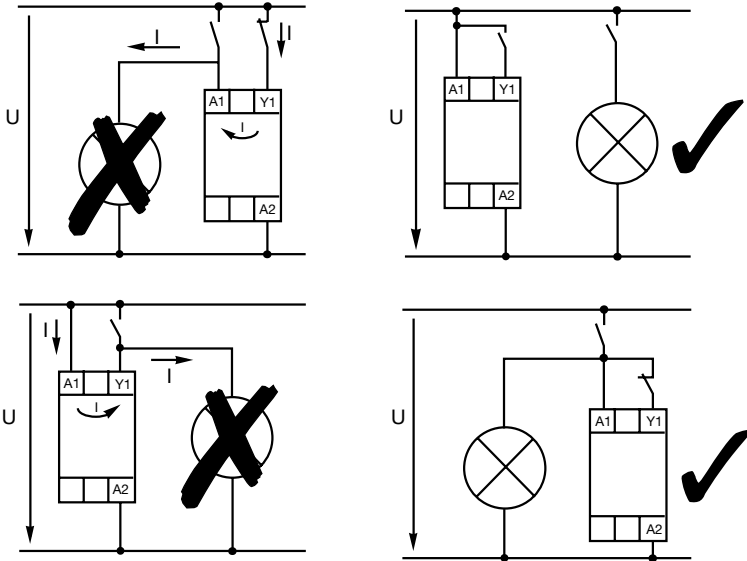
Wiring notes

Approximate dimensions

Wiring notes

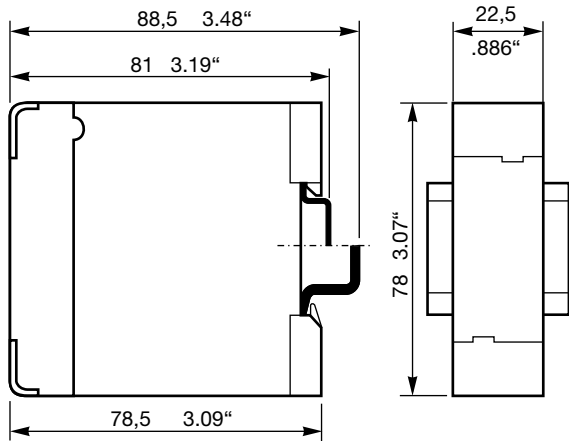
for single-function devices with control contact
(CT-AHE, CT-AWE with auxiliary voltage)

6



Dimensional drawing

Dimensions in mm



CT-S Range Electronic timers



CT-S range

Benefits and advantages

Characteristics

- Diversity:
 - 8 multifunction timers
 - 13 single-function timers
 - 8 switching relays
- Control supply voltages:
 - Multi range: 24-48 V DC, 24-240 V AC
 - Wide range: 24-240 V AC/DC
 - Single range: 380-440 V AC
- Innovative connection technology
 - Double-chamber cage connection terminals
 - Easy Connect Technology
- Devices with:
 - 1 or 2 c/o contacts
 - 2nd c/o contact can be selected as instantaneous contact ¹⁾
 - Remote potentiometer connection ¹⁾
 - Control input with volt-free or voltage-related triggering e.g. to start timing, pause timing
 - Extended operating temperature range down to -40 °C ¹⁾
- Sealable transparent cover for protection against unauthorized changes of time values
- Integrated marker label
- Approvals / Marks (partly pending)



¹⁾ selected devices

6

Synonyms

used expression	alternative expression(s)	used expression	alternative expression(s)
1 c/o contact	SPDT	voltage-related	wet / non-floating
2 c/o contacts	DPDT	volt-free	dry / floating

Benefits

Easy Connect Technology ^①

Tool-free wiring and excellent vibration resistance. Push-in terminals provide connection of wires up to 2 x 0,5 - 1,5 mm² (2 x 20 - 16 AWG), rigid or fine-strand with or without wire end ferrules.

Double-chamber cage connection terminals ^②

Double-chamber cage connection terminals provide connection of wires up to 2 x 0,5-2,5 mm² (2 x 20-14 AWG) rigid or fine-strand, with or without wire end ferrules. Potential distribution does not require additional terminals.

Snap-On housing

Tool-free DIN rail installation and deinstallation of the Electronic Timer with Snap-On housing.

Time range preselection and fine adjustment ^③

Direct assignment of the preselected time range to the fine adjustment potentiometer scale by multicolor scales.

LEDs for status indication ^④

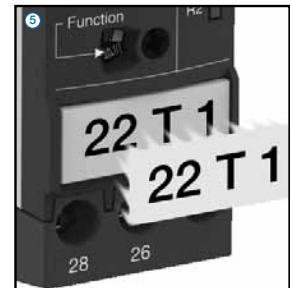
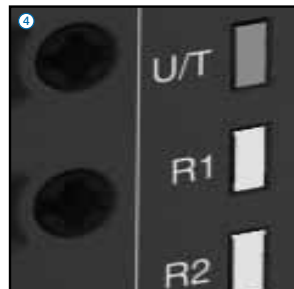
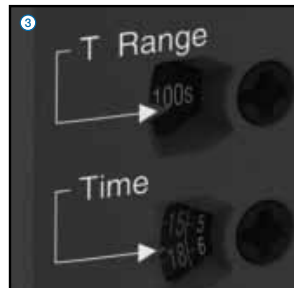
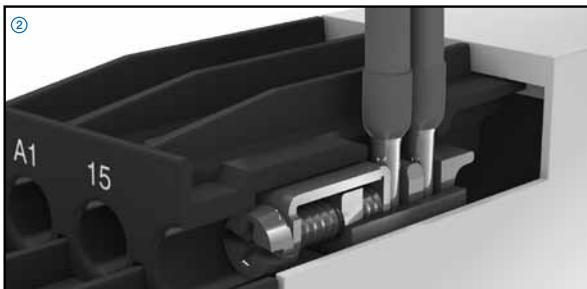
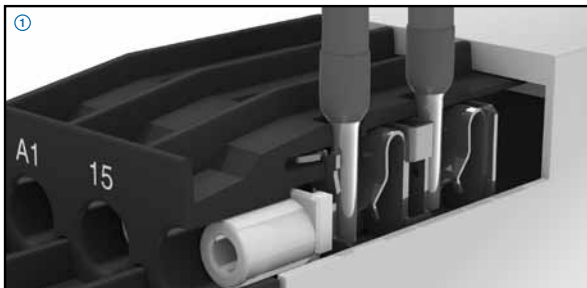
All actual operational states are displayed by front-face LED's, thus simplifying commissioning and troubleshooting.

Integrated marker label ^⑤

Integrated marker labels allow the product to be marked quickly and simply. No additional marker labels are required.

Sealable transparent cover ^⑥

Protection against unauthorized changes of time and threshold values. Available as an accessory.



CT-S range Conversion table



Previous Generation



New Generation



1SVR630010R0200	CT-MFS.21
1SVR630010R3200	CT-MBS.22
1SVR630020R0200	CT-MVS.21
1SVR630020R3100	CT-MVS.12
1SVR630020R3300	CT-MVS.22
1SVR630021R2300	CT-MVS.23
1SVR630030R3300	CT-MXS.22
1SVR630040R3300	CT-WBS.22
1SVR630100R0300	CT-ERS.21
1SVR630100R3100	CT-ERS.12
1SVR630100R3300	CT-ERS.22
1SVR630110R3300	CT-AHS.22
1SVR630120R3100	CT-ARS.11
1SVR630120R3300	CT-ARS.21
1SVR630180R0300	CT-APS.21
1SVR630180R3100	CT-APS.12
1SVR630180R3300	CT-APS.22
1SVR630210R3300	CT-SDS.22
1SVR630211R2300	CT-SDS.23

Double-chamber cage connection terminals	
1SVR730010R0200	CT-MFS.21S
1SVR730010R3200	CT-MBS.22S
1SVR730020R0200	CT-MVS.21S
1SVR730020R3100	CT-MVS.12S
1SVR730020R3300	CT-MVS.22S
1SVR730021R2300	CT-MVS.23S
1SVR730030R3300	CT-MXS.22S
1SVR730040R3300	CT-WBS.22S
1SVR730100R0300	CT-ERS.21S
1SVR730100R3100	CT-ERS.12S
1SVR730100R3300	CT-ERS.22S
1SVR730110R3300	CT-AHS.22S
1SVR730120R3100	CT-ARS.11S
1SVR730120R3300	CT-ARS.21S
1SVR730180R0300	CT-APS.21S
1SVR730180R3100	CT-APS.12S
1SVR730180R3300	CT-APS.22S
1SVR730210R3300	CT-SDS.22S
1SVR730211R2300	CT-SDS.23S

Easy Connect Technology	
1SVR740010R0200	CT-MFS.21P
1SVR740010R3200	CT-MBS.22P
1SVR740020R0200	CT-MVS.21P
1SVR740020R3100	CT-MVS.12P
1SVR740020R3300	CT-MVS.22P
1SVR740021R2300	CT-MVS.23P
1SVR740030R3300	CT-MXS.22P
1SVR740040R3300	CT-WBS.22P
1SVR740100R0300	CT-ERS.21P
1SVR740100R3100	CT-ERS.12P
1SVR740100R3300	CT-ERS.22P
1SVR740110R3300	CT-AHS.22P
1SVR740120R3100	CT-ARS.11P
1SVR740120R3300	CT-ARS.21P
1SVR740180R0300	CT-APS.21P
1SVR740180R3100	CT-APS.12P
1SVR740180R3300	CT-APS.22P
1SVR740210R3300	CT-SDS.22P
1SVR740211R2300	CT-SDS.23P

ABB's electronic timers in a new housing Benefits at a glance

Double-chamber cage connection terminals

Easy conversions:

The predecessor range of electronic timers is replaced by an identical range of electronic timers with double-chamber cage connection terminals. The Reference code has changed in one digit only: 1SVRx changed to 1SVR7.

Ratings:

Double-chamber cage connection terminals provide connection of wires up to 1 x 0,5-4 mm² (1 x 20-12 AWG) or 2 x 0,5-2,5 mm² (2 x 20-14 AWG) rigid or 1 x 0,5-2,5 mm² (1 x 20-14 AWG) / 2 x 0,5-1,5 mm² (2 x 20 -16 AWG), rigid or fine-strand, with or without wire end ferrules. Potential distribution does not require additional terminals.

Extended type designators

The references with push-in terminals or screw terminals can be differentiated easily by the extended type designator:
CT-xxS.xxS indicates the screw terminal
CT-xxS.xxP indicates the push-in terminal

Easy Connect Technology

New Options:

In addition to our existing well established screw connections, ABB introduces a new innovative connection technology: Easy Connect Technology with push-in terminals.

Tool-Free Wiring:

The push-in terminals can be wired with rigid or fine-strand wires with wire end ferrules totally tool-free. The connection direction is exactly the same as for the screw version.

Higher utility class:

The Easy Connect Technology provides excellent vibration resistance with gas tight push-in terminals – the right solution for harsh environment.

Ratings:

Push-in terminals provide connection of wires up to 2 x 0,5 - 1,5 mm² (2 x 20-16 AWG), rigid or fine-strand with or without wire end ferrules.

CT-S range

Ordering details



CT-MVS.21P

Description

The highly sophisticated CT-S range in ABB's new S-range housing offers two different types of connection terminals and is ideally suited for universal use. Two different connection technologies are available:

- Double-chamber cage connection terminals:
- Easy Connect Technology:

Accessories:

The CT-S range offers the possibility of using accessories such as a remote potentiometer to adjust the time delay or a sealable, transparent cover to protect against unauthorized changes of time and threshold values.



CT-MBS.22P

Ordering details

Time function	Rated control supply voltage	Time ranges	Control input	Output	Reference code	Catalog number	Weight (1 pce) kg (lb)
	24-240 V AC/DC ²⁾ ³⁾ ⁴⁾	10 (0.05 s-300 h)	■	2 c/o	CT-MVS.21S	1SVR730020R0200	0.148 (0.326)
					CT-MVS.21P	1SVR740020R0200	0.136 (0.300)
	CT-MVS.22S				1SVR730020R3300	0.142 (0.313)	
	CT-MVS.22P				1SVR740020R3300	0.131 (0.289)	
	CT-MVS.23S				1SVR730021R2300	0.144 (0.317)	
	CT-MVS.23P				1SVR740021R2300	0.133 (0.293)	
	24-48 V DC, 24-240 V AC	10 (0.05 s-300 h)	■	1 c/o	CT-MVS.12S	1SVR730020R3100	0.107 (0.236)
					CT-MVS.12P	1SVR740020R3100	0.102 (0.225)
	24-48 V DC, 24-240 V AC ⁵⁾	2 x 10 (0.05 s-300 h)	■	2 c/o	CT-MXS.22S	1SVR730030R3300	0.142 (0.313)
					CT-MXS.22P	1SVR740030R3300	0.131 (0.289)
	24-240 V AC/DC ²⁾ ³⁾ ⁴⁾	10 (0.05 s-300 h)	◇/◇	2 c/o	CT-MFS.21S	1SVR730010R0200	0.145 (0.320)
					CT-MFS.21P	1SVR740010R0200	0.133 (0.293)
	CT-MBS.22S				1SVR730010R3200	0.140 (0.309)	
	CT-MBS.22P				1SVR740010R3200	0.129 (0.284)	

- ON-delay (accumulative)
OFF-delay without aux. voltage
- OFF-delay without aux. voltage
- Impulse-ON
- Impulse-OFF
- Symmetrical ON-delay and OFF-delay
- Flasher starting with ON
- Flasher starting with OFF
- Pulse generator starting
- Star-delta change-over with impulse
- Pulse former
- ON/OFF-function
- Star-delta change-over twice
- ON-delayed with ON or OFF
- Pulse generator starting with ON or OFF
- Single-pulse generator
- Impulse-ON/OFF
- Flasher starting with ON
- Flasher starting with OFF
- fixed impulse with adjustable time delay
- Adjustable impulse with fixed time delay

- 1) Asymmetrical ON- and OFF-delay
- 2) Extended temperature range -40 °C
- 3) Remote potentiometer connection
- 4) 2nd c/o contact selectable as instantaneous contact
- 5) 2 remote potentiometer connections

- Control input with voltage-related triggering
- ◇ Control input with volt-free triggering

CT-S range

Ordering details



CT-ERS.21P



CT-AHS.22P



CT-SDS.23P

- ☒(+) ON-delay (accumulative)
- OFF-delay without aux. voltage
- 1☒ Impulse-ON
- ☒ Impulse-ON/OFF
- ☒ Flasher starting with ON
- ☒ Flasher starting with OFF
- ON/OFF-function
- 1☒ Impulse-ON/OFF
- ☒ Flasher starting with ON
- ☒ Flasher starting with OFF
- ☒ fixed impulse with adjustable time delay
- fixed impulse with fixed time delay
- △ Star-delta change-over

Time function	Rated control supply voltage	Time ranges	Control input	Output	Reference code	Catalog number	Weight (1 pce) kg (lb)	
☒ 1☒ ☒ ☒ ☒ ☒	24-48 V DC, 24-240 V AC	10 (0.05 s- 300 h)		2 c/o	CT-WBS.22S	1SVR730040R3300	0.123 (0.271)	
					CT-WBS.22P	1SVR740040R3300	0.115 (0.254)	
☒	24-240 V AC/ DC 2)	10 (0.05 s- 300 h)		2 c/o	CT-ERS.21S	1SVR730100R0300	0.130 (0.287)	
	CT-ERS.21P				1SVR740100R0300	0.121 (0.267)		
	24-48 V DC, 24-240 V AC				CT-ERS.22S	1SVR730100R3300	0.121 (0.267)	
	CT-ERS.22P				1SVR740100R3300	0.113 (0.249)		
	24-48 V DC, 24-240 V AC				CT-ERS.12S	1SVR730100R3100	0.106 (0.234)	
	CT-ERS.12P				1SVR740100R3100	0.101 (0.222)		
■	24-240 V AC/ DC 2)	10 (0.05 s- 300 h)	■	2 c/o	CT-APS.21S	1SVR730180R0300	0.146 (0.322)	
	CT-APS.21P				1SVR740180R0300	0.125 (0.276)		
	24-48 V DC, 24-240 V AC				CT-APS.22S	1SVR730180R3300	0.138 (0.304)	
	CT-APS.22P				1SVR740180R3300	0.127 (0.280)		
	24-48 V DC, 24-240 V AC				CT-APS.12S	1SVR730180R3100	0.109 (0.240)	
	CT-APS.12P				1SVR740180R3100	0.103 (0.227)		
	24-48 V DC, 24-240 V AC				CT-AHS.22S	1SVR730110R3300	0.136 (0.300)	
	CT-AHS.22P				1SVR740110R3300	0.125 (0.276)		
■ 6)	24-240 V AC/DC	7 (0.05 s- 10 min)		1 c/o	CT-ARS.11S	1SVR730120R3100	0.106 (0.234)	
					CT-ARS.11P	1SVR740120R3100	0.100 (0.220)	
					2 c/o	CT-ARS.21S	1SVR730120R3300	0.124 (0.273)
					CT-ARS.21P	1SVR740120R3300	0.115 (0.254)	
■ 6)	110-127 V AC or 110 V DC 8)				CT-VBS.17	1SVR430261R6000	0.123 (0.271)	
	200-240 V AC/DC 8)				CT-VBS.18	1SVR430261R5000	0.118 (0.260)	
△ 7)	24-48 V DC, 24-240 V AC	7 (0.05 s- 10 min)		2 n/o	CT-SDS.22S	1SVR730210R3300	0.114 (0.251)	
					CT-SDS.22P	1SVR740210R3300	0.108 (0.238)	
					CT-SDS.23S	1SVR730211R2300	0.118 (0.260)	
					CT-SDS.23P	1SVR740211R2300	0.112 (0.247)	

- 1) Asymmetrical ON- and OFF-delay
- 2) Extended temperature range -40 °C
- 3) Remote potentiometer connection
- 4) 2nd c/o contact selectable as instantaneously contact
- 5) 2 remote potentiometer connections
- 6) Without auxiliary voltage
- 7) 50 ms transition time
- 8) For DC contactor coils
- Control input with voltage-related triggering
- ◆ Control input with volt-free triggering

CT-S range Ordering details



CT-IRS.35

6



ON/OFF-function

Time function	Rated control supply voltage	Time ranges	Control input	Output	Reference code	Catalog number	Weight (1 pce) kg (lb)	
□	24 V AC/DC			2 c/o	CT-IRS.16	1SVR430220R9100	0.121 (0.267)	
	110-240 V AC				CT-IRS.14	1SVR430221R7100	0.126 (0.278)	
	24 V AC/DC				CT-IRS.26	1SVR430220R9300	0.135 (0.298)	
	110-240 V AC				CT-IRS.24	1SVR430221R7300	0.141 (0.311)	
	24 V AC/DC			2 c/o	CT-IRS.26G ⁹⁾	1SVR430230R9300	0.147 (0.324)	
	110-240 V AC				CT-IRS.24G ⁹⁾	1SVR430231R7300	0.150 (0.331)	
	24 V AC/DC				3 c/o	CT-IRS.36	1SVR430220R9400	0.159 (0.351)
	220-240 V AC					CT-IRS.35	1SVR430221R1400	0.161 (0.355)

⁹⁾ Contacts with gold-plated contacts

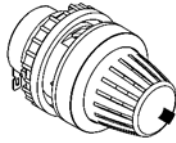
CT-S range

Ordering details

Accessories

Remote potentiometer

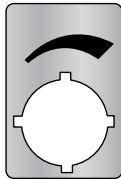
50 k Ω \pm 20 % - 0,2 Ω , degree of protection IP66



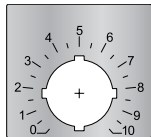
MT-x50B



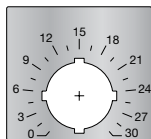
30 mm adapters



Marker label 29.6 x 44.5 mm

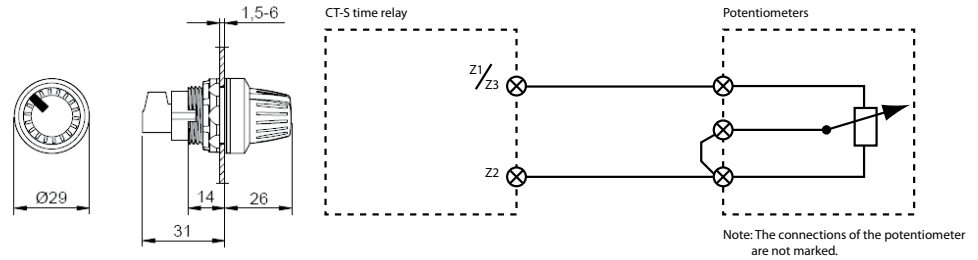


Marker label with scale 0-10
48.5 x 44.5 mm



Marker label with scale 0-30
48.5 x 44.5 mm

Material	Diameter	Reference code	Catalog number	Pack.-unit	Weight
	in mm				
Plastic, black	22.5	MT-150B	1SFA611410R1506	1	0.040
Plastic, chrome	22.5	MT-250B	1SFA611410R2506	1	0.040
Metal, chrome	22.5	MT-350B	1SFA611410R3506	1	0.048



30 mm adapter for attaching the potentiometer 22 mm in 30 mm mounting hole

Material	Reference code	Catalog number	Pack.-unit	Weight
			pieces	1 piece
Plastic, black	KA1-8029	1SFA616920R8029	1	g / oz
Metal, chrome	KA1-8030	1SFA616920R8030	1	

Marker label

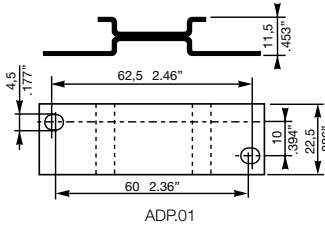
Caption	Reference code	Catalog number	Pack.-unit	Weight
			pieces	1 piece
Symbol (see illustration)	SK 615 562-87	GJD6155620R0087	1	0.002
Scale 0 - 10	SK 615 562-88	GJD6155620R0088	1	0.002
Scale 0 - 30	MA16-1060	1SFA611940R1060	1	0.002

CT-S range

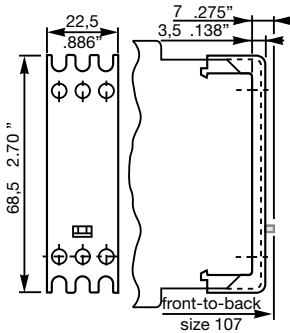
Ordering details

Accessories

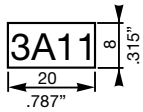
6



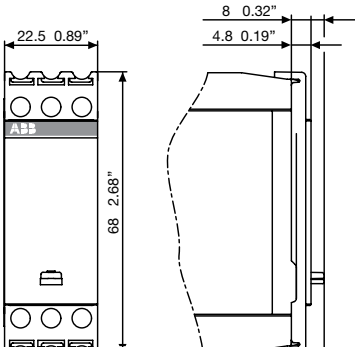
ADP.01



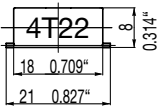
COV.01



MAR.01



COV.11



MAR.02

Accessories

Material	for devices	Reference code	Catalog number	Pack.-unit pieces	Weight 1 piece g / oz
Adapter for screw mounting ¹⁾	CT-S 22.5 mm	ADP.01	1SVR430029R0100	1	18.4/0.65
Sealable transparent cover		COV.01	1SVR430005R0100	1	5.2/0.18
Sealable transparent cover ¹⁾	CT-S.S/P 22.5 mm	COV.11	1SVR730005R0100	1	4 / 0.129

Marker label

Material	for devices	Reference code	Catalog number	Pack.-unit pieces	Weight 1 piece g / oz
Marker	CT-S without DIP switch	MAR.01	1SVR366017R0100	10	0.19/0.007
Marker	CT-S with DIP switch	MAR.02	1SVR430043R0000	10	0.13/0.005
Marker	CT-S.S/P with DIP switch	MAR.12	1SVR730006R0000	10	0.152/0.335

¹⁾ also available for CT-S.S/P

CT-S range Function diagrams

Remarks

Legend

- Control supply voltage not applied / Output contact open
- Control supply voltage applied / Output contact closed

- A1-Y1/B1 Control input with voltage-related triggering
- Y1-Z2 Control input with volt-free triggering
- X1-Z2 Control input with volt-free triggering

Remote potentiometer connection:

When an external potentiometer is connected to the remote potentiometer connection (terminals **Z1-Z2**, **Z3-Z2** respectively), the internal, front-face potentiometer is disabled and the time adjustment is made via the external potentiometer.

2nd c/o contact selectable as instantaneous contact:

When switch position Inst. "I" is selected, the functionality of the 2nd c/o contact changes to an instantaneous contact. It acts like the c/o contacts of a switching relay, i.e. applying or interrupting the control supply voltage energizes or de-energizes the c/o contact. The designation of the 2nd c/o contact changes from **25-26/28** to **21-22/24**, when selected as instantaneous contact.

Terminal designations on the device and in the diagrams:

The 1st c/o contact is always designated **15-16/18**.
 The 2nd c/o contact is designated **25-26/28**, if it responds to the time delay.
 If the 2nd c/o contact is selected as an instantaneous contact, the designation **25-26/28** is replaced by **21-22/24**.
 Control supply voltage is always applied to terminals **A1-A2**.

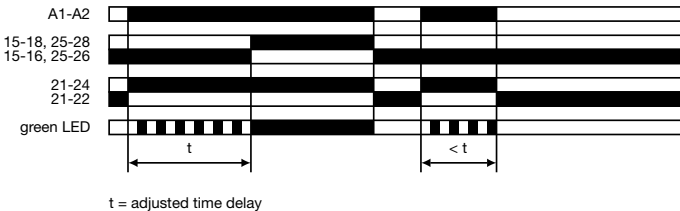
Function of the yellow LEDs:

On devices without the function '2nd c/o contact selectable as instantaneous contact', the yellow LED **R** glows as soon as the output relay energizes and turns off when the output relay de-energizes.

Devices with the function '2nd c/o contact selectable as instantaneous contact' have two yellow LEDs, designated **R1** and **R2**. LED **R1** shows the status of the 1st c/o contact (**15-16/18**) and LED **R2** shows the status of the 2nd c/o contact (**25-26/28**, **21-22/24** resp.). LED **R1** or **R2** glow as soon as the corresponding output relay energizes and turns off when the corresponding output relay de-energizes.

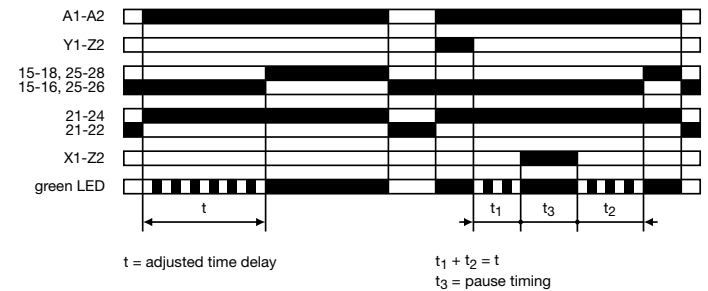
⊗ ON-delay (Delay on make) CT-MVS, CT-ERS, CT-WBS

This function requires continuous control supply voltage for timing.
 Timing begins when control supply voltage is applied. The green LED flashes during timing. When the selected time delay is complete, the output relay energizes and the flashing green LED turns steady.
 If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



⊗ ON-delay (Delay on make) CT-MFS, CT-MBS

This function requires continuous control supply voltage for timing.
 If control input **Y1-Z2** is open, timing begins when control supply voltage is applied. Or, if control supply voltage is already applied, opening control input **Y1-Z2** also starts timing. The green LED flashes during timing. When the selected time delay is complete, the output relay energizes and the flashing green LED turns steady.
 If control input **Y1-Z2** closes before the time delay is complete, the time delay is reset and the output relay remains de-energized.
 Pause timing / Accumulative ON-delay (CT-MFS):
 Timing can be paused by closing control input **X1-Z2**. The elapsed time t_1 is stored and continues from this time value when **X1-Z2** is re-opened. This can be repeated as often as required.
 If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



CT-S range Function diagrams

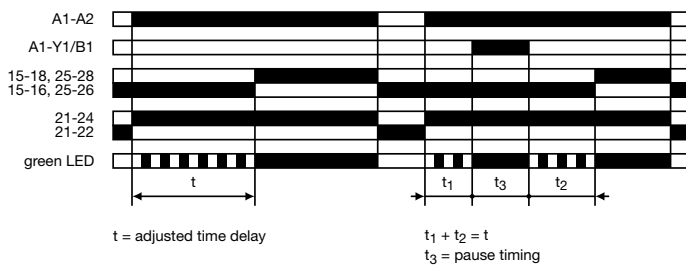
☒+ Accumulative ON-delay (Accumulative delay on make) CT-MVS

This function requires continuous control supply voltage for timing. Timing begins when control supply voltage is applied. The green LED flashes during timing. When the selected time delay is complete, the output relay energizes and the flashing green LED turns steady.

Timing can be paused by closing control input **A1-Y1/B1**. The elapsed time t_1 is stored and continues from this time value when **A1-Y1/B1** is re-opened.

This can be repeated as often as required.

6 If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



OFF-delay with auxiliary voltage (Delay on break) CT-MFS, CT-MBS, CT-AHS

This function requires continuous control supply voltage for timing.

If control input **Y1-Z2** is closed, the output relay energizes immediately. If control input **Y1-Z2** is opened, the time delay starts. The green LED flashes during timing. When the selected time delay is complete, the output relay de-energizes and the flashing green LED turns steady.

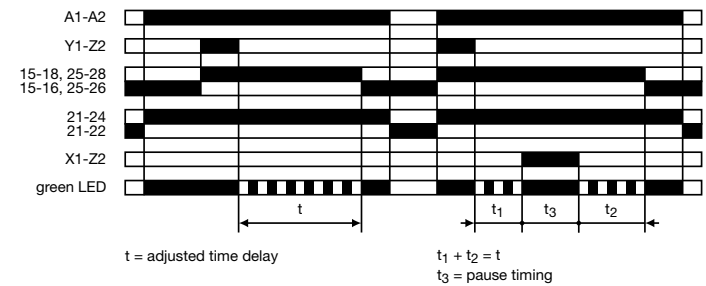
If control input **Y1-Z2** closes before the time delay is complete, the time delay is reset and the output relay does not change state. Timing starts again when control input **Y1-Z2** re-opens.

Pause timing / Accumulative OFF-delay (CT-MFS):

Timing can be paused by closing control input **X1-Z2**. The elapsed time t_1 is stored and continues from this time value when **X1-Z2** is re-opened.

This can be repeated as often as required.

If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



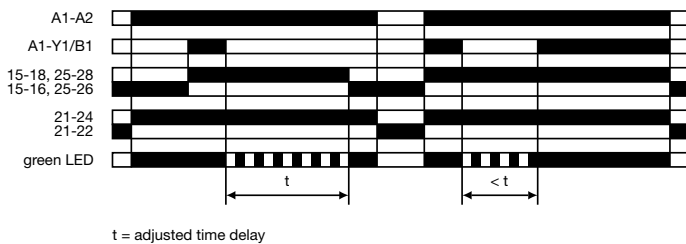
OFF-delay with auxiliary voltage (Delay on break) CT-MVS, CT-APS

This function requires continuous control supply voltage for timing.

If control input **A1-Y1/B1** is closed, the output relay energizes immediately. If control input **A1-Y1/B1** is opened, the time delay starts. The green LED flashes during timing. When the selected time delay is complete, the output relay de-energizes and the flashing green LED turns steady.

If control input **A1-Y1/B1** recloses before the time delay is complete, the time delay is reset and the output relay does not change state. Timing starts again when control input **A1-Y1/B1** re-opens.

If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.

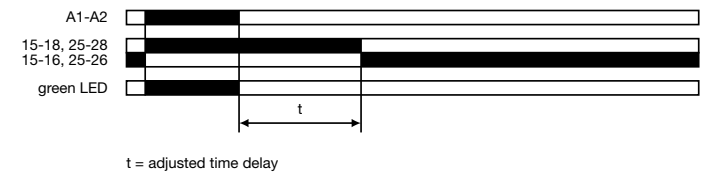


OFF-delay without auxiliary voltage (True delay on break) CT-ARS

The OFF-delay function without auxiliary voltage does not require continuous control supply voltage for timing. After a storage time of several months without any voltage, a formatting time of about 5 minutes is necessary.

Applying control supply voltage energizes the output relay immediately. Applied control supply voltage is displayed by the glowing green LED. If control supply voltage is interrupted, the OFF-delay starts and the LED turns off. When timing is complete, the output relay de-energizes.

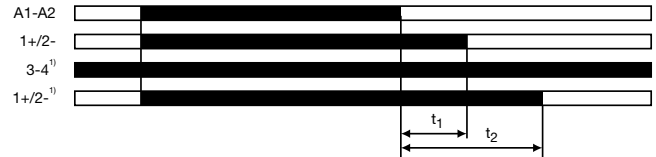
For correct operation of the unit, it is necessary to complete the minimum energizing time. As soon as timing starts, the LED turns off.



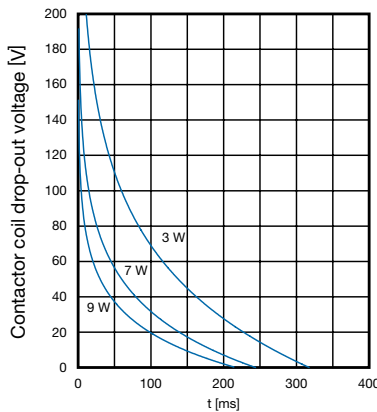
CT-S range Function diagrams

OFF-delay without auxiliary voltage for DC contactor coils CT-VBS

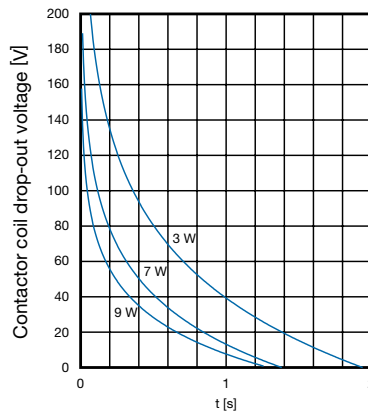
The DC contactor coil connected to the output is energized when control supply voltage is applied.
If control supply voltage is disconnected, the DC contactor coil remains energized for a short time delay. This time delay depends on the coil drop-out voltage and on the wattage of the contactor coil.



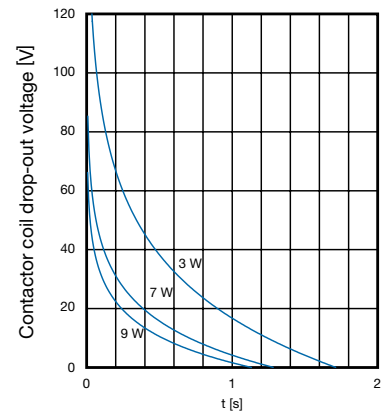
t₁ = OFF-delay (without jumper between terminals 3 and 4 ¹⁾)
t₂ = OFF-delay (with jumper between terminals 3 and 4)
¹⁾ only for version 200-240 V AC



Time delay guideline values
200-240 V AC version without jumper 3/4



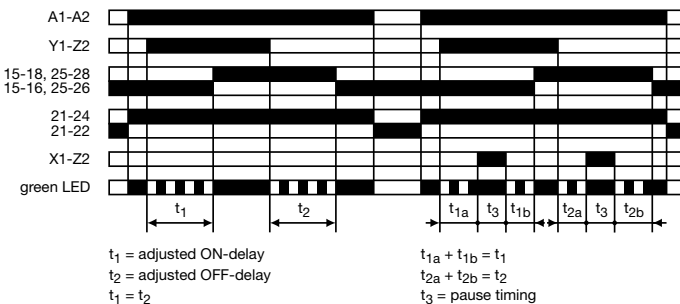
Time delay guideline values
200-240 V AC version with jumper 3/4



Time delay guideline values
110-127 V AC version

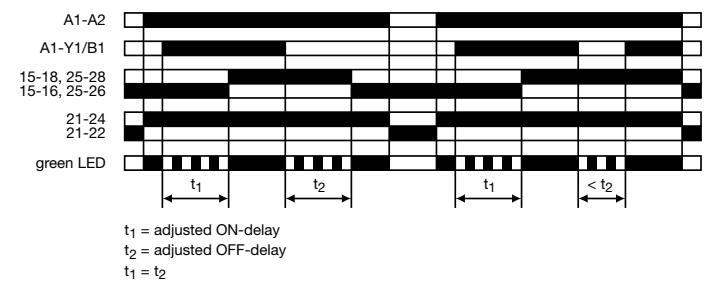
Symmetrical ON-delay and OFF-delay (Symmetrical delay on make and delay on break) CT-MFS, CT-MBS

This function requires continuous control supply voltage for timing.
Closing control input Y1-Z2 starts the ON-delay t₁. When timing is complete, the output relay energizes. Opening control input Y1-Z2 starts the OFF-delay t₂. Both timing functions are displayed by the flashing green LED. When the OFF-delay t₂ is complete, the output relay de-energizes.
If control input Y1-Z2 opens before the ON-delay t₁ is complete, the time delay is reset and the output relay remains de-energized. If control input Y1-Z2 closes before the OFF-delay t₂ is complete, the time delay is reset and the output relay remains energized.
Pause timing / Accumulative, symmetrical ON-delay and OFF-delay (CT-MFS): Timing can be paused by closing control input X1-Z2. The elapsed time t_{1a} or t_{2a} is stored and continues from this time value when X1-Z2 is re-opened. This can be repeated as often as required.
If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



Symmetrical ON-delay and OFF-delay (Symmetrical delay on make and delay on break) CT-MVS

This function requires continuous control supply voltage for timing.
Closing control input A1-Y1/B1 starts the ON-delay t₁. When timing is complete, the output relay energizes. Opening control input A1-Y1/B1 starts the OFF-delay t₂. Both timing functions are displayed by the flashing green LED. When the OFF-delay t₂ is complete, the output relay de-energizes.
If control input A1-Y1/B1 opens before the ON-delay t₁ is complete, the time delay is reset and the output relay remains de-energized. If control input A1-Y1/B1 closes before the OFF-delay t₂ is complete, the time delay is reset and the output relay remains energized.
If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



CT-S range Function diagrams

Asymmetrical ON-delay and OFF-delay (Asymmetrical delay on make and delay on break) CT-MXS

This function requires continuous control supply voltage for timing.

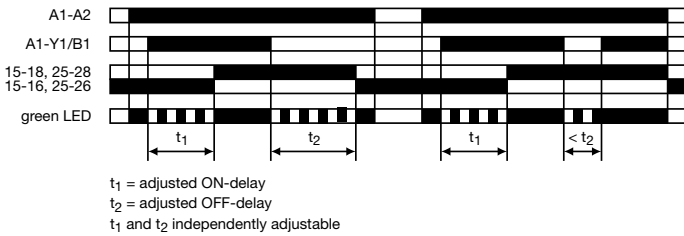
Closing control input **A1-Y1/B1** starts the ON-delay t_1 . When timing is complete, the output relay energizes. Opening control input **A1-Y1/B1** starts the OFF-delay t_2 . When the OFF-delay is complete, the output relay de-energizes. Both timing functions are displayed by the flashing green LED. The ON-delay and OFF-delay are independently adjustable.

If control input **A1-Y1/B1** opens before the ON-delay is complete ($<t_1$), the time delay is reset and the output relay remains de-energized.

If control input **A1-Y1/B1** closes before the OFF-delay is complete ($<t_2$), the time delay is reset and the output relay remains energized.

If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.

6

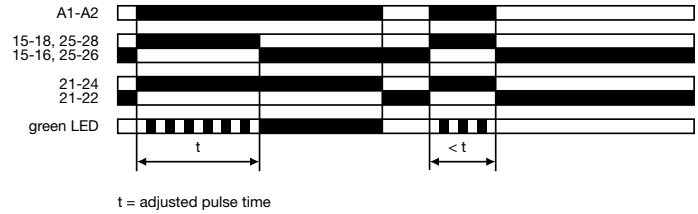


Impulse-ON (Interval) CT-MVS, CT-WBS

This function requires continuous control supply voltage for timing.

The output relay energizes immediately when control supply voltage is applied and de-energizes after the set pulse time is complete. The green LED flashes during timing. When the selected pulse time is complete, the flashing green LED turns steady.

If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



Impulse-ON (Interval) CT-MFS, CT-MBS

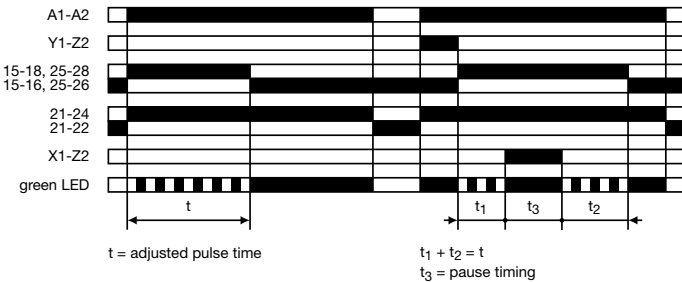
This function requires continuous control supply voltage for timing.

The output relay energizes immediately when control supply voltage is applied and de-energizes after the set pulse time is complete. If control input **Y1-Z2** is open, timing begins when control supply voltage is applied. Or, if control supply voltage is already applied, opening control input **Y1-Z2** starts timing. The green LED flashes during timing. When the selected pulse time is complete, the output relay de-energizes and the flashing green LED turns steady.

Closing control input **Y1-Z2**, before the pulse time is complete, de-energizes the output relay and resets the pulse time.

Pause timing / Accumulative impulse-ON (CT-MFS):
Timing can be paused by closing control input **X1-Z2**. The elapsed time t_1 is stored and continues from this time value when **X1-Z2** is re-opened. This can be repeated as often as required.

If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



Impulse-OFF with auxiliary voltage (Trailing edge interval) CT-MFS, CT-MBS

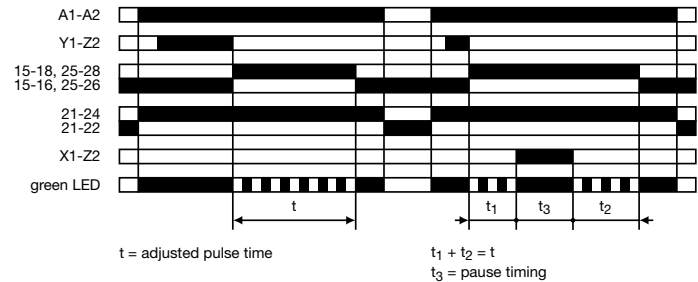
This function requires continuous control supply voltage for timing.

If control supply voltage is applied, opening control input **Y1-Z2** energizes the output relay immediately and starts timing. The green LED flashes during timing. When the selected pulse time is complete, the output relay de-energizes and the flashing green LED turns steady.

Closing control input **Y1-Z2**, before the pulse time is complete, de-energizes the output relay and resets the pulse time.

Pause timing / Accumulative impulse-OFF (CT-MFS):
Timing can be paused by closing control input **X1-Z2**. The elapsed time t_1 is stored and continues from this time value when **X1-Z2** is re-opened. This can be repeated as often as required.

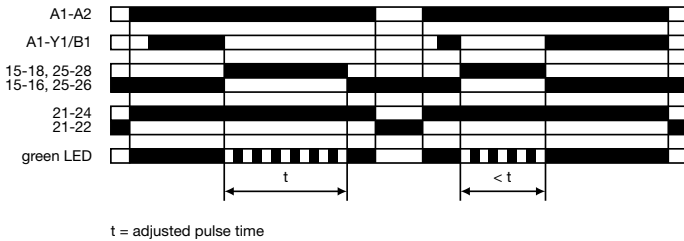
If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



CT-S range Function diagrams

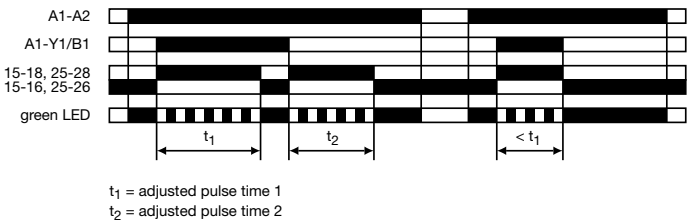
Impulse-OFF with auxiliary voltage (Trailing edge interval) CT-MVS

This function requires continuous control supply voltage for timing.
If control supply voltage is applied, opening control input **A1-Y1/B1** energizes the output relay immediately and starts timing. The green LED flashes during timing. When the selected pulse time is complete, the output relay de-energizes and the flashing green LED turns steady.
Closing control input **A1-Y1/B1**, before the pulse time is complete, de-energizes the output relay and resets the pulse time.
If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



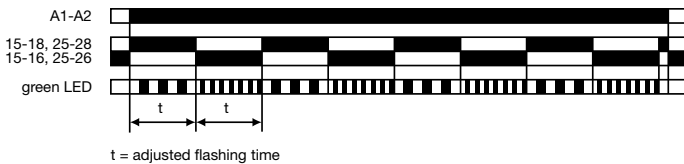
Impulse-ON and impulse-OFF (Interval and trailing edge interval) CT-MXS

This function requires continuous control supply voltage for timing.
If control supply voltage is applied, closing control input **A1-Y1/B1** energizes the output relay immediately and starts the pulse time t_1 . The green LED flashes during timing. When t_1 is complete, the output relay de-energizes and the flashing green LED turns steady.
Re-opening control input **A1-Y1/B1** energizes the output relay immediately and starts the pulse time t_2 . The green LED flashes during timing. When t_2 is complete, the output relay de-energizes and the flashing green LED turns steady. t_1 and t_2 are independently adjustable.
If control input **A1-Y1/B1** changes state before the pulse time is complete, the output relay de-energizes and the pulse time is reset. If control input **A1-Y1/B1** changes state again, the interrupted pulse time restarts.
If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



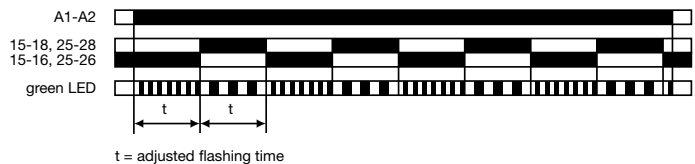
Flasher, starting with the ON time (Recycling equal times, ON first) CT-WBS

Applying control supply voltage starts timing with symmetrical ON & OFF times. The cycle starts with an ON time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time.
If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



Flasher, starting with the OFF time (Recycling equal times, OFF first) CT-WBS

Applying control supply voltage starts timing with symmetrical ON & OFF times. The cycle starts with an OFF time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time.
If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



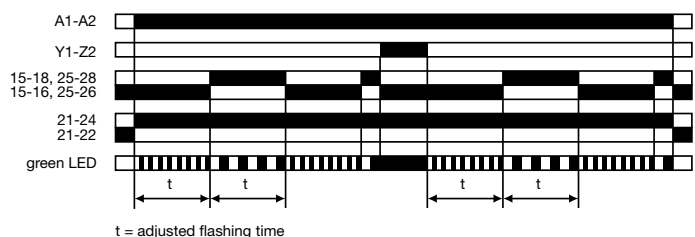
Flasher with reset, starting with the ON time (Recycling equal times with reset, ON first) CT-MFS, CT-MBS

Applying control supply voltage starts timing with symmetrical ON & OFF times. The cycle starts with an ON time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time.
The time delay can be reset by closing control input **Y1-Z2**. Opening control input **Y1-Z2** starts the timer pulsing again with symmetrical ON & OFF times.
If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



Flasher with reset, starting with the OFF time (Recycling equal times with reset, OFF first) CT-MFS, CT-MBS

Applying control supply voltage starts timing with symmetrical ON & OFF times. The cycle starts with an OFF time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time.
The time delay can be reset by closing control input **Y1-Z2**. Opening control input **Y1-Z2** starts the timer pulsing again with symmetrical ON & OFF times.
If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



CT-S range Function diagrams



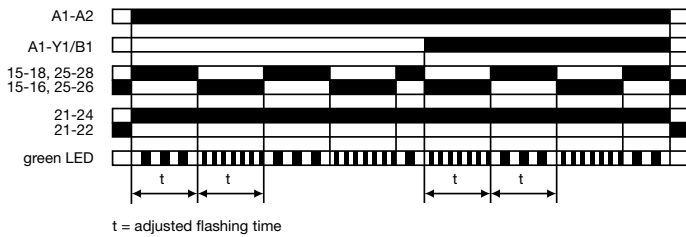
Flasher, starting with the ON or OFF time (Recycling equal times, ON or OFF first) CT-MVS

Applying control supply voltage starts timing with symmetrical ON & OFF times. The cycle starts with an ON time first.

Closing control input **A1-Y1/B1**, with control supply voltage applied, starts the cycle with an OFF time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time.

If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.

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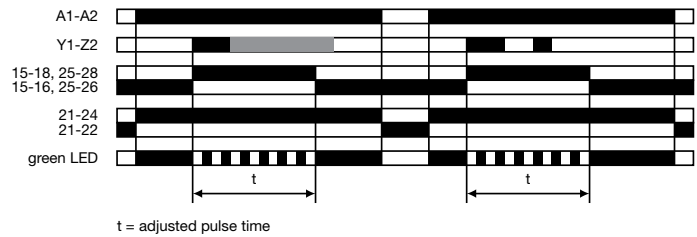


Pulse former (Single shot) CT-MFS, CT-MBS

This function requires continuous control supply voltage for timing.

Closing control input **Y1-Z2** energizes the output relay immediately and starts timing. Operating the control contact switch **Y1-Z2** during the time delay has no effect. The green LED flashes during timing. When the selected ON time is complete, the output relay de-energizes and the flashing green LED turns steady. After the ON time is complete, it can be restarted by closing control input **Y1-Z2**.

If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.

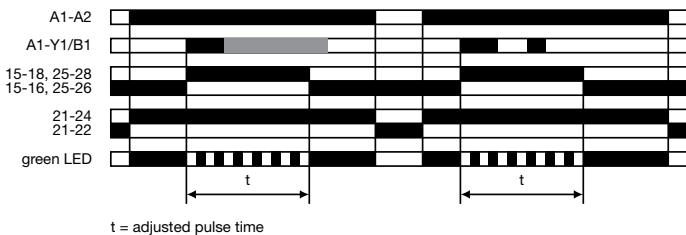


Pulse former (Single shot) CT-MVS

This function requires continuous control supply voltage for timing.

Closing control input **A1-Y1/B1** energizes the output relay immediately and starts timing. Operating the control contact switch **A1-Y1/B1** during the time delay has no effect. The green LED flashes during timing. When the selected ON time is complete, the output relay de-energizes and the flashing green LED turns steady. After the ON time is complete, it can be restarted by closing control input **A1-Y1/B1**.

If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.

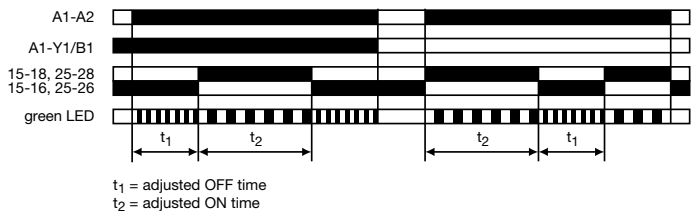


Pulse generator, starting with the ON or OFF time (Recycling unequal times, ON or OFF first) CT-MXS


This function requires continuous control supply voltage for timing.

Applying control supply voltage, with open control input **A1-Y1/B1**, starts timing with an ON time t_2 first. Applying control supply voltage, with closed control input **A1-Y1/B1**, starts timing with an OFF time t_1 first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time. The ON & OFF times are independently adjustable.

If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.

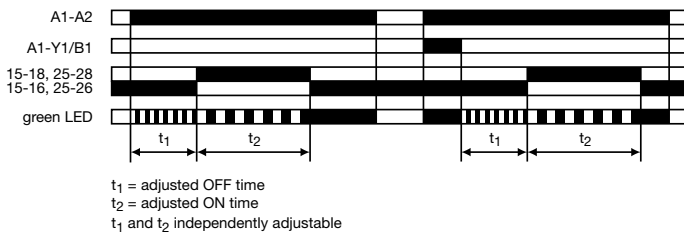



CT-S range Function diagrams

 **Single-pulse generator, starting with the OFF time (Delay on make with interval output) CT-MXS**

This function requires continuous control supply voltage for timing. Applying control supply voltage, or, if control supply voltage is already applied, opening control input **A1-Y1/B1** energizes the output relay after the OFF time t_1 is complete. When the following ON time t_2 is complete, the output relay de-energizes. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time.

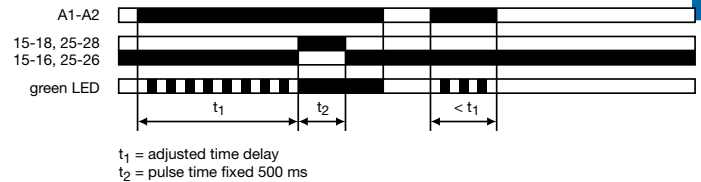
The ON & OFF times are independently adjustable. Closing control input **A1-Y1/B1**, with control supply voltage applied, de-energizes the output relay and resets the time delay. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



 **Fixed impulse with adjustable time delay (Delayed pulse output) CT-WBS**

This function requires continuous control supply voltage for timing. The time delay t_1 starts when control supply voltage is applied. The green LED flashes during timing. When t_1 is complete, the output relay energizes for the fixed impulse time t_2 of 500 ms and the flashing green LED turns steady.

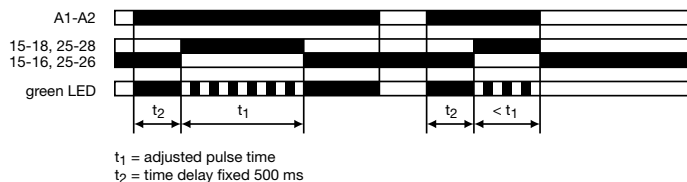
If control supply voltage is interrupted, the time delay is reset. The output relay does not change state.




 **Adjustable impulse with fixed time delay (Delayed Interval) CT-WBS**

This function requires continuous control supply voltage for timing. Applying control supply voltage starts the fixed time delay t_2 of 500 ms. When t_2 is complete, the output relay energizes and the selected pulse time t_1 starts. The green LED flashes during timing. When t_1 is complete, the output relay de-energizes and the flashing green LED turns steady.

If control supply voltage is interrupted, the pulse time is reset. The output relay does not change state.



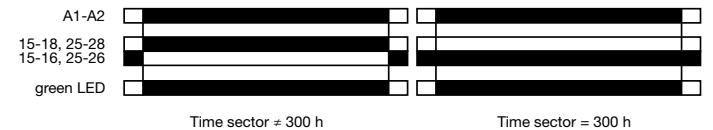
 **ON/OFF-Function CT-MFS, CT-MBS, CT-MVS, CT-MXS, CT-WBS**

This function is used for test purposes during commissioning and troubleshooting.

If the selected max. value of the time range is smaller than 300 h (front-face potentiometer "Time sector" \neq 300 h), applying control supply voltage energizes the output relay immediately and the green LED glows. Interrupting control supply voltage, de-energizes the output relay.

If the selected max. value of the time range is 300 h (front-face potentiometer "Time sector" = 300 h) and control supply voltage is applied, the green LED glows, but the output relay does not energize.

Time settings and operating of the control inputs have no effect on the operation.



 **Switching relays CT-IRS**

The switching relay may be used to increase the number of available contacts or to reinforce contacts, or as a coupling/decoupling interface. Approx. 10 ms after applying control supply voltage to terminals **A1-A2**, the output relay energizes.

If control supply voltage is interrupted, the output relay de-energizes.

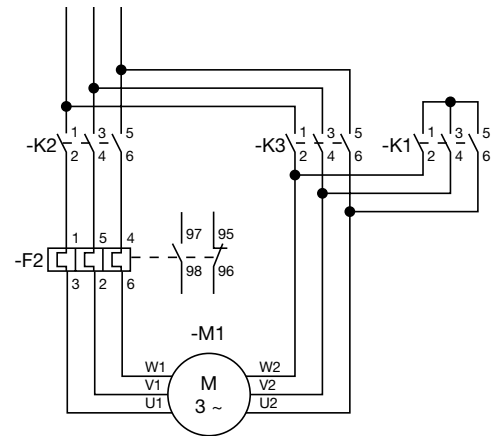
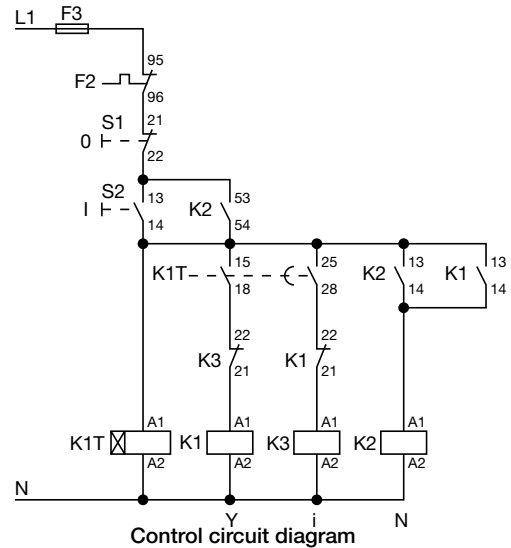
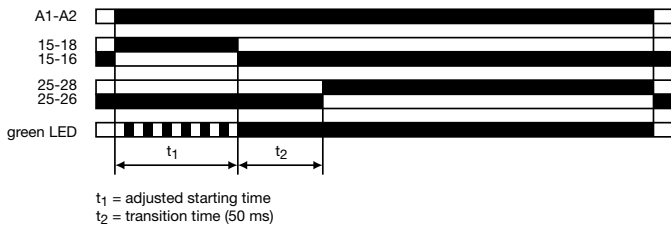


CT-S range Function diagrams

△1□ Star-delta change-over with impulse function (Star-delta starting, interval/delay on make) CT-MFS, CT-MBS, CT-MVS.2x

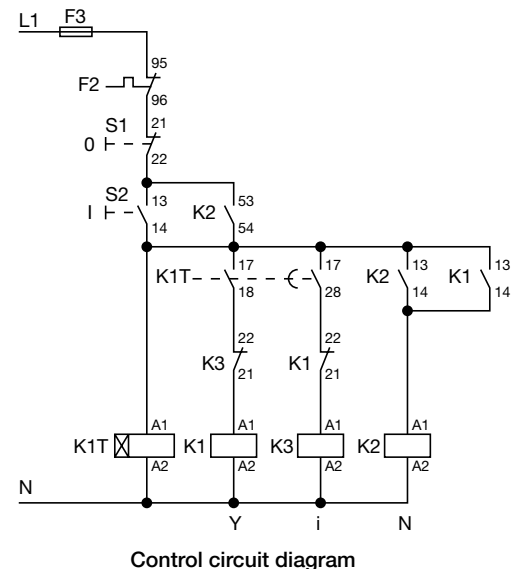
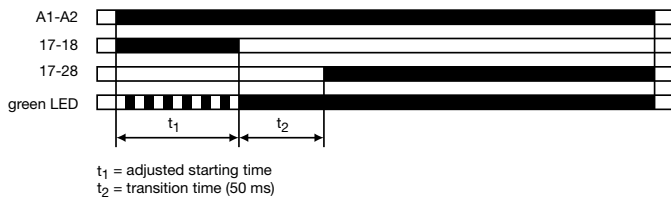
This function requires continuous control supply voltage for timing.
Applying control supply voltage to terminals **A1-A2**, energizes the star contactor connected to terminals **15-18** and begins the set starting time t_1 . The green LED flashes during timing. When the starting time is complete, the first c/o contact de-energizes the star contactor.
Now, the fixed transition time t_2 of 50 ms starts. When the transition time is complete, the second c/o contact energizes the delta contactor connected to terminals **25-28**. The delta contactor remains energized as long as control supply voltage is applied to the unit.

6



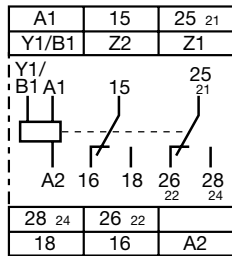
△ Star-delta change-over (Star-delta starting) CT-SDS

This function requires continuous control supply voltage for timing.
Applying control supply voltage to terminals **A1-A2**, energizes the star contactor connected to terminals **17-18** and begins the set starting time t_1 . The green LED flashes during timing. When the starting time is complete, the first output contact de-energizes the star contactor.
Now, the fixed transition time t_2 of 50 ms starts. When the transition time is complete, the second output contact energizes the delta contactor connected to terminals **17-28**. The delta contactor remains energized as long as control supply voltage is applied to the unit.



CT-S range Connection diagrams

CT-MVS.21

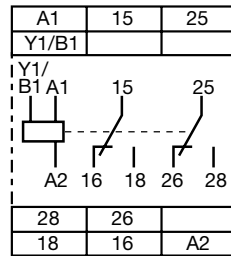


A1-A2 Supply: 24-240 V AC/DC

15-16/18 1. c/o contact
25-26/28 2. c/o contact
21-22/24 2. c/o contact as instantaneous contact

A1-Y1/B1 Control input
Z1-Z2 Remote potentiometer connection

CT-MVS.22

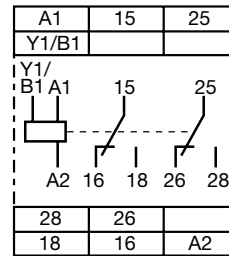


A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
25-26/28 2. c/o contact

A1-Y1/B1 Control input

CT-MVS.23

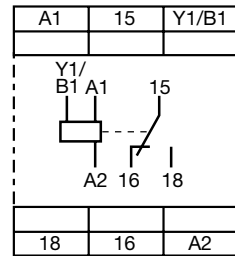


A1-A2 Supply: 380-440 V AC

15-16/18 1. c/o contact
25-26/28 2. c/o contact

A1-Y1/B1 Control input

CT-MVS.12

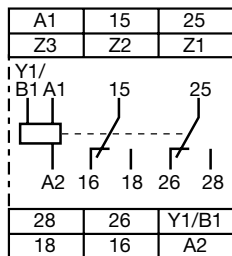


A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact

A1-Y1/B1 Control input

CT-MXS.22

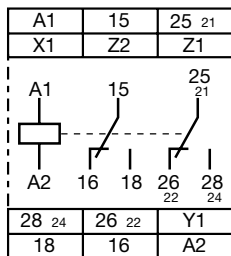


A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
25-26/28 2. c/o contact

A1-Y1/B1 Control input
Z1-Z2 Remote potentiometer connection
Z3-Z2 Remote potentiometer connection

CT-MFS.21

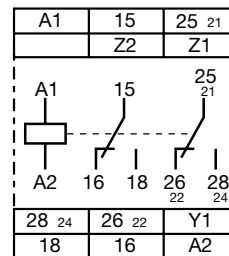


A1-A2 Supply: 24-240 V AC/DC

15-16/18 1. c/o contact
25-26/28 2. c/o contact
21-22/24 2. c/o contact as instantaneous contact

Y1-Z2 Control input
X1-Z2 Control input
Z1-Z2 Remote potentiometer connection

CT-MBS.22

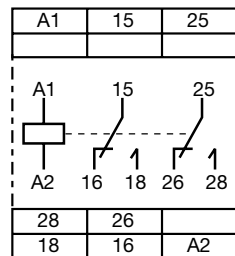


A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
25-26/28 2. c/o contact
21-22/24 2. c/o contact as instantaneous contact

Y1-Z2 Control input
Z1-Z2 Remote potentiometer connection

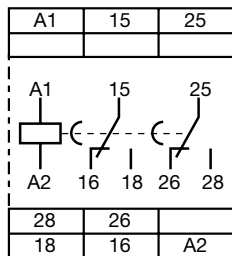
CT-WBS.22



A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
25-26/28 2. c/o contact

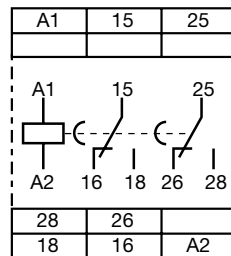
CT-ERS.21



A1-A2 Supply: 24-240 V AC/DC

15-16/18 1. c/o contact
25-26/28 2. c/o contact

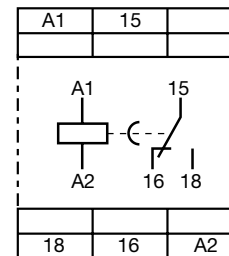
CT-ERS.22



A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
25-26/28 2. c/o contact

CT-ERS.12



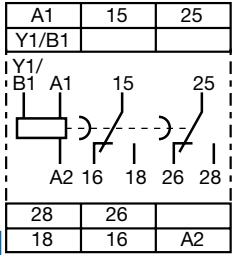
A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact

CT-S range Connection diagrams

6

CT-APS.21

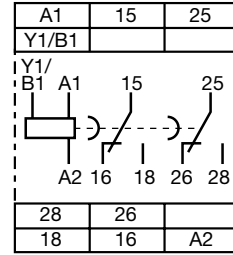


A1-A2 Supply: 24-240 V AC/DC

15-16/18 1. c/o contact
25-26/28 2. c/o contact

A1-Y1/B1 Control input

CT-APS.22

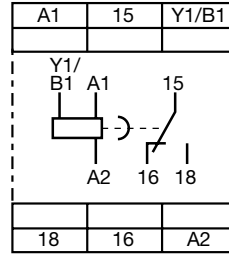


A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
25-26/28 2. c/o contact

A1-Y1/B1 Control input

CT-APS.12

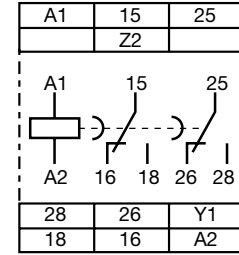


A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact

A1-Y1/B1 Control input

CT-AHS.22

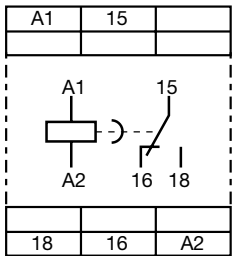


A1-A2 Supply: 24-48 V DC or 24-240 V AC

15-16/18 1. c/o contact
25-26/28 2. c/o contact

Y1-Z2 Control input

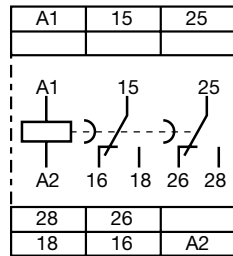
CT-ARS.11



A1-A2 Supply: 24-240 V AC/DC

15-16/18 1. c/o contact

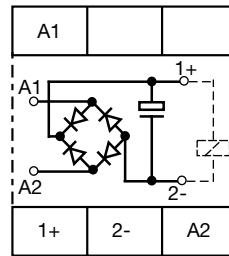
CT-ARS.21



A1-A2 Supply: 24-240 V AC/DC

15-16/18 1. c/o contact
25-26/28 2. c/o contact

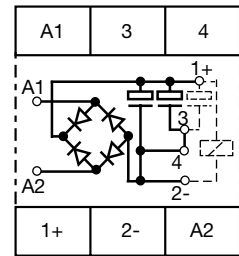
CT-VBS.17



A1-A2 Supply: 110-127 V AC

1+ - 2- Contactor coil

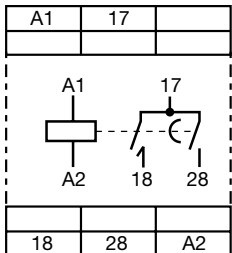
CT-VBS.18



A1-A2 Supply: 200-240 V AC

1+ - 2- Contactor coil
3-4 Jumper for setting the time delay (see time delay diagram)

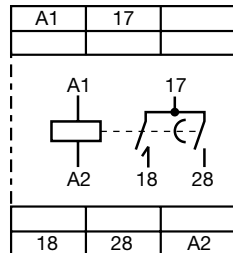
CT-SDS.22



A1-A2 Supply: 24-48 V DC or 24-240 V AC

17-18 1. n/o contact
17-28 2. n/o contact

CT-SDS.23

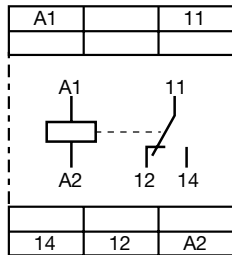


A1-A2 Supply: 380-440 V AC

17-18 1. n/o contact
17-28 2. n/o contact

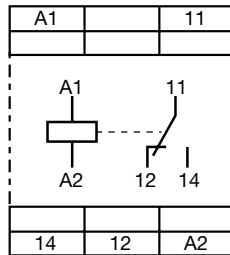
CT-S range Connection diagrams

□ CT-IRS.16



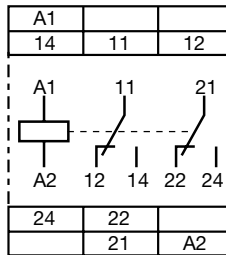
A1-A2 Supply: 24 AC/DC
11-12/14 1. c/o contact

□ CT-IRS.14



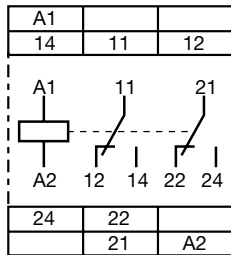
A1-A2 Supply: 110-240 V AC
11-12/14 1. c/o contact

□ CT-IRS.26



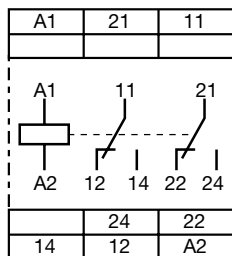
A1-A2 Supply: 24 AC/DC
11-12/14 1. c/o contact
21-22/24 2. c/o contact

□ CT-IRS.24



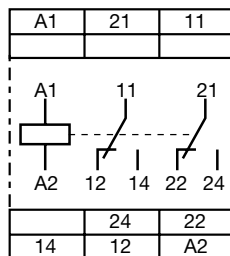
A1-A2 Supply: 110-240 V AC
11-12/14 1. c/o contact
21-22/24 2. c/o contact

□ CT-IRS.26G (gold-plated cont.)



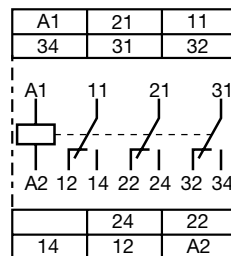
A1-A2 Supply: 24 AC/DC
11-12/14 1. c/o contact
21-22/24 2. c/o contact

□ CT-IRS.24G (gold-plated cont.)



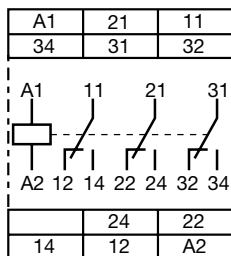
A1-A2 Supply: 110-240 V AC
11-12/14 1. c/o contact
21-22/24 2. c/o contact

□ CT-IRS.36



A1-A2 Supply: 24 V AC/DC
11-12/14 1. c/o contact
21-22/24 2. c/o contact
31-32/34 3. c/o contact

□ CT-IRS.35



A1-A2 Supply: 220-240 V AC
11-12/14 1. c/o contact
21-22/24 2. c/o contact
31-32/34 3. c/o contact

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

		CT-S
Input circuit - Supply circuit		
Rated control supply voltage U_s	CT-xxx.x1	24-240 V AC/DC
	CT-xxx.x2	24-48 V DC, 24-240 V AC
	CT-xxx.x3	380-440 V AC
	CT-xxx.x4	110-240 V AC
	CT-xxx.x5	220-240 V AC
	CT-xxx.x6	24 V AC/DC
	CT-xxx.x7	100-127 V AC or 110 V DC
	CT-xxx.x8	200-240V AC/DC
Rated control supply voltage U_s tolerance		-15...+10 %
Rated frequency		DC or 50/60 Hz
Frequency range AC		47-63 Hz
Typical current / power consumption		depending on device, see data sheet
Power failure buffering time	24 V DC 230/400 V AC	min. 15 ms min. 20 ms
Input circuit - Control circuit		
Kind of triggering	CT-MVS, CT-MXS, CT-APS	voltage-related triggering
Control input, Control function	A1-Y1	start timing external (CT-MVS, CT-MXS, CT-APS)
Parallel load / polarized		yes / no
Maximum cable length to the control input		50 m - 100 pF/m
Minimum control pulse length		20 ms
Control voltage potential		see rated control supply voltage
Current consumption of the control input	24 V DC 230 V AC 400 V AC	1.2 mA 8 mA 6 mA
Kind of triggering	CT-MFS, CT-MBS, CT-AHS	volt-free triggering
Control input, Control function	Y1-Z2 X1-Z2	start timing external (CT-MFS, CT-MBS, CT-AHS) pause timing / accumulative functions (CT-MFS)
Maximum switching current in the control circuit		1 mA
Maximum cable length to the control input		50 m - 100 pF/m
Minimum control pulse length		20 ms
No-load voltage at the control inputs		10-40 V DC
Remote potentiometer		
Remote potentiometer connections, Resistance value	Z1-Z2 Z3-Z2	50 k Ω (CT-MFS, CT-MBS, CT-MVS.21, CT-MXS) 50 k Ω (CT-MXS)
Maximum cable length to remote potentiometer		2 x 25 m, shielded with 100 pF/m
Shield connection		Z2
Timing circuit		
Time ranges	10 time ranges 0.05 s - 300 h 7 time ranges 0.05 s - 10 min (CT-SDS, CT-ARS)	1.) 0.05-1 s 2.) 0.15-3 s 3.) 0.5-10 s 4.) 1.5-30 s 5.) 5-100 s 6.) 15-300 s 7.) 1.5-30 min 8.) 15-300 min 9.) 1.5-30 h 10.) 15-300 h 1.) 0.05-1 s 2.) 0.15-3 s 3.) 0.5-10 s 4.) 1.5-30 s 5.) 5-100 s 6.) 15-300 s 7.) 0.5-10 min
Recovery time	24-240 V AC/DC 24-48 V DC, 24-240 V AC 380-440 V AC	<50 ms < 80 ms < 60 ms
Accuracy within the rated control supply voltage tolerance		$\Delta t < 0.004\%$ / V
Accuracy within the temperature range		$\Delta t < 0.03\%$ / °C
Repeat accuracy (constant parameters)		$\Delta t < 0.2\%$
Star-delta transition time		fixed 50 ms (CT-SDS, CT-MBS, CT-MFS, CT-MVS.2x)
Star-delta transition time tolerance		± 2 ms
Minimum energizing time		100 ms (CT-ARS)
Formatting time ¹⁾		5 min (CT-ARS)

¹⁾ prior to first commissioning and after a six-month stop in operation

CT-S range

Technical data

Indication of operational states

Control supply voltage / timing	U/T: green LED	: control supply voltage applied / : timing
Control supply voltage	U: green LED	: control supply voltage applied
Relay state	R, R1, R2: yellow LED	: output relay energized (R, R1, R2)

Output circuit

Kind of output	15-16/18	relay, 1 c/o contact
	15-16/18; 25-26/28	relay, 2 c/o contacts
	15-16/18; 25(21)-26(22)/28(24)	relay, 2 c/o contacts, 2nd c/o contact selectable as inst. contact
	17-18; 17-28	relay, 2 n/o contacts (CT-SDS)
Contact material		Cd-free, on request
Rated operational voltage U_g	IEC/EN 60947-1	250 V
Minimum switching voltage / minimum switching current		12 V / 10 mA (CT-IRS.2xG: 10 mV / 10 μ A)
Maximum switching voltage / maximum switching current		see load limit curves (CT-IRS.2xG: 10 V / 200 mA)
Rated operational current I_g (IEC/EN 60947-5-1)	AC12 (resistive) at 230 V	4 A
	AC15 (inductive) at 230 V	3 A
	AC15 (inductive) at 230 V	4 A
	DC13 (inductive) at 24 V	2 A (CT-ARS; 1.5 A)
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)	B 300
	max. rated operational voltage	300 V AC
	Maximum continuous thermal current at B300	5 A
	max. making/breaking apparent power at B300	3600 VA / 360 VA
Mechanical lifetime		30×10^6 switching cycles
Electrical lifetime	at AC12, 230 V, 4 A	0.1×10^6 switching cycles
Max. fuse rating to achieve short-circuit protection (IEC/EN 60947-5-1)	n/c contact	6 A fast-acting
	n/o contact	10 A fast-acting

General data ²⁾

MTBF		on request
Duty time		100%
Dimensions (W x H x D)	product dimensions	22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in)
	packaging dimensions	97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in)
Weight		depending on device, see ordering details
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool
Mounting position		any
Minimum distance to other units	vertical / horizontal	not necessary / not necessary
Material of housing		UL 94 V-0
Degree of protection	housing / terminals	IP50 / IP20

Electrical connection ²⁾

	Screw connection technology	Easy Connect Technology (Push-in)
Wire size	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm ² (1 x 20-14 AWG)
		2 x 0.5-1.5 mm ² (2 x 20-16 AWG)
	rigid	1 x 0.5-4 mm ² (1 x 20-12 AWG)
		2 x 0.5-2.5 mm ² (2 x 20-14 AWG)
Stripping length	8 mm (0.32 in)	
Tightening torque	0.6-0.8 Nm (5.31-7.08 lb.in)	-

²⁾ Data for all references 1SVR 730 xxx xxx and 1SVR 740 xxx xxx. For devices with 1SVR 430 xxx xxx and 1SVR 630 xxx xxx please refer to the data sheet.

CT-S range

Technical data

Environmental data

Ambient temperature ranges	operation / storage	-25...+60 °C / -40...+85 °C, -40...+60 °C / -40...+85 °C (CT-MVS.21, CT-MFS.21, CT-ERS.21, CT-APS.21)
Damp heat (cyclic) (IEC/EN 60068-2-30)		6 x 24 h cycle, 55 °C, 95 % RH
Vibration, sinusoidal (IEC/EN 60068-2-6)	functioning	40 m/s ² , 10-58/60-150 Hz
Vibration, seismic (IEC/EN 60068-3-3)	resistance	60 m/s ² , 10-58/60-150 Hz, 20 cycles
	functioning	20 m/s ²
Shock, half-sine (IEC/EN 60068-2-27)	functioning	100 m/s ² , 11 ms, 3 shocks/direction
	resistance	300 m/s ² , 11 ms, 3 shocks/direction

6

Isolation data

Rated insulation voltage U_i	input circuit / output circuit	500 V
Rated impulse withstand voltage U_{imp} between all isolated circuits	VDE 0110, IEC/EN 60664	4 kV; 1.2/50 µs
Power-frequency withstand voltage test between all isolated circuits (test voltage)	routine test	2.0 kV, 50Hz, 1 s
	type test	2.5 kV, 50 Hz, 1 min
Basic insulation (IEC/EN 61140)	input circuit / output circuit	500 V
Protective separation (IEC/EN 61140; IEC/EN 50178; VDE 0106 part 101 and part 101/A1)	input circuit / output circuit	250 V
Pollution degree (IEC/EN 60664-1, VDE 0110)		3
Overtoltage category (IEC/EN 60664-1, VDE 110)		III

Standards

Product standard	IEC 61812-1, EN 61812-1 + A11, DIN VDE 0435 part 2021
Low Voltage Directive	2006/95/EC
EMC Directive	2004/108/EC
RoHS Directive	2002/95/EC

Electromagnetic compatibility

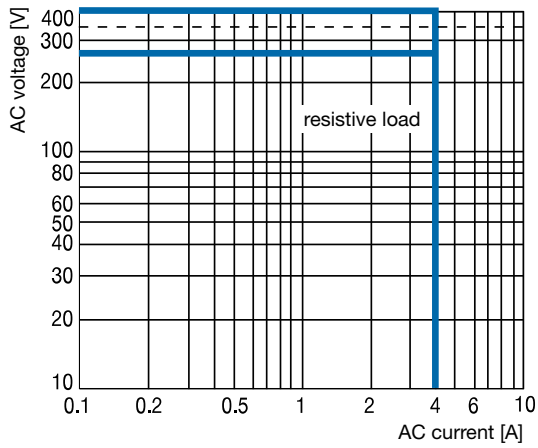
Interference immunity to		IEC/EN 61000-6-1, IEC/EN 61000-6-2
electronic discharge	IEC/EN 61000-6-2	Level 3 6 kV / 8 kV
radiated, radio-frequency electromagnetic field	IEC/EN 61000-6-3	Level 3 10 V/m (1 GHz) 3 V/m (2 GHz) 1 V/m (2.7 GHz)
electrical fast transient/burst surge	IEC/EN 61000-6-4	Level 3 2 kV / 5 kHz
	IEC/EN 61000-6-5	Level 4 2 kV A1-A2
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-6-6	Level 3 10 V
		Level 3
Interference emissions		IEC/EN 61000-6-3, IEC/EN 61000-6-4
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B

CT-S range Technical diagrams

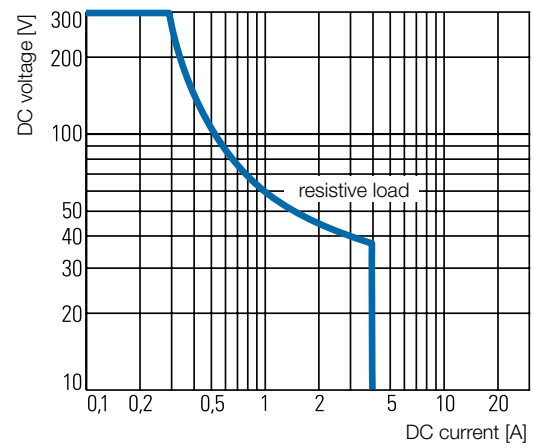
Technical diagrams

Load limit curves

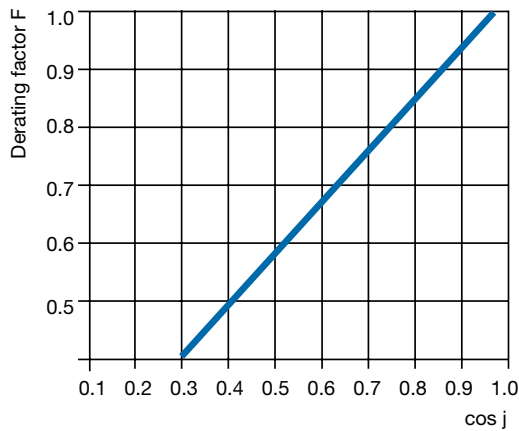
AC load (resistive)



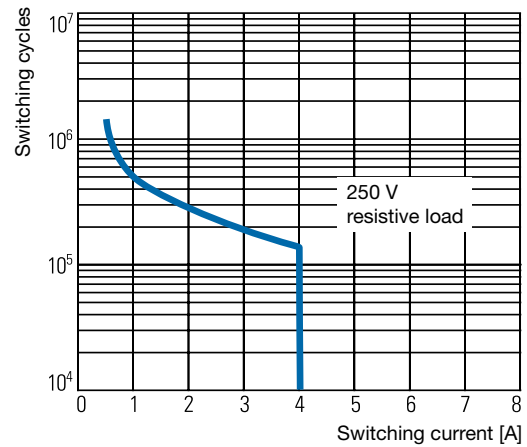
DC load (resistive)



Derating factor F for inductive AC load



Contact lifetime



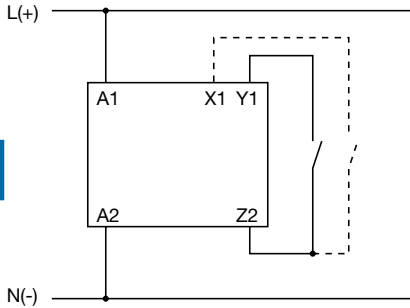
CT-S range

Wiring notes

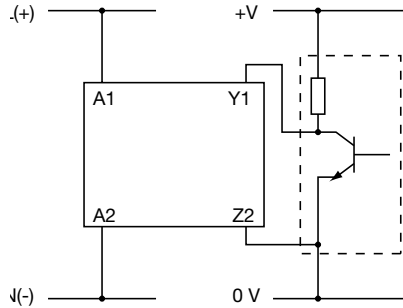
Approximate dimensions

Wiring notes

Control inputs (volt-free triggering)

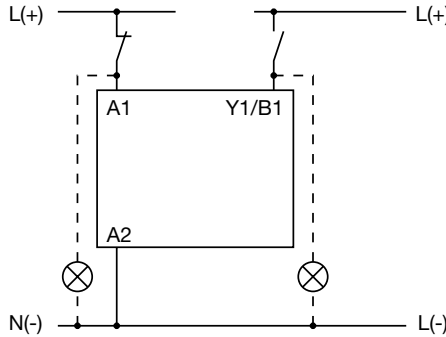
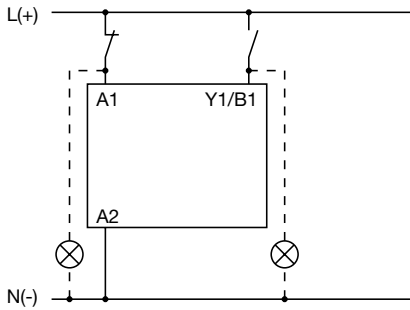


Triggering of the control inputs (volt-free) with a proximity switch (3 wire)



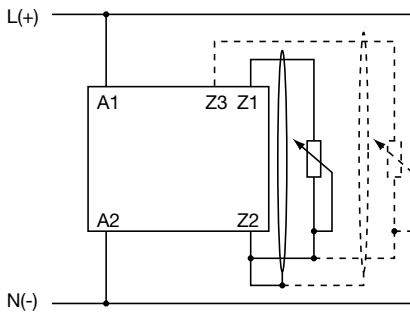
6

Control inputs (voltage-related triggering)

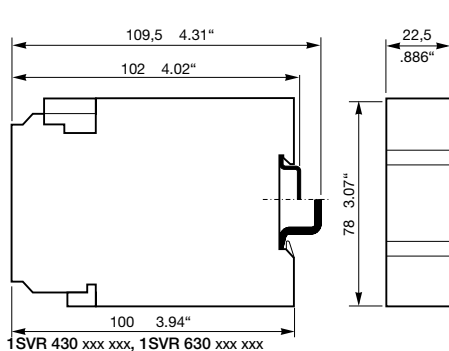


The control input **Y1/B1** is triggered with electric potential against **A2**. It is possible to use the control supply voltage from terminal **A1** or any other voltage within the rated control supply voltage range.

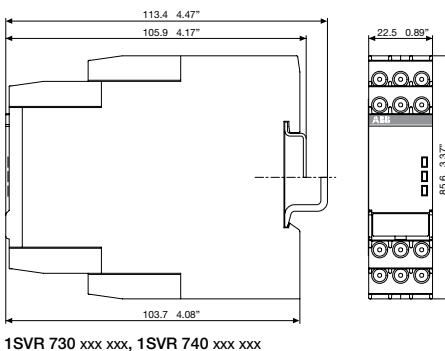
Remote potentiometer



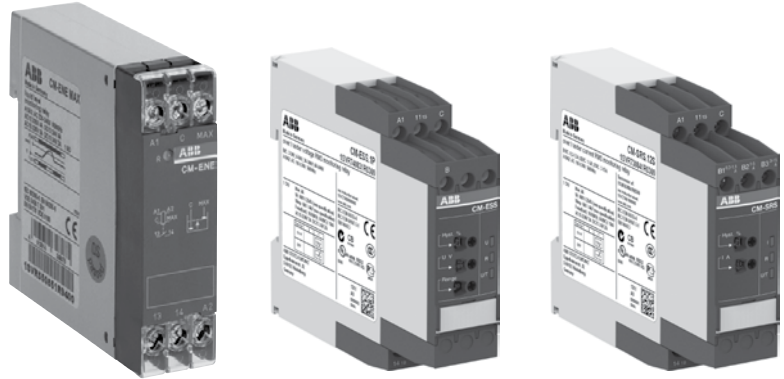
Dimensional drawing



Dimensions in mm and inches



CM-E Range Measuring & monitoring relays



Measuring and monitoring relays

Benefits and advantages.

Benefits CM-E range



6

- Only 22.5 mm wide housing
- Output contacts: 1 c/o contact or 1 n/o contact
- One supply voltage range
- One monitoring function
- Cost-efficient solution for OEM applications
- Preset monitoring ranges

CM-S range: Universal and multifunctional



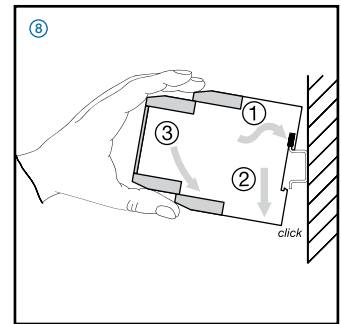
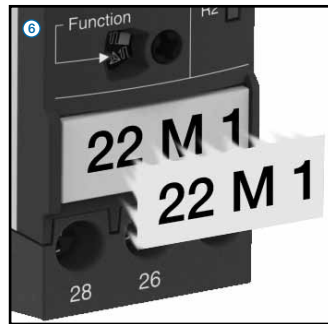
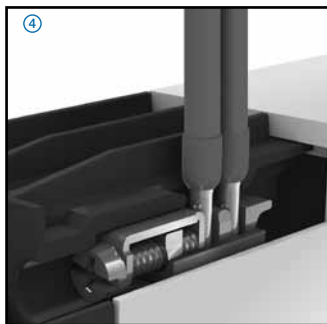
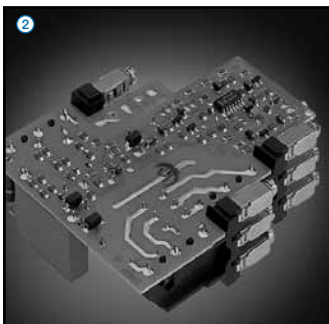
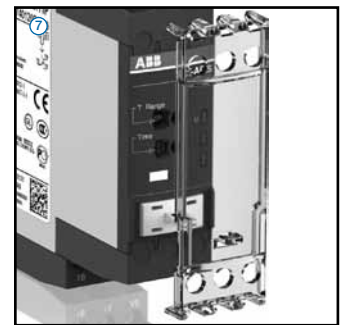
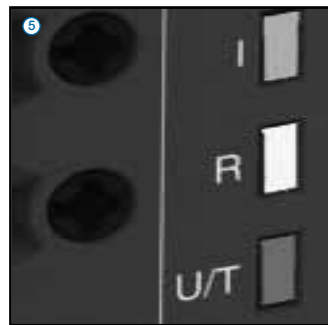
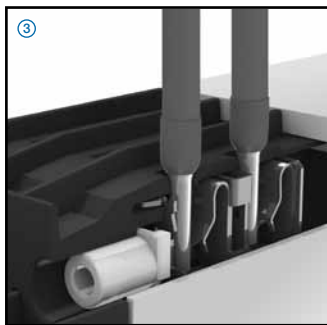
- Only 22.5 mm wide housing
- Output contacts: 1 or 2 c/o (SPDT) contacts
- One supply voltage range or supplied by measuring circuit
- Setting and operation via front-face operating controls
- Adjustment of threshold values and switching hysteresis via direct reading scale
- Integrated and snap-fitted front-face marker
- Snap-on housing: The relays can be placed on a DIN rail tool-free - just snap it on or remove it tool-free
- Sealable transparent cover (accessory)

Combination screws ①

Easy tightening and release of the connecting screws with pozidrive, pan- or crosshead screwdriver.

Safety ②

The "real distance" is hidden.
The clearance and the creepage distances of our products exceed international standards and substantially increase the safety of our products.



Measuring and monitoring relays

Benefits and advantages.

CM-N range: Multifunctional



- 45 mm wide housing
- Output contacts: 2 c/o (SPDT) contacts
- Continuous voltage range (24-240 V AC/DC) or single-supply
- Setting and operation via front-face operating controls
- Adjustment of threshold values and switching hysteresis via direct reading scale
- Adjustable time delays
- Integrated and snap-fitted front-face marker label
- Sealable transparent cover (accessory)

ABBs measuring and monitoring relays in a new housing

Benefits at a glance

Double-chamber cage connection terminals

Easy conversions:

The old range of measuring and monitoring relays is replaced by an identical range of relays with Double-chamber cage connection terminals.

The ordering number just changed in one digit:

1SVRx3 ... changed to 1SVR73...

1SVRx5 ... changed to 1SVR75...

and for the type designator we are using one more specifier:

CM-xxS changed to CM-xxS.S

CM-xxN changed to CM-xxN.S

The new range is identically replacing the old range.

Ratings:

Double-chamber cage connection terminals provide connection of wires up to 1 x 0.5-4 mm² (1 x 20-12 AWG) or 2 x 0.5-2.5 mm² (2 x 20-14 AWG) rigid or 1 x 0.5-2.5 mm² (1 x 20-14 AWG) / 2 x 0.5-1.5 mm² (2 x 20 -16 AWG), rigid or fine-strand, with or without wire end ferrules. Potential distribution does not require additional terminals.

Extended features

Flammability:

The plastic housing material used meets the requirements for the highest flammability class. (UL94 V-O rated)

Look and feel:

The new housing fits perfectly with ABB's control products offer.

Easy Connect Technology & Double-chamber cage connection terminals

Benefits new CM-S range housing

Easy Connect Technology ③

Tool-free wiring for excellent vibration resistance. Push-in terminals provide connection of wires up to 2 x 0.5 - 1.5 mm², rigid or fine stranded with or without wire end ferrules.

Double-chamber cage connection terminals ④

Double-chamber cage connection terminals provide connection of wires up to 2 x 0.5-2.5 mm² (2 x 20-14 AWG) rigid or fine-strand, with or without wire end ferrules. Potential distribution does not require additional terminals.

Snap-On housing ⑧

Tool-free DIN rail installation and deinstallation of the monitoring relay with Snap-On housing.

LED's for status indication ⑤

All actual operational states are displayed by front-face LED's, thus simplifying commissioning and troubleshooting.

Integrated marker label ⑥

Integrated marker labels allow the product to be marked quickly and simply. No additional marker labels are required.

Sealable transparent cover ⑦

Protection against unauthorized changes of time and threshold values. Available as an accessory.

Easy Connect Technology

New options:

Additionally to the existing well established screw connections a new innovative connection technology can be offered: Easy Connect Technology with push-in terminals.

Tool-free Wiring:

The push-in terminals can be wired with rigid or fine stranded wires with wire end ferrules totally tool-free. The connection direction is exactly the same as the screw version.

Higher utility class:

The Easy Connect Technology provides excellent vibration resistance with gas tight push-in terminals – the right solution for harsh environment.

Ratings:

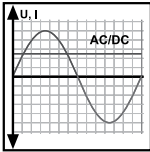
Push-in terminals provide connection of wires up to 2 x 1.5mm² (2 x 20-16 AWG), rigid or fine stranded with or without wire end ferrules.

Measuring and monitoring relays

Monitoring features and application ranges

Single-phase current and voltage monitoring

- Over- or undercurrent monitoring CM-SRS and CM-SRS.M
- Over- and undercurrent monitoring CM-SFS
- Over- or undervoltage monitoring CM-ESS and CM-ESS.M
- Over- and undervoltage monitoring CM-EFS



6

Current monitoring

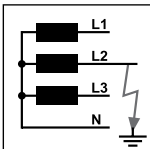
- Monitoring of motor current consumption
- Monitoring of lighting installations and heating circuits
- Monitoring of hoisting gear and transportation equipment overload
- Monitoring of locking devices, electromechanical brake gear and locked rotor

Voltage monitoring

- Speed monitoring of DC motors
- Monitoring of battery voltages and other supply networks
- Monitoring of upper and lower voltage threshold values

Insulation monitoring

- CM-IWS.2 for electrically isolated AC systems, and CM-IWS.1 & CM-IWN 1 for electrically isolated AC, DC and mixed AC/DC systems.
- CM-IWN.5 for solar applications $\leq 1000 \mu\text{F}$

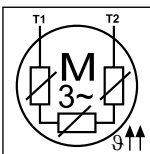


Insulation monitoring

- Monitoring of electrically isolated supply mains for insulation resistance failure
- Detection of initial faults
- Protection against earth faults

Thermistor motor protection

CM-MSE, CM-MSS and CM-MSN provide full protection of motors with integrated PTC resistor sensors.

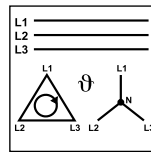


Thermistor motor protection

- Protection of motors against thermal overload, e. g. caused by insufficient cooling, heavy load starting conditions, undersized motors, etc.

Three-phase monitoring

- Phase loss CM-PBE
- Over- and undervoltage CM-PVE
- Phase sequence and phase loss CM-PFE and CM-PFS
- Phase sequence and phase loss, over- and undervoltage CM-PSS.xx and CM-PVS.xx
- Phase sequence and phase loss, unbalance CM-PAS.xx
- Phase sequence and phase loss, unbalance, over- and undervoltage CM-MPS.xx and CM-MPN.xx
- Over- and undervoltage, over- and underfrequency CM-UFS.x

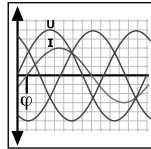


Three-phase voltage monitoring

- Voltage monitoring of mobile three-phase equipment
- Protection of personnel and installations against phase reversal
- Monitoring of the supply voltage to machines and installations
- Protection of equipment against damage caused by unstable supply voltage
- Switching to emergency or auxiliary supply
- Protection of motors against damage caused by unbalanced phase voltages and phase loss
- Automatic connection & disconnection of decentralised power stations to the grid

Motor load monitoring

CM-LWN monitoring relays load states of single- and three-phase asynchronous motors.

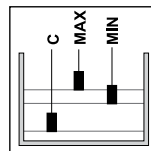


Motor load monitoring

- Detection of V-belt breaking
- Motor protection against overload
- Monitoring of filters for clogging
- Protection of pumps against dry running
- Detection of high pressure in conduit systems
- Monitoring for dulling blades in sawing and cutting machines

Liquid level monitoring

CM-ENE, CM-ENS and CM-ENN for control and regulation of liquid levels and ratios of mixtures of conductive fluids.



Liquid level monitoring and control

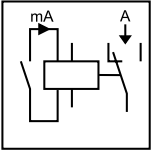
- Protection of pumps against dry running
- Protection against container overflow
- Control of liquid levels
- Detection of leaks
- Control of mixing ratios

Measuring and monitoring relays

Monitoring features and application ranges

Contact protection, sensor evaluation

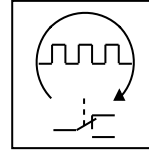
The CM-KRN protects sensitive control contacts from excessive loads and can store switch positions. The CM-SIS supplies and evaluates NPN and PNP sensors.



Contact protection / sensor evaluation

- Storage of the switching states of bouncing contacts
- Amplification of the switch state information of sensitive contacts
- Supply and evaluation of NPN or PNP sensors

Cycle monitoring

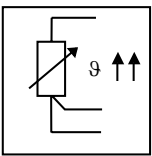


Cycle monitoring

- External monitoring of the correct function of programmable logic controllers (plc) and industrial pcs (ipc)

Temperature monitoring

Acquisition, messaging and regulation of temperatures of solid, liquid and gaseous media in processes and machines via PT100, PT1000, KTY83, KTY 84 or NTC sensors with C510, C511, C512, C513.



Temperature monitoring

- Motor and system protection
- Control panel temperature monitoring
- Frost monitoring
- Temperature limits for process variables, e.g. in the packing or electroplating industry
- Control of systems and machines like heating, air-conditioning and ventilation systems, solar collectors, heat pumps or hot water supply systems
- Monitoring of servomotors with KTY sensors
- Bearing and gear oil monitoring
- Coolant monitoring

Measuring and monitoring relays

Monitoring features and application ranges

6

		Current and voltage monitoring, single-phase							Three-phase monitoring													
		CM-SRS.1x	CM-SRS.2x	CM-SRS.M	CM-SFS.2	CM-ESS.2x	CM-ESS.M	CM-EFS.2	CM-PBE	CM-PVE	CM-PFE	CM-PFS	CM-PSS.x1	CM-PVS.x1	CM-PAS.x1	CM-MPS.x1	CM-MPS.x3	CM-MPN.52	CM-MPN.62	CM-MPN.72	CM-UFS.2	
Approvals																						
	UL 508, CAN/CSA C22.2 No.14	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	GL	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
	GOST	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	CB scheme	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	CCC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	RMRS	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	ENEL DK 5940 Ed. 2.2																					■
Marks																						
	CE	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	C-Tick	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

		Insulation monitoring relays for un-grounded supply mains					Motor load monitoring			Temperature monitoring			Contact protection, sensor interface					
		CM-IWS.2	CM-IWS.1	CM-IWN.1	CM-IWN.5	CM-IWN	CM-LWN			CM-TCS	C512	C513	CM-KRN	CM-SIS				
Approvals																		
	UL 508, CAN/CSA C22.2 No.14	■	■	■	■	■	■				■	■	■	■	■			
	GL	■	■	■		■	■						■	■				
	GOST	■	■	■	■	■	■				■							
	CB scheme	■	■	■	□	■	■				■							
	CCC	■	■	■	□	■	■				■							
	RMRS						■											
Marks																		
	CE	■	■	■	■	■	■				■	■	■					
	C-Tick	■	■	■	■	■	■				■							

		Cycle monitoring		Thermistor motor protection									Liquid level monitoring					
		CM-WDS		CM-MSE	CM-MSS (1)	CM-MSS (2)	CM-MSS (3)	CM-MSS (4)	CM-MSS (5)	CM-MSS (6)	CM-MSS (7)	CM-MSN	CM-ENE MIN	CM-ENE MAX	CM-ENS	CM-ENS UP/...	CM-ENN	CM-ENN UP/...
Approvals																		
	UL 508, CAN/CSA C22.2 No.14	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	GL			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	GOST	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	II (2) G D, PTB 02 ATEX 3080																	
	CB scheme			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	CCC			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	RMRS	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Marks																		
	CE	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	C-Tick	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

¹⁾ Versions with safety isolation without approval

CM-E Range Current & voltage monitoring relays



Current & voltage monitoring relays
Single phase



Current and voltage monitoring relays, single phase

Benefits and advantages

6



Characteristics current monitoring relays

- Monitoring of DC and AC currents: 3 mA to 15 A ¹⁾
- TRMS measuring principle
- One device includes 3 measuring ranges
- Over- and undercurrent monitoring¹⁾
- ON or OFF delay configurable¹⁾
- Open- or closed circuit principle configurable¹⁾
- Latching function configurable¹⁾
- Thresholds for >I and/or <I adjustable¹⁾
- Fixed hysteresis of 5 %¹⁾
- Start-up delay T_v adjustable 0; 0.1 - 30 s¹⁾
- Tripping delay T_v adjustable 0; 0.1 - 30 s¹⁾
- 1 x 2 c/o contacts (common signal) or 2 x 1 c/o contact (separate signals for >I and <I) configurable¹⁾
- 22.5 mm width
- 3 LED's for status indication

¹⁾ depending on device

Current monitoring, single-phase

The ABB current monitoring relays CM-SRS.xx reliably monitor the occurrence of currents that exceed or fall below the selected threshold value. The functions overcurrent or undercurrent monitoring can be pre-selected. Single- and multifunction devices for the monitoring of direct or alternating currents from 3 mA to 15 A are available.

Current window monitoring (I_{min} , I_{max})

The window monitoring relay CM-SFS.2x is available if the application requires the simultaneous monitoring of over- and undercurrents.

Characteristics voltage monitoring relays

- Monitoring of DC and AC voltages from 3 - 600 V
- TRMS measuring principle
- One device includes 4 measuring ranges: 3 - 30 V; 6 - 60 V; 30 - 300 V; 60 - 600 V
- Over- and undervoltage monitoring¹⁾
- ON or OFF delay configurable¹⁾
- Open- or closed circuit principle configurable¹⁾
- Latching function configurable¹⁾
- Threshold values for >U and/or <U adjustable¹⁾
- Fixed hysteresis of 5 %¹⁾
- Start-up delay T_v adjustable 0; 0.1 - 30 s¹⁾
- Tripping delay T_v adjustable 0; 0.1 - 30 s¹⁾
- 1 x 2 c/o contacts (common signal) or 2 x 1 c/o contact (separate signals for >U and <U) configurable¹⁾
- 22.5 mm width
- 3 LED's for status indication

Voltage monitoring, single-phase

The ABB voltage monitoring relays CM-SRS.xx are used to monitor direct and alternating voltages within a range of 3-600 V. Over- or undervoltage detection can be preselected.

Voltage window monitoring (U_{min} , U_{max})

For the simultaneous detection of over- and undervoltages, the window monitoring relay CM-EFS.2 can be used.

Current and voltage monitoring relays, single phase

Selection and conversion

Measuring & monitoring relays
CM Range

	Reference code	Catalog number	Predecessor
	CM-SRS.11S	1SVR730840R0200	1SVR430840R0200
	CM-SRS.11P	1SVR740840R0200	
	CM-SRS.11S	1SVR730841R0200	1SVR430841R0200
	CM-SRS.11P	1SVR740841R0200	
	CM-SRS.11S	1SVR730841R1200	1SVR430841R1200
	CM-SRS.11P	1SVR740841R1200	
	CM-SRS.12S	1SVR730840R0300	1SVR430840R0300
	CM-SRS.12S	1SVR730841R0300	1SVR430841R0300
	CM-SRS.21S	1SVR730841R1300	1SVR430841R1300
	CM-SRS.21S	1SVR730840R0400	1SVR430840R0400
	CM-SRS.21P	1SVR740840R0400	
	CM-SRS.21S	1SVR730841R0400	1SVR430841R0400
	CM-SRS.21P	1SVR740841R1400	
	CM-SRS.22S	1SVR730840R0500	1SVR430840R0500
	CM-SRS.22S	1SVR730841R0500	1SVR430841R0500
	CM-SRS.M1S	1SVR730841R1500	1SVR430841R1500
	CM-SRS.M1P	1SVR730840R0600	1SVR430840R0600
	CM-SRS.M2S	1SVR740840R0600	
	CM-SFS.21S	1SVR730760R0400	1SVR430760R0400
	CM-SFS.21P	1SVR740760R0400	
	CM-SFS.22S	1SVR730760R0500	1SVR430760R0500
Rated control supply voltage U_s			
24 - 240 V AC/DC		■	■
110 - 130 V AC		■	■
220 - 240 V AC		■	■
Measuring ranges AC/DC			
3 - 30 mA		■	■
10 - 100 mA		■	■
0.1 - 1 A		■	■
0.3 - 1.5 A		■	■
1 - 5 A		■	■
3 - 15 A		■	■
Monitoring function			
Over- or undercurrent		■	■
Windows current monitoring		■	■
Latching			sel
Open circuit or closed circuit principle			sel
Timing functions for tripping delay			
ON delay, 0 or 0,1 - 30 s			adj
ON or OFF delay			sel
Output			
c/o contact		1	2
Connection type			
Easy Connect Technology		■	■
Double-chamber cage connection terminals		■	■

Current and voltage monitoring relays, single phase

Selection and conversion

6

Reference code	Catalog number	Predecessor
CM-ESS.1S	1SVR730831R0300	1SVR430831R0300
CM-ESS.1P	1SVR740831R0300	
CM-ESS.1S	1SVR730831R0300	1SVR430831R0300
CM-ESS.1P	1SVR740831R0300	
CM-ESS.1S	1SVR730831R1300	1SVR430831R1300
CM-ESS.1P	1SVR740831R1300	
CM-ESS.2S	1SVR730830R0400	1SVR430830R0400
CM-ESS.2P	1SVR740830R0400	
CM-ESS.2S	1SVR730831R0400	1SVR430831R0400
CM-ESS.2P	1SVR740831R0400	
CM-ESS.2S	1SVR730831R1400	1SVR430831R1400
CM-ESS.2P	1SVR740831R1400	
CM-ESS.MS	1SVR730830R0500	1SVR430830R0500
CM-ESS.MP	1SVR740830R0500	
CM-EFS.2S	1SVR730750R0400	1SVR430750R0400
CM-EFS.2P	1SVR740750R0400	

Rated control supply voltage U _s	CM-ESS.1S	CM-ESS.1P	CM-ESS.1S	CM-ESS.1P	CM-ESS.1S	CM-ESS.1P	CM-ESS.2S	CM-ESS.2P	CM-ESS.2S	CM-ESS.2P	CM-ESS.2S	CM-ESS.2P	CM-ESS.MS	CM-ESS.MP	CM-EFS.2S	CM-EFS.2P
24 - 240 V AC/DC	■	■					■	■					■	■	■	■
110 - 130 V AC			■	■					■	■						
220 - 240 V AC					■	■					■	■				

Measuring ranges AC/DC	CM-ESS.1S	CM-ESS.1P	CM-ESS.1S	CM-ESS.1P	CM-ESS.1S	CM-ESS.1P	CM-ESS.2S	CM-ESS.2P	CM-ESS.2S	CM-ESS.2P	CM-ESS.2S	CM-ESS.2P	CM-ESS.MS	CM-ESS.MP	CM-EFS.2S	CM-EFS.2P
3 - 30 V	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
6 - 60 V	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
30 - 300 V	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
60 - 600 V	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Monitoring function	CM-ESS.1S	CM-ESS.1P	CM-ESS.1S	CM-ESS.1P	CM-ESS.1S	CM-ESS.1P	CM-ESS.2S	CM-ESS.2P	CM-ESS.2S	CM-ESS.2P	CM-ESS.2S	CM-ESS.2P	CM-ESS.MS	CM-ESS.MP	CM-EFS.2S	CM-EFS.2P
Over- or undervoltage	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
Windows voltage monitoring															■	■
Latching													sel	sel	sel	sel
Open circuit or closed circuit principle													sel	sel	sel	sel

Timing functions for tripping delay	CM-ESS.1S	CM-ESS.1P	CM-ESS.1S	CM-ESS.1P	CM-ESS.1S	CM-ESS.1P	CM-ESS.2S	CM-ESS.2P	CM-ESS.2S	CM-ESS.2P	CM-ESS.2S	CM-ESS.2P	CM-ESS.MS	CM-ESS.MP	CM-EFS.2S	CM-EFS.2P
ON delay, 0 or 0,1 - 30 s							adj	adj	adj	adj	adj	adj	adj	adj		
ON or OFF delay															sel	sel

Output	CM-ESS.1S	CM-ESS.1P	CM-ESS.1S	CM-ESS.1P	CM-ESS.1S	CM-ESS.1P	CM-ESS.2S	CM-ESS.2P	CM-ESS.2S	CM-ESS.2P	CM-ESS.2S	CM-ESS.2P	CM-ESS.MS	CM-ESS.MP	CM-EFS.2S	CM-EFS.2P
c/o contact	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2

Connection type	CM-ESS.1S	CM-ESS.1P	CM-ESS.1S	CM-ESS.1P	CM-ESS.1S	CM-ESS.1P	CM-ESS.2S	CM-ESS.2P	CM-ESS.2S	CM-ESS.2P	CM-ESS.2S	CM-ESS.2P	CM-ESS.MS	CM-ESS.MP	CM-EFS.2S	CM-EFS.2P
Easy Connect Technology		■		■		■		■		■		■		■		■
Double-chamber cage connection terminals	■		■		■		■		■		■		■		■	

Current and voltage monitoring relays, single phase

Ordering details Current monitors

Description

Single phase voltage and current monitors protect sensitive equipment and control systems against undervoltage, undercurrent events, overvoltage or overcurrent events. Different units with adjustable or fixed threshold values (trip points) are available.



CM-SRS.22S



CM-SFS.22P

Ordering details

Rated control supply voltage	Tripping delay T_v	Measuring range	Reference code	Catalog number	Weight (1 pce) kg (lb)
24-240 V AC/DC	without	3-30 mA 10-100 mA 0.1-1 A	CM-SRS.11S	1SVR730840R0200	0.145 (0.320)
110-130 V AC				1SVR730841R0200	0.161 (0.355)
220-240 V AC				1SVR730841R1200	0.161 (0.355)
24-240 V AC/DC			CM-SRS.11P	1SVR740840R0200	0.137 (0.302)
110-130 V AC				1SVR740841R0200	0.153 (0.337)
220-240 V AC				1SVR740841R1200	0.153 (0.337)
24-240 V AC/DC	without	0.3-1.5 A 1-5 A 3-15 A	CM-SRS.12S	1SVR730840R0300	0.137 (0.302)
110-130 V AC				1SVR730841R0300	0.168 (0.370)
220-240 V AC				1SVR730841R1300	0.168 (0.370)
24-240 V AC/DC	adjustable 0 or 0.1-30 s	3-30 mA 10-100 mA 0.1-1 A	CM-SRS.21S	1SVR730840R0400	0.152 (0.335)
110-130 V AC				1SVR730841R0400	0.179 (0.395)
220-240 V AC				1SVR730841R1400	0.179 (0.395)
24-240 V AC/DC			CM-SRS.21P	1SVR740840R0400	0.141 (0.311)
110-130 V AC				1SVR740841R0400	0.168 (0.370)
220-240 V AC				1SVR740841R1400	0.168 (0.370)
24-240 V AC/DC	adjustable 0 or 0.1-30 s	0.3-1.5 A 1-5 A 3-15 A	CM-SRS.22S	1SVR730840R0500	0.144 (0.399)
110-130 V AC				1SVR730841R0500	0.181 (0.399)
220-240 V AC				1SVR730841R1500	0.181 (0.399)
24-240 V AC/DC	adjustable 0 or 0.1-30 s	3-30 mA 10-100 mA 0.1-1 A	CM-SRS.M1S	1SVR730840R0600	0.153 (0.337)
			CM-SRS.M1P	1SVR740840R0600	0.142 (0.313)
24-240 V AC/DC	adjustable 0 or 0.1-30 s	0.3-1.5 A 1-5 A 3-15 A	CM-SRS.M2S	1SVR730840R0700	0.155 (0.342)
24-240 V AC/DC	adjustable 0 or 0.1-30 s	3-30 mA 10-100 mA 0.1-1 A	CM-SFS.21S	1SVR730760R0400	0.150 (0.331)
			CM-SFS.21P	1SVR740760R0400	0.139 (0.306)
24-240 V AC/DC	adjustable 0 or 0.1-30 s	0.3-1.5 A 1-5 A 3-15 A	CM-SFS.22S	1SVR730760R0500	0.158 (0.348)

Current and voltage monitoring relays, single phase

Ordering details, Voltage monitors



CM-ESS.MP



CM-EFS.2

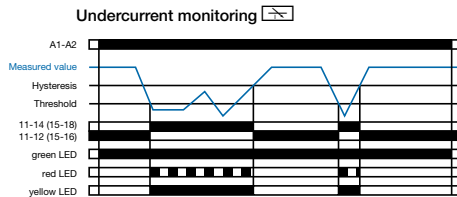
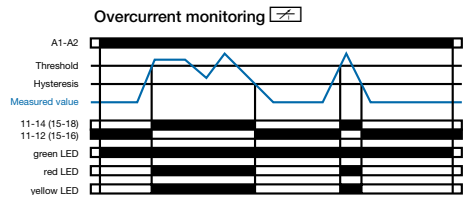
Ordering details

Rated control supply voltage	Tripping delay TV	Measuring range	Reference code	Catalog number	Weight (1 pce) kg (lb)
24-240 V AC/DC	without	3-30 V 6-60 V 30-300 V 60-600 V	CM-ESS.1S	1SVR730830R0300	0.135 (0.298)
110-130 V AC				1SVR730831R0300	0.164 (0.362)
220-240 V AC				1SVR730831R1300	0.164 (0.362)
24-240 V AC/DC			CM-ESS.1P	1SVR740830R0300	0.126 (0.278)
110-130 V AC				1SVR740831R0300	0.155 (0.342)
220-240 V AC				1SVR740831R1300	0.155 (0.342)
24-240 V AC/DC	adjustable 0 or 0.1-30 s	3-30 V 6-60 V 30-300 V 60-600 V	CM-ESS.2S	1SVR730830R0400	0.153 (0.337)
110-130 V AC				1SVR730831R0400	0.181 (0.399)
220-240 V AC				1SVR730831R1400	0.181 (0.399)
24-240 V AC/DC			CM-ESS.2P	1SVR740830R0400	0.142 (0.313)
110-130 V AC				1SVR740831R0400	0.170 (0.375)
220-240 V AC				1SVR740831R1400	0.170 (0.375)
24-240 V AC/DC	adjustable 0 or 0.1-30 s	3-30 V 6-60 V 30-300 V 60-600 V	CM-ESS.MS	1SVR730830R0500	0.154 (0.340)
			CM-ESS.MP	1SVR740830R0500	0.143 (0.320)
24-240 V AC/DC	adjustable 0 or 0.1-30 s	3-30 V 6-60 V 30-300 V 60-600 V	CM-EFS.2S	1SVR730750R0400	0.157 (0.346)
			CM-EFS.2P	1SVR740750R0400	0.146 (0.322)

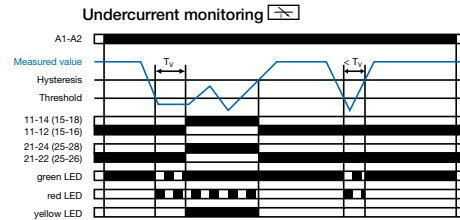
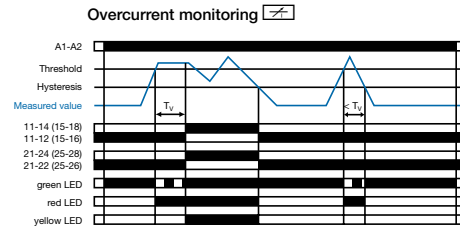
Current and voltage monitoring relays, single phase

Function diagrams

Function diagrams CM-SRS.1

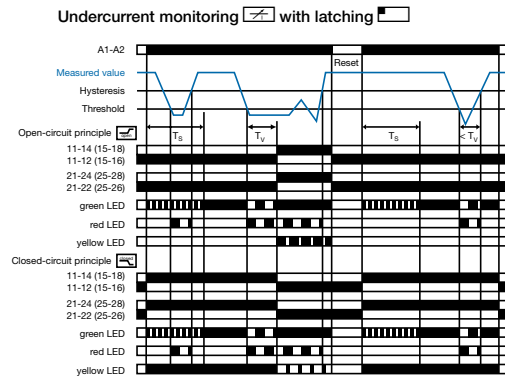
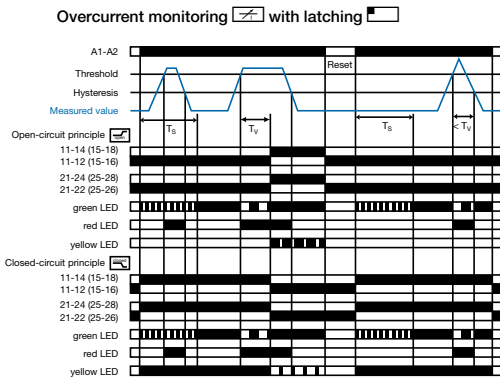
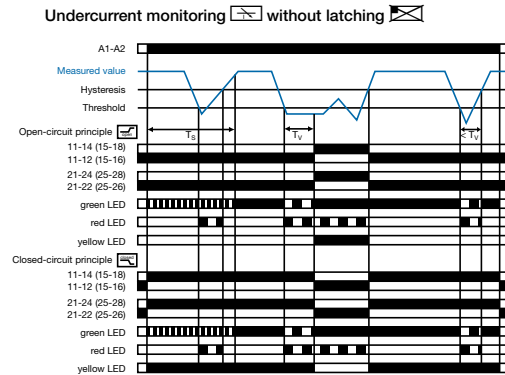
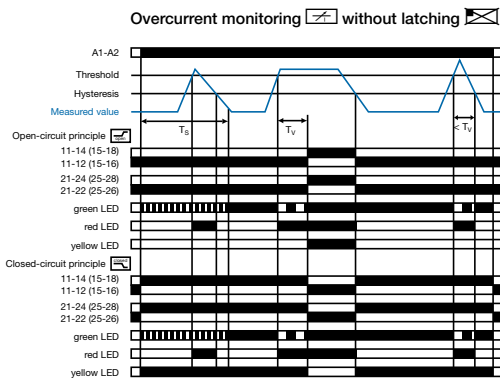


Function diagrams CM-SRS.2



If the measured value exceeds resp. drops below the adjusted threshold value, the output relay(s) energize(s): on the CM-SRS.1 immediately, on the CM-SRS.2 after the set tripping delay T_v . If the measured value exceeds resp. drops below the threshold value plus resp. minus the adjusted hysteresis, the output relay(s) de-energize(s). The hysteresis is adjustable within a range of 3-30 % of the threshold value.

Function diagrams CM-SRS.M



If the measured value exceeds resp. drops below the adjusted threshold value before the set start-up delay T_s is complete, the output relays do not change their actual state. If the measured value exceeds resp. drops below the adjusted threshold value when T_s is complete, the tripping delay T_v starts. If T_v is complete and the measured value is still exceeding resp. below the threshold value plus resp. minus the set hysteresis, the output relays energize / de-energize.

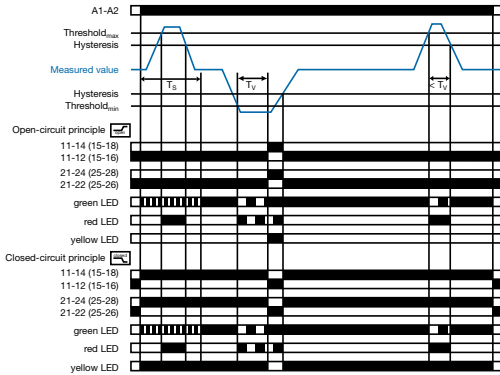
If the measured value exceeds resp. drops below the threshold value minus resp. plus the set hysteresis and the latching function is not activated, the output relays de-energize / energize. With activated latching function, the output relays remain energized and de-energize only, when the supply voltage is interrupted / the output relays remain de-energized and energize only, when the supply voltage is switched off and then again switched on = Reset. The hysteresis is adjustable within a range of 3-30 % of the threshold value.

Current and voltage monitoring relays, single phase

Function diagrams

Function diagrams CM-SFS.2

Current window monitoring 1x2 c/o contact
ON-delayed without latching



ON-delayed current window monitoring with parallel switching c/o contacts

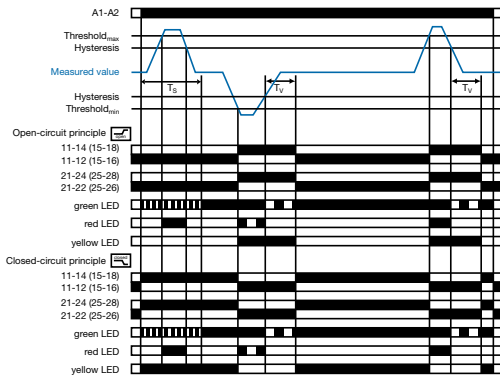
If the measured value exceeds resp. drops below the adjusted threshold value before the set start-up delay T_s is complete, the output relays do not change their actual state.

If the measured value exceeds resp. drops below the adjusted threshold value when T_s is complete, the tripping delay T_v starts, when is configured. If T_v is complete and the measured value is still exceeding resp. below the threshold value minus resp. plus the fixed hysteresis (5%), the output relays energize / de-energize .

If the measured value exceeds resp. drops below the threshold value plus resp. minus the hysteresis and the latching function is not activated , the output relays de-energize / energize . With activated latching function the output relays remain energized and de-energize only, when the supply voltage is interrupted / the output relays remain de-energized and energize only, when the supply voltage is switched off and then again switched on = Reset.

Further function diagrams see data sheet.

Current window monitoring 1x2 c/o contact
OFF-delayed without latching



OFF-delayed current window monitoring with parallel switching c/o contacts

If the measured value exceeds resp. drops below the adjusted threshold value when the set start-up delay T_s is complete, the output relays energize / de-energize , when is configured, and remain in this position during the set tripping delay T_v .

If the measured value exceeds resp. drops below the threshold value plus resp. minus the fixed hysteresis (5%) and the latching function is not activated , the tripping delay T_v starts.

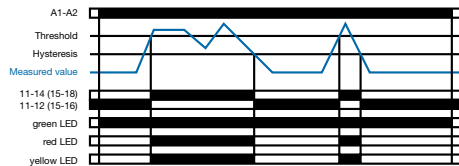
After completion of T_v the output relays de-energize / energize , provided that the latching function is not activated . With activated latching function the output relays remain energized and de-energize only, when the supply voltage is interrupted / the output relays remain de-energized and energize only, when the supply voltage is switched off and then again switched on = Reset.

When is adjusted on the device, the functionality is equivalent to the one described above. There is only to consider that in this case, instead of both output relays, only one output relay each will be switched.

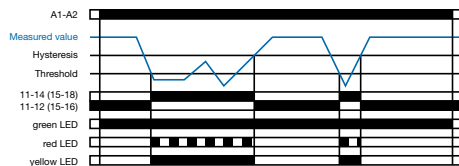
">" = 11₁₅-12₁₆/14₁₈; "<" = 21₂₅-22₂₆/24₂₈

Function diagrams CM-ESS.1

Overvoltage monitoring

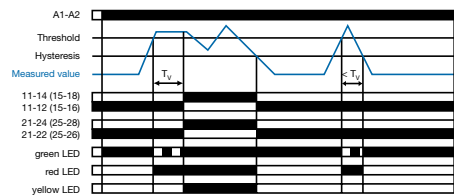


Undervoltage monitoring

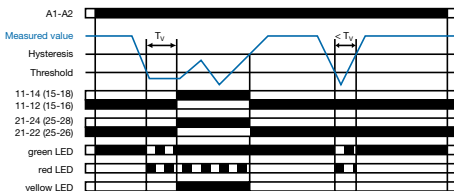


Function diagrams CM-ESS.2

Overvoltage monitoring



Undervoltage monitoring

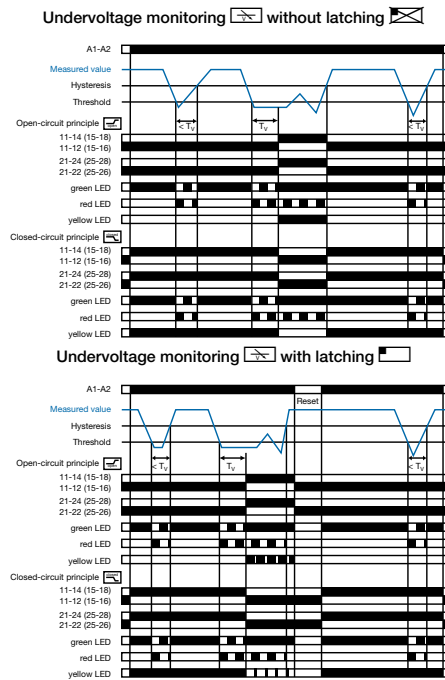
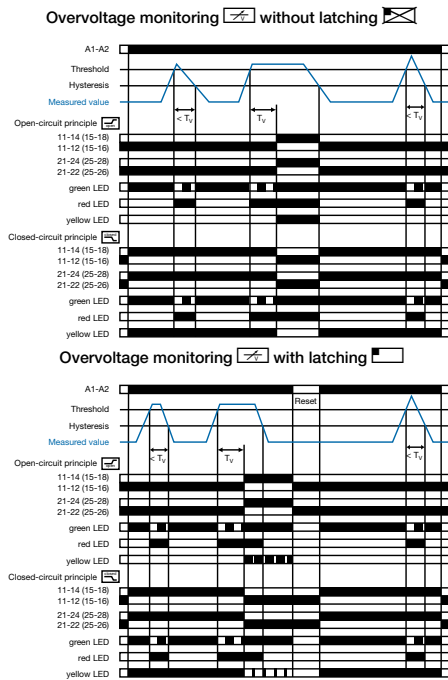


Depending on the configuration, the voltage monitoring relays **CM-ESS.1** and **CM-ESS.2** can be used for over- or undervoltage monitoring in single-phase AC and/or DC systems. The voltage to be monitored (measured value) is applied to terminals B-C. The devices work according to the open-circuit principle. If the measured value exceeds resp. drops below the adjusted threshold value, the output relay(s) energize(s): on the CM-ESS.1 immediately, on the CM-ESS.2 after the set tripping delay T_v . If the measured value exceeds resp. drops below the threshold value plus resp. minus the adjusted hysteresis, the output relay(s) de-energize(s). The hysteresis is adjustable within a range of 3-30 % of the threshold value.

Current and voltage monitoring relays, single phase

Function diagrams

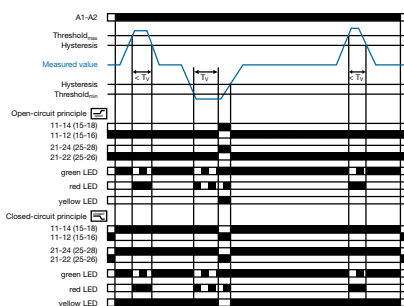
Function diagrams CM-ESS.M



If the measured value exceeds resp. drops below the adjusted threshold value, the tripping delay T_v starts. If T_v is complete and the measured value is still exceeding resp. below the threshold value plus resp. minus the set hysteresis, the output relays energize / de-energize. If the measured value exceeds resp. drops below the threshold value plus resp. minus the set hysteresis and the latching function is not activated, the output relays de-energize / energize. With activated latching function the output relays remain energized and de-energize only, when the supply voltage is interrupted / the output relays remain de-energized and energize only, when the supply voltage is switched off and then again switched on = Reset. The hysteresis is adjustable within a range of 3-30 % of the threshold value. Further function diagrams see data sheet.

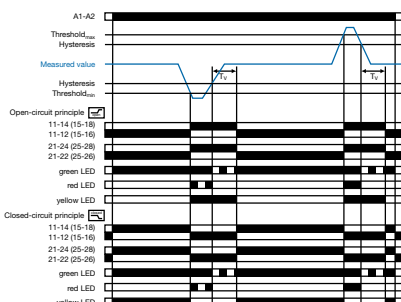
Voltage window monitoring 1x2 c/o contact

ON-delayed without latching



Voltage window monitoring 1x2 c/o contact

OFF-delayed without latching



ON-delayed voltage window monitoring with parallel switching c/o contacts

If the measured value exceeds resp. drops below the adjusted threshold value, the tripping delay T_v starts, when is configured. If T_v is complete and the measured value is still exceeding resp. below the threshold value minus resp. plus the fixed hysteresis (5%), the output relays energize / de-energize.

If the measured value exceeds resp. drops below the threshold value plus resp. minus the hysteresis and the latching function is not activated, the output relays de-energize / energize. With activated latching function the output relays remain energized and de-energize only, when the supply voltage is interrupted / the output relays remain de-energized and energize only, when the supply voltage is switched off and then again switched on = Reset.

OFF-delayed voltage window monitoring with parallel switching c/o contacts

If the measured value exceeds resp. drops below the adjusted threshold value, the output relays energize / de-energize, when is configured, and remain in this position during the set tripping delay T_v .

If the measured value exceeds resp. drops below the threshold value plus resp. minus the fixed hysteresis (5%) and the latching function is not activated, the tripping delay T_v starts.

After completion of T_v , the output relays de-energize / energize, provided that the latching function is not activated. With activated latching function the output relays remain energized and de-energize only, when the supply voltage is interrupted / the output relays remain de-energized and energize only, when the supply voltage is switched off and then again switched on = Reset.

When is adjusted on the device, the functionality is equivalent to the one described above. There is only to consider that in this case, instead of both output relays, only one output relay each will be switched.

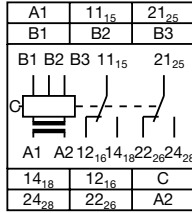
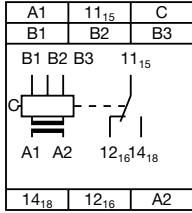
$$">U" = 11_{15-12_{16}}/14_{18}; "<U" = 21_{25-22_{26}}/24_{28}$$

Current and voltage monitoring relays, single phase

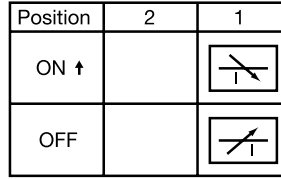
Connection diagrams

DIP switches

Connection diagram CM-SRS.1, CM-SRS.2



DIP switch functions CM-SRS.1, CM-SRS.2



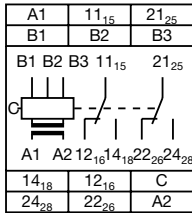
1 ON Undercurrent monitoring
OFF Overcurrent monitoring
OFF = Default

6

A1-A2 Control supply voltage
B1-C Measuring range 1:
3-30 mA or 0.3-1.5 A
B2-C Measuring range 2:
10-100 mA or 1-5 A
B3-C Measuring range 3:
0.1-1 A or 3-15 A
11₁₅-12₁₆/14₁₈ Output contacts -
open-circuit principle

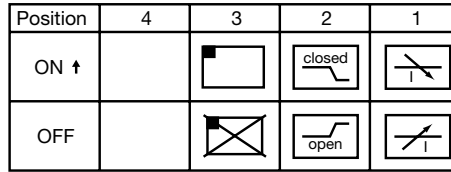
A1-A2 Control supply voltage
B1-C Measuring range 1:
3-30 mA or 0.3-1.5 A
B2-C Measuring range 2:
10-100 mA or 1-5 A
B3-C Measuring range 3:
0.1-1 A or 3-15 A
11₁₅-12₁₆/14₁₈ Output contacts -
21₂₅-22₂₆/24₂₈ open-circuit principle

Connection diagram CM-SRS.M



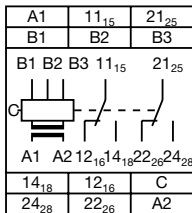
A1-A2 Control supply voltage
B1-C Measuring range 1:
3-30 mA bzw. 0.3-1.5 A
B2-C Measuring range 2:
10-100 mA bzw. 1-5 A
B3-C Measuring range 3:
0.1-1 A bzw. 3-15 A
11₁₅-12₁₆/14₁₈ Output contacts -
21₂₅-22₂₆/24₂₈ open-or
closed circuit principle

DIP switch functions CM-SRS.M



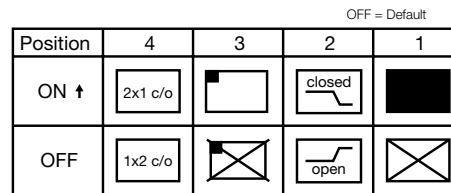
1 ON Undercurrent monitoring
OFF Overcurrent monitoring
3 ON Latching function activated
OFF Latching function not activated
2 ON Closed-circuit principle
OFF Open-circuit principle
OFF = Default

Connection diagram CM-SFS.2



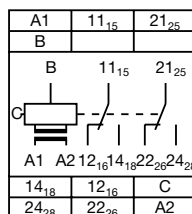
A1-A2 Control supply voltage
B1-C Measuring range 1:
3-30 mA or 0.3-1.5 A
B2-C Measuring range 2:
10-100 mA or 1-5 A
B3-C Measuring range 3:
0.1-1 A or 3-15 A
11₁₅-12₁₆/14₁₈ Output contacts -
21₂₅-22₂₆/24₂₈ open-or
closed circuit principle

DIP switch function CM-SFS.2



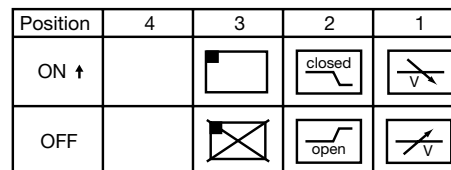
1 ON OFF-delay
OFF ON-delay
3 ON Latching function activated
OFF Latching function not activated
2 ON Closed-circuit principle
OFF Open-circuit principle
4 ON 2x1 c/o contact
OFF 1x2 c/o contacts

Connection diagram CM-ESS.M



A1-A2 Control supply voltage
B-C Measuring ranges:
3-30 V; 6-60 V;
30-300 V; 60-600 V
11₁₅-12₁₆/14₁₈ Output contacts -
21₂₅-22₂₆/24₂₈ Open- or closed circuit
principle

DIP switch functions CM-ESS.M



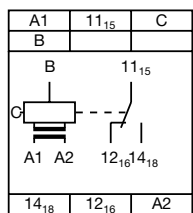
1 ON Undervoltage monitoring
OFF Overvoltage monitoring
3 ON Latching function activated
OFF Latching function not activated
2 ON Closed-circuit principle
OFF Open-circuit principle
OFF = Default

Current and voltage monitoring relays, single phase

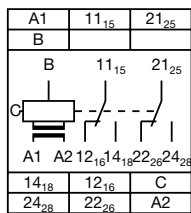
Connection diagrams

DIP switches

Connection diagram CM-ESS.1, CM-ESS.2



A1-A2 Control supply voltage
B-C Measuring ranges:
3-30 V; 6-60 V;
30-300 V; 60-600 V
11₁₅-12₁₆/14₁₈ Output contacts -
open-circuit principle



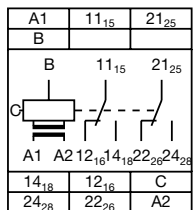
A1-A2 Control supply voltage
B-C Measuring ranges:
3-30 V; 6-60 V;
30-300 V; 60-600 V
11₁₅-12₁₆/14₁₈ Output contacts -
21₂₅-22₂₆/24₂₈ open-circuit principle

DIP switch functions CM-ESS.1, CM-ESS.2

Position	2	1
ON ↑		
OFF		

1 ON Undervoltage monitoring
OFF Overvoltage monitoring
OFF = Default

Connection diagram CM-EFS.2



A1-A2 Control Supply voltage
B-C Measuring ranges:
3-30 V; 6-60 V;
30-300 V; 60-600 V
11₁₅-12₁₆/14₁₈ Output contacts -
21₂₅-22₂₆/24₂₈ open- or closed circuit
principle

DIP switch functions CM-EFS.2

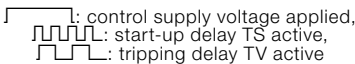
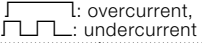
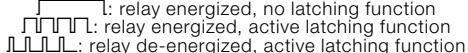
Position	4	3	2	1
ON ↑				
OFF				





OFF = Default

1 ON ON-delay
OFF OFF-delay
2 ON Closed-circuit principle
OFF Open-circuit principle
3 ON Latching function activated
OFF Latching function not activated
4 2 x 1 c/o contact
1 x 2 c/o contacts

Current and voltage monitoring relays, single phase

Technical data

Type	CM-SRS.1	CM-SRS.2	CM-SRS.M	CM-SFS.2		
Input circuit - Supply circuit						
Rated control supply voltage U_s	A1-A2 110-130 V AC 220-240 V AC 24-240 V AC/DC					
Rated control supply voltage U_s tolerance	-15...+10 %					
Rated frequency	AC versions 50/60 Hz AC/DC versions 50/60 Hz or DC					
Current / power consumption	see data sheets					
Power failure buffering time	20 ms					
Transient overvoltage protection	Varistors					
Input circuit - Measuring circuit						
Monitoring function	B1/B2/B3-C over- or undercurrent monitoring configurable			over- and under-current monitoring		
Measuring method	True RMS measuring principle					
Measuring inputs	CM-SxS.x1		CM-SxS.x2			
Terminal connection	B1-C	B2-C	B3-C	B1-C	B2-C	B3-C
Measuring ranges AC/DC	3-30 mA	10-100 mA	0.1-1 A	0.3-1.5 A	1-5 A	3-15 A ²⁾
Input resistance	3.3 q	1 q	0.1 q	0.05 q	0.01 q	0.0025 q
Pulse overload capacity $t < 1$ s	500 mA	1 A	10 A	15 A	50 A	100 A
Continuous capacity	50 mA	150 mA	1.5 A	2 A	7 A	17 A
Threshold value(s)	adjustable within the indicated measuring range					
Setting accuracy of threshold value	10 %					
Repeat accuracy (constant parameters)	0.07 % of full scale					
Hysteresis related to the threshold value	3-30 % adjustable			5 % fixed		
Measuring signal frequency range	DC / 15 Hz - 2 kHz					
Rated measuring signal frequency range	DC / 50-60 Hz					
Maximum response time	AC: 80 ms / DC: 120 ms					
Accuracy within the control supply voltage tolerance	$\Delta U \leq 0.5 \%$					
Accuracy within the temperature range	$\Delta U \leq 0.06 \%$ / °C					
Timing circuit						
Start-up delay T_s	none		0 or 0.1-30 s adjustable			
Tripping delay T_V	none		0 or 0.1-30 s adjustable			
Repeat accuracy (constant parameters)	$\pm 0.07 \%$ of full scale					
Accuracy within the control supply voltage tolerance	$\Delta t \leq 0.5 \%$					
Accuracy within the temperature range	$\Delta t \leq 0.06 \%$ / °C					
Indication of operational states						
Control supply voltage	U/T: green LED					
Measured value	I: red LED					
Relay status	R: yellow LED					
Output circuits						
Kind of output	11(15)-12(16)/14(18), 21(25)-22(26)/24(28) - Relays		1x2 c/o contacts or 2x1 c/o contact configurable			
Operating principle ¹⁾	open-circuit principle		open- or closed-circuit principle configurable			
Contact material	AgNi					
Rated operational voltage U_o	IEC/EN 60947-1 250 V					
Minimum switching voltage / minimum switching current	24 V / 10 mA					
Maximum switching voltage / maximum switching current	250 V AC / 4 A AC					
Rated operational current I_o (IEC/EN 60947-5-1)	AC12 (resistive) at 230 V AC15 (inductive) at 230 V DC12 (resistive) at 24 V DC13 (inductive) at 24 V					
AC rating (UL 508)	Utilization category (Control Circuit Rating Code) max. rated operational voltage max. continuous thermal current at B 300 max. making/breaking apparent power (Make/Break) at B 300					
Mechanical lifetime	30x10 ⁶ switching cycles					
Electrical lifetime (AC12, 230 V, 4 A)	0.1x10 ⁶ switching cycles					
Max. fuse rating to achieve short-circuit protection	n/c contact	6 A fast-acting	10 A fast-acting	6 A fast-acting		
	n/o contact	10 A fast-acting				

¹⁾ Open-circuit principle: output relay energizes if the measured value exceeds  / falls below  the adjusted threshold value
Closed-circuit principle: output relay de-energizes if measured value exceeds  / falls below  the adjusted threshold value

Current monitoring relays, single phase

Technical data

Measuring &
monitoring relays
CM Range

Type	CM-SRS.1	CM-SRS.2	CM-SRS.M	CM-SFS.2
General data				
MTBF			on request	
Duty time			100%	
Dimensions	product dimensions	22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in)		
	packaging dimensions	97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in)		
(W x H x D)				
Weight	net weight	depending on device, see ordering details		
	gross weight	depending on device, see ordering details		
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool		
Mounting position		any		
Minimum distance to other units		10mm (0.39in) at measured current > 10 A		
Material of housing		UL 94 V-0		
Degree of protection	housing / terminals	IP50 / IP20		
Electrical connection				
Wire size		Screw connection technology	Easy Connect Technology (Push-in)	
	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm ² (1 x 20-14 AWG) 2 x 0.5-1.5 mm ² (2 x 20-16 AWG)	2 x 0.5-1.5 mm ² (2 x 20-16 AWG)	
	rigid	1 x 0.5-4 mm ² (1 x 20-12 AWG) 2 x 0.5-2.5 mm ² (2 x 20-14 AWG)	2 x 0.5-1.5 mm ² (2 x 20-16 AWG)	
Stripping length			8 mm (0.32 in)	
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)		-
Environmental data				
Ambient temperature range	operation / storage	-20...+60 °C / -40...+85 °C		
Damp heat (IEC 60068-2-30)		55 °C, 6 cycles		
Vibration (sinusoidal) (IEC/EN 60255-21-1)		Class 2		
Shock (IEC/EN 60255-21-2)		Class 2		
Isolation data				
Rated insulation voltage (VDE 0110, IEC 60947-1, IEC/EN 60255-5)	supply / measuring circuit / output	600 V		
	supply / output 1/2	250 V		
Rated impulse withstand voltage U _{imp} (IEC/EN 60947-1, IEC/EN 60255-5) ²⁾	supply / measuring circuit / output	6 kV 1.2/50 µs		
	supply / output 1/2	4 kV 1.2/50 µs		
Pollution degree (VDE 0110, IEC 664, IEC/EN 60255-5)		3		
Overvoltage category (VDE 0110, IEC 664, IEC/EN 60255-5)		III		
Standards				
Product standard		IEC/EN 60255-6		
Low Voltage Directive		2006/95/EC		
EMC Directive		2004/108/EC		
Electromagnetic compatibility				
Interference immunity to		IEC/EN 61000-6-2		
electrostatic discharge	IEC/EN 61000-4-2	Level 3		
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3		
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3		
surge	IEC/EN 61000-4-5	Level 3		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3		
Interference emission		IEC/EN 61000-6-3		
high-frequency radiated	IEC/CISPR 22; EN 55022	Class B		
high-frequency conducted	IEC/CISPR 22; EN 55022	Class B		

²⁾ In case of measured currents > 10 A, lateral spacing has to be min. 10 mm

Voltage monitoring relays, single phase

Technical data

Type	CM-ESS.1	CM-ESS.2	CM-ESS.M	CM-EFS.2
Input circuit - Supply circuit	A1-A2			
Rated control supply voltage U_s	A1-A2	110-130 V AC		220-240 V AC
	A1-A2	220-240 V AC		
	A1-A2	24-240 V AC/DC		
Rated control supply voltage U_s tolerance		-15...+10 %		
Rated frequency	AC versions	50/60 Hz		50/60 Hz or DC
	AC/DC versions	50/60 Hz		
Current / power consumption		see data sheet		
Power failure buffering time		20 ms		
Transient overvoltage protection		Varistors		
6 Input circuit - Measuring circuit	B-C			
Monitoring function	Over or undervoltage monitoring configurable		Over and undervoltage monitoring configurable	
Measuring method	True RMS measuring principle			
Measuring inputs	CM-ExS			
	Terminal connection	B-C	B-C	B-C
	Measuring range AC/DC	3-30 V	6-60 V	30-300 V
	Input resistance	600 k Ω	600 k Ω	600 k Ω
	Pulse overload capacity $t < 1$ s	800 V	800 V	800 V
	Continuous capacity	660 V	660 V	660 V
Threshold value(s)	adjustable within the indicated measuring range			
Setting accuracy of threshold value	10 %			
Repeat accuracy (constant parameters)	± 0.07 % of full scale			
Hysteresis related to the threshold value	3-30 % adjustable		5 % fixed	
Measuring signal frequency range	DC / 15 Hz - 2 kHz			
Rated measuring signal frequency range	DC / 50-60 Hz			
Maximum response time	AC: 80 ms / DC: 120 ms			
Accuracy within the control supply voltage tolerance	$\Delta U \leq 0.5$ %			
Accuracy within the temperature range	$\Delta U \leq 0.06$ % / $^{\circ}\text{C}$			
Transient overvoltage protection	Varistors			
Timing circuit				
Delay time T_v	none	0 or 0.1-30 s adjustable		
Repeat accuracy (constant parameters)	± 0.07 % of full scale			
Accuracy within the control supply voltage tolerance	-	$\Delta t \leq 0.5$ %		
Accuracy within the temperature range	-	$\Delta t \leq 0.06$ % / $^{\circ}\text{C}$		
Indication of operational states				
Control supply voltage	U/T: green LED	: control supply voltage applied : tripping delay T_v active		
Measured value	U: red LED	: overvoltage, : undervoltage		
Relay status	R: yellow LED	: relay energized, no latching function : relay energized, active latching function : relay de-energized, active latching function		
Output circuits				
Kind of output	1 c/o contact	2 c/o contacts	1x2 c/o contacts or 2x1 c/o contact configurable	
Operating principle ¹⁾	open-circuit principle		open- or closed-circuit principle configurable	
Contact material	AgNi			
Rated operational voltage U_s	IEC/EN 60947-1		250 V	
Minimum switching voltage / minimum switching current	24 V / 10 mA			
Maximum switching voltage / maximum switching current	250 V AC / 4 A AC			
Rated operational current I	AC12 (resistive) at 230 V	4 A		
	AC15 (inductive) at 230 V	3 A		
(IEC/EN 60947-5-1)	DC12 (resistive) at 24 V	4 A		
	DC13 (inductive) at 24 V	2 A		

¹⁾ Open-circuit principle: output relay energizes if the measured value exceeds / falls below the adjusted threshold value
 Closed-circuit principle: output relay de-energizes if measured value exceeds / falls below the adjusted threshold value²⁾

Voltage monitoring relays, single phase

Technical data

Measuring &
monitoring relays
CM Range

Type		CM-ESS.1	CM-ESS.2	CM-ESS.M	CM-EFS.2
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)			B 300	
	max. rated operational voltage			300 V AC	
	max. continuous thermal current at B 300			5 A	
	max. making/breaking apparent power (Make/Break) at B 300			3600/360 VA	
	Mechanical lifetime			30x10 ⁶ switching cycles	
Electrical lifetime (AC12, 230 V, 4 A)			0.1x10 ⁶ switching cycles		
Max. fuse rating to achieve short-circuit protection	n/c contact	6 A fast-acting		10 A fast-acting	6 A fast-acting
	n/o contact			10 A fast-acting	
General data					
MTBF				on request	
Duty time				100%	
Dimensions (W x H x D)	product dimensions			22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in)	
	packaging dimensions			97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in)	
Weight	net weight			depending on device, see ordering details	
	gross weight			depending on device, see ordering details	
Mounting				DIN rail (IEC/EN 60715), snap-on mounting without any tool	
Mounting position				any	
Minimum distance to other units	vertical / horizontal			not necessary / not necessary	
Material of housing				UL 94 V-0	
Degree of protection	housing / terminals			IP50 / IP20	
Electrical connection					
Wire size		Screw connection technology		Easy Connect Technology (Push-in)	
	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm ² (1 x 20-14 AWG)		2 x 0.5-1.5 mm ² (2 x 20-16 AWG)	
		2 x 0.5-1.5 mm ² (2 x 20-16 AWG)			
rigid	1 x 0.5-4 mm ² (1 x 20-12 AWG)		2 x 0.5-1.5 mm ² (2 x 20-16 AWG)		
Stripping length				8 mm (0.32 in)	
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)			-
Isolation data					
Rated insulation voltage (VDE 0110, IEC 60947-1, IEC/EN 60255-5)	supply / measuring circuit / output			600 V	
	supply / output 1/2			250 V	
	Rated impulse withstand voltage U _{imp} (IEC/EN 60947-1, IEC/EN 60255-5) ¹⁾	supply / measuring circuit / output			6 kV 1.2/50 μs
	supply / output 1/2			4 kV 1.2/50 μs	
Pollution degree (VDE 0110, IEC 664, IEC/EN 60255-5)				3	
Overvoltage category (VDE 0110, IEC 664, IEC/EN 60255-5)				III	
Standards					
Product standard				IEC/EN 60255-6	
Low Voltage Directive				2006/95/EC	
EMC Directive				2004/108/EC	
Electromagnetic compatibility					
Interference immunity to				IEC/EN 61000-6-2	
electrostatic discharge	IEC/EN 61000-4-2			Level 3	
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3			Level 3	
electrical fast transient / burst	IEC/EN 61000-4-4			Level 3	
surge	IEC/EN 61000-4-5			Level 3	
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6			Level 3	
Interference emission				IEC/EN 61000-6-3	
high-frequency radiated	IEC/CISPR 22; EN 55022			Class B	
high-frequency conducted	IEC/CISPR 22; EN 55022			Class B	

6

Notes

CM-E Range

Three-phase monitoring relays









































Three-phase monitoring relays
Benefits, advantages, & applications



Three-phase monitoring relays

Benefits, advantages, & applications

Characteristics of the CM range three-phase monitors

- Adjustable phase unbalance threshold value ¹⁾
- Adjustable ON-delay/OFF-delay time ¹⁾
- Dual frequency measuring 50/60 Hz
- Powered by the measuring circuit
- 1 n/o contact, 1 or 2 contacts
- LED status indication
- Approvals:                                   
- Marks:   
- Multifunctional and single-functional devices
- Phase loss monitoring
- Phase sequence monitoring ¹⁾
- Over- and undervoltage monitoring (fixed or adjustable)¹⁾
- Wide-range operating voltage guarantees world-wide operation

¹⁾ depending on device type

Phase unbalance monitoring

If the supply by the three-phase system is unbalanced due to uneven distribution of the load, the motor will convert a part of the energy into reactive power. This energy gets lost unexploited; also the motor is exposed to higher thermal strain. Other thermal protection devices fail to detect continuing unbalances which can lead to damage or destruction of the motor. The CM range three-phase monitors with phase unbalance monitoring can reliably detect this critical situation.

Phase sequence

Changing the phase sequence during operation or a wrong phase sequence prior to startup causes a change of the rotational direction of the connected device. Generators, pumps or fans rotate in the wrong direction and the installation is no longer working properly. Especially for moveable equipment, such as construction machinery, phase sequence detection prior to the startup process is highly reasonable.

Phase loss

In case of phase loss, undefined stats of the installation are likely to occur. E.g. the startup process of motors is disturbed. All three-phase monitors of the ABB CM range detect a phase loss as soon as the voltage of one phase drops below 60% of its nominal value.

Voltage monitoring

All electric devices can be damaged when operated continuously in a network with out-of-range voltages. For example, safe starting is not ensured in case of undervoltage. Also, the switching state of a contactor is not clearly defined when operated in a „forbidden“ voltage range. This can lead to undefined stats of the installation and cause damage or destruction of valuable parts.

Expanded functionality

ABB's new generation of three-phase monitoring relays feature additional functions making the application field for the devices considerably larger.

Selectable phase sequence monitoring

The phase sequence monitoring can be switched off by means of a rotary switch or a DIP switch. This enables monitoring of three-phase mains where phase sequence is not relevant for the application, for example in case of motors with forward and reverse rotation, heating applications, etc.

Automatic phase sequence correction

The automatic phase sequence correction is activated by means of a DIP switch. With activated phase sequence correction, it is ensured that for any non-fixed or portable equipment, e.g. construction machinery, the correct phase sequence is always applied to the input terminals of the load. For details regarding the wiring, please see function description / diagrams.

Structure of the type designation

CM-__ x.yz

x: width of enclosure

y: Control supply voltage / measuring range

1	110, 115, 120, 127 V supply systems (phase-neutral)
2	220, 230, 240 V supply systems (phase-neutral)
3	200, 208, 220, 230, 240, 257, 260 V supply systems (phase-phase)
4	440, 460 V supply systems (phase-phase)
5	480, 500 V supply systems (phase-phase)
6	575, 600 V supply systems (phase-phase)
7	660, 690 V supply systems (phase-phase)
8	200, 400 V supply systems (phase-phase)

z: Rated frequency / output circuit

1	50/60 Hz – 1x2 c/o
2	50/60 Hz – 1x2 or 2x1 c/o
3	50/60/400 Hz – 1x2 oder 2x1 c/o



1 Threshold value V_{min}/V_{max}

2 R/T: yellow LED
Relay status, timing

F1: red LED
fault message

F2: red LED failure:
- overvoltage: F1
- undervoltage: F2

- phase unbalance:
F1 and F2 constant
- phase loss: F1 on F2
flashing

- phase sequence:
F1 and F2 alternately flashing

3 Adjustment of the tripping delay

4 Time setting 0.1-10 s
Phase sequence and phase loss
are indicated without any time delay

Three-phase monitoring relays

Selection and conversion

Measuring & monitoring relays
CM Range

Rated control supply voltage U_s	Reference code	Catalog number	Predecessor
	CM-PBE	1SVR550881R9400	
	CM-PBE	1SVR550882R9500	
	CM-PVE	1SVR550870R9400	no predecessor
	CM-PVE	1SVR550871R9500	
	CM-PFE	1SVR550824R9100	
	CM-PFS.S ¹⁾	1SVR730824R9300	1SVR630824R9300
	CM-PFS.P ¹⁾	1SVR740824R9300	
	CM-PSS.31S	1SVR730794R2300	1SVR630784R2300
	CM-PSS.31P	1SVR740784R2300	
	CM-PSS.41S	1SVR730784R3300	1SVR630784R3300
	CM-PSS.41P	1SVR740784R3300	
	CM-PVS.31S	1SVR730794R1300	1SVR63079 R1300
	CM-PVS.31P	1SVR740794R1300	
	CM-PVS.41S	1SVR730794R3300	1SVR630794R3300
	CM-PVS.41P	1SVR740794R3300	
	CM-PVS.81S	1SVR730794R2300	1SVR630794R2300
	CM-PVS.81P	1SVR740794R2300	
	CM-PAS.31S	1SVR730774R1300	1SVR630774R1300
	CM-PAS.31P	1SVR740774R1300	
	CM-PAS.41S	1SVR730774R3300	1SVR630774R3300
	CM-PAS.41P	1SVR740774R3300	
	CM-MPS.11S	1SVR730885R1300	1SVR630885R1300
	CM-MPS.11P	1SVR740885R1300	
	CM-MPS.21S	1SVR730885R3300	1SVR630885R3300
	CM-MPS.21P	1SVR740885R3300	
	CM-MPS.31S	1SVR730884R1300	1SVR630884R1300
	CM-MPS.31P	1SVR740884R1300	
Phase to Phase			
160-300 V AC			■
200-400 V AC			■
200-500 V AC			■
208-440 V AC			■
300-500 V AC			■
320-460 V AC			■
350-580 V AC			■
380 V AC			■
380-440 V AC	■	■	
400 V AC	■	■	
450-720 V AC			■
530-820 V AC			■
Phase to Neutral			
90-170 V AC			
180-280 V AC			■
185-265 V AC			■
220-240 V AC	■		
230 V AC			
Rated frequency			
50/60 Hz	■	■	■
50/60/400 Hz			■
Suitable for monitoring			
Single-phase mains	■	■	
Three-phase mains	■	■	■
Monitoring function			
Phase failure	■	■	■
Phase sequence			sel sel sel sel sel sel sel sel sel sel sel sel sel sel sel sel sel sel sel sel sel sel sel sel sel
Automatic phase sequence correction			
Overvoltage			■
Undervoltage			■
Unbalance			■
Neutral	■	■	
Overfrequency			■
Underfrequency			■
Thresholds	fix	fix	adj
Timing functions for tripping delay			
ON delay			sel sel sel sel
On and OFF delay	fix	fix	adj adj adj adj adj adj adj adj adj adj adj
Connection type			
Easy Connect Technology			■
Double-chamber cage connection terminals			■

Three-phase monitoring relays

Selection and conversion

6

Rated control supply voltage U_s	Reference code	Catalog number	Predecessor
	CM-MPS.41S	1SVR730884R3300	1SVR630884R4300
	CM-MPS.41P	1SVR740884R3300	
	CM-MPS.23S	1SVR730885R4300	1SVR630885R4300
	CM-MPS.23P	1SVR740885R4300	
	CM-MPS.43S	1SVR730884R4300	1SVR630884R4300
	CM-MPS.43P	1SVR740884R4300	
	CM-MPN.52S ⁽¹⁾	1SVR750487R8300	1SVR650487R8300
	CM-MPN.52P ⁽¹⁾	1SVR760487R8300	
	CM-MPN.62S ⁽¹⁾	1SVR750488R8300	1SVR650488R8300
	CM-MPN.62P ⁽¹⁾	1SVR760488R8300	
	CM-MPN.72S ⁽¹⁾	1SVR750489R8300	1SVR650489R8300
	CM-MPN.72P ⁽¹⁾	1SVR760489R8300	
Phase to Phase			
160-300 V AC			
200-400 V AC			
200-500 V AC			
208-440 V AC			
300-500 V AC	■	■	
320-460 V AC			■
350-580 V AC			■
380 V AC			
380-440 V AC			■
400 V AC			■
450-720 V AC			■
530-820 V AC			■
Phase to Neutral			
90-170 V AC			
180-280 V AC			■
185-265 V AC			■
220-240 V AC			
230 V AC			
Rated frequency			
50/60 Hz	■	■	
50/60/400 Hz			■
Suitable for monitoring			
Single-phase mains			■
Three-phase mains	■	■	■
Monitoring function			
Phase failure	■	■	■
Phase sequence	sel	sel	adj
Automatic phase sequence correction			adj
Overvoltage	■	■	■
Undervoltage	■	■	■
Unbalance	■	■	■
Neutral			■
Overfrequency			
Underfrequency			
Thresholds	adj	adj	adj
Timing functions for tripping delay			
ON delay			
On and OFF delay	adj	adj	adj
Connection type			
Easy Connect Technology		■	■
Double-chamber cage connection terminals	■	■	■

Three-phase monitoring relays

Ordering details

Description

Only reliable and continuous monitoring of a three-phase network guarantees the trouble-free and economic operation of machines and installations.



CM-PBE



CM-PSS.41P



CM-PAS.31P

Ordering details

Rated control supply voltage = measuring voltage	Monitoring function	Neutral monitoring	Reference code	Catalog number	Weight (1 pce) kg (lb)
3x380-440 V AC, 220-240 V AC	Phase failure detection (Single- and three-phase)	■	CM-PBE ¹⁾	1SVR550881R9400	0.08 (0.17)
3x380-440 V AC			CM-PBE	1SVR550882R9500	0.08 (0.17)
3x320-460 V AC, 185-265 V AC	Over- / under-voltage and phase failure detection (Single- and three-phase)	■	CM-PVE ¹⁾	1SVR550870R9400	0.08 (0.17)
3x320-460 V AC			CM-PVE	1SVR550871R9500	0.08 (0.17)
3x208-440 V AC	Phase sequence monitoring and phase failure detection (Three-phase)		CM-PFE ²⁾	1SVR550824R9100	0.08 (0.17)
3x200-500 V AC			CM-PFS ²⁾	1SVR430824R9300	0.15 (0.33)
3x380 V AC	Over- / undervoltage with fixed threshold values ± 10 %		CM-PSS.31S	1SVR730784R2300	0.132 (0.291)
			CM-PSS.31P	1SVR740784R2300	0.123 (0.271)
3x400 V AC			CM-PSS.41S	1SVR740784R3300	0.132 (0.291)
			CM-PSS.41P	1SVR730784R3300	0.123 (0.271)
3x160-300 V AC	Over- and under-voltage with adjustable threshold values (Three-phase)		CM-PVS.31S	1SVR730794R1300	0.141 (0.311)
			CM-PVS.31P	1SVR740794R1300	0.132 (0.291)
3x300-500 V AC			CM-PVS.41S	1SVR730794R3300	0.139 (0.306)
			CM-PVS.41P	1SVR740794R3300	0.131 (0.289)
3x200-400 V AC			CM-PVS.81S	1SVR730794R2300	0.136 (0.300)
			CM-PVS.81P	1SVR740794R2300	0.128 (0.282)
3x160-300 V AC	Phase unbalance (Three-phase)		CM-PAS.31S	1SVR730774R1300	0.133 (0.293)
			CM-PAS.31P	1SVR740774R1300	0.124 (0.273)
3x300-500 V AC			CM-PAS.41S	1SVR730774R3300	0.132 (0.291)
			CM-PAS.41P	1SVR740774R3300	0.123 (0.271)

¹⁾ The version with neutral monitoring is also suitable for monitoring single-phase mains. For this, all three external conductors (L1,L2,L3) have to be jumpered and connected as one single conductor.

²⁾ For applications where a reverse fed voltage >60% is expected, we recommend to use our three-phase monitoring relays for unbalance CM-PAS.xx

Three-phase monitoring relays

Ordering details

Ordering details

Rated control supply voltage = measuring voltage	Monitoring function	Neutral monitoring	Reference code	Catalog number	Weight (1 pce) kg (lb)		
90-170 V AC	Multifunctional (Three-phase phase failure detection, Phase sequence monitoring, overvoltage, undervoltage, Phase unbalance)	■	CM-MPS.11S	1SVR730885R1300	0.148 (0.326)		
			CM-MPS.11P	1SVR740885R1300	0.137 (0.302)		
CM-MPS.21S			1SVR730885R3300	0.146 (0.322)			
CM-MPS.21P			1SVR740885R3300	0.135 (0.298)			
3x300-500 V AC			CM-MPS.31S	1SVR730884R1300	0.142 (0.313)		
			CM-MPS.31P	1SVR740884R1300	0.133 (0.293)		
			CM-MPS.41S	1SVR730884R3300	0.140 (0.309)		
180-280 V AC			Multifunctional (Three-phase phase failure detection, Phase sequence monitoring, overvoltage, undervoltage, Phase unbalance)	■	CM-MPS.41P	1SVR740884R3300	0.132 (0.291)
					CM-MPS.23S	1SVR730885R4300	0.149 (0.328)
	CM-MPS.23P	1SVR740885R4300			0.138 (0.304)		
3x300-500 V AC	CM-MPS.43S	1SVR730884R4300			0.148 (0.327)		
	CM-MPS.43P	1SVR740884R4300			0.137 (0.302)		
3x350-580 V AC	CM-MPN.52S	1SVR750487R8300			0.230 (0.507)		
	CM-MPN.52P	1SVR760487R8300			0.226 (0.498)		
3x450-720 V AC	CM-MPN.62S	1SVR750488R8300			0.229 (0.505)		
	CM-MPN.62P	1SVR760488R8300			0.225 (0.496)		
3x530-820 V AC	CM-MPN.72S	1SVR750489R8300	0.224 (0.494)				
	CM-MPN.72P	1SVR760489R8300	0.220 (0.485)				
3 x 400 V AC (L-L) / 230 V AC (L-N)	see Three-Phase overview page	■	CM-UFS.2	1SVR630736R1300	0.140 (0.309)		
24-240 V AC/DC	Grid feeding monitoring (overvoltage, undervoltage, change in grid frequency)		CM-UFD.M21	1SVR510730R0300	0.225 (0.496)		
24 V AC/DC or 230 V AC			CM-UFD.M32	1SVR510730R4400	0.395 (0.871)		



CM-MPS.23P

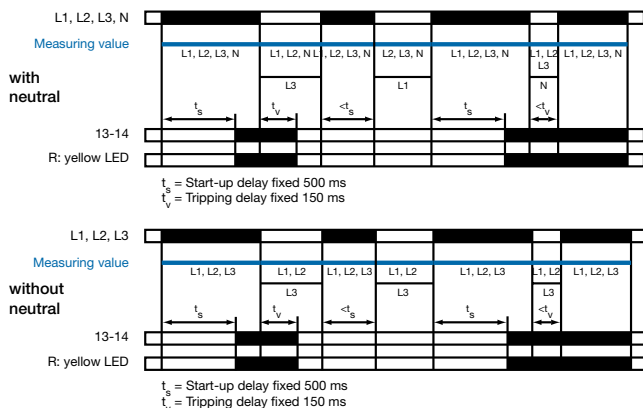


CM-MPN.52P

Three-phase monitoring relays

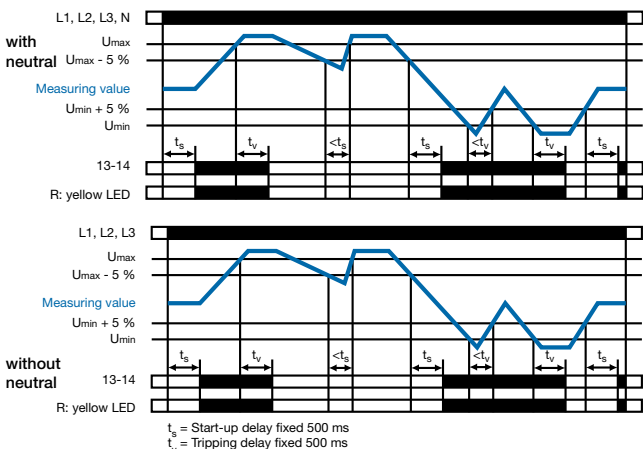
Function diagrams

Function diagrams - Three-phase monitoring CM-PBE



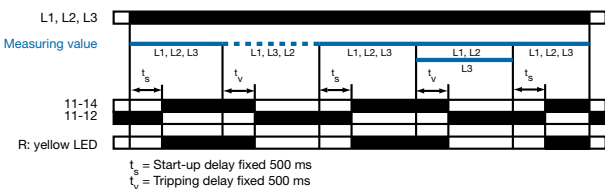
If all phases (and the neutral) are present, the output relay energizes after the start-up delay t_s is complete. If a phase failure occurs, the tripping delay t_v starts. When timing is complete, the output relay de-energizes. As soon as the voltage returns to the tolerance range, timing of t_s starts. When timing is complete, the output relay re-energizes automatically. The yellow LED glows when the output relay is energized.

Function diagrams - Three-phase monitoring CM-PVE



If all phases (and the neutral) are present with correct voltage, the output relay energizes after the start-up delay t_s is complete. If the voltage exceeds or falls below the fixed threshold value or if a phase failure occurs, the tripping delay t_v starts. When timing is complete, the output relay de-energizes. As soon as the voltage returns to the tolerance range, timing of t_s starts. When timing is complete, the output relay re-energizes automatically. The yellow LED glows when the output relay is energized.

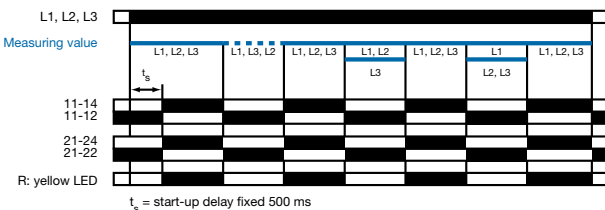
Function diagram - CM-PFE



If all phases are present with the correct phase sequence, the output relay energizes after the start-up delay t_s is complete. If a phase failure or a phase sequence error occurs, the tripping delay t_v starts. When timing is complete, the output relay de-energizes. The yellow LED glows when the output relay is energized.

In case of motors which continue running with only two phases, the CM-PFE detects phase failure if the reverse fed voltage is less than 60 % of the originally applied voltage.

Function diagram - CM-PFS



If all phases are present with the correct phase sequence, the output relay energizes after the start-up delay t_s is complete. If a phase failure or a phase sequence error occurs, the output relay de-energizes instantaneously. The yellow LED glows when the output relay is energized.

In case of motors which continue running with only two phases, the CM-PFS detects phase failure if the reverse fed voltage is less than 60 % of the originally applied voltage.

ATTENTION

If several CM-PFS units are placed side by side and the control supply voltage is higher than 415 V, spacing of at least 10 mm has to be kept between the individual units.

Three-phase monitoring relays

Function diagrams

Phase sequence and phase failure monitoring CM-PSS.xx, CM-PVS.xx, CM.PAS.xx, CM-MPS.xx, CM-MPN.xx

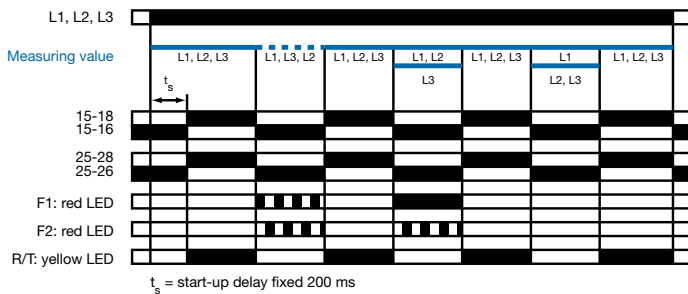
Applying control supply voltage begins the fixed start-up delay t_s . When t_s is complete and all phases are present with correct voltage, the output relays energize and the yellow LED R/T glows.

Phase sequence monitoring

If phase sequence monitoring is activated, the output relays de-energize as soon as a phase sequence error occurs. The fault is displayed by alternated flashing of the LEDs F1 and F2. The output relays re-energize automatically as soon as the phase sequence is correct again.

Phase failure monitoring

The output relays de-energize instantaneous if a phase failure occurs. The fault is indicated by lightning of LED F1 and flashing of LED F2. The output relays re-energize automatically as soon as the voltage returns to the tolerance range.



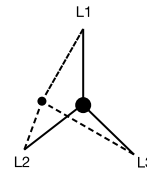
Interrupted neutral monitoring CM-MPS.11, CM-MPS.21, CM-MPS.23

The interruption of the neutral in the main to be monitored is detected by means of phase unbalance evaluation.

Determined by the system, in case of unloaded neutral, i.e. symmetrical load between all three phases, it may happen that an interruption of the neutral will not be detected.

If the star point is displaced by asymmetrical load in the three-phase main, an interrupted neutral will be detected.

Displacement of the star point



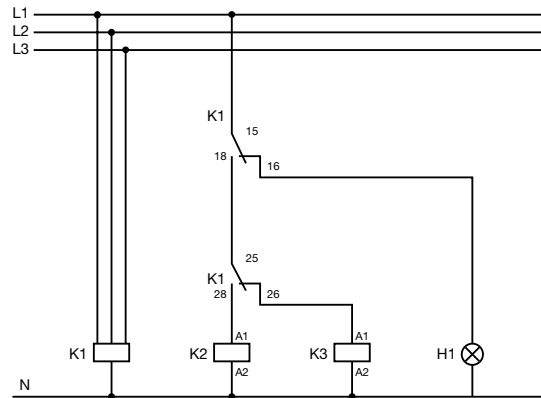
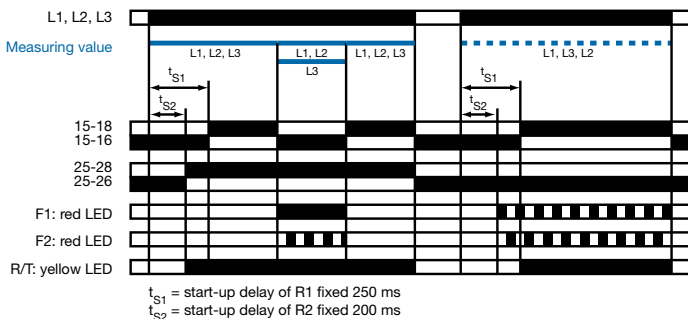
Automatic phase sequence correction CM-MPS.x3, CM-MPN.x2

This function can be selected only if phase sequence monitoring is activated and operating mode 2x1 c/o (SPDT) contact is selected.

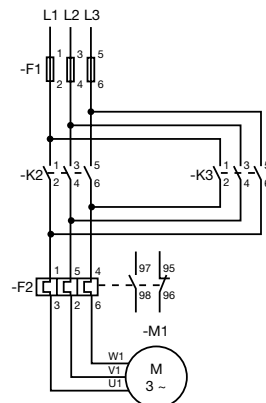
Applying control supply voltage begins the fixed start-up delay t_{s1} . When t_{s1} is complete and all phases are present with correct voltage, output relay R1 energizes. Output relay R2 energizes when the fixed start-up delay t_{s2} is complete and all phases are present with correct phase sequence. Output relay R2 remains de-energized if the phase sequence is incorrect.

If the voltage to be monitored exceeds or falls below the set threshold values for phase unbalance, over- or undervoltage or if a phase failure occurs, output relay R1 de-energizes and the LEDs F1 and F2 indicate the fault.

Output relay R2 is responsive only to a false phase sequence. In conjunction with a reversing contactor combination, this enables an automatic correction of the rotation direction. See circuit diagrams on the right.



Control circuit diagram (K1 = CM-MPS.xx or CM-MPN.xx)



Power circuit diagram

Three-phase monitoring relays

Function diagrams

Over- and undervoltage monitoring 1x2 c/o

CM-PSS.xx¹, CM-PVS.xx², CM-MPS.xx², CM-MPN.xx²

Applying control supply voltage begins the fixed start-up delay t_s . When t_s is complete and all phases are present with correct voltage and with correct phase sequence, the output relays energize and the yellow LED R/T glows.

Type of tripping delay = ON-delay

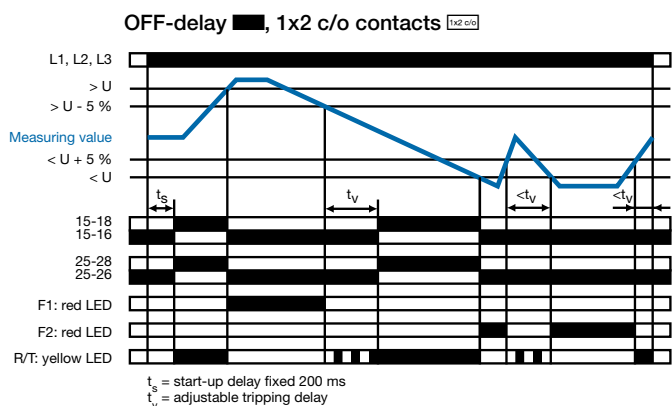
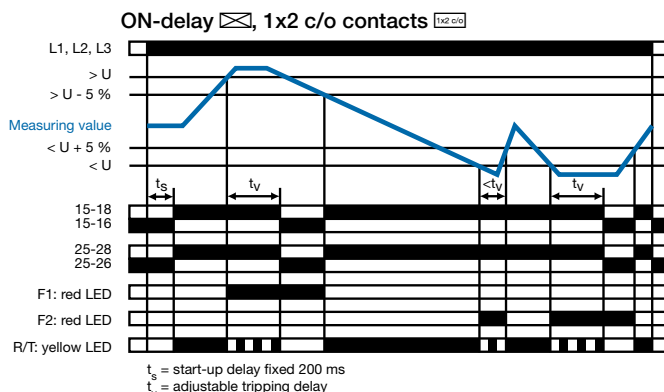
If the voltage to be monitored exceeds or falls below the fixed¹⁾ or set²⁾ threshold value, the output relays de-energize after the set tripping delay t_v is complete. The LED R/T flashes during timing and turns off as soon as the output relays de-energize.

The output relays re-energize automatically as soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 % and the LED R/T glows.

Type of tripping delay = OFF-delay

If the voltage to be monitored exceeds or falls below the fixed¹⁾ or set²⁾ threshold value, the output relays de-energize instantaneously and the LED R/T turns off.

As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %, the output relays re-energize automatically after the set tripping delay t_v is complete. The LED R/T flashes during timing and turns steady when timing is complete.



Over- and undervoltage monitoring 2x1 c/o

CM-MPS.x3, CM-MPN.x2

Applying control supply voltage begins the fixed start-up delay t_s . When t_s is complete and all phases are present with correct voltage and with correct phase sequence, the output relays energize. The yellow LED R/T glows as long as at least one output relay is energized.

Type of tripping delay = ON-delay

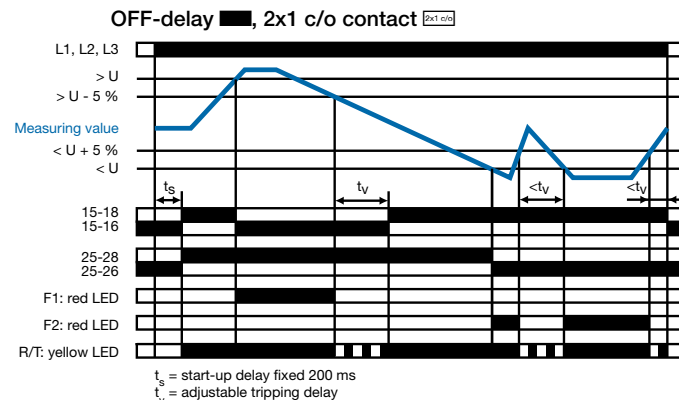
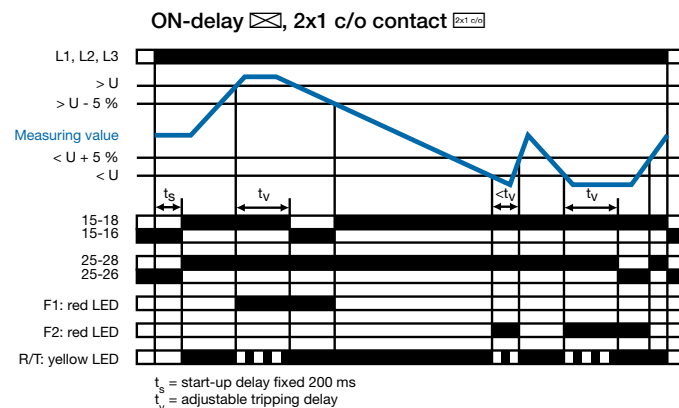
If the voltage to be monitored exceeds or falls below the set threshold value, output relay R1 (overvoltage) or output relay R2 (undervoltage) de-energizes after the set tripping delay t_v is complete. The LED R/T flashes during timing.

The corresponding output relay re-energizes automatically as soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %.

Type of tripping delay = OFF-delay

If the voltage to be monitored exceeds or falls below the set threshold value, output relay R1 (overvoltage) or output relay R2 (undervoltage) de-energizes instantaneously.

As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %, the corresponding output relay re-energizes automatically after the set tripping delay t_v is complete. The LED R/T flashes during timing.



Three-phase monitoring relays

Function diagrams

Phase unbalance monitoring CM-PAS.xx, CM-MPS.xx, CM-MPN.xx

Applying control supply voltage begins the fixed start-up delay t_s . When t_s is complete and all phases are present with correct voltage and with correct phase sequence, the output relays energize and the yellow LED R/T glows.

Type of tripping delay = ON-delay

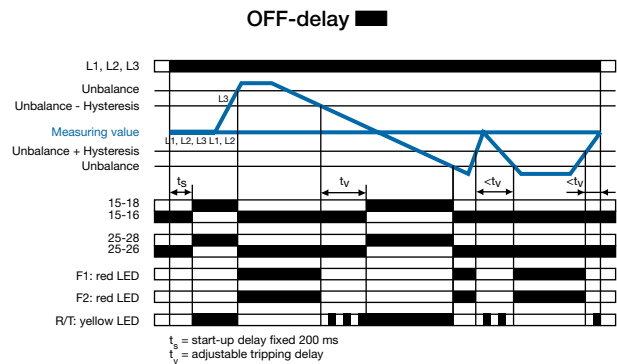
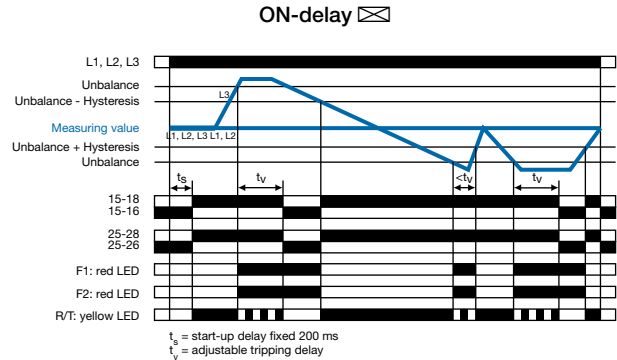
If the voltage to be monitored exceeds or falls below the set phase unbalance threshold value, the output relays de-energize after the set tripping delay t_v is complete. The LED R/T flashes during timing and turns off as soon as the output relays de-energize.

6 The output relays re-energize automatically as soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 20 % and the LED R/T glows.

Type of tripping delay = OFF-delay

If the voltage to be monitored exceeds or falls below the set phase unbalance threshold value, the output relays de-energize instantaneously and the LED R/T turns off.

As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 20 %, the output relays re-energize automatically after the set tripping delay t_v is complete. The LED R/T flashes during timing and turns steady when timing is complete.



LED functions CM-PSS.xx, CM-PSV.xx, CM-PAS.xx, CM-MPS.xx, CM-MPN.xx

Function	R/T: yellow LED	F1: red LED	F2: red LED
Control supply voltage applied, output relay energized		-	-
Tripping delay t_v active		-	-
Phase failure	-		
Phase sequence	-		
Overvoltage	-		-
Undervoltage	-	-	
Phase unbalance	-		
Interruption of the neutral	-		
Adjustment error ¹⁾			

¹⁾ Possible misadjustments of the front-face operating controls:

Overlapping of the threshold values: An overlapping of the threshold values is given, if the threshold value for overvoltage is set to a smaller value than the threshold value for undervoltage.

DIP switch 3 = OFF and DIP switch 4 = ON: Automatic phase sequence correction is activated and selected operating mode is 1x2 c/o contacts

DIP switch 2 and 4 = ON: Phase sequence detection is deactivated and the automatic phase sequence correction is activated

Type of tripping delay CM-PSS.xx, CM-PSV.xx, CM-PAS.xx, CM-MPS.xx, CM-MPN.xx

The type of tripping delay ☒ / ■ can be adjusted via a rotary (CM-PxS.xx) or a DIP switch (CM-MPx.xx).

Switch position ON-delay ☒:

In case of a fault, the de-energizing of the output relays and the respective fault message are suppressed for the adjustable tripping delay t_v .

Switch position OFF-delay ■:

In case of a fault, the output relays de-energize instantaneously and a fault message is displayed and stored for the length of the adjustable tripping delay t_v . Thereby, also momentary undervoltage conditions are recognized.

Three-phase monitoring relays Function diagrams

Grid feeding monitoring CM-UFS.2

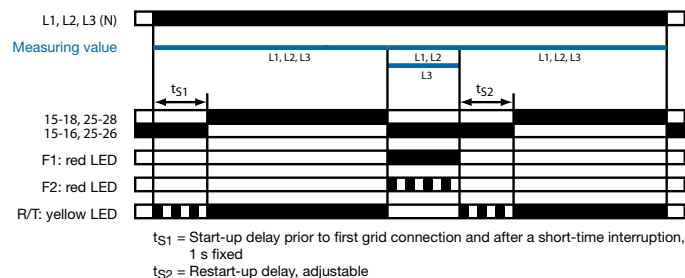
Function of the yellow LED

The yellow LED is flashing during timing and turns steady as soon as the output relays are energized.

Phase failure monitoring

Applying control supply voltage begins the fixed start-up delay t_{s1} . When t_{s1} is complete and all phases are present with correct voltage and frequency, the output relays energize. They de-energize instantaneously if a phase failure occurs. The fault is indicated by LEDs.

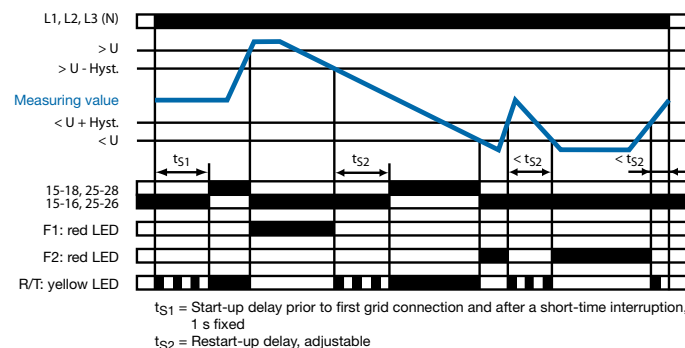
As soon as all 3 phases are present again, the output relays re-energize automatically after the set restart delay t_{s2} is complete.



Over- and undervoltage monitoring

Applying control supply voltage begins the fixed start-up delay t_{s1} . When t_{s1} is complete and all phases are present with correct voltage and frequency, the output relays energize.

If the voltage to be monitored exceeds or falls below the fixed threshold value, the output relays de-energize instantaneously. The fault type is indicated by LEDs. As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %, the output relays re-energize after the set restart delay t_{s2} is complete.



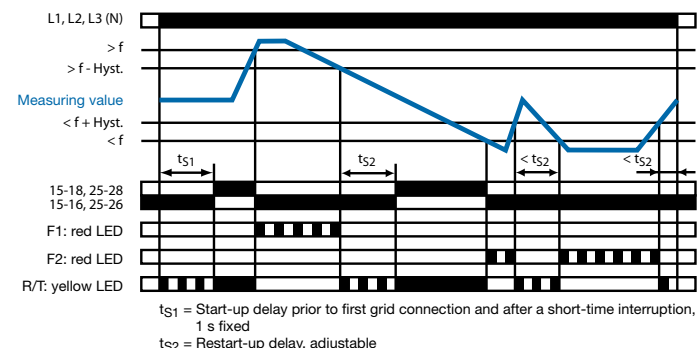
LED Functions

Function	R/T: yellow LED	F1: red LED	F2: red LED
Output relay energized		-	-
Delay active		-	-
Overvoltage	-		-
Undervoltage	-	-	
Overfrequency	-		-
Underfrequency	-	-	
Phase failure	-		

Over- and underfrequency monitoring

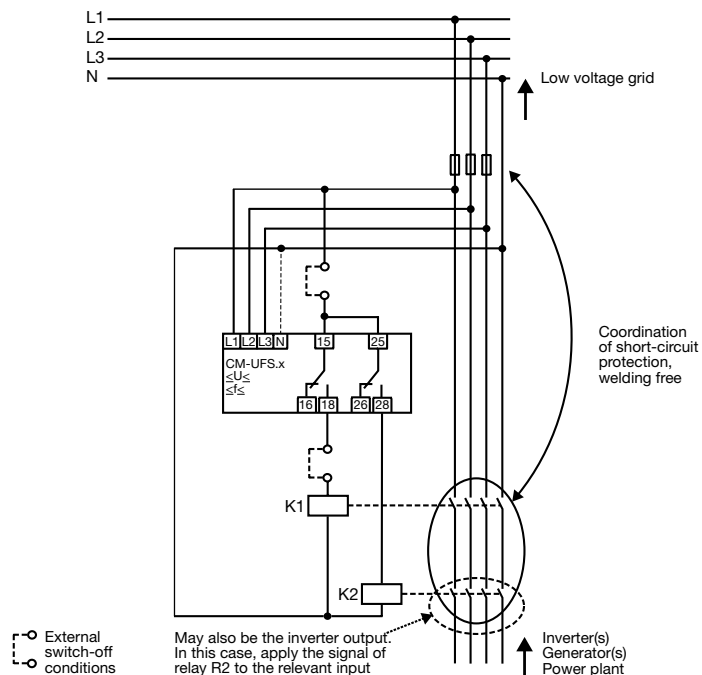
Applying control supply voltage begins the fixed start-up delay t_{s1} . When t_{s1} is complete and all phases are present with correct voltage and frequency, the output relays energize.

If the frequency to be monitored exceeds or falls below the fixed threshold value, the output relays deenergize instantaneously. The fault type is indicated by LEDs. As soon as the frequency returns to the tolerance range, taking into account a fixed hysteresis, the output relays re-energize after the set restart delay t_{s2} is complete.



Function diagram legend

- Control supply voltage not applied / Output contact open / LED off
- Control supply voltage applied / Output contact closed / LED glowing

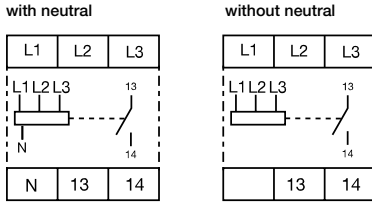


Automatized grid connection instead of a permanently accessible switching point with a disconnection function

Three-phase monitoring relays

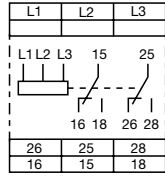
Connection diagrams, DIP switches

Connection diagrams CM-PBE



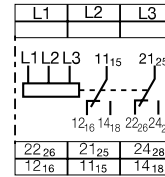
L1, L2, L3, (N) Control supply voltage =
Measuring voltage
13-14 Output contact -
closed-circuit principle

Connection diagram CM-PVS.x1



L1, L2, L3 Control supply voltage =
measuring voltage
15-16/18 Output contacts -
25-26/28 closed-circuit principle

Connection diagram CM-PFS



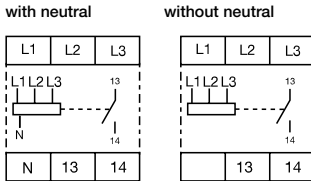
L1-L2-L3 Control supply voltage =
Measuring voltage
11₁₅-12₁₆/14₁₈ Output contact -
21₂₅-22₂₆/24₂₈ Closed-circuit principle

6

Rotary switch "Function" CM-PVS

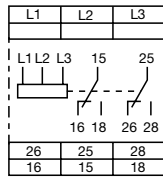
- ON-delay
with phase sequence monitoring
- OFF-delay
with phase sequence monitoring
- ON-delay
without phase sequence monitoring
- OFF-delay
without phase sequence monitoring

Connection diagrams CM-PVE



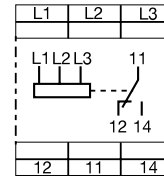
L1, L2, L3, (N) Control supply voltage =
Measuring voltage
13-14 Output contact -
closed-circuit principle

Connection diagram CM-PSS.x1



L1, L2, L3 Control supply voltage =
measuring voltage
15-16/18 Output contacts -
25-26/28 closed-circuit principle

Connection diagram CM-PFE

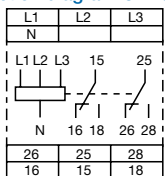


L1-L2-L3 Control supply voltage =
Measuring voltage
11-12/14 Output contact
Closed-circuit principle

Rotary switch "Function" CM-PSS

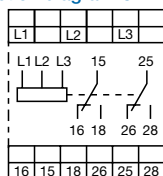
- ON-delay
with phase sequence monitoring
- OFF-delay
with phase sequence monitoring
- ON-delay
without phase sequence monitoring
- OFF-delay
without phase sequence monitoring

Connection diagram CM-UFS.2



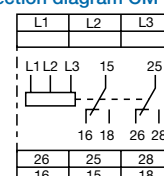
L1, L2, L3, N Control supply voltage =
Measuring voltage
15-16/18 Output contacts -
25-26/28 closed-circuit principle

Connection diagram CM-MPN.x2



L1, L2, L3 Control supply voltage =
measuring voltage
15-16/18 Output contacts -
25-26/28 closed-circuit principle

Connection diagram CM-PAS.x1

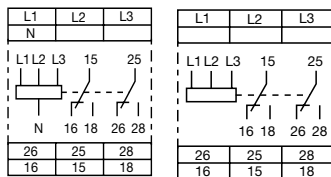


L1, L2, L3 Control supply voltage =
measuring voltage
15-16/18 Output contacts -
25-26/28 closed-circuit principle

Three-phase monitoring relays

Connection diagrams, DIP switches, rotary switches

Connection diagram CM-MPS.x3



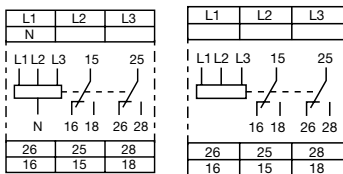
L1, L2, L3, (N) Control supply voltage = measuring voltage
15-16/18 Output contacts - closed-circuit principle
25-26/28

DIP switch functions CM-MPS.x3 and CM-MPN.x2

Position	4	3	2	1
ON ↑		2x1 c/o		
OFF		1x2 c/o		

- 1 Timing function**
ON ON-delayed
OFF OFF-delayed
 - 2 Phase sequence monitoring**
ON deactivated
OFF activated
 - 3 Operating principle of output**
ON 2x1 c/o contact
OFF 1x2 c/o contacts
 - 4 Phase sequence correction**
ON activated
OFF deactivated
- ¹⁾ Output relay R1 is responsive to overvoltage, output relay R2 is responsive to undervoltage. In case of other faults, both output relays react synchronously.

Connection diagram CM-MPS.x1



L1, L2, L3, (N) Control supply voltage = measuring voltage
15-16/18 Output contacts - closed-circuit principle
25-26/28

DIP switch functions CM-MPS.x1

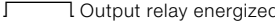
Position	2	1
ON ↑		
OFF		

- 1 Timing function**
ON ON-delayed
OFF OFF-delayed
- 2 Phase sequence monitoring**
ON deactivated
OFF activated

Three-phase monitoring relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Type	CM-PBE ¹⁾	CM-PBE	CM-PVE ¹⁾	CM-PVE	CM-PFE	CM-PFS
Supply circuit = measuring circuit	L1-L2-L3-N	L1-L2-L3	L1-L2-L3-N	L1-L2-L3	L1-L2-L3	
Rated control supply voltage U_s = measuring voltage	3x380-440 V AC, 220-240 V AC	3x380-440 V AC	3x320-460 V AC, 185-265 V AC	3x320-460 V AC	3x208-440 V AC	3x200-500 V AC
Power consumption						approx. 15 VA
Rated control supply voltage U_s tolerance	-15...+15 %		-15...+10 %		-10...+10 %	-15...+10 %
Rated frequency	50/60 Hz		50/60 Hz (-10...+10 %)		50/60 Hz	
Duty time	100 %					
Measuring circuit	L1-L2-L3-N	L1-L2-L3	L1-L2-L3-N	L1-L2-L3	L1-L2-L3	
Monitoring functions	phase failure	■	■	■	■	■
	phase sequence	-	-	-	■	■
	over / undervoltage	-	-	-	-	-
	neutral	■	-	■	-	-
Measuring ranges	3x380-440 V AC, 220-240 V AC	3x380-440 V AC	3x320-460 V AC, 185-265 V AC	3x320-460 V AC	3x208-440 V AC	3x200-500 V AC
Thresholds	U_{min}	0.6 x UN	fixed 185 V / 320 V	fixed 320 V	0.6 x UN	
	U_{max}		fixed 265 V / 460 V	fixed 460 V		
Hysteresis related to the threshold value	fixed 5 % (release value = 0.65 x UN)		fixed 5 %			
Measuring voltage frequency	50/60 Hz (-10 %...+10 %)				50/60 Hz	
Response time	40 ms		80 ms		500 ms	
Accuracy within the rated control supply voltage tolerance						$\Delta U \leq 0.5\ %$
Accuracy within the temperature range	$\Delta U \leq 0.06\ \% / \text{°C}$					
Timing circuit						
Start-up delay t_s	fixed 500 ms ($\pm 20\ %$)				fixed 500 ms	
Tripping t_v	fixed 150 ms ($\pm 20\ %$)	at over- / undervoltage fixed 500 ms ($\pm 20\ %$)			fixed 500 ms	-
Indication of operational states						
Relay status	R: yellow LED	 Output relay energized				
Output circuits	13-14				11-12/14	11(15)-12(16)/14(18), 21(25)-22(26)/24(28)
Kind of output	1 n/o contact				1 c/o contact	2 c/o contacts
Operating principle ²⁾	closed-circuit principle					
Contact material	AgCdO				AgNi	
Rated operational voltage U_n	IEC/EN 60947-1		250 V			
Minimum switching voltage / Minimum switching current	- / -					
Maximum switching voltage	250 V AC, 250 V DC					
Rated operational current I_n (IEC/EN 60947-5-1)	AC12 (resistive) 230 V		4 A			
	AC15 (inductive) 230 V		3 A			
	DC12 (resistive) 24 V		4 A			
	DC13 (inductive) 24 V		2 A			
Mechanical lifetime	30 x 10 ⁶ switching cycles					
Electrical lifetime (AC12, 230 V, 4 A)	0.1 x 10 ⁶ switching cycles					
Max. fuse rating to achieve short-circuit protection	n/c contact	10 A fast-acting				4 A fast-acting
	n/o contact	10 A fast-acting				6 A fast-acting
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)		B 300			
	max. rated operational voltage		300 V AC			
	max. continuous thermal current at B 300		5 A			
	max. making/breaking apparent power at B 300		3600/360 VA			

¹⁾ Device with neutral monitoring: The external conductor voltage towards the neutral conductor is measured.

²⁾ Closed-circuit principle: Output relay is de-energized if the measured value exceeds/drops below the adjusted threshold.

Three-phase monitoring relays

Technical data

Measuring &
monitoring relays
CM Range

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Type	CM-PBE ¹⁾	CM-PBE	CM-PVE ¹⁾	CM-PVE	CM-PFE	CM-PFS	
General data							
Dimensions (W x H x D)	22.5 x 78 x 78.5 mm (0.89 x 3.07 x 3.09 in)					22.5 x 78 x 100 mm (0.89 x 3.07 x 3.94 in)	
Weight	see data sheet						
Mounting	DIN rail (IEC/EN 60715)						
Mounting position	any						
Degree of protection	housing / terminals IP50 / IP20						
Electrical connection							
Wire size	fine-strand with wire end ferrule	2 x 0.75-1.5 mm ² (2 x 18-16 AWG)				2 x 0.75- 2.5 mm ² (2 x 8-14 AWG)	
	fine-strand without wire end ferrule	2 x 1-1.5 mm ² (2 x 18-16 AWG)					
	rigid	2 x 0.75-1.5 mm ² (2 x 18-16 AWG)				2 x 0.5- 4 mm ² (2 x 20-12 AWG)	
Stripping length	10 mm (0.39 in)					7 mm (0.28 in)	
Tightening torque	0.6-0.8 Nm						
Environmental data							
Ambient temperature range	operation / storage	-20...+60 °C / -40...+85 °C					
Environmental testing (IEC 68-2-30)	24 h cycle time, 55 °C, 93 % rel., 96 h						
Operational reliability (IEC 68-2-6)	6 g					4 g	
Mechanical resistance (IEC 68-2-6)	10 g					6 g	
Isolation data							
Rated insulation volt. between supply, measuring and output circuits (VDE 0110, IEC 60947-1)	400 V			500 V			
Rated impulse withstand voltage U_{imp} between all isolated circuits (VDE 0110, IEC 664)	4 kV / 1.2 - 50 μ s						
Test voltage between all isolated circuits	2.5 kV, 50 Hz, 1 min.						
Pollution category (VDE 0110, IEC/EN 60664, IEC 255-5)	3						
Overvoltage category (VDE 0110, IEC/EN 60664, IEC 255-5)	III						
Standards							
Product standard	IEC 255-6, EN 60255-6						
Low Voltage Directive	2006/95/EC						
EMC Directive	2004/108/EC						
Electromagnetic compatibility							
Interference immunity to	EN 61000-6-2						
electrostatic discharge	IEC/EN 61000-4-2	Level 3 - 6 kV/ 8 kV					
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 - 10 V/m					
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3 - 2 kV / 5 kHz					
surge	IEC/EN 61000-4-5	Level 4 - 2 kV-L					
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 - 10 V					
Interference emission	EN 61000-6-4						

¹⁾ Device with neutral monitoring: The external conductor voltage towards the neutral conductor is measured.

²⁾ Closed-circuit principle: Output relay is de-energized if the measured value exceeds/drops below the adjusted threshold.

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Three-phase monitoring relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Type	CM-PSS.31	CM-PSS.41	CM-PVS.31	CM-PVS.41	CM-PVS.81	CM-PAS.31	CM-PAS.41
Input circuit = Measuring circuit							
Rated control supply voltage $U_s =$ measuring voltage	3x380 V AC	3x400 V AC	3x160-300 V AC	L1, L2, L3 3x300-500 V AC	3x200-400 V AC	3x160-300 V AC	3x300-500 V AC
Rated control supply voltage U_s tolerance	-15...+10 %						
Rated frequency	50/60 Hz						
Frequency range	45-65 Hz						
Typical current / power consumption	25 mA / 18 VA (380 V AC)	25 mA / 18 VA (400 V AC)	25 mA / 10 VA (230 V AC)	25 mA / 18 VA (400 V AC)	19 mA / 10 VA (300 V AC)	25 mA / 10 VA (230 V AC)	25 mA / 18 VA (400 V AC)
6 Measuring circuit							
Monitoring functions	L1, L2, L3						
Phase failure	■	■	■	■	■	■	■
Phase sequence	can be switched off						
Automatic phase sequence correction	-	-	-	-	-	-	-
Over- / undervoltage	■	■	■	■	■	-	-
Phase unbalance	-	-	-	-	-	■	■
Neutral	-	-	-	-	-	-	-
Measuring range							
Overvoltage	3x418 V AC	3x440 V AC	3x220-300 V AC	3x420-500 V AC	3x300-400 V AC	-	-
Undervoltage	3x342 V AC	3x360 V AC	3x160-230 V AC	3x300-380 V AC	3x210-300 V AC	-	-
Phase unbalance	-	-	-	-	-	2-25 % of average of phase voltages	
Thresholds							
Overvoltage	fixed		adjustable within measuring range				-
Undervoltage	fixed		adjustable within measuring range				-
Phase unbalance (switch-off value)	-	-	-	-	-	adjust. within meas. range	
Hysteresis related to the threshold value	-		fixed 5 %			fixed 20 %	
Rated frequency of the measuring signal	50/60 Hz						
Frequency range of the measuring signal	45-65 Hz						
Maximum measuring cycle time	100 ms						
Accuracy within the rated control supply voltage tolerance	$\Delta U \leq 0.5\%$						
Accuracy within the temperature range	$\Delta U \leq 0.06\% / \text{°C}$						
Measuring method	True RMS						
Timing circuit							
Start-up delay t_s	fixed 200 ms						
Tripping delay t_v	ON- or OFF-delay 0; 0.1-30 s adjustable					ON- delay 0; 0.1-30 s adjustable	
Repeat accuracy (constant parameters)	-	-	-	-	1 w 0.2 %	-	-
Accuracy within the rated control supply voltage tolerance	$\Delta t \leq 0.5\%$						
Accuracy within the temperature range	$\Delta t \leq 0.06\% / \text{°C}$						
Indication of operational states	Details see function description / -diagrams			1 yellow LED, 2 red LED's		Details see function description / -diagrams	
Output circuits							
Kind of output	15-16/18, 25-26/28 2x1 c/o contacts (Relays)						
Operating principle ¹⁾	closed-circuit principle						
Contact material	AgNi alloy, Cd free						
Rated operational voltage U_n	IEC/EN 60947-1 250 V						
Minimum switching power	24 V / 10 mA						
Maximum switching voltage	see load limit curve						

¹⁾ Closed-circuit principle: Output relay(s) de-energize(s) if measured value exceeds or falls below the adjusted threshold value

Three-phase monitoring relays

Technical data

Measuring &
monitoring relays
CM Range

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Type	CM-PSS.31	CM-PSS.41	CM-PVS.31	CM-PVS.41	CM-PVS.81	CM-PAS.31	CM-PAS.41	
Rated operational current I_o (IEC/EN 60947-5-1)	AC12 (resistive) 230 V			4 A				
	AC15 (inductive) 230 V			3 A				
	DC12 (resistive) 24 V			4 A				
	DC13 (inductive) 24 V			2 A				
	Utilization category (Control Circuit Rating Code)			B 300				
AC rating (UL 508)	max. rated operational voltage			300 V AC				
	max. continuous thermal current at B 300			5 A				
	max. making/breaking apparent power at B 300			3600/360 VA				
	Mechanical lifetime			30 x 10 ⁶ switching cycles				
Electrical lifetime (AC12, 230 V, 4 A)			0.1 x 10 ⁶ switching cycles					
Max. fuse rating to achieve short-circuit protection	n/c contact			6 A fast-acting				
	n/o contact			10 A fast-acting				
General data ¹⁾								
MTBF	on request							
Duty time	100%							
Dimensions (W x H x D)	product dimensions			22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in)				
	packaging dimensions			97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in)				
Weight	depending on device, see ordering details							
Mounting	DIN rail (IEC/EN 60715), snap-on mounting without any tool							
	any							
Mounting position	vertical / horizontal							
Minimum distance to other units	not necessary / not necessary							
Material of housing	UL 94 V-0							
Degree of protection	housing / terminals			IP50 / IP20				
Electrical connection ¹⁾								
Wire size	Screw connection technology			Easy Connect Technology (Push-in)				
	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm ² (1 x 20-14 AWG)			2 x 0.5-1.5 mm ² (2 x 20-16 AWG)			
		2 x 0.5-1.5 mm ² (2 x 20-16 AWG)						
rigid	1 x 0.5-4 mm ² (1 x 20-12 AWG)			2 x 0.5-1.5 mm ² (2 x 20-16 AWG)				
2 x 0.5-2.5 mm ² (2 x 20-14 AWG)								
Stripping length	8 mm (0.32 in)							
Tightening torque	0.6-0.8 Nm (5.31-7.08 lb.in)			-				
Environmental data								
Ambient temperature ranges	operation / storage			-25...+60 °C / -40...+85 °C				
Damp heat (IEC 60068-2-30)	55 °C, 6 cycles							
Climatic category	3K3							
Vibration (sinusoidal) (IEC/EN 60255-21-1)	Class 2							
Shock (IEC/EN 60255-21-2)	Class 2							
Isolation data ¹⁾								
Rated insulation voltage U_i	input circuit / output circuit			600 V				
	output circuit 1 / output circuit 2			300 V				
Rated impulse withstand voltage U_{imp} (VDE 0110, IEC/EN 60664)	input circuit			6 kV; 1.2/50 μs				
	output circuit			4 kV; 1.2/50 μs				
Test voltage between all isolated circuits (type test)	2.5 kV, 50 Hz, 1 s							
Basis isolation	input circuit / output circuit			600 V				
Protective separation (VDE 0106 part 101 and 101/A, IEC/EN 1140)	input circuit /			-				
	output circuit							
Pollution degree (VDE 0110, IEC/EN 60664)	3							
Overvoltage category (VDE 0110, IEC 60664)	III							
Standards								
Product standard	IEC/EN 60255-6, EN 50178							
Low Voltage Directive	2006/95/EG							
EMC directive	2004/108/EG							
RoHS directive	2002/95/EG							
Electromagnetic compatibility								
Interference immunity to			EN 61000-6-1, EN 61000-6-2					
electrostatic discharge	IEC/EN 61000-4-2			Level 3 (6 kV / 8 kV)				
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3			Level 3 (10 V/m)				
electrical fast transient / burst	IEC/EN 61000-4-4			Level 3 (2 kV / 2 kHz)				
surge	IEC/EN 61000-4-5			Level 4 (2 kV L-L)				
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6			Level 3 (10 V)				
Interference emission			Class 3					
high-frequency radiated	IEC/CISPR 22, EN 50022			EN 61000-6-3, EN 61000-6-4				
high-frequency conducted	IEC/CISPR 22, EN 50022			Class B				

¹⁾ Data for devices 1SVR 730 xxx xxx, 1SVR 740 xxx xxx, 1SVR 750 xxx xxx, 1SVR 760 xxx xxx. For devices 1SVR x30 xxx xxx, 1SVR x50 xxx xxx refer to the data sheet.

Three-phase monitoring relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Type	CM-MPS.11	CM-MPS.21	CM-MPS.31	CM-MPS.41
Input circuit = Measuring circuit	L1, L2, L3, N		L1, L2, L3	
Rated control supply voltage U_s = measuring voltage	3x90-170 V AC	3x180-280 V AC	3x160-300 V AC	3x300-500 V AC
Rated control supply voltage U_s tolerance	-15...+10 %			
Rated frequency	50/60 Hz			
Frequency range	45-65 Hz			
Typical current / power consumption	25 mA / 10 VA (115 V AC)	25 mA / 18 VA (230 V AC)	25 mA / 10 VA (230 V AC)	25 mA / 18 VA (400 V AC)
6 Measuring circuit	L1, L2, L3, N		L1, L2, L3	
Monitoring functions	Phase failure	■	■	■
	Phase sequence	-	can be switched off	
	Automatic phase sequence correction	-	-	-
	Over- / undervoltage	■	■	■
	Phase unbalance	■	■	■
	Interrupted neutral	■	-	■
Measuring range	Overvoltage	3x120-170 V AC	3x240-280 V AC	3x220-300 V AC
	Undervoltage	3x90-130 V AC	3x180-220 V AC	3x160-230 V AC
	Phase unbalance	2-25 % of average of phase voltages		
Thresholds	Overvoltage	adjustable within measuring range		
	Undervoltage	adjustable within measuring range		
	Phase unbalance (switch-off value)	adjustable within measuring range		
Hysteresis related to the threshold value	Over- / undervoltage	fixed 5 %		
	Phase unbalance	fixed 20 %		
Rated frequency of the measuring signal	50/60 Hz			
Frequency range of the measuring signal	45-65 Hz			
Maximum measuring cycle time	100 ms			
Accuracy within the rated control supply voltage tolerance	$\Delta U \leq 0.5\%$			
Accuracy within the temperature range	$\Delta U \leq 0.06\% / \text{°C}$			
Measuring method	True RMS			
Timing circuit	fixed 200 ms			
Start-up delay t_s	fixed 200 ms			
Tripping delay t_v	ON- or OFF-delay 0; 0.1-30 s adjustable			
Accuracy within the rated control supply voltage tolerance	$\Delta t \leq 0.5\%$			
Accuracy within the temperature range	$\Delta t \leq 0.06\% / \text{°C}$			
Indication of operational states	Details see function description / -diagrams			
Output circuits	15-16/18, 25-26/28			
Kind of output	1x2 c/o contacts (Relays)			
Operating principle ¹⁾	closed-circuit principle			
Contact material	AgNi alloy, Cd free			
Rated operational voltage U_o (IEC/EN 60947-1)	250 V			
Minimum switching power	24 V / 10 mA			
Maximum switching voltage	see load limit curve			
Rated operational current I_o (IEC/EN 60947-5-1)	AC12 (resistive) 230 V	4 A		
	AC15 (inductive) 230 V	3 A		
	DC12 (resistive) 24 V	4 A		
	DC13 (inductive) 24 V	2 A		
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)	B 300		
	max. rated operational voltage	300 V AC		
	max. continuous thermal current at B 300	5 A		
	max. making/breaking apparent power at B 300	3600/360 VA		
Mechanical lifetime	30 x 10 ⁶ switching cycles			
Electrical lifetime (AC12, 230 V, 4 A)	0,1 x 10 ⁶ switching cycles			
Max. fuse rating to achieve short-circuit protection	n/c contact	6 A fast-acting		
	n/o contact	10 A fast-acting		

Three-phase monitoring relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Type		CM-MPS.11	CM-MPS.21	CM-MPS.31	CM-MPS.41
General data ²⁾					
MTBF		on request			
Duty time		100%			
Dimensions	product dimensions	22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in)			
	packaging dimensions	97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in)			
(W x H x D)					
Weight		Screw connection technology	Easy Connect Technology (Push-in)		
	net weight	depending on device, see ordering details			
	gross weight	depending on device, see ordering details			
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool			
Mounting position		any			
Minimum distance to other units	vertical / horizontal	not necessary / not necessary			
Material of housing		UL 94 V-0			
Degree of protection	housing / terminals	IP50 / IP20			
Electrical connection ²⁾					
Wire size		Screw connection technology	Easy Connect Technology (Push-in)		
	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm ² (1 x 20-14 AWG) 2 x 0.5-1.5 mm ² (2 x 20-16 AWG)	2 x 0.5-1.5 mm ² (2 x 20-16 AWG)		
	rigid	1 x 0.5-4 mm ² (1 x 20-12 AWG) 2 x 0.5-2.5 mm ² (2 x 20-14 AWG)	2 x 0.5-1.5 mm ² (2 x 20-16 AWG)		
Stripping length		8 mm (0.32 in)			
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)		-	
Environmental data					
Ambient temperature ranges	operation / storage	-25...+60 °C / -40...+85 °C			
Damp heat (IEC 60068-2-30)		55 °C, 6 cycles			
Climatic category		3K3			
Vibration (sinusoidal) (IEC/EN 60255-21-1)		Class 2			
Shock (IEC/EN 60255-21-2)		Class 2			
Isolation data ²⁾					
Rated insulation voltage U_i	input circuit / output circuit	600 V			
	output circuit 1 / output circuit 2	300 V			
Rated impulse withstand voltage U_{imp} (VDE 0110, IEC/EN 60664)	input circuit	6 kV; 1.2/50 μ s			
	output circuit	4 kV; 1.2/50 μ s			
Test voltage between all isolated circuits (type test)		2.5 kV, 50 Hz, 1 s			
Basis isolation	input circuit / output circuit	600 V			
Protective separation (VDE 0106 part 101 and 101/A, IEC/EN 61140)	input circuit / output circuit	yes	-		
Pollution degree (VDE 0110, IEC/EN 60664)		3			
Overvoltage category (VDE 0110, IEC 60664)		III			
Standards ²⁾					
Product standard		IEC/EN 60255-6, EN 50178			
Low Voltage Directive		2006/95/EG			
EMC directive		2004/108/EG			
RoHS directive		2002/95/EG			
Electromagnetic compatibility					
Interference immunity to		EN 61000-6-1, EN 61000-6-2			
electrostatic discharge	IEC/EN 61000-4-2	Level 3 (6 kV / 8 kV)			
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)			
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3 (2 kV / 2 kHz)			
surge	IEC/EN 61000-4-5	Level 4 (2 kV L-L)			
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)			
harmonics and interharmonics	IEC/EN 61000-4-13	Class 3			
Interference emission		EN 61000-6-3, EN 61000-6-4			
high-frequency radiated	IEC/CISPR 22, EN 50022	Class B			
high-frequency conducted	IEC/CISPR 22, EN 50022	Class B			

¹⁾ Closed-circuit principle: Output relay(s) de-energize(s) if measured value exceeds or falls below the adjusted threshold value

²⁾ Data for devices 1SVR 730 xxx xxx, 1SVR 740 xxx xxx, 1SVR 750 xxx xxx, 1SVR 760 xxx xxx. For devices 1SVR x30 xxx xxx, 1SVR x50 xxx xxx refer to the data sheet.

Three-phase monitoring relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Type	CM-MPS.23	CM-MPS.43	CM-MPN.52	CM-MPN.62	CM-MPN.72
Input circuit = Measuring circuit					
Rated control supply voltage $U_s =$ measuring voltage	L1, L2, L3, N 3x180-280 V AC	3x300-500 V AC	L1, L2, L3 3x350-580 V AC 3x450-720 V AC 3x530-820 V AC		
Rated control supply voltage U_s tolerance	-15...+10 %				
Rated frequency	50/60/400 Hz 45-440 Hz		50/60 Hz 45-65 Hz		
Frequency range	5 mA / 4 VA (230 V AC)		5 mA / 4 VA (400 V AC)	29 mA / 41 VA (480 V AC)	29 mA / 52 VA (600 V AC)
Typical current / power consumption			29 mA / 59 VA (690 V AC)		
6 Measuring circuit					
Monitoring functions	L1, L2, L3, N	L1, L2, L3			
Phase failure	■	■	■	■	■
Phase sequence	can be switched off				
Automatic phase sequence correction	configurable				
Over- / undervoltage	■	■	■	■	■
Phase unbalance	■	■	■	■	■
Interrupted neutral	■	-	-	-	-
Measuring range					
Overvoltage	3x240-280 V AC	3x420-500 V AC	3x480-580 V AC	3x600-720 V AC	3x690-820 V AC
Undervoltage	3x180-220 V AC	3x300-380 V AC	3x350-460 V AC	3x450-570 V AC	3x530-660 V AC
Thresholds	2-25 % of average of phase voltages				
Overvoltage	adjustable within measuring range				
Undervoltage	adjustable within measuring range				
Phase unbalance (switch-off value)	adjustable within measuring range				
Hysteresis related to the threshold value	Over- / undervoltage fixed 5 % Phase unbalance fixed 20 %				
Rated frequency of the measuring signal	50/60/400 Hz		50/60 Hz		
Frequency range of the measuring signal	45-440 Hz		45-65 Hz		
Maximum measuring cycle time	100 ms				
Accuracy within the rated control supply voltage tolerance	$\Delta U \leq 0.5\%$				
Accuracy within the temperature range	$\Delta U \leq 0.06\% / \text{°C}$				
Measuring method	True RMS				
Timing circuit					
Start-up delay t_s and t_{s2}	fixed 200 ms				
Start-up delay t_{s1}	fixed 250 ms				
Tripping delay t_v	ON- or OFF-delay 0; 0.1-30 s adjustable		ON-delay 0; 0.1-30 s adjustable		
Accuracy within the rated control supply voltage tolerance	$\Delta t \leq 0.5\%$				
Accuracy within the temperature range	$\Delta t \leq 0.06\% / \text{°C}$				
Indication of operational states	Details see function description / -diagrams				
Output circuits					
Kind of output	15-16/18, 25-26/28 2x1 or 1x2 c/o contacts configurable (Relays)				
Operating principle ¹⁾	closed-circuit principle				
Contact material	AgNi alloy, Cd free				
Rated operational voltage U_o	IEC/EN 60947-1 250 V				
Minimum switching power	24 V / 10 mA				
Maximum switching voltage	see load limit curve				
Rated operational current I_o (IEC/EN 60947-5-1)	AC12 (resistive) 230 V: 4 A AC15 (inductive) 230 V: 3 A DC12 (resistive) 24 V: 4 A DC13 (inductive) 24 V: 2 A				
AC rating (UL 508)	Utilization category (Control Circuit Rating Code) B 300 max. rated operational voltage: 300 V AC max. continuous thermal current at B 300: 5 A max. making/breaking apparent power at B 300: 3600/360 VA				
Mechanical lifetime	30 x 10 ⁶ switching cycles				
Electrical lifetime (AC12, 230 V, 4 A)	0,1 x 10 ⁶ switching cycles				
Max. fuse rating to achieve short-circuit protection	n/c contact 6 A fast-acting		n/o contact 10 A fast-acting		

¹⁾ Closed-circuit principle: Output relay(s) de-energize(s) if measured value exceeds or falls below the adjusted threshold value

Three-phase monitoring relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Type	CM-MPS.23	CM-MPS.43	CM-MPN.52	CM-MPN.62	CM-MPN.72
General data ²⁾					
MTBF	on request				
Duty time	100%				
Dimensions (W x H x D)	product dimensions	22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in)			
	packaging dimensions	97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in)			
Weight	depending on device, see ordering details				
Mounting	DIN rail (IEC/EN 60715), snap-on mounting without any tool				
Mounting position	any				
Minimum distance to other units	vertical / horizontal	not necessary / not necessary			
Material of housing	UL 94 V-0				
Degree of protection	housing / terminals	IP50 / IP20			
Electrical connection ²⁾					
Wire size	fine-strand with(out) wire end ferrule	Screw connection technology		Easy Connect Technology (Push-in)	
		rigid	1 x 0.5-2.5 mm ² (1 x 20-14 AWG) 2 x 0.5-1.5 mm ² (2 x 20-16 AWG)	2 x 0.5-1.5 mm ² (2 x 20-16 AWG)	
Stripping length		8 mm (0.32 in)			
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)			
Environmental data					
Ambient temperature ranges	operation / storage	-25...+60 °C / -40...+85 °C			
Damp heat (IEC 60068-2-30)		55 °C, 6 cycles			
Climatic category		3K3			
Vibration (sinusoidal) (IEC/EN 60255-21-1)		Class 2			
Shock (IEC/EN 60255-21-2)		Class 2			
Isolation data ²⁾					
Rated insulation voltage U_i	input circuit / output circuit	600 V	1000 V		
	output circuit 1 / 2		300 V		
Rated impulse withstand voltage U_{imp} (VDE 0110, IEC/EN 60664)	input circuit	6 kV; 1.2/50 μ s	8 kV; 1.2/50 μ s		
	output circuit		4 kV; 1.2/50 μ s		
Test voltage (type test) between	isolated output circuits		2.5 kV, 50 Hz, 1 s		
	input circuit and isolated output circuits	2.5 kV, 50 Hz, 1 s	4 kV, 50 Hz, 1 s		
Basis isolation	input circuit / output circuit	600 V	1000 V		
Protective separation (VDE 0106 part 101 and 101/A, IEC/EN 61140)	input circuit / output circuit		-		
Pollution degree (VDE 0110, IEC/EN 60664)			3		
Overvoltage category (VDE 0110, IEC 60664)			III		
Standards ²⁾					
Product standard		IEC/EN 60255-6, EN 50178			
Low Voltage Directive		2006/95/EG			
EMC directive		2004/108/EG			
RoHS directive		2002/95/EG			
Electromagnetic compatibility					
Interference immunity to		EN 61000-6-1, EN 61000-6-2			
electrostatic discharge	IEC/EN 61000-4-2	Level 3 (6 kV / 8 kV)			
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)			
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3 (2 kV / 2 kHz)			
surge	IEC/EN 61000-4-5	Level 4 (2 kV L-N)	Level 4 (2 kV L-L)		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)			
harmonics and interharmonics	IEC/EN 61000-4-13	Class 3			
Interference emission		EN 61000-6-3, EN 61000-6-4			
high-frequency radiated	IEC/CISPR 22, EN 50022	Class B			
high-frequency conducted	IEC/CISPR 22, EN 50022	Class B			

²⁾ Data for devices 1SVR 730 xxx xxx, 1SVR 740 xxx xxx, 1SVR 750 xxx xxx, 1SVR 760 xxx xxx. For devices 1SVR x30 xxx xxx, 1SVR x50 xxx xxx refer to the data sheet.

Three-phase monitoring relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Type	CM-UFS.2	
Input circuit - Measuring circuit	L1, L2, L3	L-N
Rated control supply voltage $U_s =$ measuring voltage	3 x 400 V AC	3 x 230 V AC
Rated control supply voltage tolerance U_s	-20...+20 %	
Control supply voltage range	3 x 300-500 V AC	3 x 180-280 V AC
Rated frequency	50 Hz	
Frequency range	45-55 Hz	
Typical current / power consumption	23 mA / 16 VA	
Power failure buffering time	min. 20 ms	
6 Input circuit - measuring circuit	L1, L2, L3	L-N
Monitoring functions	<ul style="list-style-type: none"> Phase failure Over-/ undervoltage Over-/ underfrequency 10 minutes average value 	
Measuring range	Voltage range 3 x 320-480 V AC	3 x 184-276 V AC
Thresholds	Frequency range	45-55 Hz
	Overvoltage	fix, 120 % of U_s
	Undervoltage	fix, 80 % of U_s
	Overfrequency	50,3 or 51 Hz, configurable
	Underfrequency	49,7 or 49 Hz, configurable
Hysteresis related to the threshold value	Over-/ undervoltage	fix 5 %
	Over-/ underfrequency	fix 20 mHz
Rated frequency of the measuring signal	50 Hz	
Frequency range of the measuring signal	45-55 Hz	
Maximum measuring cycle time	50 ms	
Maximum reaction time (time between fault detection and change of switching status of the relay)	Over-/ undervoltage	< 120 ms
	Over-/ underfrequency	< 100 ms
10 minutes average value	-	
Accuracy within the rated control supply voltage tolerance	$\Delta U \leq 0,5\%$	
Accuracy within the temperature range	$\Delta U \leq 0,06\% / \text{°C}$	
Measuring method	True RMS	
Timing circuit		
Start-up delay t_{s1} prior to grid connection after a short interruption	fix, 1 s	
Restart delay t_{s2}	adjustable, 0 s; 0,1 – 30 s	
Accuracy within the rated control supply voltage tolerance	$\Delta t \leq 0,5\%$	
Accuracy within the temperature range	$\Delta t \leq 0,06\% / \text{°C}$	
Indication of operational states	1 yellow LED, 2 red LEDs Details see operation mode and function description/diagrams	
Output circuits	15-16/18, 25-26/28	
Kind of output	Relais, 1 x 2 changeover	
Operation principle ¹⁾	closed-circuit principle	
Contact material	AgNi alloy, Cd free	
Rated operational voltage U_o (IEC/EN 60947-1)	250 V	
Minimum switching voltage / switching current	24 V / 10 mA	
Maximum switching voltage / switching current	see load limit curve	
Rated operational current I_o (IEC/EN 60947-5-1)	AC12 (resistive) 230 V	4 A
	AC15 (inductive) 230 V	3 A
	DC12 (resistive) 24 V	4 A
	DC13 (inductive) 24 V	2 A
Mechanical lifetime	30 x 10 ⁶ switching cycles	
Electrical lifetime (AC12, 230 V, 4 A)	0,1 x 10 ⁶ switching cycles	
Max. fuse rating to achieve short-circuit protection	n/c contact	6 A fast-acting
	n/o contact	10 A fast-acting

Three-phase monitoring relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Type		CM-UFS.2
General data		
MTBF		on request
Duty time		100%
Dimensions (W x H x D)	product dimensions	22.5 x 78 x 100 mm (0.89 x 3.07 x 3.94 in)
Weight	gross weight	0.140 (0.31)
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool
Mounting position		any
Minimum distance to other units	vertical / horizontal	not necessary / not necessary
Degree of protection	housing / terminals	IP50 / IP20
Electrical connection		
Wire size	fine-strand with(out) wire end ferrule	2 x 0.75 - 2.5 mm ² (2 x 18-14 AWG)
	rigid	2 x 0.5 - 4 mm ² (2 x 20-12 AWG)
Stripping length		7 mm (0.28 in)
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)
Environmental data		
Ambient temperature range	operation / storage	-25...+60 °C / -40...+85 °C
Damp heat, cyclic (IEC/EN 60068-2-30)		2 x 12 h cycle, 55 °C, 95 % RH
Climatic category (IEC/EN 60721-3-1)		3K3
Vibration (sinusoidal) (IEC/EN 60255-21-1)		Class 2
Shock (IEC/EN 60255-21-2)		Class 2
Isolation data		
Rated impulse withstand voltage U_i	input circuit / output circuit	600 V
	output circuit 1 / 2	300 V
Rated impulse withstand voltage U_{imp} (VDE 0110, IEC/EN 60664)	input circuit	6 kV; 1.2/50 μ s
	output circuit	4 kV; 1.2/50 μ s
Test voltage between all isolated circuits (type test)		2.5 kV, 50 Hz, 1 s
Basis isolation	input circuit / output circuit	600 V
Protective separation (VDE 0160 Part 101 and 101/A, IEC/EN 61140)	input circuit / output circuit	yes
Pollution degree (VDE 0110, IEC/EN 60664)		3
Overvoltage category (VDE 0110, IEC 60664)		III
Standards		
Product standard	Type-tested in accordance with "Guideline for Connections to ENEL distribution network" Ed.2.1., January 2011	
Further standards	EN 50178, EN 61727	
Low Voltage Directive	2006/95/EG	
EMV-Directive	2004/108/EG	
RoHS-Directive	2002/95/EG	
Electromagnetic compatibility		
Interference immunity to	IEC/EN 61000-6-1, IEC/EN 61000-6-2	
electrostatic discharge	IEC/EN 61000-4-2	Level 3 (6 kV / 8 kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3 (2 kV / 2 kHz)
surge	IEC/EN 61000-4-5	Level 4 (2 kV L-L, L-N)
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)
harmonics and interharmonics	IEC/EN 61000-4-13	Class 3
Interference emission	IEC/EN 61000-6-3, IEC/EN 61000-6-4	
high-frequency radiated	IEC/CISPR 22, EN 50022	Class B
high-frequency conducted	IEC/CISPR 22, EN 50022	Class B

¹⁾ Closed-circuit principle: Output relay(s) de-energize(s) if measured value exceeds or falls below the adjusted threshold value

Notes



Insulation monitoring relays
for unearthed supply systems

CM-E Range Insulation monitoring relays



Insulation monitoring relays for unearthed supply systems

Benefits and advantages

6



Insulation monitoring relays for unearthed pure AC systems: Characteristics

- For monitoring the insulation resistance of unearthed IT system: up to $U_n = 400$ V AC
- According to IEC/EN 61227-8 "Electrical safety in low voltage distribution systems up to 1000 V AC and 1500 V DC – Equipment for testing, measuring or monitoring of protective measures – Part 8: Insulation monitoring devices for IT systems"
- Rated control supply voltage 24–240 V AC/DC
- Superimposed DC signal
- One measuring range 1–100 kW
- Precise adjustment of the threshold value in 1 kW steps
- Interrupted wire detection
- Fault storage/latching configurable by control input
- 1 c/o contact, closed-circuit principle
- 22.5 mm [0.89 in] width
- 3 LEDs for status indication

A new generation of insulation monitoring relays of the CM range consolidates ABB's strengths in innovative control products.

The new products are in accordance to IEC/EN 61557-1 and to IEC/EN 61557-8. That means the monitoring relays can be used directly to measure the insulation resistance in unearthed AC and DC mains with a voltage up to 690 V AC and 1000 V DC!

With the new prognostic measuring principle the measuring and response time is reduced significantly.

Insulation monitoring relays for unearthed AC, DC or mixed AC/DC systems: Characteristics

- For monitoring the insulation resistance of unearthed IT systems up to $U_n = 250$ V AC and 300 V DC or $U_n = 400$ V AC and 600 V DC
- According to IEC/EN 61227-8 "Electrical safety in low voltage distribution systems up to 1000 V AC and 1500 V DC – Equipment for testing, measuring or monitoring of protective measures – Part 8: Insulation monitoring devices for IT systems"
- Rated control supply voltage 24–240 V AC/DC
- Prognostic measuring principle with superimposed square wave signal
- 1 or 2 measuring ranges (1-100kW or 1-100 kW + 2-200 kOhm)¹⁾
- 1 or 2 (configurable) c/o contacts¹⁾
- Precise adjustment of the measuring value in 1 or 2 kW steps¹⁾
- (non-volatile) fault storage, configurable latching, interrupted wire protection, open- or closed-circuit principle selectable¹⁾
- 22.5 or 45 mm width
- 3 LEDs for status indication
- Solution for solar available

¹⁾ depending on device

Standardization background:

- IEC/EN 61557-1 "Electrical safety in low voltage distribution system up to 1000 V AC and 1500 V DC – Equipment for testing, measuring or monitoring of protective measures – Part 1: General requirements"
- IEC/EN 61557-8 "Electrical safety in low voltage distribution system up to 1000 V AC and 1500 V DC – Equipment for testing, measuring or monitoring of protective measures – Part 1: Insulation monitoring devices for IT systems"

Insulation monitoring relays for unearthed supply systems

Insulation monitoring in IT systems

In electricity supply systems, an earthing system defines the electrical potential of the conductors relative to that of the earth's conductive surface. The choice of earthing system has implications for the safety and electromagnetic compatibility of the power supply. Note that regulations for earthing (grounding) systems vary considerably among different countries.

The international standard IEC 60364 distinguishes three families of earthing arrangements, using the two-letter codes TN, TT and IT.

IT supply systems

The IT system is supplied either by an isolation transformer or a voltage source, such as battery or a generator. In this system no active conductor is directly connected to earth potential. The advantage of this is that only a small fault current can flow in case of an insulation fault. This current is essentially caused by the system's leakage capacitance. The system's fuse or MCB does not respond, thus maintaining the voltage supply and therefore operation even in case of a phase-to-earth fault.

The first letter indicates the connection between earth and the power-supply equipment (generator or transformer):

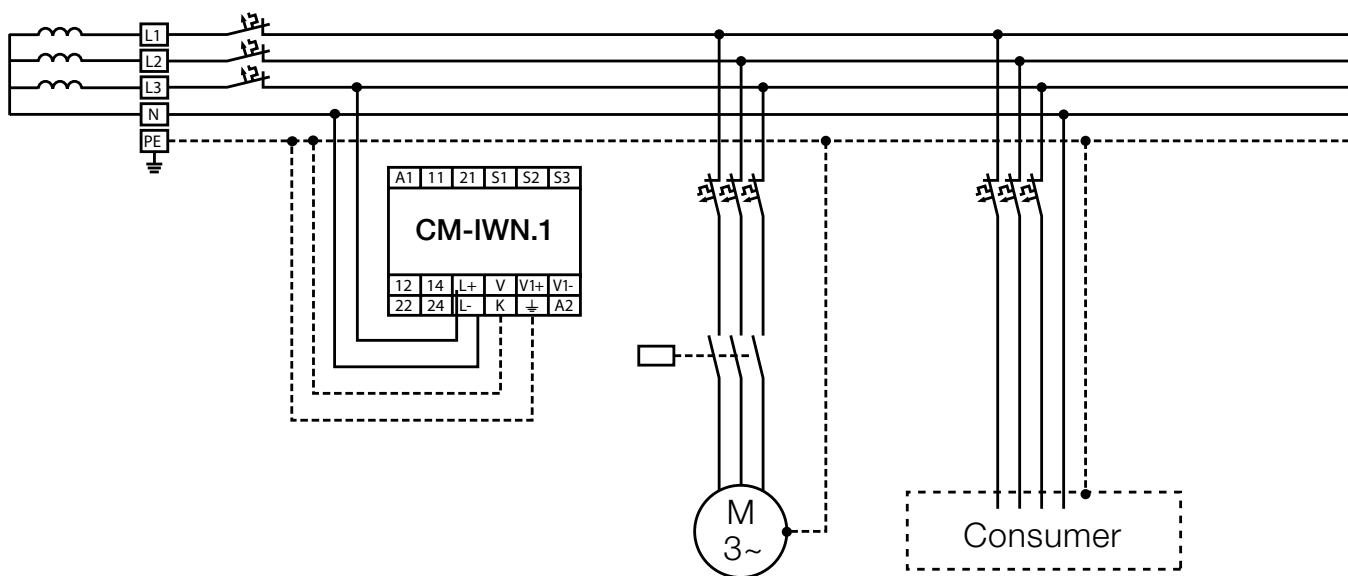
- T: direct connection of a point with earth (Latin: terra)
- I: no point is connected with earth (insulation), except perhaps via a high impedance

The second letter indicates the connection between earth and the electrical device being supplied:

- T: direct connection of a point with earth
- N: direct connection to neutral at the origin of installation, which is connected to the earth

The high reliability of an IT system is guaranteed thanks to continuous insulation monitoring.

The insulation monitoring device recognizes insulation faults as they develop, and immediately reports that the value has fallen below the minimum. This prevents operational interruptions caused by a second more severe insulation fault.



Insulation monitoring relays for unearthed supply systems

Application / monitoring function, measuring principle

6

Application / monitoring function CM-IWS.2

The CM-IWS.2 serves to monitor insulation resistance in accordance with IEC 61557-8 in unearthed IT AC systems. The insulation resistance between system lines and system earth is measured. If this falls below the adjustable threshold values, the output relay de-energizes. The device can monitor control circuits (single-phase) and main circuits (3-phase). Supply systems with voltages $U_n = 0-400$ V AC (45-65 Hz) can be directly connected to the measuring inputs and their insulation resistance being monitored. For systems with voltages above 400 V AC the insulation monitoring relay CM-IWN.1 with or without the coupling unit CM-IVN can be used.

Application / monitoring function CM-IWS.1

The CM-IWS.1 serves to monitor insulation resistance in accordance with IEC 61557-8 in unearthed IT AC systems, IT AC systems with galvanically connected DC circuits, or unearthed IT DC systems. The insulation resistance between system lines and system earth is measured. If this falls below the adjustable threshold value, the output relay de-energizes. The device can monitor control circuits (single-phase) and main circuits (3-phase). Supply systems with voltages $U_n = 0-250$ V AC (15-400 Hz) or 0-300 V DC can be directly connected to the measuring inputs and their insulation resistance being monitored. For systems with voltages above 250 V AC and 300 V DC the insulation monitoring relay CM-IWN.x with or without the coupling unit CM-IVN can be used.

Application / monitoring function CM-IWN.1 / CM-IWN.5

The CM-IWN.x serves to monitor insulation resistance in accordance with IEC 61557-8 in unearthed IT AC systems, IT AC systems with galvanically connected DC circuits, or unearthed IT DC systems. The insulation resistance between system lines and system earth is measured. If this falls below the adjustable threshold values, the output relays switch into the fault state. The device can monitor control circuits (single-phase) and main circuits (3-phase). Supply systems with voltages $U_n = 0-400$ V AC (15-400 Hz) or 0-600 V DC can be directly connected to the measuring inputs and their insulation resistance being monitored. For systems with voltages above 400 V AC and 600 V DC the coupling unit CM-IVN can be used for the expansion of the CM-IWN.x voltage range.

Application / monitoring function CM-IVN

The coupling unit CM-IVN is designed to extend the nominal voltage range of the insulation monitoring relay CM-IWN.1 up to 690 V AC and 1000 V DC. The coupling unit can be connected to the system to be monitored by means of the terminals VL+ and VL-. The terminal V_{\perp} has to be connected to the earth potential. The terminals L+, V1+, L-, V1-, VS and VE have to be connected to the CM-IWN.1 as shown in the connection diagrams below. Supply systems with voltages $U_n = 0-690$ V AC (15-400 Hz) or 0-1000 V DC can be connected.

Measuring principle CM-IWS.2

A superimposed DC measuring signal is used for measurement. From the superimposed DC measuring voltage and its resultant current the value of the insulation resistance of the system to be monitored is calculated.

Measuring principle CM-IWS.1

A pulsating measuring signal is fed into the system to be monitored and the insulation resistance calculated. This pulsating measuring signal alters its form depending on the insulation resistance and system leakage capacitance. From this altered form the change in the insulation resistance is forecast. When the forecast insulation resistance corresponds to the insulation resistance calculated in the next measurement cycle and is smaller than the set threshold value, the output relay de-energizes. This measuring principle is also suitable for the detection of symmetrical insulation faults.

Measuring principle CM-IWN.1 / CM-IWN.5

A pulsating measuring signal is fed into the system to be monitored and the insulation resistance calculated.

This pulsating measuring signal alters its form depending on the insulation resistance and system leakage capacitance. From this altered form the change in the insulation resistance is forecast. When the forecast insulation resistance corresponds to the insulation resistance calculated in the next measurement cycle and is smaller than the set threshold value, the output relays are activated or deactivated, depending on the device configuration. This measuring principle is also suitable for the detection of symmetrical insulation faults.

Measuring principle CM-IVN

With CM-IWN.1 a pulsating measuring signal is fed into the system to be monitored and the insulation resistance calculated. This pulsating measuring signal alters its form depending on the insulation resistance and system leakage capacitance. From this altered form the change in the insulation resistance is forecast. When the forecast insulation resistance corresponds to the insulation resistance calculated in the next measurement cycle and is smaller than the set threshold value, the output relays are activated or deactivated, depending on the device configuration. This measuring principle is also suitable for the detection of symmetrical insulation faults.

Characteristics CM-IWS.2

- For monitoring the insulation resistance of unearthed IT systems up to $U_n = 400$ V AC
- Rated control supply voltage 24-240 V AC/DC
- Measuring principle with superimposed DC voltage
- One measuring range 1-100 k Ω
- Precise adjustment of the threshold value in 1 k Ω steps
- Fault storage / latching configurable by control input
- 1 c/o contact, closed-circuit principle
- 22.5 mm [0.89 in] width
- 3 LEDs for status indication

Characteristics CM-IWS.1

- For monitoring the insulation resistance of unearthed IT systems up to $U_n = 250$ V AC and 300 V DC
- Rated control supply voltage 24-240 V AC/DC
- Prognostic measuring principle with superimposed square wave signal
- One measuring range 1-100 k Ω
- Precise adjustment of the threshold value in 1 k Ω steps
- Interrupted wire detection
- Fault storage / latching configurable by control input
- 1 c/o [SPDT] contact, closed-circuit principle
- 22.5 mm [0.89 in] width
- 3 LEDs for status indication

Characteristics CM-IWN.1, CM-IWN.5

- For monitoring the insulation resistance of unearthed IT systems up to $U_n = 400$ V AC and 600 V DC
- CM-IWN.5: According to IEC/EN 61557-8 "Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 8: Insulation monitoring devices for IT systems"
- Rated control supply voltage 24-240 V AC/DC
- Prognostic measuring principle with superimposed square wave signal
- Two measuring ranges 1-100 k Ω and 2-200 k Ω
- One (1 x 2 c/o) or two (2 x 1 c/o) threshold values $R_{an1}/R1^{1)}$ (final switch-off) and $R_{an2}/R21$ (prewarning) configurable²⁾
- Precise adjustment of the threshold values in 1 k Ω steps (R1) and 2 k Ω steps (R2)
- Interrupted wire detection configurable
- Non-volatile fault storage configurable
- Open- or closed-circuit principle configurable
- 45 mm (1.77 in) width
- 3 LEDs for status indication

¹⁾ term. acc. to IEC/EN 61557-8

²⁾ R2 only active with 2 x 1 c/o configuration

Characteristics CM-IVN

- Expansion of the nominal voltage range of the insulation monitoring relay CM-IWN.1 for monitoring the insulation resistance of unearthed IT systems up to 690 V AC and 1000 V DC
- According to IEC/EN 61557-8 "Electrical safety in low voltage distribution systems up to 1000 V AC and 1500 V DC – Equipment for testing, measuring or monitoring of protective measures – Part 8: Insulation monitoring devices for IT systems"
- Passive device, no supply voltage needed
- 45 mm [1.77 in] width

Insulation monitoring relays for unearthed supply systems

Selection and conversion table



6

Typical applications

Benefits of ABB's new range of insulation monitoring relays:

- Extended measuring voltage range AC and DC
- All devices with wide supply voltage range
- Reduced number of references
- Optimized solutions for solar applications

	Reference code	Catalog number
	CM-IWS.2	1SVR630670R0200
	CM-IWS.1	1SVR630660R0100
	CM-IWN.1	1SVR650660R0200
	CM-IWN.4	1SVR650660R0300
	CM-IWN.5	1SVR650660R0400
	CM-IWN.6	1SVR650660R0500
	CM-IVN	1SVR650669R9400
Rated control supply voltage U_c		
24 - 240 VAC/DC	■	■
Measuring voltages		
250 V AC (L-PE)	■	■
400 V AC (L-PE)	■	■
690 V AC	■	■
300 V DC (L-PE)	■	■
600 V DC (L-PE)	■	■
1000 V DC	■	■
Measuring range		
1 - 100 k Ω	■	■
2 - 200 k Ω	■	■
Output contacts		
1 c/o	■	■
1 x 2 c/o or 2 x 1 c/o	■	■
Working principle		
open circuit principle	■	■
open or closed principle adjustable	■	■
Test		
Front face button or control input	■	■
Reset		
Front face button or control input	■	■
Fault storage / latching configurable	■	■
Non voltage storage configurable	■	■
Interrupted wire detection	■	■
Threshold values configurable	1	1 2 2 2 2
System leakage capacitance, max.		
10 μ F	■	■
20 μ F	■	■
500 μ F	■	■
1000 μ F	■	■
2000 μ F	■	■
Coupling unit		
		Yes Yes Yes Yes CM-IWN.1-6

Insulation monitoring relays for unearthed supply systems

Ordering details

Measuring & monitoring relays
CM Range

NEW



CM-IWS.2

Description

The high reliability of an IT system is guaranteed thanks to continuous insulation monitoring. An insulation monitoring device recognizes insulation faults as they develop, and immediately reports that the value has fallen below the minimum. This prevents operational interruption caused by a second, more severe insulation fault.

ABB developed a totally new range of insulation monitors for AC, DC or mixed AC/DC IT Systems up to 690 V AC or 1000 V DC. With only 4 devices most standard applications can be served. Additionally a version for solar applications with increased earth leakage capacitance has been added.



CM-IWS.1



CM-IWN.1



CM-IVN

Ordering details

Rated control supply voltage = measuring voltage	Nominal voltage U_n of the distribution system to be monitored	System leakage capacitance, max.	Adjustment range of the specified response value R_{an} (threshold)	Reference code	Catalog number	Weight (1 pce) kg (lb)
24-240 V AC/DC	0-250 V AC / 0-300 V DC	10 μ F	1-100 kW	CM-IWS.1	1SVR630660R0100	0.133 (0.293)
24-240 V AC/DC	0-400 V AC	10 μ F	1-100 kW	CM-IWS.2	1SVR630670R0200	0.127 (0.280)
24-240 V AC/DC	0-400 V AC / 0-600 V DC	20 μ F	1-100 kW 2-200 kW	CM-IWN.1	1SVR650660R0200	0.231 (0.509)
24-240 V AC/DC	0-400 V AC / 0-600 V DC	1000 μ F	(activated / de-activated by DIP-switch)	CM-IWN.5	1SVR650660R0400	0.231 (0.509)
Passive device, no control supply voltage needed	0-690 V AC / 0-1000 V DC			CM-IVN	1SVR650669R9400	0.169 (0.373)

Ordering details - New range available at 4th quarter of 2012

Rated control supply voltage = measuring voltage	Nominal voltage U_n of the distribution system to be monitored	System leakage capacitance, max.	Adjustment range of the specified response value R_{an} (threshold)	Reference code	Catalog number	Weight (1 pce) kg (lb)
24-240 V AC/DC	0-250 V AC / 0-300 V DC	10 μ F	1-100 k Ω	CM-IWS.1S	1SVR730660R0100	0.148 (0.326)
				CM-IWS.1P	1SVR740660R0100	0.137 (0.302)
24-240 V AC/DC	0-400 V AC	10 μ F	1-100 k Ω	CM-IWS.2S	1SVR730670R0200	0.141 (0.311)
				CM-IWS.2P	1SVR740670R0200	0.130 (0.287)
24-240 V AC/DC	0-400 V AC / 0-600 V DC	20 μ F	1-100 k Ω 2-200 k Ω	CM-IWN.1S	1SVR750660R0200	0.241 (0.531)
				CM-IWN.1P	1SVR760660R0200	.217 (0.478)
24-240 V AC/DC	0-400 V AC / 0-600 V DC	500 μ	(activated / de-activated by DIPswitch)	CM-IWN.4S	1SVR750660R0300	0.241 (0.531)
				CM-IWN.4P	1SVR760660R0300	0.217 (0.478)
24-240 V AC/DC	0-400 V AC / 0-600 V DC	1000 μ F		CM-IWN.5S	1SVR750660R0400	0.241 (0.531)
				CM-IWN.5P	1SVR760660R0400	0.217 (0.478)
24-240 V AC/DC	0-400 V AC / 0-600 V DC	2000 μ F		CM-IWN.6S	1SVR760660R0500	0.241 (0.531)
				CM-IWN.6P	1SVR760660R0500	0.217 (0.478)

Insulation monitoring relays for unearthed supply systems

Operating state indication

LEDs, status information and fault messages CM-IWS.2

Operational state	LED U (green)	LED F (red)	LED R (yellow)
Start-up		OFF	OFF
No fault		OFF	
Insulation fault (below threshold value)			OFF
Invalid measuring result			OFF
Internal system fault	OFF		OFF
Test function		OFF	OFF
No fault after fault storage ¹⁾		²⁾	

1) The device has triggered after an insulation fault. The fault has been stored and the insulation resistance has returned to a higher value than the threshold value plus hysteresis.

2) Depending on the fault.

6

LEDs, status information and fault messages CM-IWS.1

Operational state	LED U (green)	LED F (red)	LED R (yellow)
Start-up		OFF	OFF
No fault		OFF	
Insulation fault (below threshold value)			OFF
KE/⊥ wire interruption			OFF
System leakage capacitance too high / invalid measurement result			OFF
Internal system fault	OFF		OFF
Test function		OFF	OFF
No fault after fault storage ¹⁾		²⁾	

1) The device has triggered after an insulation fault. The fault has been stored and the insulation resistance has returned to a higher value than the threshold value plus hysteresis.

2) Depending on the fault.

LEDs, status information and fault messages CM-IWN.1, CM-IWN.5

Operational state	LED U (green)	LED F (red)	LED R (yellow)
Start-up		OFF	OFF
No fault		OFF	¹⁾
Prewarning			
Insulation fault (below threshold value)			¹⁾
KE/⊥ wire interruption			¹⁾
L+/L- wire interruption during system start-up / test function	/		¹⁾
System leakage capacitance too high / invalid measurement result			¹⁾
Internal system fault	¹⁾		¹⁾
Setting fault ²⁾			
Test function		OFF	¹⁾
No fault after fault storage ³⁾		⁴⁾	

1) Depending on the configuration

2) Possible faulty setting: The threshold value for final switch-off is set at a higher value than the threshold value for prewarning.

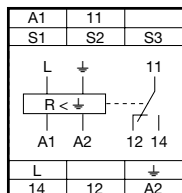
3) The device has triggered after an insulation fault. The fault has been stored and the insulation resistance has returned to a higher value than the threshold value plus hysteresis.

4) Depending on the fault

Insulation monitoring relays for unearthed supply systems

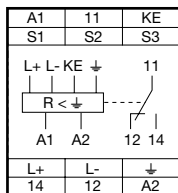
Connection diagrams, DIP switches

Connection diagram CM-IWS.2



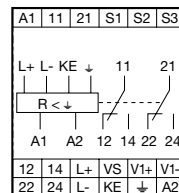
- A1-A2 Control supply voltage
- S1-S3 Remote test
- S2-S3 Remote reset
- L Measuring circuit/input, system connection
- ↓ Measuring circuit/input, earth connections
- 11-12/14 Output relay, closed-circuit principle

Connection diagram CM-IWS.1



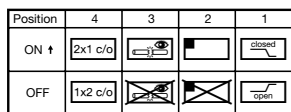
- A1-A2 Control supply voltage
- S1-S3 Remote test
- S2-S3 Remote reset
- L+, L- Measuring circuit/input, system connection
- ↓, KE Measuring circuit/input, earth connections
- 11-12/14 Output relay, closed-circuit principle

Connection diagram CM-IWN.1



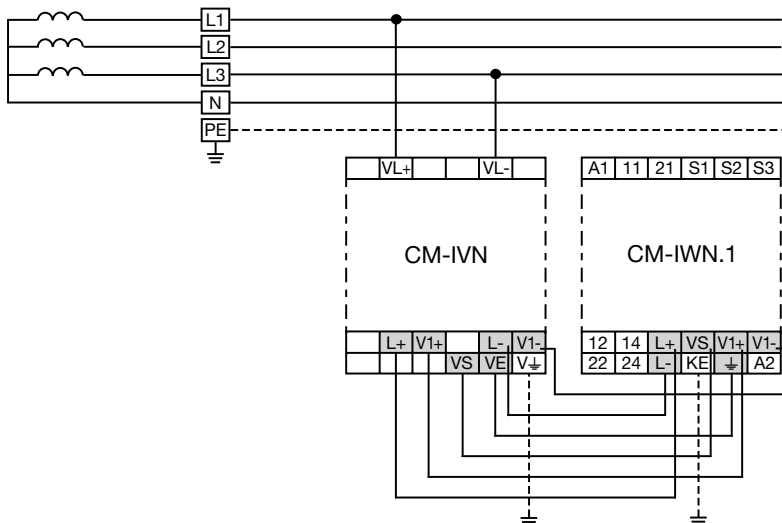
- A1-A2 Control supply voltage
- S1-S3 Remote test
- S2-S3 Remote reset
- L+, L-, ↓, KE Measuring circuit/input, system connection
- VS, V1+, V1- Measuring circuit/input, earth connections
- 11-12/14 Connections for the coupling unit (if used)
- 21-22/24 Output relay 1, open- or closed-circuit principle
- Output relay 2, open- or closed-circuit principle

DIP switches of IWN.1



	ON	OFF (default)
DIP switch 1	Closed-circuit principle <input type="checkbox"/>	Open-circuit principle <input type="checkbox"/>
Operating principle of the output relays	If closed-circuit principle is selected, the output relays de-energize in case a fault is occurring. In non-fault state the relays are energized.	If open-circuit principle is selected, the output relays energize in case a fault is occurring. In non-fault state the relays are de-energized.
DIP switch 2	Fault storage activated (latching) <input type="checkbox"/>	Fault storage de-activated (non latching) <input checked="" type="checkbox"/>
Non-volatile fault storage	If the fault storage function is activated, the output relays remain in tripped position until a reset is done either by the front-face button or by the remote reset connection S2-S3. This function is non-volatile.	If the fault storage function is de-activated, the output relays switch back to their original position as soon as the insulation fault no longer exists.
DIP switch 3	Interrupted wire detection activated <input checked="" type="checkbox"/>	Interrupted wire detection de-activated <input type="checkbox"/> With this configuration the interrupted wire detection is de-activated.
Interrupted wire detection	With this configuration, the CM-IWN.1 monitoring relays the wires connected to + and KE for interruptions.	
DIP switch 4	2 x 1 c/o (SPDT) contact <input checked="" type="checkbox"/>	1 x 2 c/o (SPDT) contacts <input type="checkbox"/>
2 x 1 c/o, 1 x 2 c/o	If operating principle 2 x 1 c/o contact is selected, the output relay R1 (11-12/14) reacts to threshold value R1 (final switch-off) and the output relay R2 (21-22/24) reacts to threshold value R2 (prewarning)	If operating principle 1 x 2 c/o contacts is selected, both output relays R1 (11-12/14) and R2 (21-22/24) react synchronously to threshold value R1. Settings of the threshold value R2 have no effect on the operation.

Connection diagram CM-IVN



- VE Connection to CM-IWN.1 - ↓
- VS Connection to CM-IWN.1 - VS
- L+ Connection to CM-IWN.1 - L+
- V1+ Connection to CM-IWN.1 - V1+
- L- Connection to CM-IWN.1 - L-
- V1- Connection to CM-IWN.1 - V1-
- VL+, VL- Measuring circuit / Measuring input
Connection to the system
- V↓ Measuring circuit / Measuring input
Connection to earth

Insulation monitoring relays for unearthed supply systems

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

		CM-IWS.2	CM-IWS.1	CM-IWN.1,4,5,6
Input circuit - Supply circuit				
Rated control supply voltage U_c		A1 - A2 24-240 V AC/DC		
Rated control supply voltage tolerance		-15...+10 %		
Typical current / power consumption	24 V DC	30 mA / 0.7 VA	35 mA / 0.9 VA	55 mA / 1.3 VA
	115 V AC	12 mA / 1.4 VA	17 mA / 2.0 VA	20 mA / 2.3 VA
	230 V AC	12 mA / 2.8 VA	14 mA / 3.2 VA	15 mA / 3.5 VA
Rated frequency f_n		DC or 15-400 Hz		
Frequency range AC		13.5-440 Hz		
Power failure buffering time	min.	20 ms		
Input circuit - Measuring circuit				
Monitoring function		L, ↓	L+, L-, ↓, KE	L+, L-, ↓, KE
Measuring principle		insulation resistance monitoring of IT systems (IEC/EN 61557-8) superimposed DC voltage	prognostic measuring principle with superimposed square wave signal	
Nominal voltage U_n of the distribution system to be monitored		0-400 V AC	0-250 V AC / 0-300 V DC	400 V AC / 0-600 V DC
Voltage range of the distribution system to be monitored		0-460 V AC (tolerance +15 %)	0-287.5 V AC / 0-345 V DC (tolerance +15 %)	0-460 V AC / 0-690 V DC (tolerance +15 %)
Rated frequency f_n of the distribution system to be monitored		50-60 Hz	DC or 15-400 Hz	DC or 15-400 Hz
System leakage capacitance C_e	max.		10 μ F	CM-IWN.1 20 μ F CM-IWN.5 1000 μ F
Tolerance of the rated frequency f_n		45-65 Hz	13.5-440 Hz	13.5-440 Hz
Extraneous DC voltage U_{dc} (when connected to an AC system)	max.	none	290 V DC	460 V DC
Number of possible response / threshold values			1	2
Adjustment range of the specified response value R_{an} (threshold)	min.-max.		1-100 k Ω	-
	min.-max. R1		-	1-100 k Ω
	min.-max. R2		-	2-200 k Ω (activated / de-activated by DIP-switch)
Adjustment resolution			1 k Ω	
	R1		1 k Ω	1 k Ω
	R2		-	2 k Ω
Tolerance of the adjusted threshold value / Relative percentage uncertainty A	at 1-10 kW R_F		± 0.5 k Ω	-
at -5...+45 °C, $U_n = 0-115$ %, $U_s = 85-110$ %, $f_n = 15-400$ Hz, $C_e = 1$ μ F	at 10-100 kW R_F		± 6 %	-
	at 1-15 kW R_F		-	± 1 k Ω *
	at 15-200 kW R_F		-	± 8 %
Hysteresis related to the threshold value			25 %; min. 2 k Ω	
Internal impedance Z	at 50 Hz	135 k Ω	100 k Ω	155 k Ω
Internal DC resistance R		185 k Ω	115 k Ω	185 k Ω
Measuring voltage U_m		15 V	22 V	24 V
Tolerance of measuring voltage U_m			+10 %	
Measuring current I_m	max.	0.1 mA	0.3 mA	0.15 mA
Response time t_{an}	pure AC system	0.5 x R_{an} and $C_e = 1$ μ F		
	DC system or AC system with connected rectifiers			max. 15 s
Repeat accuracy (constant parameters)				< 0.1 % of full scale
Accuracy of R_a (measured value) within the rated control supply voltage tolerance				< 0.05 % of full scale
Accuracy of R_a (measured value) within the operation temperature range	at 1-10 kW R_F		5 W / K	-
	at 10-100 kW R_F		0.05 % / K	-
	at 10-200 kW R_F		-	0.05 % / K
Transient over voltage protection ($\frac{1}{2}$ - terminal)		Z-diode		avalanche diode
Input circuit - Control circuits				
Control inputs - volt free	S1-S3		S1 - S2 - S3	
	S2-S3		remote test	
			remote reset	
Maximum switching current in the control circuit			1 mA	
Maximum cable length to the control inputs			50 m - 100 pF/m [164 ft - 30.5 pF/ft]	
Minimum control pulse length			150 ms	
No-load voltage at the control input		≤ 24 V ± 5 %		≤ 24 V DC
Indication of operational states				
Control supply voltage			LED U (green)*	
Fault message			LED F (red)*	
Relay status			LED R (yellow)*	

*in combination with CM-IWN ± 1.5 k Ω

Insulation monitoring relays for unearthed supply systems

Technical data

Measuring &
monitoring relays
CM Range

	CM-IWS.2	CM-IWS.1	CM-IWN.1,4,5,6
Output circuits			
Kind of output	relay, 1 c/o (SPDT) contact		2 x 1 or 1 x 2 c/o (SPDT) contacts configurable
Operating principle	closed-circuit principle ¹⁾		open- or closed circuit principle ¹⁾ configurable
Contact material	AgNi alloy, Cd free		
Rated voltage (VDE 0110, IEC 60947-1)	250 V AC / 300 V DC		
Min. switching voltage / Min. switching current	24 V / 10 mA		
Max. switching voltage / Max. switching current	see data sheet		
Rated operational current I _o (IEC/EN 60947-5-1)	AC12 (resistive) at 230 V	4 A	
	AC15 (inductive) at 230 V	3 A	
	DC12 (resistive) at 24 V	4 A	
	DC13 (inductive) at 24 V	2 A	
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)	B 300, pilot duty general purpose (250 V, 4 A, cos φ 0.75)	
	max. rated operational voltage	250 V AC	
	max. continuous thermal current at B 300	4 A	
	max. making/breaking apparent power at B 300	3600/360 VA	
Mechanical lifetime		30 x 10 ⁶ switching cycles	
Electrical lifetime (AC12, 230 V, 4 A)		0.1 x 10 ⁶ switching cycles	
Max. fuse rating to achieve short-circuit protection	n/c contact	6 A fast-acting	
	n/o contact	10 A fast-acting	
Conventional thermal current I _{th} (IEC/EN 60947-1)		4 A	
General data			
Duty time		100 %	
Dimensions (W x H x D)		22.5 x 78 x 100 mm [0.89 x 3.07 x 3.94 in]	45 x 78 x 100 mm [1.78 x 3.07 x 3.94 in]
Weight	gross weight	0.149 kg [0.328 lb]	0.163 kg [0.359 lb]
	net weight	0.127 kg [0.280 lb]	0.133 kg [0.293 lb]
Mounting		DIN rail (EN 60715), snap-on mounting without any tool	
Mounting position		any	
Minimum distance to other units	vertical	not necessary	
	horizontal	10 mm [0.4 in] at U _n > 240 V	not necessary
Degree of protection	housing / terminal	IP50 / IP20	
Electrical connection			
Wire size	fine-strand with(out) wire end ferrule	2 x 0.75-2.5 mm ² (2 x 18-14 AWG)	
	rigid	2 x 0.5-4 mm ² (2 x 20-12 AWG)	
Stripping length		7 mm [0.28 in]	
Tightening torque		0.6-0.8 Nm [5.31-7.08 lb.in]	
Environmental data			
Ambient temperature ranges	operation/storage/ transport	-25...+60 °C/-40...+85 °C/-40...+85 °C	
Climatic category	IEC/EN 60721-3-3	3K5 (no condensation, no ice formation)	
Damp heat, cyclic	IEC/EN 60068-2-30	6 x 24 h cycle, 55 °C, 95 % RH	
Vibration, sinusoidal	IEC/EN 60255-21-1	Class 2	
Shock, half-sine	IEC/EN 60255-21-2	Class 2	

6

Insulation monitoring relays for unearthed supply systems

Technical data

6

		CM-IWS.2	CM-IWS.1	CM-IWN.1,4,5,6
Isolation data				
Rated impulse withstand voltage U_{imp} between all isolated circuits (IEC/EN 60947-1, IEC/EN 60664-1, VDE 0110-1)	supply / measuring circuit		6 kV	
	supply / output circuit		6 kV	
	measuring / output circuit		6 kV	
	output 1 / output circuit 2			4 kV
Pollution degree (IEC/EN 60664-1, VDE 0110-1)			3	
Overvoltage category (IEC/EN 60664-1, VDE 0110-1)			III	
Rated insulation voltage U (IEC/EN 60947-1, IEC/EN 60664-1, VDE 0110-1)	supply / measuring circuit	400 V	300 V	600 V
	supply / output circuit		300 V	
	supply / measuring circuit	400 V	300 V	600 V
	output 1 / output circuit 2	-	-	300 V
Basis isolation for rated control supply voltage (IEC/EN 60664-1, VDE 0110-1)	supply / measuring circuit	400 V AC / 300 V DC	250 V AC / 300 V DC	400 V AC / 600 V DC
	supply / output circuit		250 V AC / 300 V DC	
	measuring / output circuit	400 V AC / 300 V DC	250 V AC / 300 V DC	400 V AC / 600 V DC
	output 1 / output 2		250 V AC / 300 V DC	
Protective separation (IEC/EN 61140)	supply / output circuit		250 V AC / 250 V DC	
	supply / measuring circuit		250 V AC / 250 V DC	
	measuring / output circuit		250 V AC / 250 V DC	
	supply / output circuit		2.32 kV, 50 Hz, 2 s	
Test voltage between all isolated circuits, routine test (IEC/EN 60255-5, IEC/EN 61010-1)	supply / measuring circuit		2.32 kV, 50 Hz, 2 s	
	supply / measuring circuit		2.32 kV, 50 Hz, 2 s	
	measuring / output circuit	2.2 kV, 50 Hz, 1 s		2.53 kV, 50 Hz, 1 s
Standards				
Product standard		IEC/EN 61557-8, IEC/EN 60255-6		
Other standards		EN 50178		
Low Voltage Directive		2006/95/EC		
EMC Directive		2004/108/EC		
RoHS Directive		2002/95/EC		
Electromagnetic compatibility				
Interference immunity to		IEC/EN 61000-6-1, IEC/EN 61000-6-2, IEC/EN 61326-2-4		
electrostatic discharge	IEC/EN 61000-4-2	Level 3, 6 kV / 8 kV		
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3, 10 V/m (1 GHz) / 3 V/m (2 GHz) / 1 V/m (2.7 GHz)		
electrical fast transient/burst	IEC/EN 61000-4-4	Level 3, 2 kV / 5 kHz		
surge	IEC/EN 61000-4-5	Level 3, installation class 3, supply circuit and measuring circuit 1 kV L-L, 2 kV L-earth		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3, 10 V		
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-11	Level 3		
harmonics and interharmonics	IEC/EN 61000-4-13	Level 3		
high-frequency radiated	IEC/CISPR 22, EN 50022	IEC/EN 61000-6-3, IEC/EN 61000-6-4 Class B		
high-frequency conducted	IEC/CISPR 22, EN 50022	Class B		

Insulation monitoring relays for unearthed supply systems

Technical data

Measuring &
monitoring relays
CM Range

6

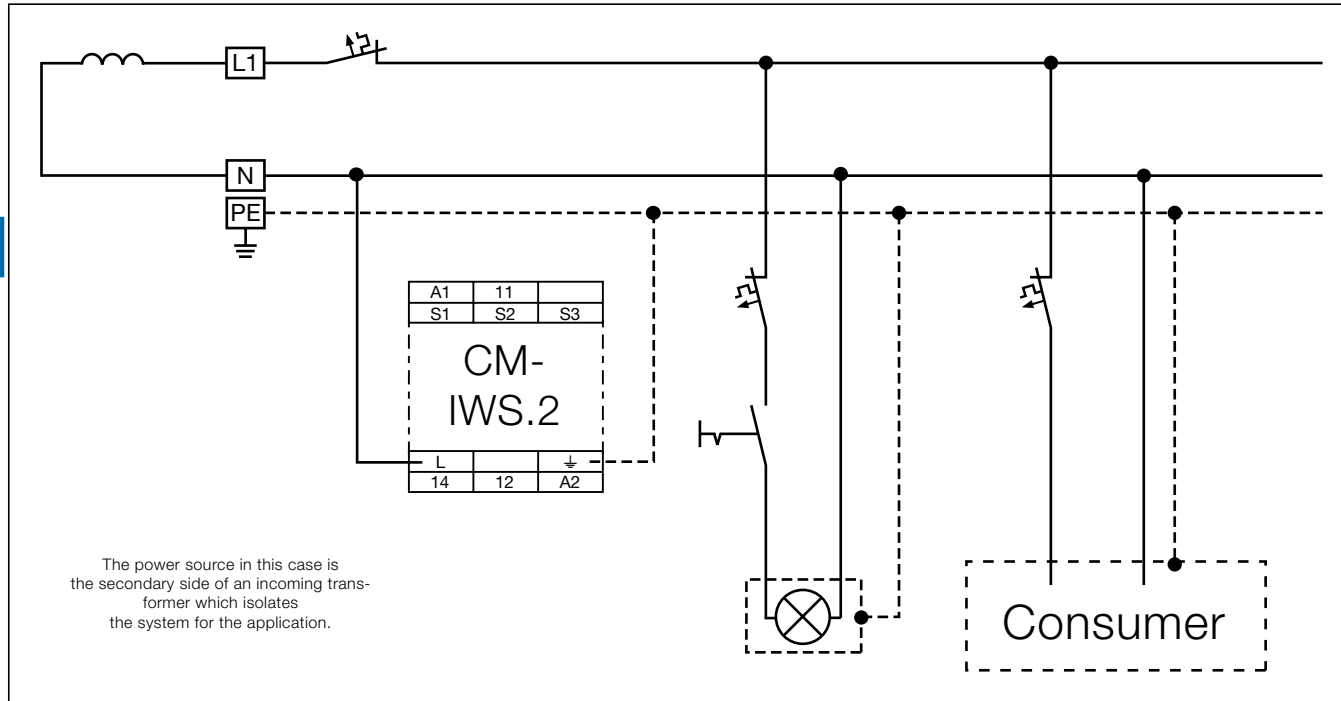
Technical data - CM-IVN

Input circuit - Measuring circuit		VL+, VL-, V±
Function		expansion of the nominal voltage range of the insulation monitoring relay CM-IWN.1 to 690 V AC or 1000 V DC, max. length of connection cable 40 cm
Measuring principle		see CM-IWN.1
Nominal voltage U_n of the distribution system to be monitored		0-690 V AC / 0-1000 V DC
Voltage range of the distribution system to be monitored		0-793.5 V AC / 0-1150 V DC (tolerance +15 %)
Rated frequency f_N of the distribution system to be monitored		DC or 15-400 Hz
Tolerance of the rated frequency f_N		13.5-440 Hz
System leakage capacitance C_e	max.	20 μ F
Extraneous DC voltage U_d (when connected to an AC system)	max.	793.5 V DC
Tolerance of the adjusted threshold value / Relative percentage uncertainty A at -5...+45 °C, $U_n = 0-115$ %	at 1-15 k Ω R_F	± 1.5 k Ω
$U_n = 85-110$ %	at 15-200 k Ω R_F	± 8 %
$f_N, f_c, C_e = 1 \mu$ F		
Internal impedance Z	at 50 Hz	195 k Ω
Internal DC resistance R_i		200 k Ω
Measuring voltage U_m		24 V
Tolerance of measuring voltage U_m		+10 %
Measuring current I_m		0.15 mA
General data		
MTBF		on request
Duty time		100 %
Dimensions (W x H x D)		45 x 78 x 100 mm [1.78 x 3.07 x 3.94 in]
Weight	gross weight	0.200 kg [0.441 lb]
	net weight	0.169 kg [0.373 lb]
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool
Mounting position		any
Minimum distance to other units	vertical	not necessary
	horizontal	10 mm [0.4 in] at $U_n > 600$ V
Degree of protection		IP50 / IP20
Electrical connection		
Wire size	fine-strand with(out) wire end ferrule	2 x 0.75-2.5 mm ² (2 x 18-14 AWG)
	rigid	2 x 0.5-4 mm ² (2 x 20-12 AWG)
Stripping length		7 mm [0.28 in]
Tightening torque		0.6-0.8 Nm [5.31-7.08 lb.in]
Max. length of connection cable to CM-IWN.1		40 cm
Environmental data		
Ambient temperature ranges	operation / storage / transport	-25...+60 °C / -40...+85 °C / -40...+85 °C
Climatic category	IEC/EN 60721-3-3	3K5 (no condensation, no ice formation)
Damp heat, cyclic	IEC/EN 60068-2-30	6 x 24 h cycle, 55 °C, 95 % RH
Vibration, sinusoidal	IEC/EN 60255-21-1	Class 2
Shock, half-sine	IEC/EN 60255-21-2	Class 2
Isolation data		
Rated impulse withstand voltage U_{imp} between all isolated circuits (IEC/EN 60947-1, IEC/EN 60664-1, VDE 0110-1)	input circuit / PE	8 kV
Pollution degree (IEC/EN 60664-1, VDE 0110-1)		3
Overvoltage category (IEC/EN 60664-1, VDE 0110-1)		III
Rated insulation voltage U_i (IEC/EN 60947-1, IEC/EN 60664-1, VDE 0110-1)	input circuit / PE	1000 V
Test voltage between all isolated circuits, routine test (IEC/EN 60255-5, IEC/EN 61010-1)	input circuit / PE	3.3 kV, 50 Hz, 1 s
Standards		
Product standard		IEC/EN 61557-8, IEC/EN 60255-6
Other standards		EN 50178
Low Voltage Directive		2006/95/EC
EMC Directive		2004/108/EC
RoHS Directive		2002/95/EC
Electromagnetic compability		
Interference immunity to		IEC/EN 61000-6-1, IEC/EN 61000-6-2, IEC/EN 61326-2-4
electrostatic discharge	IEC/EN 61000-4-2	Level 3, 6 kV / 8 kV
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3, 10 V/m (1 GHz) / 3 V/m (2 GHz) / 1 V/m (2.7 GHz)
electrical fast transient/burst	IEC/EN 61000-4-4	Level 3, 2 kV / 5 kHz
surge	IEC/EN 61000-4-5	Level 3, installation class 3, supply circuit and measuring circuit 1 kV L-L, 2 kV L-earth
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3, 10 V
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-11	Level 3
harmonics and interharmonics	IEC/EN 61000-4-13	Level 3
Interference emission		IEC/EN 61000-6-3, IEC/EN 61000-6-4
high-frequency radiated	IEC/CISPR 22, EN 50022	Class B
high-frequency conducted	IEC/CISPR 22, EN 50022	Class B

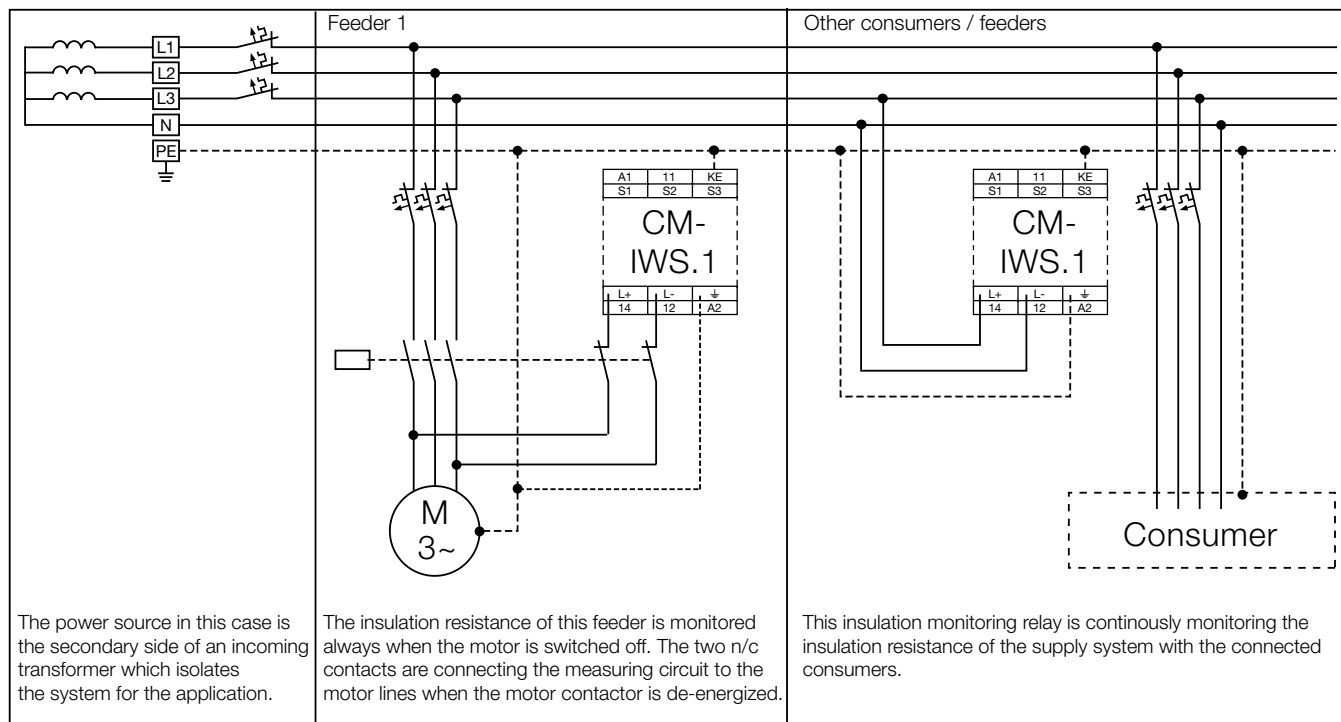
Insulation monitoring relays for unearthed supply systems

Application examples

Application example CM-IWS.2



Application example CM-IWS.1



Earth fault / insulation resistance monitoring of different feeder circuits with fault localization.

CM-E Range Motor load monitoring relays



Motor load monitoring relays



Motor load monitoring relays

Fields of application

The motor load monitor relay monitors the load states of single-phase and three-phase asynchronous motors. The evaluation of the phase angle between current and voltage allows a very precise monitoring of the load states.

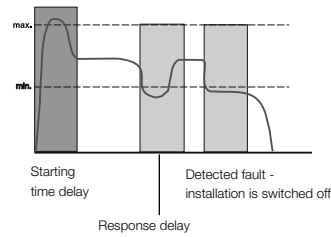
Compared with other conventional measuring principles (e.g. pressure transducers, current measurement), $\cos \varphi$ monitoring is a more precise and economical alternative. The motor is used as a sensor for its own load status.

Main applications

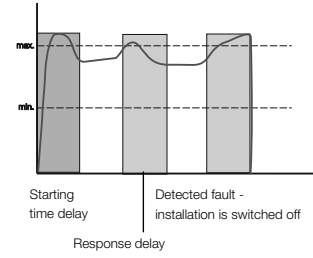
- Pump monitoring
 - Dry-running protection (underload)
 - Closed valves (overload)
 - Pipe break (overload)
- Heating, air-conditioning, ventilation
 - Monitoring of filter pollution
 - V-belt breakage (underload)
 - Closed shutters/valves (overload)
 - Air ventilating volume
- Agitating machines
 - High consistency within the tank (overload)
 - Pollution of the tank (overload)
- Transport/Conveyance
 - Congested conveyor belts (overload)
 - Jamming of belts (overload)
 - Material accumulation in spiral conveyors (overload)
 - Lifting platforms
- Machine installation
 - Wear of tools, e.g. worn saw blades in circular saws, etc. (overload)
 - Tool breakage (underload)
 - V-belt drives (breakage underload)

Pump control

Dry-running protection

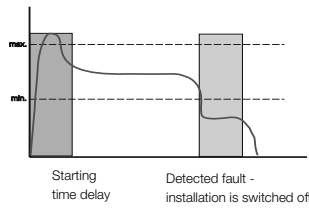


Filter pollution

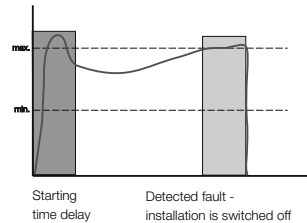


Ventilator monitoring

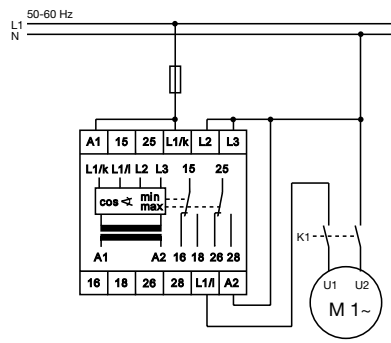
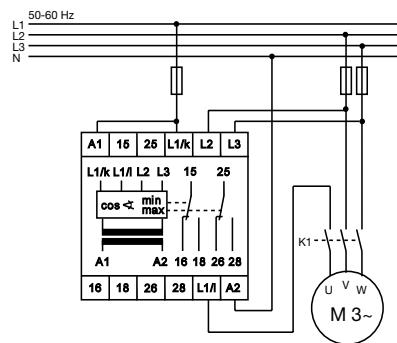
V-belt monitoring



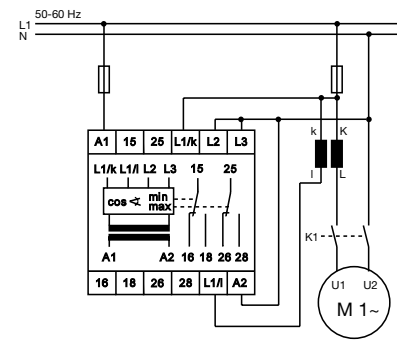
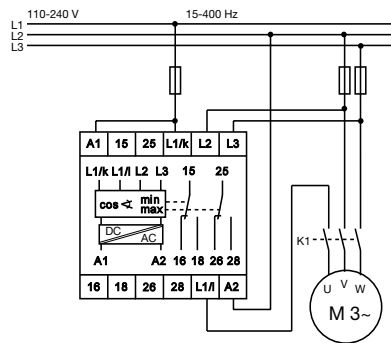
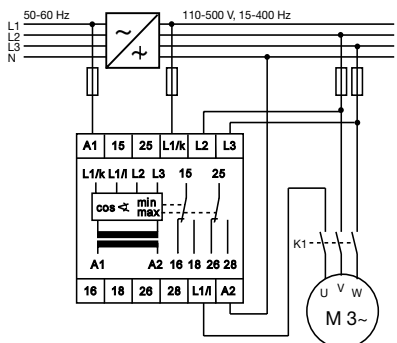
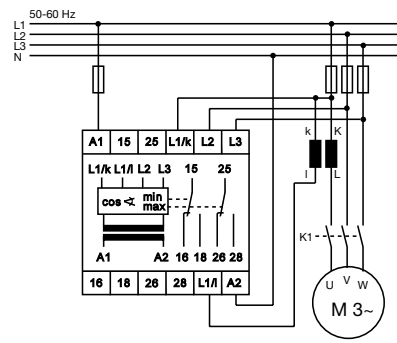
Filter pollution



Wiring examples (for motor currents ≤ 20 A)



Wiring examples (for motor currents ≥ 20 A)



Motor load monitoring relays

Ordering details



CM-LWN

Description

The motor load monitor CM-LWN monitors the load of single-phase and three-phase asynchronous motors. The evaluation of the phase angle between current and voltage ($\cos \varphi$ monitoring) allows a very precise monitoring of the load status.

Ordering details

Rated control supply voltage = measuring voltage	Current range	Reference code	Catalog number	Weight (1 pce) kg (lb)
24-240 V AC/DC	0.5-5 A	CM-LWN	1SVR450335R0000	0.30 (0.66)
110-130 V AC			1SVR450330R0000	0.30 (0.66)
220-240 V AC			1SVR450331R0000	0.30 (0.66)
380- 440 V AC			1SVR450332R0000	0.30 (0.66)
480-500 V AC			1SVR450334R0000	0.30 (0.66)
24-240 V AC/DC	2-20 A		1SVR450335R0100	0.30 (0.66)
110-130 V AC			1SVR450330R0100	0.30 (0.66)
220-240 V AC			1SVR450331R0100	0.30 (0.66)
380- 440 V AC			1SVR450332R0100	0.30 (0.66)
480-500 V AC			1SVR450334R0100	0.30 (0.66)

Characteristics

- Pump monitoring
- Under and overload monitoring $\cos \varphi$ and $\cos \varphi$ in one unit
- Adjustable starting delay 0.3-30 s
- Direct measurement of currents up to 20 A
- Adjustable response time delay 0.2-2 s
- Single-phase or three-phase monitoring
- 2 x 1 c/o contact, closed-circuit principle
- 3 LEDs for status indication
- Under- and overload monitoring

Motor load monitoring relays

Technical information

The **CM-LWN** module monitors the load status of inductive loads.

The primary application is the monitoring of single- or three-phase asynchronous motors (squirrel cage) under varying load conditions. The measuring principle is based on the evaluation of the phase shift (φ) between the voltage and the current in one phase.

The phase difference is nearly inversely proportional to the load. Therefore, $\cos \varphi$, measured relatively from 0 to 1, measures the relationship of effective power to apparent power. A value towards 0 indicates low load and a value towards 1 indicates high load.

Threshold values can be set individually for $\cos \varphi_{\max}$ and $\cos \varphi_{\min}$. If the set threshold value is reached, a LED lights up and the relay is de-energized.

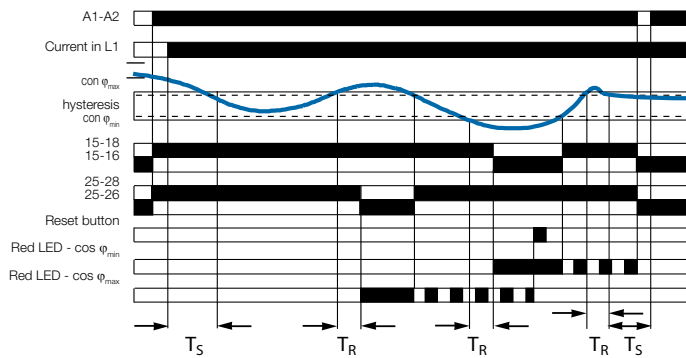
If $\cos \varphi$ returns to the acceptable limits (taking into account the hysteresis), the relay is reset to its original state and the LED flashes permanently to indicate the occurrence of the trip event. This message can be deleted using the reset button or by switching off the supply.

A time delay (Time S) of 0.3 to 30 s can be set for the starting phase of the motor. It is also possible to set a response delay time (Time R) of 0.2 to 2 s to suppress unwanted tripping due to unavoidable short load changes during normal operation.

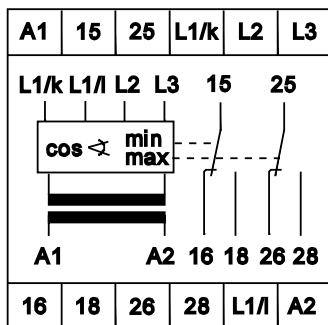
6 To guarantee correct operation of the response delay (Time R), the adjusted value for $\cos \varphi_{\max}$ has to be higher than the value for $\cos \varphi_{\min}$ plus the hysteresis. Consequently, the overload and underload indication must not be active at the same time.

Due to the internal electrical isolation of the supply circuit and the measuring circuit, it is also possible to use the device in systems with different supply voltages.

Function diagram CM-LWN



Connection diagram CM-LWN



- A1-A2 Rated control supply voltage
- L1/K-L1/L Measuring current
- L1/K-L2-L3 Measuring voltage
- 15-16/18 Output contacts - underload ($\cos \varphi_{\min}$)
- 25-26/28 Output contacts - overload ($\cos \varphi_{\max}$) closed-circuit principle

Motor load monitoring relays

Technical data

Type		CM-LWN
Input circuit - Supply circuit		A1-A2
Rated control supply voltage U_s - power consumption	A1-A2	24-240 V AC/DC approx. 8.4 VA/W
	A1-A2	110-130 V AC approx. 3.6 VA
	A1-A2	220-240 V AC approx. 3.6 VA
	A1-A2	380-440 V AC approx. 3.6 VA
	A1-A2	480-500 V AC approx. 3.6 VA
Rated control supply voltage U_s tolerance		-15 %...+10 %
Rated frequency	AC versions	50-60 Hz
	AC/DC versions	15-400 Hz or DC
Duty time		100 %
Measuring circuit		L1/L-L1/K-L2-L3
Monitoring function		Motor load monitoring by $\cos \phi$
Voltage range	L1/K-L2-L3	110-500 V AC single-phase or three-phase
Current range	L1/L-L1/K	0.5-5 A version 2-20 A version
Permissible overload of current input		25 A for 3 s 100 A for 3 s
Thresholds		$\cos \phi_{\min}$ and $\cos \phi_{\max}$ adjustable from 0 to 1
Hysteresis (related to phase angle ϕ in °)		4°
Frequency of measuring voltage		15-400 Hz
Response time		300 ms
Timing circuits		indication of over- and undervoltage fault
Start-up time (Time S)		0.3-30 s, adjustable
Response delay (Time R)		0.2-2 s, adjustable
Accuracy within the rated control supply voltage tolerance		$\Delta t \leq 0.5 \%$
Accuracy within the temperature range		$\Delta t \leq 0.06 \%$ / °C
Indication of operational states		
Control supply voltage		U: green LED
below $\cos \phi_{\min}$		$\cos \phi_{\min}$: red LED
$\cos \phi_{\max}$ exceeded		$\cos \phi_{\max}$: red LED
Output circuits		15-16/18, 25-26/28
Kind of output		2 x 1 c/o contact
Operational principle ¹⁾		closed-circuit principle
Contact material		AgCdO
Rated voltage (VDE 0110, IEC 664-1, IEC 947-1)		250 V
Max. switching voltage		400 V AC, 300 V DC
Rated operational current I_b (IEC/EN 60947-1)	AC12 (resistive) 230 V	4 A
	AC15 (inductive) 230 V	3 A
	DC12 (resistive) 24 V	4 A
	DC13 (inductive) 24 V	2 A
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)	B 300
	max. rated operational voltage	300 V AC
	max. continuous thermal current at B 300	5 A
	max. making/breaking apparent power at B 300	3600/360 VA
Mechanical lifetime		30×10^6 switching cycles
Electrical lifetime	at AC12, 230 V, 4 A	0.1×10^6 switching cycles
Max. fuse rating to achieve short-circuit protection	n/c / n/o contact	10 A fast-acting / 10 A fast-acting
General data		
Dimensions (W x H x D)		45 mm x 78 mm x 100 mm (1.77 inch x 3.07 inch x 3.94 inch)
Mounting position		any
Degree of protection	housing / terminals	IP50 / IP20
Ambient temperature range	operation / storage	-25...+65 °C / -40...+85 °C
Mounting		DIN rail (IEC/EN 60715)
Electrical connection		
Wire size	fine-strand with wire end ferrule	2 x 2.5 mm ² (2 x 14 AWG)
Standards		
Product standard		IEC 255-6, EN 60255-6
Low Voltage Directive		2006/95/EC
EMC Directive		2004/108/EC, 91/263/EEC, 92/31/EEC, 93/68/EEC, 93/67/EEC
Electromagnetic compatibility		EN 61000-6-2, EN 61000-6-4
electrostatic discharge	IEC/EN 61000-4-2	Level 3 (6 kV / 8 kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3 (2 kV / 5 kHz)
surge	IEC/EN 61000-4-5	Level 4 (2 kV L-L)
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)
Operational reliability (IEC 68-2-6)		5 g
Mechanical resistance (IEC 68-2-6)		10 g
Environmental testing (IEC 68-2-30)		24 h cycle time, 55 °C, 93 % rel., 96 h
Isolation data		
Rating (HD 625.1 S1, VDE 0110, IEC 664-1, IEC 60255-5)		250 V, 400 V, 500 V depending on the version
Rated insulation voltage between supply-, measuring- and output circuit		4 kV / 1.2 - 50 us
Rated impulse withstand voltage between all isolated circuits		2.5 kV, 50 Hz, 1 min.
Test voltage between all isolated circuits		3
Pollution category		III
Overvoltage category		III

¹⁾ Open-circuit principle: Output relay is energized if the measured value exceeds/drops below the adjusted threshold.

Closed-circuit principle: Output relay is de-energized if the measured value exceeds/drops below the adjusted threshold.

Notes



CM-E Range Motor control and protection



Motor control and protection

Benefits and advantages

UMC100-FBP is a flexible, modular and expandable motor management system for constant-speed low-voltage range motors.

Its most important tasks include motor protection, prevention of plant standstills and the reduction of down time. This is made possible by early information relating to possible motor problems which avoids unplanned plant standstills. Even if a motor trips, quick diagnosis of the cause of the fault serves to reduce downtime.

UMC100-FBP combines in a very compact unit:

Motor protection

- Overload, underload
- Overvoltage, undervoltage
- Blocked rotor, low / high current
- Phase failure, imbalance, phase sequence
- Earth leakage
- Thermistor protection
- Limitation of starts per time
- One single version with integrated measuring system covers the rated motor current from 0,24 to 63 A

Motor control

- Integrated and easy to parametrize motor starter functions like direct, reverse, star-delta,...
- Additionally free programmable logic for application specific control functions
- Expansion modules DX111, DX122 for more I/Os
- Expansion modules VI150, VI155 for 3-phase voltage measuring

Motor diagnostics

- Quick and comprehensive access to all relevant data via fieldbus and/or operator panel
- Current, thermal load
- Phase voltages
- Power factor
- Energy

Communication

- Communication-independent basic device
- Freely selectable fieldbus protocol with FieldBusPlug
- Profibus DP
- DeviceNet
- Modbus
- CANopen

Typical application segments

- Oil & gas
- Cement
- Paper
- Mining
- Steel
- Chemical industry

Further information

UMC & FBP Catalogue 2CDC 190 022 D0204
UMC & FBP Brochure 2CDC 135 011 B0202

Motor control and protection

Technical data



Basic device UMC100-FBP

UMC100-FBP allows the connection of one I/O-expansion module DX111 or DX122, and one voltage module VI150 or VI155. Expansion modules are connected via 2-wire bus, the max. distance to UMC100-FBP is 3 m.

Main power

Voltage	max 1000 V AC
Frequency	45 to 65 Hz
Rated motor current	0.24 to 63 A, without accessories
	Greater currents with transformer
Transformer diameter	11 mm (max 25 mm2)
Tripping classes	5, 10, 20, 30, 40 in accordance with EN/IEC 60947-4-1
Short-circuit protection	Separate fuse on network side

6

Control unit

Supply voltage	24 V DC
Reverse polarity protection	yes
Inputs	6 digital inputs 24 V DC 1 PTC input
Outputs	3 relay outputs relay 1 digital output transistor
Interfaces	1 for ABB FieldBusPlug 1 for UMC100-PAN control station 1 for expansion module
Parametric assignment	via fieldbus, control station and / or software
Addressing	Control station or addressing set
LEDs	3 LEDs: green, yellow, red

Environment and mechanical data

Fastening	on DIN busbar (EN50022-35) or with 4 screws x M4
Dimensions (W x H x D)	70 x 105 x 110 mm (incl. FieldBusPlug and control panel)
Weight	0.39 kg
Terminal cross-section	max. 2.5 mm ² or 2 x 1.5 mm ²



I/O-expansion modules DX111 / DX122

Expansion modules to increase the number of I/Os of a UMC100-FBP. Easy use of inputs by parametrizing for fault or warning; individual message on operator panel configurable.

Supply voltage	24 V DC	
Inputs	DX111	8 digital inputs 24 V DC
	DX122	8 digital inputs 110/230 V AC
Outputs		4 relay outputs relay
		1 analogue output, 0/4 to 20 mA / 0 to 10 V configurable
Fastening	on DIN busbar (EN50022-35)	
Dimensions (W x H x D)	45 x 77 x 100 mm (without terminal block)	

Motor control and protection

Technical data

Voltage expansion modules

Measures the 3 phase voltages of a motor. Different versions for use in grounded and ungrounded networks.



Supply voltage		24 V DC
Inputs	VI150	3 analogue inputs 150 - 690 V AC
		For use in grounded networks
		Maximum operation altitude 2000 m
Inputs	VI155	3 analogue inputs 150 - 690 V AC
		For use in all networks
		Maximum operation altitude > 2000 m
Outputs		1 relay output
Fastening		on DIN busbar (EN50022-35)
Dimensions (W x H x D)		22.5 x 77 x 100 mm (without terminal block)

6



Control panel UMC100-PAN

Installation on the device or on the switching cabinet door

Graphics-enabled and backlit display, 3 LEDs for status indication

Freely configurable error messages

Multilingual: German, English, French, Italian, Portuguese, Spanish, Russian

For more detailed information about the UMC100, see section 2, pages 2.16 and 2.17

Universal motor controller – 0.24...63 A



UMC100-FBP

Type	Description	Catalog number
UMC100-FBP.0	Universal Motor Controller	1SAJ520000R0101
UMC100-FBP.2	Universal Motor Controller, ATEX	1SAJ520000R0201
UMC100-PAN	Operating, diagnostics and parameter setting panel; direct UMC mounting	1SAJ590000R0102
UMCPAN-CAB.070	0.7 m ext. cable with door mounting set	1SAJ510003R0001
UMCPAN-CAB.150	1.5 m ext. cable with door mounting set	1SAJ510004R0001
UMCPAN-CAB.30	3 m ext. cable with door mounting set	1SAJ510002R0001
DTM software	Advanced programming, parameter assignment	1SAJ924012R0004
VI150-FBP.0	Voltage Expansion Module, analog inputs 150...690V AC, 1 relay output, for 3-phase networks (grounded)	1SAJ650000R0100
VI155-FBP.0	Voltage Expansion Module, analog inputs 150...690V AC, 1 relay output, for 3-phase networks (all)	1SAJ655000R0100



CM-E Range Thermistor motor protection



Thermistor motor protection relays

Benefits and advantages

Selection table

Operating principle and fields of application for thermistor motor protection relays

The CM range of thermistor motor protection relays are used to control motors equipped with PTC temperature sensors. The PTC temperature sensors are incorporated in the motor windings to measure the motor heating. This enables direct control and evaluation of the following operating conditions:

- heavy duty starting
- increased switching frequency
- single-phase operation
- high ambient temperature
- insufficient cooling
- break operation
- unbalance

The relay is independent of the rated motor current, the insulation class and the method of starting.

The PTC sensors are connected in series to the terminals T_a and T_b (or T_a and T_{bx} without short-circuit detection). The number of possible PTC sensors per measuring circuit is limited by the sum of the individual PTC sensor resistances: $R_G = R_1 + R_2 + R_N \leq 1.5 \text{ k}\Omega$.

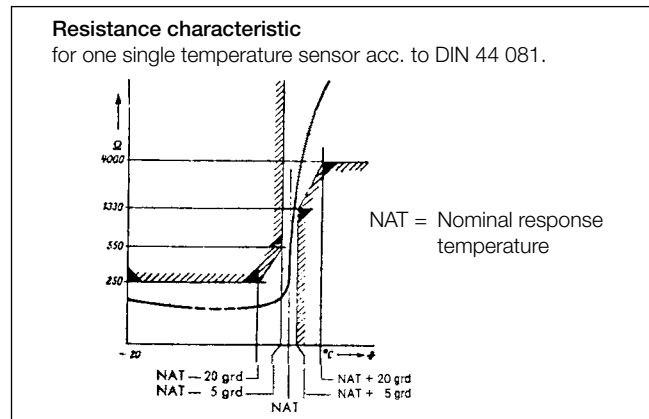
Under normal operating conditions the resistance is below the response threshold. If only one of the PTC resistors heats up excessively, the output relay de-energizes. If the autoreset function is configured, the output relay energizes automatically after cooling down.

Devices with manual (pushbutton on front-side) or remote reset configuration have to be controlled via the control input by the required signal.

Further applications:

Temperature monitoring of equipment with PTC sensors integrated, such as

- machine rolling bearings,
- hot-air ventilators,
- oil,
- air,
- heating installations, etc.



Selection table thermistor motor protection relays

Type	CM-MSE	CM-MSS (1)	CM-MSS (2)	CM-MSS (3)	CM-MSS (4)	CM-MSS (5)	CM-MSS (6)	CM-MSS (7)	CM-MSN
Function									
Measuring range									
Number of sensor circuits	1	1	1	1	1	1	2	3	6
Wire break monitoring	•	•	•	•	•	•	•	•	•
Short-circuit detection	-	-	-	• 1)	•	•	•	•	•
Non-volatile fault storage	-	-	-	-	• 2)	• 2)	-	• 2)	• 2)
Operation/Reset									
Auto reset	•	•	•	•	• 2)	• 2)	• 2)	• 2)	• 2)
Manual reset	-	-	•	•	•	•	•	•	•
Remote reset	-	-	•	•	•	•	•	•	•
Test button	-	-	-	-	•	•	•	•	•
Output contacts									
Operational principle	closed-circuit principle								
Number / type	1 c/o	1 c/o	2 c/o	2 c/o	1 n/o + 1 n/c	2 c/o	1 c/o per sensor circuit	1 n/o + 1 n/c accumulative evaluation	1 n/o + 1 n/c accumulative evaluation
Width of housing	22.5 mm								45 mm
Supply voltages and Reference codes									
24 V AC	1SVR550805R9300		1SVR430811R9300						
24 V AC/DC		1SVR430800R9100	1SVR430810R9300	1SVR430710R9300					
110-130 V AC	1SVR550800R9300		1SVR430811R0300	1SVR430711R0300					
220-240 V AC	1SVR550801R9300	1SVR430801R1100	1SVR430811R1300	1SVR430711R1300					
380-440 V AC				1SVR430711R2300					
24-240 V AC/DC					1SVR430720R0400	1SVR430720R0300	1SVR430710R0200	1SVR430720R0500	1SVR450025R0100

1) configurable via terminals

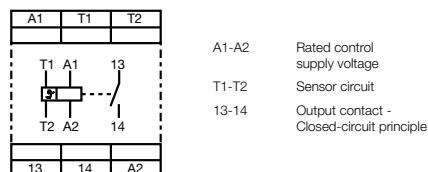
2) Auto reset without non-volatile fault storage configurable by permanent jumpering of connecting terminals S1-T2 or S1/X1-S2/X2

Thermistor motor protection relays

Product overview

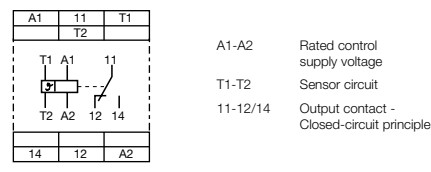
CM-MSE

- Auto reset
- Connection of several sensors (max. 6 sensors conn. in series)
- Monitoring of bimetals
- 1 n/o contact
- Excellent cost / performance ratio



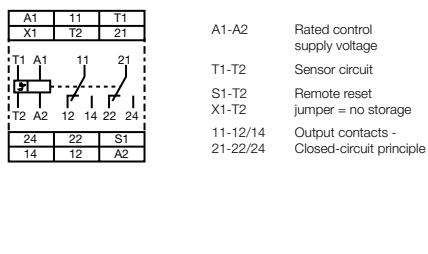
CM-MSS (1), 1 c/o contact

- Auto reset
- Connection of several sensors
- Monitoring of bimetals
- 1 c/o contact
- 2 LEDs for status indication



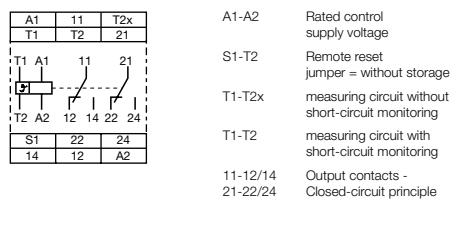
CM-MSS (2), 2 c/o contacts

- Fault storage can be switched off
- Auto reset configurable
- Reset button
- Remote reset
- Monitoring of bimetals
- 2 c/o contacts
- 2 LEDs for status indication



CM-MSS (3), 2 c/o contacts, short-circuit monitoring configurable

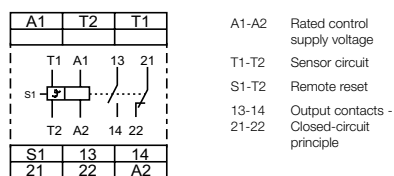
- Fault storage can be switched off
- Auto reset configurable
- Reset button
- Remote reset
- Monitoring of bimetals
- Short-circuit monitoring of the sensor circuit configurable
- 2 c/o contacts
- 2 LEDs for status indication



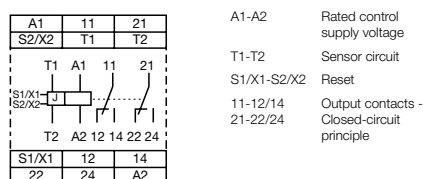
CM-MSS (4) + CM-MSS (5), 1-channel

- Short-circuit monitoring of the sensor circuit
- Wide supply voltage range: 24-240 V AC/DC
- Non-volatile fault storage selectable
- Reset and test button
- Remote reset
- Auto reset configurable
- Output contacts: 1 n/c and 1 n/o or 2 c/o contacts
- 2 LEDs for status indication

CM-MSS (4)



CM-MSS (5)



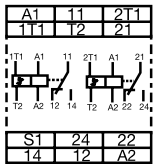
Thermistor motor protection relays

Product overview

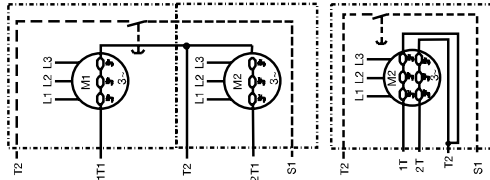
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CM-MSS (6), 2-channel, single evaluation

- Short-circuit monitoring for the sensor circuits
- Wide supply voltage range: 24-240 V AC/DC
- 2 separate sensor circuits for monitoring of two motors or one motor with 2 sensor circuits (prewarning and final switch off)
- Reset button
- Auto reset configurable
- Output contacts: 2 x 1 c/o contact
- 3 LEDs for status indication



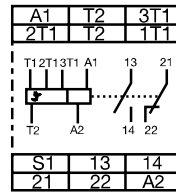
A1-A2 Rated control supply voltage
11-12/14, 21-22/24 Output contacts - Closed-circuit principle
1T1-T2 Sensor circuit
2T1-T2



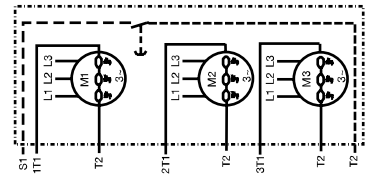
S1-T2 jumpered = no storage

CM-MSS (7), 3 sensor circuits, accumulative evaluation

- Short-circuit monitoring for the sensor circuits
- Wide supply voltage range: 24-240 V AC/DC
- Non-volatile fault storage configurable
- Remote reset
- Auto reset configurable
- Reset and test button
- Output contacts: 1 n/c and 1 n/o contact
- 4 LEDs for status indication



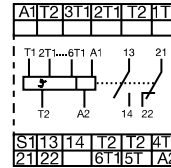
A1-A2 Rated control supply voltage
13-14 Output contacts - Closed-circuit principle
21-22



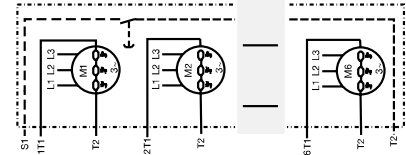
1T1-T2 Sensor circuits
2T1-T2
3T1-T2
S1-T2 Remote reset jumpered = no storage

CM-MSN, 6 sensor circuits, accumulative evaluation

- Short-circuit monitoring of the sensor circuit
- Wide supply voltage range: 24-240 V AC/DC
- Non-volatile fault storage configurable
- Remote reset
- Auto reset configurable
- Reset and test button
- Output contacts: 1 n/c, 1 n/o contact
- 7 LEDs for status indication



A1-A2 Rated control supply voltage
13-14 Output contacts - Closed-circuit principle
21-22



accumulative evaluation = if any input exceeds the threshold, the output relay will trip

Thermistor motor protection relays

Ordering details

Description

The thermistor motor protection relays CM-MSE, CM-MSS and CM-MSN are used to control motors equipped with PTC temperature sensors. The PTC temperature sensors are incorporated in the motor windings to measure the motor heating. This enables direct control and evaluation of various operating conditions. Depending on the products also ATEX approvals for use in hazardous areas are available.

ABB also offers PTC temperature sensors C011 (according to DIN 44081) which are suitable for embedding in motor windings.



CM-MSE



CM-MSS (5)



CM-MSN

Ordering details

Rated control supply voltage = measuring voltage	Reference code	Catalog number	Weight (1 pce) kg (lb)
24 V AC	CM-MSE	1SVR550805R9300	0.11 (0.24)
110-130 V AC		1SVR550800R9300	0.11 (0.24)
220-240 V AC		1SVR550801R9300	0.11 (0.24)
24 V AC/DC ¹⁾	CM-MSS (1)	1SVR430800R9100	0.15 (0.33)
220-240 V AC		1SVR430801R1100	0.15 (0.33)
24 V AC/DC ¹⁾	CM-MSS (2)	1SVR430810R9300	0.15 (0.33)
24 V AC		1SVR430811R9300	0.15 (0.33)
110-130 V AC		1SVR430811R0300	0.15 (0.33)
220-240 V AC	CM-MSS (3)	1SVR430811R1300	0.15 (0.33)
24 V AC/DC ¹⁾		1SVR430710R9300	0.15 (0.33)
110-130 V AC		1SVR430711R0300	0.15 (0.33)
220-240 V AC	CM-MSS (4) ²⁾	1SVR430711R1300	0.15 (0.33)
380-440 V AC		1SVR430711R2300	0.15 (0.33)
24-240 V AC/DC	CM-MSS (5) ³⁾	1SVR430720R0400	0.15 (0.33)
	CM-MSS (6)	1SVR430720R0300	0.15 (0.33)
	CM-MSS (7)	1SVR430710R0200	0.15 (0.33)
	CM-MSS (7)	1SVR430720R0500	0.15 (0.33)
	CM-MSN	1SVR450025R0100	0.23 (0.51)

¹⁾ Not electrically isolated

²⁾ CM-MSS (4): 1-channel 1 n/c, 1 n/o

³⁾ CM-MSS (5): 1-channel 2 c/o

Thermistor motor protection relays

Ordering details

PTC temperature sensors C011

Description

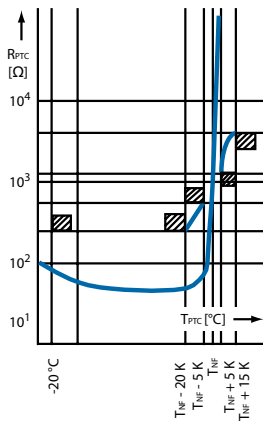


The PTC temperature sensors (temperature-dependent with positive temperature coefficient) are selected by the manufacturer of the motor depending on:

- the motor insulation class according to IEC/EN 60034-11,
- the special characteristics of the motor, such as the conductor cross-section of the windings, the permissible overload factor etc.
- special conditions prescribed by the user, such as the permissible ambient temperature, risks resulting from locked rotor, extent of permitted overload etc.

Temperature sensor characteristics

6



One temperature sensor must be embedded in each phase winding. For instance, in case of three-phase squirrel cage motors, three sensors are embedded in the stator windings. For pole-changing motors with one winding (Dahlander connection), 3 sensors are also sufficient. Pole-changing motors with two windings, however, require The sensors are suitable for embedding in motor windings with rated operating voltages of up to 600 V AC. Conductor length: 500 mm per sensor. A 14 V varistor can be connected in parallel to protect the sensors from overvoltage. Due to their characteristics, the thermistor motor protection relays can also be used with PTC temperature sensors of other manufacturers which comply with DIN 44 081 and DIN 44 082 6 sensors.

If an additional warning is required before the motor is switched off, separate sensors for a correspondingly lower temperature must be embedded in the winding. They have to be connected to a second control unit.

Ordering details

Rated response temperature T_{NF}	Color Coding	Reference code	Catalog number	Weight (1 pce) kg (lb)
70 °C	white-brown	C011-70 ¹⁾	GHC0110003R0001	0.02 (0.044)
80 °C	white-white	C011-80 ¹⁾	GHC0110003R0002	0.02 (0.044)
90 °C	green-green	C011-90 ¹⁾	GHC0110003R0003	0.02 (0.044)
100 °C	red-red	C011-100 ¹⁾	GHC0110003R0004	0.02 (0.044)
110 °C	brown-brown	C011-110 ¹⁾	GHC0110003R0005	0.02 (0.044)
120 °C	gray-gray	C011-120 ¹⁾	GHC0110003R0006	0.02 (0.044)
130 °C	blue-blue	C011-130 ¹⁾	GHC0110003R0007	0.02 (0.044)
140 °C	white-blue	C011-140 ¹⁾	GHC0110003R0011	0.02 (0.044)
150 °C	black-black	C011-150 ¹⁾	GHC0110003R0008	0.02 (0.044)
160 °C	blue-red	C011-160 ¹⁾	GHC0110003R0009	0.02 (0.044)
170 °C	white-green	C011-170 ¹⁾	GHC0110003R0010	0.02 (0.044)
150 °C	black-black	C011-3-150 ²⁾	GHC0110033R0008	0.05 (0.11)

¹⁾Temperature sensor C011, standard version acc. to DIN 44081

²⁾Triple temperature sensor C011-3

Thermistor motor protection relays

Technical information

PTC temperature sensors C011

Technical data

Characteristic data

	Sensor type C011
Cold-state resistance	50 -100 Ω at 25 °C
Warm-state resistance ± 5 up to 6 K of rated response temperature T_{NF}	10 000 Ω
Thermal time constant, sensor open ¹⁾	< 5 s
Permitted ambient temperature	+180 °C

Rated response temperature w tolerance TNF w iTNF	PTC resistance R from -20 °C to TNF - 20 K	PTC resistance R at PTC temperatures of:		
		TNF - iTNF (UPTC m 2.5 V)	TNF + iTNF (UPTC m 2.5 V)	TNF + 15 K (UPTC m 7.5 V)
70 ± 5 °C	$\leq 100 \Omega$	$\leq 570 \Omega$	$\geq 570 \Omega$	-
80 ± 5 °C		$\leq 550 \Omega$	$\geq 1330 \Omega$	$\geq 4000 \Omega$
90 ± 5 °C				
100 ± 5 °C				
110 ± 5 °C				
120 ± 5 °C				
130 ± 5 °C				
140 ± 5 °C				
150 ± 5 °C				
160 ± 5 °C		$\leq 570 \Omega$	$\geq 570 \Omega$	-
170 ± 7 °C				

¹⁾ Not embedded in windings.

²⁾ For triple temperature sensor take values x 3.

Thermistor motor protection relays

Technical data

Type	CM-MSE	CM-MSS	CM-MSN
Input circuit			
Rated control supply voltage U_s power consumption	A1-A2	24 V AC approx. 1.5 VA	
	A1-A2	24 V AC/DC approx. 1.1 VA / 0.6 W	
	A1-A2	110-130 V AC approx. 1.5 VA	
	A1-A2	220-240 V AC approx. 1.5 VA	
	A1-A2	380-440 V AC approx. 1.7 VA	
	A1-A2	24-240 V AC/DC approx. 1.4-1.7 W / approx. 3.5-5.7 VA	
Rated control supply voltage U_s tolerance		-15 % ... +10 %	
Rated frequency		AC: 50-60 Hz / 24-240 V AC/DC versions: 15-400 Hz	
Duty time		100 %	
6 Measuring circuit			
Monitoring function	T1-T2	T1-T2/T2x, 1T1...6T1-T2	1T1...6T1-T2
		temperature monitoring by means of PTC sensors	
Number of sensor circuits	1	1, 2 oder 3 (see order details)	6
Short-circuit monitoring	-	see ordering details	yes
Non-volatile fault storage	-	see ordering details	configurable
Test function	-	see ordering details	yes
Sensor circuit			
Temperature threshold (relay de-energizes)	2.7-3.7 k Ω	CM-MSS (1+2): 3050 \pm 550 Ω	3.6 k Ω \pm 5 %
		CM-MSS (3-7): 3.6 k Ω \pm 5 %	
Temperature hysteresis (relay energizes)	1.7-2.3 k Ω	CM-MSS (1+2): 1900 \pm 400 Ω	1.6 k Ω \pm 5 %
		CM-MSS (3-7): 1.6 k Ω \pm 5 %	
Short-circuit threshold (relay de-energizes)		<18 Ω	
Short-circuit hysteresis (relay energizes)		>45 Ω	
Maximum total resistance of sensors connected in series (cold state)		\leq 1.5 k Ω	
Maximum sensor cable length for short-circuit detection		2 x 100 m at 0.75 mm ² , 2 x 400 m at 2.5 mm ²	
Response time		<100 ms	
Control circuit for storage and hysteresis function			
Remote reset	S1-T2 or S1/X1-S2/X2	-	n/o contact
Maximum no-load voltage			approx. 25 V, 24-240 V; AC/DC versions: 5.5 V
Maximum cable length			\leq 50 m, 100-200 m if shielded
Indication of operational states			
Control supply voltage	U: green LED	-	: control supply voltage applied
Fault indication	F: red LED	-	: output relay de-energized
Output circuits			
	13-14	11-12/14, 21-22/24, 13-14, 21-22	13-14, 21-22
Kind of output	1 n/o contact	CM-MSS (1): 1 c/o contact CM-MSS (2,3,5): 2 c/o contacts CM-MSS (4, 7): 1 n/o + 1 n/c CM-MSS (6): 2x1 c/o contact	1 n/o + 1 n/c contact
Operational principle		closed-circuit principle (output relay de-energizes if the measured value exceeds/drops below the adjusted threshold)	
Contact material	AgCdO	CM-MSS (1+2+6): AgCdO CM-MSS (3+4+5+7): AgNi	AgNi
Rated voltage (VDE 0110, IEC 664-1, IEC 60947-1)		250 V	
Maximum switching voltage		250 V	
Rated operational current I_o (IEC/EN 60947-5-1)	AC12 (resistive) at 230 V AC15 (inductive) at 230 V DC12 (resistive) at 24 V DC13 (resistive) at 24 V	4 A 3 A 4 A 2 A (1.5 A - n/c contact ¹⁾)	
AC rating (UL 508)	Utilization category (Control Circuit Rating Code) max. rated operational voltage max. continuous thermal current at B 300 max. making/breaking apparent power at B300	300 V AC 5 A 3600/360 VA	
Mechanical lifetime		30 (10 ¹¹) x 10 ⁹ switching cycles	
Electrical lifetime (AC12, 230 V, 4 A)		0.1 x 10 ⁶ switching cycles	
Max. fuse rating to achieve short-circuit protection	n/c contact n/o contact	10 A fast-acting 10 A fast-acting	4 A (10 A ¹⁾) fast-acting 6 A (10 A ¹⁾) fast-acting
			10 A fast-acting 10 A fast-acting
General data			
Dimensions (W x H x D)	22.5 x 78 x 78.5 mm (0.89 x 3.07 x 3.09 in)	22.5 x 78 x 100 mm (0.89 x 3.07 x 3.94 in)	45 x 78 x 100 mm (1.77 x 3.07 x 3.94 in)
Weight	approx. 0.11 kg (0.24 lb)	approx. 0.15 kg (0.33 lb)	approx. 0.23 kg (0.51 lb)
Mounting position		any	
Degree of protection	housing / terminals	IP50 / IP20	
Ambient temperature range	operation	-20...+60 °C	-25...+65 °C
	storage	-40...+85 °C	
Mounting		DIN rail (IEC/EN 60715)	

¹⁾ 1SVR 430 710 R 0200, 1SVR 430 8xx R xxxx

Thermistor motor protection relays

Technical data

Measuring &
monitoring relays
CM Range

Type		CM-MSE	CM-MSS	CM-MSN
Electrical connection				
Wire size	fine strand with wire end ferrule	2 x 1.5 mm ² (2 x 16 AWG)		2 x 2.5 mm ² (2 x 14 AWG)
	fine strand without wire end ferrule	2 x 0.75-1.5 mm ² (2 x 18-16 AWG)		2 x 0.75-2.5 mm ² (2 x 18-14 AWG)
	rigid	2 x 1-1.5 mm ² (2 x 18-16 AWG)		2 x 0.75-2.5 mm ² (2 x 18-14 AWG)
Stripping length		2 x 0.75-1.5 mm ² (2 x 18-16 AWG)		2 x 0.5-4 mm ² (2 x 20-12 AWG)
Tightening torque		10 mm (0.39 inch)		7 mm (0.28 inch)
Standards				
Product standard		IEC 255-6, EN 60255-6		
Low Voltage Directive		2006/95/EC		
EMC Directive		2004/108/EC, 91/263/EEC, 92/31/EEC, 93/68/EEC, 93/67/EEC		
Electromagnetic compatibility				
electrostatic discharge	IEC/EN 61000-4-2	EN 61000-6-2, EN 61000-6-4		
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (6 kV / 8 kV)		
electrical fast transient /burst	IEC/EN 61000-4-4	Level 3 (10 V/m)		
surge	IEC/EN 61000-4-5	Level 3 (2 kV / 5 kHz)		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3/4 (1/2 kV)		
Operational reliability (IEC 68-2-6)		6 g	4 g	5 g
Resistance to vibration (IEC 68-2-6)		10 g	6 g	10 g
Environmental testing (IEC 68-2-30)		24 h cycle time, 55 °C, 93 % rel., 96 h		
Isolation data				
Rated voltage between supply, measuring and output circuit		250 V		
Rated impulse withstand voltage between all isolated circuits		4 kV / 1.2 - 50 µs		
Test voltage between all isolated circuits		2.5 kV, 50 Hz, 1 min.		
Pollution degree		3		
Overvoltage category		III		

6

Notes

CM-E Range Temperature monitoring relays



Temperature monitoring relays





New range of temperature monitoring relays CM-TCS

The new CM-TCS temperature monitoring relays replace the existing C510 and C511 range. The number of models has been reduced in order to make selection and stocking easier. All products now feature over-temperature and under-temperature monitoring. Also, units are now configurable to open or closed circuit principle.

6 The temperature monitoring relays CM-TCS monitor overtemperature, undertemperature or temperatures between threshold values (window monitoring) with PT100 sensor. As soon as the temperature falls below or exceeds the threshold value the output relays change their positions according to the configured functionality and the front-face LED's display the current status.

Characteristics CM-TCS

- Adjustable sensor type: PT100
- Functionality like overtemperature monitoring, undertemperature monitoring, temperature window monitoring configurable
- All configurations and adjustments by front-face operating elements
- Precise adjustment with direct reading scales
- One or two threshold values
- Hysteresis 2...20 % adjustable
- Operating temperature range -40...+60 °C
- 1 x 2 c/o or 2 x 1 c/o configurable
- Open- or closed-circuit principle configurable
- Short-circuit monitoring and interrupted wire detection
- 22.5 mm (0.89 in) width
- LED's for status indication

Characteristics C512 + C513

- Adjustable sensor types: PT100, PT1000, KTY83, KTY84, NTC-B57227-K333-A1
- Measuring principle for 2-wire and 3-wire sensors
- Temperature monitor for 1-3 sensor circuits
- Adjustable over-, undertemperature monitoring or range monitoring function
- 2 thresholds
- Hysteresis for both thresholds (1-99 Kelvin)
- Adjustable time delay from 0-999 s affects to both thresholds
- Storage function selectable via external signal (Y1-Y2)
- Non volatile storage of parameter settings
- 1 n/o (for wire-break and short-circuit detection) and 2 c/o
- Multifunctional digital display
- 3 LED's for status indication
- Open- or closed-circuit principle selectable
- 45 mm wide housing with 24 terminals

C512

- Temperature monitor for 1 sensor circuit

C513

- Temperature monitor for 1-3 sensor circuits
- In the 3-sensor version the status of the single sensors is displayed if the temperature exceeds or falls below the threshold.

This way it can be easily determined which one of the connected sensors has exceeded or dropped below either one or both threshold values.

Temperature monitoring relays

Selection and conversion

NEW

Measuring & monitoring relays
CM Range

	Reference code	Catalog number	1SVR630740R9100	1SVR630740R0100	1SVR630740R9200	1SVR630740R0200	1SVR630740R9300	1SVR630740R0300	C512-24	C512-W	C513-W
Rated control supply voltage U_s											
24 V AC/DC			■			■			■		
24-240 V AC/DC			■		■		■			■	■
Technology											
analogue			■	■	■	■	■	■			
digital									■	■	■
Sensor circuits (2 or 3 wire)											
no of temperature sensors			1	1	1	1	1	1	1	1	3
no of thresholds			2	2	2	2	2	2	2	2	3
Sensor type											
PT100			■	■	■	■	■	■	■	■	■
PT100, KTY83, KTY84, NTC									■	■	■
Measuring temperature range											
-50...+50 °C			■	■							
0...+100 °C					■	■					
0...+200 °C							■	■			
-50...+500 °C									■	■	■
Monitoring function											
overtemperature			■	■	■	■	■	■	■	■	■
undertemperature			■	■	■	■	■	■	■	■	■
window temperature			■	■	■	■	■	■	■	■	■
Operating principle											
open or closed principle			■	■	■	■	■	■	■	■	■
Output contacts											
n/o									1	1	1
c/o			2	2	2	2	2	2	2	2	2
Conversion											
1SAR70001R0005	C510.01-24	24 V AC/DC	■						no device with pure 230 V AC supply.		
1SAR70001R0006	C510.01-K	110/230 V AC		■					no device with pure 230 V AC supply.		
1SAR70002R0005	C510.02-24	24 V AC/DC			■				no device with pure 230 V AC supply.		
1SAR70002R0006	C510.02-K	110/230 V AC				■			no device with pure 230 V AC supply.		
1SAR70003R0005	C510.03-24	24 V AC/DC					■		no device with pure 230 V AC supply.		
1SAR70003R0006	C510.03-K	110/230 V AC						■	no device with pure 230 V AC supply.		
1SAR70004R0005	C510.11-24	24 V AC/DC	■						no device with pure 230 V AC supply.		
1SAR70004R0006	C510.11-K	110/230 V AC		■					no device with pure 230 V AC supply.		
1SAR70005R0005	C510.12-24	24 V AC/DC			■				no device with pure 230 V AC supply.		
1SAR70005R0006	C510.12-K	110/230 V AC				■			no device with pure 230 V AC supply.		
1SAR70006R0005	C510.13-24	24 V AC/DC					■		no device with pure 230 V AC supply.		
1SAR70006R0006	C510.13-K	110/230 V AC						■	no device with pure 230 V AC supply.		
1SAR700011R0005	C511.01-24	24 V AC/DC	■								
1SAR700011R0006	C511.01-W	24-240 V AC/DC		■							
1SAR700012R0005	C511.02-24	24 V AC/DC			■						
1SAR700012R0006	C511.02-W	24-240 V AC/DC				■					
1SAR700013R0005	C511.03-24	24 V AC/DC					■				
1SAR700013R0010	C511.03-W	24-240 V AC/DC						■			
1SAR700016R0005	C511.11-24	24 V AC/DC	■								
1SAR700016R0010	C511.11-W	24-240 V AC/DC		■							
1SAR700016R0005	C511.12-24	24 V AC/DC			■						
1SAR700016R0010	C511.12-W	24-240 V AC/DC				■					
1SAR700016R0005	C511.13-24	24 V AC/DC					■				
1SAR700016R0010	C511.13-W	24-240 V AC/DC						■			

Temperature monitoring relays

Ordering details



Description

Acquisition, messaging and regulation of temperatures of solid, liquid and gaseous media in processes and machines via PT100, PT1000, KTY83, KTY84 or NTC sensors.

ABB offers different temperature monitoring relays to meet the needs of your application:



CM-TCS



C512, C513

Ordering details - Temperature monitoring relays

Rated control supply voltage	Measuring range	Reference code	Catalog number	Weight (1 pce) kg (lb)
24-240 V AC/DC	-50...+50 °C	CM-TCS.11 ¹⁾	1SVR630740R0100	0.127 (0.281)
	0...+100 °C	CM-TCS.12 ¹⁾	1SVR630740R0200	0.127 (0.281)
	0...+200 °C	CM-TCS.13 ¹⁾	1SVR630740R0300	0.127 (0.281)
24 V AC/DC	-50...+50 °C	CM-TCS.21 ¹⁾	1SVR630740R9100	0.141 (0.310)
	0...+100 °C	CM-TCS.22 ¹⁾	1SVR630740R9200	0.141 (0.310)
	0...+200 °C	CM-TCS.23 ¹⁾	1SVR630740R9300	0.141 (0.310)
24 V AC/DC	-50...+500 °C *)	C512-24 ²⁾	1SAR700100R0005	0.32 (0.71)
24-240 V AC/DC		C512-W ²⁾	1SAR700100R0010	0.33 (0.73)
24-240 V AC/DC		C513-W ²⁾	1SAR700110R0010	0.34 (0.75)

¹⁾ PT100 sensors, 2 or 3 wire connection, 2 thresholds adjustable

²⁾ PT100, PT1000, KTY83, KTY84, NTC-B57227-K333-A1, 2 or 3 wire connection, 2 thresholds, multifunctional display.

Open or closed circuit principle adjustable, 1 n/o, 2 c/o contacts

(Typ Siemens Matsushita B57272-A333-A1 - 100 °C: 1.8 kΩ, 25 °C: 32.762 kΩ)

Ordering details - New range temperature monitoring relays

Rated control supply voltage	Measuring range	Reference code	Catalog number	Weight (1 pce) kg (lb)
24-240 V AC/DC	-50...+50 °C	CM-TCS.11S	1SVR730740R0100	0.151 (0.333)
		CM-TCS.11P	1SVR740740R0100	0.140 (0.309)
	0...+100 °C	CM-TCS.12S	1SVR730740R0200	0.151 (0.333)
		CM-TCS.12P	1SVR740740R0200	0.140 (0.309)
	0...+200 °C	CM-TCS.13S	1SVR730740R0300	0.151 (0.333)
		CM-TCS.13P	1SVR740740R0300	0.140 (0.309)
24 V AC/DC	-50...+50 °C	CM-TCS.21S	1SVR730740R9100	0.138 (0.304)
		CM-TCS.21P	1SVR740740R9100	0.127 (0.280)
	0...+100 °C	CM-TCS.22S	1SVR730740R9200	0.138 (0.304)
		CM-TCS.22P	1SVR740740R9200	0.127 (0.280)
	0...+200 °C	CM-TCS.23S	1SVR730740R9300	0.138 (0.304)
		CM-TCS.23P	1SVR740740R9300	0.127 (0.280)

Ordering details - Replaceable cover marking for digital devices

Use for	Language	Reference code	Catalog number	Weight (1 pce) kg (lb)
C512	German	C512-D	1SVR700101R0100	
C512	English	C512-E	1SVR700102R0100	
C513	German	C513-D	1SVR700111R0100	
C513	English	C513-E	1SVR700112R0100	

*) The measuring range depends on the used sensor type:

- PT100: -50...+500 °C
- PT1000: -50...+500 °C
- NTC: +80...+160 °C
- KTY83: -50...+175 °C
- KTY84: -40...+300 °C

(Typ Siemens Matsushita B57272-A333-A1 - 100 °C: 1.8 kΩ, 25 °C: 32.762 kΩ)

Temperature monitoring relays

Overview, functional description and diagrams

NEW

Overview

The temperature monitoring relays can be used for temperature measurement in solid, liquid and gaseous media. The temperature is acquired by the sensor in the medium, evaluated by the device and monitored to determine whether it is within an operating range (range monitoring function) or has exceeded or fallen below a threshold.

Functional description

CM-TCS

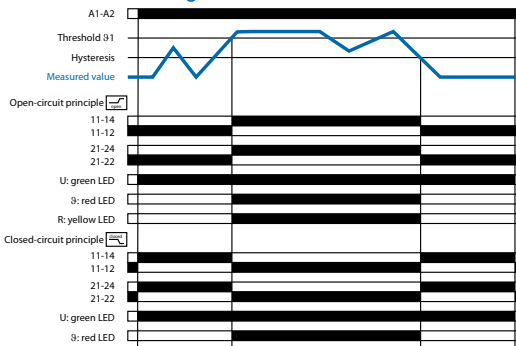
The temperature monitoring relays CM-TCS monitor overtemperature, undertemperature, or temperatures between two threshold values (window monitoring) with PT100 sensor. As soon as the temperature falls below or exceeds the threshold value the output relays change their positions according to the configured functionality and the front-face LEDs display the current status. Regardless of the selected configuration, the device is monitoring its measuring circuit for interrupted wires or short-circuits.

DIP switches

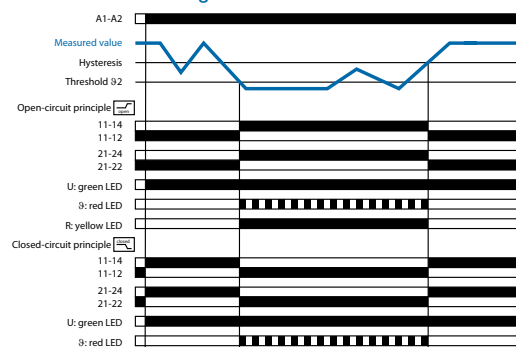
Position	4	3	2	1
ON †	2x1 c/o	closed		
OFF	1x2 c/o	open		

Function diagrams

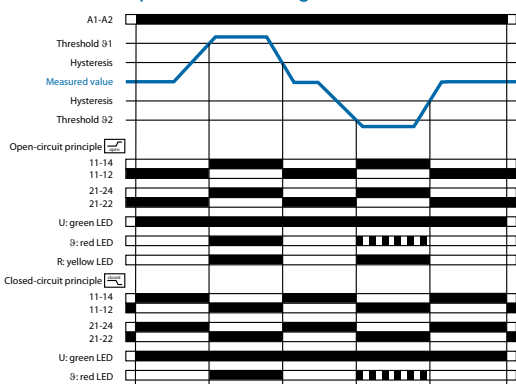
CM-TCS - Overvoltage



CM-TCS - Undervoltage



CM-TCS - Temperature monitoring



	ON	OFF (default)
DIP switch 1 Monitoring principle	Overtemperature monitoring If overtemperature monitoring is selected, the CM-TCS recognizes temperatures above the selected threshold and trips the output relay according to the selected operating principle.	Undertemperature monitoring If undertemperature monitoring is selected, the CM-TCS recognizes temperatures below the selected threshold and trips the output relay according to the selected operating principle.
DIP switch 2 Temperature window monitoring	Temperature window monitoring activated If temperature window monitoring is selected, the CM-TCS monitors over- and undertemperature. If temperature window monitoring is activated, DIP switch 1 is disabled.	Temperature window monitoring de-activated Temperature window monitoring is de-selected.
DIP switch 3 Operating principle of the output relays	Closed-circuit principle If closed-circuit principle is selected, the output relays are energized. They de-energize if a fault is occurring.	Open-circuit principle If open-circuit principle is selected, the output relays are deenergized. They energize if a fault is occurring.
DIP switch 4 2 x 1 c/o contact, 1 x 2 c/o contacts	2 x 1 c/o (SPDT) contact If operating principle 2 x 1 c/o contact is selected, the output relay R1 (11-12/14) reacts to threshold value t_1 and the output relay R2 (21-22/24) reacts to threshold value t_2 .	1 x 2 c/o (SPDT) contacts If operating principle 1 x 2 c/o contacts is selected, both output relays R1 (11-12/14) and R2 (21-22/24) react synchronously to one threshold value. Overtemperature monitoring: Settings of the threshold value t_2 have no effect on the operation. Undertemperature monitoring: Settings of the threshold values t_2 have no effect on the operation.

Temperature monitoring relays

Overview, functional description and diagrams

NEW

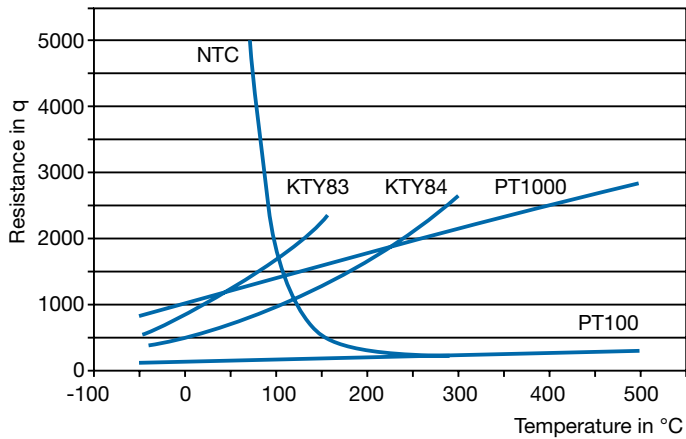
Functional description

Digital tripping devices

Once the temperature has reached the set threshold of u_1 , output relay K1 changes its switching state after the set time delay t has elapsed (K2 reacts in the same way for u_2).

6

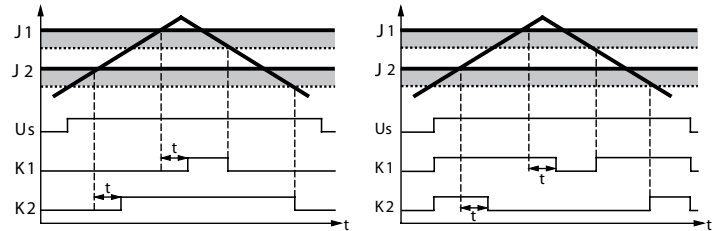
Characteristic curves of resistance sensors



Function diagrams

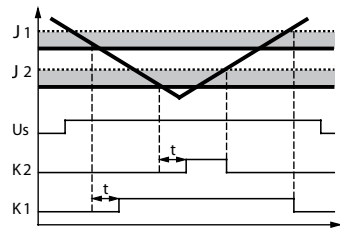
Overtemperature - C512/C513

Open-circuit principle

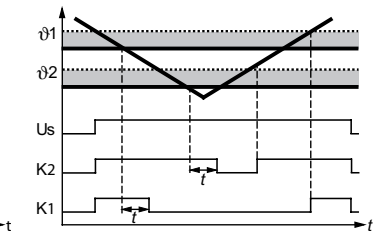


Undertemperature - C512/C513

Open-circuit principle

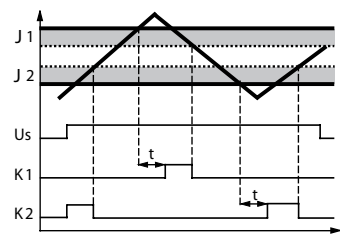


Closed-circuit principle

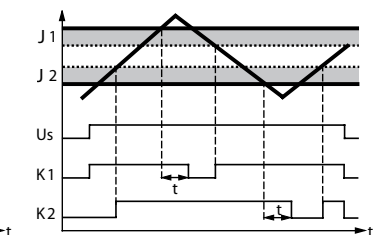


Range monitoring - C512/C513

Open-circuit principle

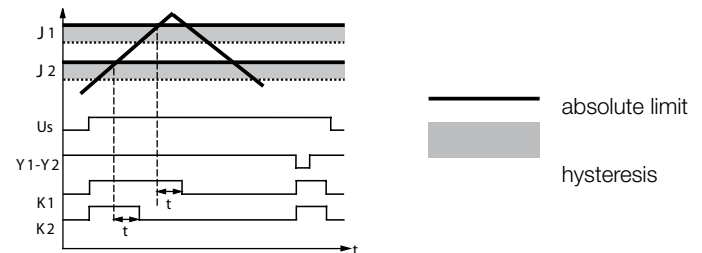


Closed-circuit principle



Function principle with storage function - C512/C513

using overtemperature with closed-circuit principle as an example



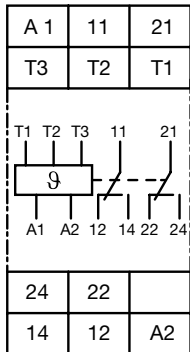
— absolute limit
■ hysteresis

NEW

Temperature monitoring relays

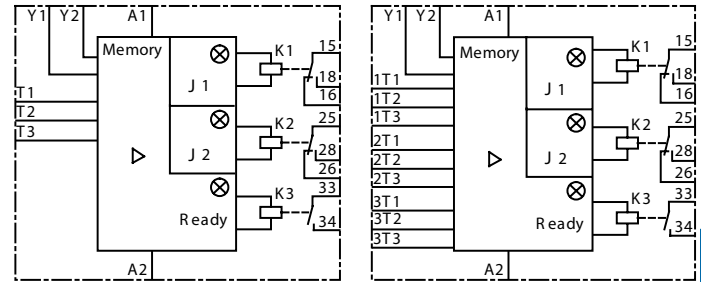
Connection diagrams, resistance thermometer sensors

Connection diagrams



CM-TCS

- A1-A2 Control supply voltage
- 11-12/14 Output relay R1
- 21-22/24 Output relay R2
- T1, T2, T3 Measuring input, connection PT100



C512

- | | | | |
|----------|-------------------------------|----------|-------------------------------|
| A1-A2 | Rated control supply voltage | A1-A2 | Rated control supply voltage |
| 15-16/18 | Output contacts | 15-16/18 | Output contacts |
| 25-26/28 | Output contacts | 25-26/28 | Output contacts |
| 33-34 | Output contacts | 33-34 | Output contacts |
| T1-T3 | Sensor connection | 1T1-1T3 | Sensor connection 1 |
| Y1-Y2 | Connection for storage bridge | 2T1-2T3 | Sensor connection 2 |
| | | 3T1-3T3 | Sensor connection 3 |
| | | Y1-Y2 | Connection for storage bridge |

Connection of resistance thermometer sensors

2-wire measurement

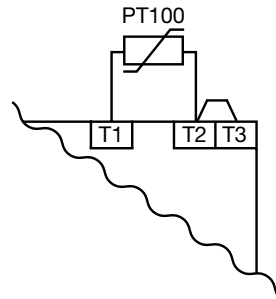
When using 2-wire temperature sensors the sensor resistance and the wire resistance are added together.

The resulting systematic errors must be taken into account when adjusting the tripping device.

A jumper must be connected between the terminals T2 and T3.

The following table can be used for PT100 sensors to determine the temperature errors caused by the line length.

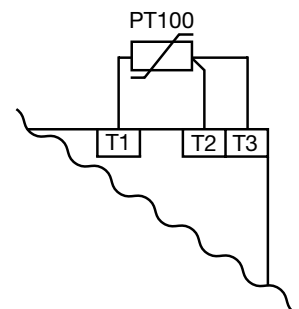
When using resistance sensors with two-wire connection a bridge must be inserted between terminals T2 and T3.



3-wire measurement

To minimize the influence of the wire resistance, a three-wire connection is usually used.

By means of the additional wire two measuring circuits are created. One of these two circuits is used for reference. This way, the tripping device can calculate and take into account the wire resistance automatically.



Error caused by the line

The error resulting from the line resistance amounts to approx. 2.5 Kelvin/Ohm. If the resistance of the line is not known and it is not possible to measure it, the error caused by the line can be estimated using the following table.

Temperature error

(depending on the line length and conductor cross section for PT100 sensors at an ambient temperature of 20 °C, in K)

Line length in m	Wire size mm ²			
	0.50	0.75	1	1.5
0	0.0	0.0	0.0	0.0
10	1.8	1.2	0.9	0.6
25	4.5	3.0	2.3	1.5
50	9.0	6.0	4.5	3.0
75	13.6	9.0	6.8	4.5
100	18.1	12.1	9.0	6.0
200	36.3	24.2	18.1	12.1
500	91.6	60.8	45.5	30.2

Type		CM-TCS.11/12/13	CM-TCS.21/22/23
Input circuit			
Rated control supply voltage	U_s	A1-A2	24-240 V AC/DC
Rated control supply voltage U_s tolerance			-15...+10 %
Typical current / power / consumption			24 V DC 115 V AC 230 V AC
Rated frequency		AC	33 mA / 0.8 VA 12.5 mA / 1.5 VA 13 mA / 2.9 VA
Frequency range		AC	13.5-440 Hz
Power failure buffering time		min.	20 ms
6 Measuring circuit			
Sensor type			T1, T2, T3 PT100
Connection of the sensor		2-wire 3-wire	yes, jumper between T2-T3 yes, use terminal T1, T2, T3
Monitoring function			overtemperature, undertemperature or window monitoring
Threshold values adjustable within the measuring range		CM-TCS.x1 CM-TCS.x2 CM-TCS.x3	-50...+50 °C 0...+100 °C 0...+200 °C
Number of possible thresholds			2
Tolerance of the adjusted threshold value			typ. ±5 % of the range end value
Hysteresis related to the threshold value			2-20 % of threshold value, min. 1 °C
Measuring principle			continuous current
Typical current in the sensor circuit			0.8 mA
Interrupted wire detection			yes, indicated via LED status
Short-circuit detection			yes, indicated via LED status
Accuracy within the rated control supply voltage tolerance			< 0.2 °C / or < 0.01 %/K
Accuracy within the temperature range			< 0.2 °C / or < 0.01 %/K
Repeat accuracy (constant parameters)			< 0.2 % of full scale
Maximum measuring cycle			320 ms
Output circuit			
Kind of output			2 x 1 or 1 x 2 c/o (SPDT) contacts configurable
Operating principle ¹⁾			open- or closed-circuit principle configurable
Contact material			AgNi alloy, Cd free
Rated voltage (VDE 0110, IEC 60947-1)			250 V AC / 300 V DC
Minimum switching voltage / Minimum switching current			24 V / 10 mA
Maximum switching voltage / Maximum switching current			see 'Load limit curves'
Rated operating current I_n (IEC/EN 60947-1-5)		AC12 (resistive) 230 V AC15 (inductive) 230 V DC12 (resistive) 24 V DC13 (inductive) 24 V	4 A 3 A 4 A 2 A
AC Rating (UL508)		utilization category	B 300, pilot duty general purpose (250 V, 4 A, cos φ 0.75)
		maximum rated operational voltage	250 V AC
		maximum continuous thermal current at B 300	4 A
		maximum making/breaking apparent power at B 300	3600/360 VA
Mechanical lifetime			30 x 10 ⁶ switching cycles
Electrical lifetime ((AC12, 230 V, 4 A)			0.1 x 10 ⁶ switching cycles
Maximum fuse rating to achieve short-circuit protection		n/c contact n/o contact	6 A fast-acting 10 A fast-acting
Conventional thermal current I_{th} acc. IEC/EN 60947-1			4 A
General data			
Dimensions (W x H x D)			22.5 x 78 x 100 mm (0.89 x 3.07 x 3.94 in)
Mounting position			any
Weight		net weight gross weight	0.141 kg (0.310 lb) 0.166 kg (0.336 lb)
Degree of protection		enclosure / terminals	IP50 / IP20
Ambient temperature range		operation storage/transport	-40...+60 °C -40...+85 °C
Mounting			DIN rail (IEC/EN 60715), snap-on mounting without any tool

Temperature monitoring relays

Technical data

NEW

Measuring & monitoring relays
CM Range

Type		CM-TCS.11/12/13	CM-TCS.21/22/23
Electrical connection			
Wire size	rigid	2 x 0.5-4 mm ² (2 x 20-12 AWG)	
	fine-strand with wire end ferrule	2 x 0.75-2.5 mm ² (2 x 18-14 AWG)	
Stripping length		7 mm (0.28 in)	
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)	
Electrical connection for devices in new housing			
Wire size	rigid	Screw connection technology	Easy Connect Technology (Push-in)
		1 x 0.5-2.5 mm ² (1 x 20-14 AWG)	2 x 0.5-1.5 mm ² (2 x 20-16 AWG)
		2 x 0.5-1.5 mm ² (2 x 20-16 AWG)	
	fine-strand with wire end ferrule	1 x 0.5-4 mm ² (1 x 20-12 AWG)	2 x 0.5-1.5 mm ² (2 x 20-16 AWG)
		2 x 0.5-2.5 mm ² (2 x 20-14 AWG)	
Stripping length		8 mm (0.32 in)	8 mm (0.32 in)
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)	-
Standards			
Product standard		IEC/EN 60255-6: 2008	
Other standards		EN 50178, IEC/EN 60204	
Low Voltage Directive		2006/95/EC	
EMC Directive		2004/108/EC	
RoHS Directive		2002/95/EC	
Environmental data			
Ambient temperature ranges	operation/storage/ transport	-40...+60°C/-40...+85°C/-40...+85°C	
Climatic category		3K5 (no condensation, no ice formation)	
Damp heat, cyclic		6 x 24 h cycle, 55 °C, 95 % RH	
Vibration, sinusoidal		Class 2	
Shock		Class 2	
Isolation data			
Rated impulse withstand voltage U _{imp} between all isolated circuits (IEC/EN 60947-1, IEC/EN 60664-1, VDE 0110-1)	supply circuit / measuring circuit	4 kV	-
	supply circuit / output circuits	4 kV	
	measuring circuit / output circuits	4 kV	
	output circuit 1 / output circuit 2	4 kV	
Pollution degree (IEC/EN 60664-1, VDE 0110-1)		3	
Overvoltage category (IEC/EN 60664-1, VDE 0110-1)		III	
Rated insulation voltage U _i (IEC/EN 60947-1, IEC/EN 60664-1, VDE 0110-1)	supply circuit / measuring circuit	300 V	-
	supply circuit / output circuits	300 V	
	measuring circuit / output circuits	300 V	
	output circuit 1 / output circuit 2	300 V	
Basis isolation for rated control supply voltage (IEC/EN 60664-1, VDE 0110-1)	supply circuit / measuring circuit	250 V AC / 300 V DC	-
	supply circuit / output circuits	250 V AC / 300 V DC	
	measuring circuit / output circuits	250 V AC / 300 V DC	
	output circuit 1 / output circuit 2	250 V AC / 300 V DC	
Protective separation (IEC/EN 61140, IEC/EN 50178)	supply circuit / measuring circuit	250 V AC / 250 V DC	-
	supply circuit / output circuits	250 V AC / 300 V DC	250 V AC / 250 V DC
	measuring circuit / output circuits	250 V AC / 300 V DC	250 V AC / 250 V DC
Test voltage between all isolated circuits, routine test (IEC/EN 60255-5, IEC/EN 61010-1)	supply circuit / measuring circuit	2.0 kV, 50 Hz, 1 s	-
	supply circuit / output circuits	2.0 kV, 50 Hz, 1 s	
	measuring circuit / output circuits	2.0 kV, 50 Hz, 1 s	
Test voltage between all isolated circuits, type test (IEC/EN 60255-5)	supply circuit / measuring circuit	4.0 kV, 50 Hz, 1 s	-
	supply circuit / output circuits	4.0 kV, 50 Hz, 1 s	
	measuring circuit / output circuits	4.0 kV, 50 Hz, 1 s	
Electromagnetic compatibility			
Interference immunity to		IEC/EN 61000-6-1, IEC/EN 61000-6-2, IEC/EN 61326-2-4	
electrostatic discharge	IEC/EN 61000-4-2	Level 3, 6 kV / 8 kV	
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3, 10 V/m (1 GHz) / 3 V/m (2 GHz) / 1 V/m (2.7 GHz)	
electrical fast transient/burst	IEC/EN 61000-4-4	Level 3, 2 kV / 5 kHz	
surge	IEC/EN 61000-4-52	Level 3, installation class 3, supply circuit and measuring circuit 1 kV L-L, 2 kV L-earth	
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3, 10 V	
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-11	Level 3	
harmonics and interharmonics	IEC/EN 61000-4-13	Level 3	
Interference emission		EN 61000-6-3, EN 61000-6-4	
high-frequency radiated	IEC/CISPR 22, EN 50022	Class B	
high-frequency conducted	IEC/CISPR 22, EN 50022	Class B	

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Temperature monitoring relays

Technical data

Type		C512	C513
Input circuit			
Rated control supply voltage	U_s	A1-A2 24 V AC/DC	A1-A2 24-240 V AC/DC
Power consumption		AC < 7 VA DC < 4 W	
Rated control supply voltage U_s tolerance			-15...+10 %
Rated frequency		AC	
Sensor circuit			
Sensor type		PT100, PT1000, KTY83, KTY84, NTC	
Sensor current		PT100 typ. 1 mA	PT1000, KTY83, KTY84, NTC typ. 0,2 mA
Wire-break detection		yes (not for NTC)	
Short-circuit detection		yes	
3-wire connection		yes (2-wire connection of sensors with terminals T2 and T3 bridged)	
Measuring circuit			
Setting accuracy at $T_a = 20\text{ °C}$ (T_{20})		< $\pm 2\text{ K} \pm 1\text{ digit}$	
Accuracy within the temperature range		0.05 °C / °C deviation from T_{20}	
Response time		500 ms	
Hysteresis settings	temperature 1	1-99 kelvin	
	temperature 2	1-99 kelvin	
Tripping delay		0-999 s	
Output circuit			
Kind of output		2 c/o + 1n/o	2 c/o + 1 n/o
Rated operating current I_b (IEC/EN 60947-1-5)	AC12 (resistive) 230 V	3 A	
	AC15 (inductive) 230 V	1 A	
	DC12 (resistive) 24 V	0,1 A	
	DC13 (inductive) 24 V	0,1 A	
Mechanical lifetime		30 x 10 ⁶ switching cycles	
Electrical lifetime (AC15 at 3 A)		0.1 x 10 ⁵ switching cycles	
Max. fuse rating to achieve short-circuit protection		4 A, operating class gL/gG	
General data			
Dimensions (W x H x D)		45 x 105.9 x 86 mm (1.77 x 4.17 x 3.39 in)	
Tightening torque		0.8-1.2 Nm	
Mounting position		any	
Degree of protection	enclosure / terminals	IP 40 / IP 20	
Ambient temperature range	operation	-25...+60 °C	
	storage	-40...+80 °C	
Mounting		DIN rail (IEC/EN 60715)	
Electrical connection			
Wire size	rigid	1 x 4 mm ² (1 x 12 AWG), 2 x 2.5 mm ² (2 x 14 AWG)	
	fine-strand with wire end ferrule	1 x 2.5 mm ² (1 x 14 AWG), 2 x 1.5 mm ² (2 x 16 AWG)	
Standards			
Environmental conditions		IEC 60721-3-3	
Low Voltage Directive		IEC 60947-5-1, VDE 0660	
Electromagnetic compatibility	Interference immunity	EN 61000-6-2	
	Interference emission	EN 61000-6-4	
Vibration resistance (IEC 68-2-6)		5-26 Hz / 0.75 mm	
Shock resistance (IEC 68-2-27)		15 g / 11 ms	
Isolation data			
Rated insulation voltage		300 V AC	
Pollution degree		3	



CM-E Range Liquid level monitors & controls



Liquid level monitors and controls

Benefits and advantages

CM-ENE MIN/MAX

- Monitoring of pump systems for dry running (ENE MIN) and overflow (ENE MAX)
- Connection of 2 electrodes possible at C and MIN/MAX
- 3 supply voltage versions
- Optimal price/performance ratio
- 1 n/o contact: Open-circuit principle for CM-ENE MIN, Closed-circuit principle for CM-ENE MAX
- LED for status indication

CM-ENS

- 6**
- Monitoring and control of liquid levels (when draining or filling liquids in tanks)
 - Monitoring and control of mixture ratios (conductivity of liquids)
 - Adjustable response sensitivity 5-100 kq
 - 4 supply voltage versions 24 - 415 V AC
 - Version with protective separation acc. to VDE 0160 J
 - Cascadable
 - 1 c/o contact or 1 n/o and 1 n/c contact
 - 2 LEDs for status indication

CM-ENS UP/DOWN

- Monitoring and control of liquid levels
- Selectable function "fill" or "drain"
- Adjustable response sensitivity 5-100 kq
- Cascadable
- 1 c/o contact
- 2 LEDs for status indication

CM-ENN

- Monitoring and control of liquid levels (when emptying or filling liquids in tanks)
- Monitoring and control of mixture ratios (conductivity of liquids)
- 3 response sensitivities from 250 q - 500 kq in one unit
- 5 supply voltage versions 24 V AC/DC - 415 V AC
- Selectable ON- or OFF-delay 0.1-10 s
- 2 c/o contacts
- 2 LEDs for status indication

CM-ENN UP/DOWN

- Liquid level relay with 5 electrode inputs
- Level control with integrated overflow and dry-running protection
- Adjustable response sensitivity 5-100 kq
- Cascadable
- 1 c/o contact and 2 n/c contacts as alarm outputs
- 4 LEDs for status indication

Response sensitivity	Max. electrode current	Max. cable capacity	Max. cable length
250 Ω - 5 k Ω	8 mA	200 nF	1000 m
2.5-50 k Ω	2 mA	20 nF	100 m
25-500 k Ω	0.5 mA	4 nF	20 m

Liquid level monitors and controls

Ordering details

Description

ABB's liquid level monitoring relays for regulation and control of liquid levels and ratios of mixtures of conductive fluids.

The assortment includes single function and multifunction monitoring relays which can be used for over flow and dry-running protection, for filling and draining applications, for max and min alarm or any combination of such functions. Furthermore, a wide range of accessories is available.

Ordering details

Rated control supply voltage	Reference code	Catalog number	Weight (1 pce) kg (lb)
24 V AC	CM-ENE MIN	1SVR550855R9500	0.15 (0.33)
110-130 V AC		1SVR550850R9500	0.15 (0.33)
220-240 V AC		1SVR550851R9500	0.15 (0.33)
24 V AC	CM-ENE MAX	1SVR550855R9400	0.15 (0.33)
110-130 V AC		1SVR550850R9400	0.15 (0.33)
220-240 V AC		1SVR550851R9400	0.15 (0.33)
24 V AC	CM-ENS	1SVR430851R9100	0.15 (0.33)
110-130 V AC		1SVR430851R0100	0.15 (0.33)
220-240 V AC		1SVR430851R1100	0.15 (0.33)
380-415 V AC		1SVR430851R2100	0.15 (0.33)
220-240 V AC ¹⁾		1SVR430851R1300	0.15 (0.33)
24 V AC	CM-ENS UP/DOWN	1SVR430851R9200	0.15 (0.33)
110-130 V AC		1SVR430851R0200	0.15 (0.33)
220-240 V AC		1SVR430851R1200	0.15 (0.33)
24-240 V AC/DC	CM-ENN	1SVR450055R0000	0.30 (0.66)
24 V AC		1SVR450059R0000	0.30 (0.66)
110-130 V AC		1SVR450050R0000	0.30 (0.66)
220-240 V AC		1SVR450051R0000	0.30 (0.66)
380-415 V AC	CM-ENN UP/DOWN	1SVR450052R0000	0.30 (0.66)
24 V AC		1SVR450059R0100	0.15 (0.33)
110-130 V AC		1SVR450050R0100	0.15 (0.33)
220-240 V AC	CM-ENN UP/DOWN	1SVR450051R0100	0.15 (0.33)
380-415 V AC		1SVR450052R0100	0.15 (0.33)

¹⁾ Version with protective separation acc. to VDE 0160, 1 n/o, 1 n/c

Liquid level monitors are

Suitable for		Not suitable for	
spring water	acids, bases	chemically pure water	ethylene glycol
drinking water	liquid fertilizers	fuel	concentrated alcohol
sea water	milk, beer, coffee	oils	paraffin
sewage	non-concentrated alcohol	explosive areas (liquid gas)	lacquers



CM-ENE MIN



CM-ENE MAX



CM-ENS



CM-ENN

Liquid level monitors and controls

Ordering details

Accessories

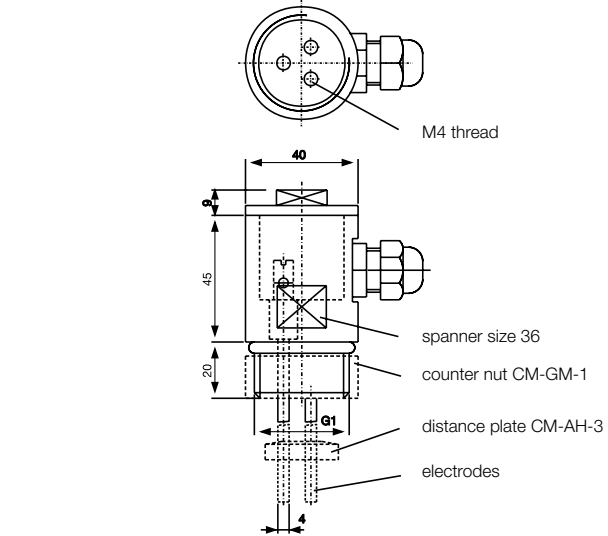
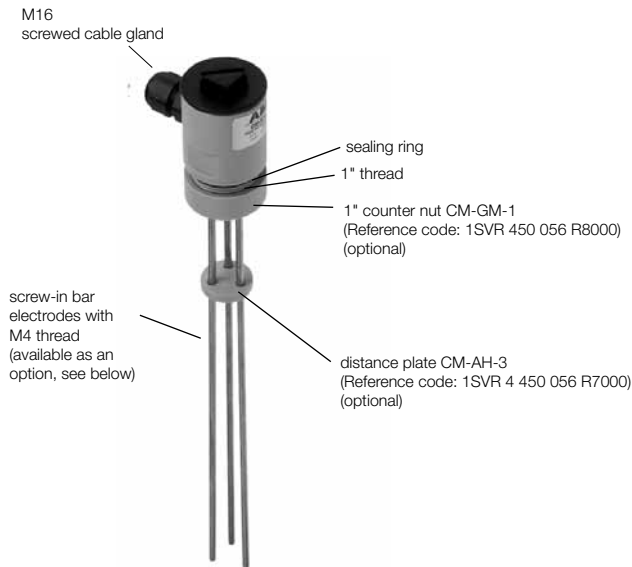
Compact support CM-KH-3 for 3 bar electrodes

Dimensions in mm

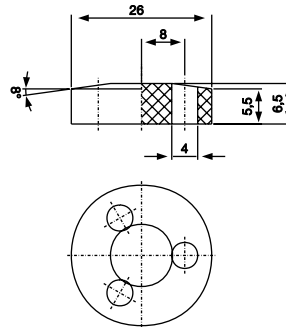
- Ideally suited for use with liquid level relays CM-ENS and CM-ENN
- Wire connection by screw terminals
- Pull relief by M16 screwed cable glands
- Temperature range up to 90 °C
- Food safe material (PPH)
- Screw-in electrodes (M4 thread)
- Distance plate (CM-AH-3) and locking nut (CM-GM-1) optionally available as an accessory

6

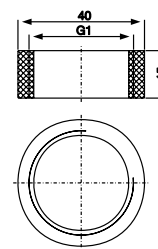
Compact support CM-KH-3



Distance plate CM-AH-3



Counter nut CM-GM-1

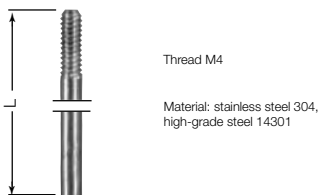


Technical data compact support

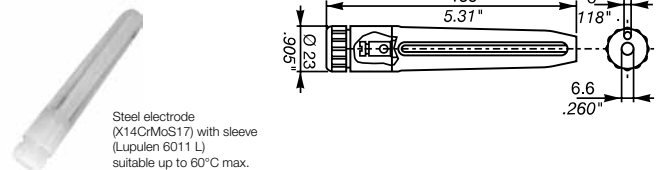
Type of mounting:	G 1" thread
Mounting position:	any
Enclosure material:	PPH
Sealing:	NBR 70
Temperature range:	90 °C max.
Pressure:	10 bar max. (60 °C)

Description	Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
Compact support for 3 bar electrodes	CM-KH-3	1SVR450056R6000		0.06 (0.132)
Distance plate for 3 bar electrodes	CM-AH-3	1SVR450056R7000	1	0.06 (0.132)
Counter nut for 1" thread	CM-GM-1	1SVR450056R8000		0.06 (0.132)

Screw-in bar electrodes for compact support CM-KH-3



Suspension electrode CM-HE



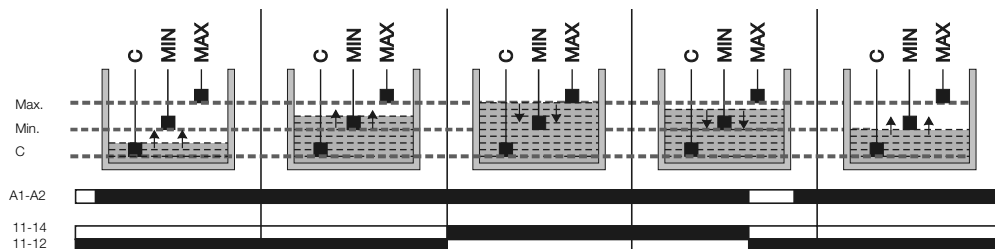
During project engineering the compatibility of the electrode material with the medium to be supervised is to be examined!

Length	Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
300 mm	CM-SE-300	1SVR450056R0000		0.08 (0.176)
600 mm	CM-SE-600	1SVR450056R0100		0.08 (0.176)
1000 mm	CM-SE-1000	1SVR450056R0200		0.08 (0.176)
CM-HE	CM-HE	1SVR402902R0000	1	0.08 (0.176)

Liquid level monitors and controls

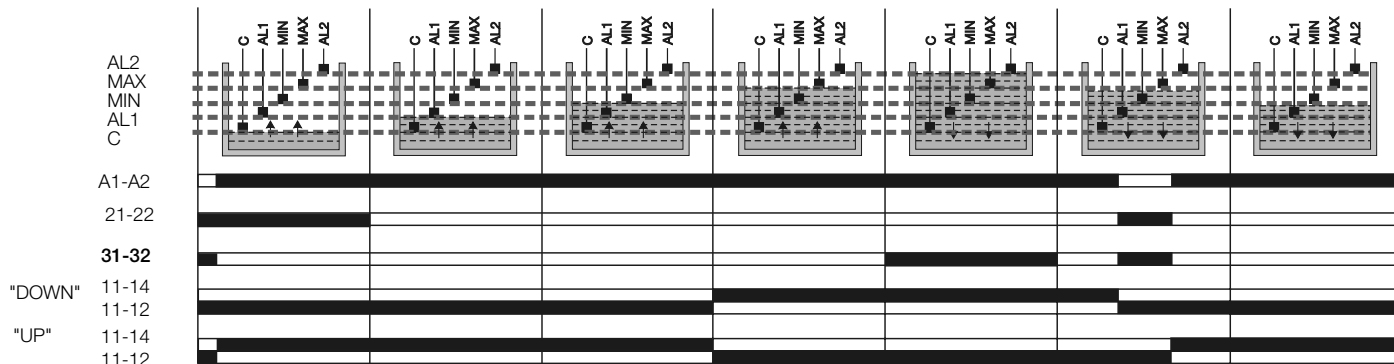
Function diagrams

Function diagram CM-ENS



The CM-ENS monitors levels of conductive liquids and is used for example for liquid level control in pump systems. It can be used for filling or draining tanks for example. It is also suitable for monitoring the conductivity of liquids. The measuring principle is based on the resistance change sensed by single-pole electrodes. After the supply voltage is applied to the terminals A1 and A2, the output relay is de-energized. The probes must be connected to C, MAX, MIN. The output relay energizes if the liquid exceeds the maximum level (C and MAX wet) and de-energizes if the liquid level is below the minimum level (MAX and MIN dry). Based on the measuring circuit there will be a response delay of approx. 250 ms at maximum sensitivity. Different levels in one tank can be controlled by up to 5 CM-ENS without interfering with each other.

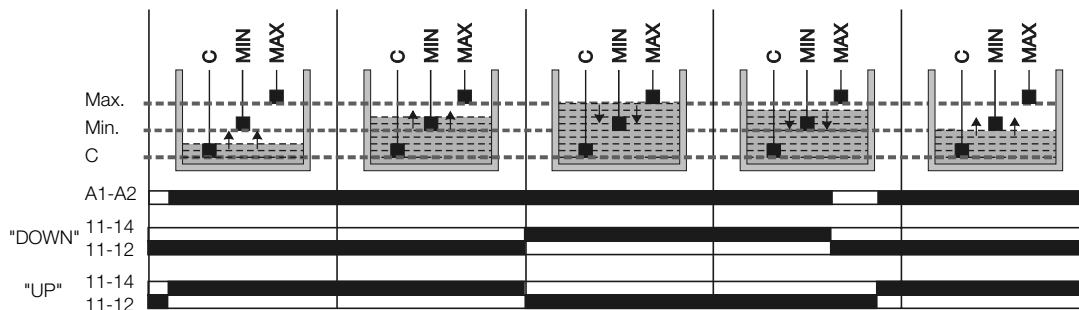
Function diagram CM-ENN UP/DOWN



If a metal tank is used, the ground reference electrode C is not required. In this case the cable can be connected directly to the metal surface of the tank.

The CM-ENN UP/DOWN monitors levels of conductive liquids and media and is used e.g. for liquid level control in pump systems. The measuring principle is based on the resistance change sensed by single-pole electrodes. The function of the output relay 11-12/14 can be selected by a selector switch on the front of the unit to fill "UP" or drain "DOWN". If the "UP" function is selected, the output relay is energized until the MAX electrode becomes wet. Then it is de-energized and not re-energized until the MIN electrode becomes dry. If the "DOWN" function is selected, the output relay is energized as soon as the MAX electrode becomes wet. It remains energized until the liquid level has dropped below the MIN electrode. The electrode inputs AL1 and AL2 energize/de-energize the corresponding output relays RAL1 (21-22) and RAL2 (31-32). AL1 opens if contact RAL1 (21-22) is wet. AL2 closes if contact RAL2 (31-32) is wet. This way, two additional alarm outputs for exceeding or dropping below the normal level can be implemented in addition to the filling levels MAX and MIN.

Function diagram CM-ENS UP/DOWN



The CM-ENS UP/DOWN monitors levels of conductive liquids and other media, and is used e.g. for liquid level control in pump systems.

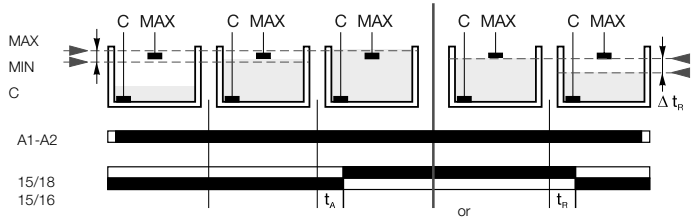
The measuring principle is based on the resistance change sensed by single-pole electrodes. The output relay functions fill (UP) or drain (DOWN) can be selected on a front-face selector switch. If the "UP" function is selected, the output relay is energized until the MAX electrode becomes wet. Then it is de-energized and not re-energized until the MIN electrode becomes dry. If the "DOWN" function is selected, the output relay is energized as soon as the MAX electrode becomes wet. It remains energized until the liquid level has dropped below the MIN electrode. The electrodes can be connected to more than one CM-ENS unit without interference.

Liquid level monitors and controls

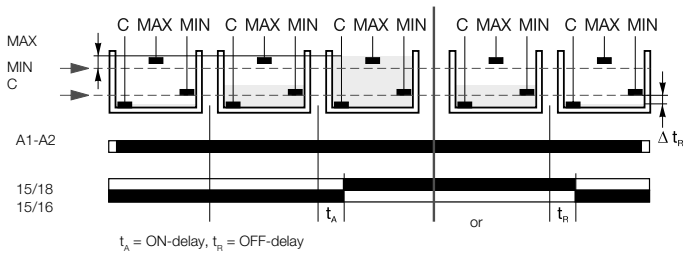
Function diagrams

Function diagrams CM-ENN

Circuit with 2 electrodes



Circuit with 3 electrodes

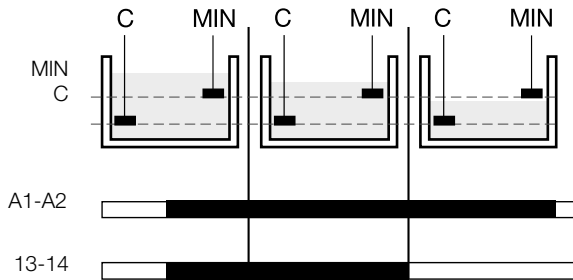


The CM-ENN monitors levels of conductive liquids and is used for example for liquid level monitoring in pump control systems, for dry-running protection of submersible pumps or overflow monitoring of tanks. It is also suitable for conductivity monitoring of liquids. The measuring principle is based on the resistance change sensed by single-pole electrodes (wet or dry).

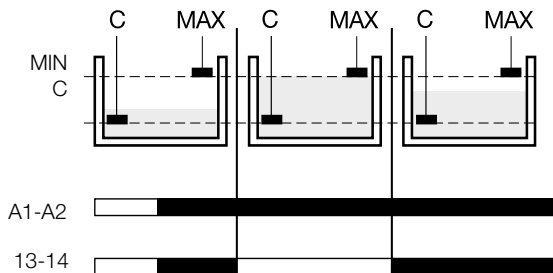
Instead of electrodes, other sensors or transducers can also be used if their output quantities are different resistance values. The measuring, output and supply circuits are electrically isolated for potential separation and to prevent electrical interference.

Due to the integrated ON- or OFF-delay, it is possible to set up time-dependent liquid controls using only two electrodes (C, MAX). Different liquid levels in one tank can be controlled by up to 5 CM-ENN (AC version) without mutual interference.

Function diagram CM-ENE MIN



Function diagram CM-ENE MAX



The liquid level relays CM-ENE MIN and CM-ENE MAX are used to monitor levels of conductive liquids, for example in pump control systems for dry-running or overflow monitoring.

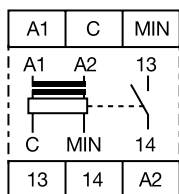
The measuring principle is based on the occurring resistance change when moistening single-pole electrodes. The single-pole electrodes (see also section Accessories) are connected to the terminals C and MIN or MAX. If the supply voltage is applied to A1-A2 and the electrodes are wet, the output relay of the CM-ENE MIN is energized and the output relay of the CM-ENE MAX is de-energized.

The output relay of the CM-ENE MIN de-energizes if the electrodes are no longer wet. The output relay of the CM-ENE MAX energizes if the electrodes are no longer wet.

Liquid level monitors and controls

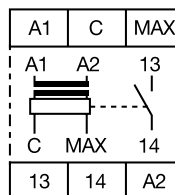
Connection diagrams

Connection diagram CM-ENE MIN



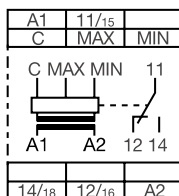
- A1-A2 Rated control supply voltage
- C Ground reference electrode
- MIN Minimum level
- 13-14 Output contact - open-circuit principle

Connection diagram CM-ENE MAX



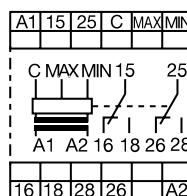
- A1-A2 Rated control supply voltage
- C Ground reference electrode
- MAX Max. level
- 13-14 Output contact - closed-circuit principle

Connection diagram CM-ENS



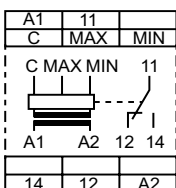
- A1-A2 Rated control supply voltage
- C Ground reference electrode
- MAX Maximum level
- MIN Minimum level
- 11(15)-12(16)/14(18) Output contacts - open-circuit principle

Connection diagram CM-ENN



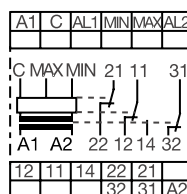
- A1-A2 Rated control supply voltage
- C Ground reference electrode
- MIN Min. level electrode
- MAX Max. level electrode
- 15-16/18 Output contacts - 25-26/28 open-circuit principle

Connection diagram CM-ENS UP/DOWN



- A1 - A2 Rated control supply voltage
- C Ground reference electrode
- MAX Maximum level
- MIN Minimum level
- 11-12/14 Output contacts - open-circuit or closed-circuit principle selectable

Connection diagram CM-ENN UP/DOWN



- A1-A2 Rated control supply voltage
- C Ground reference electrode
- MIN Minimum level electrode
- MAX Maximum level electrode
- AL1 Alarm electrode 1
- AL2 Alarm electrode 2
- 11-12/14 Output contacts - open-circuit or closed-circuit principle selectable

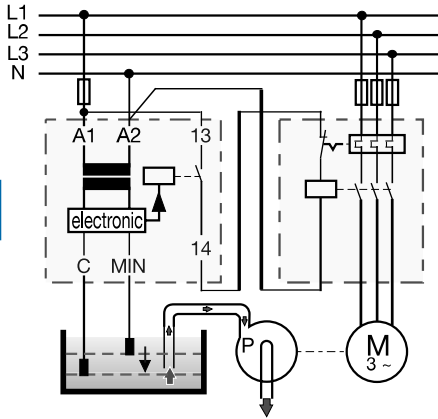
Liquid level monitors and controls

Application examples

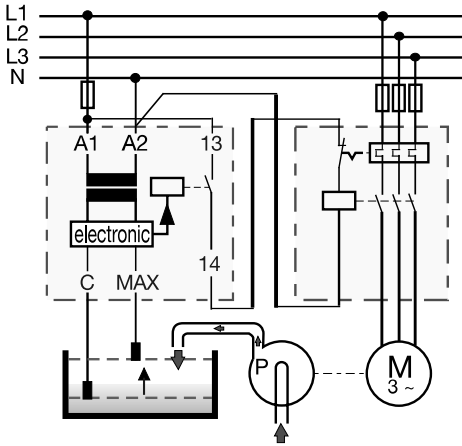
6

Application examples CM-ENE MIN/MAX

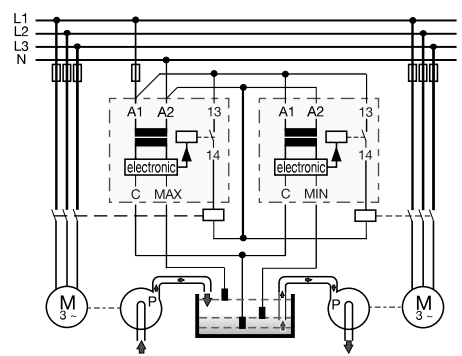
CM-ENE MIN



CM-ENE MAX

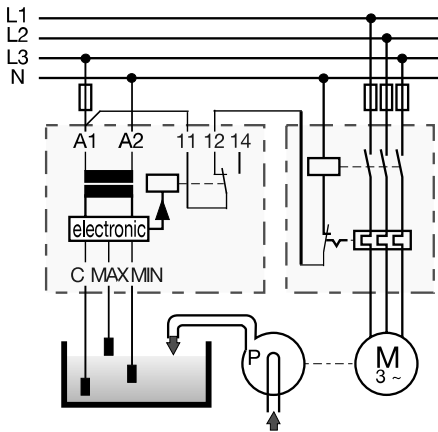


CM-ENE MIN und CM-ENE MAX

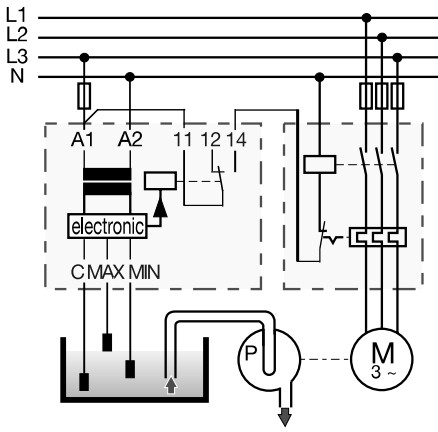


Application examples CM-ENS

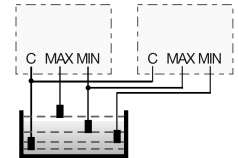
fill



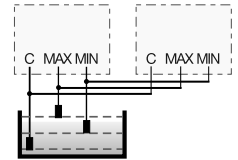
drain



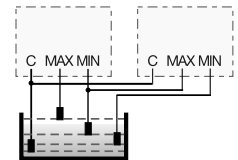
Cascading
The electrode inputs can be interconnected as required, which ensures simple monitoring of different liquid levels.



Redundancy
Redundant liquid level monitoring or control can be implemented by connecting the electrodes to two units. This makes the application much safer.

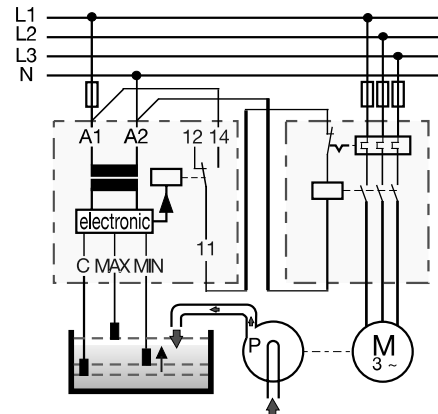


Cascading of electrodes
The electrode inputs can be interconnected as required, which ensures simple monitoring of different liquid levels.

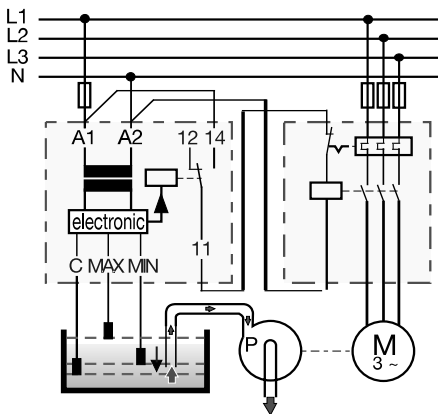


Application examples CM-ENS UP/DOWN

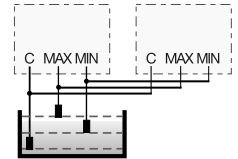
Liquid level control - fill - switch position "UP"



Liquid level control - drain - switch position "DOWN"



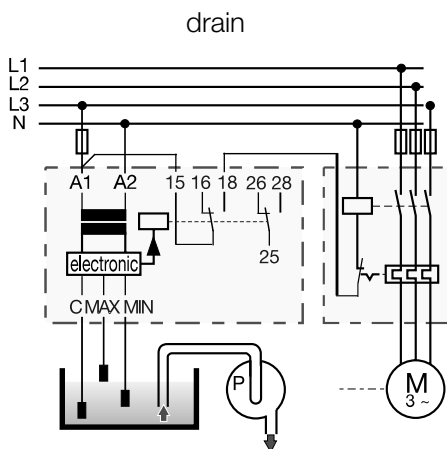
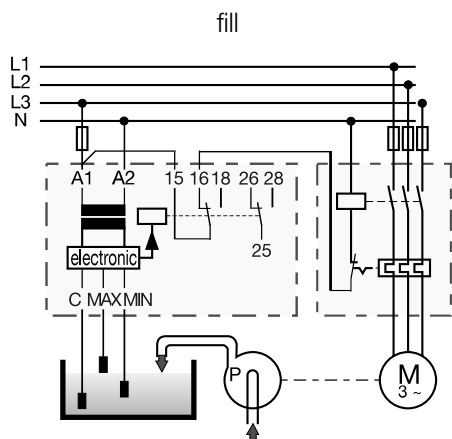
Redundancy
Redundant liquid level monitoring or control can be implemented by connecting the electrodes to two units. This makes the application much safer.



Liquid level monitors and controls

Application examples

Application examples CM-ENN



For commissioning, set both potentiometers (response sensitivity = R value and ON-delay = time value) to the minimum value (5) and select a suitable resistance range (sector).

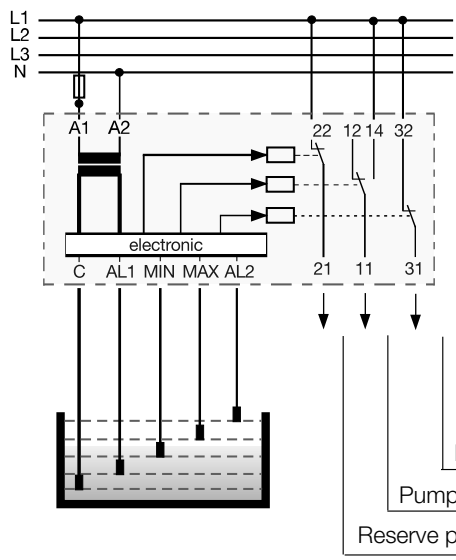
After all electrodes have been wetted by the liquid being monitored, turn the sensitivity potentiometer towards maximum value (100) until the relay energizes. If the relay does not energize, select a higher Ω value (sector) on the device and proceed as before.

Then it has to be checked if the relay de-energizes properly as soon as the electrodes C and MIN are no longer wet. Liquid levels higher than the maximum level electrode can be obtained by setting an ON-delay (TA = 0.1...10 s).

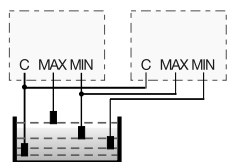
Liquid levels lower than the minimum level electrode can be obtained by setting an OFF-delay time (TR = 0.1...10 s), e.g. for emptying tanks.

6

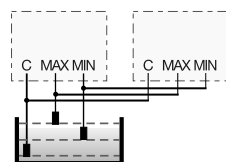
Application example CM-ENN UP/DOWN



Electrode	Relay	LED
AL1 not wet	RAL1 (21-22) closed	off
AL1 wet	RAL1 (21-22) open	on
AL2 wet	RAL2 (31-32) closed	off
AL2 not wet	RAL2 (31-32) open	on
Supply voltage failure	RAL1 (21-22) RAL2 (31-32)	closed off



Cascading of electrodes
The electrode inputs can be interconnected as required, which ensures simple monitoring of different liquid levels.



Redundancy
Redundant liquid level monitoring or control can be implemented by connecting the electrodes to two units.

This makes the application much safer.

Liquid level monitors and controls

Technical data

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Type		CM-ENE MIN	CM-ENE MAX
Supply circuit			
Rated control supply voltage U_s - power consumption	A1-A2	24 V AC	approx. 1.5 VA
	A1-A2	110-130 V AC	approx. 1.2 VA
	A1-A2	220-240 V AC	approx. 1.4 VA
Rated control supply voltage U_s tolerance		-15...+15 %	
Rated frequency		50-60 Hz	
Duty time		100 %	
Measuring circuit			
Monitoring function		dry-running protection	overflow protection
Response sensitivity		0-100 k Ω , not adjustable	
Maximum electrode voltage		30 V AC	
Maximum electrode current		1.5 mA	
Electrode supply line	max. cable capacity	3 nF	
	max. cable length	30 m	
Timing circuit			
Time delay		-	
Tripping delay		fixed approx. 200 ms	
Indication of operational states			
Output relay energized		R: yellow LED	
Output circuits			
Kind of output		13-14	
Operational principle 1)		1 n/o contact	
Contact material		open-circuit principle	closed-circuit principle
Rated operational voltage U_s (IEC/EN 60947-1)		AgCdo	
Minimum switching voltage / minimum switching current		250 V	
Maximum switching voltage		- / -	
Rated operational current I_s (IEC/EN 60947-5-1)		250 V	
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)	4 A	
	max. rated operational voltage	3 A	
	max. continuous thermal current at B 300	4 A	
	max. making/breaking apparent power at B 300	2 A	
Mechanical lifetime		B 300	
Electrical lifetime (AC12, 230 V, 4 A)		300 V AC	
Max. fuse rating to achieve short-circuit protection	n/c contact	5 A	
	n/o contact	3600/360 VA	
		30 x 10 ⁶ switching cycles	
		0.3 x 10 ⁶ switching cycles	
		-	
		10 A fast-acting	
General data			
Dimensions (W x H x D)		22.5 x 78 x 78.5 mm (0.89 x 3.07 x 3.09 in)	
Mounting position		any	
Degree of protection	enclosure / terminals	IP50 / IP20	
Ambient temperature range	operation / storage	-20...+60 °C / -40...+85 °C	
Mounting		DIN rail (IEC/EN 60715)	
Electrical connection			
Wire size	fine-strand with wire-end ferrule	2 x 0.75-1.5 mm ² (2 x 18-16 AWG)	
	fine-strand without wire-end ferrule	2 x 1-1.5 mm ² (2 x 18-16 AWG)	
	rigid	2 x 0.75-1.5 mm ² (2 x 18-16 AWG)	
Stripping length		10 mm (0.39 inch)	
Tightening torque		0.6-0.8 Nm	
Standards			
Product standard		IEC 255-6, EN 60255-6	
Low Voltage Directive		2006/95/EC	
EMC Directive		2004/108/EC	
Electromagnetic compatibility			
electrostatic discharge	IEC/EN 61000-4-2	EN 61000-6-2, EN 61000-6-4	
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (6 kV / 8 kV)	
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3 (10 V/m)	
surge	IEC/EN 61000-4-5	Level 3 (2 kV / 5 kHz)	
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 4 (2 kV L-L)	
Resistance to vibration (IEC 68-2-6)		Level 3 (10 V)	
Mechanical resistance (IEC 68-2-6)		6 g	
		10 g	
Isolation data			
Rat. insulation volt. betw. supply, meas. & output circuit (VDE 0110, IEC 60947)		250 V	
Rated impulse withstand voltage between all isolated circuits (VDE 0110, IEC 664)		4 kV / 1.2-50 μ s	
Test voltage between all isolated circuits		2.5 kV, 50 Hz, 1 min.	
Pollution category (VDE 0110, IEC 664, IEC 255-5)		3 / C	
Overvoltage category (VDE 0110, IEC 664, IEC 255-5)		III / C	
Environmental testing (IEC 68-2-30)		24 h cycle time, 55 °C, 93 % rel., 96 h	

1) Open-circuit principle: Output relay energizes if the measured value exceeds/drops below the adjusted threshold.
 Closed-circuit principle: Output relay de-energizes if the measured value exceeds/drops below the adjusted threshold.

Liquid level monitors and controls

Technical data

Measuring &
monitoring relays
CM Range

6

Type		CM-ENS	CM ENS UP/DOWN
Supply circuit			
Rated control supply voltage U_s - power consumption	A1-A2	24 V AC	24 V AC
	A1-A2	110-130 V AC approx. 1.5 VA	110-130 V AC approx. 4 VA
	A1-A2	220-240 V AC approx. 1.5 VA	220-240 V AC approx. 4 VA
	A1-A2	380-415 V AC approx. 1.5 VA	
Rated control supply voltage U_s tolerance			-15...+10 %
Rated frequency			50-60 Hz
Duty time			100 %
Measuring circuit			
Monitoring function			MAX-MIN-C
Response sensitivity			liquid level control
Maximum electrode voltage			5-100 kg, adjustable
Maximum electrode current			30 V AC
Electrode supply line	max. cable capacity		1 mA
	max. cable length		10 nF
			100 m
Timing circuit			
Time delay			-
Tripping delay			approx. 250 ms
Indication of operational states			
Control supply voltage			U: green LED
Output relay energized			R MAX/MIN: yellow LED
Alarm relay AL1			R AL1: yellow LED
Alarm relay AL2			R AL2: yellow LED
Output circuits			
Kind of output			11-12/14, 21-22, 31-32
Operational principle ¹⁾			1 c/o contact, 1 n/o + 1 n/c contact 2)
Contact material			open-circuit principle
Rated operational voltage U_o (IEC/EN 60947-1)			open- and closed-circuit principle
Minimum switching voltage / minimum switching current			AgCdo
Maximum switching voltage			250 V
Rated operational current I_o (IEC/EN 60947-5-1)			- / -
	AC12 (resistive) 230 V		250 V
	AC15 (inductive) 230 V		4 A
	DC12 (resistive) 24 V		3 A
	DC13 (inductive) 24 V		4 A
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)		2 A
	max. rated operational voltage		B 300
	max. continuous thermal current at B 300		300 V AC
	max. making/breaking apparent power at B 300		5 A
Mechanical lifetime			3600/360 VA
Electrical lifetime (AC12, 230 V, 4 A)			30 x 106 switching cycles
Max. fuse rating to achieve short-circuit protection	n/c / n/o contact		0.3 x 106 switching cycles
			10 A fast-acting / 10 A fast-acting
General data			
Dimensions (W x H x D)			22.5 x 70 x 100 mm (0.89 x 3.07 x 3.94 in)
Mounting position			any
Degree of protection	enclosure / terminals		IP50 / IP20
Ambient temperature range	operation / storage		-20...+60 °C / -40...+85 °C
Mounting			DIN rail (IEC/EN 60715)
Electrical connection			
Wire size	fine-strand with wire end ferrule		2 x 2.5 mm ² (2 x 14 AWG)
Standards			
Product standard			IEC 255-6, EN 60255-6
Low Voltage Directive			2006/95/EG
EMC Directive			2004/108/EG
Electromagnetic compatibility			
electrostatic discharge	IEC/EN 61000-4-2		Level 3 (6 kV / 8kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3		Level 3 (10 V/m)
electrical fast transient / burst	IEC/EN 61000-4-4		Level 3 (2 kV / 5 kHz)
surge	IEC/EN 61000-4-5		Level 4 (2 kV L-L)
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6		Level 3 (10 V)
Resistance to vibration (IEC 68-2-6)			4 g
Mechanical resistance (IEC 68-2-6)			6 g
Isolation data			
Rated insulation voltage between supply, measuring and output circuit (VDE 0110, IEC 60947)			250 V
Rated impulse withstand voltage between all isolated circuits (VDE 0110, IEC 664)			4 kV / 1.2 - 50 μs
Test voltage between all isolated circuits			2.5 kV, 50 Hz, 1 min.
Pollution category (VDE 0110, IEC 664, IEC 255-5)			3 / C
Overvoltage category (VDE 0110, IEC 664, IEC 255-5)			III / C
Environmental testing (IEC 68-2-30)			24 h cycle time, 55 °C, 93 % rel., 96 h

¹⁾ Open-circuit principle: Output relay energizes if the measured value exceeds/drops below the adjusted threshold.
 Closed-circuit principle: Output relay de-energizes if the measured value exceeds/drops below the adjusted threshold.

²⁾ 1SVR 430 851 R1300 (version with safe isolation)

Liquid level monitors and controls

Technical data

6

Type		CM-ENN UP/DOWN		CM-ENN
Supply circuit				
Rated control supply voltage U_s - power consumption	A1-A2	24 V AC		24 V AC
	A1-A2	110-130 V AC approx. 1.5 VA		110-130 V AC approx. 2.5 VA
	A1-A2	220-240 V AC approx. 1.5 VA		220-240 V AC approx. 3 VA
	A1-A2	380-415 V AC approx. 1.5 VA		380-415 V AC approx. 4 VA
	A1-A2			24-240 V AC/DC approx. 2 VA/W
Rated control supply voltage U_s tolerance				-15...+10 %
Rated frequency		50-60 Hz		50-60 Hz oder DC
Duty time				100 %
Measuring circuit				
Monitoring function		MAX-MIN-C liquid level control		
Response sensitivity		adjustable 5-100 k Ω	250 Ω - 5 k Ω	adjustable 2.5-50 k Ω 25-500 k Ω
Maximum electrode voltage		30 V AC		20 V AC
Maximum electrode current		1 mA	8 mA	2 mA 0.5 mA
Electrode supply line	max. cable capacity	10 nF	200 nF	20 nF 4 nF
	max. cable length	100 m	1000 m	100 m 20 m
Timing circuit				
Time delay		-		0.1-10 s, adjustable, ON- or OFF-delay
Tripping delay		approx. 250 ms		-
Indication of operational states				
Control supply voltage		U: green LED		
Output relay energized		R MAX/MIN: yellow LED		R: yellow LED
Output circuits				
Kind of output		11-12/14, 21-22, 31-32		15-16/18, 25-26/28
Operational principle ¹⁾		1 c/o + 2 n/c contacts		2 c/o contacts
Contact material		open-circuit principle		open- and closed-circuit principle
Rated operational voltage U_e	IEC/EN 60947-1	250 V		400 V
Minimum switching voltage / minimum switching current		- / -		- / -
Maximum switching voltage		250 V		400 V
Rated operational current I_e (IEC/EN 60947-5-1)	AC12 (resistive) 230 V	4 A		5 A
	AC15 (inductive) 230 V		3 A	
	DC12 (resistive) 24 V	4 A		5 A
	DC13 (inductive) 24 V	2 A		2.5 A
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)			B 300
	max. rated operational voltage			300 V AC
	max. continuous thermal current at B 300			5 A
	max. making/breaking apparent power at B 300			3600/360 VA
Mechanical lifetime				30 x 10 ⁵ switching cycles
Electrical lifetime (AC12, 230 V, 4 A)				0.3 x 10 ⁶ switching cycles 0.1 x 10 ⁶ switching cycles
Max. fuse rating to achieve short-circuit protection	n/c / n/o contact			4 A fast-acting / 6 A fast-acting
General data				
Dimensions (W X H X D)		45 x 78 x 100 mm (1.77 x 3.07 x 3.94 in)		
Mounting position		any		
Degree of protection	enclosure / terminals	IP50 / IP20		
Ambient temperature range	operation / storage	-25...+65 °C / -40...+85 °C		
Mounting		DIN rail (IEC/EN 60715)		
Electrical connection				
Wire size	fine-strand with wire end ferrule	2 x 2.5 mm ² (2 x 14 AWG)		
Standards				
Product standard		IEC 255-6, EN 60255-6		
Low Voltage Directive		2006/95/EG		
EMC Directive		2004/108/EG		
Electromagnetic compatibility				
electrostatic discharge	IEC/EN 61000-4-2	Level 3 (6 kV / 8kV)		
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)		
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3 (2 kV / 5 kHz)		
surge	IEC/EN 61000-4-5	Level 4 (2 kV L-L)		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)		
Resistance to vibration (IEC 68-2-6)		5 g		
Mechanical resistance (IEC 68-2-6)		10 g		
Isolation data				
Rated insulation voltage between supply, measuring and output circuit (VDE 0110, IEC 60947)		250 V		500 V
Rated impulse withstand voltage between all isolated circuits (VDE 0110, IEC 664)				4 kV / 1.2 - 50 μ s
Test voltage between all isolated circuits				2.5 kV, 50 Hz, 1 min.
Pollution category (VDE 0110, IEC 664, IEC 255-5)				3 / C
Overvoltage category (VDE 0110, IEC 664, IEC 255-5)				III / C
Environmental testing (IEC 68-2-30)		24 h cycle time, 55 °C, 93 % rel., 96 h		

¹⁾ Open-circuit principle: Output relay energizes if the measured value exceeds/drops below the adjusted threshold.
Closed-circuit principle: Output relay de-energizes if the measured value exceeds/drops below the adjusted threshold.

Contact protection & sensor interface relays



Contact protection & sensor interface relays



Contact protection and sensor interface relays

Ordering details

6



CM-KRN



CM-SIS

Description

Contact protection relay:

The CM-KRN protects sensitive control contacts from excessive load. It can be used with latching function or without. Bounce time of control contacts can be bypassed by the adjustable response delay time. Use for contact protection.

Contact protection relay:

The CM-SIS is used to supply 2- or 3-wire NPN or PNP sensors with power and to evaluate their switching signals. Two sensors of the types NPN or PNP can be connected simultaneously. Selection is done via the front-face rotary switch.

Ordering details

Rated control supply voltage	Timing circuit	Reference code	Catalog number	Weight (1 pce) kg (lb)
24 V AC	0.05-30 s	CM-KRN	1SVR450089R0000	0.30 (0.66)
110-130 V AC			1SVR450080R0000	0.30 (0.66)
220-240 V AC			1SVR450081R0000	0.30 (0.66)
380-415 V AC			1SVR450082R0000	0.30 (0.66)
24 V AC			1SVR450099R0000	0.30 (0.66)
110-130 V AC			1SVR450090R0000	0.30 (0.66)
220-240 V AC			1SVR450091R0000	0.30 (0.66)
24 V AC/DC ¹⁾			1SVR450099R1000	0.30 (0.66)
110-240 V AC / 105-260 V DC ²⁾		CM-SIS	1SVR430500R2300	0.22 (0.48)

¹⁾ Not electrically isolated

²⁾ Safe isolation, short circuit and overload proof

Characteristics CM-KRN

- Protects and reduces load from sensitive control contacts
- Adjustable ON-delay 0.05-30 s
- Acts as two-position switch
- Stores switch positions
- Electrically isolated circuits
- 2 c/o contacts
- 2 LEDs for status indication

Characteristics CM-SIS

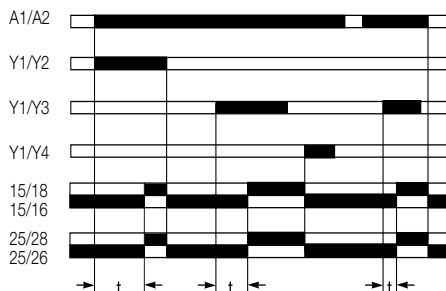
- High efficiency
- Low heating
- Wide range of supply voltage
- Constant output voltage 24 V DC
- Safe isolation acc. to EN 50178 (VDE 0160)
- Short-circuit and overload proof
- Input protected by internal fuse
- 2 x 1 c/o contact
- 3 LEDs for status indication

Contact protection and sensor interface relays

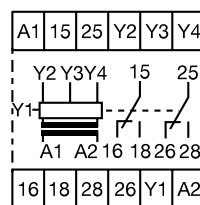
Technical information

Use for contact protection. The contact to be protected is connected to terminals Y1 and Y2. Use for contact protection with latching capacity. The output relay energizes after contact Y1-Y3 has been closed for at least 20 ms. It remains energized until contact Y1-Y4 closes. The switching positions are stored. The relay is suitable for load reduction purposes for devices with minimum and maximum contacts. The CM-KRN can be operated via 3-wire proximity sensors for switching of higher power. The supply circuit, the control circuit and the output circuit are electrically isolated against each other.

Function diagram CM-KRN

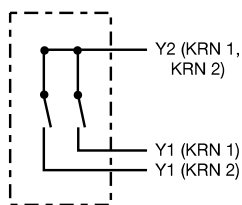


Connection diagram CM-KRN



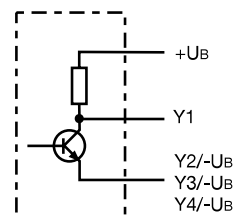
- A1-A2 Rated control supply voltage
- Measuring circuits: Y1-Y2 "On-Off" input (max. switch-on resistance 6-10 kΩ, min. switch-off resistance 15-20 kΩ)
- Y1-Y3 "Set" input (max. switch-on resistance 6-10 kΩ)
- Y1-Y4 "Reset" input (max. switch-off resistance 15-20 kΩ)
- 15-16/18 Output contacts - open-circuit principle
- 25-26/28 Output contacts - open-circuit principle

Use, applications



Actuators with 2 contacts and one common point can be connected to 2 separate CM-KRN units. Connect the common point of contacts to terminals Y2 of the two CM-KRN units.

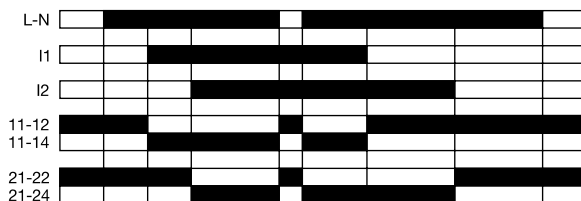
Operation via 3-wire proximity sensors NPN



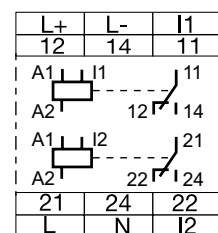
On; relay energizes, Y1/Y3 or Y2
Off; relay de-energizes, Y1/Y4 or Y2

The CM-SIS (terminals L+, L-) supplies the connected sensors with voltage (24 V DC), the maximum power supply current is 0.5 A. The supply voltage and the sensor inputs are electrically isolated from the supply circuit. To ensure maximum safety when using these sensors, the principle of safe isolation has been included.

Function diagram CM-SIS



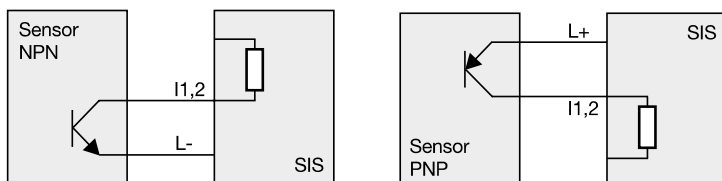
Connection diagram CM-SIS



- L - N Rated control supply voltage
- I1 Sensor input 1
- I2 Sensor input 2
- L+ - L- Output voltage 24 V DC / 0.5 A
- 11-12/14 Output contacts - open-circuit principle
- 21-22/24 Output contacts - open-circuit principle

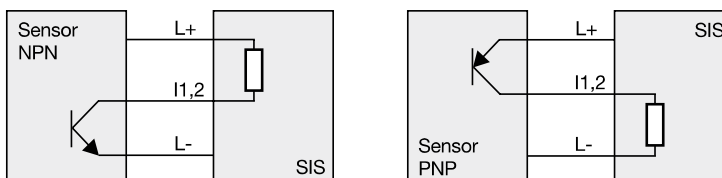
Each sensor input signal energizes the corresponding output relay without delay. The relay is energized as soon as a threshold current is exceeded at input I1 or I2. Sensor leakage currents of up to 8 mA don't affect the evaluation. The threshold value is about 9 mA. If the threshold value at input I1 or I2 is exceeded the corresponding relay R1 or R2 energizes and the corresponding LED lights up.

Connection of 2-wire sensors



The wide-range supply voltage input of CM-SIS allows its application in nearly all supply systems.

Connection of 3-wire sensors





The CM-SIS is also suitable for other applications, for example it is also possible to connect PTC or NTC resistors instead of PNP or NPN sensors or to operate the SIS directly by switching contacts.

Contact protection and sensor interface relays

Technical data

6

Type		CM-KRN
Supply circuit		A1-A2
Rated control supply voltage U_s - power consumption	A1-A2	24 V AC - approx. 3.5 VA
	A1-A2	24 V AC/DC - approx. 3.5 VA
	A1-A2	110-130 V AC - approx. 3.5 VA
	A1-A2	220-240 V AC - approx. 3.5 VA
	A1-A2	380-415 V AC - approx. 3.5 VA
Rated control supply voltage U_s tolerance		-15...+10 %
Rated frequency		50-60 Hz
Duty time		100 %
Timing circuit		
ON-delay time		0.05-1 s, 1.5-30 s
OFF-delay time		max. 50 ms
Measuring circuit / contact circuit		Y1-Y2/Y3/Y4
Measuring input	contact protection without latching	Y1-Y2
	contact protection with latching	Y1-Y3/Y4
Threshold	Y1-Y2/Y3	6-10 k Ω
Threshold-Hysteresis	Y1-Y2/Y4	15-20 k Ω
No-load voltage at the measuring input		\leq 10 V DC
Contact time for latching (CM-KRN without timing circuit)		min. 20 ms
Switching current at the measuring input		3 mA
Maximum applied voltage at the measuring input		\leq \pm 30 V (contact voltage)
Indication of operational states		
Control supply voltage	U: green LED	 : control supply voltage applied
Relay status	R: yellow LED	 : output relay energized
Output circuit		15-16/18, 25-26/28
Kind of output		relay, 2 c/o contacts
Operating principle ¹⁾		open-circuit principle
Rated operational voltage (VDE 0110, IEC 60947-5-1)		400 V
Rated switching voltage		400 V AC
Rated operational current I_n (IEC/EN 60947-5-1)	AC12 (resistive) 230 V	5 A
	AC15 (inductive) 230 V	3 A
	DC12 (resistive) 24 V	5 A
	DC13 (inductive) 24 V	2.5 A
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)	B 300
	max. rated operational voltage	300 V AC
	max. continuous thermal current at B 300	5 A
	max. making/breaking apparent power at B 300	3600/360 VA
Mechanical lifetime		30 x 10 ⁶ switching cycles
Electrical lifetime (AC12, 230 V, 5 A)		0.1 x 10 ⁶ switching cycles
Max. fuse rating to achieve short-circuit protection	n/c / n/o contact	10 A fast-acting / 10 A fast-acting
General data		
Dimensions (W x H x D)		45 x 78 x 100 mm (1.77 x 3.07 x 3.94 in)
Mounting position		any
Degree of protection	enclosure / terminals	IP20 / IP50
Ambient temperature range	operation / storage	-25...+65 °C / -40...+85 °C
Mounting		DIN rail (IEC/EN 60715)
Electrical connection		
Wire size	fine-strand with wire end ferrule	2 x 2.5 mm ² (2 x 14 AWG)
Standards		
Product standard		IEC 255-6, EN 60255-6
Low Voltage Directive		2006/95/EC
EMC Directive		2004/108/EC
Electromagnetic compatibility		
Interference immunity to		
electrostatic discharge	IEC/EN 61000-4-2	6 kV / 8 kV
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	10 V/m
electrical fast transient / burst	IEC/EN 61000-4-4	2 kV / 5 kHz
surge	IEC/EN 61000-4-5	2 kV symmetrical
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	10 V
Isolation data		
Rated insulation voltage (IEC 60947-1)		400 V
Rated impulse withstand voltage U_{imp} (IEC 644-6)		4 kV
Pollution category (IEC 255-5, IEC 664)		3
Overvoltage category (IEC 255-5, IEC 664)		III

¹⁾ Open-circuit principle: Output relay is energized if the measured value exceeds/drops below the adjusted threshold.

Contact protection and sensor interface relays

Technical information

Measuring & monitoring relays
CM Range

6

Type		CM-SIS
Input circuit		
Supply voltage	L-N AC DC	110-240 V AC (-15...+10 %) 110-240 V (max. 105-260 V DC)
Frequency, AC supply		47-440 Hz
Supply voltage failure bridging time		10 ms min. at 100 % load
Current consumption	max. at 115 V AC at 230 V AC	0.35 A 0.27 A 0.14 A
Inrush current at 25°C (≤ 2 ms)		33 A
Internal input fuse		800 mA slow-acting
Measuring circuit		
Sensor voltage	L+ L-	24 V DC ± 3%
Sensor current / power		max. 0.5 A / 12 W
Residual ripple		max. 100 mV _{pp}
Deviation with	load change statical load change dynamical 10-90 % change of the input voltage	max. ± 0.5 % max. .5 % max. ± 0.5 %
Short-circuit protection		overcurrent switch-off with automatic restart
Overload protection		excess temperature and overcurrent switch-off
Reset after thermal overload switch-off		automatic reset after cooling down
Sensor type connection possibilities	I1, I2	2- or 3-wire connection, NPN or PNP selectable by front-face switch
Input resistance		approx. 2.5 kΩ
Threshold value for relays R1, R2		$U_{emitter/collector} < 2.3 \text{ V (I1, I2 > 8 mA)}$
Maximum switching frequency		approx. 20 Hz
Output circuit		
Kind of output		11-12/14, 21-22/24 2 relays, 1 c/o contact each
Operating principle ¹⁾		open-circuit principle
Rated operational voltage		250 V
Maximum switching voltage		250 V AC
Rated operational current I _n (IEC/EN 60947-5-1)	AC12 (resistive) 230 V AC15 (inductive) 230 V DC12 (resistive) 24 V DC13 (inductive) 24 V	4 A 3 A 4 A 2 A
AC rating (UL 508)	Utilization category (Control Circuit Rating Code) max. rated operational voltage max. continuous thermal current at B 300 max. making/breaking apparent power at B 300	B 300 300 V AC 5 A 3600/360 VA
Mechanical lifetime		10 x 10 ⁶ switching cycles
Electrical lifetime		0.1 x 10 ⁶ switching cycles
Max. fuse rating to achieve short-circuit protection	n/c / n/o contact	6 A fast-acting / 10 A fast-acting
Indication of operational states		
Control supply voltage	U: green LED	: control supply voltage applied
Relay status R1	R1: yellow LED	: threshold value at input I1 exceeded
Relay status R2	R2: yellow LED	: threshold value at input I2 exceeded
General data		
Efficiency at rated load		approx. 84 % (at 230 V AC)
Ambient temperature range	operation / storage	0...+55 °C / -25...+75 °C
Dimensions (W x H x D)		22.5 x 78 x 100 mm (0.89 x 3.07 x 3.94 in)
Mounting position		horizontally
Mounting		DIN rail (IEC/EN 60715)
Minimum distance to other units		left-hand side 10 mm (0.39 in), vertical distance 50 mm (1.97 in)
Electrical connection		
Wire size		2 x 2,5 mm ² (2 x 14 AWG)
Standards		
Product standard		IEC 255-6, EN 60255-6
Electrical safety		IEC(EN) 60255-5, EN 50178 (VDE 0160), EN60950, UL 508, CSA 22.2
Galvanic isolation		safe isolation between L+,L-, I1,I2, and L,N,11,12,14,21,22,24
Electromagnetic compatibility		
Interference immunity to		EN 61000-6-2
electrostatic discharge	IEC/EN 61000-4-2	Level 3 (6 / 8 kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)
electrical fast transient / burst	IEC/EN 61000-4-4	Level 4 (4 kV)
surge	IEC/EN 61000-4-5	Inst. class 3 (2 kV)
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)
Interference immunity to	EN 50081-2	radiated noise EN 55011, class B
Input current harmonics		no limitation
Isolation data		
Insulation testing		2.5 kV AC (routine test), 3 kV AC (type test)
Degree of pollution		2
Overvoltage category		II

Notes

Cycle monitoring relay w/watchdog function



Cycle monitoring relay
with watchdog function



Cycle monitoring relay with watchdog function

Ordering details



CM-WDS

Description

The cycle monitoring relay CM-WDS (watchdog) observes if a regularly intermittent pulse is applied to its pulse input "I". It is, for example, possible to connect the output of a programmable logic controller (plc), which is set and reset regularly (e. g. once each cycle). The connected cycle pulse must be generated by suitable programming of the plc/ipc. Now, the CM-WDS monitors if the cycle time of the plc/ipc program is smaller than the cycle monitoring time set by means of the front-face selector switch "time value (ms)".

The output relay 11-12/14 of the CM-WDS energizes and the red LED is switched off, if there are minimum 8 successive regular pulses on input "I". When the pulse signal stays out or is not regular, the output relay de-energizes and the red LED is illuminated.

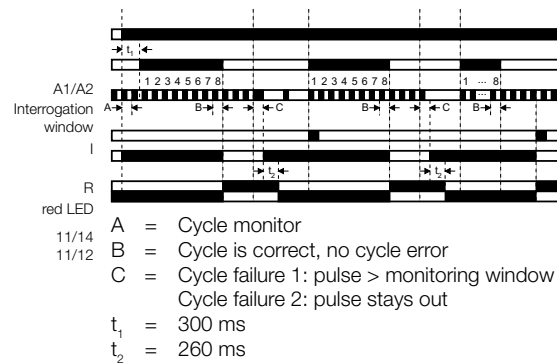
In case the monitoring time is too short or too long, this can be adjusted by a modified programming of the plc/ips or by modified setting of the monitoring time "time value (ms)".

A fault recognized and stored with the CM-WDS can be reset by an H-impulse (0-1-transition) on the reset input "R(9)", so that the cycle monitoring is again released. The reset impulse can be generated by means of a reset button or by suitable programming of the controller (plc/ipc).

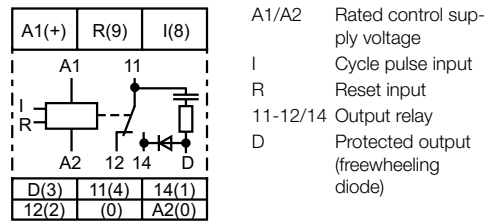
Ordering details

Rated control supply voltage	Reference code	Catalog number	Weight (1 pce) kg (lb)
24 V DC	CM-WDS	1SVR430896R000	0.15 (0.33)

Function diagram CM-WDS



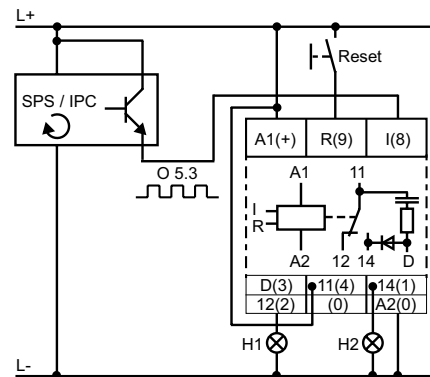
Connection diagram CM-WDS



Characteristics

- Cycle monitor for monitoring the function of programmable logic controllers or industrial pcs
- 4 selectable cycle monitoring time ranges from 0.5 to 1000 ms
- 24 V DC supply
- 1 c/o contact
- 2 LEDs for status indication

Example of application - circuit diagram



Application

The CM-WDS is designed for the external monitoring of the correct function of programmable logic controllers (plc) and industrial pcs (ipc).

Cycle monitoring relay with watchdog function

Technical data

Type		CM-WDS
Input circuit		A1-A2
Rated control supply voltage U_s - power consumption A1-A2		24 V DC - approx. 1 W
Tolerance of the rated control supply voltage U_s		-30 % - +30 %
Duty time		100 %
Measuring circuit		I
Monitoring function		cycle monitoring
Measuring voltage		24 V DC
Current consumption at the measuring input		approx. 5 mA
Setting range of cycle monitoring time		selectable: 0.5-150 ms, 0.5-260 ms, 0.5-500 ms, 0.5-1000 ms
Response time		approx. 0.5-1000 ms
Accuracy within the supply voltage tolerance		$\Delta U \leq 0.5 \%$
Accuracy within the temperature range		$\Delta U \leq 0.06 \%$ / °C
Timing circuit		
ON-delay		approx. 2.2-10 s
Indication of operational states		
Control supply voltage		U: green LED
Output relay de-energized / cycle error		F: red LED
Output circuit		11-12/14
Kind of output		1 c/o
Operating principle ¹⁾		Closed-circuit principle
Contact material		AgCdo
Rated operational voltage U_o IEC/EN 60947-1		250 V
Minimum switching voltage / Minimum switching current		
Maximum switching voltage		250 V AC, 250 V DC
Rated operational current I_o (IEC/EN 60947-5-1)	AC12 (resistive) 230 V	4 A
	AC15 (inductive) 230 V	3 A
	DC12 (resistive) 24 V	4 A
	DC13 (inductive) 24 V	2 A
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)	B 300
	max. rated operational voltage	300 V AC
	max. continuous thermal current at B 300	5 A
	max. making/breaking apparent power at B 300	3600/360 VA
Mechanical lifetime		10 x 10 ⁸ switching cycles
Electrical lifetime (AC12, 230 V, 4 A)		0.1 x 10 ⁸ switching cycles
Max. fuse rating to achieve short-circuit protection	n/c / n/o contacts	10 A fast-acting / 10 A fast-acting
General data		
Dimensions (W x H x D)		22.5 x 78 x 100 mm (0.89 x 3.07 x 3.94 in)
Mounting position		any
Degree of protection	enclosure / terminals	IP50 / IP20
Ambient temperature range	operation / storage	-20...+60 °C / -40...+85 °C
Mounting		DIN rail (IEC/EN 60715)
Electrical connection		
Wire size	fine-strand with wire end ferrule	2 x 2.5 mm ² (2 x 14 AWG)
Standards		
Product standard		IEC 255-6, EN 60255-6
Low Voltage Directive		2006/95/EC
EMC Directive		2004/108/EC
Operational reliability (IEC 68-2-6)		4 g
Mechanical shock resistance (IEC 68-2-6)		6 g
Electromagnetic compatibility		
Interference immunity to		EN 61000-6-2
electrostatic discharge	IEC/EN 61000-4-2	Level 3 (6 kV / 8 kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3 (2 kV / 5 kHz)
surge	IEC/EN 61000-4-5	Level 3 (2 kV L-L)
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)
Interference emission		EN 61000-6-4
Isolation data		
Rated insulation voltage between supply-, control- and output circuit (VDE 0110, IEC 60947-1)		250 V
Rated impulse withstand between all isolated circuits (VDE 0110, IEC 664)		4 kV / 1.2-50 μ s
Test voltage between all isolated circuits		2.5 kV, 50 Hz, 1 min
Pollution degree (VDE 0110, IEC 664, IEC 255-5)		3/C
Overvoltage category (VDE 0110, IEC 664, IEC 255-5)		III
Environmental tests (IEC 68-2-30)		24 h cycle, 55 °C, 93 % rel. 96 h

¹⁾ Closed-circuit principle: Output relay de-energizes if a cycle error occurs

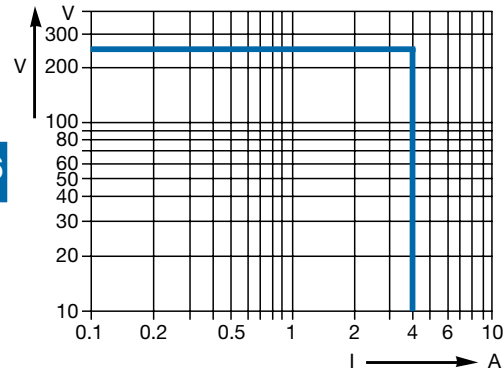
General technical data

Load limit curves

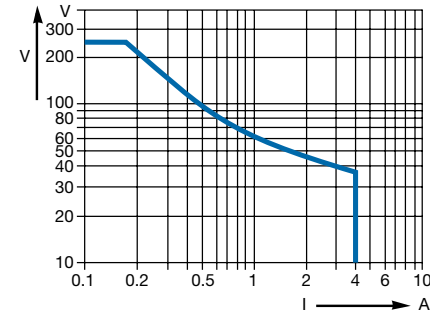
Load limit curves

CM-S (22.5 mm), CM-E (22.5 mm)

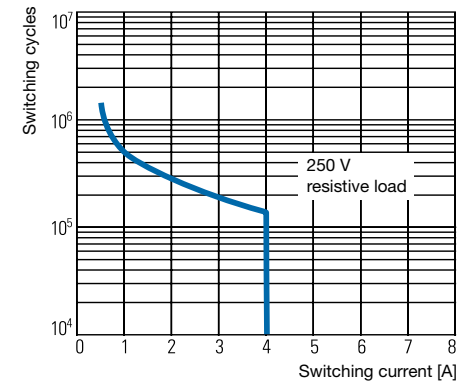
AC load (resistive)



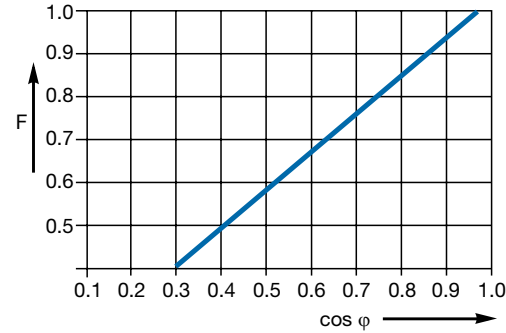
DC load (resistive)



Contact lifetime

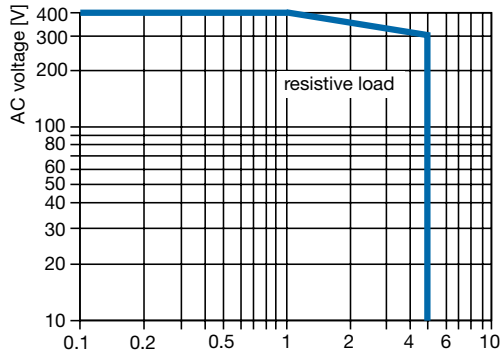


Derating factor F for inductive AC load

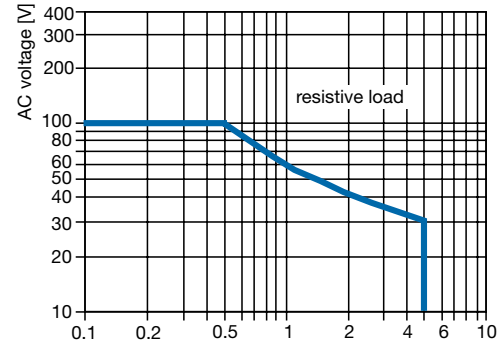


CM-N (45 mm)

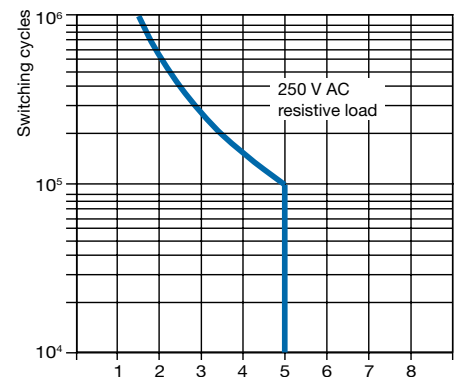
AC load (resistive)



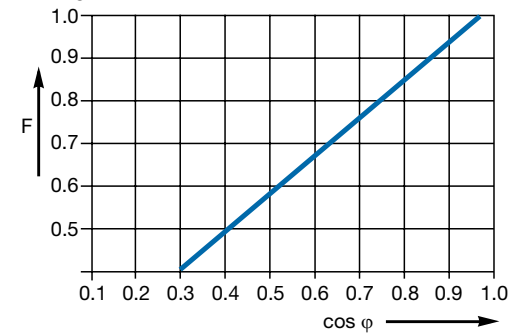
DC load (resistive)



Contact lifetime



Derating factor F for inductive AC load

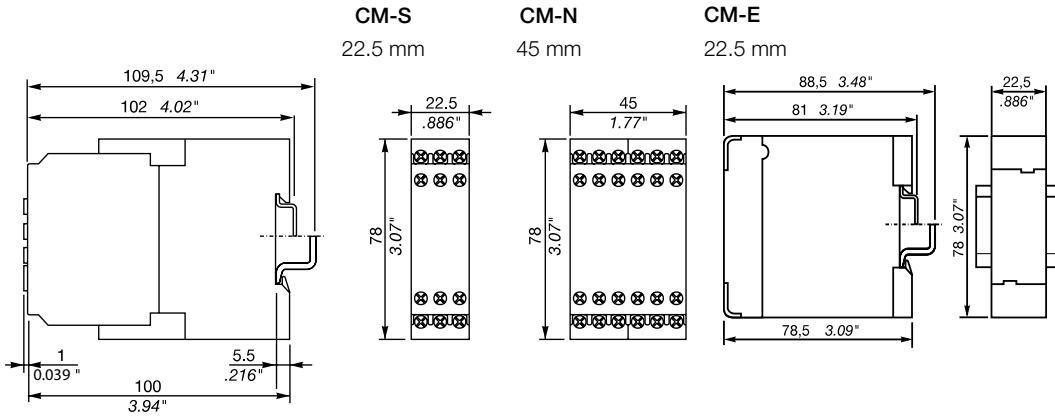


General technical data

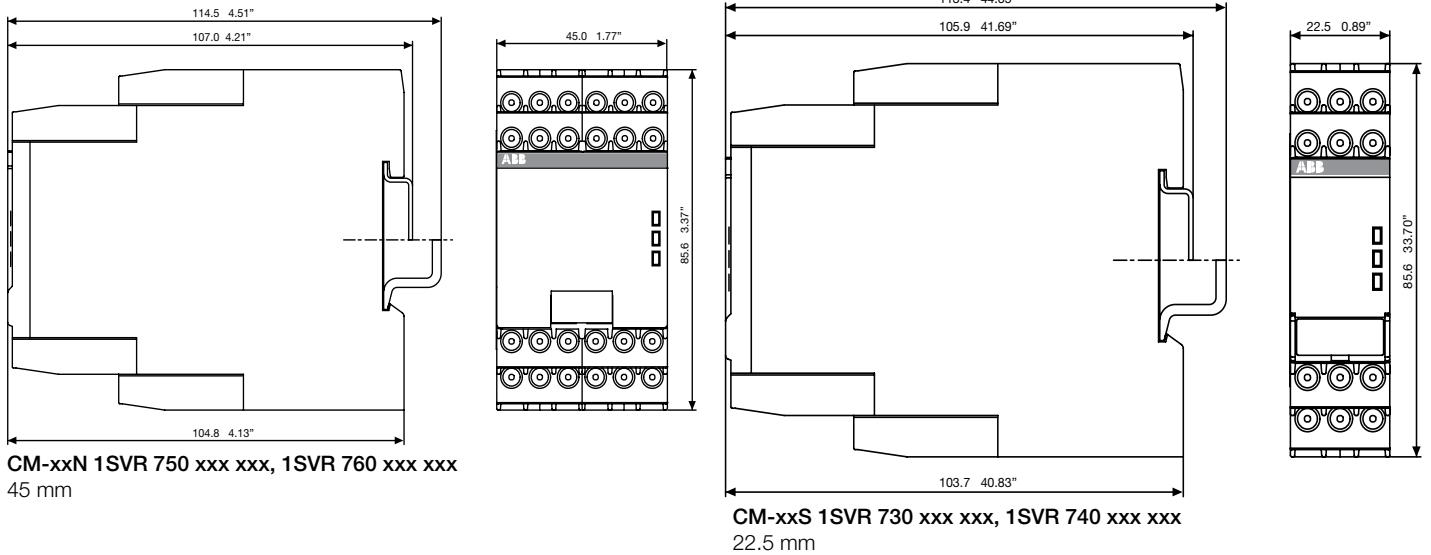
Approximate dimensions

Measuring and monitoring relays CM range old housing

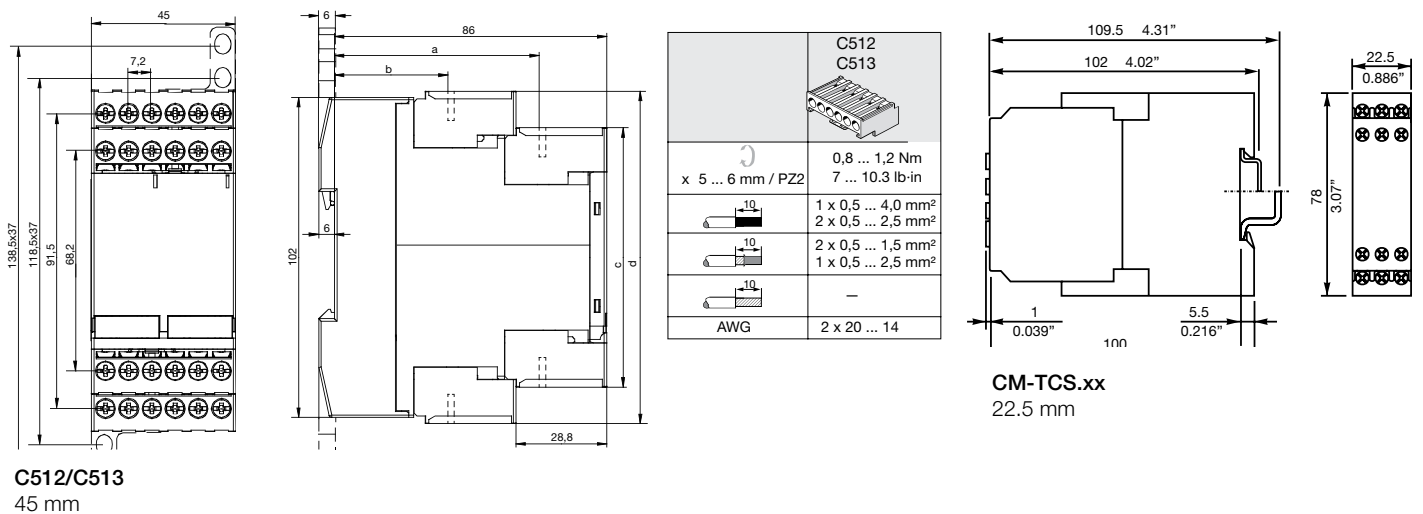
Dimensions in mm



Measuring and monitoring relays CM range new housing



Temperature monitoring relays



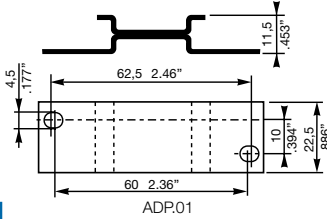
Accessories

Ordering details

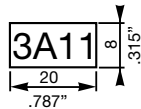
Accessories

Ordering details

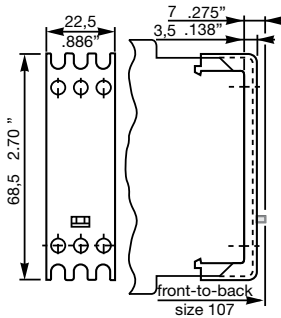
Description	For type	Width in mm	for devices	Reference code	Catalog number	Pkg qty	Weight (1 pce) g (oz)
Adapter for screw mounting	CM-S	22.5		ADP.01	1SVR430029R0100	1	18.4 (0.65)
	CM-N	45		ADP.02	1SVR440029R0100	1	36.7 (1.30)
Marker label	CM-S, CM-N		without DIP switches	MAR.01	1SVR366017R0100	10	0.19 (0.007)
	CM-S, CM-N		with DIP switches	MAR.02	1SVR430043R0000	10	0.13 (0.005)
	CM-S, CM-N in new housing		with DIP switches	MAR.12	1SVR730006R0000	10	0.152 (0.335)
Sealable transparent cover	CM-S	22.5		COV.01	1SVR430005R0100	1	5.2 (0.18)
	CM-N	45		COV.02	1SVR440005R0100	1	7.7 (0.27)
	CM-S.S/P	22.5		COV.11	1SVR730005R0100	1	4.0 (0.129)
	CM-N.S/P	45		COV.12	1SVR750005R0100	1	7 (0.247)



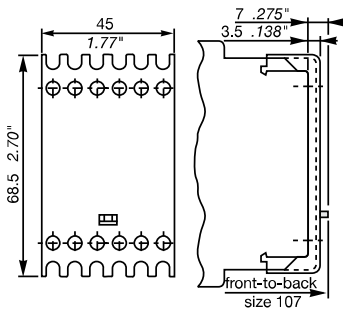
ADP.01



MAR.01



Sealable cover
COV.01



Sealable cover
COV.02

Accessories

Ordering details



CM-CT



CM-CT
with mounted accessories

Plug-in current transformers CM-CT

- Without primary conductor though with foot angle, insulating protective cap and bar fastening screws
- Primary / rated current from 50 A to 600 A
- Secondary current of 1 A or 5 A
- Class 1

Ordering details

Rated primary current	Secondary current	Burden class	Reference code	Catalog number	Weight (1 pce) g (oz)
50 A	1 A	1 VA / 1	CM-CT 50/1	1SVR450116R1000	0.31 (0.683)
75 A		1.5 VA / 1	CM-CT 75/1	1SVR450116R1100	0.31 (0.683)
100 A		2.5 VA / 1	CM-CT 100/1	1SVR450116R1200	0.276 (0.608)
150 A		2.5 VA / 1	CM-CT 150/1	1SVR450116R1300	0.32 (0.705)
200 A		2.5 VA / 1	CM-CT 200/1	1SVR450116R1400	0.222 (0.489)
300 A		5 VA / 1	CM-CT 300/1	1SVR450117R1100	0.29 (0.639)
400 A		5 VA / 1	CM-CT 400/1	1SVR450117R1200	0.27 (0.595)
500 A		5 VA / 1	CM-CT 500/1	1SVR450117R1300	0.29 (0.639)
600 A		5 VA / 1	CM-CT 600/1	1SVR450117R1400	0.24 (0.529)
50 A		5 A	1 VA / 1	CM-CT 50/5	1SVR450116R5000
75 A	1.5 VA / 1		CM-CT 75/5	1SVR450116R5100	0.31 (0.683)
100 A	2.5 VA / 1		CM-CT 100/5	1SVR450116R5200	0.31 (0.683)
150 A	2.5 VA / 1		CM-CT 150/5	1SVR450116R5300	0.28 (0.617)
200 A	5 VA / 1		CM-CT 200/5	1SVR450116R5400	0.29 (0.639)
300 A	5 VA / 1		CM-CT 300/5	1SVR450117R5100	0.252 (0.556)
400 A	5 VA / 1		CM-CT 400/5	1SVR450117R5200	0.26 (0.573)
500 A	5 VA / 1		CM-CT 500/5	1SVR450117R5300	0.208 (0.459)
600 A	5 VA / 1		CM-CT 600/5	1SVR450117R5400	0.21 (0.463)

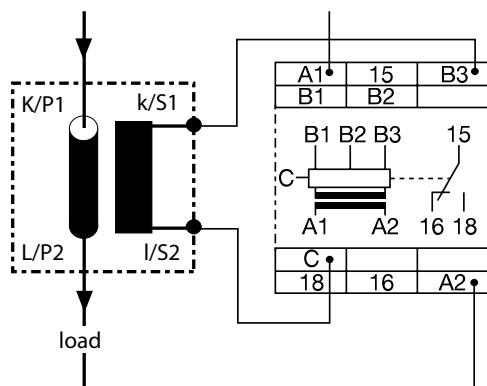
Ordering details - Accessories

Description	Reference code	Catalog number	Weight (1 pce) g (oz)
Snap-on fastener for DIN rail mounting of CM-CT	CM-CT A	1SVR450118R1000	0.009 (0.02)

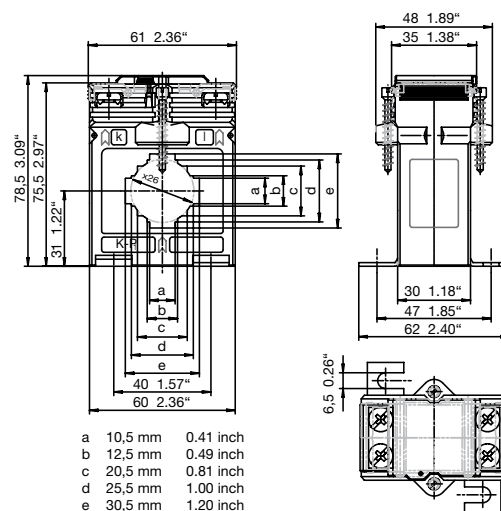


CM-CT-A
mounted on DIN rail

Operating principle / circuit diagram



Dimensional drawing

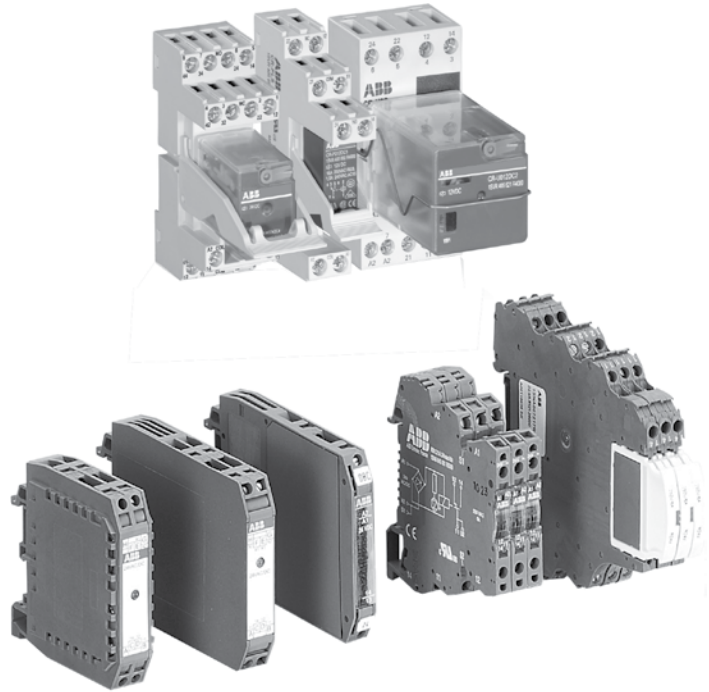


Notes

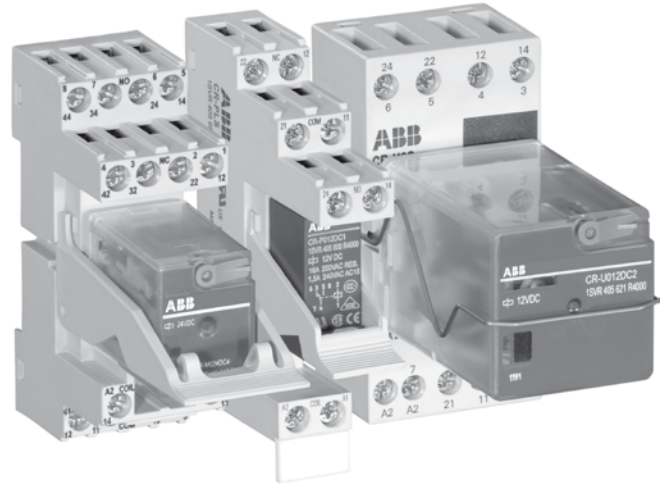
CR Range Interface Relays & optocouplers



CR Range
Interface relays & optocouplers



Notes



CR Range Interface Relays

Pluggable interface relays Benefits and advantages

6

Pluggable pcb relays CR-P

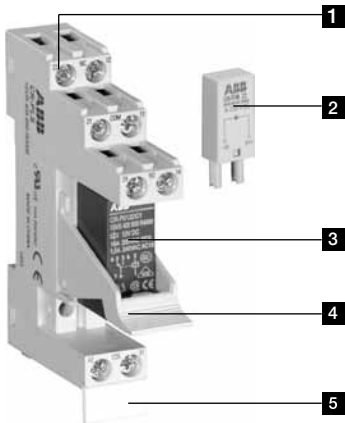
- 9 different coil voltages
 - DC versions: 12 V, 24 V, 48 V, 110 V
 - AC versions: 24 V, 48 V, 110 V, 120 V, 230 V
- Output contacts:
 - 1 c/o contact (16 A) or
 - 2 c/o contacts (8 A) optionally equipped with gold contacts
- Logical or standard sockets
- Cadmium-free contact material
- Width on socket: 15,5 mm
- Pluggable function modules
 - Reverse polarity protection/ Free wheeling diode
 - LED indication
 - RC elements
 - Overvoltage protection

Pluggable miniature relays CR-M

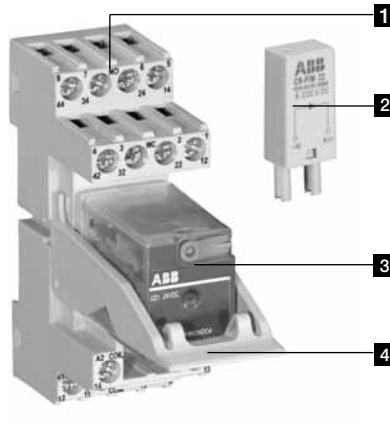
- 12 different coil voltages
 - DC versions: 12 V, 24 V, 48 V, 60 V, 110 V, 125 V, 220 V
 - AC versions: 24 V, 48 V, 60 V, 110 V, 120 V, 230 V
- Output contacts
 - 2 c/o contacts (12 A) or
 - 3 c/o contacts (10 A) or
 - 4 c/o contacts (6 A) optionally equipped with gold contacts, LED and free wheeling diode
- Integrated test button for manual actuation and locking of the output contacts (blue = DC, orange = AC) that can be removed if necessary
- With or without integrated LED
- Logical or standard sockets
- Cadmium-free contact material
- Width on socket: 27 mm
- Pluggable function modules
 - Reverse polarity protection/ Free wheeling diode
 - LED indication
 - RC elements
 - Overvoltage protection

Pluggable universal relays CR-U

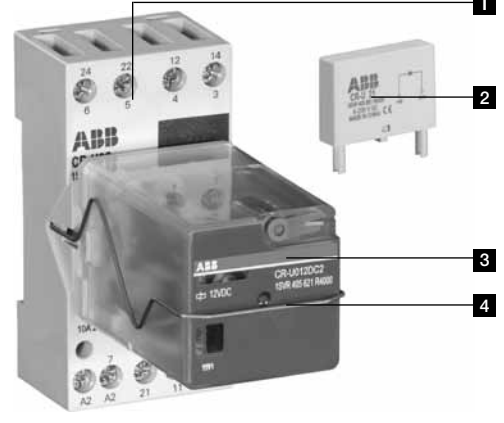
- 10 different coil voltages
 - DC versions: 12 V, 24 V, 48 V, 110 V, 125 V, 220 V
 - AC versions: 24 V, 48 V, 60 V, 110 V, 120 V, 230 V
- Output contacts
 - 2 c/o contacts (10 A) or
 - 3 c/o contacts (10 A)
- Integrated test button for manual actuation and locking of the output contacts (blue = DC, orange = AC) that can be removed if necessary
- With or without integrated LED
- Cadmium-free contact material
- Width on socket: 38 mm
- Pluggable function modules
 - Reverse polarity protection/ Free wheeling diode
 - LED indication
 - RC elements
 - Overvoltage protection
 - Multifunction time module



- 1** Socket
- 2** Pluggable function module
- 3** Interface relay
- 4** Holder
- 5** Marker label



- 1** Socket
- 2** Pluggable function module
- 3** Interface relay
- 4** Holder



- 1** Socket
- 2** Pluggable function module
- 3** Interface relay
- 4** Holder

Pluggable interface relays

Approvals and marks

Interface relays
CR Range

Kinds of sockets

Standard sockets - Position of connecting terminals:

Coil connection (A1-A2) on lower socket side, contact connections (n/o and n/c contacts) on the lower and upper socket side.

Logical sockets - Position of connecting terminals:

Coil connection (A1-A2) on lower socket side, all contact connections (common contacts, n/o and n/c contacts) on upper socket side.

Details see connection diagrams

Kind of connecting terminals



Screw type



Spring type



Fork type

Approvals and marks

- existing
- pending

		Relays			Sockets							Modules	
		CR-P	CR-M	CR-U	CR-PLS CR-PSS	CR-PLC	CR-M..L. CR-M..SS	CR-M..SF	CR-U..S CR-U..E	CR-U..SM	CR-P/M	CR-U	
Approvals													
	UL 508	■	■ ¹⁾	■									
	CAN/CSA C22.2 No.14	■	■ ²⁾	■	■	■	■	■	■	■	■ ⁶⁾	■ ⁷⁾	
	CAN/CSA C22.2 No.14	■	■ ³⁾	■									
	VDE	■	■ ⁴⁾	■									
	GOST	■	■	■	■	■	■	■	■	■	■	■	
	Lloyds Register		■ ⁵⁾	■									
	CCC	■	■	■									
	RMRS	■	■	■	■	■	■	■	■	■			
Marks													
	CE	■	■	■	■	■	■	■	■	■	■	■	

¹⁾ except 60 V DC and 125 V DC devices with gold contacts

²⁾ except devices with gold contacts

³⁾ except 60 V DC and 125 V DC devices

⁴⁾ except 125 V DC devices

⁵⁾ only devices with 4 c/o contacts

⁶⁾ except CR-P/M 42B, CR-P/M 42BV, CR-P/M 42C, CR-P/M 42CV, CR-P/M 52D, CR-P/M 62E, CR-P/M 62EV, CR-P/M 62D, CR-P/M 62DV

⁷⁾ except CR-U 41B, CR-U 41BV, CR-U 41C, CR-U 41CV, CR-U 51D, CR-U 61CV, CR-U 61E, CR-U 61EV, CR-U 61D, CR-U 61DV, CR-U 91C, CR-U T

Pluggable interface relays

Ordering details

6



CR-P

Description

Interface relays are widely used in various industrial applications:

As an interface they link the electronic controlling, e.g. PLC (programmable logic controller), PC or field bus systems, to the sensor / actuator level. Here, they take on various functions: Switching of AC or DC loads with different resistive, inductive and capacitive parts, switching voltages from a few mV up to 250 V, switching currents from a few mA up to 16 A, amplification of weak control signals, electrical isolation of control and load circuits, and signal multiplying. In contrast to electronic switching devices, interface relays don't use additional internal protective circuits and thus are overload-proof against short-time variations like current or voltage peaks.

Ordering details - CR-P range

Rated control supply voltage	Outputs	Contact ratings	Reference code	Catalog number	Pkg	Weight
					qty	(1 pce) kg (lb)
12 V DC	1 c/o (SPDT)	250 V, 16 A	CR-P012DC1	1SVR405600R4000	10	0.014 (0.031)
24 V DC			CR-P024DC1	1SVR405600R1000		
48 V DC			CR-P048DC1	1SVR405600R6000		
110 V DC			CR-P110DC1	1SVR405600R8000		
24 V AC			CR-P024AC1	1SVR405600R0000		
48 V AC			CR-P048AC1	1SVR405600R5000		
110 V AC			CR-P110AC1	1SVR405600R7000		
120 V AC			CR-P120AC1	1SVR405600R2000		
230 V AC			CR-P230AC1	1SVR405600R3000		
12 V DC			2 c/o (SPDT)	250 V, 8 A		
24 V DC	CR-P024DC2	1SVR405601R1000				
48 V DC	CR-P048DC2	1SVR405601R6000				
110 V DC	CR-P110DC2	1SVR405601R8000				
24 V AC	CR-P024AC2	1SVR405601R0000				
48 V AC	CR-P048AC2	1SVR405601R5000				
110 V AC	CR-P110AC2	1SVR405601R7000				
120 V AC	CR-P120AC2	1SVR405601R2000				
230 V AC	CR-P230AC2	1SVR405601R3000				
24 V DC	2 c/o gold contact	250 V, 8 A			CR-P024DC2	1SVR405606R1000
24 V AC			CR-P024AC2G	1SVR405606R0000		
110 V AC			CR-P110AC2G	1SVR405606R7000		
230 V AC			CR-P230AC2G	1SVR405606R3000		



CR-PLS

Ordering details - Accessories

Version	Connection terminal	Reference code	Catalog number	Pkg	Weight
				qty	(1 pce) kg (lb)
Logical socket with protective separation	screw	CR-PLS	1SVR405650R0000	10	0.045 (0.099)
Logical socket	screw	CR-PLSx	1SVR405650R0100		0.043 (0.095)
Logical socket	spring	CR-PLC	1SVR405650R0200		0.042 (0.093)
Standard socket	screw	CR-PSS	1SVR405650R1000		0.038 (0.084)
Plastic Holder for socket		CR-PH	1SVR405659R0000	10	0.002 (0.004)
Jumper bar for sockets with screw connection		CR-PJ	1SVR405658R5000		0.018 (0.040)
Marker		CR-PM	1SVR405658R0000	10	0.0002 (0.0004)



CR-PJ

Pluggable interface relays

Ordering details

Interface relays
CR Range



CR-M

Description

Interface relays are widely used in various industrial applications: As an interface they link the electronic controlling, e.g. PLC (programmable logic controller), PC or field bus systems, to the sensor / actuator level. Here, they take on various functions: Switching of AC or DC loads with different resistive, inductive and capacitive parts, switching voltages from a few mV up to 250 V, switching currents from a few mA up to 16 A, amplification of weak control signals, electrical isolation of control and load circuits, and signal multiplying. In contrast to electronic switching devices, interface relays don't use additional internal protective circuits and thus are overload-proof against short-time variations like current or voltage peaks.

Ordering details - CR-M range

Rated control supply voltage	Outputs	Contact ratings	Reference code	Catalog number	Pkg	Weight
					qty	(1 pce) kg (lb)
12 V DC	2 c/o (SPDT) without LED	250 V, 12 A	CR-M012DC2	1SVR405611R4000	10	0.033 (0.073)
24 V DC			CR-M024DC2	1SVR405611R1000		
48 V DC			CR-M048DC2	1SVR405611R6000		
60 V DC			CR-M060DC2	1SVR405611R4200		
110 V DC			CR-M110DC2	1SVR405611R8000		
125 V DC			CR-M125DC2	1SVR405611R8200		
220 V DC			CR-M220DC2	1SVR405611R9000		
24 V AC			CR-M024AC2	1SVR405611R0000		
48 V AC			CR-M048AC2	1SVR405611R5000		
110 V AC			CR-M110AC2	1SVR405611R7000		
120 V AC			CR-M120AC2	1SVR405611R2000		
230 V AC			CR-M230AC2	1SVR405611R3000		
12 V DC			3 c/o (SPDT) without LED	250 V, 10 A		
24 V DC	CR-M024DC3	1SVR405612R1000				
48 V DC	CR-M048DC3	1SVR405612R6000				
60 V DC	CR-M060DC3	1SVR405612R4200				
110 V DC	CR-M110DC3	1SVR405612R8000				
125 V DC	CR-M125DC3	1SVR405612R8200				
220 V DC	CR-M220DC3	1SVR405612R9000				
24 V AC	CR-M024AC3	1SVR405612R0000				
48 V AC	CR-M048AC3	1SVR405612R5000				
110 V AC	CR-M110AC3	1SVR405612R7000				
120 V AC	CR-M120AC3	1SVR405612R2000				
230 V AC	CR-M230AC3	1SVR405612R3000				
12 V DC	4 c/o (SPDT) without LED	250 V, 6 A			CR-M012DC4	1SVR405613R4000
24 V DC			CR-M024DC4	1SVR405613R1000		
48 V DC			CR-M048DC4	1SVR405613R6000		
60 V DC			CR-M060DC4	1SVR405613R4200		
110 V DC			CR-M110DC4	1SVR405613R8000		
125 V DC			CR-M125DC4	1SVR405613R8200		
220 V DC			CR-M220DC4	1SVR405613R9000		
24 V AC			CR-M024AC4	1SVR405613R0000		
48 V AC			CR-M048AC4	1SVR405613R5000		
110 V AC			CR-M110AC4	1SVR405613R7000		
120 V AC			CR-M120AC4	1SVR405613R2000		
230 V AC			CR-M230AC4	1SVR405613R3000		

Pluggable interface relays

Ordering details



CR-M

Ordering details - CR-M range

Rated control supply voltage	Outputs	Contact ratings	Reference code	Catalog number	Pkg	Weight				
					qty	(1 pce) kg (lb)				
12 V DC	2 c/o (SPDT) with LED	250 V, 12 A	CR-M012DC2L	1SVR405611R4100	10	0.033 (0.073)				
24 V DC			CR-M024DC2L	1SVR405611R1100						
48 V DC			CR-M048DC2L	1SVR405611R6100						
60 V DC			CR-M060DC2L	1SVR405611R4300						
110 V DC			CR-M110DC2L	1SVR405611R8100						
125 V DC			CR-M125DC2L	1SVR405611R8300						
220 V DC			CR-M220DC2L	1SVR405611R9100						
24 V AC			CR-M024AC2L	1SVR405611R0100						
48 V AC			CR-M048AC2L	1SVR405611R5100						
110 V AC			CR-M110AC2L	1SVR405611R7100						
120 V AC			CR-M120AC2L	1SVR405611R2100						
230 V AC			CR-M230AC2L	1SVR405611R3100						
12 V DC			3 c/o (SPDT) with LED	250 V, 10 A			CR-M012DC3L	1SVR405612R4100	10	0.033 (0.073)
24 V DC							CR-M024DC3L	1SVR405612R1100		
48 V DC							CR-M048DC3L	1SVR405612R6100		
60 V DC	CR-M060DC3L	1SVR405612R4300								
110 V DC	CR-M110DC3L	1SVR405612R8100								
125 V DC	CR-M125DC3L	1SVR405612R8300								
220 V DC	CR-M220DC3L	1SVR405612R9100								
24 V AC	CR-M024AC3L	1SVR405612R0100								
48 V AC	CR-M048AC3L	1SVR405612R5100								
110 V AC	CR-M110AC3L	1SVR405612R7100								
120 V AC	CR-M120AC3L	1SVR405612R2100								
230 V AC	CR-M230AC3L	1SVR405612R3100								
12 V DC	4 c/o (SPDT) with LED	250 V, 6 A			CR-M012DC4L	1SVR405613R4100	10	0.033 (0.073)		
24 V DC					CR-M024DC4L	1SVR405613R1100				
48 V DC					CR-M048DC4L	1SVR405613R6100				
60 V DC			CR-M060DC4L	1SVR405613R4300						
110 V DC			CR-M110DC4L	1SVR405613R8100						
125 V DC			CR-M125DC4L	1SVR405613R8300						
220 V DC			CR-M220DC4L	1SVR405613R9100						
24 V AC			CR-M024AC4L	1SVR405613R0100						
48 V AC			CR-M048AC4L	1SVR405613R5100						
110 V AC			CR-M110AC4L	1SVR405613R7100						
120 V AC			CR-M120AC4L	1SVR405613R2100						
230 V AC2			CR-M230AC4L	1SVR405613R3100						
24 V DC			4 c/o (SPDT) LED and free-wheeling diode	250 V, 6 A	CR-M024DC4LD	1SVR405614R1100			10	0.033 (0.073)
24 V DC			4 (SPDT) c/o gold contacts	250 V, 6 A	CR-M024DC4G	1SVR405618R1000			10	0.033 (0.073)
24 V AC					CR-M024AC4G	1SVR405618R0000				
110 V AC	CR-M110AC4G	1SVR405618R7000								
230 V AC	CR-M230AC4G	1SVR405618R3000								

Pluggable interface relays

Ordering details

Interface relays
CR Range



CR-M

Rated control supply voltage	Outputs	Contact ratings	Reference code	Catalog number	Pkg	Weight				
					qty	(1 pce) kg (lb)				
12 V DC	4 c/o (SPDT) with gold contacts and LED	250 V / 6 A	CR-M012DC4LG	1SVR405618R4100	10	0.033 (0.073)				
24 V DC			CR-M024DC4LG	1SVR405618R1100						
48 V DC			CR-M048DC4LG	1SVR405618R6100						
60 V DC			CR-M060DC4LG	1SVR405618R4300						
110 V DC			CR-M110DC4LG	1SVR405618R8100						
125 V DC			CR-M125DC4LG	1SVR405618R8300						
220 V DC			CR-M220DC4LG	1SVR405618R9100						
24 V AC			CR-M024AC4LG	1SVR405618R0100	10	0.033 (0.073)				
48 V AC			CR-M048AC4LG	1SVR405618R5100						
110 V AC			CR-M110AC4LG	1SVR405618R7100						
120 V AC			CR-M120AC4LG	1SVR405618R2100						
230 V AC			CR-M230AC4LG	1SVR405618R3100						
12 V DC			4 c/o (SPDT) with gold contacts, LED and free-wheeling diode				CR-M012DC4LDG	1SVR405618R4400	10	0.033 (0.073)
24 V DC							CR-M024DC4LDG	1SVR405618R1400		

6



CR-M4SS



CR-MJ

Ordering details - Accessories

Version	Connection terminal	Reference code	Catalog number	Pkg	Weight
				qty	(1 pce) kg (lb)
Logical socket for 2 c/o	screw	CR-M2LS	1SVR405651R1100	10	0.055 (0.121)
Logical socket for 3 c/o		CR-M3LS	1SVR405651R2100		0.062 (0.137)
Logical socket for 2/4 c/o		CR-M4LS	1SVR405651R3100		0.066 (0.146)
Logical socket for 2 c/o	spring	CR-M2LC	1SVR405651R1200	10	0.065 (0.143)
Logical socket for 2/4 c/o		CR-M4LC	1SVR405651R3200		0.066 (0.146)
Standard socket for 2 c/o	screw	CR-M2SS	1SVR405651R1000	10	0.066 (0.146)
Standard socket for 3 c/o		CR-M3SS	1SVR405651R2000		0.068 (0.150)
Standard socket for 2/4 c/o		CR-M4SS	1SVR405651R3000		0.070 (0.154)
Standard socket for 2 c/o	fork type	CR-M2SF	1SVR405651R1300	10	0.040 (0.088)
Standard socket for 2/4 c/o		CR-M4SF	1SVR405651R3300		0.048 (0.106)
Plastic holder		CR-MH	1SVR405659R1000	10	0.003 (0.007)
Metal holder		CR-MH1	1SVR405659R1100	10	0.0005 (0.001)
CR-MJ		CR-MJ	1SVR405658R6000	10	0.029 (0.064)
CR-M		CR-MM	1SVR405658R1000	10	0.0005 (0.001)

Pluggable interface relays

Ordering details

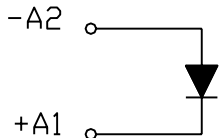


CR-P/M ...

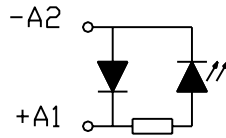
Ordering details - CR-P/M range

Rated control supply voltage	Description	Version	Reference code	Catalog number	Pkg	Weight
					qty	(1 pce) kg (lb)
6-230 V DC	Diode - Reverse polarity protection/ free wheeling diode	A1+, A2-	CR-P/M 22	1SVR405651R0000	10	0.003 (0.007)
6-24 V DC	Diode and LED - Reverse polarity protection/ free wheeling diode	red, A1+, A2-	CR-P/M 42	1SVR405652R0000	10	0.003 (0.007)
24-60 V DC		green, A1+, A2-	CR-P/M 42V	1SVR405652R1000		
110-230 V DC		red, A1+, A2-	CR-P/M 42B	1SVR405652R4000		
		green, A1+, A2-	CR-P/M 42BV	1SVR405652R4100		
6-24 V AC 24-60 V AC 110-230 V AC	Spark quenching	red, A1+, A2-	CR-P/M 42C	1SVR405652R9000	10	0.003 (0.007)
		green, A1+, A2-	CR-P/M 42CV	1SVR405652R9100		
		red, for DC A1+, A2-	CR-P/M 52B	1SVR405653R0000		
24-60 V AC	Spark quenching	green, for DC A1+, A2-	CR-P/M 52D	1SVR405653R4000	10	0.003 (0.007)
		red, for DC A1+, A2-	CR-P/M 52C	1SVR405653R1000		
6-24 V AC/DC	Diode and LED	red, for DC A1+, A2-	CR-P/M 62	1SVR405654R0000	10	0.003 (0.007)
		green, for DC A1+, A2-	CR-P/M 62V	1SVR405654R1000		
24-60 V AC/DC		red, for DC A1+, A2-	CR-P/M 62E	1SVR405654R4000		
		green, for DC A1+, A2-	CR-P/M 62EV	1SVR405654R4100		
110-230 V AC/DC	Diode and LED	red, for DC A1+, A2-	CR-P/M 92	1SVR405654R0100	10	0.003 (0.007)
		green, for DC A1+, A2-	CR-P/M 92V	1SVR405654R1100		
6-24 V AC/DC	Varistor and LED Overvoltage protection	red, for DC A1+, A2-	CR-P/M 62C	1SVR405655R0000	10	0.003 (0.007)
		green, for DC A1+, A2-	CR-P/M 62CV	1SVR405655R1000		
24-60 V AC/DC		red, for DC A1+, A2-	CR-P/M 62D	1SVR405655R4000		
		green, for DC A1+, A2-	CR-P/M 62DV	1SVR405655R4100		
110-230 V AC/DC	Varistor and LED Overvoltage protection	red, for DC A1+, A2-	CR-P/M 92C	1SVR405655R0100	10	0.003 (0.007)
		green, for DC A1+, A2-	CR-P/M 92CV	1SVR405655R1100		
24 V AC	Overvoltage protection		CR-P/M 72	1SVR405656R0000	10	0.002 (0.004)
115 V AC			CR-P/M 72A	1SVR405656R1000		
230 V AC			CR-P/M 82	1SVR405656R2000		

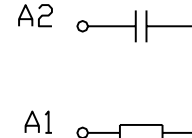
Connection diagrams



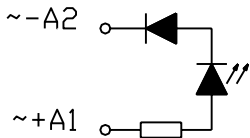
CR-P/M 22



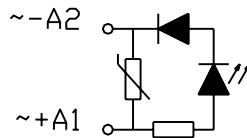
CR-P/M 42, P/M 42C, P/M 42BV, CR-P/M 42B, CR-P/M 42V, CR-P/M 42CV



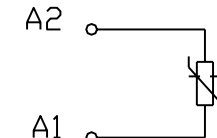
CR-P/M 52B, CR-P/M 52D, CR-P/M 52C



CR-P/M 62, P/M 92, P/M 62EV, CR-P/M 62E, CR-P/M 92V, CR-P/M 62V, CR-P/M 92V



CR-P/M 62C, P/M 62DV, CR-P/M 62D, CR-P/M 92C, P/M 62DV, CR-P/M 62CV, CR-P/M 92CV



CR-P/M 72, CR-P/M 72A, CR-P/M 82

Pluggable interface relays

Ordering details

Interface relays
CR Range



CR-U

Description

Interface relays are widely used in various industrial applications: As an interface they link the electronic controlling, e.g. PLC (programmable logic controller), PC or field bus systems, to the sensor / actuator level. Here, they take on various functions: Switching of AC or DC loads with different resistive, inductive and capacitive parts, switching voltages from a few mV up to 250 V, switching currents from a few mA up to 16 A, amplification of weak control signals, electrical isolation of control and load circuits, and signal multiplying. In contrast to electronic switching devices, interface relays don't use additional internal protective circuits and thus are overload-proof against short-time variations like current or voltage peaks.

Ordering details - CR-U range

Rated control supply voltage	Outputs	Contact ratings	Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)				
12 V DC	2 c/o without LED	250 V, 10 A	CR-U012DC2	1SVR405621R4000	10	0.083 (0.183)				
24 V DC			CR-U024DC2	1SVR405621R1000						
48 V DC			CR-U048DC2	1SVR405621R6000						
110 V DC			CR-U110DC2	1SVR405621R8000						
220 V DC			CR-U220DC2	1SVR405621R9000						
24 V AC			CR-U024AC2	1SVR405621R0000						
48 V AC			CR-U048AC2	1SVR405621R5000						
110 V AC			CR-U110AC2	1SVR405621R7000						
120 V AC			CR-U120AC2	1SVR405621R2000						
230 V AC			CR-U230AC2	1SVR405621R3000						
12 V DC			3 c/o without LED	250 V, 10 A			CR-U012DC3	1SVR405622R4000	10	0.083 (0.183)
24 V DC							CR-U024DC3	1SVR405622R1000		
48 V DC	CR-U048DC3	1SVR405622R6000								
110 V DC	CR-U110DC3	1SVR405622R8000								
125 V DC	CR-U125DC3	1SVR405622R8200								
220 V DC	CR-U220DC3	1SVR405622R9000								
24 V AC	CR-U024AC3	1SVR405622R0000								
48 V AC	CR-U048AC3	1SVR405622R5000								
60 V AC	CR-U060AC3	1SVR405622R5200								
110 V AC	CR-U110AC3	1SVR405622R7000								
120 V AC	CR-U120AC3	1SVR405622R2000								
230 V AC	CR-U230AC3	1SVR405622R3000								
12 V AC	2 c/o with LED	250 V, 10 A	CR-U012DC2L	1SVR405621R4100	10	0.083 (0.183)				
24 V DC			CR-U024DC2L	1SVR405621R1100						
48 V DC			CR-U048DC2L	1SVR405621R6100						
110 V DC			CR-U110DC2L	1SVR405621R8100						
220 V DC			CR-U220DC2L	1SVR405621R9100						
24 V AC			CR-U024AC2L	1SVR405621R0100						
48 V AC			CR-U048AC2L	1SVR405621R5100						
110 V AC			CR-U110AC2L	1SVR405621R7100						
120 V AC			CR-U120AC2L	1SVR405621R2100						
230 V AC			CR-U230AC2L	1SVR405621R3100						
12 V DC			3 c/o with LED	250 V, 10 A			CR-U012DC3L	1SVR405622R4100	10	0.083 (0.183)
24 V DC							CR-U024DC3L	1SVR405622R1100		
48 V DC	CR-U048DC3L	1SVR405622R6100								
110 V DC	CR-U110DC3L	1SVR405622R8100								
220 V DC	CR-U220DC3L	1SVR405622R9100								
24 V AC	CR-U024AC3L	1SVR405622R0100								
48 V AC	CR-U048AC3L	1SVR405622R5100								
110 V AC	CR-U110AC3L	1SVR405622R7100								
120 V AC	CR-U120AC3L	1SVR405622R2100								
230 V AC	CR-U230AC3L	1SVR405622R3100								

Ordering details - Accessories



CR-U2S

Version	Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
Socket for 2 c/o and module	CR-U2S	1SVR405670R0000	10	
Socket for 3 c/o and module	CR-U3S	1SVR405660R0000		
Socket for 3 c/o	CR-U3E	1SVR405660R0100		
Socket small for 2 c/o	CR-U2SM	1SVR405670R1100		
Socket small for 3 c/o	CR-U3SM	1SVR405660R1100		
Holder for CR-U socket	CR-UH	1SVR405669R0000		

Pluggable interface relays

Ordering details



CR-U...

Ordering details - CR-U range

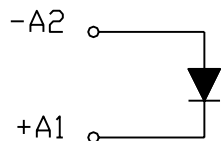
Rated control supply voltage	Description	Version	Reference code	Catalog number	Pkg	Weight	
					qty	(1 pce) kg (lb)	
6-230 V DC	Diode - Reverse polarity protection/free wheeling diode	A1+, A2-	CR-U 21	1SVR405661R0000	10	0.007 (0.015)	
6-24 V DC	Diode and LED - Reverse polarity protection/free wheeling diode	red, A1+, A2- green, A1+, A2-	CR-U 41	1SVR405662R0000	10	0.007 (0.015)	
24-60 V DC		red, A1+, A2- green, A1+, A2-	CR-U 41B	1SVR405662R4000			
110-230 V DC		red, A1+, A2- green, A1+, A2-	CR-U 41C	1SVR405662R9000			
		red, A1+, A2- green, A1+, A2-	CR-U 41CV	1SVR405662R9100			
6-24 V AC 24-60 V AC 110-230 V AC	Spark quenching		CR-U 51B CR-U 51D CR-U 51C	1SVR405663R0000 1SVR405663R4000 1SVR405663R1000	10	0.007 (0.015)	
6-24 V AC/DC 24-60 V AC/DC 110-230 V AC/DC	Diode and LED	red, for DC A1+, A2- green, for DC A1+, A2-	CR-U 61	1SVR405664R0000	10	0.007 (0.015)	
24-60 V AC/DC		red, for DC A1+, A2- green, for DC A1+, A2-	CR-U 61V	1SVR405664R1000			
		red, for DC A1+, A2- green, for DC A1+, A2-	CR-U 61E	1SVR405664R4000			
110-230 V AC/DC		red, for DC A1+, A2- green, for DC A1+, A2-	CR-U 91	1SVR405664R0100			
6-24 V AC/DC 24-60 V AC/DC 110-230 V AC/DC	Varistor and LED Overvoltage protection	red, for DC A1+, A2- green, for DC A1+, A2-	CR-U 61C	1SVR405665R0000	10	0.007 (0.015)	
		red, for DC A1+, A2- green, for DC A1+, A2-	CR-U 61CV	1SVR405665R1000			
		red, for DC A1+, A2- green, for DC A1+, A2-	CR-U 61D	1SVR405665R4000			
		red, for DC A1+, A2- green, for DC A1+, A2-	CR-U 61DV	1SVR405665R4100			
24 V AC 115 V AC 230 V AC	Overvoltage protection		CR-U 71 CR-U 71A CR-U 81	1SVR405666R0000 1SVR405666R1000 1SVR405666R2000	10	0.007 (0.015)	
24-240 V AC/DC		Multifunction time module	pluggable onto CR-U2S and CR-U3S	CR-U T	1SVR405667R0000	10	0.014 (0.031)



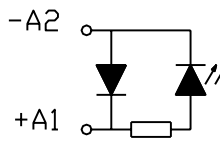
CR-U T

Connection diagrams

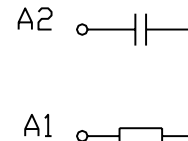
All CR-U modules can be plugged onto sockets CR-U2S and CR-U3S.



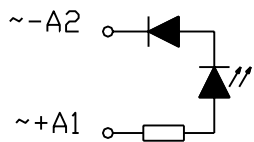
CR-U 21



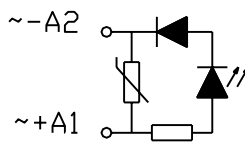
CR-U 41, CR-U 41B, CR-U 41C, CR-U 41V, CR-U 41BV, CR-U 41CV



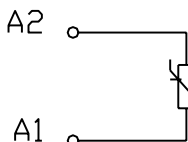
CR-U 51B, CR-U 51C CR-U 51D,



CR-U 61, CR-U 61E, CR-U 91, CR-U 61V, CR-U 61EV, CR-U 91V



CR-U 61C, CR-U 61D, CR-U 91C, CR-U 61CV, CR-U 61DV CR-U 91CV



CR-U 71, CR-U 81 CR-U 71A,

Pluggable interface relays


Technical data

Interface relays
CR Range


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Input circuit - coil data


CR-P range

	Rated control supply voltage U_s	Rated frequency	Make voltage (at 20 °C)	Maximum voltage (at 55 °C)	Break voltage	Rated power	Coil resistance (at 20 °C)	Tolerance of coil resistance
DC coils	12 V DC	-	8.4 V DC	30.6 V DC	M 0.1 U_s	0.4-0.48 W	360 q	w 10%
	24 V DC	-	16.8 V DC	61.2 V DC	M 0.1 U_s	0.4-0.48 W	1440 q	w 10%
	48 V DC	-	33.6 V DC	122.4 V DC	M 0.1 U_s	0.4-0.48 W	5700 q	w 10%
	110 V DC	-	77 V DC	280 V DC	M 0.1 U_s	0.4-0.48 W	25200 q	w 10%
AC coils	24 V AC	50 / 60 Hz	19.2 V AC	28.8 V AC	M 0.15 U_s	0.75 VA	400 q	w 10%
	48 V AC	50 / 60 Hz	38.4 V AC	57.6 V AC	M 0.15 U_s	0.75 VA	1550 q	w 10%
	110 V AC	50 / 60 Hz	88 V AC	132 V AC	M 0.15 U_s	0.75 VA	8900 q	w 10%
	120 V AC	50 / 60 Hz	96 V AC	144 V AC	M 0.15 U_s	0.75 VA	10200 q	w 10%
	230 V AC	50 / 60 Hz	184 V AC	276 V AC	M 0.15 U_s	0.75 VA	38500 q	w 10%

CR-M range

	Rated control supply voltage U_s	Rated frequency	Make voltage (at 20 °C)	Maximum voltage (at 55 °C)	Break voltage	Rated power	Coil resistance (at 20 °C)	Tolerance of coil resistance
DC coils	12 V DC	-	9.6 V DC	13.2 V DC	M 0.1 U_s	0.9 W	160 q	w 10%
	24 V DC	-	19.2 DC	26.4 V DC	M 0.1 U_s	0.9 W	640 q	w 10%
	48 V DC	-	38.4 V DC	52.8 V DC	M 0.1 U_s	0.9 W	2600 q	w 10%
	60 V DC	-	48.0 V DC	66.0 V DC	M 0.1 U_s	0.9 W	4000 q	w 10%
	110 V DC	-	88 V DC	121 V DC	M 0.1 U_s	0.9 W	13600 q	w 10%
	125 V DC	-	100 V DC	137,5 V DC	M 0.1 U_s	0.9 W	16000 q	w 10%
	220 V DC	-	176 V DC	242 V DC	M 0.1 U_s	0.9 W	54000 q	w 10%
AC coils	24 V AC	50 / 60 Hz	19.2 V AC	26.4 V AC	M 0.2 U_s	1.6 VA	158 q	w 10%
	48 V AC	50 / 60 Hz	38.4 V AC	52.8 V AC	M 0.2 U_s	1.6 VA	640 q	w 10%
	60 V AC	50 / 60 Hz	48.0 V AC	66.0 V AC	M 0.2 U_s	1.6 VA	930 q	w 10%
	110 V AC	50 / 60 Hz	88 V AC	121 V AC	M 0.2 U_s	1.6 VA	3450 q	w 10%
	120 V AC	50 / 60 Hz	96 V AC	132 V AC	M 0.2 U_s	1.6 VA	3770 q	w 10%
	230 V AC	50 / 60 Hz	184 V AC	253 V AC	M 0.2 U_s	1.6 VA	16100 q	w 10%

CR-U range

	Rated control supply voltage U_s	Rated frequency	Make voltage (at 20 °C)	Maximum voltage (at 55 °C)	Break voltage	Rated power	Coil resistance (at 20 °C)	Tolerance of coil resistance
DC coils	12 V DC	-	9.6 V DC	13.2 V DC	M 0.1 U_s	1.5 W	110 q	w 10%
	24 V DC	-	19.2 V DC	26.4 V DC	M 0.1 U_s	1.5 W	430 q	w 10%
	48 V DC	-	38.4 V DC	52.8 V DC	M 0.1 U_s	1.5 W	1750 q	w 10%
	110 V DC	-	88.0 V DC	121.0 V DC	M 0.1 U_s	1.5 W	9200 q	w 10%
	125 V DC	-	96.0 V DC	132.0 V DC	M 0.1 U_s	1.5 W	11000 q	w 10%
	220 V DC	-	176.0 V DC	242.0 V DC	M 0.1 U_s	1.5 W	37000 q	w 10%
	AC coils	24 V AC	50 / 60 Hz	19.2 V AC	26.4 V AC	M 0.15 U_s	2.8 VA (50 Hz) 2.5 VA (60 Hz)	75 q
48 V AC		50 / 60 Hz	38.4 V AC	52.8 V AC	M 0.15 U_s	2.8 VA (50 Hz) 2.5 VA (60 Hz)	305 q	w 10%
60 V AC		50 / 60 Hz	48.0 V AC	66.0 V AC	M 0.15 U_s	2.8 VA (50 Hz) 2.5 VA (60 Hz)	475 q	w 10%
110 V AC		50 / 60 Hz	88.0 V AC	121.0 V AC	M 0.15 U_s	2.8 VA (50 Hz) 2.5 VA (60 Hz)	1700 q	w 10%
120 V AC		50 / 60 Hz	96.0 V AC	132.0 V AC	M 0.15 U_s	2.8 VA (50 Hz) 2.5 VA (60 Hz)	1910 q	w 10%
230 V AC		50 / 60 Hz	184.0 V AC	253.0 V AC	M 0.15 U_s	2.8 VA (50 Hz) 2.5 VA (60 Hz)	7080 q	w 10%

Pluggable interface relays

Technical data

6

Type	CR-P...1	CR-P...2	CR-M...2	CR-M...3	CR-M...4	CR-U...2	CR-U...3
Output circuit(s)	11-12/14	11-12/14 21-22/24	11-12/14 21-22/24	11-12/14 21-22/24 31-32/34	11-12/14 21-22/24 31-32/34 41-42/44	11-12/14 31-32/34	11-12/14 21-22/24 31-32/34
Kind of output	Relay, 1 c/o	Relay, 2 c/o	Relay, 2 c/o	Relay, 3 c/o	Relay, 4 c/o	Relay, 2 c/o	Relay, 3 c/o
Contact material	AgNi	AgNi AgNi/Au 5 µm	AgNi	AgNi	AgNi AgNi/Au 5 µm	AgNi	
Rated operational voltage U_e (VDE 0110, IEC 60947-1)				250 V			
Minimum switching voltage				5 V			
Maximum switching voltage	DC	300 V DC		250 V DC			
	AC	400 V AC		250 V AC			
Minimum switching current				5 mA (AgNi), 2 mA (AgNi/Au)			
Rated free air thermal current I_{th}	16 A	8 A	12 A	10 A	6 A	10 A	
Rated operational current (IEC 60947-5-1)	AC12 (resistive) 230 V	16 A	8 A	12 A	10 A	6 A	10 A
	AC15 (inductive) 230 V	1.5 A	1 A	1.5 A	1.5 A	1 A	1.5 A
	DC12 (resistive) 24 V	16 A	8 A	12 A	10 A	6 A	10 A
	DC13 (inductive) 24 V	2 A	2 A	8 A	8 A	6 A	2 A
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)					-	B 300
	max. rated operational voltage					-	300 V AC
	max. continuous thermal current at B 300					-	5 A
	max. making / breaking apparent power at B 300					-	3600/360 VA
	Utilization category General Purpose (single phase)					-	10 A, 250 V AC
	Utilization category (Resistive)	16 A, 250 V AC	8 A, 250 V AC	10 A, 250 V AC 12 A, 150 V AC	6 A, 250 V AC 10 A, 150 V AC	6 A, 250 V AC 10 A, 150 V AC	10 A, 250 V AC
Minimum switching power				0.3 W (AgNi), 0.1 W (AgNi/Au)		0.3 W	
Maximum switching power	AC-1	4000 VA	2000 VA	3000 VA	2500 VA	1500 VA	2500 VA
Contact resistance				≤ 100 mΩ		≤ 100 mΩ	
Maximum switching capacity	rated load AC-1	600 switching cycles/h		1200 switching cycles/h			
	without load	72000 switching cycles/h		18000 switching cycles/h		12000 switching cycles/h	
Mechanical lifetime	> 3 × 10 ⁷ switching cycles			> 2 × 10 ⁷ switching cycles			
Electrical lifetime	AC1 (resistive)	> 10 ⁵ switching cycles		> 10 ⁵ switching cycles		> 10 ⁵ switching cycles	
		(16 A, 250 V) (8 A, 250 V)	(12 A, 250 V) (10 A, 250 V)	(6 A, 250 V)	(10 A, 250 V)		
	cos φ	see reduction factor F					
Response time	typ. 7 ms		typ. 13 ms (DC), 10 ms (AC)			typ. 18 ms (DC), 12 ms (AC)	
Release time	typ. 3 ms		typ. 3 ms (DC), 8 ms (AC)			typ. 7 ms (DC), 10 ms (AC)	
Isolation data							
Rated insulation voltage	400 V AC			250 V AC			
Insulation class	C250 / B400			C250 / B250		C250	
Rated impulse withstand voltage U_{imp}	between coil and contacts	5 kV AC			2.5 kV AC		
	between open contacts	1 kV AC			1.5 kV AC		
	between c/o contacts	2.5 kV AC			2.5 kV AC	2 kV AC	2 kV AC
Clearance	between coil and contacts	≥ 10 mm		≥ 2.5 mm	≥ 1.6 mm	≥ 3 mm	
Creepage distance	between coil and contacts	≥ 10 mm		≥ 4 mm	≥ 3.2 mm	≥ 4.2 mm	
Overvoltage category	III			III	II	III	
Pollution degree	3			3	2	3	
General data							
Dimensions (W x H x D) when mounted	12.7 x 29 x 15.7 mm			21.2 x 27.5 x 35.6 mm		35 x 35 x 54.4 mm	
Weight	14 g (0.031 lb)			35 g (0.077 lb)		83 g (0.18 lb)	
Mounting	on socket (see accessories)						
Mounting position	any						
Degree of protection	IP 67			IP 40			
Electrical connection							
Connection	by socket						

Pluggable interface relays

Technical data, load limit curves

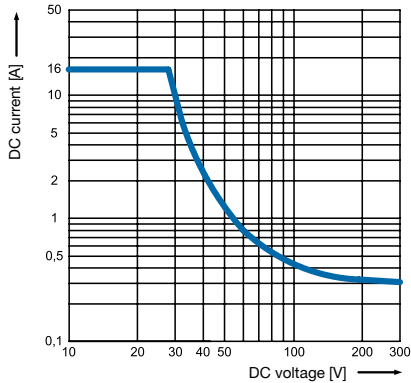
Interface relays
CR Range

Type		CR-P...1	CR-P...2	CR-M...2	CR-M...3	CR-M...4	CR-U...2	CR-U...3
Environmental data								
Ambient temperature range	operation DC	-40 ... +85 °C			-40 ... +70 °C			
	operation AC	-40 ... +70 °C			-40 ... +55 °C			
	storage	-40 ... +85 °C						
Vibration resistance 10-150 Hz	n/o contact	10 g			5 g		5 g	
	n/c contact	10 g	5 g		5 g		5 g	
Shock resistance	n/o contact	30 g	20 g		10 g		10 g	
	n/c contact	30 g	20 g		5 g		10 g	
Standards								
Product standard		EN 61810-1, EN 60255-23 IEC 60664-1		EN 60810-1, EN 60255-23 IEC 61810-7			EN 60255-1-00	
Low Voltage Directive		73/23/EEC						

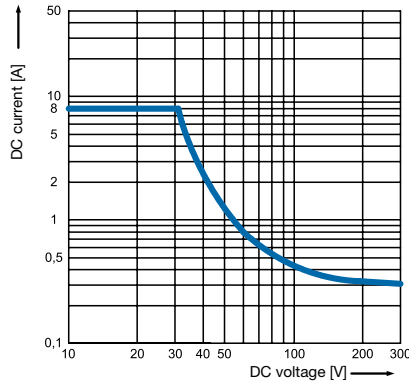
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Load limit curves - Maximum switching power at resistive DC load

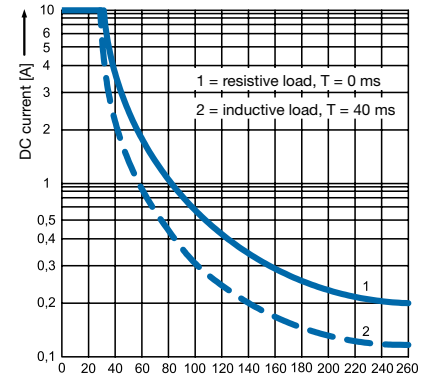
CR-P with 1 c/o contact



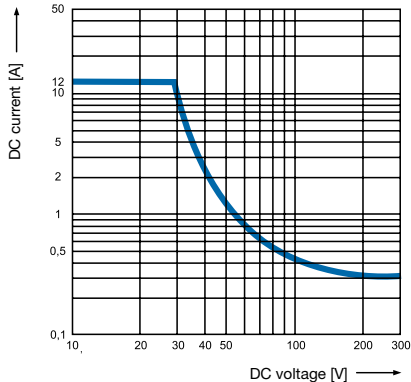
CR-P with 2 c/o contacts



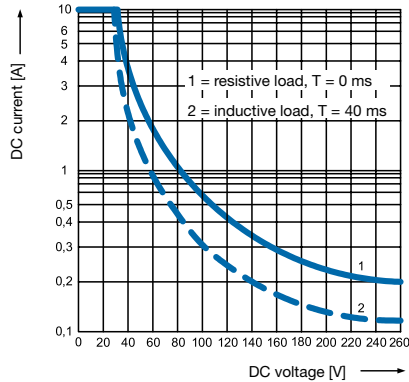
CR-U with 2 and 3 c/o contacts



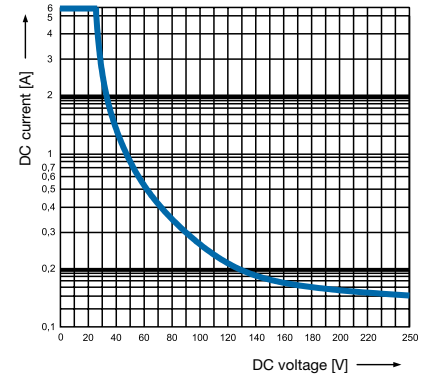
CR-M with 2 c/o contacts



CR-M with 3 c/o contacts



CR-M with 4 c/o contacts



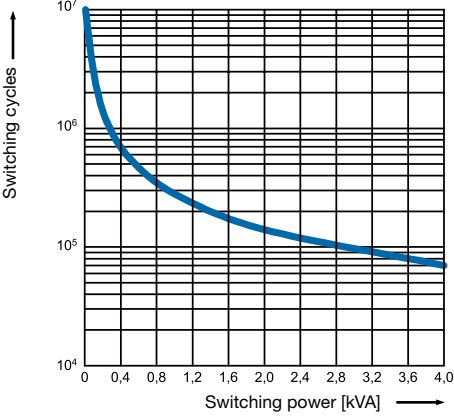
Pluggable interface relays

Load limit curves

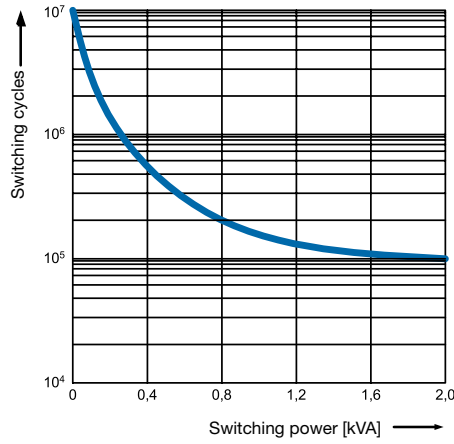
Load limit curves - Electrical lifetime at resistive AC load

6

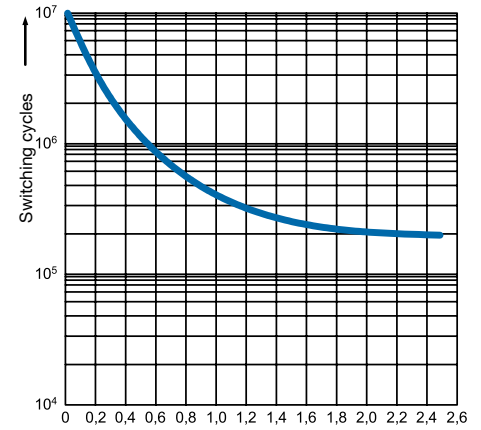
CR-P with 1 c/o contact



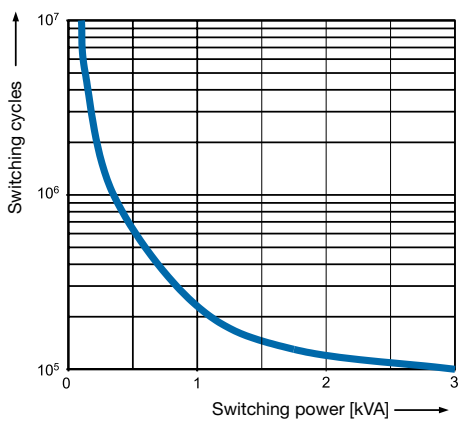
CR-P with 2 c/o contacts



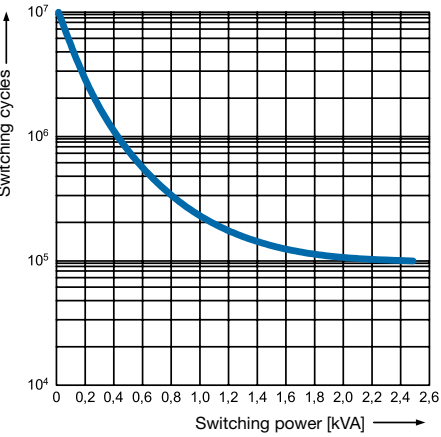
CR-U with 2 and 3 c/o contacts



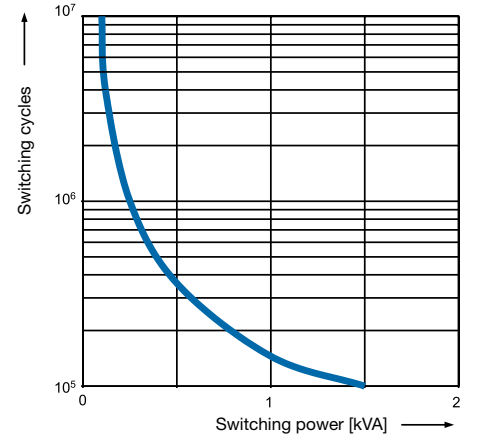
CR-M with 2 c/o contacts



CR-M with 3 c/o contacts

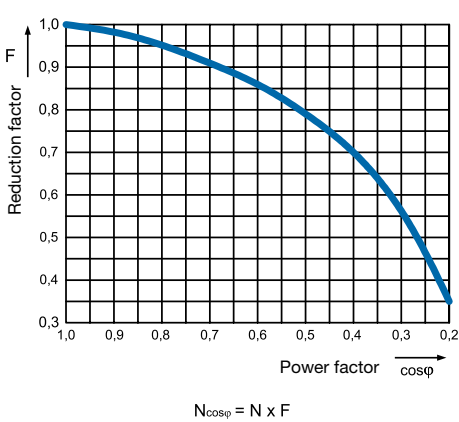


CR-M with 4 c/o contacts

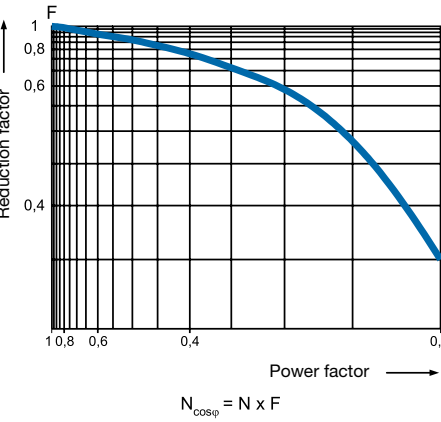


Reduction factor F at inductive AC load

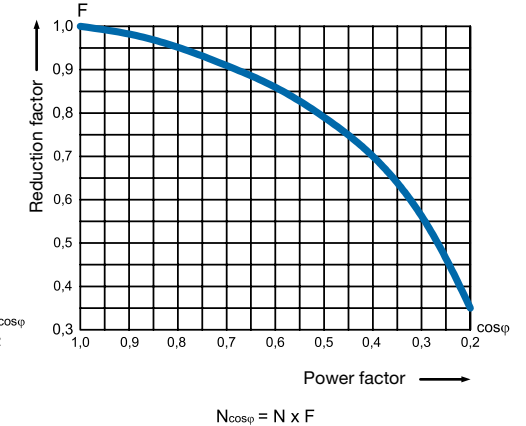
CR-P



CR-M



CR-U

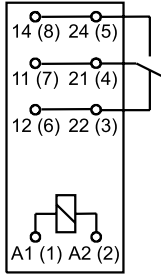


Pluggable interface relays

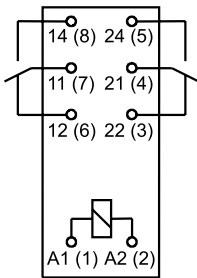
Connection diagrams

Interface relays
CR Range

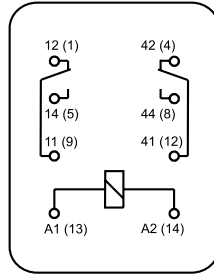
Connection diagrams



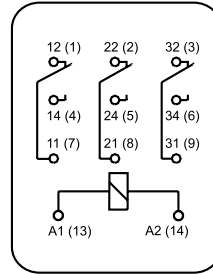
CR-P with 1 c/o contact



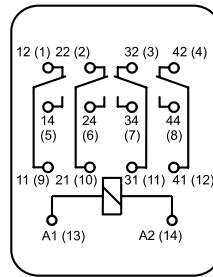
CR-P with 2 c/o contacts



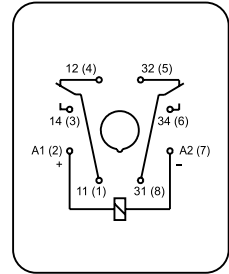
CR-M with 2 c/o contacts



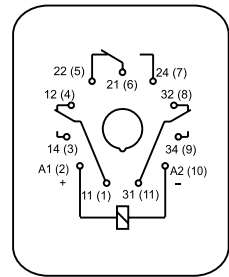
CR-M with 3 c/o contacts



CR-M with 4 c/o contacts



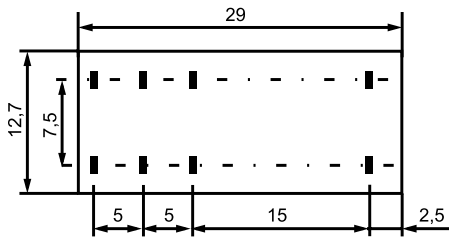
CR-U with 2 c/o contacts



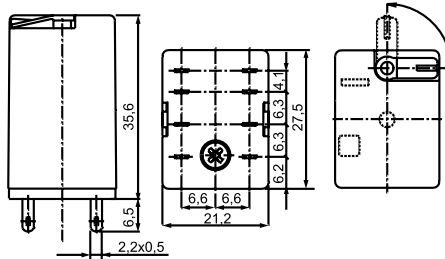
CR-U with 3 c/o contacts

Dimensional drawings

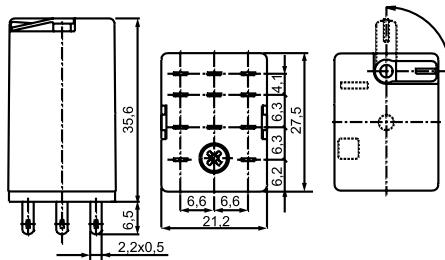
Dimensions in mm



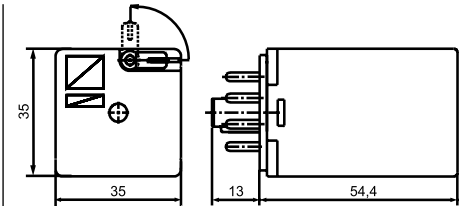
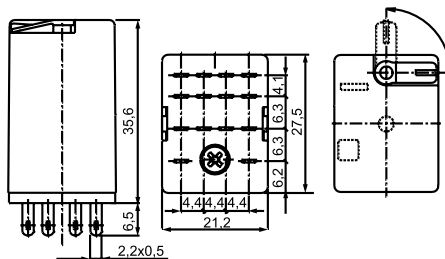
CR-P



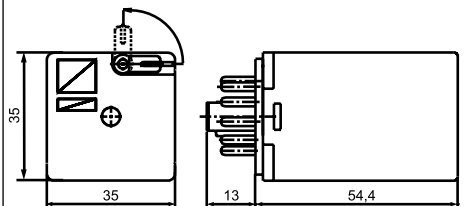
CR-M with 2 c/o contacts



CR-M with 3 c/o contacts



CR-U with 2 c/o contacts



CR-U with 3 c/o contacts

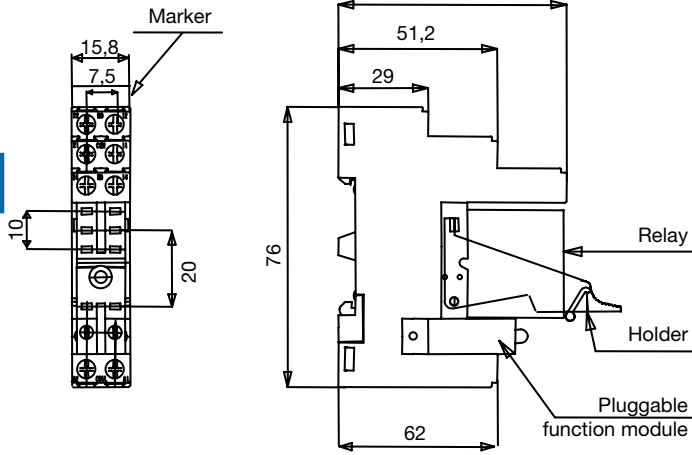
Pluggable interface relays

Approximate dimensions

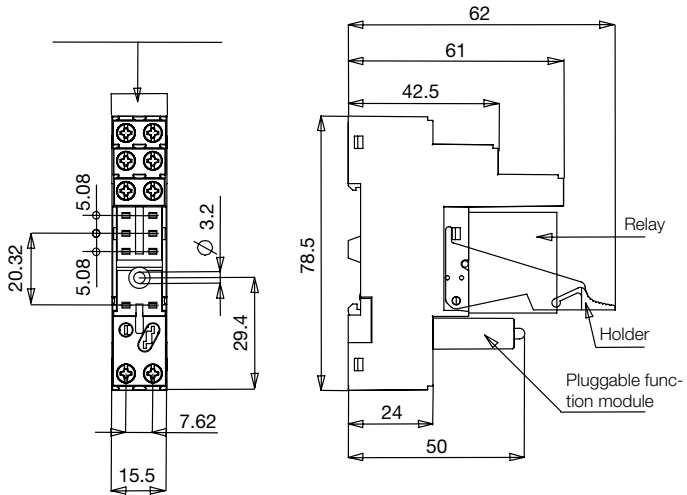
Dimensional drawings

Sockets for screw connection

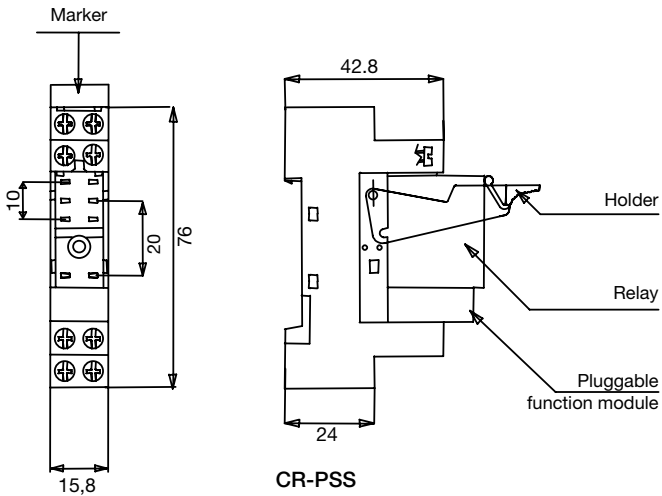
6



CR-PLS

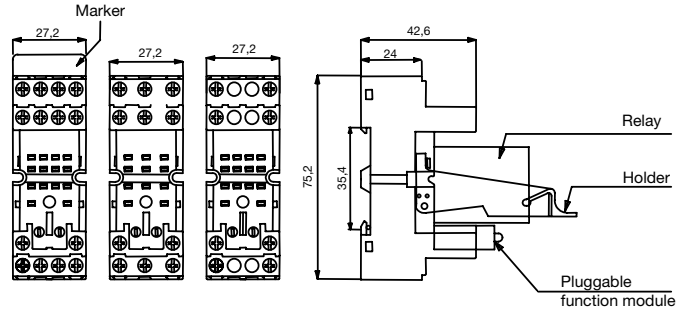


CR-PLSx

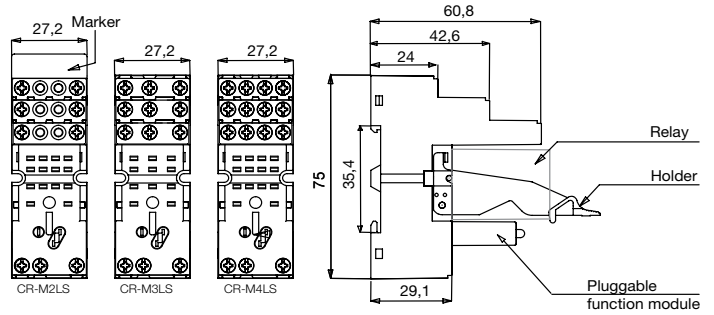


CR-PSS

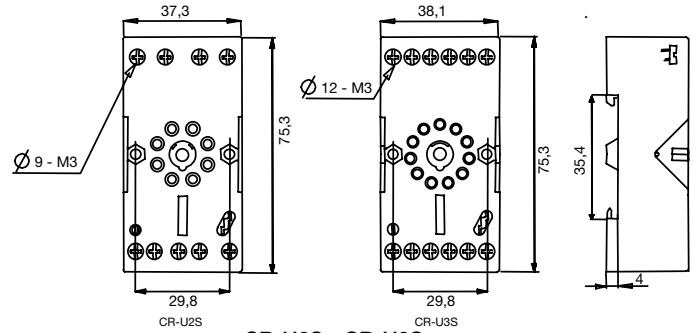
Dimensions in mm



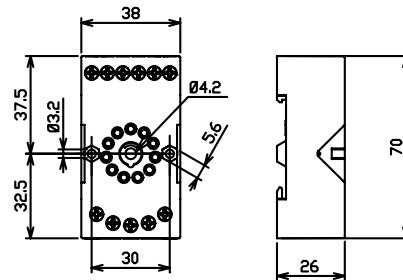
CR-M2SS - CR-M3SS - CR-M4SS



CR-M2LS - CR-M3LS - CR-M4LS



CR-U2S - CR-U3S



CR-U3E

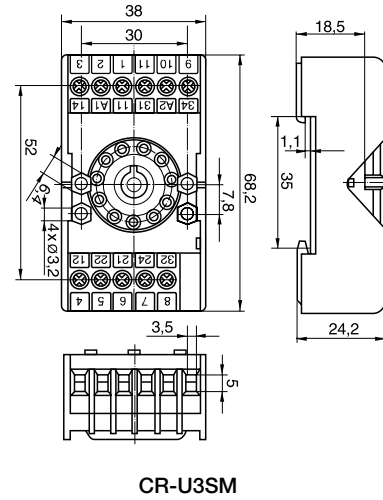
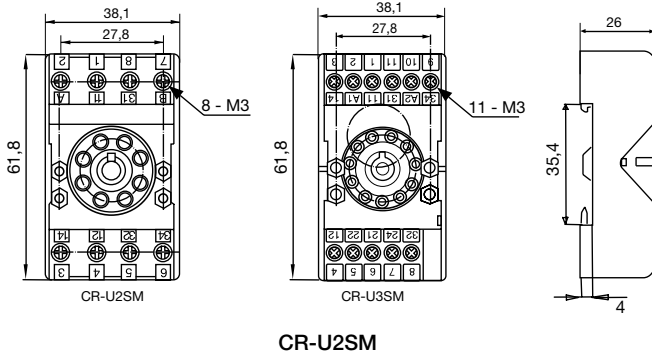
Pluggable interface relays

Approximate dimensions

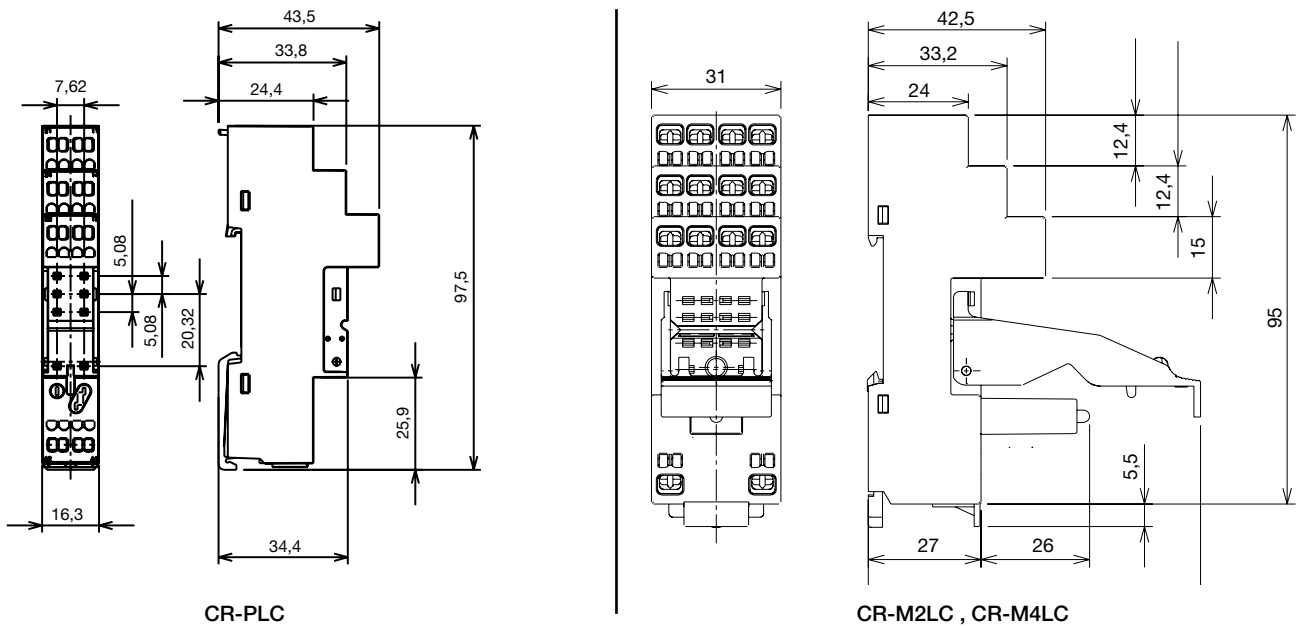
Interface relays
CR Range

Dimensional drawings

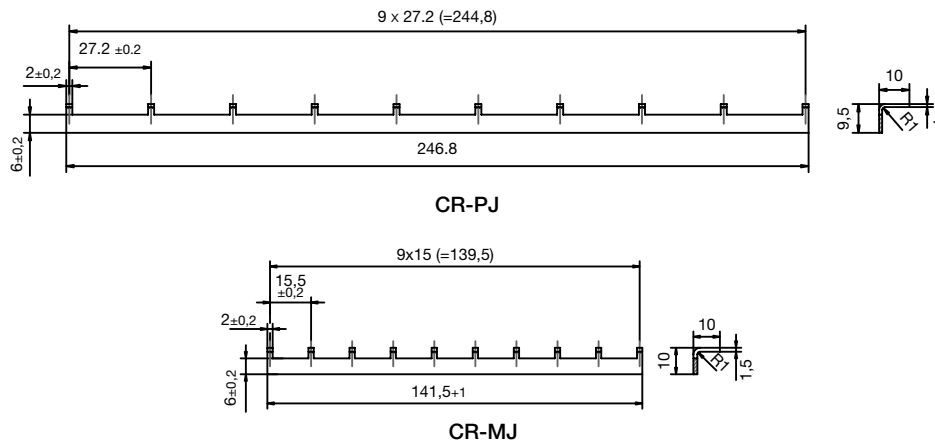
Dimensions in mm



Sockets for spring connection



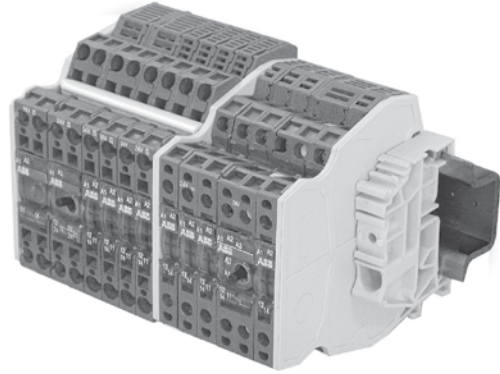
Jumper



Notes



Interface relays
R600, R500



R600 & R500 Interface relays

Interface relays, R600, R500

Benefits and advantages

6



R600 series

Standard range in screw clamp or spring clamp versions

- Spacing : 6 mm
- Wire size : 2.5 mm² (4 mm² solid wire)
- Contact type : 1 NO, 1 NC, 1 SPDT, 1 DPDT from 1 mA to 8 A / 250 V
- Transistor : 100 mA
MOS : 1 A to 5 A
Triac : 1 A to 2 A



R500 series

Standard range with pluggable functions

- Spacing : 5.08 mm (the smallest in the market)
- Wire size : 2.5 mm² (4 mm² solid)
- Contact type : 1 SPDT from 10 mA to 6 A / 250 V
- Transistor : 30 mA to 100 mA
MOS : 1 A to 2 A
Triac : 1 A

In today's automation systems, PLCs are the core of industry. They link sensors and actuators to the process, which are connected to the PLC via conventional wires.

However these PLCs are not completely isolated from the industrial environment, hence voltage spikes and transient currents can affect their operating functions. And additionally, their application range is often limited to 24 VDC / 100 mA.



So, with the aim to adapt application voltage and/or current and provide as well the appropriate galvanic isolation to the PLC, it is recommended to install the correct interface to provide both voltage-current level adaptation and isolation protection.

This interfacing is possible thanks to ABB's relays and optocouplers ranges, which offer wide adaptation in both voltage (from 5 to 400 V) and current (from 10-7 to 16 A) as well as high isolation between input and output from 2 to 4 KV.

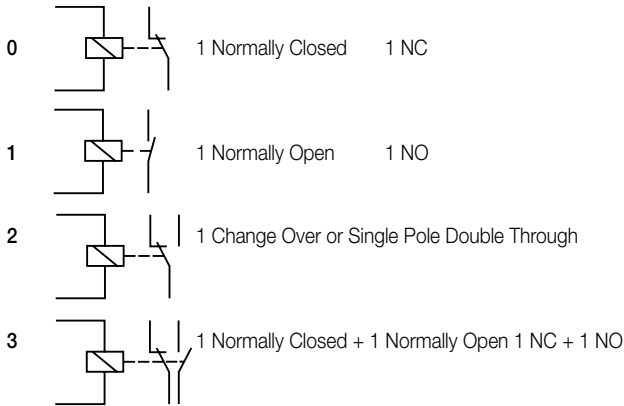
Interface relays, R600, R500

Type designators

Interface relays
R600 & R500 Range

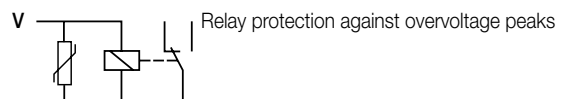
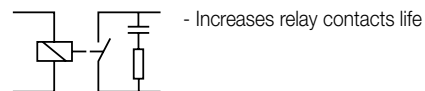
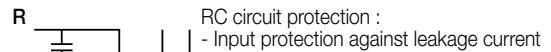
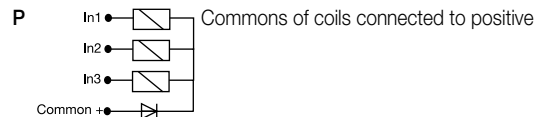
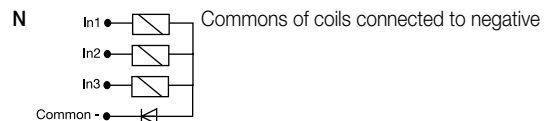
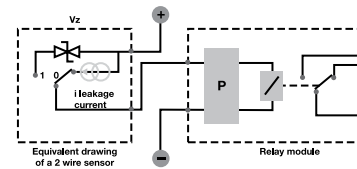
SERIES	CODE	NB OF RELAYS	CONTACT TYPE	NB OF CONTACTS PER RELAY	PARTICULARITIES			
R 600 	<table border="1"><tr><td>R</td><td>B</td></tr></table>	R	B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
R	B							
R 600 	<table border="1"><tr><td>R</td><td>B</td><td>R</td></tr></table>	R	B	R	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R	B	R						
R 500	<table border="1"><tr><td>D</td><td>2,5/5</td><td>R</td></tr></table>	D	2,5/5	R	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D	2,5/5	R						
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		↓	↓	↓	↓			
		1	0	1	None			
		2	1	2	A			
			2		B			
			3		C			
					N			
					P			
					R			
					V			
					I			

Description of contact types

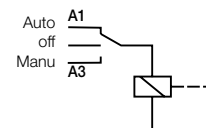


Features

- None Input voltage DC
- A Input voltage AC/DC
- B Input voltage AC
- C 2 wire sensor compatibility



I Switch to force the coil for maintenance and/or installation purposes



Color coding for relays

Color	Current level in contacts	Switching current	Switching voltage	Switching load power
green	Very low level	10 ⁻⁷ to 5 A	10 ⁻³ to 250 V	10 ⁻¹⁰ to 2000 VA 10 ⁻¹⁰ to 200 W
grey	Low level	1 mA to 8 A	5 to 250 V	0,05 to 1500 VA 0,05 to 192 W
blue	High level	10 mA to 16 A	12 to 380 V	0,6 to 4000 VA 0,6 to 240 W

Interface relays, R600 Selection

6

	Reference code	Catalog number
	RB 121-5VDC	1SNA645034R2300
	RB 121-5VDC	1SNA645036R2500
	RBR 121-5VDC	1SNA645534R2500
	RBR 121-5VDC	1SNA645536R2700
	RB 121-12VDC	1SNA645069R0000
	RB 121-12VDC	1SNA645037R2600
	RBR 121-12VDC	1SNA645569R0000
	RBR 121-12VDC	1SNA645537R2000
	RB 101AR-24VAC/DC	1SNA645019R0400
	RBR 101AR-24VAC/DC	1SNA645519R0600
	RB 111A-24VAC/DC	1SNA645014R2700
	RB 111AI-24VAC/DC	1SNA645063 R0000
	RB 111AR-24VAC/DC	1SNA645018R0300
	RBR 111A-24VAC/DC	1SNA645514R2100
	RBR 111AI-24VAC/DC	1SNA645563R0200
	RBR 111AR-24VAC/DC	1SNA645518R0500
	RB 121-24VDC	1SNA645064R0100
	RB 121-24VDC	1SNA645065R0200
	RB 121A-24VAC/DC	1SNA645001R0300
	RB 121A-24VAC/DC	1SNA645005R0700
	RB 121AI-24VAC/DC	1SNA645032R2100
	RB 121AI-24VAC/DC	1SNA645009R1300
	RB 121AI-24VAC/DC	1SNA645033R2200
	RB 121AI-24VAC/DC	1SNA645010R0700
	RBR 121-24VDC	1SNA645564R0300
	RBR 121-24VDC	1SNA645565R0400
	RBR 121A-24VAC/DC	1SNA645501R0500
	RBR 121A-24VAC/DC	1SNA645505R0100
	RBR 121AI-24VAC/DC	1SNA645532R2300
	RBR 121AI-24VAC/DC	1SNA645509R1500
	RBR 121AI-24VAC/DC	1SNA645533R2400
	RBR 121AI-24VAC/DC	1SNA645510R0100

Input voltage																													
5 V DC	■	■	■	■																									
12 V DC					■	■	■	■																					
24 V DC									■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
48 - 60 V DC																													
110 - 115 V DC																													
230 V DC																													
60 - 230 V DC																													
24 V AC									■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
48 - 60 V AC																													
115 V AC																													
230 V AC																													
60 - 230 V AC																													

Output rating																													
10 mA - 6 A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1 mA - 6 A		■	■	■	■	■	■	■																					
1 mA - 8 A																													

Output contacts																													
c/o	1	1	1	1	1	1	1	1																					
n/o																													
n/c									1	1																			

Terminal type																													
Screw	■	■		■	■		■		■	■	■	■																	
Spring		■	■			■	■	■		■																			

Interface relays, R600

Benefits and advantages

Characteristics

Standard range in screw clamp or spring clamp versions

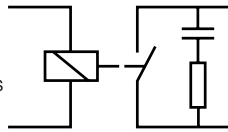
- Spacing : 6 mm
- Wire size : 2.5 mm² (4 mm² solid wire)
- Contact type : 1 NO, 1 NC, 1 SPDT, 1 DPDT from 1 mA to 8 A / 250 V
- Transistor : 100 mA
 - MOS : 1 A to 5 A
 - Triac : 1 A to 2 A

6

Benefits

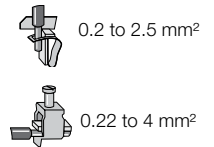
Increased contact life

The contacts are protected by built in RC-circuits which result in increased contact life.



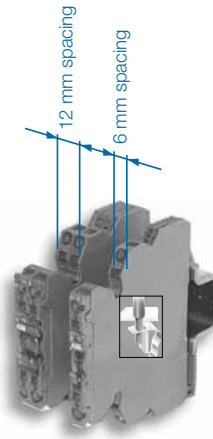
Variety of connections

R600 relays and optocouplers are available with both screw terminals or spring terminals.



Space saving

With a width of only 6 mm or 12 mm the compact design saves space in each cabinet.

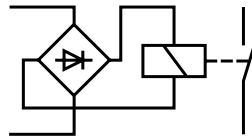


Functioning status

Functioning display through a green LED.



Only one part number AC/DC

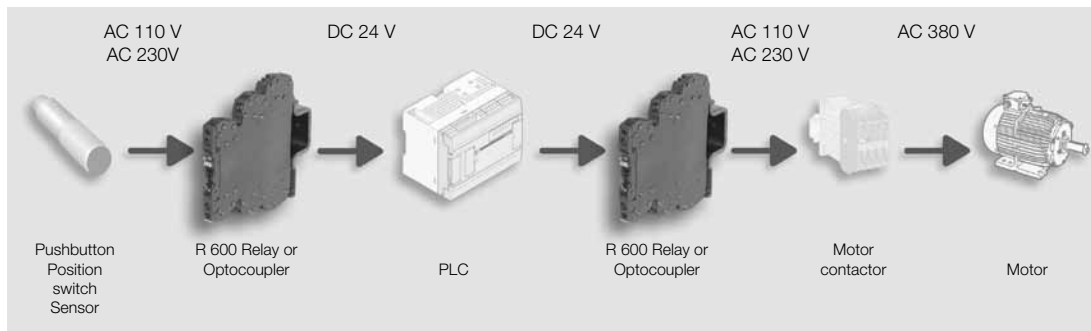


Measurement & Test

Holes for holding DIA. 2 mm test plugs to simplify any measure or test.



Excellent adaptation and conversion of digital signals



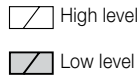
Interface relays, R600

Ordering details

Interface relays
R600 & R500 Range



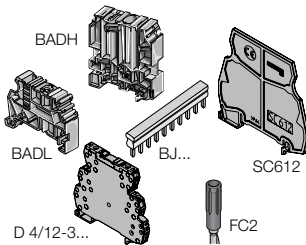
R600



R600 Relay		Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
☑ Relay module 1 NO high level 6 mm spacing		RB 111 A-24VAC/DC	1SNA645014R2700	10	0.02 (0.44)
		RB 111 A-48-60VAC/DC	1SNA645015R2000		
		RB 111 A-115VAC/DC	1SNA645016R2100		
		RB 111 A-230VAC/DC	1SNA645017R2200		
☑ Relay mod. 1 NO high level w/safety switch 6 mm spacing		RB 111 AI-24VAC/DC	1SNA645063R0000		
☑ Relay mod. 1 NO/NC high level w/contact protection 12 mm spacing		RB 111 AR-24VAC/DC	1SNA645018R0300	5	0.03 (0.44)
		RB 101 AR-24VAC/DC	1SNA645019R0400		
☑ Relay module 1 NO high level 6 mm spacing		RBR 111 A-24VAC/DC	1SNA645514R2100	10	0.02 (0.44)
		RBR 111 A-48-60VAC/DC	1SNA645515R2200		
		RBR 111 A-115VAC/DC	1SNA645516R2300		
☑ Relay mod. 1 NO high level w/safety switch 6 mm spacing		RBR 111 AI-24VAC/DC	1SNA645563R0200		
		RBR 111 AR-24VAC/DC	1SNA645518R0500	5	0.03 (0.44)
☑ Relay mod. 1 NO/NC high level w/contact protection 12 mm spacing		RBR 101 AR-24VAC/DC	1SNA645519R0600		
☑ Relay module 1 SPDT high level		RB 121-5VDC	1SNA645034R2300	10	0.02 (0.44)
		RB 121-12VDC	1SNA645069R0100		
		RB 121-24VDC	1SNA645064R0100		
		RB 121 A-24VAC/DC	1SNA645001R0300		
		RB 121 A-48-60VAC/DC	1SNA645002R0400		
		RB 121 A-115VAC/DC	1SNA645003R0500		
☑ Relay module 1 SPDT high level		RB 121 A-230VAC/DC	1SNA645004R0400	10	0.02 (0.44)
		RB 121-5VDC	1SNA645534R2500		
		RB 121-12VDC	1SNA645569R0000		
		RB 121-24VDC	1SNA645564R0300		
		RB 121 A-24VAC/DC	1SNA645501R0500		
		RB 121 A-48-60VAC/DC	1SNA645502R0600		
☑ Relay module 1 SPDT low level		RB 121 A-115VAC/DC	1SNA645503R0700	10	0.02 (0.44)
		RB 121 A-230VAC/DC	1SNA645504R0000		
		RB 121-5VDC	1SNA645036R2500		
		RB 121-12VDC	1SNA645037R2600		
		RB 121-24VDC	1SNA645065R0200		
		RB 121 A-24VAC/DC	1SNA645005R0700		
☑ Relay module 1 SPDT low level		RB 121 A-48-60VAC/DC	1SNA645006R0000	10	0.02 (0.44)
		RB 121 A-115VAC/DC	1SNA645007R0100		
		RB 121 A-230VAC/DC	1SNA645008R1200		
		RB 121-5VDC	1SNA645536R2700		
		RB 121-12VDC	1SNA645537R2000		
		RB 121-24VDC	1SNA645565R0400		
☑ Relay module 1 SPDT low level		RB 121 A-24VAC/DC	1SNA645505R0100	10	0.02 (0.44)
		RB 121 A-48-60VAC/DC	1SNA645506R0200		
		RB 121 A-115VAC/DC	1SNA645507R0300		
		RB 121 A-230VAC/DC	1SNA645508R1400		

Accessories R600

	Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
End section	BADH V0	011690027	50	
	BADL V0	039990302	50	
Separator end section	BAM2 V0	039996701	50	
Divisible shunt 10 poles	SC 612	1SNA290474R0200	10	
Screw clamp distribution block sp. 12 mm	BJ 612-10	1SNA290488R0100	10	
Spring clamp distribution block sp. 12 mm	D4/12-3-3	1SNA645031R2000	5	
Test plug DIA. 2 mm	D4/12-3R-3R	1SNA645531R2200	5	
Marking method	FC2	000786526	10	
	RC65 / RC610	see marking		



Interface relays, R600

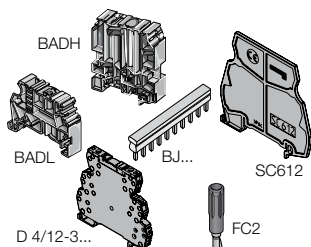
Ordering details

6



R600

- High level
- Low level

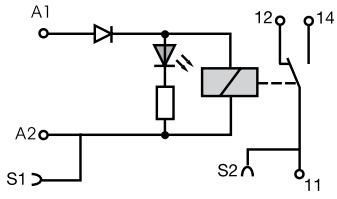


R600 Relay	Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)			
<input type="checkbox"/> Relay mod. 1SPDT high level w/leakage current protec. <input type="checkbox"/> Relay mod. 1SPDT high level w/large coil voltage range <input type="checkbox"/> Relay mod. 1SPDT high level with switch <input type="checkbox"/> Relay mod. 1SPDT high level with safety switch <input checked="" type="checkbox"/> Relay module 1SPDT low level with switch <input checked="" type="checkbox"/> Relay module 1SPDT low level with safety switch <input type="checkbox"/> Relay mod. 1SPDT high level w/leakage current protec. <input type="checkbox"/> Relay mod. 1SPDT high level w/large coil voltage range <input type="checkbox"/> Relay mod. 1SPDT high level with switch <input type="checkbox"/> Relay mod. 1SPDT high level with safety switch <input checked="" type="checkbox"/> Relay module 1SPDT low level with switch <input checked="" type="checkbox"/> Relay module 1SPDT low level with safety switch	<input checked="" type="checkbox"/> RB 121 AR-115VAC/DC <input checked="" type="checkbox"/> RB 121 AR-230VAC/DC	1SNA645046R0700 1SNA645011R2400	5	0.03 (0.066)			
	<input checked="" type="checkbox"/> RB 121 A 60-230VAC/DC	1SNA645020R0100					
	<input checked="" type="checkbox"/> RB 121 AI-24VAC/DC	1SNA645032R2100					
	<input checked="" type="checkbox"/> RB 121 AI-24VAC/DC	1SNA645009R1300					
	<input checked="" type="checkbox"/> RB 121 AI-24VAC/DC	1SNA645033R2200					
	<input checked="" type="checkbox"/> RB 121 AI-24VAC/DC	1SNA645010R0700					
	<input type="checkbox"/> RB 121 AR-115VAC/DC	1SNA645546R0100					
	<input type="checkbox"/> RB 121 AR-230VAC/DC	1SNA645511R2600					
	<input type="checkbox"/> RB 121 A 60-230VAC/DC	1SNA645520R0300					
	<input type="checkbox"/> RB 121 AI-24VAC/DC	1SNA645532R2300					
	<input type="checkbox"/> RB 121 AI-24VAC/DC	1SNA645509R1500					
	<input checked="" type="checkbox"/> RB 121 AI-24VAC/DC	1SNA645533R2400					
	<input checked="" type="checkbox"/> RB 121 AI-24VAC/DC	1SNA645510R0100					
	<input checked="" type="checkbox"/> Relay module 1 DPDT low level <input checked="" type="checkbox"/> Relay module 1 DPDT low level	<input checked="" type="checkbox"/> RB 122 A-24VAC/DC <input checked="" type="checkbox"/> RB 122 A-48-60VAC/DC <input checked="" type="checkbox"/> RB 122 A-115VAC/DC <input checked="" type="checkbox"/> RB 122 A-230VAC/DC <input checked="" type="checkbox"/> RBR 122 A-24VAC/DC <input checked="" type="checkbox"/> RBR 122 A-48-60VAC/DC <input checked="" type="checkbox"/> RBR 122 A-115VAC/DC <input checked="" type="checkbox"/> RBR 122 A-230VAC/DC			1SNA645012R2500 1SNA645040R1500 1SNA645041R0200 1SNA645013R2600 1SNA645512R2700 1SNA645540R1700 1SNA645541R0400 1SNA645513R2000	5	0.03 (0.066)
Accessories R600							
End section		BADH V0 BADL V0 BAM2 V0	011690027 039990302 039996701	50 50 50			
Separator end section		SC 612	1SNA290474R0200	10			
Divisible shunt 10 poles		BJ 612-10	1SNA290488R0100	10			
Screw clamp distribution block sp. 12 mm		D4/12-3-3	1SNA645031R2000	5			
Spring clamp distribution block sp. 12 mm		D4/12-3R-3R	1SNA645531R2200	5			
Test plug DIA. 2 mm		FC2	000786526	10			
Marking method		RC65 / RC610	see marking				

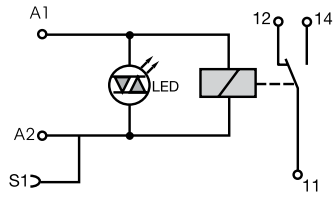
Interface relays, R600

Connection diagrams

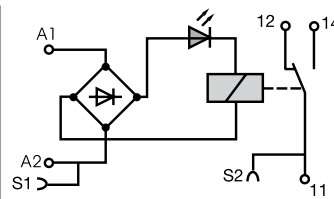
Interface relays
R600 & R500 Range



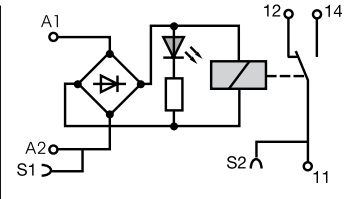
RB...121 - 5-12 V DC



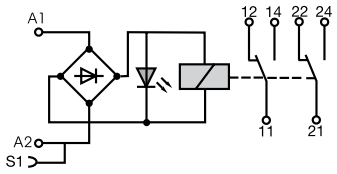
RB...121 - 24 V DC



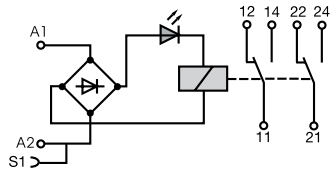
RB...121 A
48-60-115-230 V AC/DC



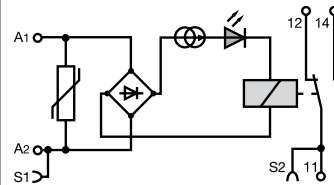
RB...121 A - 24 V AC/DC



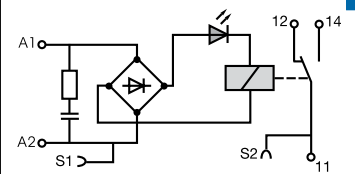
RB...122 A
24-48-60 V AC/DC



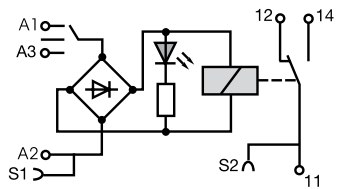
RB...122 A
115-230 V AC/DC



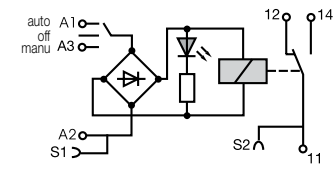
RB...121 A



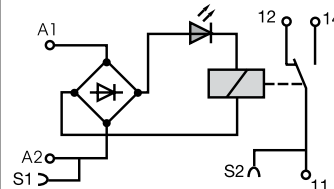
RB...121 AR



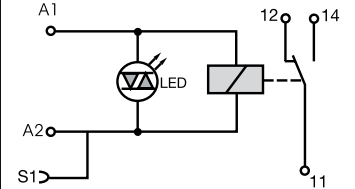
RB...121 AI



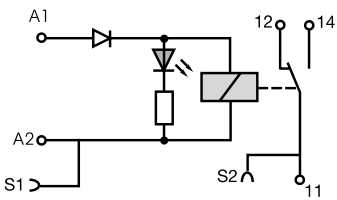
RB...121 AI



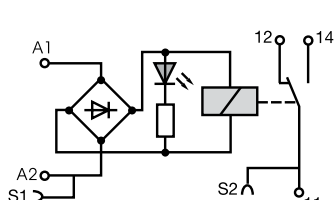
RB...121 A
48-60-115-230 V AC/DC



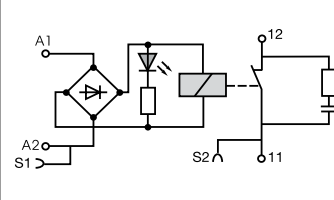
RB...121 - 12-24 V DC



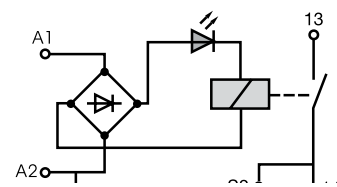
RB...121 - 5 V DC



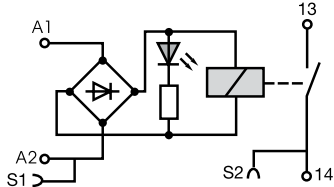
RB...121 A - 24 V AC/DC



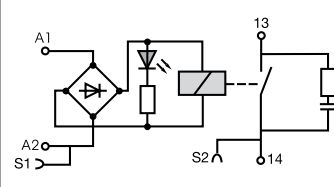
RB...101 AR



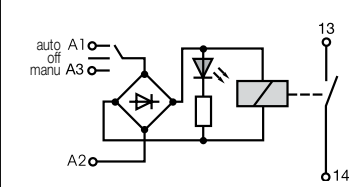
RB...111 A 48-60-115-230 V AC/DC



RB...111 A - 24 V AC/DC



RB...111 AR



RB...111 AI

Interface relays, R600

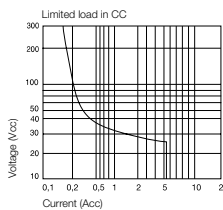
Technical information

Technical data

Relay : 1NO or 1NC high level contact 10 mA to 6 A - 6 mm .236" or 12 mm .472" spacing

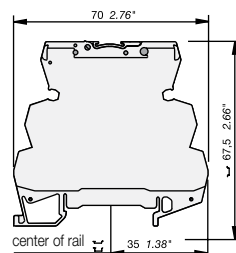
		RB 111 A				RB 111 AI	RB 111 AR	RB 101 AR	
Relay characteristics coil									
Rated voltage: +20%, -15% on DC ; 10%, -10% on AC		24 VAC/DC	48 VAC/DC	60 VAC/DC	115 VAC/DC	230 VAC/DC ±10% on AC ±10%-15% on DC	24 VAC/DC	24 VAC/DC	24 VAC/DC
Frequency		50/60 Hz							
Power		0.24 W	0.34 W	0.54 W	0.46 W	0.8 W	0.24 W	0.24 W	0.24 W
Rated current		10 mA	7 mA	9 mA	4 mA	3.5 mA	10 mA	10 mA	10 mA
Drop-out voltage at 20°C		4.5 V	8 V	8 V	17 V	27 V	4.5 V	4.5 V	4.5 V
Status device		green LED							
Relay characteristics contact									
Type		1 NO					1 NO + RC		
Voltage switching range min./max.		12 V / 250 VAC							
Current switching range min./max.		10 mA / 6 A							
Load switching range		AC1 min./max.		0.6 VA / 1500 VA (ohmic load)					
		DC1 min./max.		0.6 W / 140 W					
Number of on-load operations		10 ⁵ on AC15							
Number of off-load operations		10 ⁷							
Operation speed		F	5 ms	6 ms	7 ms		5 ms		
		O	8 ms		15 ms		8 ms		
Bounce		1.2 ms							
Insulation coil / contact		4000 V RMS				3800 V RMS			4000 V RMS
Resistance to shock coil / contact		4000 V RMS							
Insulation contact / contact		1000 V RMS							
Ambient temperature		storage		-40 °C to +80 °C					
		operating		-20 °C to +70 °C ¹⁾					
Other characteristics		Screw clamp				Spring clamp			
Body material		grey				UL 94 V0			
Wire size		Solid wire		0.2 - 4 mm ² (24-12 AWG)		0.2-2.5 mm ² (24-12 AWG)			
		Stranded wire		0.22 - 2.5 mm ² (24-12 AWG)					
Rated wire size		2.5 mm ² (12 AWG)							
Wire stripping length		9 mm (0.354 in)							
Recommended screwdriver		3.5 mm (0.137 in)							
Protection		IP20 NEMA7							
Recommended torque		0.4-0.6 Nm (3.5-5.3 lb.in)							
Approvals		UL, (pending), LRS, CE							
Reference standards		CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.							

¹⁾ Over 55°C, blocks have to be mounted on horizontal rail with 10 mm spacing between each block. For vertical rail mounting use temperature is 15°C less decreased.

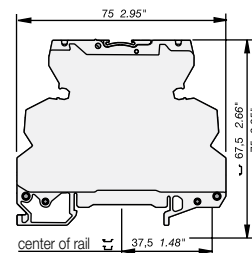


	DC12	AC12	DC13	AC15
24 V	6 A	6 A	1 A	3 A
110/120 V	0.3 A	6 A	0.2 A	3 A
220/230 V	0.2 A	6 A	0.1 A	3 A

Dimensional drawings



Screw clamp module



Spring clamp module

Interface relays, R600

Technical information

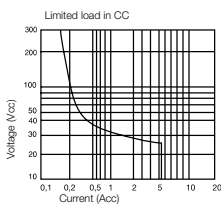
Interface relays
R600 & R500 Range

Technical data

Relay : 1 SPDT high level contact 10 mA to 6 A - 6 mm .236"

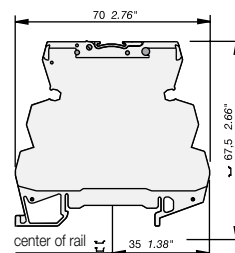
	RB 121			RB 121A				
Relay characteristics coil								
Rated voltage: +20%, -15% on DC ; 10%, -10% on AC	5 V DC	12 V DC	24 V DC	24 V AC/DC	48 V AC/DC	60 V AC/DC	115 V AC/DC	230 V AC/DC ± 10% on AC ± 10%-15% on DC
Frequency	-			50/60 Hz				
Power	0.2 W	0.2 W	0.28 W	0.24 W	0.33 W	0.54 W	0.46 W	0.8 W
Rated current	40 mA	16 mA	12 mA	10 mA	7 mA	9 mA	4 mA	3.5 mA
Drop-out voltage at 20°C	1.2 V	2.2 V	1.2 V	4.5 V	8 V	8 V	17 V	27 V
Status device	green LED							
Relay characteristics contact								
Type	1 SPDT							
Voltage switching range min./max.	12 V / 250 V AC							
Current switching range min./max.	10 mA / 6 A							
Load switching range	0.6 VA / 1500 VA (ohmic load)							
AC1 min./max.	0.6 W / 140 W							
DC1 min./max.	10 ⁵ on AC15							
Number of on-load operations	10 ⁷							
Number of off-load operations	10 ⁷							
Operation speed	F	5 ms			6 ms		7 ms	
	O	8 ms			15 ms		16 ms	
Bounce	1.2 ms							
Insulation coil / contact	4000 V RMS							
Resistance to shock coil / contact	4000 V RMS							
Insulation contact / contact	1000 V RMS							
Ambient temperature	storage	-40 °C to -80 °C						
	operating	-20 °C to 70 °C ¹⁾						
Other characteristics								
Body material	grey	Screw clamp			Spring clamp			
Wire size	Solid wire	0.2 - 4 mm ² (24-12 AWG)			0.2-2.5 mm ² (24-12 AWG)			
	Stranded wire	0.22 - 2.5 mm ² (24-12 AWG)						
Rated wire size	2.5 mm ² (12 AWG)							
Wire stripping length	9 mm (0.354 in)							
Recommended screwdriver	3.5 mm (0.137 in)							
Protection	IP20 NEMA1							
Recommended torque	0.4-0.6 Nm (3.5-5.3 lb.in)							
Approvals	UL (pending for 12 V DC) , CE (pending) , LRS , CE							
Reference standards	CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.							

¹⁾ Over 55°C, blocks have to be mounted on horizontal rail with 10 mm spacing between each block. For vertical rail mounting use temperature is 15°C less decreased.

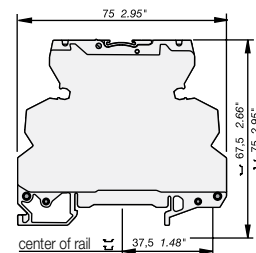


	DC12	AC12	DC13	AC15
24 V	6 A	6 A	1 A	3 A
110/120 V	0.3 A	6 A	0.2 A	3 A
220/230 V	0.2 A	6 A	0.1 A	3 A

Dimensional drawings



Screw clamp module



Spring clamp module

Interface relays, R600

Technical information

Technical data

Relay : 1 SPDT low level with contact 1 mA upto 6 A - 6 m 0.236" spacing

	RB 121			RB 121 A				
Relay characteristics coil								
Rated voltage: +20%, -15% on DC ; 10%, -10% on AC	5 V DC	12 V DC	24 V DC	24 VAC/DC	48 VAC/DC	60 V AC/DC	115 V AC/DC	230 V AC/DC ± 10% on AC ± 10%-15% on DC
Frequency	50/60 Hz							
Power	0.2 W	0.2 W	0.28 W	0.24 W	0.33 W	0.54 W	0.46 W	0.8 W
Rated current	40 mA	16 mA	12 mA	10 mA	7 mA	9 mA	4 mA	3.5 mA
Drop-out voltage at 20°C	1.2 V	2.2 V	1.2 V	4.5 V	8 V	8 V	17 V	27 V
Status device	green LED							

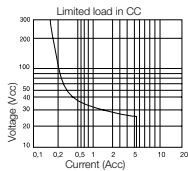
Relay characteristics contact

Type	1 SPDT								
Voltage switching range min./max.	5 V / 250 V AC								
Current switching range min./max.	1 mA / 6 A								
Load switching range	0.05 VA / 1500 VA (ohmic load)								
	0.05 W / 140 W								
Number of on-load operations	10 ⁵ on AC15								
Number of off-load operations	10 ⁷								
Operation speed	F	5 ms	5 ms	5 ms	5 ms	5 ms	5 ms	6 ms	7 ms
	O	8 ms	8 ms	8 ms	8 ms	8 ms	8 ms	15 ms	16 ms
Insulation coil / contact	4000 V RMS								
Resistance to shock coil / contact	4000 V RMS								
Insulation contact / contact	1000 V RMS								
Ambient temperature	storage	-40 °C to -80 °C							
	operating	-20 °C to 70 °C ¹⁾							

Other characteristics

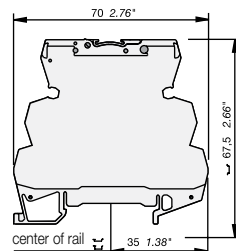
	Screw clamp	Spring clamp
Body material	grey	UL 94 V0
Wire size	Solid wire 0.2 - 4 mm ² (24-12 AWG)	0.2-2.5 mm ² (24-12 AWG)
	Stranded wire	0.22 - 2.5 mm ² (24-12 AWG)
Rated wire size	2.5 mm ² (12 AWG)	
Wire stripping length	9 mm (0.354 in)	
Recommended screwdriver	3.5 mm (0.137 in)	
Protection	IP20 NEMA7	
Recommended torque	0.4-0.6 Nm (3.5-5.3 lb.in)	
Approvals	UL (pending for 24 V DC), CE (pending), LRS, CE	
Reference standards	CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.	

¹⁾ Over 55°C, blocks have to be mounted on horizontal rail with 10 mm spacing between each block. For vertical rail mounting use temperature is 15°C less decreased.

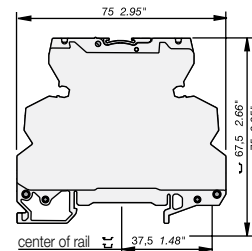


	DC12	AC12	DC13	AC15
24 V	6 A	6 A	1 A	3 A
110/120 V	0.3 A	6 A	0.2 A	3 A
220/230 V	0.2 A	6 A	0.1 A	3 A

Dimensional drawings



Screw clamp module





Spring clamp module

Interface relays, R600

Technical information

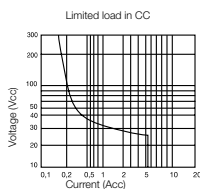
Interface relays
R600 & R500 Range

Technical data

-  Relay : 1 SPDT high level with switch or large coil voltage range or with leakage current protection 12 mm 0.472" spacing
 Relay : 1 SPDT low level with switch - 12 mm 0.472" spacing

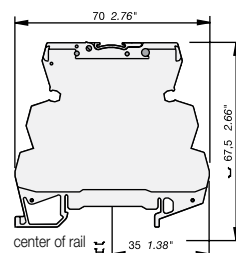
	RB 121 AR		RB 121AI		RB 121 AI		RB 121 AI		
Relay characteristics coil									
Rated voltage: +20%, -15% on DC ; 10%, -10% on AC	115 V AC/DC		230 V AC/DC ± 10% on AC ± 10%-15% on DC		24 VAC/DC		24 VAC/DC		
Frequency	50/60 Hz								
Power	2 W		2.8 W		0.24 W		0.24 W		
Rated current	18 mA		12 mA		10 mA		10 mA		
Drop-out voltage at 20°C	17 V		27 V		4.5 V		4.5 V		
Permissible leakage current	1.6 mA		1 mA						
Status device	green LED								
Relay characteristics contact									
Type	1 SPDT								
Voltage switching range min./max.	12 V / 250 V AC				5 V / 250 V		12 V / 250 V		
Current switching range min./max.	10 mA / 6 A								
Load switching range	AC1 min./max.	0.6 VA / 1500 VA (ohmic load)				0.05 VA / 1500 VA (ohmic load)		0.6 VA / 1500 VA (ohmic load)	
	DC1 min./max.	0.6 W / 140 W				0.05 W / 140 W		0.6 W / 140 W	
Number of on-load operations	10 ⁵ on AC15								
Number of off-load operations	10 ⁷								
Operation speed	F	6 ms	7 ms	5 ms	5 ms	5 ms	7 ms		
	O	15 ms	16 ms	8 ms	8 ms	8 ms	20 ms		
Insulation coil / contact	4000 V RMS								
Resistance to shock coil / contact	4000 V RMS								
Insulation contact / contact	1000 V RMS								
Ambient temperature	storage	-40 °C to -80 °C							
	operating	-20 °C to 70 °C ¹⁾							
Other characteristics									
Body material	grey				UL 94 V0		Spring clamp		
Wire size	Solid wire	0.2 - 4 mm ² (24-12 AWG)				0.22 - 2.5 mm ² (24-12 AWG)			
	Stranded wire					0.22 - 2.5 mm ² (24-12 AWG)			
Rated wire size					2.5 mm ² (12 AWG)				
Wire stripping length					9 mm (0.354 in)				
Recommended screwdriver					3.5 mm (0.137 in)				
Protection					IP20 NEMA1				
Recommended torque					0.4-0.6 Nm (3.5-5.3 lb.in)				
Approvals					cRUus, (pending), (B), LRS, CE				
Reference standards	CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.								

¹⁾ Over 55°C, blocks have to be mounted on horizontal rail with 10 mm spacing between each block. For vertical rail mounting use temperature is 15°C less decreased.

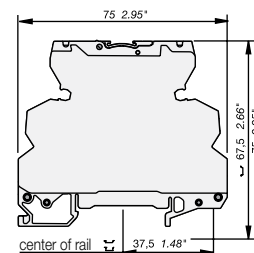


	DC12	AC12	DC13	AC15
24 V	6 A	6 A	1 A	3 A
110/120 V	0.3 A	6 A	0.2 A	3 A
220/230 V	0.2 A	6 A	0.1 A	3 A

Dimensional drawings



Screw clamp module




Spring clamp module





Interface relays, R600

Technical information

Technical data

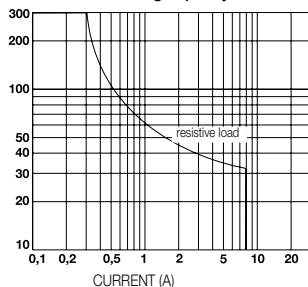
 Relay : 1 DPDT low level contact 1 mA to 8 A - 12 mm 0.472" spacing

6

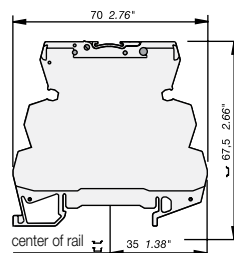
		RB ... 122A				
Relay characteristics coil						
Rated voltage: +20%, -15% on DC ; 10%, -10% on AC	24 V AC/DC	48 V AC/DC	60 V AC/DC	115 V AC/DC	230 V AC/DC ± 10% on AC ± 10%-15% on DC	
Frequency	50/60 Hz					
Power	0.48 W	0.62 W	0.96 W	0.58 W	1.15 W	
Rated current	20 mA	13 mA	16 mA	5 mA	5 mA	
Drop-out voltage at 20°C	5.4 V	8.8 V	8.8 V	20 V	10 V	
Status device	green LED					
Relay characteristics contact						
Type	1 DPDT					
Voltage switching range min./max.	5 V / 250 V DC - 250 V AC					
Current switching range min./max.	1 mA / 8 A		1 mA / 5 A			
Load switching range	5 mVA / 1500 VA (ohmic load)					
AC1 min./max. DC1 min./max.	5 mW / 192 W					
Number of on-load operations	10 ⁵					
Number of off-load operations	2 x 10 ⁷					
Operation speed	F	6 ms	10 ms	10 ms	6 ms	6 ms
	O	10 ms	14 ms	14 ms	15 ms	15 ms
Bounce	1 ms					
Insulation coil / contact	3500 V RMS					
Resistance to shock coil / contact	3500 V RMS					
Insulation contact / contact	3500 V RMS (between 2 contacts)					
Ambient temperature	storage	-40 °C to -80 °C				
	operating	-20 °C to 70 °C ¹⁾				
Other characteristics		Screw clamp		Spring clamp		
Body material	grey	UL 94 V0				
Wire size	Solid wire	0.2 - 4 mm ² (24-12 AWG)		0.2-2.5 mm ² (24-12 AWG)		
	Stranded wire			0.22 - 2.5 mm ² (24-12 AWG)		
Rated wire size				2.5 mm ² (12 AWG)		
Wire stripping length				9 mm (0.354 in)		
Recommended screwdriver				3.5 mm (0.137 in)		
Protection				IP20 NEMA1		
Recommended torque				0.4-0.6 Nm (3.5-5.3 lb.in)		
Approvals		c  us (pending for 12 V DC) ,  (pending),  , 				
Reference standards		CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.				

¹⁾ Over 55°C, blocks have to be mounted on horizontal rail with 10 mm spacing between each block. For vertical rail mounting use temperature is 15°C less decreased.

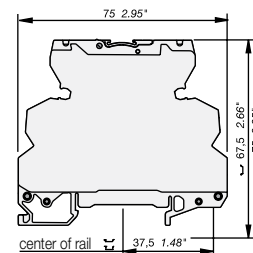
Max. DC load breaking capacity



Dimensional drawings



Screw clamp module

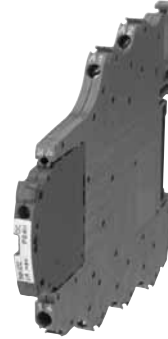


Spring clamp module

Interface relays, R500 Selection

Interface relays
R600 & R500 Range

	Reference code	Catalog number
	D 2,5/5-R121-24VDC	1SNA645047R0000
	D 2,5/5-R121L-24VDC	1SNA645547R0200
	D 2,5/5-R121AL-24VAC/DC	1SNA645021R2600
	D 2,5/5-R121AL-48VAC/DC	1SNA645521R2000
	D 2,5/5-R121BL-110VAC	1SNA645049R1200
	D 2,5/5-R121BL-230VAC	1SNA645549R1400
Input voltage		
24 V DC	■	■
48 V DC		■
24 V AC		■
48 V AC		■
110 V AC		■
230 V AC		■
Output rating		
10 mA - 6 A	■	■
Output contacts		
c/o	1	1
Type		
with LED		■
without LED	■	



R500 series

It is our range offering pluggable functions

- Spacing : 5.08 mm (the smallest in the market)
- Wire size : 2.5 mm² (4 mm² solid)
- Contact type : 1 SPDT from 10 mA to 6 A / 250 V
- Transistor : 30 mA to 100 mA
MOS : 1 A to 2 A
Triac : 1 A

Interface relays, R500

Ordering details

6

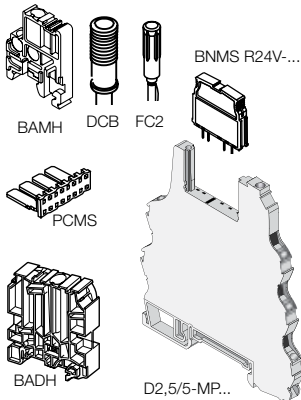


R500

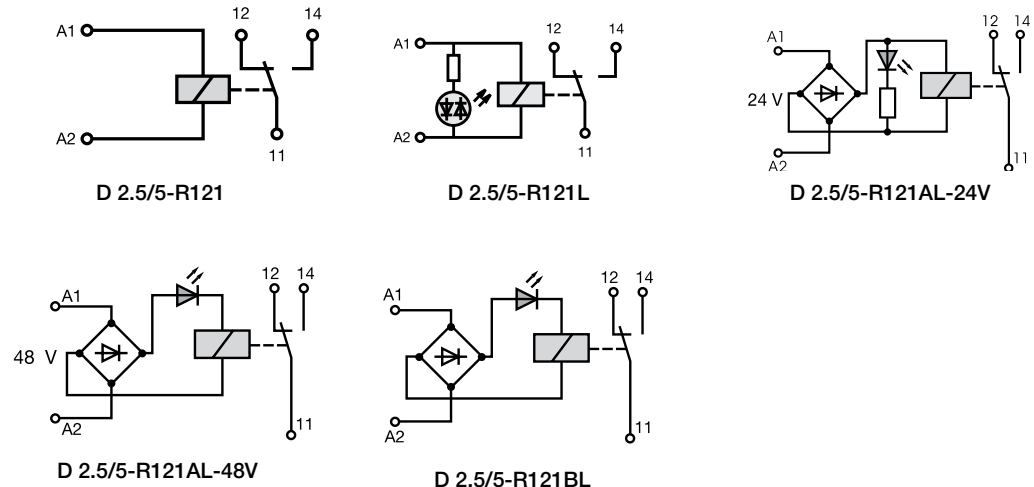
Description of R500 Relay	Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
<input type="checkbox"/> Relay module 1 SPDT high level	D 2,5/5-R121-24VDC	1SNA607217R0200	10	0.032 (0.071)
	D 2,5/5-R121L-24VDC	1SNA607201R1300		
	D 2,5/5-R121AL-24VAC/DC	1SNA607231R0000		
<input type="checkbox"/> Relay module with LED 1 SPDT high level	D 2,5/5-R121AL-48VAC/DC	1SNA607232R0100	10	0.04 (0.088)
	D 2,5/5-R121BL-110VAC	1SNA607264R1100		
	D 2,5/5-R121BL-230VAC	1SNA607265R1200		

R500 Accessories	Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
High end stop	BAMH 9,1 mm	011483600	50	
	BAMH V0 9,1 mm	019483601		
	BADH 12 mm	011690027		
Comb type jumper bar 2 to 22 poles		consult us		
Jumper bar 10 poles grey ■	PCMS V0	1SNA205523R2200	8	
Relay / Opto base	D 2,5/5-MP	1SNA607224R0100	10	0.028 (0.062)
Relay / Opto base with LED 24 VDC	D 2,5/5-MP-24VDC	1SNA607222R0700		
Relay / Opto base with LED 24 VAC/VDC	D 2,5/5-MP-24VAC/DC	1SNA607260R2100		
Relay / Opto base with LED 48 VAC/VDC	D 2,5/5-MP-48VAC/DC	1SNA607261R1600		
Relay / Opto base with LED 110 VAC	D 2,5/5-MP-110VAC	1SNA607266R1300		
Relay / Opto base with LED 230 VAC	D 2,5/5-MP-230VAC	1SNA607267R1400		
Plug relay 24 V 1 SPDT 10 mA to 6 A	BNMS R24V-1	1SNA031820R1400	4	
Plug relay 24 V 1 SPDT 1 mA to 6 A	BNMS R24V-2	1SNA031847R1300		
Test device blue	DCB ¹⁾	1SNA105028R2100	4	
Test plug DIA. 2 mm	FC2	000786526	10	
Marking method	RC55	see marking		

¹⁾ Only on top decks



Connection diagrams



Interface relays, R500

Technical information

Interface relays
R600 & R500 Range

Technical data



Relay : 1 SPDT high level with contact 10 mA to 6 A - 5.08mm 0.200" spacing

	D 2.5/5-R121	D 2.5/5-R121L	D 2.5/5-R121AL				D 2.5/5-R121BL	
Relay characteristics coil								
Rated voltage: +20%, -15% on DC ; 10%, -10% on AC	24 V DC	24 V DC	24 V AC	24 V DC	48 V AC	48 V DC	110 V AC	230 V AC
Frequency			50/60 Hz		50/60 Hz		50/60 Hz	50/60 Hz
Power	0.17 W	0.3 W	0.35 W	0.35 W	0.44 W	0.47 W	1.08 W	2.13 W
Rated current	7 mA	12 mA	12.4 mA	10 mA	7.6 mA	6.8 mA	8.4 mA	8 mA
Drop-out voltage at 20°C	2.4 V	2.4 V	4.8 V	4.8 V	10 V	10 V	25 V	45 V
Status device	green LED							

Relay characteristics contact

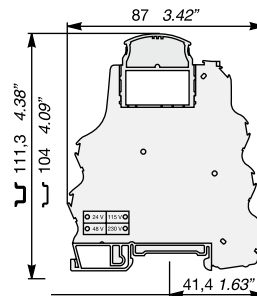
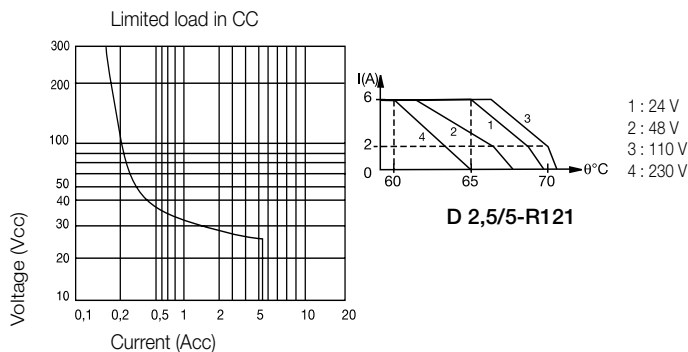
Type	1 SPDT								
Voltage switching range min./max.	12 V / 250 V AC								
Current switching range min./max.	10 mA / 6 A								
Load switching range	AC1 min./max.				0.6 VA / 1500 VA (ohmic load)				
	DC1 min./max.				0.6 W / 140 W				
Number of on-load operations	10 ⁵ on AC15								
Number of off-load operations	10 x 10 ⁷								
Operation speed	F	5 ms	5 ms	5 ms	5 ms	5 ms	5 ms	6 ms	7 ms
	O	8 ms	8 ms	15 ms	15 ms	15 ms	15 ms	15 ms	15 ms
Insulation coil / contact	4000 V RMS								
Resistance to shock coil / contact	4000 V RMS								
Insulation contact / contact	1000 V RMS								
Ambient temperature	storage								
	operating								
	-40 °C to -80 °C								
	See derating curves								

Other characteristics

Body material	grey	UL 94 V0
Wire size	Solid wire	0.2 - 4 mm ² (24-12 AWG)
	Stranded wire	0.22 - 2.5 mm ² (24-12 AWG)
Rated wire size	2.5 mm ² (12 AWG)	
Wire stripping length	10 mm (0.394 in)	
Recommended screwdriver	3.5 mm (0.137 in)	
Protection	IP20 NEMA1	
Recommended torque	0.4-0.6 Nm (3.5-5.3 lb.in)	
Approvals	c  us (pending) , 	
Reference standards	CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.	

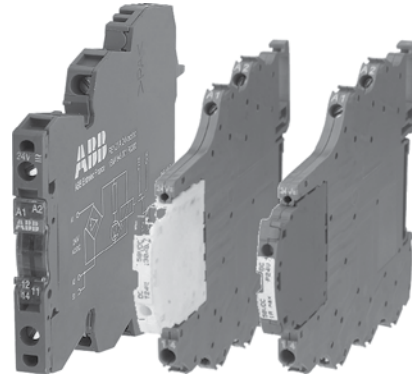
	DC12	AC12	DC13	AC15
24 V	6 A	6 A	1 A	3 A
110/120 V	0.3 A	6 A	0.2 A	3 A
220/230 V	0.2 A	6 A	0.1 A	3 A

Dimensional drawings





Optocouplers
R600 & R500

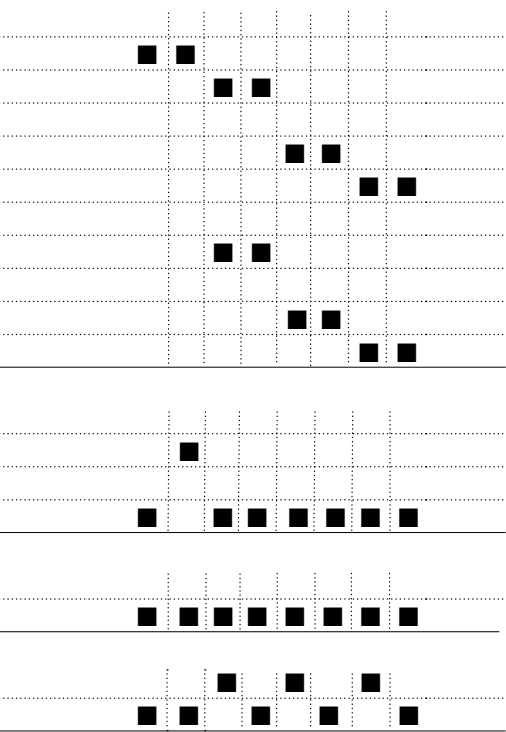


R600 & R500 Optocouplers

R600 Optocouplers Selection

Optocouplers
R600 & R500 Range

OBROA 1000-24VDC	1SNA645527R2600
OBROA 2000-24VDC	1SNA645529R0000
OBOA 1000-48-60VAC/DC	1SNA645061R0600
OBROA 1000-48-60VAC/DC	1SNA645561R0000
OBOA 1000-115VAC/DC	1SNA645062R0700
OBROA 1000-115VAC/DC	1SNA645562R0100
OBOA 1000-230VAC/DC	1SNA645028R0500
OBROA 1000-230VAC/DC	1SNA645528R0700



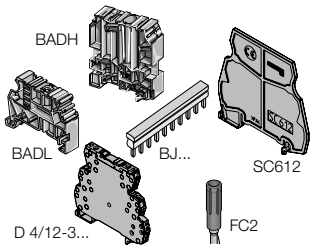
R600 Optocouplers

Ordering details

6



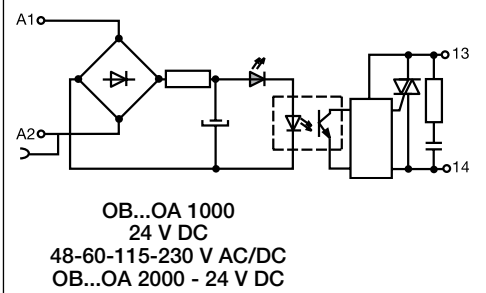
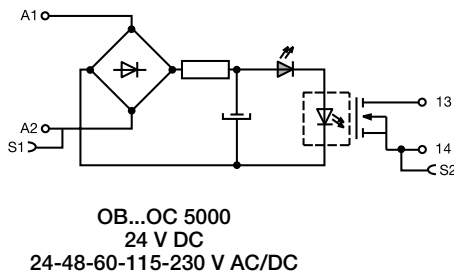
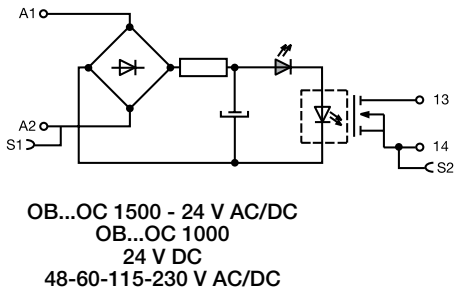
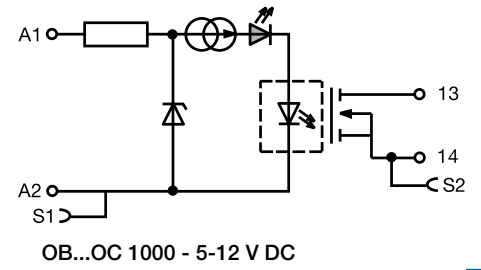
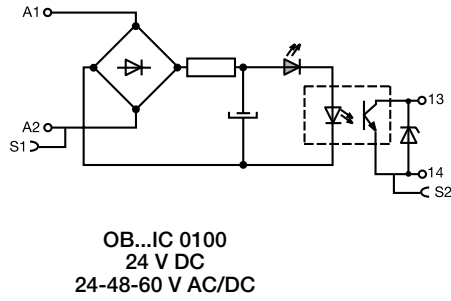
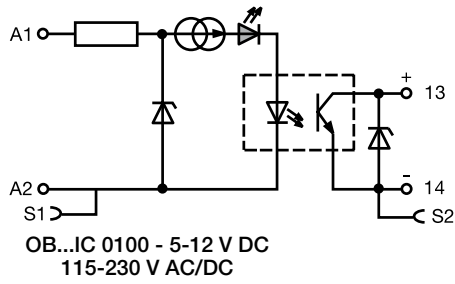
R600 Optocoupler		Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
Optocoupler module 100 mA/DC		OBIC 0100-5-12VDC	1SNA645047R0000	10	0.02 (0.44)
		OBIC 0100-24VDC	1SNA645021R2600		
		OBIC 0100-48-60VAC/DC	1SNA645049R1200		
		OBIC 0100-115-230VAC/DC	1SNA645022R2700		
Optocoupler module 100 mA/DC		OBRIC 0100-5-12VDC	1SNA645547R0200	10	0.02 (0.44)
		OBRIC 0100-24VDC	1SNA645521R2000		
		OBRIC 0100-48-60VAC/DC	1SNA645549R1400		
		OBRIC 0100-115-230VAC/DC	1SNA645522R2100		
Optocoupler module 2 A/DC		OBOC 1000-5-12VDC	1SNA645050R1700	10	0.02 (0.44)
		OBOC 1000-24VDC	1SNA645051R0400		
		OBOC 1500-24VAC/DC	1SNA645025R2200		
		OBOC 1000-48-60VAC/DC	1SNA645053R0600		
		OBOC 1000-115VAC/DC	1SNA645054R0700		
		OBOC 1000-230VAC/DC	1SNA645026R2300		
Optocoupler module 2 A/DC		OBROC 1000-5-12VDC	1SNA645550R1100	10	0.02 (0.44)
		OBROC 1000-24VDC	1SNA645551R0600		
		OBROC 1500-24VAC/DC	1SNA645525R2400		
		OBROC 1000-48-60VAC/DC	1SNA645553R0000		
		OBROC 1000-115VAC/DC	1SNA645554R0100		
		OBROC 1000-230VAC/DC	1SNA645526R2500		
Optocoupler module 5 A/DC		OBOC 5000-24VDC	1SNA645024R2100	10	0.02 (0.44)
		OBOC 5000-115VAC/DC	1SNA645058R1300		
		OBOC 5000-230VAC/DC	1SNA645059R1400		
Optocoupler module 5 A/DC		OBROC 5000-24VDC	1SNA645524R2300	10	0.02 (0.44)
		OBROC 5000-115VAC/DC	1SNA645558R1500		
		OBROC 5000-230VAC/DC	1SNA645559R1600		
Optocoupler module 1 A/AC 6 mm spacing		OBOA 1000-24VDC	1SNA645027R2400	10	0.03 (0.066)
		OBOA 1000-48-60VAC/DC	1SNA645061R0600		
		OBOA 1000-115VAC/DC	1SNA645062R0700		
		OBOA 1000-230VAC/DC	1SNA645028R0500		
Optocoupler module 2 A/AC 12 mm spacing		OBOA 2000-24VDC	1SNA645029R0600	5	0.03 (0.066)
Optocoupler module 1 A/AC 6 mm spacing		OBROA 1000-24VDC	1SNA645527R2600	10	0.03 (0.066)
		OBROA 1000-48-60VAC/DC	1SNA645561R0000		
		OBROA 1000-115VAC/DC	1SNA645562R0100		
		OBROA 1000-230VAC/DC	1SNA645528R0700		
Optocoupler module 2 A/AC 12 mm spacing		OBROA 2000-24VDC	1SNA645529R0000	5	0.03 (0.066)



Accessories	Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
End section	BADH V0	011690027	50	
	BADL V0	039990302	50	
	BAM2 V0	039996701	50	
Separator end section	SC 612	1SNA290474R0200	10	
Divisible shunt 10 poles	BJ 612-10	1SNA290488R0100	10	
Screw clamp distribution block sp. 12 mm	D4/12-3-3	1SNA645031R2000	5	
Spring clamp distribution block sp. 12 mm	D4/12-3R-3R	1SNA645531R2200	5	
Test plug DIA. 2 mm	FC2	000786526	10	
Marking method	RC65 / RC610	see marking		

R600 Optocouplers

Connection diagrams







R600 Optocouplers

Technical data

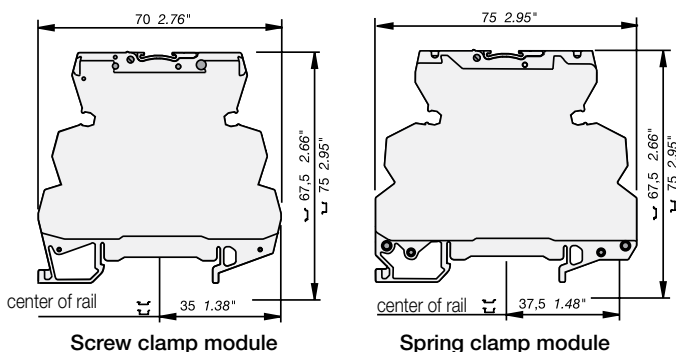
Technical data

Optocoupler : 5 to 58 V DC output / 100 mA - 6 mm 0.236" spacing

		OB...IC 0100			
Relay characteristics coil		5 V DC - 12 V DC		24 V DC	48 V AC/DC 60 V AC/DC 115 V AC/DC 230 V AC/DC
Input voltage: +20%, -15% on DC ; 10%, -10% on AC					
Frequency					50 / 60 Hz
Input current AC/DC		5 mA	9 mA	4 mA	4 mA 5 mA 7 mA / 16 mA 11.5 mA / 25 mA
6	Pull-in voltage at Is=100%	4 V		15 V	25 V 60 V AC / 70 V DC
Switching time C / O		10 μs / 500 μs			
Operating frequency		1000 Hz			5 ms / 20 ms 5 ms / 15 ms
Permissible leakage current					20 Hz
Output		0.9 mA	1 mA		0.9 mA 1.6 mA
Output voltage					4.5 to 58 V DC
Output current min.					1 mA
Output current max.					100 mA
Output leakage current at U _{max}					< 50 μA
Residual voltage at I max and U rated		typical			1 V
		max			1.3 V
Frequency on inductive load					
Isolation Input / Output		input / Output			2500 V RMS
Temperature		storage			-40...+80 °C
		operating			-20...+70 °C ¹⁾
Other characteristics		Screw clamp		Spring clamp	
Body material		grey		UL 94 V0	
Wire size		Solid wire		0.2 - 4 mm ² (24-12 AWG)	
		Stranded wire		0.22 - 2.5 mm ² (24-12 AWG)	
Rated wire size				2.5 mm ² (12 AWG)	
Wire stripping length				9 mm (0.354 in)	
Recommended screwdriver				3.5 mm (0.137 in)	
Protection				IP20 NEMA1	
Recommended torque				0.4-0.6 Nm (3.5-5.3 lb.in)	
Approvals				e  us (pending for 12 V DC) ,  (pending),  , 	
Reference standards		CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.			

¹⁾ Over 55°C, blocks have to be mounted on horizontal rail with 10 mm spacing between each block. For vertical rail mounting use temperature is 15°C less decreased.

Dimensional drawings



R600 Optocouplers

Technical data

Optocouplers
R600 & R500 Range

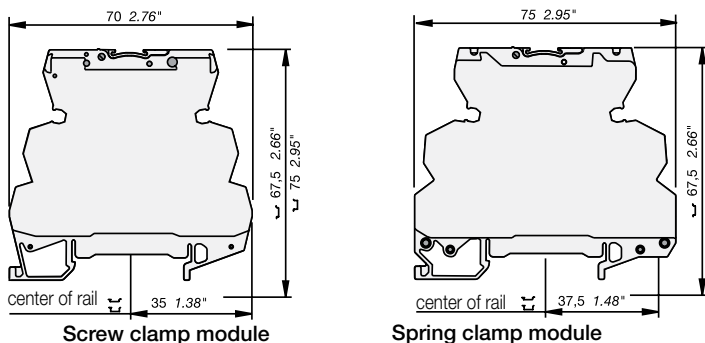
Technical data

Optocoupler : 5 to 58 V DC output / 2 A - 6 mm 0.236" spacing

	OB...IC 0100		OB..OC 1500	OB...OC 1000				
Relay characteristics coil								
Input voltage: +20%, -15% on DC ; 10%, -10% on AC	5 V DC - 12 V DC		24 V DC	24 V AC/DC	48 V AC/DC	60 V AC/DC	115 V AC/DC	230 V AC/DC
Frequency	50 / 60 Hz							
Input current	5 mA	9 mA	4 mA	6.3 mA	4 mA	5.1 mA	4.2 mA	4 mA
Pull-in voltage at Is=100%	4 V		15 V	15 V	27 V		50 V	80 V
Switching time C / O	15 μ s / 250 μ s		30 μ s / 400 μ s	1 ms / 7 ms	5 ms / 20 ms		500 μ s / 10 ms	1 ms / 15 ms
Operating frequency	2000 Hz		1000 Hz	60 Hz	20 Hz			
Permissible leakage current	1 mA		0.8 mA	0.9 mA	1 mA		0.3 mA	
Output								
Output voltage	4.5 to 58 V DC							
Output current min.	1 mA							
Output current max.	2 A							
Output leakage current at U _{max}	< 50 μ A							
Redidual voltage at I max and U rated	typical		0.1 V					
	max		0.5 V					
Frequency on inductive load								
Isolation Input / Output	input / Output		2500 V RMS					
Temperature	storage		-40...+80 °C					
	operating		-20...+70 °C ¹⁾					
Other characteristics	Screw clamp				Spring clamp			
Body material	grey				UL 94 V0			
Wire size	Solid wire		0.2 - 4 mm ² (24-12 AWG)		0.2-2.5 mm ² (24-12 AWG)			
	Stranded wire		0.22 - 2.5 mm ² (24-12 AWG)					
Rated wire size	2.5 mm ² (12 AWG)							
Wire stripping length	9 mm (0.354 in)							
Recommended screwdriver	3.5 mm (0.137 in)							
Protection	IP20 NEMA1							
Recommended torque	0.4-0.6 Nm (3.5-5.3 lb.in)							
Approvals	UL (pending for 12 V DC) , CE (pending), LRS , CE							
Reference standards	CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.							

¹⁾ Over 55°C, blocks have to be mounted on horizontal rail with 10 mm spacing between each block. For vertical rail mounting use temperature is 15°C less decreased.

Dimensional drawings



R600 Optocouplers

Technical data

Technical data

Optocoupler : 5 to 58 V DC output / 5 A - 6 mm 0.236" spacing

OB... OC 5000

Input

Input voltage	24 V DC	115 V AC/DC	230 V AC/DC
Frequency		50 / 60 Hz	50 / 60 Hz
Input current	5.4 mA	4.2 mA	4 mA
Pull-in voltage at Is=100%	12 V	50 V	80 V
Switching time C / O	30 μs / 400 μs	500 μs / 10 ms	1ms / 15 ms
Operating frequency	1000 Hz	50 Hz	35 Hz
Permissible leakage current	0.8 mA	0.3 mA	0.3 mA



Output

Output voltage		4.5- 58 V DC	
Output current min.		25 mA	
Output current max.		1 A	
Output leakage current at U _{max}		< 0.50 mA	
Residual voltage at I max and U rated	typical	1 V	
	max	1.6 V	
Frequency on inductive load		See Note 1	
Isolation Input / Output	input / Output	2500 V RMS	

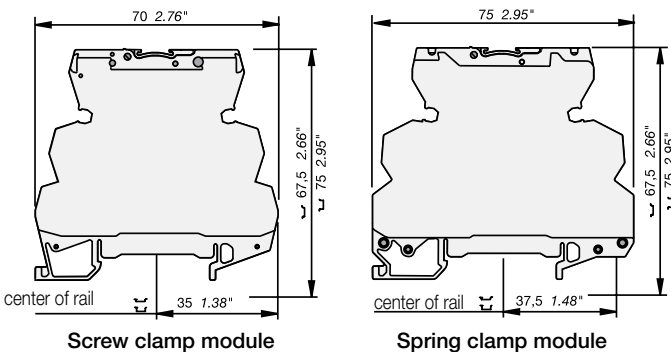
Temperature

Ambient temperature	storage	-40...+80 °C
	operating	See derating curve

Other characteristics

Body material	grey	UL 94 V0
Wire size	Solid wire	0.2 - 4 mm ² (24-12 AWG)
	Stranded wire	0.22 - 2.5 mm ² (24-12 AWG)
Rated wire size		2.5 mm ² (12 AWG)
Wire stripping length		10 mm (0.394 in)
Recommended screwdriver		3.5 mm (0.137 in)
Protection		IP20 NEMA1
Recommended torque		0.4-0.6 Nm (3.5-5.3 lb.in)
Approvals		 us (pending), 
Reference standards		CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.

Dimensional drawings







R600 Optocouplers

Technical data

Optocouplers
R600 & R500 Range

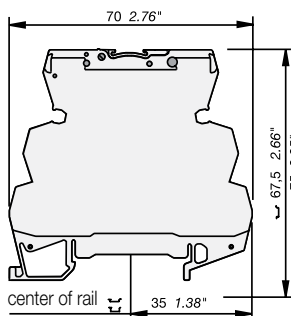
Technical data

Optocoupler : 24 to 400 V AC output / 2 A max. - 6 mm or 12 mm spacing

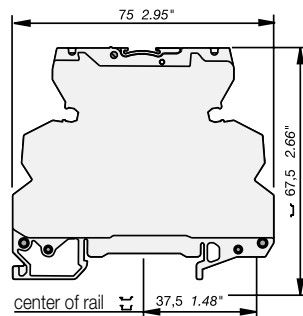
	OB...OA 1000					OB...OA 2000
Relay characteristics coil						
Input voltage: +20%, -15% on DC ; 10%, -10% on AC	24 V DC	48 V AC/DC	60 V AC/DC	115 V AC/DC	230 V AC/DC	24 V DC
Frequency	50/60 Hz					
Input current	3.6 mA	4.3 mA	5.5 mA	4.15 mA	4.6 mA	3.6 mA
Pull-in voltage at Is=100%	14 V	15 V	18 V	60 V	135 V	14 V
Switching time C / O	150 μs / 1 ms	3 ms / 30 ms		2.2 ms / 18 ms	2.5 ms / 25 ms	150 μs / 1 ms
Operating frequency	500 Hz	20 Hz		25 Hz	20 Hz	500 Hz
Permissible leakage current	1 mA					
Output						
Output voltage	24-58 V AC					
Frequency	50/60 Hz					
Output current min.	25 mA					
Output current max.	1 A					2 mA
Output leakage current at U _{max}	< 0.50 mA					
Residual voltage at I max and U rated	typical					1 V
	max					1.6 V
Frequency on inductive load						
Isolation Input / Output	input / Output	2500 V RMS				
Temperature	storage	-40...+80 °C				
	operating	-20...+70 °C ¹⁾				
Other characteristics						
Body material	grey	Screw clamp		Spring clamp		
		UL 94 V0				
Wire size	Solid wire	0.2 - 4 mm ² (24-12 AWG)		0.2-2.5 mm ² (24-12 AWG)		
	Stranded wire	0.22 - 2.5 mm ² (24-12 AWG)				
Rated wire size	2.5 mm ² (12 AWG)					
Wire stripping length	9 mm (0.354 in)					
Recommended screwdriver	3.5 mm (0.137 in)					
Protection	IP20 NEMA1					
Recommended torque	0.4-0.6 Nm (3.5-5.3 lb.in)					
Approvals	c  us (pending for 12 V DC) ,  (pending),  , LRS , 					
Reference standards	CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.					

¹⁾ Over 55°C, blocks have to be mounted on horizontal rail with 10 mm spacing between each block. For vertical rail mounting use temperature is 15°C less decreased.

Dimensional drawings



Screw clamp module



Spring clamp module

R500 Optocouplers Selection

6

Reference code	Catalog number
D 2,5/5-OBIC-0030-5VDC	1SNA607274R1300
D 2,5/5-OBIC-0030-24VDC	1SNA607210R1700
D 2,5/5-OBIC-0030-48VDC	1SNA607211R0400
D 2,5/5-OBIC-0030-125VDC	1SNA607275R1400
D 2,5/5-OBIA-0030-24VAC	1SNA607212R0500
D 2,5/5-OBIA-0030-48VAC	1SNA607213R0600
D 2,5/5-OBIA-0030-115VAC	1SNA607214R0700
D 2,5/5-OBIA-0030-230VAC	1SNA607215R0000
D 2,5/5-OBOC-0100-5VDC	1SNA607203R1500
D 2,5/5-OBOC-0100-24VDC	1SNA607204R1600
D 2,5/5-OBOC-0100-48VDC	1SNA607205R1700
D 2,5/5-OBOC-1000-5VDC	1SNA607206R1000
D 2,5/5-OBOC-1000-24VDC	1SNA607207R1100
D 2,5/5-OBOC-1000-24VAC/DC	1SNA607250R2700
D 2,5/5-OBOC-1000-48VAC/DC	1SNA607251R1400
D 2,5/5-OBOC-1000-110VAC	1SNA607270R2300
D 2,5/5-OBOC-1000-230VAC	1SNA607271R1000
D 2,5/5-OBOC-2000-5VDC	1SNA607208R2200
D 2,5/5-OBOC-2000-24VDC	1SNA607209R2300
D 2,5/5-OBOC-2000-24VAC/DC	1SNA607255R1000
D 2,5/5-OBOC-2000-48VAC/DC	1SNA607256R1100
D 2,5/5-OBOC-2000-110VAC	1SNA607272R1100
D 2,5/5-OBOC-2000-230VAC	1SNA607273R1200
D 2,5/5-OB0A-1000-24VDC	1SNA607238R1700
D 2,5/5-OB0A-1000-24VAC/DC	1SNA607240R2500
D 2,5/5-OB0A-1000-48VAC/DC	1SNA607241R1200
D 2,5/5-OB0A-1000-110VAC	1SNA607268R2500
D 2,5/5-OB0A-1000-230VAC	1SNA607269R2600

Input voltage	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
5 V DC	■																			
24 V DC		■																		
48 V DC			■																	
125 V DC				■																
24 V AC					■															
48 V AC						■														
110 V AC							■													
115 V AC								■												
230 V AC									■											

Output rating	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
30 mA	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
100 mA										■	■	■	■	■	■	■	■	■	■	■
2 A																				
1 A																				

Output voltage	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
30 V DC																				
58 V DC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
253 V AC																				

Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
input optocoupler	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
output optocoupler																				

R500 Optocouplers Selection

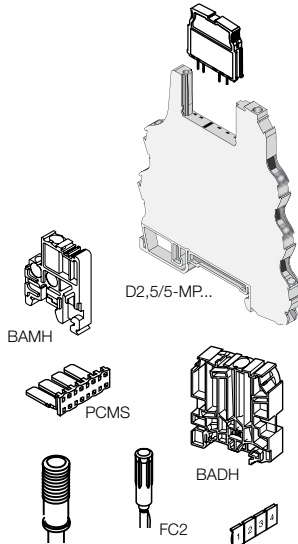
Optocouplers
R600 & R500 Range



Description of R600 Optocoupler	Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
Optocoupler module 30 mA/DC	D 2,5/5-OBIC-0030-5VDC	1SNA607274R1300	1	0.032 (0.071)
	D 2,5/5-OBIC-0030-24VDC	1SNA607210R1700		
	D 2,5/5-OBIC-0030-48VDC	1SNA607211R0400		
	D 2,5/5-OBIC-0030-125VDC	1SNA607275R1400		
Optocoupler module 30 mA/AC	D 2,5/5-OBIA-0030-24VAC	1SNA607212R0500	1	0.032 (0.071)
	D 2,5/5-OBIA-0030-48VAC	1SNA607213R0600		
	D 2,5/5-OBIA-0030-115VAC	1SNA607214R0700		
	D 2,5/5-OBIA-0030-230VAC	1SNA607215R0000		
Optocoupler module 100 mA/DC	D 2,5/5-OBOC-0100-5VAC	1SNA607203R1500	1	0.032 (0.071)
	D 2,5/5-OBOC-0100-24VAC	1SNA607204R1600		
	D 2,5/5-OBOC-0100-48VAC	1SNA607205R1700		
Optocoupler module 1 A/DC	D 2,5/5-OBOC-1000-5VDC	1SNA607206R1000	1	0.04 (0.088)
	D 2,5/5-OBOC-1000-24VDC	1SNA607207R1100		
	D 2,5/5-OBOC-1000-24VAC/DC	1SNA607250R2700		
	D 2,5/5-OBOC-1000-48VAC/DC	1SNA607251R1400		
	D 2,5/5-OBOC-1000-110VAC	1SNA607270R2300		
	D 2,5/5-OBOC-1000-230VAC	1SNA607271R1000		
Optocoupler module 2 A/DC	D 2,5/5-OBOC-2000-5VDC	1SNA607208R2200	1	0.04 (0.088)
	D 2,5/5-OBOC-2000-24VDC	1SNA607209R2300		
	D 2,5/5-OBOC-2000-24VAC/DC	1SNA607255R1000		
	D 2,5/5-OBOC-2000-48VAC/DC	1SNA607256R1100		
	D 2,5/5-OBOC-2000-110VAC	1SNA607272R1100		
	D 2,5/5-OBOC-2000-230VAC	1SNA607273R1200		
Optocoupler module 1 A/DC	D 2,5/5-OBOA-1000-24VAC	1SNA607238R1700	1	0.032 (0.071)
	D 2,5/5-OBOA-1000-24VAC/DC	1SNA607240R2500		
	D 2,5/5-OBOA-1000-48VAC/DC	1SNA607241R1200		
	D 2,5/5-OBOA-1000-110VAC	1SNA607268R2500		
	D 2,5/5-OBOA-1000-230VAC	1SNA607269R2600		

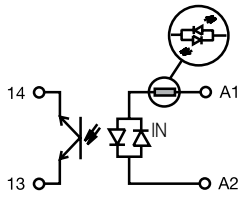
6

BNMS P...

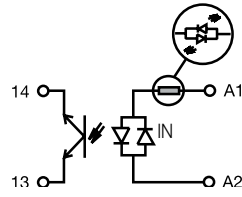


Description of Accessories	Reference code	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
High end stop	BAMH 9.1 mm	011483600	50	
	BAMH V0 9.1 mm	019483601		
	BADH 12 mm	011690027		
Comb type jumper bar 2 to 22 poles		consult us		
Jumper bar 10 poles grey	PCMS V0	1SNA205523R2200	8	
Input opto base	D 2.5-5-MP1	1SNA607223R0000	10	0.028 (0.062)
Plug OBIC 5 V white	BNMS T5V-1	003183103	4	
Plug OBIC 24 V white	BNMS T24V-1	003180021		
Plug OBIC 48 V white	BNMS T48V-1	1SNA031801R1600		
Plug OBIC 125 V white	BNMS T125V-1	1SNA031845R1100		
Test device blue	DCB (1)	010502821	10	
Test plug DIA 2 mm	FC2	000786526		
Marking method	RC55	see marking		

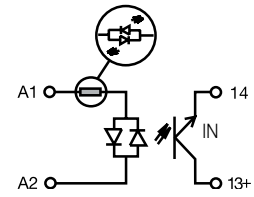
R500 Optocouplers Connection diagrams



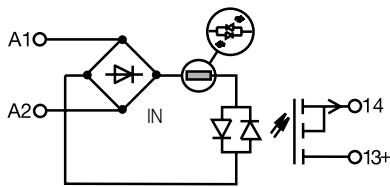
D 2.5/5-OBIC-0030



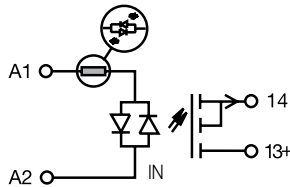
D 2.5/5-OBIA-0030



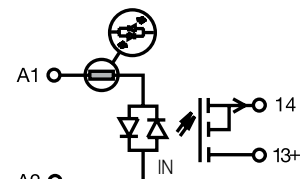
D 2.5/5-OBOC-0100



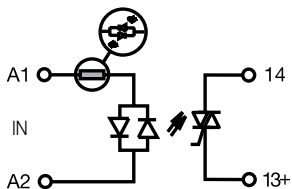
D 2.5/5-OBOC-1000
24/48 VAC/DC
110/230 VAC



D 2.5/5-OBOC-1000 5/24 VDC



D 2.5/5-OBOC-2000



D 2.5/5-OBOA-1000



R500 Optocouplers

Technical data

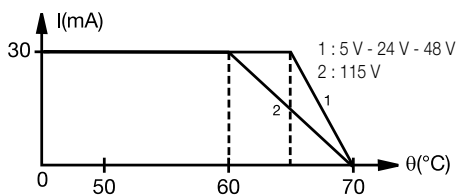
Optocouplers
R600 & R500 Range

Technical data

Pluggable optocoupler : 5 to 58 V DC output / 30 mA - 5.08 mm 0.200" spacing

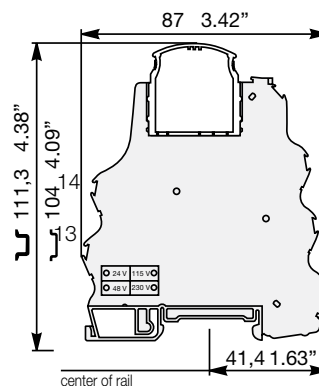
		D 2.5/5-OBIC-0030			
Input					
Input voltage		4.5 V to 5.5 VDC	19.2 V to 27.6 VDC	38.4 V to 55.2 VDC	93.5 V to 140 VDC
Input current		6 mA	5 mA	4.1 mA	3 mA
Pull-in voltage at Is=100%		3.5 V	12 V	21 V	50 V
Switching time C / O		20 μ s / 1.3 ms			
Operating frequency		400 Hz			
Permissible leakage current			1 mA	0.8 mA	
Output					
Output voltage		4.5 to 58 V DC			
Output current min.		0.5 mA			
Output current max.		30 mA			
Output leakage current at U _{max}		< 50 μ A			
Residual voltage at I max and U rated	typical	2.3 V DC			
	max	2.7 V DC			
Frequency on inductive load					
Isolation Input / Output	input / Output	2500 V RMS			
Ambient temperature	storage	-40...+80 °C			
	operating	See derating curve			
Other characteristics					
Body material	grey	UL 94 V0			
Wire size	Solid wire	0.2 - 4 mm ² (24-12 AWG)			
	Stranded wire	0.22 - 2.5 mm ² (24-12 AWG)			
Rated wire size		2.5 mm ² (12 AWG)			
Wire stripping length		9 mm (0.354 in)			
Recommended screwdriver		3.5 mm (0.137 in)			
Protection		IP20 NEMA1			
Recommended torque		0.4-0.6 Nm (3.5-5.3 lb.in)			
Approvals		c  us (pending), 			
Reference standards		CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.			

Derating curve



D 2.5/5-OBIC-0030

Dimensional drawings



R500 Optocouplers

Technical data

Technical data

Pluggable optocoupler : 5 to 58 V DC output / 30 mA - 5.08 mm 0.200" spacing

D 2.5/5-OBIA-0030

Input	20.4 to 26.4 V AC	40.8 V to 52.8 V AC	98 V to 126.5 V AC	195.5 V to 253 V AC
Input voltage			50 / 60 Hz	50 Hz
Input current	8.5 mA	4.5 mA	8 mA	7 mA
Pull-in voltage at Is=100%	13 V	22 V	50 V	95 V
Switching time C / O	6 ms / 10 ms			
Operating frequency	30 Hz			
Permissible leakage current	1 mA		2 mA	

Output	
Output voltage	4.5 V to 58 V DC
Output current min.	0.5 mA
Output current max.	30 mA
Output leakage current at U _{max}	< 50 µA
Residual voltage at I max and U rated	typical: 2.3 V DC max: 2.7 V DC
Frequency on inductive load	2500 V RMS
Isolation Input / Output	input / Output

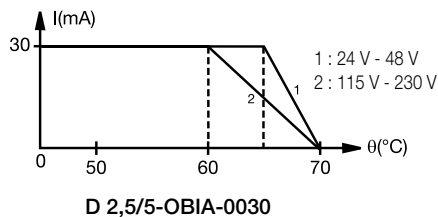
Temperature

Ambient temperature	storage	-40...+80 °C
	operating	See derating curve

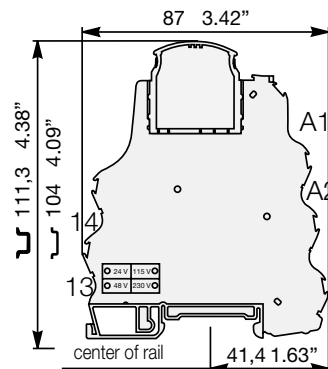
Other characteristics

Body material	grey	UL 94 V0
Wire size	Solid wire	0.2 - 4 mm ² (24-12 AWG)
	Stranded wire	0.22 - 2.5 mm ² (24-12 AWG)
Rated wire size		2.5 mm ² (12 AWG)
Wire stripping length		9 mm (0.354 in)
Recommended screwdriver		3.5 mm (0.137 in)
Protection		IP20 NEMA1
Recommended torque		0.4-0.6 Nm (3.5-5.3 lb.in)
Approvals		UL (pending), CE
Reference standards	CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.	

Derating curve



Dimensional drawings



R500 Optocouplers

Technical data

Optocouplers
R600 & R500 Range

Technical data

Pluggable optocoupler : 5 to 58 V DC output / 100 mA - 5.08 mm 0.200" spacing

	D 2.5/5-OBIA-0100 5 V DC / 24 V DC		D 2.5/5-OBIA-0100 48 V DC
Input			
Input voltage	4.5 V to 5.5 V DC	20.4 V to 28.8 V DC	40.8 V to 57.6 V DC
Frequency			
Input current	8.5 mA	4.8 mA	3.9 mA
Pull-in voltage at $I_s=100\%$	2.9 V DC	16 V DC	26 V DC
Switching time C / O		20 μ s / 1.3 ms	
Operating frequency		400 Hz	
Permissible leakage current		1 mA	
Output			
Output voltage		4.5 V to 58 V DC	
Output current min.		1 mA	
Output current max.		100 mA	
Output leakage current at U_{max}		< 50 μ A	
Residual voltage at I_{max} and U rated	typical	1 V DC	
	max	1.3 V DC	
Frequency on inductive load		See Note 1	
Isolation Input / Output	input / Output	2500 V RMS	
Temperature			
Ambient temperature	storage	-40...+80 °C	
	operating	See derating curve	
Other characteristics			
Body material	grey	UL 94 V0	
Wire size	Solid wire	0.2 - 4 mm ² (24-12 AWG)	
	Stranded wire	0.22 - 2.5 mm ² (24-12 AWG)	
Rated wire size		2.5 mm ² (12 AWG)	
Wire stripping length		9 mm (0.354 in)	
Recommended screwdriver		3.5 mm (0.137 in)	
Protection		IP20 NEMA1	
Recommended torque		0.4-0.6 Nm (3.5-5.3 lb.in)	
Approvals		cULus (pending), CE	
Reference standards		CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.	

Note 1 :

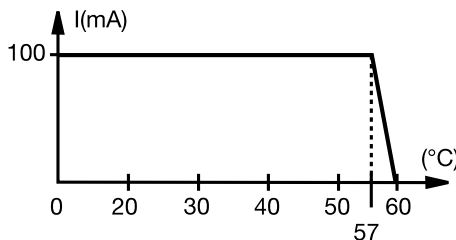
$$F_{max} = (1 - 0,007 \times U_s) / (L \times I_s^2)$$

or

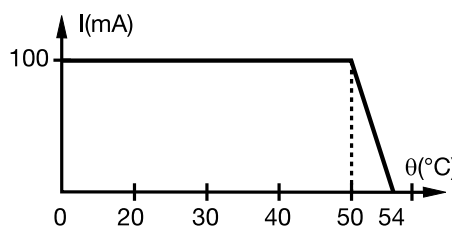
$$F_{max} = (1 - 0,007 \times U_s) / (P \times \frac{L}{R})$$

U_s = Output voltage
 I_s = Output current
 L = Inductance of load
 P = Power of load
 R = Resistance of load

Derating curve

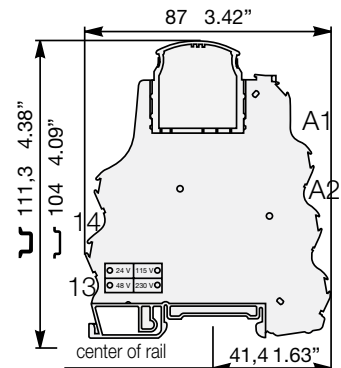


D 2.5/5-OBOC-0100 5 V DC / 24 V DC



D 2.5/5-OBOC-0100 48 V DC

Dimensional drawings



R500 Optocouplers

Technical data

Technical data



Pluggable optocoupler : 5 to 58 V DC output / 1 A - 5.08 mm 0.200" spacing

6

Input	D 2.5/5-OBOC-1000 5/24 V DC		D 2.5/5-OBOC-1000 24/48 V AC/DC				D 2.5/5-OBOC-1000 110/230 V AC	
	5 V DC	24 V DC	24 V AC	24 V DC	48 V AC	48 V DC	110 V AC	230 V AC
Input voltage	4.5 - 5.5 V DC	20.4 - 28.8 V DC	24 ± 10 %	20.4 - 28.8 V DC	48 ± 10 %	40.8 to 57.6 V DC	110 ± 10 %	230 ± 10 %
Frequency			50 / 60 Hz		50 / 60 Hz		50 / 60 Hz	50 / 60 Hz
Input current	12.3 mA	6.7 mA	10.5 mA	8 mA	6.8 mA	5.8 mA	8.5 mA	7.5 mA
Pull-in voltage at Is=100%	3.5 V DC	10 V DC						
Switching time C / O	20 / 250 µs	50 / 350 µs	15 / 13 ms	5 / 13 ms	15 / 15 ms	6 / 25 ms	15 / 15 ms	15 / 15 ms
Operating frequency	2000 Hz	1500 Hz				20 Hz		
Permissible leakage current								

Output		
Output voltage		4.5 V to 58 V DC
Output current min.		1 mA
Output current max.		1 A
Output leakage current at U _{max}		< 50 µA
Residual voltage at I max and U rated	typical	0.1 V DC
	max	0.5 V DC
Frequency on inductive load		See Note 1
Isolation Input / Output	input / Output	2500 V RMS

Temperature		
Ambient temperature	storage	-40...+80 °C
	operating	See derating curve

Other characteristics		
Body material	grey	UL 94 V0
Wire size	Solid wire	0.2 - 4 mm ² (24-12 AWG)
	Stranded wire	0.22 - 2.5 mm ² (24-12 AWG)
Rated wire size		2.5 mm ² (12 AWG)
Wire stripping length		10 mm (0.394 in)
Recommended screwdriver		3.5 mm (0.137 in)
Protection		IP20 NEMA1
Recommended torque		0.4-0.6 Nm (3.5-5.3 lb.in)
Approvals		 us (pending), 
Reference standards		CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.

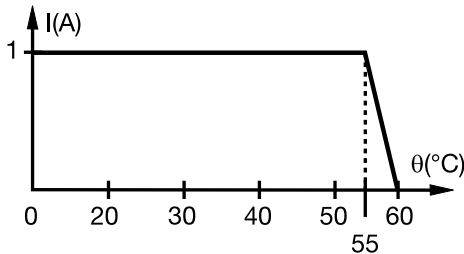
Note 1 :

$$F_{max} = (1 - 0.007 \times U_s) / (L \times I_s^2)$$
 or

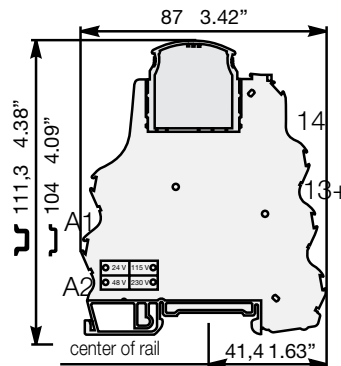
$$F_{max} = (1 - 0.007 \times U_s) / (P \times \frac{L}{R})$$

- U_s = Output voltage
- I_s = Output current
- L = Inductance of load
- P = Power of load
- R = Resistance of load

Derating curve



Dimensional drawings



R500 Optocouplers

Technical data

Optocouplers
R600 & R500 Range

Technical data

Pluggable optocoupler : 5 to 30 V DC output / 2 A - 5.08 mm 0.200" spacing

	D 2.5/5-OBOC-2000 5/24 V DC		D 2.5/5-OBOC-2000 24/48 V AC/DC				D 2.5/5-OBOC-2000 110/230 V AC	
	5 V DC	24 V DC	24 V AC	24 V DC	48 V AC	48 V DC	110 V AC	230 V AC
Input voltage	4.5 - 5.5 V DC	20.4 - 28.8 V DC	24 ± 10 %	20.4 - 28.8 V DC	48 ± 10 %	40.8 to 57.6 V DC	110 ± 10 %	230 ± 10 %
Frequency			50 / 60 Hz		50 / 60 Hz		50 / 60 Hz	50 / 60 Hz
Input current	12.3 mA	6.7 mA	10.5 mA	8 mA	6.8 mA	5.8 mA	8.5 mA	7.5 mA
Pull-in voltage at Is=100%	3.5 V DC	10 V DC						
Switching time C / O	20 / 250 µs	50 / 350 µs	15 / 13 ms	5 / 13 ms	15 / 15 ms	6 / 25 ms	15 / 15 ms	15 / 15 ms
Operating frequency	2000 Hz	1500 Hz			20 Hz			
Permissible leakage current								

Output

Output voltage	4.5 V to 58 V DC	
Output current min.	1 mA	
Output current max.	2 A	
Output leakage current at U _{max}	< 50 µA	
Residual voltage at I max and U rated	typical	0.1 V DC
	max	0.5 V DC
Frequency on inductive load	See Note 1	
Isolation Input / Output	input / Output	2500 V RMS

Temperature

Ambient temperature	storage	-40...+80 °C
	operating	See derating curve

Other characteristics

Body material	grey	UL 94 V0
Wire size	Solid wire	0.2 - 4 mm ² (24-12 AWG)
	Stranded wire	0.22 - 2.5 mm ² (24-12 AWG)
Rated wire size		2.5 mm ² (12 AWG)
Wire stripping length		10 mm (0.394 in)
Recommended screwdriver		3.5 mm (0.137 in)
Protection		IP20 NEMA1
Recommended torque		0.4-0.6 Nm (3.5-5.3 lb.in)
Approvals		us (pending), CE
Reference standards	CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.	

Note 1 :

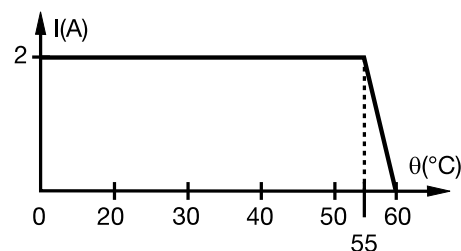
$$F_{max} = (1 - 0,012 \times U_s) / (L \times I_s^2)$$

or

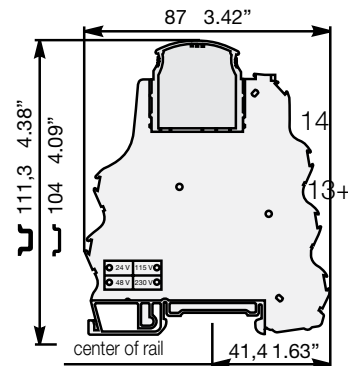
$$F_{max} = (1 - 0,012 \times U_s) / (P \times \frac{L}{R})$$

U_s = Output voltage
I_s = Output current
L = Inductance of load
P = Power of load
R = Resistance of load

Derating curve



Dimensional drawings



R500 Optocouplers

Technical data



Technical data

Pluggable optocoupler : 24 to 253 V AC output / 1 A - 5.08 mm 0.200" spacing

	D 2.5/5-... 24 V DC	D 2.5/5-OBOA-1000 24 V AC/DC - 48 V AC/DC				D 2.5/5-OBOA-1000 110 V AC - 230 V AC	
Input	24 V DC	24 V AC	24 V DC	48 V AC	48 V DC	110 V AC	230 V AC
Input voltage	20.4 - 28.8 V DC	24 ± 10 %	20.6 - 28.8 V DC	48 ± 10 %	40.8 - 57.6 V DC	110 ± 10 %	230 ± 10 %
Frequency		50 / 60 Hz		50 / 60 Hz		50 / 60 Hz	50 / 60 Hz
Input current	4 mA	10 mA	7 mA	6 mA	5 mA	8 mA	7.5 mA
Pull-in voltage at Is=100%							
Switching time C / O	10/20 ms	20/20 ms	10/20 ms	20/20 ms	10/20 ms	20/20 ms	20/20 ms
Operating frequency	15 Hz						
Permissible leakage current							

Output	24-253 V AC - 50/60 Hz							
Output voltage	24-253 V AC - 50/60 Hz							
Output current min.	25 mA							
Output current max.	1 A							
Output leakage current at U _{max}	< 0.50 mA							
Residual voltage at I max and U rated	typical	1 V						
	max	1.6 V						
Frequency on inductive load	See Note 1							
Isolation Input / Output	input / Output	2500 V RMS						

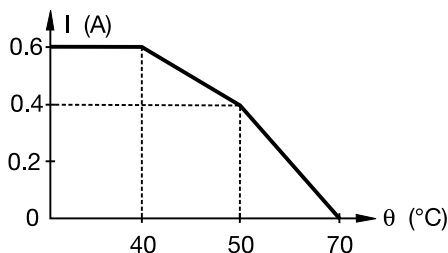
Temperature		
Ambient temperature	storage	-40...+80 °C
	operating	See derating curve

Other characteristics		
Body material	grey	UL 94 V0
Wire size	Solid wire	0.2 - 4 mm ² (24-12 AWG)
	Stranded wire	0.22 - 2.5 mm ² (24-12 AWG)
Rated wire size	2.5 mm ² (12 AWG)	
Wire stripping length	10 mm (0.394 in)	
Recommended screwdriver	3.5 mm (0.137 in)	
Protection	IP20 NEMA1	
Recommended torque	0.4-0.6 Nm (3.5-5.3 lb.in)	
Approvals	 us (pending), 	
Reference standards	CEI 947-7-1 / CEI 947-1 / CEI 1131-2 (in relevant parts) / CEI 60664-1 / CEM : IRC 1000-4-2, 3, 4, 5, 6.	

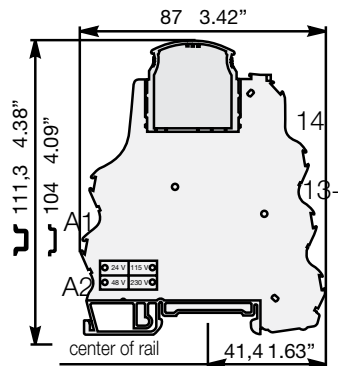
Note 1 :
 $F_{max} = (1 - 0.012 \times U_s) / (L \times I_s^2)$
 or
 $F_{max} = (1 - 0.012 \times U_s) / (P \times \frac{L}{R})$

U_s = Output voltage
 I_s = Output current
 L = Inductance of load
 P = Power of load
 R = Resistance of load

Derating curve



Dimensional drawings





Accessories

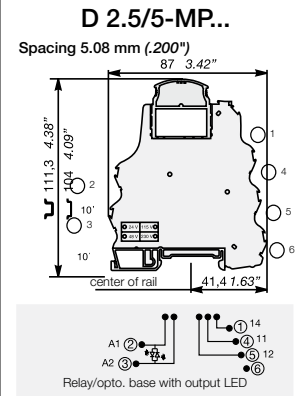
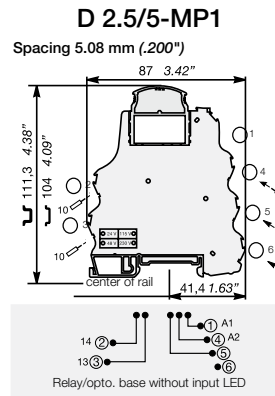
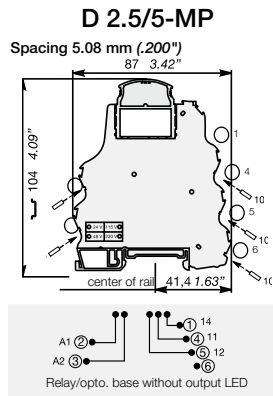
Interface relays & optocouplers

Terminal blocks component holder

Base for pluggable plug
R500 Series

DIN 3

End stop		th. 9 mm	BADL	V0	039990302
End stop		th. 9 mm	BAM2	V0	039996701
Rail		35 x 7.5 x 1	PR30		017322005
Rail		35 x 15 x 2.3	PR4		016850012
Rail		35 x 15 x 1.5	PR5		016870022



Observations

Terminal blocks are delivered without plugs.

Max. working temperature
version without LED : 100°C
version with LED : 85°C
Contact resistance : < 5 mΩ

Ref. Code	Catalog No.	Ref. Code	Catalog No.	Ref. Code	Catalog No.
Grey V0	Order plugs separately	Grey V0	Order plugs separately	Grey V0	Order plugs separately
D 2.5/5-MP	1SNA607224R0100	D 2.5/5-MP1	1SNA607223R0000	D 2.5/5-MP-24VDC	1SNA607222R0700
				D 2.5/5-MP-24VAC/DC	1SNA607260R2100
				D 2.5/5-MP-48VAC/DC	1SNA607261R1600
				D 2.5/5-MP-110VAC	1SNA607266R1300
				D 2.5/5-MP-230VAC	1SNA607267R1400

Characteristics

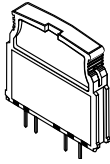
			IEC	UL/CSA pending	IEC	UL/CSA pending	IEC	UL/CSA pending
Wire size	Compression clamp	Solid wire	0.2-4 mm ²	24-12 AWG	0.2-4 mm ²	24-12 AWG	0.2-4 mm ²	24-12 AWG
		Stranded wire	0.22-2.5 mm ²	24-12 AWG	0.22-2.5 mm ²	24-12 AWG	0.22-2.5 mm ²	24-12 AWG
Voltage	Rated		320 V	300 V	320 V	300 V	320 V	300 V
	Pulse		4 kV		4 kV		4 kV	
	Pollution degree		3		3		3	
Current	Rated		6 A	6 A	6 A	6 A	6 A	6 A
Wire size	Rated / Gauge		2.5 mm ²	12 AWG	2.5 mm ²	12 AWG	2.5 mm ²	12 AWG
Wire stripping length			10 mm / .394"		10 mm / .394"		10 mm / .394"	
Recommended screwdriver			3.5 mm / .137"		3.5 mm / .137"		3.5 mm / .137"	
Recommended torque			0.4-0.6 Nm / 3.5-5.3 lb.in		0.4-0.6 Nm / 3.5-5.3 lb.in		0.4-0.6 Nm / 3.5-5.3 lb.in	
Protection			IP 20 / NEMA1		IP 20 / NEMA1		IP 20 / NEMA1	

Accessories

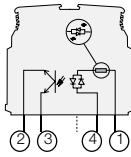
	Ref. Code	Catalog No.	Ref. Code	Catalog No.	Ref. Code	Catalog No.
1 Test device	DCB (1)	blue 010502821	DCB (1)	blue 010502821	DCB (1)	blue 1SNA105028R2100
2 Test plug	FC2	DIA. 2 000786526	FC2	DIA. 2 010502821	FC2	DIA. 2 1SNA007865R2600
3 Relay plug 1 SPDT 10 mA/6 A 1 SPDT 1 mA/6 A	BNMS R24V-1	beige 1SNA031820R1400	BNMS R24V-1	beige 000786526	BNMS R24V-1	beige 1SNA031820R1400
	BNMS R24V-2	beige 1SNA031847R1300			BNMS R24V-2	beige 1SNA031847R1300
4 Input optocoupler plug 5 V DC 24 V DC 24 V DC 48 V DC 125 V DC 24 V AC 48 V AC 115 V AC 230 V AC	BNMS N24V-3	red 1SNA031807R1400	BNMS T5V-1	white 003183103	BNMS N24V-3	red 1SNA031807R1400
	BNMS P24V-3	red 1SNA031810R1200	BNMS T24V-1	white 1SNA031848R2400	BNMS P24V-3	red 1SNA031810R1200
	BNMS N24V-1	red 1SNA031813R0100	BNMS T24V-2	white 003180021	BNMS N24V-1	red 1SNA031813R0100
	BNMS P24V-1	red 1SNA031815R0300	BNMS T48V-1	white 1SNA031801R1600	BNMS P24V-1	red 1SNA031815R0300
	BNMS N24V-2	red 1SNA031817R0500	BNMS T125V-1	white 1SNA031845R1100	BNMS N24V-2	red 1SNA031817R0500
	BNMS P24V-2	red 1SNA031819R1700	BNMS T24V-1	yellow 003180217	BNMS P24V-2	red 1SNA031819R1700
	BNMS A24V-4	black 003183913	BNMS T48V-1	yellow 1SNA031803R1000	BNMS A24V-4	black 003183913
5 Output optocoupler 5 V DC/100 mA 5 V DC/100 mA 48 V DC/100 mA 48 V DC/100 mA	BNMS N5V-3	red 1SNA031806R1300	BNMS T115V-1	yellow 003180411	BNMS N5V-3	red 1SNA031806R1300
	BNMS P5V-3	red 1SNA031809R2600	BNMS T230V-1	yellow 1SNA031805R1200	BNMS P5V-3	red 1SNA031809R2600
	BNMS N48V-3	red 1SNA031808R2500			BNMS N48V-3	red 1SNA031808R2500
	BNMS P48V-3	red 1SNA031811R0700			BNMS P48V-3	red 1SNA031811R0700
	BNMS N5V-1	red 1SNA031812R0000			BNMS N5V-1	red 1SNA031812R0000
	BNMS P5V-1	red 1SNA031814R0200			BNMS P5V-1	red 1SNA031814R0200
	BNMS N5V-2	red 1SNA031816R0400			BNMS N5V-2	red 1SNA031816R0400
	BNMS P5V-2	red 1SNA031818R1600			BNMS P5V-2	red 1SNA031818R1600
7 Fuse plug 125 V/125 mA 125 V/500 mA 125 V/2 A 125 V/5 A 250 V/125 mA 250 V/2 A 250 V/5 A 125 V/125 mA 250 V/125 mA 125 V/2 A	BNMS F125mA-1	grey 003182101	BNMS F125mA-1	grey 003182101	BNMS F125mA-1	grey 003182101
	BNMS F500mA-1	grey 003183812	BNMS F500mA-1	grey 003183812	BNMS F500mA-1	grey 003183812
	BNMS F2A-1	grey 003182202	BNMS F2A-1	grey 003182202	BNMS F2A-1	grey 003182202
	BNMS F5A-1	grey 003182303	BNMS F5A-1	grey 003182303	BNMS F5A-1	grey 003182303
	BNMS F125mA-2	grey 1SNA031824R0400	BNMS F125mA-2	grey 1SNA031824R0400	BNMS F125mA-2	grey 1SNA031824R0400
	BNMS F2A-2	grey 003182505	BNMS F2A-2	grey 003182505	BNMS F2A-2	grey 003182505
	BNMS F5A-2	grey 1SNA031826R0600	BNMS F5A-2	grey 1SNA031826R0600	BNMS F5A-2	grey 1SNA031826R0600
	BNMS F125mA-3	grey 003182707			BNMS F125mA-3	grey 1SNA031827R0700
	BNMS F125mA-4	grey 003182810			BNMS F125mA-4	grey 1SNA031828R1000
	BNMS F2A-7	grey 1SNA031849R2500	BNMS F2A-7	grey 1SNA031849R2500		
8 Strap plug	BNMS ST1	grey 003182911	BNMS ST1	grey 003182911	BNMS ST1	grey 003182911
	BNMS ST2	grey 003183016	BNMS ST2	grey 003183016		
9 Converter plug 0-20 mA/0-10 V 4-20 mA/2-10 V 0-20 mA/0-5 V 4-20 mA/1-5 V	BNMS CAI/U-500	grey 1SNA031832R0400				
	BNMS CAI/U-500	grey 1SNA031832R0400				
	BNMS CAI/U-250	grey 1SNA031833R0500				
	BNMS CAI/U-250	1SNA031833R0500				
10 Comb type jumper bar 10 poles R See section on marking	PCMS V0 (2)	1SNA205523R2200	PCMS V0 (2)	1SNA205523R2200	PCMS V0 (2)	1SNA205523R2200
	RC 55		RC 55		RC 55	

(1) Solely on the top stage. (2) Comb type jumper bar from 2 to 22 poles, see accessories.

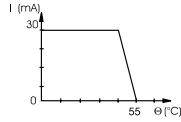
Input optocoupler plugs



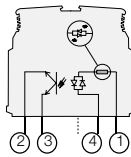
DC plugs



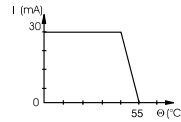
Derating curve



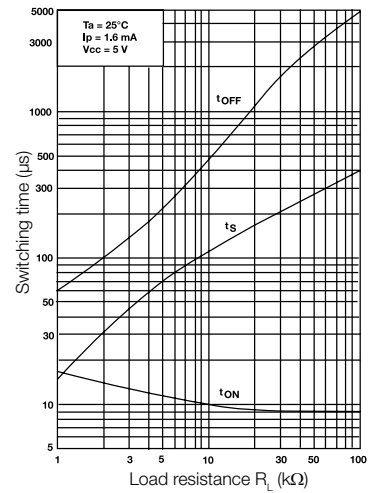
AC plugs



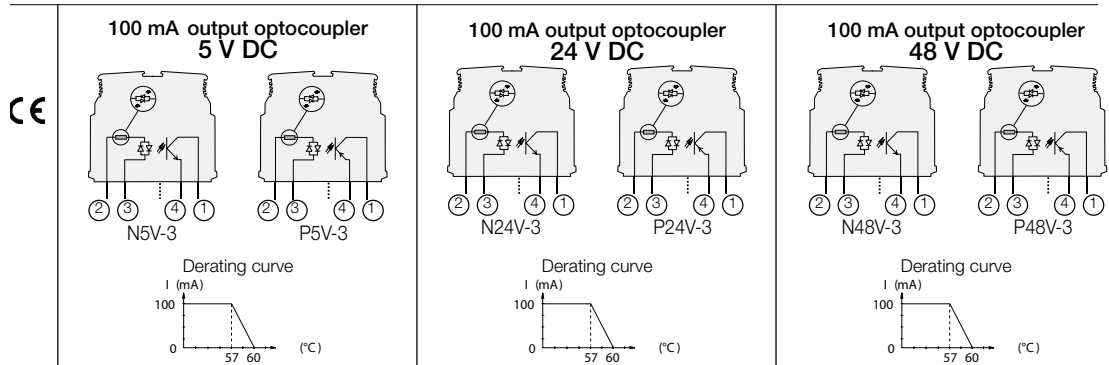
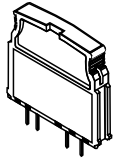
Derating curve



Switching time R_L curve 1 for 24 V DC plugs only



	5 V DC		24 V DC		48 V DC		125 V DC	
Catalog number	Ref. Code	Cat. No.	Ref. Code	Cat. No.	Ref. Code	Cat. No.	Ref. Code	Cat. No.
	BNMS T5V-1 1SNA031831R0300		BNMS T24V-1 1SNA031800R2100 BNMS T24V-2 1SNA031848R2400		BNMS T48V-1 1SNA031801R1600		BNMS T125V-1 1SNA031845R1100	
Characteristics								
INPUT			BNMS T24V-1	BNMS T24V-2				
Voltage	4.5 V to 5.5 V DC		19.2 V to 27.6 V DC		38.4 V to 55.2 V DC		93.5 V to 140 V DC	
Max. current	6 mA		5 mA		4.1 mA		3 mA	
Typical triggering threshold at $I_s = 100\%$	3.5 V		12 V DC		21 V DC		50 V DC	
Switching time	C/O	20 µs / 1.3 ms	20 µs / 1.3 ms	10 µs / see curve 1	20 µs / 1.3 ms		20 µs / 1.3 ms	
Leakage current			1 mA		0.8 mA			
OUTPUT								
Max. voltage / Max. current	58 V / 30 mA		58 V / 30 mA	58 V / 5 mA	58 V / 30 mA		58 V / 30 mA	
Residual voltage max. I and rated U standard	2.3 V DC		2.3 V DC	0.3 V DC	2.3 V DC		2.3 V DC	
max.	2.7 V DC		2.7 V DC	0.5 V DC	2.7 V DC		2.7 V DC	
Compatibility	TTL							
Input / Output isolation	2.5 kV		2.5 kV		2.5 kV		2.5 kV	
TEMPERATURE								
Storage	-30°C to +80°C		-30°C to +80°C		-30°C to +80°C		-30°C to +80°C	
Operating	-20°C to +55°C		-20°C to +55°C		-20°C to +55°C		-20°C to +55°C	
	24 V AC		48 V AC		115 V AC		230 V AC	
Part number	Ref. Code	Cat. No.	Ref. Code	Cat. No.	Ref. Code	Cat. No.	Ref. Code	Cat. No.
	BNMS T24V-1 1SNA031802R1700		BNMS T48V-1 1SNA031803R1000		BNMS T115V-1 1SNA031804R1100		BNMS T230V-1 1SNA031805R1200	
Characteristics								
INPUT								
Voltage	20.4 V to 26.4 V AC		40.8 V to 52.8 V AC		98 V to 126.5 V AC		195.5 V to 253 V AC	
Max. current	8.5 mA		4.5 mA		8 mA		7 mA	
Typical triggering threshold at $I_s = 100\%$	13 V AC		22 V AC		50 V AC		95 V AC	
Switching time	C/O	6 ms / 10 ms	6 ms / 10 ms		6 ms / 10 ms		6 ms / 10 ms	
Leakage current	1 mA		1 mA		2 mA		2 mA	
OUTPUT								
Max. voltage / Max. current	58 V / 30 mA		58 V / 30 mA		58 V / 30 mA		58 V / 30 mA	
Residual voltage max. I and rated U standard	2.3 V DC		2.3 V		2.3 V		2.3 V	
max.	2.7 V DC		2.7 V		2.7 V		2.7 V	
Input / Output isolation	2.5 kV		2.5 kV		2.5 kV		2.5 kV	
TEMPERATURE								
Storage	-30°C to +80°C		-30°C to +80°C		-30°C to +80°C		-30°C to +80°C	
Operating	-20°C to +55°C		-20°C to +55°C		-20°C to +55°C		-20°C to +55°C	

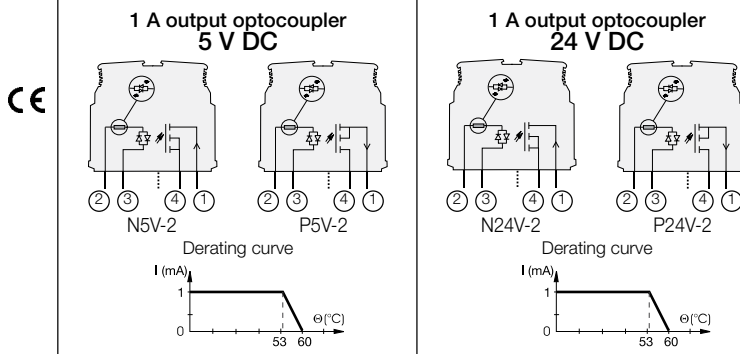
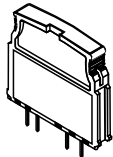


Part numbers	Ref. Code	Cat. No.	Ref. Code	Cat. No.	Type	Cat. No.
	BNMS N5V-3	1SNA031806R1300	BNMS N24V-3	1SNA031807R1400	BNMS N48V-3	1SNA031808R2500
	BNMS P5V-3	1SNA031809R2600	BNMS P24V-3	1SNA031810R1200	BNMS P48V-3	1SNA031811R0700

6 Characteristics

INPUT							
Voltage	4.5 V to 5.5 V DC		20.4 V to 28.8 V DC		40.8 V to 57.6 V DC		
Max. current	8.5 mA		4.8 mA		3.9 mA		
Typical triggering threshold at $I_s = 100\%$	2.9 V DC		16 V DC		26 V DC		
Switching time	C/O	20 μ s / 1.3 ms		20 μ s / 1.3 ms		20 μ s / 1.3 ms	
Leakage current	1 mA		1 mA		1 mA		
OUTPUT							
Max. voltage / Max. current	58 V / 100 mA		58 V / 100 mA		58 V / 100 mA		
Residual voltage max. I and rated U							
standard U	1 V DC		1 V DC		1 V DC		
max.	1.3 V DC		1.3 V DC		1.3 V DC		
Frequency on inductive load	See Note 1		See Note 1		See Note 1		
Input / Output isolation	2,5 kV		2,5 kV		2,5 kV		
TEMPERATURE							
Storage	- 30°C to + 80°C		- 30°C to + 80°C		- 30°C to + 80°C		
Operating	- 20°C to + 60°C		- 20°C to + 60°C		- 20°C to + 60°C		

MOS output optocoupler plugs



Note 1 :

$$F_{max} = (1 - 0,007 \times U_s) / (L \times I_s^2)$$

or

$$F_{max} = (1 - 0,007 \times U_s) / (P \times \frac{1}{R})$$

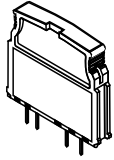
U_s = Output voltage supply
 I_s = Output current
 L = Inductive load
 P = Load power
 R = Load resistance

Part numbers	Ref. Code	Cat. No.	Ref. Code	Cat. No.
	BNMS N5V-2	1SNA031816R0400	BNMS N24V-2	1SNA031817R0500
	BNMS P5V-2	1SNA031818R1600		

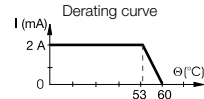
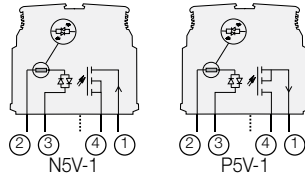
Characteristics

INPUT					
Voltage	4.5 V to 5.5 V DC		20.4 V to 28.8 V DC		
Max. current	12.5 mA		6.7 mA		
Typical triggering threshold at $I_s = 100\%$	3.5 V DC		10 V DC		
Switching time	C/O	20 μ s / 250 μ s		50 μ s / 350 μ s	
Leakage current	1 mA		1 mA		
OUTPUT					
Max. voltage / Max. current	58 V / See graphs		58 V / See graphs		
Residual voltage max. I and rated U					
standard U	1 V DC		1 V DC		
max.	1.3 V DC		1.3 V DC		
Frequency on inductive load	See Note 1		See Note 1		
Input / Output isolation	2,5 kV		2,5 kV		
TEMPERATURE					
Storage	- 30°C to + 80°C		- 30°C to + 80°C		
Operating	- 20°C to + 60°C		- 20°C to + 60°C		

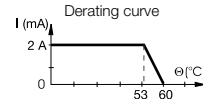
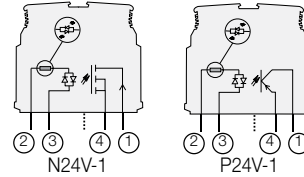
MOS output optocoupler plug



2 A output optocoupler 5 V DC



2 A output optocoupler 24 V DC



Note 2 :

$$F_{max} = (1 - 0.012 \times U_s) / (L \times I_s^2)$$

or

$$F_{max} = (1 - 0.012 \times U_s) / (P \times \frac{L}{R})$$

U_s = Output voltage supply
 I_s = Output current
 L = Inductive load
 P = Load power
 R = Load resistance

Part numbers

Ref. Code	Cat. No.	Ref. Code	Cat. No.
BNMS N5V-1	1SNA031812R0000	BNMS N24V-1	003181301
BNMS P5V-1	003181402	BNMS P24V-1	003181503

Characteristics

INPUT

	5 V DC	24 V DC
Voltage	4.5 V to 5.5 V DC	20.4 V to 28.8 V DC
Max. current	12.5 mA	6.7 mA
Typical triggering threshold	3.5 V DC	10 V DC
Switching time C/O	20 μs / 250 μs	50 μs / 350 μs
Leakage current	1 mA	1 mA

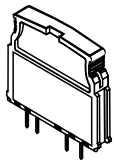
OUTPUT

	5 V DC	24 V DC
Max. voltage / Max. current	30 V DC / See graphs	30 V / See graphs
Residual voltage max. I and rated U		
standard U	1 V DC	1 V DC
max.	1.3 V DC	1.3 V DC
Frequency on inductive load	See Note 2	See Note 2
Input / Output isolation	2.5 kV	2.5 kV

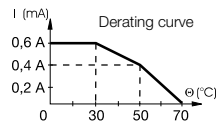
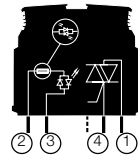
TEMPERATURE

	5 V DC	24 V DC
Storage	- 30°C to + 80°C	- 30°C to + 80°C
Operating	- 20°C to + 60°C	- 20°C to + 60°C

Triac output optocoupler plug



1 A output optocoupler 24 V DC



Part numbers

Ref. Code	Cat. No.
BNMS A24V-4	003183913

Characteristics

INPUT

	24 V DC
Voltage	20.4 V to 28.8 V DC
Max. current	3.8 mA
Typical triggering threshold	10 V DC
Switching time C/O	9.5 ms / 12 ms
Leakage current	

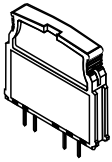
OUTPUT

	24 V DC
Max. voltage / Max. current	24 V to 253 V AC / See derating curve
Residual voltage max. I and rated U	
standard U	1 V AC
max.	1.3 V AC
Input / Output isolation	2.5 kV

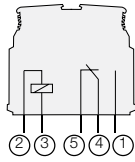
TEMPERATURE

	24 V DC
Storage	- 30°C to + 80°C
Operating	- 20°C to + 70°C

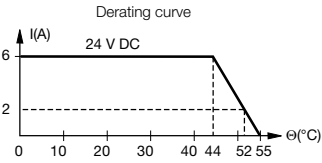
Relay plugs



1 SPDT relay



R24V-1

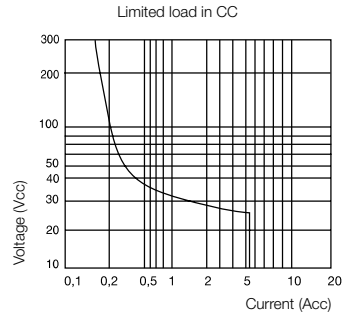


Part numbers

Ref. Code	Cat. No.
BNMS R24V-1	1SNA031820R1400
BNMS R24V-2	1SNA031847R1300

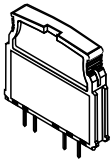
Characteristics

	BNMS R24V-1	BNMS R24V-2
COIL		
Voltage	20.4 V to 28.8 V DC	
Current max.	7 mA	
Trip voltage	1.2 V	
CONTACT		
Type	1 SPDT	
Voltage mini. / max.	12 V / 250 V	5 V / 250 V
Switching current mini. / max.	10 mA / 6 A	1 mA / 6 A
Switching current AC1 mini. / max.	0,6 VA/1500 VA (resistance)	0,05 VA/1500 VA (resistance)
DC1 mini. / max.	0,6 W / 140 W	0,05 W / 140 W
Number of operations on load	10 ⁶ operations for AC15	
Number of operations off load	10x10 ⁶ operations	
Operating speed C/O	6 ms / 8 ms	
Bounce	1,5 ms	
Isolation Coil / Contact	4 kV	
Resistance to shock waves Coil / Contact	4 kV	
Isolation Contact / Contact	1 kV	
TEMPERATURE		
Storage	- 40°C to + 80°C	
Operating	- 20°C to + 55°C	

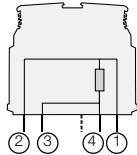


	DC12	AC12	DC13	AC15
24 V	6 A	6 A	1 A	3 A
110/120 V	0.3 A	6 A	0.2 A	3 A
220/230 V	0.2 A	6 A	0.1 A	3 A

Analogical plugs

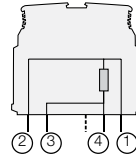


Current / Voltage Converter



Plug with 250 Ω accuracy resistance for analogical signals.

Current / Voltage Converter



Plug with 500 Ω accuracy resistance for analogical signals.

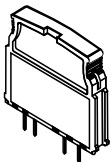
Part numbers

Ref. Code	Cat. No.	Ref. Code	Cat. No.
BNMS CA I/U-250	1SNA031832R0400	BNMS CA I/U-500	1SNA031833R0500

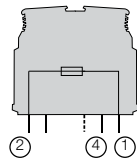
Characteristics

	250 Ω	500 Ω
Resistance	250 Ω	500 Ω
Power	0.35 W	0.35 W
Accuracy	0.1 %	0.1 %
Stability	25 ppm	25 ppm

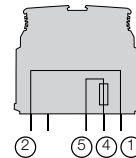
Fuse and strap plugs



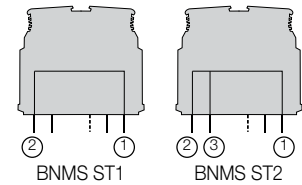
Output fuse plug



Input fuse plug



Strap plug

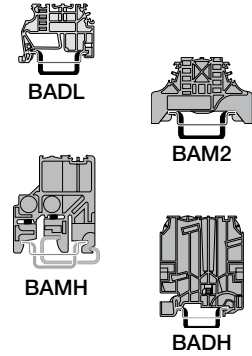


Part numbers

Ref. Code	Cat. No.	Ref. Code	Cat. No.	Ref. Code	Cat. No.
BNMS F125mA-1	125 V / 125 mA	003182101	BNMS F125mA-3	125 V / 125 mA	003182707
BNMS F500mA-1	125 V / 500 mA	003183812	BNMS F125mA-4	250 V / 125 mA	003182810
BNMS F2A-1	125 V / 2 A	003182202			
BNMS F5A-1	125 V / 5 A	003182303			
BNMS F125mA-2	250 V / 125 mA	1SNA031824R0400			
BNMS F2A-2	250 V / 2 A	003182505			
BNMS F5A-2	250 V / 5 A	1SNA031826R0600			
				BNMS ST1	003182911
				BNMS ST2	003183016

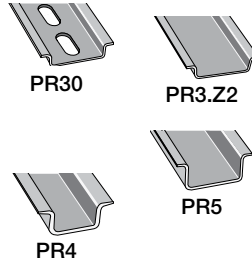
End stops

The end stops are mounted at the extremity of the terminal board assembly, giving additional support to the terminal blocks as markers. For various types of marking, refer to the marker section.



Description	Ref. Code	Catalog number	Packaging Weight kg
End stop DIN 3	BADL 9 mm	039990302	50
End stop with screws DIN 3	grey BAM2 10 mm	039995701	50
	light grey BAM2 10 mm	020635116	50
	grey BAM2 10 mm	029635100	50
High end stop with screws DIN 1 and DIN 3	grey BAMH 9.1 mm	011483600	50
	beige BAMH 9.1 mm	019483601	50
High end stop with screws DIN 3	grey BADH 12 mm	011690027	50

Mounting rails



Symmetrical white passivated galvanized steel prepunched rail	PR30 2 m	017322005	1
Symmetrical white passivated galvanized steel rail	PR3.Z2 2 m	017430017	1
Symmetrical white passivated galvanized steel rail	PR5 2 m	016870022	1
Symmetrical white passivated galvanized steel rail	PR4 2 m	016850012	1

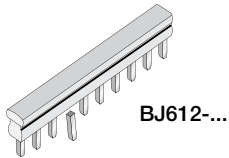
Test devices



Test plug DIA. 2 mm	FC2	1SNA007865R2600	10
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Assembled jumper bar

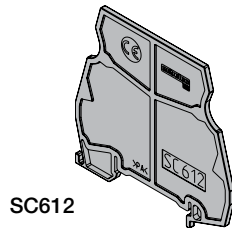
This accessory permits electrical connection between 2 to 70 blocks with 6 mm spacing placed side by side. It can be used with screw clamp or spring clamp blocks with 6 mm or 12 mm spacing. Interconnection of blocks not placed side by side is possible if teeth of the jumper bar have been cut in front of the blocks not to be connected. These teeth can be removed using pliers. Use of separator end sections before and after the jumper bar is required to preserve IP20 protection of the assembly.



Assembled jumper bar 10 poles - 24 A	BJ612-10	029048801	10
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Separator end section

Directly mounted on the rail beside the block, it permits to identify and make electrical insulation of product groups using jumper bars. Dimensions are the same as screw clamp blocks : width 70 mm and height on rail 67.5 mm with 2 mm spacing.



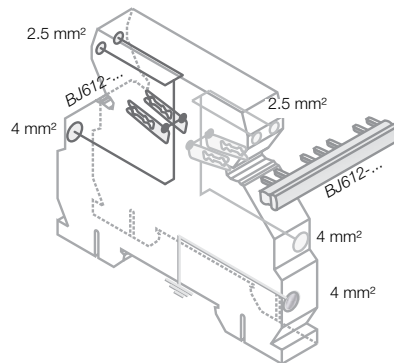
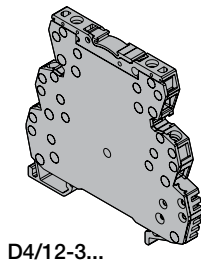
Separator end section	SC612	1SNA290474R0200	10
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Distribution module

This terminal block with BJ612-... jumper bars permits 2 polarities distribution (*PCL side and process side*) thanks to two separate circuits, each of them including :

- one 4 mm² input,
- two 2,5 mm² outputs
- one double output for jumper bar BJ612-...

It permits also the connection of ground to the rail through a 4 mm² input.



Rated voltage : 250 VAC-DC
 Rated current : 32 A (4 mm²) - 16 A (2,5 mm²)
 Recommended torque : 0.4 - 0.6 Nm

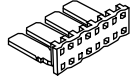
Screw clamp distribution block sp. 12 mm	D4/12-3-3	1SNA645031R2000	5
Spring clamp distribution block sp. 12 mm	D4/12-3R-3R	1SNA645531R2200	5

Accessories

PCMS

Comb-type jumper

This accessory permits the electrical connection of 2 to 22 blocks.



No. of poles	Grey UL94V0	Red UL94V0	Blue UL94V0	Green/Yellow UL94V0
2	1SNA205491R2300	1SNA205492R2400	1SNA205493R2500	-
3	1SNA205495R2700	-	-	-
4	1SNA205499R0300	1SNA205500R1000	1SNA205501R0500	-
5	1SNA205503R0700	1SNA205504R0000	1SNA205505R0100	-
6	1SNA205507R0300	1SNA205508R1400	1SNA205509R1500	-
7	1SNA205511R2600	-	-	-
8	1SNA205515R2200	-	-	-
9	1SNA205519R0600	-	-	-
10	1SNA205523R2200	1SNA205524R2300	1SNA205525R2400	1SNA205526R2500
11	1SNA205527R2600	-	-	-
12	1SNA205531R2200	1SNA205532R2300	1SNA205533R2400	1SNA205534R2500
13	1SNA205535R2600	-	-	-
14	1SNA205539R0200	-	-	-
15	1SNA205543R0600	-	-	-
16	1SNA205547R0200	1SNA205548R1300	1SNA205549R1400	1SNA205550R1100
17	1SNA205551R0600	-	-	-
18	1SNA205555R0200	-	-	-
19	1SNA205559R1600	-	-	-
20	1SNA205563R0200	1SNA205564R0300	1SNA205565R0400	1SNA205566R0500
21	1SNA205567R0600	-	-	-
22	1SNA205571R0200	-	-	-

6

DC

Test device on screw head

This patented device is mounted on the round screwdriver opening. It is used for trouble shooting, measuring and control for monitoring and repairing an installation, on blocks without a test socket. For this, the device receives an **FC2** test plug.



The DC's are differentiated by their colour :

blue for **MA 2.5/5** blocks

DCB 010502821

BJ Jumper bar

BJS Jumper bar not assembled

To connect terminal blocks, place the metal tube into the top center hole on each terminal block to be connected.

The metal tube contacts the terminal block's internal connector bar.

To be mounted on blocks series R910 :

Screw + washer + post **EV6D** 1SNA168400R1600



PC

Comb-type jumper bar

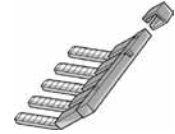
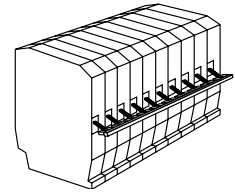
PC **EIP**

This accessory can be used only on the terminal blocks with at least one compression clamp connection. It permits the electrical connection of 2 to 10 blocks.

Interconnection of non-consecutive blocks is possible by removing the teeth opposite the blocks which must not be connected. The comb-type jumper bars can be cut using pliers (or a saw) : in this case, the use of an insulating tip **EIP** is recommended. The comb is placed in the compression clamp before tightening the screws, above the eventual conductor.

To be mounted on blocks series R900 and R910 :

Insulating tip for comb **EIP** 011355024
Comb-type jumper bar **PC9** 15 A 10 poles 021016012

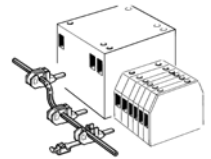
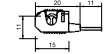
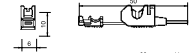


IDC jumper

(insulation displacement jumper)

Characteristics

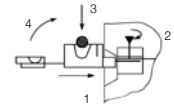
Wire size mm ² / AWG	Rigid Flexible	IEC	CSA
		NFC VDE	
Voltage	V	600	600
	Current	A	26 15
Rated wire size	mm ² / AWG	2.5 mm ²	14 AWG
Working temperature	°C	-55°C -> +110°C	
Protection		IP20 / NEMA1	



Quick-jump lets you interconnect screw clamp terminals of different sizes, levels and all manufacturers quickly and safely. Its insulation displacement technology makes it easy to use, fast, economical and does not require a special tool. Use as a jumper between relays, switches and other electronic components. ABB Quick-jump will fit any screw clamp type terminal block, from 6 mm .238" spacing and larger.

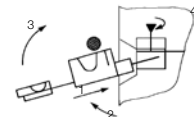
How to use : connecting Quick-jump to your terminal

- 1 - Insert ABB Quick-jump into your terminal screw clamp.
- 2 - Tighten the terminal screw.
- 3 - Guide jumper wire through the V-shaped opening in the Quick-jump.
- 4 - Secure the wire by closing the Quick-jump lever with any flat nose pliers.



Adding a shunt in an installation :

- 1 - Insert ABB Quick-jump into your terminal screw clamp.
- 2 - Guide the terminal screw clamp into contact with the wire.
- 3 - Secure the wire by closing the Quick-jump lever with any flat nose pliers.
- 4 - Tighten the terminal screw.



Insulation displacement jumper **AD 2.5** 011420520

Marking for Interface Modules

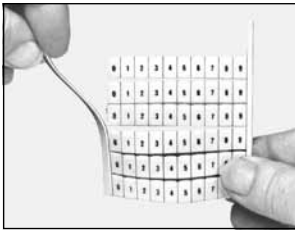
Selection table

Markers for modules :	RC610	RC55	RC65
R500	☐	●	☐
R600	●	POSSIBLE	●
R900	☐	●	☐
R910	●	POSSIBLE	●
R1800	☐	●	☐

Possible mounting : **POSSIBLE**

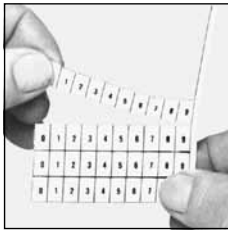
Recommended mounting : ●

Impossible mounting : ☐



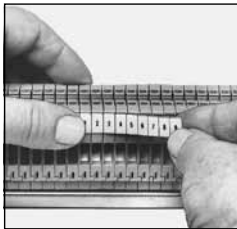
1

Remove one of the side bands of the card.



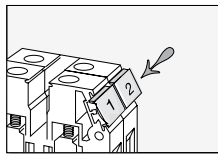
2

Separate the chosen strip from the rest of the card.

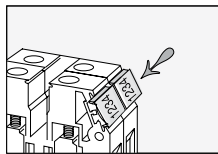


3

Press the first marker in place, hold it and slide your thumb on the rest of the strip.



Horizontal marking



Vertical marking

Marking for terminal blocks

Standard RC marker cards

Marker sizes	RC55	RC65	RC610
Blank cards	023000012	023200000	023300001
Horizontal marking			
10 strips from 1 to 10	023000200 (5)	023200226 (5)	023300227 (25)
10 strips from 11 to 20	023000301 (2)	023200327 (2)	023300320 (10)
10 strips from 21 to 30	023000402	023200420	023300421 (6)
10 strips from 31 to 40	023000503	023200521	023300522 (4)
10 strips from 41 to 50	023000604	023200622	023300623 (3)
10 strips from 51 to 60	023000705	023200723	023300724 (2)
10 strips from 61 to 70	023000816	023200804	023300805 (2)
From 1 to 100	023003007 (2)	023203025 (2)	023303026 (15)
From 101 to 200	023003124	023203112	023303113 (2)
20 times L1-L2-L3-N-PE	023013125	023213113	023313114 (2)
Vertical marking			
10 strips from 1 to 10	023004106	023204124	023304125 (5)
10 strips from 11 to 20	023004207	023204225	023304226 (3)
10 strips from 21 to 30	023004300	023204326	023304327 (2)
10 strips from 31 to 40	023004401	023204427	023304420 (2)
From 1 to 100	023006015	023206003	023306004 (8)

(x) = Nb of cards in 5 mm spacing kit

(x) = Nb of cards in 6 mm spacing kit

(x) = Nb of cards in 6 mm spacing kit

Notes



Logic relays

Concept

CL range logic relays are suitable for small and medium-sized control tasks and are able to substitute logic wiring in a quick and simple manner.

They can be used for applications in control as well as for timing functions, e. g.

- in buildings, lighting systems, air-conditioning systems, general control functions,
- in small machines and systems or
- as stand-alone control module for small applications.

6

Steps to the application of CL range

- CL range can be used easily, rapidly and comfortably without any time-consuming planning and programming.
- The user can discover the advantages and the benefit of these logic relays in no time at all.
- CL range provides for the control statements according to a simple circuit diagram.
- Setup, storage, simulation and documentation are performed using the compact and user-friendly CL-SOFT software (CL-LAS.PS002).

Software characteristics (CL-SOFT)

- display on a PC monitor according to IEC, ANSI
- different languages to choose from
- easy installation on all Microsoft Windows™ operating systems

Technical Data overview

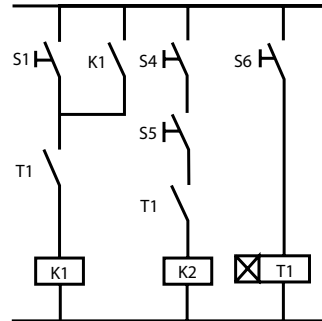
Logic relays

- 8 or 12 digital inputs
- 4 or 6 digital relay outputs
- optionally with 4 or 8 transistor outputs
- 128 rungs
- 3 contacts as n/o or n/c contacts in series plus 1 coil per rung
- optionally with 2 or 4 analog inputs (not 100-240 V AC version)
- power flow display for checking the circuit diagram (devices with display)
- expansions for local or remote level
- enclosure color RAL 7035
- DIN rail mounting

Display system

- usable as compact HMI logic relay
- fully graphic, backlit display module
- 12 digital inputs
- 4 digital relay outputs
- optionally with 4 transistor outputs
- 256 rungs
- 4 contacts as n/o or n/c contacts in series plus 1 coil per rung
- optionally with 4 analog inputs (not 100-240 V AC version)
- networking-compatible via CL-NET
- front panel mounting
- expansion for local

Logic links instead of wiring



Documentation (download from the internet)

Logic relay manual	1SVC 440 795 M0100
Remote display manual	1SVC 440 795 M2100
Display system manual	1SVC 440 795 M1100

Remote display

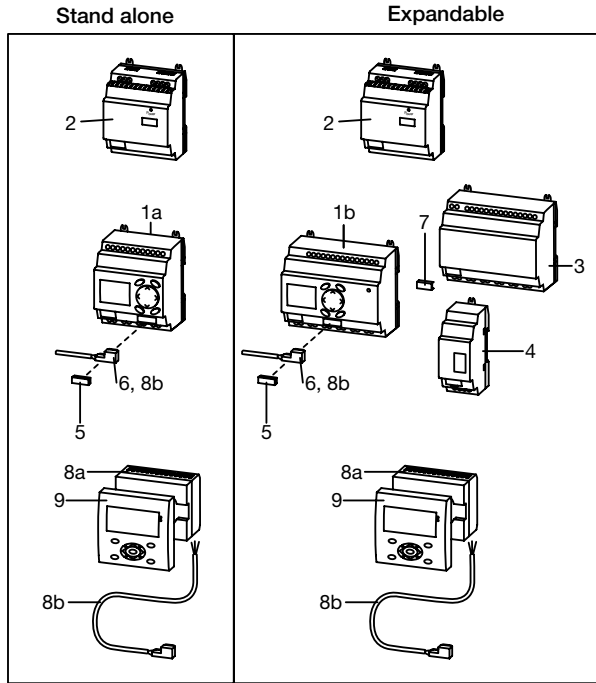
- Remote display up to a distance of 5 m
- Illustration of text and status displays
- Remote adjustment via keypad
- Front panel mounting

Software

- 16 timing relays 0.01-99:59 h
- 16 counting relays for up-, down counting
- 8 weekly timer, 8 annual timers
- 16 analog value comparators
- 16 freely editable display texts
- 32 markers or auxiliary relays

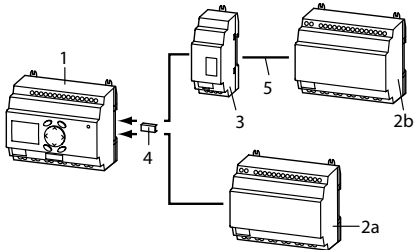
Logic relays System overview

Logic relays



- 1a Logic relay CL-LS..
- 1b Expandable logic relay CL-LM..
- 2 Power supply CP-D...
- 3 I/O expansion CL-LER..., CL-LET.. for logic relays CL-LM..
- 4 Coupler unit CL-LEC.. for remote expansion of logic relays CL-LM..
- 5 Memory module CL-LAS.MD003 for logic relays CL-LS..., CL-LM..
- 6 Connecting cable CL-LAS.TK001, CL-LAS.TK002 to connect PC
- 7 CL-LINK plug CL-LAS.TK011 to connect expansion to logic relays CL-LM..
- 8a Remote display connection module CL-LDC.S..
- 8b Connecting cable CL-LAD.TK007 to connect a remote displays to a logic relay
- 9 Display module CL-LDD..

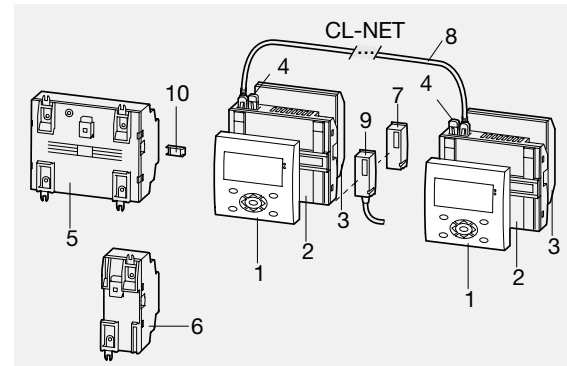
Expansion of logic relays*



- 1 Logic relay CL-LM..
- 2 I/O expansion CL-LER..., CL-LET..
2a local expansion
2b remote expansion
- 3 Coupler unit CL-LEC.. for remote expansion of logic relays CL-LM..
- 4 CL-LINK plug CL-LAS.TK011 for expansion of logic relays CL-LM..
- 5 up to 30 m

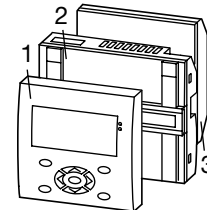
* max. 1 expansion per logic relay

Display system → Compact HMI logic relay



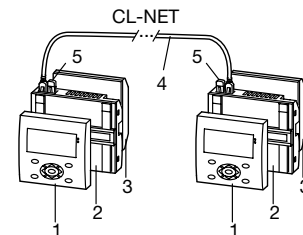
- 1 Display module CL-LDD..
- 2 Display base module CL-LDC.LN..
- 3 Display I/O module CL-LDR..., CL-LDT..
- 4 Termination resistor CL-LAD.TK009
- 5 I/O expansion CL-LER..., CL-LET..
- 6 Coupler unit CL-LEC.. for remote expansion
- 7 Memory module CL-LAD.MD004 for display base module
- 8 Connecting cable CL-LAD.TK002, CL-LAD.TK003, CL-LAD.TK004
- 9 Connecting cable CL-LAD.TK001, CL-LAD.TK011 to connect PC
- 10 CL-LINK plug CL-LAS.TK011 for expansion of logic relays CL-LM..
- e.g. door of switchgear cabinet

Stand alone with I/O module











- 1 Display CL-LDD..
- 2 Remote display connection module CL-LDC.S.. incl. connecting cable
- 3 Display base module CL-LDC.L..

Communication via CL-NET



- 1 Display CL-LDD..
- 2 Display base module CL-LDC.LN.. for CL-NET
- 3 Display I/O module CL-LDR..., CL-LDT..
- 4 Connecting cable CL-LAD.TK002, CL-LAD.TK003, CL-LAD.TK004
- 5 Termination resistor CL-LAD.TK009

■ existing
□ pending

		Logic relays				Expansions			Display system				Accessories	
		CL-LSR	CL-LST	CL-LMR	CL-LMT	CL-LER	CL-LET	CL-LEC	CL-LDD	CL-LDC	CL-LDR	CL-LDT	CL-LAS	CL-LAD
Approvals														
	UL	■	■	■	■	■	■	■	■	■	■	■	■ ¹⁾	■ ²⁾
	CAN/CSA C22.2 No.14	■	■	■	■	■	■	■	■	■	■	■	■ ¹⁾	■ ²⁾
	CAN/CSA C22.2 No.213 (hazardous locations)	■	■	■	■	■	■	■	■	■	■	■	■ ¹⁾	■ ²⁾
	GL	■	■	■	■				■	■ ³⁾	■ ⁴⁾	■		
	GOST	■	■	■	■	■	■	■	■	■	■	■	■	■
	Lloyds Register	■	■	■	■				■	■ ³⁾	■ ⁴⁾	■		
Marks														
	CE	■	■	■	■	■	■	■	■	■	■	■	■	■
	C-Tick	□	□	□	□	□	□	□	□	□	□	□	□	□

¹⁾ not for: CL-LAS-PS002, CL-LAS.TD001, CL-LAS.FD001, CL-LAS.TK002, CL-LAS.TK011

²⁾ not for: CL-LAD.TK006, CL-LAD.TK011, CL-LAD.FD002

³⁾ not for: CL-LDC.SDC2, CL-LDC.SAC2, CL-LDC.LAC2, CL-LDC.LNAC2

⁴⁾ not for: CL-LDR.16AC2

Logic relays

Ordering details

Stand alone logic relays



CL-LSR



CL-LST

Logic relays stand alone

Rated operational voltage	Display + Keypad	Timer	Input / Output	Reference code	Catalog number	Weight (1 pce) kg (lb)
24 V AC	■	■	8 inputs / 4 relay outputs	CL-LSR.C12AC1	1SVR440712R0300	0.20 (0.44)
		■		CL-LSR.CX12AC1	1SVR440712R0200	
100-240 V AC	■			CL-LSR.12AC2	1SVR440713R0100	
	■	■		CL-LSR.C12AC2	1SVR440713R0300	
		■		CL-LSR.CX12AC2	1SVR440713R0200	
		■		CL-LSR.C12DC1	1SVR440710R0300	
12 V DC	■	■		CL-LSR.CX12DC1	1SVR440710R0200	
24 V DC	■			CL-LSR.12DC2	1SVR440711R0100	
	■	■		CL-LSR.C12DC2	1SVR440711R0300	
24 V DC		■		CL-LSR.CX12DC2	1SVR440711R0200	
	■	■		CL-LST.C12DC2	1SVR440711R1300	
24 V DC		■		CL-LST.CX12DC2	1SVR440711R1200	

6

Display modules



CL-LDD.K

Rated operational voltage	Description	Reference code	Catalog number	Weight (1 pce) kg (lb)
-	Graphic display 132 x 64 pixel	CL-LDD.XK	1SVR440839R4500	0.14 (0.30)
-	Graphic display 132 x 64 pixel, with keypad	CL-LDD.K	1SVR440839R4400	0.13 (0.29)
24 V DC	Module to displace the display from the logic relay, incl.	CL-LDC.SDC2	1SVR440841R0000	0.16 (0.36)
100-240 V DC	connecting cable CL-LAD.TK007, 5m, length adaptable	CL-LDC.SAC2	1SVR440843R0000	0.16 (0.36)



CL-LDC.S..

Logic relays

Ordering details

Expandable logic relays



CL-LMR



CL-LER



CL-LEC

Logic relays expandable

Rated operational voltage	Display + Keypad	Timer	Input / Output	Reference code	Catalog number	Weight (1 pce) kg (lb)
24 V AC	■	■	12 inputs / 6 relay outputs	CL-LMR.C18AC1	1SVR440722R0300	0.36 (0.79)
100-240 V AC	■	■		CL-LMR.CX18AC1	1SVR440722R0200	
				CL-LMR.C18AC2	1SVR440723R0300	
12 V DC	■	■		CL-LMR.CX18AC2	1SVR440723R0200	
				CL-LMR.C18DC1	1SVR440720R0300	
24 V DC	■	■		CL-LMR.CX18DC1	1SVR440720R0200	
			CL-LMR.C18DC2	1SVR440721R0300		
24 V DC	■	■	CL-LMR.CX18DC2	1SVR440721R0200		
			CL-LMT.C20DC2	1SVR440721R1300	0.36 (0.79)	
24 V DC	■	■	CL-LMT.CX20DC2	1SVR440721R1200		

Expansions

Rated operational voltage	Description	Reference code	Catalog number	Weight (1 pce) kg (lb)
-	2 relay outputs	CL-LER.2O	1SVR440709R5000	0.07 (0.15)
100-240 V AC	12 inputs, 6 relay outputs	CL-LER.18AC2	1SVR440723R0000	0.26 (0.57)
24 V DC		CL-LER.18DC2	1SVR440721R0000	0.22 (0.49)
24 V DC	12 inputs, 8 transistor outputs	CL-LET.20DC2	1SVR440721R1000	0.21 (0.46)
-	Coupler unit for remote expansion with a distance of up to 30 m	CL-LEC.CI000	1SVR440709R0000	0.07 (0.15)

Logic relays

Ordering details

CL-LA...



CL-LAS.PS002



CL-LAS.TK001



CL-LAS.MD003

Description	Reference code	Catalog number	Weight (1 pce) kg (lb)
Software for programming and control of CL range devices. Installation CD-ROM for Microsoft Windows™.	CL-LAS.PS002	1SVR440799R8000	0.10 (0.21)
Memory module for logic relays Memory size: 32 kB	CL-LAS.MD003	1SVR440799R7000	0.02 (0.04)
Cable with serial interface to connect PC and logic relay. Length: 2 m	CL-LAS.TK001	1SVR440799R6000	0.10 (0.22)
Cable with USB interface to connect PC and logic relay	CL-LAS.TK002	1SVR440799R6100	0.06 (0.13)
Cable for point-to-point connection of remote-display connection module and logic relay, length adaptable	CL-LAD.TK007	1SVR440899R6600	0.20 (0.44)
Fixing brackets for screw mounting of logic relay, expansion, display base module	CL-LAS.FD001	1SVR440799R5000	0.01 (0.01)
Spare plug (CL-LINK) for connection of logic relay to expansion	CL-LAS.TK011	1SVR440799R5100	0.10 (0.22)
Primary switch mode power supplies, Rated input voltage: 100-240 V AC Rated output voltage/current: 24 V DC / 0.42 A	CP-D 24/0.42 ¹⁾	1SVR427041R0000	0.06 (0.13)
Primary switch mode power supplies, Rated input voltage: 100-240 V AC Rated output voltage/current: 24 V DC / 1.3 A	CP-D 24/1.3 ²⁾	1SVR427043R0100	0.19 (0.41)

¹⁾ replaces CL-LAS.SD001, technical data see chapter "Primary switch mode power supplies"

²⁾ replaces CL-LAS.SD002, technical data see chapter "Primary switch mode power supplies"

Logic relays

Ordering details

Display systems

Display systems

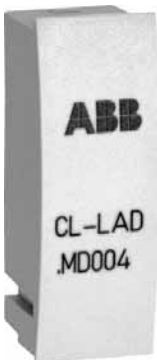
Rated operational voltage	Description	Reference code	Catalog number	Weight (1 pce) kg (lb)
-	Display module Graphic display 132 x 64 pixel	CL-LDD.XK	1SVR440839R4500	0.14 (0.30)
-	Display module Graphic display 132 x 64 pixel, with keypad	CL-LDD.K	1SVR440839R4400	0.13 (0.29)
24 V DC	Display base module	CL-LDC.LDC2	1SVR440821R0000	0.16 (0.36)
100-240 V AC	CPU / power supply	CL-LDC.LAC2	1SVR440823R0000	
24 V DC	Display base module	CL-LDC.LNDC2	1SVR440821R1000	0.17 (0.38)
100-240 V AC	CPU / power supply, networking-compatible (CL-NET)	CL-LDC.LNAC2	1SVR440823R1000	
24 V DC	Display I/O module 12 inputs, 4 relay outputs	CL-LDR.16AC2	1SVR440853R0000	0.17 (0.38)
24 V DC	Display I/O module 12 inputs, 4 relay outputs, 1 analog output	CL-LDR.16DC2	1SVR440851R0000	
24 V DC	Display I/O module 12 inputs, 4 transistor outputs	CL-LDT.16DC2	1SVR440851R1000	0.14 (0.30)
24 V DC	Display I/O module 12 inputs, 4 transistor outputs, 1 analog output	CL-LDT.17DC2	1SVR440851R3000	0.14 (0.30)



CL-LDD.K



CL-LDC.LN..



CL-LAD.MD004



CL-LAD.TK001



CL-LAD.TK002

CL-LAD...

Description	Reference code	Catalog number	Weight (1 pce) kg (lb)
Memory module for display base modules Memory size: 256 kB	CL-LAD.MD004	1SVR440899R7000	0.02 (0.03)
Cable with serial interface to connect PC and display base module	CL-LAD.TK001	1SVR440899R6000	0.11 (0.23)
Cable with USB interface to connect PC and display base module	CL-LAD.TK011	1SVR440899R6700	
Network cable (CL-NET) to connect 2 display base modules Length: 0.3 m	CL-LAD.TK002	1SVR440899R6100	0.05 (0.12)
Network cable (CL-NET) to connect 2 display base modules Length: 0.8 m	CL-LAD.TK003	1SVR440899R6200	0.07 (0.14)
Network cable (CL-NET) to connect 2 display base modules Length: 1.5 m	CL-LAD.TK004	1SVR440899R6300	0.08 (0.18)
Cable for point-to-point connection of remote display connection modules and display base module, length adaptable, Length: 5 m	CL-LAD.TK005	1SVR440899R6400	0.20 (0.44)
Cable for point-to-point connection of 2 display base modules, length adaptable. Length: 5 m	CL-LAD.TK006	1SVR440899R6500	0.12 (0.26)
Termination resistor, content: 2 pieces	CL-LAD.TK009	1SVR440899R6900	0.01 (0.02)
Protective cover, transparent, for harsh environmental conditions and application in the food industry	CL-LAD.FD001	1SVR440899R1000	0.03 (0.07)
Protective cover, transparent and sealable	CL-LAD.FD011	1SVR440899R2000	0.03 (0.07)
Assembly tool for mounting of display modules	CL-LAD.FD002	1SVR440899R3000	

Logic relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type	CL-LSR.C...12DC1	CL-LSR....12DC2 CL-LST.C...12DC2	CL-LSR.C...12AC1	CL-LSR...12AC2
Input circuit - supply circuit				
Rated operational voltage U_n	12 V DC	24 V DC	24 V AC	100-240 V AC
Rated operational voltage tolerance	-15...+30 %	-15...+20 %	-15...+10 %	-
Operational voltage range	10.2-15.6 V DC	20.4-28.8 V DC	20.4-26.4 V AC	85-264 V AC
Rated frequency	0 Hz	-	50/60 Hz	-
Rated frequency tolerance	-	-	±5 %	-
Residual ripple	≤ 5 %	-	-	-
Input current				
at 12 V DC	typ. 140 mA	-	-	-
at 24 V DC	-	typ. 80 mA	-	-
at 24 V AC	-	-	typ. 200 mA	-
at 115/120 V AC (60 Hz)	-	-	-	typ. 40 mA
at 230/240 V AC (50 Hz)	-	-	-	typ. 20 mA
Power failure buffering (IEC/EN 61131-2)	-	10 ms	-	20 ms
Power dissipation				
at 12 V DC	typ. 2 W	-	-	-
at 24 V DC	-	typ. 2 W	-	-
at 24 V AC	-	-	typ. 5 VA	-
at 115/120 V AC	-	-	-	typ. 5 VA
at 230/240 V AC	-	-	-	typ. 5 VA

6

Type	CL-LMR.C...18DC1	CL-LMR.C...18DC2 CL-LMT.C...20DC2	CL-LMR.C...18AC1	CL-LMR.C...18AC2
Input circuit - supply circuit				
Rated operational voltage U_n	12 V DC	24 V DC	24 V AC	100-240 V AC
Rated operational voltage tolerance	-15...+30 %	-15...+20 %	-15...+10 %	-
Operational voltage range	10.2-15.6 V DC	20.4-28.8 V DC	20.4-26.4 V AC	85-264 V AC
Rated frequency	0 Hz	-	50/60 Hz	-
Rated frequency tolerance	-	-	±5 %	-
Residual ripple	≤ 5 %	-	-	-
Input current				
at 12 V DC	typ. 200 mA	-	-	-
at 24 V DC	-	typ. 140 mA	-	-
at 24 V AC	-	-	typ. 300 mA	-
at 115/120 V AC (60 Hz)	-	-	-	typ. 70 mA
at 230/240 V AC (50 Hz)	-	-	-	typ. 35 mA
Power failure buffering (IEC/EN 61131-2)	-	10 ms	-	20 ms
Power dissipation				
at 12 V DC	typ. 3.5 W	-	-	-
at 24 V DC	-	typ. 3.5 W	-	-
at 24 V AC	-	-	typ. 7 VA	-
at 115/120 V AC	-	-	-	typ. 10 VA
at 230/240 V AC	-	-	-	typ. 10 VA

Type	CL-LER.18DC2 CL-LET.20DC2	CL-LER.18AC2		
Input circuit - supply circuit				
Rated operational voltage U_n	24 V DC	100-240 V AC	-	-
Rated operational voltage tolerance	-15...+20 %	-15...+10 %	-	-
Operational voltage range	20.4-28.8 V DC	85-264 V AC	-	-
Rated frequency	0 Hz	50/60 Hz	-	-
Rated frequency tolerance	-	±5 %	-	-
Residual ripple	≤ 5 %	-	-	-
Input current				
at 24 V DC	typ. 140 mA	-	-	-
at 115/120 V AC (60 Hz)	-	typ. 70 mA	-	-
at 230/240 V AC (50 Hz)	-	typ. 35 mA	-	-
Power failure buffering (IEC/EN 61131-2)	10 ms	20 ms	-	-
Power dissipation				
at 24 V DC	typ. 3.4 W	-	-	-
at 115/120 V AC	-	typ. 10 VA	-	-
at 230/240 V AC	-	typ. 10 VA	-	-

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type		CL-LSR.C...12DC1	CL-LSR...12DC2 CL-LST.C...12DC2	CL-LSR.C...12AC1	CL-LSR.C...12AC2
Input circuit - Digital inputs		12 V DC	24 V DC	24 V AC	115 / 230 V AC
Number				8	
Inputs can be used as analog inputs			2 (I7, I8)		-
Indication of operational states			LCD-Display (if existing)		
Electrical isolation	from voltage supply			no	
	between digital inputs			no	
	from the outputs			yes	
Rated operational voltage U_o		12 V DC	24 V DC	24 V AC	
	U_o on „0“ signal	4 V DC (I1-I8)	< 5 V DC (I1-I8)	0-6 V AC (sinusoidal)	0-40 V AC (sinusoidal)
	U_o on „1“ signal	8 V DC (I1-I8)	> 15 V DC (I1-I6), > 8 V DC (I7, I8)	> 9.5 V DC, 14-26,4 V AC (sinusoidal) (I1-I6), > 7 V AC (sinusoidal) (I7,I8)	79-264 V AC (sinusoidal)
Rated frequency				50-60 Hz	
Input current on „1“ signal					6x0.25 mA
		3.3 mA (at 12 V DC, I1-I6), 1.1 mA (at 12 V DC, I7, I8)	3.3 mA (at 24 V DC, I6-I7), 2.2 mA (at 24 V DC, I7, I8)	4 mA (at 24 V AC, 50 Hz, I1-I6), 2 mA (at 24 V AC, 50 Hz, I7,I8), 2 mA (at 24 V DC, I7, I8)	(at 115 V AC, 60 Hz, I1-I6), 6x0.5 mA (at 230 V AC, 50 Hz, I1-I6) 2x4 mA (at 115 V AC, 60 Hz, I7, I8), 2x6 mA (at 230 V AC, 50 Hz, I7, I8)
Time delay from „0“ to „1“	debounce ON		20 ms		80 ms (at 50 Hz), 66 ² / ₃ ms (at 60 Hz)
	debounce OFF	typ. 0.3 ms (I1-I6), typ. 0.35 ms (I7, I8)	typ. 0.25 ms (I1-I8)		20 ms (at 50 Hz), 16 ² / ₃ ms (at 60 Hz)
Time delay from „1“ to „0“	debounce ON		20 ms		80 ms (at 50 Hz, I1-I6), 66 ² / ₃ ms (at 60 Hz, I1-I6) 160 ms (at 50 Hz, I7, I8), 150 ms (at 60 Hz, I7, I8)
	debounce OFF	typ. 0.3 ms (I1-I6), typ. 0.15 ms (I7, I8)		20 ms (at 50 Hz), 16 ² / ₃ ms (at 60 Hz)	20 ms (at 50 Hz, I1-I6), 16 ² / ₃ ms (at 60 Hz, I1-I6) 100 ms (at 50 Hz, I7, I8), 100 ms (at 60 Hz, I7, I8)
Cable length (unshielded)		100 m		-	-
Maximum cable length per input				40 m	40 m (I1-I6), 100 m (I7, I8)
Frequency counter	Number	2 (I3, I4)		-	-
	counting frequency	< 1 kHz		-	-
	pulse shape	square-wave		-	-
	pulse / pause ratio	1:1		-	-
Rapid counter inputs	Number	2 (I1, I2)		-	-
	counting frequency	< 1 kHz		-	-
	pulse shape	square-wave		-	-
	pulse / pause ratio	1:1		-	-
Cable length (shielded)		< 20 m		-	-
Input circuit - Analog inputs					
Number			2 (I7, I8)		-
Electrical isolation	from voltage supply		no		-
	from the digital inputs		no		-
	from the outputs		yes		-
	from PC interface, memory module, CL-NET, CL-LINK		no		-
Input type			DC voltage		-
Signal range			0-10 V DC		-
Resolution	analog		0.01 V		-
	digital		0.01 V; 10 Bit (value 1-1023)		-
Input impedance			11.2 k Ω		-
Accuracy of the actual value	two CL devices		$\pm 3\%$		-
	within one device		$\pm 2\%$, $\pm 0.12\text{ V}$		-
Conversion time analog/digital	Input delay ON		20 ms		-
	Input delay OFF		each cycle		-
Input current			< 1 mA		-
Cable length (shielded)			< 30 m		-

Logic relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type		CL-LMR.C...18DC1	CL-LMR.C...18DC2 CL-LMT.C...20DC2	CL-LMR.C...18AC1	CL-LMR.C...18AC2
Input circuit - Digital inputs					
Number		12 V DC	24 V DC	24 V AC	115 / 230 V AC
Inputs can be used as analog inputs			4 (I7, I8, I11, I12)		-
Indication of operational states			LCD-Display (if existing)		
Electrical isolation	from voltage supply			no	
	between digital inputs			no	
	from the outputs			yes	
	from PC interface, memory module, CL-NET, CL-LINK		no		yes
Rated operational voltage U_o		12 V DC	24 V DC	24 V AC	
	U_o on „0“ signal	4 V DC (I1-I12)	< 5 V DC (I1-I12, R1-R12)	0-6 V AC (sinusoidal)	0-40 V AC (sinusoidal)
	U_o on „1“ signal	8 V DC (I1-I12)	> 15 V DC (I1-I6, I9, I10) > 8 V DC (I7, I8, I11, I12)	> 9.5 V DC, 14-26.4 V AC (sinusoidal) (I1-I6, I9, I10) > 7 V AC (sinusoidal) (I7, I8, I11, I12)	79-264 V AC (sinusoidal)
Rated frequency				50-60 Hz	
Input current on „1“ signal					6x0.25 mA (at 115 V AC, 60 Hz, I1-I6), 6x0.5 mA (at 230 V AC, 50 Hz, I1-I6)
		3.3 mA (at 12 V DC, I1-I6, I9-I12), 1.1 mA (at 12 V DC, I7, I8)	3.3 mA (at 24 V DC, I1-I6, I9, I10), 2.2 mA (at 24 V DC, I7, I8, I11, I12)	4 mA (at 24 V AC, 50 Hz, I1-I6, I9, I10), 2 mA (at 24 V AC, 50 Hz, I7, I8, I11, I12), 2 mA (at 24 V DC, I7, I8, I11, I12)	2x4 mA (at 115 V AC, 60 Hz, I7, I8), 2x6 mA (at 230 V AC, 50 Hz, I7, I8), 4x0.25 mA (at 115 V AC, 60 Hz, I9-I12), 4x0.5 mA (at 230 V AC, 50 Hz, I9-I12)
Time delay from „0“ to „1“	debounce ON	20 ms		80 ms (at 50 Hz), 66 ^{2/3} ms (at 60 Hz)	
	debounce OFF	typ. 0.3 ms (I1-I6, I9, I10), typ. 0.35 ms (I7, I8, I11, I12)	typ. 0.25 ms	20 ms (at 50 Hz), 16 ^{2/3} ms (at 60 Hz)	
Time delay from „1“ to „0“	debounce ON	20 ms		80 ms (at 50 Hz), 66 ^{2/3} ms (at 60 Hz)	
	debounce OFF	typ. 0.4 ms (I1-I6, I9, I10), typ. 0.35 ms (I7, I8, I11, I12)	-	20 ms (at 50 Hz), 16 ^{2/3} ms (at 60 Hz)	
Cable length (unshielded)		100 m			
Maximum cable length per input				max. 40 m, typ. 40 m (I9, I10)	typ. 40 m (I1-I6, I9-I12), typ. 100 m (I7, I8)
Frequency counter	number	2 (I3, I4)		-	-
	counting frequency	< 1 kHz		-	-
	pulse shape	square-wave		-	-
	pulse / pause ratio	1:1		-	-
Rapid counter inputs	number	2 (I1, I2)		-	-
	counting frequency	< 1 kHz		-	-
	pulse shape	square-wave		-	-
	pulse / pause ratio	1:1		-	-
Cable length (shielded)		< 20 m			
Input circuit - Analog inputs					
Number		4 (I7, I8, I11, I12)			-
Electrical isolation	from voltage supply		no		-
	from the digital inputs		no		-
	from the outputs		yes		-
	from PC interface, memory module, CL-NET, CL-LINK		no		-
Input type		DC voltage			-
Signal range		0-10 V DC			-
Resolution	analog	0.01 V			-
	digital	0.01 V; 10 Bit (value 1-1023)			-
Input impedance		11.2 k Ω			-
Accuracy of the actual value	two CL devices	$\pm 3\%$			-
	within one device	$\pm 2\%$, $\pm 0.12\text{ V}$			-
Conversion time analog/digital	Input delay ON	20 ms			-
	Input delay OFF	each cycle			-
Input current		< 1 mA			-
Cable length (shielded)		< 30 m			-

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type		CL-LER.18DC2 CL-LET.20DC2	CL-LER.18AC2
Input circuit - Digital inputs		24 V DC	115 / 230 V AC
Number			12
Inputs can be used as analog inputs			-
Indication of operational states			-
Electrical isolation	from voltage supply		no
	between digital inputs		no
	from the outputs		yes
	from PC interface, memory module, CL-NET, CL-LINK		no
Rated operational voltage U_o		24 V DC	
	U_o on „0“ signal	< 5 V DC (I1-I12, R1-R12)	0-40 V AC (sinusoidal)
	U_o on „1“ signal	-	79-264 V AC (sinusoidal)
Rated frequency		-	50-60 Hz
Input current on „1“ signal		3.3 mA (at 24 V DC, R1-R12)	12x0.25 mA (at 115 V AC, 60 Hz, R1-R12), 12x0.5 mA (at 230 V AC, 50 Hz, R1-R12)
Time delay from „0“ to „1“	debounce ON	20 ms	80 ms (at 50 Hz, I1-I12, R1-R12), 66 ² / ₃ ms (at 60 Hz, I1-I12, R1-R12)
	debounce OFF	typ. 0.25 ms (R1-R12)	20 ms (at 50 Hz, I1-I12, R1-R12), 16 ² / ₃ ms (at 60 Hz, I1-I12, R1-R12)
Time delay from „1“ to „0“	debounce ON	20 ms	80 ms (at 50 Hz, I1-I12, R1-R12), 66 ² / ₃ ms (at 60 Hz, I1-I12, R1-R12)
	debounce OFF	-	20 ms (at 50 Hz, I1-I12, R1-R12), 16 ² / ₃ ms (at 60 Hz, I1-I12, R1-R12)
Cable length (unshielded)		100 m	-
Maximum cable length per input		-	typ. 40 m (I1-I6, I9-I12, R1-R12), typ. 100 m (I7, I8)

6

Logic relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type	CL-LSR...	CL-LMR... CL-LER...	CL-LER.20
Output circuit - Relay outputs			
Number	4	6	2
Outputs in groups of	1		2
Parallel switching of outputs to increase capacity	not permissible		
Fusing of the output relay	circuit-breaker B16 or fuse 8 A (slow-acting)		
Electrical isolation	from voltage supply	yes	
	from the inputs	yes	
	from PC interface, memory module, CL-NET, CL-LINK	no	
	protective separation	300 V AC	
	basic isolation	600 V AC	
Mechanical lifetime	10x10 ⁶ switching cycles		
Rung	conventional thermal current (10 A UL)	8 A	
	recommended for load 12 V AC/DC	> 500 mA	
	short-circuit proof $\cos \varphi = 1$; characteristic B16 at 600 A	16 A	
	short-circuit proof $\cos \varphi = 0.5$ up to 0.7; characteristic B16 at 900 A	16 A	
	Rated impulse withstand voltage U_{imp} contact-coil	6 kV	
	Rated operational voltage U_a	250 V AC	
Rated insulation voltage U_i	250 V AC		
Protective separation (EN 50178)	between coil and contact	300 V AC	
	between two contacts	300V AC	
Making capacity	AC15, 250 V AC, 3 A (600 ops./h)	300.000 switching cycles	
	DC13, L/R ≤ 150 ms, 24 V DC, 1 A (500 ops./h)	200.000 switching cycles	
Breaking capacity	AC15, 250 V AC, 3 A (600 ops./h)	300.000 switching cycles	
	DC13, L/R ≤ 150 ms, 24 V DC, 1 A (500 ops./h)	200.000 switching cycles	
Incandescent lamp load	1000 W at 230/240 V AC	25.000 switching cycles	
	500 W at 115/120 V AC	25.000 switching cycles	
Fluorescent lamp load	10 x 58 W at 230/240 V AC with electrical control gear	25.000 switching cycles	
	10 x 58 W at 230/240 V AC uncompensated	25.000 switching cycles	
	1 x 58 W at 230/240 V AC conventional compensated	25.000 switching cycles	
Switching frequency	mechanical operations	10x10 ⁶	
	switching frequency	10 Hz	
	resistive load / lamp load	2 Hz	
	inductive load	0.5 Hz	
UL/CSA			
Continuous current at 240 V		10 A AC	
Continuous current at 24 V		8 A DC	
AC	Utilization category (Control Circuit Rating Codes)	B 300 Light Pilot Duty	
	max. rated operational voltage	300 V AC	
	max. continuous thermal current $\cos \varphi = 1$ at B 300	5 A	
	max. making / breaking apparent power (Make/Break) $\cos \varphi \neq 1$ at B 300	3600/360 VA	
DC	Utilization category (Control Circuit Rating Codes)	R 300 Light Pilot Duty	
	max. rated operational voltage	300 V DC	
	max. continuous thermal current at R 300	1 A	
	max. making / breaking apparent power (Make/Break) at R 300	28/28 VA	

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type	CL-LST...	CL-LMT...	CL-LET...
Output circuit - Transistor outputs			
Number	4	8	
Rated operational voltage U_o	24 V DC		
Operational voltage range	20.4-28.8 V DC		
Residual ripple	≤ 5 %		
Supply current	on „0“ signal	typ. 9 mA / max. 16 mA	typ. 18 mA / max. 32 mA
	on „1“ signal	typ. 12 mA / max. 22 mA	typ. 24 mA / max. 44 mA
Reverse voltage protection	yes (Attention: If supply voltage is reversed, applying voltage at the outputs, causes a short circuit.)		
Electrical isolation	from voltage supply	yes	
	from the inputs	yes	
	from PC interface, memory module, CL-NET, CL-LINK	-	
Rated operational current I_o on „1“ signal DC	max. 0.5 A		
Lamp load without R_f	5 W		
Residual current on „0“ signal per channel	< 0.1 mA		
Max. output voltage	on „0“ signal at external load < 10 MΩ	2.5 V	
	on „1“ signal at $I_o = 0.5\text{ A}$	$U = U_o - 1\text{ V}$	
Short-circuit protection	yes, thermal (analysis results from diagnosis input I16, I15; R15, R16)		
Short-circuit tripping current for $R_f \leq 10\text{ m}\Omega$	$0.7\text{ A} \leq I_o \leq 2\text{ A}$ per output		
Total short-circuit current	8 A	16 A	
Peak short-circuit current	16 A	32 A	
Thermal tripping	yes		
Max. switching frequency with constant resistive load $R_L < 100\text{ k}\Omega$ (depending on active channels and their load)	40.000 switching cycles/h		
Parallel connection of outputs	with resistive load, inductive load with external suppressor, combination within one group	group 1: Q1-Q4	group 1: Q1-Q4, group 2: Q5-Q8
	number of outputs	max. 4	
	max. total current	2 A (Attention! Outputs must be actuated simultaneously and for the same length of time.)	
Indication of operational states of the outputs	LCD-Display (if existing)		
Inductive load ¹⁾ without external suppressor			
$T_{0.95} = 1\text{ ms}$, $R = 48\ \Omega$, $L = 16\text{ mH}$	utilization factor	0.25 g	
	duty time	100 %	
	max. switching frequency $f = 0.5\text{ Hz}$ (max. duty time = 50 %)	1500 switching cycles	
DC13, $T_{0.95} = 72\text{ ms}$, $R = 48\ \Omega$, $L = 1.15\text{ H}$	utilization factor	0.25 g	
	duty time	100 %	
	max. switching frequency $f = 0.5\text{ Hz}$ (max. duty time = 50 %)	1500 switching cycles	
$T_{0.95} = 15\text{ ms}$, $R = 48\ \Omega$, $L = 0.24\text{ H}$	utilization factor	0.25 g	
	duty time	100 %	
	max. switching frequency $f = 0.5\text{ Hz}$ (max. duty time = 50 %)	1500 switching cycles	
Inductive load ¹⁾ with external suppressor			
	demand factor	1 g	
	duty time	100 %	
	max. switching frequency	depends on suppressor	
	max. duty time		

¹⁾ For inductive loading, without external suppression of the transistor outputs, the following applies:
 $T_{0.95}$ = time in ms, until 95 % of the steady-state current is achieved. $T_{0.95} \cdot 3 \times T_{0.65} = 3 \times L/R$.

Data transfer rate in the CL-NET network: bus lengths of 40 m and over only attainable with cables with additional cross-section and connection adapter.

Logic relays

Technical data

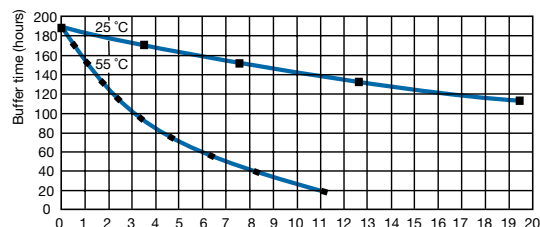
CL Range
Logic relays

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type	CL-LSR..., CL-LST...	CL-LMR... CL-LMT.. CL-LET., CL-LER.18..	CL-LER.20 CL-LEC.CI000
General data			
Dimensions (W x H x D)	71.5 mm x 90 mm x 58 mm (2.81 inch x 3.54 inch x 2.28 inch)	107.5 mm x 90 mm x 58 mm (4.23 inch x 3.54 inch x 2.28 inch)	35.5 mm x 90 mm x 58 mm (1.40 inch x 3.54 inch x 2.28 inch)
Weight	0.2 kg (0.44 lb)	0.3 kg (0.66 lb)	0.07 kg (0.15 lb)
Mounting	DIN rail (IEC/EN 60715), 35 mm or screw mounting with fixing brackets CL-LAS.FD001 (accessories)		
Mounting position	horizontal / vertical		
Electrical connection			
Wire size	rigid fine-strand with wire end ferrule	0.2-4 mm ² (22-12 AWG) 0.2-2.5 mm ² (22-12 AWG)	
Max. tightening torque	0.6 Nm		
Environmental data			
Ambient temperature range	operation storage	-25...+55 °C, cold acc. to IEC 60068-2-1, heat acc. to IEC 60068-2-2 -40...+70 °C	
LCD-Display (clearly legible)	0...+55 °C		
Condensation	avoid condensation with suitable methods		
Humidity, no condensation (IEC/EN 60068-2-30)	5-95 %		
Air pressure (operation)	795-1080 hPa		
Degree of protection (IEC/EN 60529)	IP20		
Vibration (IEC/EN 60068-2-6)	10-57 Hz (constant amplitude 0.15 mm), 57-150 Hz (constant acceleration 2 g)		
Shock resistance (half-sine 15 g / 11 ms) (IEC/EN 60068-2-27)	18 Shocks		
Drop (IEC/EN 60068-2-31) height of fall	50 mm		
Free fall, packaged (IEC/EN 60068-2-32)	1 m		
Insulation data			
Overvoltage category	II		
Pollution degree (DIN EN 60947)	2		
Rating of air and creepage distances	EN 50178, UL 508, CSA C22.2, No. 142		
Insulation resistance	EN 50178		
Standards			
Standards and directives	EN 55011, EN 55022, IEC/EN 61000-4, IEC 60068-2-6, IEC 60068-2-27		
Electromagnetic compatibility			
Interference immunity			
electrostatic discharge (ESD)	IEC/EN 61000-4-2	Level 3 (air discharge 8 kV, contact discharge 6 kV)	
electromag. field (HF radiation resistance)	IEC/EN 61000-4-3	10 V/m	
fast transients (Burst)	IEC/EN 61000-4-4	Level 3 (supply cable 2 kV, signal lines 2 kV)	
powerful impulses (Surge)	IEC/EN 61000-4-5	supply cable symmetrical (AC) 2 kV, Level 2 (supply cable symmetrical (DC) 0.5 kV)	
HF line emission	IEC/EN 61000-4-6	10 V	
Interference suppression (EN 55011, EN 55022)	class B		
Real time clock			
Back-up time	see diagram		-
Accuracy	typ. ±5 (±0.5 h/year)		-
Repeat accuracy of the time relay			
Accuracy (from value)	±1		-
Resolution	range „S“	10 ms	-
	range „M:“	1 s	-
	range „H:M“	1 min	-
Retention behaviour			
Write cycles of retention memory (minimum)	1.000.000 (10 ⁶)		-

Technical diagram

Back-up time of the real time clock



Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type		CL-LDD...
Input circuit - Supply circuit		
Power failure buffering (IEC/EN 61131-2)		10 ms
General data		
Dimensions (W x H x D)		with keypad: 86.5 x 86.5 x 21.5 mm (3.41 x 3.41 x 0.85 inch) without keypad: 86.5 x 86.5 x 20 mm (3.41 x 3.41 x 0.79 inch)
6 Weight		0.13 kg (0.29 lb)
Mounting		2 x 22.5 mm, with 2 retainers screwed
Mounting position		horizontal / vertical
Environmental data		
Ambient temperature range	operation	-25...+55 °C (cold acc. to IEC 60068-2-1, heat acc. to IEC 60068-2-2)
	storage	-40...+70 °C
LCD-Display (clearly legible)		-5...+50 °C, -10...0 °C (with backlit / continuous operation)
Condensation		avoid condensation with suitable methods
Humidity, no condensation (IEC/EN 60068-2-30)		5-95 %
Air pressure (operation)		795-1080 hPa
Degree of protection (IEC/EN 60529)		IP65
Vibration (IEC/EN 60068-2-6)		10-57 Hz (constant amplitude 0.15 mm), 57-150 Hz (constant acceleration 2 g)
Shock resistance (half-sine 15 g / 11 ms) (IEC/EN 60068-2-27)		18 Shocks
Drop (IEC/EN 60068-2-31) height of fall		50 mm
Free fall, packaged (IEC/EN 60068-2-32)		1 m
Insulation data		
Pollution degree (DIN EN 60947)		3
Rating of air and creepage distances		EN 50178, UL 508, CSA 22.2, No 142
Insulation resistance		EN 50178
Standards		
Standards and directives		EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, IEC 60068-2-6, IEC 60068-2-27
Electromagnetic compatibility		
Interference immunity		
electrostatic discharge (ESD)	IEC/EN 61000-4-2	Level 3 (air discharge 8 kV, contact discharge 6 kV)
electromag. field (HF radiation resistance)	IEC/EN 61000-4-3	10 V/m
fast transients (Burst)	IEC/EN 61000-4-4	Level 3 (supply cable 2 kV, signal lines 2 kV)
powerful impulses (Surge)	IEC/EN 61000-4-5	Level 3 (supply cable symmetrical 2 kV, CL-LDC.L...AC2) Level 2 (0.5 kV supply cable symmetrical, CL-LDC.L...AC2)
HF line emission	IEC/EN 61000-4-6	10 V
Interference suppression (EN 55011, EN 55022)		class B

Logic relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

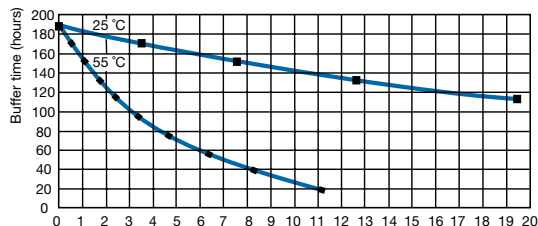
Type	CL-LDC. SDC2	CL-LDC. SAC2	CL-LDC. LDC2	CL-LCD. LAC2	CL-LDC. LNDC2	CL-LDC. LNAC2
Input circuit - Supply circuit						
Rated operational voltage U_o	24 V DC	100-240 V AC	24 V DC	100-240 V AC	24 V DC	100-240 V AC
Rated operational voltage tolerance	-15...+20 %	-15...+10 %	-15...+20 %	-15...+10 %	-15...+20 %	-15...+10 %
Operational voltage range	20.4-28.8 V DC	85-264 V AC	20.4-28.8 V DC	85-264 V AC	20.4-28.8 V DC	85-264 V AC
Frequency	0 Hz	50/60 Hz	0 Hz	50/60 Hz	0 Hz	50/60 Hz
Frequency tolerance	-	± 5 %	-	± 5 %	-	± 5 %
Residual ripple	≤ 5 %	-	≤ 5 %	-	≤ 5 %	-
Input current	at 24 V DC typ. 185 mA	-	typ. 200 mA	-	typ. 200 mA	-
	at 115/120 V AC (60 Hz)	typ. 90 mA	-	typ. 90 mA	-	typ. 90 mA
	at 230/240 V AC (50 Hz)	typ. 60 mA	-	typ. 60 mA	-	typ. 60 mA
Power failure buffering (IEC/EN 61131-2)	10 ms					
Power dissipation	at 24 V DC 1.5 W	-	3.4 W	-	3.4 W	-
	at 115/120 V AC	typ. 11 VA	-	typ. 11 VA	-	typ. 11 VA
	at 230/240 V AC	typ. 15 VA	-	typ. 15 VA	-	typ. 15 VA
Network - point-to-point connection						
Number of stations	1		-			
Data transfer rate	CL-LS..., CL-LM...	9.6 kBaud	-			
	CL-LDD	19.2 kBaud	-			
Distance	max. 5 m					
Electrical isolation	to voltage supply	yes	-			
	to connected device	yes	-			
Termination system	spring-type terminal					
Network - CL-NET						
Number of stations	max. 1		-		max. 8	
Data transfer rate	6 m	-	-		1000 kBit/s	
	25 m	-	-		500 kBit/s	
	40 m	-	-		250 kBit/s	
	125 m	-	-		125 kBit/s	
	300 m	-	-		50 kBit/s	
	700 m	-	-		20 kBit/s	
	1000 m	-	-		10 kBit/s	
Electrical isolation	to voltage supply	-	-		yes	
	to inputs	-	-		yes	
	to outputs	-	-		yes	
	to PC interface, memory module, CL-NET, CL-LINK	-	-		yes	
Bus terminator (first and last station)	-					
Termination system	RJ45, 8 pole					
General data						
Dimensions (W x H x D)	75 x 58 x 36.2 mm (2.95 x 2.28 x 1.43 inch)		107.5 x 90 x 30 mm (4.23 x 3.54 x 1.18 inch)			
Weight	0.164 kg (0.36 lb)		0.145 kg (0.32 lb)			
Mounting	plugged onto CL-LDD		plugged onto CL-LDD or on DIN rail (IEC/EN 60715)			
Mounting position						
Electrical connection - Supply circuit						
Wire size	fine-strand with wire end ferrule	0.2 mm ² / 2.5 mm ² (24-12 AWG)				
	rigid	0.2 mm ² / 4 mm ² (24-12 AWG)				
Electrical connection - Data cable						
Wire size	fine-strand with wire end ferrule	0.08 mm ² / 1.5 mm ² (28-12 AWG)	-		0.2 mm ² / 2.5 mm ² (24-12 AWG)	
	rigid	0.08 mm ² / 2.5 mm ² (28-12 AWG)	-		0.2 mm ² / 4 mm ² (24-12 AWG)	
Environmental data						
Ambient temperature range	operation	-25...+55 °C (cold acc. to IEC 60068-2-1, heat acc. to IEC 60068-2-2)				
	storage	-40...+70 °C				
Condensation	avoid condensation with suitable methods					
Humidity, no condensation (IEC/EN 60068-2-30)	5-95 %					
Air pressure (operation)	795-1080 hPa					
Degree of protection (IEC/EN 60529)	IP20					
Vibration (IEC/EN 60068-2-6)	10-57 Hz (constant amplitude 0.15 mm), 57-150 Hz (constant acceleration 2 g)					

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type	CL-LDC. SDC2	CL-LDC. SAC2	CL-LDC. LDC2	CL-LCD. LAC2	CL-LDC. LNDC2	CL-LDC. LNAC2
Shock (half-sine 15 g / 11 ms) (IEC/EN 60068-2-27)						18 Shocks
Drop (IEC/EN 60068-2-31) height of fall						50 mm
Free fall, packaged (IEC/EN 60068-2-32)						1 m
Insulation data						
Degree of protection (DIN EN 60947)						2
Rating of air and creepage distances						EN 50178, UL 508, CSA 22.2, No 142
Isolation resistance						EN 50178
Standards						
Standards and directives						EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, IEC 60068-2-6, IEC 60068-2-27
Electromagnetical compatibility						
Interference immunity						
electrostatic discharge (ESD)	IEC/EN 61000-4-2					Level 3 (air discharge 8 kV, contact discharge 6 kV)
electromag. field (HF radiation resistance)	IEC/EN 61000-4-3					10 V/m
fast transients (Burst)	IEC/EN 61000-4-4					Level 3 (supply cable 2 kV, signal lines 2 kV)
powerful impulses (Surge)	IEC/EN 61000-4-5					Level 3 (supply cable symmetrical 2 kV, CL-LDC.L...AC2)
			Level 2 (1 kV supply cable symmetrical)			Level 2 (0.5 kV supply cable symmetrical, CL-LDC.L...AC2)
HF line emission	IEC/EN 61000-4-6					10 V
Interference suppression (EN 55011, EN 55022)						class B
Real time clock						
Back-up time						see diagram
Accuracy						typ. ± 5 s/day ($\pm 0,5$ h/year)
Repeat accuracy of the time relay						
Accuracy (from value)						$\pm 0,02\%$
Resolution	range „S“					5 ms
	range „M:S“					1 s
	range „H:M“					1 min
Retention behaviour						
Write cycles of retention memory (minimum)						10^{10} (read/ write cycles)

Technical diagram

Back-up time of the real time clock



Logic relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type		CL-LD...16DC2	CL-LD...17DC2	CL-LDR.16AC2
Input circuit - Digital inputs				
Number		24 V DC		115/230 V
Inputs can be used as analog inputs		12		-
Indication of operational states		4 (I7, I8, I11, I12)		-
Electrical isolation		-		LCD-Display (if existing)
	from supply voltage	-		no
	from digital inputs	-		no
	from the outputs	-		yes
	from PC interface, memory module, CL-NET, CL-LINK	-		yes
Rated operational voltage U_o		24 V DC		-
	U_o on „0“ signal	< 5 V DC (I1-I6, I9, I10), < 8 V DC (I7, I8, I11, I12)		0-40 V AC (sinusoidal)
	U_o on „1“ signal	> 15 V DC (I1-I6, I9, I10), > 8 V DC (I7, I8, I11, I12)		79-264 V AC (sinusoidal)
Rated frequency		0 Hz		50-60 Hz
Input current on „1“ signal		3.3 mA (at 24 V DC, I1-I6, I9, I10), 2.2 mA (at 24 V DC, I7, I8, I11, I12)		12x0.2 mA (at 115 V AC, 60 Hz, I1-I12), 12x0.5 mA (at 230 V AC, 50 Hz, I1-I12)
Time delay from „0“ to „1“	debounce ON	20 ms		10 ms (at 50 Hz), 100 ms (at 60 Hz)
	debounce OFF	typ. 0.1 ms (I1-I4), typ. 0.25 ms (I5-I12)		10 ms (at 50 Hz), 100 ms (at 60 Hz)
Time delay from „1“ to „0“	debounce ON	20 ms		10 ms (at 50 Hz), 100 ms (at 60 Hz)
	debounce OFF	typ. 0.1 ms (I1-I4), typ. 0.4 ms (I5, I6, I9, I10), typ. 0.2 ms (I7, I8, I11, I12)		10 ms (at 50 Hz), 100 ms (at 60 Hz)
Cable length (unshielded)		100 m		-
Maximum cable length per input		-		typ. 60 m
Frequency counter	number	4 (I1, I2, I3, I4)		-
	counting frequency	< 3 kHz		-
	pulse shape	square-wave		-
	pulse / pause ratio	1:1		-
Incremental counter	number	2 (I1 + I2, I3 + I4)		-
	counting frequency	< 3 kHz		-
	pulse shape	square-wave		-
	signal offset	90°		-
	pulse / pause ratio	1:1		-
Rapid counter inputs	number	4 (I1, I2, I3, I4)		-
	counting frequency	< 3 kHz		-
	pulse shape	square-wave		-
	pulse / pause ratio	1:1		-
Cable length (shielded)		< 20 m		-
Input circuit - Analog inputs				
Number		4 (I7, I8, I11, I12)		-
Electrical isolation	to voltage supply	no		-
	to digital inputs	no		-
	to outputs	yes		-
	to PC interface, memory modul, CL-NET, CL-LINK	yes		-
Input type		DC voltage		-
Signal range		0-10 V DC		-
Resolution	analog	0.01 V		-
	digital	0.01 V; 10 Bit (value 0-1023)		-
Input impedance		11.2 k Ω		-
Accuracy of the actual value	two CL-LD... devices	$\pm 3\%$		-
	within one device	$\pm 2\%$		-
Conversion time analog/digital		each cycle		-
Input current		< 1 mA		-
Cable length (shielded)		< 30 m		-

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type	CL-LD...16DC2	CL-LD...17DC2	CL-LDR.16AC2
Output circuit - Analog outputs			
Number	-	1	-
Electrical separation	from voltage supply	no	-
	from the digital inputs	no	-
	from the digital outputs	yes	-
	from PC interface, memory module, CL-NET, CL-LINK	yes	-
Output type	-	DC voltage	-
Signal range	-	0-10 V DC	-
Max. output current	-	0.01 A	-
Burden resistance	-	1 k Ω	-
Overload and short-circuit protection	-	yes	-
Resolution	analog	0.01 V DC	-
	digital	10 Bit, (value: 0-1023)	-
Setting time	-	100 ms	-
Accuracy	-25...+55 °C	2 %	-
	25 °C	1 %	-
Conversion time	-	each CPU cycle	-
General data			
Dimensions (W x H x D)	CL-LDR: 89 x 90 x 44 mm (3.5 x 3.54 x 1.73 inch)		89 x 90 x 44 mm
	CL-LDT (build-in): 89 x 90 x 25 mm (3.5 x 3.54 x 0.98 inch)		(3.5 x 3.54 x 1.73 inch)
Weight	CL-LDR: 0.15 kg (0.33 lb) / CL-LDT: 0.14 kg (0.31 lb)		0.15 kg (0.33 lb)
Mounting	snap-on power supply unit		
Mounting position	horizontal / vertical		
Electrical connection			
Wire size	fine-strand with wire end ferrule	0.2 mm ² / 2.5 mm ² (24-12 AWG)	
	rigid	0.2 mm ² / 4 mm ² (24-12 AWG)	
Electrical connection - Data cable			
Wire size	fine-strand with wire end ferrule	0.08 mm ² / 1.5 mm ² (28-12 AWG)	
	rigid	0.08 mm ² / 2.5 mm ² (28-12 AWG)	
Environmental data			
Ambient temperature range	operation	-25...+55 °C (cold acc. to IEC 60068-2-1, heat acc. to IEC 60068-2-2)	
	storage	-40...+70 °C	
Condensation	avoid condensation with suitable methods		
Humidity, no condensation (IEC/EN 60068-2-30)	5-95 %		
Atmospheric pressure (operation)	795-1080 hPa		
Degree of protection (IEC/EN 60529)	IP20		
Vibration (IEC/EN 60068-2-6)	10-57 Hz (constant amplitude 0.15 mm), 57-150 Hz (constant acceleration 2 g)		
Shock (half-sine 15 g / 11 ms) (IEC/EN 60068-2-27)	18 Shocks		
Drop (IEC/EN 60068-2-31) height of fall	50 mm		
Free fall, packaged (IEC/EN 60068-2-32)	1 m		
Insulation data			
Pollution degree	2		
Rating of air and creepage distances	EN 50178, UL 508, CSA C22.2, No. 142		
Isolation resistance	EN 50178		
Standards			
Standards and directives	EN 61000-6-1/-2/-3/-4, IEC/EN 61000-4, IEC 60068-2-6, IEC 60068-2-27		
Electromagnetic compatibility			
electrostatic discharge (ESD)	IEC/EN 61000-4-2	Level 3 (air discharge 8 kV, contact discharge 6 kV)	
electromag. field (HF radiation res.)	IEC/EN 61000-4-3	10 V/m	
fast transients (Burst)	IEC/EN 61000-4-4	Level 3 (supply cable 2 kV, signal cable 2 kV)	
powerful impulses (Surge)	IEC/EN 61000-4-5	2 kV (supply cable symmetrical), Level 2 (0.5 kV supply cable symmetrical)	
HF line emission	IEC/EN 61000-4-6	10 V	
Interference suppression (EN 55011, EN 55022)	class B		

Logic relays

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type		CL-LDR...
Output circuit - Relay outputs		
Number		4
Outputs in groups of		-
Parallel switching of outputs to increase capacity		not permissible
Fusing of the output relay		circuit-breaker B16 or fuse 8 A (slow-acting)
Electrical isolation	from voltage supply	yes
	from the inputs	yes
	from PC interface, memory module, CL-NET, CL-LINK	yes
	protective separation	300 V AC
	Basic isolation	600 V AC
Mechanical lifetime		10×10^6 switching cycles
Rung	conventional thermal current (10 A UL)	8 A
	recommended load 12 V AC/DC	> 500 mA
	short-circuit proof $\cos \varphi = 1$; characteristic B16 at 600 A	16 A
	short-circuit proof $\cos \varphi = 0.5$ up to 0.7; characteristic B16 at 900 A	16 A
	Rated impulse withstand voltage U_{imp} contact-coil	6 kV
	Rated operational voltage U_e	250 V AC
Rated insulation voltage U_i		250 V AC
Protective separation (EN 50178)	between coil and contact	300 V AC
	between two contacts	300V AC
Making capacity	AC15, 250 V AC, 3 A (600 ops./h)	300.000 switching cycles
	DC13, L/R ≤ 150 ms, 24 V DC, 1 A (500 ops./h)	200.000 switching cycles
Breaking capacity	AC15, 250 V AC, 3 A (600 ops./h)	300.000 switching cycles
	DC13, L/R ≤ 150 ms, 24 V DC, 1 A (500 ops./h)	200.000 switching cycles
Incandescent lamp load	1000 W at 230/240 V AC	25.000 switching cycles
	500 W at 115/120 V AC	25.000 switching cycles
Fluorescent lamp load	10 x 58 W at 230/240 V AC with electrical control gear	25.000 switching cycles
	10 x 58 W at 230/240 V AC uncompensated	25.000 switching cycles
	1 x 58 W at 230/240 V AC conventional compensated	25.000 switching cycles
Switching frequency	mechanical operations	10×10^6
	switching frequency	10 Hz
	resistive load / lamp load	2 Hz
	inductive load	0.5 Hz
UL/CSA		
Continuous current at 240 V		10 A AC
Continuous current at 24 V		8 A DC
AC	Utilization category (Control Circuit Rating Codes)	B 300 Light Pilot Duty
	max. rated operational voltage	300 V AC
	max. continuous thermal current $\cos \varphi = 1$ at B 300	5 A
	max. making / breaking apparent power (Make/Break) $\cos \varphi \neq 1$ at B 300	3600/360 VA
DC	Utilization category (Control Circuit Rating Codes)	R 300 Light Pilot Duty
	max. rated operational voltage	300 V DC
	max. continuous thermal current at R 300	1 A
	max. making / breaking apparent power (Make/Break) at R 300	28/28 VA

Data at $T_a = 25\text{ °C}$ and rated values, if nothing else indicated.

Type	CL-LDT...
Output circuit - Transistor outputs	
Number	4
Rated operational voltage U_o	24 V DC
Operational voltage range	20.4-28.8 V DC
Residual ripple	-
Supply current	on „0“ signal typ. 18 mA / max. 32 mA on „1“ signal typ. 24 mA / max. 44 mA
Reverse voltage protection	yes (Attention: If supply voltage is reversed, applying voltage at the outputs, causes a short circuit.)
Electrical isolation	from voltage supply yes from the inputs yes from PC interface, memory module, CL-NET, CL-LINK yes
Rated operational current I_o on „1“ signal DC	max. 0.5 A
Lamp load without R_L	5 W (Q1-Q4)
Residual current on „0“ signal per channel	< 0.1 mA
Max. output voltage	on „0“ signal at external load < 10 M Ω 2.5 V on „1“ signal at $I_o = 0.5$ A $U = U_o - 1$ V
Short-circuit protection	thermal (Q1-Q4), (analysis results from diagnosis input I16)
Short-circuit tripping current for $R_L \leq 10$ m Ω	0.7 A $\leq I_o \leq 2$ A per output
Total short-circuit current	8 A
Peak short-circuit current	16 A
Thermal tripping	yes
Max. switching frequency with constant resistive load $R_L < 100$ k Ω (depending on active channels and their load)	40.000 switching cycles/h
Parallel connection of outputs	with resistive load, inductive load with external suppressor, combination within one group group 1: Q1-Q4 number of outputs max. 4 max. total current 2 A (Attention! Outputs must be actuated simultaneously and for the same length of time.)
Indication of operational states of the outputs	LCD-Display (if existing)
Inductive load ¹⁾ without external suppressor	
$T_{0.95} = 1$ ms, $R = 48$ Ω , $L = 16$ mH	utilization factor 0.25 g duty time 100 % max. switching frequency $f = 0.5$ Hz (max. duty time = 50 %) 1500 switching cycles
DC13, $T_{0.95} = 72$ ms, $R = 48$ Ω , $L = 1.15$ H	utilization factor 0.25 g duty time 100 % max. switching frequency $f = 0.5$ Hz (max. duty time = 50 %) 1500 switching cycles
$T_{0.95} = 15$ ms, $R = 48$ Ω , $L = 0.24$ H	utilization factor 0.25 g duty time 100 % max. switching frequency $f = 0.5$ Hz (max. duty time = 50 %) 1500 switching cycles
Inductive load ¹⁾ with external suppressor	
	demand factor 1 g duty time 100 % max. switching frequency max. duty time depends on suppressor

¹⁾ For inductive loading, without external suppression of the transistor outputs, the following applies:
 $T_{0.95}$ = time in ms, until 95 % of the steady-state current is achieved. $T_{0.95} \cdot 3 \times T_{0.65} = 3 \times L/R$.

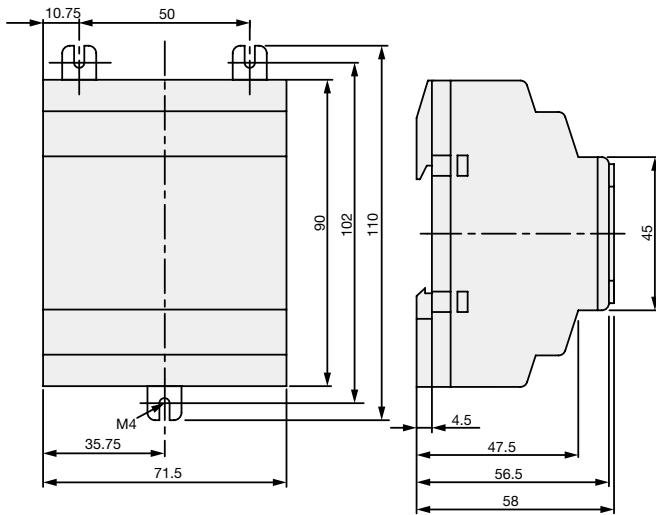
Data transfer rate in the CL-NET network: bus lengths of 40 m and over only attainable with cables with additional cross-section and connection adapter.

Logic relays

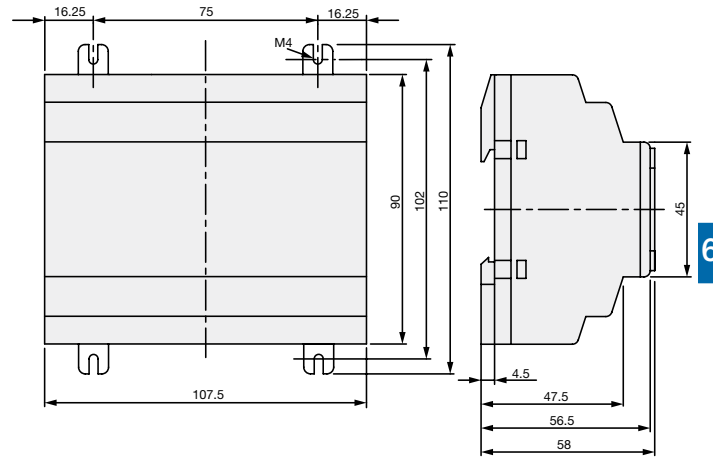
Approximate dimensions

CL Range
Logic relays

CL-LSR, CL-LST

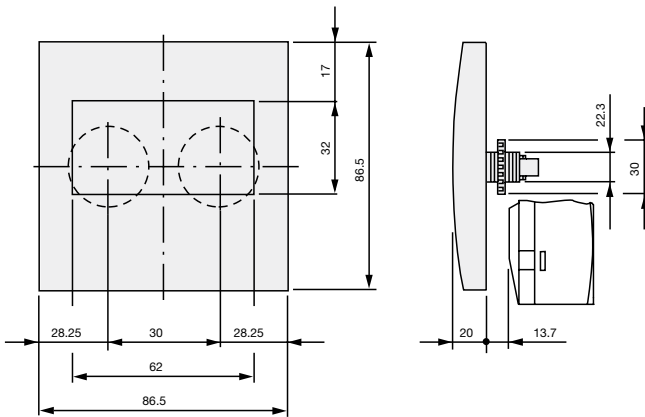


CL-LMR, CL-LMT

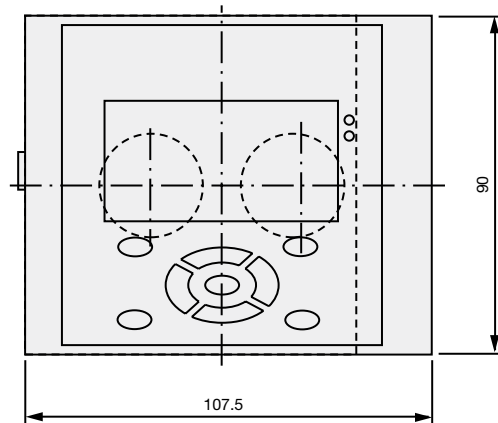


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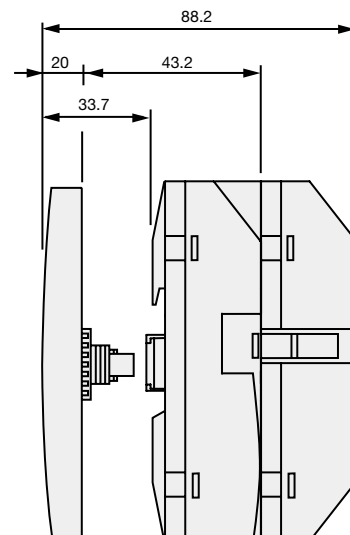
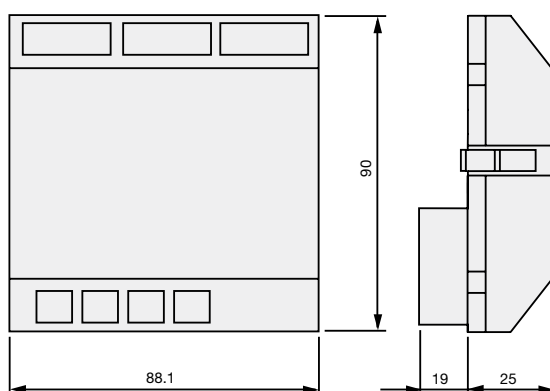
CL-LDD



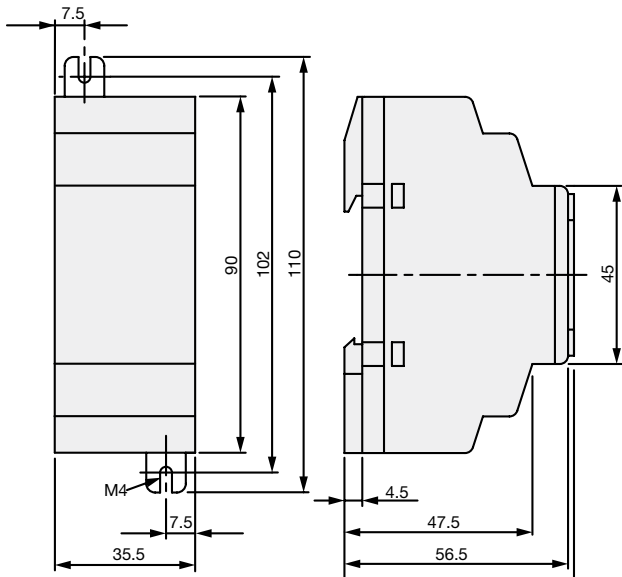
CL-LDD.K + CL-LDC.L. +
(CL-LDR or CL-LDT)



CL-LDR, CL-LDT

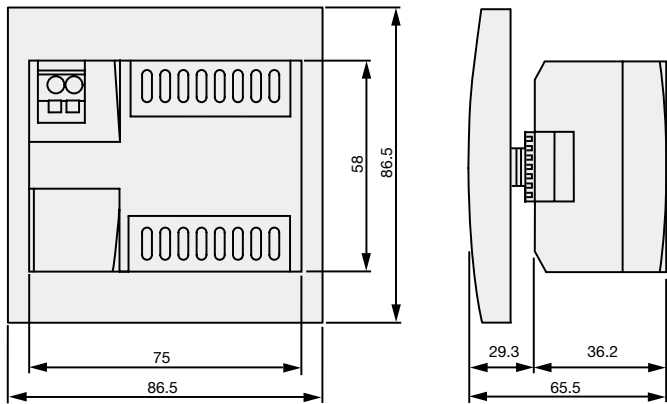


CL-LER.20

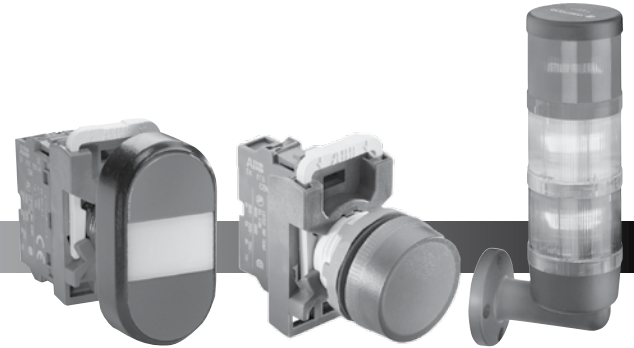


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CL-LDC.S..



7 - Pilot devices



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Modular Pilot devices

General construction

- Snap-on feature reduces installation time
- Bezels: Black plastic, chrome metal. Grey plastic available as an option
- Contact block holder features rear mounting with quick-release locking mechanism for high security
- Buttons available in several colors
- Engraved text caps available
- Custom-specific markings on request
- UL File# E76003
- CSA File# LR19700

Operators

- Pushbuttons, illuminated and non-illuminated
- Double pushbuttons, illuminated and non-illuminated
- Mushroom pushbuttons, illuminated and non-illuminated, Ø 40 mm and Ø 60 mm
- Emergency stop pushbuttons, illuminated and non-illuminated, twist or pull release
- Selector switches, illuminated and non-illuminated, 2 or 3 position, short or long handle
- Key operated selector switches, 2 or 3 position
- Toggle switches, 2 or 3 position
- Joy sticks
- Extreme duty pushbuttons

Pilot lights

- Full voltage, resistor and transformer
- LED & filament bulbs available for illuminated pushbuttons and pilot lights

Contact blocks

- Quick-mount, quick-release contact block holder for fast and easy assembly
- NO & NC contact blocks are color coded for easy identification: Green = NO, Red = NC
- Silver tipped contacts
- Wiping action for high reliability
- Low energy gold plated contact blocks
- Base mounted contact blocks which snap onto a 35 mm DIN rail or into a plastic enclosure
- Contact block holder for three or five blocks in a single row

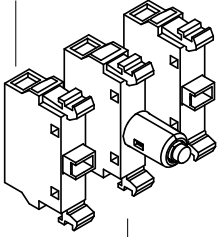
Additional products

- Buzzer, continuous and pulsating
- 5 kΩ and 10 kΩ potentiometers
- Definite purpose pushbuttons
- Reset pushbuttons
- Broad range of accessories

Mounting

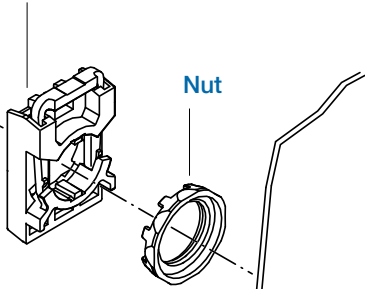
Contact block

Single pole with making or breaking contact



holder

Available either for three or five blocks in one single row. Additional blocks can be stacked on holders for three blocks.



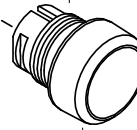
Nut

Legend plates

Of aluminum with slots that guide the legend plate and the operator into the correct position. Please, see the chapter 'Legend plates' for more information.

Operator

buttons, lenses and handles in several colors. Illuminated or non-illuminated.



LED/lamp block

Illuminated pushbuttons, illuminated selector switches and pilot lights have a lamp block in the center position of the holder.

Round or notched holes

Same actuator can be used in notched holes as well as in round holes.

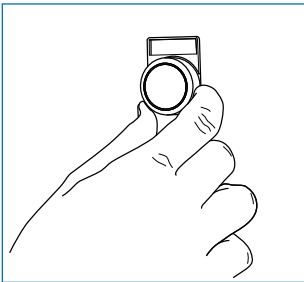
Legend plate holder

Of black plastic. Insert of brushed aluminum. Please see the chapter 'Legend plates' for more information.

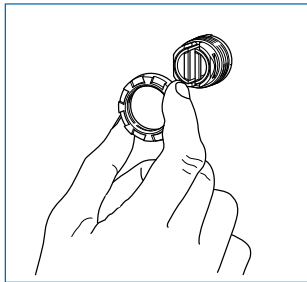
bezels

pushbuttons, selector switches and toggle switches with bezel in black plastic, chrome plastic or chrome metal are available.

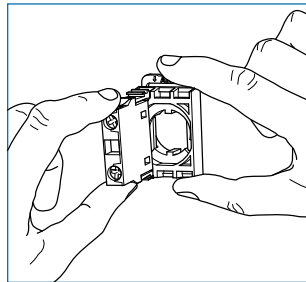
Easy to install



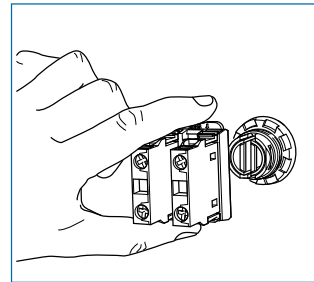
The operator is to be inserted from the front...



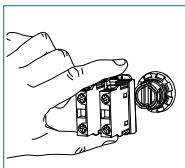
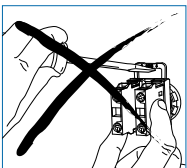
...and secured at the back with the nut.



The Contact blocks/lamp block are then snapped on to the holder...



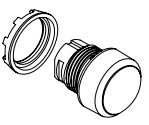
...and the holder snaps on to the operator.



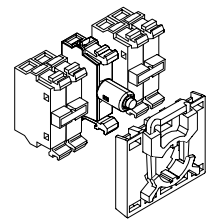
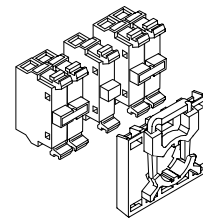
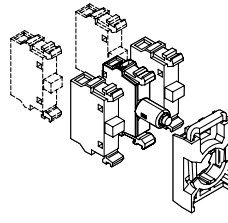
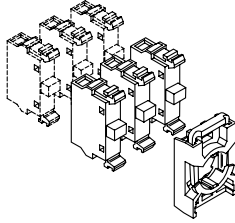
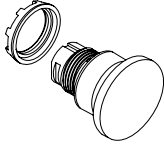
Press down the spring on the holder and pull the holder from the actuator.

Contact block combinations

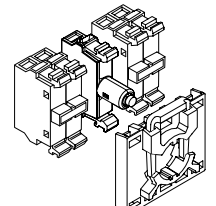
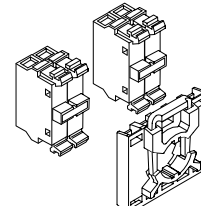
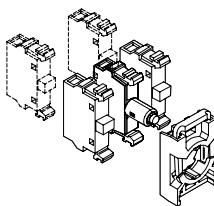
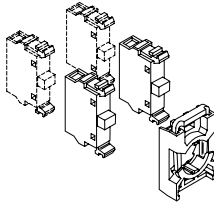
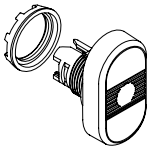
Pushbuttons



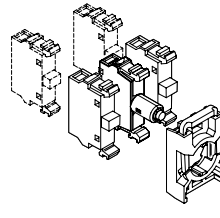
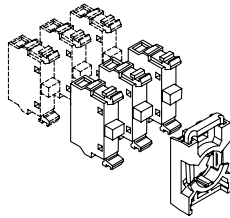
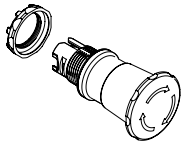
Mushroom pushbuttons



Double pushbuttons

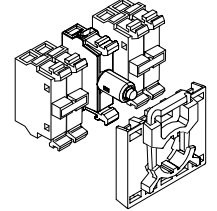
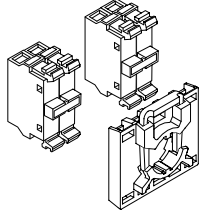
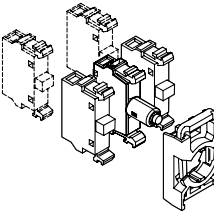
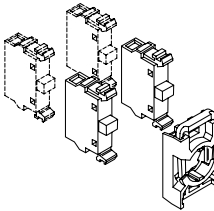
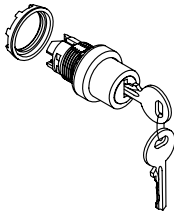
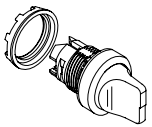


Emergency stop pushbuttons

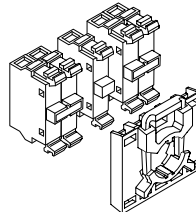
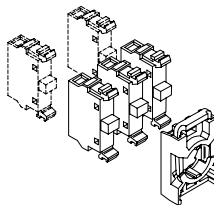
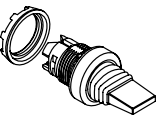


Selector switches

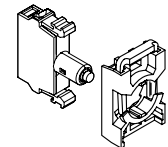
Key-operated selector switches



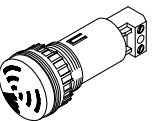
Toggle switches



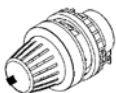
Pilot lights



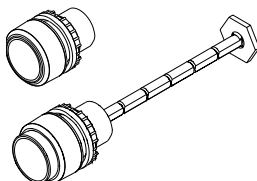
Buzzers



Potentiometers



Reset pushbuttons



Catalog number explanation

Modular pilot devices

Pilot light

Example 1: Type ML1-100R

L1 Pilot Light Head

Lens color:
R = Red
G = Green
Y = Yellow
L = Blue
W = White
C = Clear

Operators

7 Example 2: Type MP1-10Y

P Pushbutton
PD Pushbutton, **D**ouble
PK Pushbutton, **K**ey-lockable
PM Pushbutton, **M**ushroom
PMT Pushbutton, **M**ushroom, **T**wist release
PMP Pushbutton, **M**ushroom, **P**ull release
2SS 2-pos, **S**elector **S**witch
3SS 3-pos, **S**elector **S**witch
KB Buzzer
KT Potentiometer
TS Toggle **S**witch

Button color:
R = Red
G = Green
Y = Yellow
L = Blue
W = White
B = Black (non-illuminated only)
C = Clear
U = Grey (non-illuminated only)

Lens color for double pushbuttons
R = Red
G = Green
Y = Yellow
C = Clear
B = Black (non-illuminated only)
 -

Example 3: Type M2SSK1-101

2SSK 2-pos. Selector **S**witch, **K**ey-lockable
3SSK 3-pos. Selector **S**witch, **K**ey-lockable
PK Pushbutton, **K**ey-lockable

Key code:
1 = 71
2 = 72
3 = 73

Buzzer, contact blocks, lamp blocks

Example 4: Type MCBH-10

B Buzzer
CB Contact **B**lock
CBH Contact **B**lock with **H**older
LB Lamp **B**lock

Contact blocks:
10 = 1NO
01 = 1NC
11 = 1 NO + 1 NC
02 = 2 NO
20 = 2 NC

M = "Generation" M, Modular Range

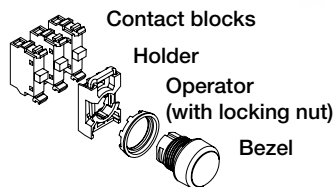
Flush and extended pushbuttons

Non-illuminated, momentary and maintained

How to order:

- Alt.1** • Operator
+ Holder
+ Contact block(s)

- Alt.2** • Operator
+ Holder with Contact block(s)



NOTE: For contact blocks & holders, see Accessories page 7.26

Bezel - How to order

- Black plastic - Standard
 Chrome plastic - Replace '1' with '2' in Catalog number
 Chrome metal - Replace '1' with '3' in Catalog number



Bezel options	Catalog number
Black plastic	MPX-10X
Chrome metal	MPX-30X



Non-illuminated flush pushbutton with black plastic bezel

Operator: pushbutton

Description	Catalog number	Weight oz.
Flush pushbutton		
Momentary		
Red	MP1-10R	0.56
Green	MP1-10G	0.56
Yellow	MP1-10Y	0.56
Blue	MP1-10L	0.56
White	MP1-10W	0.56
Black	MP1-10B	0.56
Clear	MP1-10C	0.56
Maintained		
Red	MP2-10R	0.56
Green	MP2-10G	0.56
Yellow	MP2-10Y	0.56
Blue	MP2-10L	0.56
White	MP2-10W	0.56
Black	MP2-10B	0.56
Clear	MP2-10C	0.56



Non-illuminated extended pushbutton with black plastic bezel

Extended pushbutton

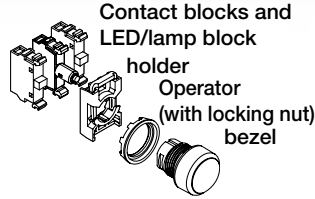
Momentary		
Red	MP3-10R	0.56
Green	MP3-10G	0.56
Yellow	MP3-10Y	0.56
Blue	MP3-10L	0.56
White	MP3-10W	0.56
Black	MP3-10B	0.56
Clear	MP3-10C	0.56
Maintained		
Red	MP4-10R	0.56
Green	MP4-10G	0.56
Yellow	MP4-10Y	0.56
Blue	MP4-10L	0.56
White	MP4-10W	0.56
Black	MP4-10B	0.56
Clear	MP4-10C	0.56

Flush and extended pushbuttons Illuminated, momentary and maintained

How to order:

- Alt.1** • Operator
+ holder
+ Contact block(s)
+ LED/lamp block

- Alt.2** • Operator
+ holder with contact block(s)
and lamp block



NOTE: No contact block in center position, reserved for lamp block

NOTE: For contact blocks, holders & LED lamp blocks, see Accessories pages 7.25 - 7.30.

Bezel - How to order

- Black plastic - Standard
Chrome plastic - Replace '1' with '2' in Catalog number
Chrome metal - Replace '1' with '3' in Catalog number



Bezel options	Catalog number
Black plastic	MPX-11X
Chrome metal	MPX-31X

7



Illuminated flush pushbutton with black plastic bezel

Operator: pushbutton

Description	Catalog number	Weight oz.
Flush pushbutton (light bulb max 2 W, not included)		
Momentary		
Red	MP1-11R	0.56
Green	MP1-11G	0.56
Yellow	MP1-11Y	0.56
Blue	MP1-11L	0.56
White	MP1-11W	0.56
Clear	MP1-11C	0.56
Maintained		
Red	MP2-11R	0.56
Green	MP2-11G	0.56
Yellow	MP2-11Y	0.56
Blue	MP2-11L	0.56
White	MP2-11W	0.56
Clear	MP2-11C	0.56
Extended pushbutton (light bulb max 2 W, not included)		
Momentary		
Red	MP3-11R	0.56
Green	MP3-11G	0.56
Yellow	MP3-11Y	0.56
Blue	MP3-11L	0.56
White	MP3-11W	0.56
Clear	MP3-11C	0.56
Maintained		
Red	MP4-11R	0.56
Green	MP4-11G	0.56
Yellow	MP4-11Y	0.56
Blue	MP4-11L	0.56
White	MP4-11W	0.56
Clear	MP4-11C	0.56



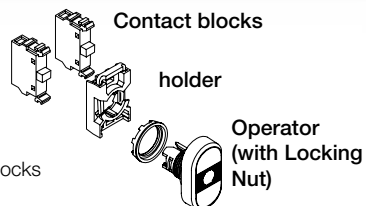
Illuminated extended pushbutton with black plastic bezel

Double pushbuttons Non-illuminated

How to order:

Alt.1 • Operator
+ holder
+ Contact blocks

Alt.2 • Operator
+ holder with contact blocks



NOTE: No contact block in center position
For contact blocks & holders, see Accessories pages 7.26.



Double pushbutton, non-illuminated
Lens color=black



Double pushbutton, non-illuminated
Lens color=black



Legend plate holder

Operator: Double pushbutton

Upper button	Lower button	Catalog number	Weight oz.
Flush pushbuttons			
Green		Red	
No text	No text	MPD1-11B	0.88
I	O	MPD2-11B	0.88
ON	OFF	MPD3-11B	0.88
START	STOP	MPD4-11B	0.88
White		Black	
No text	No text	MPD5-11B	0.88
I	O	MPD6-11B	0.88
ON	OFF	MPD7-11B	0.88
START	STOP	MPD8-11B	0.88

Extended lower pushbutton

Upper button	Lower button	Catalog number	Weight oz.
Green		Red	
No text	No text	MPD12-11B	0.88
I	O	MPD13-11B	0.88
ON	OFF	MPD14-11B	0.88
START	STOP	MPD15-11B	0.88
White		Black	
No text	No text	MPD16-11B	0.88
I	O	MPD17-11B	0.88
ON	OFF	MPD18-11B	0.88
START	STOP	MPD19-11B	0.88

Legend plate holder

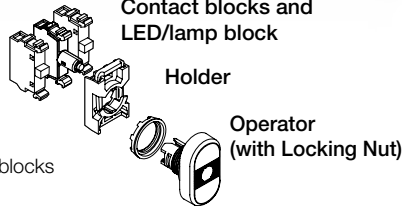
Legend plate holder	Catalog number	Weight oz.
Legend plate holder	MA1-8139	0.11

Double pushbuttons Non-illuminated

How to order:

- Alt.1** • Operator
+ Holder
+ Contact blocks
+ LED/lamp block

- Alt.2** • Operator
+ Holder with Contact blocks
and lamp block



NOTE: No contact block in center position, reserved for LED/lamp block
For contact blocks & holders, see Accessories pages 7.26.

Operator: Double pushbutton

Upper button	Lower button	Catalog number	Weight oz.
--------------	--------------	----------------	------------

Flush pushbutton

Red indicator light

Green		Red	
No text	No text	MPD1-11R	0.88
I	O	MPD2-11R	0.88
ON	OFF	MPD3-11R	0.88
START	STOP	MPD4-11R	0.88
White		Black	
No text	No text	MPD5-11R	0.88
I	O	MPD6-11R	0.88
ON	OFF	MPD7-11R	0.88
START	STOP	MPD8-11R	0.88

Green indicator light

Red			
No text	No text	MPD1-11G	0.88
I	O	MPD2-11G	0.88
ON	OFF	MPD3-11G	0.88
START	STOP	MPD4-11G	0.88
White		Black	
No text	No text	MPD5-11G	0.88
I	O	MPD6-11G	0.88
ON	OFF	MPD7-11G	0.88
START	STOP	MPD8-11G	0.88

Yellow indicator light

Green		Red	
No text	No text	MPD1-11Y	0.88
I	O	MPD2-11Y	0.88
ON	OFF	MPD3-11Y	0.88
START	STOP	MPD4-11Y	0.88
White		Black	
No text	No text	MPD5-11Y	0.88
I	O	MPD6-11Y	0.88
ON	OFF	MPD7-11Y	0.88
START	STOP	MPD8-11Y	0.88

Clear indicator light

Green		Red	
No text	No text	MPD1-11C	0.88
I	O	MPD2-11C	0.88
ON	OFF	MPD3-11C	0.88
START	STOP	MPD4-11C	0.88
White		Black	
No text	No text	MPD5-11C	0.88
I	O	MPD6-11C	0.88
ON	OFF	MPD7-11C	0.88
START	STOP	MPD8-11C	0.88

NOTE: LED bulb or integrated LED block recommended.

7



Double pushbutton, illuminated
Lens color: Red, green, yellow, clear

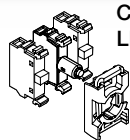


Double pushbutton, illuminated
Lens color: Red, green, yellow, clear

Double pushbuttons Illuminated

How to order:

- Alt.1** • Operator
+ Holder
+ Contact blocks
+ LED/lamp block



Contact blocks and
LED/lamp block

Holder

- Alt.2** • Operator
+ Holder with Contact blocks
and lamp block



Operator
(with Locking
Nut)

NOTE: No contact block in center position, reserved for LED/lamp block
For contact blocks, holders & LED lamp blocks, see Accessories pages 7.25 - 7.30.



Double pushbutton with extended
lower button, illuminated
Lens color: Red, green, yellow, clear

Operator: Double pushbutton

Upper button	Lower button	Catalog number	Weight oz.
--------------	--------------	----------------	------------

Extended Lower button

Red indicator light

Green		Red	
No text	No text	MPD12-11R	0.88
I	O	MPD13-11R	0.88
ON	OFF	MPD14-11R	0.88
START	STOP	MPD15-11R	0.88
White		Black	
No text	No text	MPD16-11R	0.88
I	O	MPD17-11R	0.88
ON	OFF	MPD18-11R	0.88
START	STOP	MPD19-11R	0.88

Green indicator light

Green		Red	
No text	No text	MPD12-11G	0.88
I	O	MPD13-11G	0.88
ON	OFF	MPD14-11G	0.88
START	STOP	MPD15-11G	0.88
White		Black	
No text	No text	MPD16-11G	0.88
I	O	MPD17-11G	0.88
ON	OFF	MPD18-11G	0.88
START	STOP	MPD19-11G	0.88

Yellow indicator light

Green		Red	
No text	No text	MPD12-11Y	0.88
I	O	MPD13-11Y	0.88
ON	OFF	MPD14-11Y	0.88
START	STOP	MPD15-11Y	0.88
White		Black	
No text	No text	MPD16-11Y	0.88
I	O	MPD17-11Y	0.88
ON	OFF	MPD18-11Y	0.88
START	STOP	MPD19-11Y	0.88

Clear indicator light

Green		Red	
No text	No text	MPD12-11C	0.88
I	O	MPD13-11C	0.88
ON	OFF	MPD14-11C	0.88
START	STOP	MPD15-11C	0.88
White		Black	
No text	No text	MPD16-11C	0.88
I	O	MPD17-11C	0.88
ON	OFF	MPD18-11C	0.88
START	STOP	MPD19-11C	0.88

NOTE: LED bulb or integrated LED block recommended

Mushroom pushbuttons Non-illuminated and illuminated

How to order non-illuminated:

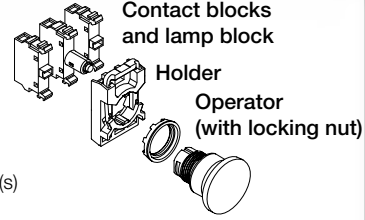
Alt.1 • Operator
+ Holder
+ Contact block(s)

Alt.2 • Operator
+ Holder with Contact block(s)

How to order illuminated:

Alt.1 • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block

Alt.2 • Operator
+ Holder with Contact block(s)
and lamp block



NOTE: No contact block in center position, reserved for LED/lamp block
For contact blocks, holders & LED lamp blocks, see Accessories pages 7.25 - 7.30.

Operator: Mushroom pushbutton

Description	Catalog number	Weight oz.
Non-illuminated		
Ø 40 mm		
Red	MPM1-10R	0.63
Green	MPM1-10G	0.63
Yellow	MPM1-10Y	0.63
black	MPM1-10B	0.63
Ø 60 mm		
Red	MPM2-10R	0.71
Yellow	MPM2-10Y	0.71
black	MPM2-10B	0.71

Illuminated (light bulb max 2 W, not included)

Ø 40 mm		
Red	MPM1-11R	0.63
Green	MPM1-11G	0.63
Yellow	MPM1-11Y	0.63
Ø 60 mm		
Red	MPM2-11R	0.71
Yellow	MPM2-11Y	0.71

7



Mushroom pushbuttons,
non-illuminated



Mushroom pushbuttons,
illuminated

Emergency stops

Non-illuminated and illuminated

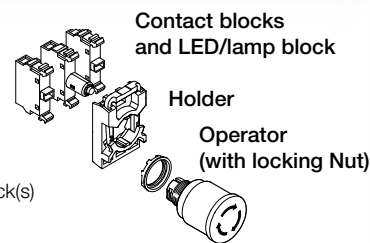
30mm, 40mm & 60mm head

How to order non-illuminated:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
- Alt.2** • Operator
+ Holder with Contact block(s)

How to order illuminated:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block
- Alt.2** • Operator
+ Holder with Contact block(s)
and LED/lamp block



NOTE: For contact blocks, holders & LED lamp blocks, see Accessories pages 7.25 - 7.30.

Fulfills IEC 60947-5-5

Operator: Emergency stop ①



Emergency stop, key release, non-illuminated, Ø 40 mm

Description		Catalog number	Weight oz.
Non-illuminated			
Ø 30 mm			
Red	Twist release	MPET3-10R	1.3
Red	Key release code 71/Ronis 455	MPEK3-11R	2.3
Red	Key release code 72/Ronis 421	MPEK3-12R	2.3
Red	Key release code 73/Ronis 3433-E	MPEK3-13R	2.3
Ø 40 mm			
Red	Twist release	MPET4-10R	1.3
Red	Key release code 71/Ronis 455	MPEK4-11R	2.3
Red	Key release code 72/Ronis 421	MPEK4-12R	2.3
Red	Key release code 73/Ronis 3433-E	MPEK4-13R	2.3
Ø 60 mm			
Red	Twist release	MPMT4-11R	1.7



Emergency stop, twist release illuminated, Ø 40 mm

Illuminated (bulb max 2 W, not included).			
Ø 40 mm			
Red	Twist release	MPMT3-11R	1.4
Ø 60 mm			
Red	Twist release	MPMT4-11R	1.7

To comply with the standard, IEC 60947-5-5, a number of tests have to be conducted:

Durability test	6,050 cycles. This is not a test of mechanical life. The product has a mechanical life of 100,000 operations.	Latching test	Impulse voltage test at 2,500 V
Robustness	The force 113 N applied in three axes	Resetting test	Pulling force < 50 N Turning torque < 1 Nm
Conditioning	Heat and cold, moist atmosphere, and in 5 % NaCl	Shock	15 g shock
		Vibration	2 h at 50m/s ²
		Contacts with positive opening operation	15 g shock

① E-stop requires yellow background. See legend plates on page 7.118.

Twist, pull or key release operators

Non-illuminated and illuminated

30mm & 40mm head

How to order non-illuminated:

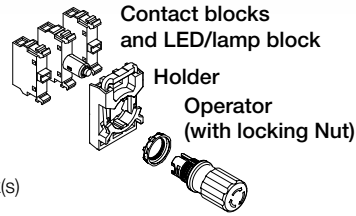
Alt.1 • Operator
+ Holder
+ Contact block(s)

Alt.2 • Operator
+ Holder with Contact block(s)

How to order illuminated:

Alt.1 • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block

Alt.2 • Operator
+ Holder with Contact block(s)
and LED/lamp block



NOTE: For contact blocks, holders & LED lamp blocks, see Accessories pages 7.25 - 7.30.

7



Pull release, Ø 30 mm



Key release, Ø 30 mm



Twist release, Ø 40 mm

Operator: Push pull or twist release

Description		Catalog number	Weight oz.
Non-illuminated			
Ø 30 mm			
Black	Twist release	MPET3-10B	1.3
Black	Pull release	MPEP3-10B	1.3
Red	Pull release	MPEP3-10R	1.3
Black	Key release code 71/Ronis 455	MPEK3-11B	1.3
Ø 40 mm			
Black	Twist release	MPET4-10B	1.3
Black	Pull release	MPEP4-10B	1.3
Red	Pull release	MPEP4-10R	1.3
Black	Key release code 71/Ronis 455	MPEK4-11B	1.3
Ø 60 mm			
Red	Pull release	MPMP4-11R	1.7
Illuminated			
Ø 40 mm			
Red	Pull release	MPMP3-11R	1.4
Ø 60 mm			
Red	Pull release	MPMP4-11R	1.7

To comply with the standard, IEC 60947-5-5, a number of tests have to be conducted:

Durability test	6,050 cycles. This is not a test of mechanical life. The product has a mechanical life of 100,000 operations.	Latching test	Impulse voltage test at 2,500 V
Robustness	The force 113 N applied in three axes	Resetting test	Pulling force < 50 N Turning torque < 1 Nm
Conditioning	Heat and cold, moist atmosphere, and in 5 % NaCl	Shock	15 g shock
		Vibration	2 h at 50m/s ²
		Contacts with positive opening operation	15 g shock

⊙ Use as a twist, pull or key release. Operator is not an E-Stop.

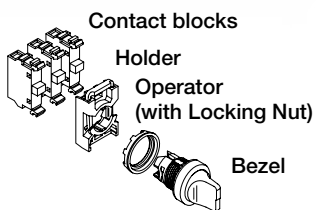
Selector switches

Two position, non-illuminated

How to order:

Alt.1 • Operator
+ Holder
+ Contact block(s)

Alt.2 • Operator
+ Holder with Contact block(s)



NOTE: No contact block in center position
For contact blocks & holders, see Accessories pages 7.26.

Bezel - How to order

Black plastic - Standard
Chrome metal - Replace '1' with '3' in
Catalog number



Bezel options	Catalog number
Black plastic	M2SS(X)-10X
Chrome metal	M2SS(X)-30X



Selector switch, short handle



Selector switch, long handle

Operator: Two-position Selector Switch

Description	Catalog number	Weight oz.
Short handle		
Maintained		
Red	M2SS1-10R	0.53
Black	M2SS1-10B	0.53
Grey	M2SS1-10U	0.53
Maintained		
Red	M2SS2-10R	0.53
Black	M2SS2-10B	0.53
Grey	M2SS2-10U	0.53
Momentary, spring return from C to B		
Red	M2SS3-10R	0.53
Black	M2SS3-10B	0.53
Grey	M2SS3-10U	0.53
Long handle		
Maintained		
Red	M2SS4-10R	0.63
Black	M2SS4-10B	0.63
Grey	M2SS4-10U	0.63
Maintained		
Red	M2SS5-10R	0.63
Black	M2SS5-10B	0.63
Grey	M2SS5-10U	0.63
Momentary, spring return from C to B		
Red	M2SS6-10R	0.63
Black	M2SS6-10B	0.63
Grey	M2SS6-10U	0.63

Contacts actuated

Handle position	Left block	Right block
B C	<input type="checkbox"/>	<input type="checkbox"/>
A C	<input type="checkbox"/>	<input type="checkbox"/>
A C	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Not actuated
 Actuated

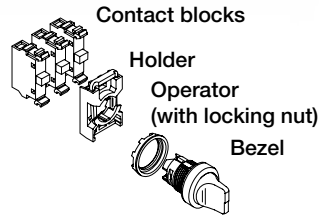
Selector switches

Three position, non-illuminated

How to order:

Alt.1 • Operator
+ Holder
+ Contact block(s)

Alt.2 • Operator
+ Holder with Contact block(s)



NOTE: For contact blocks & holders, see Accessories pages 7.26.

Bezel - How to order

Black plastic - Standard
Chrome metal - Replace '1' with '3' in Catalog number



Bezel options	Catalog number
Black plastic	M3SS(X)-10X
Chrome metal	M3SS(X)-30X

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Selector Switch, short handle

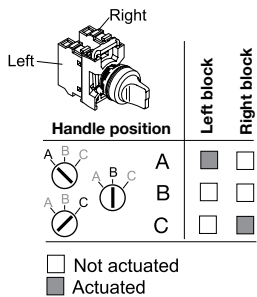


Selector Switch, long handle

Operator: Three-position selector switch

Description	Catalog number	Weight oz.
Short handle		
Maintained		
Red	M3SS1-10R	0.53
Black	M3SS1-10B	0.53
Grey	M3SS1-10U	0.53
Momentary, spring return from A to B and from C to B		
Red	M3SS2-10R	0.53
Black	M3SS2-10B	0.53
Grey	M3SS2-10U	0.53
Momentary, spring return from C to B		
Red	M3SS3-10R	0.53
Black	M3SS3-10B	0.53
Grey	M3SS3-10U	0.53
Momentary, spring return from A to B		
Red	M3SS7-10R	0.53
Black	M3SS7-10B	0.53
Grey	M3SS7-10U	0.53
Long handle		
Maintained		
Red	M3SS4-10R	0.63
Black	M3SS4-10B	0.63
Grey	M3SS4-10U	0.63
Momentary, spring return from A to B and from C to B		
Red	M3SS5-10R	0.63
Black	M3SS5-10B	0.63
Grey	M3SS5-10U	0.63
Momentary, spring return from C to B		
Red	M3SS6-10R	0.63
Black	M3SS6-10B	0.63
Grey	M3SS6-10U	0.63
Momentary, spring return from A to B		
Red	M3SS8-10R	0.63
Black	M3SS8-10B	0.63
Grey	M3SS8-10U	0.63

Contacts actuated



Selector switches

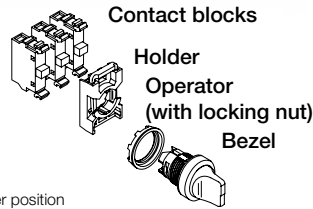
Three position with operation of center position

How to order:

Alt.1 • Operator
+ Holder
+ Contact block(s)

Alt.2 • Operator
+ Holder with contact block(s)

NOTE: No contact block in center position
For contact blocks & holders, see Accessories pages 7.26.



Bezel - How to order

Black plastic - Standard
Chrome metal - Replace '1' with '3' in Catalog number



Bezel options	Catalog number
Black plastic	M3SSC(X)-10B
Chrome metal	M3SSC(X)-30B



Selector switch, short handle

Operator: Three-position selector switch with operation of center position

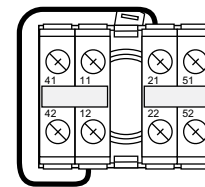
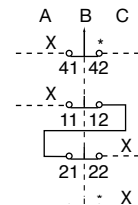
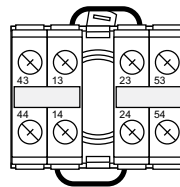
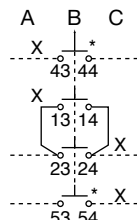
Description	Catalog number	Weight oz.
Short handle		
Black	M3SSC1-10B	0.53
Black	M3SSC2-10B	0.53
Black	M3SSC3-10B	0.53
Black	M3SSC7-10B	0.53



Selector switch, long handle

Long handle		
Black	M3SSC4-10B	0.63
Black	M3SSC5-10B	0.63
Black	M3SSC6-10B	0.63
Black	M3SSC8-10B	0.63

Center position connection detail



Contacts actuated

Handle position	Left block	Center block	Right block
A	■	■	□
B	□	□	□
C	□	■	■

Not actuated
 Actuated

Selector switches

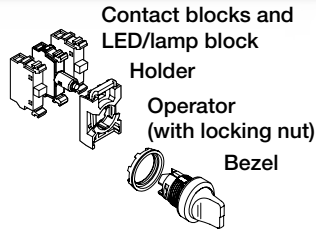
Two position, illuminated

How to order:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block

- Alt.2** • Operator
+ Holder with Contact block(s)
and LED/lamp block

NOTE: For contact blocks, holders & LED lamp blocks, see Accessories pages 7.25 - 7.30.



Bezel - How to order

black plastic - Standard
Chrome metal - Replace '1' with '3' in Catalog number









bezel options	Catalog number
black plastic	M2SS(X)-11X
Chrome metal	M2SS(X)-31X

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Selector switch, short handle

Operator: Two-position selector switch (light bulb max 2W, not included)

Description	Catalog number	Weight oz.	
Short handle			
Maintained			
	Red	M2SS1-11R	0.53
	Green	M2SS1-11G	0.53
	Yellow	M2SS1-11Y	0.53
	Blue	M2SS1-11L	0.53
	Clear	M2SS1-11C	0.53
Maintained			
	Red	M2SS2-11R	0.53
	Green	M2SS2-11G	0.53
	Yellow	M2SS2-11Y	0.53
	Blue	M2SS2-11L	0.53
	Clear	M2SS2-11C	0.53
Momentary, spring return from C to B			
	Red	M2SS3-11R	0.53
	Green	M2SS3-11G	0.53
	Yellow	M2SS3-11Y	0.53
	Blue	M2SS3-11L	0.53
	Clear	M2SS3-11C	0.53
Long handle			
Maintained			
	Red	M2SS4-11R	0.63
	Green	M2SS4-11G	0.63
	Yellow	M2SS4-11Y	0.63
	Blue	M2SS4-11L	0.63
	Clear	M2SS4-11C	0.63
Maintained			
	Red	M2SS5-11R	0.63
	Green	M2SS5-11G	0.63
	Yellow	M2SS5-11Y	0.63
	Blue	M2SS5-11L	0.63
	Clear	M2SS5-11C	0.63
Momentary, spring return from C to B			
	Red	M2SS6-11R	0.63
	Green	M2SS6-11G	0.63
	Yellow	M2SS6-11Y	0.63
	Blue	M2SS6-11L	0.63
	Clear	M2SS6-11C	0.63



Selector switch, long handle

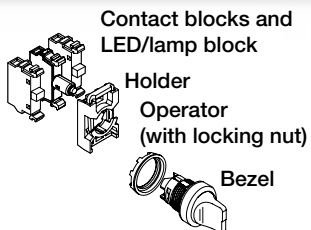
Selector switches

Three position, illuminated, short handle

How to order:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block

- Alt.2** • Operator
+ Holder with Contact block(s)
and LED/lamp block



NOTE: For contact blocks, holders & LED lamp blocks, see Accessories pages 7.25 - 7.30.

Bezel - How to order

Black plastic - Standard
Chrome metal - Replace '1' with '3' in Catalog number



Bezel options	Catalog number
Black plastic	M3SS(X)-11X
Chrome metal	M3SS(X)-31X

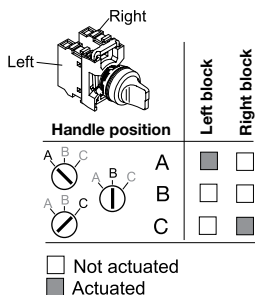


Selector switch, short handle

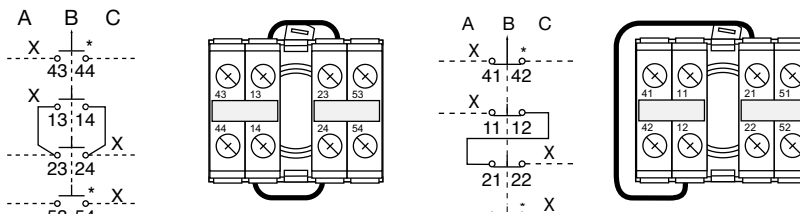
Operator: Three-position selector switches (light bulb max 2W, not included)

Description	Catalog number	Weight oz.
Short handle		
Maintained		
Red	M3SS1-11R	0.53
Green	M3SS1-11G	0.53
Yellow	M3SS1-11Y	0.53
Blue	M3SS1-11L	0.53
Clear	M3SS1-11C	0.53
Momentary, spring return from A to B and from C to B		
Red	M3SS2-11R	0.53
Green	M3SS2-11G	0.53
Yellow	M3SS2-11Y	0.53
Blue	M3SS2-11L	0.53
Clear	M3SS2-11C	0.53
Momentary, spring return from C to B		
Red	M3SS3-11R	0.53
Green	M3SS3-11G	0.53
Yellow	M3SS3-11Y	0.53
Blue	M3SS3-11L	0.53
Clear	M3SS3-11C	0.53
Momentary, spring return from A to B		
Red	M3SS7-11R	0.53
Green	M3SS7-11G	0.53
Yellow	M3SS7-11Y	0.53
Blue	M3SS7-11L	0.53
Clear	M3SS7-11C	0.53

Contacts actuated



Center position connection detail



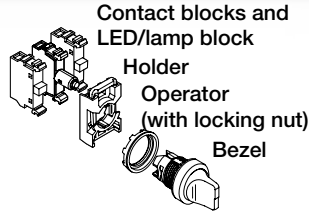
Selector switches

Three position, illuminated, long handle

How to order:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block

- Alt.2** • Operator
+ Holder with Contact block(s)
and LED/lamp block



NOTE: For contact blocks, holders & LED lamp blocks, see Accessories pages 7.25 - 7.30.

Bezel - How to order

Black plastic - Standard
Chrome metal - Replace '1' with '3' in
Catalog number























Bezel options	Catalog number
Black plastic	M3SS(X)-11X
Chrome metal	M3SS(X)-31X

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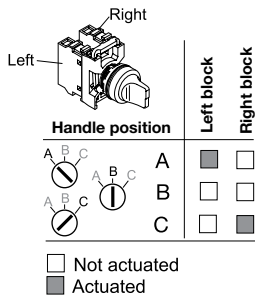





Selector Switch, long handle

Operator: Three-position selector switches (light bulb max 2W, not included)

Description	Catalog number	Weight oz.
Long handle		
Maintained		
 Red	M3SS4-11R	0.63
 Green	M3SS4-11G	0.63
 Yellow	M3SS4-11Y	0.63
 Blue	M3SS4-11L	0.63
 Clear	M3SS4-11C	0.63
Momentary, spring return from A to B and from C to B		
 Red	M3SS5-11R	0.63
 Green	M3SS5-11G	0.63
 Yellow	M3SS5-11Y	0.63
 Blue	M3SS5-11L	0.63
 Clear	M3SS5-11C	0.63
Momentary, spring return from C to B		
 Red	M3SS6-11R	0.63
 Green	M3SS6-11G	0.63
 Yellow	M3SS6-11Y	0.63
 Blue	M3SS6-11L	0.63
 Clear	M3SS6-11C	0.63
Momentary, spring return from A to B		
 Red	M3SS8-11R	0.63
 Green	M3SS8-11G	0.63
 Yellow	M3SS8-11Y	0.63
 Blue	M3SS8-11L	0.63
 Clear	M3SS8-11C	0.63

Contacts actuated



Handle position	Left block	Right block
 A	<input type="checkbox"/>	<input type="checkbox"/>
 B	<input type="checkbox"/>	<input type="checkbox"/>
 C	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Not actuated
 Actuated

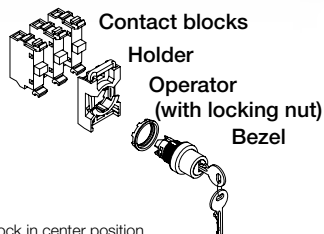
Key-operated selector switches

Two and three positions

How to order:

- Alt.1** • Operator
+ Holder
+ Contact block(s)

- Alt.2** • Operator
+ Holder with Contact block(s)



NOTE: No contact block in center position.
For contact blocks & holders, see Accessories pages 7.26.

Bezel - How to order

Black plastic - Standard
Chrome metal - Replace '1' with '3' in Catalog number



Bezel options	Catalog number
Black plastic	M3SSK(X)-10X
Chrome metal	M3SSK(X)-30X

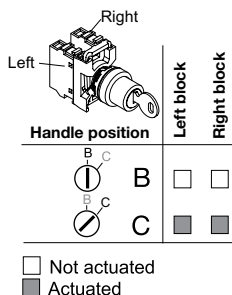


Key-operated selector switch

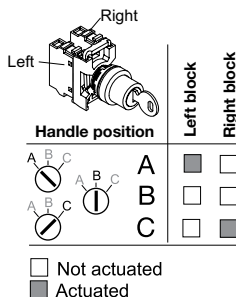
Operator: Key-operated selector switch

	Description	Catalog number	Weight oz.
Two positions			
Maintained (The key can be removed in both positions)			
	Key release code 71/Ronis 455	M2SSK1-101	1.6
	Key release code 72/Ronis 421	M2SSK1-102	1.6
	Key release code 73/Ronis 3433-E	M2SSK1-103	1.6
Maintained (The key can be removed in position B only)			
	Key release code 71/Ronis 455	M2SSK2-101	1.6
	Key release code 72/Ronis 421	M2SSK2-102	1.6
	Key release code 73/Ronis 3433-E	M2SSK2-103	1.6
Momentary, spring return from C to B (The key can be removed in position B only)			
	Key release code 71/Ronis 455	M2SSK3-101	1.6
	Key release code 72/Ronis 421	M2SSK3-102	1.6
	Key release code 73/Ronis 3433-E	M2SSK3-103	1.6
Three positions			
Maintained (The key can be removed in all positions)			
	Key release code 71/Ronis 455	M3SSK1-101	1.6
	Key release code 72/Ronis 421	M3SSK1-102	1.6
	Key release code 73/Ronis 3433-E	M3SSK1-103	1.6
Maintained (The key can be removed in position B only)			
	Key release code 71/Ronis 455	M3SSK2-101	1.6
	Key release code 72/Ronis 421	M3SSK2-102	1.6
	Key release code 73/Ronis 3433-E	M3SSK2-103	1.6
Momentary, spring return from A to B and from C to B (The key can be removed in position B only)			
	Key release code 71/Ronis 455	M3SSK3-101	1.6
	Key release code 72/Ronis 421	M3SSK3-102	1.6
	Key release code 73/Ronis 3433-E	M3SSK3-103	1.6

Contacts actuated



Contacts actuated





Potentiometer

Potentiometers

Operator: Potentiometer

Description	Catalog number	Weight oz.
-------------	----------------	------------

Complete Potentiometers

Black knob with integrated position indication and marking in white

With resistor 5 kohm

Black plastic bezel	MT-105B	1.4
Chrome metal bezel	MT-305B	1.7

With resistor 10 kohm

Black plastic bezel	MT-110B	1.4
Chrome metal bezel	MT-310B	1.7

With resistor 50 kohm

Black plastic bezel	MT-150B	1.4
Chrome metal bezel	MT-350B	1.7

Knob without Resistor

Black knob with integrated position indication and marking in white.

For shaft diameter 6 -6.35 mm.

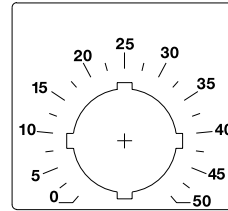
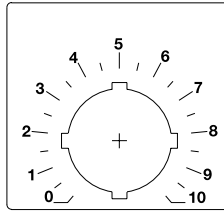
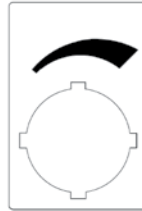
Min. shaft length 20 mm.

Black plastic bezel	KT-100B	1.2
Chrome metal bezel	KT-300B	1.5

Legend plates aluminum

Symbol: see fig. (29.6 x 44.5 mm)	SK 615 562-87	0.071
Scale: 0-10 (48.5 x 44.5 mm)	SK 615 562-88	0.071
Scale: 0-50 (48.5 x 44.5 mm)	1SFA611830R1252	0.071

Legend plates



Buzzers



Buzzer

Operator: Buzzer

Description	Catalog number	Weight oz.
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Buzzers

Black. Frequency: Approx. 2400 Hz.

Loudness: Min 80 dB (A)/10 cm

Rated Current: < 8 mA.

Service Life:>5000 h

Suitable for both 50 and 60 Hz networks

Supply voltage Tone Catalog number

24 V AC/DC	Continuous	KB1-4010	0.020
115 V AC/DC	Continuous	KB1-4030	0.020
230 V AC	Continuous	KB1-4040	0.020
24 V AC/DC	Pulsating	KB1-4110	0.020
115 V AC/DC	Pulsating	KB1-4130	0.020
230 V AC	Pulsating	KB1-4140	0.020

Reset pushbuttons

How to order without shaft:

Alt.1 • Operator

How to order with shaft:

Alt.1 • Operator
+ shaft
+ flexible joint

Bezel - How to order

Black plastic - Standard

Chrome metal - Replace '1' with '3' in
Catalog number

Bezel options	Catalog number
Black plastic	KPRX-10XX
Chrome metal	KPRX-30XX



Operator: Reset pushbutton

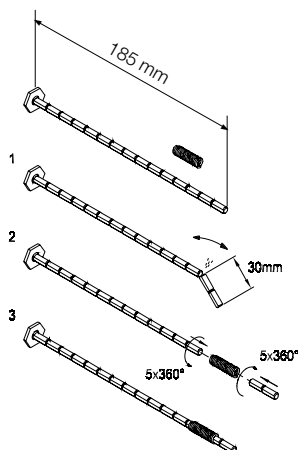


Reset pushbutton actuator
without shaft

Description	Text	Catalog number	Weight oz.
Without shaft			
Flush pushbutton			
Red	No text	KPR1-100R	0.71
Green	No text	KPR1-100G	0.71
	II	KPR1-103G	0.71
Yellow	No text	KPR1-100Y	0.71
Blue	No text	KPR1-100L	0.71
white	R	KPR1-101L	0.71
	No text	KPR1-100W	0.71
	R	KPR1-101W	0.71
black	I	KPR1-102W	0.71
	II	KPR1-103W	0.71
	No text	KPR1-100B	0.71
	RESET	KPR1-104B	0.71
Extended pushbutton			
Red	No text	KPR2-100R	0.74
	O	KPR2-105R	0.74
white	No text	KPR2-100W	0.74
black	No text	KPR2-100B	0.74
	O	KPR2-105B	0.74
With shaft			
flush pushbutton			
Red	No text	KPR3-100R	0.95
Green	No text	KPR3-100G	0.95
	II	KPR3-103G	0.95
Yellow	No text	KPR3-100Y	0.95
Blue	No text	KPR3-100L	0.95
White	R	KPR3-101L	0.95
	No text	KPR3-100W	0.95
	R	KPR3-101W	0.95
Black	I	KPR3-102W	0.95
	II	KPR3-103W	0.95
	No text	KPR3-100B	0.95
	RESET	KPR3-104B	0.95
	RESET	KPR3-104BMR	0.95
Extended pushbutton			
Red	No text	KPR4-100R	0.99
	O	KPR4-105R	0.99
White	No text	KPR4-100W	0.99
Black	No text	KPR4-100B	0.99
	O	KPR4-105B	0.99
Accessories – In applications with long shaft, a flexible joint can be used to avoid damage to the shaft.			
Shaft: (including fixing nut)		KA1-8046	0.25
Flexible joint		KA1-8047	0.18
240mm metal shaft Including fixing nut & foot		KA1-8046MR	



Reset pushbutton with shaft marked "R"

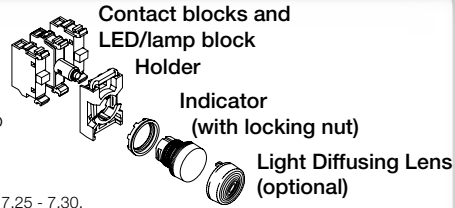


Pilot lights

How to order:

Alt.1 • Indicator
+ Holder
+ LED/lamp block

Alt.2 • Indicator
+ Holder
+ LED/lamp block
+ Lens: used together with LED to improve light diffusion (Cannot be used together with Text Cap)



For contact blocks, holders & LED lamp blocks, see Accessories pages 7.25 - 7.30.

7



Pilot light

Indicator: Pilot light

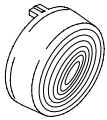
Description	Catalog number	Weight oz.
Pilot lights		
Red	ML1-100R	0.63
Green	ML1-100G	0.63
Yellow	ML1-100Y	0.63
Blue	ML1-100L	0.63
White	ML1-100W	0.63
Clear	ML1-100C	0.63

Note: Bulbs, lamp blocks & LED blocks are not included – See Accessories page 7.27.

Accessories

Light diffusing lens	KA1-8005	0.035
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Note: Light diffusing lens is used to improve illumination of LED bulbs. Cannot be used together with text cap.



Light diffusing lens

Toggle switches

Two and three position

How to order:

Alt.1 • Operator
+ Holder
+ Contact block(s)

Alt.2 • Operator
+ Holder with Contact block(s)

Contact blocks

Holder

Operator (with locking nut)

NOTE: For contact blocks & holders, see Accessories pages 7.26.



Toggle Switch

Operator: Toggle switch

Description	Bezel	Catalog number	Weight oz.
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Two positions

Maintained

	Black plastic	MTS1-10B	0.74
	Chrome metal	MTS1-30B	0.74

Three positions

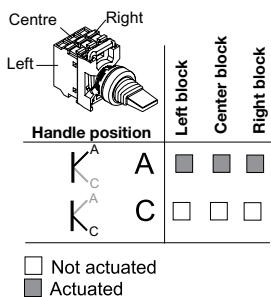
Momentary, spring return from A to B and from C to B

	Black plastic	MTS2-10B	0.74
	Chrome metal	MTS2-30B	0.74

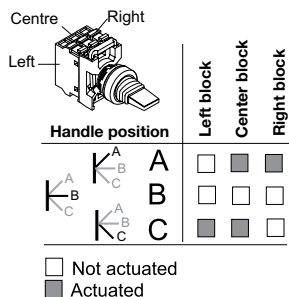
Maintained

	Black plastic	MTS3-10B	0.74
	Chrome metal	MTS3-30B	0.74

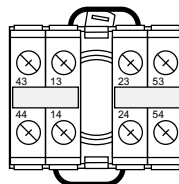
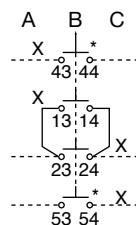
Contacts actuated



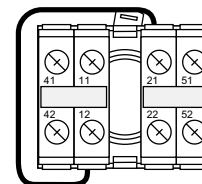
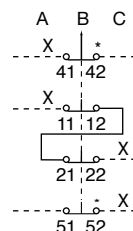
Contacts actuated



Center position connection detail



* Contacts may be N.O. or N.C.

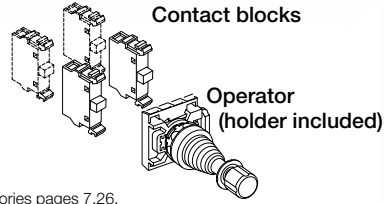


* Contacts may be N.O. or N.C.

Joysticks IP67 and IP69K

How to order:

- Operator holder included
+ Contact blocks



For contact blocks, see Accessories pages 7.26.

Operator: Joystick

Description	Catalog number	Weight oz.
Joystick		
2-position maintained	MJS1-60B	2.2
2-position momentary	MJS2-60B	2.2
4-position maintained	MJS5-60B	3.1
4-position momentary	MJS6-60B	3.1

Joystick with latching function

2-position maintained	MJS7-60B	2.2
2-position momentary	MJS8-60B	2.2
4-position maintained	MJS11-60B	3.1
4-position momentary	MJS12-60B	3.1

Micro switch blocks

1 NO	MCBL-10	0.35
1 NC	MCBL-01	0.35

Legend plates

2-position (1) (up - down)	MA6-1240	0.14
2-position (2) (right - left)	MA6-1241	0.14
4-position (3)	MA6-1242	0.14

Legend plate holders

4-position	MA1-8137	0.14
2-position	MA1-8138	0.11

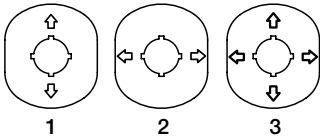
Insert with symbol

↑	MA6-1065	0.035
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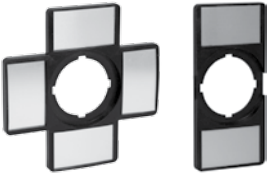
7



Joystick with latching function



Legend plates



Legend plate hc

Accessories

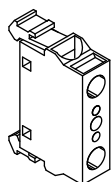
Transformer and lamp blocks



Transformer block for pilot lights



Transformer block for illuminated operators



Diode block



Lamp block

Description	Bulb suffix		Catalog number	Weight oz.
	LED	Filament		
Transformer blocks for pilot lights				
For 6 or 24 V Filament bulb and 24 V LED. Max 1.2 W Filament bulb lamp block included in the transformer, BA 9s base				
Primary voltage	Secondary voltage			
110-127 V AC	6 V AC	- T2	KTR1-1001	3.4
220-250 V AC	6 V AC	- T2	KTR1-1002	3.4
380-420 V AC	6 V AC	- T3	KTR1-1003	3.4
440-480 V AC	6 V AC	- T4	KTR1-1004	3.4
500-600 V AC	6 V AC	- T5	KTR1-1005	3.4
110-127 V AC	24 V AC ¹⁾	T1 T6	KTR1-1011	3.4
220-250 V AC	24 V AC ¹⁾	T2 T7	KTR1-1012	3.4
380-420 V AC	24 V AC ¹⁾	T3 T8	KTR1-1013	3.4
440-480 V AC	24 V AC ¹⁾	T4 T9	KTR1-1014	3.4

Transformer blocks for illuminated operators - Intended to supply 1.2W filament bulb mounted in lamp block MLB-J only

110-127 V AC	6 V AC	- T2	KTR1-2001	3.4
220-250 V AC	6 V AC	- T2	KTR1-2002	3.4
380-420 V AC	6 V AC	- T3	KTR1-2003	3.4
440-480 V AC	6 V AC	- T4	KTR1-2004	3.4
500-600 V AC	6 V AC	- T5	KTR1-2005	3.4
110-127 V AC	24 V AC ¹⁾	T1 T6	KTR1-2011	3.4
220-250 V AC	24 V AC ¹⁾	T2 T7	KTR1-2012	3.4
380-420 V AC	24 V AC ¹⁾	T3 T8	KTR1-2013	3.4
440-480 V AC	24 V AC ¹⁾	T4 T9	KTR1-2014	3.4

¹⁾ Can be used with LED bulb

Diode block

Diode block	MDB-1001	0.53
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Note: To be used if several lamps are to be connected to a common lamp-test pushbutton. A diode must be connected in series with each lamp. The Diode block snaps onto the lamp block or is placed at the side

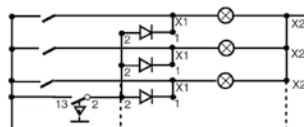


Diagram for lamp test with three Diode blocks (not intended for integrated LED bulbs)

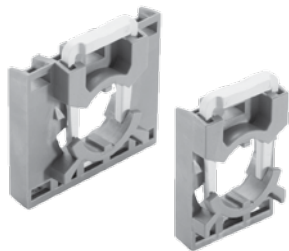
Single lamp blocks for front mounting, BA 9s base

Description	Catalog number	Weight oz.	
230 V, 2 W X1 X2	For max. 2 W, 230 V AC and DC Filament bulb or LED	MLB-1	0.53
115 V X1 X2 60 V 1.2 W	115 V AC supply voltage. For 60 V Filament bulb 1.2 W	MLB-2	0.60
230 V X1 X2 130 V 2 W	230 V AC supply voltage. For 130 V Filament bulb 2 W	MLB-3	0.71
115 V X1 X2 24 V LED	115 V AC and DC supply voltage For 24 V LED only	MLB-4	0.60
LED X1 X2 24-230V	LED block designed to prevent glowing from leakage current.	MLB-8	0.53

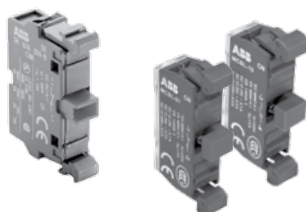
NOTE: Package order quantities will apply.

Accessories

Contact blocks and holders



Holders for contact block

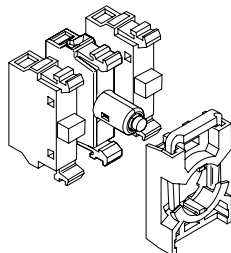
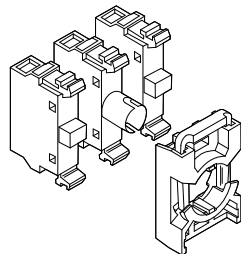
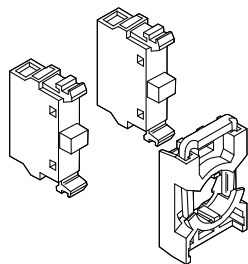


Contact block

Micro switch blocks



Double contact blocks



Description	Catalog number	Weight oz.
Holders		
Holders for three blocks	MCBH-00	0.21
Holders for five blocks*	MCBH5-00	0.28

* Note: Double contact blocks are required on side positions

Single contact blocks for front mounting

1 NO	MCB-10	0.46
1 NC	MCB-01	0.46
1 NO w/gold plated contacts	MCB-10G	0.46
1 NC w/gold plated contacts	MCB-01G	0.46

Micro switch blocks

1 NO	MCBL-10	0.35
1 NC	MCBL-01	0.35

Double contact block for front mounting

2 NO	MCB-20	0.92
2 NC	MCB-02	0.92
1 NO + 1 NC	MCB-11	0.92
2NC w/gold plated contacts	MCB-02G	0.92
2NO w/gold plated contacts	MCB-20G	0.92

Note: To be used together with MCBH5-00 when Contact blocks in position 4- and 5- are needed. Also when using 2nd lamp blocks MCBH-00 together with Selector Switch and Contact block in position 3- is needed

Contact blocks with holder for front mounting ①

For non-illuminated operators

1 NC	MCBH-01
1 NO	MCBH-10
2 NC	MCBH-02
2 NO	MCBH-20
3 NC	MCBH-03
3 NO	MCBH-30
1 NO + 1 NC	MCBH-11
1 NO + 2 NC	MCBH-12
2 NO + 1 NC	MCBH-21

For illuminated operator

1 LB	MCBH-001
1 NC + 1 LB	MCBH-011
1 NO + 1 LB	MCBH-101
1 NO + 1 NC + 1 LB	MCBH-111
2 NO & 1 LB	MCBH-021
2 NO & 1 LB	MCBH-201

① Max. # of blocks in holder is 3.

Accessories

LED bulbs



LED bulbs

Description	Wavelength nm	Luminance mcd	Catalog number	Weight oz.
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LED bulbs

With one diode chip mounted on a Ba 9s base. Choose the same color for the LED and the lamp cap or else use a clear lamp cap.

For white light use white LED with clear lamp cap. At DC the lamp base have to be connected to cathode (-) and the bottom contact to anode (+).

Rated voltage 12 V, DC, rated current 15 mA, service life >50 000 h

Red	630	250	KA2-2011	0.18
Green	525	1000	KA2-2012	0.18
Yellow	592	250	KA2-2013	0.18
Blue	470	450	KA2-2014	0.18
White	¹⁾	600	KA2-2015	0.18

Rated voltage 24 V, (AC)/DC, rated current 15 mA, service life >50 000 h

Red	630	250	KA2-2021	0.18
Green	525	800	KA2-2022	0.18
Yellow	592	250	KA2-2023	0.18
Blue	470	400	KA2-2024	0.18
White	¹⁾	500	KA2-2025	0.18

Rated voltage 36 V, (AC)/DC, rated current 12 mA, service life >50 000 h

Red	630	200	KA2-2031	0.18
Green	525	2000	KA2-2032	0.18
Yellow	592	200	KA2-2033	0.18
Blue	470	750	KA2-2034	0.18
White	¹⁾	1400	KA2-2035	0.18

Rated voltage 48 V, (AC)/DC, rated current 12 mA, service life >50 000 h

Red	630	200	KA2-2041	0.18
Green	525	1700	KA2-2042	0.18
Yellow	592	240	KA2-2043	0.18
Blue	470	720	KA2-2044	0.18
White	¹⁾	1200	KA2-2045	0.18

Rated voltage 60 V, (AC)/DC, rated current 10 mA, service life >50 000 h

Red	630	160	KA2-2051	0.18
Green	525	1400	KA2-2052	0.18
Yellow	592	200	KA2-2053	0.18
Blue	470	600	KA2-2054	0.18
White	¹⁾	1000	KA2-2055	0.18

Rated voltage 110-130 V, AC, rated current 4-6 mA, service life 25 000 h

Red	630	60-100	KA2-2131	0.18
Green	525	500-850	KA2-2132	0.18
Yellow	592	70-120	KA2-2133	0.18
Blue	470	220-350	KA2-2134	0.18
White	¹⁾	350-600	KA2-2135	0.18

Rated voltage 110-130 V, AC/DC, rated current 4-6 mA, service life 25 000 h

Red	630	60	KA2-2141	0.18
Green	525	500	KA2-2142	0.18
Yellow	592	70	KA2-2143	0.18
Blue	470	220	KA2-2144	0.18
White	¹⁾	350	KA2-2145	0.18

Rated voltage 230 V, AC, rated current 4 mA, service life 25 000 h

Red	630	60	KA2-2221	0.18
Green	525	500	KA2-2222	0.18
Yellow	592	70	KA2-2223	0.18
Blue	470	220	KA2-2224	0.18
White	¹⁾	350	KA2-2225	0.18

Note: Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

Choose the same color on the LED as on the lamp cap.

¹⁾ X=0,31, Y=0,32 according to the ICI Chromaticity Diagram.

Accessories

LED and filament bulbs



LED bulbs

Description	Wavelength nm	Luminance mcd	Catalog number	Weight oz.
LED bulbs continued				
Rated voltage 230 V, AC/DC, rated current 4 mA, service life 25 000 h				
Red	630	60	KA2-2231	0.18
Green	525	500	KA2-2232	0.18
Yellow	592	70	KA2-2233	0.18
Blue	470	220	KA2-2234	0.18
White	¹⁾	350	KA2-2235	0.18

Note: Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

Choose the same color on the LED as on the lamp cap.

¹⁾ X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.

Flashing LED bulbs

Rated voltage 24 V, DC rated current 25 mA

Description	Wavelength nm	Service life hours	Catalog number	Weight oz.
Red	630	50 000	4950 512-1	0.18
Green	565	50 000	4950 512-2	0.18
Yellow	585	50 000	4950 512-3	0.18

Note: Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

Choose the same color on the LED as on the lamp cap.

Filament bulbs BA 9s base

Rated voltage V m AC/DC	Rated current A	Rated output W	Service life h	Luminance mcd	Catalog number	Weight oz.
6	200	1.2	10 000	350	5911 086-11	0.071
12	100	1.2	10 000	203	5911 086-12	0.071
24	50	1.2	10 000	280	5911 086-13	0.071
30	40	1.2	10 000	250	5911 086-4	0.071
48	42	2	6 000	500	5911 086-5	0.071
60	20	1.2	5 000	190	5911 086-14	0.071
110	18	2	7 500	250	5911 086-7	0.071
130	15	2	7 500	120	5911 086-15	0.071

A lamp Changing Tool is required for changing bulb.

Lamp changing tool

For LED bulbs and for bulbs	KA1-8072	0.071
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A lamp changing tool is required for changing bulb.



Filament bulbs



Lamp changing tool

Accessories

LED blocks, front mounting



LED block with built in leakage current protection

Description	Rated Current mA	Wavelength nm	Luminance mcd	Catalog number	Weight oz.
LED-blocks					
Lamp block with one diode chip integrated into lamp block. Choose the same color for the LED and the lamp cap or else use a clear cap.					
Rated voltage 12 V, DC					
Red	12.0	620	320	MLBL-00R	0.42
Green	9.3	520	1500	MLBL-00G	0.42
Yellow	12.0	588	380	MLBL-00Y	0.42
Blue	9.5	468	450	MLBL-00L	0.42
White	9.3	²⁾	600	MLBL-00W	0.42
Rated voltage 24 V, AC/DC					
Red	9.9	620	250	MLBL-01R	0.42
Green	9.2	520	1500	MLBL-01G	0.42
Yellow	9.9	588	250	MLBL-01Y	0.42
Blue	9.3	468	450	MLBL-01L	0.42
White	9.2	²⁾	600	MLBL-01W	0.42
Rated voltage 48 V, AC/DC					
Red	10.0	620	260	MLBL-02R	0.42
Green	9.7	520	1500	MLBL-02G	0.42
Yellow	10.0	588	300	MLBL-02Y	0.42
Blue	9.7	468	450	MLBL-02L	0.42
White	9.7	¹⁾	600	MLBL-02W	0.42
Rated voltage 60 V, AC/DC					
Red	13.0	620	350	MLBL-03R	0.42
Green	12.7	520	2000	MLBL-03G	0.42
Yellow	13.0	588	400	MLBL-03Y	0.42
Blue	12.7	468	550	MLBL-03L	0.42
White	12.7	¹⁾	750	MLBL-03W	0.42
Rated voltage 110-130 V, AC					
Red	8.6	620	200	MLBL-04R	0.42
Green	8.5	520	1200	MLBL-04G	0.42
Yellow	8.6	588	250	MLBL-04Y	0.42
Blue	7.0	468	400	MLBL-04L	0.42
White	7.0	¹⁾	500	MLBL-04W	0.42
Rated voltage 110-130 V, DC					
Red	9.9	620	250	MLBL-05R	0.42
Green	9.8	520	1500	MLBL-05G	0.42
Yellow	9.9	588	300	MLBL-05Y	0.42
Blue	9.8	468	450	MLBL-05L	0.42
White	9.8	¹⁾	600	MLBL-05W	0.42
Rated voltage 220 V, DC					
Red	8.0	620	180	MLBL-06R	0.42
Green	8.0	520	110	MLBL-06G	0.42
Yellow	8.0	588	200	MLBL-06Y	0.42
Blue	8.0	468	450	MLBL-06L	0.42
White	8.0	¹⁾	600	MLBL-06W	0.42
Rated voltage 230 V, AC					
Red	9.5	620	250	MLBL-07R	0.42
Green	9.4	520	1500	MLBL-07G	0.42
Yellow	9.5	588	300	MLBL-07Y	0.42
Blue	8.2	468	450	MLBL-07L	0.42
White	8.2	¹⁾	600	MLBL-07W	0.42

Note: Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

¹⁾ X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.

Accessories

LED blocks, front mounting



LED block with built in leakage current protection

Description	Rated Current mA	Wavelength nm	Luminance mcd	Catalog number	Weight oz.
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LED blocks, cont.

Lamp block with one diode chip integrated into lamp block. Choose the same color for the LED and the lamp cap or else use a clear cap.

Rated voltage 380 V, AC

Red	10.2	620	250	MLBL-08R	0.42
Green	10.2	520	1500	MLBL-08G	0.42
Yellow	10.2	582	300	MLBL-08Y	0.42
Blue	9.1	468	450	MLBL-08L	0.42
White	9,1	¹⁾	600	MLBL-08W	0.42

Rated voltage 415 V, AC

Red	11.2	620	280	MLBL-09R	0.42
Green	11.2	520	1800	MLBL-09G	0.42
Yellow	11.2	588	350	MLBL-09Y	0.42
Blue	9.9	468	500	MLBL-09L	0.42
White	9.9	¹⁾	650	MLBL-09W	0.42

Note: Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

¹⁾ X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.

Rear mounted LED blocks can be found on page 7.62.

Accessories



DIN-rail adaptor



Dummy block



30mm adaptors



Adaptor



30mm gasket



Lamp changing tool



Mounting tool



Mounting tool for power tool



Blanking plugs



Square bezels

Description	Catalog number	Weight oz.
DIN-rail Adaptor		
DIN-rail adaptor	MA1-8131	0.71
DIN-rail (adaptor) kit with one dummy block	MA1-8001	0.99

NOTE: Use with base mount blocks. See page ____.

Dummy block

Dummy block, rear mount	MDB-2	0.11
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Dummy blocks are used when only one contact block or a compact device is used together with the DIN-Rail Adaptor

30 mm Adaptors for 22 mm operator (1.5-4 mm panels)

For Emergency stop pushbutton ①

Black plastic	KA1-8027	0.25
Metal	KA1-8028	0.74

For pushbuttons, selector switches, pilot lights, potentiometers and buzzers:

Black plastic	KA1-8029	0.35
Metal	KA1-8030	1.2

Flush mounted adaptors (metal)

For pushbuttons	KA1-8073	1.8
For Selector switches	MA1-8074	1.8

30mm Gasket

For 30mm adaptors for 22mm operator	1SFA616920R8019	
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Lamp changing tool

For LED bulbs and for bulbs	KA1-8072	0.071
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Mounting tool for operator

Mounting tool for tightening the locking nut	MA1-8015	0.74
Mounting tool for power tool	MA1-8149	5.5

Extra key

Ronis 455 (key code 71)	SK616021-71	0.25
Ronis 421 (key code 72)	SK616021-72	0.25
Ronis 3433-E (key code 73)	SK616021-73	0.25

Locking nut

Locking nut 22mm	MA1-8019	0.035
Locking nut 30mm w/22mm device	MA1-8134	

The Locking nut can also be used with Compact Devices.

Blanking plug

Grey, 22mm	MA1-8129	0.18
Light grey, 22mm	MA1-8136	0.18
Black, 22mm	MA1-8130	0.18
Black, 30mm	MA1-8133	0.18

Square bezel

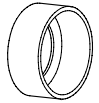
Black, plastic	SK616016-2	0.035
Grey, plastic	MA1-8124	0.035

① For use with MPMP and MPMT only

Accessories



Protective membrane



Protective ring



Protective cover



Bezel



Shroud for emergency stop



Lockable shroud



Touch guard

Description	Catalog number	Weight oz.
Protective membrane		
For flush button	KA1-8052	0.071
For extended button	KA1-8002	0.071
For double pushbutton	MA1-8126	0.071

Protective ring

Operator for protective ring	SK615512-1	0.071
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Note: For flush and extended pushbuttons. To prevent accidental operation. Cannot be used together with Legend plate holder

Protective cover

Protective cover	KA1-8010	0.28
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Note: For flush pushbutton. To prevent accidental operation. Cannot be used together with Legend plate holder.

Bezel

For pushbutton

Grey plastic	KA1-8079	0.071
black plastic	KA1-8022	0.071
Chrome metal	KA1-8021	0.53

For Selector switch

Grey plastic	KA1-8077	0.035
black plastic	KA1-8080	0.035
Chrome metal	KA1-8024	0.35

Shroud for emergency stop

Yellow	MA1-8053	0.71
Grey	MA1-8128	0.71

Note: For 40 mm Emergency stop pushbuttons and machine stop pushbuttons. To prevent accidental operation. With anti rotation tabs and slot for pad-lock and with water drainage. Not for use with plastic enclosures.

Shroud for pilot devices

Lockable shroud	MA1-8153	0.023
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Touch guard for pushbuttons

Touch guard	MA1-8152	0.009
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Accessories Lenses



Lens for Pilot light

Description	Catalog number	Weight oz.
Lenses for pilot lights		
Red	KA1-8031	0.071
Green	KA1-8032	0.071
Yellow	KA1-8033	0.071
Blue	KA1-8034	0.071
White	KA1-8035	0.071
Clear	KA1-8038	0.071
Fresnel light diffusion lens ①	KA1-8005	0.071



Flush lens for pushbutton

Description	Catalog number	Weight oz.
Lenses for non-illuminated pushbuttons		
Flush – opaque		
Red	KA1-8081	0.53
Green	KA1-8082	0.53
Yellow	KA1-8083	0.53
Blue	KA1-8084	0.53
White	KA1-8085	0.53
Black	KA1-8086	0.53
Grey	KA1-8087	0.53
Clear	KA1-8088	0.53



Extended lens for pushbutton

Description	Catalog number	Weight oz.
Extended - opaque		
Red	KA1-8091	0.88
Green	KA1-8092	0.88
Yellow	KA1-8093	0.88
Blue	KA1-8094	0.88
White	KA1-8095	0.88
Black	KA1-8096	0.88
Grey	KA1-8097	0.88
Clear	KA1-8098	0.88

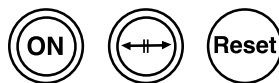
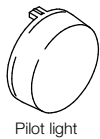
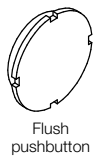
Description	Catalog number	Weight oz.
Lenses for illuminated pushbuttons		
Flush – transparent		
Red	KA1-8101	0.53
Green	KA1-8102	0.53
Yellow	KA1-8103	0.53
Blue	KA1-8104	0.53
White	KA1-8105	0.53
Clear	KA1-8108	0.53

Description	Catalog number	Weight oz.
Extended - transparent		
Red	KA1-8111	0.88
Green	KA1-8112	0.88
Yellow	KA1-8113	0.88
Blue	KA1-8114	0.88
White	KA1-8115	0.88
Clear	KA1-8118	0.88

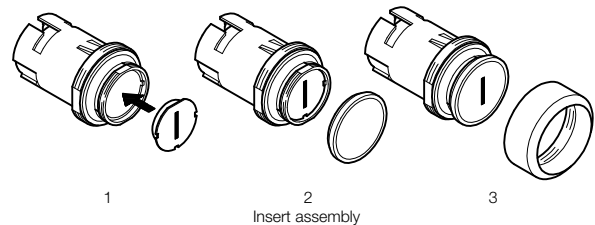
① Light diffusing lens insert is placed between the bulb and the lens.

Text cap inserts

Legend	Cap color ①	Suffix code ②	Flush button catalog number	Extended button catalog number	Pilot light catalog number
	White	C82	1SFA616901R9036	—	—
Start	White	C67	1SFA616901R2030	1SFA616902R2030	1SFA616903R2030
START	Green	C5	1SFA616906R1042	—	—
	Black	C81	1SFA616908R1042	—	—
On	White	C68	1SFA616901R1020	1SFA616902R1020	1SFA616903R1020
ON	White	C69	1SFA616901R1039	—	1SFA616903R1039
	Green	C70	1SFA616906R1039	—	—
	Black	C1	1SFA616908R1039	—	—
Off	White	C71	1SFA616901R1019	1SFA616902R1019	1SFA616903R1019
OFF	White	C72	—	1SFA616902R1040	—
	Red	C73	—	1SFA616905R1040	—
	Black	C2	1SFA616908R1040	1SFA616909R1040	—
Stop	White	C74	1SFA616901R1031	1SFA616902R1031	1SFA616903R1031
STOP	Red	C4	1SFA616904R1047	1SFA616905R1047	—
Reset	White	C75	1SFA616901R1025	1SFA616902R1025	1SFA616903R1025
Blank	White	C15	1SFA616901R9000	1SFA616902R9000	1SFA616903R9000
	Green	CG	29491468-2	29491469-2	—
UP	Green	C11	1SFA616906R1043	—	—
DOWN	Green	C12	1SFA616906R1044	—	—
OPEN	White	C16	1SFA616901R1045	—	—
	Green	C19	1SFA616906R1045	—	—
CLOSE	White	C17	1SFA616901R1046	—	—
	Green	C20	1SFA616906R1046	—	—
REV	Green	C6	1SFA616906R1048	—	—
FWD	Green	C7	1SFA616906R1049	—	—
SLOW	Green	C8	1SFA616906R1050	—	—
FAST	Green	C9	1SFA616906R1051	—	—
JOG	Green	C10	1SFA616906R1052	—	—
RESET	Black	C3	1SFA616908R1041	—	—
LATCH	White	C18	1SFA616901R1053	—	—

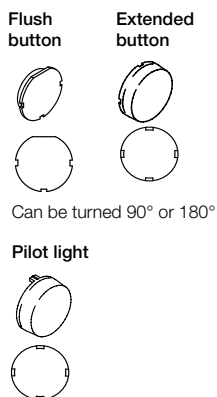


Examples of inserts



① Illuminated pushbuttons and pilot lights must use white insert.
② Add suffix code to end of the catalog number.

Text cap inserts



Text caps for illuminated pushbuttons and pilot lights

Text/Symbol ^①	Cap color	Suffix ^②	Flush button Catalog No.	Extended button Catalog No.	Pilot light Catalog No.
→→	White	C14	1SFA616901R9006	1SFA616902R9006	1SFA616903R9006
O	White	C21	1SFA616901R9004	1SFA616902R9004	1SFA616903R9004
	Red	C22	1SFA616904R9004	1SFA616905R9004	–
	Black	C23	1SFA616908R9004	–	–
I	White	C24	1SFA616901R9002	1SFA616902R9002	1SFA616903R9002
	Green	C25	1SFA616906R9002	–	–
	Black	C26	1SFA616908R9002	–	–
II	White	C27	1SFA616901R9003	1SFA616902R9003	1SFA616903R9003
	Green	C28	1SFA616906R9003	–	–
	Black	C29	1SFA616908R9003	–	–
III	White	C30	1SFA616901R9028	1SFA616902R9028	–
	Black	C31	1SFA616908R9028	–	–
+	White	C32	1SFA616901R9011	1SFA616902R9011	–
	Green	C33	1SFA616906R9011	–	–
	Black	C34	1SFA616908R9011	–	–
–	White	C35	1SFA616901R9012	–	–
	Red	C36	1SFA616904R9012	–	–
	Black	C37	1SFA616908R9012	–	–
↑	White	C38	1SFA616901R9005	1SFA616902R9005	1SFA616903R9005
	Black	C39	1SFA616908R9005	–	–
↗	White	C40	1SFA616901R9014	1SFA616902R9014	–
	Black	C41	1SFA616908R9014	–	–
↔	White	C42	1SFA616901R9015	1SFA616902R9015	–
	Black	C43	1SFA616908R9015	–	–
↔↔	White	C44	1SFA616901R9016	1SFA616902R9016	–
	Black	C45	1SFA616908R9016	–	–
⤵	White	C46	1SFA616901R9017	1SFA616902R9017	–
	Black	C47	1SFA616908R9017	–	–
⊕	White	C47	1SFA616901R9018	1SFA616902R9018	–
	Black	C48	1SFA616908R9018	–	–
●	White	C49	1SFA616901R9019	1SFA616902R9019	–
	Black	C50	1SFA616908R9019	–	–
⊙	White	C51	1SFA616901R9020	1SFA616902R9020	–
	Black	C52	1SFA616908R9020	–	–
✋	White	C53	1SFA616901R9021	1SFA616902R9021	–
	Black	C54	1SFA616908R9021	–	–
⚡	White	C55	1SFA616901R9022	1SFA616902R9022	–
	Black	C56	1SFA616908R9022	–	–
⚡⚡	White	C57	1SFA616901R9023	1SFA616902R9023	–
	Black	C58	1SFA616908R9023	–	–
⚡	White	C59	1SFA616901R9024	1SFA616902R9024	–
	Black	C60	1SFA616908R9024	–	–
⤴	White	C61	1SFA616901R9025	1SFA616902R9025	–
	Black	C62	1SFA616908R9025	–	–
⤵	White	C63	1SFA616901R9026	1SFA616902R9026	–
	Black	C64	1SFA616908R9026	–	–
⚡	White	C65	1SFA616901R9027	1SFA616902R9027	–
	Black	C66	1SFA616908R9027	–	–

① Use only white caps for illuminated pushbutton and pilot lights.
② Add suffix code to end of the catalog number.

Technical data

Standards and approvals

IEC / EN 60947-1	Low-Voltage Switchgear and Controlgear - Part 1: General rules
IEC / EN 60947-5-1	Low-Voltage Switchgear and Controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices
IEC / EN 60947-5-5	Low-Voltage Switchgear and Controlgear - Part 5-5: Control circuit devices and switching elements - Electrical Emergency Stop device with mechanical latching function
IEC / EN 60073	Basic and safety principles for man-machine interface, marking and identification - Coding principles for indicators and actuators
IEC / EN 60529	Degrees of Protection provided by enclosures (IP code)
EN 50013	Low-Voltage Switchgear and Controlgear for industrial use - Terminal marking and distinctive number for particular control switches
DIN 40050-9	Road vehicles; Degrees of Protection (IP-code); protection against foreign objects; water and contact; electrical equipment
UL 508	Industrial Control Equipment
CSA C22.2 No 14	Industrial Control Equipment

Environmental data

Degrees of protection

Operators	IEC/EN DIN	UL/CSA
Pushbutton: MP *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Double pushbutton: MPD *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Mushroom pushbutton: MPM *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Emergency Stop: MPMT/P *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Selector Switch: M2SS/M3SS *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Key-operated Selector Switch: M2SSK/M3SSK *	IP66	Catalog number 1, 3R, 4, 4X, 12
Toggle Switch: MTS2/MTS3 *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Extreme Duty pushbutton: KP6	-	Catalog number 1, 3R, 4, 4X
Reset pushbutton: KPR *	IP 66	Catalog number 1, 3R, 4, 4X, 12, 13
Joystick: MJS	IP66, 67, 69K	Catalog number 1, 4X (indoor), 12, 13
Pilot lights: ML	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Buzzer: KB	IP65	Catalog number 4X
Potentiometer: KT *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Contact block and Transformer block	IP20	-
Plastic Enclosures	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Metallic Enclosures	IP66, 67, 69K	-

Temperature

Ambient temperature during operation	-25 to +70 °C
Storage temperature	-40 to +85 °C

* With Chrome plastic bezel IP66 Catalog number 1, 12, 13

Please note that specified degree of protection is for operator mounted on panel. If other items are mounted in between, please make sure that they are correctly sealed.

Technical Data

Terminals

Plus-minus Pozidriv No.2 screw with DIN-washer.

Connectable Area	min. 1 x 0.5 mm ² /AWG 20 max. 2 x 2.5 mm ² /2 x AWG14
------------------	---------------------------------------------------------------------------------

Tightening Torque

Operators Locking Nut	Min. 2 Nm / Max. 2.3 Nm
Cable Terminals	0.9 Nm

Material

No ozone depleting substances in the products.

All front of panel plastic components are made of polycarbonate

PC Polycarbonate	High impact strength, good outdoor resistance. Chemical resistance (see table below)
PSU Polysulphone	Can withstand high temperatures, acids, basic solutions, alkaline compounds, oils, alcohols.
PA Polyamide	Can withstand high temperatures, aliphatic, aromatic and chlorinated hydrocarbons, esters, ketone-aldehydes, alcohols and basic solutions.
PBT	Can withstand high temperature, aliphatic and aromatic hydrocarbons, acids, basic solutions, alcohols, grease and oils
Zinc	Good corrosion resistance in inland-, sea and industrial atmosphere.
light-alloy	Good corrosion resistance in inland-, sea and industrial atmosphere.

Chemical Resistance for Polycarbonate

Chemical Class	Effects
Acids	No significant effect under most typical conditions of concentration and temperature
Alcohols and Alkalis	Generally compatible at low concentration and room temperature. Higher concentrations and elevated temperatures can result in etching and attack evidenced by decomposition.
Aliphatic Hydrocarbons	Generally compatible
Amines	Surface crystallization and chemical attack. Avoid.
Aromatic Hydrocarbons	Partial solvents and severe stress cracking agents (i.e., xylene, toluene). Avoid.
Detergents and Cleaners	Mild soap solutions are generally compatible. Strong alkaline materials should be avoided.
Esters	Cause severe crystallization. Partial solvents. Avoid.
Greases and Oils	Pure petroleum Catalog numbers generally compatible. Many additives used with them are not.
Halogenated Hydrocarbons	Solvents. Avoid.
Ketones	Cause severe crystallization and stress cracking. Partial solvents. Avoid.
Silicone Oil and Greases	Generally compatible up to 85 °C.



Approvals

The pushbuttons, selector switches and pilot lights are approved by:
- National approval agencies: UL, CSA and China Compulsory Product Certification

For detail information please contact ABB

Technical data

Electrical data

Standard contact blocks

Self cleaning silver contacts, NC contact with positive opening. At voltages and currents below 24 V and 5.6 mA we recommend our Micro Switch blocks.

Ratings as per IEC 60947-5-1

Rated Insulation Voltage, U_i		690 V		
Rated Thermal Current, I_{th}		10 A		
Rated Operational Current, I_e Utilization category AC 15,	at: 120 V at: 230 V at: 400 V at: 690 V	8 A 6 A 4 A 2 A		
Rated Operational Current, I_e utilisation category DC 13,	at: 24 V at: 125 V at: 250 V	5 A 1.1 A 0.55 A		

Ratings as per UL, CSA, NEMA

		A600 AC		Q600 DC
Rated Insulation Voltage		600 V		600 V
Rated Thermal Current		10 A		2.5 A
Rated Operational Current	at: 120 V at: 240 V at: 480 V at: 600 V	6 A 3 A 1.5 A 1.2 A	at: 125 V at: 250 V at: 480 V at: 600 V	0.55 A 0.27 A 0.10 A 0.10 A

Contact resistance

< 25 mΩ

Compulsory function test

at: 5V, 16 mA

Max. number of contact blocks per operator

The Contact blocks can be stacked in max two levels on the 3- block holder. Only one level is accepted on the 5-block holder.

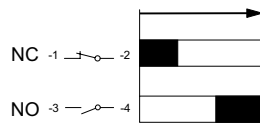
pushbutton, Toggle Switch, Mushroom pushbutton, Double pushbutton, Selector Switch, Key-operated Selector Switch and Emergency Stop Operator	6
Joystick	8

Short circuit protection

Max. fuse at 1 kA

gG 16A

Diagram for make-and-break contact



Micro Switch block / Ratings as per IEC 60947-5-1

Rated Insulation Voltage, U_i		125 V
Rated Thermal Current, I_{th}		3 A
Rated Operational Current, I_e utilization category AC 14,	at: 125 V	0.5 A
Rated Operational Current, I_e utilization category DC 13,	at: 24 V	0.3 A
Rated Operational Current, I_e utilization category DC 12,	at: 24 V	0.1 A

Minimum Switching Capacity

Standard Contact blocks	24 V DC	5.6 mA
Gold plated Contact blocks	5 V DC	12 mA
	12 V DC	1 mA
Micro Switch blocks	3 V DC	1 mA

Ratings as per UL 508

	125 V AC	3 A
	60 V DC	0.2 A
	48 V DC	0.1 A

Mechanical data

Mechanical life

Standard Contact blocks		10 million operations
pushbuttons, Momentary Mushroom pushbutton		2 million operations
Selector Switches Present standard (no operation of center contact)		500 000 operations
With operation of center contact		250 000 operations
		150 000 operations
Maintained Mushroom pushbutton, Key-operated Selector Switch and Double pushbutton		500 000 operations
Emergency Stop Toggle Switch		100 000 operations 1 million operations
Joystick		500 000 operations
		400 000 operations
		300 000 operations

Technical data

Lamp block ratings as per IEC 60 947-5-1

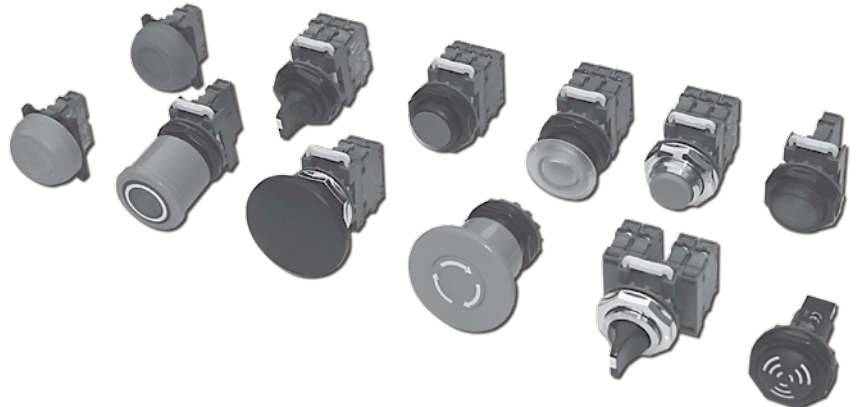
Rated Insulation Voltage	230 V
Base	BA 9s
Permissible power, up to	2 W

Transformer block

Suitable for Filament bulb 6 or 24 V AC, 1.2 W and LED 24 V.	
Rated Power	1.5 W
Rated Insulation Voltage acc. to IEC 70 °C (DT)	Class E

LED bulbs

Service Life for LED bulbs means number of service hours until the brightness has been reduced down 50 %. Service Life 50 000 h	
Color of white LED	x=0.31 Y=0.32 means the position of color in the ICI Chromaticity Diagram
Voltage Tolerance on LED bulbs	-30 to +10 % voltage is acceptable without affecting the Service Life
Voltage Peaks on LED bulbs	Voltage Peaks up to 1000 V Current Peaks up to 500 mA during a few msec
Glowing light	All integrated LED bulbs have a function built in to cut leakage currents.



Modular Range, 30mm Pilot devices

General construction

- Snap-on features reduce installation time
- Bezels: black plastic or chrome metal
- Contact block holder features rear mounting with quick-release locking mechanism for high security
- Buttons available in several colors
- Engraved text caps available
- Custom-specific markings on request
- UL File# E76003
- CSA File# LR19700

Operators

- Pushbuttons, illuminated and non-illuminated
- Mushroom pushbuttons, illuminated and non-illuminated, 40mm and 60mm diameter
- Emergency stop pushbuttons, illuminated and non-illuminated, twist or pull release
- Selector switches, illuminated and non-illuminated, 2- or 3-position, short or long handle
- Key-operated selector switches, 2- or 3-position
- Toggle switches, 2- or 3-position

Contact blocks

- Quick-mount, quick release contact block holder for fast and easy assembly/disassembly
- NO & NC contact blocks are color-coded for easy identification: Green = NO; Red = NC
- Silver-tipped contacts
- Wiping action for high reliability
- Low energy gold-plated contact blocks
- Contact block holder for three or five blocks in a single row

Pilot lights

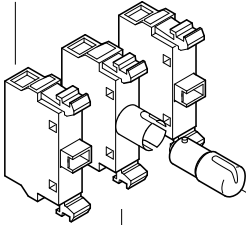
- Full voltage, resistor and transformer
- LED and filament bulbs available

General information Mounting

Exploded view

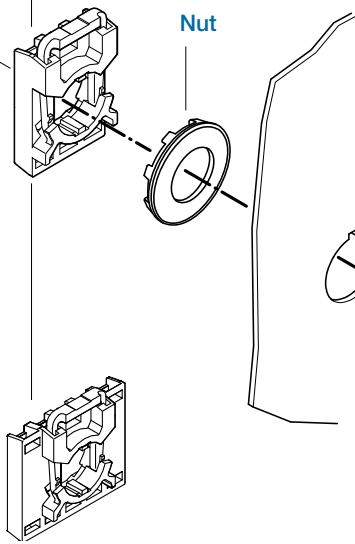
Contact block

Single pole with making or breaking contact



Holder

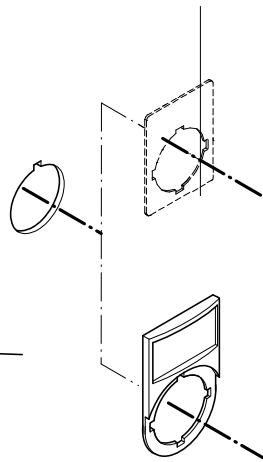
Available either for three or five blocks in one single row. Additional blocks can be stacked on holders for three blocks.



Nut

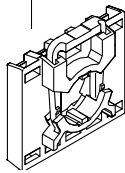
Legend plates

Of aluminum with slots that guide the legend plate and the operator into the correct position.



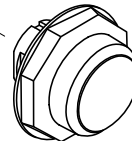
Lamp block

Illuminated pushbuttons, illuminated selector switches and pilot lights have a lamp block in the center position of the holder.



Operator

Buttons, lenses and handles in several colors. Illuminated or non-illuminated.

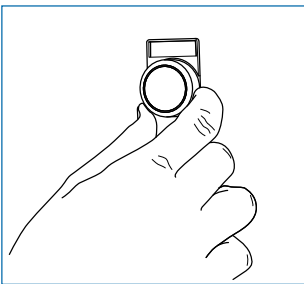


Five block holder

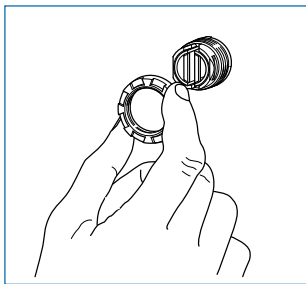
Bezels

Pushbuttons, selector switches and toggle switches with bezel in black plastic, chrome metal are available.

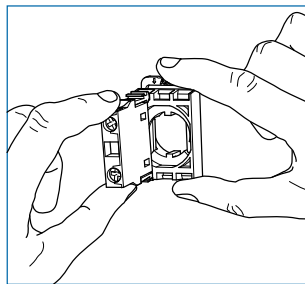
Easy to mount



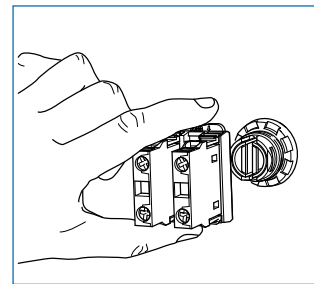
The operator is to be inserted from the front....



...and secured at the back with a nut.

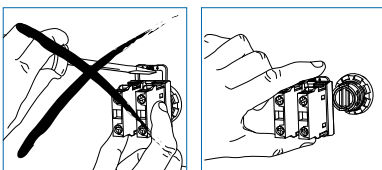


The contact blocks/lamp block are then snapped on to the holder..



...and the holder snaps on to the operator.

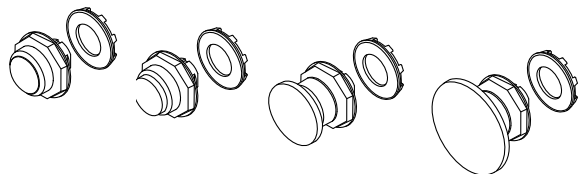
...and to remove



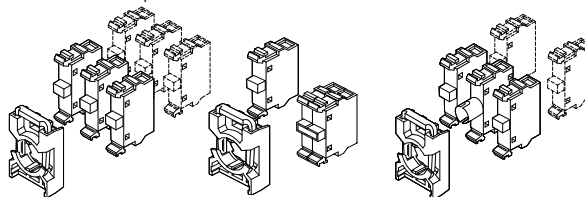
Press down the spring on the holder and pull the holder from the actuator.

Selection guide

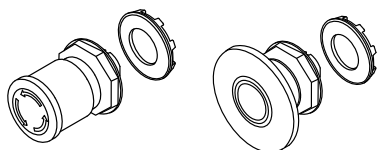
Pushbuttons and Mushroom pushbuttons



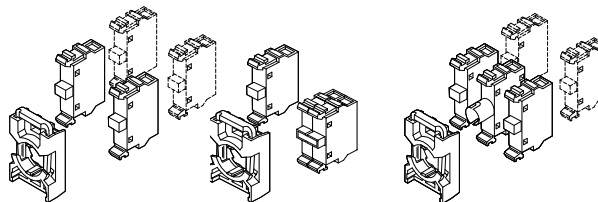
Contact block/lamp block combinations



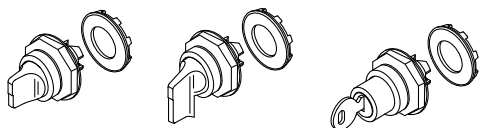
Emergency stop pushbuttons



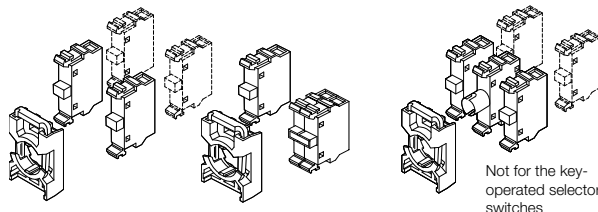
Contact block/lamp block combinations



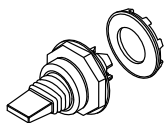
Selector switches



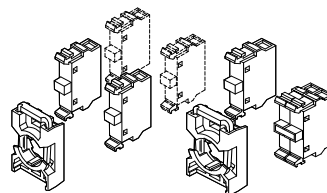
Contact block/lamp block combinations



Toggle switches



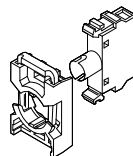
Contact block combinations



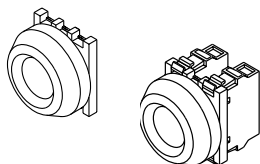
Pilot lights



Lamp block combination



Extreme duty pushbuttons



Flush and extended pushbuttons

Non-illuminated and illuminated

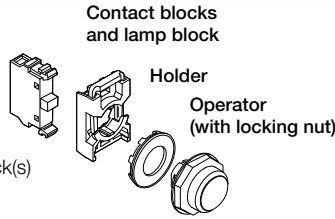
Momentary and maintained

How to order non-illuminated:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
- Alt.2** • Operator
+ Holder with Contact block(s)

How to order illuminated:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block
- Alt.2** • Operator
+ Holder with Contact block(s)
and lamp block

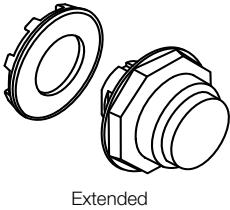
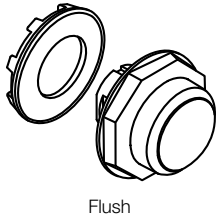


Δ Non-illuminated button color		‡ Illuminated button color	
R Red	G Green	R Red	G Green
Y Yellow	L Blue	Y Yellow	L Blue
W White	B Black	W White	B Black
C Clear			

To select button color, substitute the Δ or the ‡ in the catalog number with the above color letter code.
EX: G1MP1-10R (for a red button).

NOTE: No contact block in center position, reserved for LED/lamp block
For contact blocks, holders & LED lamp blocks, see Accessories pages 7.54 - 7.58.

7



Non-illuminated

Description	Catalog number
Black plastic bezel Flush, momentary Flush, maintained Extended, momentary Extended, maintained	G1MP1-10Δ G1MP2-10Δ G1MP3-10Δ G1MP4-10Δ
Chrome bezel Flush, momentary Flush, maintained Extended, momentary Extended, maintained	G2MP1-30Δ G2MP2-30Δ G2MP3-30Δ G2MP4-30Δ

Illuminated^①

Description	Catalog number
Black plastic bezel Flush, momentary Flush, maintained Extended, momentary Extended, maintained	G1MP1-11‡ G1MP2-11‡ G1MP3-11‡ G1MP4-11‡
Chrome bezel Flush, momentary Flush, maintained Extended, momentary Extended, maintained	G2MP1-31‡ G2MP2-31‡ G2MP3-31‡ G2MP4-31‡

① No contact block in the center position.

② Lamp block MLB-1. Bulb not included. Other lamp block see Accessories, bulb max 1.2 W.

Mushroom pushbuttons

Non-illuminated and illuminated

Momentary

How to order non-illuminated:

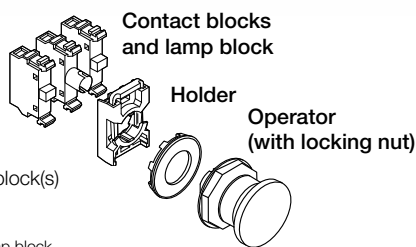
Alt.1 • Operator
+ Holder
+ Contact block(s)

Alt.2 • Operator
+ Holder with Contact block(s)

How to order illuminated:

Alt.1 • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block

Alt.2 • Operator
+ Holder with Contact block(s)
and lamp block

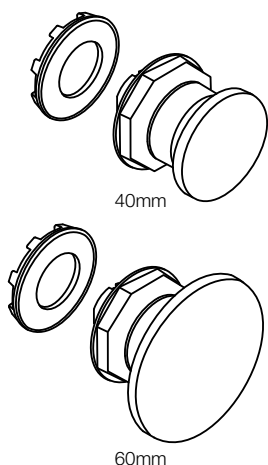


Δ Non-illuminated button color	‡ Illuminated button color
R Red	R Red
Y Yellow	Y Yellow
B Black	G Green

To select button color, substitute the Δ or the ‡ in the catalog number with the above color letter code.

EX: G1MPM1-10R (for a red button).

NOTE: No contact block in center position, reserved for LED/lamp block.
For contact blocks, holders & LED lamp blocks, see Accessories pages 7.54 - 7.58.



Non-illuminated

Description	Catalog number
Black plastic bezel 40mm 60mm	G1MPM1-10Δ G1MPM2-10Δ
Chrome bezel 40mm 60mm	G2MPM1-30Δ G2MPM2-30Δ

Illuminated^①

Description	Catalog number
Black plastic bezel 40mm 60mm	G1MPM1-11‡ G1MPM2-11‡
Chrome bezel 40mm 60mm	G2MPM1-31‡ G2MPM2-31‡

① No contact block in the center position

② Lamp block MLB-1. Bulb not included. Other lamp block see Accessories, bulb max 1.2 W.

Emergency stop pushbuttons

Non-illuminated and illuminated

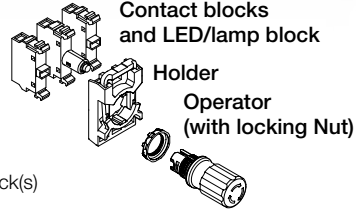
30mm, 40mm & 60mm head

How to order non-illuminated:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
- Alt.2** • Operator
+ Holder with Contact block(s)

How to order illuminated:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block
- Alt.2** • Operator
+ Holder with Contact block(s)
and LED/lamp block

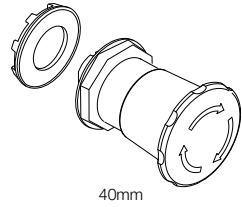
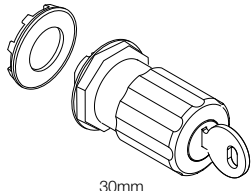


NOTE: No contact block in center position, reserved for LED/lamp block.
For contact blocks, holders & LED lamp blocks, see Accessories pages 7.54 - 7.58.

7

Fulfills IEC 60947-5-5

Operator: Emergency Stop



		Description	Catalog number
Non-Illuminated			
30mm			
Black Plastic Bezel			
Red	Twist release		G1MPET3-10R
Red	Key release (Key code 71, Ronis 455)		G1MPEK3-11R
Red	Key release (Key code 72, Ronis 421)		G1MPEK3-12R
Red	Key release (Key code 73, Ronis 3433-E)		G1MPEK3-13R
Chrome Bezel			
Red	Twist release		G2MPET3-10R
Red	Key release (Key code 71, Ronis 455)		G2MPEK3-11R
Red	Key release (Key code 72, Ronis 421)		G2MPEK3-12R
Red	Key release (Key code 73, Ronis 3433-E)		G2MPEK3-13R
40mm			
Black Plastic Bezel			
Red	Twist release		G1MPET4-10R
Red	Key release (Key code 71, Ronis 455)		G1MPEK4-11R
Red	Key release (Key code 72, Ronis 421)		G1MPEK4-12R
Red	Key release (Key code 73, Ronis 3433-E)		G1MPEK4-13R
Chrome Bezel			
Red	Twist release		G2MPET4-10R
Red	Key release (Key code 71, Ronis 455)		G2MPEK4-11R
Red	Key release (Key code 72, Ronis 421)		G2MPEK4-12R
Red	Key release (Key code 73, Ronis 3433-E)		G2MPEK4-13R
Illuminated			
40mm			
Black Plastic Bezel			
Red	Twist release		G1MPMT3-11R
Chrome Bezel			
Red	Twist release		G2MPMT3-11R
60mm			
Black Plastic Bezel			
Red	Twist release		G1MPMT4-11R
Chrome Bezel			
Red	Twist release		G2MPMT4-11R

Pull release operators

Non-illuminated and illuminated

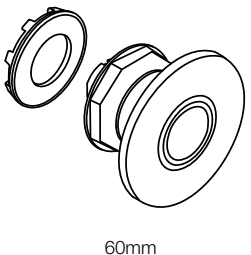
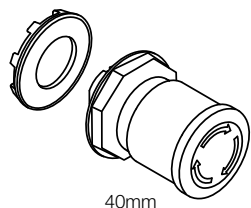
30mm, 40mm & 60mm head

How to order non-illuminated:	How to order illuminated:	
Alt.1 • Operator + Holder + Contact block(s) Alt.2 • Operator + Holder with Contact block(s)	Alt.1 • Operator + Holder + Contact block(s) + LED/lamp block Alt.2 • Operator + Holder with Contact block(s) and LED/lamp block	

NOTE: No contact block in center position, reserved for LED/lamp block.
For contact blocks, holders & LED lamp blocks, see Accessories pages 7.54 - 7.58.

Fulfills IEC 60947-5-5

Operator: Twist or pull release operators



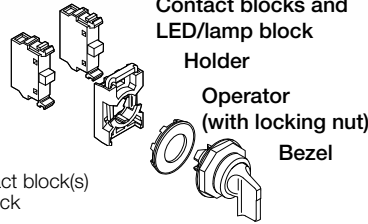
	Description	Catalog number
Non-Illuminated		
30mm		
Black Plastic Bezel		
Red	Pull release	G1MPEP3-10R
Chrome bezel		
Red	Pull release	G2MEP3-10R
40mm		
Black Plastic Bezel		
Red	Pull release	G1MPEP4-10R
Chrome Bezel		
Red	Twist release	G2MPET4-10R
Illuminated		
40mm		
Black Plastic Bezel		
Red	Pull release	G1MPMP3-11R
Chrome bezel		
Red	Pull release	G2MPMP3-11R
60mm		
Black Plastic Bezel		
Red	Pull release	G1MPMP4-11R
Chrome Bezel		
Red	Twist release	G2MPMP4-11R

Two position selector switches Non-illuminated

How to order:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block

- Alt.2** • Operator
+ Holder with Contact block(s)
and LED/lamp block



Δ Non-illuminated handle color

R Red

B Black

U Grey

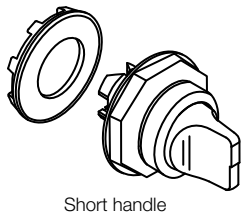
To select handle color, substitute the Δ in the catalog number with the above color letter code.
EX: G1M2SS1-10ΔR (for a red button).

NOTE: No contact block in center position, reserved for LED/lamp block.
For contact blocks & holders, see Accessories pages 7.54.

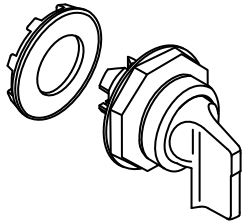
7

Non-illuminated

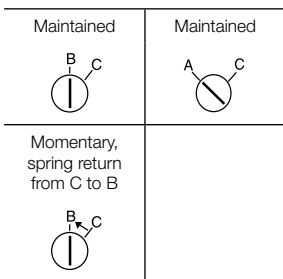
Description	Catalog number
Short handle	
Black plastic bezel	
Maintained B & C	G1M2SS1-10Δ
Maintained A & C	G1M2SS2-10Δ
Spring return from C to B	G1M2SS3-10Δ
Chrome bezel	
Maintained B & C	G2M2SS1-30Δ
Maintained A & C	G2M2SS2-30Δ
Spring return from C to B	G2M2SS3-30Δ
Long handle	
Black plastic bezel	
Maintained B & C	G1M2SS4-10Δ
Maintained A & C	G1M2SS5-10Δ
Spring return from C to B	G1M2SS6-10Δ
Chrome bezel	
Maintained B & C	G2M2SS4-30Δ
Maintained A & C	G2M2SS5-30Δ
Spring return from C to B	G2M2SS6-30Δ



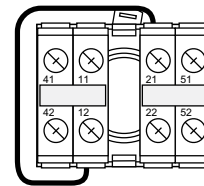
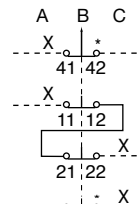
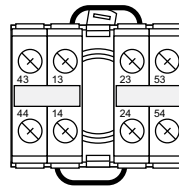
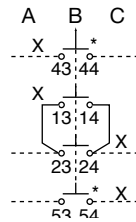
Short handle



Long handle



Center position connection detail



Contact functions

Block positions as seen from operator front.

Handle position	Left block	Right block
A (B)	O	O
C	x	x

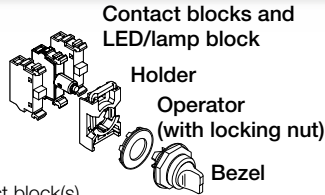
O = not actuated (normal state)
x = actuated (state changed)

Two position selector switches Illuminated

How to order:

Alt.1 • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block

Alt.2 • Operator
+ Holder with Contact block(s)
and LED/lamp block



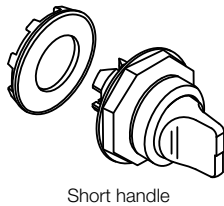
Δ Illuminated handle color	
R Red	L Blue
G Green	C Clear
Y Yellow	

To select handle color, substitute the Δ in the catalog number with the above color letter code.
EX: G1M2SS1-11R (for a red handle).

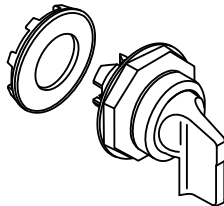
For contact blocks, holders & LED lamp blocks, see Accessories pages 7.54 - 7.58.

Illuminated[Ⓛ]

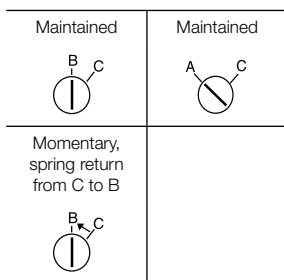
Description	Catalog number
Short handle	
Black plastic bezel	
Maintained B & C	G1M2SS1-11Δ
Maintained A & C	G1M2SS2-11Δ
Spring return from C to B	G1M2SS3-11Δ
Chrome bezel	
Maintained B & C	G2M2SS1-31Δ
Maintained A & C	G2M2SS2-31Δ
Spring return from C to B	G2M2SS3-31Δ
Long handle	
Black plastic bezel	
Maintained B & C	G1M2SS4-11Δ
Maintained A & C	G1M2SS5-11Δ
Spring return from C to B	G1M2SS6-11Δ
Chrome bezel	
Maintained B & C	G2M2SS4-31Δ
Maintained A & C	G2M2SS5-31Δ
Spring return from C to B	G2M2SS6-31Δ



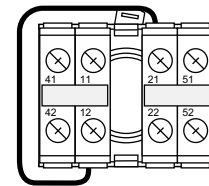
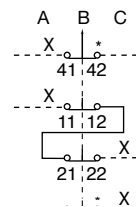
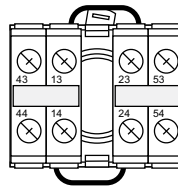
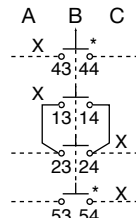
Short handle



Long handle



Center position connection detail



Ⓛ No contact block in the center position

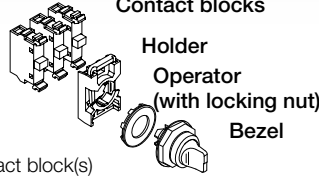
Ⓜ Lamp block MLB-1. Bulb not included. Other lamp block see Accessories, bulb max 1.2 W.

Three position selector switches Non-illuminated

How to order:

Alt.1 • Operator
+ Holder
+ Contact block(s)

Alt.2 • Operator
+ Holder with contact block(s)



Δ Non-illuminated handle color

R Red

B Black

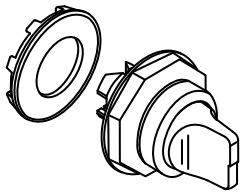
U Grey

To select handle color, substitute the Δ in the catalog number with the above color letter code.
EX: G1M3SS1-10R (for a red handle).

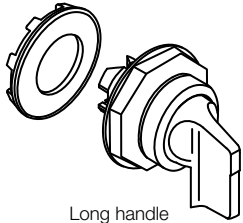
NOTE: No contact block in center position.

For contact blocks & holders, see Accessories pages 7.54.

7



Short handle



Long handle

Non-illuminated

Description	Catalog number
Short handle	
Black plastic bezel	
Maintained A, B & C	G1M3SS1-10Δ
Spring return A & C to B	G1M3SS2-10Δ
Maint A, Spring ret C to B	G1M3SS3-10Δ
Maint C, Spring ret A to B	G1M3SS7-10Δ
Chrome bezel	
Maintained A, B & C	G2M3SS1-30Δ
Spring return A & C to B	G2M3SS2-30Δ
Maint A, Spring ret C to B	G2M3SS3-30Δ
Maint C, Spring ret A to B	G2M3SS7-30Δ
Long handle	
Black plastic bezel	
Maintained A, B & C	G1M3SS4-10Δ
Spring return A & C to B	G1M3SS5-10Δ
Maint A, Spring ret C to B	G1M3SS6-10Δ
Maint C, Spring ret A to B	G1M3SS8-10Δ
Chrome bezel	
Maintained A, B & C	G2M3SS4-30Δ
Spring return A & C to B	G2M3SS5-30Δ
Maint A, Spring ret C to B	G2M3SS6-30Δ
Maint C, Spring ret A to B	G2M3SS8-30Δ

Maintained



Momentary, spring return from A to B and from C to B



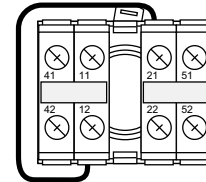
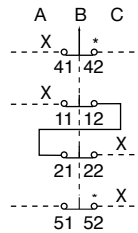
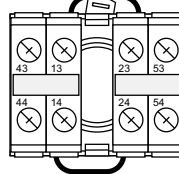
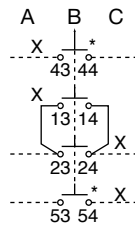
Momentary, spring return from C to B



Momentary, spring return from A to B



Center position connection detail



Three position selector switches Illuminated

How to order:

Alt.1

- Operator
- + Holder
- + Contact block(s)
- + LED/lamp block

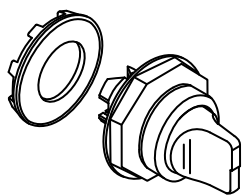
Alt.2

- Operator
- + Holder with Contact block(s) and LED/lamp block

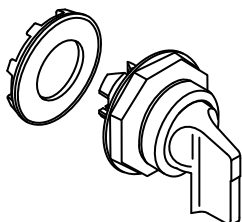
Δ Illuminated handle color	
R Red	L Blue
G Green	C Clear
Y Yellow	

To select handle color, substitute the Δ in the catalog number with the above color letter code.
EX: G1M3SS1-11R (for a red handle).

NOTE: For contact blocks, holders & LED lamp blocks, see Accessories pages 7.54 - 7.58.



Short handle

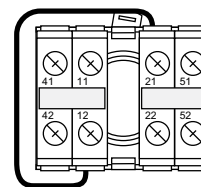
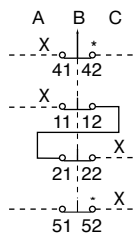
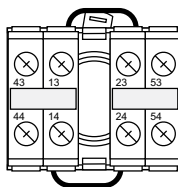
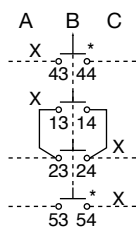
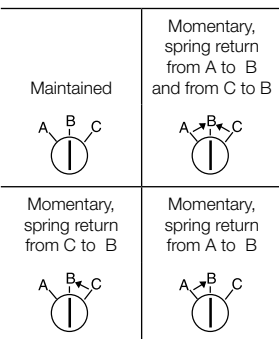


Long handle

Illuminated[Ⓛ]

Description	Catalog number
Short handle	
Black plastic bezel	
Maintained A, B & C	G1M3SS1-11Δ
Spring return A & C to B	G1M3SS2-11Δ
Maint A, Spring ret C to B	G1M3SS3-11Δ
Maint C, Spring ret A to B	G1M3SS7-11Δ
Chrome bezel	
Maintained A, B & C	G2M3SS1-31Δ
Spring return A & C to B	G2M3SS2-31Δ
Maint A, Spring ret C to B	G2M3SS3-31Δ
Maint C, Spring ret A to B	G2M3SS7-31Δ
Long handle	
Black plastic bezel	
Maintained A, B & C	G1M3SS4-11Δ
Spring return A & C to B	G1M3SS5-11Δ
Maint A, Spring ret C to B	G1M3SS6-11Δ
Maint C, Spring ret A to B	G1M3SS8-11Δ
Chrome bezel	
Maintained A, B & C	G2M3SS4-31Δ
Spring return A & C to B	G2M3SS5-31Δ
Maint A, Spring ret C to B	G2M3SS6-31Δ
Maint C, Spring ret A to B	G2M3SS8-31Δ

Center position connection detail



Ⓛ No contact block in the center position

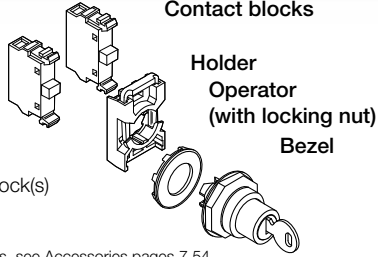
Key-operated selector switches ①

Two and three position

How to order:

Alt.1 • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block

Alt.2 • Operator
+ Holder with Contact block(s)
and LED/lamp block



Δ Key codes

1 Ronis 71

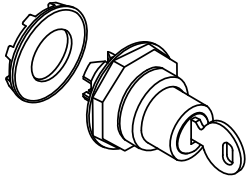
2 Ronis 72

3 Ronis 73

To select desired key code, substitute the Δ in the catalog number with the above key letter code.
EX: G1M2SSK1-10Δ (Ronis 72 key)

NOTE: For contact blocks & holders, see Accessories pages 7.54.

7



Two position	Three position
Maintained 	Maintained
Maintained 	Maintained
Momentary, spring return from C to B 	Momentary, spring return from A to B and from C to B
	Momentary, spring return from C to B
	Momentary, spring return from C to B

Description	The key can be removed in...	Catalog number
2-position		
Black plastic bezel		
Maintained B & C	B & C	G1M2SSK1-10Δ
Maintained B & C	B only	G1M2SSK2-10Δ
Spring return C to B	B only	G1M2SSK3-10Δ
Chrome bezel		
Maintained B & C	B & C	G2M2SSK1-30Δ
Maintained B & C	B only	G2M2SSK2-30Δ
Spring return C to B	B only	G2M2SSK3-30Δ
3-position		
Black plastic bezel		
Maintained A, B, & C	A, B & C	G1M3SSK1-10Δ
Maintained A, B, & C	B only	G1M3SSK2-10Δ
Spring return A & C to B	B only	G1M3SSK3-10Δ
Spring return C to B	A only	G1M3SSK4-10Δ
Spring return C to B	A, B, & C	G1M3SSK5-10Δ
Chrome bezel		
Maintained A, B, & C	A, B & C	G2M3SSK1-30Δ
Maintained A, B, & C	B only	G2M3SSK2-30Δ
Spring return A & C to B	B only	G2M3SSK3-30Δ
Spring return C to B	A only	G2M3SSK4-30Δ
Spring return C to B	A, B, & C	G2M3SSK5-30Δ

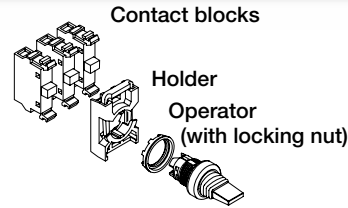
① Includes two keys

Toggle switches

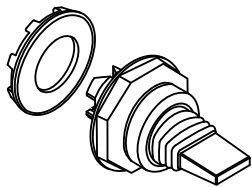
Two and three position

How to order:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
- Alt.2** • Operator
+ Holder with Contact block(s)



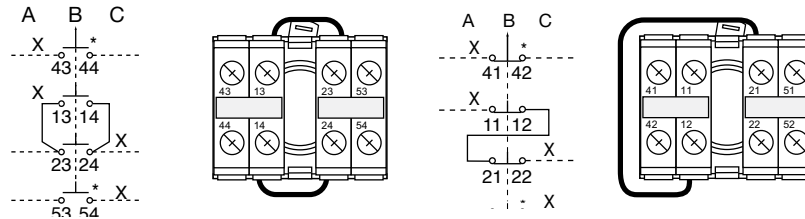
NOTE: For contact blocks & holders, see Accessories pages 7.54.



Description	Catalog number
2-position	
Maintained, black bezel	G1MTS1-10B
Maintained, chrome bezel	G2MTS1-30B
3-position	
Maintained, black bezel	G1MTS3-10B
Maintained, chrome bezel	G2MTS3-30B
Spring return from A and C to B, black bezel	G1MTS2-10B
Spring return from A and C to B, chrome bezel	G2MTS2-30B

Two position	Three position
Maintained	Momentary, spring return from A to B and from C to B
	Maintained

Center position connection detail

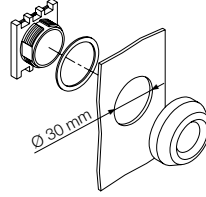


Extreme duty pushbuttons for 30mm mounting hole

How to order

- Operator
- + Contact block(s)

Mounting



NOTE: For contact blocks, see Accessories pages 7.54.

Operator: Extreme duty pushbutton

The Extreme duty pushbutton, for 30 mm hole, is a robust and compact pushbutton for use in cold, hot, damp, oily and other tough environments. Suitable especially for hydraulic lifts, compact pendant controllers and pushbutton stations.

Description	Included contact blocks	Catalog number	Weight oz.
Red	-	KP6-40R	0.78
Green	-	KP6-40G	0.78
black	-	KP6-40B	0.78
black	1 NO + 1 NC	KP6-40B-11	1.7
black	1 NO	KP6-40B-10	1.2
black	1 NC	KP6-40B-01	1.2
black	2 NO	KP6-40B-20	1.7
black	2 NC	KP6-40B-02	1.7

Contact blocks

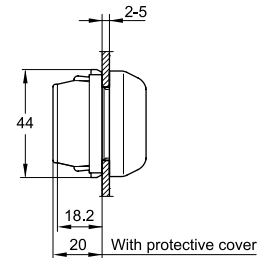
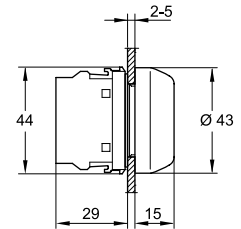
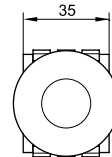
1 NO	MCB-10	0.46
1 NC	MCB-01	0.46

Accessories

Guide washer for positioning and anti-rotation	2154 373-1	
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Technical data

Degree of protection	IP66 UL Catalog number 1, 3R, 4, 4X
Ambient temperature	-30° — +70°



Red



Green



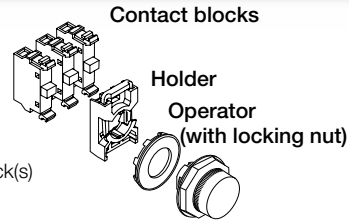
Black

Pilot lights

How to order:

Alt.1 • Operator
+ Holder
+ Contact block(s)

Alt.2 • Operator
+ Holder with Contact block(s)



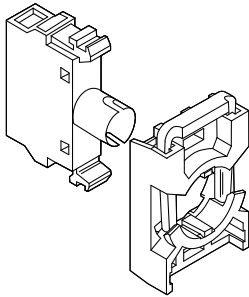
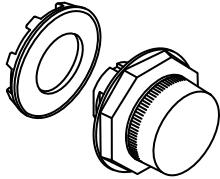
Δ Lens color

R Red	L Blue
G Green	W White
Y Yellow	C Clear

To select lens color, substitute the Δ in the catalog number with the above color letter code.
EX: G1ML1-100R (for a red lens).

NOTE: For contact blocks, see Accessories pages 7.54.

Description	Catalog number
Black plastic mounting ring	G1ML1-100Δ
Chrome mounting ring	G2ML1-100Δ



Lamp block + holder



Diffusing lens

Lamp blocks with holder ①

Supply voltage	Catalog number
For max. 2 W, 230 V AC and DC filament bulb or LED $\frac{230\text{ V, } 2\text{ W}}{X1 \quad X2}$ 115 V AC supply voltage.	MCBH-001
For 60 V filament bulb max. 1.2 W 230 V AC supply voltage.	MCBH-002
For 130 V filament bulb max. 2 W 230 V AC supply voltage.	MCBH-003

Light diffusing lens

To improve illumination. *Note: Cannot be used with text cap.*

Description	Catalog number
The lens is used instead of text cap	KA1-8005

① Bulb not included. See page 7.48

Accessories

Transformer and lamp blocks



Transformer block for pilot lights

Description	Bulb suffix		Catalog number	Weight oz.	
	LED	Filament			
Transformer blocks for pilot lights					
For 6 or 24 V Filament bulb and 24 V LED. Max 1.2 W Filament bulb lamp block included in the transformer, BA 9s base					
Primary voltage	Secondary voltage				
110-127 V AC	6 V AC	-	T2	KTR1-1001	3.4
220-250 V AC	6 V AC	-	T2	KTR1-1002	3.4
380-420 V AC	6 V AC	-	T3	KTR1-1003	3.4
440-480 V AC	6 V AC	-	T4	KTR1-1004	3.4
500-600 V AC	6 V AC	-	T5	KTR1-1005	3.4
110-127 V AC	24 V AC ¹⁾	T1	T6	KTR1-1011	3.4
220-250 V AC	24 V AC ¹⁾	T2	T7	KTR1-1012	3.4
380-420 V AC	24 V AC ¹⁾	T3	T8	KTR1-1013	3.4
440-480 V AC	24 V AC ¹⁾	T4	T9	KTR1-1014	3.4

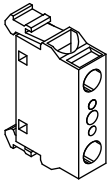
Transformer blocks for illuminated operators - Intended to supply 1.2W filament bulb mounted in lamp block MLB-J only

110-127 V AC	6 V AC	-	T2	KTR1-2001	3.4
220-250 V AC	6 V AC	-	T2	KTR1-2002	3.4
380-420 V AC	6 V AC	-	T3	KTR1-2003	3.4
440-480 V AC	6 V AC	-	T4	KTR1-2004	3.4
500-600 V AC	6 V AC	-	T5	KTR1-2005	3.4
110-127 V AC	24 V AC ¹⁾	T1	T6	KTR1-2011	3.4
220-250 V AC	24 V AC ¹⁾	T2	T7	KTR1-2012	3.4
380-420 V AC	24 V AC ¹⁾	T3	T8	KTR1-2013	3.4
440-480 V AC	24 V AC ¹⁾	T4	T9	KTR1-2014	3.4

¹⁾ Can be used with LED bulb



Transformer block for illuminated operators



Diode block

Diode block

Diode block	MDB-1001	0.53
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Note: To be used if several lamps are to be connected to a common lamp-test pushbutton. A diode must be connected in series with each lamp. The Diode block snaps onto the lamp block or is placed at the side

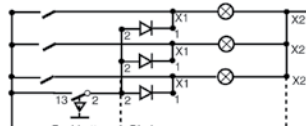


Diagram for lamp test with three Diode blocks (not intended for integrated LED bulbs)

Single lamp blocks for front mounting, BA 9s base

Description	Catalog number	Weight oz.	
<p>230 V, 2 W X1 X2</p>	For max. 2 W, 230 V AC and DC Filament bulb or LED	MLB-1	0.53
<p>115 V X1 X2 60 V 1.2 W</p>	115 V AC supply voltage. For 60 V Filament bulb 1.2 W	MLB-2	0.60
<p>230 V X1 X2 130 V 2 W</p>	230 V AC supply voltage. For 130 V Filament bulb 2 W	MLB-3	0.71
<p>115 V X1 X2 24 V LED</p>	115 V AC and DC supply voltage For 24 V LED only	MLB-4	0.60
<p>LED X1 X2 24-230V</p>	LED block designed to prevent glowing from leakage current.	MLB-8	0.53

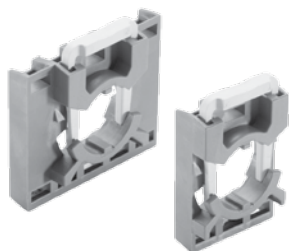
NOTE: Package order quantities will apply.



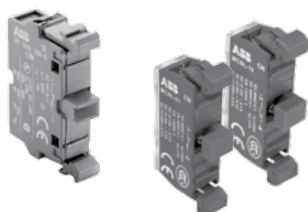
Lamp block

Accessories

Contact blocks and holders



Holders for contact block

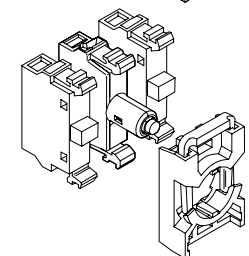
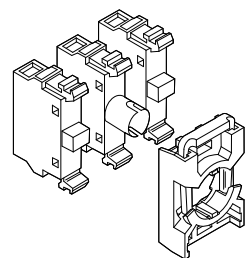
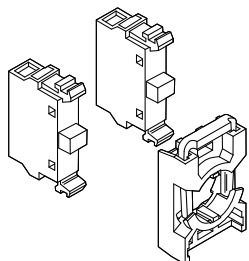


Contact block

Micro switch blocks



Double contact blocks



Description	Catalog number	Weight oz.
Holders		
Holders for three blocks	MCBH-00	0.21
Holders for five blocks*	MCBH5-00	0.28

* Note: Double contact blocks are required on side positions

Single contact blocks for front mounting

1 NO	MCB-10	0.46
1 NC	MCB-01	0.46
1 NO w/gold plated contacts	MCB-10G	0.46
1 NC w/gold plated contacts	MCB-01G	0.46

Micro switch blocks

1 NO	MCBL-10	0.35
1 NC	MCBL-01	0.35

Double contact block for front mounting

2 NO	MCB-20	0.92
2 NC	MCB-02	0.92
1 NO + 1 NC	MCB-11	0.92
2NC w/gold plated contacts	MCB-02G	0.92
2NO w/gold plated contacts	MCB-20G	0.92

Note: To be used together with MCBH5-00 when Contact blocks in position 4- and 5- are needed. Also when using 2nd lamp blocks MCBH-00 together with Selector Switch and Contact block in position 3- is needed

Contact blocks with holder for front mounting ①

For non-illuminated operators

1 NC	MCBH-01
1 NO	MCBH-10
2 NC	MCBH-02
2 NO	MCBH-20
3 NC	MCBH-03
3 NO	MCBH-30
1 NO + 1 NC	MCBH-11
1 NO + 2 NC	MCBH-12
2 NO + 1 NC	MCBH-21

For illuminated operator

1 LB	MCBH-001
1 NC + 1 LB	MCBH-011
1 NO + 1 LB	MCBH-101
1 NO + 1 NC + 1 LB	MCBH-111
2 NO & 1 LB	MCBH-021
2 NO & 1 LB	MCBH-201

① Max. # of blocks in holder is 3.

Accessories LED bulbs



LED bulbs

7

Description	Wavelength nm	Luminance mcd	Catalog number	Weight oz.
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LED bulbs

With one diode chip mounted on a Ba 9s base. Choose the same color for the LED and the lamp cap or else use a clear lamp cap.

For white light use white LED with clear lamp cap. At DC the lamp base have to be connected to cathode (-) and the bottom contact to anode (+).

Rated voltage 12 V, DC, rated current 15 mA, service life >50 000 h

Red	630	250	KA2-2011	0.18
Green	525	1000	KA2-2012	0.18
Yellow	592	250	KA2-2013	0.18
Blue	470	450	KA2-2014	0.18
White	¹⁾	600	KA2-2015	0.18

Rated voltage 24 V, (AC)/DC, rated current 15 mA, service life >50 000 h

Red	630	250	KA2-2021	0.18
Green	525	800	KA2-2022	0.18
Yellow	592	250	KA2-2023	0.18
Blue	470	400	KA2-2024	0.18
White	¹⁾	500	KA2-2025	0.18

Rated voltage 36 V, (AC)/DC, rated current 12 mA, service life >50 000 h

Red	630	200	KA2-2031	0.18
Green	525	2000	KA2-2032	0.18
Yellow	592	200	KA2-2033	0.18
Blue	470	750	KA2-2034	0.18
White	¹⁾	1400	KA2-2035	0.18

Rated voltage 48 V, (AC)/DC, rated current 12 mA, service life >50 000 h

Red	630	200	KA2-2041	0.18
Green	525	1700	KA2-2042	0.18
Yellow	592	240	KA2-2043	0.18
Blue	470	720	KA2-2044	0.18
White	¹⁾	1200	KA2-2045	0.18

Rated voltage 60 V, (AC)/DC, rated current 10 mA, service life >50 000 h

Red	630	160	KA2-2051	0.18
Green	525	1400	KA2-2052	0.18
Yellow	592	200	KA2-2053	0.18
Blue	470	600	KA2-2054	0.18
White	¹⁾	1000	KA2-2055	0.18

Rated voltage 110-130 V, AC, rated current 4-6 mA, service life 25 000 h

Red	630	60-100	KA2-2131	0.18
Green	525	500-850	KA2-2132	0.18
Yellow	592	70-120	KA2-2133	0.18
Blue	470	220-350	KA2-2134	0.18
White	¹⁾	350-600	KA2-2135	0.18

Rated voltage 110-130 V, AC/DC, rated current 4-6 mA, service life 25 000 h

Red	630	60	KA2-2141	0.18
Green	525	500	KA2-2142	0.18
Yellow	592	70	KA2-2143	0.18
Blue	470	220	KA2-2144	0.18
White	¹⁾	350	KA2-2145	0.18

Rated voltage 230 V, AC, rated current 4 mA, service life 25 000 h

Red	630	60	KA2-2221	0.18
Green	525	500	KA2-2222	0.18
Yellow	592	70	KA2-2223	0.18
Blue	470	220	KA2-2224	0.18
White	¹⁾	350	KA2-2225	0.18

Note: Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

Choose the same color on the LED as on the lamp cap.

¹⁾ X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.

Accessories

LED and filament bulbs



LED bulbs

Description	Wavelength nm	Luminance mcd	Catalog number	Weight oz.
LED bulbs continued				
Rated voltage 230 V, AC/DC, rated current 4 mA, service life 25 000 h				
Red	630	60	KA2-2231	0.18
Green	525	500	KA2-2232	0.18
Yellow	592	70	KA2-2233	0.18
Blue	470	220	KA2-2234	0.18
White	¹⁾	350	KA2-2235	0.18

Note: Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

Choose the same color on the LED as on the lamp cap.

¹⁾ X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.

Flashing LED bulbs

Rated voltage 24 V, DC rated current 25 mA

Description	Wavelength nm	Service life hours	Catalog number	Weight oz.
Red	630	50 000	4950 512-1	0.18
Green	565	50 000	4950 512-2	0.18
Yellow	585	50 000	4950 512-3	0.18

Note: Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

Choose the same color on the LED as on the lamp cap.



Filament bulbs

Filament bulbs BA 9s base

Rated voltage V m AC/DC	Rated current A	Rated output W	Service life h	Luminance mcd	Catalog number	Weight oz.
6	200	1.2	10 000	350	5911 086-11	0.071
12	100	1.2	10 000	203	5911 086-12	0.071
24	50	1.2	10 000	280	5911 086-13	0.071
30	40	1.2	10 000	250	5911 086-4	0.071
48	42	2	6 000	500	5911 086-5	0.071
60	20	1.2	5 000	190	5911 086-14	0.071
110	18	2	7 500	250	5911 086-7	0.071
130	15	2	7 500	120	5911 086-15	0.071

A lamp Changing Tool is required for changing bulb.

Lamp changing tool

For LED bulbs and for bulbs	KA1-8072	0.071
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A lamp changing tool is required for changing bulb.



Lamp changing tool

Accessories

LED blocks, front mounting



LED block with built in leakage current protection

Description	Rated Current mA	Wavelength nm	Luminance mcd	Catalog number	Weight oz.
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LED-blocks

Lamp block with one diode chip integrated into lamp block. Choose the same color for the LED and the lamp cap or else use a clear cap.

Rated voltage 12 V, DC

Red	12.0	620	320	MLBL-00R	0.42
Green	9.3	520	1500	MLBL-00G	0.42
Yellow	12.0	588	380	MLBL-00Y	0.42
Blue	9.5	468	450	MLBL-00L	0.42
White	9.3	²⁾	600	MLBL-00W	0.42

Rated voltage 24 V, AC/DC

Red	9.9	620	250	MLBL-01R	0.42
Green	9.2	520	1500	MLBL-01G	0.42
Yellow	9.9	588	250	MLBL-01Y	0.42
Blue	9.3	468	450	MLBL-01L	0.42
White	9.2	²⁾	600	MLBL-01W	0.42

Rated voltage 48 V, AC/DC

Red	10.0	620	260	MLBL-02R	0.42
Green	9.7	520	1500	MLBL-02G	0.42
Yellow	10.0	588	300	MLBL-02Y	0.42
Blue	9.7	468	450	MLBL-02L	0.42
White	9.7	¹⁾	600	MLBL-02W	0.42

Rated voltage 60 V, AC/DC

Red	13.0	620	350	MLBL-03R	0.42
Green	12.7	520	2000	MLBL-03G	0.42
Yellow	13.0	588	400	MLBL-03Y	0.42
Blue	12.7	468	550	MLBL-03L	0.42
White	12.7	¹⁾	750	MLBL-03W	0.42

Rated voltage 110-130 V, AC

Red	8.6	620	200	MLBL-04R	0.42
Green	8.5	520	1200	MLBL-04G	0.42
Yellow	8.6	588	250	MLBL-04Y	0.42
Blue	7.0	468	400	MLBL-04L	0.42
White	7.0	¹⁾	500	MLBL-04W	0.42

Rated voltage 110-130 V, DC

Red	9.9	620	250	MLBL-05R	0.42
Green	9.8	520	1500	MLBL-05G	0.42
Yellow	9.9	588	300	MLBL-05Y	0.42
Blue	9.8	468	450	MLBL-05L	0.42
White	9.8	¹⁾	600	MLBL-05W	0.42

Rated voltage 220 V, DC

Red	8.0	620	180	MLBL-06R	0.42
Green	8.0	520	110	MLBL-06G	0.42
Yellow	8.0	588	200	MLBL-06Y	0.42
Blue	8.0	468	450	MLBL-06L	0.42
White	8.0	¹⁾	600	MLBL-06W	0.42

Rated voltage 230 V, AC

Red	9.5	620	250	MLBL-07R	0.42
Green	9.4	520	1500	MLBL-07G	0.42
Yellow	9.5	588	300	MLBL-07Y	0.42
Blue	8.2	468	450	MLBL-07L	0.42
White	8.2	¹⁾	600	MLBL-07W	0.42

Note: Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

¹⁾ X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.

Accessories

LED blocks, front mounting



LED block with built in leakage current protection

Description	Rated Current mA	Wavelength nm	Luminance mcd	Catalog number	Weight oz.
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LED blocks, cont.

Lamp block with one diode chip integrated into lamp block. Choose the same color for the LED and the lamp cap or else use a clear cap.

Rated voltage 380 V, AC

Red	10.2	620	250	MLBL-08R	0.42
Green	10.2	520	1500	MLBL-08G	0.42
Yellow	10.2	582	300	MLBL-08Y	0.42
Blue	9.1	468	450	MLBL-08L	0.42
White	9,1	¹⁾	600	MLBL-08W	0.42

Rated voltage 415 V, AC

Red	11.2	620	280	MLBL-09R	0.42
Green	11.2	520	1800	MLBL-09G	0.42
Yellow	11.2	588	350	MLBL-09Y	0.42
Blue	9,9	468	500	MLBL-09L	0.42
White	9,9	¹⁾	650	MLBL-09W	0.42

Note: Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

¹⁾ X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.

Rear mounted LED blocks can be found on page 7.62.

Accessories



DIN-rail adaptor



Dummy block



30mm adaptors



Adaptor



30mm gasket



Lamp changing tool



Mounting tool



Mounting tool for power tool



Blanking plugs



Square bezels

Description	Catalog number	Weight oz.
DIN-rail Adaptor		
DIN-rail adaptor	MA1-8131	0.71
DIN-rail (adaptor) kit with one dummy block	MA1-8001	0.99

NOTE: Use with base mount blocks.

Dummy block

Dummy block, rear mount	MDB-2	0.11
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Dummy blocks are used when only one contact block or a compact device is used together with the DIN-Rail Adaptor

30 mm Adaptors for 22 mm operator (1.5-4 mm panels)

For Emergency stop pushbutton ①

Black plastic	KA1-8027	0.25
Metal	KA1-8028	0.74

For pushbuttons, selector switches, pilot lights, potentiometers and buzzers:

Black plastic	KA1-8029	0.35
Metal	KA1-8030	1.2

Flush mounted adaptors (metal)

For pushbuttons	KA1-8073	1.8
For Selector switches	MA1-8074	1.8

30mm Gasket

For 30mm adaptors for 22mm operator	1SFA616920R8019	
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Lamp changing tool

For LED bulbs and for bulbs	KA1-8072	0.071
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Mounting tool for operator

Mounting tool for tightening the locking nut	MA1-8015	0.74
Mounting tool for power tool	MA1-8149	5.5

Extra key

Ronis 455 (key code 71)	SK616021-71	0.25
Ronis 421 (key code 72)	SK616021-72	0.25
Ronis 3433-E (key code 73)	SK616021-73	0.25

Locking nut

Locking nut 22mm	MA1-8019	0.035
Locking nut 30mm w/22mm device	MA1-8134	

The Locking nut can also be used with Compact Devices.

Blanking plug

Grey, 22mm	MA1-8129	0.18
Light grey, 22mm	MA1-8136	0.18
Black, 22mm	MA1-8130	0.18
Black, 30mm	MA1-8133	0.18

Square bezel

Black, plastic	SK616016-2	0.035
Grey, plastic	MA1-8124	0.035

① Illuminated pushbuttons and pilot lights must use white insert.

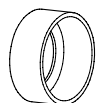
② For extended pushbuttons, insert "E" at the end of the catalog number. For compact pushbuttons, insert "P" at the end of the catalog number.

Accessories



Protective membrane

Description	Catalog number	Weight oz.
Protective membrane		
For flush button	KA1-8052	0.071
For extended button	KA1-8002	0.071
For double pushbutton	MA1-8126	0.071



Protective ring



Protective cover

Protective ring

Operator for protective ring	SK615512-1	0.071
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Note: For flush and extended pushbuttons. To prevent accidental operation. Cannot be used together with Legend plate holder

Protective cover

Protective cover	KA1-8010	0.28
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Note: For flush pushbutton. To prevent accidental operation. Cannot be used together with Legend plate holder.



Bezel

Bezel

For pushbutton

Grey plastic	KA1-8079	0.071
black plastic	KA1-8022	0.071
Chrome metal	KA1-8021	0.53

For Selector switch

Grey plastic	KA1-8077	0.035
black plastic	KA1-8080	0.035
Chrome metal	KA1-8024	0.35



Shroud for emergency stop

Shroud for emergency stop

Yellow	MA1-8053	0.71
Grey	MA1-8128	0.71

Note: For 40 mm Emergency stop pushbuttons and machine stop pushbuttons. To prevent accidental operation. With anti rotation tabs and slot for pad-lock and with water drainage. Not for use with plastic enclosures.



Lockable shroud

Shroud for pilot devices

Lockable shroud	MA1-8153	0.023
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Touch guard

Touch guard for pushbuttons

Touch guard	MA1-8152	0.009
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Accessories

Lenses



Lens for Pilot light

Description	Catalog number	Weight oz.
Lenses for pilot lights		
Red	KA1-8031	0.071
Green	KA1-8032	0.071
Yellow	KA1-8033	0.071
Blue	KA1-8034	0.071
White	KA1-8035	0.071
Clear	KA1-8038	0.071
Fresnel light diffusion lens ①	KA1-8005	0.071



Flush lens for pushbutton

Lenses for non-Illuminated pushbuttons

Flush – opaque

Red	KA1-8081	0.53
Green	KA1-8082	0.53
Yellow	KA1-8083	0.53
Blue	KA1-8084	0.53
White	KA1-8085	0.53
Black	KA1-8086	0.53
Grey	KA1-8087	0.53
Clear	KA1-8088	0.53



Extended lens for pushbutton

Extended - opaque

Red	KA1-8091	0.88
Green	KA1-8092	0.88
Yellow	KA1-8093	0.88
Blue	KA1-8094	0.88
White	KA1-8095	0.88
Black	KA1-8096	0.88
Grey	KA1-8097	0.88
Clear	KA1-8098	0.88

Lenses for illuminated pushbuttons

Flush – transparent


Red	KA1-8101	0.53
Green	KA1-8102	0.53
Yellow	KA1-8103	0.53
Blue	KA1-8104	0.53
White	KA1-8105	0.53
Clear	KA1-8108	0.53

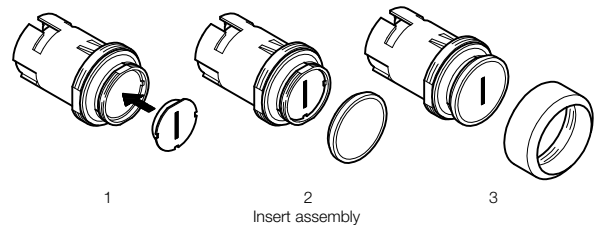
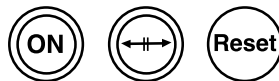
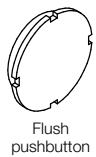
Extended - transparent

Red	KA1-8111	0.88
Green	KA1-8112	0.88
Yellow	KA1-8113	0.88
Blue	KA1-8114	0.88
White	KA1-8115	0.88
Clear	KA1-8118	0.88

① Light diffusing lens insert is placed between the bulb and the lens.

Text cap inserts

Legend	Cap color ①	Suffix code ②	Flush button catalog number	Extended button catalog number	Pilot light catalog number
	White	C82	1SFA616901R9036	—	—
Start	White	C67	1SFA616901R2030	1SFA616902R2030	1SFA616903R2030
START	Green	C5	1SFA616906R1042	—	—
	Black	C81	1SFA616908R1042	—	—
On	White	C68	1SFA616901R1020	1SFA616902R1020	1SFA616903R1020
ON	White	C69	1SFA616901R1039	—	1SFA616903R1039
	Green	C70	1SFA616906R1039	—	—
	Black	C1	1SFA616908R1039	—	—
Off	White	C71	1SFA616901R1019	1SFA616902R1019	1SFA616903R1019
OFF	White	C72	—	1SFA616902R1040	—
	Red	C73	—	1SFA616905R1040	—
	Black	C2	1SFA616908R1040	1SFA616909R1040	—
Stop	White	C74	1SFA616901R1031	1SFA616902R1031	1SFA616903R1031
STOP	Red	C4	1SFA616904R1047	1SFA616905R1047	—
Reset	White	C75	1SFA616901R1025	1SFA616902R1025	1SFA616903R1025
Blank	White	C15	1SFA616901R9000	1SFA616902R9000	1SFA616903R9000
	Green	CG	29491468-2	29491469-2	—
UP	Green	C11	1SFA616906R1043	—	—
DOWN	Green	C12	1SFA616906R1044	—	—
OPEN	White	C16	1SFA616901R1045	—	—
	Green	C19	1SFA616906R1045	—	—
CLOSE	White	C17	1SFA616901R1046	—	—
	Green	C20	1SFA616906R1046	—	—
REV	Green	C6	1SFA616906R1048	—	—
FWD	Green	C7	1SFA616906R1049	—	—
SLOW	Green	C8	1SFA616906R1050	—	—
FAST	Green	C9	1SFA616906R1051	—	—
JOG	Green	C10	1SFA616906R1052	—	—
RESET	Black	C3	1SFA616908R1041	—	—
LATCH	White	C18	1SFA616901R1053	—	—



① Illuminated pushbuttons and pilot lights must use white insert.
② Add suffix code to end of the catalog number.

Technical data

Standards and approvals

IEC / EN 60947-1	Low-Voltage Switchgear and Controlgear - Part 1: General rules
IEC / EN 60947-5-1	Low-Voltage Switchgear and Controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices
IEC / EN 60947-5-5	Low-Voltage Switchgear and Controlgear - Part 5-5: Control circuit devices and switching elements - Electrical Emergency Stop device with mechanical latching function
IEC / EN 60073	Basic and safety principles for man-machine interface, marking and identification - Coding principles for indicators and actuators
IEC / EN 60529	Degrees of Protection provided by enclosures (IP code)
EN 50013	Low-Voltage Switchgear and Controlgear for industrial use - Terminal marking and distinctive number for particular control switches
DIN 40050-9	Road vehicles; Degrees of Protection (IP-code); protection against foreign objects; water and contact; electrical equipment
UL 508	Industrial Control Equipment
CSA C22.2 No 14	Industrial Control Equipment

Environmental data

Degrees of protection

Operators	IEC/EN DIN	UL/CSA
Pushbutton: MP *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Double pushbutton: MPD *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Mushroom pushbutton: MPM *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Emergency Stop: MPMT/P *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Selector Switch: M2SS/M3SS *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Key-operated Selector Switch: M2SSK/M3SSK *	IP66	Catalog number 1, 3R, 4, 4X, 12
Toggle Switch: MTS2/MTS3 *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Extreme Duty pushbutton: KP6	-	Catalog number 1, 3R, 4, 4X
Reset pushbutton: KPR *	IP 66	Catalog number 1, 3R, 4, 4X, 12, 13
Joystick: MJS	IP66, 67, 69K	Catalog number 1, 4X (indoor), 12, 13
Pilot lights: ML	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Buzzer: KB	IP65	Catalog number 4X
Potentiometer: KT *	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Contact block and Transformer block	IP20	-
Plastic Enclosures	IP66	Catalog number 1, 3R, 4, 4X, 12, 13
Metallic Enclosures	IP66, 67, 69K	-

Temperature

Ambient temperature during operation	-25 to +70 °C
Storage temperature	-40 to +85 °C

* With Chrome plastic bezel IP66 Catalog number 1, 12, 13

Please note that specified degree of protection is for operator mounted on panel. If other items are mounted in between, please make sure that they are correctly sealed.

Technical Data

Terminals

Plus-minus Pozidriv No.2 screw with DIN-washer.

Connectable Area	min. 1 x 0.5 mm ² /AWG 20 max. 2 x 2.5 mm ² /2 x AWG14
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Tightening Torque

Operators Locking Nut	Min. 2 Nm / Max. 2.3 Nm
Cable Terminals	0.9 Nm

Material

No ozone depleting substances in the products.

All front of panel plastic components are made of polycarbonate

PC Polycarbonate	High impact strength, good outdoor resistance. Chemical resistance (see table below)
PSU Polysulphone	Can withstand high temperatures, acids, basic solutions, alkaline compounds, oils, alcohols.
PA Polyamide	Can withstand high temperatures, aliphatic, aromatic and chlorinated hydrocarbons, esters, ketone-aldehydes, alcohols and basic solutions.
PBT	Can withstand high temperature, aliphatic and aromatic hydrocarbons, acids, basic solutions, alcohols, grease and oils
Zinc	Good corrosion resistance in inland-, sea and industrial atmosphere.
light-alloy	Good corrosion resistance in inland-, sea and industrial atmosphere.

Chemical Resistance for Polycarbonate

Chemical Class	Effects
Acids	No significant effect under most typical conditions of concentration and temperature
Alcohols and Alkalis	Generally compatible at low concentration and room temperature. Higher concentrations and elevated temperatures can result in etching and attack evidenced by decomposition.
Aliphatic Hydrocarbons	Generally compatible
Amines	Surface crystallization and chemical attack. Avoid.
Aromatic Hydrocarbons	Partial solvents and severe stress cracking agents (i.e., xylene, toluene). Avoid.
Detergents and Cleaners	Mild soap solutions are generally compatible. Strong alkaline materials should be avoided.
Esters	Cause severe crystallization. Partial solvents. Avoid.
Greases and Oils	Pure petroleum Catalog numbers generally compatible. Many additives used with them are not.
Halogenated Hydrocarbons	Solvents. Avoid.
Ketones	Cause severe crystallization and stress cracking. Partial solvents. Avoid.
Silicone Oil and Greases	Generally compatible up to 85 °C.



Approvals

The pushbuttons, selector switches and pilot lights are approved by:
- National approval agencies: UL, CSA and China Compulsory Product Certification

For detail information please contact ABB

Technical data

Electrical data

Standard contact blocks

Self cleaning silver contacts, NC contact with positive opening. At voltages and currents below 24 V and 5.6 mA we recommend our Micro Switch blocks.

Ratings as per IEC 60947-5-1

Rated Insulation Voltage, U_i		690 V		
Rated Thermal Current, I_{th}		10 A		
Rated Operational Current, I_e Utilization category AC 15,	at: 120 V at: 230 V at: 400 V at: 690 V	8 A 6 A 4 A 2 A		
Rated Operational Current, I_e utilisation category DC 13,	at: 24 V at: 125 V at: 250 V	5 A 1.1 A 0.55 A		

Ratings as per UL, CSA, NEMA

		A600 AC		Q600 DC
Rated Insulation Voltage		600 V		600 V
Rated Thermal Current		10 A		2.5 A
Rated Operational Current	at: 120 V at: 240 V at: 480 V at: 600 V	6 A 3 A 1.5 A 1.2 A	at: 125 V at: 250 V at: 480 V at: 600 V	0.55 A 0.27 A 0.10 A 0.10 A

Contact resistance

< 25 mΩ

Compulsory function test

at: 5V, 16 mA

Max. number of contact blocks per operator

The Contact blocks can be stacked in max two levels on the 3- block holder. Only one level is accepted on the 5-block holder.

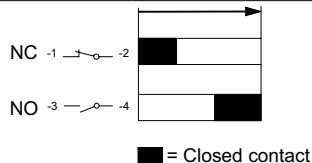
pushbutton, Toggle Switch, Mushroom pushbutton, Double pushbutton, Selector Switch, Key-operated Selector Switch and Emergency Stop Operator	6
Joystick	8

Short circuit protection

Max. fuse at 1 kA

gG 16A

Diagram for make-and-break contact



Micro Switch block / Ratings as per IEC 60947-5-1

Rated Insulation Voltage, U_i		125 V
Rated Thermal Current, I_{th}		3 A
Rated Operational Current, I_e utilization category AC 14,	at: 125 V	0.5 A
Rated Operational Current, I_e utilization category DC 13,	at: 24 V	0.3 A
Rated Operational Current, I_e utilization category DC 12,	at: 24 V	0.1 A

Minimum Switching Capacity

Standard Contact blocks	24 V DC	5.6 mA
Gold plated Contact blocks	5 V DC	12 mA
	12 V DC	1 mA
Micro Switch blocks	3 V DC	1 mA

Ratings as per UL 508

	125 V AC	3 A
	60 V DC	0.2 A
	48 V DC	0.1 A

Mechanical data

Mechanical life

Standard Contact blocks		10 million operations
pushbuttons, Momentary Mushroom pushbutton		2 million operations
Selector Switches Present standard (no operation of center contact)		500 000 operations
With operation of center contact		250 000 operations
		150 000 operations
Maintained Mushroom pushbutton, Key-operated Selector Switch and Double pushbutton		500 000 operations
Emergency Stop		100 000 operations
Toggle Switch		1 million operations
Joystick		500 000 operations
		400 000 operations
		300 000 operations

Assembled Modular range

ABB

Assembled Modular Range

22mm & 30mm



7

General construction

- Snap-on feature reduces installation time
- Bezels: black plastic, chrome metal
- Contact block holder features rear mounting with quick-release locking mechanism for high security
- Buttons available in several colors
- Engraved text caps available
- Custom-specific markings on request
- UL File# E76003
- CSA File# LR19700

Operators

- Pushbuttons, illuminated and non-illuminated
- Double pushbuttons, illuminated and non-illuminated
- Mushroom pushbuttons, illuminated and non-illuminated, 40mm and 60mm diameter
- Emergency stop pushbuttons, illuminated and non-illuminated, twist or pull release
- Selector switches, illuminated and non-illuminated, 2- or 3-position, short or long handle
- Key-operated selector switches, 2- or 3-position
- Toggle switches, 2- or 3-position

Contact blocks

- Quick-mount, quick release contact block holder for fast and easy assembly/disassembly
- NO & NC contact blocks are color-coded for easy identification: Green = NO; Red = NC
- Silver-tipped contacts
- Wiping action for high reliability
- Low energy gold-plated contact blocks
- Contact block holder for three or five blocks in a single row

Pilot lights

- Full voltage, resistor and transformer
- LED and filament bulbs available

Mounting

Exploded view

Contact block

Single pole with making or breaking contact

Holder

Available either for three or five blocks in one single row. Additional blocks can be stacked on holders for three blocks.

Legend plates

Of brushed aluminum with slots that guide the legend plate and the operator into the correct position. See the chapter, "Legend Plates" for more information.

Lamp block

Illuminated pushbuttons, illuminated selector switches and pilot lights have a lamp block in the center position of the holder.

Operator

Buttons, lenses and handles in several colors. Illuminated or non-illuminated.

Five block holder

Legend plate holder

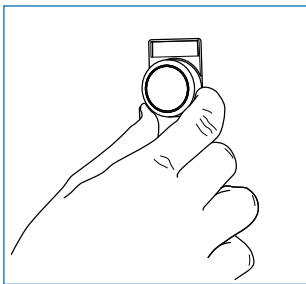
Of black plastic, insert of brushed aluminum. See the chapter, "Legend Plates" for more information.

Bezels

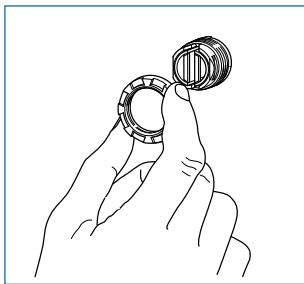
Pushbuttons, selector switches and toggle switches with bezel in black plastic, chrome metal are available.

7

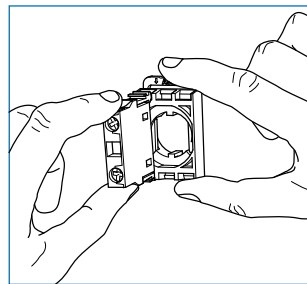
Easy to mount



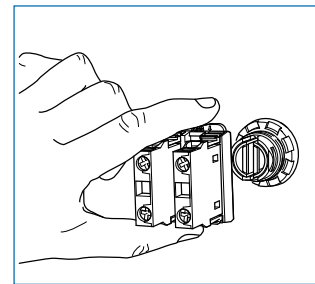
The operator is to be inserted from the front....



...and secured at the back with a nut.

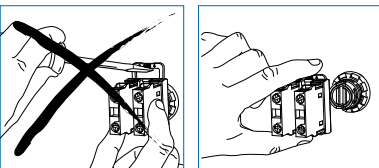


The contact blocks/lamp block are then snapped on to the holder...



...and the holder snaps on to the operator.

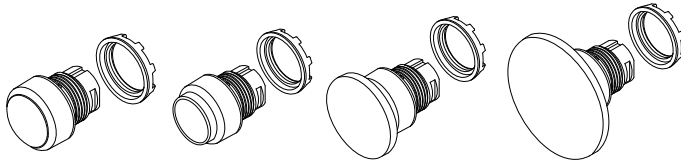
...and to remove



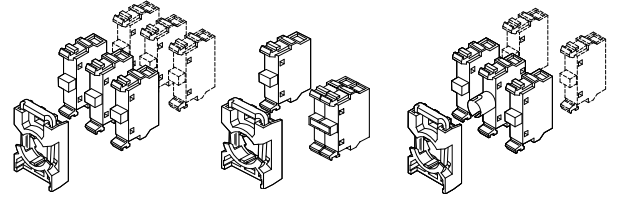
Press down the spring on the holder and pull the holder from the actuator.

Selection guide

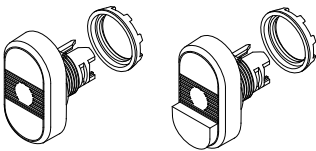
Pushbuttons and Mushroom pushbuttons



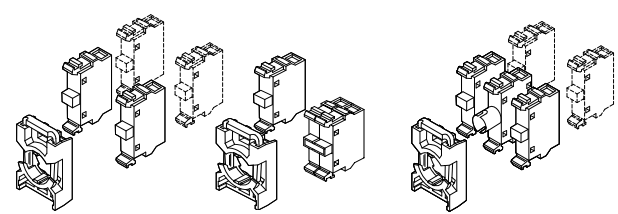
Contact block/lamp block combinations



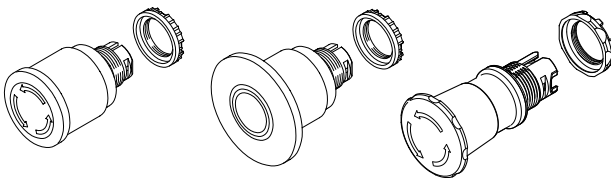
Double pushbuttons



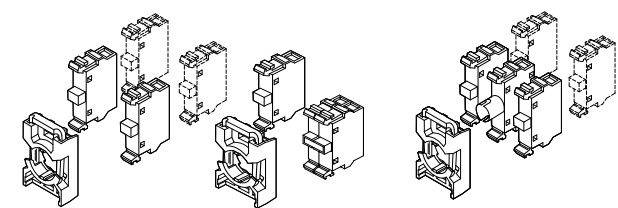
Contact block/lamp block combinations



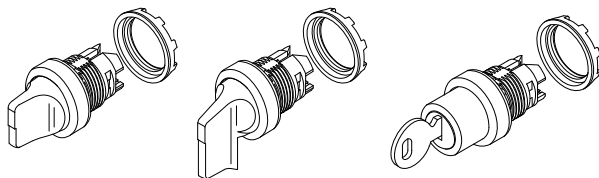
Emergency stop pushbuttons



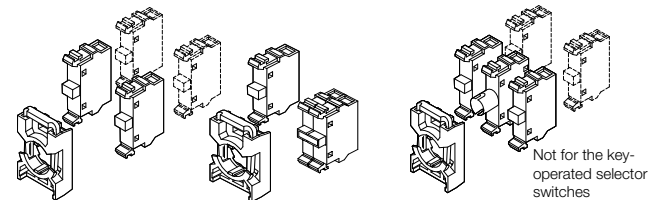
Contact block/lamp block combinations



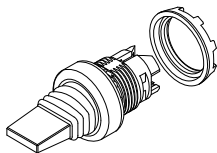
Selector switches



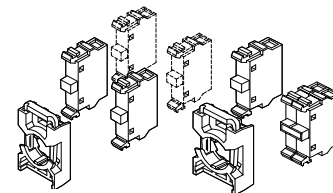
Contact block/lamp block combinations



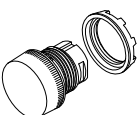
Toggle switches



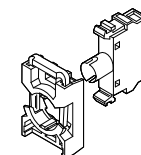
Contact block combinations



Pilot lights



Lamp block combination



Catalog number and list price explanation

Assembled pilot device catalog numbers are created by selecting the appropriate characters from the grid. Begin at the top of the grid and work down, adding the desired characters to the catalog number to create a specific product. The list price is found by adding the prices of all the individually selected options.

Pushbuttons, non-illuminated

Options	Catalog number characters															
Momentary flush			M	P	1	-										
Maintained flush			M	P	2	-										
Momentary extended			M	P	3	-										
Maintained extended			M	P	4	-										
Bezel, black plastic, with holder							4	0								
Bezel, chrome metal, with holder							6	0								
Button color - Red										R						
Button color - Green										G						
Button color - Yellow										Y						
Button color - Blue										L						
Button color - White										W						
Button color - Black										B						
Button color - Clear										C						
Contact blocks, 1 NO											1	0				
Contact blocks, 2 NO											2	0				
Contact blocks, 3 NO											3	0				
Contact blocks, 1 NC											0	1				
Contact blocks, 2 NC											0	2				
Contact blocks, 3 NC											0	3				
Contact blocks, 1 NO + 1 NC											1	1				
Contact blocks, 2 NO + 1 NC											2	1				
Contact blocks, 1 NO + 2 NC											1	2				
Contact blocks, 1 NO, Gold											1	0	G			
Contact blocks, 2 NO, Gold											2	0	G			
Contact blocks, 3 NO, Gold											3	0	G			
Contact blocks, 1 NC, Gold											0	1	G			
Contact blocks, 2 NC, Gold											0	2	G			
Contact blocks, 3 NC, Gold											0	3	G			
Contact blocks, 1 NO + 1 NC, Gold											1	1	G			
Contact blocks, 2 NO + 1 NC, Gold											2	1	G			
Contact blocks, 1 NO + 2 NC, Gold											1	2	G			
Text Caps with Clear Lens Only										C				C	X	X
5 Block Holder																5
30mm Black Plastic Adaptor Ring	G	1														
30mm Chrome Metal Adaptor Ring	G	2														

M P 1 - 4 0 R 1 0

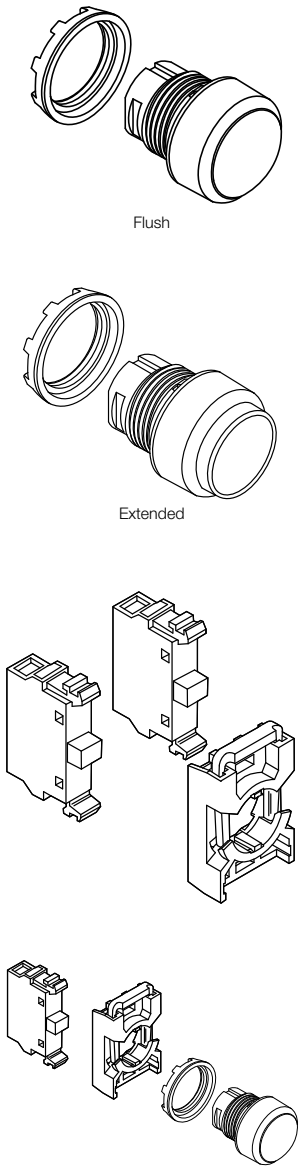
EXAMPLE:

What is the catalog number and price for a 22mm momentary flush pushbutton with a black bezel, red button & 1 NO contact block? Follow the arrows to see how the catalog number is determined.

Pushbuttons

Non-illuminated

Pushbuttons, non-illuminated



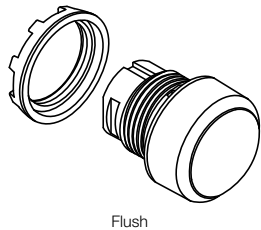
Options	Catalog number characters																			
Momentary Flush			M	P	1	-														
Maintained Flush ①			M	P	2	-														
Momentary Extended			M	P	3	-														
Maintained Extended ①			M	P	4	-														
Bezel, Black Plastic, with Holder									4	0										
Bezel, Chrome Metal, with Holder									6	0										
Button Color - Red											R									
Button Color - Green											G									
Button Color - Yellow											Y									
Button Color - Blue											L									
Button Color - White											W									
Button Color - Black											B									
Button Color - Clear											C									
Contact Blocks, 1NO												1	0							
Contact Blocks, 2NO												2	0							
Contact Blocks, 3NO												3	0							
Contact Blocks, 1NC												0	1							
Contact Blocks, 2NC												0	2							
Contact Blocks, 3NC												0	3							
Contact Blocks, 1NO+1NC												1	1							
Contact Blocks, 2NO+1NC												2	1							
Contact Blocks, 1NO+2NC												1	2							
Contact Blocks, 1NO, Gold												1	0						G	
Contact Blocks, 2NO, Gold												2	0						G	
Contact Blocks, 3NO, Gold												3	0						G	
Contact Blocks, 1NC, Gold												0	1						G	
Contact Blocks, 2NC, Gold												0	2						G	
Contact Blocks, 3NC, Gold												0	3						G	
Contact Blocks, 1NO+1NC, Gold												1	1						G	
Contact Blocks, 2NO+1NC, Gold												2	1						G	
Contact Blocks, 1NO+2NC, Gold												1	2						G	
Text Caps with Clear Lens Only												C						C	X	X②
5 Block Holder																				5
30mm Black Plastic Adaptor Ring	G																			1
30mm Chrome Metal Adaptor Ring	G																			2

See catalog number explanation on page 7.70.

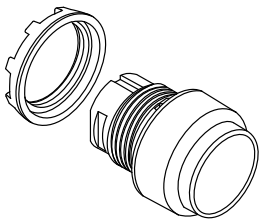
① No contact block in center position.
② Replace "XX" with text cap legends from pages 7.72 - 7.74.

Pushbuttons Illuminated ①

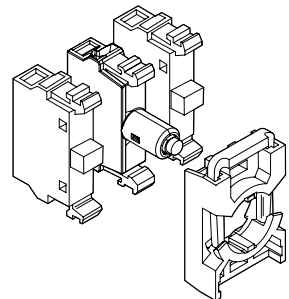
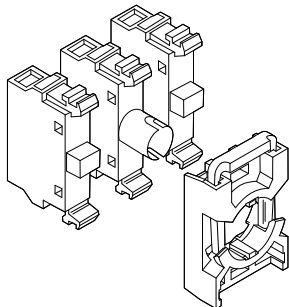
Pushbuttons, Illuminated ①



Flush



Extended



Options					Catalog number characters																			
Momentary Flush	M	P	1	-																				
Maintained Flush	M	P	2	-																				
Momentary Extended	M	P	3	-																				
Maintained Extended	M	P	4	-																				
Bezel, Black Plastic, with Holder				-																				
Bezel, Chrome Metal, with Holder				-																				
Lamp block, MLB-1, Bulb not Included				-						2														
Lamp block, MLB-4, Bulb not Included				-						5														
Lamp block, MLB-5, Bulb not Included				-						6														
Lamp block w/integrated LED ③				-						7														
Lamp block w/zener diode, Bulb not incl.				-						8														
Button Color - Red				-							R													
Button Color - Green				-							G													
Button Color - Yellow				-							Y													
Button Color - Blue				-							L													
Button Color - White				-							W													
Button Color - Clear				-							C													
Contact Blocks, 1NO				-							1	0												
Contact Blocks, 2NO				-							2	0												
Contact Blocks, 3NO				-							3	0												
Contact Blocks, 1NC				-							0	1												
Contact Blocks, 2NC				-							0	2												
Contact Blocks, 3NC				-							0	3												
Contact Blocks, 1NO+1NC				-							1	1												
Contact Blocks, 2NO+1NC				-							2	1												
Contact Blocks, 1NO+2NC				-							1	2												
Contact Blocks, 1NO, Gold				-							1	0					G							
Contact Blocks, 2NO, Gold				-							2	0					G							
Contact Blocks, 3NO, Gold				-							3	0					G							
Contact Blocks, 1NC, Gold				-							0	1					G							
Contact Blocks, 2NC, Gold				-							0	2					G							
Contact Blocks, 3NC, Gold				-							0	3					G							
Contact Blocks, 1NO+1NC, Gold				-							1	1					G							
Contact Blocks, 2NO+1NC, Gold				-							2	1					G							
Contact Blocks, 1NO+2NC, Gold				-							1	2					G							
LED 12VDC				-																L		7		
LED 24VAC/DC				-																L		8		
LED 48VAC/DC				-																L		9		
LED 60VAC/DC				-																L		6	0	
LED 110-130VAC				-																L		1		
LED 110-130VAC/DC				-																L		1	3	
LED 230V AC/DC				-																L		2		
LED 230V AC - Integrated only				-																L		2	3	
LED 380V AC - Integrated only				-																L		3	8	
LED 415V AC - Integrated only				-																L		4	1	
Transformer Block 110-127/24VLED				-																T		L	1	
Transformer Block 220-240/24VLED				-																T		L	2	
Transformer Block 380-420/24VLED				-																T		L	3	
Transformer Block 440-480/24VLED				-																T		L	4	
Text Caps with Clear Lens Only				-																C				X X ^⓪
5 Block Holder				-																				5
30mm Black Plastic Adaptor Ring	G		1	-																				
30mm Chrome Metal Adaptor Ring	G		2	-																				

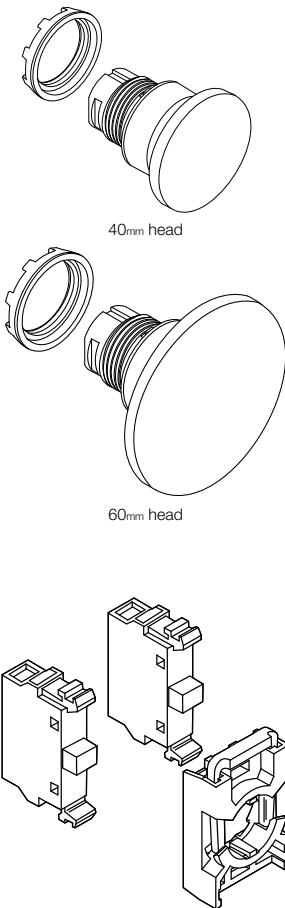
See catalog number explanation on page 7.70.

① No contact block in center position.
 ② No LED or transformer block can be combined with "illuminated without lamp block" selection.
 ③ Includes one diode chip integrated into lamp block.
 ④ Replace "XX" with text cap legends from pages 7.72 - 7.74

Mushroom pushbuttons

Non-illuminated, momentary

Mushroom pushbuttons, non-illuminated



Options	Catalog number characters																			
Momentary, 40 mm			M	P	M	1	-													
Momentary, 60 mm			M	P	M	2	-													
Bezel, Black Plastic, with Holder								4	0											
Bezel, Chrome Metal, with Holder								6	0											
Button Color - Red												R								
Button Color - Yellow												Y								
Button Color - Black												B								
Contact Blocks, 1NO													1	0						
Contact Blocks, 2NO													2	0						
Contact Blocks, 3NO													3	0						
Contact Blocks, 1NC													0	1						
Contact Blocks, 2NC													0	2						
Contact Blocks, 3NC													0	3						
Contact Blocks, 1NO+1NC													1	1						
Contact Blocks, 2NO+1NC													2	1						
Contact Blocks, 1NO+2NC													1	2						
Contact Blocks, 1NO, Gold													1	0						G
Contact Blocks, 2NO, Gold													2	0						G
Contact Blocks, 3NO, Gold													3	0						G
Contact Blocks, 1NC, Gold													0	1						G
Contact Blocks, 2NC, Gold													0	2						G
Contact Blocks, 3NC, Gold													0	3						G
Contact Blocks, 1NO+1NC, Gold													1	1						G
Contact Blocks, 2NO+1NC, Gold													2	1						G
Contact Blocks, 1NO+2NC, Gold													1	2						G
5 Block Holder																				5
30mm Black Plastic Adaptor Ring	G		1																	
30mm Chrome Metal Adaptor Ring	G		2																	

See catalog number explanation on page 7.70.

Mushroom pushbuttons Illuminated, momentary ①

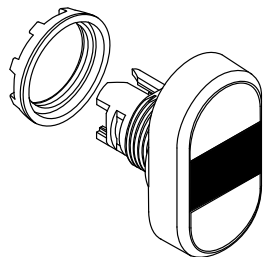
Mushroom pushbuttons, illuminated, momentary ①

Options	Catalog number characters																			
Momentary, 40 mm			M	P	M	1	-													
Momentary, 60 mm			M	P	M	2	-													
Bezel, Black Plastic, with Holder							-	4												
Bezel, Chrome Metal, with Holder							-	6												
Lamp block, MLB-1, Bulb not Included							-		2											
Lamp block, MLB-4, Bulb not Included							-		5											
Lamp block, MLB-5, Bulb not Included							-		6											
Lamp block w/integrated LED ②							-		7											
Lamp block with zener diode, bulb not incl.							-		8											
Button Color - Red							-			R										
Button Color - Yellow							-			Y										
Button Color - Green (40mm only)							-			G										
Contact Blocks, 1NO							-				1	0								
Contact Blocks, 2NO							-				2	0								
Contact Blocks, 3NO							-				3	0								
Contact Blocks, 1NC							-				0	1								
Contact Blocks, 2NC							-				0	2								
Contact Blocks, 3NC							-				0	3								
Contact Blocks, 1NO+1NC							-				1	1								
Contact Blocks, 2NO+1NC							-				2	1								
Contact Blocks, 1NO+2NC							-				1	2								
Contact Blocks, 1NO, Gold							-				1	0	G							
Contact Blocks, 2NO, Gold							-				2	0	G							
Contact Blocks, 3NO, Gold							-				3	0	G							
Contact Blocks, 1NC, Gold							-				0	1	G							
Contact Blocks, 2NC, Gold							-				0	2	G							
Contact Blocks, 3NC, Gold							-				0	3	G							
Contact Blocks, 1NO+1NC, Gold							-				1	1	G							
Contact Blocks, 2NO+1NC, Gold							-				2	1	G							
Contact Blocks, 1NO+2NC, Gold							-				1	2	G							
LED 12VDC							-										L	7		
LED 24VAC/DC							-										L	8		
LED 48VAC/DC							-										L	9		
LED 60VAC/DC							-										L	6	0	
LED 110-130VAC							-										L	1		
LED 110-130VAC/DC							-										L	1	3	
LED 230V, AC/DC							-										L	2		
LED 230V, AC-integrated only							-										L	2	3	
LED 380V, AC-integrated only							-										L	3	8	
LED 415V, AC-integrated only							-										L	4	1	
Transformer Block 110-127/24VLED							-										T	L	1	
Transformer Block 220-240/24VLED							-										T	L	2	
Transformer Block 380-420/24VLED							-										T	L	3	
Transformer Block 440-480/24VLED							-										T	L	4	
5 Block Holder							-													5
30mm Black Plastic Adaptor Ring	G																			
30mm Chrome Metal Adaptor Ring	G																			

See catalog number explanation on page 7.70.

① No contact block in center position.
② Includes one diode chip integrated into lamp block.

Double pushbuttons, Flush/flush, non-illuminated ①



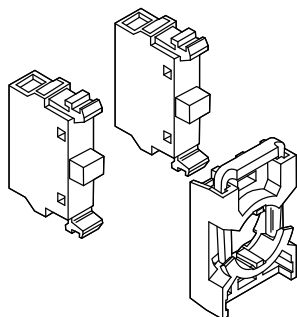
Double pushbutton

Double pushbuttons, flush/flush, non-illuminated ①

Options	Catalog number characters									
Flush/Flush, Green/Red	M	P	D	1	-	-	-	-	-	-
Flush/Flush, Green/Red, I/O	M	P	D	2	-	-	-	-	-	-
Flush/Flush, Green/Red, ON/OFF	M	P	D	3	-	-	-	-	-	-
Flush/Flush, Green/Red, START/STOP	M	P	D	4	-	-	-	-	-	-
Flush/Flush, White/Black	M	P	D	5	-	-	-	-	-	-
Flush/Flush, White/Black, I/O	M	P	D	6	-	-	-	-	-	-
Flush/Flush, White/Black, ON/OFF	M	P	D	7	-	-	-	-	-	-
Flush/Flush, White/Black, START/STOP	M	P	D	8	-	-	-	-	-	-
With Holder	-	-	-	-	-	2	0	-	-	-
Center Lens Color - Black	-	-	-	-	-	-	-	B	-	-
Contact Blocks, 1NO	-	-	-	-	-	-	-	-	1	0
Contact Blocks, 2NO	-	-	-	-	-	-	-	-	2	0
Contact Blocks, 3NO	-	-	-	-	-	-	-	-	3	0
Contact Blocks, 1NC	-	-	-	-	-	-	-	-	0	1
Contact Blocks, 2NC	-	-	-	-	-	-	-	-	0	2
Contact Blocks, 3NC	-	-	-	-	-	-	-	-	0	3
Contact Blocks, 1NO+1NC	-	-	-	-	-	-	-	-	1	1
Contact Blocks, 2NO+1NC	-	-	-	-	-	-	-	-	2	1
Contact Blocks, 1NO+2NC	-	-	-	-	-	-	-	-	1	2
Contact Blocks, 1NO, Gold	-	-	-	-	-	-	-	-	1	0
Contact Blocks, 2NO, Gold	-	-	-	-	-	-	-	-	2	0
Contact Blocks, 3NO, Gold	-	-	-	-	-	-	-	-	3	0
Contact Blocks, 1NC, Gold	-	-	-	-	-	-	-	-	0	1
Contact Blocks, 2NC, Gold	-	-	-	-	-	-	-	-	0	2
Contact Blocks, 3NC, Gold	-	-	-	-	-	-	-	-	0	3
Contact Blocks, 1NO+1NC, Gold	-	-	-	-	-	-	-	-	1	1
Contact Blocks, 2NO+1NC, Gold	-	-	-	-	-	-	-	-	2	1
Contact Blocks, 1NO+2NC, Gold	-	-	-	-	-	-	-	-	1	2
5 Block Holder	-	-	-	-	-	-	-	-	-	-

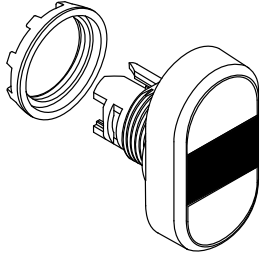
7

See catalog number explanation on page 7.70.



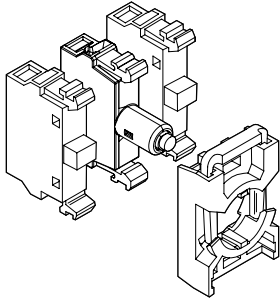
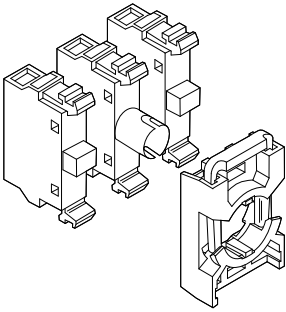
① No contact block in center position.

Double pushbuttons Flush/flush, illuminated center ①



Double pushbutton, flush/flush

7



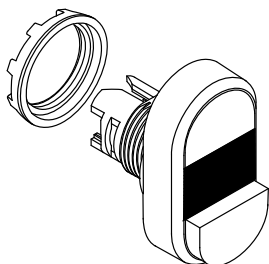
Double pushbuttons, flush/flush, illuminated center ①

Options	Catalog number characters																			
Flush/Flush, Green/Red	M	P	D	1	-															
Flush/Flush, Green/Red, I/O	M	P	D	2	-															
Flush/Flush, Green/Red, ON/OFF	M	P	D	3	-															
Flush/Flush, Green/Red, START/STOP	M	P	D	4	-															
Flush/Flush, White/Black	M	P	D	5	-															
Flush/Flush, White/Black, I/O	M	P	D	6	-															
Flush/Flush, White/Black, ON/OFF	M	P	D	7	-															
Flush/Flush, White/Black, START/STOP	M	P	D	8	-															
With Holder																				2
Lamp block, MLB-1, Bulb not included																				2
Lamp block, MLB-4, Bulb not included																				5
Lamp block, MLB-5, Bulb not included																				6
Lamp block w/integrated LED ②																				7
Lamp block with zener diode, bulb not incl.																				8
Center Lens Color - Red																				R
Center Lens Color - Yellow																				Y
Center Lens Color - Green																				G
Center Lens Color - Clear																				C
Contact Blocks, 1NO																				1
Contact Blocks, 2NO																				0
Contact Blocks, 3NO																				3
Contact Blocks, 1NC																				0
Contact Blocks, 2NC																				0
Contact Blocks, 3NC																				0
Contact Blocks, 1NO+1NC																				1
Contact Blocks, 2NO+1NC																				2
Contact Blocks, 1NO+2NC																				1
Contact Blocks, 1NO, Gold																				1
Contact Blocks, 2NO, Gold																				2
Contact Blocks, 3NO, Gold																				3
Contact Blocks, 1NC, Gold																				0
Contact Blocks, 2NC, Gold																				0
Contact Blocks, 3NC, Gold																				0
Contact Blocks, 1NO+1NC, Gold																				1
Contact Blocks, 2NO+1NC, Gold																				2
Contact Blocks, 1NO+2NC, Gold																				1
LED 12VDC																				
LED 24VAC/DC																				L
LED 48VAC/DC																				L
LED 60VAC/DC																				L
LED 110-130VAC																				L
LED 110-130VAC/DC																				L
LED 230V AC/DC																				L
LED 230V, AC-integrated only																				L
LED 380V, AC-integrated only																				L
LED 415V, AC-integrated only																				L
Transformer Block 110-127/24VLED																				T
Transformer Block 220-240/24VLED																				T
Transformer Block 380-420/24VLED																				T
Transformer Block 440-480/24VLED																				T
5 Block Holder																				

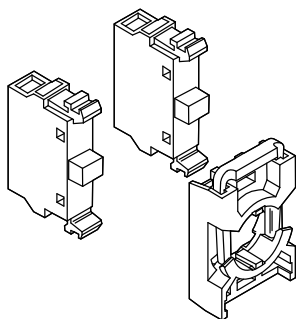
See catalog number explanation on page 7.70.

① No contact block in center position.
② No LED or transformer block can be combined with "illuminated without lamp block" selection.
③ Includes one diode chip integrated into lamp block.

Double pushbuttons Flush/extended, non-illuminated ①



Double pushbutton, flush/extended



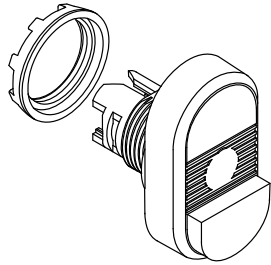
Double pushbuttons, flush/extended, non-illuminated ①

Options	Catalog number characters																			
Flush/extended, Green/Red	M	P	D	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, Green/Red, I/O	M	P	D	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, Green/Red, ON/OFF	M	P	D	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, Green/Red, START/STOP	M	P	D	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, White/Black	M	P	D	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, White/Black, I/O	M	P	D	1	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, White/Black, ON/OFF	M	P	D	1	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, White/Black, START/STOP	M	P	D	1	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
With Holder	-	-	-	-	-	-	-	2	0	-	-	-	-	-	-	-	-	-	-	-
Center Lens Color - Black	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-
Contact Blocks, 1NO	-	-	-	-	-	-	-	-	-	-	1	0	-	-	-	-	-	-	-	-
Contact Blocks, 2NO	-	-	-	-	-	-	-	-	-	-	2	0	-	-	-	-	-	-	-	-
Contact Blocks, 3NO	-	-	-	-	-	-	-	-	-	-	3	0	-	-	-	-	-	-	-	-
Contact Blocks, 1NC	-	-	-	-	-	-	-	-	-	-	0	1	-	-	-	-	-	-	-	-
Contact Blocks, 2NC	-	-	-	-	-	-	-	-	-	-	0	2	-	-	-	-	-	-	-	-
Contact Blocks, 3NC	-	-	-	-	-	-	-	-	-	-	0	3	-	-	-	-	-	-	-	-
Contact Blocks, 1NO+1NC	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
Contact Blocks, 2NO+1NC	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-
Contact Blocks, 1NO+2NC	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-
Contact Blocks, 1NO, Gold	-	-	-	-	-	-	-	-	-	-	1	0	-	-	-	-	-	-	-	G
Contact Blocks, 2NO, Gold	-	-	-	-	-	-	-	-	-	-	2	0	-	-	-	-	-	-	-	G
Contact Blocks, 3NO, Gold	-	-	-	-	-	-	-	-	-	-	3	0	-	-	-	-	-	-	-	G
Contact Blocks, 1NC, Gold	-	-	-	-	-	-	-	-	-	-	0	1	-	-	-	-	-	-	-	G
Contact Blocks, 2NC, Gold	-	-	-	-	-	-	-	-	-	-	0	2	-	-	-	-	-	-	-	G
Contact Blocks, 3NC, Gold	-	-	-	-	-	-	-	-	-	-	0	3	-	-	-	-	-	-	-	G
Contact Blocks, 1NO+1NC, Gold	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	G
Contact Blocks, 2NO+1NC, Gold	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-	G
Contact Blocks, 1NO+2NC, Gold	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	G
5 Block Holder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5

See catalog number explanation on page 7.70.

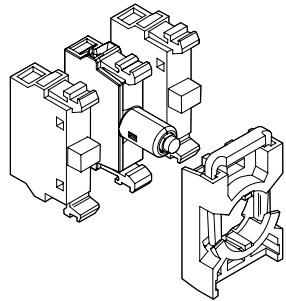
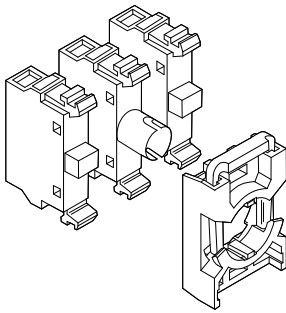
① No contact block in center position.

Double pushbuttons Flush/extended, illuminated ①



Double pushbutton, flush/extended, illuminated

7



Double pushbuttons, flush/extended, illuminated ①

Options	Catalog number characters															
Flush/extended, Green/Red	M	P	D	1	2	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, Green/Red, I/O	M	P	D	1	3	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, Green/Red, ON/OFF	M	P	D	1	4	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, Green/Red, START/STOP	M	P	D	1	5	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, White/Black	M	P	D	1	6	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, White/Black, I/O	M	P	D	1	7	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, White/Black, ON/OFF	M	P	D	1	8	-	-	-	-	-	-	-	-	-	-	-
Flush/extended, White/Black, START/STOP	M	P	D	1	9	-	-	-	-	-	-	-	-	-	-	-
With Holder	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
Lamp block, MLB-1, Bulb not Included	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Lamp block, MLB-4, Bulb not Included	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-
Lamp block, MLB-5, Bulb not Included	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-
Lamp block w/integrated LED ③	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-
Lamp block w/zener diode, bulb not incl.	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-
Center Lens Color - Red	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-
Center Lens Color - Yellow	-	-	-	-	-	-	-	-	-	Y	-	-	-	-	-	-
Center Lens Color - Green	-	-	-	-	-	-	-	-	-	G	-	-	-	-	-	-
Center Lens Color - Clear	-	-	-	-	-	-	-	-	-	C	-	-	-	-	-	-
Contact Blocks, 1NO	-	-	-	-	-	-	-	-	1	0	-	-	-	-	-	-
Contact Blocks, 2NO	-	-	-	-	-	-	-	-	2	0	-	-	-	-	-	-
Contact Blocks, 3NO	-	-	-	-	-	-	-	-	3	0	-	-	-	-	-	-
Contact Blocks, 1NC	-	-	-	-	-	-	-	-	0	1	-	-	-	-	-	-
Contact Blocks, 2NC	-	-	-	-	-	-	-	-	0	2	-	-	-	-	-	-
Contact Blocks, 3NC	-	-	-	-	-	-	-	-	0	3	-	-	-	-	-	-
Contact Blocks, 1NO+1NC	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-
Contact Blocks, 2NO+1NC	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-
Contact Blocks, 1NO+2NC	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-
Contact Blocks, 1NO, Gold	-	-	-	-	-	-	-	-	1	0	0	-	-	-	G	-
Contact Blocks, 2NO, Gold	-	-	-	-	-	-	-	-	2	0	0	-	-	-	G	G
Contact Blocks, 3NO, Gold	-	-	-	-	-	-	-	-	3	0	0	-	-	-	G	G
Contact Blocks, 1NC, Gold	-	-	-	-	-	-	-	-	0	1	1	-	-	-	G	G
Contact Blocks, 2NC, Gold	-	-	-	-	-	-	-	-	0	2	2	-	-	-	G	G
Contact Blocks, 3NC, Gold	-	-	-	-	-	-	-	-	0	3	3	-	-	-	G	G
Contact Blocks, 1NO+1NC, Gold	-	-	-	-	-	-	-	-	1	1	1	-	-	-	G	G
Contact Blocks, 2NO+1NC, Gold	-	-	-	-	-	-	-	-	2	1	1	-	-	-	G	G
Contact Blocks, 1NO+2NC, Gold	-	-	-	-	-	-	-	-	1	2	2	-	-	-	G	G
LED 12VDC	-	-	-	-	-	-	-	-	-	-	-	-	-	L	7	-
LED 24VAC/DC	-	-	-	-	-	-	-	-	-	-	-	-	-	L	8	-
LED 48VAC/DC	-	-	-	-	-	-	-	-	-	-	-	-	-	L	9	-
LED 60VAC/DC	-	-	-	-	-	-	-	-	-	-	-	-	-	L	6	0
LED 110-130VAC	-	-	-	-	-	-	-	-	-	-	-	-	-	L	1	-
LED 110-130VAC/DC	-	-	-	-	-	-	-	-	-	-	-	-	-	L	1	3
LED 230V AC/DC	-	-	-	-	-	-	-	-	-	-	-	-	-	L	2	-
LED 230V, AC-integrated only	-	-	-	-	-	-	-	-	-	-	-	-	-	L	2	3
LED 380V, AC-integrated only	-	-	-	-	-	-	-	-	-	-	-	-	-	L	3	8
LED 415V, AC-integrated only	-	-	-	-	-	-	-	-	-	-	-	-	-	L	4	1
Transformer Block 110-127/24VLED	-	-	-	-	-	-	-	-	-	-	-	-	-	T	L	1
Transformer Block 220-240/24VLED	-	-	-	-	-	-	-	-	-	-	-	-	-	T	L	2
Transformer Block 380-420/24VLED	-	-	-	-	-	-	-	-	-	-	-	-	-	T	L	3
Transformer Block 440-480/24VLED	-	-	-	-	-	-	-	-	-	-	-	-	-	T	L	4
5 Block Holder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5

See catalog number explanation on page 7.70.

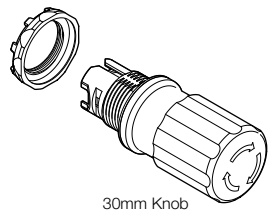
① No contact block in center position.
② No LED or transformer block can be combined with "illuminated without lamp block" selection.
③ Includes one diode chip integrated into lamp block.

Emergency stops & twist, pull release operators

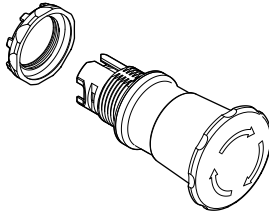
Non-illuminated, maintained

Fulfills IEC 60947-5-5

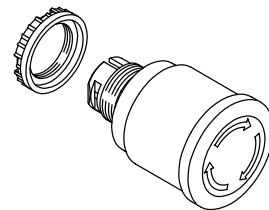
Emergency stops and machine stops, non-illuminated, maintained



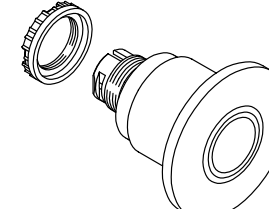
30mm Knob



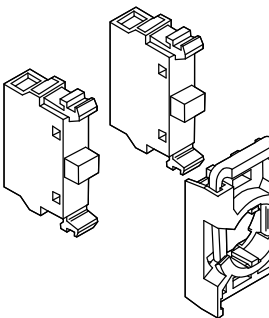
40mm Mushroom



40mm Knob



60mm Mushroom



Options	Catalog number characters																					
30mm Knob, Twist Release			M	P	E	T	3	-														
30mm Knob, Pull Release			M	P	E	P	3	-														
30mm Knob, Key Release (Key Code 71)			M	P	E	K	3	-														
40mm Mushroom, Twist Release			M	P	E	T	4	-														
40mm Mushroom, Pull Release			M	P	E	P	4	-														
40mm Mushroom, Key Release (Key Code 71)			M	P	E	K	4	-														
60mm, Mushroom Twist Release			M	P	M	T	4	-														
60mm, Mushroom Pull Release			M	P	M	P	4	-														
With Holder, 3 block												2	0									
Red																				R		
Contact Blocks, 1NO																				1	0	
Contact Blocks, 2NO																				2	0	
Contact Blocks, 3NO																				3	0	
Contact Blocks, 1NC																				0	1	
Contact Blocks, 2NC																				0	2	
Contact Blocks, 3NC																				0	3	
Contact Blocks, 1NO+1NC																				1	1	
Contact Blocks, 2NO+1NC																				2	1	
Contact Blocks, 1NO+2NC																				1	2	
Contact Blocks, 1NO, Gold																				1	0	G
Contact Blocks, 2NO, Gold																				2	0	G
Contact Blocks, 3NO, Gold																				3	0	G
Contact Blocks, 1NC, Gold																				0	1	G
Contact Blocks, 2NC, Gold																				0	2	G
Contact Blocks, 3NC, Gold																				0	3	G
Contact Blocks, 1NO+1NC, Gold																				1	1	G
Contact Blocks, 2NO+1NC, Gold																				2	1	G
Contact Blocks, 1NO+2NC, Gold																				1	2	G
5 Block Holder																						
30mm Black Plastic Adaptor Ring	G																					5
30mm Chrome Metal Adaptor Ring	G																					

See catalog number explanation on page 7.70.

NOTE:

1. If used as an emergency stop, device must have a yellow background.
2. E-stop requires twist to release only.

To comply with the standard, IEC 60947-5-5, a number of tests have to be conducted:

Durability test	6,0505 cycles. This is not a test of mechanical life. The product has a mechanical life of 100,000 operations.	Latching test	Impulse voltage test at 2,500 V
Robustness	The force 113 N applied in three axes.	Resetting test	Pulling force < 50 N Turning torque < Nm
Conditioning	Heat and cold, moist atmosphere, and in 5% NaC	Shock	15 g shock
		Vibration	2 h at 50 m/s ²
		Contacts with positive opening operation	15 g shock

Emergency stops & twist, pull release operators

Illuminated, maintained ①

Fulfills IEC 60947-5-5

Emergency stops and machine stops, illuminated ①

Options	Catalog number characters															
40mm, Knob Twist Release			M	P	M	T	3	-								
60mm, Mushroom Twist Release			M	P	M	T	4	-								
60mm, Mushroom Pull Release			M	P	M	P	4	-								
With Holder										2						
Lamp block, MLB-1, Bulb not Included										2						
Lamp block, MLB-4, Bulb not Included										5						
Lamp block, MLB-5, Bulb not Included										6						
Lamp block w/integrated LED ②										7						
Lamp block with zener diode, bulb not incl.										8						
Button Color - Red											R					
Contact Blocks, 1NO											1	0				
Contact Blocks, 2NO											2	0				
Contact Blocks, 3NO											3	0				
Contact Blocks, 1NC											0	1				
Contact Blocks, 2NC											0	2				
Contact Blocks, 3NC											0	3				
Contact Blocks, 1NO+1NC											1	1				
Contact Blocks, 2NO+1NC											2	1				
Contact Blocks, 1NO+2NC											1	2				
Contact Blocks, 1NO, Gold											1	0			G	
Contact Blocks, 2NO, Gold											2	0			G	
Contact Blocks, 3NO, Gold											3	0			G	
Contact Blocks, 1NC, Gold											0	1			G	
Contact Blocks, 2NC, Gold											0	2			G	
Contact Blocks, 3NC, Gold											0	3			G	
Contact Blocks, 1NO+1NC, Gold											1	1			G	
Contact Blocks, 2NO+1NC, Gold											2	1			G	
Contact Blocks, 1NO+2NC, Gold											1	2			G	
LED 12VDC														L	7	
LED 24VAC/DC														L	8	
LED 48VAC/DC														L	9	
LED 60VAC/DC														L	6	0
LED 110-130VAC														L	1	
LED 110-130VAC/DC														L	1	3
LED 230V AC/DC														L	2	
LED 230V, AC-integrated only														L	2	3
LED 380V, AC-integrated only														L	3	8
LED 415V, AC-integrated only														L	4	1
Transformer Block 110-127/24VLED														T	L	1
Transformer Block 220-240/24VLED														T	L	2
Transformer Block 380-420/24VLED														T	L	3
Transformer Block 440-480/24VLED														T	L	4
5 Block Holder																5
30mm Black Plastic Adaptor Ring	G														1	
30mm Chrome Metal Adaptor Ring	G														2	

See catalog number explanation on page 7.70.

NOTE:

1. If used as an emergency stop, device must have a yellow background.
2. E-stop requires twist to release only.

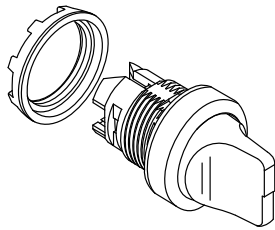
To comply with the standard, IEC 60947-5-5, a number of tests have to be conducted.

See page 7.49.

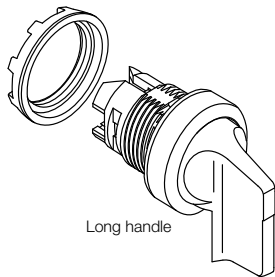
① No contact block in center position.
 ② No filament bulb, LED or transformer block can be combined with "illuminated without lamp block" selection.
 ③ Includes one diode chip integrated into lamp block.

Selector switches, two position Non-illuminated ①

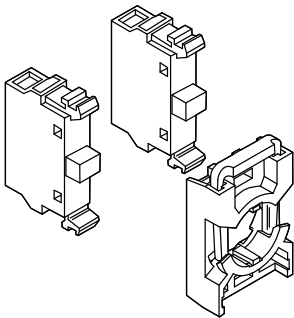
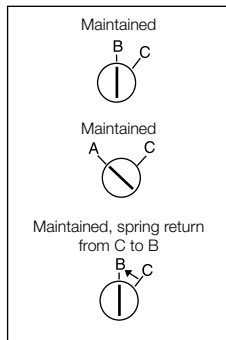
Selector switches, 2 position, non-illuminated ①



Short handle



Long handle



Contact functions

Block positions as seen from operator front.

Handle position	Left block	Right block
A or (B)	O	O
C	X	X

O = not actuated (normal state)
X = actuated (changed state)

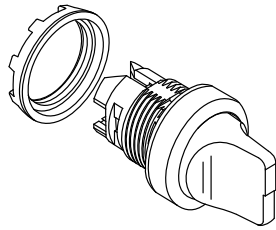
Options	Catalog number characters																					
Short/Main B&C	M	2	S	S	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Short/Main A&C	M	2	S	S	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Short/Spring Return C to B	M	2	S	S	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Long/Main B&C	M	2	S	S	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Long/Main A&C	M	2	S	S	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Long/Spring Return C to B	M	2	S	S	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Bezel, Black Plastic, with Holder									4	0												
Bezel, Chrome Metal, with Holder									6	0												
Switch Color - Red																			R			
Switch Color - Black																			B			
Switch Color - Grey																			U			
Contact Blocks, 1NO																				1	0	
Contact Blocks, 2NO																				2	0	
Contact Blocks, 3NO																				3	0	
Contact Blocks, 1NC																				0	1	
Contact Blocks, 2NC																				0	2	
Contact Blocks, 3NC																				0	3	
Contact Blocks, 1NO+1NC																				1	1	
Contact Blocks, 2NO+1NC																				2	1	
Contact Blocks, 1NO+2NC																				1	2	
Contact Blocks, 1NO, Gold																				1	0	
Contact Blocks, 2NO, Gold																				2	0	
Contact Blocks, 3NO, Gold																				3	0	
Contact Blocks, 1NC, Gold																				0	1	
Contact Blocks, 2NC, Gold																				0	2	
Contact Blocks, 3NC, Gold																				0	3	
Contact Blocks, 1NO+1NC, Gold																				1	1	
Contact Blocks, 2NO+1NC, Gold																				2	1	
Contact Blocks, 1NO+2NC, Gold																				1	2	
5 Block Holder																						5
30mm Black Plastic Adaptor Ring	G	1																				
30mm Chrome Metal Adaptor Ring	G	2																				

See catalog number explanation on page 7.70.

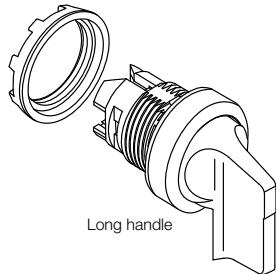
① No contact block in center position.

Selector switches, two position Illuminated ①

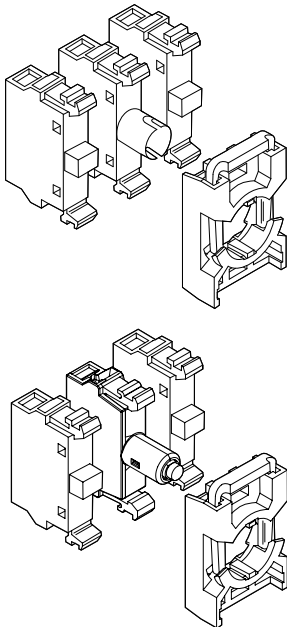
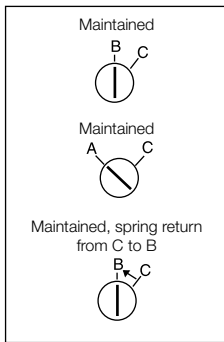
Selector switches, 2 position, illuminated ①



Short handle



Long handle



Options	Catalog number characters															
Short/Main B&C	M	2	S	S	1	-	-	-	-	-	-	-	-	-	-	-
Short/Main A&C	M	2	S	S	2	-	-	-	-	-	-	-	-	-	-	-
Short/Spring Return C to B	M	2	S	S	3	-	-	-	-	-	-	-	-	-	-	-
Long/Main B&C	M	2	S	S	4	-	-	-	-	-	-	-	-	-	-	-
Long/Main A&C	M	2	S	S	5	-	-	-	-	-	-	-	-	-	-	-
Long/Spring Return C to B	M	2	S	S	6	-	-	-	-	-	-	-	-	-	-	-
Bezel, Black Plastic, with Holder											4					
Bezel, Chrome Metal, with Holder											6					
Lamp block, MLB-1, Bulb not Included										2						
Lamp block, MLB-4, Bulb not Included										5						
Lamp block, MLB-5, Bulb not Included										6						
Lamp block w/integrated LED ③										7						
Lamp block w/zener diode, Bulb not incl.										8						
Switch Color - Red											R					
Switch Color - Green											G					
Switch Color - Yellow											Y					
Switch Color - Blue											L					
Switch Color - Clear											C					
Contact Blocks, 1NO										1	0					
Contact Blocks, 2NO										2	0					
Contact Blocks, 3NO										3	0					
Contact Blocks, 1NC										0	1					
Contact Blocks, 2NC										0	2					
Contact Blocks, 3NC										0	3					
Contact Blocks, 1NO+1NC										1	1					
Contact Blocks, 2NO+1NC										2	1					
Contact Blocks, 1NO+2NC										1	2					
Contact Blocks, 1NO, Gold										1	0					G
Contact Blocks, 2NO, Gold										2	0					G
Contact Blocks, 3NO, Gold										3	0					G
Contact Blocks, 1NC, Gold										0	1					G
Contact Blocks, 2NC, Gold										0	2					G
Contact Blocks, 3NC, Gold										0	3					G
Contact Blocks, 1NO+1NC, Gold										1	1					G
Contact Blocks, 2NO+1NC, Gold										2	1					G
Contact Blocks, 1NO+2NC, Gold										1	2					G
LED 12VDC										1	2					G
LED 24VAC/DC															L	7
LED 48VAC/DC															L	8
LED 60VAC/DC															L	9
LED 110-130VAC															L	6 0
LED 110-130VAC/DC															L	1 3
LED 230V AC/DC															L	2 3
LED 230V, AC-integrated only															L	3 8
LED 380V, AC-integrated only															L	4 1
LED 415V, AC-integrated only															L	1 1
Transformer Block 110-127/24VLED															T	2 3
Transformer Block 220-240/24VLED															T	1 2
Transformer Block 380-420/24VLED															T	3 4
Transformer Block 440-480/24VLED															T	1 3
5 Block Holder															T	2 4
30mm Black Plastic Adaptor Ring ③	G	1														5
30mm Chrome Metal Adaptor Ring ③	G	2														

See catalog number explanation on page 7.70.

Contact functions

Block positions as seen from operator front.

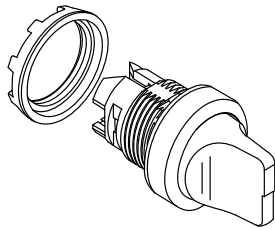
Handle position	Left block	Right block
A or (B)	O	O
C	X	X

O = not actuated (normal state)
X = actuated (changed state)

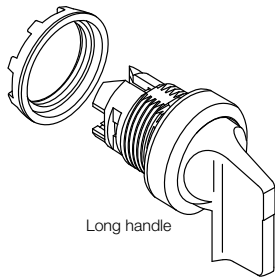
① No contact block in center position.
② No LED or transformer block can be combined with "Illuminated without lamp block" selection.
③ Includes one diode chip integrated into lamp block.

Selector switches, two position Non-Illuminated ①

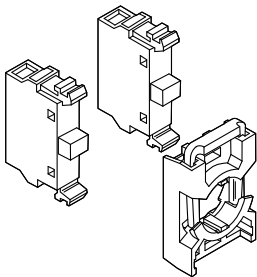
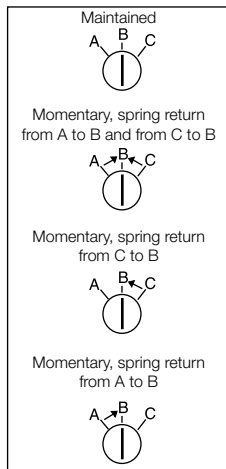
Selector switches, 2 position, non-illuminated ①



Short handle



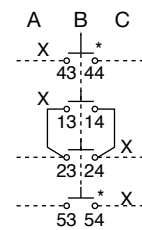
Long handle



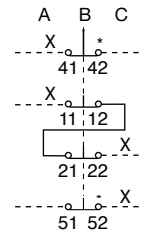
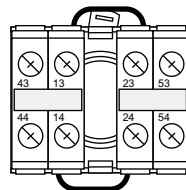
Options	Catalog number characters												
Short/3-Main	M	3	S	S	1	-	-	-	-	-	-	-	-
Short/Spring Return to B	M	3	S	S	2	-	-	-	-	-	-	-	-
Short/Main A&B/Spring Return C to B	M	3	S	S	3	-	-	-	-	-	-	-	-
Long/3-Main	M	3	S	S	4	-	-	-	-	-	-	-	-
Long/Spring Return to B	M	3	S	S	5	-	-	-	-	-	-	-	-
Long/Main A&B/Spring Return C to B	M	3	S	S	6	-	-	-	-	-	-	-	-
Short/Main B&C/Spring Return A to B	M	3	S	S	7	-	-	-	-	-	-	-	-
Long/Main B&C/Spring Return A to B	M	3	S	S	8	-	-	-	-	-	-	-	-
Bezel, Black Plastic, with Holder	-	-	-	-	-	4	0	-	-	-	-	-	-
Bezel, Chrome Metal, with Holder	-	-	-	-	-	6	0	-	-	-	-	-	-
Switch Color - Red	-	-	-	-	-	-	-	R	-	-	-	-	-
Switch Color - Black	-	-	-	-	-	-	-	B	-	-	-	-	-
Switch Color - Grey	-	-	-	-	-	-	-	U	-	-	-	-	-
Contact Blocks, 1NO	-	-	-	-	-	-	-	-	1	0	-	-	-
Contact Blocks, 2NO	-	-	-	-	-	-	-	-	2	0	-	-	-
Contact Blocks, 3NO	-	-	-	-	-	-	-	-	3	0	-	-	-
Contact Blocks, 1NC	-	-	-	-	-	-	-	-	0	1	-	-	-
Contact Blocks, 2NC	-	-	-	-	-	-	-	-	0	2	-	-	-
Contact Blocks, 3NC	-	-	-	-	-	-	-	-	0	3	-	-	-
Contact Blocks, 1NO+1NC	-	-	-	-	-	-	-	-	1	1	-	-	-
Contact Blocks, 2NO+1NC	-	-	-	-	-	-	-	-	2	1	-	-	-
Contact Blocks, 1NO+2NC	-	-	-	-	-	-	-	-	1	2	-	-	-
Contact Blocks, 1NO, Gold	-	-	-	-	-	-	-	-	1	0	G	-	-
Contact Blocks, 2NO, Gold	-	-	-	-	-	-	-	-	2	0	G	-	-
Contact Blocks, 3NO, Gold	-	-	-	-	-	-	-	-	3	0	G	-	-
Contact Blocks, 1NC, Gold	-	-	-	-	-	-	-	-	0	1	G	-	-
Contact Blocks, 2NC, Gold	-	-	-	-	-	-	-	-	0	2	G	-	-
Contact Blocks, 3NC, Gold	-	-	-	-	-	-	-	-	0	3	G	-	-
Contact Blocks, 1NO+1NC, Gold	-	-	-	-	-	-	-	-	1	1	G	-	-
Contact Blocks, 2NO+1NC, Gold	-	-	-	-	-	-	-	-	2	1	G	-	-
Contact Blocks, 1NO+2NC, Gold	-	-	-	-	-	-	-	-	1	2	G	-	-
5 Block Holder	-	-	-	-	-	-	-	-	-	-	-	-	5
30mm Black Plastic Adaptor Ring	G	1	-	-	-	-	-	-	-	-	-	-	-
30mm Chrome Metal Adaptor Ring	G	2	-	-	-	-	-	-	-	-	-	-	-

See catalog number explanation on page 7.70.

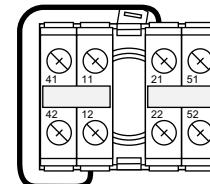
Center position connection detail



* Contacts may be N.O. or N.C.



* Contacts may be N.O. or N.C.



Contact functions

Block positions as seen from operator front.

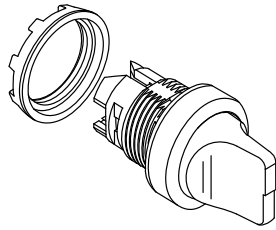
Handle position	Left block	Right block
A	X	O
B	O	O
C	O	X

O = not actuated (normal state)
X = actuated (changed state)

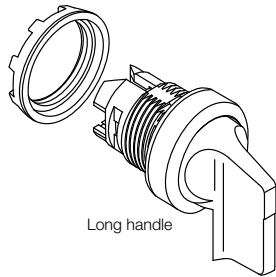
① No contact block in center position.

Selector switches, three position Illuminated ①

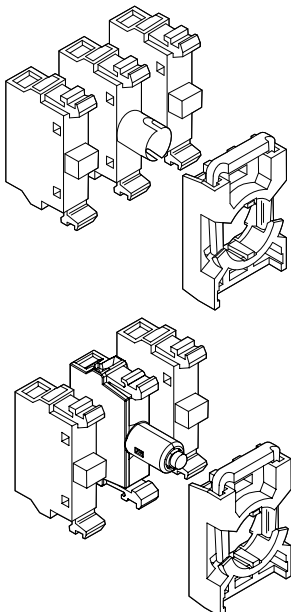
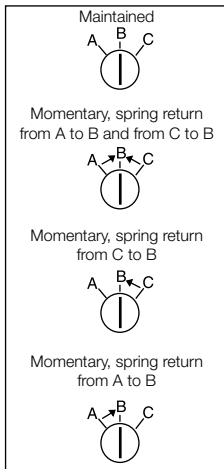
Selector switches, 3 position, illuminated ①



Short handle



Long handle



Options	Catalog number characters									
Short/3-Main	M	3	S	S	1	-	-	-	-	-
Short/Spring Return to B	M	3	S	S	2	-	-	-	-	-
Short/Main A&B/Spring Return C to B	M	3	S	S	3	-	-	-	-	-
Long/3-Main	M	3	S	S	4	-	-	-	-	-
Long/Spring Return to B	M	3	S	S	5	-	-	-	-	-
Long/Main A&B/Spring Return C to B	M	3	S	S	6	-	-	-	-	-
Short/Main B&C/Spring Return A to B	M	3	S	S	7	-	-	-	-	-
Long/Main B&C/Spring Return A to B	M	3	S	S	8	-	-	-	-	-
Bezel, Black Plastic, with Holder	-	-	-	-	-	-	4	-	-	-
Bezel, Chrome Metal, with Holder	-	-	-	-	-	-	6	-	-	-
Lamp block, MLB-1, Bulb not Included	-	-	-	-	-	2	-	-	-	-
Lamp block, MLB-4, Bulb not Included	-	-	-	-	-	5	-	-	-	-
Lamp block, MLB-5, Bulb not Included	-	-	-	-	-	6	-	-	-	-
Lamp block w/integrated LED ②	-	-	-	-	-	7	-	-	-	-
Lamp block with zener diode, bulb not incl.	-	-	-	-	-	8	-	-	-	-
Switch Color - Red	-	-	-	-	-	-	-	R	-	-
Switch Color - Green	-	-	-	-	-	-	-	G	-	-
Switch Color - Yellow	-	-	-	-	-	-	-	Y	-	-
Switch Color - Blue	-	-	-	-	-	-	-	L	-	-
Switch Color - Clear	-	-	-	-	-	-	-	C	-	-
Contact Blocks, 1NO	-	-	-	-	-	1	0	-	-	-
Contact Blocks, 2NO	-	-	-	-	-	2	0	-	-	-
Contact Blocks, 3NO	-	-	-	-	-	3	0	-	-	-
Contact Blocks, 1NC	-	-	-	-	-	0	1	-	-	-
Contact Blocks, 2NC	-	-	-	-	-	0	2	-	-	-
Contact Blocks, 3NC	-	-	-	-	-	0	3	-	-	-
Contact Blocks, 1NO+1NC	-	-	-	-	-	1	1	-	-	-
Contact Blocks, 2NO+1NC	-	-	-	-	-	2	1	-	-	-
Contact Blocks, 1NO+2NC	-	-	-	-	-	1	2	-	-	-
Contact Blocks, 1NO, Gold	-	-	-	-	-	1	0	G	-	-
Contact Blocks, 2NO, Gold	-	-	-	-	-	2	0	G	-	-
Contact Blocks, 3NO, Gold	-	-	-	-	-	3	0	G	-	-
Contact Blocks, 1NC, Gold	-	-	-	-	-	0	1	G	-	-
Contact Blocks, 2NC, Gold	-	-	-	-	-	0	2	G	-	-
Contact Blocks, 3NC, Gold	-	-	-	-	-	0	3	G	-	-
Contact Blocks, 1NO+1NC, Gold	-	-	-	-	-	1	1	G	-	-
Contact Blocks, 2NO+1NC, Gold	-	-	-	-	-	2	1	G	-	-
Contact Blocks, 1NO+2NC, Gold	-	-	-	-	-	1	2	G	-	-
LED 12VDC	-	-	-	-	-	-	-	-	L	7
LED 24VAC/DC	-	-	-	-	-	-	-	-	L	8
LED 48VAC/DC	-	-	-	-	-	-	-	-	L	9
LED 60VAC/DC	-	-	-	-	-	-	-	-	L	6 0
LED 110-130VAC	-	-	-	-	-	-	-	-	L	1 3
LED 110-130VAC/DC	-	-	-	-	-	-	-	-	L	1 3
LED 230V AC/DC	-	-	-	-	-	-	-	-	L	2 3
LED 230V, AC-integrated only	-	-	-	-	-	-	-	-	L	2 3
LED 380V, AC-integrated only	-	-	-	-	-	-	-	-	L	3 8
LED 415V, AC-integrated only	-	-	-	-	-	-	-	-	L	4 1
Transformer Block 110-127/24VLED	-	-	-	-	-	-	-	-	T	L 1
Transformer Block 220-240/24VLED	-	-	-	-	-	-	-	-	T	L 2
Transformer Block 380-420/24VLED	-	-	-	-	-	-	-	-	T	L 3
Transformer Block 440-480/24VLED	-	-	-	-	-	-	-	-	T	L 4
5 Block Holder	-	-	-	-	-	-	-	-	-	5
30mm Black Plastic Adaptor Ring	G	1	-	-	-	-	-	-	-	-
30mm Chrome Metal Adaptor Ring	G	2	-	-	-	-	-	-	-	-

See catalog number explanation on page 7.70.

Contact functions

Block positions as seen
from operator front.

Handle position	Left block	Right block
A	X	O
B	O	O
C	O	X

O = not actuated (normal state)
X = actuated (changed state)

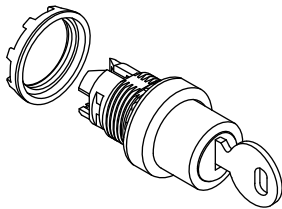
Center position connection detail

See page 7.56.

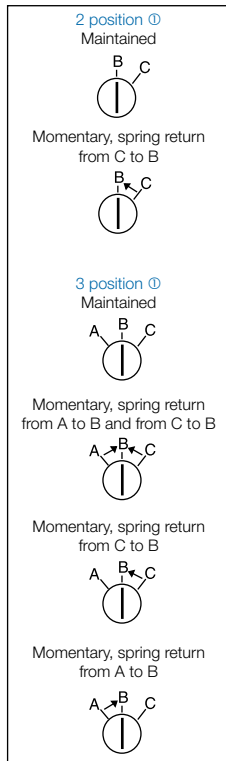
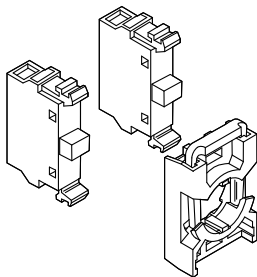
① No contact block in center position.
② No LED or transformer block can be combined with "illuminated without lamp block" selection.
③ Includes one diode chip integrated into lamp block.

Key-operated selector switches

Two & three position ①



Key operated



Key-operated selector switches, 2 & 3 position ①

Options	Catalog number characters										
2 Maintained Positions, Key Removable in B and C	M	2	S	S	K	1	-				
2 Maintained Positions, Key Removable in B	M	2	S	S	K	2	-				
2 Positions, Spring Return from C to B, Key Removable in B	M	2	S	S	K	3	-				
3 Maintained Positions, Key Removable in A, B and C	M	3	S	S	K	1	-				
3 Maintained Positions, Key Removable in B	M	3	S	S	K	2	-				
3 Positions, Spring Return from A and C to B, Key Removable in B	M	3	S	S	K	3	-				
3 Positions, A and B maintained, Spring Return C to B, Key Removable in A	M	3	S	S	K	4	-				
3 Positions, A and B maintained, Spring Return C to B, Key Removable in All Positions	M	3	S	S	K	5	-				
Bezel, Black Plastic, with Holder							4	0			
Bezel, Chrome Metal, with Holder							6	0			
Key Code 71									1		
Key Code 72									2		
Key Code 73									3		
Other Key Code									4		
Contact Blocks, 1NO										1	0
Contact Blocks, 2NO										2	0
Contact Blocks, 3NO										3	0
Contact Blocks, 1NC										0	1
Contact Blocks, 2NC										0	2
Contact Blocks, 3NC										0	3
Contact Blocks, 1NO+1NC										1	1
Contact Blocks, 2NO+1NC										2	1
Contact Blocks, 1NO+2NC										1	2
Contact Blocks, 1NO, Gold										1	0
Contact Blocks, 2NO, Gold										2	0
Contact Blocks, 3NO, Gold										3	0
Contact Blocks, 1NC, Gold										0	1
Contact Blocks, 2NC, Gold										0	2
Contact Blocks, 3NC, Gold										0	3
Contact Blocks, 1NO+1NC, Gold										1	1
Contact Blocks, 2NO+1NC, Gold										2	1
Contact Blocks, 1NO+2NC, Gold										1	2
5 Block Holder											5
30mm Black Plastic Adaptor Ring	G	1									
30mm Chrome Metal Adaptor Ring	G	2									

See catalog number explanation on page 7.70.

Extra key

Description	Catalog No.	Reference code
Ronis 455 (key code 71)	SK 616 021-71	SK 616 021-71
Ronis 421 (key code 72)	SK 616 021-72	SK 616 021-72
Ronis 3433-E (key code 73)	SK 616 021-73	SK 616 021-73

Contact block functions

Block positions as seen from operator front.

2 Position switch

Handle position	Left block	Right block
B	O	O
C	X	X

O = not actuated (normal state)
X = actuated (changed state)

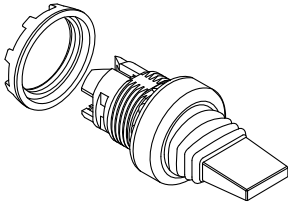
3 Position switch

Handle position	Left block	Right block
A	O	X
B	O	O
C	X	O

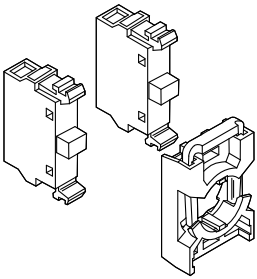
O = not actuated (normal state)
X = actuated (changed state)

① No contact block in center position.

Toggle switches



Toggle switch



7

Toggle switches

Options	Catalog number characters										
2 Maintained Positions			M	T	S	1	-				
3 Positions, Spring Return to Center			M	T	S	2	-				
3 Maintained Positions			M	T	S	3	-				
Bezel, Black, with Holder								4	0		
Bezel, Chrome, with Holder								6	0		
Switch Color - Black										B	
Contact Blocks, 1NO										1	0
Contact Blocks, 2NO										2	0
Contact Blocks, 3NO										3	0
Contact Blocks, 1NC										0	1
Contact Blocks, 2NC										0	2
Contact Blocks, 3NC										0	3
Contact Blocks, 1NO+1NC										1	1
Contact Blocks, 2NO+1NC										2	1
Contact Blocks, 1NO+2NC										1	2
Contact Blocks, 1NO, Gold										1	0
Contact Blocks, 2NO, Gold										2	0
Contact Blocks, 3NO, Gold										3	0
Contact Blocks, 1NC, Gold										0	1
Contact Blocks, 2NC, Gold										0	2
Contact Blocks, 3NC, Gold										0	3
Contact Blocks, 1NO+1NC, Gold										1	1
Contact Blocks, 2NO+1NC, Gold										2	1
Contact Blocks, 1NO+2NC, Gold										1	2
5 Block Holder											
30mm Black Plastic Adaptor Ring	G		1								
30mm Chrome Metal Adaptor Ring	G		2								

See catalog number explanation on page 7.70.

Maintained



Contact block functions

Block positions as seen from operator front.

2 Position switch

Handle position	Left block	Right block
A	O	O
C	X	X

O = not actuated (normal state)

X = actuated (changed state)

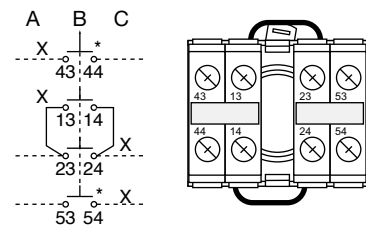
3 Position switch

Handle position	Left block	Right block
A	O	X
B	O	O
C	X	O

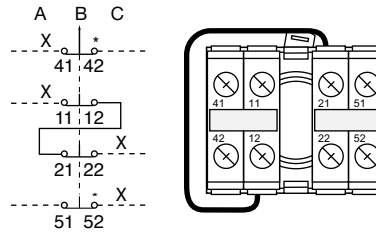
O = not actuated (normal state)

X = actuated (changed state)

Center position connection detail

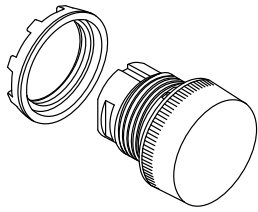


* Contacts may be N.O. or N.C.

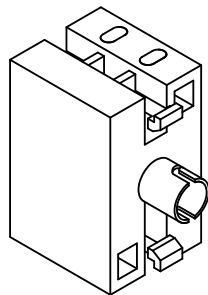
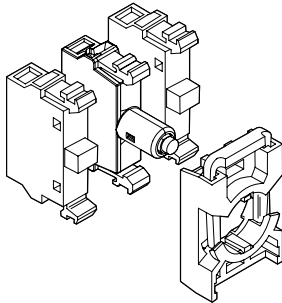
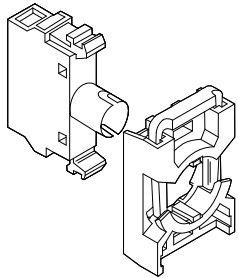


* Contacts may be N.O. or N.C.

Pilot lights



Pilot light



Options

Options	Catalog number characters										
Pilot Light with light diffusing lens			M	L	1	-	-	-	-	-	-
With Holder						-	2	0			
Lens Color - Red									R		
Lens Color - Green									G		
Lens Color - Yellow									Y		
Lens Color - Blue									L		
Lens Color - White									W		
Lens Color - Clear									C		
Lamp block, MLB-1, Bulb not included										1	0
Lamp block, MLB-4, Bulb not included										0	1
Lamp block, MLB-5, Bulb not included										0	2
Lamp block w/integrated LED ①											7
Lamp block with zener diode, bulb not incl.											8
LED 12VDC											L 7
LED 24VAC/DC											L 8
LED 48VAC/DC											L 9
LED 60VAC/DC											L 6 0
LED 110-130VAC											L 1
LED 110-130VAC/DC											L 1 3
LED 230V AC/DC											L 2
LED 230V, AC-integrated only											L 2 3
LED 380V, AC-integrated only											L 3 8
LED 415V, AC-integrated only											L 4 1
Transformer Block 110-127/24VLED											TL1
Transformer Block 220-240/24VLED											TL2
Transformer Block 380-420/24VLED											TL3
Transformer Block 440-480/24VLED											TL4
5 Block Holder											
30mm Black Plastic Adaptor Ring	G		1								
30mm Chrome Metal Adaptor Ring	G		2								

See catalog number explanation on page 7.70.

① Includes one diode chip integrated into lamp block.

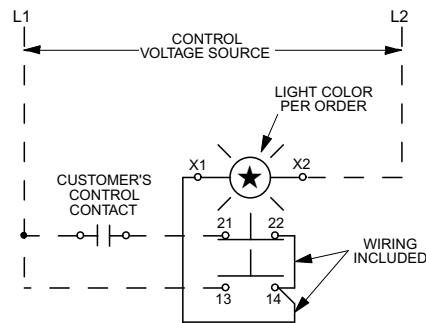
Press to test pilot lights

Press to test pilot lights ②

Options	Catalog number characters									
			M	P	1	-				
Momentary, Flush			M	P	1	-				
Momentary, Extended			M	P	3	-				
Bezel, Black Plastic with Holder, 1/1 Contacts							KL			
Bezel, Chrome Metal with Holder, 1/1 Contacts							ML			
Illuminated without Lamp Block								PT		
Full Voltage Lamp Block,									FPT	
(select LED from below)										
Resistor Lamp Block,									RPT	
(select 120V or 240V LED only)										
LED, 12VDC										L7
LED, 24VAC/DC										L8
LED, 48VAC/DC										L9
LED, 60VAC/DC										L60
LED 110-130VAC										L1
LED 110-130VAC/DC										L13
LED 230VAC/DC										L2
LED 230VAC Integrated only										L230
LED 380VAC Integrated only										L38
LED 415VAC Integrated only										L41
Transformer + Lamp Block 110-127/6VBulb										TPT1
Transformer + Lamp Block 220-240/6VBulb										TPT2
Transformer + Lamp Block 380-420/6VBulb										TPT3
Transformer + Lamp Block 440-480/6VBulb										TPT4
Transformer + Lamp Block 500-600/6VBulb										TPT5
Transformer + Lamp Block 110-127/24VBulb										TPT6
Transformer + Lamp Block 220-240/24VBulb										TPT7
Transformer + Lamp Block 380-420/24VBulb										TPT8
Transformer + Lamp Block 440-480/24VBulb										TPT9
Transformer + Lamp Block 110-127/24VLED										TPTL1
Transformer + Lamp Block 220-240/24VLED										TPTL2
Transformer + Lamp Block 380-420/24VLED										TPTL3
Transformer + Lamp Block 440-480/24VLED										TPTL4
Button Color - Red										R
Button Color - Green										G
Button Color - Yellow										Y
Button Color - Blue										L
Button Color - White										W
Button Color - Clear										C
30mm Black Plastic Adaptor Ring	G				1					
30mm Chrome Metal Adaptor Ring	G				2					

See catalog number explanation on page 7.70.

Schematic



Press-to-test schematic

① LED or transformer block cannot be combined with "illuminated without lamp block" selection.
 ② 1 NO & 1NC contact blocks included.



Compact Range
22mm

Compact Range, 22mm Pilot devices



The Compact Range is designed to be our most efficient solution when it comes to assembly and cost, suitable for the most demanding environments. It can also be combined with the Modular Range to cover the needs of additional flexibility.

General construction

- "All-in-one design"
- Same front as modular
- 42mm built in depth
- Up to 2 electrical separated contacts
- Metal or black plastic look
- UL file #E76003

Product features

- Suitable in the toughest environments IP 66, 67 & 69K
- Wiping action gives high performance with low energies
- UL/NEMA Type 1,3R,4,4X,12,13

Operators

- Pushbuttons (illuminated & non illuminated)
- Emergency stops (twist, pull & key release)
- Machine stops (twist, pull & key release)
- Selector switches (2 & 3 position)
- Mushrooms

Pilot lights

- Integrated LED (wide range of voltages)
- BA9s base for filament bulb or LED

Pushbuttons

Flush and extended, non-illuminated

Color codes for pushbuttons

	Red	Green	Yellow	Blue	White	Black	Grey
Δ	R	G	Y	L	W	B	U

Bezel - How to order

Black Plastic - Standard
 Chrome Metal - Replace '1' with '3' in
 Catalog number



Bezel options	Catalog number
Black plastic	CP(X)10X-XX
Chrome metal	CP(X)30X-XX

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Flush pushbutton

Operator: Flush and extended pushbutton

Description	Catalog number	Weight oz.
Flush pushbutton		
Momentary		
1 NO	CP110Δ-10	0.63
2 NO	CP110Δ-20	0.78
1 NC	CP110Δ-01	0.63
2 NC	CP110Δ-02	0.78
1 NO +1 NC	CP110Δ-11	0.78
Maintained		
1 NO	CP210Δ-10	0.63
2 NO	CP210Δ-20	0.78
1 NC	CP210Δ-01	0.63
2 NC	CP210Δ-02	0.78
1 NO +1 NC	CP210Δ-11	0.78



Extended pushbutton

Extended pushbutton		
Momentary		
1 NO	CP310Δ-10	0.67
2 NO	CP310Δ-20	0.78
1 NC	CP310Δ-01	0.67
2 NC	CP310Δ-02	0.78
1 NO +1 NC	CP310Δ-11	0.78
Maintained		
1 NO	CP410Δ-10	0.67
2 NO	CP410Δ-20	0.78
1 NC	CP410Δ-01	0.67
2 NC	CP410Δ-02	0.78
1 NO +1 NC	CP410Δ-11	0.78



Flush pushbutton
with marking

Flush pushbutton		
Momentary, white button with black I		
1 NO	CP1110W-10	0.63
Momentary, white button with black II		
1 NO	CP1210W-10	0.63
Extended pushbutton		
Momentary, black button with white O		
1 NC	CP3310B-01	0.63

Pushbuttons

Flush and extended, illuminated

Bezel - How to order

Black plastic - Standard
 Chrome metal - Replace '1' with '3' in Catalog number



Bezel options	Catalog number
Black plastic	CP(X)1XX-XX
Chrome metal	CP(X)3XX-XX



Illuminated pushbutton

Operator: Illuminated pushbutton with integrated LED

Description	Catalog number	Weight oz.
-------------	----------------	------------

Flush pushbutton 24V AC/DC

Momentary

Red	1 NC	CP111R-01	0.88
Red	1 NO	CP111R-10	0.88
Green	1 NO	CP111G-10	0.88
Yellow	1 NO	CP111Y-10	0.88

Maintained

Red	1 NC	CP211R-01	0.88
Red	1 NO	CP211R-10	0.88
Green	1 NO	CP211G-10	0.88
Yellow	1 NO	CP211Y-10	0.88

Extended pushbutton 24V AC/DC

Momentary

Red	1 NC	CP311R-01	0.88
Red	1 NO	CP311R-10	0.88
Green	1 NO	CP311G-10	0.88
Yellow	1 NO	CP311Y-10	0.88

Maintained

Red	1 NC	CP411R-01	0.88
Red	1 NO	CP411R-10	0.88
Green	1 NO	CP411G-10	0.88
Yellow	1 NO	CP411Y-10	0.88



Illuminated pushbutton extended

Flush pushbutton 110-130V AC/DC

Momentary

Red	1 NC	CP112R-01	0.88
Red	1 NO	CP112R-10	0.88
Green	1 NO	CP112G-10	0.88
Yellow	1 NO	CP112Y-10	0.88

Maintained

Red	1 NC	CP212R-01	0.88
Red	1 NO	CP212R-10	0.88
Green	1 NO	CP212G-10	0.88
Yellow	1 NO	CP212Y-10	0.88

Extended pushbutton 110-130V AC/DC

Momentary

Red	1 NC	CP312R-01	0.88
Red	1 NO	CP312R-10	0.88
Green	1 NO	CP312G-10	0.88
Yellow	1 NO	CP312Y-10	0.88

Illuminated pushbuttons

Flush and extended, illuminated



Illuminated pushbutton

Operator: Illuminated pushbutton with integrated LED

Description	Catalog number	Weight oz.	
Extended pushbutton 110-130V AC/DC			
Maintained			
Red	1 NC	CP412R-01	0.88
Red	1 NO	CP412R-10	0.88
Green	1 NO	CP412G-10	0.88
Yellow	1 NO	CP412Y-10	0.88

Flush pushbutton 220V AC/DC

Momentary

Red	1 NC	CP113R-01	0.88
Red	1 NO	CP113R-10	0.88
Green	1 NO	CP113G-10	0.88
Yellow	1 NO	CP113Y-10	0.88

Maintained

Red	1 NC	CP213R-01	0.88
Red	1 NO	CP213R-10	0.88
Green	1 NO	CP213G-10	0.88
Yellow	1 NO	CP213Y-10	0.88

Extended pushbutton 220V AC/DC

Momentary

Red	1 NC	CP313R-01	0.88
Red	1 NO	CP313R-10	0.88
Green	1 NO	CP313G-10	0.88
Yellow	1 NO	CP313Y-10	0.88

Maintained

Red	1 NC	CP413R-01	0.88
Red	1 NO	CP413R-10	0.88
Green	1 NO	CP413G-10	0.88
Yellow	1 NO	CP413Y-10	0.88



Illuminated pushbutton
extended

Compact mushrooms



Compact mushroom

Operator: Compact mushroom

Description	Catalog number	Weight oz.	
Red	1 NO + 1 NC	CPM310R-11	1.3
Green	1 NO + 1 NC	CPM310G-11	1.3
Yellow	1 NO + 1 NC	CPM310Y-11	1.3
Black	1 NO + 1 NC	CPM310B-11	1.3
Blue	1 NO + 1 NC	CPM310L-11	1.3

Emergency stop pushbuttons

Non-illuminated

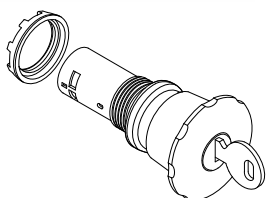
30mm and 40mm



Emergency stop pushbutton
twist release, 30 mm



Emergency stop pushbutton
pull release, 40 mm



Emergency stop pushbutton
key release, 40mm

Operator: Emergency stop pushbutton

Description	Catalog number	Weight oz.	
Emergency stop pushbutton			
Twist release, Ø 30 mm			
1 NC	CE3T-10R-01	1.1	
2 NO	CE3T-10R-20	1.1	
2 NO	CE4T-10R-20	1.1	
2 NC	CE3T-10R-02	1.1	
1 NO + 1 NC	CE3T-10R-11	1.1	
Key release Ø 30 mm: Ronis 455, Key code 71			
2 NC	CE3K1-10R-02	2.1	
1 NO + 1 NC	CE3K1-10R-11	2.1	
Twist release Ø 40 mm			
1 NC	CE4T-10R-01	1.3	
2 NC	CE4T-10R-02	1.3	
1 NO + NC	CE4T-10R-11	1.3	
Key release Ø 40 mm: Key code 71 = Ronis 455			
2 NC	CE4K1-10R-02	2.3	
1 NO + 1 NC	CE4K1-10R-11	2.3	
"EMO" Marking			
Twist release			
Contacts included:			
2 NC	Red	CE9-1003	0.087

Twist, pull or key release operators

Non-illuminated

30mm and 40 mm

Operator: Twist, pull or key release



Machine stop pushbutton
twist release 30 mm

Description	Catalog number	Weight oz.
Machine stop pushbutton		
Twist release Ø 30 mm		
1 NO + 1 NC	CE3T-10B-11	1.1
Pull release Ø 30 mm		
1 NO + 1 NC	CE3P-10B-11	1.1
Key release Ø 30 mm: Key code 71 = Ronis 455		
1 NO + 1 NC	CE3K1-10B-11	2.1
Twist release Ø 40 mm		
1 NO + 1 NC	CE4T-10B-11	1.1
Pull release Ø 40 mm		
1 NO + 1 NC	CE4P-10B-11	1.1
Key release Ø 40 mm: Key code 71 = Ronis 455		
1 NO + 1 NC	CE4K1-10B-11	2.3
Pull release Ø 30 mm		
2 NC	CE3P-10R-02	1.1
1 NO + 1 NC	CE3P-10R-11	1.1
Pull release Ø 40 mm		
2 NC	CE4P-10R-02	1.3
1 NO + 1 NC	CE4P-10R-11	1.3

Selector switches

Two and three position, non-illuminated

Color codes for switches

	Red	Black	Grey
Δ	R	B	U

Bezel - How to order

Black plastic - Standard
Chrome metal - Replace '1' with '3' in Catalog number



Bezel options	Catalog number
Black plastic	C(X)SS(X)10X-XX
Chrome metal	C(X)SS(X)30X-XX

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Selector switch

Operator: Selector switches

Description	Catalog number	Weight oz.	
Two-position			
Maintained			
	1 NO	C2SS110Δ-10	0.71
	2 NO	C2SS110Δ-20	0.85
	1 NC	C2SS110Δ-01	0.71
	2 NC	C2SS110Δ-02	0.85
	1 NO +1 NC	C2SS110Δ-11	0.85
Maintained			
	1 NO	C2SS210Δ-10	0.71
	2 NO	C2SS210Δ-20	0.85
	1 NC	C2SS210Δ-01	0.71
	2 NC	C2SS210Δ-02	0.85
	1 NO +1 NC	C2SS210Δ-11	0.85
Momentary			
	1 NO	C2SS310Δ-10	0.71
	2 NO	C2SS310Δ-20	0.85
	1 NC	C2SS310Δ-01	0.71
	2 NC	C2SS310Δ-02	0.85
	1 NO +1 NC	C2SS310Δ-11	0.85

Contacts actuated

Two position selector switch contacts included,

	actuated in position C			
	NC	NO	NC	NO
	11	13	21	23
	12	14	22	24
1NO	-	1	-	-
2NO	-	1	-	1
1NC	1	-	-	-
2NC	1	-	1	-
1NO + 1NC	-	1	1	-

Three position selector switch contacts included,

	actuated in position: A				actuated in position: C			
	NC	NO	NC	NO	NC	NO	NC	NO
	21	23	11	13	11	13	21	23
	22	24	12	14	12	14	22	24
2NO	-	1	-	1	-	1	-	1
2NC	1	-	1	-	1	-	1	-
1NO + 1NC	1	-	-	1	1	-	-	1

Three-position

Maintained			
	2 NO	C3SS110Δ-20	0.85
	2 NC	C3SS110Δ-02	0.85
	1 NO +1 NC	C3SS110Δ-11	0.85
Momentary			
	2 NO	C3SS210Δ-20	0.85
	2 NC	C3SS210Δ-02	0.85
	1 NO +1 NC	C3SS210Δ-11	0.85
Momentary			
	2 NO	C3SS310Δ-20	0.85
	2 NC	C3SS310Δ-02	0.85
	1 NO +1 NC	C3SS310Δ-11	0.85
Momentary			
	2 NO	C3SS710Δ-20	0.85
	2 NC	C3SS710Δ-02	0.85
	1 NO +1 NC	C3SS710Δ-11	0.85

Pilot lights with integrated LED



Pilot light with integrated LED,
with leakage current protection

Operator: Pilot light with integrated LED

Description	Rated Current mA	Wavelength nm	Luminance mcd	Catalog number	Weight oz.
Pilot light with integrated LED service life >50 000 hours					
Rated voltage 12 V, DC ¹⁾					
Red	30	625	60	CL-501R	0.81
Green	15	520	126	CL-501G	0.81
Yellow	30	590	60	CL-501Y	0.81
Blue	30	470	22	CL-501L	0.81
White	30	²⁾	88	CL-501W	0.81
Rated voltage 24 V, AC/DC					
Red	15	625	60	CL-502R	0.81
Green	15	520	126	CL-502G	0.81
Yellow	15	590	60	CL-502Y	0.81
Blue	15	470	22	CL-502L	0.81
White	15	²⁾	88	CL-502W	0.81
Rated voltage 48 V, AC/DC					
Red	15	625	60	CL-504R	0.81
Green	15	520	126	CL-504G	0.81
Yellow	15	590	60	CL-504Y	0.81
Blue	15	470	22	CL-504L	0.81
White	15	²⁾	88	CL-504W	0.81
Rated voltage 60 V, AC/DC					
Red	15	625	60	CL-505R	0.81
Green	15	520	126	CL-505G	0.81
Yellow	15	590	60	CL-505Y	0.81
Blue	15	470	22	CL-505L	0.81
White	15	²⁾	88	CL-505W	0.81
Rated voltage 110-130 V, AC					
Red	15	625	60	CL-513R	0.81
Green	15	520	126	CL-513G	0.81
Yellow	15	590	60	CL-513Y	0.81
Blue	15	470	22	CL-513L	0.81
White	15	²⁾	88	CL-513W	0.81
Rated voltage 110-130 V, DC ¹⁾					
Red	15	625	60	CL-515R	0.81
Green	15	520	126	CL-515G	0.81
Yellow	15	590	60	CL-515Y	0.81
Blue	15	470	22	CL-515L	0.81
White	15	²⁾	88	CL-515W	0.81
Rated voltage 220 V, DC ¹⁾					
Red	15	625	60	CL-520R	0.81
Green	15	520	126	CL-520G	0.81
Yellow	15	590	60	CL-520Y	0.81
Blue	15	470	22	CL-520L	0.81
White	15	²⁾	88	CL-520W	0.81

Note: ¹⁾ Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

²⁾ X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.

Pilot lights with integrated LED



Pilot light with integrated LED,
with leakage current protection

Operator: Pilot light with integrated LED - Service life 750,000 hours

Description	Rated current mA	Wavelength nm	Luminance mcd	Catalog number	Weight oz.
Rated voltage 230 V, AC					
Red	15	625	60	CL-523R	0.81
Green	15	520	126	CL-523G	0.81
Yellow	15	590	60	CL-523Y	0.81
Blue	15	470	22	CL-523L	0.81
White	15	²⁾	88	CL-523W	0.81
Rated voltage 380 V, AC					
Red	15	625	60	CL-530R	0.81
Green	15	520	126	CL-530G	0.81
Yellow	15	590	60	CL-530Y	0.81
Blue	15	470	22	CL-530L	0.81
White	15	²⁾	88	CL-530W	0.81
Rated voltage 415 V, AC					
Red	15	625	60	CL-541R	0.81
Green	15	520	126	CL-541G	0.81
Yellow	15	590	60	CL-541Y	0.81
Blue	15	470	22	CL-541L	0.81
White	15	²⁾	88	CL-541W	0.81

Note: ²⁾ X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.

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Pilot lights



Pilot light

Operator: Pilot light – Ba 9s base, bulb not included

Description	Catalog number	Weight oz.
Pilot light BA 9s base, bulb not included		
Red	CL-100R	0.018
Green	CL-100G	0.018
Yellow	CL-100Y	0.018
Blue	CL-100L	0.018
White	CL-100W	0.018
Clear	CL-100C	0.018

Buzzers



Buzzer, green



Buzzer, red



Buzzer, yellow



Buzzer, black

Description		Luminance mcd	Catalog number	Package quantity	Weight kg
Non-illuminated					
Rated voltage 24V, AC/DC					
Black	Continuous		CB1-620B	10	0.021
Black	Pulsation		CB1-630B	10	0.021
Rated voltage 110-130 V, AC					
Black	Continuous		CB1-621B	10	0.021
Black	Pulsation		CB1-631B	10	0.021
Rated voltage 110-130 V, DC					
Black	Continuous		CB1-622B	10	0.021
Black	Pulsation		CB1-632B	10	0.021
Rated voltage 230 V, AC					
Black	Continuous		CB1-623B	10	0.021
Black	Pulsation		CB1-633B	10	0.021
illuminated					
Rated voltage 24V, AC/DC					
Green	Continuous	126	CB1-600G	10	0.021
Red	Pulsation	60	CB1-610R	10	0.021
Yellow	Pulsation	60	CB1-610Y	10	0.021
Rated voltage 110-130 V, AC					
Green	Continuous	126	CB1-601G	10	0.021
Red	Pulsation	60	CB1-611R	10	0.021
Yellow	Pulsation	60	CB1-611Y	10	0.021
Rated voltage 110-130 V, DC					
Green	Continuous	126	CB1-602G	10	0.021
Red	Pulsation	60	CB1-612R	10	0.021
Yellow	Pulsation	60	CB1-612Y	10	0.021
Rated voltage 230 V, AC					
Green	Continuous	126	CB1-603G	10	0.021
Red	Pulsation	60	CB1-613R	10	0.021
Yellow	Pulsation	60	CB1-613Y	10	0.021

Accessories

LED Bulbs



LED bulbs

Description	Rated Current mA	Wavelength nm	Luminance mcd	Catalog number	Weight oz.
LED Bulbs					
With one diode chip inserted on Ba9s base, choose the same color for the LED and the lamp cap or else use a clear lamp cap. For white light, use a LED clear lens cap.					
Rated voltage 12 V, AC service life >50 000 h					
Red	15	630	250	KA2-2011	0.18
Green	15	525	1000	KA2-2012	0.18
Yellow	15	592	250	KA2-2013	0.18
Blue	15	470	450	KA2-2014	0.18
White	15	¹⁾	600	KA2-2015	0.18
Rated voltage 24 V, (AC)/DC service life >50 000 h					
Red	15	630	250	KA2-2021	0.18
Green	15	525	800	KA2-2022	0.18
Yellow	15	592	250	KA2-2023	0.18
Blue	15	470	400	KA2-2024	0.18
White	15	¹⁾	500	KA2-2025	0.18
Rated voltage 36 V, (AC)/DC service life >50 000 h					
Red	12	630	200	KA2-2031	0.18
Green	12	525	2000	KA2-2032	0.18
Yellow	12	592	200	KA2-2033	0.18
Blue	12	470	750	KA2-2034	0.18
White	12	¹⁾	1400	KA2-2035	0.18
Rated voltage 48 V, (AC)/DC service life >50 000 h					
Red	12	630	200	KA2-2041	0.18
Green	12	525	1700	KA2-2042	0.18
Yellow	12	592	240	KA2-2043	0.18
Blue	12	470	720	KA2-2044	0.18
White	12	¹⁾	1200	KA2-2045	0.18
Rated voltage 60 V, (AC)/DC service life >50 000 h					
Red	10	630	160	KA2-2051	0.18
Green	10	525	1400	KA2-2052	0.18
Yellow	10	592	200	KA2-2053	0.18
Blue	10	470	600	KA2-2054	0.18
White	10	¹⁾	1000	KA2-2055	0.18
Rated voltage 110-130 V, AC service life 25 000 h					
Red	4-6	630	60-100	KA2-2131	0.18
Green	4-6	525	500-850	KA2-2132	0.18
Yellow	4-6	592	70-120	KA2-2133	0.18
Blue	4-6	470	220-350	KA2-2134	0.18
White	4-6	¹⁾	350-600	KA2-2135	0.18
Rated voltage 110-130 V, AC/DC service life 25 000 h					
Red	4-6	630	60	KA2-2141	0.18
Green	4-6	525	500	KA2-2142	0.18
Yellow	4-6	592	70	KA2-2143	0.18
Blue	4-6	470	220	KA2-2144	0.18
White	4-6	¹⁾	350	KA2-2145	0.18
Rated voltage 230 V, AC service life 25 000 h					
Red	4	630	60	KA2-2221	0.18
Green	4	525	500	KA2-2222	0.18
Yellow	4	592	70	KA2-2223	0.18
Blue	4	470	220	KA2-2224	0.18
White	4	¹⁾	350	KA2-2225	0.18

Note: Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

Choose the same color on the LED as on the lamp cap.

¹⁾X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.

Accessories

LED and filament bulbs



LED bulbs

Description	Rated Current mA	Wave-length nm	Luminance mcd	Catalog number	Weight oz.
LED bulbs continued					
Rated voltage 230 V, AC/DC service life 25 000 h					
Red	4	630	60	KA2-2231	0.18
Green	4	525	500	KA2-2232	0.18
Yellow	4	592	70	KA2-2233	0.18
Blue	4	470	220	KA2-2234	0.18
White	4	¹⁾	350	KA2-2235	0.18

Note: Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

Choose the same color on the LED as on the lamp cap.

¹⁾X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.



Filament bulb

Rated voltage V	Rated current mA	Rated output W	Service life h	Luminance mcd	Catalog number	Weight oz.
Filament bulbs BA 9s base						
6	200	1.2	10 000	350	5911 086-11	0.071
12	100	1.2	10 000	230	5911 086-12	0.071
24	50	1.2	10 000	280	5911 086-13	0.071
30	40	1.2	10 000	250	5911 086-4	0.071
48	42	2	6 000	500	5911 086-5	0.071
60	20	1.2	5 000	190	5911 086-14	0.071
110	18	2	7 500	250	5911 086-7	0.071
130	15	2	7 500	120	5911 086-15	0.071

Note: Catalog number of current: AC/DC. A Lamp Changing Tool is required for changing Bulb.

Lamp changing tool

For LED and filament bulbs	KA1-8072	0.071
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Lamp changing tool

Accessories



DIN-rail adaptor with pushbutton



Lamp changing tool



Mounting tool



Mounting tool for power tool



Protective cover



Bezels



Square bezels



Blanking plugs



Adaptor

Description	Catalog number	Weight oz.
DIN-rail adaptor		
DIN-rail adaptor	CA1-8080	0.99
Dummy block	MDB-2	0.11
Note: Two dummy blocks are included with the DIN-rail Adaptor to make it possible to mount any Compact Device		
Lamp changing tool		
For LED bulbs and for bulbs	KA1-8072	0.071
Mounting tool		
Used for tightening the locking nut	MA1-8015	0.74
Mounting tool for power tool	MA1-8149	5.5
Membrane		
Flush button	KA1-8052	0.071
Extended button	KA1-8002	0.071
Note: Made of transparent, heat and cold resistant silicon rubber. Does not harden at low temperature. Remove the gasket when using membrane.		
Protective ring		
Protective ring	SK 615 512-1	0.071
Note: For flush and extended pushbutton to prevent inadvertent operation. Cannot be used together with legend plate holder.		
Protective cover		
Protective cover	KA1-8010	0.28
Note: For flush pushbutton. To prevent accidental operation. Cannot be used together with legend plate holder.		
Button		
Grey, flush	KA1-8087	0.035
Grey, extended	KA1-8097	0.035
Bezel		
For pushbutton		
Black	KA1-8022	0.071
Metal	KA1-8021	0.53
For selector switch		
Black	CA1-8077	0.035
Metal	CA1-8078	0.35
Square bezel		
Black, plastic	SK 616 016-2	0.035
Grey, plastic	MA1-8124	0.035
Light diffusing lens		
Light diffusing lens	KA1-8005	0.035
Note: To improve illumination. Cannot be used with text cap. The lens is used instead of text cap		
Blanking plug		
Light grey	MA1-8136	0.18
Grey	MA1-8129	0.18
Black	MA1-8130	0.18
Adaptors 30 mm		
Black plastic	KA1-8029	0.35
Metal	KA1-8030	1.2
Note: For use when fitting the 22 mm pilot devices in 30 mm mounting holes (1.5 - 4 mm panels). For use with pushbuttons, selector switches, emergency stop pushbutton and pilot lights.		
Adaptors		
For flush mounted pushbutton	KA1-8073	1.8
For flush mounted selector switches	CA1-8075	1.6
Extra key		
Key code 71=Ronis 455	SK 616 021-71	0.25

Standards and approvals

IEC / EN 60947-1	Low-Voltage Switchgear and Controlgear - Part 1: General rules
IEC / EN 60947-5-1	Low-Voltage Switchgear and Controlgear - Part 5-1: Control circuit devices and switching elements - Electro-mechanical control circuit devices
IEC / EN 60947-5-5	Low-Voltage Switchgear and Controlgear - Part 5-5: Control circuit devices and switching elements - Electrical Emergency Stop device with mechanical latching function
IEC / EN 60073	Basic and safety principles for man-machine interface, marking and identification - Coding principles for indicators and actuators
IEC / EN 60529	Degrees of Protection provided by enclosures (IP Code)
EN 50013	Low-Voltage Switchgear and Controlgear for industrial use - Terminal Marking and distinctive number for particular control switches
DIN 40050-9	Road vehicles; Degrees of Protection (IP-code); protection against foreign objects; water and contact; electrical equipment
UL 508	Industrial Control Equipment
CSA C22.2 No 14	Industrial Control Equipment

Environmental data

Degrees of protection

Pilot device:	IEC/EN DIN	UL/CSA
Pushbuttons	IP66, IP67 and IP69K	Catalog number 1, 3R, 4, 4X, 12, 13
Selector Switches	IP66, IP67 and IP69K	Catalog number 1, 3R, 4, 4X, 12, 13
Pilot Lights	IP66, IP67 and IP69K	Catalog number 1, 3R, 4, 4X, 12, 13
Buzzers	IP66, IP67 and IP69K	Catalog number 1, 3R, 4, 4X, 12, 13
Emergency Stops	IP66, IP67 and IP69K	Catalog number 1, 3R, 4, 4X, 12, 13
Terminals	IP20	

Temperature

Ambient temperature during operation	-25 to +70 °C
Storage temperature	-40 to +85 °C

Technical data

Cable connections

Operator	Cable terminal
Pushbutton Selector Switch Emergency Stop	Plus-minus Pozidriv No. 2 Connectable area: min. 1 x 0.5 mm ² / 1 x AWG22 max. 2 x 1.5 mm ² / 2 x AWG14
Pilot Light Buzzer	Connectable area: min. 1 x 0.5 mm ² / 1 x AWG20 max. 2 x 2.5 mm ² / 2 x AWG14

Tightening torque

Operators Locking Nut	Min. 2 Nm / Max. 2.3 Nm
Cable Terminals M3	0.8 Nm
Cable Terminals M3.5	0.9 Nm

Short circuit protection

Max. fuse at 1 kA	gG 10A
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Mechanical life

Pushbuttons, Selector Switches	500 000 operations
Emergency Stop Pushbutton	50 000 operations

Material

No ozone depleting substances in the products.

All front of panel plastic components are made of polycarbonate

PC Polycarbonate	High impact strength, good outdoor resistance. Chemical resistance (see table below)
PSU Polysulphone	Can withstand high temperatures, acids, basic solutions, alkaline compounds, oils, alcohols.
PA Polyamide	Can withstand high temperatures, aliphatic, aromatic and chlorinated hydrocarbons, esters, ketone-aldehydes, alcohols and basic solutions.
PBT	Can withstand high temperature, aliphatic and aromatic hydrocarbons, acids, basic solutions, alcohols, grease and oils
Zinc	Good corrosion resistance in inland-, sea and industrial atmosphere.
Light-alloy	Good corrosion resistance in inland-, sea and industrial atmosphere.

Chemical resistance for polycarbonate

Chemical class

Chemical class	Effects
Acids	No significant effect under most typical conditions of concentration and temperature
Alcohols and Alkalis	Generally compatible at low concentration and room temperature. Higher concentrations and elevated temperatures can result in etching and attack evidenced by decomposition.
Aliphatic Hydrocarbons	Generally compatible
Amines	Surface crystallization and chemical attack. Avoid.
Aromatic Hydrocarbons	Partial solvents and severe stress cracking agents (i.e., xylene, toluene). Avoid.
Detergents and Cleaners	Mild soap solutions are generally compatible. Strong alkaline materials should be avoided.
Esters	Cause severe crystallization. Partial solvents. Avoid.
Greases and Oils	Pure petroleum Catalog numbers generally compatible. Many additives used with them are not.
Halogenated Hydrocarbons	Solvents. Avoid.
Ketones	Cause severe crystallization and stress cracking. Partial solvents. Avoid.
Silicone Oil and Greases	Generally compatible up to 85 °C.

Please note that specified degree of protection is for operator mounted on panel. If other items are mounted in between, please make sure that they are correctly sealed.

Technical data

Electrical data

Contacts

Ratings as per IEC 60947-5-1

Rated Insulation Voltage, U _i		300 V	
Rated Thermal Current, I _{th}		5 A	
Rated impulse withstand voltage U _{imp}		4 kV	
Rated frequency		50-60 Hz	
Sound level db		>90 db	
Rated Operational Current, I _o Utilization category AC-15	at: 240 V	1 A	
Rated Operational Current, I _o Utilization category DC-13	at: 24 V at: 125 V	0.3 A 0.2 A	

Ratings as per UL, CSA, NEMA

		C300 AC	R300 DC
Rated Insulation Voltage		250 V	250 V
Rated Thermal Current		2.5 A	1 A
Rated Operational Current	at: 120 V at: 125 V at: 240 V at: 250 V	1.5 A 0.75 A	0.22 A 0.11 A

Short circuit protection

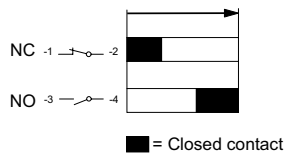
Max. fuse at 1 kA	gG 10A
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Minimum switching capacity

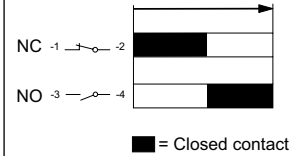
5 V DC	1 mA
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Make-and-break contacts

Pushbutton



Emergency Stop Pushbutton

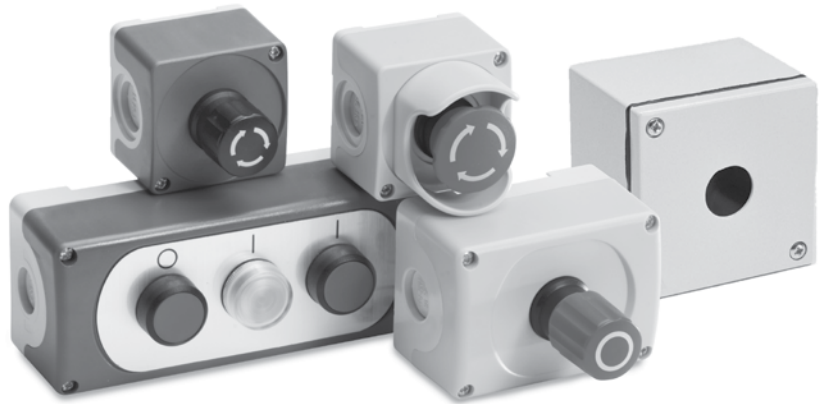


LED Bulbs

Service Life for LED Bulbs means number of service hours until the brightness has been reduced down 50 %. Service Life 50 000 h

Color of white LED	x=0.31 Y=0.32 means the position of color in the ICI Chromaticity Diagram
Voltage Tolerance on LED Bulbs	-30 to +10 % Voltage is acceptable without affecting the Service Life
Voltage Peaks on LED Bulbs	Voltage peaks up to 1000 V Current peaks up to 500 mA during a few msec
Glowing Light	All integrated LED Bulbs have a function built in to cut leakage currents

Enclosures and assembled Stations



Large plastic enclosure (Modular & Compact)

This enclosure can fit both Modular and Compact operators with the unique possibility to mount up to 5 contact blocks assigned to one operator.

Protection degree:

IP 66
UL Type 1, 3R, 4, 4X, 12, 13

Compact plastic enclosure

The compact enclosure is one of the smallest on the market intended for compact operators.

Protection degree:

IP 66, 67, 69K
UL Type 1, 3R, 4, 4X, 12, 13

Assembled stations

We can also offer some of the most common assembled stations as a standard with combination from both Modular and Compact Range.

Plastic enclosures Modular Range, 22mm

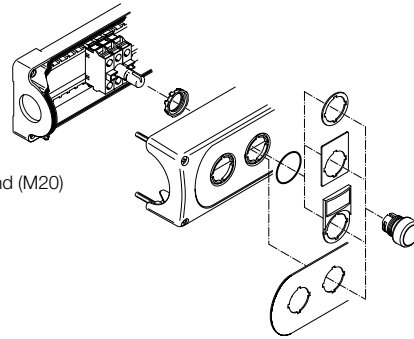


Empty enclosures
1-seat - 6-seat

Description	Catalog number	Weight oz.
Empty plastic enclosures with stainless steel screws		
1-seat	MEP1-0	5.3
1-seat	MEPY1-0	5.3
2-seat	MEP2-0	6.0
3-seat	MEP3-0	7.1
4-seat	MEP4-0	8.1
6-seat	MEP6-0	11

When ordering

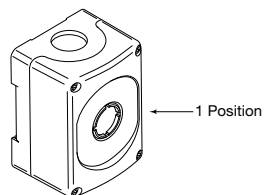
- Select operators
- Note: Select contact blocks and lamp blocks for rear mounting
- Accessories
N.B. One spacer per operator has to be ordered if legend plate is not used. (for rear mounted pilot devices)
- Holes for cable glands
1-seat to 3-seat enclosures: M20 and Pg 13.5/Pg16 and (M20)
4-seat and 6-seat enclosures: M25/Pg 16 and (M20)



UL Listed applications: For end of line use only.

Plastic enclosures, assembled stations 1, 2 & 3 seat, 22mm Modular Range

1-seat Plastic enclosures. Yellow top/light grey bottom

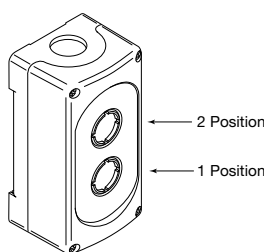


Description					Catalog No.
	Pos - 1	Pos - 2	Pos - 3	Pos - 4	
Type	Twist Release 40mm E	—	—	—	P1-ES
Color	Red	—	—	—	
Contacts	2 NC	—	—	—	
Name plate	EMERGENCY STOP	—	—	—	
Type	Ill. Twist Release 40mm E	—	—	—	
Color	40mm E-Stop	—	—	—	P1-1ES
Contacts	Red, 120V filament	—	—	—	
Name plate	EMERGENCY STOP	—	—	—	
Contacts	2 NC, 1 LB	—	—	—	

1-seat Plastic enclosure, dark grey top/light grey bottom

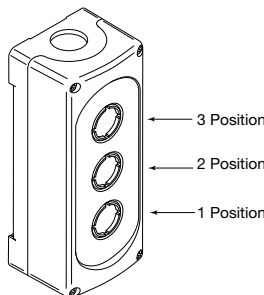
Description					Catalog No.
	Pos - 1	Pos - 2	Pos - 3	Pos - 4	
Type	3-pos sel. Main	—	—	—	P1-HOA
Color	Black	—	—	—	
Contacts	2 NO	—	—	—	
Name plate	HAND/OFF/AUTO	—	—	—	

2-seat Plastic enclosure, dark grey top/light grey bottom



Description					Catalog No.
	Pos - 1	Pos - 2	Pos - 3	Pos - 4	
Type	Button mom, Ext.	Button mom, Flush	—	—	P2-SS
Color	Red	Green	—	—	
Contacts	1 NC	1 NO	—	—	
Name plate	STOP	START	—	—	
Type	3-pos sel. Main	Pilot Light	—	—	P2-1HOARL
Color	Black	Red	—	—	
Contacts	2 NO	1 LB, 120V filament	—	—	
Name plate	HAND/OFF/AUTO	RUN	—	—	
Type	2-pos sel. Main	Pilot Light	—	—	P2-100RL
Color	Black	Red	—	—	
Contacts	1 NO	1 LB, 120V filament	—	—	
Name plate	ON/OFF	RUN	—	—	

3-seat Plastic enclosure, dark grey top/light grey bottom

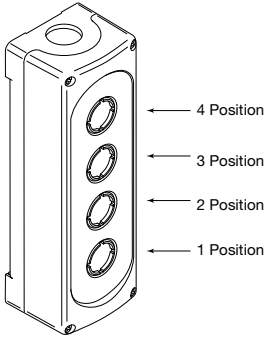


Description					Catalog No.
	Pos - 1	Pos - 2	Pos - 3	Pos - 4	
Type	Button mom, Ext.	Button mom, Flush	Pilot Light	—	P3-1SSRL
Color	Red	Green	Red	—	
Contacts	1 NC	1 NO	1 LB, 120V filament	—	
Name plate	STOP	START	RUN	—	
Type	3-pos sel. Main	Pilot Light	Pilot Light	—	P3-1HOARLGL
Color	Black	Red	Green	—	
Contacts	2 NO	1 LB, 120V filament	1 LB, 120V filament	—	
Name plate	HAND/OFF/AUTO	RUN	OFF	—	
Type	2-pos sel. Main	Pilot Light	Pilot Light	—	P3-100RLGL
Color	Black	Red	Green	—	
Contacts	1 NO	1 LB, 120V filament	1 LB, 120V filament	—	
Name plate	ON/OFF	RUN	OFF	—	
Type	3-pos sel. Main	Button mom, Flush	Pilot Light	—	P3-1HOASRL
Color	Black	Green	Red	—	
Contacts	2 NO	1 NO	1 LB, 120V filament	—	
Name plate	HAND/OFF/AUTO	START	RUN	—	
Type	Twist Release 40mm E Stop	3-pos sel. Main	Pilot Light	—	P3-1ESHOARL
Color	Red	Black	Red	—	
Contacts	2 NC	2 NO	1 LB, 120V filament	—	
Name plate	EMERGENCY STOP	HAND/OFF/AUTO	RUN	—	
Type	5kOhm Pot	Stop	Start	—	MEP3-SSPOT5
Color	Black	Red	Green	—	
Contacts	Leads	1NO+1NC	1NO+1NC	—	
Name Plate	Scale	(text cap)	(text cap)	—	

Plastic enclosures, assembled stations

4 seat Modular Range

4-seat Plastic enclosure, dark grey top/light grey bottom



Description					Catalog No.
	Pos - 1	Pos - 2	Pos - 3	Pos - 4	
Type	Button mom., Ext.	Button mom., Flush	Pilot Light	Pilot Light	P4-1SSRLGL
Color	Red	Green	Green	Red	
Contacts	1 NC	1 NO	1 LB, 120V filament	1 LB, 120V filament	
Name plate	STOP	START	OFF	RUN	
Type	3-pos sel. Main	Button mom., Flush	Pilot Light	Pilot Light	P4-1HOASRLGL
Color	Black	Green	Green	Red	
Contacts	2 NO	1 NO	1 LB, 120V filament	1 LB, 120V filament	
Name plate	HAND/OFF/AUTO	START	OFF	RUN	
Type	3-pos sel. Main	Pilot Light	Pilot Light	Pilot Light	P4-1HOARLYLGL
Color	Black	Green	Yellow	Red	
Contacts	2 NO	1 LB, 120V filament	1 LB, 120V filament	1 LB, 120V filament	
Name plate	HAND/OFF/AUTO	OFF	FAULT	RUN	
Type	2-pos. sel. Main	Pilot Light	Pilot Light	Pilot Light	P4-1OORLYLGL
Color	Black	Green	Yellow	Red	
Contacts	1 NO	1 LB, 120V filament	1 LB, 120V filament	1 LB, 120V filament	
Name plate	ON/OFF	OFF	FAULT	RUN	
Type	Twist Release 40mm E Stop	Button mom., Ext.	Button mom., Flush	Pilot Light	P4-1ESSRSL
Color	Red	Red	Green	Red	
Contacts	2 NC	1 NC	1 NO	1 LB, 120V filament	
Name plate	EMERGENCY STOP	STOP	START	RUN	
Type	Twist Release 40mm E Stop	3-pos. sel. Main	Pilot Light	Pilot Light	P4-1ESHOARLGL
Color	Red	Black	Green	Red	
Contacts	2 NC	2 NO	1 LB, 120V filament	1 LB, 120V filament	
Name plate	EMERGENCY STOP	HAND/OFF/AUTO	OFF	RUN	
Type	Twist Release 40mm E Stop	2-pos sel. Main	Pilot Light	Pilot Light	P4-1ESOORLGL
Color	Red	Black	Green	Red	
Contacts	2 NC	1 NO	1 LB, 120V filament	1 LB, 120V filament	
Name plate	EMERGENCY STOP	ON/OFF	OFF	RUN	

Plastic enclosures Compact Range E-Stop



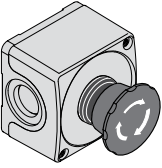
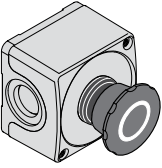
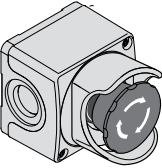
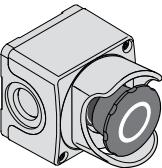
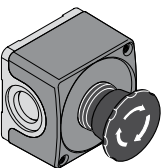
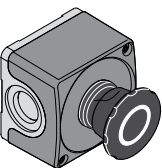
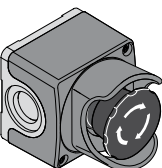
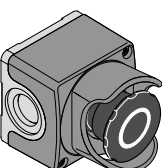
1-seat plastic enclosure for emergency stop pushbutton (yellow) and machine stops (grey)

Description	Catalog number	Weight oz.
Enclosure for emergency stop pushbutton		
Yellow/light grey	CEPY1-0	2.5
Shroud		
Yellow	CA1-8053	0.56
Enclosure for machine stop pushbutton		
Dark grey/light grey	CEP1-0	2.5
Shroud		
Grey	CA1-8054	0.56

Assembled stations - see page 7.65.

Plastic assembled stations Compact E-Stop

Assembled 1-seat emergency stop enclosures

	Description	Catalog Number
	Emergency Stop Enclosure Twist release; red button 2NC	CEPY1-1001
	With aluminum legend plate	CEPY1-1001LP
	Emergency Stop Enclosure Pull release; red button 2NC	CEPY1-1002
	With aluminum legend plate	CEPY1-1002LP
	Emergency Stop Enclosure with Shroud Twist release; red button 2NC	CEPY1-2001
	Emergency Stop Enclosure with Shroud Pull release; red button 2NC	CEPY1-2002
	Machine Stop Enclosure Twist release; black button 1NO + 1NC	CEP1-1001
	Machine Stop Enclosure Pull release; black button 1NO + 1NC	CEP1-1002
	Machine Stop Enclosure with Shroud Twist release; black button 1NO + 1NC	CEP1-2001
	Machine Stop Enclosure with Shroud Pull release; black button 1NO + 1NC	CEP1-2002

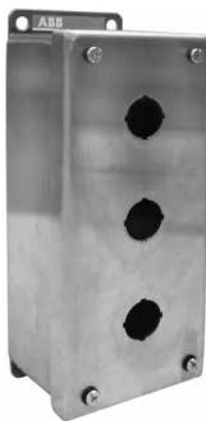
Steel enclosures, empty 22mm



MEM121-0

UL Type 4 & 12, 0.075" carbon steel, ANSI-61 gray, 22mm

Description	Height	Width	Depth	Catalog Number
1-hole	3.50	3.25	2.75	MEM121-0
2-hole	5.75	3.25	2.75	MEM122-0
3-hole	8.00	3.25	2.75	MEM123-0
4-hole	10.25	3.25	2.75	MEM124-0
6-hole, 2x3	9.50	6.25	3.00	MEM126-0



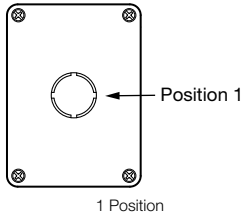
MEMX3-0

UL Type 4X, stainless steel, brushed finish, 22mm

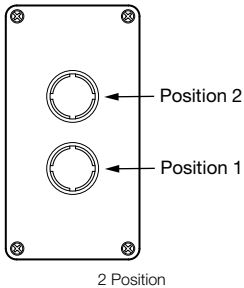
Description	Height	Width	Depth	Catalog Number
1-hole	3.50	3.25	2.75	MEMX1-0
2-hole	5.75	3.25	2.75	MEMX2-0
3-hole	8.00	3.25	2.75	MEMX3-0
4-hole	10.25	3.25	2.75	MEMX4-0
6-hole, 2x3	9.50	6.25	3.00	MEMX6-0

Steel enclosures, assembled stations 22mm

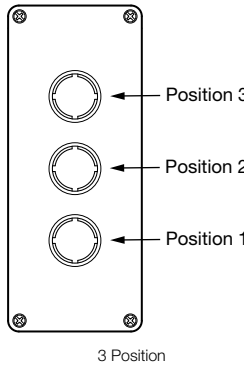
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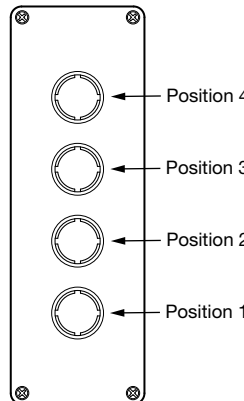
1 Position



2 Position



3 Position



4 Position

1-Seat Stations

	Pos 1	Pos 2	Pos 3	Pos 4	Type 12 Catalog Number	Type 4X Stainless Catalog Number
E-STOP						
Type	40mm Twist	-	-	-	MEM121-ES	MEMX1-ES
Color	Red	-	-	-		
Contacts	2NC	-	-	-		
Name Plate	EMER. STOP	-	-	-		
E-STOP Illuminated						
Type	40mm Twist	-	-	-	MEM121-1ES	MEMX1-1ES
Color	Red Illuminated	-	-	-		
Contacts	2NC	-	-	-		
Lamp	120V LED	-	-	-		
Name Plate	EMER. STOP	-	-	-		

2-Seat Stations

	Pos 1	Pos 2	Pos 3	Pos 4	Type 12 Catalog Number	Type 4X Stainless Catalog Number
START, STOP						
Type	Mom, extend.	Mom, flush	-	-	MEM122-SS	MEMX2-SS
Color	Red	Green	-	-		
Contacts	1NO + 1NC	1NO + 1NC	-	-		
Name Plate	STOP	START	-	-		
HOA, RUN LIGHT						
Type	3-pos, maint.	Pilot light	-	-	MEM122-1HOARL	MEMX2-1HOARL
Color	Black	Red	-	-		
Contacts	2NO	120V LED	-	-		
Name Plate	Hand O Auto	Run	-	-		

3-Seat Stations

	Pos 1	Pos 2	Pos 3	Pos 4	Type 12 Catalog Number	Type 4X Stainless Catalog Number
START, STOP, RUN LIGHT						
Type	Mom, extend.	Mom, flush	Pilot light	-	MEM123-1SSRL	MEMX3-1SSRL
Color	Red	Green	Red	-		
Contacts	1NO + 1NC	1NO + 1NC	120V LED	-		
Name Plate	STOP	START	Run	-		
START, STOP, E-STOP						
Type	40mm Twist	Mom, extend.	Mom, flush	-	MEM123-SSES	MEMX3-SSES
Color	Red	Red	Green	-		
Contacts	2NC	1NO + 1NC	1NO + 1NC	-		
Name Plate	EMER. STOP	STOP	START	-		

4-Seat Stations

	Pos 1	Pos 2	Pos 3	Pos 4	Type 12 Catalog Number	Type 4X Stainless Catalog Number
START, STOP, E-STOP, RUN LIGHT						
Type	40mm Twist	Mom, extend.	Mom, flush	Pilot light	MEM124-1ESSRL	MEMX4-1ESSRL
Color	Red	Red	Green	Red		
Contacts	2NC	1NO + 1NC	1NO + 1NC	120V LED		
Name Plate	EMER. STOP	STOP	START	Run		

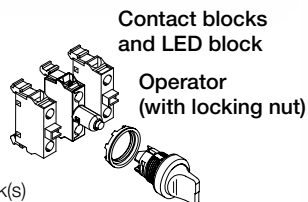
Two position selector switches for vertically mounted enclosures

How to order non-illuminated:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
- Alt.2** • Operator
+ Holder with Contact block(s)

How to order illuminated:

- Alt.1** • Operator
+ Holder
+ Contact block(s)
+ LED/lamp block
- Alt.2** • Operator
+ Holder with Contact block(s)
and lamp block



NOTE: For contact blocks & LED lamp blocks, see Accessories pages 7.113 - 7.115.

Bezel - How to order

Black plastic - Standard
Chrome metal - Replace '1' with '3' in Catalog number

Bezel options	Catalog number
Black plastic	M2SSVX-1XX
Chrome metal	M2SSVX-3XX



Two-position selector switch
non-illuminated



Two-position selector switch
illuminated

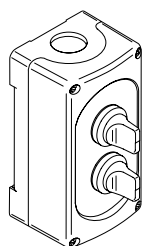
Operator: Two-position Selector Switch

Description	Catalog number	Weight oz.
Short handle, non-illuminated		
Maintained		
Red	M2SSV1-10R	0.53
Black	M2SSV1-10B	0.53
Maintained		
Red	M2SSV2-10R	0.53
Black	M2SSV2-10B	0.53
Momentary, spring return from C to B		
Red	M2SSV3-10R	0.53
Black	M2SSV3-10B	0.53
Short handle, illuminated		
Maintained		
Red	M2SSV1-11R	0.53
Green	M2SSV1-11G	0.53
Yellow	M2SSV1-11Y	0.53
Maintained		
Red	M2SSV2-11R	0.53
Green	M2SSV2-11G	0.53
Yellow	M2SSV2-11Y	0.53
Momentary, spring return from C to B		
Red	M2SSV3-11R	0.53
Green	M2SSV3-11G	0.53
Yellow	M2SSV3-11Y	0.53

Contacts actuated

Handle position	Left block	Right block
B	<input type="checkbox"/>	<input type="checkbox"/>
A	<input type="checkbox"/>	<input type="checkbox"/>
C	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Not actuated
 Actuated

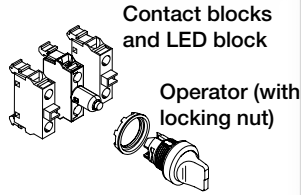


Enclosure with selector switches

Three position selector switches for vertically mounted enclosures

How to order:

- Alt.1** • Operator
+ Contact blocks for rear mounting
- Alt.2** • Operator
+ Contact blocks and lamp block
for rear mounting



NOTE: For contact blocks & LED lamp blocks, see Accessories pages 7.111 - 7.113.

Bezel - How to order

Black plastic - Standard
Chrome metal - Replace '1' with '3' in
Catalog number



Bezel options	Catalog number
Black Plastic	M3SSVX-1XX
Chrome Metal	M3SSVX-3XX

7



Three-position selector switch
non-illuminated

Operator: Three-position selector switch

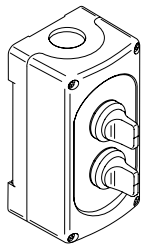
Description	Catalog number	Weight oz.
Short Handle, non-illuminated		
Maintained		
Red	M3SSV1-10R	0.53
Black	M3SSV1-10B	0.53
Momentary, spring return from A to B and from C to B		
Red	M3SSV2-10R	0.53
Black	M3SSV2-10B	0.53
Momentary, spring return from C to B		
Red	M3SSV3-10R	0.53
Black	M3SSV3-10B	0.53



Three-position selector switch
illuminated

Short handle, illuminated		
Maintained		
Red	M3SSV1-11R	0.53
Green	M3SSV1-11G	0.53
Yellow	M3SSV1-11Y	0.53
Momentary, spring return from A to B and from C to B		
Red	M3SSV2-11R	0.53
Green	M3SSV2-11G	0.53
Yellow	M3SSV2-11Y	0.53
Momentary, spring return from C to B		
Red	M3SSV3-11R	0.53
Green	M3SSV3-11G	0.53
Yellow	M3SSV3-11Y	0.53

Note: No contact in center position. Lamp block for max 230 V AC/DC. Bulb not included.
Other lamp block see accessories



Enclosure with selector switches

Contacts actuated

Handle position	Left block	Right block
A	<input type="checkbox"/>	<input type="checkbox"/>
B	<input type="checkbox"/>	<input type="checkbox"/>
C	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Not actuated
 Actuated

LED Blocks for rear mounting



LED block with built in leakage current protection

Description	Rated Current mA	Wavelength nm	Luminance mod	Catalog number	Weight oz.
LED blocks					
Rated voltage 12 V, DC ¹⁾					
Red	12.0	620	320	MLBL-00BR	0.42
Green	9.3	520	1500	MLBL-00BG	0.42
Yellow	12.0	588	380	MLBL-00BY	0.42
Blue	9.5	468	450	MLBL-00BL	0.42
White	9.3	²⁾	600	MLBL-00BW	0.42
Rated voltage 24 V, AC/DC ¹⁾					
Red	9.9	620	250	MLBL-01BR	0.42
Green	9.2	520	1500	MLBL-01BG	0.42
Yellow	9.9	588	250	MLBL-01BY	0.42
Blue	9.3	468	450	MLBL-01BL	0.42
White	9.2	²⁾	600	MLBL-01BW	0.42
Rated voltage 48 V, AC/DC ¹⁾					
Red	10.0	620	260	MLBL-02BR	0.42
Green	9.7	520	1500	MLBL-02BG	0.42
Yellow	10.0	588	300	MLBL-02BY	0.42
Blue	9.7	468	450	MLBL-02BL	0.42
White	9.7	²⁾	600	MLBL-02BW	0.42
Rated voltage 60 V, AC/DC ¹⁾					
Red	13.0	620	350	MLBL-03BR	0.42
Green	12.7	520	2000	MLBL-03BG	0.42
Yellow	13.0	588	400	MLBL-03BY	0.42
Blue	12.7	468	550	MLBL-03BL	0.42
White	12.7	²⁾	750	MLBL-03BW	0.42
Rated voltage 110-130 V, AC					
Red	8.6	620	200	MLBL-04BR	0.42
Green	8.5	520	1200	MLBL-04BG	0.42
Yellow	8.6	588	250	MLBL-04BY	0.42
Blue	7.0	468	400	MLBL-04BL	0.42
White	7.0	²⁾	500	MLBL-04BW	0.42
Rated voltage 110-130 V, DC ¹⁾					
Red	9.9	620	250	MLBL-05BR	0.42
Green	9.8	520	1500	MLBL-05BG	0.42
Yellow	9.9	588	300	MLBL-05BY	0.42
Blue	9.8	468	450	MLBL-05BL	0.42
White	9.8	²⁾	600	MLBL-05BW	0.42
Rated voltage 220 V, DC ¹⁾					
Red	8.0	620	180	MLBL-06BR	0.42
Green	8.0	520	110	MLBL-06BG	0.42
Yellow	8.0	588	200	MLBL-06BY	0.42
Blue	8.0	468	450	MLBL-06BL	0.42
White	8.0	²⁾	600	MLBL-06BW	0.42
Rated voltage 230 V, AC					
Red	9.5	620	250	MLBL-07BR	0.42
Green	9.4	520	1500	MLBL-07BG	0.42
Yellow	9.5	588	300	MLBL-07BY	0.42
Blue	8.2	468	450	MLBL-07BL	0.42
White	8.2	²⁾	600	MLBL-07BW	0.42

Note: ¹⁾ Care should be taken for DC supply where + and - must be correctly connected. This is marked X1 (+) and X2 (-) on the product.

²⁾ X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.

LED Blocks for rear mounting



LED block with built in leakage current protection

Description	Rated current mA	Wavelength nm	Luminance mcd	Catalog number	Weight oz.
Cont. LED blocks					
Rated voltage 380 V, AC					
Red	10.2	620	250	MLBL-08BR	0.42
Green	10.2	520	1500	MLBL-08BG	0.42
Yellow	10.2	582	300	MLBL-08BY	0.42
Blue	9.1	468	450	MLBL-08BL	0.42
White	9.1	²⁾	600	MLBL-08BW	0.42
Rated voltage 415 V, AC					
Red	11.2	620	280	MLBL-09BR	0.42
Green	11.2	520	1800	MLBL-09BG	0.42
Yellow	11.2	588	350	MLBL-09BY	0.42
Blue	9.9	468	500	MLBL-09BL	0.42
White	9.9	²⁾	650	MLBL-09BW	0.42

²⁾ X=0.31, Y=0.32 according to the ICI Chromaticity Diagram.

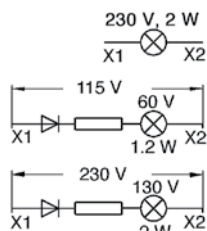
Accessories for plastic enclosures



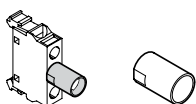
Contact block



Double contact block



Lamp blocks



Protective sleeve



Cable gland



Sealing ring



Blanking plugs

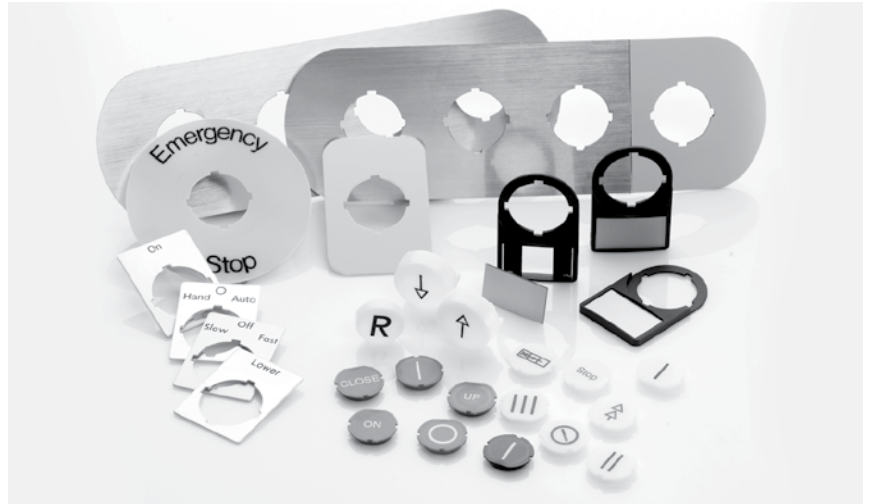
Description	Catalog number	Weight oz.
Contact block for rear mounting		
1NO	MCB-10B	0.46
1NC	MCB-01B	0.46
Double contact block		
2NO	MCB-20B	0.92
2NC	MCB-02B	0.92
1NO+1NC	MCB-11B	0.92
Contact block with gold plated contacts		
1NO	MCB-10BG	0.46
1NC	MCB-01BG	0.46
Lamp block for rear mounting		
For max. 2 W, 230 V AC and DC Filament Bulb or LED	MLB-1B	0.53
115 V AC supply voltage. For 60 V Filament Bulb 1.2 W	MLB-2B	0.60
230 V AC supply voltage. For 130 V Filament Bulb 2 W	MLB-3B	0.71
Protective sleeve		
Protective sleeve	5396 0543-1	0.071
Note: To make a rear mounted lamp block screen protected. IP20 (Not together with illuminated selector switch)		
Cable gland		
Grey plastic. Threaded outer sleeve sealing ring included.		
M25	MA5-3001	0.53
M20	MA5-3002	0.53
PG 13.5	MA5-3006	0.35
PG 16	MA5-3007	0.53
Nut		
Grey plastic. For cable gland above.		
M25	MA5-3003	0.18
M20	MA5-3004	0.18
PG 13.5	MA5-3008	0.035
PG 16	MA5-3009	0.035
Earthing Terminal		
For Plastic Enclosure.	MA5-3005	0.18
Sealing ring		
For plastic enclosure.	MA1-8150	0.035
Spacer		
1 mm thick. Needed when legend plates are not used in plastic enclosures.		
Spacer	SK 615 516-1	0.071
Spacer for modular emergency stop pushbutton	KA1-8045	0.14
Blanking plug		
Grey, 22mm	MA1-8129	0.18
Black, 22mm	MA1-8130	0.18
Black, 30mm	MA1-8133	0.18
Light grey, 22mm	MA1-8136	0.18
Adaptor		
PG 16/M20	MA5-3010	0.35

Notes



Legend plates

22mm



7

22mm Legend plates

Fixed legend plates

- Of silvergrey anodized aluminum for:
 - pushbuttons
 - two-position selector switches
 - three-position selector switches
 - toggle switches
 - customer selected text

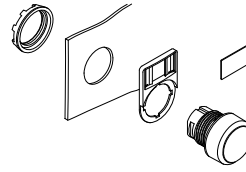
Special legend plates

- For emergency stop pushbuttons
 - Legend plate with or without customer selected text
 - Legend plate holders with inserts of anodized brushed aluminum with or without text or symbol for:
 - pushbuttons
 - two-position selector switch
 - three position selector switch
 - customer selected text
- For plastic enclosures:
- Legend plate holders with inserts of anodized brushed aluminum on black plastic. With or without text or symbol for push-buttons
 - Legend plates of silvergrey anodized aluminum. For 1- 2-, 3- 4- or 6-seat plastic enclosures

Special legend plates 22mm

Legend plate holders with inserts

- Holder of black plastic.
 - Holder of grey plastic for plastic enclosures.
 - Insert of brushed aluminum on black plastic.
- The insert is securely retained in a pocket and can be removed.
3 mm high text in typeface Helvetica.



Legend plate holder (black) for panel mounting

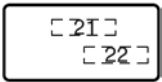
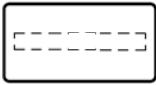
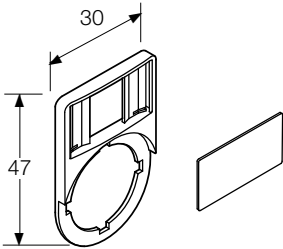
Description	Catalog number
Black	1SFA616920R8120

Inserts

Description	Catalog number
Of brushed aluminum on black plastic Without text or symbol	1SFA616920R8121

Inserts with text/symbol

Description	Catalog number
Of brushed aluminum on black plastic <u>With text or symbol</u>	
O	1SFA611930R1032
I	1SFA611930R1033
→	1SFA611930R1034
→→	1SFA611930R1035
Close	1SFA611930R1036
Open	1SFA611930R1037
On	1SFA611930R1038
Off	1SFA611930R1039
Fast	1SFA611930R1040
Slow	1SFA611930R1041
Down	1SFA611930R1042
Up	1SFA611930R1043
Start	1SFA611930R1044
Stop	1SFA611930R1045



For two-position selector switch

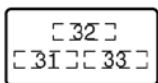
Inserts for two-position selector switches

Of brushed aluminum on black plastic. Text on both sides.

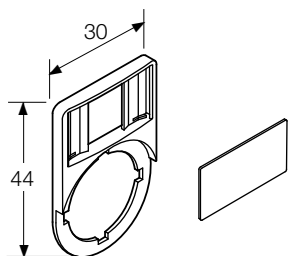
Description	Catalog number
<u>With text or symbol</u>	
Pos. 21 Pos. 22	
O I	1SFA611930R1070
I II	1SFA611930R1071
→ →→	1SFA611930R1072
Off On	1SFA611930R1073
Stop Start	1SFA611930R1074
Low High	1SFA611930R1075
Slow Fast	1SFA611930R1076
Close Open	1SFA611930R1077
Jog Run	1SFA611930R1078
Hand Auto	1SFA611930R1079

Special legend plates

22mm



For three-position selector switch



Inserts for three-position selector switches

Of brushed aluminum on black plastic. Text on both sides.

Description			Catalog number
<u>With text or symbol</u>			
Pos. 31	Pos. 32	Pos. 33	
←	○	→	1SFA611930R1080
→	○	→→	1SFA611930R1081
I	○	II	1SFA611930R1082
Hand	○	Auto	1SFA611930R1083
Slow	Off	Fast	1SFA611930R1084

Legend plate holder (grey) for plastic enclosures

Description	Catalog number
Grey	1SFA611930R1060

Inserts

Description	Catalog number
Of brushed aluminum on black plastic	
Without text or symbol	1SFA611930R1061

Inserts with text/symbol

Description	Catalog number
Of brushed aluminum on black plastic	
<u>With text or symbol</u>	
○	1SFA611930R1062
I	1SFA611930R1063
II	1SFA611930R1064

Special legend plates Emergency stops 22mm

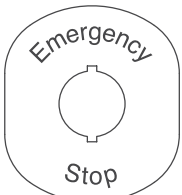
Emergency stop legend plates, 70mm, for modular enclosures ①



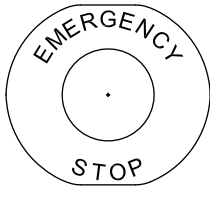
SK 615 546-2



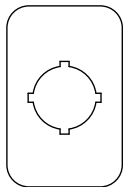
CA6-1026



MA6-1101



ELP22-1101



1SFA 611 930 R1011

Description/Text	Catalog number
Black text on a yellow aluminum plate. Emergency Stop Without text	SK 615 546-2 SK 615 546-8
Black text on a yellow plastic plate. Can be used as yellow background. Emergency Stop	1SFA616915R1005

Emergency stop legend plates, 60mm, for Compact enclosures

Description/Text	Catalog number
Legend plate, yellow aluminum, 60mm	CA6-1026

Emergency stop legend plates for Modular enclosures

Description/Text	Catalog number
For horizontally mounted enclosures with yellow plastic/black text	MA6-1026
UL Type 3/3R, 4, 4X, 12 For horizontally mounted enclosures with yellow plastic/black text	ELP22-1101
For vertically mounted enclosures with yellow plastic/black text	MA6-1101

Emergency stop legend plate

Description/Text	Catalog number
Black text on a yellow aluminum plate. Legend plate without text	1SFA611930R1010
Legend plate (1SFA 611 930 R1010) with text: Emergency Stop	1SFA611930R1019
Black text on a yellow plastic plate. Legend plate without text	1SFA611930R1011
Legend plate (1SFA 611 930 R1011) with text: Emergency Stop	1SFA611930R1023

① Does not work with pushbutton enclosure.

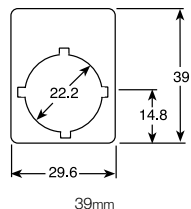
② Quantity per package: 10.

③ When ordering, please state text and position (Line 21 and Line 22). Only the initial character is upper case unless other is stated. Quantity per package: 1.

Legend plates for pushbuttons 22mm

22mm Blank fixed legend plates

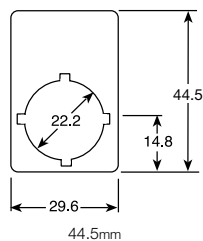
Of silvergrey aluminum



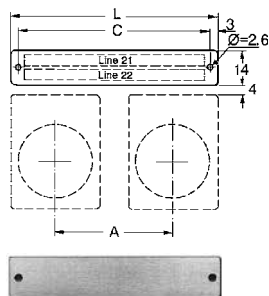
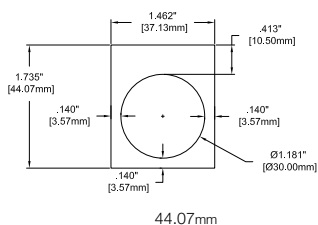
Size	Catalog number
39mm H	SK 615 540-1
44.5mm H	SK 615 541-1
44.07 mm H (UL Type 3/3R, 4, 4X & 12)	LP22-2000

22mm Engraved fixed legend plates, with text ①

Of silvergrey aluminum



Text	Catalog number
English	
Close	SK 615 552-13
Down	SK 615 552-14
Emergency stop	SK 615 552-15
Fast	SK 615 552-16
Forward	SK 615 552-17
In	SK 615 550-29
Inching	SK 615 552-18
Jog	SK 615 552-JO
Left	SK 615 552-39
Lower	SK 615 552-20
Off	SK 615 552-21
On	SK 615 552-22
Open	SK 615 552-23
Out	SK 615 552-24
Raise	SK 615 552-25
Reset	SK 615 552-27
Reverse	SK 615 552-28
Right	SK 615 552-40
Run	SK 615 552-29
Slow	SK 615 552-30
Start	SK 615 550-44
Stop	SK 615 552-31
Up	SK 615 552-32



Legend plates without or with customer-selected text

Of aluminum

Number of operations	Max number of characters per line	Dimensions			Without text Catalog number
		A	L	C	
1	7	-	29.6	23.6	SK 615 545-1
2	20	30.5	60	54	SK 615 545-2
2	24	40	70	64	SK 615 545-3
3	33	30.5	90	84	SK 615 545-4
3	42	40	110	104	SK 615 545-5

① Text height 3 mm.

Engraved legend plate form
Special legend plates
22mm

ENGRAVED LEGEND PLATE FORM

PAGE: ___ OF: ___

ORDER DATE: _____

ORDER NUMBER: _____

ISSUED BY: _____

ORDER QTY: _____

ALL CAPITALS? YES NO

SHIPPING METHOD: _____

REMARKS: _____

DUE DATE: ____ - ____ - ____

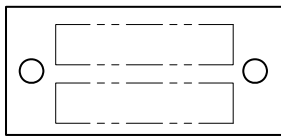
To be completed by ABB personnel:

ENGRAVER: _____

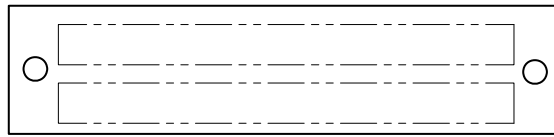
Q.C. INSPECTION: _____

PRINT INFORMATION TO BE ENGRAVED

MAX 7
CHARAC-
TERS PER
LINE

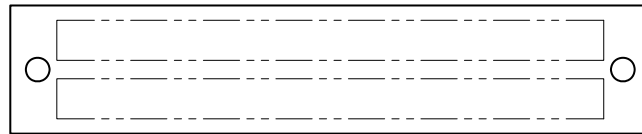


SK 615 545-1



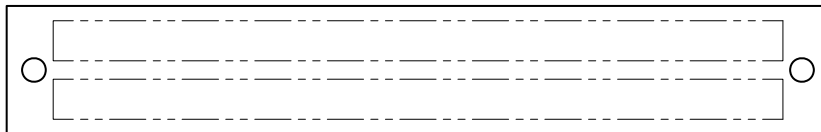
SK 615 545-2

MAXIMUM OF 20
CHARACTERS PER LINE



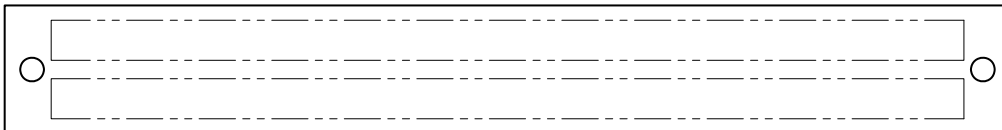
SK 615 545-3

MAXIMUM OF 24
CHARACTERS PER LINE



SK 615 545-4

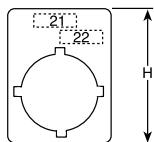
MAXIMUM OF 33
CHARACTERS PER LINE



SK 615 545-5

MAXIMUM OF 44
CHARACTERS PER LINE

Legend plates for two position selector switches 22mm



H = 39 mm

Engraved fixed legend plates, with symbols ①

Of silvergrey aluminum

Symbol/Text		Catalog number
Pos. 21	Pos. 22	
O	I	SK 615 550-75
I	II	SK 615 550-76
→	→→	SK 615 562-72

Engraved fixed legend plates, with text ①

Of silvergrey aluminum

Symbol/Text		Catalog number
Pos. 21	Pos. 22	
English		
Hand	Auto	SK 615 550-71
Jog	Run	SK 615 552-52
Off	On	SK 615 552-53
Stop	Start	SK 615 552-55

① Text height 3 mm. Only the initial character is upper case unless other is stated.

Legend plates for three position selector switches 22mm

Engraved fixed legend plates, with symbols ①

Of silvergrey aluminum

Symbol/Text

Pos. 31	Pos. 32	Pos. 33	Catalog number
I	○	II	SK 615 550-81
←	○	→	SK 615 562-82
→	○	→→	SK 615 562-83

Engraved fixed legend plates, with text ①

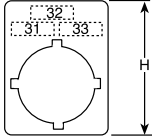
Of silvergrey aluminum

Symbol/Text

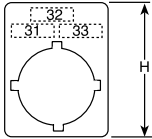
Pos. 31	Pos. 32	Pos. 33	Catalog number
Hand	○	Auto	SK 615 550-80
Slow	Off	Fast	SK 615 552-60

Aluminum name plate blank (anodized silvergray aluminum)

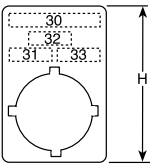
Blank	39mm	SK 615 540-1
	44.5mm	SK 615 541-1



H = 39 mm



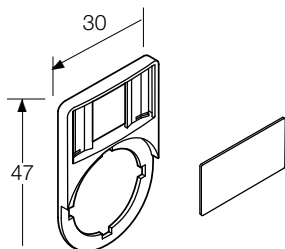
H = 39 mm



H = 44.5 mm

① Text height 3 mm. Only the initial character is upper case unless other is stated.

Custom engraved inserts for legend plate holders 22mm



Nameplate Inserts — Brushed aluminum

Type	Maximum letters per line	Catalog number
<p>1 line</p>	11	MP-NP19-01
<p>2 lines</p>	11	MP-NP19-02
<p>2 position selector switch</p>	5	MP-NP19-03
<p>3 position selector switch</p>	5	MP-NP19-04
<p>2 position selector switch</p>	5	MP-NP19-05

General specifications

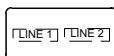
- All characters are 1/8" high, upper & lower case. Please specify if all capital letters are desired.
- The legend plate inserts and the fixed legend plates are silver-grey anodized aluminum.
- All special engravings involve engraving the desired lettering into the metal surface and then treating the engraved surfaces with black ink.

EXAMPLE:

MP-NP19-05

1: FWD

2: REV



"MP-NP19" is the blank legend plate catalog number. "-05" refers to the layout of text (see dimension illustrations).

Legend Plate order form

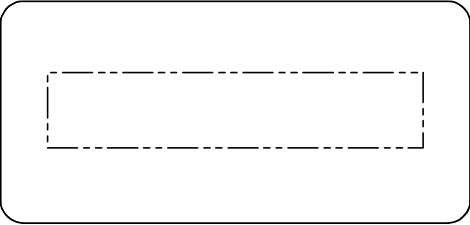
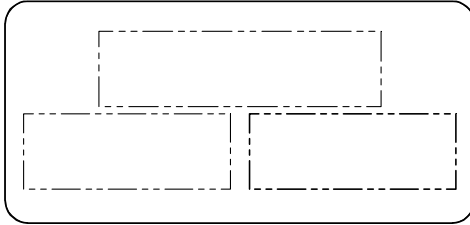
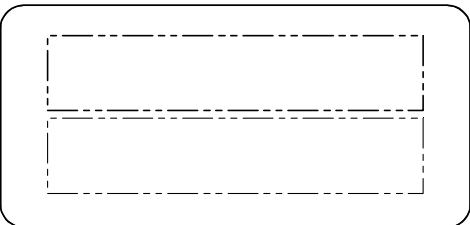
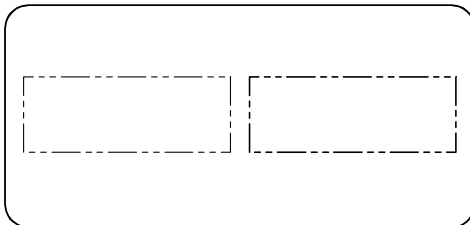
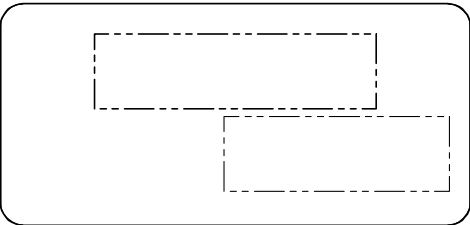
Use legend plate order form on next page.

Engraved legend plate form

Custom engraved nameplates
22mm

7

ENGRAVED LEGEND PLATE FORM MP-NP19		PAGE: ____ OF: ____
MP-NP19- ____ (BRUSHED ALUMINUM)	ORDER NUMBER: _____	
ORIG. DATE: _____	ORDER: QTY: _____	
ISSUED BY: _____	SHIPPING METHOD: _____	
ALL CAPITALS? YES NO	DUE DATE: ____ - ____ - ____	
REMARKS: _____	ENGRAVER: _____	
	Q.C. INSPECTION: _____	

PRINT INFORMATION TO BE ENGRAVED	
 -01	 -04
 -02	 -05
 -03	MP-NP19: REV. A 03/04/05

Custom engraved nameplates 22mm

Fixed nameplates — aluminum ①

Type	Maximum letters per line	Catalog number
<p>Pushbuttons or pilot lights</p>	11	MP-NPE28-01
	39mm	
<p>Pushbuttons or pilot lights</p>	11	MP-NPE29-01
	44.5mm	
<p>2 Position selector switches</p>	5	MP-NPE28-02
	39mm	
<p>2 Position selector switches</p>	11 (line 1) 5 (line 2) 5 (line 3)	MP-NPE29-02
	44.5mm	
<p>3 Position selector switches</p>	5	MP-NPE28-03
	39mm	
<p>3 Position selector switches</p>	11 (line 1) 5 (line 2) 5 (line 3A) 5 (line 3B)	MP-NPE29-03
	44.5mm	
<p>2 Position toggle switches</p>	4	MP-NPE28-04
	39mm	
<p>2 Position toggle switches</p>	5	MP-NPE29-04
	44.5mm	
<p>3 Position toggle switches</p>		MP-NPE28-05
	39mm	
<p>3 Position toggle switches</p>		MP-NPE29-05
	44.5mm	



CBK-NPE28-02

Fixed nameplates — aluminum ①

Type	Maximum letters per line	Catalog number
<p>Pushbuttons or pilot lights</p>	11	MP-NPE28-06
	39mm	
<p>Pushbuttons or pilot lights</p>	11	MP-NPE29-06
	44.5mm	
<p>2 Position selector switches</p>	5	MP-NPE28-07
	39mm	
<p>2 Position selector switches</p>	11 (line 1) 5 (line 2) 5 (line 3)	MP-NPE29-07
	44.5mm	

General specifications

1. All characters are 1/8" high, upper & lower case. Please specify if all capital letters are desired.
2. The legend plate inserts and the fixed legend plates are silver-grey anodized aluminum.
3. All special engravings involve engraving the desired lettering into the metal surface and then treating the engraved surfaces with black ink.

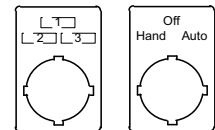
Ordering custom engraved nameplates — USE ORDER FORM FROM FOLLOWING PAGES

1. Select the desired legend plate.
2. Indicate the catalog number.
3. Write the desired words to be engraved on each line.

EXAMPLE:

MP-NPE28P-03

- 1: OFF
- 2: HAND
- 3: AUTO



① For drilling plans, see page 7.74.

Engraved legend plate form

Custom engraved nameplates
22mm

7

ENGRAVED LEGEND PLATE FORM

MP-NPE28 PAGE: ___ OF: ___

MP-NPE28-____ (BRUSHED ALUMINUM)	ORDER NUMBER: _____
ORIG. DATE: _____	ORDER: QTY: _____
ISSUED BY: _____	SHIPPING METHOD: _____
ALL CAPITALS? YES NO	DUE DATE: ___ - ___ - ___
REMARKS: _____	ENGRAVER: _____
	Q.C. INSPECTION: _____

PRINT INFORMATION TO BE ENGRAVED

-01

-02

-03

-04, -05 or -06

-07

MP-NPE28
5/26/04

Engraved legend plate form

Custom engraved nameplates
22mm

Pilot Devices
Legend plates
22mm

ENGRAVED LEGEND PLATE FORM

MP-NPE29

PAGE: ___ OF: ___

MP-NPE29- ____ (BRUSHED ALUMINUM)

ORDER NUMBER: _____

ORIG. DATE: _____

ORDER: QTY: _____

ISSUED BY: _____

SHIPPING METHOD: _____

ALL CAPITALS? YES NO

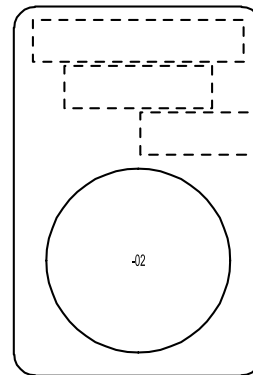
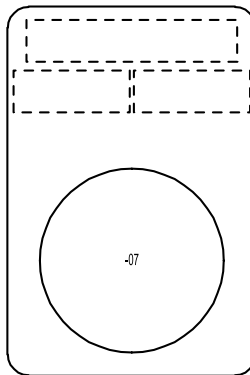
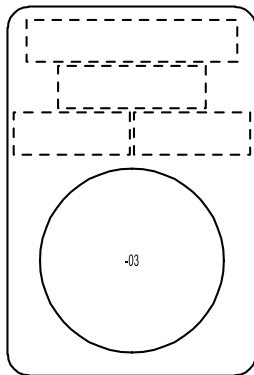
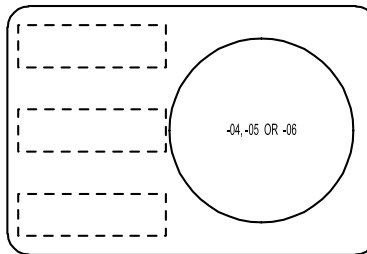
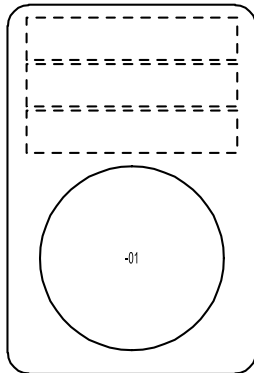
DUE DATE: ___ - ___ - ___

REMARKS: _____

ENGRAVER: _____

Q.C. INSPECTION: _____

PRINT INFORMATION TO BE ENGRAVED

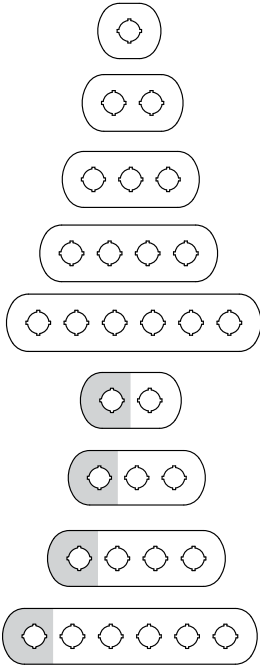


MP-NPE29
6/10/04

Special legend plates for plastic enclosures 22mm

Legend plates for plastic enclosures

For 1, 2, 3, 4 or 6-seat



Description	Catalog number
Of silvergrey aluminum on plastic.	
1-seat	1SFA611930R1000
2-seat	1SFA611930R1002
3-seat	1SFA611930R1003
4-seat	1SFA611930R1004
6-seat	1SFA611930R1005
Of silvergrey aluminum on plastic. (Pos. 1 Yellow)	
2-seat	1SFA611930R1006
3-seat	1SFA611930R1007
4-seat	1SFA611930R1008
6-seat	1SFA611930R1009

Custom engraved legend plates for plastic enclosures For 1, 2, 3, 4 or 6-seat

Fill in appropriate templates on the following pages when ordering

Description	Name Plate	Catalog number
Custom engraved 1-seat	1SFA 611 930 R1000	CUSTOM 1 SEAT
Custom engraved 2-seat	1SFA 611 930 R1002	CUSTOM 2 SEAT
Custom engraved 3-seat	1SFA 611 930 R1003	CUSTOM 3 SEAT
Custom engraved 4-seat	1SFA 611 930 R1004	CUSTOM 4 SEAT
Custom engraved 6-seat	1SFA 611 930 R1005	CUSTOM 6 SEAT
Custom engraved 2-seat, position 1 yellow	1SFA 611 930 R1006	CUSTOM 2 SEAT Y
Custom engraved 3-seat, position 1 yellow	1SFA 611 930 R1007	CUSTOM 3 SEAT Y
Custom engraved 4-seat, position 1 yellow	1SFA 611 930 R1008	CUSTOM 4 SEAT Y
Custom engraved 6-seat, position 1 yellow	1SFA 611 930 R1009	CUSTOM 6 SEAT Y

Engraved legend plate form
Custom engraved nameplates
1-Seat, vertical, 22mm

Pilot Devices
Legend plates
22mm

ENGRAVED LEGEND PLATE FORM

PAGE ____ of ____

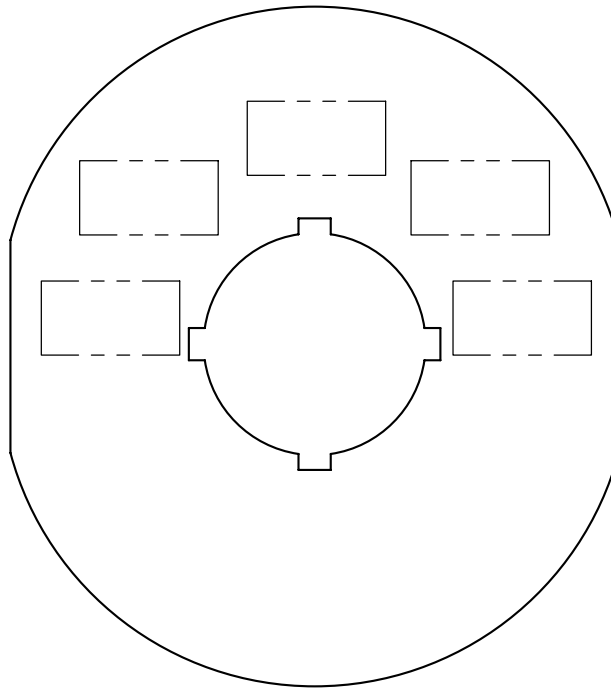
CUSTOM 1 SEAT
(silver-grey brushed plastic)

ORDER NUMBER : _____ ORDER QTY: _____
SHIPPING METHOD _____ DUE DATE: ____ / ____ / ____
ALL CAPITALS? YES NO
ORDER DATE: _____ ISSUED BY _____
REMARKS: _____

To be completed by ABB personnel.

ENGRAVER _____ Q.C. INSPECTION: _____

PRINT INFORMATION TO BE ENGRAVED:



Engraved legend plate form

Custom engraved nameplates
1-Seat, horizontal, 22mm

ENGRAVED LEGEND PLATE FORM

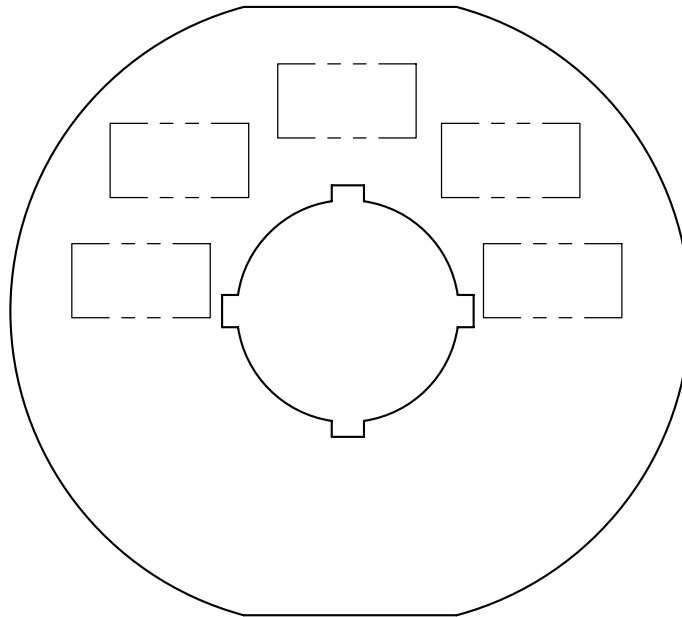
PAGE ____ of ____

CUSTOM 1 SEAT
(silver-grey brushed plastic)

ORDER NUMBER : _____ ORDER QTY: _____
SHIPPING METHOD _____ DUE DATE: ____ / ____ / ____
ALL CAPITALS? YES NO
ORDER DATE: _____ ISSUED BY _____
REMARKS: _____

To be completed by ABB personnel.
ENGRAVER _____ Q.C. INSPECTION: _____

PRINT INFORMATION TO BE ENGRAVED:



Engraved legend plate form
 Custom engraved nameplates
 2-Seat, vertical, 22mm

Pilot Devices
Legend plates
 22mm

ENGRAVED LEGEND PLATE FORM

PAGE ____ of ____

CIRCLE ONE: **CUSTOM 2 SEAT**
 (silver-grey aluminum)

CUSTOM 2 SEAT Y
 (position 1 yellow)

ORDER NUMBER : _____

ORDER QTY: _____

SHIPPING METHOD _____

DUE DATE: ____ / ____ / ____

ALL CAPITALS? YES NO

ORDER DATE: _____

ISSUED BY _____

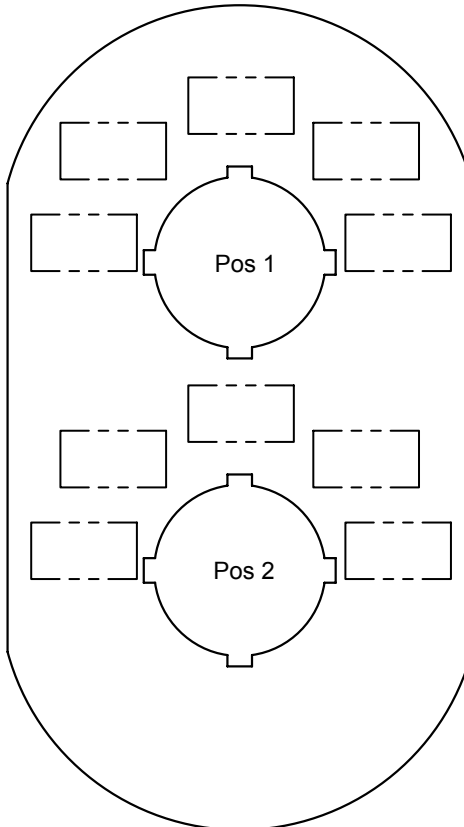
REMARKS : _____

To be completed by ABB personnel.

ENGRAVER _____

Q.C. INSPECTION: _____

PRINT INFORMATION TO BE ENGRAVED:



Engraved legend plate form

Custom engraved nameplates
3-Seat, vertical, 22mm

ENGRAVED LEGEND PLATE FORM

PAGE ___ of ___

CIRCLE ONE: CUSTOM 3 SEAT CUSTOM 3 SEAT Y
 (silver-grey aluminum) (position 1 yellow)

ORDER NUMBER : _____ ORDER QTY: _____

SHIPPING METHOD _____ DUE DATE: ___ / ___ / ___

ALL CAPITALS? YES NO

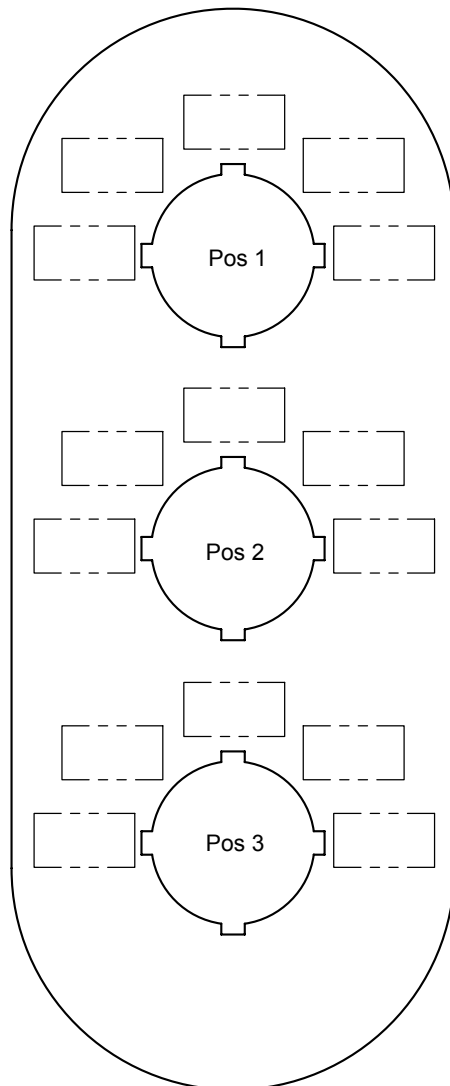
ORDER DATE: _____ ISSUED BY _____

REMARKS : _____

To be completed by ABB personnel.

ENGRAVER _____ Q.C. INSPECTION: _____

PRINT INFORMATION TO BE ENGRAVED:



Engraved legend plate form
Custom engraved nameplates
4-Seat, vertical, 22mm

ENGRAVED LEGEND PLATE FORM

PAGE ____ of ____

CIRCLE ONE: CUSTOM 4 SEAT CUSTOM 4 SEAT Y
 (silver-grey aluminum) (position 1 yellow)

ORDER NUMBER : _____ ORDER QTY: _____

SHIPPING METHOD _____ DUE DATE: ____ / ____ / ____

ALL CAPITALS? YES NO

ORDER DATE: _____ ISSUED BY _____

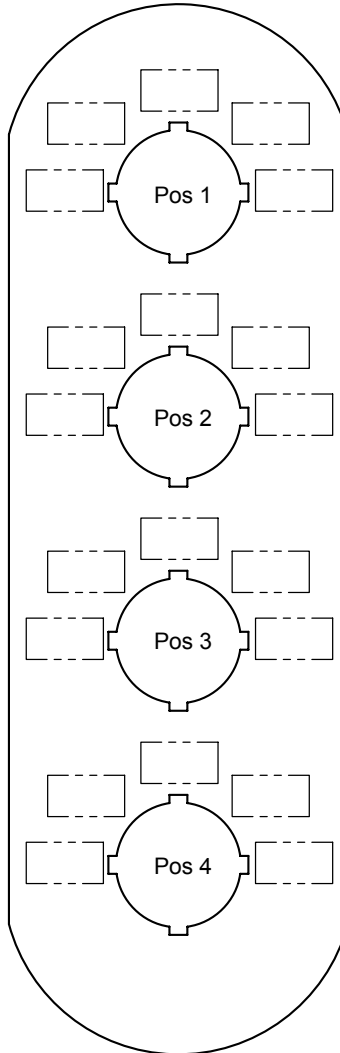
REMARKS: _____

To be completed by ABB personnel

ENGRAVER _____

Q.C. INSPECTION: _____

PRINT INFORMATION TO BE ENGRAVED:



Engraved legend plate form

Custom engraved nameplates
6-Seat, vertical, 22mm

ENGRAVED LEGEND PLATE FORM

PAGE ____ of ____

CIRCLE ONE: CUSTOM 6 SEAT CUSTOM 6 SEAT Y
 (silver-grey aluminum) (position 1 yellow)

ORDER NUMBER : _____ ORDER QTY: _____

SHIPPING METHOD _____ DUE DATE: ____ / ____ / ____

ALL CAPITALS? YES NO

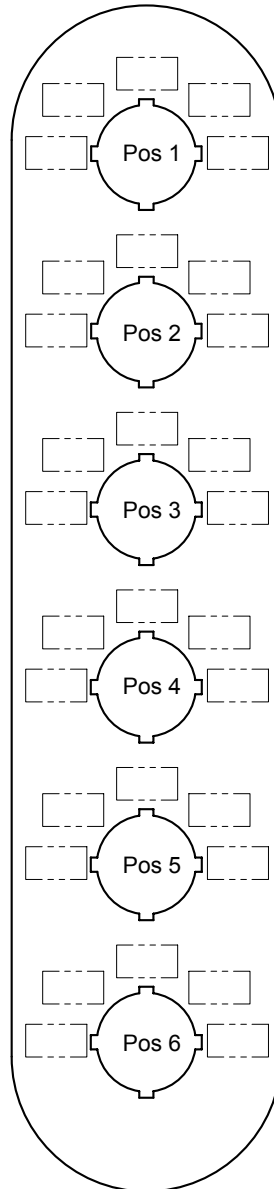
ORDER DATE: _____ ISSUED BY _____

REMARKS : _____

To be completed by ABB personnel.

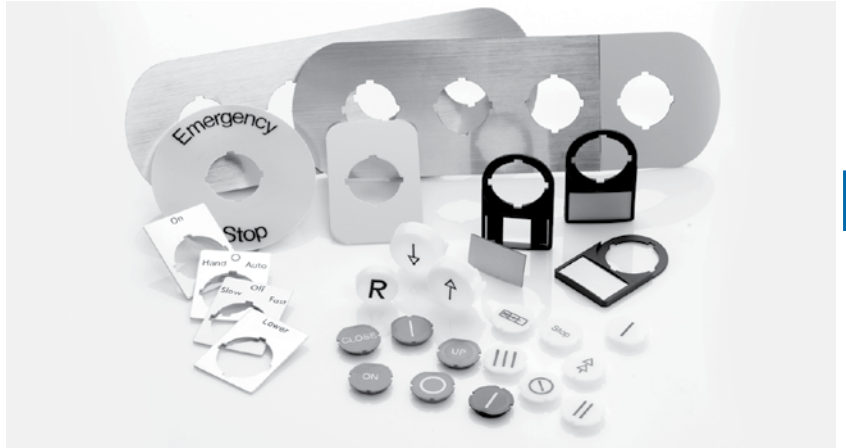
ENGRAVER _____ Q.C. INSPECTION: _____

PRINT INFORMATION TO
BE ENGRAVED:





Legend plates 30mm

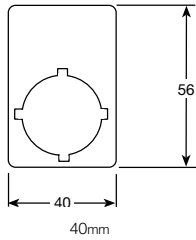
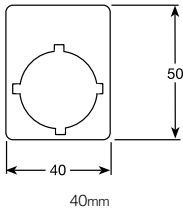


Custom legend plates

- Legend plate with customer selected text

30mm Legend plates

Legend plates for pushbuttons 30mm



Blank fixed legend plates

Of silvergrey aluminum

Size	Catalog Number
50mm H	SK 615 640-1
56mm H	SK 615 641-1

Engraved fixed legend plates, with text ①

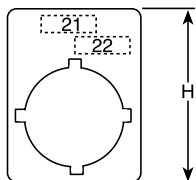
Of silvergrey aluminum, 50mm H

Text	Catalog Number
English	
Close	SK 615 652-13
Down	SK 615 652-14
Emergency stop	SK 615 652-15
Fast	SK 615 652-16
Forward	SK 615 652-17
In	SK 615 650-29
Inching	SK 615 652-18
Jog	SK 615 652-JO
Left	SK 615 652-39
Lower	SK 615 652-20
Off	SK 615 652-21
On	SK 615 652-22
Open	SK 615 652-23
Out	SK 615 652-24
Raise	SK 615 652-25
Reset	SK 615 652-27
Reverse	SK 615 652-28
Right	SK 615 652-40
Run	SK 615 652-29
Slow	SK 615 652-30
Start	SK 615 652-44
Stop	SK 615 652-31
Up	SK 615 652-32

① Text height 3 mm.

Legend plates for selector switches

30mm



Two positions

Engraved fixed legend plates, with text ①

Of silvergrey aluminum, 50mm H

Symbol/Text

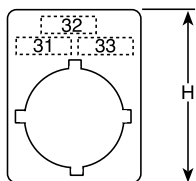
Pos 21 Pos. 22

Catalog Number

English

Fwd Rev
Hand Auto
Jog Run
Off On
Stop Start

SK 615 652-FR
SK 615 652-71
SK 615 652-52
SK 615 652-53
SK 615 652-55



Three positions

Engraved fixed legend plates, with text ①

Of silvergrey aluminum, 50mm H

Symbol/Text

Pos 31 Pos. 32 Pos. 33

Catalog Number

English

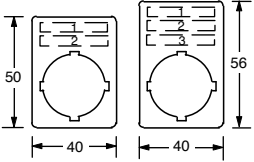
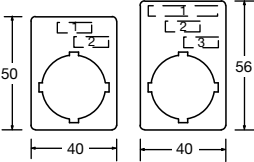
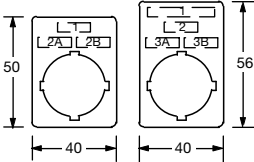
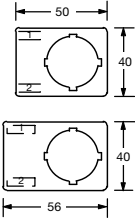
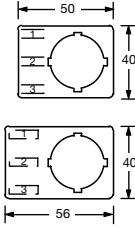
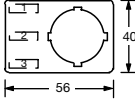
Hand O Auto
Slow Off Fast

SK 615 652-80
SK 615 652-60

① Text height 3 mm. Only the initial character is upper case unless other is stated.

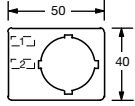
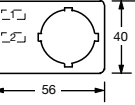
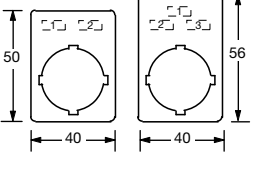
Custom engraved legend plates 30mm

Fixed nameplates — aluminum

Type	Maximum letters per line	Catalog number
 <p>Pushbuttons or pilot lights</p>	11	G1MP-NPE28-01
	50mm	G1MP-NPE29-01
 <p>2 Position selector switches</p>	5	G1MP-NPE28-02
	11 (line 1) 5 (line 2) 5 (line 3)	G1MP-NPE29-02
 <p>3 Position selector switches</p>	5	G1MP-NPE28-03
	11 (line 1) 5 (line 2) 5 (line 3A) 5 (line 3B)	G1MP-NPE29-03
 <p>2 Position toggle switches</p>	4	G1MP-NPE28-04
	50mm	G1MP-NPE29-04
 <p>3 Position toggle switches</p>	5	G1MP-NPE28-05
	50mm	G1MP-NPE29-05
 <p>3 Position toggle switches</p>	5	G1MP-NPE28-07
	11 (line 1) 5 (line 2) 5 (line 3) 5 (line 3B)	G1MP-NPE29-07



Fixed nameplates — aluminum

Type	Maximum letters per line	Catalog number
 <p>Pushbuttons or pilot lights</p>	11	G1MP-NPE28-06
	50mm	G1MP-NPE29-06
 <p>Pushbuttons or pilot lights</p>	11	G1MP-NPE29-06
	56mm	G1MP-NPE29-06
 <p>2 Position selector switches</p>	5	G1MP-NPE28-07
	11 (line 1) 5 (line 2) 5 (line 3) 5 (line 3B)	G1MP-NPE29-07

General specifications

- All characters are 1/8" high, upper & lower case. Please specify if all capital letters are desired.
- The legend plate inserts and the fixed legend plates are silver-grey anodized aluminum.
- All special engravings involve engraving the desired lettering into the metal surface and then treating the engraved surfaces with black ink.

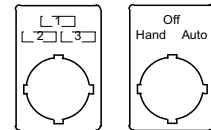
Ordering custom engraved nameplates

- Select the desired legend plate.
- Use following pages to order.
- Indicate the catalog number.
- Write the desired words to be engraved on each line.

EXAMPLE:

G1MP-NPE28P-03

- OFF
- HAND
- AUTO



Engraved legend plate form

Custom engraved legend plates
30mm

Pilot Devices
Legend plates
30mm

ENGRAVED LEGEND PLATE FORM

G1MP-NPE28

PAGE: ___ OF: ___

G1MP-NPE28-___ (BRUSHED ALUMINUM)

ORDER NUMBER: _____

ORIG. DATE: _____

ORDER: QTY: _____

ISSUED BY: _____

SHIPPING METHOD: _____

ALL CAPITALS? YES NO

DUE DATE: ___ - ___ - ___

REMARKS: _____

ENGRAVER: _____

Q.C. INSPECTION: _____

PRINT INFORMATION TO BE ENGRAVED

The diagram illustrates seven different legend plate configurations:

- 01:** A large circle with a legend area. Above it are two stacked rectangular boxes, the top one being dashed.
- 02:** A large circle with a legend area. Above it are two stacked rectangular boxes, the top one being dashed.
- 03:** A large circle with a legend area. Above it are two side-by-side rectangular boxes, the top one being dashed.
- 04, -05 or -06:** A large circle with a legend area. To its left are three stacked rectangular boxes, the top and bottom ones being dashed.
- 07:** A large circle with a legend area. Above it are two side-by-side rectangular boxes, the top one being dashed.

G1MP-NPE28
6/10/04

Engraved legend plate form

Custom engraved legend plates
30mm

7

ENGRAVED LEGEND PLATE FORM
G1MP-NPE29

PAGE: ___ OF: ___

G1MP-NPE29-___ (BRUSHED ALUMINUM)	ORDER NUMBER: _____
ORIG. DATE: _____	ORDER: QTY: _____
ISSUED BY: _____	SHIPPING METHOD: _____
ALL CAPITALS? YES NO	DUE DATE: ___ - ___ - ___
REMARKS: _____	ENGRAVER: _____
	Q.C. INSPECTION: _____

PRINT INFORMATION TO BE ENGRAVED

-01

-02

-03

-04, -05 or -06

-07

G1MP-NPE29
6/10/04



Signal Towers K70 and Signal Beacons KSB offers the customer a wide range of signal elements in all voltages and a solution for every signalling field.

Signal towers K70

- Fast mounting of signal elements using bayonet fixing
- Easy changing of bulbs for each module without tools
- Flexibility of signal element combination
- Up to 5 elements possible/up to 10 elements with bracket for 2-sided mounting
- High protection rating optical and audible signal elements with IP 54
- LED elements for long life

Signal towers and beacons

- Permanent Light
- Blinking Light
- Flashing Light
- Audible
- LED Permanent Light
- LED Blinking Light
- LED Rotating Light

Signal beacons KSB

- Vandal-proof design withstands every mechanical and natural challenge both indoors and outdoors.
- High protection rating IP 65
- Cap consists of high impact polycarbonate (up to 20 J)
- Bulb change via inside of control box

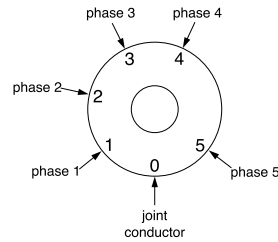
Signal towers K70 Signal beacons KSB

Simple fitting with quick fix system

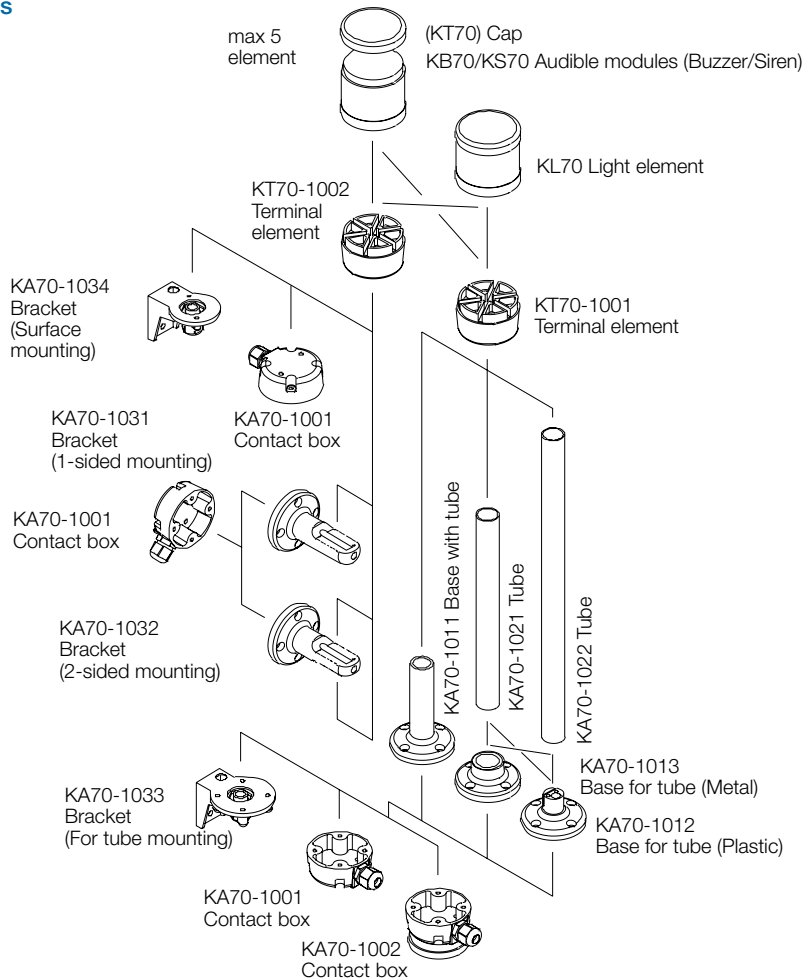
Each K 70 module is equipped with a bayonet fixing with integral contact system. The modules are fastened together by aligning the corresponding white marks then with a gentle twist they are locked into place (see the figures).



Connection plans



Combination possibilities



Optical modules for signal towers K70



Light Elements



Description	Catalog number	Weight oz.
Light element		
Permanent light, 12-240 V AC/DC. For bulb BA 15d. Bulb not included		
Red	KL70-401R	3.2
Green	KL70-401G	3.2
Yellow	KL70-401Y	3.2
Blue	KL70-401L	3.2
Clear	KL40-401C	3.2
Blinking light, 24 V AC/DC. With integrated LED		
Red	KL70-306R	3.5
Green	KL70-306G	3.5
Yellow	KL70-306Y	3.5
Blue	KL70-306L	3.5
Clear	KL70-306C	3.5
Flashing light, 24 V AC/DC. With integrated Xenon Tube		
Red	KL70-203R	4.2
Green	KL70-203G	4.2
Yellow	KL70-203Y	4.2
Blue	KL70-203L	4.2
Clear	KL70-203C	4.2
Blinking light, 115 V AC. With integrated LED		
Red	KL70-342R	0.10
Green	KL70-342G	3.5
Yellow	KL70-342Y	3.5
Blue	KL70-342L	3.5
Clear	KL70-342C	3.5
Flashing light, 115 V AC. With integrated Xenon Tube		
Red	KL70-113R	3.9
Green	KL70-113G	3.9
Yellow	KL70-113Y	3.9
Blue	KL70-113L	3.9
Clear	KL70-113C	3.9
Blinking light, 230 V AC. With integrated LED		
Red	KL70-352R	3.5
Green	KL70-352G	3.5
Yellow	KL70-352Y	3.5
Blue	KL70-352L	3.5
Clear	KL70-352C	3.5
Flashing light, 230 V AC. With integrated Xenon Tube		
Red	KL70-123R	3.9
Green	KL70-123G	3.9
Yellow	KL70-123Y	3.9
Blue	KL70-123L	3.9
Clear	KL70-123C	3.9
LED Permanent light, 24 V AC/DC. With integrated LED		
Red	KL70-305R	3.5
Green	KL70-305G	3.5
Yellow	KL70-305Y	3.5
Blue	KL70-305L	3.5
Clear	KL70-305C	3.5
LED Rotating light, 24 V AC/DC. With integrated LED		
Red	KL70-307R	3.5
Green	KL70-307G	3.5
Yellow	KL70-307Y	3.5
Blue	KL70-307L	3.5
Clear	KL70-307C	3.5

Signal towers K70



LED bulb

Description	Catalog number	Weight oz.
Bulbs for signal tower K70 bulb Ba 15d, 42mm, Max 7 W. For permanent or blinking light.		
24 V, 5 W, AC/DC	KA4-1021	0.32
115 V, 5 W, AC/DC	KA4-1118	0.32
230 V, 5 W, AC/DC	KA4-1148	0.32

LED bulbs for signal tower K70 Ba 15d. For 24 V AC/DC, 40mA.

Red	KA4-1021	0.32
Green	KA4-1022	0.32
Yellow	KA4-1023	0.32
Blue	KA4-1024	0.32
White	KA4-1025	0.32

Audible modules. Buzzer element. 85 dB, continuous or pulsating tone, adjustable.

24 V AC/DC	KB70-3001	0.39
115 V AC	KB70-3101	0.39
230 V AC	KB70-1201	0.42



Terminal element

Siren element

Multi function, 8 diff. Tones adjustable, volume adjustable 100 dB, 115 V AC	KS70-1104	0.46
Multi function, 8 diff. Tones adjustable, volume adjustable 100 dB, 230 V AC	KS70-1204	0.42
Multi function, 7 diff. Tones adjustable, volume adjustable, remote control, 100 dB, 24 V DC	KS70-2004	0.42
Multi function, 8 diff. Tones adjustable, volume adjustable 100 dB, 24 V AC/DC	KS70-3004	0.42
Continuous tone alternating 108 dB, 24 V DC	KS70-2002	0.53

Terminal elements

For tube mounting, including cap	KT70-1001	0.53
For bracket or base, including cap	KT70-1002	0.53

Special parts

Contact box

Cable exit at side	KA70-1001	0.25
Magnetic base	KA70-1002	0.25

Base with tube

D=25 mm L=110 mm	KA70-1011	0.21
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Base for tube

D=25 mm, Plastic	KA70-1012	0.11
D=25 mm, Metal	KA70-1013	1.1

Tube, anodized aluminum

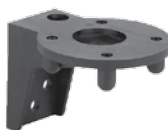
D=25 mm L=250 mm	KA70-1021	0.28
D=25 mm L=400 mm	KA70-1022	0.42
D=25 mm L=800 mm	KA70-1023	0.42

Bracket

1-sided mounting	KA70-1031	0.25
2-sided mounting	KA70-1032	0.25
For tube mounting	KA70-1033	0.25
For surface mounting	KA70-1034	0.25



Contact box



Bracket

Signal beacons KSB



Light element



Anti-twist device

Description	Catalog number	Weight oz.
Light element		
Permanent light, 12-240 V AC/DC. For bulb BA 15d. Bulb not included.		
Red	KSB-401R	0.46
Green	KSB-401G	0.46
Yellow	KSB-401Y	0.46
Blue	KSB-401L	0.46
Clear	KSB-401C	0.46
Flashing light, 24 V DC. With integrated Xenon Tube		
Red	KSB-203R	0.49
Green	KSB-203G	0.49
Yellow	KSB-203Y	0.49
Blue	KSB-203L	0.49
Clear	KSB-203C	0.49
Flashing light, 115 V AC. With integrated Xenon Tube		
Red	KSB-113R	0.49
Green	KSB-113G	0.49
Yellow	KSB-113Y	0.49
Blue	KSB-113L	0.49
Clear	KSB-113C	0.49
Flashing light, 230 V AC. With integrated Xenon Tube		
Red	KSB-123R	0.49
Green	KSB-123G	0.49
Yellow	KSB-123Y	0.49
Blue	KSB-123L	0.49
Clear	KSB-123C	0.49
LED permanent light, 24 V AC/DC. With integrated LED		
Red	KSB-305R	0.49
Green	KSB-305G	0.49
Yellow	KSB-305Y	0.49
LED blinking light, 24 V AC/DC. With integrated LED		
Red	KSB-306R	0.49
Green	KSB-306G	0.49
Yellow	KSB-306Y	0.49
LED rotation light, 24 V AC/DC. With integrated LED		
Red	KSB-307R	0.49
Green	KSB-307G	0.49
Yellow	KSB-307Y	0.49
Special parts		
Anti-twist device	KASB-100	0.18
Bulbs for signal beacons max 10 W. For permanent light. Bulb Ba 15d, 52mm.		
12 V, 7 W, AC/DC	KA3-1018	0.39
24 V, 7 W, AC/DC	KA3-1028	0.39
115 V, 7 W, AC/DC	KA3-1118	0.39
220-260 V, 7-10 W, AC/DC	KA3-1148	0.39

Technical data

Signal towers K70 and signal beacons KSB

Signal towers K70

Approvals



E 175 441



Technical specifications

Housing and Accessories	Polamide, high impact, black
Dome	Polycarbonate, transparent
Fixing	Base mounting, tube Ø 25mm, bracket mounting
Socket	B 15 d, for bulb max. 7W
Connection	Screw connection up to 2.5 mm ²
Number of modules possible -2-sided bracket	max. 5 max. 10 elements

Degrees of protection

Light Elements	IP 54	UL Catalog number 5
Audible Elements	IP 54	UL Catalog number 5

Electrical data

Permanent Light Element	12-240 V AC/DC
Bulb Socket B 15 d, max 7 W	Bulb not included

Flashing light element	24 V DC	115 V AC	230 V AC
Flash Frequency	1 Hz	1 Hz	1 Hz
Flash Energy	2 Ws	2 Ws	2 Ws
Life Duration	4 x 10 ⁶ flashes		
Current Consumption reduced for AS-Interface	125 mA 80 mA	20mA	35 mA
Starting Current	< 0.5 A at 24 V		

LED permanent light element	24 V AC/DC	115 V AC	230 V AC
Life Duration	100 000 hours		
Current Consumption	45 mA	25mA	25mA
Starting Current	< 0.5 A at 24 V		

LED blinking light element	24 V AC/DC	115 V AC	230 V AC
Life Duration	100 000 hours		
Current Consumption	25 mA	25mA	25mA
Starting Current	< 0.5 A at 24 V		
Blink Frequency	c. 1 Hz	c. 1 Hz	c. 1 Hz

LED rotation light element	24 V, AC/DC
Life Duration	100 000 hours
Current Consumption	70 mA
Starting Current	< 0.5 A at 24 V
Rotation Frequency	c. 120 r.p.m.

Temperature

Ambient Temperature during operations	-20 to +50 °C
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Signal beacons KSB

Approvals



E 175 441



Technical specifications

Housing and Accessories	PC/ABS-Blend, high impact, black
Dome	Polycarbonate, transparent
Fixing	Installation mounting for Ø 37mm, (PG 29)
Bulb Socket	B 15 d, for bulb max. 10W
Bulb Change	Via rear access with bayonet mechanism (Bulb not included)
Connection	Screw connection max 2.5 mm ²

Degrees of protection

IP 65, UL Catalog number 5

Electrical data

Permanent Light Element Operating Voltage	max. 250 V
Life Duration	100 000 hours
Bulb socket B 15 d, max 10 W	Bulb not included

LED version: permanent light	24 V, AC/DC
Life Duration	100 000 hours
Current Consumption	45 mA

Blinking light element	24 V, AC/DC
Life Duration	100 000 hours
Current Consumption	25 mA

Rotation light element	24 V, AC/DC
Life Duration	100 000 hours
Current Consumption	70 mA
Starting Current	< 0.5 A

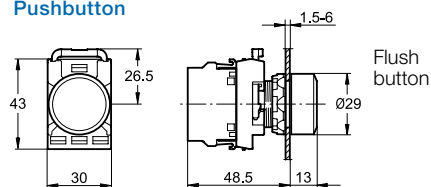
Flashing light element	24 V AC/DC	115 V AC	230 V AC
Operating Voltage	24 V AC/DC	115 V AC	230 V AC
Flash Frequency	1 Hz	1 Hz	1 Hz
Flash Energy	2 Ws	2 Ws	2 Ws
Life Duration	4 x 10 ⁶ flashes		
Current Consumption	125 mA	20mA	35 mA
Starting Current	< 0.5 A	< 0.5 A	< 0.5 A

Temperature	-20 to +50 °C
Ambient Temperature during operations	-20 to +50 °C

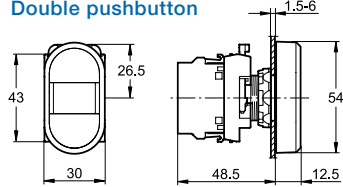
Approximate dimensions Modular Range

3D drawings can be found in ABB Library.

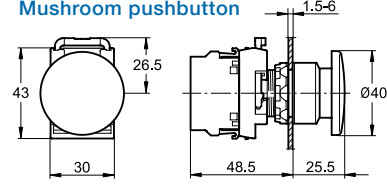
Pushbutton



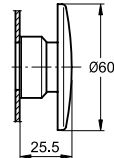
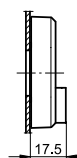
Double pushbutton



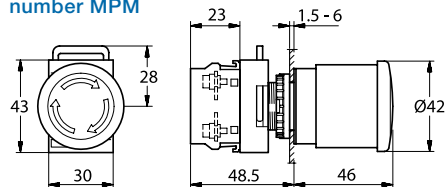
Mushroom pushbutton



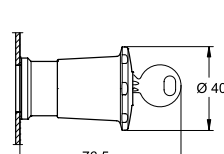
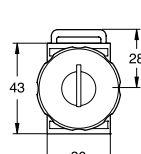
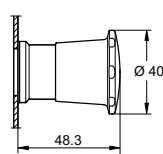
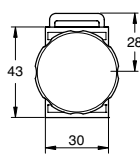
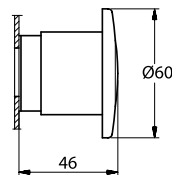
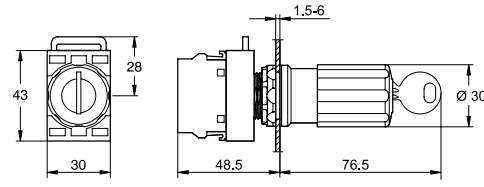
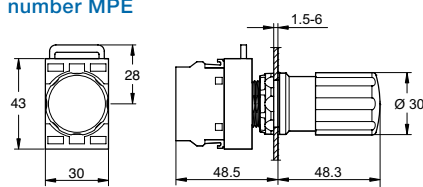
Flush button



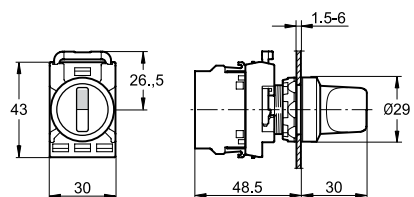
Emergency stop pushbutton Catalog number MPM



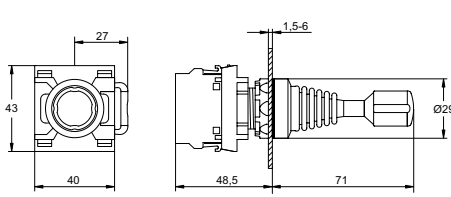
Emergency stop pushbutton Catalog number MPE



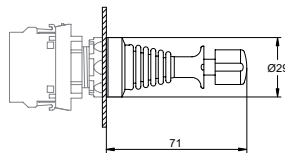
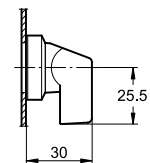
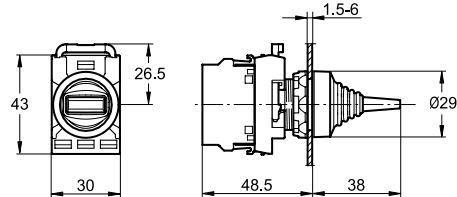
Selector switch



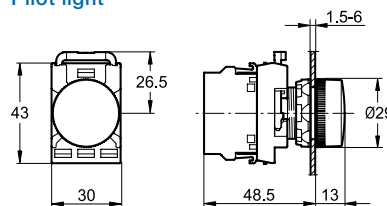
Joystick



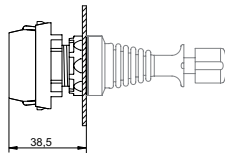
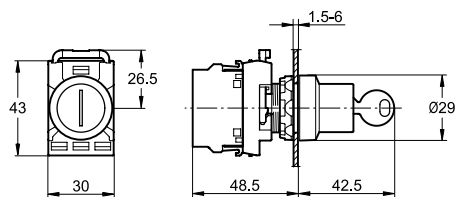
Toggle switch



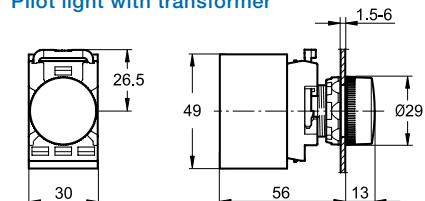
Pilot light



Key-operated selector switch

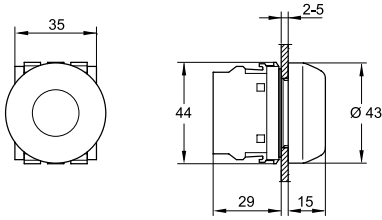


Pilot light with transformer

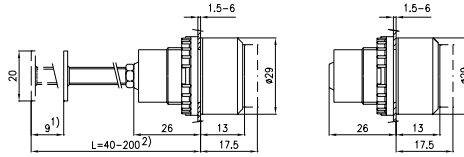


Approximate dimensions Drilling plans

Heavy duty pushbutton

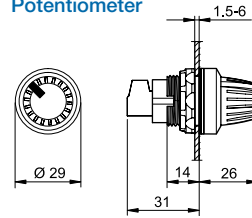


Reset pushbutton

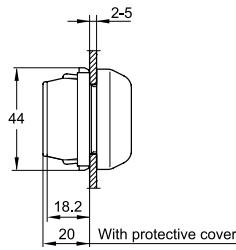
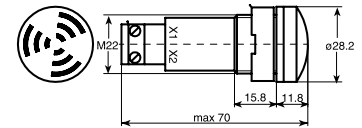


- 1) Length of stroke.
- 2) Can be cut to desired length.

Potentiometer

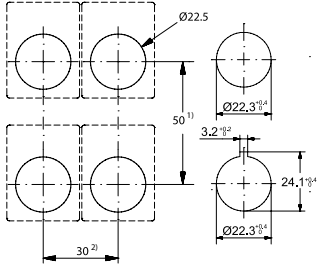


Buzzer

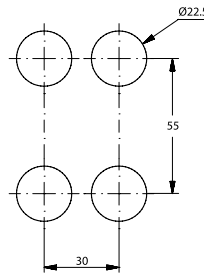


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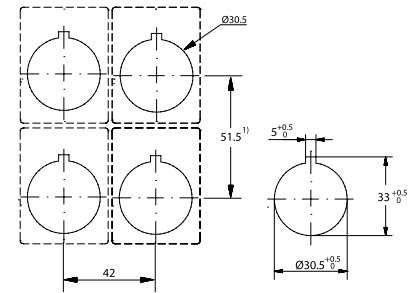
Drilling plans for pushbuttons, switches and pilot lights



Drilling plan for double pushbutton



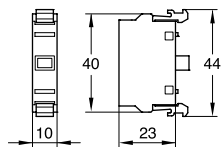
Drilling plan for 30 mm adaptor



- 1) 55 mm when Legend Plate H= 44.5 mm is used.
61 mm for mushroom Pushbutton with D=60 mm
- 2) 37 mm when Legend Plate with insert is used,

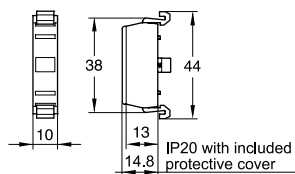
Contact block

(for front mounting)



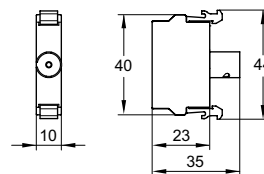
Micro contact block

(for front mounting)

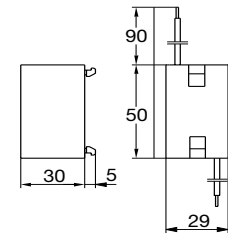


Lamp block

(for front mounting)

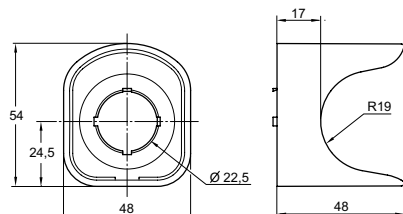


Transformer block



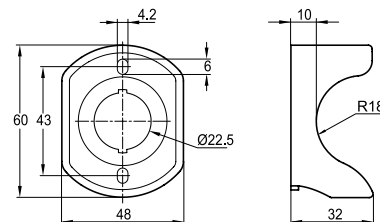
Emergency stop shroud

Modular Range



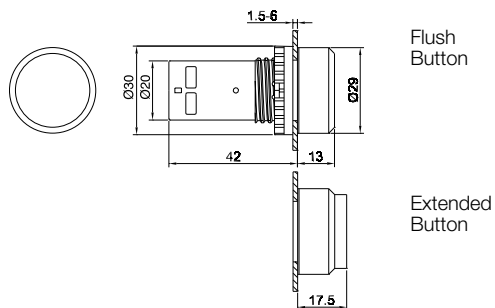
Emergency stop shroud

Compact Range

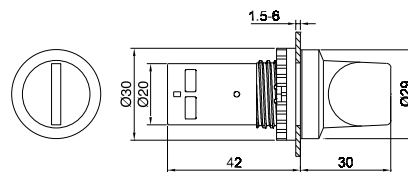


Approximate dimensions Compact Range

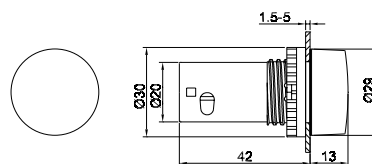
Pushbutton



Selector switch



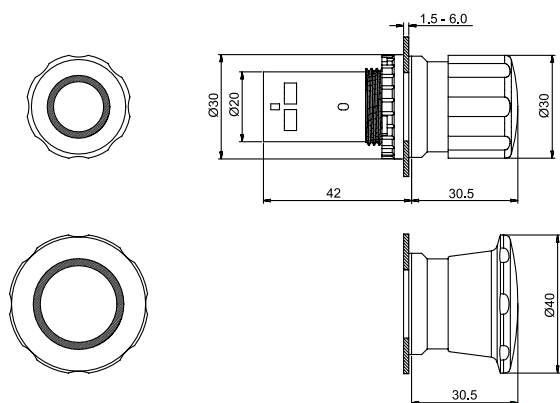
Pilot light



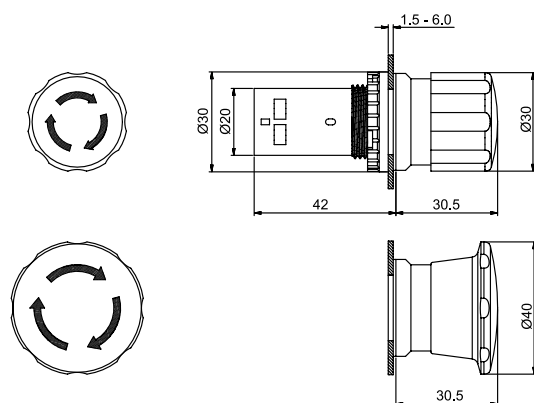
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Emergency stop pushbuttons

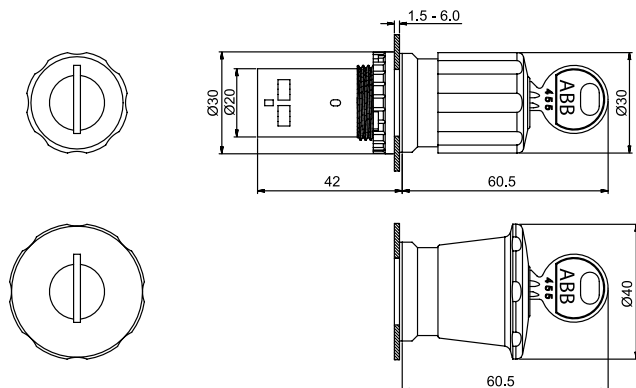
CE3P/CE4P (Pull release)



CE3T/CE4T (Twist release)



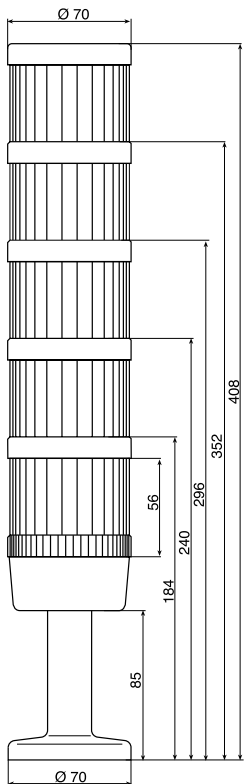
CE3K1/CE4K1



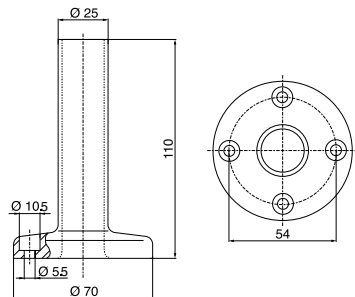
Dimensions and drilling plans

Signal towers

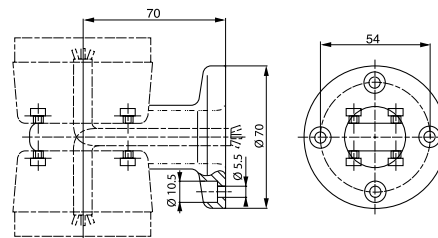
Signal towers K 70



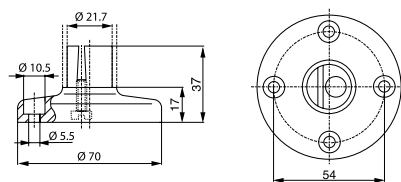
Base with integrated tube



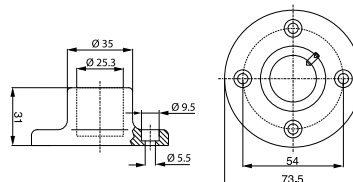
Bracket 2-sided mounting



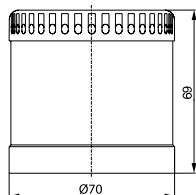
Base for tube, plastic



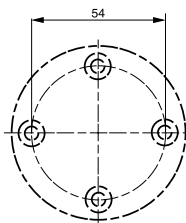
Base for tube, metal



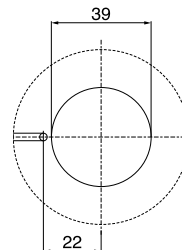
Audible module



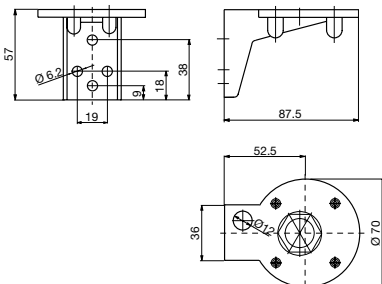
Drilling plan for signal towers K 70



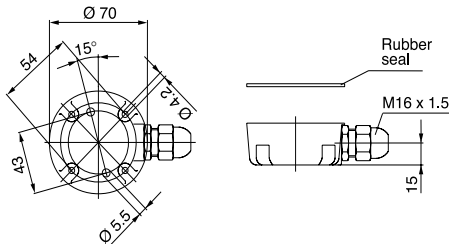
Drilling plan for signal beacons KSB



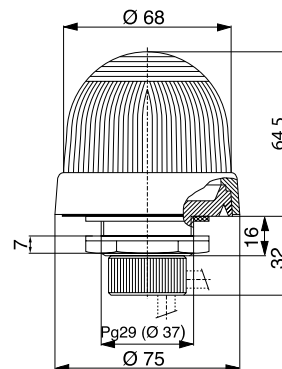
Bracket for tube mounting



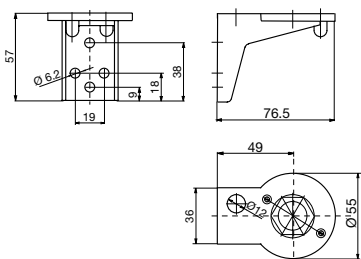
Contact box for cable exit at side



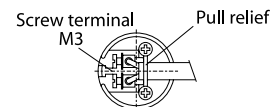
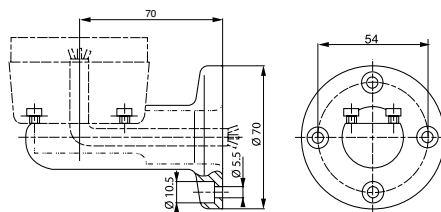
Signal beacons K SB



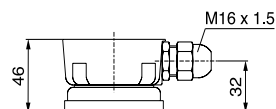
Bracket for surface mounting



Bracket 1-sided mounting



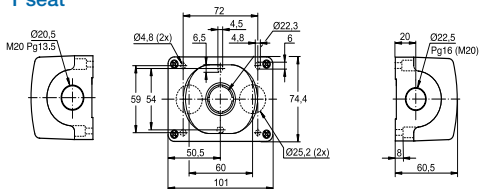
Contact box with magnetic base



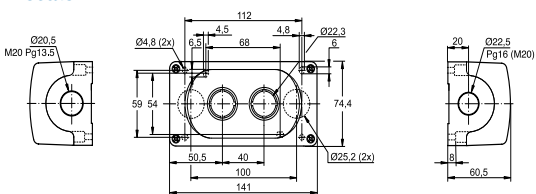
Approximate dimensions Enclosures

Plastic enclosures

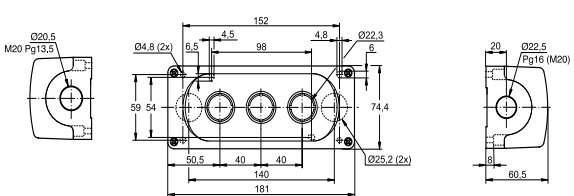
1 seat



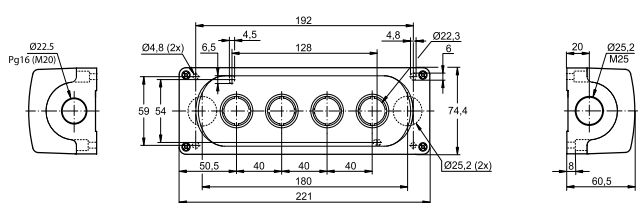
2 seats



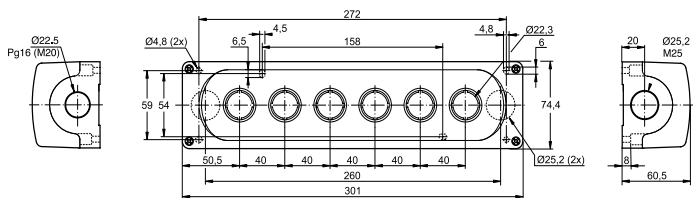
3 seats



4 seats

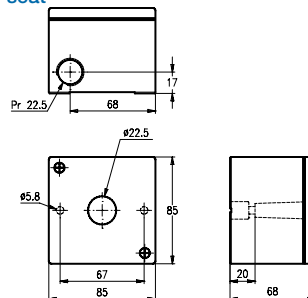


6 seats

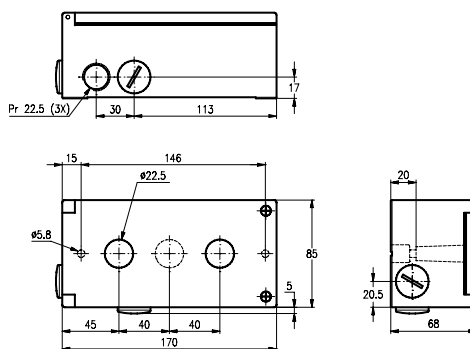


Metallic enclosures

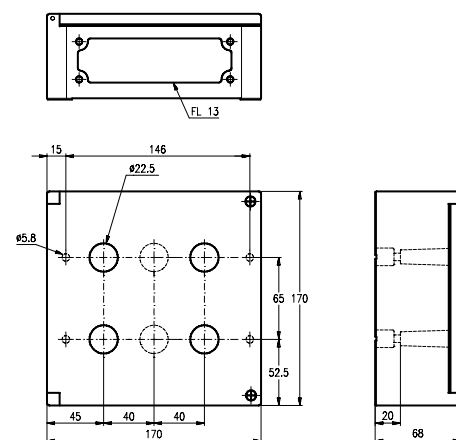
1 seat



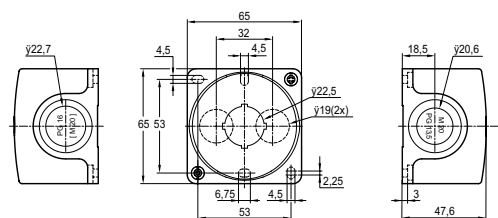
2 or 3 seats



4 or 6 seats



Plastic enclosure for Compact Range



Degrees of protection

General

In an installation, the degree of protection required for electrical equipment depends on the environmental characteristics. The degree of protection, ensured by the enclosure of equipment or by the cubicle containing the equipment is expressed by the IP code which gives the level of protection against access to hazardous parts, the ingress of foreign bodies and/or the ingress of water, in compliance with IEC 60529, IEC 60947-1.

Besides the IP symbol, the complete code has two figures followed (optionally) by two additional letters. A short description of the elements used in IP coding is given below.

IP... code	Figures or letters	Specifications for installation protection	Protection of persons
First Figure		Against ingress of foreign bodies	Against access to hazardous parts with:
	0	No protection	No protection
	1	Diameter > 50 mm	Back of hand
	2	Diameter > 12.5 mm	Finger
	3	Diameter > 2.5 mm	Tool
	4	Diameter > 1 mm	Wire
	5	Limited protection against dust	Wire
	6	Total protection against dust	Wire
Second Figure		Against entrance of water having a harmful effect	
	0	No protection	
	1	Vertical dripping	
	2	Dripping at a vertical angle of < 15°	
	3	Rain at a vertical angle of < 60°	
	4	Splashing	
	5	Low pressure water jet	
	6	Powerful water jets	
	7	Temporary immersion	
	8	Permanent immersion	
	9K*	High Pressure, High Temperature washdown	

Note: The Catalog number of enclosure or cubicle in which the equipment must be installed prevails with respect to the degree of protection.

*) According to DIN 400 50-9



8 - Limit switches



General information	8.1 - 8.2
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Plastic casing limit switches.....8.3 - 8.30

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Description & applications	8.3 - 8.4
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40mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT	8.10 - 8.14
60mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT	8.16 - 8.17
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Ordering details	8.22
40mm	
Catalog number explanation	8.23
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Ordering details	8.26 - 8.28
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40mm, IP66, UL Type 4X, PG 13.5 and 1/2" NPT	8.36 - 8.41
60mm, IP66, UL Type 4X, PG 13.5 and 1/2" NPT	8.42 - 8.43
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40mm	
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Ordering details	8.49 - 8.51
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Miniature limit switches8.55 - 8.62

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Plastic casing UL Type 1 & metal casing - UL Type 4 & 4X, Pre-wired, 35mm.....	8.59 - 8.60
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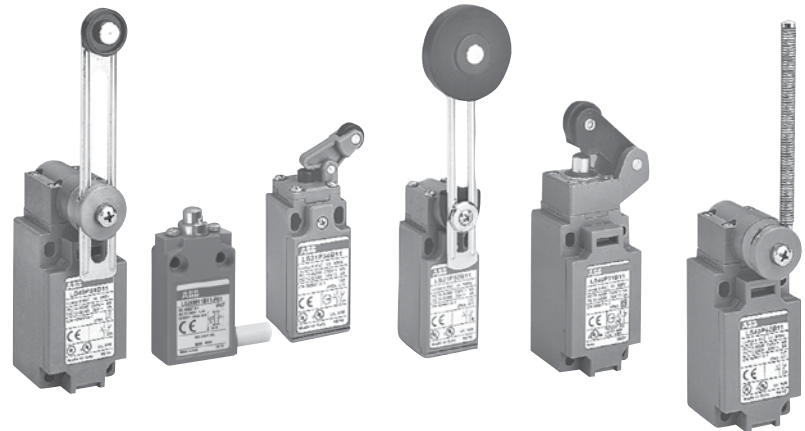
General technical data8.73 - 8.80

Notes

Limit switches



Limit Switches General information



Description

Limit switches can be mounted into remote locations so that they are actuated by an object other than a human operator. They are used for detecting presence/absence, counting, travel limit, and more.

Limit switches are made of reinforced UL-V0 thermoplastic fiberglass, offer double insulation and a degree of protection of IP 65 and UL Type 4.

Casings come in 4 dimensions:

- 30mm width
- 35mm width (miniature prewired only)
- 40mm width
- 60mm width

Applications

Easy to use, electromechanical limit switches offer specific qualities:

- Visible operation
- Electrically separated contacts
- Precise operating points (consistency)
- Immune to electromagnetic disturbances

Limit switches used for these mechanical applications:

- Presence/absence
- Positioning and travel limit
- Objects passing/counting

UL Listed file #E191693

Plastic Limit switches


ABB

Limit Switches

Plastic casing, 30mm, 40mm, & 60mm



Description

Limit switches are made of reinforced UL-V0 thermoplastic fiberglass, offer double insulation  and a degree of protection of IP 65 and UL Type 4.

Casings come in 3 dimensions:

- 30mm width
– LS35P
- 40mm width
– LS45P
- 60mm width
– LS75P

Applications

Easy to use, electromechanical limit switches offer specific qualities:

- Visible operation
- Electrically separated contacts
- Precise operating points (consistency)
- Immune to electromagnetic disturbances

Limit switches used for these mechanical applications:

- Presence/absence
- Positioning and travel limit
- Objects passing/counting

UL Listed file #E191693

General information

30mm, 40mm & 60mm, IP65, UL Type 4

Applications

Easy to use, electromechanical limit switches offer specific qualities:

- Visible operation
- Able to switch strong currents (10 A conventional thermal current)
- Electrically separated contacts
- Precise operating points (consistency)
- Immune to electromagnetic disturbances

Limit switches used for these mechanical applications:

- Presence/absence
- Positioning and travel limit
- Objects passing/counting

Description

Limit switches, which are made of reinforced UL-V0 thermoplastic fiberglass, offer double insulation  and a degree of protection of IP 65 and UL type 4.

Casings come in 3 dimensions:

- 30mm width
– LS35P
- 40mm width
– LS45P
- 60mm width
– LS75P

8


30 or 40mm width casings with standardized dimensions corresponding to:

- EN 50047 for 30mm width
- EN 50041 for 40mm width

Mounting the casing

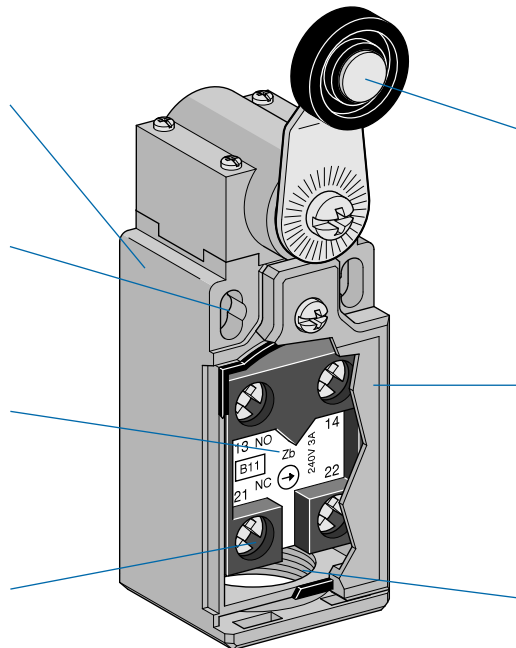
- 2 x M4 screws on top part for 30mm width
- 2 or 4 x M5 screws for 40mm width
- 2 or 4 x M5 screws for 60mm width

Block of 2 contacts

- Contact configuration: N.O. + N.C., 2 N.O., 2 N.C.
- Positive opening operation 
- Snap action or slow action
- Zb shape: the 2 contacts are electrically separated

Connecting terminals

- M3.5 (+,-) pozidriv 2 screw
- Screw head with captive cable clamp
- Markings conform with IEC 947-1, IEC 947-5-1, EN 50005 and 50013 standards



A variety of operating heads

- Plain plunger
 - Roller plunger
 - Roller lever, adjustable or not, etc.
- Assembled using 4 x \varnothing 3 screws for 30mm width
Assembled using 4 x \varnothing 4 screws for 40mm width

Cover

- Closed using \varnothing 3 screws for 30mm width
 - Self clipping closure for 40mm width
- One piece sealing gasket to ensure tightness

Electrical connection

- 1 x Pg 11 cable gland for LS31P
- 1 x Pg 13.5 cable gland for LS30P
- 1 x Pg 13.5 cable gland for LS40P
- 1 x 1/2" NPT cable gland for LS35P (standard)
- 1 x 1/2" NPT cable gland for LS45P (standard)

General information

30mm, 40mm & 60mm, IP65, UL Type 4
Catalog number explanation

Catalog number explanation

LS 3 5 P 41 B 11

Limit switch

Casing width

3: 30mm
4: 40mm
7: 60mm

Electrical connection

0: pg 13.5
1: pg 11
5: 1/2" NPT (standard)

Plastic casing

Operating heads (see selection guides)

30mm = codes 10...92
40mm = codes 11...92
60mm = codes 11...98 ①

Contact block

11: 1 N.O. contact + 1 N.C. contact
20: 2 N.O. contacts
02: 2 N.C. contacts

Contact type

B: Zb Snap action
L: Zb Slow action (contact dependent)
D: Zb Slow action non-overlapping late make
C: Zb Slow action overlapping early make

① For 60mm components, contact factory.

30mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT

Movement to be detected

On end



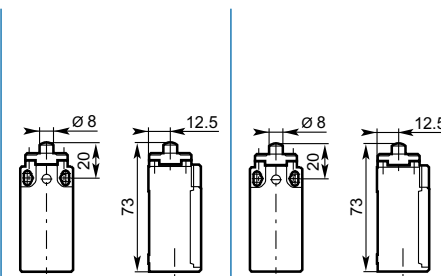
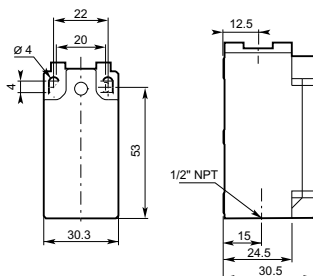
Operating head type

		Plain thermoplastic plunger	Plain steel plunger
Conformity / (N.C. contact with positive opening operation)		EN 50 047	EN 50 047
Maximum actuation speed	m/s	0.5	0.5
Min. force: - actuation	N	9	9
- positive opening operation	N	44	44

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	Catalog number	LS35P10B11	LS35P11B11
B11 = Snap action contacts 	Operation diagram		
D11 = Non-overlapping slow action contacts 	Operation diagram		
C11 = Overlapping slow action contacts 	Operation diagram		
L02 = Slow action contacts 	Operation diagram		
L20 = Slow action contacts 	Operation diagram		
B02 = Snap action contacts 	Operation diagram		
Weight (packing per unit)	oz.	2.29	2.46

Approximate dimensions (mm)



30mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT

30° Cam Translat.

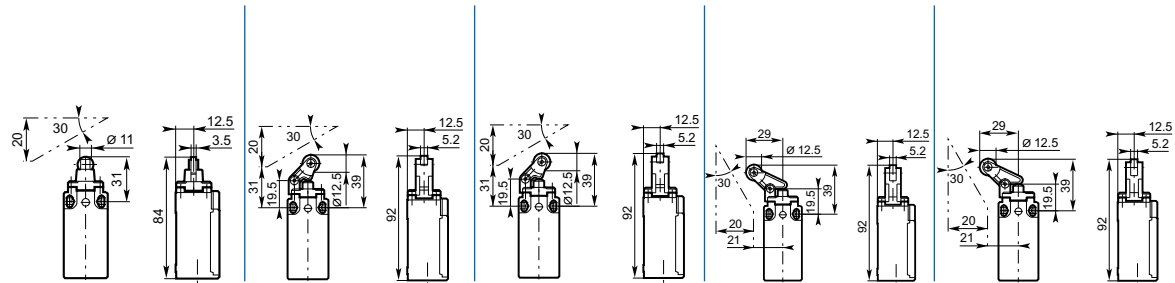
30° Unidirectional Cam Translation Movement



Plastic roller plunger	Plastic roller lever on plastic plunger	Plastic roller lever on steel plunger	Plastic roller lever on steel plunger	Plastic roller lever on plastic plunger
EN 50 047	EN 50 047	EN 50 047		
0,3	1	1	1	1
12	7	7	3	3
41	24	24	24	24

LS35P13B11	LS35P30B11	LS35P31B11	LS35P32B11	LS35P34B11
0 1.4 3.3 7.8 11.2 mm 21-22 13-14 13-14	0 3.0 7.1 16.9 24.4 mm 21-22 13-14 13-14	0 3.0 7.1 16.9 24.4 mm 21-22 13-14 13-14	0 2.6 6.2 14.7 21.3 mm 21-22 13-14 13-14	0 2.6 6.2 14.7 21.3 mm 21-22 13-14 13-14
LS35P13D11	LS35P30D11	LS35P31D11	LS35P32D11	LS35P34D11
0 2.6 5.1 11.4 mm 21-22 13-14 4.7	0 5.6 10.9 24.4 mm 21-22 13-14 10.1	0 5.6 10.9 24.4 mm 21-22 13-14 10.1	0 4.9 9.4 21.1 mm 21-22 13-14 8.8	0 4.9 9.4 21.1 mm 21-22 13-14 8.8
LS35P13C11	LS35P30C11	LS35P31C11	LS35P32C11	LS35P34C11
0 4.6 7.0 11.4 mm 21-22 13-14 2.6	0 9.8 15.0 24.4 mm 21-22 13-14 5.6	0 9.8 15.0 24.4 mm 21-22 13-14 5.6	0 8.5 13.0 21.1 mm 21-22 13-14 4.9	0 8.5 13.0 21.1 mm 21-22 13-14 4.9
LS35P13L02	LS35P30L02	LS35P31L02	LS35P32L02	LS35P34L02
0 2.3 4.7 11.4 mm 11-12 21-22	0 4.9 10.1 24.4 mm 11-12 21-22	0 4.9 10.1 24.4 mm 11-12 21-22	0 4.2 8.8 21.1 mm 11-12 21-22	0 4.2 8.8 21.1 mm 11-12 21-22
LS35P13L20	LS35P30L20	LS35P31L20	LS35P32L20	LS35P34L20
0 2.3 11.4 mm 13-14 23-24	0 4.9 24.4 mm 13-14 23-24	0 4.9 24.4 mm 13-14 23-24	0 4.2 21.1 mm 13-14 23-24	0 4.2 21.1 mm 13-14 23-24
LS35P13B02	LS35P30B02	LS35P31B02	LS35P32B02	LS35P34B02
0 1.4 3.3 7.8 11.2 mm 11-12 21-22 2.46	0 3.0 7.1 16.9 24.4 mm 11-12 21-22 2.29	0 3.0 7.1 16.9 24.4 mm 11-12 21-22 2.46	0 2.6 6.2 14.7 21.3 mm 11-12 21-22 2.64	0 2.6 6.2 14.7 21.3 mm 11-12 21-22 2.46

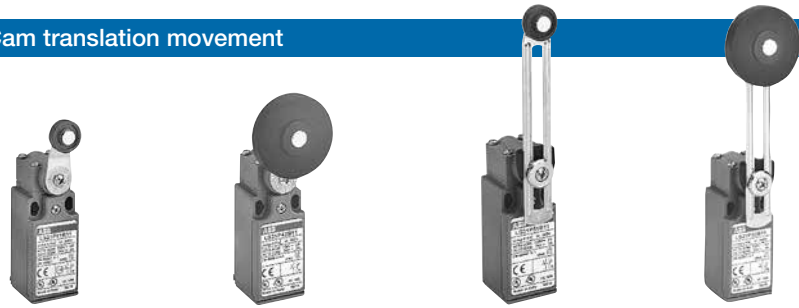
Approximate dimensions (in mm)



30mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT

Movement to be detected

30° Cam translation movement



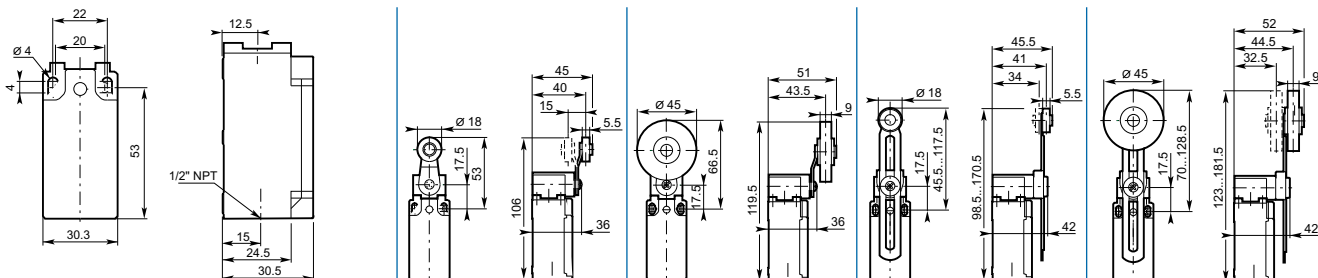
Operating head type

	Ø 18 Polyamide roller lever	Ø 45 Rubber roller lever	Adjustable Ø 18 polyamide roller lever	Adjustable Ø 45 rubber roller lever
Conformity / (N.C. contact with positive opening operation)	EN 50 047			
Maximum actuation speed	m/s 1.5	1.5	1.5	1.5
Min. torque:	N.m 0.10	0.10	0.10	0.10
- actuation	N.m 0.32	—	—	—
- positive opening operation				

Additional technical data

B11 = Snap action contacts	Catalog number	LS35P41B11	LS35P42B11	LS35P51B11	LS35P52B11
	Operation diagram				
D11 = Non-overlapping slow action contacts	Catalog number	LS35P41D11	LS35P42D11	LS35P51D11	LS35P52D11
	Operation diagram				
C11 = Overlapping slow action contacts	Catalog number	LS35P41C11	LS35P42C11	LS35P51C11	LS35P52C11
	Operation diagram				
L02 = Slow action contacts	Catalog number	LS35P41L02	LS35P42L02	LS35P51L02	LS35P52L02
	Operation diagram				
L20 = Slow action contacts	Catalog number	LS35P41L20	LS35P42L20	LS35P51L20	LS35P52L20
	Operation diagram				
B02 = Snap action contacts	Catalog number	LS35P41B02	LS35P42B02	LS35P51B02	LS35P52B02
	Operation diagram				
Weight (packing per unit)	oz.	3.17	4.23	3.52	4.58

Approximate dimensions (mm)



30mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT

Plastic
Limit switches

Movement to be detected



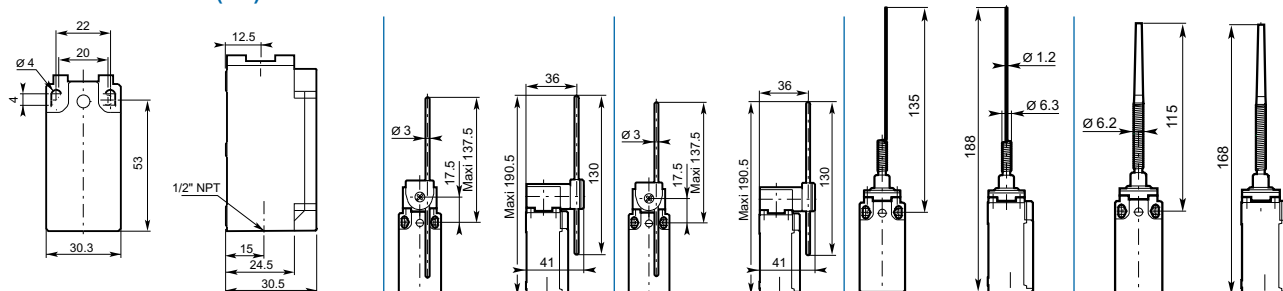
Operating head type

	Adjustable \varnothing 3 stainless steel rod lever	Adjustable \varnothing 3 fiber-glass rod lever	Spring rod	Flexible rod with insulated end
Conformity / \ominus (N.C. contact with positive opening operation)				
Maximum actuation speed	m/s 1.5	m/s 1.5	m/s 1	m/s 1
Min. torque: - actuation	N.m 0.10	N.m 0.10	N.m 0.12	N.m 0.12
- positive opening operation	N.m -	N.m -	N.m -	N.m -

8

B11 = Snap action contacts	Catalog number	LS35P71B11	LS35P72B11	LS35P91B11	LS35P92B11
	Operation diagram				
D11 = Non-overlapping Slow action contacts	Catalog number	LS35P71D11	LS35P72D11	LS35P91D11	LS35P92D11
	Operation diagram				
C11 = Overlapping Slow action contacts	Catalog number	LS35P71C11	LS35P72C11	LS35P91C11	LS35P92C11
	Operation diagram				
L02 = Slow action contacts	Catalog number	LS35P71L02	LS35P72L02	LS35P91L02	LS35P92L02
	Operation diagram				
L20 = Slow action contacts	Catalog number	LS35P71L20	LS35P72L20	LS35P91L20	LS35P92L20
	Operation diagram				
B02 = Snap action contacts	Catalog number	LS35P71B02	LS35P72B02	LS35P91B02	LS35P92B02
	Operation diagram				
Weight (packing per unit)	oz.	3.52	3.52	2.82	2.82

Approximate dimensions (mm)



40mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT

Movement to be detected

On end 30° Cam translation Unidirectional

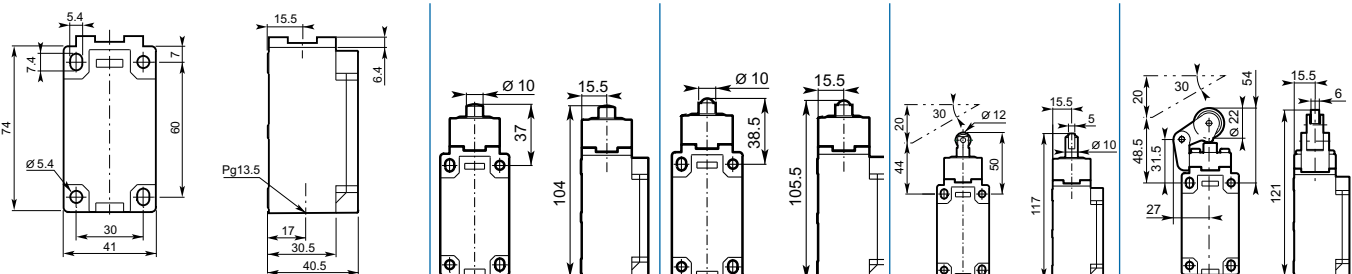


Operating head type

	Steel plain plunger	Steel ball plunger	Steel roller plunger	Polyamide roller lever
Conformity / \oplus (N.C. contact with positive opening operation)	EN 50 041 \oplus	EN 50 041 \oplus	EN 50 041 \oplus	\oplus
Maximum actuation speed m/s	0.5	0.5	0.5	1
Min. force/torque:				
- actuation	22 N	22 N	16 N	12 N
- positive opening operation	66 N	66 N	48 N	40 N

	Catalog number	LS45P11B11	LS45P12B11	LS45P13B11	LS45P31B11
B11 = Snap action contacts					
	Operation diagram				
D11 = Non-overlapping Slow action contacts					
	Operation diagram				
C11 = Overlapping Slow action contacts					
	Operation diagram				
L02 = Slow action contacts					
	Operation diagram				
L20 = Slow action contacts					
	Operation diagram				
B02 = Snap action contacts					
	Operation diagram				
Weight (packing per unit)	oz	4.93	4.93	5.11	6.17

Approximate dimensions (mm)



40mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT

Plastic
Limit switches

30° Cam transl.

30° Cam translation movement

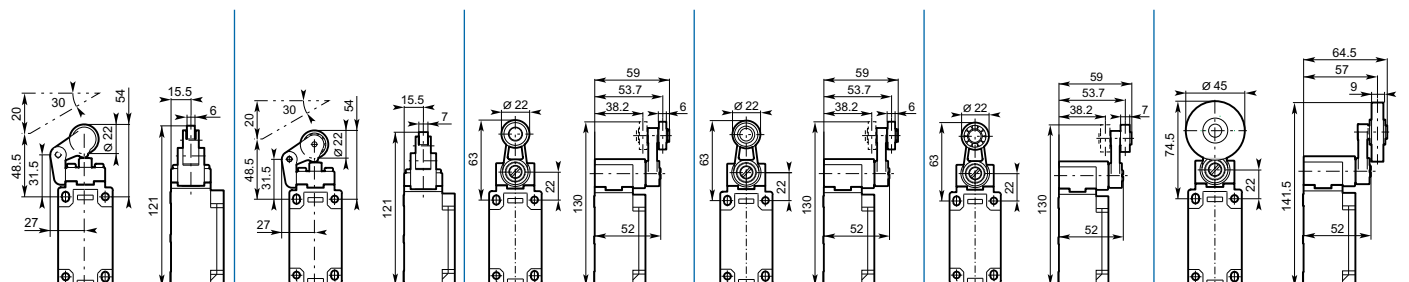


Stainless steel roller lever	Ball-bearing roller lever	Ø 22 Polyamide roller lever	Ø 22 Stainless steel roller lever	Ø 22 Ball-bearing roller lever	Ø 45 Rubber roller lever
1	1	1.5	1.5	1.5	1.5
12 N	12 N	0.15 N.m	0.15 N.m	0.15 N.m	0.15 N.m
40 N	40 N	0.44 N.m	0.44 N.m	0.44 N.m	-

8

LS45P32B11 	LS45P33B11 	LS45P41B11 	LS45P42B11 	LS45P43B11 	LS45P44B11
LS45P32D11 	LS45P33D11 	LS45P41D11 	LS45P42D11 	LS45P43D11 	LS45P44D11
LS45P32C11 	LS45P33C11 	LS45P41C11 	LS45P42C11 	LS45P43C11 	LS45P44C11
LS45P32L02 	LS45P33L02 	LS45P41L02 	LS45P42L02 	LS45P43L02 	LS45P44L02
LS45P32L20 	LS45P33L20 	LS45P41L20 	LS45P42L20 	LS45P43L20 	LS45P44L20
LS45P32B02 	LS45P33B02 	LS45P41B02 	LS45P42B02 	LS45P43B02 	LS45P44B02
6.52	6.52	6.52	6.87	6.87	7.23

Approximate dimensions (in mm)



40mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT

Movement to be detected



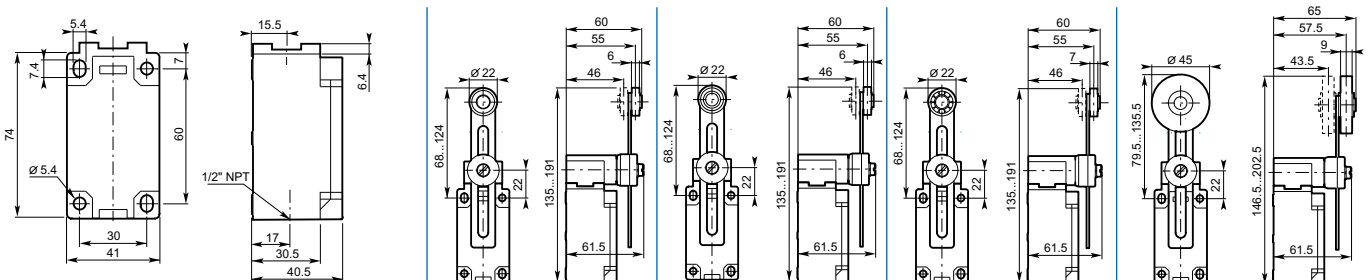
Operating head type

	Adjustable Ø 22 polyamide roller lever	Adjustable Ø 22 stainless steel roller lever	Adjustable Ø 22 stainless steel ball-bearing roller lever	Adjustable Ø 45 rubber roller lever
Conformity / \ominus (N.C. contact with positive opening operation)				
Maximum actuation speed m/s	1.5	1.5	1.5	1.5
Min. torque: - actuation N.m	0.15	0.15	0.15	0.15
- positive opening operation N.m	—	—	—	—

8

B11 = Snap action contacts 	Catalog number	LS45P51B11	LS45P52B11	LS45P53B11	LS45P54B11
D11 = Non-overlapping Snap action contacts 	Catalog number	LS45P51D11	LS45P52D11	LS45P53D11	LS45P54D11
C11 = Overlapping Slow action contacts 	Catalog number	LS45P51C11	LS45P52C11	LS45P53C11	LS45P54C11
L02 - Slow action contacts 	Catalog number	LS45P51L02	LS45P52L02	LS45P53L02	LS45P54L02
L20 = Slow action contacts 	Catalog number	LS45P51L20	LS45P52L20	LS45P53L20	LS45P54L20
B02 = Snap action contacts 	Catalog number	LS45P51B02	LS45P52B02	LS45P53B02	LS45P54B02
Weight (packing per unit) oz		6.70	7.05	7.05	7.05

Approximate dimensions (in mm)



40mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT

Movement to be detected



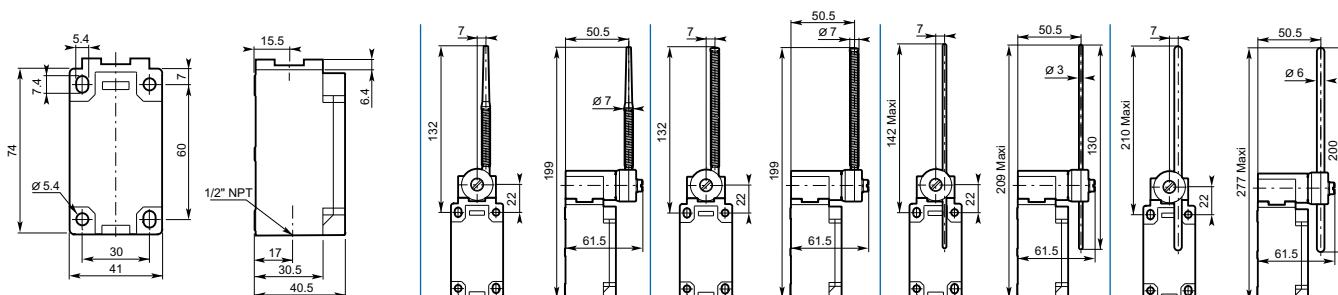
Operating head type

	Flexible lever with insulated end	Coil spring lever	Adjustable Ø 3 stainless steel rod lever	Adjustable ø 6 polyamide rod lever
Conformity / \ominus (N.C. contact with positive opening operation)			EN 50 041	EN 50 041
Maximum actuation speed	m/s 1.5	1.5	1.5	1.5
Min. torque:				
- actuation	N.m 0.15	0.15	0.15	0.15
- positive opening operation	N.m -	-	-	-

8

B11 = Snap action contacts	Catalog number	LS45P61B11	LS45P62B11	LS45P71B11	LS45P72B11
	Operation diagram				
D11 = Non-overlapping Slow action contacts	Catalog number	LS45P61D11	LS45P62D11	LS45P71D11	LS45P72D11
	Operation diagram				
C11 = Overlapping Slow action contacts	Catalog number	LS45P61C11	LS45P62C11	LS45P71C11	LS45P72C11
	Operation diagram				
L02 - Slow action contacts	Catalog number	LS45P61L02	LS45P62L02	LS45P71L02	LS45P72L02
	Operation diagram				
L20 = Slow action contacts	Catalog number	LS45P61L20	LS45P62L20	LS45P71L20	LS45P72L20
	Operation diagram				
B02 = Snap action contacts	Catalog number	LS45P61B02	LS45P62B02	LS45P71B02	LS45P72B02
	Operation diagram				
Weight (packing per unit)	oz	6.70	6.70	6.52	6.52

Approximate dimensions (in mm)



40mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT

Movement to be detected

Multidirectional



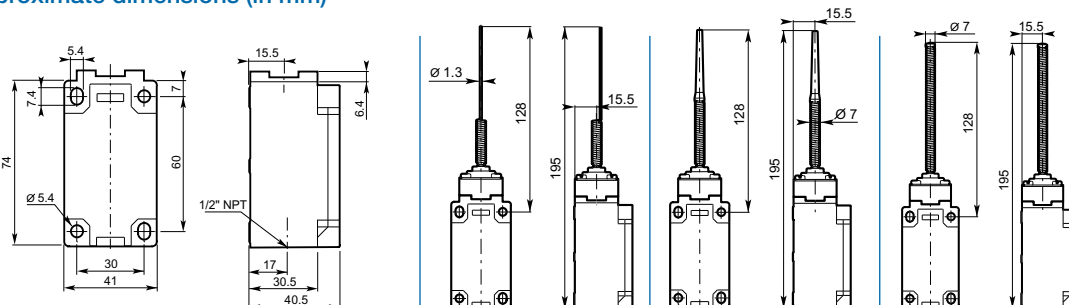
Operating head type

	Spring rod	Flexible rod with insulated end	Coil spring rod
Conformity / \ominus (N.C. contact with positive opening operation)			
Maximum actuation speed	m/s 1	m/s 1	m/s 1
Min. torque: - actuation	N.m 0.18	N.m 0.18	N.m 0.18
- positive opening operation	N.m -	N.m -	N.m -

8

	Catalog number	LS45P91B11	LS45P92B11	LS45P93B11
B11 = Snap action contacts	Catalog number	LS45P91B11	LS45P92B11	LS45P93B11
	Operation diagram			
D11 = Non-overlapping Slow action contacts	Catalog number	LS45P91D11	LS45P92D11	LS45P93D11
	Operation diagram			
C11 = Overlapping Slow action contacts	Catalog number	LS45P91C11	LS45P92C11	LS45P93C11
	Operation diagram			
L02 = Slow action contacts	Catalog number	LS45P91L02	LS45P92L02	LS45P93L02
	Operation diagram			
L20 = Slow action contacts	Catalog number	LS45P91L20	LS45P92L20	LS45P93L20
	Operation diagram			
B02 = Snap action contacts	Catalog number	LS45P91B02	LS45P92B02	LS45P93B02
	Operation diagram			
Weight (packing per unit)	oz	4.76	4.93	5.11

Approximate dimensions (in mm)



Notes

Plastic
Limit switches

60mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT

Movement to be detected

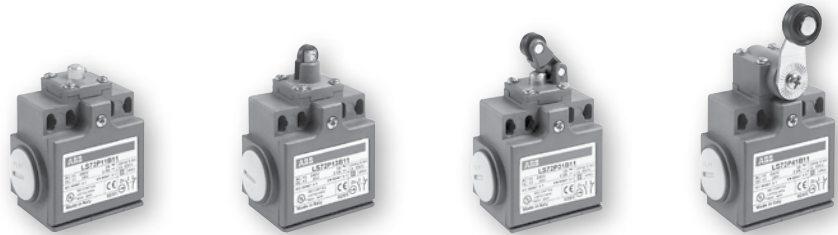
On end

30° Cam Translat.

Unidirectional

30° Cam Translat.

8



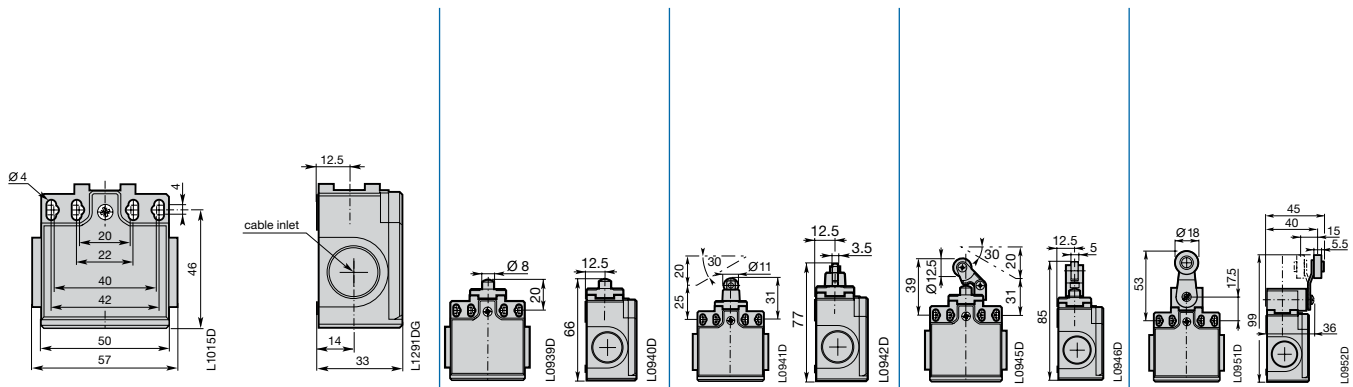
Actuator

	Metal plunger	ø11 plastic roller plunger	ø12.5 plastic roller lever on steel plunger	ø18 plastic roller lever
Conformity / \ominus (N.C. contact with positive opening operation) – Maximum actuation speed Min. force / torque: - actuation - positive opening operation	\ominus 0.5 m/s 15 N 45 N	\ominus 0.3 m/s 12 N 41 N	\ominus 1 m/s 7 N 24 N	\ominus 1.5 m/s 0.1 N.m 0.32 N.m

B11 = Snap action contacts	Catalog Number	LS75P11B11	LS75P13B11	LS75P31B11	LS75P41B11
	Operation diagram				
D11 = Non-overlapping Slow action contacts	Catalog Number	LS75P11D11	LS75P13D11	LS75P31D11	LS75P41D11
	Operation diagram				
Weight (packing per unit)	oz	3.52	3.52	3.70	4.40

Special heads, accessories and special contact arrangement or particular function: please consult us.

Approximate dimensions (mm)



60mm, IP 65, UL Type 4, PG 13.5 and 1/2" NPT

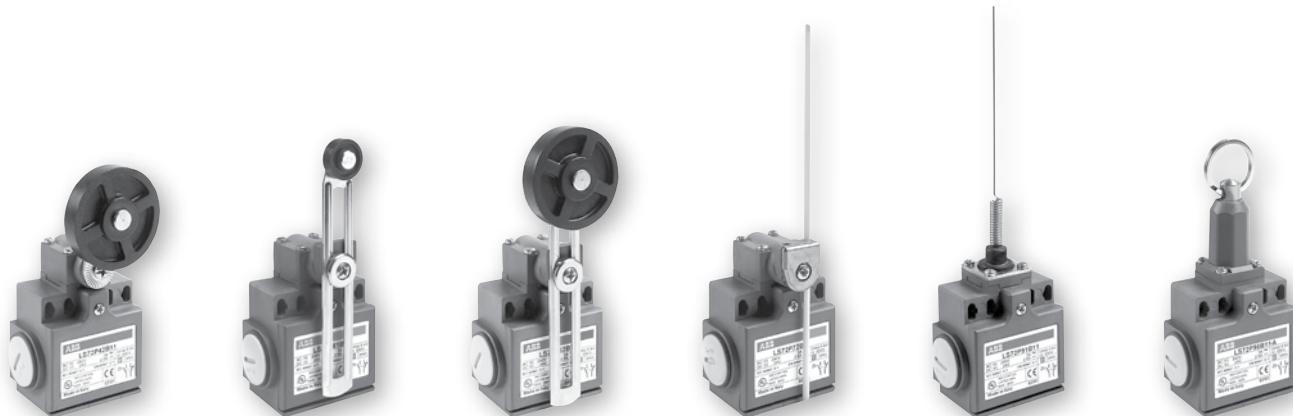
Plastic
Limit switches

30° Cam Translation Movement

Fully Direction Trans.

Multidirectional

Pull action



8

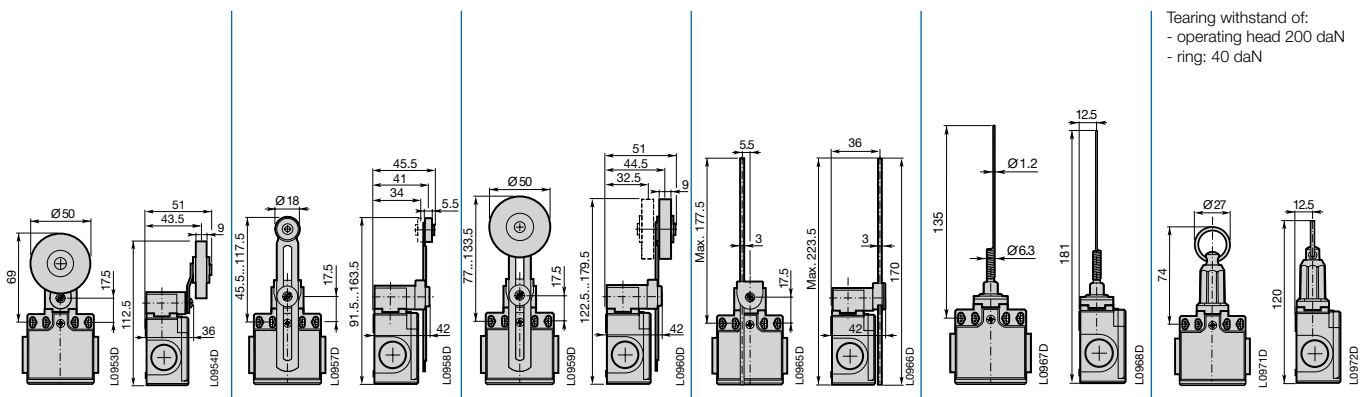
ø50 rubber roller lever	Adjustable ø18 plastic roller lever	Adjustable ø50 rubber roller lever	Adjustable ø3 fibre-glass rod lever	Spring rod lever	Pull action with ring
1.5 m/s 0.1 N.m 0.32 N.m	1.5 m/s 0.1 N.m 0.32 N.m	1.5 m/s 0.1 N.m 0.32 N.m	1.5 m/s 0.1 N.m 0.32 N.m	1 m/s 0.12 N.m -	0.5 m/s 30 N -

LS75P42B11	LS75P51B11	LS75P52B11	LS75P72B11	LS75P91B11	LS75P98B11-A
0 17° 31° 47° 74°	0 17° 31° 47° 74°	0 17° 31° 47° 74°	0 17° 31° 47° 74°	0 12° 23° 36°	0 0.9 2.0 5.6 mm
21-22 13-14	21-22 13-14	21-22 13-14	21-22 13-14	21-22 13-14	21-22 13-14
LS75P42D11	LS75P51D11	LS75P52D11	LS75P72D11	LS75P91D11	LS75P98D11-A
0 21° 37° 74°	0 21° 37° 74°	0 21° 37° 74°	0 21° 37° 74°	0 14° 36°	0 1.0 5.6 mm
21-22 13-14	21-22 13-14	21-22 13-14	21-22 13-14	21-22 13-14	21-22 13-14
5.11	4.76	5.46	4.23	3.88	5.11

Special heads, accessories and special contact arrangement or particular function: please consult us.

■ Closed contact / □ Open contact

Approximate dimensions (in mm)



Tearing withstand of:
- operating head 200 daN
- ring: 40 daN

Notes

Plastic limit switches Components

ABB

Components

Plastic limit switches
30mm, 40mm & 60mm ①

① For 60mm components, contact factory.

Components

Catalog number explanation

30mm, IP 65, UL Type 4



LS35P40B11

Casings with contact block and angular motion head (without actuator)

	LS	35	P	40	B11	
Limit Switch	LS					
Casing width 30 mm		3				
Cable inlet						
1 cable inlet for Pg 13.5 cable gland				0		
1 cable inlet for Pg 11 cable gland				1		
1 cable inlet by 1/2" NPT plastic adaptor				5		
Plastic casing			P			
Operating heads (without actuator)						
With angular movement for non-adjustable roller levers				40		
With angular movement for adjustable roller or rod levers				50		
						Contacts
						11 1 N.O. + 1 N.C. contacts
						02 2 N.C. contacts
						20 2 N.O. contacts
						Snap action
						B Zb Snap
						Dependent (slow) action
						L Zb Slow / Simultaneous
						D Zb Non-overlapping late make
						C Zb Overlapping early make

8



LSA30X41

Separate actuators (lever, key)

	LS	A	30	X	41	
Limit Switch	LS					
Actuator (lever, key)		A				
Casing width: 30 mm			30			
						Actuator:
						05, 06 key
						41, 42 non-adjustable roller lever
						51, 52 adjustable roller lever
						71, 72, 73, 74 adjustable rod lever
						For casing of:
						M Metal
						P Plastic
						X Plastic or metal

Separate contact blocks



LSC30XD11

	LS	C	30	X	D	11	
Limit Switch	LS						
Contact blocks		C					
Casing width 30 mm			30				
For casing of:							
Metal					M		
Plastic					P		
Plastic or metal					X		
							Contacts
							11 1 N.O. + 1 N.C. contacts
							02 2 N.C. contacts
							20 2 N.O. contacts
							Snap action
							B Zb Snap
							Dependent (slow) action
							L Zb Slow / Simultaneous
							D Zb Non-overlapping late make
							C Zb Overlapping early make

Components

Selection guide

30mm, IP 65, UL Type 4

Non-adjustable actuators



LSA30X42 ⊗



LSA30X41 ⊗ (A Shape)

Roller levers (non-adjustable)

Adjustable actuators



LSA30X52 ⊗



LSA30X51 ⊗

Adjustable roller levers



LSA30X71 ⊗

Adjustable rod levers



LSA30X72 ⊗



LSA30X73 ⊗



LSA30X74 ⊗

Casings



LS35P40 casings (equipped with angular motion head) for roller levers (**non-adjustable**)

- ⊕ LS35P40B11, LS35P40D11, LS35P40C11, LS35P40L02, LS35P40B02
- ⊗ LS35P40L20



LS30P50 ... LS35P50 (equipped with angular motion head) for **adjustable** roller or rod levers

- ⊗ LS35P50B11, LS35P50D11, LS35P50C11, LS35P50L02, LS35P50L20, LS35P50B02

Contact blocks



- ⊕ LSC30XB11, LSC30XD11, LSC30XC11, LSC30XL02, LSC30XB02
- ⊗ LSC30XL20

⊕ Suitable for positive opening operation (IEC 60947-5-1 and EN 50041).

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊕ are fitted.

Components

Casings with angular motion head 30mm, IP 65, UL Type 4



LS35P40B11

⊖ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

Casings with angular motion head for non-adjustable roller levers, delivered without actuator

Contact blocks						Positive opening operation	Actuation speed max. m/s	Unit weight oz. (1 pc)	Catalog number
B11	D11	C11	L02	L20	B02				
1						⊖	1.5	3.24	LS35P40B11
	1					⊖	1.5	3.24	LS35P40D11
		1				⊖	1.5	3.24	LS35P40C11
			1			⊖	1.5	3.24	LS35P40L02
				1		⊗	1.5	3.24	LS35P40L20
					1	⊖	1.5	3.24	LS35P40B02

Casings with angular motion head for adjustable rod or roller levers, delivered without actuator

Contact blocks						Positive opening operation	Actuation speed max. m/s	Unit weight oz (1 pc)	Catalog number
B11	D11	C11	L02	L20	B02				
1						⊗	1.5	3.24	LS35P50B11
	1					⊗	1.5	3.24	LS35P50D11
		1				⊗	1.5	3.24	LS35P50C11
			1			⊗	1.5	3.24	LS35P50L02
				1		⊗	1.5	3.24	LS35P50L20
					1	⊗	1.5	3.24	LS35P50B02

Actuators for LS35P40 (delivered with M3.5 screw)

To be actuated by 30° cam

ø 18mm polyamide roller lever ⊕

ø 45mm rubber roller lever ⊕

⊖

⊗

—

—

0.42

0.91

LSA30X41

LSA30X42

Actuators for LS35P50 (delivered with M3.5 screw and adaptation parts)

To be actuated by 30° cam

ø 18mm adjustable polyamide roller lever ⊕

ø 45mm adjustable rubber roller lever ⊕

⊗

⊗

—

—

0.77

1.23

LSA30X51

LSA30X52

To be actuated by fully directional translation movement

ø 3mm adjustable inox rod lever, 170mm ⊕

ø 3mm adjustable fiberglass rod lever, 170mm ⊕

ø 6mm adjustable polyamide rod lever, 195mm ⊕

ø 6mm adjustable fiberglass rod lever, 195mm ⊕

⊗

⊗

⊗

⊗

—

—

—

—

0.74

0.52

0.63

0.77

LSA30X71

LSA30X72

LSA30X73

LSA30X74

Right angle key for LS35P15

Right angle key (mounting 13mm)

⊖

—

0.45

LSA30P05

Straight key for LS35P16

Straight key (mounting 13mm)

⊖

—

0.45

LSA30P06

Separate contact blocks

1 NC & 1 NO 2-pole snap action

1 NC & 1 NO 2-pole non-overlapping slow action

1 NO & 1 NC 2-pole non-overlapping slow action

2 NC 2-pole simultaneous slow action

2 NO 2-pole simultaneous slow action

2 NC 2-pole snap action

⊖

⊖

⊖

⊖

⊖

⊖

—

—

—

—

—

—

0.88

0.88

0.88

0.88

0.88

0.88

LSC30XB11

LSC30XD11

LSC30XC11

LSC30XL02

LSC30XL20

LSC30XB02

1/2" NPT plastic adaptors

1 piece

—

—

0.24

LSR1305



LSA30X41



LSA30X42



LSA30X51



LSA30X71



LSC30XD11



LSR1305

⊕ Free position adjustment of lever 10° by 10° over 360°.

Components

Catalog number explanation

40mm, IP 65, UL Type 4

Bodies with contact block for rectilinear or angular motion heads



LS45P00B11

	LS	45	P	00	B11
Limit Switch	LS				
Casing width 40 mm		4			
Cable inlet					
1 cable inlet for Pg 13.5 cable gland				0	
1 cable inlet for 1/2" NPT				5	
Plastic casing			P		
Without operating head				00	
					Contacts
					11 1 N.O. + 1 N.C. contacts
					02 2 N.C. contacts
					20 2 N.O. contacts
					Snap action
					B Zb Snap
					Dependent (slow) action
					L Zb Slow / Simultaneous
					D Zb Non-overlapping late make
					C Zb Overlapping early make



LSTH41

Operating heads

	LS	T	H	41
Limit Switch	LS			
Operating head		T		
For plastic casing 40 mm width				40
				Operator head:
				11 ... 14, 19 with rectilinear movement (plain plunger, steel ball plunger or roller plunger)
				31 ... 37 with rectilinear movement (roller lever on steel plunger)
				40 with angular movement (without actuator) actuator to be ordered separately
				41 ... 44 with angular movement (roller lever)
				50 with angular movement (without actuator) actuator to be ordered separately
				51 ... 54 with angular movement (adjustable roller lever)
				61, 62 flexible lever (spring)
				71, 72, 73 adjustable lever (rod)
				91 ... 93 multidirectional angular movement (spring rod)



LSA40X51

Separate actuators (roller lever, adjustable roller or rod levers, etc.)

	LS	A	40	X	51
Limit Switch	LS				
Actuator (roller)		A			
Casing width: 40 mm			40		
					Actuator:
					41 ... 44 non-adjustable roller lever
					51 ... 54 adjustable roller lever
					61, 62 flexible lever (spring)
					71, 72, 73 adjustable lever (rod)
					For casing of:
					M Metal
					P Plastic
					X Plastic or metal

Separate contact blocks



LSC40XC11

	LS	C	40	X	C	11
Limit Switch	LS					
Contact blocks		C				
Casing width: 40 mm			40			
For casing of:						Contacts
Metal						11 1 N.O. + 1 N.C. contacts
Plastic						02 2 N.C. contacts
Plastic or metal						20 2 N.O. contacts
						Snap action:
						B Zb Snap
						Dependent (slow) action:
						L Zb Slow / Simultaneous
						D Zb Non-overlapping late make
						C Zb Overlapping early make

Components

Selection guide

40mm, IP 65, UL Type 4

Rectilinear motion



LSTH37 ⊕



LSTH33 ⊕



LSTH36 ⊕



LSTH32 ⊕



LSTH12 ⊕
(B Shape)



LSTH19 ⊕
(C Shape)



LSTH14 ⊕
(B Shape)



LSTH35 ⊕



LSTH13 ⊕
(C Shape)



LSTH11 ⊕
(B Shape)



LSTH31 ⊕

Angular motion



LSTH54 ⊗



LSTH53 ⊗



LSTH52 ⊗



LSTH51 ⊗



LSTH93 ⊗



LSTH92 ⊗



LSTH91 ⊗



LSTH72 ⊗
(D Shape)



LSTH71 ⊗
(D Shape)



LSTH62 ⊗



LSTH61 ⊗

LSTH... rectilinear motion heads

- To be actuated from end.
With plunger (plain or with ball): LSTH11, LSTH12 and LSTH14.
- To be actuated by 30° cam translation.
With roller plunger: LSTH13, LSTH19.
- To be actuated unidirectionally by 30° cam translation.
With roller lever on steel plunger: LSTH31 ... LSTH37.

LSTH... angular motion heads

- To be actuated by 30° cam translation.
With roller lever: LSTH41 ... LSTH54.
- To be actuated by fully directional translation movement.
With rod or spring lever: LSTH61 ... LSTH72.
- To be actuated multidirectionally.
With spring rod: LSTH91 ... LSTH93.



Bodies with contact block

- ⊕ LS45P00B11, LS45P00D11, LS45P00C11, LS45P00L02, LS45P00B02

- ⊗ LS45P00L20
Suitable for positive opening operation (IEC 60947-5-1 and EN 50041).

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊕ are fitted.

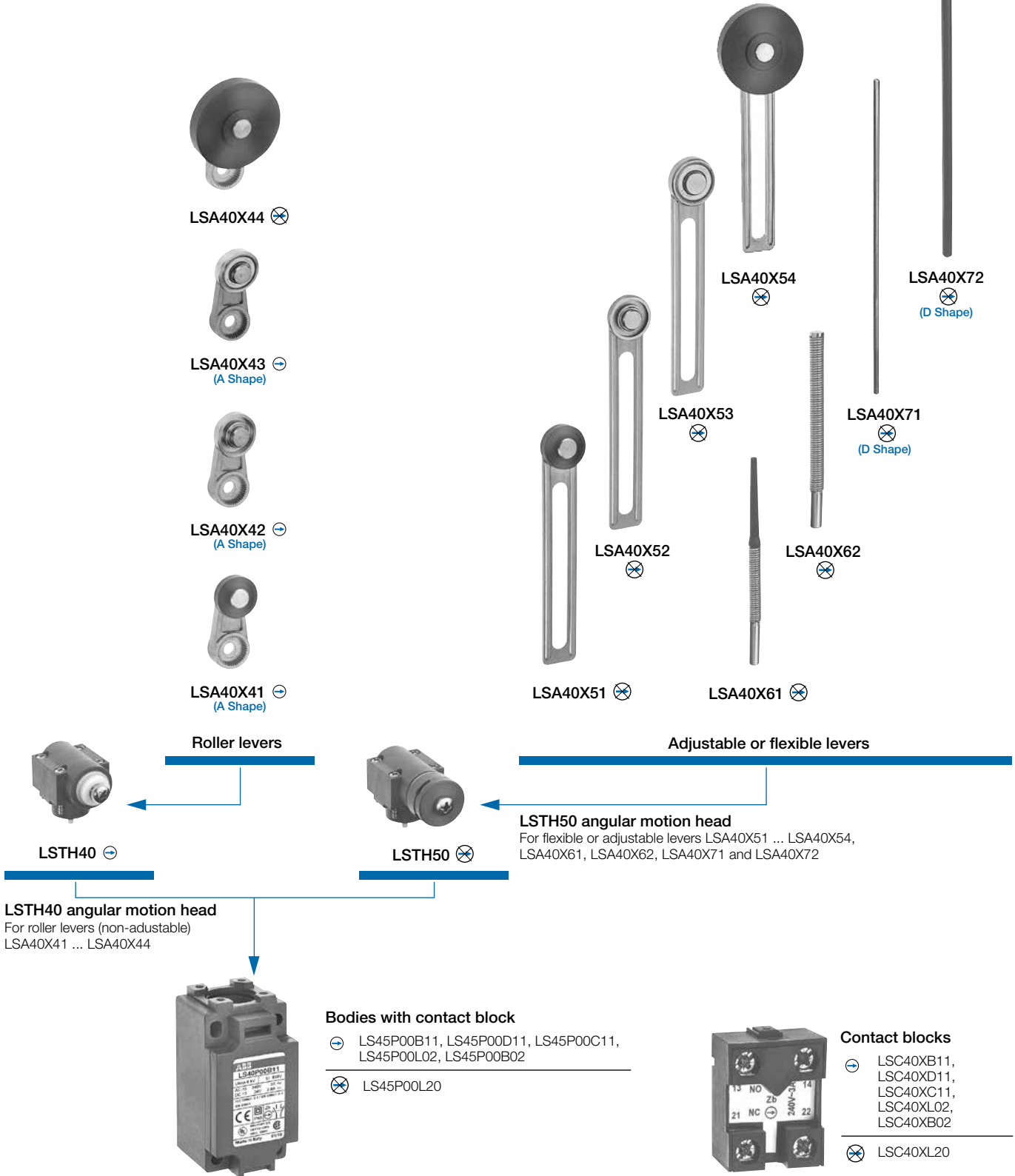
Components

Selection guide

40mm, IP 65, UL Type 4

Plastic
Limit switches

Angular motion



⊖ : Suitable for positive opening operation (IEC 60947-5-1 and EN 50041)
Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

Components

40mm, IP 65, UL Type 4

⊖ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

Bodies with contact block for rectilinear or angular motion heads

Contact blocks						Positive opening operation	Actuation speed max. m/s	Unit weight oz (1 pc)	Catalog number
B11	D11	C11	L02	L20	B02				
1						⊖	—	3.80	LS45P00B11
	1					⊖	—	3.80	LS45P00D11
		1				⊖	—	3.80	LS45P00C11
			1			⊖	—	3.80	LS45P00L02
				1		⊗	—	3.80	LS45P00L20
					1	⊖	—	3.80	LS45P00B02

Rectilinear motion heads with actuator

To be actuated by end

Steel plain plunger (zinc-plated)	⊖	0.5	1.48	LSTH11
Steel plain plunger (zinc-plated) and dust protection cup	⊖	0.5	1.51	LSTH14
Steel ball plunger	⊖	0.5	1.48	LSTH12

To be actuated by 30° cam

Steel roller plunger (zinc-plated)	⊖	0.5	1.69	LSTH13
Steel roller plunger (zinc-plated) and dust protection cup	⊖	0.5	1.69	LSTH19

To be actuated unidirectionally by 30° cam

∅ 22mm polyamide roller lever on steel plunger (zinc-plated)	⊖	1.5	1.62	LSTH31
∅ 22mm polyamide roller lever on steel plunger (zinc-plated) & dust protection cup	⊖	1.5	1.72	LSTH35
∅ 22mm stainless steel roller lever on steel plunger (zinc-plated).	⊖	1.5	1.94	LSTH32
∅ 22mm stainless steel roller lever on steel plunger (zinc-plated) & dust protection cup	⊖	1.5	2.04	LSTH36
∅ 22mm steel ball-bearing roller lever on steel plunger (zinc-plated)	⊖	1.5	2.01	LSTH33
∅ 22mm steel ball-bearing roller lever on steel plunger (zinc-plated) & dust protection cup	⊖	1.5	2.11	LSTH37



LS45P00B11



LSTH11



LSTH19



LSTH31



LSTH37

Components

40mm, IP 65, UL Type 4

⊕ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊕ are fitted.



LSTH41



LSTH51



LSTH92



LSTH40



LSA40X41



LSA40X43

Bodies with contact block for rectilinear or angular motion heads

Contact blocks	Positive opening operation	Actuation speed max. m/s	Unit weight oz (1 pc)	Catalog number
Angular motion heads with actuator				
To be actuated by 30° cam				
⊕ ∅ 22mm polyamide roller lever ⊕	⊕	1.5	2.89	LSTH41
∅ 22mm stainless steel roller lever ⊕	⊕	1.5	3.20	LSTH42
∅ 22mm steel ball-bearing roller lever ⊕	⊕	1.5	3.28	LSTH43
∅ 45mm rubber roller lever ⊕	⊗	1.5	3.45	LSTH44
∅ 22mm adjustable polyamide roller lever ⊕	⊗	1.5	3.10	LSTH51
∅ 22mm adjustable stainless steel roller lever ⊕	⊗	1.5	3.45	LSTH52
∅ 22mm adjustable steel ball-bearing roller lever ⊕	⊗	1.5	3.52	LSTH53
∅ 45mm adjustable rubber roller lever ⊕	⊗	1.5	3.70	LSTH54
To be actuated by fully directional translation movement				
Stainless steel flexible lever with insulated end ⊕	⊗	1	2.92	LSTH61
Stainless steel coil spring lever ⊕	⊗	1	3.13	LSTH62
∅ 3mm adjustable stainless steel rod lever, 195mm ⊕	⊗	1	3.06	LSTH71
∅ 6mm adjustable polyamide rod lever, 195mm ⊕	⊗	1	2.92	LSTH72
∅ 6mm adjustable fiberglass rod lever, 195mm ⊕	⊗	1	3.06	LSTH73
Multidirectional angular motion heads (to be actuated by fully directional translation movement)				
Stainless steel spring rod	⊗	1	1.62	LSTH91
Stainless steel flexible rod with insulated end	⊗	1	1.72	LSTH92
Stainless steel coil spring rod	⊗	1	1.94	LSTH93
Angular motion head without actuator for non-adjustable roller levers (delivered with M5 screw and washer)				
	⊕	1.5	1.76	LSTH40
Actuators for angular motion head LSTH40				
∅ 22mm polyamide roller lever ⊕	⊕	—	1.12	LSA40X41
∅ 22mm stainless steel roller lever ⊕	⊕	—	1.48	LSA40X42
∅ 22mm steel ball-bearing roller lever ⊕	⊕	—	1.55	LSA40X43
∅ 45mm rubber roller lever ⊕	⊗	—	1.76	LSA40X44

⊕ Free position adjustment of lever 9° by 9° over 360°.

Components

40mm, IP 65, UL Type 4

⊖ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊕ are fitted.



LSTH50



LSA40X72



LSA40X51



LSC40XB11

	Positive opening operation	Actuation speed max. m/s	Unit weight oz (1 pc)	Catalog number
Angular motion head without actuator, for flexible or adjustable levers (delivered with M5 screw, washer & adaptation parts)				
	⊖	—	2.04	LSTH50
Actuators for angular motion head LSTH50				
∅ 22mm adjustable polyamide roller lever ⊕	⊕	—	0.81	LSA40X51
∅ 22mm adjustable stainless steel roller lever ⊕	⊕	—	1.12	LSA40X52
∅ 22mm adjustable steel ball-bearing roller lever ⊕	⊕	—	1.19	LSA40X53
∅ 45mm adjustable rubber roller lever ⊕	⊕	—	1.37	LSA40X54
Stainless steel flexible lever with insulated end ⊕	⊕	—	0.59	LSA40X61
Stainless steel coil spring lever ⊕	⊕	—	0.81	LSA40X62
∅ 3mm adjustable stainless steel rod lever, 195mm ⊕	⊕	—	0.49	LSA40X71
∅ 6mm adjustable polyamide rod lever, 195mm ⊕	⊕	—	0.35	LSA40X72
∅ 6mm adjustable fiberglass rod lever, 195mm ⊕	⊕	—	0.49	LSA40X73
Contact blocks (with adaptor)				
1 NC & 1 NO 2-pole snap action	⊖	—	1.12	LSC40XB11
1 NC & 1 NO 2-pole non-overlapping slow action	⊖	—	1.12	LSC40XD11
1 NO & 1 NC 2-pole overlapping slow action	⊖	—	1.12	LSC40XC11
2 NC 2-pole simultaneous slow action	⊖	—	1.12	LSC40XL02
2 NO 2-pole simultaneous slow action	⊖	—	1.12	LSC40XL20
2 NC 2-pole snap action	⊖	—	1.12	LSC40XB02

	Positive opening operation	Actuation speed max. m/s	Unit weight oz (1 pc)	Catalog number
Contact blocks (with adaptor)				
1 NC & 1 NO 2-pole snap action	⊖	—	1.12	LSC40XB11
1 NC & 1 NO 2-pole non-overlapping slow action	⊖	—	1.12	LSC40XD11
1 NO & 1 NC 2-pole overlapping slow action	⊖	—	1.12	LSC40XC11
2 NC 2-pole simultaneous slow action	⊖	—	1.12	LSC40XL02
2 NO 2-pole simultaneous slow action	⊖	—	1.12	LSC40XL20
2 NC 2-pole snap action	⊖	—	1.12	LSC40XB02

⊕ Free position adjustment of lever 9° by 9° over 360°.

Plastic limit switches

Technical data

ABB

Technical data

Plastic limit switches
30mm, 40mm & 60mm

Technical data

IP 65, UL Type 4

General technical data

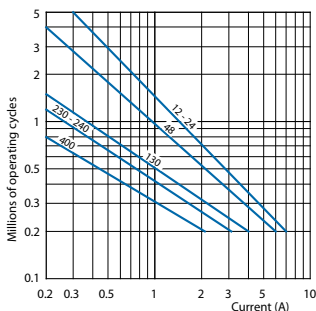
Standards	Devices conform with international IEC 947-5-1 and European EN 60 947-5-1 standards	
Certifications - Approvals	UL & CSA	
Air temperature near the device (IEC)	°C	- 25 ... + 70
- during operation	°C	- 30 ... + 80
- for storage		
Climatic withstand	According to IEC 68-2-3 and salty mist according to IEC 68-2-11	
Mounting positions	All positions are authorized	
Shock withstand (according to IEC 68-2-27 and EN 60 068-2-27)	50g ⊕ (1/2 sinusoidal shock for 11 ms) no change in contact position	
Resistance to vibrations (acc. to IEC 68-2-6 and EN 60 068-2-6)	25g (10 – 500 Hz) no change in position of contacts greater than 100 μs	
Protection against electrical shocks (acc. to IEC 536)	Class II	
Degree of protection	UL Type 4 & IP 65	
Consistency (measured over 1 million operations)	0.1 mm (upon closing point)	
Minimum actuation speed	m/s	Slow action contacts 0.060 / Snap action contacts 0.001

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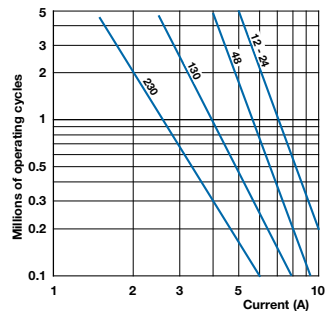
Electrical Data

Rated insulation voltage U_i - according to IEC 947-1 and EN 60-947-1 - according to UL 508 and CSA C22-2 n° 14	500 V (degree of pollution 3) A 600, Q 600													
Rated impulse withstand voltage U _{imp} (according to IEC 947-1 and EN 60 947-1)	kV	6												
Conventional free air thermal current I _{th} (according to IEC 947-5-1) q ≤ 40 °C	A	10												
Short-circuit protection U _{sc} ≤ 500 V a.c. - gG (gI) type fuses	A	10												
Rated operational current I _o / AC-15 (according to IEC 947-5-1)	24 V - 50/60 Hz A 130 V - 50/60 Hz A 230 V - 50/60 Hz A 240 V - 50/60 Hz A 400 V - 50/60 Hz A	10 5.5 3.1 3 1.8												
I _o / DC-13 (according to IEC 947-5-1)	24 V - d.c. A 110 V - d.c. A 250 V - d.c. A	2.8 0.6 0.27												
Switching frequency	Cycles/h	3600												
Load factor		0.5												
Resistance between contacts	mW	25												
Connecting terminals	M3.5 (+, -) pozidriv 2 screw with cable clamp													
Terminal for protective conductor	- M3.5 (+, -) pozidriv 2 screw with cable clamp													
Connecting capacity	1 or 2 x mm ²	0.5 ... 2.5												
Terminal marking	According to EN 50 013													
Mechanical durability	Millions of operations	<table border="0"> <tr> <td>15</td> <td rowspan="5">} LS</td> <td rowspan="5"> </td> <td rowspan="5">30</td> <td rowspan="5">} P</td> <td>10 - 12; 30 - 34</td> </tr> <tr> <td>10</td> <td>13; 41 - 44; 51 - 54; 61 - 72</td> </tr> <tr> <td>5</td> <td>91 - 93</td> </tr> <tr> <td>> 1</td> <td>15; 16</td> </tr> </table>	15	} LS		30	} P	10 - 12; 30 - 34	10	13; 41 - 44; 51 - 54; 61 - 72	5	91 - 93	> 1	15; 16
15	} LS		30					} P	10 - 12; 30 - 34					
10									13; 41 - 44; 51 - 54; 61 - 72					
5									91 - 93					
> 1									15; 16					
Electrical durability (according to IEC 947-5-1)				Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)										

AC-15 – Snap action



AC-15 – Slow action



DC-13	Snap action	Slow action
	Power breaking for a durability of 5 million operating cycles	
Voltage 24 V	9.5 W	12 W
Voltage 48 V	6.8 W	9 W
Voltage 110 V	3.6 W	6 W

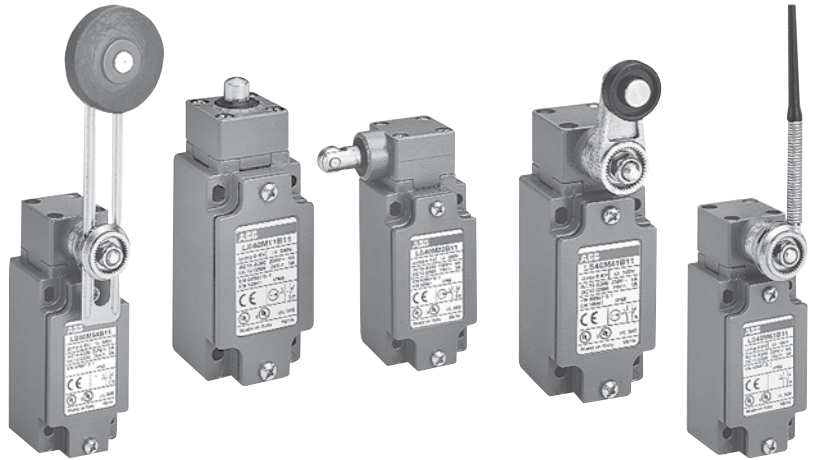
⊕ except for LS30/31/35 (P42): 25g

Metal Limit switches

ABB

Limit Switches

Metal casing, 30mm, 40mm & 60mm



Description

Limit switches are made of aluminum alloy and have a degree of protection of IP 66 and UL type 4X.

The casings come in 3 dimensions:

- LS35M, 30mm width.
- LS45M, 40mm width.
- LS75M, 60mm width.

UL Listed #E191693

Applications

Easy to use, electromechanical limit switches offer specific qualities:

- Visible operation.
- Able to switch strong currents (10 conventional thermal current).
- Electrically separated contacts.
- Precise operating points (consistency).
- Immune to electromagnetic disturbances.

Limit switches used for these mechanical applications:

- Presence/absence.
- Positioning and travel limit.
- Objects passing/counting.

General information

IP66, UL Type 4X

30mm, 40mm & 60mm

Applications

Easy to use, electromechanical limit switches offer specific qualities:

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Description

Limit switches, which are made of aluminum alloy, have a degree of protection of IP 66 and UL Type 4X.

The casings come in 3 dimensions:

- 30mm width
– LS35M
- 40mm width
– LS45M
- 60mm width
– LS65M

8

Casing

- 30mm width with standardized dimensions according to EN 50047
- 40mm width with standardized dimensions according to EN 50041
- 60mm width

Mounting the casing

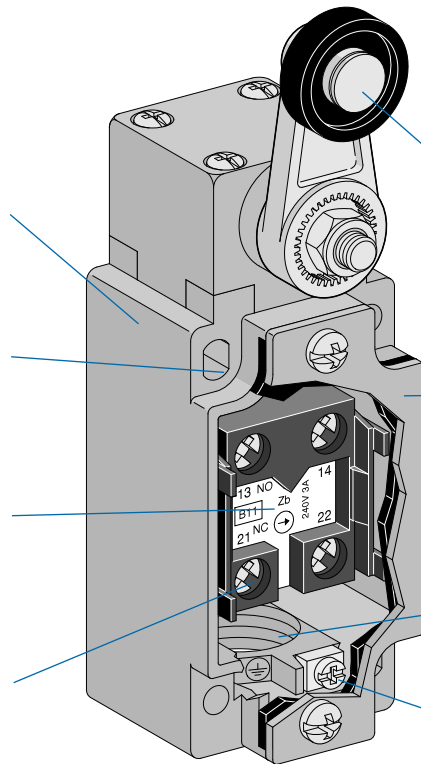
- 2 x M4 screws for 30mm width
- 2 or 4 x M5 screws for 40mm width
- 2 or 4 x M5 screws for 60mm width

Block of 2 contacts

- Contact configuration: N.O. + N.C., 2 N.O., 2 N.C.
- Positive opening operation
- Snap action or slow action
- Zb shape: the 2 contacts are electrically separated

Connecting terminals

- M3.5 (+,-) pozidriv 2 screw
- Screw heads with captive cable clamp
- Markings conform with IEC 947-1, IEC 947-5-1, EN 50005 and 50013 standards



A variety of operating heads

- Plain plunger
- Roller plunger
- Roller lever, adjustable or not, etc.
- Assembled using 4 x M3 screws for 30mm widths
- Assembled using 4 x M4 screws for 40 & 60mm widths

Cover

- Closed using 3 x M3 screws for 30mm width
- Closed using 2 x M4 screws for 40mm width
- Closed using 4 x M4 screws for 60mm width
- One piece sealing gasket to ensure tightness

Electrical connection

- 1 x pg 13.5 cable gland for 40mm width – LS40M
- 1 x 1/2" NPT cable gland – LS45M
- 3 x pg 13.5 cable glands for 60mm width – LS70M
- 3 x 1/2" NPT cable glands for 60mm width – LS75M

Terminal for protective conductor placed near the cable inlet and marked ⊕

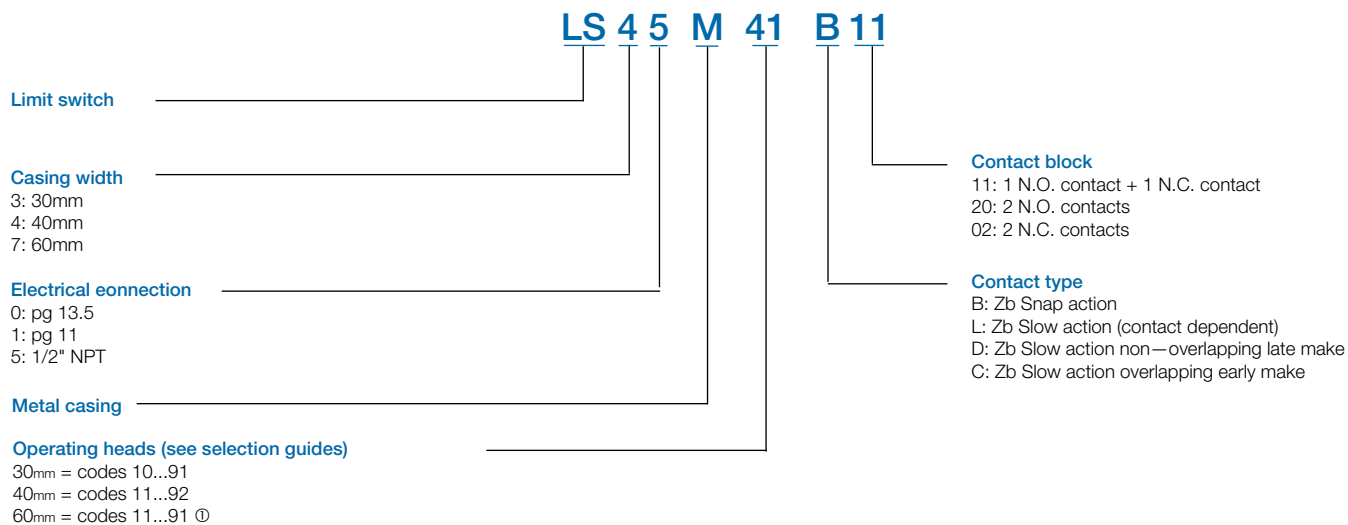
- M3.5 (+,-) pozidriv 2 screw
- Screw head with captive cable clamp

General information

IP66, UL Type 4X

30mm, 40mm & 60mm

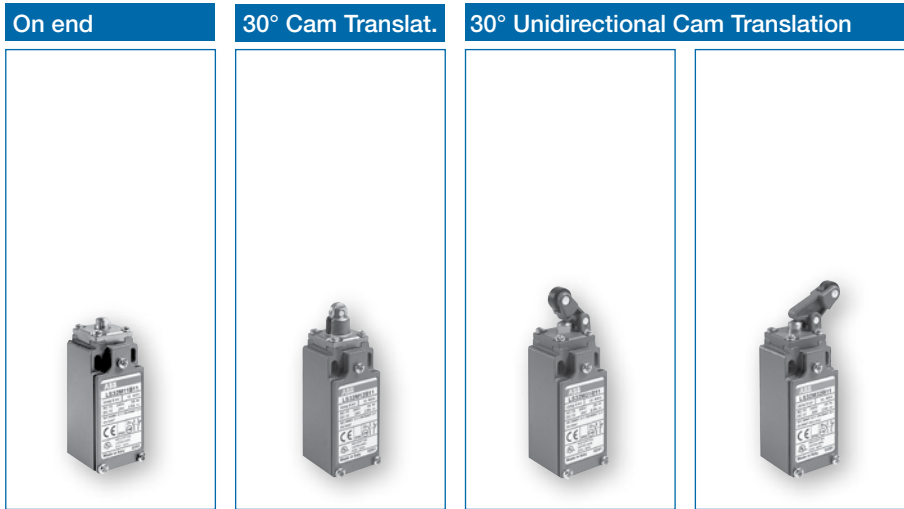
Catalog number explanation



① For 60mm components, contact factory.

30mm, IP66, UL Type 4X, PG 13.5 and 1/2" NPT

Movement to be detected



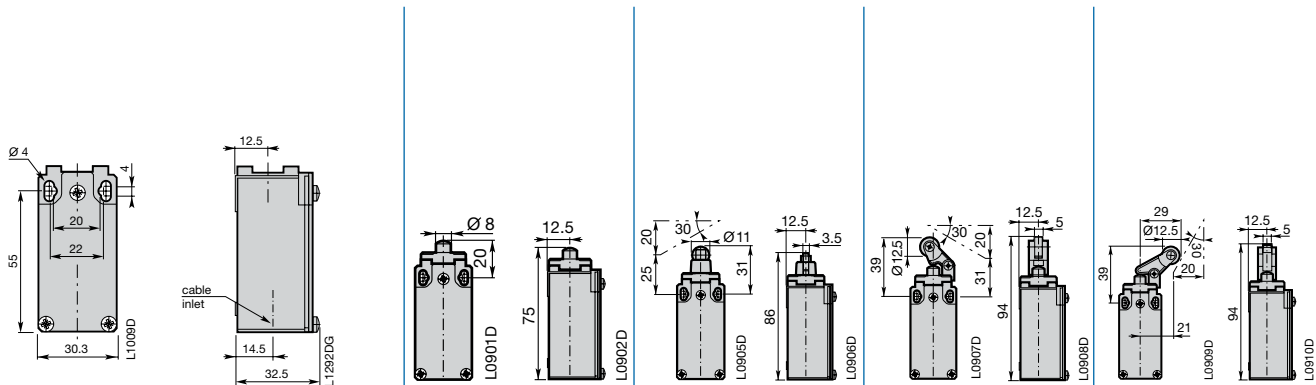
Actuator	Metal plunger	Metal roller plunger	Ø12.5 plastic roller lever on steel plunger	Ø12.5 plastic roller lever on steel plunger
Conformity / (N.C. contact with positive opening operation) EN	50047 (B shape)	EN 50047 (C shape)	EN 50047 (E shape)	-
Maximum actuation speed	0.5 m/s	0.3 m/s	1 m/s	1 m/s
Min. force / torque: - actuation	15 N	12 N	7 N	7 N
- positive opening operation	45 N	41 N	24 N	24 N

B11 = Snap action contacts	Catalog number	LS35M11B11	LS35M12B11	LS35M31B11	LS35M32B11
	Operation diagram				
	Weight (oz)	6.34	6.52	6.17	6.17

D11 = Non-overlapping Slow action contacts	Catalog number	LS35M11D11	LS35M12D11	LS35M31D11	LS35M32D11
	Operation diagram				
	Weight (oz)	6.34	6.52	6.17	6.17

Closed contact / Open contact

Dimensions (mm)

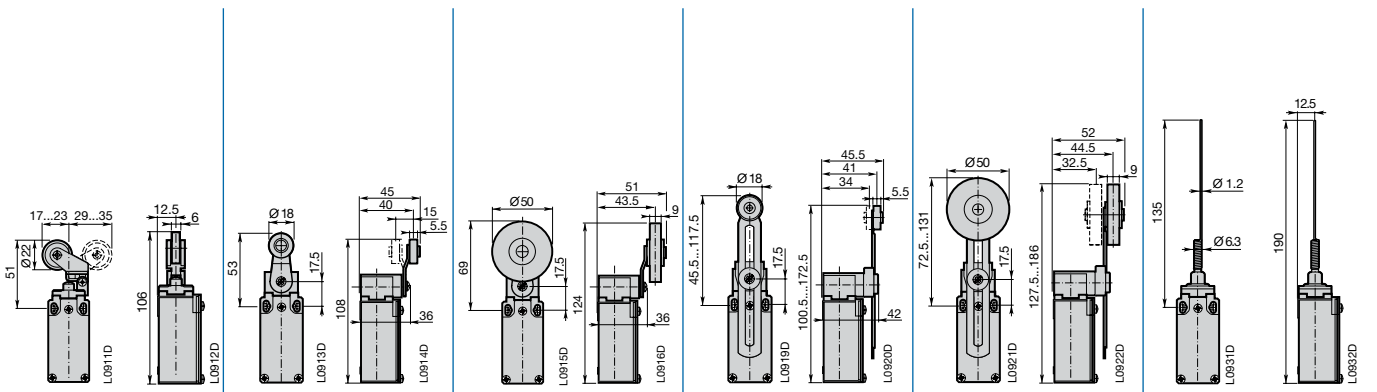


30mm, IP66, UL Type 4X, PG 13.5 and 1/2" NPT

Metal
Limit switches

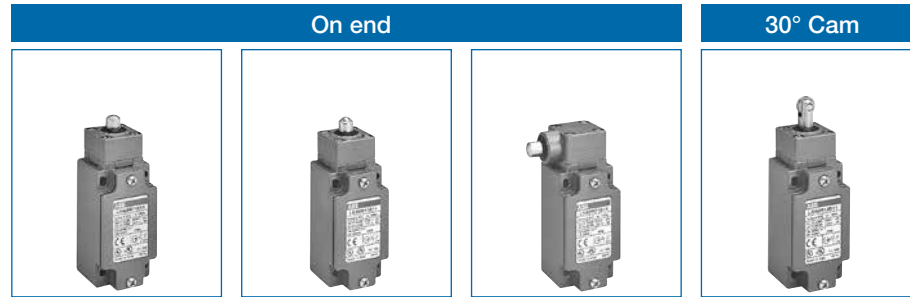
Unidirectional	30° Cam Translation Movement				Multidirectional
ø22 plastic roller lever on steel plunger	ø18 plastic roller lever	ø50 rubber roller lever	Adjustable ø18 plastic roller lever	Adjustable ø50 rubber roller lever	Spring rod lever
1 m/s 7 N 24 N	EN 50047 (A shape) 1.5 m/s 0.1 N.m 0.32 N.m	1.5 m/s 0.1 N.m 0.32 N.m	1.5 m/s 0.1 N.m 0.32 N.m	1.5 m/s 0.1 N.m 0.32 N.m	1 m/s 0.12 N.m -
LS35M38B11	LS35M41B11	LS35M42B11	LS35M51B11	LS35M52B11	LS35M91B11
LS35M38D11	LS35M41D11	LS35M42D11	LS35M51D11	LS35M52D11	LS35M91D11
6.34	8.11	8.99	8.46	9.34	6.34

■ Closed contact / □ Open contact



40mm, IP66, UL Type 4X, PG 13.5 and 1/2" NPT

Movement to be detected

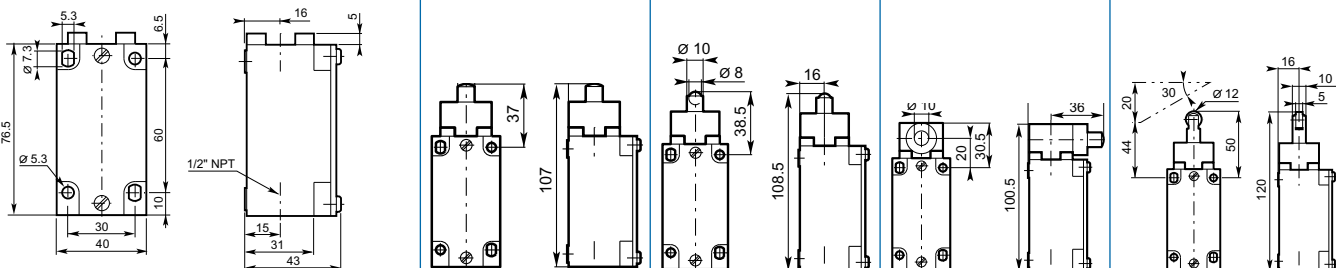


Operating head type

		Stainless steel plain plunger	Stainless steel ball plunger	Stainless steel lateral plain plunger	Stainless steel roller plunger
Conformity / (N.C. contact with positive opening operation)		EN 50 041	EN 50 041	EN 50 041	EN 50 041
Maximum actuation speed	m/s	0.5	0.5	0.5	0.5
Min. force:	N	22	22	30	16
- actuation					
- positive opening operation	N	66	66	70	48

	Catalog number	LS45M11B11	LS45M12B11	LS45M21B11	LS45M13B11
B11 = Snap action contacts					
	Operation diagram				
D11 = Non-overlapping Slow action contacts					
	Operation diagram				
C11 = Overlapping Slow action contacts					
	Operation diagram				
L02 = Slow action contacts					
	Operation diagram				
L20 = Slow action contacts					
	Operation diagram				
B02 = Snap action contacts					
	Operation diagram				
Weight (packing per unit)	oz	8.46	8.46	9.17	8.46

Dimensions (mm)

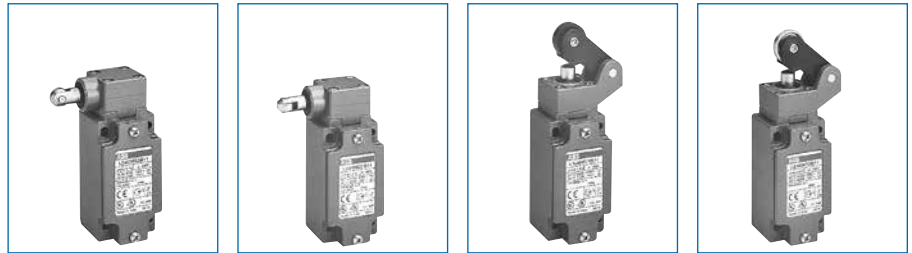


40mm, IP66, UL Type 4X, PG 13.5 and 1/2" NPT

Metal
Limit switches

Movement to be detected

30° Cam translation movement



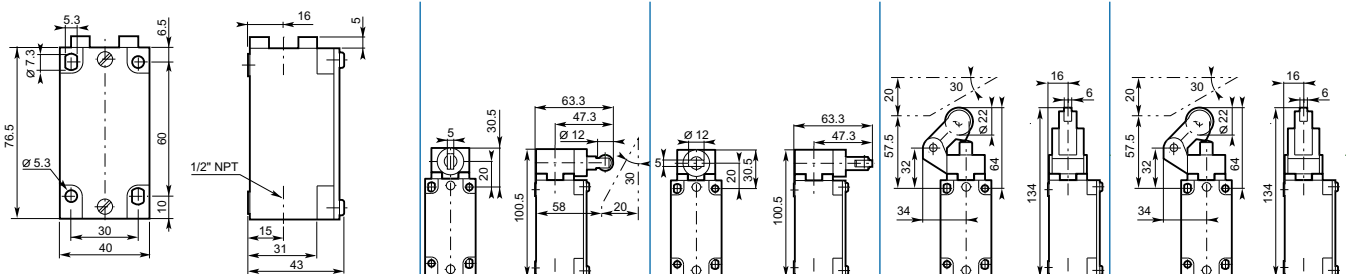
Operating head type

	Lateral plunger with vertical roller	Lateral plunger with horizontal roller	ø 22 Polyamide roller lever	ø 22 Stainless steel roller lever
Conformity / \ominus (N.C. contact with positive opening operation)	EN 50 041 \ominus	EN 50 041 \ominus	\ominus	\ominus
Maximum actuation speed m/s	0.5	0.5	1.5	1.5
Min. force: - actuation	N 30	N 30	N 12	N 12
- positive opening operation	N 70	N 70	N 40	N 40

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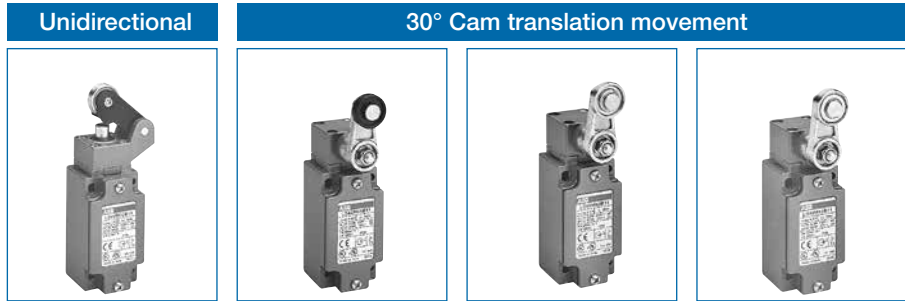
B11 = Snap action contacts	Catalog number	LS45M22B11	LS45M23B11	LS45M31B11	LS45M32B11
	Operation diagram				
D11 = Non-overlapping Slow action contacts	Catalog number	LS45M22D11	LS45M23D11	LS45M31D11	LS45M32D11
	Operation diagram				
C11 = Overlapping Slow action contacts	Catalog number	LS45M22C11	LS45M23C11	LS45M31C11	LS45M32C11
	Operation diagram				
L02 = Slow action contacts	Catalog number	LS45M22L02	LS45M23L02	LS45M31L02	LS45M32L02
	Operation diagram				
L20 = Slow action contacts	Catalog number	LS45M22L20	LS45M23L20	LS45M31L20	LS45M32L20
	Operation diagram				
B02 = Snap action contacts	Catalog number	LS45M22B02	LS45M23B02	LS45M31B02	LS45M32B02
	Operation diagram				
Weight (packing per unit)	oz	9.34	9.34	9.70	0.9.87

Dimensions (mm)



40mm, IP66, UL Type 4X, PG 13.5 and 1/2" NPT

Movement to be detected

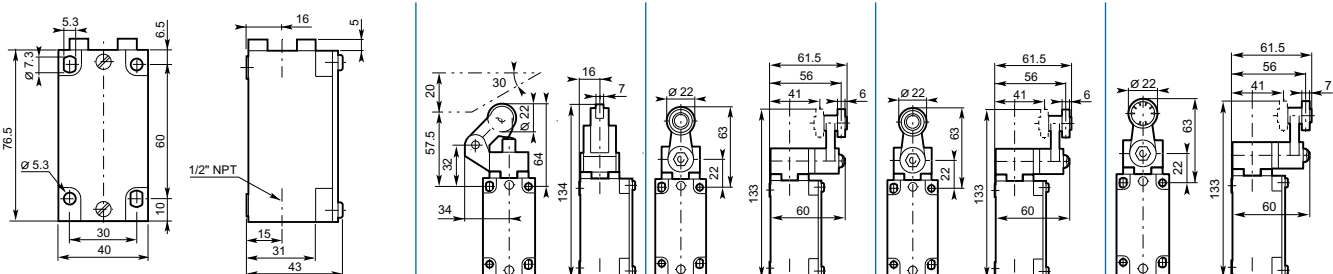


Operating head type

	ø 22 Ball-bearing roller lever	ø 22 Polyamide roller lever	ø 22 Stainless steel roller lever	ø 22 Ball-bearing roller lever
Conformity / \ominus (N.C. contact with positive opening operation)		EN 50 041	EN 50 041	EN 50 041
Maximum actuation speed m/s	1.5	1.5	1.5	1.5
Min. force/torque:				
- actuation	12 N	0.15 N.m	0.15 N.m	0.15 N.m
- positive opening operation	40 N	0.44 N.m	0.44 N.m	0.44 N.m

B11 = Snap action contacts	Catalog number List price	LS45M33B11	LS45M41B11	LS45M42B11	LS45M43B11
	Operation diagram				
D11 = Non-overlapping slow action contacts	Catalog number List price	LS45M33D11	LS45M41D11	LS45M42D11	LS45M43D11
	Operation diagram				
C11 = Overlapping slow action contacts	Catalog number List price	LS45M33C11	LS45M41C11	LS45M42C11	LS45M43C11
	Operation diagram				
L02 = Slow action contacts	Catalog number List price	LS45M33L02	LS45M41L02	LS45M42L02	LS45M43L02
	Operation diagram				
L20 = Slow action contacts	Catalog number List price	LS45M33L20	LS45M41L20	LS45M42L20	LS45M43L20
	Operation diagram				
B02 = Snap action contacts	Catalog number List price	LS45M33B02	LS45M41B02	LS45M42B02	LS45M43B02
	Operation diagram				
Weight (packing per unit)	oz	9.87	9.87	9.87	9.87

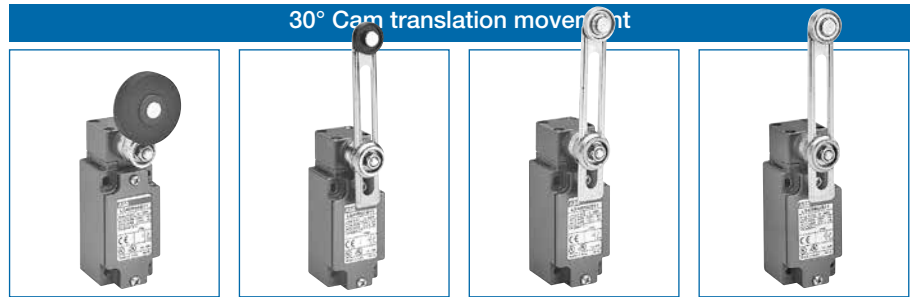
Dimensions (mm)



40mm, IP66, UL Type 4X, PG 13.5 and 1/2" NPT

Metal
Limit switches

Movement to be detected

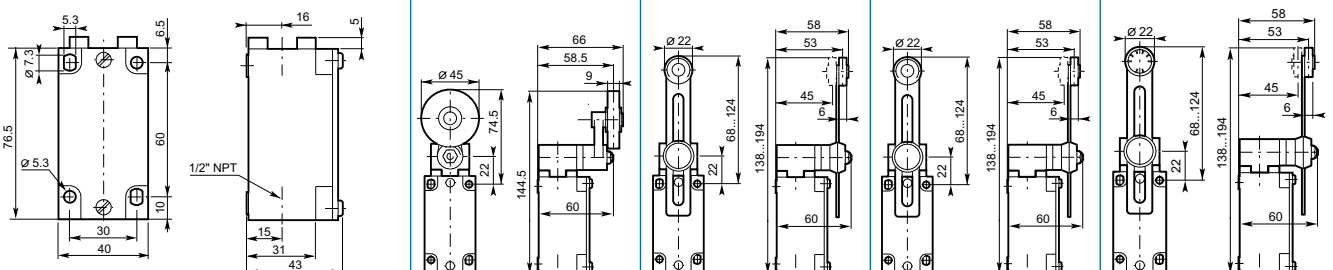


Operating head type

	ø 45 Rubber roller lever	Adjustable ø 22 polyamide roller lever	Adjustable ø 22 stainless steel roller lever	Adjustable ø 22 stainless steel ball-bearing roller lever
Conformity / ⊕ (N.C. contact with positive opening operation)	■	■	■	■
Maximum actuation speed	m/s 1.5	1.5	1.5	1.5
Min. torque: - actuation	N.m 0.15	0.15	0.15	0.15
- positive opening operation	N.m -	-	-	-

B11 = Snap action contacts	Catalog number	LS45M44B11	LS45M51B11	LS45M52B11	LS45M53B11
	Operation diagram				
D11 = Non-overlapping slow action contacts	Catalog number	LS45M44D11	LS45M51D11	LS45M52D11	LS45M53D11
	Operation diagram				
C11 = Overlapping slow action contacts	Catalog number	LS45M44C11	LS45M51C11	LS45M52C11	LS45M53C11
	Operation diagram				
L02 = Slow action contacts	Catalog number	LS45M44L02	LS45M51L02	LS45M52L02	LS45M53L02
	Operation diagram				
L20 = Slow action contacts	Catalog number	LS45M44L20	LS45M51L20	LS45M52L20	LS45M53L20
	Operation diagram				
B02 = Snap action contacts	Catalog number	LS45M44B02	LS45M51B02	LS45M52B02	LS45M53B02
	Operation diagram				
Weight (packing per unit)	oz	10.93	10.22	10.58	10.58

Dimensions (mm)



40mm, IP66, UL Type 4X, PG 13.5 and 1/2" NPT

Movement to be detected

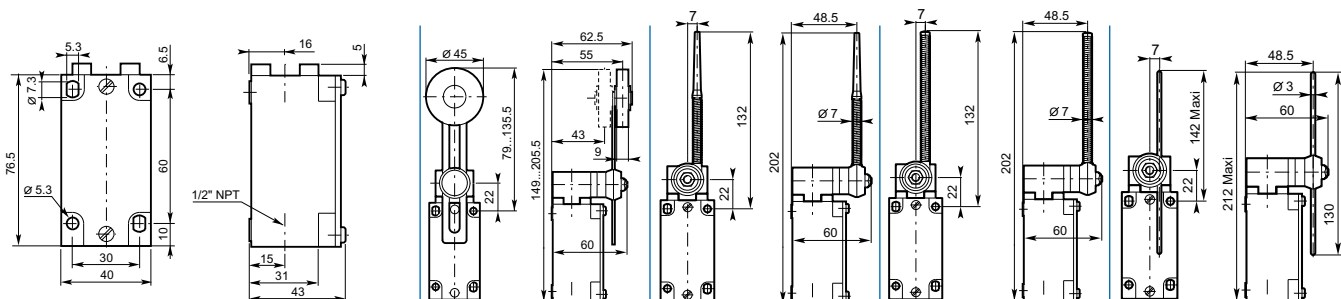


Operating head type

	Adjustable ø 45 rubber roller lever	Flexible lever with insulated end	Coil spring lever	Adjustable ø 3 stainless steel rod lever
Conformity / \ominus (N.C. contact with positive opening operation)				EN 50 041
Maximum actuation speed	m/s 1.5	m/s 1.5	m/s 1.5	m/s 0.5
Min. torque: - actuation	N.m 0.15	N.m 0.15	N.m 0.15	N.m 0.15
- positive opening operation	N.m -	N.m -	N.m -	N.m -

B11 = Snap action contacts	Catalog number	LS45M54B11	LS45M61B11	LS45M62B11	LS45M71B11
	Operation diagram				
D11 = Non-overlapping Slow action contacts	Catalog number	LS45M54D11	LS45M61D11	LS45M62D11	LS45M71D11
	Operation diagram				
C11 = Overlapping Slow action contacts	Catalog number	LS45M54C11	LS45M61C11	LS45M62C11	LS45M71C11
	Operation diagram				
L02 = Slow action contacts	Catalog number	LS45M54L02	LS45M61L02	LS45M62L02	LS45M71L02
	Operation diagram				
L20 = Slow action contacts	Catalog number	LS45M54L20	LS45M61L20	LS45M62L20	LS45M71L20
	Operation diagram				
B02 = Snap action contacts	Catalog number	LS45M54B02	LS45M61B02	LS45M62B02	LS45M71B02
	Operation diagram				
Weight (packing per unit)	oz	11.11	10.22	10.40	10.05

Dimensions (mm)



40mm, IP66, UL Type 4X, PG 13.5 and 1/2" NPT

Metal
Limit switches

Movement to be detected



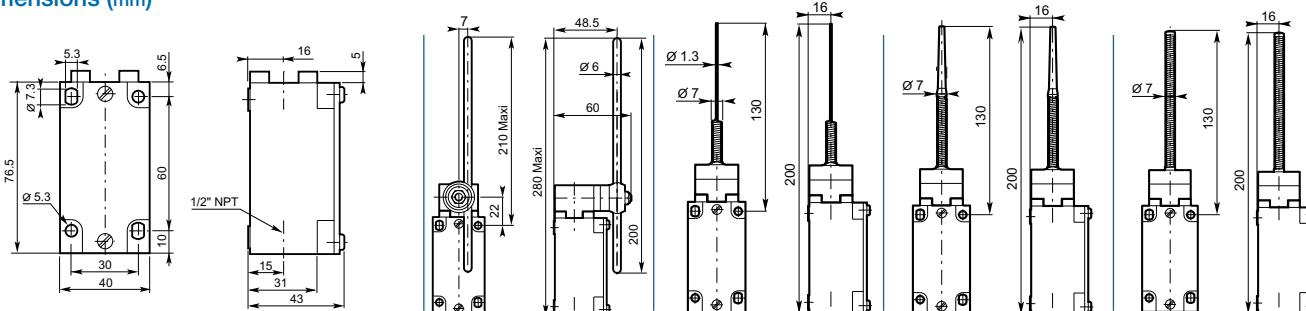
Operating head type

	Adjustable Ø 6 polyamide rod lever	Spring rod	Flexible rod with insulated end	Coil spring rod
Conformity / \ominus (N.C. contact with positive opening operation)	EN 50 041			
Maximum actuation speed	m/s 1.5	1	1	1
Min. torque: - actuation	N.m 0.15	0.18	0.18	0.18
- positive opening operation	N.m -	-	-	-

8

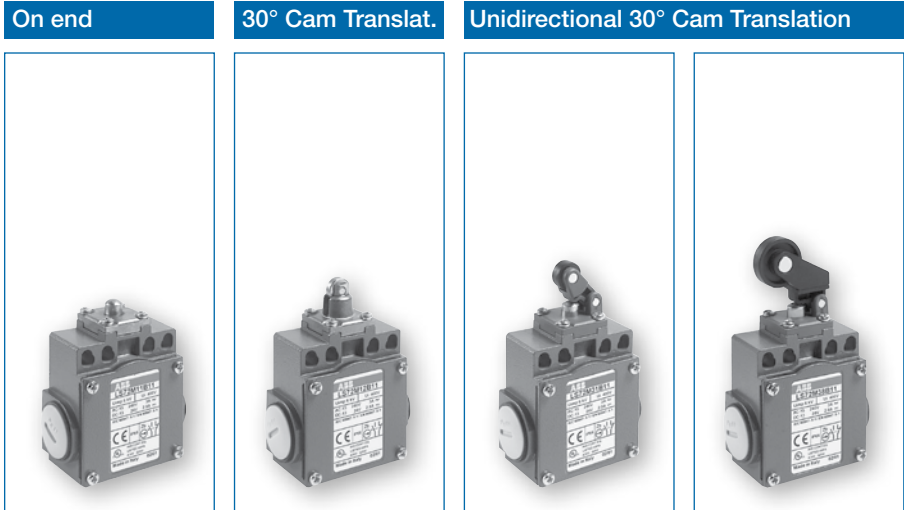
	Catalog number	LS45M72B11	LS45M91B11	LS45M92B11	LS45M93B11
B11 = Snap action contacts	Catalog number	LS45M72B11	LS45M91B11	LS45M92B11	LS45M93B11
	Operation diagram				
D11 = Non-overlapping Slow action contacts	Catalog number	LS45M72D11	LS45M91D11	LS45M92D11	LS45M93D11
	Operation diagram				
C11 = Overlapping Slow action contacts	Catalog number	LS45M72C11	LS45M91C11	LS45M92C11	LS45M93C11
	Operation diagram				
L02 = Slow action contacts	Catalog number	LS45M72L02	LS45M91L02	LS45M92L02	LS45M93L02
	Operation diagram				
L20 = Slow action contacts	Catalog number	LS45M72L20	LS45M91L20	LS45M92L20	LS45M93L20
	Operation diagram				
B02 = Snap action contacts	Catalog number	LS45M72B02	LS45M91B02	LS45M92B02	LS45M93B02
	Operation diagram				
Weight (packing per unit)	oz	10.05	8.28	8.28	8.28

Dimensions (mm)



60mm, IP66, UL Type 4X, PG 13.5 and 1/2" NPT

Movement to be detected:



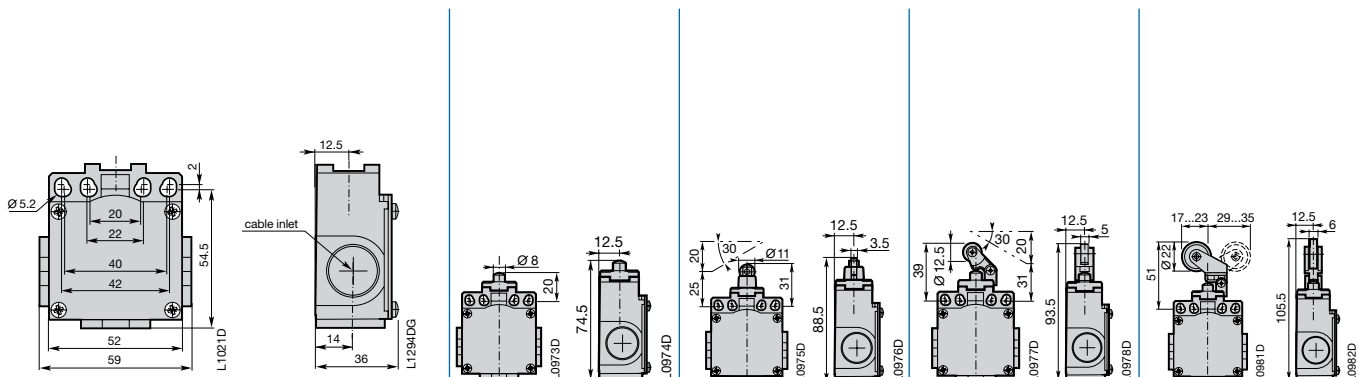
Actuator

	Metal plunger	ø11 metal roller plunger	ø12.5 plastic roller lever on steel plunger	ø22 plastic roller lever on steel plunger
Conformity / \ominus (N.C. contact with positive opening operation) –	\ominus	\ominus	\ominus	\ominus
Maximum actuation speed	0.5 m/s	0.3 m/s	1 m/s	1 m/s
Min. force / torque: - actuation	15 N	12 N	7 N	7 N
- positive opening operation	45 N	41 N	24 N	24 N

B11 - Snap action contacts	Catalog number	LS75M11B11	LS75M12B11	LS75M31B11	LS75M38B11
	Operation diagram				
	Weight (packing per unit)	oz	9.52	9.87	9.34
D11 = Non-overlapping Slow action contacts	Catalog number	LS75M11D11	LS75M12D11	LS75M31D11	LS75M38D11
	Operation diagram				
	Weight (packing per unit)	oz	9.52	9.87	9.34

Closed contact / Open contact

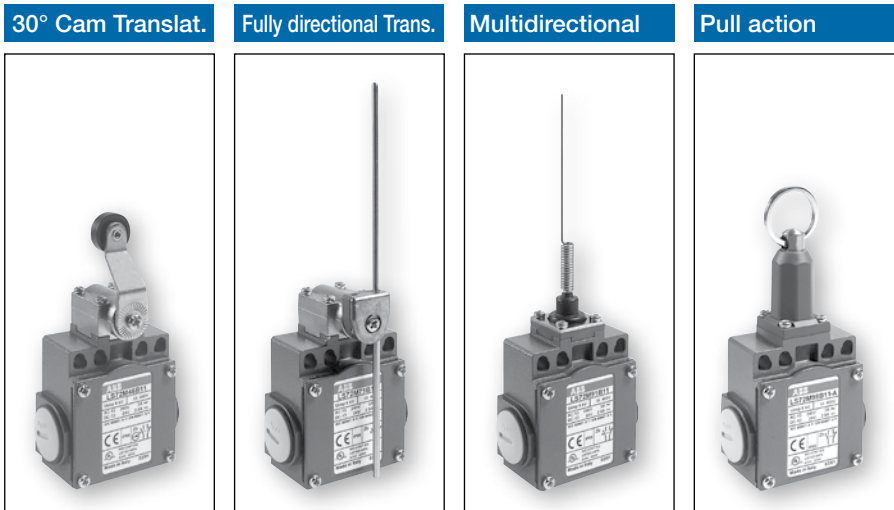
Dimensions (mm)



60mm, IP66, UL Type 4X, PG 13.5 and 1/2" NPT

Metal
Limit switches

Movement to be detected:



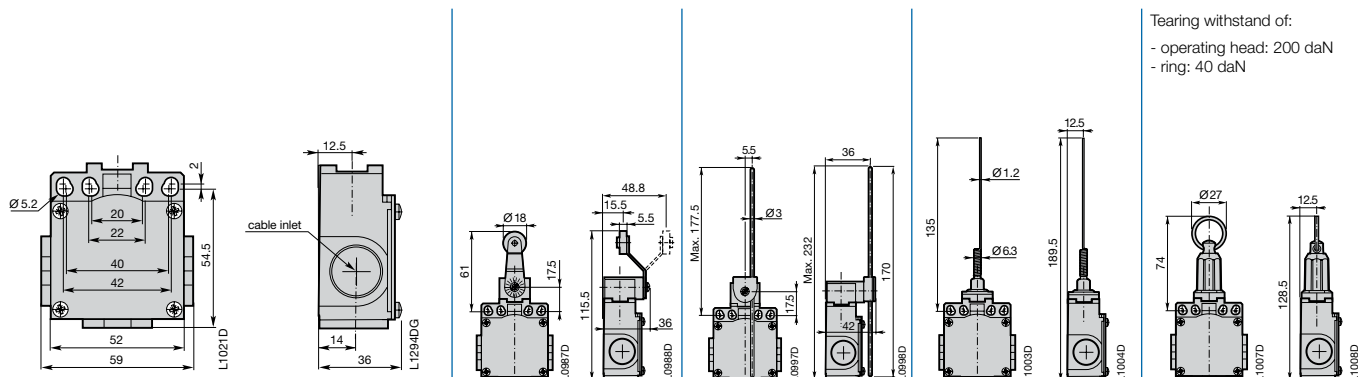
Actuator

	30° Cam Translat.	Fully directional Trans.	Multidirectional	Pull action
Actuator	∅18 plastic roller with bent lever	Adjustable ∅3 stainless steel rod lever	Spring rod	Pull action with ring
Conformity / \ominus (N.C. contact with positive opening operation) – Maximum actuation speed	\ominus 1.5 m/s	\ominus 1.5 m/s	– 1 m/s	– 0.5 m/s
Min. force / torque: - actuation - positive opening operation	0.1 N.m 0.32 N.m	0.1 N.m 0.32 N.m	0.12 N.m –	30 N –

B11 = Snap action contacts	Catalog number	LS75M45B11	LS75M71B11	LS75M91B11	LS75M98B11-A
Operation diagram					
D11 = Non-overlapping Slow action contacts	Catalog number	LS75M45D11	LS75M71D11	LS75M91D11	LS75M98D11-A
Operation diagram					
Weight (packing per unit)	oz	0.335	0.380	0.315	0.350

■ Closed contact / □ Open contact

Dimensions (mm)



Notes

Metal limit switches Components

ABB

Components

Metal limit switches

40mm & 60mm ①

① Components for 30mm metal switches are not available.

Components

Catalog number explanation

IP66, UL Type 4X, 40mm

Casings with contact block for rectilinear or angular motion heads



LS45M00B11

	LS	45	M	00	B11
Limit Switch	LS				Contacts
Casing width: 40 mm		4			11 1 N.O. + 1 N.C. contacts
Cable inlet:					02 2 N.C. contacts
1 cable inlet for Pg 13.5 cable gland				0	20 2 N.O. contacts
1 cable inlet for 1/2" NPT				5	
Metal casing			M		Snap action
Without operating head				00	BZb Snap
					Dependent (slow) action
					LZb Slow / Simultaneous
					DZb Non-overlapping late make
					CZb Overlapping early make

Operating heads



LSTE41

	LS	T	E	41
Limit Switch	LS			
Operating head		T		
For Metal casing 40 mm or 60 mm width			E	
				Actuator heads:
				11 ... 13with rectilinear movement (plain plunger, steel ball plunger or roller plunger)
				21 ... 23with rectilinear movement (with lateral plain or roller plunger)
				31 ... 33with rectilinear movement (with roller lever on steel plunger)
				40with angular movement (without actuator) actuator to be ordered separately
				41 ... 44with angular movement (roller lever)
				50with angular movement (without actuator)
				51 ... 54with angular movement (adjustable roller lever)
				61, 62flexible lever (spring)
				71, 72, 73adjustable lever (rod)
				91 ... 93multidirectional angular movement (spring rod)

Separate actuators (Roller lever, adjustable roller or rod levers, etc.)



LSA40X54

	LS	A	40	X	54
Limit Switch	LS				
Actuator (roller)		A			Actuator heads:
Casing width: 40 mm			40		41 ... 44non-adjustable roller lever
					51 ... 54adjustable roller lever
					61, 62flexible lever (spring)
					71, 72, 73adjustable lever (rod)
					For casing of:
					M Metal
					P Plastic
					X Plastic or metal

Separate contact blocks



LSC40XB11

	LS	C	40	X	B	11
Limit Switch	LS					
Contact blocks		C				Contacts
Casing width: 40 mm			40			11 1 N.O. + 1 N.C. contacts
						02 2 N.C. contacts
						20 2 N.O. contacts
For casing of:						Snap action:
Metal	M					BZb Snap
Plastic	P					Dependent (slow) action:
Plastic or metal	X					LZb Slow / Simultaneous
						DZb Non-overlapping late make
						CZb Overlapping early make

Components

Selection guide

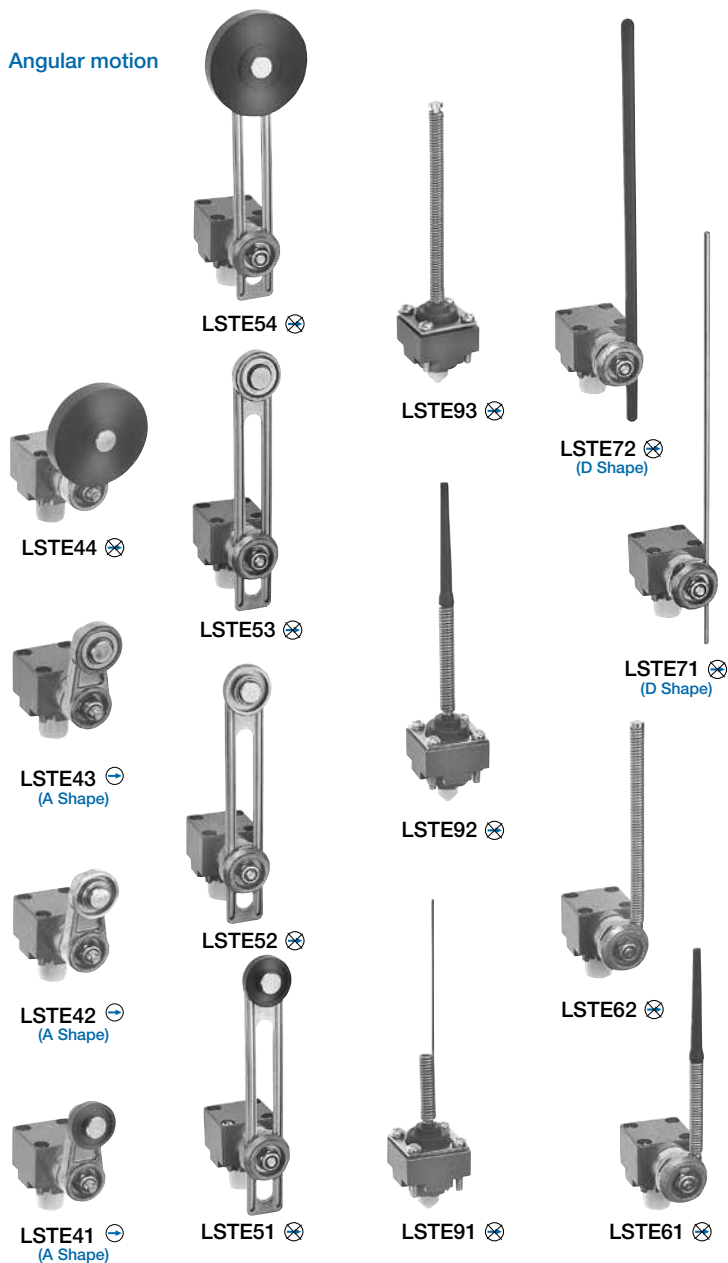
IP66, UL Type 4X, 40mm

Actuators:

Rectilinear motion



Angular motion



Casings:

LSTE... rectilinear motion heads

- To be actuated from end. With plunger (plain, lateral plain or ball): LSTE11, LSTE12 and LSTE21.
- To be actuated by 30° cam translation. With roller plunger: LSTE13, LSTE22 and LSTE23.
- To be actuated unidirectionally by 30° cam translation. With roller lever on stainless steel plunger: LSTE31 ... LSTE33.

LSTE... angular motion heads

- To be actuated by 30° cam translation. With roller lever: LSTE41 ... LSTE54.
- To be actuated by fully directional translation movement. With rod or spring lever: LSTE61 ... LSTE72.
- To be actuated multidirectionally. With spring rod: LSTE91 ... LSTE93.



Bodies with contact block

- ⊕ LS45M00B11, LS45M00D11, LS45M00C11, LS45M00L02, LS45M00B02
- ⊗ LS45M00L20

⊕ : Suitable for positive opening operation (IEC 60947-5-1 and EN 50041).

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊕ are fitted.

Components

IP66, UL Type 4X
40mm

Non-Adjustable actuators



LSA40X44 ⊗



LSA40X43 ⊕



LSA40X42 ⊕



LSA40X41 ⊕

Non-Adjustable Roller levers



LSTE40 ⊕

LSTE40 angular motion head
For roller levers (non-adjustable)
LSA40X41 ... LSA40X44

Adjustable actuators



LSA40X51 ⊗



LSA40X52 ⊗



LSA40X53 ⊗



LSA40X54 ⊗



LSA40X61 ⊗



LSA40X62 ⊗



LSA40X71 ⊗



LSA40X72 ⊗

Adjustable or flexible levers



LSTE50 ⊗

LSTE50 angular motion head
For flexible or adjustable levers LSA40X51 ... LSA40X54,
LSA40X61, LSA40X62, LSA40X71 and LSA40X72.

Bodies with contact block

- ⊕ LS45M00B11, LS45M00D11, LS45M00C11,
LS45M00L02, LS45M00B02
- ⊗ LS45M00L20



Contact blocks

- ⊕ LSC40XB11,
LSC40XD11,
LSC40XC11,
LSC40XL02,
LSC40XB02
- ⊗ LSC40XL20



⊕ : Suitable for positive opening operation (IEC 60947-5-1)

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊕ are fitted.

Components

IP66, UL Type 4X

40mm

⊖ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.



LS40M00B11



LSTE11



LSTE21



LSTE13

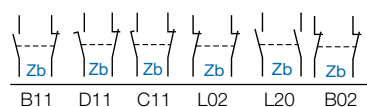


LSTE22



LSTE32

Contact blocks



Positive opening operation

Actuation speed max. m/s

Unit weight kg (1 pc)

Catalog number

Bodies with contact block for rectilinear or angular motion heads									
1						⊖	—	0.168	LS45M00B11
	1					⊖	—	0.168	LS45M00D11
		1				⊖	—	0.168	LS45M00C11
			1			⊖	—	0.168	LS45M00L02
				1		⊗	—	0.168	LS45M00L20
					1	⊖	—	0.168	LS45M00B02

Rectilinear motion heads with actuator

To be actuated from end

Stainless steel plain plunger	⊖	0.5			LSTE11
Stainless steel ball plunger	⊖	0.5			LSTE12
Stainless steel lateral plain plunger	⊖	0.5			LSTE21

To be actuated by 30° cam

Stainless steel roller plunger	⊖	0.5	0.084		LSTE13
Stainless steel lateral plunger with vertical roller	⊖	0.5			LSTE22
Stainless steel lateral plunger with horizontal roller	⊖	0.5			LSTE23

To be actuated unidirectionally by 30° cam

∅ 22mm polyamide roller lever on stainless steel plunger	⊖	1.5			LSTE31
∅ 22mm stainless steel roller lever on stainless steel plunger	⊖	1.5			LSTE32
∅ 22mm steel ball-bearing roller lever on stainless steel plunger	⊖	1.5			LSTE33

Components

IP66, UL Type 4X

40mm

⊖ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.



LSTE41



LSTE52



LSTE72 LSTE91



LSTE40



LSA40X41

	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number
Angular motion heads with actuator				
To be actuated by 30° cam				
⊖ ∅ 22mm polyamide roller lever ①	⊖	1.5	0.134	LSTE41
∅ 22mm stainless steel roller lever ①	⊖	1.5	0.142	LSTE42
∅ 22mm steel ball-bearing roller lever ①	⊖	1.5	0.145	LSTE43
∅ 45mm rubber roller lever ①	⊗	1.5	0.162	LSTE44
∅ 22mm adjustable polyamide roller lever ①	⊗	1.5	0.152	LSTE51
∅ 22mm adjustable stainless steel roller lever ①	⊗	1.5	0.161	LSTE52
∅ 22mm adjustable steel ball-bearing roller lever ①	⊗	1.5	0.163	LSTE53
∅ 45mm adjustable rubber roller lever ①	⊗	1.5	0.168	LSTE54
To be actuated by fully directional translation movement				
Stainless steel flexible lever with insulated end ①	⊗	1	0.145	LSTE61
Stainless steel coil spring lever ①	⊗	1	0.152	LSTE62
∅ 3mm stainless steel rod lever, 195mm ①	⊗	1	0.150	LSTE71
∅ 6mm polyamide rod lever, 195mm ①	⊗	1	0.145	LSTE72
∅ 6mm fiberglass rod lever, 195mm ①	⊗	1	0.149	LSTE73
Multidirectional angular motion heads (to be actuated by fully directional translation movement)				
Stainless steel spring rod	⊗	1	0.066	LSTE91
Stainless steel flexible rod with insulated end	⊗	1	0.068	LSTE92
Stainless steel coil spring rod	⊗	1	0.075	LSTE93
Angular motion head without actuator, for non-adjustable roller levers (delivered with M5 nylostop nut)				
	⊖	1.5	0.102	LSTE40
Actuators for angular motion head LSTE40				
∅ 22mm polyamide roller lever ①	⊖	—	0.032	LSA40X41
∅ 22mm stainless steel roller lever ①	⊖	—	0.042	LSA40X42
22mm steel ball-bearing roller lever ①	⊖	—	0.044	LSA40X43
∅ 45mm rubber roller lever ①	⊗	—	0.050	LSA40X44

① Free position adjustment of lever by 9° over 360°

Components

IP66, UL Type 4X

40mm

⊕ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊕ are fitted.



LSTE50



LSA40X52



LSA40X71



LSA40X61



LSC40XB11

	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number
Angular motion head without actuator, for flexible or adjustable levers (delivered with M5 nylon nut & adaptation parts)				
	⊗	1 - 1.5 ⊕	0.121	LSTE50
Actuators for angular motion head LSTE50				
∅ 22mm adjustable polyamide roller lever ⊕	⊗	—	0.023	LSA40X51
∅ 22mm adjustable stainless steel roller lever ⊕	⊗	—	0.032	LSA40X52
∅ 22mm adjustable steel ball-bearing roller lever ⊕	⊗	—	0.034	LSA40X53
∅ 45mm adjustable rubber roller lever ⊕	⊗	—	0.039	LSA40X54
Stainless steel flexible lever with insulated end ⊕	⊗	—	0.017	LSA40X61
Stainless steel coil spring lever ⊕	⊗	—	0.023	LSA40X62
∅ 3mm adjustable stainless steel rod lever, 195mm ⊕	⊗	—	0.014	LSA40X71
∅ 6mm adjustable polyamide rod lever, 195mm ⊕	⊗	—	0.010	LSA40X72
∅ 6mm adjustable fiberglass rod lever, 195mm ⊕	⊗	—	0.014	LSA40X73
Contact blocks (with adaptor)				
1 NC & 1 NO 2-pole snap action	⊕	—	0.032	LSC40XB11
1 NC & 1 NO 2-pole non-overlapping slow action	⊕	—	0.032	LSC40XD11
1 NO & 1 NC 2-pole overlapping slow action	⊕	—	0.032	LSC40XC11
2 NC 2-pole simultaneous slow action	⊕	—	0.032	LSC40XL02
2 NO 2-pole simultaneous slow action	⊗	—	0.032	LSC40XL20
Bipolar 2 NC 2-pole snap action	⊕	—	0.032	LSC40XB02

⊕ Free position adjustment of lever by 9° over 360°
 ⊗ According to lever.

Notes

Metal limit switches

Technical data



Technical data

Metal limit switches
30mm, 40mm & 60mm

Technical data

IP 65, UL Type 4

General technical data

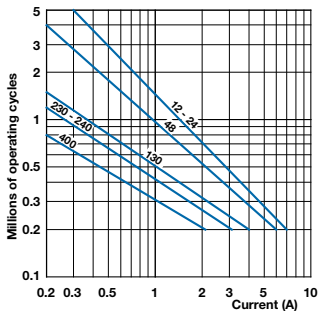
Standards	Devices conform with international IEC 947-5-1 and European EN 60 947-5-1 standards	
Certifications - Approvals	UL & CSA	
Air temperature near the device (IEC)	°C	- 25 ... + 70
- during operation	°C	- 30 ... + 80
- for storage		
Climatic withstand	According to IEC 68-2-3 and salty mist according to IEC 68-2-11	
Mounting positions	All positions are authorized	
Shock withstand (according to IEC 68-2-27 and EN 60 068-2-27)	50g Ⓣ (1/2 sinusoidal shock for 11 ms) no change in contact position	
Resistance to vibrations (acc. to IEC 68-2-6 and EN 60 068-2-6)	25g (10 – 500 Hz) no change in position of contacts greater than 100 μs	
Protection against electrical shocks (acc. to IEC 536)	Class I	
Degree of protection	UL Type 4X & IP 66	
Consistency (measured over 1 million operations)	0.05 mm (upon closing point)	
Minimum actuation speed	m/s	Slow action contacts 0.060 / Snap action contacts 0.001

8

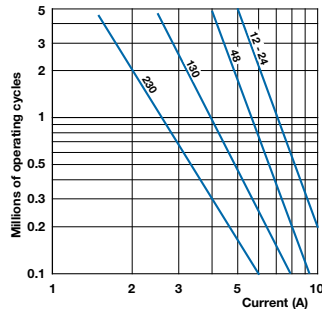
Electrical Data

Rated insulation voltage U_i - according to IEC 947-1 and EN 60-947-1 - according to UL 508 and CSA C22-2 n° 14		500 V (degree of pollution 3) A 600, Q 600
Rated impulse withstand voltage U_{imp} (according to IEC 947-1 and EN 60 947-1)	kV	6
Conventional free air thermal current I_{th} (according to IEC 947-5-1) $q \leq 40$ °C	A	10
Short-circuit protection $U_g \leq 500$ V a.c. - gG (gI) type fuses	A	10
Rated operational current I_o / AC-15 (according to IEC 947-5-1)	24 V - 50/60 Hz A 130 V - 50/60 Hz A 230 V - 50/60 Hz A 240 V - 50/60 Hz A 400 V - 50/60 Hz A	10 5.5 3.1 3 1.8
I_o / DC-13 (according to IEC 947-5-1)	24 V - d.c. A 110 V - d.c. A 250 V - d.c. A	2.8 0.6 0.27
Switching frequency	Cycles/h	3600
Load factor		0.5
Resistance between contacts	mW	25
Connecting terminals		M3.5 (+, -) pozidriv 2 screw with cable clamp
Terminal for protective conductor		M3.5 (+, -) pozidriv 2 screw with cable clamp
Connecting capacity	1 or 2 x mm ²	0.5 ... 2.5
Terminal marking		According to EN 50 013
Mechanical durability	Millions of operations	30 } LS 40 } M { 11- 13; 21 - 23; 31 - 33 25 } 60 } { 41 - 44; 51 - 54; 61 - 72 10 } { 91 - 93
Electrical durability (according to IEC 947-5-1)		Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)

AC-15 – Snap action



AC-15 – Slow action



DC-13	Snap action		Slow action	
	Power breaking for a durability of 5 million operating cycles			
Voltage 24 V	9.5 W	12 W		
Voltage 48 V	6.8 W	9 W		
Voltage 110 V	3.6 W	6 W		

Ⓣ except for LS30/31/35 (P42): 25g

Miniature Limit switches



Limit switches

Miniature pre-wired

30mm & 35mm

Metal & plastic casings



Description

Plastic limit switches are made of reinforced UL-VO thermoplastic fiberglass, offering double insulation <square image> and protection of IP67 and NEMA Type 1.

Metal limit switches are made of zinc alloy and have a degree of protection of IP67 and NEMA Type 4, 4X.

Casings come in 2 dimensions:

- 30mm width
- 35mm width

Applications

Easy to use, electromechanical limit switches offer specific qualities:

- Visible operation
- Able to switch strong currents (5A thermal)
- Electrically separated contacts (Zb shape)
- Precise operating points (consistency)
- Immune to electromagnetic disturbances

Limit switches used for these mechanical applications:


- Presence/absence
 - Positioning and travel limit
 - Objects passing/counting
- UL Listed file #E191693

General information

Metal & plastic

Pre-wired

Description

LS20P ... LS26P limit switches, made of fiberglass reinforced UL-V0 thermoplastic material, sealed with epoxy resin at the base on the body, offer double insulation  and a degree of protection IP67, NEMA Type 1.


LS20M ... LS26M limit switches, made of zinc alloy (zamack), sealed with epoxy resin at the base on the body, offer a degree of protection IP67, NEMA 4, 4X.

The casings come in 2 dimensions:

- LS20 ... LS21, 30 mm width,
- LS25 ... LS26, 35 mm width.

Applications

Easy to use, electromechanical limit switches offer specific qualities:

- Visible operation.
- Able to switch strong currents (5 A conventional thermal current).
- Electrically separated contacts (Zb shape).
- Contact blocks with positive opening operation of the "N.C." normally closed contact(s) (symbol .
- Precise operating points (consistency).
- Immune to electromagnetic disturbances.

They are exceptional detection devices thanks to these characteristics:

- Presence/absence.
- Positioning and travel limit.
- Objects passing/counting.

8


A variety of operating heads:

- Plain plunger
 - Roller plunger
 - Roller lever, adjustable or not, etc.
- Assembled using 2 x ø3 screws for LS20P...LS26P
Assembled using 2 x M3 screws for LS20M...LS26M

Casing:

- 30 mm or 35 mm width

Contact blocks:

- Contact configuration: 1 N.O. + 1 N.C.
- Positive opening operation 
- Snap action or slow action
- Zb shape: the 2 contacts are electrically separated

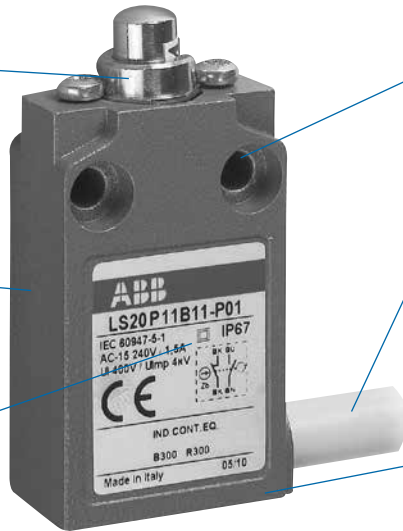
Mounting the casing:

- 2 x M4 screws on the top part

Electrical connection:

- Cable output left/right or cable output bottom: for LS20P...LS26P
 - cable IEC 20/22 II PVC 4 x 0.75 mm²
 - cable UL 62 PVC 4 x AWG 18
- for LS20M...LS26M
 - cable IEC 20/22 II PVC 5 x 0.75 mm²
 - cable UL 62 PVC 5 x AWG 18
- Standard length: 1 m (other lengths on request)
- Other outputs (on request):
 - connector M12 or 7/8" NPT
 - cable with end connector

- Compounding with epoxy resin for IP67 protection degree



Catalog number explanation

Example : **LS 2 5 M 51 D 11 - U 02**

Limit Switch, prewired.....LS2							
30 mm width: cable output left / right..... 0							Cable length:
30 mm width: cable output bottom..... 1							011 m
35 mm width: cable output left / right..... 5							022 m
35 mm width: cable output bottom..... 6							033 m
							U cable UL 62 - PVC (black)
Plastic casing.....P							Contact types:
Metal casingM							11 1 N.O. + 1 N.C. contacts
Operating heads:							Snap action:
Codes.....10...98							BZb Snap
							Dependent (slow) action:
							DZb Non-overlapping late make

Plastic casing UL Type 1 & metal casing - UL Type 4 & 4X Pre-wired, 30mm

Miniature
limit switches

Movement to be detected:

On end

30° Cam Trans.

On end

For Plastic Casing:

Cable: 4 x 0.75 mm² / 4 x AWG 18

Length: 1 m ⊕

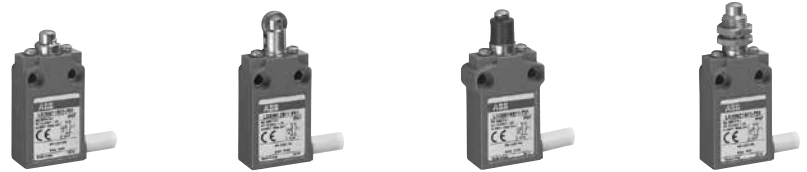
(Other lengths see ordering details)

For Metal Casing:

Cable: 5 x 0.75 mm² / 5 x AWG 18

Length: 1 m ⊕

(Other lengths see ordering details)



Actuator

	Metal plunger	Metal Roller plunger	Metal plunger (with dust protection cup)	Metal plunger with fixing nuts
⊕ (N.C. contact with positive opening operation)	⊕	⊕	⊕	⊕
Maximum actuation speed	0.5 m/s	0.1 m/s	0.5 m/s	0.5 m/s
Min. force / torque: - actuation	15 N	10 N	15 N	15 N
- positive opening operation	30 N	30 N	30 N	30 N

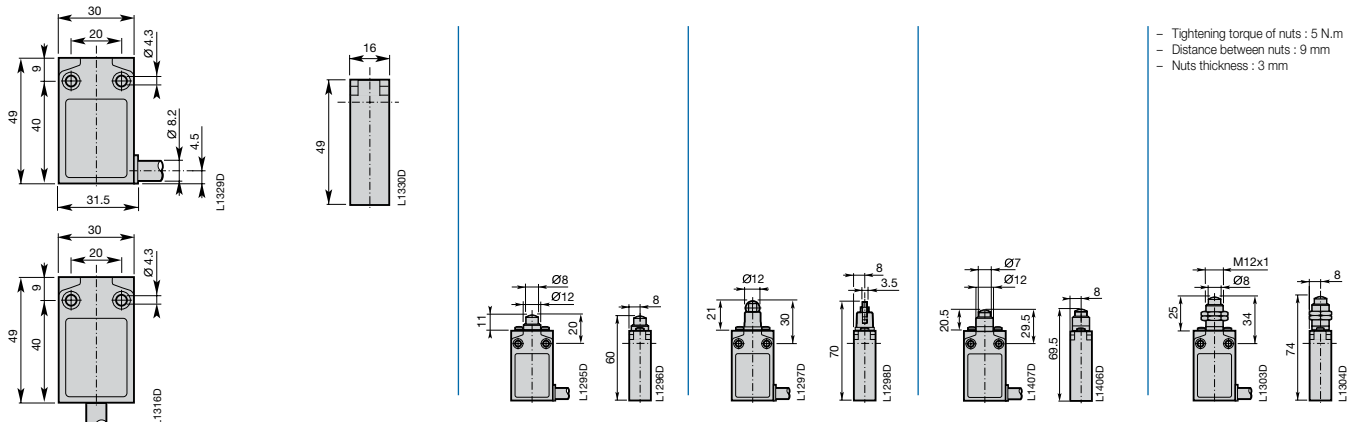
Additional technical data

Cable output left / right code.....	0 1	} Does not affect pricing.
Cable output bottom code.....		
Plastic casing.....	P	
Metal casing.....	M	
Type to be completed with the above codes Δ		

B11 = Snap action contacts	Catalog number	LS2ΔΔ11B11-U01	LS2ΔΔ12B11-U01	LS2ΔΔ16B11-U01	LS2ΔΔ21B11-U01
	Operation diagram				
D11 = Non-overlapping Slow action contacts	Catalog number	LS2ΔΔ11D11-U 01	LS2ΔΔ12D11-U01	LS2ΔΔ16D11-U01	LS2ΔΔ21D11-U01
	Operation diagram				
Weight ⊕ (packing per unit)	oz	4.40	4.58	4.40	4.93

■ Closed contact / □ Open contact

Dimensions (mm)



⊕ Other cable lengths available. Replace last two digits "01" with: 02-2m, 05-5m, 10-10m.
⊕ add 1.76 oz with metal casing.

Plastic casing UL Type 1 & metal casing - UL Type 4 & 4X

Pre-wired, 30mm

Movement to be detected:

30° Cam Translation Movement

Multidirectional

For Plastic Casing:

Cable: 4 x 0.75 mm² / 4 x AWG 18

Length: 1 m ⊕

(Other lengths see ordering details)

For Metal Casing:

Cable: 5 x 0.75 mm² / 5 x AWG 18

Length: 1 m ⊕

(Other lengths see ordering details)



Actuator

⊕ (N.C. contact with positive opening operation)

Maximum actuation speed

Min. force / torque: - actuation

- positive opening operation

Metal Roller plunger with fixing nuts



0.1 m/s
10 N
30 N

ø14 plastic roller lever



1.5 m/s
0.08 N.m
0.28 N.m

Adjustable ø18 plastic roller lever



1.5 m/s
0.08 N.m
0.28 N.m

Spring rod



-
1.0 m/s
0.10 N.m
-

Additional Technical Data

Cable output left / right code..... 0 } Does not affect pricing.
Cable output bottom code..... 1 }

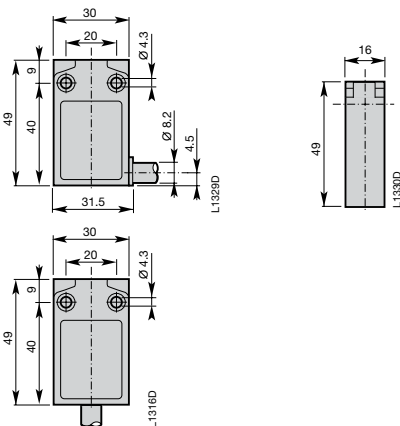
Plastic casing..... P
Metal casing..... M

Type to be completed with the above codes Δ

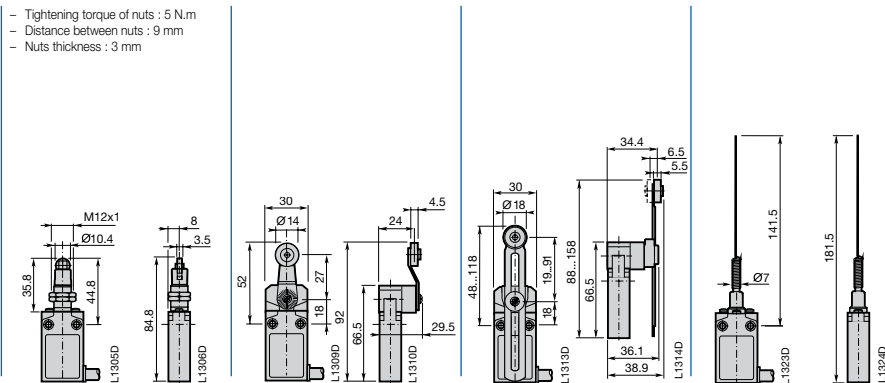
B11 = Snap action contacts	Catalog number	LS2ΔΔ22B11-U01	LS2ΔΔ41B11-U01	LS2ΔΔ 51B11- U 01	LS2ΔΔ 91B11- U 01
	Operation diagram				
D11 = Non-overlapping Slow action contacts	Catalog number	LS2ΔΔ22D11-U01	LS2ΔΔ41D11-U01	LS2ΔΔ51D11-U 01	-
	Operation diagram				-
Weight ⊕ (packing per unit)	oz	5.11	6.17	6.70	6.70

■ Closed contact / □ Open contact

Dimensions (mm)



- Tightening torque of nuts : 5 N.m
- Distance between nuts : 9 mm
- Nuts thickness : 3 mm



⊕ Other cable lengths available. Replace last two digits "01" with: 02-2m, 05-5m, 10-10m.
⊕ add 1.76 oz with metal casing.

Plastic casing UL Type 1 & metal casing - UL Type 4 & 4X

Pre-wired, 35mm

Movement to be detected:

On end

30° Cam Trans.

On end

For Plastic Casing:

Cable: 4 x 0.75 mm² / 4 x AWG 18
Length: 1 m ⊕
(Other lengths see ordering details)

For Metal Casing:

Cable: 5 x 0.75 mm² / 5 x AWG 18
Length: 1 m ⊕
(Other lengths see ordering details)



Actuator

	Metal plunger	Metal Roller plunger	Metal plunger (with dust protection cup)	Metal plunger with fixing nuts
⊕ (N.C. contact with positive opening operation)	⊕	⊕	⊕	⊕
Maximum actuation speed	0.5 m/s	0.1 m/s	0.5 m/s	0.5 m/s
Min. force / torque: - actuation	15 N	10 N	15 N	15 N
- positive opening operation	30 N	30 N	30 N	30 N

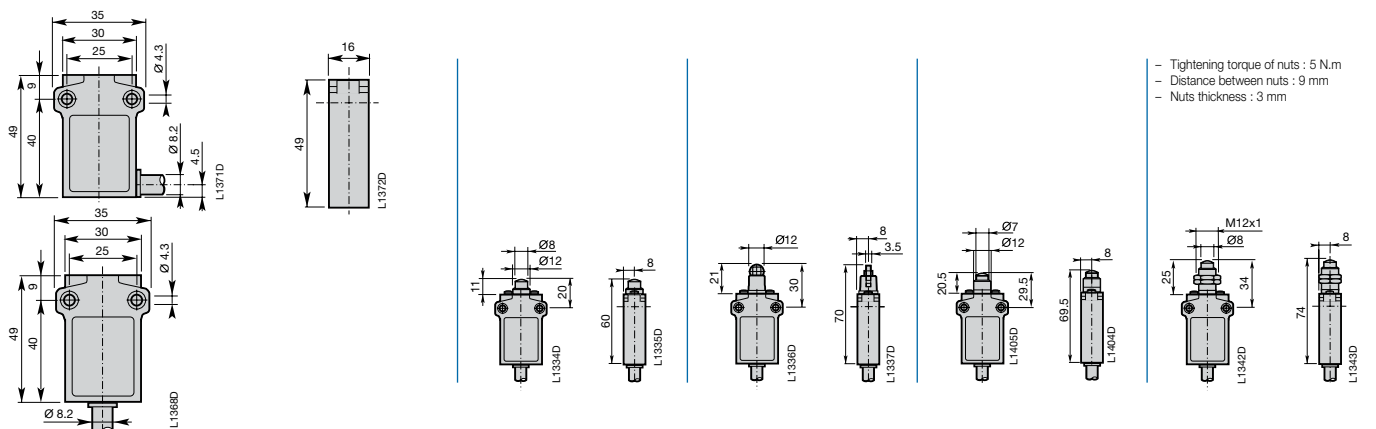
Additional Technical Data

Cable output left / right code.....	5	} Does not affect pricing.
Cable output bottom code.....	6	
Plastic casing.....	P	
Metal casing.....	M	
Type to be completed with the above codes Δ		

	Catalog number	LS2ΔΔ11B11-U01	LS2ΔΔ12B11-U01	LS2ΔΔ16B11-U01	LS2ΔΔ21B11-U01
B11 = Snap action contacts					
	Operation diagram				
D11 = Non-overlapping Slow action contacts	Catalog number	LS2ΔΔ11D11-U01	LS2ΔΔ12D11-U01	LS2ΔΔ16D11-U01	LS2ΔΔ21D11-U01
	Operation diagram				
Weight ⊕ (packing per unit)	oz	4.40	4.58	4.40	4.93

■ Closed contact / □ Open contact

Dimensions (mm)



⊕ Other cable lengths available. Replace last two digits "01" with: 02-2m, 05-5m, 10-10m.
 ⊕ add 1.76 oz with metal casing.

Plastic casing UL Type 1 & metal casing - UL Type 4 & 4X

Pre-wired, 35mm

Movement to be detected:

30° Cam Translation

Multidirectional

For Plastic Casing:

Cable: 4 x 0.75 mm² / 4 x AWG 18

Length: 1 m \varnothing

(Other lengths see ordering details)

For Metal Casing:

Cable: 5 x 0.75 mm² / 5 x AWG 18

Length: 1 m \varnothing

(Other lengths see ordering details)



Actuator

	Metal Roller plunger with fixing nuts	ø14 plastic roller lever	Adjustable ø18 plastic roller lever	Spring rod
⊖ (N.C. contact with positive opening operation)	⊖	⊖	⊖	-
Maximum actuation speed	0.1 m/s	1.5 m/s	1.5 m/s	1.0 m/s
Min. force / torque: - actuation	10 N	0.08 N.m	0.08 N.m	0.10 N.m
- positive opening operation	30 N	0.28 N.m	0.28 N.m	-

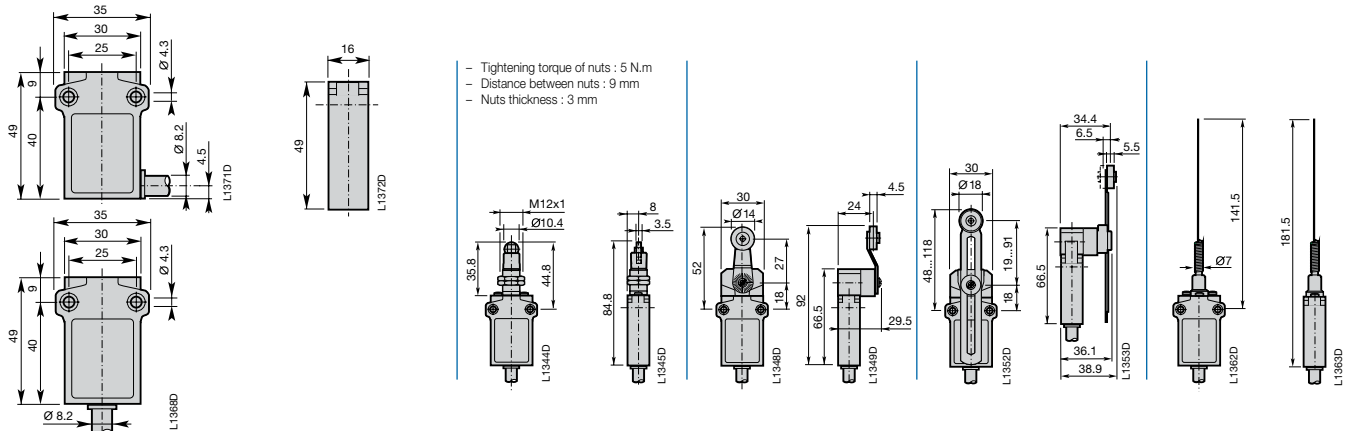
Additional Technical Data

Cable output left / right code.....	$\left. \begin{matrix} 5 \\ 6 \end{matrix} \right\}$	Does not affect pricing.
Cable output bottom code.....		
Plastic casing.....	P	
Metal casing.....	M	
Type to be completed with the above codes Δ		

	Catalog number	LS2ΔΔ22B11-U01	LS2ΔΔ41B11-U01	LS2ΔΔ51B11-U01	LS2ΔΔ91B11-U01
<p>B11 = Snap action contacts</p>					
<p>D11 = Non-overlapping Slow action contacts</p>					-
Weight \varnothing (packing per unit)	oz	7.05	7.05	8.11	8.28

Closed contact / Open contact-

Dimensions (mm)



① Other cable lengths available. Replace last two digits "01" with: 02-2m, 05-5m, 10-10m.
 ② add 1.76 oz with metal casing.

Miniature limit switches

Technical data



Technical data

Miniature pre-wired

30mm & 35mm

Metal & plastic casings

Technical data

Plastic & metal casing

30mm & 35mm

General Technical Data

	Plastic Casing	Metal Casing
Standards	IEC 60947-1, IEC 60947-5-1, EN 60947-1, EN 60947-5-1, UL 508 and CSA C22-2 n° 14	
Certifications - Approvals	UL - CSA - CCC	
Air temperature near the device		
– during operation	°C – 25 ... + 70	– 25 ... + 70
– for storage	°C – 30 ... + 80	– 30 ... + 80
Climatic withstand	According to IEC 68-2-3 and salty mist according to IEC 68-2-11	
Mounting positions	All positions are authorized	
Shock withstand (according to IEC 68-2-27 and EN 60068-2-27)	g 50g* (1/2 sinusoidal shock for 11 ms) no change in contact position	
Resistance to vibrations (acc. to IEC 68-2-6 and EN 60068-2-6)	g 25g (10 ... 500 Hz) no change in position of contacts greater than 100 µs	
Protection against electrical shocks (acc. to IEC 536)	Class II	Class I
Degree of protection (according to IEC 529 and EN 60529)	IP65	IP66 **
Consistency (measured over 1 million operations)	0.1 mm (upon closing point)	0.1 mm (upon closing point)

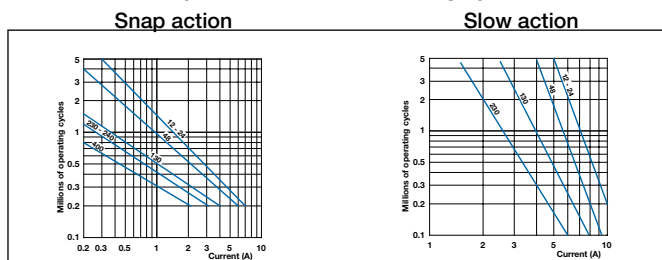
Electrical Data

Rated insulation voltage U_i			
– according to IEC 60947-1 and EN 60947-1	V	500 (degree of pollution 3)	400 (LS3..M. & LS7..M.), 500 (LS4xM..) - (degree of pollution 3)
– according to UL 508, CSA C22-2 n° 14	V	600	300 (LS3..M. & LS7..M.), 600 (LS4..M.)
Rated impulse withstand voltage U_{imp}	kV	6	
(according to IEC 60947-1 and EN 60947-1)			
Conventional enclosed thermal current I_{the}	A	10	
(according to IEC 60947-5-1 and EN 60947-5-1) $\theta \leq 40$ °C			
Short-circuit protection gG type fuses	A	10	
Rated operational current			
I_g / AC-15 – acc. to IEC 60947-5-1			
24 V - 50/60 Hz	A	10	
130 V - 50/60 Hz	A	5.5	
230 V - 50/60 Hz	A	3.1	
240 V - 50/60 Hz	A	3	
400 V - 50/60 Hz	A	1.8	
– acc. to UL 508, CSA C22 n° 14		A 600	A 300 (LS3..M. & LS7..M.), A 600 (LS4..M.)
I_g / DC-13 – acc. to IEC 60947-5-1			
24 V - d.c.	A	2.8	
110 V - d.c.	A	0.6	
250 V - d.c.	A	0.27	
– acc. to UL 508, CSA C22 n° 14		Q 600	Q 300 (LS3..M. & LS7..M.), Q 600 (LS4..M.)
Positivity		Contacts with positive opening operation as per IEC 60947-5-1 chapter 3 and EN 60947-5-1	
Resistance between contacts	mΩ	25	
Mechanical durability	Millions of operations	$\left. \begin{array}{l} 15 \\ 10 \\ > 5 \end{array} \right\} \text{LS} \left\{ \begin{array}{l} 3x \\ 7x \end{array} \right. \left\{ \begin{array}{l} P \\ P \end{array} \right. \left\{ \begin{array}{l} 10...12 ; 30...38 \\ 13 ; 41...46 ; 51...55 ; 61...78 \\ 14 ; 91...92 ; 98 \end{array} \right.$	$\left. \begin{array}{l} 15 \\ 10 \\ > 5 \end{array} \right\} \text{LS} \left\{ \begin{array}{l} 3x \\ 7x \end{array} \right. \left\{ \begin{array}{l} M \\ M \end{array} \right. \left\{ \begin{array}{l} 11...12 ; 31...38 \\ 13 ; 41...46 ; 51...55 ; 61...78 \\ 14 ; 91...92 ; 98 \end{array} \right.$
	Millions of operations	$\left. \begin{array}{l} 15 \\ 10 \\ > 5 \end{array} \right\} \text{LS} \left\{ \begin{array}{l} 4x \\ 4x \end{array} \right. \left\{ \begin{array}{l} P \\ P \end{array} \right. \left\{ \begin{array}{l} 11 ; 12 ; 31...33 \\ 13 ; 41...44 ; 51...55 ; 61...74 \\ 14 ; 19 ; 34...36 ; 91...93 \end{array} \right.$	$\left. \begin{array}{l} 30 \\ 25 \\ 10 \end{array} \right\} \text{LS} \left\{ \begin{array}{l} 4x \\ 4x \end{array} \right. \left\{ \begin{array}{l} M \\ M \end{array} \right. \left\{ \begin{array}{l} 11...13 ; 21...23 ; 31...33 \\ 41...44 ; 51...55 ; 61...74 \\ 91...93 \end{array} \right.$
Electrical durability (according to IEC 60947-5-1 appendix C)		Utilization categories AC-15 and DC-13 (see curves and values below)	
– max. switching frequency	Cycles/h	3600	
– load factor		0.5	
Connecting data of contact blocks			
Connecting terminals		M3.5 (+, -) pozidriv 2 screw with cable clamp	
Connecting capacity	1 or 2 x mm ² / AWG	0.5 mm ² / AWG 20 to 2.5 mm ² / AWG 14	
Terminal marking		According to EN 50013	

* Except for LS3..M42, M52 and M55 - LS3..P42, P52 and P55 - LS7..M42, M52 and M55 - LS7..P42, P52 and P55: 25g

** Except for LS3..M52, M55, M73, M74 and M92 - LS7..M52, M55, M73, M74 and M92 - LS4..M54, M72, M92 and M93 : the degree of protection is IP65.

Electrical durability for AC-15 utilization category



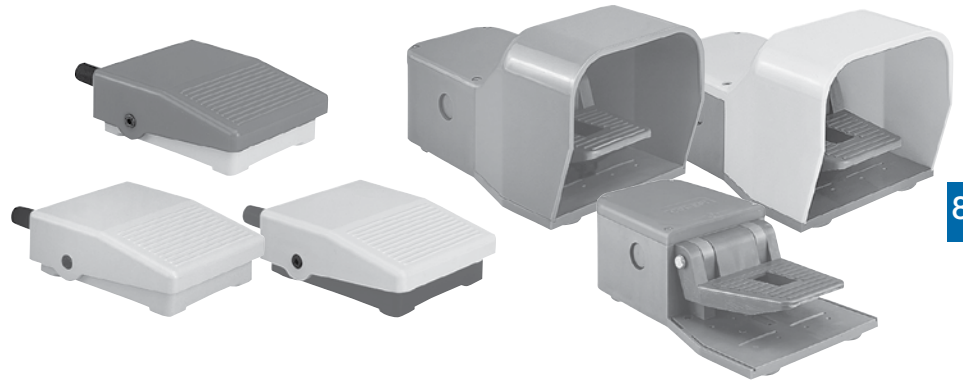
Electrical durability for DC-13 utilization category

	Snap action	Slow action
Power breaking for a durability of 5 million operating cycles		
Voltage	24 V	12 W
	9.5 W	
Voltage	48 V	9 W
	6.8 W	
Voltage	110 V	6 W
	3.6 W	

Plastic Foot switches



Foot switches



Description of Mini foot switches

- Reduced dimensions: 100 x 75 x 34 mm.
- Materials: cover and base made of self-extinguishing ABS.
- Color choice: black or grey base; black, grey, yellow or red cover.

Description of foot switches with covers

- Dimensions: 285 x 140 x 145.
- Materials: base, cover and pedal made of shock resistant Bayblend® FR 90 material (alloyed polycarbonate and ABS).
- Color choice: grey base; grey, yellow or red cover.
- Variations: grey base, half-red cover.
Especially used for emergency stop function.

Note: this emergency stop function must never contain the «locked in neutral position» device.

UL Listed file #E191693

Application

Foot switch-operated machines such as: shearing machines, folding machines, spinning lathes, machine tools, wrapping machines, riveting presses, etc.

Foot switches with covers come in three operation formats:

- **Free movement:** contact position follows pedal movement: actuated when the pedal is pushed down, released when pedal is in a state of rest.
- **Foot switch locked in neutral position:** same operation as above, after unlocking the pedal with the end of the foot.
- **Foot switch latched in low position:** same operation as free movement, except that a state of rest is obtained only after having unlatched the pedal with the end of the foot.

General information

IPM Mini foot switches, IPS Foot switches with covers Description

Application

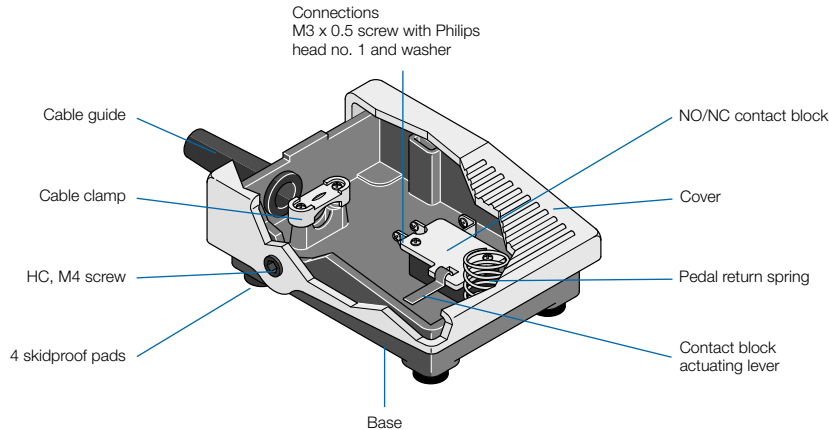
Foot switch-operated machines such as: shearing machines, folding machines, spinning lathes, machine tools, wrapping machines, riveting presses, etc.

Foot switches with covers come in three operation formats:

- **Free movement** (momentary): contact position follows pedal movement: actuated when the pedal is pushed down, released when pedal is in a state of rest.
- **Foot switch locked in neutral position:** same operation as above, after unlocking the pedal with the end of the foot.
- **Foot switch latched in low position** (maintained): same operation as free movement, except that a state of rest is obtained only after having unlatched the pedal with the end of the foot.

Description of Mini foot switches

- Reduced dimensions: 100 x 75 x 34 mm.
- Materials: cover and base made of self-extinguishing ABS.
- Color choice: black or grey base; black, grey, yellow or red cover.

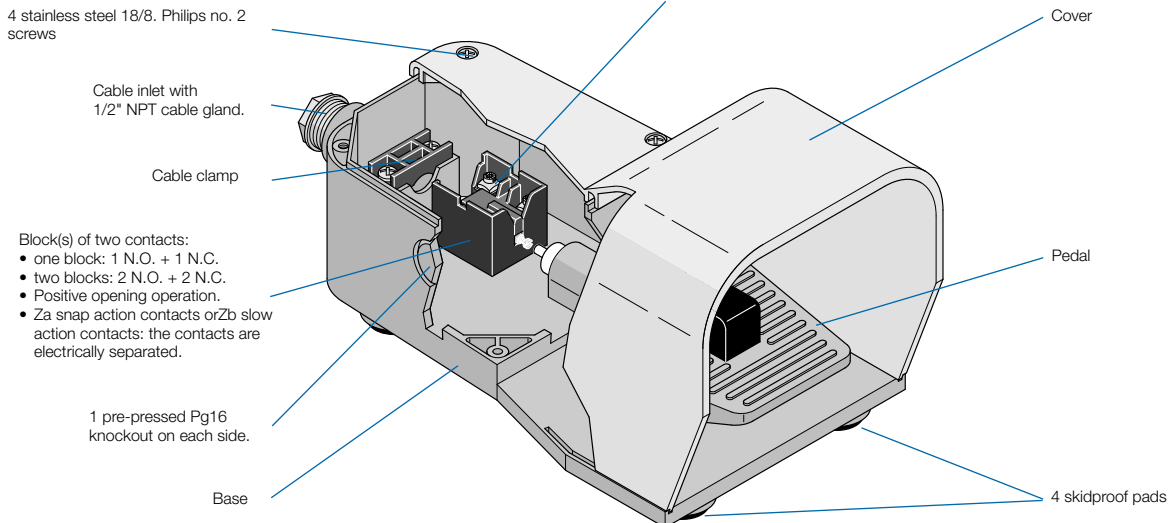


Description of foot switches with covers

- Dimensions: 285 x 140 x 145.
- Materials: base, cover and pedal made of shock resistant Bayblend® FR 90 material (alloyed polycarbonate and ABS).
- Color choice: grey base; grey, yellow or red cover.
- Variations: grey base, half-red cover. Especially used for emergency stop function.

Note: this emergency stop function must never contain the «locked in neutral position» device.

- Connecting terminals
- M 3.5 (+, -) Philips no. 1 screw
 - Screw head with captive cable clamp.
 - Markings conform with IEC 947-1, IEC 947-5-1, EN 50 005 and 50 013 standards.



Comment: Foot switches with covers can be assembled on a plate and equipped with a transportation handle. Upon request, instead of the handle an emergency stop button can be installed above a tube that allows for connection cable passage.

Foot switches

Mini foot switches, IP 40

IPM Mini foot switches



IPM1R



IPM1Y



IPM1G



IPM1B



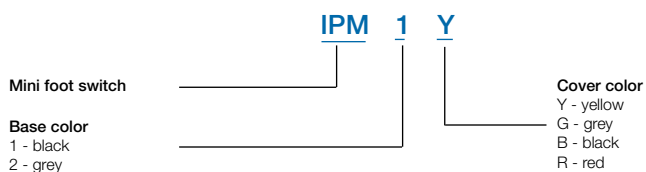
IPM1R



N.O. + N.C.
contact block

	Cover color	Unit weight in kg Packing 1 piece	Catalog number
Black base			
1	Yellow	0.130	IPM1Y
1	Grey	0.130	IPM1G
1	Black	0.130	IPM1B
1	Red	0.130	IPM1R
Grey base			
1	Yellow	0.130	IPM2Y
1	Grey	0.130	IPM2G
1	Black	0.130	IPM2B
1	Red	0.130	IPM2R

Catalog number explanation



Foot switches

Foot switches with covers, IP 65

IPS foot switches



IPSY1A11



IPSR1A11



IPSG1A11



IPSZ1A11

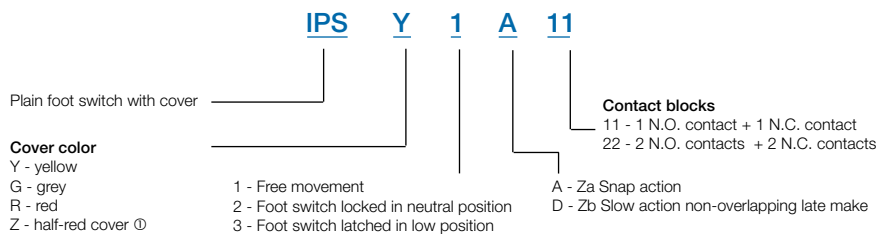
Contact blocks (set of 1 N.O. + 1 N.C.)				Unit weight in kg	Catalog number
Snap action		Non-overlapping slow action			
Za	Za	Zb	Zb	Packing 1 piece	
Free movement					
1	—	1	—	1.100	IPSA1A11
—	—	—	—	1.100	IPSA1D11
—	1 + 1	—	—	1.100	IPSA1A22
—	—	—	1 + 1	1.100	IPSA1D22
Locked in neutral position					
1	—	1	—	1.100	IPSA2A11
—	—	—	—	1.100	IPSA2D11
—	1 + 1	—	—	1.100	IPSA2A22
—	—	—	1 + 1	1.100	IPSA2D22
Latched in low position					
1	—	1	—	1.100	IPSA3A11
—	—	—	—	1.100	IPSA3D11
—	1 + 1	—	—	1.100	IPSA3A22
—	—	—	1 + 1	1.100	IPSA3D22
Free movement foot switch with half-red cover					
1	—	1	—	0.800	IPSZ1A11
—	—	—	—	0.800	IPSZ1D11
—	1 + 1	—	—	0.800	IPSZ1A22
—	—	—	1 + 1	0.800	IPSZ1D22
Foot switch latched in low position with half-red cover					
1	—	1	—	0.800	IPSZ3A11
—	—	—	—	0.800	IPSZ3D11
—	1 + 1	—	—	0.800	IPSZ3A22
—	—	—	1 + 1	0.800	IPSZ3D22

Color code

To select a foot switch color, substitute the appropriate color code for the Δ in the catalog number

Yellow	Y
Grey	G
Red	R

Catalog number explanation

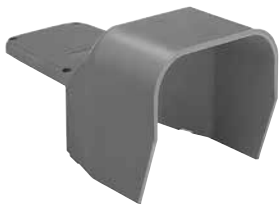


① Incompatible with locked in neutral position function.

Components

Double Insulation - Protection Cover in ABS - IP65

⊕ "N.C." contact with positive opening operation.






IP5XG



IP5XZ



IP5XCD11

Contact blocks	Positive opening operation	Catalog number
 B11  D11  C11		
Protection cover for foot switch		
Grey cover	—	IP5XG
Yellow cover	—	IP5XY
Red cover	—	IP5XR
Half red cover	—	IP5XZ
Contact block for IPS... foot switches		
1NC & 1NO (Za) snap action		
1 — —	⊕	IP5XCA11
1NC & 1NO (Zb) slow action non-overlapping late make		
— 1 —	⊕	IP5XCD11



Foot switches Technical data

Technical data

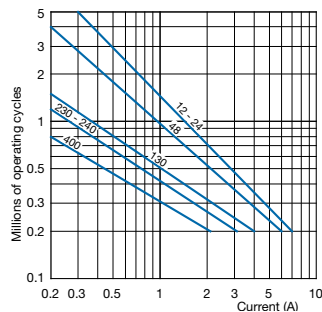
General technical data

	Mini foot switch	Foot switch with cover
Standards	IEC 1058-1	IEC 947-5-1
Certifications & Approvals	—	UL - CSA - BG
Air temperature near the device		
– during operation	°C	– 10 ... + 70
– for storage	°C	– 25 ... + 80
Climatic withstand	—	according to IEC 68-2-3 and salty mist according to IEC 68-2-11
Shock withstand (according to IEC 68-2-27 and EN 60 068-2-27)	g	50g (1/2 sinusoidal shock for 11 ms) no change in contact position
Degree of protection (according to IEC 529 and EN 60 529)	IP 40	IP 65
Actuation torque	N.m	0.25
Operating angle	Degree	2 to 4
Cable inlet	Cable guide ø min. 6mm; ø max. 8.5 mm	Pg 16

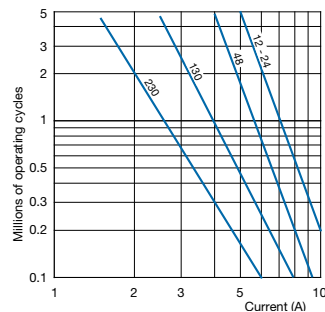
8 Electrical data

Rated insulation voltage U_i	V	250	500 (according to IEC 947-1 and EN 60-947-1) Degree of pollution 3
Rated impulse withstand voltage U_{imp} (according to IEC 947-1 and EN 60 947-1)	kV	1	6
Conventional free air thermal current I_{th} ($q < 40$ °C)	A	15	10 (according to IEC 947-1)
Short-circuit protection $U_e < 500$ V a.c. - gG (gI) type fuses	A	10	10
Rated operational current	A	3 (250 V a.c.) 0.06 (230 V d.c.)	A 600 (according to UL 508 and CSA C22-2 n° 14) Q 600 (according to UL 508 and CSA C22-2 n° 14)
AC-15 acc. to IEC 947-5-1	24 V 130 V 230 V 240 V 400 V	A A A A A	10 5.5 3.1 3 1.8
DC-13 acc. to IEC 947-5-1	24 V 110 V 250 V	A A A	2.8 0.6 0.27
Resistance between contacts	mΩ	30	25
Connecting terminals		M3 x 0.5 screw with Philips head no. 1 and washer	M3.5 (+, -) screw with Philips head no. 1 with cable clamp
Positive opening operation (according to IEC 947-5-1)		—	⊕
Connecting capacity	1 or 2 x mm ²	—	0.5 – 2.5
Terminal marking		—	According to EN 50 013
Mechanical durability	Millions of operations	10	30
Electrical durability	Operations	100,000	According to IEC 947-5-1, utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)

AC-15 – Snap action



AC-15 – Slow action



DC-13		Snap action	Slow action
		Power breaking for a durability of 5 million operating cycles	
Voltage	24 V	9.5 W	12 W
Voltage	48 V	6.8 W	9 W
Voltage	110 V	3.6 W	6 W

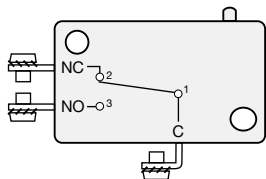
Technical data & approximate dimensions

Mini-footswitches

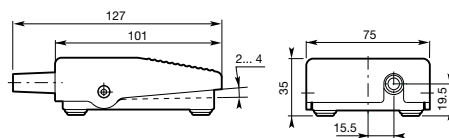
IPM Mini foot switches

Base color		Yellow cover	Grey cover	Black cover	Red cover
Black base	Catalog number	IPM1Y	IPM1G	IPM1B	IPM1R
Grey base	Catalog number	IPM2Y	IPM2G	IPM2B	IPM2R
Weight (packing per unit)	kg	0.130	0.130	0.130	0.130

N.O. + N.C. Contact block



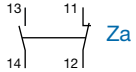
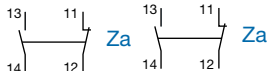
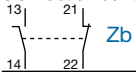
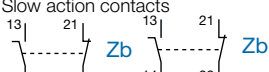
Dimensions (mm)



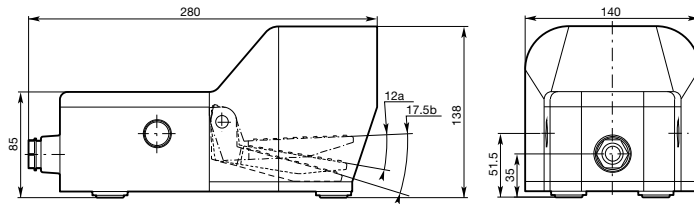
Technical data & approximate dimensions

Foot switches with covers

IPS Foot switches

		Free movement	Locked in neutral position	Latched in low position
Snap action contacts 	Catalog number ⊖ (Positive opening operation of the N.C. contact)	IPS1A11 ⊖	IPS2A11 ⊖	IPS3A11 ⊖
Snap action contacts 	Catalog number ⊖ (Positive opening operation of the N.C. contact)	IPS1A22 ⊖	IPS2A22 ⊖	IPS3A22 ⊖
Non-overlapping Slow action contacts 	Catalog number ⊖ (Positive opening operation of the N.C. contact)	IPS1D11 ⊖	IPS2D11 ⊖	IPS3D11 ⊖
Non-overlapping Slow action contacts 	Catalog number ⊖ (Positive opening operation of the N.C. contact)	IPS1D22 ⊖	IPS2D22 ⊖	IPS3D22 ⊖
Weight (packing per unit)	kg	1.10	1.10	1.10

Dimensions (mm)



Plain foot switch
 a = pre-travel
 b = total travel

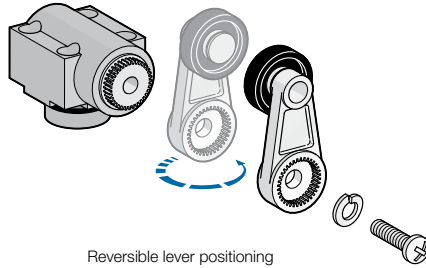


General technical data

Limit switches

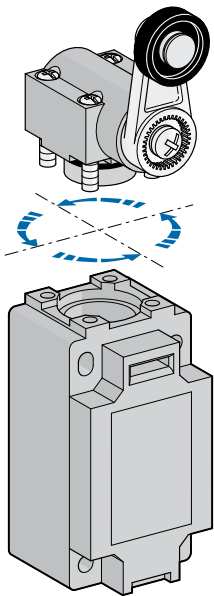
General Technical data

Technical data Implementation

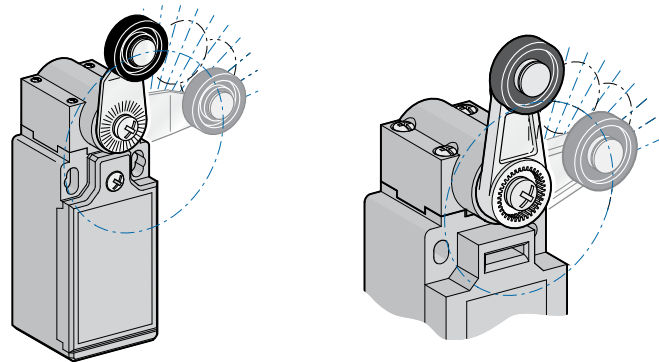


Reversible lever positioning

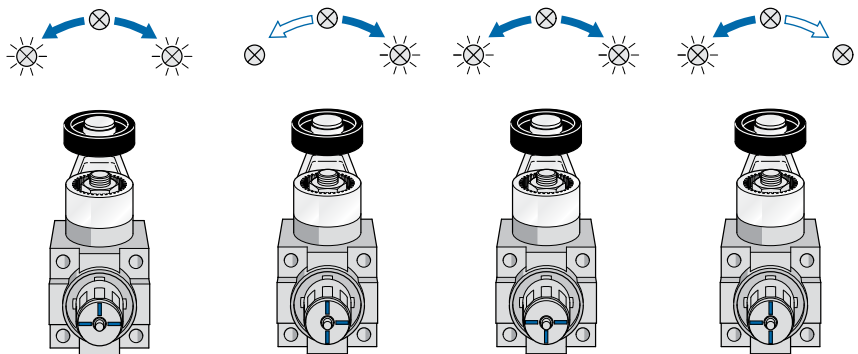
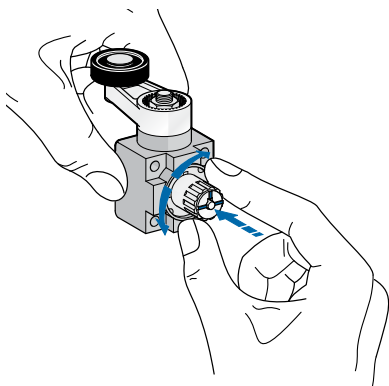
8



90° head orientation



Free position adjustment of lever



Technical data


Terminology

Double insulation

Class II materials, according to IEC 536, are designed with double insulation. This measure consists in doubling the functional insulation with an additional layer of insulation so as to eliminate the risk of electric shock and thus not having to protect elsewhere. No conductive part of "double insulated" material should be connected to a protective conductor.

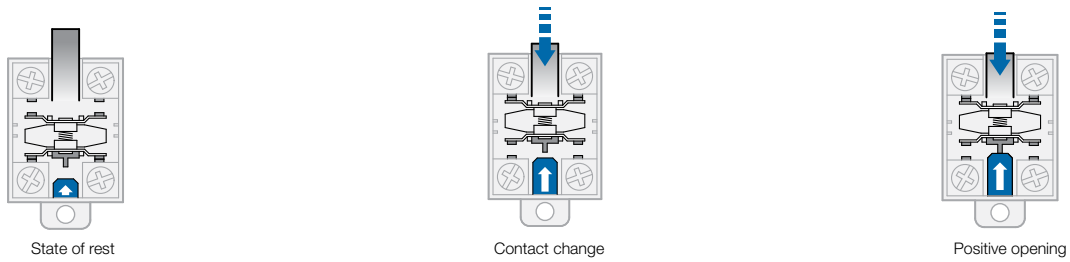
Positive opening operation

A control switch, with one or more break-contact elements, has a positive opening operation when the switch actuator ensures full contact opening of the break-contact. For the part of travel that separates the contacts, there must be a positive drive, with no resilient member (e.g. springs), between the moving contacts and the point of the actuator to which the actuating force is applied.

The positive opening operation does not deal with N.O. contacts. Control switches with positive opening operation may be provided with either snap action or slow action contact elements. To use several contacts on the same control switch with positive opening operation, they must be electrically separated from each other, if not, only one may be used. Every control switch with positive opening operation must be indelibly marked on the outside with the symbol: .

Snap action

Snap action contacts are characterized by a release position that is distinct from the operating position (differential travel). Snap breaking of moving contacts is independent of the switch actuator's speed and contributes to regular electric performance even for slow switch actuator speeds.



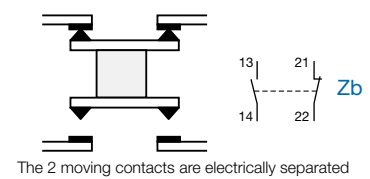
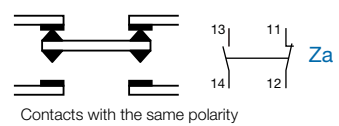
Slow action

Slow action contacts are characterized by a release position that is the same as the operating position. The switch actuator's speed directly conditions the travel speed of contacts.



Contact shape according to IEC 947-5-1.

Change-over contact elements with 4 terminals must be indelibly marked with the corresponding **Za** or **Zb** symbol as in the diagrams below.



Utilization category

AC-15: switching of electromagnetic loads of electromagnets using an alternating current (>72 VA).
 DC-13: switching of electromagnets using a direct current.

Terminals

Limit switches with metal casings must have a terminal, for a protective conductor, that is placed inside the casing very close to the cable inlet and must be indelibly marked.

Minimum actuation force/torque

The minimum amount of force/torque that is to be applied to the switch actuator to produce a change in contact position.

Minimum force/torque to achieve positive opening operation

The minimum amount of force/torque that is to be applied to the switch actuator to ensure positive opening operation of the N.C. contact.

Technical data

Travel and operation diagrams

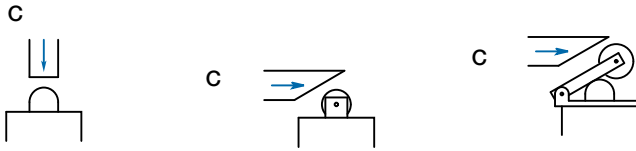
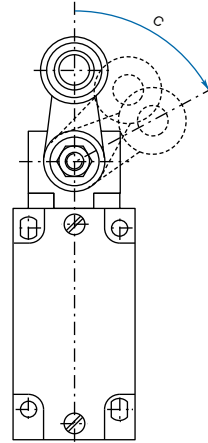
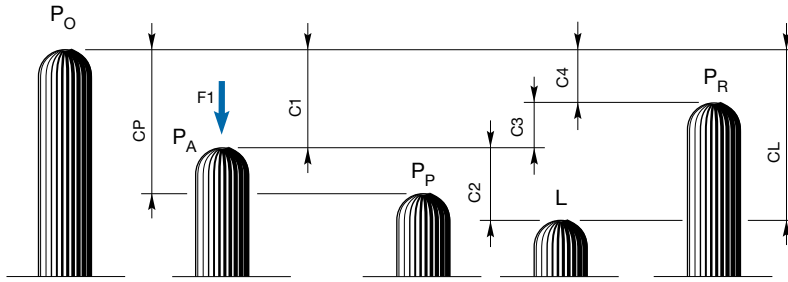


Diagram in millimeters

Diagram in degrees

8

P₀ Free position

Position of the switch actuator when no external force is exerted on it.

P_A Operating position

Position of the switch actuator, under the effect of force F₁, when the contacts leave their initial free position.

P_P Positive opening position

Position of the switch actuator from which positive opening is ensured.

L Max. travel position

Maximum acceptable travel position of the switch actuator under the effect of a force F₁.

P_R Release position

Position of the switch actuator when the contacts return to their initial free position.

C₁ Pre-travel

Distance between the free position P₀ and the operating position P_A.

C_p Positive opening travel

Minimum travel of the switch actuator, from the free position, to ensure positive opening operation of the normally closed contact.

C₂ Over-travel

Distance between the operating position P_A and the max. travel position L.

C_L Max. travel

Distance between the free position P₀ and the max. travel position L.

C₃ Differential travel (C1-C4)

Travel difference of the switch actuator between the operating position P_A and the release position P_R.

C₄ Release travel

Distance between the release position P_R and the free position P₀.

Diagram for snap action contacts:

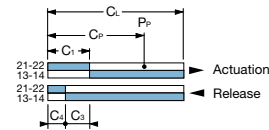
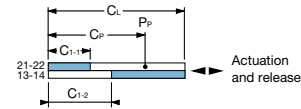


Diagram for non-overlapping slow action contacts:



Note: for slow action contacts, C₃ = 0, C₁₋₁ = pre-travel of contact 21-22, C₁₋₂ = pre-travel of contact 13-14.

Examples:

LS45M13B11
(snap action contacts)

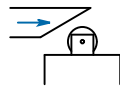
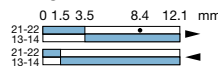


Diagram in millimeters/cam travel



LS45M41B11
(snap action contacts)

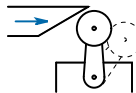
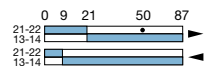


Diagram in degrees/lever rotation



LS45M11D11
(non-overlapping slow action contacts)

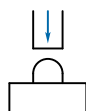
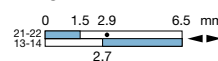


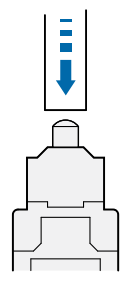
Diagram in millimeters/plunger travel



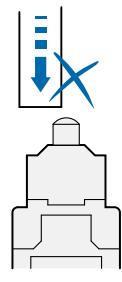
Technical data

Utilization precautions

Plain plunger

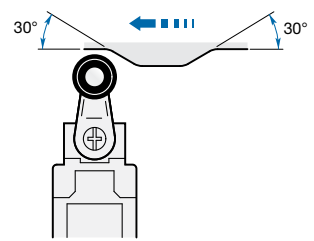


Correct

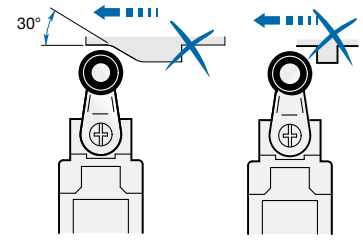


Incorrect

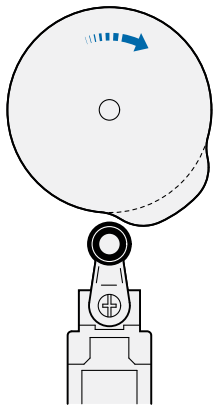
Roller plunger or roller lever



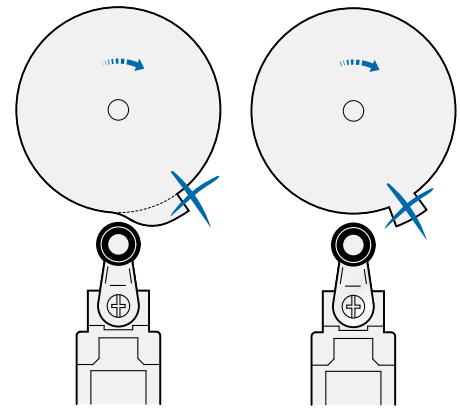
Correct



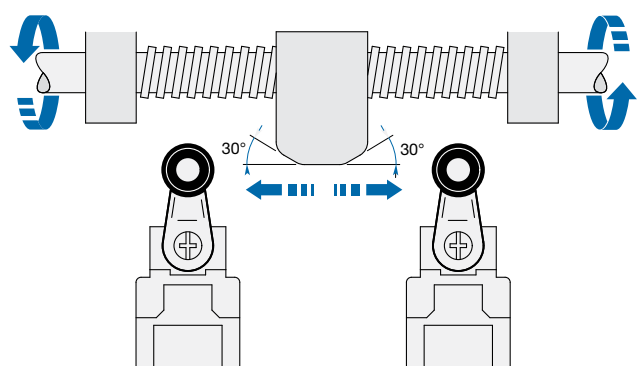
Incorrect



Correct



Incorrect



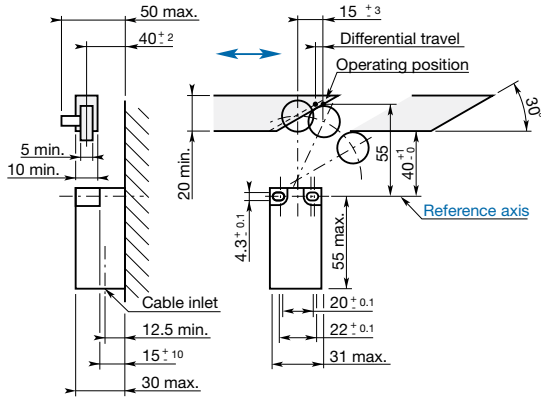
For a relatively slow movement of the switch actuator, a limit switch with a snap action contact block is preferred.

Technical data EN 50047 standard

The European Committee for Electrotechnical Standardization (CENELEC), which groups together 18 European countries, publishes EN standards. The present standard defines dimensions and mechanical data for limit switches (30 x 55mm).

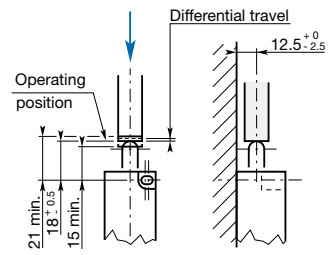
A Shape

Roller lever operating heads



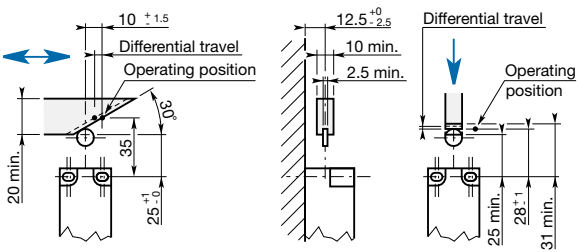
B Shape

Rounded plunger operating heads



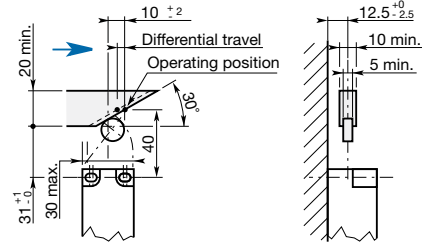
C Shape

Roller plunger operating heads



E Shape

Roller lever operating heads



Technical data

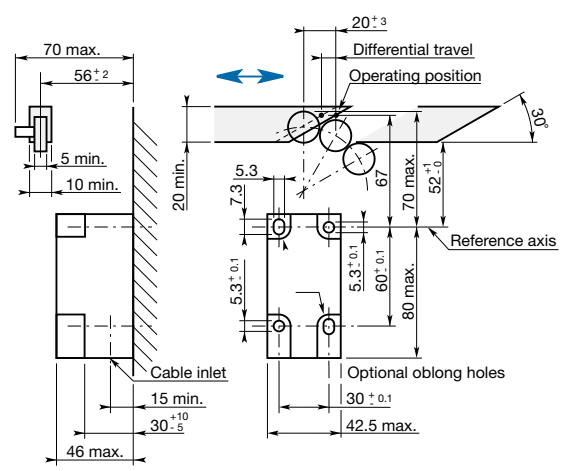
EN 50041 standard

The European Committee for Electrotechnical Standardization (CENELEC), which groups together 18 European countries, publishes EN standards. The present standard defines dimensions and mechanical data for limit

switches (42.5 x 80 mm).

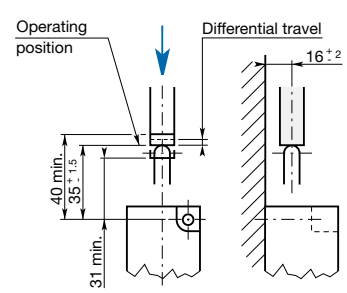
A Shape

Roller lever operating heads



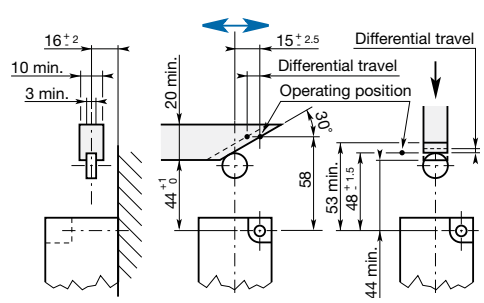
B Shape

Rounded plunger operating heads



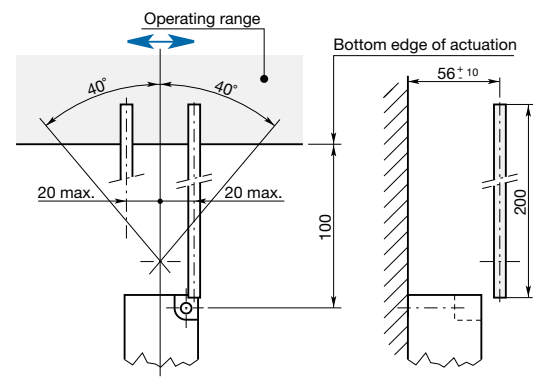
C Shape

Roller plunger operating heads



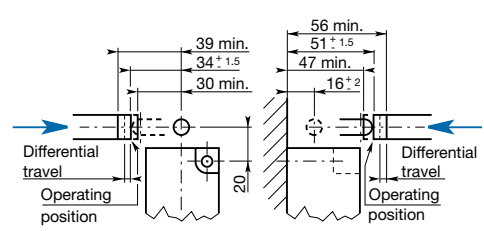
D Shape

Rod operating heads



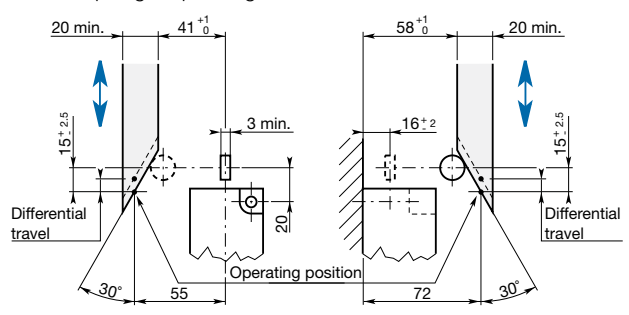
F Shape

Rounded lateral plunger operating heads

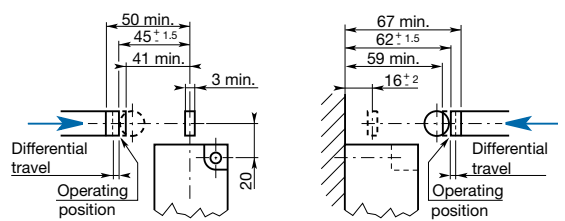


G Shape

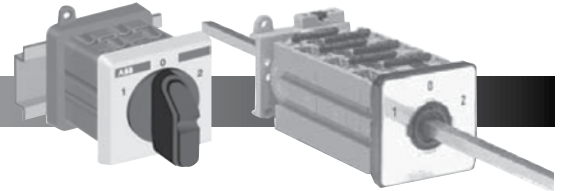
Lateral roller plunger operating heads - Lateral actuation



Lateral roller plunger operating heads - Front actuation



9 - Cam switches



Cam switches 9.1 – 9.20

Features and benefits	9.1
General information	9.2
Ordering details	
ON-OFF switches	9.3 - 9.4
Change-over switches	9.5
Multi-step switches	9.6 - 9.9
Motor control switches	9.10
Voltmeter switches	9.11
Ammeter switches	9.12
Accessories	9.13 - 9.14
Technical data	9.15 - 9.16
Approximate dimensions	9.17 - 9.19
Special cam switches, contact plan	9.20

Notes

Cam switches OM, ON & OL (10A, 25A, 40A, 80A, 125A, 160A & 200A)

Complete range of standard and special cam switches for door and base mounting



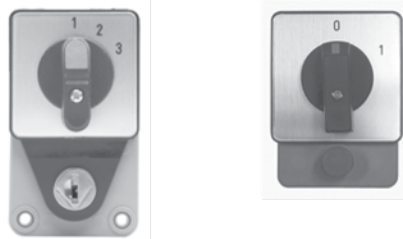
Complete delivery includes handle and front plate. Snap-on mounting of contact block with interlocking

Protected terminals and interconnections. Self lifting plus-minus screws for fast assembly.

Handle, color black or grey. Padlockable handle, color black or red-yellow.



Keylock and cylinder lock solutions



Type OM, ON, & OL
Cam switches

General Information

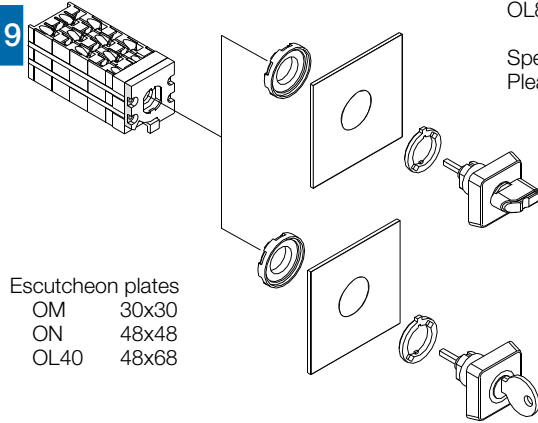
Door mounting cam switches

- IP 65
- NEMA 4X outdoor (ON, OL40)
- Key operated switch, IP54
- OM, Miniature
- ON, Normal
- OL, Large

Door drilling

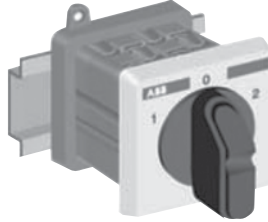
OM: Ø 16.5mm / Ø 22.5mm
 ON: Ø 22.5mm / Ø 30.5mm
 OL40: Ø 22.5mm / Ø 30.5mm

Maximum panel thickness 5.5 mm.
 The black handle with square escutcheon plate marked for switch type is supplied with the switch body. Optional adaptor ring available for 30.5 mm hole.



DIN-rail mounting

- P 44
- ON, Modular



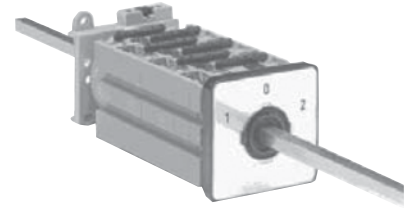
Number of contacts

OM: 16 contacts
 ON: 20 contacts
 ON_M: 6 contacts
 OL40: 20 contacts
 OL80, 125, 160, 200: 24 contacts

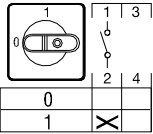
Special switches up to 60 contacts
 Please consult with us.

Features:

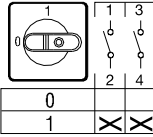
- Complete delivery for easy purchasing and assembly
 - Standard delivery with black handle, alt. grey or red yellow handle
 - Small panel size: front space in side to side mounting 30 mm or 50 mm up to 25 A
 - Finger protected terminals and interconnections (IP20, VBG4)
 - Self lifting screws, terminal screws for fast cabling
 - Double break silver contacts with 0,35 µm gold grid ensure a high breaking capacity and reliable connection.
- Also available with solid golden contacts for extremely difficult circumstances. Have to be ordered separately, please add G to the type, e.g; OMA 1 PBG.
- Fast special engraving service available
 - Metallic shaft as special version
 - Fast-on terminals available as special version



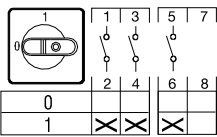
ON-OFF Switches



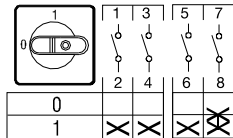
O_A1_



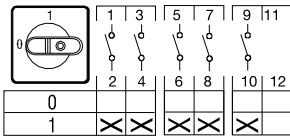
O_A2_



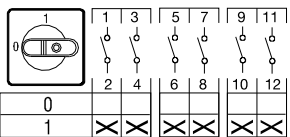
O_A3_



O_A4_



O_A5_



O_A6_

Black handle and front plate with standard text are included. The type and the ordering number are for one piece. Special engraved front-plates to be ordered as separate items.

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number
----------	-----------------	---------------------------	-------------	----------------

Rotating angle 90°, O-position: 9 o'clock

Miniature, door mounted

0 - 1	1	10	0.04	OMA1PB
	2	10	0.04	OMA2PB
	3	10	0.05	OMA3PB
0 - 1	4	10	0.05	OMA4PB
	5	10	0.06	OMA5PB
	6	10	0.06	OMA6PB

Normal, door mounted

0 - 1	1	25	0.08	ONA1PB
	2	25	0.09	ONA2PB
	3	25	0.10	ONA3PB
0 - 1	4	25	0.11	ONA4PB
	5	25	0.12	ONA5PB
	6	25	0.12	ONA6PB

Large, door mounted

0 - 1	1	40	0.13	OL40A1PB
	2	40	0.17	OL40A2PB
	3	40	0.21	OL40A3PB
0 - 1	4	40	0.25	OL40A4PB
	5	40	0.29	OL40A5PB
	6	40	0.33	OL40A6PB

Modular, DIN-rail mounted

0 - 1	1	25	0.09	ONA1M
	2	25	0.10	ONA2M
	3	25	0.11	ONA3M
	6	25	0.11	ONA6M
		25	0.12	ONA6M

Key operated, withdrawable in both positions, rotating angle 90°, O-position: 9 o'clock ①

Miniature, door mounted

0 - 1	1	10	0.06	OMA1KB
	3	10	0.07	OMA3KB

Normal, door mounted 90°

0 - 1	1	25	0.11	ONA1KB
	3	25	0.13	ONA3KB

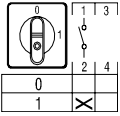
Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

① Different withdrawability of key is also possible to be ordered as special switch.

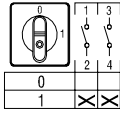
Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

ON-OFF Switches

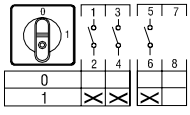
Change-over switches



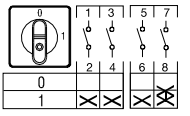
O_A01_



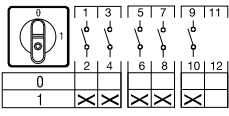
O_A02_



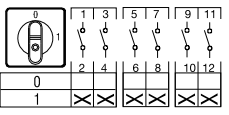
O_A03_



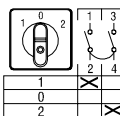
O_A04_



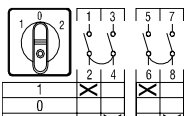
O_A05_



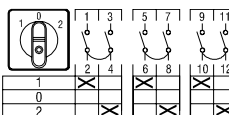
O_A06_



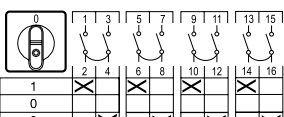
O_U1_



O_U2_



O_U3_



O_U4_

ON - OFF switches

Black handle and front plate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs.

Special engraved front plates to be ordered as separate items.

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number
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Rotating angle 90°, O-position: 12 o'clock

Miniature, door mounted

0 - 1	1	10	0.04	OMA01PB OMA02PB OMA03PB
	2	10	0.04	
	3	10	0.05	
0 - 1	4	10	0.05	OMA04PB OMA05PB OMA06PB
	5	10	0.06	
	6	10	0.06	

Normal, door mounted

0 - 1	1	25	0.08	ONA01PB ONA02PB ONA03PB
	2	25	0.09	
	3	25	0.10	
0 - 1	4	25	0.11	ONA04PB ONA05PB ONA06PB
	5	25	0.12	
	6	25	0.12	

Modular, DIN-rail mounted

0 - 1	1	25	0.09	ONA01M ONA02M ONA03M ONA06M
	2	25	0.10	
	3	25	0.11	
	6	25	0.12	

Key operated, withdrawable in both positions, rotating angle 90°, O-position: 12 o'clock

Miniature, door mounted

0 - 1	1	10	0.06	OMA01KB OMA03KB
	3	10	0.07	

Normal, door mounted

0 - 1	1	25	0.11	ONA01KB ONA03KB
	3	25	0.13	

Change-over switches

Black handle and front plate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs.

Special engraved front plates to be ordered as separate items.

Rotating angle 60° - 0 - 60°

Miniature, door mounted

1 - 0 - 2	1	10	0.05	OMU1PB OMU2PB OMU3PB OMU4PB
	2	10	0.06	
	3	10	0.06	
	4	10	0.07	

Normal, door mounted

1 - 0 - 2	1	25	0.09	ONU1PB ONU2PB ONU3PB ONU4PB
	2	25	0.11	
	3	25	0.13	
	4	25	0.14	

Large, door mounted

1 - 0 - 2	1	40	0.17	OL40U1PB OL40U2PB OL40U3PB OL40U4PB
	2	40	0.25	
	3	40	0.33	
	4	40	0.41	

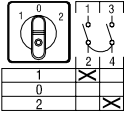
Modular, DIN-rail mounted

1 - 0 - 2	1	25	0.09	ONU1M ONU2M ONU3M ONU4M
	2	25	0.11	
	3	25	0.13	
	4	25	0.14	

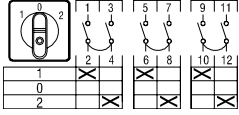
Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

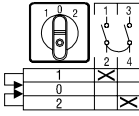
Change-over switches



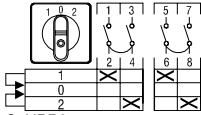
O_U1_



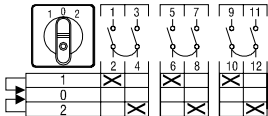
O_U3_



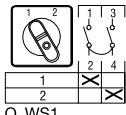
O_URR1_



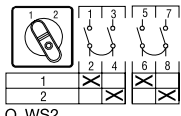
O_URR2_



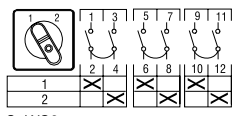
O_URR3_



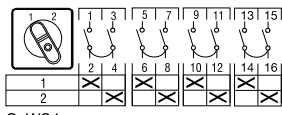
O_WS1_



O_WS2_



O_WS3_



O_WS4_

Black handle and front plate with standard text are included. The type and the ordering number are for one piece. Special engraved front plates to be ordered as separate items.

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number
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Key operated, with 0-position, withdrawable in all positions

Miniature, door mounted

1 - 0 - 2	1	10	0.07	OMU1KB
	3	10	0.08	OMU3KB

Normal, door mounted

1 - 0 - 2	1	25	0.12	ONU1KB
	3	25	0.13	ONU3KB

1_R - 0 - 2_R, with two sided spring return

Miniature, door mounted

1 _R - 0 - 2 _R	1	10	0.05	OMURR1PB
	3	10	0.06	OMURR3PB

Normal, door mounted

1 _R - 0 - 2 _R	1	25	0.09	ONURR1PB
	2	25	0.11	ONURR2PB
	3	25	0.12	ONURR3PB

Large, door mounted

1 _R - 0 - 2 _R	1	45	0.17	OL40URR1PB
	2	45	0.25	OL40URR2PB
	3	45	0.33	OL40URR3PB

Modular, DIN-rail mounted

1 _R - 0 - 2 _R	1	25	0.09	ONURR1M
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Without 0-position

Miniature, door mounted

1 - 2	1	10	0.09	OMWS1PB
	2	10	0.11	OMWS2PB
	3	10	0.13	OMWS3PB
	4	10	0.14	OMWS4PB

Normal, door mounted

1 - 2	1	25	0.09	ONWS1PB
	2	25	0.11	ONWS2PB
	3	25	0.13	ONWS3PB
	4	25	0.14	ONWS4PB

Large, door mounted

1 - 2	1	40	0.17	OL40WS1PB
	2	40	0.25	OL40WS2PB
	3	40	0.33	OL40WS3PB
	4	40	0.41	OL40WS4PB

Modular, DIN-rail mounted

1 - 2	1	25	0.09	ONWS1M
	2	25	0.11	ONWS2M
	3	25	0.13	ONWS3M
	4	25	0.14	ONWS4M

Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

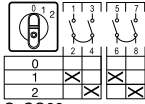
Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

Multi-step switches

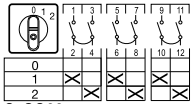
9



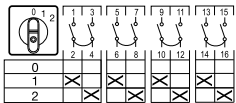
O_SO21_



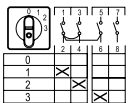
O_SO22_



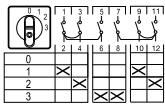
O_SO23_



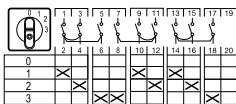
O_SO24_



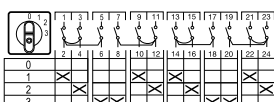
O_SO31_



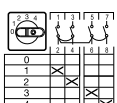
O_SO32_



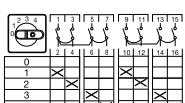
O_SO33_



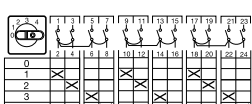
O_SO34_



O_SO41_



O_SO42_



O_SO43_

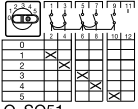
Black handle and front plate with standard text are included. The type and the ordering number are for one piece. Special engraved front plates to be ordered as separate items..

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number
2- step, with O-position				
Miniature, door mounted				
0 - 1 - 2	1 2 3 4	10 10 10 10	0.04 0.05 0.06 0.07	OMSO21PB OMSO22PB OMSO23PB OMSO24PB
Normal, door mounted				
0 - 1 - 2	1 2 3 4	25 25 25 25	0.10 0.12 0.13 0.14	ONSO21PB ONSO22PB ONSO23PB ONSO24PB
Modular, DIN-Rail mounted				
0 - 1 - 2	1	25	0.10	ONSO21M
3- step, with O-position				
Miniature, door mounted				
0 - 1 - 2 - 3	1 2 3 4	10 10 10 10	0.05 0.06 0.07 0.08	OMSO31PB OMSO32PB OMSO33PB OMSO34PB
Normal, door mounted				
0 - 1 - 2 - 3	1 2 3 4	25 25 25 25	0.10 0.12 0.13 0.14	ONSO31PB ONSO32PB ONSO33PB ONSO34PB
Large, door mounted				
0 - 1 - 2 - 3	1	45	0.41	OL40SO31PB
Modular, DIN-rail mounted				
0 - 1 - 2 - 3	1	25	0.11	ONSO31M
3- step, with O-position				
Miniature, door mounted				
1 - 2 - 3	1 2 3 4	10 10 10 10	0.05 0.06 0.07 0.08	OMST31PB OMST32PB OMST33PB OMST34PB
Normal, door mounted				
1 - 2 - 3	1 2 3 4	25 25 25 25	0.10 0.12 0.13 0.14	ONST31PB ONST32PB ONST33PB ONST34PB
Modular, DIN-rail mounted				
1 - 2 - 3	1	25	0.10	ONST31M
4- step, with O-position				
Miniature, door mounted				
0 - 1 - 2 - 3 - 4	1 2 3	10 10 10	0.05 0.06 0.07	OMSO41PB OMSO42PB OMSO43PB
Normal, door mounted				
0 - 1 - 2 - 3 - 4	1 2 3	25 25 25	0.11 0.12 0.13	ONSO41PB ONSO42PB ONSO43PB
4- step, without O-position				
Miniature, door mounted				
1 - 2 - 3 - 4	1 2 3	10 10 10	0.05 0.06 0.07	OMST41PB OMST42PB OMST43PB
Normal, door mounted				
1 - 2 - 3 - 4	1 2 3	25 25 25	0.11 0.12 0.13	ONST41PB ONST42PB ONST43PB

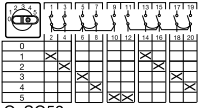
Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

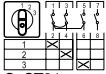
Multi-step switches



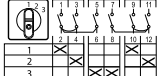
O_SO51_



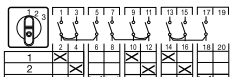
O_SO52_



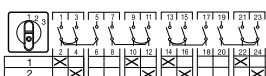
O_ST31_



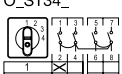
O_ST32_



O_ST33_



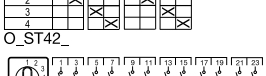
O_ST34_



O_ST41_



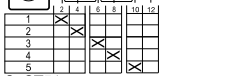
O_ST42_



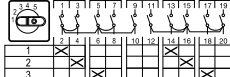
O_ST43_



O_ST51_



O_ST52_



O_ST61_



O_ST62_



O_ST63_

Black handle and front plate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs.
Special engraved front plates to be ordered as separate items.

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number
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5- step, with O-position

Miniature, door mounted

0 - 1 - 2 - 3 - 4 - 5	1 2	10 10	0.06 0.08	OMSO51PB OMSO52PB
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Normal, door mounted

0 - 1 - 2 - 3 - 4 - 5	1 2	25 25	0.12 0.14	ONSO51PB ONSO52PB
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5- step, without O-position

Miniature, door mounted

0 - 1 - 2 - 3 - 4 - 5	1 2	10 10	0.06 0.08	OMST51PB OMST52PB
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Normal, door mounted

0 - 1 - 2 - 3 - 4 - 5	1 2	25 25	0.12 0.14	ONST51PB ONST52PB
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6- step, with O-position

Normal, door mounted

1-2-3-4-5-6	1 2 3	25 25 25	0.115 0.19 0.265	ONSO61PB ONSO62PB ONSO63PB
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Large, door mounted

1-2-3-4-5-6	1 2 3	40 40 40	0.185 0.305 0.425	OL40SO61PB OL40SO62PB OL40SO63PB
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6-step without O-position

Normal, door mounted

1-2-3-4-5-6	1 2 3	25 25 25	0.115 0.19 0.265	ONST61PB ONST62PB ONST63PB
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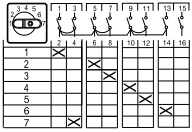
Large, door mounted

1-2-3-4-5-6	1 2 3	40 40 40	0.185 0.305 0.425	OL40ST61PB OL40ST62PB OL40ST63PB
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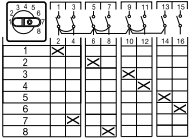
Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

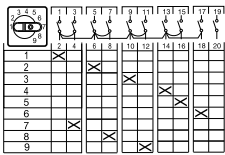
Multi-step switches



O_ST71_



O_ST81_



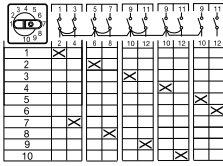
O_ST91_

Black handle and front plate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs.
Special engraved front plates to be ordered as separate items.

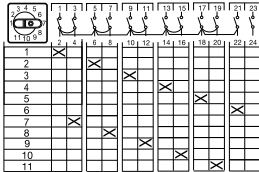
Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number
7-step with 0-position				
Normal, door mounted				
1-2-3-4-5-6-7	1	25	0.14	ONSO71PB
Large, door mounted				
1-2-3-4-5-6-7	1	40	0.3	OL40SO71PB
7-step without 0-position				
Normal, door mounted				
1-2-3-4-5-6-7	1	25	0.14	ONST71PB
Large, door mounted				
1-2-3-4-5-6-7	1	40	0.3	OL40ST71PB
8-step with 0-position				
Normal, door mounted				
1-2-3-4-5-6-7-8	1	25	0.145	ONSO81PB
Large, door mounted				
1-2-3-4-5-6-7-8	1	40	0.148	OL40SO81PB
8-step without 0-position				
Normal, door mounted				
1-2-3-4-5-6-7-8	1	25	0.145	ONST81PB
Large, door mounted				
1-2-3-4-5-6-7-8	1	40	0.148	OL40ST81PB
9-step with 0-position				
Normal, door mounted				
1-2-3-4-5-6-7-8-9	1	25	0.165	ONSO91PB
Large, door mounted				
1-2-3-4-5-6-7-8-9	1	40	0.265	OL40SO91PB
9-step without 0-position				
Normal, door mounted				
1-2-3-4-5-6-7-8-9	1	25	0.165	ONST91PB
Large, door mounted				
1-2-3-4-5-6-7-8-9	1	40	0.265	OL40ST91PB

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

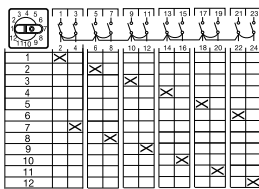
Multi-step switches



O_ST101_



O_ST111_



O_ST121_

Black handle and front plate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs.
Special engraved front plates to be ordered as separate items.

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number
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10-step with 0-position

Normal, door mounted

1-2-3-4-5-6-7-8-9-10	1	25	0.17	ONSO101PB
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Large, door mounted

1-2-3-4-5-6-7-8-9-10	1	40	0.27	OL40SO101PB
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10-step without 0-position

Normal, door mounted

1-2-3-4-5-6-7-8-9-10	1	25	0.17	ONST101PB
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Large, door mounted

1-2-3-4-5-6-7-8-9-10	1	40	0.27	OL40ST101PB
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11-step with 0-position

Normal, door mounted

1-2-3-4-5-6-7-8-9-10-11	1	25	0.19	ONSO111PB
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Large, door mounted

1-2-3-4-5-6-7-8-9-10-11	1	40	0.305	OL40SO111PB
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11-step without 0-position

Normal, door mounted

1-2-3-4-5-6-7-8-9-10-11	1	25	0.19	ONST111PB
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Large, door mounted

1-2-3-4-5-6-7-8-9-10-11	1	40	.305	OL40ST111PB
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12-step without 0-position

Normal, door mounted

1-2-3-4-5-6-7-8-9-10-11-12	1	25	0.195	ONST121PB
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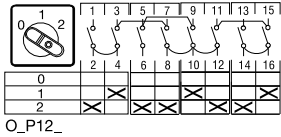
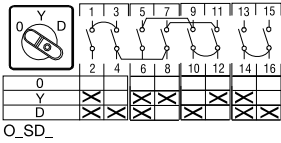
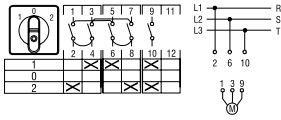
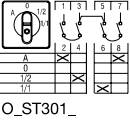
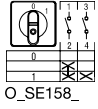
Large, door mounted

1-2-3-4-5-6-7-8-9-10-11-12	1	40	0.31	OL40ST121PB
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Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

Motor control switches



Pumpstart switches

Miniature, door mounted

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number
0 - 1	1	10	0.04	OMSE158PB

Normal, door mounted

0 - 1	1	25	0.09	ONSE158PB
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Modular, DIN-rail mounted

0 - 1	1	25	0.09	ONSE158M
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Ventilation switches

Black handle and front plate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs.

Special engraved front plates to be ordered as separate items.

Function	Number of poles	Rated thermal current [A]	Motor rating [kW/400V]	Weight [kg]	Catalog number
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Miniature, door mounted

A - 0 - 1/2 - 1/1	2	10	7.5	0.06	OMST301PB
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Normal, door mounted

A - 0 - 1/2 - 1/1	2	25	7.5	0.11	ONST301PB
-------------------	---	----	-----	------	-----------

Modular, door mounted

A - 0 - 1/2 - 1/1	2	25	7.5	0.11	ONST301M
-------------------	---	----	-----	------	----------

Large, door mounted

A - 0 - 1/2 - 1/1	2	40	15	0.21	OL40ST301PB
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Reversing switches

Black handle and front plate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs..

Special engraved front plates to be ordered as separate items.

Normal, door mounted

1 - 0 - 2	3	25	7.5	0.10	ONW3PB
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Large, door mounted

1 - 0 - 2	3	40	15	0.21	OL40W3PB
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Star-delta switches

Normal, door mounted

0 - Y - ΔΔ	3	25	7.5	0.12	ONSDEPB
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Large, door mounted

0 - Y - Δ	3	40	15	0.21	OL40SDEPB
-----------	---	----	----	------	-----------

Pole-change switches (Dahlander)

Winding for 2 speeds, one direction, 0 - A - AYY

Normal, door mounted

0 - 1 - 2	3	25	7.5	0.12	ONP12PB
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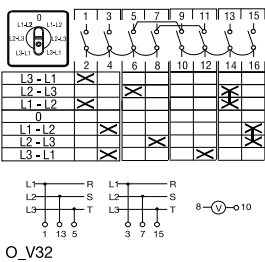
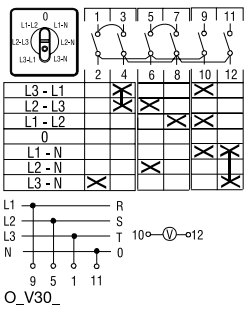
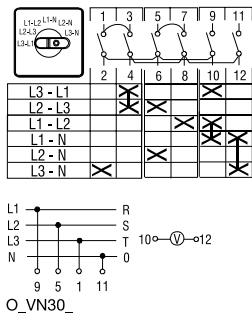
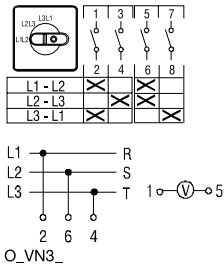
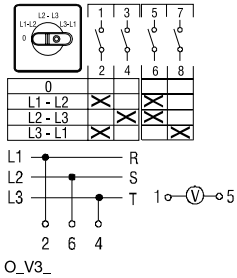
Large, door mounted

0 - 1 - 2	3	40	15	0.25	OL40P12PB
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Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

Voltmeter switches



Black handle and front plate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs.
Special engraved front plates to be ordered as separate items.

Function	Number of stages	Rated thermal current [A]	Weight [kg]	Catalog number
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4 Positions, 3 phase -3 wire, with 0-position

Miniature, door mounted

0, L1-L2,L2-L3,L3-L1	2	10	0.06	OMV3PB
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Normal, door mounted

0, L1-L2,L2-L3,L3-L1	2	25	0.11	ONV3PB
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Modular, DIN-rail mounted

0, L1-L2,L2-L3,L3-L1	2	25	0.11	ONV3M
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3 Positions, 3 phase -3 wire, without 0-position

Miniature, door mounted

L1-L2,L2-L3,L3-L1	2	10	0.06	OMVN3PB
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Normal, door mounted

L1-L2,L2-L3,L3-L1	2	25	0.11	ONVN3PB
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Modular, DIN-rail mounted

L1-L2,L2-L3,L3-L1	2	25	0.11	ONVN3M
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7 Positions, 3 phase to phase 3 phase to neutral, without 0-position

Miniature, door mounted

L1-L3,L2-L3,L1-L2 L1-N,L2-N,L3-N	3	10	0.08	OMVN30PB
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Normal, door mounted

L1-L3,L2-L3,L1-L2 L1-N,L2-N,L3-N	3	25	0.12	ONVN30PB
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Normal, door mounted

L1-L3,L2-L3,L1-L2 L1-N,L2-N,L3-N	M	25	0.12	ONVN30M
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7 Positions, 3 phase to phase 3 phase to neutral, with 0-position

Miniature, door mounted

L1-L3,L2-L3,L1-L2,0 L1-N,L2-N,L3-N	3	10	0.12	OMV30PB
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Normal, door mounted

L1-L3,L2-L3,L1-L2,0 L1-N,L2-N,L3-N	3	25	0.12	ONV30PB
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Modular, DIN-rail mounted

L1-L3,L2-L3,L1-L2,0 L1-N,L2-N,L3-N	3	25	0.12	ONV30M
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7 Positions, 3 phase to phase voltages for 2 circuits, with 0 position

Miniature, door mounted

L1-L3,L2-L3,L1-L2,0 L1-L3,L2-L3,L1-L2	4	10	0.14	OMV32PB
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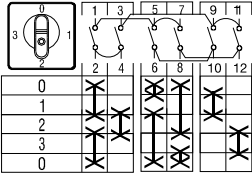
Normal, door mounted

L1-L3,L2-L3,L1-L2,0 L1-L3,L2-L3,L1-L2	4	25	0.14	ONV32PB
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Packing sizes:	OM	130 x 100 x 120 [mm]
	ON	250 x 100 x 110 [mm]

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

Ammeter switches



O_AU31

Black handle and front plate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs.
Special engraved front plates to be ordered as separate items.

Function	Number of stages	Rated thermal current [A]	Weight [kg]	Catalog number
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For 3 current transformer circuits, with 0-position

Miniature, door mounted

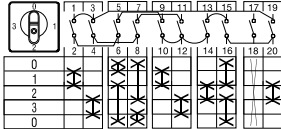
Single pole	3	10	0.12	OMAU31PB
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Normal, door mounted

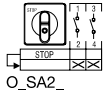
Single pole	3	25	0.12	ONAU31PB
2 pole or direct measurement in 3 phases	5	25	0.15	ONAU32PB

Modular, DIN-rail mounted

Single pole	4	25	0.12	ONAU31M
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O_AU32



O_SA2_

Stop switches

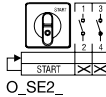
Black handle and front plate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs. Special engraved front plates to be ordered as separate items.

Miniature, door mounted, with spring return, contacts N.C.

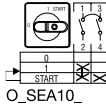
O _R -Stop	2	10	0.04	OMSA2PB
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Normal, door mounted, with spring return, contacts N.C.

O _R -Stop	2	25	0.09	ONSA2PB
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O_SE2_



O_SEA10_

Start switches

Black handle and front plate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs. Special engraved front plates to be ordered as separate items. With spring return.

Miniature, door mounted, with spring return.

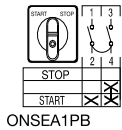
O _R -Start	1	10	0.04	OMSE2PB
0-1 _R -Start	1	10	0.05	OMSEA10PB

Normal, door mounted, with spring return.

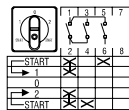
Stop-Start	1	25	0.04	ONSEA1PB
O _R -Start	1	25	0.04	ONSE2PB
0-1 _R -Start	1	25	0.09	ONSEA10PB
Start-1 _R -0-2 _R -Start	1	25	0.09	ONUR139PB

Modular, DIN-rail mounted, with spring return

0-1 _R -Start	1	25	0.09	ONSEA10M
Start-1 _R -0-2 _R -Start	1	25	0.09	ONUR139M



ONSEA1PB

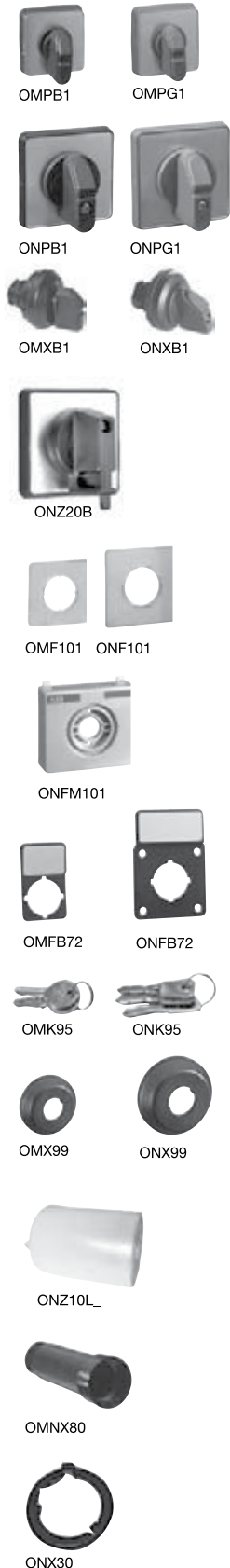


O_UR139_

Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

Accessories



The type and the ordering number are for one piece.

Color	For cam switches type	Packing quantities	Weight [kg]	Catalog number
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Handle with blank front plate without engraving

Black	OM_ Mini	5	0.05	OMP1
Grey	OM_ Mini		0.05	OMPG1
Black	ON_ Normal, OL40	5	0.08	ONPB1
Grey	ON_ Normal, OL40		0.08	ONPG1

Handle with round escutcheon plate

Black	OM_ Mini	5	0.02	OMXB1
Black, nose-type	OM_ Mini		0.02	OMXNB1
Black	ON_ Normal, OL40		0.02	ONXB1

Padlockable handle

For max 2 padlocks with 6 mm bail diameter or for max 3 padlocks with 4 mm bail diameter, 90 degrees.

Black	ON_ Normal, OL40	5	0.06	ONZ20B
Red yellow	ON_ Normal, OL40		0.06	ONZ20RY

Front ring only

Black	OM_ Mini	10	0.01	OMX99
Black	ON_ Normal		0.01	ONX99

Front plate, blank without engraving ①

Silver	OM_ Mini	10	0.003	OMF101
Silver	ON_ Normal		0.003	ONF 101
Yellow	ON_ Normal, OL40		0.003	ONFY 101
Grey	ON_ Modular		0.003	ONFM 101

Additional lettering plate, without engraving, black engraving from front side ②

Black frame	OM_ Mini	5	0.01	OMFB72
Black frame	ON_ Normal,		0.01	ONFB72
Grey frame	OM_ Mini		0.01	OMFG72
Grey frame	ON_ Normal		0.01	ONFG72

Spare key

2 pcs	OM_ Mini	2	0.01	OMK95
3 pcs	ON_ Normal, OL40		0.01	ONK95

Protective rear cover

Transparent, IP 42 protection

Number of characters	Contacts	For cam switches type	Packing quantities	Weight [kg]	Catalog number
1-2	2-4	ON_ Normal	1	0.02	ONZ10L2
3-4	6-8	ON_ Normal		0.04	ONZ10L4
5-6	10-12	ON_ Normal		0.06	ONZ10L6

Nut spanner for mounting the handle to the door

Black	OM_ Mini	1	0.02	OMNX80
	ON_ Normal			

Adaptor ring for 30 mm door drilling

Black	ON_ Normal	10	0.01	ONX30
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① Special front plate for standard switches: order as separate position. Attach specification in electronic format or paper. Eg. ONF 101/TEXT

② Additional lettering plate with engraving: order as separate position. Attach specification in electronic format or paper. The text can also be typed as comment. Eg. ONFB 72/TEXT Pumping station.

Accessories

Available for special cam switches



ONZ74_

The type and the ordering number are for one piece.
Special cam switches to be specified by CAMWEB configurator.

Base mounting switches

Base mounting kit includes base for DIN-rail mounting, shaft adaptor and 200 mm shaft for cutting up to 250 mm panel depth. Can be supplied also as optional extra.

Depth(mm)	For cam switches	Catalog number
250	ON_Normal	ONZ74



O_Z31_

Cylinder interlock

To lock all pre-determined positions with a safety key (2 pcs)
Available for special cam switches only. Special configuration with CAMWEB.

	OL_Large	OLZ31
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O_Z21_

Pushbutton interlock

To release all pre-determined positions while pushed. Special configuration with CAMWEB.

	OL_Large	OLZ21
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Technical data

According to IEC / 60947-3-4-5

IEC ratings			OM_	N_	OL40
Resistive and inductive load					
AC ratings					
Impulse withstand voltage	U_{imp}	kV	-	-	6
Rated operating voltage U_e	IEC	V	500	690	690
Isolation conditions acc. to VDE		V	250	400	690
Rated thermal current I_m	IEC	A	10	25	45
Rated short circuit current (prospective)		kA	1	10	10
Max back up fuse link		A	10	25	40
Short time current carrying capacity		3s	A	-	100
		10s	A	-	60
		30s	A	-	32
		60s	A	-	30
Rated operational current I_e		A	10	25	45
Non- or slightly inductive load	AC1	380 V	A	10	25
Switching of resistive loads	AC21	400 V	A	10	25
Switching of magnetic drives relays, valves, traction magnets	AC11	220-240 V	A	2.5	5.5
		380-440 V	A	-	3.5
		500 V	A	-	4.5
Mixed resistive and inductive load, pf. 0,7	AC22	220-500 V	A	10	20
		660-690 V	A	-	20
DC ratings					
Switching capacity DC rated voltage with resistive circuits ($T \leq 1ms$)	DC1	24 V	A	10	10
		40 V	A	6	10
		60 V	A	2.5	3
		110 V	A	0.7	0.8
		220 V	A	0.3	0.32
		440 V	A	-	0.22
Switching capacity DC rated voltage with inductive circuits ($T < 50 ms$)	DC1	24 V	A	-	10
		30 V	A	6	4.5
		40 V	A	3	1.7
		60 V	A	1	0.7
		110 V	A	0.7	0.3
			A	0.3	0.3
Motor ratings					
AC ratings					
Rated operational power	AC2	220-240 V	kW	2.5	3.5
3-phase		380-440 V	kW	-	6
Starting of slip-ring, switching off		500 V	kW	-	6
		660-690 V	kW	-	6
Rated operational power	AC3	220-240 V	kW	1.8	2.2
3-phase, 3-pole		380-440 V	kW	2.2	5.5
Direct starting of squirrel cage motors, switching off running motors		500 V	kW	-	4
		660-690 V	kW	-	4
1-phase		110 V	kW	0.3	0.4
		220-240 V	kW	0.55	0.75
		400 V	kW	0.75	1.3
Rated operational power	AC23	220-240 V	kW	1.8	2.6
3-phase, 3-pole		380-440 V	kW	3.0	7.5
Occasional switching of motors or other highly-inductive devices load		500 V	kW	-	4.8
		660-690 V	kW	-	4.8
1-phase		110 V	kW	0.37	0.5
		220-240 V	kW	0.75	0.9
		380-440 V	kW	1.1	1.5

Technical data UL/CSA

UL and CSA ratings

		OM_	ON_	OL_40	OL80	OL125	OL160	OL200
UL 508 Manual Motor Controller file number E 63822								
Maximum operating voltage	VAC							
Ampere rating	A	300	600	600	600	600	600	600
Pilot duty		A300	A600	A600	A600	A600	A600	A600
General use		10	25	40	80	125	160	200
Rated power (HP)								
3-phase	120V	HP	1	1	5	10	15	32
	240V	HP	1	1	10	30	40	64
	480V	HP	-	2	20	40	50	120
	600V	HP	-	5	23	40	50	120
1-Phase	120V	HP	0.33	.05	2	7.5	10	10
	240V	HP	0.75	1	3	15	20	20
	480V	HP	-	2	10	-	-	-
	600V	HP	-	3	10	-	-	-
Short circuit ratings								
Maximum prospective fault current	kA	1	10	10	10	10	10	10
Maximum fuse size	A	16	35(RK5)	50(RK3)	100(RK5)	150(RK5)	200(RK5)	-
Switching frequency	cycles/h	150	150	150	150	150	150	-
Connecting screws	M	2.5	3.5	5	5	5	5	10
Max. cable cross section	MM ²	1.5	4	6	70	70	70	150
	AGW	14	14-12	14-8(Cu75)	12-2/0	12-2/0	12-2/0	300 kcmil

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Approvals:

UL-Approval, file number EG 63822
 CSA-Approval
 Lloyds Register of Shipping
 Det Norske Veritas (DNV)
 Germanischer Lloyd (GL)
 Ghost R



ON_, Normal



ON_M, Modular



OM_, Miniature



OL_, Large



OM_, Key operated

Standards:

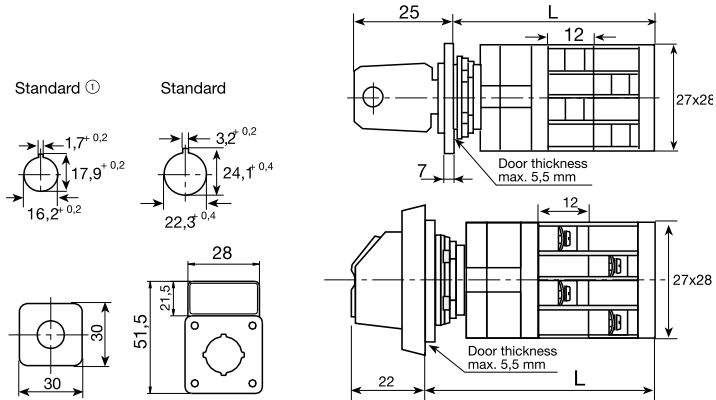
IEC 60947-3
 EN 60947-3
 UL 508
 CSA C22.2 No14

Approximate dimensions OM, ON and OL switches

Dimensions in mm.

Remark: Terminal screws on top and bottom side.

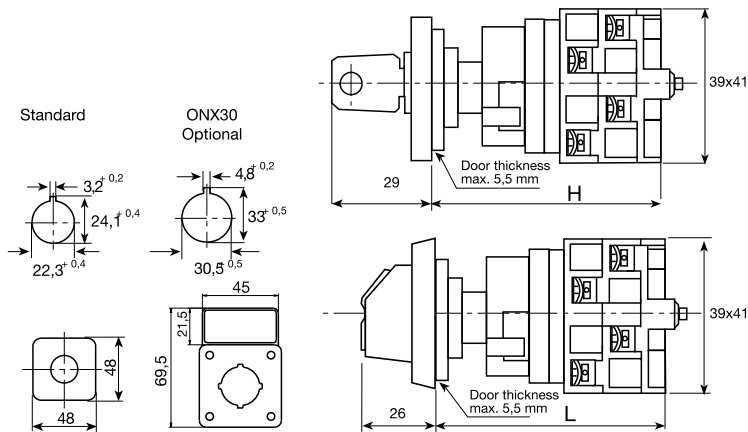
OM, Miniature



L number of contact chambers

1	2	3	4	5	6	7	8
45	57	69	81	90	105	11	138

ON, Normal



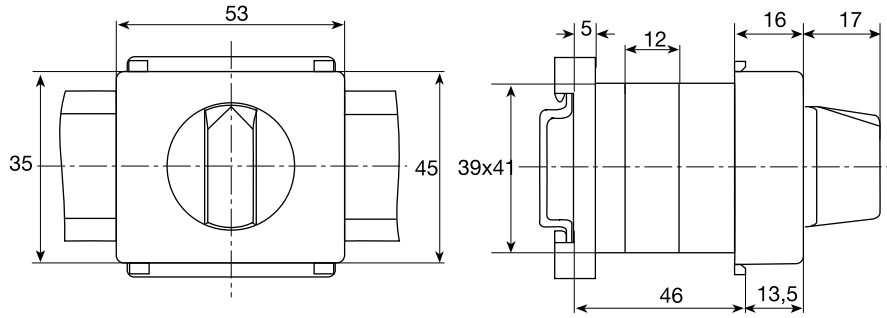
L number of contact chambers

	1	2	3	4	5	6	7	8	9	10
L	54	66	78	90	102	114	126	138	150	162
H	62	76	86	98	110	122	134	146	159	171

$\text{\textcircled{O}}$ 22mm adaptor ring can be removed and become 16mm.

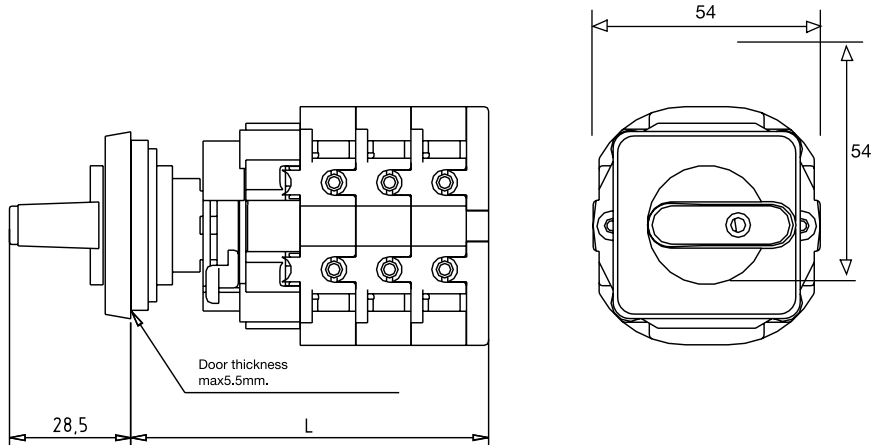
Approximate dimensions ON and OL cam switches

ON, Modular

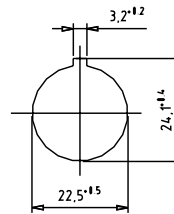


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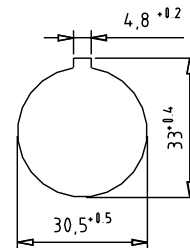
OL, Large



Standard



ONX30 (Optional)

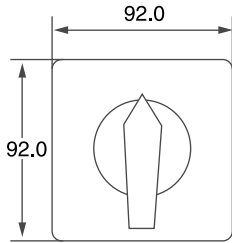
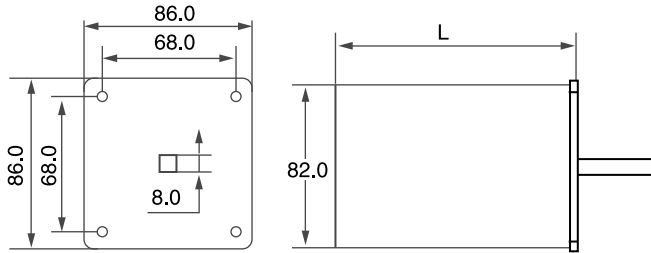


L number of contact chambers

1	2	3	4	5	6	7	8	9	10
59	72	85	98	111	124	137	150	163	176

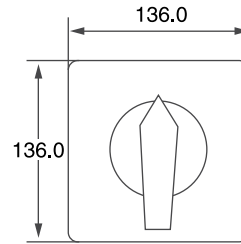
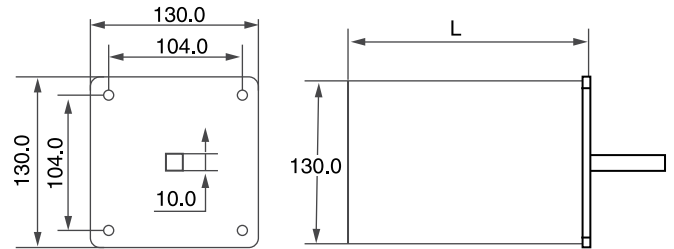
Approximate dimensions OL Cam switches

OL 80, OL125, & OL150



No. of Contacts	Length L
1-2	66
3-4	94
5-6	122
7-8	150
9-10	178
11-12	206
13-14	234
15-16	262

OL 200



No. of Contacts	Length L
1-2	120
3-4	181
5-6	242
7-8	303
9-10	364
11-12	425
13-14	486
15-16	547



Special cam switches, contact plan

Company _____

Type _____

Phone/Fax nr. _____

Project number _____

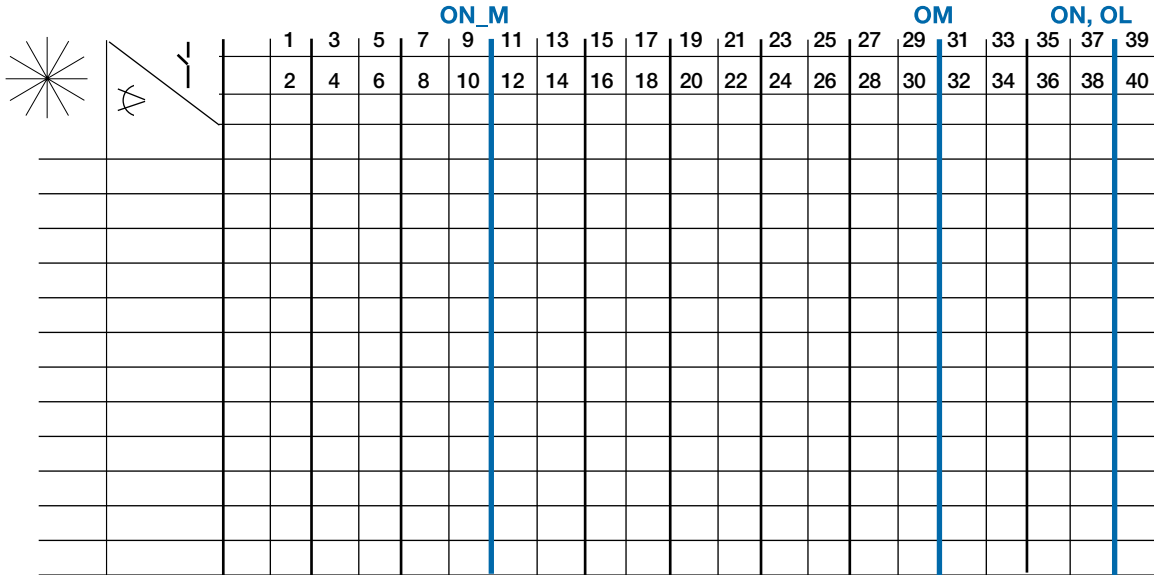
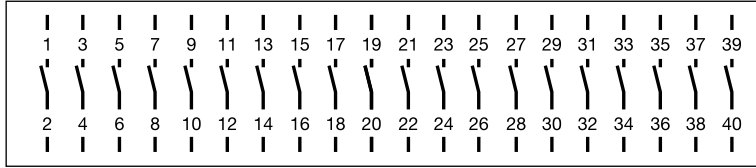
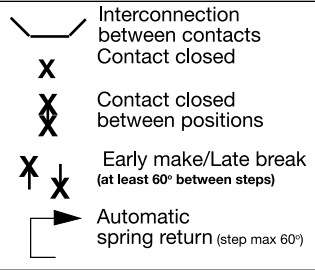
Name _____

Customer's number _____

Quantity: _____ pcs

Handled by: _____

Date: _____



	Normal	Padlockable _X20	NKey operated _K	Enclosed _E_6 IP65	Cylinder locking	Pushbutton locking
Black _B						
Grey _G						
Red-yellow _RY						

Door mounting

- OM, 10A
- ON, 25A
- OL, 40A
- OL, 80A
- OL, 125A
- OL, 160A
- OL, 200A

- Additional lettering plate
- Front plate

Max 6 (7) Letters

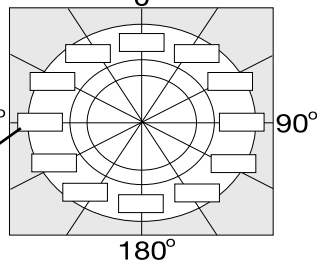
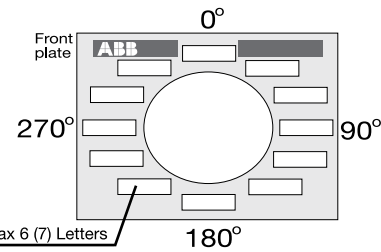


ABB Inc.

DIN-rail mounting

ON_M, Modular

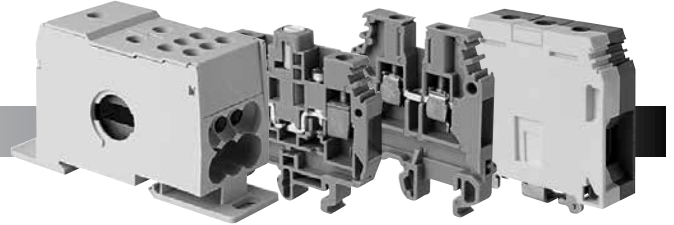


Max 3 chambers = 6 contacts
[Max 6 (7) Letters]

NOTE: Special Cam switches have minimum purchase quantities dependent on amperage size and number of contacts.

*Return completed form to:
lvps.support@us.abb.com*

10 - Terminal blocks



10

SNK terminal blocks 10.1 – 10.72

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Glossary for accessories





Product names (cont.)

M 4/6

High density blocks :

-  M 4/6.D2 : Two level blocks (levels are independent)
-  M 4/6.D1 : Two level blocks (levels are interconnected)
-  D 4/6.T3 : 3 level blocks (3 independent levels)
-  D 4/6.T1 : all 3 levels are interconnected






Switch blocks :

-  M 4/6.S... : Switch blocks
-  M 4/6.SNB... : Blade switch blocks
-  M 4/6.SB... : Plug type switch blocks
-  M 4/6.ST... : Test and measurement switch blocks

Product names (cont.)

M 4/8

Fuse blocks :

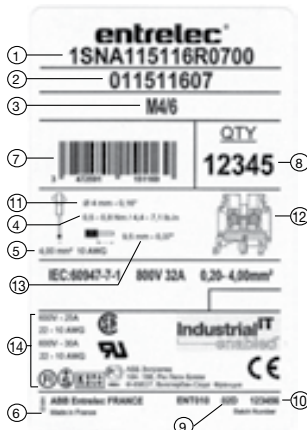
-  M 4/8.SF... : Switch fuse blocks
-  M 4/8.SFD : With LED fusion indicator
-  M 4/8.SFL : With neon lamp indicator
-  M 4/8.SF..T : With test socket screws
-  M 4/8.SN : With neutral bar in place on fuse (neutral switching)

Product names (cont.)

Spring clamp terminal blocks

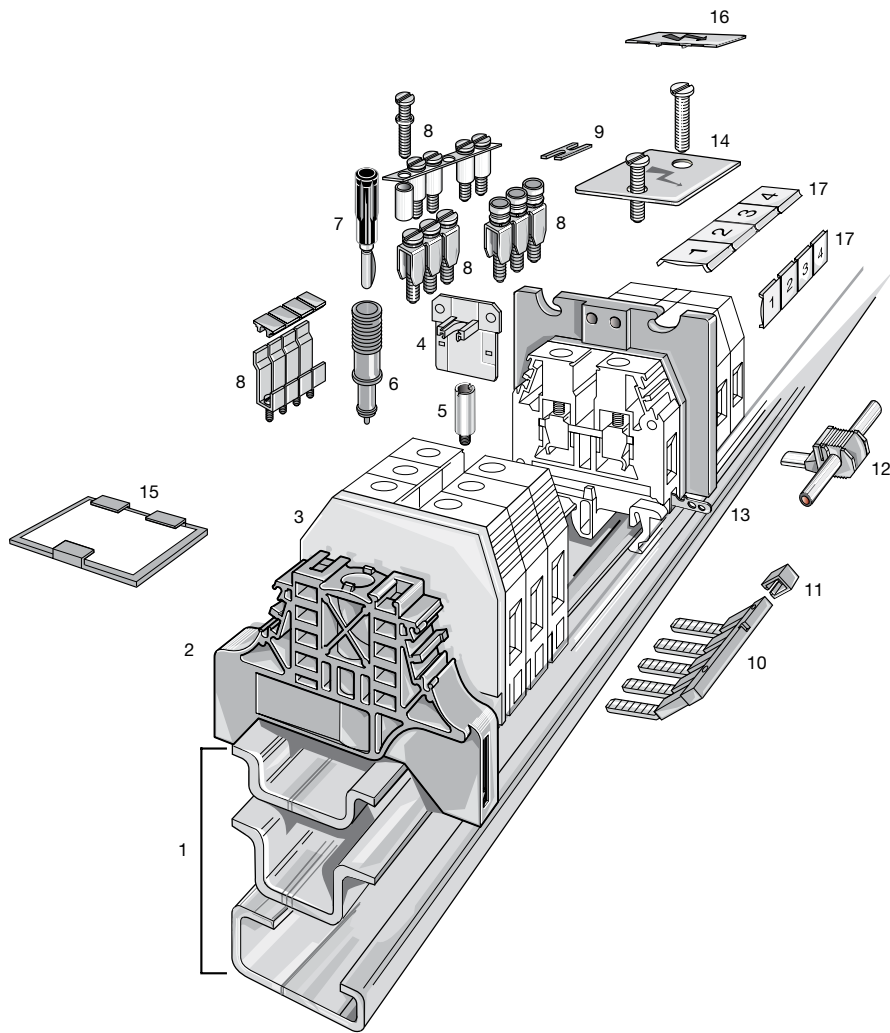
- D 4/6. (2L) • Feed-through blocks : 2 spring clamps
- D 4/6. (3L) • Feed-through blocks : 3 spring clamps
- D 4/6. (4L) • Feed-through blocks : 4 spring clamps
- D 4/6. (2L.2L) • Terminal block with 4 spring clamps on 2 separate circuits

HOW TO READ CARTON LABELS



LEGEND FOR CARTON LABEL

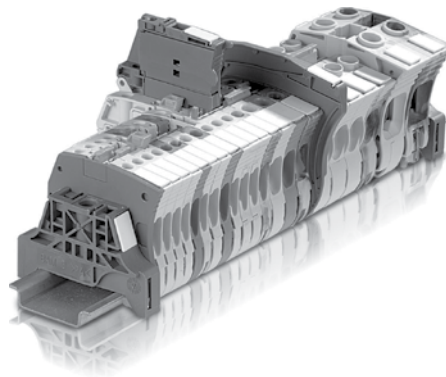
- | | |
|------------------------|----------------------------|
| 1 15 digit part number | 8 Quantity |
| 2 9 digit part number | 9 Manufacturing date code |
| 3 Description | 10 Batch number |
| 4 Recommended torque | 11 Recommended screwdriver |
| 5 Rated wire size | 12 Pole of the product |
| 6 "Made in France" | 13 Wire stripping length |
| 7 Bar code | 14 Approvals |



- | | | | |
|--------------------------|----|--------------------------------------|-----|
| 1 Rail..... | PR | 10 Comb type jumper bar | PC |
| 2 End stop | BA | 11 Insulating comb tip..... | EIP |
| 3 End section..... | FE | 12 IDC jumper | AD |
| 4 Circuit separator..... | SC | 13 Shield connector | CB |
| 5 Test socket | AL | 14 Protection label | EP |
| 6 Test device | DC | 15 Marker-holder for end stop | PEB |
| 7 Test plug | FC | 16 Single pole protection label..... | EPU |
| 8 Jumper bar | BJ | 17 Markers | RC |
| 9 Connector plate..... | EL | | |

Type SNK Terminal blocks

ABB Terminal blocks Type SNK



A smart design to support your daily connection challenges

- Marking visible from any direction
- Rail assembly process facilitated
- Facilitated maintenance operations

Rely on our expertise

- UL and worldwide certifications
- Innovation with new patented design
- Reliability: Over 50 years of expertise with screw clamp terminal blocks

Generate savings where it counts

- 1 identical end plate for most of the SNK terminal blocks
- Less terminal blocks and accessories required for a complete electrical installation

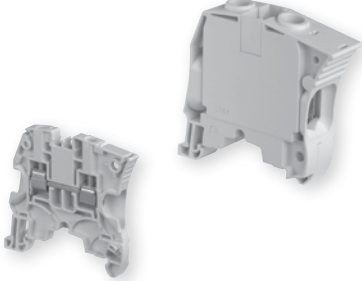
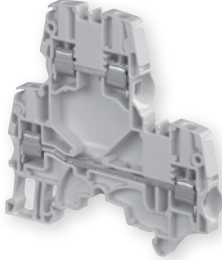
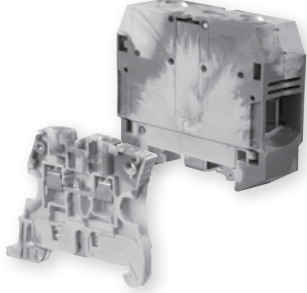
Find your preferred marking solution from our universal product offering

- SNK terminal blocks and accessories accept markers cards, self-adhesive paper strips or universal wire marker holders
- Complete marking system choice: ABB automatic printing solutions or manual marking solutions

10

General information

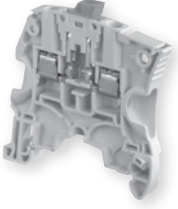
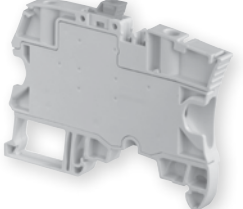
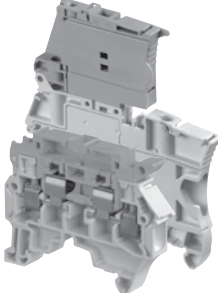
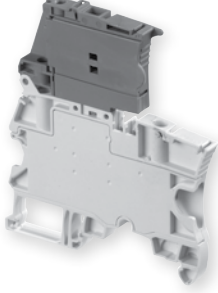
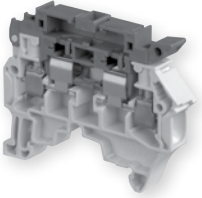
Features and benefits

Feed-through Smart Design	Double deck High wiring density for space savings	Ground Reliable rail connection
		
<p>A unique profile for smart use Easy and ergonomic mounting thanks to the unique profile of the terminal blocks:</p> <ul style="list-style-type: none"> - Easy to handle, - Reversed terminals are obvious, eliminating short circuits. <p>Clear marking areas Marking surfaces can be read clearly from any angle in an enclosure and are larger than standard markers in the market.</p> <p>Maximized flexibility The two terminal blocks central channels-aligned from 4 mm² 12 AWG up to 16 mm² 4 AWG terminal blocks-offer flexibility of use:</p> <ul style="list-style-type: none"> - Common and polarity distribution with JB screwless jumper bars, - Power distribution with JB85-3 cross-spacing jumpers, - Continuity control with TP4 or TP2 test adapters, - Advanced testing (simulation, dielectric control, etc.) prior customer acceptance with TC test connectors, - Overvoltage protection and temperature control with PG5-R2 components holder. <p>Reduce use of accessories</p> <ul style="list-style-type: none"> - One unique end section and circuit separator fits all feed-through terminal blocks. 	<p>Offers efficient space reduction for switchgears with space constraints or sensors with multiple connection constraints.</p> <p>All Double Deck terminal blocks have two marking areas as well as two central channels per deck for:</p> <ul style="list-style-type: none"> - Common and polarity distribution with JB screwless jumper bars. - Continuity control or Advanced testing (simulation, dielectric control, etc.) with TP4, TP2 test adapters and TC test connectors, on the upper deck only. 	<p>Snap-in rail connection for rapid installation and removal for 4 mm² 10 AWG up to 16 mm² 4 AWG ground terminal blocks.</p> <p>Simply snap it on the DIN3-TH35 rail for a secure connection.</p> <p>Strict qualification tests, in addition to those required in IEC standard 60947-7-2, have been performed to guarantee the reliability of the snap-in rail connection in mechanical endurance and lifetime performance.</p> <p>Our smart design enables block removal without any risk of damaging the rail connection part.</p> <p>Robust screw rail connection for higher rated sections 35 mm² 0 AWG up to 95 mm² 0000 AWG ground terminal blocks.</p>

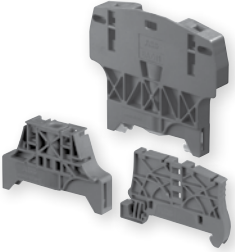






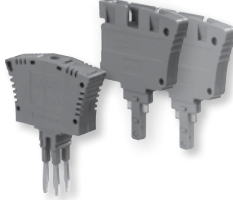
10

General information

Features and benefits

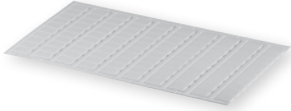
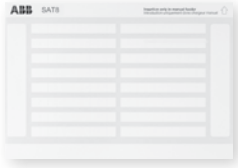

Disconnect			Fuse	
Time saving for test circuit operations			Optimized circuit protection	
Compact	Expert	Aligned with fuse		
				
<p>The ZS4-S compact version has an identical profile to the ZS4 feed-through terminal block for many benefits such as identical end section use</p>	<p>The ZS4-S-R1 expert version has two central jumper channels aligned with the ZS6 feed-through terminal block for convenient alternated distribution</p>	<p>Perfectly adapted for use with fuse terminal blocks</p>	<p>The ZS4-SF fits 5x20 mm fuses for circuit protection</p> <p>It has two central jumper channels for convenient common distribution and it is aligned with ZS4-S-R1 and ZS4-S-R2 disconnect terminal blocks, as well as the ZS6 feed-through terminal block for convenient alternated distribution and reduced wiring.</p>	<p>The ZS4-SF1 fits 5 x 20 mm and 5 x 25 mm fuses for circuit protection</p>
<p>Available with blade or plug for easy circuit opening without disconnecting the wiring.</p> <p>Also available with built-in test socket screws convenient direct connection to the test equipment for the following operations:</p> <ul style="list-style-type: none"> - Voltage control, voltage continuity control or dielectric tests. - Total or partial equipment testing. - Maintenance. 			<p>The ZS4-SF and ZS4-SF1 are based on the latest version of the IEC60947-7-3 standard.</p> <p>The wiring of the terminal block is facilitated and can be done when the fuse holder is in closed position.</p> <ul style="list-style-type: none"> - Easy blown fuse control with the ZS4-SF-R1 and ZS4-SF-R3 available with blown fuse indicator 24-60 V or 115-250 V for quick identification of fuse failures, with low leakage current (< 0.5 mA). This feature enables use on high impedance PLC inputs. - Also available with built-in test socket screws for convenient direct connection to the test equipment for test operations such as voltage control, voltage continuity control or maintenance. 	

General information Accessories

End stops	Jumpers	End sections	Circuit separators
			
<p>Choose between the new compact screwless BAZ1, the robust BAM3 and the high BAZH1 for double deck and blocks up to 35 mm² 0 AWG. All compatible with SNK label holders LH.</p>	<p>Simplify the block interconnection with the isolated screwless jumper with the JB... available for 4 to 16 mm² 10 to 4 AWG terminal blocks.</p>	<p>One end section ES4 for the core feed-through range from 4 mm² to 95 mm² 10 to 000 AWG. Just three ends sections needed for the entire SNK series range.</p>	<p>Separate and easily visualize different parts of your assembly with the universal circuit separator CS-R1.</p>
10			
Testing solutions	Shielding	Covers	Plugs
			
<p>Test your assembly up to 15 poles with the test connector TC... or simply control the voltage with the test adaptor TP for 2, 2.3 or 4 mm test plug diameter.</p>	<p>Ensure the continuity of your shield connection with the SHB... shield connectors providing rapid and convenient installation.</p>	<p>PL... individual terminal block protective covers allow the rapid identification of live circuits. They also limit access to the screw clamp.</p> <p>KCO mounting kit protective covers reliably restrict access to your terminal assembly with the possibility of sealing.</p>	<p>PG5 component plugs ease the component installation (resistors or diodes) with a quick plug-in mounting system which avoids any soldering.</p> <p>PG5-R2 plugs fit into the terminal block's jumper channel for component insertion (resistors, diodes, etc.) between two terminal blocks.</p>

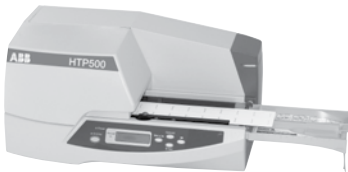
General information

Marking solutions

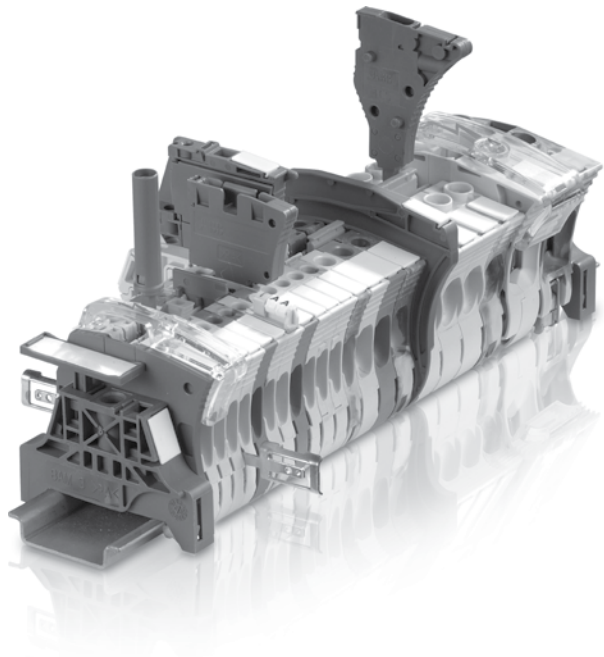
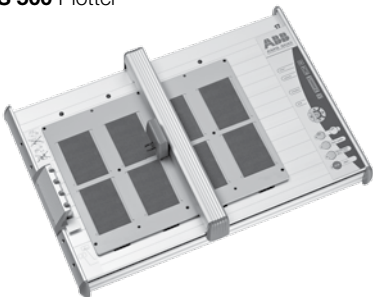
Blank marker cards for industrial use	Self adhesive strips for moderate use	Universal marker holders for moderate use
		
<p>Identify your terminal blocks with blank marker cards MC... printable with ABB marking systems</p>	<p>Identify your terminal blocks with Self Adhesive sTrips SAT... printable on all desktop printers.</p>	<p>Identify your terminal blocks with Universal Marker Holders UMH compatible with most of the wire markers available on the market.</p>

Marking systems

HTP 500 Thermal Printer



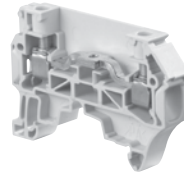
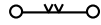
Automatic printing solutions:
AMS 500 Plotter



General information

Panorama

Feed-through



Section	
4 mm ²	12 AWG
6 mm ²	10 AWG
10 mm ²	6 AWG
16 mm ²	4 AWG
35 mm ²	0 AWG
70 mm ²	00 AWG
95 mm ²	0000 AWG

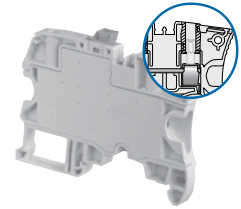
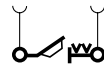
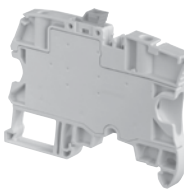
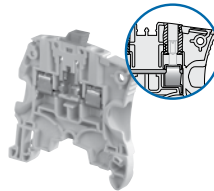
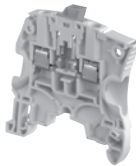
Spacing		
mm	in	
5.2	0.205	ZS4
6	0.236	ZS6
8	0.315	ZS10
10	0.394	ZS16

Spacing		
mm	in	
16	0.630	ZS35
22	0.866	ZS70
26	1.020	ZS95

Spacing		
mm	in	
8	0.315	ZS4-R1

10

Disconnect - with blade



Section	
4 mm ²	10 AWG
4 mm ²	10 AWG
6 mm ²	10 AWG
10 mm ²	6 AWG

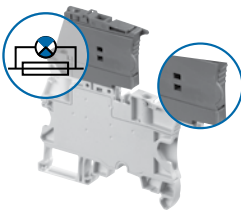
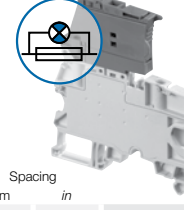
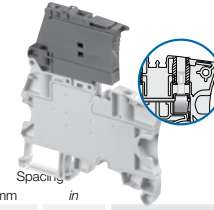
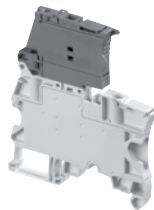
Spacing		
mm	in	
5.2	0.205	ZS4-S
6	0.236	ZS6-S
8	0.315	ZS10-S

Spacing		
mm	in	
5.2	0.205	ZS4-S-T2
5.2	0.205	ZS4-S-T2.3

Spacing		
mm	in	
6	0.236	ZS4-S-R1

Spacing		
mm	in	
6	0.236	ZS4-S-T2-R1
6	0.236	ZS4-S-T2.3-R1

For 5 x 20 mm fuses (0.197" x 0.787")



Section	
4 mm ²	10 AWG
4 mm ²	10 AWG

Spacing		
mm	in	
6	0.236	ZS4-SF

Spacing		
mm	in	
6	0.236	ZS4-SF-T2

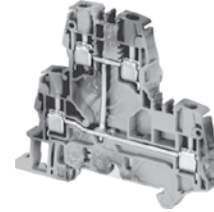
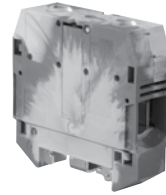
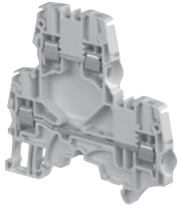
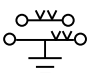
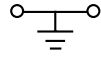
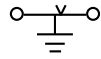
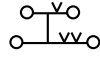
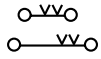
Spacing		
mm	in	
6	0.236	ZS4-SF-R1
6	0.236	ZS4-SF-R3

Spacing		
mm	in	
6	0.236	ZS4-SF-R2
6	0.236	ZS4-SF-R4

General information Panorama

Double Deck

Ground



Spacing		
mm	in	
5.2	0.205	ZS4-D2
6	0.236	ZS6-D2

Spacing		
mm	in	
5.2	0.205	ZS4-D1
6	0.236	ZS6-D1

Spacing		
mm	in	
5.2	0.205	ZS4-PE
6	0.236	ZS6-PE
8	0.315	ZS10-PE
10	0.394	ZS16-PE

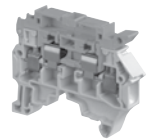
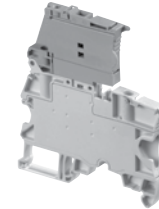
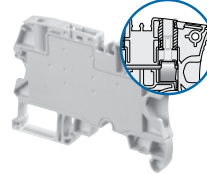
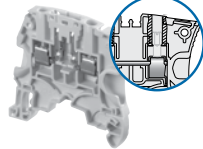
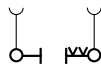
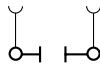
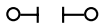
Spacing		
mm	in	
16	0.630	ZS35-PE
22	0.866	ZS70-PE
26	1.020	ZS95-PE

Spacing		
mm	in	
6	0.236	ZS6-D1-PE

Spacing		
mm	in	
6	0.236	ZS6-D2-PE

Disconnect - with plug

Disconnect - with lever



Spacing		
mm	in	
5.2	0.205	ZS4-SP
8	0.315	ZS10-SP

Spacing		
mm	in	
5.2	0.205	ZS4-SP-T2

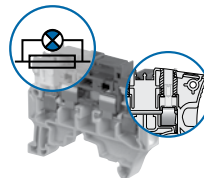
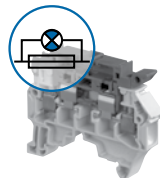
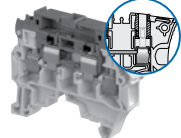
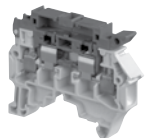
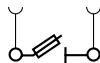
Spacing		
mm	in	
6	0.236	ZS4-SP-R1

Spacing		
mm	in	
6	0.236	ZS4-SP-T2-R1

Spacing		
mm	in	
6	0.236	ZS4-S-R2

Spacing		
mm	in	
8	0.315	ZS4-S-R3

For 5 x 20 mm and 5 x 25 mm fuses (0.197" x .787" and 0.197" x 0.984")



Spacing		
mm	in	
8	0.315	ZS4-SF1

Spacing		
mm	in	
8	0.315	ZS4-SF1-T2

Spacing		
mm	in	
8	0.315	ZS4-SF1-R1
8	0.315	ZS4-SF1-R3

Spacing		
mm	in	
8	0.315	ZS4-SF1-R2
8	0.315	ZS4-SF1-R4

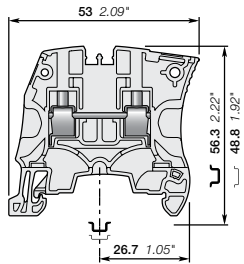
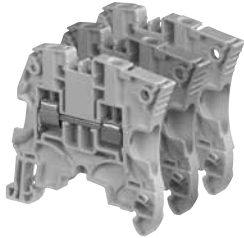
ZS4 Screw clamp terminal blocks

Feed-through



Technical Datasheet 1SNK 161 001 D0201

5.2 mm 0.205 in spacing



Features and Benefits

Save space by connecting conductors up to 4 mm² 12 AWG in just 5.2 mm 0.205 in spacing.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Feed-through	Grey	ZS4	1SNK505010R0000	50	8.77
	Blue	ZS4-BL	1SNK505020R0000	50	8.77
	Orange	ZS4-OR	1SNK505030R0000	50	8.77
	Yellow	ZS4-YL	1SNK505060R0000	50	8.77
	Green	ZS4-GN	1SNK505061R0000	50	8.77
	Red	ZS4-RD	1SNK505062R0000	50	8.77
	Purple	ZS4-PR	1SNK505063R0000	50	8.77
	Brown	ZS4-BR	1SNK505064R0000	50	8.77
	White	ZS4-WH	1SNK505065R0000	50	8.77
	Black	ZS4-BK	1SNK505066R0000	50	8.77

Main Technical Data

Connecting capacity		IEC	cULus - CSA	
1 conductor per clamp	Rigid	0.2-4 mm ²	24-12 AWG	
	Flexible	0.22-4 mm ²	24-12 AWG	
		with non insulated ferrule	0.22-4 mm ²	24-12 AWG
		with insulated ferrule	0.22-2.5 mm ²	24-14 AWG
	Gauge	A3-B3		
2 conductors per clamp	Rigid	0.2-1.5 mm ²	24-16 AWG	
	Flexible	0.2-1.5 mm ²	24-16 AWG	
		with twin ferrule	0.22-1.5 mm ²	24-16 AWG
Rated cross section	4 mm ²	12 AWG		
Rated current	32 A	20 A		
Rated short-time withstand current (1s)	480 A			
Short circuit current rating (with specific conditions)		100 kA		
Rated voltage	1000 V	600 V		
Impulse withstand voltage	8000 V			
Protection	IP20	NEMA 1		

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

Accessories

Description		Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops	Screw; 10mm 0.394 in	Dark Grey	BAM3	1SNK900001R0000	50	13.80
	Screwless; 5.2mm 0.205 in	Dark Grey	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	2.2 mm 0.087 in	Dark Grey	ES4	1SNK505910R0000	20	2.18
	3 poles	Orange	JB5-2	1SNK905302R0000	50	1.30
3 Jumper Bars	4 poles		JB5-3	1SNK905303R0000	50	2.00
	5 poles		JB5-4	1SNK905304R0000	50	2.70
	10 poles		JB5-5	1SNK905305R0000	50	3.50
	50 poles		JB5-10	1SNK905310R0000	30	7.10
	50 poles		JB5-50	1SNK905350R0000	10	36.10
4 Cross Spacing Jumpers	8 mm 0.315 in to 5.2 mm 0.205 in spacing	Orange	JB85-3	1SNK900603R0000	10	2.80
5 Circuit Separators	0 mm 0 in	Dark Grey	CS	1SNK900101R0000	20	0.20
	3 mm 0.118 in		CS-R1	1SNK900103R0000	20	5.20
6 Test Adapters	For test plugs DIA 2 mm 0.079 in	Dark Grey	TP2	1SNK900203R0000	20	1.73
	For test plugs DIA 4 mm 0.160 in		TP4	1SNK900205R0000	20	2.42
7 Test Connectors	5.2 mm 0.205 in spacing	Dark Grey	TC5	1SNK900200R0000	10	5.23
	End module, 5.2 mm 0.205 in		TC5-R1	1SNK900201R0000	10	5.23
8 Shield Connectors			SHBS	1SNK900600R0000	20	3.50
9 Protecting Covers	5.2 mm 0.205 in spacing	Transparent	PL5	1SNK900618R0000	10	1.50
10 Terminal Block Markers	Blank card	White	MC512	1SNK140000R0000	22	9.00
			MC512PA	1SNK149999R0000	20	10.00
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0.20
	Self adhesive strip	White	SAT5	1SNK900614R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

Ground Screw Clamp Terminal Blocks

Description		Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground	Profile aligned with ZS4	Green-Yellow	ZS4-PE	1SNK505150R0000	20	12.10

Technical Datasheet 1SNK 161 002 D0201
Catalogue Page 1SNK 161 002 S0201



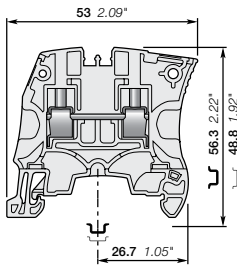
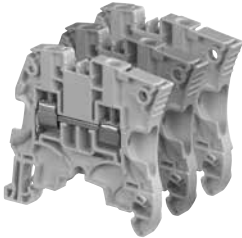
ZS6 Screw clamp terminal blocks

Feed-through



Technical Datasheet 1SNK 161 008 D0201

6 mm 0.236 in spacing



Features and Benefits

Save space by connecting conductors up to 6 mm² 10 AWG in just 6 mm 0.236 in spacing.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Feed-through	Grey	ZS6	1SNK506010R0000	50	10.64
	Blue	ZS6-BL	1SNK506020R0000	50	10.64
	Orange	ZS6-OR	1SNK506030R0000	50	10.64
	Yellow	ZS6-YL	1SNK506060R0000	50	10.64
	Green	ZS6-GN	1SNK506061R0000	50	10.64
	Red	ZS6-RD	1SNK506062R0000	50	10.64
	Purple	ZS6-PR	1SNK506063R0000	50	10.64
	Brown	ZS6-BR	1SNK506064R0000	50	10.64
	White	ZS6-WH	1SNK506065R0000	50	10.64
	Black	ZS6-BK	1SNK506066R0000	50	10.64

Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-6 mm ² 24-10 AWG
	Flexible	0.22-6 mm ² 24-10 AWG
	with non insulated ferrule	0.22-4 mm ² 24-12 AWG
	with insulated ferrule	0.22-4 mm ² 24-12 AWG
2 conductors per clamp	Gauge	A4-B3
	Rigid	0.2-2.5 mm ² 24-14 AWG
	Flexible	0.2-2.5 mm ² 24-14 AWG
with twin ferrule		0.22-2.5 mm ² 24-14 AWG
	Rated cross section	6 mm ² 10 AWG
Rated current	41 A	30 A
Rated short-time withstand current (1s)	720 A	
Short circuit current rating (with specific conditions)		100 kA
Rated voltage	1000 V	600 V
Impulse withstand voltage	8000 V	
Protection	IP20	NEMA 1
Rated voltage Ex e	630 V IEC/EN 60079-7 IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 4 mm Ø 0.157 in
Torque		0.85 Nm ± 0.15 7.52 lb.in ± 1.33

10

Accessories

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)	
1 End Stops	Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50	13.80	
	Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50	5.30	
2 End Sections	2.2 mm 0.087 in	ES4	1SNK505910R0000	20	2.18	
	3 Jumper Bars	2 poles 41 A 30 A	JB6-2	1SNK906302R0000	50	1.30
		3 poles	JB6-3	1SNK906303R0000	50	2.10
		4 poles	JB6-4	1SNK906304R0000	50	2.90
		5 poles	JB6-5	1SNK906305R0000	50	3.60
4 Circuit Separators	10 poles	JB6-10	1SNK906310R0000	20	7.40	
	50 poles	JB6-50	1SNK906350R0000	10	38.10	
	0 mm 0 in	CS	1SNK900101R0000	20	0.20	
5 Test Adapters	3 mm 0.118 in	CS-R1	1SNK900103R0000	20	5.20	
	For test plugs DIA 2 mm 0.079 in	TP2	1SNK900203R0000	20	1.73	
	For test plugs DIA 4 mm 0.160 in	TP4	1SNK900205R0000	20	2.42	
6 Test Connectors	End module, 5.2 mm 0.205 in	TC5-R1	1SNK900201R0000	10	5.23	
7 Spacers	0.8 mm 0.031 in spacing	ES-TC6	1SNK900105R0000	10	0.80	
8 Shield Connectors		SHBS	1SNK900600R0000	20	3.50	
9 Protecting Covers	6 mm 0.236 in spacing	PL6	1SNK900619R0000	10	1.84	
10 Terminal Block Markers	Blank card	MC612	1SNK150000R0000	22	10.00	
	Universal wire markers holder	UMH	1SNK900611R0000	10	0.20	
	Self adhesive strip	SAT6	1SNK900615R0000	5	6.00	

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

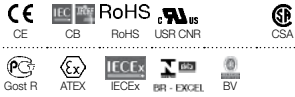
Ground Screw Clamp Terminal Blocks

Technical Datasheet 1SNK 161 002 D0201
Catalogue Page 1SNK 161 002 S0201

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground Profile aligned with ZS6	Green-Yellow	ZS6-PE	1SNK506150R0000	20	13.70

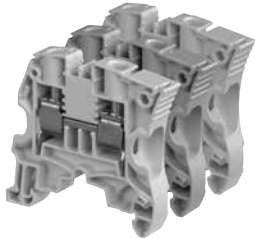
ZS10 Screw clamp terminal blocks

Feed-through

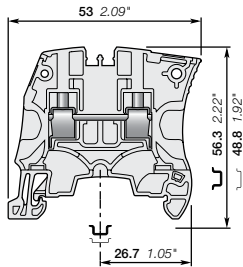


Technical Datasheet 1SNK 161 004 D0201

8 mm 0.315 in spacing



10



Features and Benefits

Save space by connecting conductors up to 10 mm² 6 AWG in just 8 mm 0.315 in spacing.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Feed-through	Grey	ZS10	1SNK508010R0000	50	14.10
	Blue	ZS10-BL	1SNK508020R0000	50	14.10
	Orange	ZS10-OR	1SNK508030R0000	50	14.10
	Yellow	ZS10-YL	1SNK508060R0000	50	14.10
	Green	ZS10-GN	1SNK508061R0000	50	14.10
	Red	ZS10-RD	1SNK508062R0000	50	14.10
	Purple	ZS10-PR	1SNK508063R0000	50	14.10
	Brown	ZS10-BR	1SNK508064R0000	50	14.10
	White	ZS10-WH	1SNK508065R0000	50	14.10
	Black	ZS10-BK	1SNK508066R0000	50	14.10

Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.5-10 mm ² 24-6 AWG
	Flexible	0.5-10 mm ² 24-6 AWG
	with non insulated ferrule	0.5-10 mm ² 24-8 AWG
	with insulated ferrule	0.5-6 mm ² 24-8 AWG
2 conductors per clamp	Gauge	A5-B5
	Rigid	0.5-4 mm ² 20-12 AWG
	Flexible	0.5-4 mm ² 20-12 AWG
	with twin ferrule	0.5-4 mm ² 20-12 AWG
Rated cross section	10 mm ²	6 AWG
Rated current	57 A	42 A
Rated short-time withstand current (1s)	1200 A	
Short circuit current rating (with specific conditions)		100 kA
Rated voltage	1000 V	600 V
Impulse withstand voltage	8000 V	
Protection	IP20	NEMA 1
Rated voltage Ex e	630 V IEC/EN 60079-7 IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		12 mm 0.472 in
Tool		Flat screwdriver Ø 4 mm Ø .157 in
Torque		1.3 Nm ± 0.3 11.5 lb.in ± 2.65

Accessories

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops	Dark Grey	Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50 13.80
		Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50 5.30
2 End Sections	Dark Grey	2.2 mm 0.087 in	ES4	1SNK505910R0000	20 2.18
		3 poles	JB8-2	1SNK908302R0000	50 2.70
		4 poles	JB8-3	1SNK908303R0000	50 4.10
		5 poles	JB8-4	1SNK908304R0000	50 5.60
		10 poles	JB8-5	1SNK908305R0000	40 7.00
3 Jumper Bars	Orange	8 mm 0.315 in to 5.2 mm 0.205 in spacing	JB8-10	1SNK908310R0000	20 14.20
			JB85-3	1SNK900603R0000	10 2.80
4 Cross Spacing Jumpers	Orange	0 mm 0 in	CS	1SNK900101R0000	20 0.20
		3 mm 0.118 in	CS-R1	1SNK900103R0000	20 5.20
5 Circuit Separators	Dark Grey	For test plugs DIA 2 mm 0.079 in	TP2	1SNK900203R0000	20 1.73
		For test plugs DIA 4 mm 0.160 in	TP4	1SNK900205R0000	20 2.42
6 Test Adapters	Dark Grey	5.2 mm 0.205 in spacing	TC5	1SNK900200R0000	10 5.23
		End module, 5.2 mm 0.205 in	TC5-R1	1SNK900201R0000	10 5.23
7 Test Connectors	Dark Grey	2.8 mm 0.110 in spacing	ES-TC8	1SNK900104R0000	10 1.35
		8 mm 0.315 in spacing	PL8	1SNK900620R0000	10 2.55
8 Spacers	Dark Grey	Blank card	MC812	1SNK160000R0000	22 10.00
		Markers	MC812PA	1SNK169999R0000	20 14.00
9 Protecting Covers	Transparent	Universal wire markers holder	UMH	1SNK900611R0000	10 0.20
		Self adhesive strip	SAT8	1SNK900616R0000	5 6.00

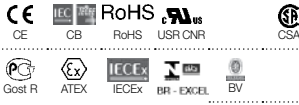
Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

Ground Screw Clamp Terminal Blocks

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground	Green-Yellow	ZS10-PE	1SNK508150R0000	20	22.50

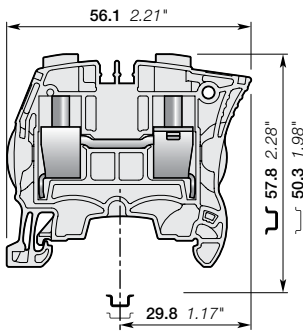
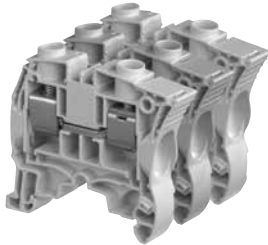
Technical Datasheet 1SNK 161 002 D0201
Catalogue Page 1SNK 161 002 S0201

ZS16 Screw clamp terminal blocks Feed-through



Technical Datasheet 1SNK 161 017 D0201

10 mm 0.394 in spacing



Features and Benefits

Save space by connecting conductors up to 16 mm² 4 AWG in just 10 mm 0.394 in spacing.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Feed-through	Grey	ZS16	1SNK510010R0000	25	20.20
	Blue	ZS16-BL	1SNK510020R0000	25	20.20
	Orange	ZS16-OR	1SNK510030R0000	25	20.20

Main Technical Data

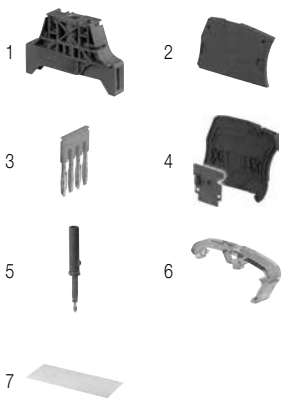
Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.5-16 mm ² 24-4 AWG
	Flexible	0.5-16 mm ² 24-4 AWG
	with non insulated ferrule	0.5-10 mm ² 24-8 AWG
	with insulated ferrule	0.5-10 mm ² 24-8 AWG
Gauge	A6-B6	
2 conductors per clamp	Rigid	0.5-6 mm ² 20-10 AWG
	Flexible	0.5-6 mm ² 20-10 AWG
	with twin ferrule	0.5-6 mm ² 20-10 AWG
Rated cross section	16 mm ²	4 AWG
Rated current	76 A	67 A
Rated short-time withstand current (1s)	1920 A	
Short circuit current rating (with specific conditions)		100 kA
Rated voltage	1000 V	600 V
Impulse withstand voltage	8000 V	
Protection	IP20	NEMA 1
Rated voltage Ex e	630 V IEC/EN 60079-7 IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		13.5 mm 0.531 in
Tool		Flat screwdriver Ø 5.5 mm Ø 0.217 in
Torque		1.8 Nm ± 0.2 15.93 lb.in ± 1.77

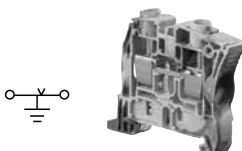
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Accessories



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)	
1 End Stops	Dark Grey	Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50	13.80
		Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	Dark Grey	2.2 mm 0.087 in	ES4	1SNK505910R0000	20	2.18
		3 poles	JB10-2	1SNK910302R0000	50	4.60
3 Jumper Bars	Orange	2 poles 76 A 67 A	JB10-3	1SNK910303R0000	50	7.10
		3 poles	JB10-4	1SNK910304R0000	40	9.40
		4 poles	JB10-5	1SNK910305R0000	30	12.00
		5 poles	JB10-10	1SNK910310R0000	20	24.00
		10 poles	CS	1SNK900101R0000	20	0.20
4 Circuit Separators	Dark Grey	0 mm 0 in	CS-R1	1SNK900103R0000	20	5.20
		3 mm 0.118 in				
5 Test Adapters	Dark Grey	For test plugs DIA 2 mm 0.079 in	TP2	1SNK900203R0000	20	1.73
		For test plugs DIA 4 mm 0.160 in	TP4	1SNK900205R0000	20	2.42
6 Protecting Covers	Transparent	PL10	1SNK900621R0000	10	3.13	
7 Terminal Block Markers	White	MC812	1SNK160000R0000	22	10.00	
		MC812PA	1SNK169999R0000	20	14.00	
	Grey	UMH	1SNK900611R0000	10	0.20	
	White	SAT8	1SNK900616R0000	5	6.00	

Some accessories may modify the terminal block's ratings. See complete information in *Technical Datasheet*.



Ground Screw Clamp Terminal Blocks

Technical Datasheet 1SNK 161 002 D0201
Catalogue Page 1SNK 161 002 S0201

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground	Green-Yellow	ZS16-PE	1SNK510150R0000	20	32.00

ZS35 Screw clamp terminal blocks

Feed-through



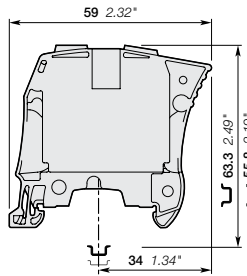
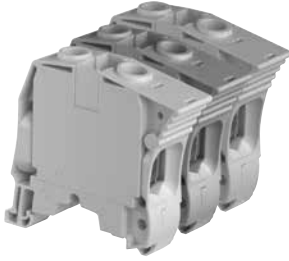
Features and Benefits

- Closed terminal block:
- No end section needed,
- Optimized rigidity.

Ordering Details

Technical Datasheet 1SNK 161 019 D0201

16 mm 0.630 in spacing



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Feed-through Closed block	Grey	ZS35	1SNK516010R0000	20	53.40
	Blue	ZS35-BL	1SNK516020R0000	20	53.40
	Orange	ZS35-OR	1SNK516030R0000	20	53.40

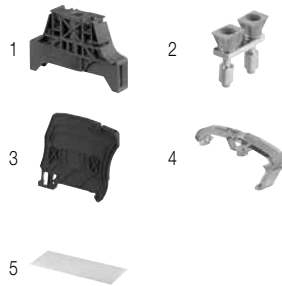
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	6-35 mm ²
	Flexible	6-35 mm ²
	with non insulated ferrule	6-35 mm ²
	with insulated ferrule	6-35 mm ²
2 conductors per clamp	Gauge	A9-B9
	Rigid	6-16 mm ²
	Flexible	6-16 mm ²
	with twin ferrule	6-10 mm ²
Rated cross section	35 mm ²	0 AWG
Rated current	125 A	150 A
Rated short-time withstand current (1s)	4200 A	
Short circuit current rating (with specific conditions)		100 kA
Rated voltage	1000 V	600 V
Impulse withstand voltage	8000 V	
Protection	IP20	NEMA 1
Rated voltage Ex e	630 V IEC/EN 60079-7 IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		17 mm 0.669 in
Tool		Flat screwdriver Ø 6.5 mm Ø 0.256 in
Torque		2.9 Nm ± 0.1 25.7 lb.in ± 0.885

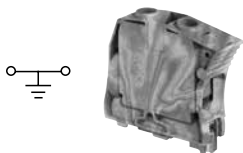
Accessories



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops 10 mm 0.394 in	Dark Grey	BAZH1	1SNK900102R0000	20	23.90
2 Jumper Bars 2 poles 125 A 150 A	Orange	JB16-2	1SNK916302R0000	10	10.20
		JB16-3	1SNK916303R0000	10	16.00
		JB16-4	1SNK916304R0000	10	21.80
		JB16-5	1SNK916305R0000	10	27.60
		JB16-10	1SNK916310R0000	10	56.60
3 Circuit Separators 3 mm 0.118 in spacing	Dark Grey	CS-R1	1SNK900103R0000	20	5.20
4 Protecting Covers 16 mm 0.630 in spacing	Transparent	PL16	1SNK900622R0000	10	4.60
5 Terminal Block Markers	White	MC812	1SNK160000R0000	22	10.00
		MC812PA	1SNK169999R0000	20	14.00
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10
Self adhesive strip	White	SAT8	1SNK900616R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

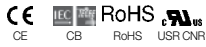
Ground Screw Clamp Terminal Blocks



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground Profile aligned with ZS35	Green-Yellow	ZS35-PE	1SNK516150R0000	20	81.80

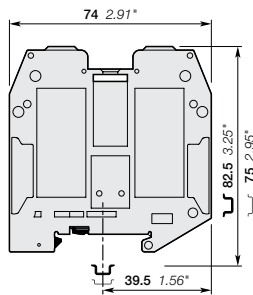
Technical Datasheet 1SNK 161 002 D0201
Catalogue Page 1SNK 161 002 S0201

ZS70 Screw clamp terminal blocks Feed-through



Technical Datasheet 1SNK 161 021 D0201

22 mm 0.866 in spacing



Features and Benefits

- Closed terminal block:
- No end section needed,
- Optimized rigidity.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Feed-through Closed block	Grey	ZS70	1SNK522010R0000	10	158.10
	Blue	ZS70-BL	1SNK522020R0000	10	158.10
	Yellow	ZS70-YL	1SNK522060R0000	10	158.10

Main Technical Data

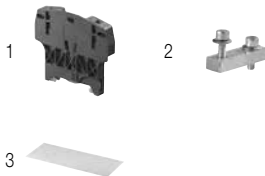
Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	16-95 mm ²
	Flexible	16-70 mm ²
	with non insulated ferrule	16-50 mm ²
	with insulated ferrule	16-50 mm ²
Gauge	B11	
2 conductors per clamp	Rigid	16-35 mm ²
	Flexible	16-35 mm ²
	with twin ferrule	16 mm ²
Rated cross section	70 mm ²	00 AWG
Rated current	192 A	159 A
Rated short-time withstand current (1s)	8400 A	
Short circuit current rating (with specific conditions)		100 kA
Rated voltage	1000 V	600 V
Impulse withstand voltage	8000 V	
Protection	IP10	NEMA 1
Rated voltage Ex e	630 V IEC/EN 60079-7 IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		25 mm 0.984 in
Tool		Allen Key Ø 6 mm Ø 0.236 in
Torque		6.5 Nm ± 0.5 57.5 lb.in ± 4.4

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Accessories



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)	
1 End Stops	Dark Grey	BAZH1	1SNK900102R0000	20	23.90	
2 Jumper Bars		2 poles	JB22-2	1SNK922302R0000	5	27.00
		3 poles	JB22-3	1SNK922303R0000	5	43.30
		5 poles	JB22-5	1SNK922305R0000	5	76.10
		10 poles	JB22-10	1SNK922310R0000	5	157.40
3 Terminal Block Markers	White	Blank card	MC812	1SNK160000R0000	22	10.00
		Universal wire markers holder	MC812PA	1SNK169999R0000	20	14.00
		Self adhesive strip	UMH	1SNK900611R0000	10	0.20
	White	SAT8	1SNK900616R0000	5	6.00	

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

Ground Screw Clamp Terminal Blocks

Technical Datasheet 1SNK 161 002 D0201
Catalogue Page 1SNK 161 002 S0201

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground Profile aligned with ZS70	Green-Yellow	ZS70-PE	1SNK522150R0000	10	222.00

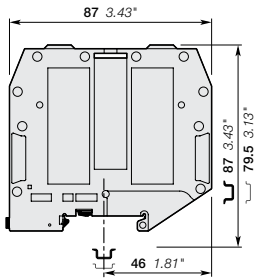
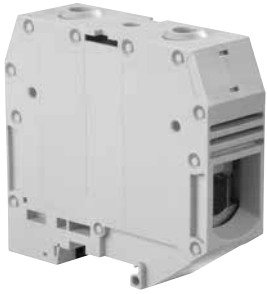
ZS95 Screw clamp terminal blocks

Feed-through



Technical Datasheet 1SNK 161 023 D0201

26 mm 1.02 in spacing



Features and Benefits

- Closed terminal block:
- No end section needed,
- Optimized rigidity.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Feed-through Closed block	Grey	ZS95	1SNK526010R0000	10	215.10
	Blue	ZS95-BL	1SNK526020R0000	10	215.10
	Yellow	ZS95-YL	1SNK526060R0000	10	215.10

Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	35-120 mm ²
	Flexible	35-95 mm ² 2-0000 AWG
	with non insulated ferrule	35-50 mm ²
with insulated ferrule	35-50 mm ²	
2 conductors per clamp	Gauge	B12
	Rigid	25-35 mm ² 4-2 AWG
	Flexible	25-35 mm ² 4-2 AWG
with twin ferrule	16 mm ²	
Rated cross section	95 mm ²	0000 AWG
Rated current	232 A	230 A
Rated short-time withstand current (1s)	11400 A	
Short circuit current rating (with specific conditions)		100 kA
Rated voltage	1000 V	600 V
Impulse withstand voltage	8000 V	
Protection	IP10	NEMA 1
Rated voltage Ex e	630 V IEC/EN 60079-7 IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		26 mm 1.023 in
Tool		Allen Key Ø 6 mm Ø 0.236 in
Torque		9.25 Nm ± 0.25 81.7 lb.in ± 2.2

Accessories

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)	
1 End Stops 10 mm 0.394 in	Dark Grey	BAZH1	1SNK900102R0000	20	23.90	
2 Jumper Bars		2 poles 232 A 230 A	JB26-2	1SNK926302R0000	5	41.20
		3 poles	JB26-3	1SNK926303R0000	5	65.70
		5 poles	JB26-5	1SNK926305R0000	5	115.70
		10 poles	JB26-10	1SNK926310R0000	5	241.50
3 Terminal Block Markers	Blank card	White	MC812	1SNK160000R0000	22	10.00
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0.20
	Self adhesive strip	White	SAT8	1SNK900616R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

Ground Screw Clamp Terminal Blocks

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground Profile aligned with ZS95	Green-Yellow	ZS95-PE	1SNK526150R0000	10	278.00

Technical Datasheet 1SNK 161 002 D0201
Catalogue Page 1SNK 161 002 S0201



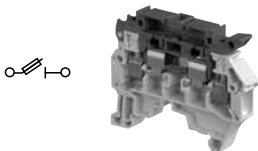
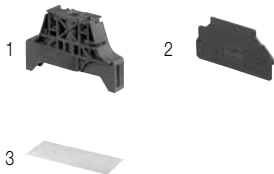
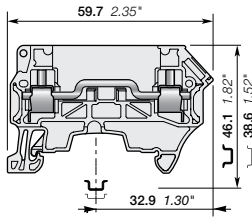
ZS4-R1 Screw clamp terminal blocks

Feed-through



Technical Datasheet 1SNK 161 009 D0201

8 mm 0.315 in spacing



Features and Benefits

Simplify the alternated feed-through and fuse circuits operations:

- With the same profile as the ZS4-SF1, the wiring of the alternated feed-through and fuse circuits is easier.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Feed-through Profile aligned with ZS4-SF1	Grey	ZS4-R1	1SNK508013R0000	50	11.00

Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-4 mm ²
	Gauge	A3-B3
2 conductors per clamp	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Maximum cross section	4 mm ²	10 AWG
Max. current / Max. cross section	28 A	26 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	800 V	300 V
Impulse withstand voltage	8000 V	
Protection	IP20	NEMA 1
Rated voltage Ex e	IEC/EN 60079-7	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		11 mm 0.433 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

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Accessories

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops	Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50	13.80
	Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	1.5 mm 0.059 in	ES4-SF	1SNK508960R0000	20	1.82
3 Terminal Block Markers	Blank card	MC812	1SNK160000R0000	22	10.00
		MC812PA	1SNK169999R0000	20	14.00
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10
	Self adhesive strip	White	SAT8	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

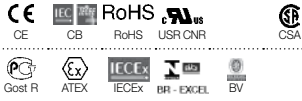
Fuse Screw Clamp Terminal Blocks

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
	Grey-Dark Grey	ZS4-SF1	1SNK508410R0000	50	13.30

Technical Datasheet 1SNK 161 002 D0201
Catalogue Page 1SNK 161 002 S0201

ZS4-D2 Screw clamp terminal blocks

Double deck with 2 feed-through circuits

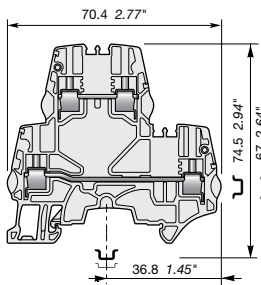


Technical Datasheet 1SNK 161 003 D0201

5.2 mm 0.205 in spacing



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Features and Benefits

- Save space with double deck terminal blocks: 2 independent circuits connected in just 5.2 mm 0.205 in spacing ;
- Customize yourself the double deck terminal blocks by soldering electronic components (up to 8.8 mm x 3.2 mm 0.346 in x 0.125 in) in the existing linking bars punching.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Double deck 2 Feed-through Circuits	Grey	ZS4-D2	1SNK505210R0000	50	15.25
	Blue	ZS4-D2-BL	1SNK505220R0000	50	15.25
	Orange	ZS4-D2-OR	1SNK505230R0000	50	15.25

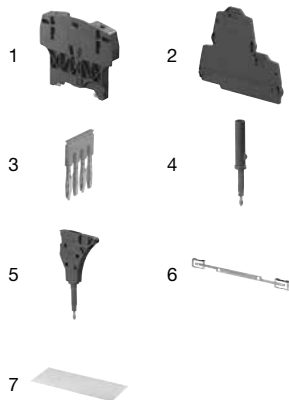
Main Technical Data

Connecting capacity		IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²	24-12 AWG
	Flexible	0.22-4 mm ²	24-12 AWG
	with non insulated ferrule	0.22-4 mm ²	24-12 AWG
	with insulated ferrule	0.22-2.5 mm ²	24-14 AWG
	Gauge	A3-B3	
2 conductors per clamp	Rigid	0.2-1.5 mm ²	24-16 AWG
	Flexible	0.2-1.5 mm ²	24-16 AWG
	with twin ferrule	0.22-1.5 mm ²	24-16 AWG
Rated cross section		4 mm ²	12 AWG
Rated current		29 A	20 A
Rated short-time withstand current (1s)		480 A	
Short circuit current rating (with specific conditions)			100 kA
Rated voltage		800 V	300 V
Impulse withstand voltage		8000 V	
Protection		IP20	NEMA 1
Rated voltage Ex e		400 V IEC/EN 60079-7 IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10 mm 0.394 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

Accessories



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops 10 mm 0.394 in	Dark Grey	BAZH1	1SNK900102R0000	20	23.90
2 End Sections 2.55 mm 0.100 in	Dark Grey	ES4-D2	1SNK505960R0000	20	4.10
3 Jumper Bars 2 poles 32 A 30 A	Orange	JB5-2	1SNK905302R0000	50	1.30
		JB5-3	1SNK905303R0000	50	2.00
		JB5-4	1SNK905304R0000	50	2.70
		JB5-5	1SNK905305R0000	50	3.50
		JB5-10	1SNK905310R0000	30	7.10
4 Test Adapters For test plugs DIA 2 mm 0.079 in	Dark Grey	TP2	1SNK900203R0000	20	1.73
		TP4	1SNK900205R0000	20	2.42
5 Test Connectors 5.2 mm 0.205 in spacing	Dark Grey	TC5	1SNK900200R0000	10	5.23
		TC5-R1	1SNK900201R0000	10	5.23
6 Shield Connectors		SHB	1SNK900602R0000	20	4.90
7 Terminal Block Markers	White	MC512	1SNK140000R0000	22	9.00
	White	MC512PA	1SNK149999R0000	20	10.00
	Grey	UMH	1SNK900611R0000	10	0.20
	White	SAT5	1SNK900614R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

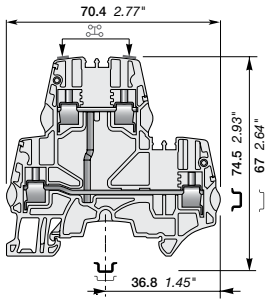
ZS4-D1 Screw clamp terminal blocks

Double deck with 1 feed-through circuit



Technical Datasheet 1SNK 161 007 D0201

5.2 mm 0.205 in spacing



Features and Benefits

- Ease one potential distribution on 4 independent screw clamps,
- Save space by connecting conductors up to 4 mm² 12 AWG in just 5.2 mm 0.205 in spacing.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Double deck 1 Feed-through Circuit	Grey	ZS4-D1	1SNK505211R0000	50	15.25

Main Technical Data

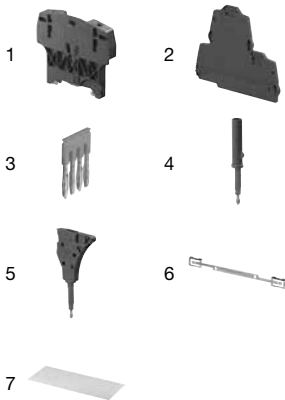
Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ² 24-12 AWG
	Flexible	0.22-4 mm ² 24-12 AWG
	with non insulated ferrule	0.22-4 mm ² 24-12 AWG
	with insulated ferrule	0.22-2.5 mm ² 24-14 AWG
Gauge	A3-B3	
2 conductors per clamp	Rigid	0.2-1.5 mm ² 24-16 AWG
	Flexible	0.2-1.5 mm ² 24-16 AWG
	with twin ferrule	0.22-1.5 mm ² 24-16 AWG
Rated cross section	4 mm ²	12 AWG
Rated current	29 A	20 A
Rated short-time withstand current (1s)	480 A	
Short circuit current rating (with specific conditions)		100 kA
Rated voltage	800 V	300 V
Impulse withstand voltage	8000 V	
Protection	IP20	NEMA 1
Rated voltage Ex e	400 V IEC/EN 60079-7 IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10 mm 0.394 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

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Accessories



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops 10 mm 0.394 in	Dark Grey	BAZH1	1SNK900102R0000	20	23.90
2 End Sections 2.55 mm 0.100 in	Dark Grey	ES4-D2	1SNK505960R0000	20	4.10
3 Jumper Bars 2 poles 32 A 30 A	Orange	JB5-2	1SNK905302R0000	50	1.30
		JB5-3	1SNK905303R0000	50	2.00
		JB5-4	1SNK905304R0000	50	2.70
		JB5-5	1SNK905305R0000	50	3.50
		JB5-10	1SNK905310R0000	30	7.10
4 Test Adapters For test plugs DIA 2 mm 0.079 in For test plugs DIA 4 mm 0.160 in	Dark Grey	TP2	1SNK900203R0000	20	1.73
		TP4	1SNK900205R0000	20	2.42
5 Test Connectors 5.2 mm 0.205 in spacing End module, 5.2 mm 0.205 in	Dark Grey	TC5	1SNK900200R0000	10	5.23
		TC5-R1	1SNK900201R0000	10	5.23
		SHB	1SNK900602R0000	20	4.90
6 Shield Connectors	White	MC512	1SNK140000R0000	22	9.00
		MC512PA	1SNK149999R0000	20	10.00
		UMH	1SNK900611R0000	10	0.20
7 Terminal Block Markers Universal wire markers holder Self adhesive strip	Grey	UMH	1SNK900611R0000	10	0.20
	White	SAT5	1SNK900614R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

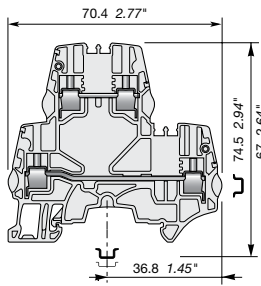
ZS6-D2 Screw clamp terminal blocks

Double deck with 2 feed-through circuits



Technical Datasheet 1SNK 161 014 D0201

6 mm 0.236 in spacing



Features and Benefits

- Save space with double deck terminal blocks: 2 independent circuits connected in 6 mm 0.236 in spacing ;
- Customize yourself the double deck terminal blocks by soldering electronic components (up to 8.8 mm x 3.2 mm 0.346 in x 0.125 in) in the existing linking bars punching.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Double deck 2 Feed-through Circuits	Grey	ZS6-D2	1SNK506210R0000	50	18.41
	Blue	ZS6-D2-BL	1SNK506220R0000	50	18.41
	Orange	ZS6-D2-OR	1SNK506230R0000	50	18.41

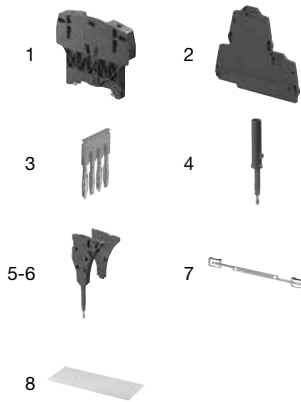
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-6 mm ² 24-10 AWG
	Flexible	0.22-6 mm ² 24-10 AWG
	with non insulated ferrule	0.22-4 mm ² 24-12 AWG
	with insulated ferrule	0.22-4 mm ² 24-12 AWG
2 conductors per clamp	Gauge	A4-B3
	Rigid	0.2-2.5 mm ² 24-14 AWG
	Flexible	0.2-2.5 mm ² 24-14 AWG
	with twin ferrule	0.22-2.5 mm ² 24-14 AWG
Rated cross section	6 mm ²	10 AWG
Rated current	41 A	30 A
Rated short-time withstand current (1s)	720 A	
Short circuit current rating (with specific conditions)		100 kA
Rated voltage	800 V	300 V
Impulse withstand voltage	8000 V	
Protection	IP20	NEMA 1
Rated voltage Ex e	400 V IEC/EN 60079-7 IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10 mm 0.394 in
Tool		Flat screwdriver Ø 4 mm Ø 0.157 in
Torque		0.85 Nm ± 0.15 7.52 lb.in ± 1.33

Accessories

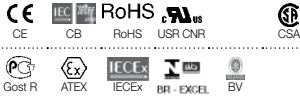


Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops 10 mm 0.394 in	Dark Grey	BAZH1	1SNK900102R0000	20	23.90
2 End Sections 2.55 mm 0.100 in	Dark Grey	ES4-D2	1SNK505960R0000	20	4.10
3 Jumper Bars 2 poles 41 A 30 A	Orange	JB6-2	1SNK906302R0000	50	1.30
		JB6-3	1SNK906303R0000	50	2.10
		JB6-4	1SNK906304R0000	50	2.90
		JB6-5	1SNK906305R0000	50	3.60
		JB6-10	1SNK906310R0000	20	7.40
4 Test Adapters For test plugs DIA 2 mm 0.079 in	Dark Grey	TP2	1SNK900203R0000	20	1.73
		TP4	1SNK900205R0000	20	2.42
5 Test Connectors End module, 5.2 mm 0.205 in	Dark Grey	TC5-R1	1SNK900201R0000	10	5.23
6 Spacers 0.8 mm 0.031 in spacing	Dark Grey	ES-TC6	1SNK900105R0000	10	0.80
7 Shield Connectors		SHB	1SNK900602R0000	20	4.90
8 Terminal Block Markers	White	MC612	1SNK150000R0000	22	10.00
		MC612PA	1SNK159999R0000	20	11.00
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10
Self adhesive strip	White	SAT6	1SNK900615R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

ZS6-D1 Screw clamp terminal blocks

Double deck with 1 feed-through circuit



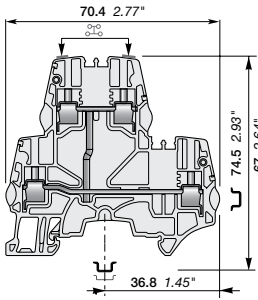
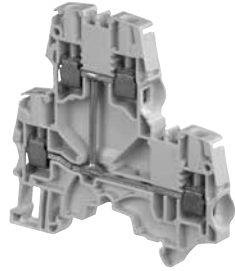
Features and Benefits

- Ease one potential distribution on 4 independent screw clamps,
- Save space by connecting conductors up to 6 mm² 10 AWG in just 6 mm 0.236 in spacing.

Ordering Details

Description		Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Double deck 1 Feed-through Circuit		Grey	ZS6-D1	1SNK506211R0000	50	18.41

6 mm 0.236 in spacing



Main Technical Data

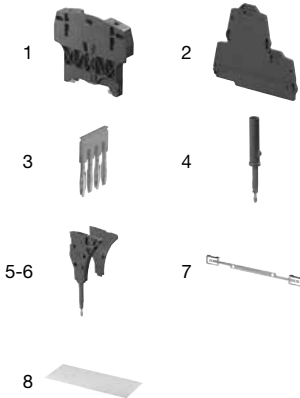
Connecting capacity		IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-6 mm ²	24-10 AWG
	Flexible	0.22-6 mm ²	24-10 AWG
	with non insulated ferrule	0.22-4 mm ²	24-12 AWG
	with insulated ferrule	0.22-4 mm ²	24-12 AWG
Gauge		A4-B3	
2 conductors per clamp	Rigid	0.2-2.5 mm ²	24-14 AWG
	Flexible	0.2-2.5 mm ²	24-14 AWG
	with twin ferrule	0.22-2.5 mm ²	24-14 AWG
Rated cross section		6 mm ²	10 AWG
Rated current		41 A	30 A
Rated short-time withstand current (1s)		720 A	
Short circuit current rating (with specific conditions)			100 kA
Rated voltage		800 V	300 V
Impulse withstand voltage		8000 V	
Protection		IP20	NEMA 1
Rated voltage Ex e		400 V IEC/EN 60079-7 IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10 mm 0.394 in
Tool		Flat screwdriver Ø 4 mm Ø 0.157 in
Torque		0.85 Nm ± 0.15 7.52 lb.in ± 1.33

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Accessories



Description		Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1	End Stops 10 mm 0.394 in	Dark Grey	BAZH1	1SNK900102R0000	20	23.90
2	End Sections 2.55 mm 0.100 in	Dark Grey	ES4-D2	1SNK505960R0000	20	4.10
3	Jumper Bars 2 poles 41 A 30 A	Orange	JB6-2	1SNK906302R0000	50	1.30
	3 poles		JB6-3	1SNK906303R0000	50	2.10
	4 poles		JB6-4	1SNK906304R0000	50	2.90
	5 poles		JB6-5	1SNK906305R0000	50	3.60
	10 poles		JB6-10	1SNK906310R0000	20	7.40
4	Test Adapters For test plugs DIA 2 mm 0.079 in	Dark Grey	TP2	1SNK900203R0000	20	1.73
	For test plugs DIA 4 mm 0.160 in		TP4	1SNK900205R0000	20	2.42
5	Test Connectors End module, 5.2 mm 0.205 in	Dark Grey	TC5-R1	1SNK900201R0000	10	5.23
6	Spacers 0.8 mm 0.031 in spacing	Dark Grey	ES-TC6	1SNK900105R0000	10	0.80
7	Shield Connectors		SHB	1SNK900602R0000	20	4.90
8	Terminal Block Markers	White	MC612	1SNK150000R0000	22	10.00
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0.20
	Self adhesive strip	White	SAT6	1SNK900615R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

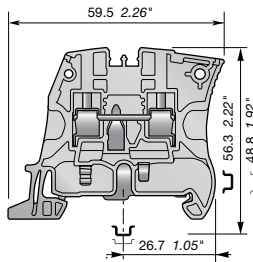
ZS4-PE Screw clamp terminal blocks

Ground



Technical Datasheet 1SNK 161 002 D0201

5.2 mm 0.205 in spacing



Features and Benefits

Improve the safety of your installation in the event of a short-circuit thanks to our screwless rail contact:

- Rail contact non operator dependent,
- Performances above the requirements of IEC 60947-7-2 terminal block standard,
- Secured snap on or remove from the rail.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground Screwless rail connection	Green-Yellow	ZS4-PE	1SNK505150R0000	20	12.10

Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-2.5 mm ²
Gauge	A3-B3	
Rated cross section	4 mm ²	12 AWG
Rated short-time withstand current (1s)	480 A	396 A
Protection	IP20	NEMA 1
Explosive atmosphere classification	IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

Accessories

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)	
1 End Stops	Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50	13.80	
	Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50	5.30	
2 End Sections	2.2 mm 0.087 in	ES4	1SNK505910R0000	20	2.18	
3 Circuit Separators	3 mm 0.118 in	CS-R1	1SNK900103R0000	20	5.20	
4 Terminal Block Markers	Blank card	MC512	1SNK140000R0000	22	9.00	
		MC512PA	1SNK149999R0000	20	10.00	
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0.20
	Self adhesive strip	White	SAT5	1SNK900614R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

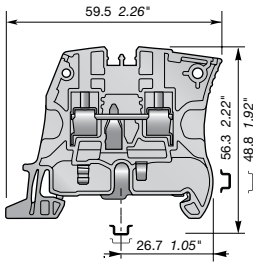
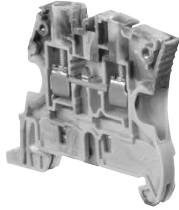
ZS6-PE Screw clamp terminal blocks

Ground



Technical Datasheet 1SNK 161 015 D0201

6 mm 0.236 in spacing



Features and Benefits

Improve the safety of your installation in the event of a short-circuit thanks to our screwless rail contact:

- Rail contact non operator dependent,
- Performances above the requirements of IEC 60947-7-2 terminal block standard,
- Secured snap on or remove from the rail.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground Screwless rail connection	Green-Yellow	ZS6-PE	1SNK506150R0000	20	13.70

Main Technical Data

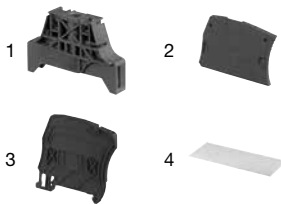
Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-6 mm ²
	Flexible	0.22-6 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-4 mm ²
Gauge	A4-B3	
Rated cross section	6 mm ²	10 AWG
Rated short-time withstand current (1s)	720 A	636 A
Protection	IP20	NEMA 1
Explosive atmosphere classification	IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 4 mm Ø 0.157 in
Torque		0.85 Nm ± 0.15 7.52 lb.in ± 1.33

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Accessories

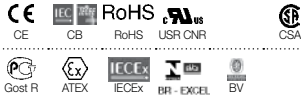


Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops	Dark Grey	BAM3	1SNK900001R0000	50	13.80
	Dark Grey	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	Dark Grey	ES4	1SNK505910R0000	20	2.18
3 Circuit Separators	Dark Grey	CS-R1	1SNK900103R0000	20	5.20
4 Terminal Block Markers	White	MC612	1SNK150000R0000	22	10.00
	White	MC612PA	1SNK159999R0000	20	11.00
	Grey	UMH	1SNK900611R0000	10	0.20
Self adhesive strip	White	SAT6	1SNK900615R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

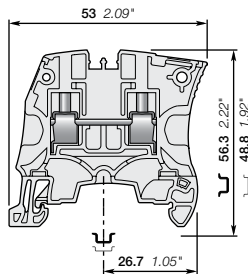
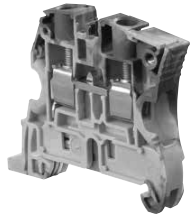
ZS10-PE Screw clamp terminal blocks

Ground



Technical Datasheet 1SNK 161 016 D0201

8 mm 0.315 in spacing



Features and Benefits

Improve the safety of your installation in the event of a short-circuit thanks to our screwless rail contact:

- Rail contact non operator dependent,
- Performances above the requirements of IEC 60947-7-2 terminal block standard,
- Secured snap on or remove from the rail,
- PE.N function available by combining ZS10-PE with ZS10-BL and 2 poles jumper bar JB8-2.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground Screwless rail connection	Green-Yellow	ZS10-PE	1SNK508150R0000	20	22.50

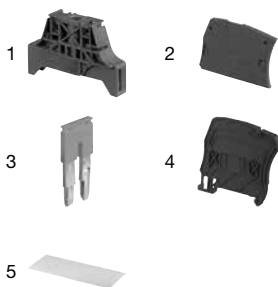
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	24-6 AWG
	Flexible	24-6 AWG
	with non insulated ferrule	24-8 AWG
	with insulated ferrule	24-8 AWG
Gauge	A5-B5	
Rated cross section	10 mm ²	6 AWG
Rated short-time withstand current (1s)	1200 A	1596 A
Protection	IP20	NEMA 1
Explosive atmosphere classification	IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-15
Wire stripping length		12 mm 0.472 in
Tool		Flat screwdriver Ø 4 mm Ø 0.157 in
Torque		1.3 Nm ± 0.3 11.5 lb.in ± 2.65

Accessories



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops	Dark Grey	BAM3	1SNK900001R0000	50	13.80
			1SNK900002R0000	50	5.30
2 End Sections	Dark Grey	ES4	1SNK505910R0000	20	2.18
3 Jumper Bars	Orange	JB8-2	1SNK908302R0000	50	2.70
4 Circuit Separators	Dark Grey	CS-R1	1SNK900103R0000	20	5.20
5 Terminal Block Markers	White	MC812	1SNK160000R0000	22	10.00
			1SNK169999R0000	20	14.00
			1SNK900611R0000	10	0.20
Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0.20
Self adhesive strip	White	SAT8	1SNK900616R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

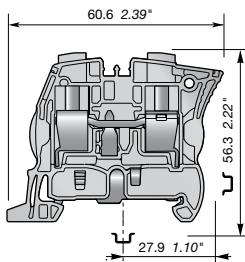
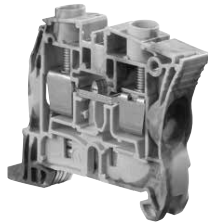
ZS16-PE Screw clamp terminal blocks

Ground



Technical Datasheet 1SNK 161 018 D0201

10 mm 0.394 in spacing



Features and Benefits

Improve the safety of your installation in the event of a short-circuit thanks to our screwless rail contact:

- Rail contact non operator dependent,
- Performances above the requirements of IEC 60947-7-2 terminal block standard,
- Secured snap on or remove from the rail,
- PE.N function available by combining ZS16-PE with ZS16-BL and 2 poles jumper bar JB10-2.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground Screwless rail connection	Green-Yellow	ZS16-PE	1SNK510150R0000	20	32.00

Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.5-16 mm ² 24-4 AWG
	Flexible	0.5-16 mm ² 24-4 AWG
	with non insulated ferrule	0.5-10 mm ² 24-8 AWG
	with insulated ferrule	0.5-10 mm ² 24-8 AWG
Gauge	A6-B6	
Rated cross section	16 mm ²	4 AWG
Rated short-time withstand current (1s)	1920 A	2544 A
Protection	IP20	NEMA 1
Explosive atmosphere classification	IM2 II 2 GD Ex e I/II	

Mounting Instructions

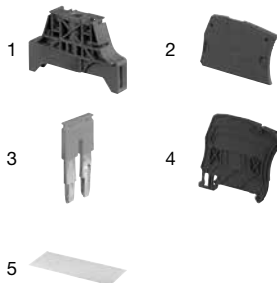
Rail		TH 35-15
Wire stripping length		13.5 mm 0.531 in
Tool		Flat screwdriver Ø 5.5 mm Ø 0.217 in
Torque		1.8 Nm ± 0.2 15.93 lb.in ± 1.77

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Accessories

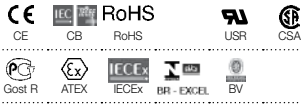
Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)	
1 End Stops	Screw; 10mm 0.394 in	Dark Grey	BAM3	1SNK900001R0000	50	13.80
	Screwless; 5,2mm 0.205 in	Dark Grey	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	2.2 mm 0.087 in	Dark Grey	ES4	1SNK505910R0000	20	2.18
3 Jumper Bars	2 poles 76 A 67 A	Orange	JB10-2	1SNK910302R0000	50	4.60
4 Circuit Separators	3 mm 0.118 in	Dark Grey	CS-R1	1SNK900103R0000	20	5.20
5 Terminal Block Markers	Blank card	White	MC812	1SNK160000R0000	22	10.00
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0.20
	Self adhesive strip	White	SAT8	1SNK900616R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".



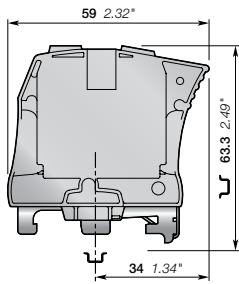
ZS35-PE Screw clamp terminal blocks

Ground



Technical Datasheet 1SNK 161 020 D0201

16 mm 0.630 in spacing



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Features and Benefits

Reliable electrical and mechanical contact with the rail that exceeds the requirements of IEC 60947-7-2 terminal block standard.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground Screw rail connection	Green-Yellow	ZS35-PE	1SNK516150R0000	20	81.80

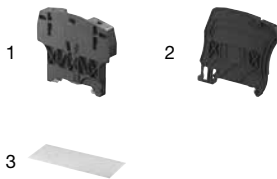
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	6-35 mm ²
	Flexible	6-35 mm ²
	with non insulated ferrule	6-35 mm ²
	with insulated ferrule	6-35 mm ²
Gauge	A9	
Rated cross section	35 mm ²	2 AWG
Rated short-time withstand current (1s)	4200 A	4032 A
Protection	IP20	NEMA 1
Explosive atmosphere classification	IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-15
Wire stripping length		17 mm 0.669 in
Tool		Flat screwdriver
Screw clamp		Ø 6.5 mm Ø 0.256 in
Rail connection screw		Ø 5.5 mm Ø 0.217 in
Torque		2.65 Nm ± 0.15 23.5 lb.in ± 1.33
Screw clamp		1.6 Nm ± 0.15 14.2 lb.in ± 1.33
Rail connection screw		1.6 Nm ± 0.15 14.2 lb.in ± 1.33

Accessories

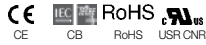


Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops 10 mm 0.394 in	Dark Grey	BAZH1	1SNK900102R0000	20	23.90
2 Circuit Separators 3 mm 0.118 in	Dark Grey	CS-R1	1SNK900103R0000	20	5.20
3 Terminal Block Markers	White	MC812	1SNK160000R0000	22	10.00
	White	MC812PA	1SNK169999R0000	20	14.00
	Grey	UMH	1SNK900611R0000	10	0.20
Self adhesive strip	White	SAT8	1SNK900616R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

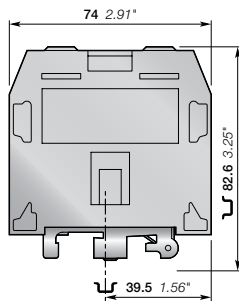
ZS70-PE Screw clamp terminal blocks

Ground



Technical Datasheet 1SNK 161 022 D0201

22 mm 0.866 in spacing



Features and Benefits

Reliable electrical and mechanical contact with the rail that exceeds the requirements of IEC 60947-7-2 terminal block standard.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground Screw rail connection	Green-Yellow	ZS70-PE	1SNK522150R0000	10	222.00

Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	16-95 mm ²
	Flexible	16-70 mm ²
	with non insulated ferrule	16-50 mm ²
	with insulated ferrule	16-50 mm ²
Gauge	B11	
Rated cross section	70 mm ²	00 AWG
Rated short-time withstand current (1s)	8400 A	8088 A
Protection	IP10	NEMA 1
Explosive atmosphere classification	IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-15
Wire stripping length		25 mm 0.984 in
Tool		Allen Key Ø 6 mm Ø 0.236 in
Screw clamp		Ø 4 mm Ø 0.158 in
Rail connection screw		Ø 4 mm Ø 0.158 in
Torque		6.5 Nm ± 0.5 57.5 lb.in ± 4.4
Screw clamp		2 Nm ± 0.5 17.7 lb.in ± 4.4
Rail connection screw		2 Nm ± 0.5 17.7 lb.in ± 4.4

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Accessories

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops	Dark Grey	BAZH1	1SNK900102R0000	20	23.90
2 Terminal Block Markers	White	MC812	1SNK160000R0000	22	10.00
		MC812PA	1SNK169999R0000	20	14.00
	Grey	UMH	1SNK900611R0000	10	0.20
	White	SAT8	1SNK900616R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

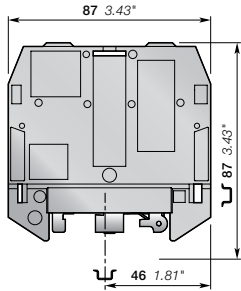
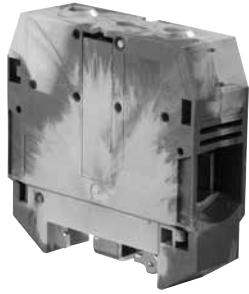
ZS95-PE Screw clamp terminal blocks

Ground



Technical Datasheet 1SNK 161 024 D0201

26 mm 1.02 in spacing



Features and Benefits

Reliable electrical and mechanical contact with the rail that exceeds the requirements of IEC 60947-7-2 terminal block standard.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Ground Screw rail connection	Green-Yellow	ZS95-PE	1SNK526150R0000	10	278.00

Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid 35-120 mm ² Flexible 35-95 mm ²	2-0000 AWG
	with non insulated ferrule 35-50 mm ² with insulated ferrule 35-50 mm ²	
	Gauge	B12
Rated cross section	95 mm ²	0000 AWG
Rated short-time withstand current (1s)	11400 A	12840 A
Protection	IP10	NEMA 1
Explosive atmosphere classification	IM2 II 2 GD Ex e I/II	

Mounting Instructions

Rail		TH 35-15
Wire stripping length		26 mm 1.023 in
Tool		Allen Key Ø 6 mm Ø 0.236 in
Screw clamp		Ø 4 mm Ø 0.158 in
Rail connection screw		Ø 0.158 in
Torque		9.25 Nm ± 0.25 81.7 lb.in ± 2.2
Screw clamp		2 Nm ± 0.25 17.7 lb.in ± 2.2
Rail connection screw		2 Nm ± 0.25 17.7 lb.in ± 2.2

Accessories



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops 10 mm 0.394 in	Dark Grey	BAZH1	1SNK900102R0000	20	23.90
2 Terminal Block Markers	White	MC812	1SNK160000R0000	22	10.00
		MC812PA	1SNK169999R0000	20	14.00
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10
Self adhesive strip	White	SAT8	1SNK900616R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

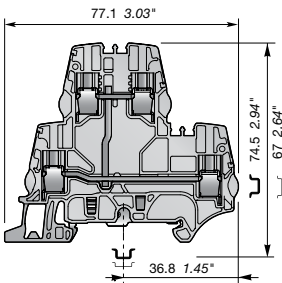
ZS6-D1-PE Screw clamp terminal blocks

Double deck with 2 ground circuits

6mm 0.236 in spacing



ZS6-D1-PE



6 mm 0.236 in Spacing

Description

- Save space with double deck ground terminal blocks aligned with ZS6-D2 double deck terminal blocks for convenient cabling process and circuit configuration;
- Benefit from our screwless rail connection: non operator independant, secured snap on or remove from the rail, performances above the requirements of IEC 60947-7-2 standard

Ordering Details

Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g
Double deck 2 ground circuits	Green-Yellow	ZS6-D1-PE	1SNK506250R0000	50	18,41

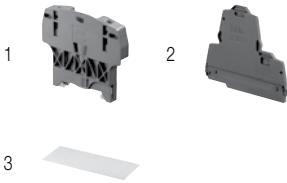
Main Technical Data

Connecting capacity		IEC	UL - CSA	Rail		
1 conductor per clamp	Rigid - Solid / Stranded	0.2-6 mm ²	24-10 AWG	Wire stripping length		TH 35-7.5, TH 35-15
	Flexible	0.22-6 mm ²				10 mm 0.394 in
	with non insulated ferrule	0.22-4 mm ²	24-12 AWG			
	with insulated ferrule	0.22-4 mm ²	24-12 AWG			
Gauge		A4-B3		Tool		Flat screwdriver Ø 4 mm Ø 0.157 in
Rated cross section		6 mm ²	10 AWG			
Rated short-time withstand current (1s)		720 A				
Protection		IP20	NEMA 1	Torque		0.85 N.m ± 0.15 7.52 lb.in ± 1.33
Explosive atmosphere classification						

The connecting capacity data for one Rigid - Solid / Stranded - Flexible conductor (when apply) is a mandatory information required by IEC, UL and CSA standards. All other data are provided as supplementary information only. For more details, please consult our CB, UL or CSA certificates and technical datasheet available on <http://www.ABB.com>

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Accessories

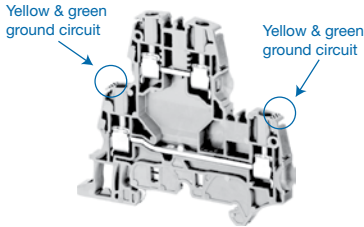
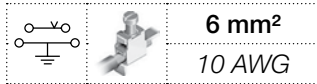


Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g
1 End Stops	Dark Grey	BAZH1	1SNK900102R0000	20	23,90
2 End Sections	Dark Grey	ES4-D2	1SNK505960R0000	20	4,10
3 Terminal Block Markers	White	MC612	1SNK150000R0000	22	10,00
	Grey	MC612PA	1SNK159999R0000	20	11,00
Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0,20
Self adhesive strip	White	SAT6	1SNK900615R0000	5	6,00

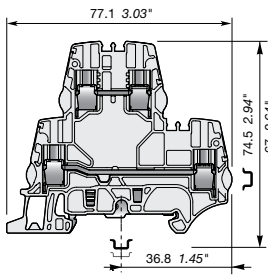
Complete list of accessories is indicated in the terminal block datasheet. Some accessories such as jumper bars may modify the terminal block's ratings: complete information in the accessories catalogue pages.

ZS6-D2-PE Screw clamp terminal blocks

Double deck with 1 feed-through circuit and 1 ground circuit
6mm 0.236 in spacing



ZS6-D2-PE



6 mm 0.236 in Spacing

Description

- Save space with ZS6-D2-PE terminal blocks: 1 feed-through circuit and 1 ground circuit in just 6 mm 0.236 in spacing;
- Customize yourself the ZS6-D2-PE terminal blocks by soldering electronic components (up to 8.8 mm x 3.2 mm 0.346 x 0.125 in) in the existing linking bars punching.

Ordering Details

Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g
Double deck 1 Feed-through Circuit and 1 Ground circuit	Grey <input type="checkbox"/>	ZS6-D2-PE	1SNK506212R0000	50	18.41

Main Technical Data

Connecting capacity		IEC	UL - CSA
1 conductor per clamp	Rigid - Solid / Stranded	0.2-6 mm ²	24-10 AWG
	Flexible	0.22-6 mm ²	
	with non insulated ferrule	0.22-4 mm ²	24-12 AWG
	with insulated ferrule	0.22-4 mm ²	24-12 AWG
Gauge		A4-B3	
2 conductors per clamp	Rigid - Solid / Stranded	0.2-2.5 mm ²	24-14 AWG
	Flexible	0.2-2.5 mm ²	
	with twin ferrule	0.22-2.5 mm ²	24-14 AWG
Rated current / Rated cross section		41 A / 6 mm ²	30 A / 10 AWG
Rated short-time withstand current (1s)		720 A	
Short Circuit Current Rating (with specific conditions)			
Rated voltage		800 V	300 V
Impulse withstand voltage		8000 V	
Protection		IP20	NEMA 1

Mounting Instructions

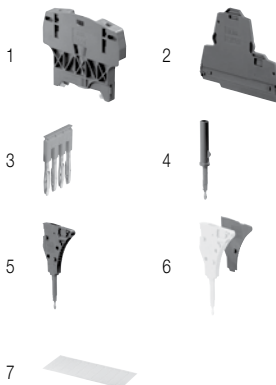
Tool	Requirement
Rail	TH 35-7.5, TH 35-15
Wire stripping length	10 mm 0.394 in
Tool	Flat screwdriver Ø 4 mm Ø 0.157 in
Torque	0.85 N.m ± 0.15 7.52 lb.in ± 1.33

Rated voltage Ex e

The connecting capacity data for one Rigid - Solid / Stranded - Flexible conductor (when apply) is a mandatory information required by IEC, UL and CSA standards. All other data are provided as supplementary information only. For more details, please consult our CB, UL or CSA certificates and technical datasheet available on <http://www.ABB.com>

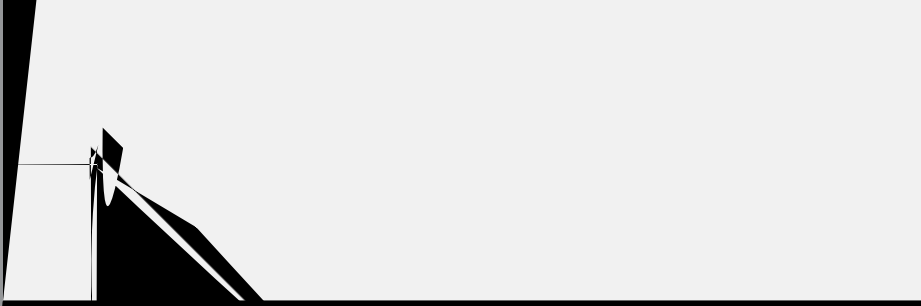
CE	IEC CB	RoHS	UL	CSA	Gost R
CE	CB	RoHS	ULR	CSA	Gost R

Accessories



Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g
1 End Stops 10 mm 0.394 in	Dark Grey	BAZH1	1SNK900102R0000	20	23.90
2 End Sections 2.55 mm 0.100 in	Dark Grey	ES4-D2	1SNK505960R0000	20	4.10
3 Jumper Bars 2 poles 41 A 30 A	Orange	JB6-2	1SNK906302R0000	50	1.30
		3 poles JB6-3	1SNK906303R0000	50	2.10
		4 poles JB6-4	1SNK906304R0000	50	2.90
		5 poles JB6-5	1SNK906305R0000	50	3.60
		10 poles JB6-10	1SNK906310R0000	20	7.40
4 Test Adapters For test plugs DIA 4 mm 0.160 in	Dark Grey	TP4	1SNK900205R0000	20	2.41
5 Test Connectors End module, 5.2 mm 0.205 in	Dark Grey	TC5-R1	1SNK900201R0000	10	5.23
6 Spacers	Dark Grey	ES-TC6	1SNK900105R0000	10	0.80
7 Terminal Block Markers	White	MC612	1SNK15000R0000	22	10.00
	White	MC612PA	1SNK15999R0000	20	11.00
	Grey	UMH	1SNK900611R0000	10	0.20
Self adhesive strip	White	SAT6	1SNK900615R0000	5	6.00

Complete list of accessories is indicated in the terminal block datasheet. Some accessories such as jumper bars may modify the terminal block's ratings: complete information in the accessories catalogue pages.



ZS6-S Screw clamp terminal blocks

Disconnect with blade
6mm 0.236 in spacing



Description

- Ease your disconnect operations with the disconnect blade operated by hand or with a screwdriver,
- Same profile as ZS6 feed-through terminal block for aligned marking and identical end section use.

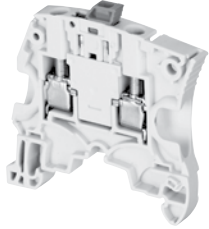
Ordering Details

Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g
Disconnect Profile aligned with ZS6	Grey	ZS6-S	1SNK506315R0000	50	8.60
	Blue	ZS6-S-BL	1SNK506322R0000	50	8.60

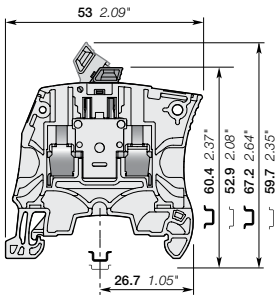
Main Technical Data

Connecting capacity		IEC	UL - CSA	Rail		TH 35-7.5, TH 35-15
1 conductor per clamp	Rigid - Solid / Stranded	0.2-6 mm ²	24-10 AWG	Wire stripping length		10.5 mm 0.413 in
	Flexible	0.22-6 mm ²				
	with non insulated ferrule	0.22-6 mm ²	24-12 AWG			
	with insulated ferrule	0.22-4 mm ²	24-12 AWG			
2 conductors per clamp	Rigid - Solid / Stranded	0.2-2.5 mm ²	24-14 AWG	Tool		Flat screwdriver Ø 4 mm Ø 0.157 in
	Flexible	0.22-2.5 mm ²				
	with twin ferrule	0.22-2.5 mm ²	24-14 AWG			
Rated current / Rated cross section		25 A / 4 mm ²	25 A / 10 AWG	Torque		0.85 N.m ± 0.15 7.52 lb.in ± 1.33
Maximum current / Maximum cross section		25 A / 6 mm ²				
Rated short-time withstand current (1s)		480 A				
Rated voltage		500 V	150 V			
Impulse withstand voltage		6000 V				
Protection		IP20	NEMA 1			

Mounting Instructions



ZS6-S



6 mm 0.236 in Spacing

Recommendation for best usage: in horizontal assemblies, disconnect terminal blocks should be mounted with fixed foot on top (power side) so that the disconnect knife does not partially close through gravity. Furthermore, as specified per IEC 60947-7-1, disconnect terminal blocks are intended to be used for temporary disconnection at zero potential and at no load.

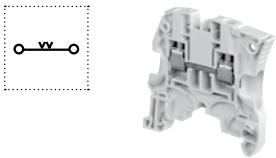
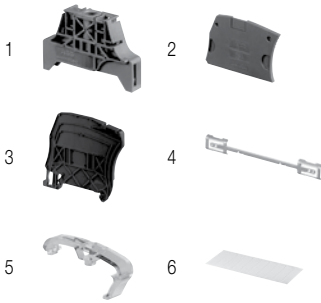
The connecting capacity data for one Rigid - Solid / Stranded - Flexible conductor (when apply) is a mandatory information required by IEC, UL and CSA standards. All other data are provided as supplementary information only. For more details, please consult our CB, UL or CSA certificates and technical datasheet available on <http://www.ABB.com>

CE	IEC CB	RoHS	UL	CSA	PC	Gost R						
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Accessories

Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g		
1 End Stops	Dark Grey	Screw; 10 mm 0.394 in	BAM3	1SNK900001R0000	50	13.80	
		Screwless; 10 mm 0.394 in	BAZ1	1SNK900002R0000	50	5.30	
2 End Sections	Dark Grey		ES4	1SNK505910R0000	20	2.18	
3 Circuit Separators	Dark Grey		CS-R1	1SNK900103R0000	20	5.20	
4 Shield Connectors			SHBS	1SNK900600R0000	20	3.50	
5 Protecting Covers	Transparent	6 mm 0.236 in spacing	PL6	1SNK900619R0000	10	1.84	
			MC612	1SNK150000R0000	22	10.00	
6 Terminal Block Markers	White	Blank card	MC612PA	1SNK159999R0000	20	11.00	
			Universal wire markers holder	UMH	1SNK900611R0000	10	0.20
			Self adhesive strip	SAT6	1SNK900615R0000	5	6.00

Complete list of accessories is indicated in the terminal block datasheet. Some accessories such as jumper bars may modify the terminal block's ratings: complete information in the accessories catalogue pages.



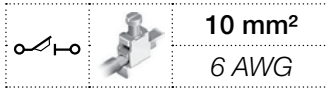
Feed-through Screw Clamp Terminal Blocks

Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g
Feed-through	Grey	ZS6	1SNK506010R0000	50	10.64

All the technical data for UL/CSA standard and dimensions in inches are in *italics*.

ZS10-S Screw clamp terminal blocks

Disconnect with blade
8mm 0.0315 in spacing

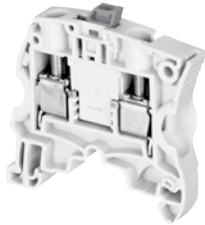


Description

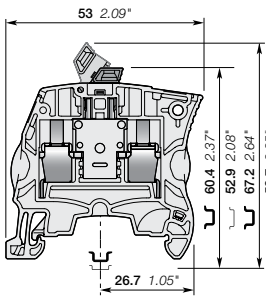
- Ease your disconnect operations with the disconnect blade operated by hand or with a screwdriver,
- Same profile as ZS10 feed-through terminal block for aligned marking and identical end section use.

Ordering Details

Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g
Disconnect Profile aligned with ZS10	Grey	ZS10-S	1SNK508315R0000	50	8.60
	Blue	ZS10-S-BL	1SNK508320R0000	50	8.60



ZS10-S



8 mm 0.315 in Spacing

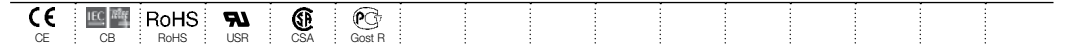
Main Technical Data

Connecting capacity		IEC	UL - CSA	Rail		TH 35-7.5, TH 35-15
1 conductor per clamp	Rigid - Solid / Stranded	0.2-10 mm ²	24-6 AWG	Wire stripping length		12 mm 0.472 in
	Flexible	0.22-10 mm ²				
	with non insulated ferrule	0.22-10 mm ²	24-12 AWG			
	with insulated ferrule	0.22-6 mm ²	24-12 AWG			
2 conductors per clamp	Rigid - Solid / Stranded	0.5-4 mm ²	20-12 AWG	Tool		Flat screwdriver Ø 4 mm Ø 0.157 in
	Flexible	0.5-4 mm ²				
	with twin ferrule	0.5-4 mm ²	20-12 AWG			
Rated current / Rated cross section		25 A / 4 mm ²	25 A / 6 AWG	Torque		1.3 N.m ± 0.3 11.5 lb.in ± 2.65
Maximum current / Maximum cross section		25 A / 10 mm ²				
Rated short-time withstand current (1s)		480 A				
Rated voltage		630 V	150 V			
Impulse withstand voltage		6000 V				
Protection		IP20	NEMA 1			

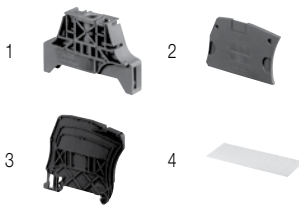
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Recommendation for best usage: in horizontal assemblies, disconnect terminal blocks should be mounted with fixed foot on top (power side) so that the disconnect knife does not partially close through gravity. Furthermore, as specified per IEC 60947-7-1, disconnect terminal blocks are intended to be used for temporary disconnection at zero potential and at no load.

The connecting capacity data for one Rigid - Solid / Stranded - Flexible conductor (when apply) is a mandatory information required by IEC, UL and CSA standards. All other data are provided as supplementary information only. For more details, please consult our CB, UL or CSA certificates and technical datasheet available on <http://www.ABB.com>

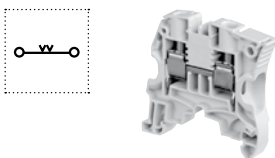


Accessories



Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g	
1 End Stops	Screw; 10 mm 0.394 in	Dark Grey	BAM3	1SNK900001R0000	50	13.80
	Screwless; 10 mm 0.394 in	Dark Grey	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	2.2 mm 0.087 in	Dark Grey	ES4	1SNK505910R0000	20	2.18
3 Circuit Separators	3 mm 0.118 in	Dark Grey	CS-R1	1SNK900103R0000	20	5.20
4 Terminal Block Markers	Blank card	White	MC812	1SNK160000R0000	22	10.00
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0.20
	Self adhesive strip	White	SAT8	1SNK900616R0000	5	6.00

Complete list of accessories is indicated in the terminal block datasheet. Some accessories such as jumper bars may modify the terminal block's ratings: complete information in the accessories catalogue pages.



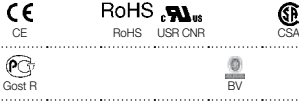
Feed-through Screw Clamp Terminal Blocks

Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g
Feed-through	Grey	ZS10	1SNK508010R0000	50	14.10

All the technical data for UL/CSA standard and dimensions in inches are in *italics*.

ZS4-S-T Screw clamp terminal blocks

Disconnect with blade - with test socket screws

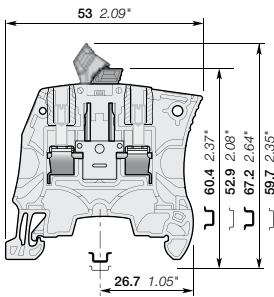


Technical Datasheet 1SNK 161 042 D0201

5.2 mm 0.205 in spacing



10



Features and Benefits

- Ease your test operations with the two built-in test socket screws,
- Screwdriver or hand operated disconnect blade,
- Same profile as ZS4 feed-through terminal block for aligned marking and identical end section use.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Profile aligned with ZS4, with 2 test socket screws DIA 2 mm 0.079 in	Grey	ZS4-S-T2	1SNK505311R0000	50	8.90
	Blue	ZS4-S-T2-BL	1SNK505321R0000	50	8.90
	Orange	ZS4-S-T2-OR	1SNK505331R0000	50	8.90
Profile aligned with ZS4, with 2 test socket screws DIA 2.3 mm 0.091 in	Grey	ZS4-S-T2.3	1SNK505312R0000	50	8.80

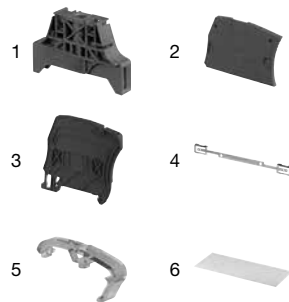
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-2.5 mm ²
	Gauge	A3-B3
2 conductors per clamp	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Rated cross section	4 mm ²	10 AWG
Rated current	25 A	25 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	400 V	150 V
Impulse withstand voltage	6000 V	
Protection	IP20	NEMA 1

Mounting Instructions

	Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in	
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in	
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885	

Accessories



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops	Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50	13.80
	Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	2.2 mm 0.087 in	ES4	1SNK505910R0000	20	2.18
3 Circuit Separators	3 mm 0.118 in	CS-R1	1SNK900103R0000	20	5.20
4 Shield Connectors		SHBS	1SNK900600R0000	20	3.50
5 Protecting Covers	5.2 mm 0.205 in spacing	PL5	1SNK900618R0000	10	1.50
6 Terminal Block Markers	Blank card	MC512	1SNK140000R0000	22	9.00
	Universal wire markers holder	UMH	1SNK900611R0000	10	0.20
	Self adhesive strip	SAT5	1SNK900614R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

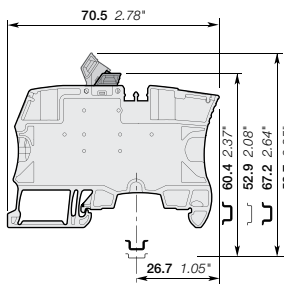
ZS4-S-R1 Screw clamp terminal blocks

Disconnect with blade



Technical Datasheet 1SNK 161 012 D0201

6 mm 0.236 in spacing



Features and Benefits

- Simplify the alternated distribution thanks to the two jumper channels aligned with ZS4 feed-through terminal blocks,
- Ease your disconnect operations with the disconnect blade operated by hand or with a screwdriver.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Profile aligned with ZS4-SF	Grey	ZS4-S-R1	1SNK506310R0000	50	13.20
	Blue	ZS4-S-R1-BL	1SNK506320R0000	50	13.20
	Orange	ZS4-S-R1-OR	1SNK506330R0000	50	13.20

Main Technical Data

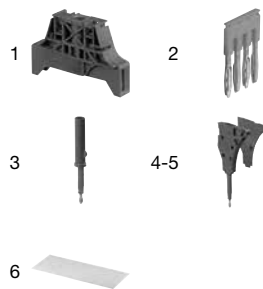
Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-4 mm ²
2 conductors per clamp	Gauge	A3-B3
	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Rated cross section	4 mm ²	10 AWG
Rated current	26 A	26 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	400 V	150 V
Impulse withstand voltage	6000 V	
Protection	IP20	NEMA 1

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

10

Accessories



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)			
1 End Stops	Dark Grey	BAM3	1SNK900001R0000	50	13.80			
	Dark Grey	BAZ1	1SNK900002R0000	50	5.30			
2 Jumper Bars	Orange	2 poles	41 A	30 A	JB6-2	1SNK906302R0000	50	1.30
		3 poles	JB6-3	1SNK906303R0000	50	2.10		
		4 poles	JB6-4	1SNK906304R0000	50	2.90		
		5 poles	JB6-5	1SNK906305R0000	50	3.60		
		10 poles	JB6-10	1SNK906310R0000	20	7.40		
3 Test Adapters	Dark Grey	For test plugs DIA 2 mm 0.079 in	TP2	1SNK900203R0000	20	1.73		
		For test plugs DIA 4 mm 0.160 in	TP4	1SNK900205R0000	20	2.42		
4 Test Connectors	Dark Grey	TC5-R1	1SNK900201R0000	10	5.23			
5 Spacers	Dark Grey	ES-TC6	1SNK900105R0000	10	0.80			
6 Terminal Block Markers	White	MC612	1SNK150000R0000	22	10.00			
		MC612PA	1SNK159999R0000	20	11.00			
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0.20		
	Self adhesive strip	White	SAT6	1SNK900615R0000	5	6.00		

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

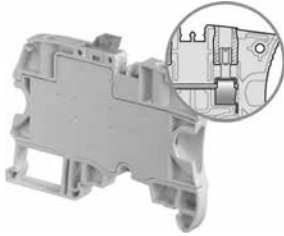
ZS4-S-T-R1 Screw clamp terminal blocks

Disconnect with blade - with test socket screws

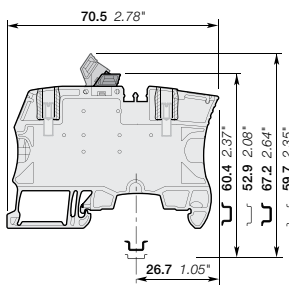


Technical Datasheet 1SNK 161 045 D0201

6 mm 0.236 in spacing



10



Features and Benefits

- Ease your test operations with the two built-in test socket screws,
- Screwdriver or hand operated disconnect blade,
- Simplify the alternated distribution thanks to the two jumper channels aligned with ZS4 feed-through terminal blocks.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Profile aligned with ZS4-SF, with 2 test socket screws DIA 2 mm 0.079 in	Grey	ZS4-S-T2-R1	1SNK506311R0000	50	14.20
	Blue	ZS4-S-T2-R1-BL	1SNK506321R0000	50	14.20
	Orange	ZS4-S-T2-R1-OR	1SNK506331R0000	50	14.20
Profile aligned with ZS4-SF, with 2 test socket screws DIA 2.3 mm 0.091 in	Grey	ZS4-S-T2.3-R1	1SNK506312R0000	50	14.20

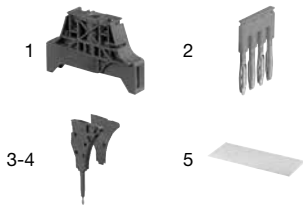
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-4 mm ²
	Gauge	A3-B3
2 conductors per clamp	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Rated cross section	4 mm ²	10 AWG
Rated current	26 A	26 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	400 V	150 V
Impulse withstand voltage	6000 V	
Protection	IP20	NEMA 1

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

Accessories



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)	
1 End Stops	Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50	13.80	
	Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50	5.30	
2 Jumper Bars	2 poles	JB6-2	1SNK906302R0000	50	1.30	
	3 poles	JB6-3	1SNK906303R0000	50	2.10	
	4 poles	JB6-4	1SNK906304R0000	50	2.90	
	5 poles	JB6-5	1SNK906305R0000	50	3.60	
	10 poles	JB6-10	1SNK906310R0000	20	7.40	
3 Test Connectors	End module, 5.2 mm 0.205 in	TC5-R1	1SNK900201R0000	10	5.23	
4 Spacers	0.8 mm 0.031 in spacing	ES-TC6	1SNK900105R0000	10	0.80	
5 Terminal Block Markers	Blank card	MC612	1SNK150000R0000	22	10.00	
		MC612PA	1SNK159999R0000	20	11.00	
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0.20
	Self adhesive strip	White	SAT6	1SNK900615R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

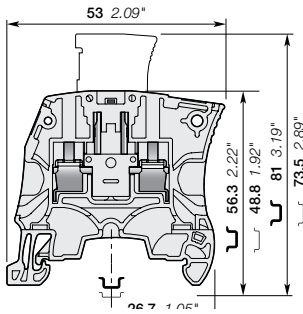
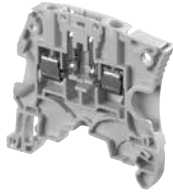
ZS4-SP Screw clamp terminal blocks

Disconnect with plug



Technical Datasheet 1SNK 161 033 D0201

5.2 mm 0.205 in spacing



Features and Benefits

- Save time with our screwless component holder plug,
- Same profile as ZS4 feed-through terminal block for aligned marking and identical end section use.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Profile aligned with ZS4, plug delivered separately	Grey	ZS4-SP	1SNK505313R0000	50	8.20

Main Technical Data

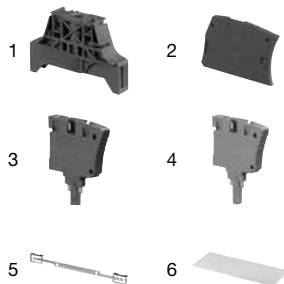
Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-2.5 mm ²
Gauge	A3-B3	
2 conductors per clamp	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Maximum cross section	4 mm ²	10 AWG
Max. current / Max. cross section	20 A	18 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	400 V	150 V
Impulse withstand voltage	6000 V	
Protection	IP20	NEMA 1

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

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Accessories

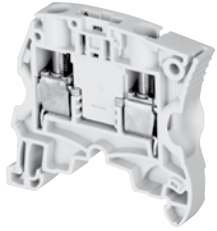


Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
1 End Stops	Dark Grey	BAM3	1SNK900001R0000	50	13.80
	Dark Grey	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	Dark Grey	ES4	1SNK505910R0000	20	2.18
3 Component Plugs	Dark Grey	PG5	1SNK900401R0000	20	3.45
4 Disconnect Plugs	Orange	PG5-R1	1SNK900402R0000	20	3.45
5 Shield Connectors		SHBS	1SNK900600R0000	20	3.50
6 Terminal Block Markers	White	MC512	1SNK140000R0000	22	9.00
	White	MC512PA	1SNK149999R0000	20	10.00
	Grey	UMH	1SNK900611R0000	10	0.20
	White	SAT5	1SNK900614R0000	5	6.00

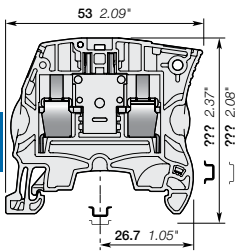
Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

ZS10-SP Screw clamp terminal blocks

Disconnect with plug
8mm 0.315 in spacing



ZS10-SP



8 mm 0.315 in Spacing

Description

- Save time with our screwless component holder plug,
- Same profile as ZS10 feed-through terminal block for aligned marking and identical end section use.

Ordering Details

Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g
Disconnect Profile aligned with ZS10	Grey	ZS10-SP	1SNK508316R0000	50	8.60

Main Technical Data

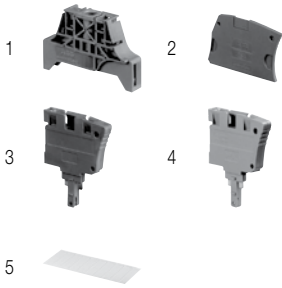
Connecting capacity	IEC	UL - CSA	Rail	TH 35-7.5, TH 35-15
1 conductor per clamp	Rigid - Solid / Stranded	0.2-10 mm ²	Wire stripping length	12 mm 0.472 in
	Flexible	0.22-10 mm ²		
	with non insulated ferrule	0.22-10 mm ²		
	with insulated ferrule	0.22-6 mm ²		
2 conductors per clamp	Rigid - Solid / Stranded	0.5-4 mm ²	Tool	Flat screwdriver Ø 4 mm Ø 0.157 in
	Flexible	0.5-4 mm ²		
	with twin ferrule	0.5-4 mm ²		
Rated current / Rated cross section	18 A / 2.5 mm ²	18 A / 6 AWG	Torque	1.3 N.m ± 0.3 11.5 lb.in ± 2.65
Maximum current / Maximum cross section	18 A / 10 mm ²			
Rated short-time withstand current (1s)	300 A			
Rated voltage	630 V	150 V		
Impulse withstand voltage	6000 V			
Protection	IP20	NEMA 1		

Mounting Instructions

The connecting capacity data for one Rigid - Solid / Stranded - Flexible conductor (when apply) is a mandatory information required by IEC, UL and CSA standards. All other data are provided as supplementary information only. For more details, please consult our CB, UL or CSA certificates and technical datasheet available on <http://www.ABB.com>

CE	RoHS	UR	CSA	Gost R
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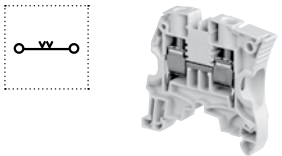
Accessories



Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g	
1 End Stops	Screw; 10 mm 0.394 in	Dark Grey	BAM3	1SNK900001R0000	50	13.80
	Screwless; 10 mm 0.394 in	Dark Grey	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	2.2 mm 0.087 in	Dark Grey	ES4	1SNK505910R0000	20	2.18
3 Component Plugs	Components in series with circuit	Dark Grey	PG5	1SNK900401R0000	20	3.45
4 Disconnect Plugs	Equipped with linking bar	Orange	PG5-R1	1SNK900402R0000	20	3.45
5 Terminal Block Markers	Blank card	White	MC812	1SNK160000R0000	22	10.00
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0.20
	Self adhesive strip	White	SAT8	1SNK900616R0000	5	6.00

Complete list of accessories is indicated in the terminal block datasheet. Some accessories such as jumper bars may modify the terminal block's ratings: complete information in the accessories catalogue pages.

Feed-through Screw Clamp Terminal Blocks

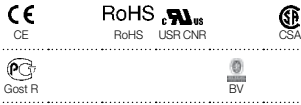


Description	Color	Type	Catalog number	Pkg pce	Weight (1 pce) g
Feed-through	Grey	ZS10	1SNK508010R0000	50	14.10

All the technical data for UL/CSA standard and dimensions in inches are in *italic*.

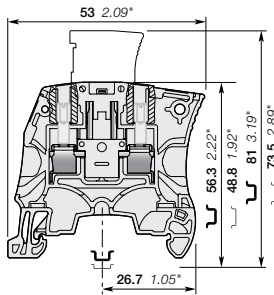
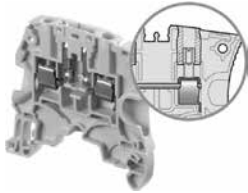
ZS4-SP-T2 Screw clamp terminal blocks

Disconnect with plug - with test socket screws



Technical Datasheet 1SNK 161 041 D0201

5.2 mm 0.205 in spacing



Features and Benefits

- Ease your test operations with the 2 built-in test socket screws DIA 2 mm 0.079 in,
- Save time with our screwless component holder plug,
- Same profile as ZS4 feed-through terminal block for aligned marking and identical end section use.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Profile aligned with ZS4, with 2 test socket screws DIA 2 mm 0.079 in, plug delivered separately	Grey	ZS4-SP-T2	1SNK505314R0000	50	8.40

Main Technical Data

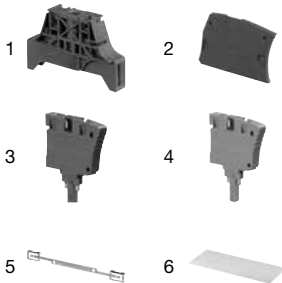
Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-2.5 mm ²
	Gauge	A3-B3
2 conductors per clamp	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Maximum cross section	4 mm ²	10 AWG
Max. current / Max. cross section	20 A	18 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	400 V	150 V
Impulse withstand voltage	6000 V	
Protection	IP20	NEMA 1

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

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Accessories



Description	Color	Type	Catalog number	Pack ^(ing) pieces	Weight (1 pc) g
1 End Stops	Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50	13.80
	Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	2.2 mm 0.087 in	ES4	1SNK505910R0000	20	2.18
3 Component Plugs	Components in series with circuit	PG5	1SNK900401R0000	20	3.45
4 Disconnect Plugs	Equipped with linking bar	PG5-R1	1SNK900402R0000	20	3.45
5 Shield Connectors		SHBS	1SNK900600R0000	20	3.50
6 Terminal Block Markers	Blank card	MC512	1SNK140000R0000	22	9.00
	Universal wire markers holder	MC512PA	1SNK149999R0000	20	10.00
	Self adhesive strip	UMH	1SNK900611R0000	10	0.20
		SAT5	1SNK900614R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

ZS4-SP-R1 Screw clamp terminal blocks

Disconnect with plug

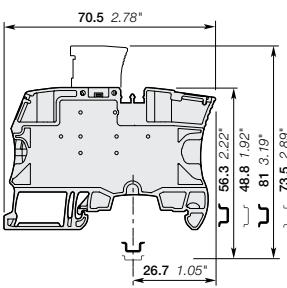


Technical Datasheet 1SNK 161 039 D0201

6 mm 0.236 in spacing



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Features and Benefits

- Simplify the alternated distribution between feed-through and disconnect circuits thanks to the two aligned jumper channels,
- Save time with our screwless component holder plug.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Profile aligned with ZS4-SF, plug delivered separately	Grey	ZS4-SP-R1	1SNK506313R0000	50	14.20

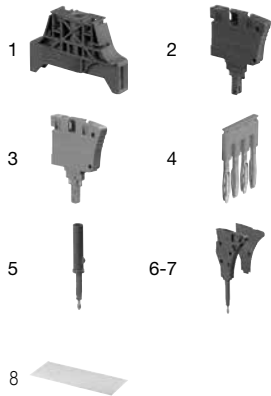
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	24-10 AWG
	Flexible	24-10 AWG
	with non insulated ferrule	24-12 AWG
	with insulated ferrule	24-12 AWG
2 conductors per clamp	Gauge	A3-B3
	Rigid	24-16 AWG
	Flexible	24-16 AWG
	with twin ferrule	24-16 AWG
Maximum cross section	4 mm ²	10 AWG
Max. current / Max. cross section	20 A	20 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	400 V	150 V
Impulse withstand voltage	6000 V	
Protection	IP20	NEMA 1

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

Accessories

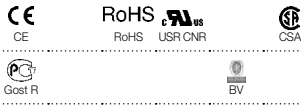


	Description	Color	Type	Catalog Number	Pack ⁽¹⁾ pieces	Weight (1 pce) g	
1	End Stops	Dark Grey	BAM3	1SNK900001R0000	50	13.80	
	Screwless; 5.2mm 0.205 in		BAZ1	1SNK900002R0000	50	5.30	
2	Component Plugs	Dark Grey	PG5	1SNK900401R0000	20	3.45	
3	Disconnect Plugs	Orange	PG5-R1	1SNK900402R0000	20	3.45	
4	Jumper Bars	Orange	2 poles	41 A	30 A	50	1.30
			3 poles			50	2.10
			4 poles			50	2.90
			5 poles			50	3.60
			10 poles			20	7.40
5	Test Adapters	Dark Grey	TP2	1SNK900203R0000	20	1.73	
			TP4	1SNK900205R0000	20	2.42	
6	Test Connectors	Dark Grey	TC5-R1	1SNK900201R0000	10	5.23	
7	Spacers	Dark Grey	ES-TC6	1SNK900105R0000	10	0.80	
8	Terminal Block Markers	White	MC612	1SNK150000R0000	22	10.00	
			MC612PA	1SNK159999R0000	20	11.00	
		Grey	UMH	1SNK900611R0000	10	0.20	
		White	SAT6	1SNK900615R0000	5	6.00	

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

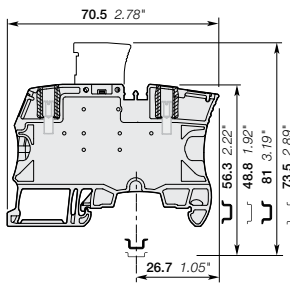
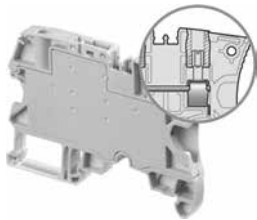
ZS4-SP-T2-R1 Screw clamp terminal blocks

Disconnect with plug – with test socket screws



Technical Datasheet 1SNK 161 040 D0201

6 mm 0.236 in spacing



Features and Benefits

- Ease your test operations with the two built-in test socket screws DIA 2 mm 0.079 in,
- Save time with our screwless component holder plug,
- Simplify the distribution between feed-through and disconnect circuits thanks to the two aligned jumper channels.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Profile aligned with ZS4-SF, with 2 test socket screws DIA 2 mm 0.079 in., plug delivered separately	Grey	ZS4-SP-T2-R1	1SNK506314R0000	50	14.20

Main Technical Data

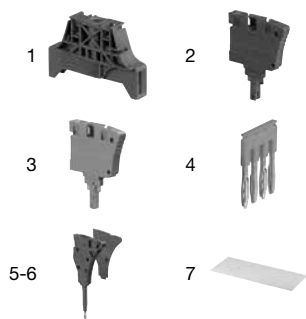
Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-4 mm ²
2 conductors per clamp	Gauge	A3-B3
	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Maximum cross section	4 mm ²	10 AWG
Max. current / Max. cross section	20 A	20 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	400 V	150 V
Impulse withstand voltage	6000 V	
Protection	IP20	NEMA 1

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

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Accessories



	Description	Color	Type	Catalog Number	Pack ^(ing) pieces	Weight (1 pce) g			
1	End Stops	Dark Grey	BAM3	1SNK900001R0000	50	13.80			
	Screwless; 5.2mm 0.205 in			BAZ1	1SNK900002R0000	50	5.30		
2	Component Plugs	Dark Grey	PG5	1SNK900401R0000	20	3.45			
3	Disconnect Plugs	Orange	PG5-R1	1SNK900402R0000	20	3.45			
4	Jumper Bars	Orange	JB6-2	1SNK906302R0000	50	1.30			
				JB6-3	1SNK906303R0000	50	2.10		
				JB6-4	1SNK906304R0000	50	2.90		
				JB6-5	1SNK906305R0000	50	3.60		
				JB6-10	1SNK906310R0000	20	7.40		
5	Test Connectors	Dark Grey	TC5-R1	1SNK900201R0000	10	5.23			
6	Spacers	Dark Grey	ES-TC6	1SNK900105R0000	10	0.80			
7	Terminal Block Markers	White	MC612	1SNK150000R0000	22	10.00			
				MC612PA	1SNK159999R0000	20	11.00		
				Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0.20
				Self adhesive strip	White	SAT6	1SNK900615R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in *Technical Datasheet*.

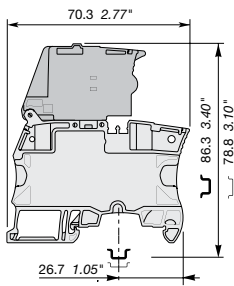
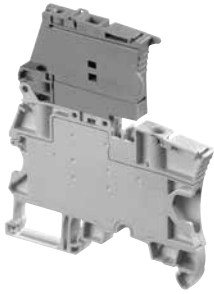
ZS4-S-R2 Screw clamp terminal blocks

Disconnect with lever



Technical Datasheet 1SNK 161 043 D0201

6 mm 0.236 in spacing



Features and Benefits

Simplify the disconnect operations for the disconnect terminal blocks installed next to fuse terminal blocks ZS4-SF:
 - With the same profile as ZS4-SF, the ZS4-S-R2 disconnect lever is easily operated by hand and the wiring of the alternated disconnect and fuse circuits is easier.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Disconnect Profile aligned with ZS4-SF	Grey-Orange	ZS4-S-R2	1SNK506414R0000	50	21.60

Main Technical Data

Connecting capacity	IEC		cULus - CSA	
1 conductor per clamp	Rigid	0.2-4 mm ²	24-10 AWG	
	Flexible	0.22-4 mm ²	24-10 AWG	
	with non insulated ferrule	0.22-4 mm ²	24-12 AWG	
	with insulated ferrule	0.22-4 mm ²	24-12 AWG	
2 conductors per clamp	Gauge		A3-B3	
	Rigid	0.2-1.5 mm ²	24-16 AWG	
	Flexible	0.2-1.5 mm ²	24-16 AWG	
	with twin ferrule	0.22-1.5 mm ²	24-16 AWG	
Rated cross section	4 mm ²		10 AWG	
Rated current	22 A		13 A	
Rated short-time withstand current (1s)	480 A			
Rated voltage	400 V		150 V	
Impulse withstand voltage	6000 V			
Protection	IP20		NEMA 1	
Rated voltage Ex e	IEC/EN 60079-7			

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

Accessories

Description	Color	Type	Catalog Number	Pack ^(ng) pieces	Weight (1 pce) g
1 End Stops	Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50	13.80
	Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50	5.30
2 Jumper Bars	2 poles 41 A 30 A	JB6-2	1SNK906302R0000	50	1.30
	3 poles	JB6-3	1SNK906303R0000	50	2.10
	4 poles	JB6-4	1SNK906304R0000	50	2.90
	5 poles	JB6-5	1SNK906305R0000	50	3.60
	10 poles	JB6-10	1SNK906310R0000	20	7.40
3 Test Adapters	For test plugs DIA 2 mm 0.079 in	TP2	1SNK900203R0000	20	1.73
	For test plugs DIA 4 mm 0.160 in	TP4	1SNK900205R0000	20	2.42
4 Test Connectors	End module, 5.2 mm 0.205 in	TC5-R1	1SNK900201R0000	10	5.23
5 Spacers	0.8 mm 0.031 in spacing	ES-TC6	1SNK900105R0000	10	0.80
6 Terminal Block Markers	Blank card	MC612	1SNK150000R0000	22	10.00
		MC612PA	1SNK159999R0000	20	11.00
	Universal wire markers holder	UMH	1SNK900611R0000	10	0.20
	Self adhesive strip	SAT6	1SNK900615 0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

Fuse Screw Clamp Terminal Blocks

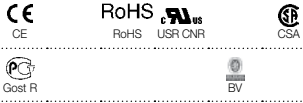
Description	Color	Type	Catalog Number	Pack ^(ng) pieces	Weight (1 pce) g
	Grey-Dark Grey	ZS4-SF	1SNK506410R0000	50	18.60

Technical Datasheet 1SNK 161 002 D0201
 Catalogue Page 1SNK 161 002 S0201



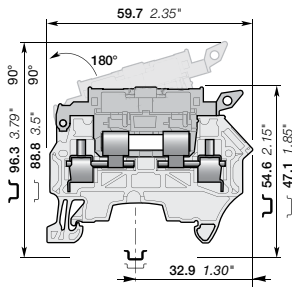
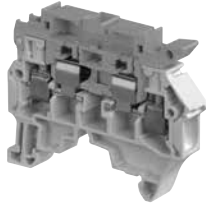
ZS4-S-R3 Screw clamp terminal blocks

Disconnect with lever



Technical Datasheet 1SNK 161 044 D0201

8 mm 0.315 in spacing



Features and Benefits

Simplify the disconnect operations for the disconnect terminal blocks installed next to fuse terminal blocks ZS4-SF1:
- With the same profile as ZS4-SF1, the ZS4-S-R3 disconnect lever is easily operated by hand and the wiring of the alternated disconnect and fuse circuits is easier.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
Disconnect Profile aligned with ZS4-SF1	Grey-Orange	ZS4-S-R3	1SNK508416R0000	50	13.30

Main Technical Data

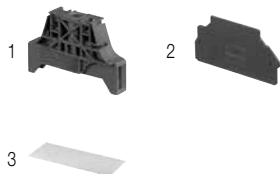
Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	24-10 AWG
	Flexible	24-10 AWG
	with non insulated ferrule	24-12 AWG
	with insulated ferrule	24-12 AWG
2 conductors per clamp	Gauge	A3-B3
	Rigid	24-16 AWG
	Flexible	24-16 AWG
	with twin ferrule	24-16 AWG
Rated cross section	4 mm ²	10 AWG
Rated current	18 A	18 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	500 V	300 V
Impulse withstand voltage	8000 V	
Protection	IP20	NEMA 1
Rated voltage Ex e	IEC/EN 60079-7	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		11 mm 0.433 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

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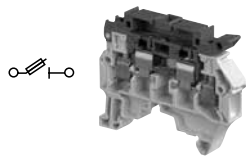
Accessories



Description	Color	Type	Catalog Number	Pack ^{(n)g} pieces	Weight (1 pce) g
1 End Stops	Dark Grey	BAM3	1SNK900001R0000	50	13.80
	Dark Grey	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	Dark Grey	ES4-SF	1SNK508960R0000	20	1.82
3 Terminal Block Markers	White	MC812	1SNK160000R0000	22	10.00
		MC812PA	1SNK169999R0000	20	14.00
	Grey	UMH	1SNK900611R0000	10	0.20
Self adhesive strip	White	SAT8	1SNK900616R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

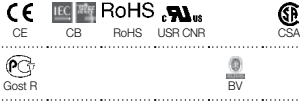
Fuse Screw Clamp Terminal Blocks



Description	Color	Type	Catalog Number	Pack ^{(n)g} pieces	Weight (1 pce) g
	Grey-Dark Grey	ZS4-SF1	1SNK508410R0000	50	13.30

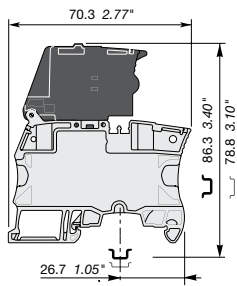
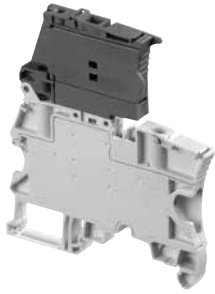
Technical Datasheet 1SNK 161 002 D0201
Catalogue Page 1SNK 161 002 S0201

ZS4-SF Screw clamp terminal blocks for 5x20 fuses



Technical Datasheet 1SNK 161 005 D0201

6 mm 0.236 in spacing



Features and Benefits

- Protect your circuits with 5x20 fuse terminal blocks compliant with IEC 60947-7-3 standard (fuse not supplied with the terminal blocks),
- Simplify the distribution thanks to the two jumper channels aligned with ZS4 feed-through and ZS4-S-R1 disconnect terminal blocks.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
	Grey-Dark Grey	ZS4-SF	1SNK506410R0000	50	18.60

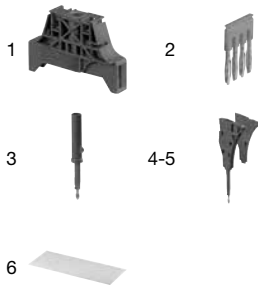
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-4 mm ²
	Gauge	A3-B3
2 conductors per clamp	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Rated cross section	4 mm ²	10 AWG
Rated current	6.3 A	6.3 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	250 V	150 V
Impulse withstand voltage	6000 V	
Protection	IP20	NEMA 1
Rated power		
Separate arrangement/Overload and short-circuit protection	2.5 W	
Separate arrangement/Exclusive short-circuit protection	4 W	
Compound arrangement/Overload and short-circuit protection	2.5 W	
Compound arrangement/Exclusive short-circuit protection	4 W	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

Accessories



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)	
1 End Stops	Screw; 10mm 0.394 in	Dark Grey	BAM3	1SNK900001R0000	50	13.80
	Screwless; 5.2mm 0.205 in	Dark Grey	BAZ1	1SNK900002R0000	50	5.30
2 Jumper Bars	2 poles 41 A 30 A	Orange	JB6-2	1SNK906302R0000	50	1.30
	3 poles		JB6-3	1SNK906303R0000	50	2.10
	4 poles		JB6-4	1SNK906304R0000	50	2.90
	5 poles		JB6-5	1SNK906305R0000	50	3.60
	10 poles		JB6-10	1SNK906310R0000	20	7.40
3 Test Adapters	For test plugs DIA 2 mm 0.079 in	Dark Grey	TP2	1SNK900203R0000	20	1.73
	For test plugs DIA 4 mm 0.160 in		TP4	1SNK900205R0000	20	2.42
4 Test Connectors	End module, 5.2 mm 0.205 in	Dark Grey	TC5-R1	1SNK900201R0000	10	5.23
5 Spacers	0.8 mm 0.031 in spacing	Dark Grey	ES-TC6	1SNK900105R0000	10	0.80
6 Terminal Block Markers	Blank card	White	MC612	1SNK150000R0000	22	10.00
			MC612PA	1SNK159999R0000	20	11.00
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10	0.20
Self adhesive strip	White	SAT6	1SNK900615R0000	5	6.00	

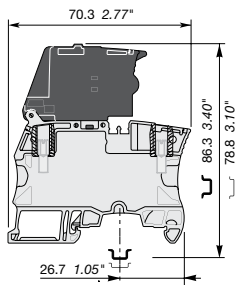
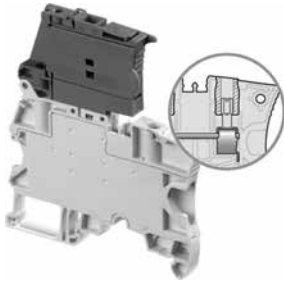
Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

ZS4-SF-T Screw clamp terminal blocks for 5x20 fuses – with test socket screws



Technical Datasheet 1SNK 161 038 D0201

6 mm 0.236 in spacing



Features and Benefits

- Protect your circuits with 5x20 Fuse terminal blocks compliant with IEC 60947-7-3 standard (fuse not supplied with the terminal blocks),
- Simplify the distribution thanks to the two jumper channels aligned with ZS4 feed-through and ZS4-S-R1 disconnect terminal blocks,
- Ease the test with built-in test socket screws.

Ordering Details

Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)
With 2 test socket screws DIA 2 mm 0.079 in	Grey-Dark Grey	ZS4-SF-T2	1SNK506411R0000	50	18.60

Main Technical Data

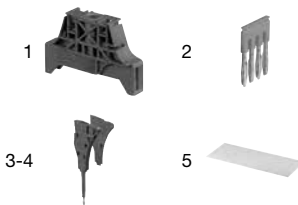
Connecting capacity		IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²	24-10 AWG
	Flexible	0.22-4 mm ²	24-10 AWG
	with non insulated ferrule	0.22-4 mm ²	24-12 AWG
	with insulated ferrule	0.22-4 mm ²	24-12 AWG
Gauge		A3-B3	
2 conductors per clamp	Rigid	0.2-1.5 mm ²	24-16 AWG
	Flexible	0.2-1.5 mm ²	24-16 AWG
	with twin ferrule	0.22-1.5 mm ²	24-16 AWG
Rated cross section	4 mm ²	10 AWG	
Rated current	6.3 A	6.3 A	
Rated short-time withstand current (1s)	480 A		
Rated voltage	250 V	150 V	
Impulse withstand voltage	6000 V		
Protection	IP20	NEMA 1	
Rated power			
Separate arrangement/Overload and short-circuit protection		2.5 W	
Separate arrangement/Exclusive short-circuit protection		4 W	
Compound arrangement/Overload and short-circuit protection		2.5 W	
Compound arrangement/Exclusive short-circuit protection		4 W	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

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Accessories



Description	Color	Type	Catalog number	Packing pieces	Weight 1 pc (g)	
1 End Stops	Dark Grey	BAM3	1SNK900001R0000	50	13.80	
	Dark Grey	BAZ1	1SNK900002R0000	50	5.30	
2 Jumper Bars	Orange	2 poles 41 A 30 A	JB6-2	1SNK906302R0000	50	1.30
		3 poles	JB6-3	1SNK906303R0000	50	2.10
		4 poles	JB6-4	1SNK906304R0000	50	2.90
		5 poles	JB6-5	1SNK906305R0000	50	3.60
		10 poles	JB6-10	1SNK906310R0000	20	7.40
3 Test Connectors	Dark Grey	TC5-R1	1SNK900201R0000	10	5.23	
4 Spacers	Dark Grey	ES-TC6	1SNK900105R0000	10	0.80	
5 Terminal Block Markers	White	Blank card	MC612	1SNK150000R0000	22	10.00
			MC612PA	1SNK159999R0000	20	11.00
		Universal wire markers holder	UMH	1SNK900611R0000	10	0.20
	White	SAT6	1SNK900615R0000	5	6.00	

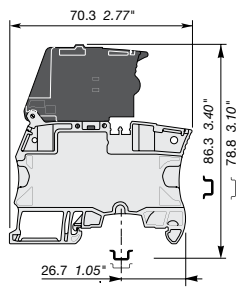
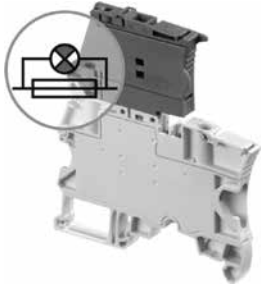
Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

ZS4-SF-R Screw clamp terminal blocks for 5x20 fuses – with blown fuse indicator



Technical Datasheet 1SNK 161 006 D0201

6 mm 0.236 in spacing



Features and Benefits

- Protect your circuits with 5x20 fuse terminal blocks compliant with IEC 60947-7-3 standard (fuse not supplied with the terminal blocks),
- Simplify the distribution thanks to the two jumper channels aligned with ZS4 feed-through and ZS4-S-R1 disconnect terminal blocks,
- Quickly identify the defective circuit thanks to the blown fuse indicator (with leakage current < 0.5 mA).

Ordering Details

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
With blown fuse indicator by red LED 24-60V	Grey-Dark Grey	ZS4-SF-R1	1SNK506412R0000	50	18.60
With blown fuse indicator by red LED 115-250V	Grey-Dark Grey	ZS4-SF-R3	1SNK506415R0000	50	18.60

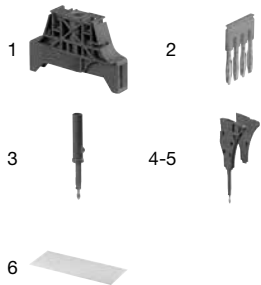
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-4 mm ²
2 conductors per clamp	Gauge	A3-B3
	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Rated cross section	4 mm ²	10 AWG
Rated current	6.3 A	6.3 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	250 V	150 V
Impulse withstand voltage	6000 V	
Protection	IP20	NEMA 1
Rated power		
Separate arrangement/Overload and short-circuit protection	2.5 W	
Separate arrangement/Exclusive short-circuit protection	4 W	
Compound arrangement/Overload and short-circuit protection	2.5 W	
Compound arrangement/Exclusive short-circuit protection	4 W	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

Accessories



Description	Color	Type	Catalog Number	Pack(ing) pieces	Weight (1pc) g
1 End Stops	Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50	13.80
	Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50	5.30
2 Jumper Bars	2 poles 41 A 30 A	JB6-2	1SNK906302R0000	50	1.30
	3 poles	JB6-3	1SNK906303R0000	50	2.10
	4 poles	JB6-4	1SNK906304R0000	50	2.90
	5 poles	JB6-5	1SNK906305R0000	50	3.60
	10 poles	JB6-10	1SNK906310R0000	20	7.40
3 Test Adapters	For test plugs DIA 2 mm 0.079 in	TP2	1SNK900203R0000	20	1.73
	For test plugs DIA 4 mm 0.160 in	TP4	1SNK900205R0000	20	2.42
4 Test Connectors	End module, 5.2 mm 0.205 in	TC5-R1	1SNK900201R0000	10	5.23
5 Spacers	0.8 mm 0.031 in spacing	ES-TC6	1SNK900105R0000	10	0.80
6 Terminal Block Markers	Blank card	MC612	1SNK150000R0000	22	10.00
		MC612PA	1SNK159999R0000	20	11.00
	Universal wire markers holder	UMH	1SNK900611R0000	10	0.20
	Self adhesive strip	SAT6	1SNK900615R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

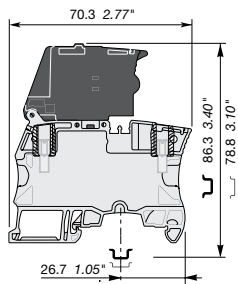
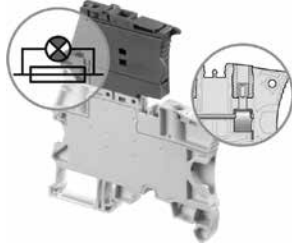
ZS4-SF-R Screw clamp terminal blocks

for 5x20 fuses – with blown fuse indicator & test socket screws



Technical Datasheet 1SNK 161 037 D0201

6 mm 0.236 in spacing



Features and Benefits

- Protect your circuits with 5x20 fuse terminal blocks compliant with IEC 60947-7-3 standard (fuse not supplied with the terminal blocks),
- Simplify the distribution thanks to the two jumper channels aligned with ZS4 feed-through and ZS4-S-R1 disconnect terminal blocks,
- Ease the test with built-in test socket screws,
- Quickly identify the defective circuit thanks to the blown fuse indicator (with leakage current < 0.5 mA).

Ordering Details

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
With blown fuse indicator by red LED 24-60V and 2 test socket screws DIA 2 mm 0.079 in	Grey-Dark Grey	ZS4-SF-R2	1SNK506413R0000	50	18.60
With blown fuse indicator by red LED 115-250V and 2 test socket screws DIA 2 mm 0.079 in	Grey-Dark Grey	ZS4-SF-R4	1SNK506416R0000	50	18.60

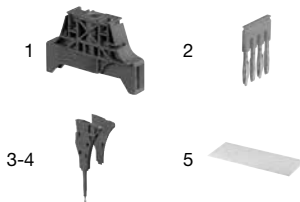
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-4 mm ²
	Gauge	A3-B3
2 conductors per clamp	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Rated cross section	4 mm ²	10 AWG
Rated current	6.3 A	6.3 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	250 V	150 V
Impulse withstand voltage	6000 V	
Protection	IP20	NEMA 1
Rated power		
Separate arrangement/Overload and short-circuit protection	2.5 W	
Separate arrangement/Exclusive short-circuit protection	4 W	
Compound arrangement/Overload and short-circuit protection	2.5 W	
Compound arrangement/Exclusive short-circuit protection	4 W	

Mounting Instructions

Rail		TH 35-7,5, TH 35-15
Wire stripping length		10.5 mm 0.413 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

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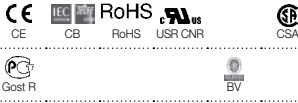


Accessories

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)	
1 End Stops	Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50	13.80	
	Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50	5.30	
2 Jumper Bars	2 poles 41 A 30 A	Orange	JB6-2	1SNK906302R0000	50	1.30
			JB6-3	1SNK906303R0000	50	2.10
			JB6-4	1SNK906304R0000	50	2.90
			JB6-5	1SNK906305R0000	50	3.60
			JB6-10	1SNK906310R0000	20	7.40
3 Test Connectors	End module, 5.2 mm 0.205 in	Dark Grey	TC5-R1	1SNK900201R0000	10	5.23
4 Spacers	0.8 mm 0.031 in spacing	Dark Grey	ES-TC6	1SNK900105R0000	10	0.80
5 Terminal Block Markers	Blank card	White	MC612	1SNK150000R0000	22	10.00
			MC612PA	1SNK159999R0000	20	11.00
		Grey	UMH	1SNK900611R0000	10	0.20
		White	SAT6	1SNK900615R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

ZS4-SF1 Screw clamp terminal blocks for 5x20 & 5x25 fuses



Features and Benefits

- Protect your circuit with 5x25 and 5x20 fuse terminal blocks, compliant with IEC 60947-7-3 standard (fuse not supplied with the terminal blocks).

Ordering Details

Technical Datasheet 1SNK 161 011 D0201

8 mm 0.315 in spacing

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
	Grey-Dark Grey	ZS4-SF1	1SNK508410R0000	50	13.30

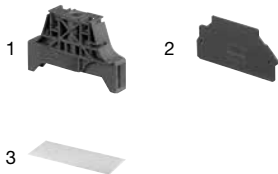
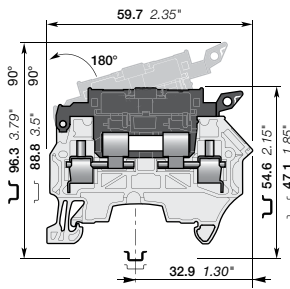
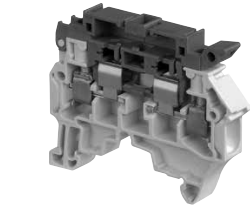
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-4 mm ²
Gauge	A3-B3	
2 conductors per clamp	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Rated cross section	4 mm ²	10 AWG
Rated current	6.3 A	6.3 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	250 V	300 V
Impulse withstand voltage	8000 V	
Protection	IP20	NEMA 1
Rated power		
Separate arrangement/Overload and short-circuit protection	2.5 W	
Separate arrangement/Exclusive short-circuit protection	4 W	
Compound arrangement/Overload and short-circuit protection	1.6 W	
Compound arrangement/Exclusive short-circuit protection	4 W	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		11 mm 0.433 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

10



Accessories

Description	Color	Type	Catalog Number	Pack(ing) pieces	Weight (1 pc) g
1 End Stops	Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50	13.80
	Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	1.5 mm 0.059 in	ES4-SF	1SNK508960R0000	20	1.82
3 Terminal Block Markers	Blank card	MC812	1SNK160000R0000	22	10.00
		MC812PA	1SNK169999R0000	20	14.00
	Universal wire markers holder	Grey	UMH	1SNK900611R0000	10
Self adhesive strip	White	SAT8	1SNK900616R0000	5	6.00

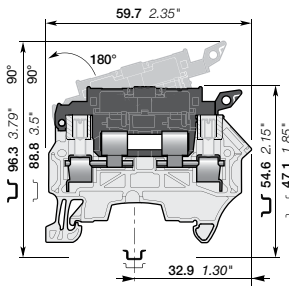
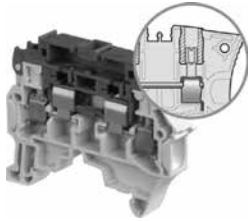
Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

ZS4-SF1-T Screw clamp terminal blocks for 5x20 & 5x25 fuses – with test socket screws



Technical Datasheet 1SNK 161 036 D0201

8 mm 0.315 in spacing



Features and Benefits

- Protect your circuit with 5x25 and 5x20 fuse terminal blocks (fuse not supplied with the terminal blocks),
- Compliant with IEC 60947-7-3 standard,
- With built in test socket screws.

Ordering Details

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
With 2 test socket screws DIA 2 mm 0.079 in	Grey-Dark Grey	ZS4-SF1-T2	1SNK508411R0000	50	13.30

Main Technical Data

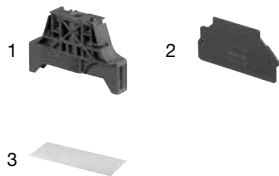
Connecting capacity	IEC	dULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-4 mm ²
2 conductors per clamp	Gauge	A3-B3
	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Rated cross section	4 mm ²	10 AWG
Rated current	6.3 A	6.3 A
Rated short-time withstand current (1s)	480 A	300 V
Rated voltage	250 V	300 V
Impulse withstand voltage	8000 V	NEMA 1
Protection	IP20	
Rated power		
Separate arrangement/Overload and short-circuit protection	2.5 W	
Separate arrangement/Exclusive short-circuit protection	4 W	
Compound arrangement/Overload and short-circuit protection	1.6 W	
Compound arrangement/Exclusive short-circuit protection	4 W	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		11 mm 0.433 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

10

Accessories



Description	Color	Type	Catalog Number	Pack ^{ing} pieces	Weight (1 pc)
1 Ed Stops	Dark Grey	BAM3	1SNK900001R0000	50	13.80
	Dark Grey	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	Dark Grey	ES4-SF	1SNK508960R0000	20	1.82
3 Terminal Block Markers	White	MC812	1SNK160000R0000	22	10.00
		MC812PA	1SNK169999R0000	20	14.00
	Grey	UMH	1SNK900611R0000	10	0.20
Self adhesive strip	White	SAT8	1SNK900616R0000	5	6.00

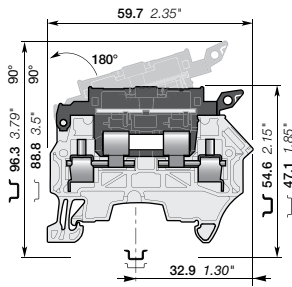
Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

ZS4-SF1-R Screw clamp terminal blocks for 5x20 & 5x25 fuses – with blown fuse indicator



Technical Datasheet 1SNK 161 034 D0201

8 mm 0.315 in spacing



Features and Benefits

- Protect your circuit with 5x25 and 5x20 fuse terminal blocks (fuse not supplied with the terminal blocks),
- Compliant with IEC 60947-7-3 standard,
- Quickly identify the defective circuit thanks to the blown fuse indicator (with leakage current < 0.5 mA).

Ordering Details

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
With blown fuse indicator by red LED 24-60V	Grey-Dark Grey	ZS4-SF1-R1	1SNK508412R0000	50	13.30
With blown fuse indicator by red LED 115-250V	Grey-Dark Grey	ZS4-SF1-R3	1SNK508414R0000	50	13.30

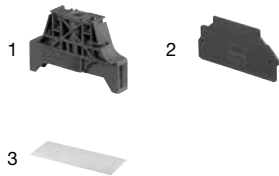
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-4 mm ²
	Gauge	A3-B3
2 conductors per clamp	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Rated cross section	4 mm ²	10 AWG
Rated current	6.3 A	6.3 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	250 V	300 V
Impulse withstand voltage	8000 V	
Protection	IP20	NEMA 1
Rated power		
Separate arrangement/Overload and short-circuit protection	2.5 W	
Separate arrangement/Exclusive short-circuit protection	4 W	
Compound arrangement/Overload and short-circuit protection	1.6 W	
Compound arrangement/Exclusive short-circuit protection	4 W	

Mounting Instructions

Rail	Diagram	TH 35-7.5, TH 35-15
Wire stripping length		11 mm 0.433 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

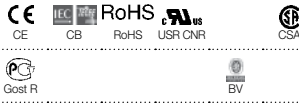
Accessories



Description	Color	Type	Catalog Number	Pack(ing) pieces	Weight 1pc (g)
1 End Stops	Dark Grey	BAM3	1SNK900001R0000	50	13.80
	Dark Grey	BAZ1	1SNK900002R0000	50	5.30
2 End Sections	Dark Grey	ES4-SF	1SNK508960R0000	20	1.82
3 Terminal Block Markers	White	MC812	1SNK160000R0000	22	10.00
	White	MC812PA	1SNK169999R0000	20	14.00
	Grey	UMH	1SNK900611R0000	10	0.20
Self adhesive strip	White	SAT8	1SNK900616R0000	5	6.00

Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

ZS4-SF1-R Screw clamp terminal blocks for 5x20 & 5x25 fuses with blown fuse indicator & test socket screws



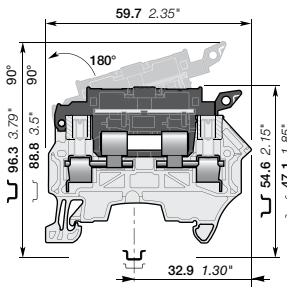
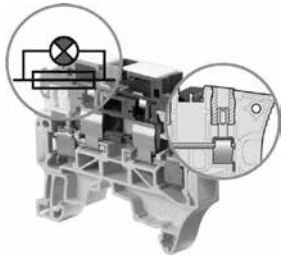
Features and Benefits

- Protect your circuit with 5x25 and 5x20 fuse terminal blocks (fuse not supplied with the terminal blocks),
- Compliant with IEC 60947-7-3 standard,
- Ease the test with built-in test socket screws,
- Quickly identify the defective circuit thanks to the blown fuse indicator (with leakage current < 0.5 mA).

Ordering Details

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
With blown fuse indicator by red LED 24-60V and 2 test socket screws DIA 2 mm 0.079 in	Grey-Dark Grey	ZS4-SF1-R2	1SNK508413R0000	50	13.30
With blown fuse indicator by red LED 115-250V and 2 test socket screws DIA 2 mm 0.079 in	Grey-Dark Grey	ZS4-SF1-R4	1SNK508415R0000	50	13.30

8 mm 0.315 in spacing



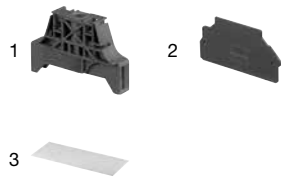
Main Technical Data

Connecting capacity	IEC	cULus - CSA
1 conductor per clamp	Rigid	0.2-4 mm ²
	Flexible	0.22-4 mm ²
	with non insulated ferrule	0.22-4 mm ²
	with insulated ferrule	0.22-4 mm ²
		A3-B3
2 conductors per clamp	Rigid	0.2-1.5 mm ²
	Flexible	0.2-1.5 mm ²
	with twin ferrule	0.22-1.5 mm ²
Rated cross section	4 mm ²	10 AWG
Rated current	6.3 A	6.3 A
Rated short-time withstand current (1s)	480 A	
Rated voltage	250 V	300 V
Impulse withstand voltage	8000 V	
Protection	IP20	NEMA 1
Rated power		
Separate arrangement/Overload and short-circuit protection	2.5 W	
Separate arrangement/Exclusive short-circuit protection	4 W	
Compound arrangement/Overload and short-circuit protection	1.6 W	
Compound arrangement/Exclusive short-circuit protection	4 W	

Mounting Instructions

Rail		TH 35-7.5, TH 35-15
Wire stripping length		11 mm 0.433 in
Tool		Flat screwdriver Ø 3.5 mm Ø 0.138 in
Torque		0.6 Nm ± 0.1 5.31 lb.in ± 0.885

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Accessories

Description	Color	Type	Catalog Number	Pack ^(ing) pieces	Weight (1 pce) g
1 End Stops		Screw; 10mm 0.394 in	BAM3	1SNK900001R0000	50 13.80
		Screwless; 5.2mm 0.205 in	BAZ1	1SNK900002R0000	50 5.30
2 End Sections	Dark Grey	1.5 mm 0.059 in	ES4-SF	1SNK508960R0000	20 1.82
3 Terminal Block Markers	White	MC812	1SNK160000R0000	22 10.00	
		MC812PA	1SNK169999R0000	20 14.00	
		Universal wire markers holder	UMH	1SNK900611R0000	10 0.20
	Self adhesive strip	SATB	1SNK900616R0000	5 6.00	

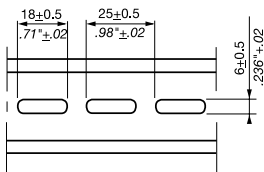
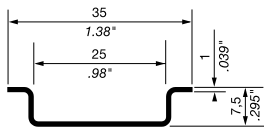
Some accessories may modify the terminal block's ratings. See complete information in "Technical Datasheet".

PR30 Mounting rail

Terminal block accessories

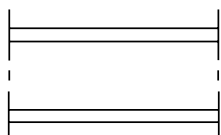
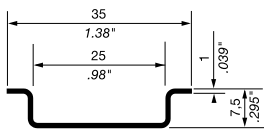
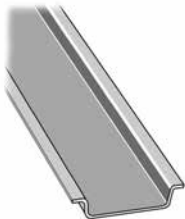
RoHS
RoHS

2000 mm 78 in Length



RoHS
RoHS

2000 mm 78 in Length



Features and Benefits

- Pre-punched symmetrical mounting rail;
- The oblong holes ease the mounting and allow to use existing and/or numerous fixings;
- Particularly well designed for fixing onto back-plates and for terminal assemblies of small dimensions

Ordering Details

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
Prepunched rail		PR30	017322005	20	

Main Technical Data

Material	Zinc plating and passivation steel		
Rail			
	IEC	cULus - CSA	
Equivalent E-Cu cross section			

Mounting Instructions

- In order to guarantee the performances and security of your installation, please ensure the rail and its fixings can withstand the static and dynamic loads of the components mounted on it;
- To prevent the rail from flexing (1 mm 0.039 in rail thickness only), fixing is recommended every 250 mm 9.842 in;
- To prevent any issues during mounting, screw heads used for rail fixing should not protrude from the rail (7,5 mm 0.295 in rail height only).

PR3.Z2 Mounting rail

Terminal block accessories

Features and Benefits

- Symmetrical mounting rail complying with IEC60715;
- Particularly well designed for fixing onto back-plates and for terminal assemblies of small dimensions

Ordering Details

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
		PR3.Z2	017430017	20	

Main Technical Data

Material	Zinc plating and passivation steel		
Rail	TH 35-7.5		
	IEC	cULus - CSA	
Equivalent E-Cu cross section	16 mm ²	4 AWG	

Mounting Instructions

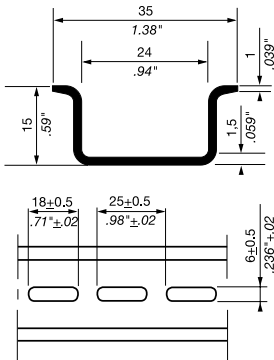
- In order to guarantee the performances and security of your installation, please ensure the rail and its fixings can withstand the static and dynamic loads of the components mounted on it;
- To prevent the rail from flexing (1 mm 0.039 in rail thickness only), fixing is recommended every 250 mm 9.842 in;
- To prevent any issues during mounting, screw heads used for rail fixing should not protrude from the rail (7,5 mm 0.295 in rail height only).

PR50 Mounting rail

Terminal block accessories

RoHS
RoHS

2000 mm 78 in Length



Features and Benefits

- Pre-punched symmetrical mounting rail;
- The oblong holes ease the mounting and allow to use existing and/or numerous fixings.

Ordering Details

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
Prepunched rail		PR50	010159826	10	

Main Technical Data

Material	Zinc plating and passivation steel	
Rail		
	IEC	cULus - CSA
Equivalent E-Cu cross section		

Mounting Instructions

- In order to guarantee the performances and security of your installation, please ensure the rail and its fixings can withstand the static and dynamic loads of the components mounted on it;
- To prevent the rail from flexing, fixing is recommended every 500 mm 19.685 in;
- In order to increase the accessibility of your terminal assembly, we recommend the use of our rail offset brackets EM45 (Catalog Number 1SNA 008 521 R2600) for a 45° orientation of the rail.

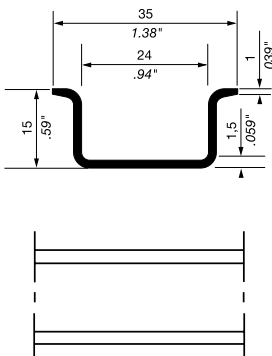
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PR5 Mounting rail

Terminal block accessories

RoHS
RoHS

2000 mm 78 in Length



Features and Benefits

- Symmetrical mounting rail

Ordering Details

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
		PR5	016870022	10	

Main Technical Data

Material	Zinc plating and passivation steel	
Rail		
	IEC	cULus - CSA
Equivalent E-Cu cross section		

Mounting Instructions

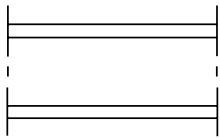
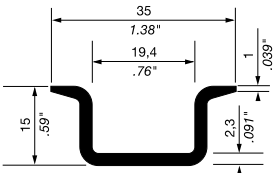
- In order to guarantee the performances and security of your installation, please ensure the rail and its fixings can withstand the static and dynamic loads of the components mounted on it;
- To prevent the rail from flexing, fixing is recommended every 500 mm 19.685 in;
- In order to increase the accessibility of your terminal assembly, we recommend the use of our rail offset brackets EM45 (Catalog Number 1SNA 008 521 R2600) for a 45° orientation of the rail.

PR4 Mounting rail

Terminal block accessories

RoHS
RoHS

2000 mm 78 in Length



Features and Benefits

- Symmetrical mounting rail complying with IEC60715;
- The rigidity of the rail is maximised by the 2.3 mm 0.090 in thickness of the rail, and by its solid, non slotted construction
- PR4 TH35-15 is the most rigid mounting rail solution and it can support any electrical devices.

Ordering Details

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
Recommended for SNK ground terminal blocks up to 35 mm ² 2 AWG.		PR4	016850012	10	

Main Technical Data

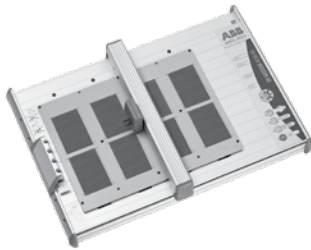
Material	Zinc plating and passivation steel	
Rail	TH 35-15	
	IEC	cULus - CSA
Equivalent E-Cu cross section	50 mm ²	0 AWG

Mounting Instructions

- In order to guarantee the performances and security of your installation, please ensure the rail and its fixings can withstand the static and dynamic loads of the components mounted on it;
- To prevent the rail from flexing, fixing is recommended every 700 mm 27.559 in;
- In order to increase the accessibility of your terminal assembly, we recommend the use of our rail offset brackets EM45 (Catalog Number 1SNA 008 521 R2600) for a 45° orientation of the rail.

10

AMS 500 Marking table Marking system



AMS 500

Features and Benefits

- Easy to use
- Compatible with most markers on the market
- Many possible character sizes.

Ordering Details

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
Full kit including: 1 marking table 1 power supply cable, 1 USB cable, 1 software		AMS 500	XUSP02636	1	12600
1 support plate for 8 cards RC/MC/RCTT/WMTT/BA4/RCT - Full format		SPRC 1	XUSP02633	1	220
1 plotter pen Ø 0.25 mm .01 in	White	AMS PEN 0.25	XUSP01132	1	
1 plotter pen Ø 0.35 mm .014 in	Yellow	AMS PEN 0.35	XUSP01133	1	
5 ink cartridges		AMS INK CARTRIDGES	XUSP01134	1	
1 cleaner fluid		AMS CLEANER FLUID	XUSP01135	1	
1 cleaner kit		AMS CLEANER KIT	XUSP01139	1	



Support plates for ABB markers

Description	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
Support plates for RC/MC/RCTT/WMTT/BA4/RCT Full format		SPRC 1	XUSP02633	1	220
RB strips		SPRC 4	XUSP01550	1	
RTM7-9		SPRC 5	XUSP01138	1	
PIB		SPRC 13	XUSP02639	1	
BA5-50		SPRC 14	XUSP02640	1	
MC... PA (3 cards)		SPRC 30	XUSP03457	1	
A4 universal support plate		SPRC 21	XUSP02695	1	851

10



SPRC 21

Other available accessories

Description	Packaging	Catalog number
Ink cartridges (5)	1	XUSP01134
Plotter pen ink (30 ml bottle)	1	XUSP02530
Cleaning cartridge (2)	1	XUSP01135
Plotter pen cleaning fluid (50 ml bottle)	1	XUSP02531
Cleaner waste bottle	1	XUSP01139
Plotter pen (.18mm)	1	XUSP01551
Plotter pen (.25mm)	1	XUSP01132
Plotter pen (.35mm)	1	XUSP01133
Plotter pen (.50mm)	1	XUSP01552
Plotter pen (.70mm)	1	XUSP01548
Plotter pen (1.00mm)	1	XUSP01549
Disposable pen ED ink - Black (.18mm)	1	XUSP03511
Disposable pen ED ink - Blue (.18mm)	1	XUSP03512
Disposable pen ED ink - Red (.18mm)	1	XUSP03513
Disposable pen ED ink - Green (.18mm)	1	XUSP03514
Disposable pen ED ink - Black (.25mm)	1	XUSP03342
Disposable pen ED ink - Blue (.25mm)	1	XUSP03343
Disposable pen ED ink - Red (.25mm)	1	XUSP03344
Disposable pen ED ink - Green (.25mm)	1	XUSP03345
Disposable pen ED ink - Black (.35mm)	1	XUSP03346
Disposable pen ED ink - Blue (.35mm)	1	XUSP03347
Disposable pen ED ink - Red (.35mm)	1	XUSP03348
Disposable pen ED ink - Green (.35mm)	1	XUSP03349
Pen adaptor for permanent marker	1	XUSP03221
RC/RCT template (8 cards)	1	XUSP02633
RTM 7/9 template	1	XUSP01138
RPB-12 template (PCB strips)	1	XUSP01550
Pads for RC/RCT template	1	XUSP02629
Pads for RTM template	1	XUSP02630
Service kit for pen maintenance	1	XUSP02861

Plotter accessories:



Marking systems

HTP500 thermal transfer printer



HTP500

Description

- Excellent print quality, resolution: 300 dpi
- Fast printing: up to 5,000 markers per hour
- Excellent marking durability
- Ease and flexibility of use in automatic, semi-automatic or manual mode



HTP500-FEED



HTP500-FEED



HTP500-PL2



RIB-B



HTP500

Ordering details

Description	Type	Package	Catalog number
Full kit including:	HTP500 KIT	-	1SNA235700R1500
- 1 HTP500 thermal transfer printer	HTP500	-	-
- software for HTP500 thermal transfer printer	HTS500	1	1SNA235702R0300
- support table	HTP500-BAS	1	1SNA235706R0700
- universal feeder for marker cards	HTP500-FEED	1	1SNA235703R0400
- support plate for ABB terminal block markers	HTP500-PL2	1	1SNA235705R0600
- universal support plate for wire markers	HTP500-PL	1	1SNA235704R0500
- black ribbon cassette	RIB-B	3	1SNA235710R0600
- cleaning cassette	HTP500-CLEAN	1	1SNA235714R2600
- power supply cable	HTP500-PW	1	1SNA235709R1200
- parallel cable	HTP500-LPT	1	1SNA235708R1100
- USB/parallel adapter cable	HTP500-USB	1	1SNA235719R0300
- wooden box for HTP500 kit	HTP500-WB	1	1SNA235717R2100

Feeders and support plates

Description	Type	Package	Catalog number
Universal feeder for marker cards	HTP500-FEED	1	1SNA235703R0400
Support plate for ABB terminal block markers	HTP500-PL2	1	1SNA235705R0600

Accessories

Description	Type	Package	Catalog number
Black ribbon cassette	RIB-B	3	1SNA235710R0600
Red ribbon cassette for identification plates and adhesive labels	RIB-R	3	1SNA235711R2300
Red ribbon cassette for terminal blocks and wire markers	RIB-RS	3	1SNA235718R0200
Cleaning cassette	HTP500-CLEAN	1	1SNA235714R2600
Standard cleaning roll ø18	HTP500-ROLL	1	1SNA235715R2700
Printing head	HTP500-PRINT	1	1SNA235716R2000
Power supply cable	HTP500-PW	1	1SNA235709R1200
Parallel cable	HTP500-LPT	1	1SNA235708R1100
USB/parallel adapter cable	HTP500-USB	1	1SNA235719R0300
Dust cover for HTP500 and AMS 500 systems	DUST COVER	1	1SNA360161R1500
Wooden box for HTP500 kit	HTP500-WB	1	1SNA235717R2100

MC512 Terminal block markers

Blank card in polycarbonate

5.2 mm 0.205 in spacing



AMS 500



HTP500

Features and Benefits

- MC512 marker card in polycarbonate for high marking quality and durability.
- Excellent marking durability in the most severe environments,
- Improved marking visibility thanks to the increased marking surface +20% (12 mm 0.472 in)

Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
Blank card	45	White	MC512	1SNK140000R0000	22	9.00
		Yellow	MC512-YL	1SNK140004R0000	22	9.00

Main Technical Data

Material	Flammability	Maximum printed digits				Dimensions	
		Horizontal	Vertical	3	8	mm	inches
Polycarbonate	V0	Horizontal	Vertical	3	8	4.8 x 12	0.189 x 0.472

Marking Systems

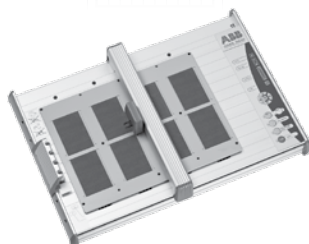
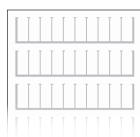
Description	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
Marking table	AMS 500 KIT	XUSP02636	1	12600.00
Thermal transfer printer	HTP500	1SNA235700R1500	1	16000.00

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MC512PA Terminal block markers

Blank card in polyamide

5.2 mm 0.205 in spacing



AMS 500

Features and Benefits

- MC512PA marker card in polyamide for standard industrial applications,
- Terminal blocks are directly independent after strip mounting,
- Improved marking visibility thanks to the increased marking surface +20% (12 mm 0.472 in)

Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
Blank card	100	White	MC512PA	1SNK149999R0000	20	10.00

Main Technical Data

Material	Flammability	Maximum printed digits				Dimensions	
		Horizontal	Vertical	3	8	mm	inches
Polyamide	V2	Horizontal	Vertical	3	8	4.8 x 12	0.189 x 0.472

Marking Systems

Description	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
Marking table	AMS 500 KIT	XUSP02636	1	12600.00

MC512PA Terminal block markers

Pre-printed marker card for horizontal terminal block assembly

5.2 mm 0.205 in spacing

Features and Benefits

Save printing time with our large pre-printed cards offer with pre-printed numbers, letters or symbols.

Main Technical Data

Material	Flammability	Maximum printed digits			Dimensions	
		Horizontal		Vertical	mm	inches
Polyamide	V2				4.8 x 12	0.189 x 0.472

Ordering Details

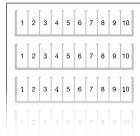
Description	Number of markers per unit	Color	Type	Catalog Number	Pack ^(ing) pieces	Weight (1 pos) g
0->9 (x10)	100	White	MC512PA	1SNK140091R0000	10	10.00
1->10 (x10)	100	White	MC512PA	1SNK140011R0000	10	10.00
11->20 (x10)	100	White	MC512PA	1SNK140021R0000	10	10.00
21->30 (x10)	100	White	MC512PA	1SNK140031R0000	10	10.00
31->40 (x10)	100	White	MC512PA	1SNK140041R0000	10	10.00
41->50 (x10)	100	White	MC512PA	1SNK140051R0000	10	10.00
51->60 (x10)	100	White	MC512PA	1SNK140061R0000	10	10.00
61->70 (x10)	100	White	MC512PA	1SNK140071R0000	10	10.00
71->80 (x10)	100	White	MC512PA	1SNK140081R0000	10	10.00
81->90 (x10)	100	White	MC512PA	1SNK140083R0000	10	10.00
91->100 (x10)	100	White	MC512PA	1SNK140101R0000	10	10.00
101->110 (x10)	100	White	MC512PA	1SNK140111R0000	10	10.00
111->120 (x10)	100	White	MC512PA	1SNK140121R0000	10	10.00
121->130 (x10)	100	White	MC512PA	1SNK140131R0000	10	10.00
131->140 (x10)	100	White	MC512PA	1SNK140141R0000	10	10.00
141->150 (x10)	100	White	MC512PA	1SNK140151R0000	10	10.00
151->160 (x10)	100	White	MC512PA	1SNK140161R0000	10	10.00
161->170 (x10)	100	White	MC512PA	1SNK140171R0000	10	10.00
171->180 (x10)	100	White	MC512PA	1SNK140181R0000	10	10.00
181->190 (x10)	100	White	MC512PA	1SNK140191R0000	10	10.00
191->200 (x10)	100	White	MC512PA	1SNK140201R0000	10	10.00
1->100	100	White	MC512PA	1SNK145011R0000	10	10.00
101->200	100	White	MC512PA	1SNK145021R0000	10	10.00
201->300	100	White	MC512PA	1SNK145031R0000	10	10.00
301->400	100	White	MC512PA	1SNK145041R0000	10	10.00
401->500	100	White	MC512PA	1SNK145051R0000	10	10.00
501->600	100	White	MC512PA	1SNK145061R0000	10	10.00
601->700	100	White	MC512PA	1SNK145071R0000	10	10.00
701->800	100	White	MC512PA	1SNK145081R0000	10	10.00
801->900	100	White	MC512PA	1SNK145091R0000	10	10.00
A (x100)	100	White	MC512PA	1SNK146011R0000	10	10.00
B (x100)	100	White	MC512PA	1SNK146021R0000	10	10.00
C (x100)	100	White	MC512PA	1SNK146031R0000	10	10.00
D (x100)	100	White	MC512PA	1SNK146041R0000	10	10.00
E (x100)	100	White	MC512PA	1SNK146051R0000	10	10.00
F (x100)	100	White	MC512PA	1SNK146061R0000	10	10.00
G (x100)	100	White	MC512PA	1SNK146071R0000	10	10.00
H (x100)	100	White	MC512PA	1SNK146081R0000	10	10.00
I (x100)	100	White	MC512PA	1SNK146091R0000	10	10.00
J (x100)	100	White	MC512PA	1SNK146101R0000	10	10.00
K (x100)	100	White	MC512PA	1SNK146111R0000	10	10.00
L (x100)	100	White	MC512PA	1SNK146121R0000	10	10.00
M (x100)	100	White	MC512PA	1SNK146131R0000	10	10.00
N (x100)	100	White	MC512PA	1SNK146141R0000	10	10.00
O (x100)	100	White	MC512PA	1SNK146151R0000	10	10.00
P (x100)	100	White	MC512PA	1SNK146161R0000	10	10.00
Q (x100)	100	White	MC512PA	1SNK146171R0000	10	10.00
R (x100)	100	White	MC512PA	1SNK146181R0000	10	10.00
S (x100)	100	White	MC512PA	1SNK146191R0000	10	10.00
T (x100)	100	White	MC512PA	1SNK146201R0000	10	10.00
U (x100)	100	White	MC512PA	1SNK146211R0000	10	10.00
V (x100)	100	White	MC512PA	1SNK146221R0000	10	10.00
W (x100)	100	White	MC512PA	1SNK146231R0000	10	10.00



MC512PA Terminal block markers

Pre-printed marker card for horizontal terminal block assembly

5.2 mm 0.205 in spacing



Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Packing pieces	Weight 1 pc (g)
X (x100)	100	White	MC512PA	1SNK146241R0000	10	10.00
Y (x100)	100	White	MC512PA	1SNK146251R0000	10	10.00
Z (x100)	100	White	MC512PA	1SNK146261R0000	10	10.00
0 (x100)	100	White	MC512PA	1SNK147001R0000	10	10.00
1 (x100)	100	White	MC512PA	1SNK147011R0000	10	10.00
2 (x100)	100	White	MC512PA	1SNK147021R0000	10	10.00
3 (x100)	100	White	MC512PA	1SNK147031R0000	10	10.00
4 (x100)	100	White	MC512PA	1SNK147041R0000	10	10.00
5 (x100)	100	White	MC512PA	1SNK147051R0000	10	10.00
6 (x100)	100	White	MC512PA	1SNK147061R0000	10	10.00
7 (x100)	100	White	MC512PA	1SNK147071R0000	10	10.00
8 (x100)	100	White	MC512PA	1SNK147081R0000	10	10.00
9 (x100)	100	White	MC512PA	1SNK147091R0000	10	10.00
+ (x100)	100	White	MC512PA	1SNK148001R0000	10	10.00
- (x100)	100	White	MC512PA	1SNK148011R0000	10	10.00
~ (x100)	100	White	MC512PA	1SNK148021R0000	10	10.00
= (x100)	100	White	MC512PA	1SNK148031R0000	10	10.00
≠ (x100)	100	White	MC512PA	1SNK148041R0000	10	10.00
L1 (x100)	100	White	MC512PA	1SNK148051R0000	10	10.00
L2 (x100)	100	White	MC512PA	1SNK148061R0000	10	10.00
L3 (x100)	100	White	MC512PA	1SNK148071R0000	10	10.00
PE (x100)	100	White	MC512PA	1SNK148091R0000	10	10.00
U1 (x100)	100	White	MC512PA	1SNK148101R0000	10	10.00
U2 (x100)	100	White	MC512PA	1SNK148111R0000	10	10.00
U3 (x100)	100	White	MC512PA	1SNK148121R0000	10	10.00
V1 (x100)	100	White	MC512PA	1SNK148131R0000	10	10.00
V2 (x100)	100	White	MC512PA	1SNK148141R0000	10	10.00
V3 (x100)	100	White	MC512PA	1SNK148151R0000	10	10.00
W1 (x100)	100	White	MC512PA	1SNK148161R0000	10	10.00
W2 (x100)	100	White	MC512PA	1SNK148171R0000	10	10.00
W3 (x100)	100	White	MC512PA	1SNK148181R0000	10	10.00
L1-L2-L3-N-PE (x20)	100	White	MC512PA	1SNK149001R0000	10	10.00
U1-U2-U3-V1-V2-V3-W1-W2-W3 (x10) + U1 (x10)	100	White	MC512PA	1SNK149011R0000	10	10.00

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MC512PA Terminal block markers

Pre-printed marker card for vertical terminal block assembly

5.2 mm 0.205 in spacing

Features and Benefits

Save printing time with our large pre-printed cards offer with pre-printed numbers, letters or symbols.

Main Technical Data

Material	Flammability	Maximum printed digits		Dimensions	
		Horizontal	Vertical	mm	inches
Polyamide	V2			4.8 x 12	0.189 x 0.472

Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Pack ⁽ⁿ⁾ pieces	Weight (1 pack) g
0->9 (x10)	100	White	MC512PA	1SNK140092R0000	10	10.00
1->10 (x10)	100	White	MC512PA	1SNK140012R0000	10	10.00
11->20 (x10)	100	White	MC512PA	1SNK140022R0000	10	10.00
21->30 (x10)	100	White	MC512PA	1SNK140032R0000	10	10.00
31->40 (x10)	100	White	MC512PA	1SNK140042R0000	10	10.00
41->50 (x10)	100	White	MC512PA	1SNK140052R0000	10	10.00
51->60 (x10)	100	White	MC512PA	1SNK140062R0000	10	10.00
61->70 (x10)	100	White	MC512PA	1SNK140072R0000	10	10.00
71->80 (x10)	100	White	MC512PA	1SNK140082R0000	10	10.00
81->90 (x10)	100	White	MC512PA	1SNK140084R0000	10	10.00
91->100 (x10)	100	White	MC512PA	1SNK140102R0000	10	10.00
101->110 (x10)	100	White	MC512PA	1SNK140112R0000	10	10.00
111->120 (x10)	100	White	MC512PA	1SNK140122R0000	10	10.00
121->130 (x10)	100	White	MC512PA	1SNK140132R0000	10	10.00
131->140 (x10)	100	White	MC512PA	1SNK140142R0000	10	10.00
141->150 (x10)	100	White	MC512PA	1SNK140152R0000	10	10.00
151->160 (x10)	100	White	MC512PA	1SNK140162R0000	10	10.00
161->170 (x10)	100	White	MC512PA	1SNK140172R0000	10	10.00
171->180 (x10)	100	White	MC512PA	1SNK140182R0000	10	10.00
181->190 (x10)	100	White	MC512PA	1SNK140192R0000	10	10.00
191->200 (x10)	100	White	MC512PA	1SNK140202R0000	10	10.00
1->100	100	White	MC512PA	1SNK145012R0000	10	10.00
101->200	100	White	MC512PA	1SNK145022R0000	10	10.00
201->300	100	White	MC512PA	1SNK145032R0000	10	10.00
301->400	100	White	MC512PA	1SNK145042R0000	10	10.00
401->500	100	White	MC512PA	1SNK145052R0000	10	10.00
501->600	100	White	MC512PA	1SNK145062R0000	10	10.00
601->700	100	White	MC512PA	1SNK145072R0000	10	10.00
701->800	100	White	MC512PA	1SNK145082R0000	10	10.00
801->900	100	White	MC512PA	1SNK145092R0000	10	10.00
901->1000	100	White	MC512PA	1SNK145102R0000	10	10.00
A (x100)	100	White	MC512PA	1SNK146012R0000	10	10.00
B (x100)	100	White	MC512PA	1SNK146022R0000	10	10.00
C (x100)	100	White	MC512PA	1SNK146032R0000	10	10.00
D (x100)	100	White	MC512PA	1SNK146042R0000	10	10.00
E (x100)	100	White	MC512PA	1SNK146052R0000	10	10.00
F (x100)	100	White	MC512PA	1SNK146062R0000	10	10.00
G (x100)	100	White	MC512PA	1SNK146072R0000	10	10.00
H (x100)	100	White	MC512PA	1SNK146082R0000	10	10.00
I (x100)	100	White	MC512PA	1SNK146092R0000	10	10.00
J (x100)	100	White	MC512PA	1SNK146102R0000	10	10.00
K (x100)	100	White	MC512PA	1SNK146112R0000	10	10.00
L (x100)	100	White	MC512PA	1SNK146122R0000	10	10.00
M (x100)	100	White	MC512PA	1SNK146132R0000	10	10.00
N (x100)	100	White	MC512PA	1SNK146142R0000	10	10.00
O (x100)	100	White	MC512PA	1SNK146152R0000	10	10.00
P (x100)	100	White	MC512PA	1SNK146162R0000	10	10.00
Q (x100)	100	White	MC512PA	1SNK146172R0000	10	10.00
R (x100)	100	White	MC512PA	1SNK146182R0000	10	10.00
S (x100)	100	White	MC512PA	1SNK146192R0000	10	10.00
T (x100)	100	White	MC512PA	1SNK146202R0000	10	10.00
U (x100)	100	White	MC512PA	1SNK146212R0000	10	10.00
V (x100)	100	White	MC512PA	1SNK146222R0000	10	10.00



MC512PA Terminal block markers

Pre-printed marker card for vertical terminal block assembly

5.2 mm 0.205 in spacing



Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Pack ⁽ⁿ⁾ pieces	Weight (1 pcs) g
W (x100)	100	White	MC512PA	1SNK146232R0000	10	10.00
X (x100)	100	White	MC512PA	1SNK146242R0000	10	10.00
Y (x100)	100	White	MC512PA	1SNK146252R0000	10	10.00
Z (x100)	100	White	MC512PA	1SNK146262R0000	10	10.00
0 (x100)	100	White	MC512PA	1SNK147002R0000	10	10.00
1 (x100)	100	White	MC512PA	1SNK147012R0000	10	10.00
2 (x100)	100	White	MC512PA	1SNK147022R0000	10	10.00
3 (x100)	100	White	MC512PA	1SNK147032R0000	10	10.00
4 (x100)	100	White	MC512PA	1SNK147042R0000	10	10.00
5 (x100)	100	White	MC512PA	1SNK147052R0000	10	10.00
6 (x100)	100	White	MC512PA	1SNK147062R0000	10	10.00
7 (x100)	100	White	MC512PA	1SNK147072R0000	10	10.00
8 (x100)	100	White	MC512PA	1SNK147082R0000	10	10.00
9 (x100)	100	White	MC512PA	1SNK147092R0000	10	10.00
+ (x100)	100	White	MC512PA	1SNK148002R0000	10	10.00
- (x100)	100	White	MC512PA	1SNK148012R0000	10	10.00
~ (x100)	100	White	MC512PA	1SNK148022R0000	10	10.00
= (x100)	100	White	MC512PA	1SNK148032R0000	10	10.00
⊥ (x100)	100	White	MC512PA	1SNK148042R0000	10	10.00
L1 (x100)	100	White	MC512PA	1SNK148052R0000	10	10.00
L2 (x100)	100	White	MC512PA	1SNK148062R0000	10	10.00
L3 (x100)	100	White	MC512PA	1SNK148072R0000	10	10.00
PE (x100)	100	White	MC512PA	1SNK148092R0000	10	10.00
U1 (x100)	100	White	MC512PA	1SNK148102R0000	10	10.00
U2 (x100)	100	White	MC512PA	1SNK148112R0000	10	10.00
U3 (x100)	100	White	MC512PA	1SNK148122R0000	10	10.00
V1 (x100)	100	White	MC512PA	1SNK148132R0000	10	10.00
V2 (x100)	100	White	MC512PA	1SNK148142R0000	10	10.00
V3 (x100)	100	White	MC512PA	1SNK148152R0000	10	10.00
W1 (x100)	100	White	MC512PA	1SNK148162R0000	10	10.00
W2 (x100)	100	White	MC512PA	1SNK148172R0000	10	10.00
W3 (x100)	100	White	MC512PA	1SNK148182R0000	10	10.00
+24V (x100)	100	White	MC512PA	1SNK148192R0000	10	10.00
+48V (x100)	100	White	MC512PA	1SNK148202R0000	10	10.00
-24V (x100)	100	White	MC512PA	1SNK148212R0000	10	10.00
-48V (x100)	100	White	MC512PA	1SNK148222R0000	10	10.00
L1-L2-L3-N-PE (x20)	100	White	MC512PA	1SNK149002R0000	10	10.00
U1-U2-U3-V1-V2-V3-W1-W2-W3 (x10) + U1 (x10)	100	White	MC512PA	1SNK149012R0000	10	10.00

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MC612 Terminal block markers

Blank card in polycarbonate

6 mm 0.236 in spacing

Features and Benefits

- MC612 marker card in polycarbonate for high marking quality and durability.
- Excellent marking durability in the most severe environments,
- Improved marking visibility thanks to the increased marking surface +20% (12 mm 0.472 in)

Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Pack ⁽ⁿ⁾ pieces	Weight (1 pce) g
Blank card	39	White	MC612	1SNK150000R0000	22	10.00
		Yellow	MC612-YL	1SNK150004R0000	22	10.00

Main Technical Data

Material	Flammability	Maximum printed digits				Dimensions	
		Horizontal	Vertical	mm	inches		
Polycarbonate	V0	3	8	5.6 x 12	0.220 x 0.472		

Marking Systems

Description	Type	Catalog Number	Pack ⁽ⁿ⁾ pieces	Weight (1 pce) g
Marking table	AMS 500 KIT	XUSP02636	1	12600.00
Thermal transfer printer	HTP500	1SNA235700R1500	1	16000.00



AMS 500



HTP500

MC612PA Terminal block markers

Blank card in polyamide

6 mm 0.236 in spacing

Features and Benefits

- MC612PA marker card in polyamide for standard industrial applications,
- Terminal blocks are directly independent after strip mounting,
- Improved marking visibility thanks to the increased marking surface +20% (12 mm 0.472 in)

Ordering Details

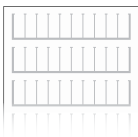
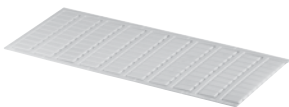
Description	Number of markers per unit	Color	Type	Catalog Number	Pack ⁽ⁿ⁾ pieces	Weight (1 pce) g
Blank card	100	White	MC612PA	1SNK159999R0000	20	11.00

Main Technical Data

Material	Flammability	Maximum printed digits				Dimensions	
		Horizontal	Vertical	mm	inches		
Polyamide	V2	3	8	5.6 x 12	0.220 x 0.472		

Marking Systems

Description	Type	Catalog Number	Pack ⁽ⁿ⁾ pieces	Weight (1 pce) g
Marking table	AMS 500 KIT	XUSP02636	1	12600.00



AMS 500

MC612PA Terminal block markers

Pre-printed marker card for horizontal terminal block assembly

6 mm 0.236 in spacing



Features and Benefits

Save printing time with our large pre-printed cards offer with pre-printed numbers, letters or symbols.

Main Technical Data

Material	Flammability	Maximum printed digits		Dimensions	
		Horizontal	Vertical	mm	inches
Polyamide	V2			5.6 x 12	0.220 x 0.472

Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Pack ⁽¹⁾ pieces	Weight (1 pcs) g
0->9 (x10)	100	White	MC612PA	1SNK150091R0000	10	11.00
1->10 (x10)	100	White	MC612PA	1SNK150011R0000	10	11.00
11->20 (x10)	100	White	MC612PA	1SNK150021R0000	10	11.00
21->30 (x10)	100	White	MC612PA	1SNK150031R0000	10	11.00
31->40 (x10)	100	White	MC612PA	1SNK150041R0000	10	11.00
41->50 (x10)	100	White	MC612PA	1SNK150051R0000	10	11.00
51->60 (x10)	100	White	MC612PA	1SNK150061R0000	10	11.00
61->70 (x10)	100	White	MC612PA	1SNK150071R0000	10	11.00
71->80 (x10)	100	White	MC612PA	1SNK150081R0000	10	11.00
81->90 (x10)	100	White	MC612PA	1SNK150083R0000	10	11.00
91->100 (x10)	100	White	MC612PA	1SNK150101R0000	10	11.00
101->110 (x10)	100	White	MC612PA	1SNK150111R0000	10	11.00
111->120 (x10)	100	White	MC612PA	1SNK150121R0000	10	11.00
121->130 (x10)	100	White	MC612PA	1SNK150131R0000	10	11.00
131->140 (x10)	100	White	MC612PA	1SNK150141R0000	10	11.00
141->150 (x10)	100	White	MC612PA	1SNK150151R0000	10	11.00
151->160 (x10)	100	White	MC612PA	1SNK150161R0000	10	11.00
161->170 (x10)	100	White	MC612PA	1SNK150171R0000	10	11.00
171->180 (x10)	100	White	MC612PA	1SNK150181R0000	10	11.00
181->190 (x10)	100	White	MC612PA	1SNK150191R0000	10	11.00
191->200 (x10)	100	White	MC612PA	1SNK150201R0000	10	11.00
1->100	100	White	MC612PA	1SNK155011R0000	10	11.00
101->200	100	White	MC612PA	1SNK155021R0000	10	11.00
201->300	100	White	MC612PA	1SNK155031R0000	10	11.00
301->400	100	White	MC612PA	1SNK155041R0000	10	11.00
401->500	100	White	MC612PA	1SNK155051R0000	10	11.00
501->600	100	White	MC612PA	1SNK155061R0000	10	11.00
601->700	100	White	MC612PA	1SNK155071R0000	10	11.00
701->800	100	White	MC612PA	1SNK155081R0000	10	11.00
801->900	100	White	MC612PA	1SNK155091R0000	10	11.00
A (x100)	100	White	MC612PA	1SNK156011R0000	10	11.00
B (x100)	100	White	MC612PA	1SNK156021R0000	10	11.00
C (x100)	100	White	MC612PA	1SNK156031R0000	10	11.00
D (x100)	100	White	MC612PA	1SNK156041R0000	10	11.00
E (x100)	100	White	MC612PA	1SNK156051R0000	10	11.00
F (x100)	100	White	MC612PA	1SNK156061R0000	10	11.00
G (x100)	100	White	MC612PA	1SNK156071R0000	10	11.00
H (x100)	100	White	MC612PA	1SNK156081R0000	10	11.00
I (x100)	100	White	MC612PA	1SNK156091R0000	10	11.00
J (x100)	100	White	MC612PA	1SNK156101R0000	10	11.00
K (x100)	100	White	MC612PA	1SNK156111R0000	10	11.00
L (x100)	100	White	MC612PA	1SNK156121R0000	10	11.00
M (x100)	100	White	MC612PA	1SNK156131R0000	10	11.00
N (x100)	100	White	MC612PA	1SNK156141R0000	10	11.00
O (x100)	100	White	MC612PA	1SNK156151R0000	10	11.00
P (x100)	100	White	MC612PA	1SNK156161R0000	10	11.00
Q (x100)	100	White	MC612PA	1SNK156171R0000	10	11.00
R (x100)	100	White	MC612PA	1SNK156181R0000	10	11.00
S (x100)	100	White	MC612PA	1SNK156191R0000	10	11.00
T (x100)	100	White	MC612PA	1SNK156201R0000	10	11.00
U (x100)	100	White	MC612PA	1SNK156211R0000	10	11.00
V (x100)	100	White	MC612PA	1SNK156221R0000	10	11.00
W (x100)	100	White	MC612PA	1SNK156231R0000	10	11.00

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MC612PA Terminal block markers

Pre-printed marker card for horizontal terminal block assembly

6 mm 0.236 in spacing



Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Pack ^(ng) pieces	Weight (1 pce) g
X (x100)	100	White	MC612PA	1SNK156241R0000	10	11.00
Y (x100)	100	White	MC612PA	1SNK156251R0000	10	11.00
Z (x100)	100	White	MC612PA	1SNK156261R0000	10	11.00
0 (x100)	100	White	MC612PA	1SNK157001R0000	10	11.00
1 (x100)	100	White	MC612PA	1SNK157011R0000	10	11.00
2 (x100)	100	White	MC612PA	1SNK157021R0000	10	11.00
3 (x100)	100	White	MC612PA	1SNK157031R0000	10	11.00
4 (x100)	100	White	MC612PA	1SNK157041R0000	10	11.00
5 (x100)	100	White	MC612PA	1SNK157051R0000	10	11.00
6 (x100)	100	White	MC612PA	1SNK157061R0000	10	11.00
7 (x100)	100	White	MC612PA	1SNK157071R0000	10	11.00
8 (x100)	100	White	MC612PA	1SNK157081R0000	10	11.00
9 (x100)	100	White	MC612PA	1SNK157091R0000	10	11.00
+ (x100)	100	White	MC612PA	1SNK158001R0000	10	11.00
- (x100)	100	White	MC612PA	1SNK158011R0000	10	11.00
~ (x100)	100	White	MC612PA	1SNK158021R0000	10	11.00
= (x100)	100	White	MC612PA	1SNK158031R0000	10	11.00
Ground (x100)	100	White	MC612PA	1SNK158041R0000	10	11.00
L1 (x100)	100	White	MC612PA	1SNK158051R0000	10	11.00
L2 (x100)	100	White	MC612PA	1SNK158061R0000	10	11.00
L3 (x100)	100	White	MC612PA	1SNK158071R0000	10	11.00
PE (x100)	100	White	MC612PA	1SNK158091R0000	10	11.00
U1 (x100)	100	White	MC612PA	1SNK158101R0000	10	11.00
U2 (x100)	100	White	MC612PA	1SNK158111R0000	10	11.00
U3 (x100)	100	White	MC612PA	1SNK158121R0000	10	11.00
V1 (x100)	100	White	MC612PA	1SNK158131R0000	10	11.00
V2 (x100)	100	White	MC612PA	1SNK158141R0000	10	11.00
V3 (x100)	100	White	MC612PA	1SNK158151R0000	10	11.00
W1 (x100)	100	White	MC612PA	1SNK158161R0000	10	11.00
W2 (x100)	100	White	MC612PA	1SNK158171R0000	10	11.00
W3 (x100)	100	White	MC612PA	1SNK158181R0000	10	11.00
L1-L2-L3-N-PE (x20)	100	White	MC612PA	1SNK159001R0000	10	11.00
U1-U2-U3-V1-V2-V3-W1-W2-W3 (x10) + U1 (x10)	100	White	MC612PA	1SNK159011R0000	10	11.00

MC612PA Terminal block markers

Pre-printed marker card for vertical terminal block assembly

6 mm 0.236 in spacing

Features and Benefits

Save printing time with our large pre-printed cards offer with pre-printed numbers, letters or symbols.

Main Technical Data

Material	Flammability	Maximum printed digits			Dimensions	
		Horizontal		Vertical	mm	inches
Polyamide	V2				5.6 x 12	0.220 x 0.472

Ordering Details



Description	Number of markers per unit	Color	Type	Catalog Number	Pack ^(mg) pieces	Weight (1 pc) g
0->9 (x10)	100	White	MC612PA	1SNK150092R0000	10	11.00
1->10 (x10)	100	White	MC612PA	1SNK150012R0000	10	11.00
11->20 (x10)	100	White	MC612PA	1SNK150022R0000	10	11.00
21->30 (x10)	100	White	MC612PA	1SNK150032R0000	10	11.00
31->40 (x10)	100	White	MC612PA	1SNK150042R0000	10	11.00
41->50 (x10)	100	White	MC612PA	1SNK150052R0000	10	11.00
51->60 (x10)	100	White	MC612PA	1SNK150062R0000	10	11.00
61->70 (x10)	100	White	MC612PA	1SNK150072R0000	10	11.00
71->80 (x10)	100	White	MC612PA	1SNK150082R0000	10	11.00
81->90 (x10)	100	White	MC612PA	1SNK150084R0000	10	11.00
91->100 (x10)	100	White	MC612PA	1SNK150102R0000	10	11.00
101->110 (x10)	100	White	MC612PA	1SNK150112R0000	10	11.00
111->120 (x10)	100	White	MC612PA	1SNK150122R0000	10	11.00
121->130 (x10)	100	White	MC612PA	1SNK150132R0000	10	11.00
131->140 (x10)	100	White	MC612PA	1SNK150142R0000	10	11.00
141->150 (x10)	100	White	MC612PA	1SNK150152R0000	10	11.00
151->160 (x10)	100	White	MC612PA	1SNK150162R0000	10	11.00
161->170 (x10)	100	White	MC612PA	1SNK150172R0000	10	11.00
171->180 (x10)	100	White	MC612PA	1SNK150182R0000	10	11.00
181->190 (x10)	100	White	MC612PA	1SNK150192R0000	10	11.00
191->200 (x10)	100	White	MC612PA	1SNK150202R0000	10	11.00
1->100	100	White	MC612PA	1SNK155012R0000	10	11.00
101->200	100	White	MC612PA	1SNK155022R0000	10	11.00
201->300	100	White	MC612PA	1SNK155032R0000	10	11.00
301->400	100	White	MC612PA	1SNK155042R0000	10	11.00
401->500	100	White	MC612PA	1SNK155052R0000	10	11.00
501->600	100	White	MC612PA	1SNK155062R0000	10	11.00
601->700	100	White	MC612PA	1SNK155072R0000	10	11.00
701->800	100	White	MC612PA	1SNK155082R0000	10	11.00
801->900	100	White	MC612PA	1SNK155092R0000	10	11.00
901->1000	100	White	MC612PA	1SNK155102R0000	10	11.00
A (x100)	100	White	MC612PA	1SNK156012R0000	10	11.00
B (x100)	100	White	MC612PA	1SNK156022R0000	10	11.00
C (x100)	100	White	MC612PA	1SNK156032R0000	10	11.00
D (x100)	100	White	MC612PA	1SNK156042R0000	10	11.00
E (x100)	100	White	MC612PA	1SNK156052R0000	10	11.00
F (x100)	100	White	MC612PA	1SNK156062R0000	10	11.00
G (x100)	100	White	MC612PA	1SNK156072R0000	10	11.00
H (x100)	100	White	MC612PA	1SNK156082R0000	10	11.00
I (x100)	100	White	MC612PA	1SNK156092R0000	10	11.00
J (x100)	100	White	MC612PA	1SNK156102R0000	10	11.00
K (x100)	100	White	MC612PA	1SNK156112R0000	10	11.00
L (x100)	100	White	MC612PA	1SNK156122R0000	10	11.00
M (x100)	100	White	MC612PA	1SNK156132R0000	10	11.00
N (x100)	100	White	MC612PA	1SNK156142R0000	10	11.00
O (x100)	100	White	MC612PA	1SNK156152R0000	10	11.00
P (x100)	100	White	MC612PA	1SNK156162R0000	10	11.00
Q (x100)	100	White	MC612PA	1SNK156172R0000	10	11.00
R (x100)	100	White	MC612PA	1SNK156182R0000	10	11.00
S (x100)	100	White	MC612PA	1SNK156192R0000	10	11.00
T (x100)	100	White	MC612PA	1SNK156202R0000	10	11.00
U (x100)	100	White	MC612PA	1SNK156212R0000	10	11.00
V (x100)	100	White	MC612PA	1SNK156222R0000	10	11.00

MC612PA Terminal block markers

Pre-printed marker card for vertical terminal block assembly

6 mm 0.236 in spacing



Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Pack ⁽ⁿ⁾ pieces	Weight (1 pce) g
W (x100)	100	White	MC612PA	1SNK156232R0000	10	11.00
X (x100)	100	White	MC612PA	1SNK156242R0000	10	11.00
Y (x100)	100	White	MC612PA	1SNK156252R0000	10	11.00
Z (x100)	100	White	MC612PA	1SNK156262R0000	10	11.00
0 (x100)	100	White	MC612PA	1SNK157002R0000	10	11.00
1 (x100)	100	White	MC612PA	1SNK157012R0000	10	11.00
2 (x100)	100	White	MC612PA	1SNK157022R0000	10	11.00
3 (x100)	100	White	MC612PA	1SNK157032R0000	10	11.00
4 (x100)	100	White	MC612PA	1SNK157042R0000	10	11.00
5 (x100)	100	White	MC612PA	1SNK157052R0000	10	11.00
6 (x100)	100	White	MC612PA	1SNK157062R0000	10	11.00
7 (x100)	100	White	MC612PA	1SNK157072R0000	10	11.00
8 (x100)	100	White	MC612PA	1SNK157082R0000	10	11.00
9 (x100)	100	White	MC612PA	1SNK157092R0000	10	11.00
+ (x100)	100	White	MC612PA	1SNK158002R0000	10	11.00
- (x100)	100	White	MC612PA	1SNK158012R0000	10	11.00
~ (x100)	100	White	MC612PA	1SNK158022R0000	10	11.00
= (x100)	100	White	MC612PA	1SNK158032R0000	10	11.00
≠ (x100)	100	White	MC612PA	1SNK158042R0000	10	11.00
L1 (x100)	100	White	MC612PA	1SNK158052R0000	10	11.00
L2 (x100)	100	White	MC612PA	1SNK158062R0000	10	11.00
L3 (x100)	100	White	MC612PA	1SNK158072R0000	10	11.00
PE (x100)	100	White	MC612PA	1SNK158092R0000	10	11.00
U1 (x100)	100	White	MC612PA	1SNK158102R0000	10	11.00
U2 (x100)	100	White	MC612PA	1SNK158112R0000	10	11.00
U3 (x100)	100	White	MC612PA	1SNK158122R0000	10	11.00
V1 (x100)	100	White	MC612PA	1SNK158132R0000	10	11.00
V2 (x100)	100	White	MC612PA	1SNK158142R0000	10	11.00
V3 (x100)	100	White	MC612PA	1SNK158152R0000	10	11.00
W1 (x100)	100	White	MC612PA	1SNK158162R0000	10	11.00
W2 (x100)	100	White	MC612PA	1SNK158172R0000	10	11.00
W3 (x100)	100	White	MC612PA	1SNK158182R0000	10	11.00
+24V (x100)	100	White	MC612PA	1SNK158192R0000	10	11.00
+48V (x100)	100	White	MC612PA	1SNK158202R0000	10	11.00
-24V (x100)	100	White	MC612PA	1SNK158212R0000	10	11.00
-48V (x100)	100	White	MC612PA	1SNK158222R0000	10	11.00
L1-L2-L3-N-PE (x20)	100	White	MC612PA	1SNK159002R0000	10	11.00
U1-U2-U3-V1-V2-V3-W1-W2-W3 (x10) + U1 (x10)	100	White	MC612PA	1SNK159012R0000	10	11.00

MC812 Terminal block markers

Blank card in polycarbonate

8 mm 0.315 in spacing



AMS 500



HTP500

Features and Benefits

- MC812 marker card in polycarbonate for high marking quality and durability.
- Excellent marking durability in the most severe environments.
- Improved marking visibility thanks to the increased marking surface +20% (12 mm 0.472 in)

Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Pack ^(nsl) pieces	Weight (1 pce) g
Blank card	30	White	MC812	1SNK160000R0000	22	10.00
		Yellow	MC812-YL	1SNK160004R0000	22	10.00

Main Technical Data

Material	Flammability	Maximum printed digits				Dimensions	
		Horizontal	3	Vertical	8	mm	inches
Polycarbonate	V0	Horizontal	3	Vertical	8	7.6 x 12	0.299 x 0.472

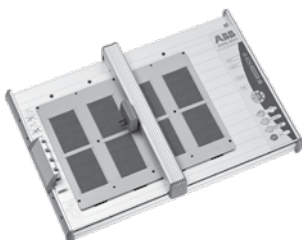
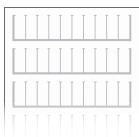
Marking Systems

Description	Type	Catalog Number	Pack ^(nsl) pieces	Weight (1 pce) g
Marking table	AMS 500 KIT	XUSP02636	1	12600.00
Thermal transfer printer	HTP500	1SNA235700R1500	1	16000.00

MC812PA Terminal block markers

Blank card in polyamide

8 mm 0.315 in spacing



AMS 500

Features and Benefits

- MC812PA marker card in polyamide for standard industrial applications.
- Terminal blocks are directly independent after strip mounting.
- Improved marking visibility thanks to the increased marking surface +20% (12 mm 0.472 in)

Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Pack ^(nsl) pieces	Weight (1 pce) g
Blank card	100	White	MC812PA	1SNK169999R0000	20	14.00

Main Technical Data

Material	Flammability	Maximum printed digits				Dimensions	
		Horizontal	3	Vertical	8	mm	inches
Polyamide	V2	Horizontal	3	Vertical	8	7.6 x 12	0.299 x 0.472

Marking Systems

Description	Type	Catalog Number	Pack ^(nsl) pieces	Weight (1 pce) g
Marking table	AMS 500 KIT	XUSP02636	1	12600.00

MC812PA Terminal block markers

Pre-printed marker card for horizontal terminal block assembly

8 mm 0.315 in spacing



Features and Benefits

Save printing time with our large pre-printed cards offer with pre-printed numbers, letters or symbols.

Main Technical Data

Material	Flammability	Maximum printed digits			Dimensions	
		Horizontal	Vertical	mm	inches	
Polyamide	V2			7.6 x 12	0.299 x 0.472	

Ordering Details



Description	Number of markers per unit	Color	Type	Catalog Number	Pack ^(ng) pieces	Weight (1 pce) g
0->9 (x10)	100	White	MC812PA	1SNK160091R0000	10	14.00
1->10 (x10)	100	White	MC812PA	1SNK160011R0000	10	14.00
11->20 (x10)	100	White	MC812PA	1SNK160021R0000	10	14.00
21->30 (x10)	100	White	MC812PA	1SNK160031R0000	10	14.00
31->40 (x10)	100	White	MC812PA	1SNK160041R0000	10	14.00
41->50 (x10)	100	White	MC812PA	1SNK160051R0000	10	14.00
51->60 (x10)	100	White	MC812PA	1SNK160061R0000	10	14.00
61->70 (x10)	100	White	MC812PA	1SNK160071R0000	10	14.00
71->80 (x10)	100	White	MC812PA	1SNK160081R0000	10	14.00
81->90 (x10)	100	White	MC812PA	1SNK160083R0000	10	14.00
91->100 (x10)	100	White	MC812PA	1SNK160101R0000	10	14.00
101->110 (x10)	100	White	MC812PA	1SNK160111R0000	10	14.00
111->120 (x10)	100	White	MC812PA	1SNK160121R0000	10	14.00
121->130 (x10)	100	White	MC812PA	1SNK160131R0000	10	14.00
131->140 (x10)	100	White	MC812PA	1SNK160141R0000	10	14.00
141->150 (x10)	100	White	MC812PA	1SNK160151R0000	10	14.00
151->160 (x10)	100	White	MC812PA	1SNK160161R0000	10	14.00
161->170 (x10)	100	White	MC812PA	1SNK160171R0000	10	14.00
171->180 (x10)	100	White	MC812PA	1SNK160181R0000	10	14.00
181->190 (x10)	100	White	MC812PA	1SNK160191R0000	10	14.00
191->200 (x10)	100	White	MC812PA	1SNK160201R0000	10	14.00
1->100	100	White	MC812PA	1SNK165011R0000	10	14.00
101->200	100	White	MC812PA	1SNK165021R0000	10	14.00
201->300	100	White	MC812PA	1SNK165031R0000	10	14.00
301->400	100	White	MC812PA	1SNK165041R0000	10	14.00
401->500	100	White	MC812PA	1SNK165051R0000	10	14.00
501->600	100	White	MC812PA	1SNK165061R0000	10	14.00
601->700	100	White	MC812PA	1SNK165071R0000	10	14.00
701->800	100	White	MC812PA	1SNK165081R0000	10	14.00
801->900	100	White	MC812PA	1SNK165091R0000	10	14.00
A (x100)	100	White	MC812PA	1SNK166011R0000	10	14.00
B (x100)	100	White	MC812PA	1SNK166021R0000	10	14.00
C (x100)	100	White	MC812PA	1SNK166031R0000	10	14.00
D (x100)	100	White	MC812PA	1SNK166041R0000	10	14.00
E (x100)	100	White	MC812PA	1SNK166051R0000	10	14.00
F (x100)	100	White	MC812PA	1SNK166061R0000	10	14.00
G (x100)	100	White	MC812PA	1SNK166071R0000	10	14.00
H (x100)	100	White	MC812PA	1SNK166081R0000	10	14.00
I (x100)	100	White	MC812PA	1SNK166091R0000	10	14.00
J (x100)	100	White	MC812PA	1SNK166101R0000	10	14.00
K (x100)	100	White	MC812PA	1SNK166111R0000	10	14.00
L (x100)	100	White	MC812PA	1SNK166121R0000	10	14.00
M (x100)	100	White	MC812PA	1SNK166131R0000	10	14.00
N (x100)	100	White	MC812PA	1SNK166141R0000	10	14.00
O (x100)	100	White	MC812PA	1SNK166151R0000	10	14.00
P (x100)	100	White	MC812PA	1SNK166161R0000	10	14.00
Q (x100)	100	White	MC812PA	1SNK166171R0000	10	14.00
R (x100)	100	White	MC812PA	1SNK166181R0000	10	14.00
S (x100)	100	White	MC812PA	1SNK166191R0000	10	14.00
T (x100)	100	White	MC812PA	1SNK166201R0000	10	14.00
U (x100)	100	White	MC812PA	1SNK166211R0000	10	14.00
V (x100)	100	White	MC812PA	1SNK166221R0000	10	14.00
W (x100)	100	White	MC812PA	1SNK166231R0000	10	14.00

MC812PA Terminal block markers

Pre-printed marker card for horizontal terminal block assembly

8 mm 0.315 in spacing



Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Pack ^(ng) pieces	Weight (1 pce) g
X (x100)	100	White	MC812PA	1SNK166241R0000	10	14.00
Y (x100)	100	White	MC812PA	1SNK166251R0000	10	14.00
Z (x100)	100	White	MC812PA	1SNK166261R0000	10	14.00
0 (x100)	100	White	MC812PA	1SNK167001R0000	10	14.00
1 (x100)	100	White	MC812PA	1SNK167011R0000	10	14.00
2 (x100)	100	White	MC812PA	1SNK167021R0000	10	14.00
3 (x100)	100	White	MC812PA	1SNK167031R0000	10	14.00
4 (x100)	100	White	MC812PA	1SNK167041R0000	10	14.00
5 (x100)	100	White	MC812PA	1SNK167051R0000	10	14.00
6 (x100)	100	White	MC812PA	1SNK167061R0000	10	14.00
7 (x100)	100	White	MC812PA	1SNK167071R0000	10	14.00
8 (x100)	100	White	MC812PA	1SNK167081R0000	10	14.00
9 (x100)	100	White	MC812PA	1SNK167091R0000	10	14.00
+ (x100)	100	White	MC812PA	1SNK168001R0000	10	14.00
- (x100)	100	White	MC812PA	1SNK168011R0000	10	14.00
~ (x100)	100	White	MC812PA	1SNK168021R0000	10	14.00
= (x100)	100	White	MC812PA	1SNK168031R0000	10	14.00
$\frac{_}{_}$ (x100)	100	White	MC812PA	1SNK168041R0000	10	14.00
L1 (x100)	100	White	MC812PA	1SNK168051R0000	10	14.00
L2 (x100)	100	White	MC812PA	1SNK168061R0000	10	14.00
L3 (x100)	100	White	MC812PA	1SNK168071R0000	10	14.00
PE (x100)	100	White	MC812PA	1SNK168091R0000	10	14.00
U1 (x100)	100	White	MC812PA	1SNK168101R0000	10	14.00
U2 (x100)	100	White	MC812PA	1SNK168111R0000	10	14.00
U3 (x100)	100	White	MC812PA	1SNK168121R0000	10	14.00
V1 (x100)	100	White	MC812PA	1SNK168131R0000	10	14.00
V2 (x100)	100	White	MC812PA	1SNK168141R0000	10	14.00
V3 (x100)	100	White	MC812PA	1SNK168151R0000	10	14.00
W1 (x100)	100	White	MC812PA	1SNK168161R0000	10	14.00
W2 (x100)	100	White	MC812PA	1SNK168171R0000	10	14.00
W3 (x100)	100	White	MC812PA	1SNK168181R0000	10	14.00
L1-L2-L3-N-PE (x20)	100	White	MC812PA	1SNK169001R0000	10	14.00
U1-U2-U3-V1-V2-V3-W1-W2-W3 (x10) + U1 (x10)	100	White	MC812PA	1SNK169011R0000	10	14.00

MC812PA Terminal block markers

Pre-printed marker card for vertical terminal block assembly

8 mm 0.315 in spacing



Features and Benefits

Save printing time with our large pre-printed cards offer with pre-printed numbers, letters or symbols.

Main Technical Data

Material	Flammability	Maximum printed digits		Dimensions	
		Horizontal	Vertical	mm	inches
Polyamide	V2			7.6 x 12	0.299 x 0.472

Ordering Details



Description	Number of markers per unit	Color	Type	Catalog Number	Pack ^(ng) pieces	Weight (1 pcs) g
0->9 (x10)	100	White	MC812PA	1SNK160092R0000	10	14.00
1->10 (x10)	100	White	MC812PA	1SNK160012R0000	10	14.00
11->20 (x10)	100	White	MC812PA	1SNK160022R0000	10	14.00
21->30 (x10)	100	White	MC812PA	1SNK160032R0000	10	14.00
31->40 (x10)	100	White	MC812PA	1SNK160042R0000	10	14.00
41->50 (x10)	100	White	MC812PA	1SNK160052R0000	10	14.00
51->60 (x10)	100	White	MC812PA	1SNK160062R0000	10	14.00
61->70 (x10)	100	White	MC812PA	1SNK160072R0000	10	14.00
71->80 (x10)	100	White	MC812PA	1SNK160082R0000	10	14.00
81->90 (x10)	100	White	MC812PA	1SNK160084R0000	10	14.00
91->100 (x10)	100	White	MC812PA	1SNK160102R0000	10	14.00
101->110 (x10)	100	White	MC812PA	1SNK160112R0000	10	14.00
111->120 (x10)	100	White	MC812PA	1SNK160122R0000	10	14.00
121->130 (x10)	100	White	MC812PA	1SNK160132R0000	10	14.00
131->140 (x10)	100	White	MC812PA	1SNK160142R0000	10	14.00
141->150 (x10)	100	White	MC812PA	1SNK160152R0000	10	14.00
151->160 (x10)	100	White	MC812PA	1SNK160162R0000	10	14.00
161->170 (x10)	100	White	MC812PA	1SNK160172R0000	10	14.00
171->180 (x10)	100	White	MC812PA	1SNK160182R0000	10	14.00
181->190 (x10)	100	White	MC812PA	1SNK160192R0000	10	14.00
191->200 (x10)	100	White	MC812PA	1SNK160202R0000	10	14.00
1->100	100	White	MC812PA	1SNK165012R0000	10	14.00
101->200	100	White	MC812PA	1SNK165022R0000	10	14.00
201->300	100	White	MC812PA	1SNK165032R0000	10	14.00
301->400	100	White	MC812PA	1SNK165042R0000	10	14.00
401->500	100	White	MC812PA	1SNK165052R0000	10	14.00
501->600	100	White	MC812PA	1SNK165062R0000	10	14.00
601->700	100	White	MC812PA	1SNK165072R0000	10	14.00
701->800	100	White	MC812PA	1SNK165082R0000	10	14.00
801->900	100	White	MC812PA	1SNK165092R0000	10	14.00
901->1000	100	White	MC812PA	1SNK165102R0000	10	14.00
A (x100)	100	White	MC812PA	1SNK166012R0000	10	14.00
B (x100)	100	White	MC812PA	1SNK166022R0000	10	14.00
C (x100)	100	White	MC812PA	1SNK166032R0000	10	14.00
D (x100)	100	White	MC812PA	1SNK166042R0000	10	14.00
E (x100)	100	White	MC812PA	1SNK166052R0000	10	14.00
F (x100)	100	White	MC812PA	1SNK166062R0000	10	14.00
G (x100)	100	White	MC812PA	1SNK166072R0000	10	14.00
H (x100)	100	White	MC812PA	1SNK166082R0000	10	14.00
I (x100)	100	White	MC812PA	1SNK166092R0000	10	14.00
J (x100)	100	White	MC812PA	1SNK166102R0000	10	14.00
K (x100)	100	White	MC812PA	1SNK166112R0000	10	14.00
L (x100)	100	White	MC812PA	1SNK166122R0000	10	14.00
M (x100)	100	White	MC812PA	1SNK166132R0000	10	14.00
N (x100)	100	White	MC812PA	1SNK166142R0000	10	14.00
O (x100)	100	White	MC812PA	1SNK166152R0000	10	14.00
P (x100)	100	White	MC812PA	1SNK166162R0000	10	14.00
Q (x100)	100	White	MC812PA	1SNK166172R0000	10	14.00
R (x100)	100	White	MC812PA	1SNK166182R0000	10	14.00
S (x100)	100	White	MC812PA	1SNK166192R0000	10	14.00
T (x100)	100	White	MC812PA	1SNK166202R0000	10	14.00
U (x100)	100	White	MC812PA	1SNK166212R0000	10	14.00
V (x100)	100	White	MC812PA	1SNK166222R0000	10	14.00

MC812PA Terminal block markers

Pre-printed marker card for vertical terminal block assembly

8 mm 0.315 in spacing



Ordering Details

Description	Number of markers per unit	Color	Type	Catalog Number	Pack ^(mg) pieces	Weight (1 pce) g
W (x100)	100	White	MC812PA	1SNK166232R0000	10	14.00
X (x100)	100	White	MC812PA	1SNK166242R0000	10	14.00
Y (x100)	100	White	MC812PA	1SNK166252R0000	10	14.00
Z (x100)	100	White	MC812PA	1SNK166262R0000	10	14.00
0 (x100)	100	White	MC812PA	1SNK167002R0000	10	14.00
1 (x100)	100	White	MC812PA	1SNK167012R0000	10	14.00
2 (x100)	100	White	MC812PA	1SNK167022R0000	10	14.00
3 (x100)	100	White	MC812PA	1SNK167032R0000	10	14.00
4 (x100)	100	White	MC812PA	1SNK167042R0000	10	14.00
5 (x100)	100	White	MC812PA	1SNK167052R0000	10	14.00
6 (x100)	100	White	MC812PA	1SNK167062R0000	10	14.00
7 (x100)	100	White	MC812PA	1SNK167072R0000	10	14.00
8 (x100)	100	White	MC812PA	1SNK167082R0000	10	14.00
9 (x100)	100	White	MC812PA	1SNK167092R0000	10	14.00
+ (x100)	100	White	MC812PA	1SNK168002R0000	10	14.00
- (x100)	100	White	MC812PA	1SNK168012R0000	10	14.00
~ (x100)	100	White	MC812PA	1SNK168022R0000	10	14.00
= (x100)	100	White	MC812PA	1SNK168032R0000	10	14.00
≠ (x100)	100	White	MC812PA	1SNK168042R0000	10	14.00
L1 (x100)	100	White	MC812PA	1SNK168052R0000	10	14.00
L2 (x100)	100	White	MC812PA	1SNK168062R0000	10	14.00
L3 (x100)	100	White	MC812PA	1SNK168072R0000	10	14.00
PE (x100)	100	White	MC812PA	1SNK168092R0000	10	14.00
U1 (x100)	100	White	MC812PA	1SNK168102R0000	10	14.00
U2 (x100)	100	White	MC812PA	1SNK168112R0000	10	14.00
U3 (x100)	100	White	MC812PA	1SNK168122R0000	10	14.00
V1 (x100)	100	White	MC812PA	1SNK168132R0000	10	14.00
V2 (x100)	100	White	MC812PA	1SNK168142R0000	10	14.00
V3 (x100)	100	White	MC812PA	1SNK168152R0000	10	14.00
W1 (x100)	100	White	MC812PA	1SNK168162R0000	10	14.00
W2 (x100)	100	White	MC812PA	1SNK168172R0000	10	14.00
W3 (x100)	100	White	MC812PA	1SNK168182R0000	10	14.00
+24V (x100)	100	White	MC812PA	1SNK168192R0000	10	14.00
+48V (x100)	100	White	MC812PA	1SNK168202R0000	10	14.00
-24V (x100)	100	White	MC812PA	1SNK168212R0000	10	14.00
-48V (x100)	100	White	MC812PA	1SNK168222R0000	10	14.00
L1-L2-L3-N-PE (x20)	100	White	MC812PA	1SNK169002R0000	10	14.00
U1-U2-U3-V1-V2-V3-W1-W2-W3 (x10) + U1 (x10)	100	White	MC812PA	1SNK169012R0000	10	14.00

SAT Terminal block markers

Self adhesive strip



Features and Benefits

- Quickly mark your terminal blocks with the pre-cut Self Adhesive strip SAT. Delivered 10 markers per strip.
- Easily print your self adhesive sheet in A5 format on any desktop printer: laser and inkjet,
- The SAT unique adhesive allows the terminal block label to be repositioned during the first few minutes.
- The excellent properties of SAT (adhesive and ink withstand) tested in our laboratories, offer an optimized resistance to severe environments (humidity, heat, oil, water, etc.).

Main Technical Data

Material	Flammability
Polyethylene	V0

Ordering Details

SAT5 Self adhesive strip for 5.2 mm 0.205 in spacing terminal blocks

Label dimensions		No markers per unit	Maximum printed digits		Color	Type	Catalog Number	Pack ⁽ⁿ⁾ pieces	Weight (1 pcs) g
mm	inches		Horizontal	Vertical					
9 x 5.2	0.354 x 0.205	240	3	6	White	SAT5	1SNK900614R0000	5	6.00

Ordering Details

SAT6 Self adhesive strip for 6 mm 0.236 in spacing terminal blocks

Label dimensions		No markers per unit	Maximum printed digits		Color	Type	Catalog Number	Pack ⁽ⁿ⁾ pieces	Weight (1 pcs) g
mm	inches		Horizontal	Vertical					
9 x 5.8	0.354 x 0.228	240	3	6	White	SAT6	1SNK900615R0000	5	6.00

Ordering Details

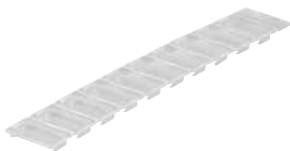
SAT8 Self adhesive strip for 8 mm 0.315 in spacing terminal blocks

Label dimensions		No markers per unit	Maximum printed digits		Color	Type	Catalog Number	Pack ⁽ⁿ⁾ pieces	Weight (1 pcs) g
mm	inches		Horizontal	Vertical					
9 x 7.8	0.354 x 0.307	160	4	6	White	SAT8	1SNK900616R0000	5	6.00

Accessories

PROCAP Protecting cap

Description	No of caps per unit	Color	Type	Catalog Number	Pack ⁽ⁿ⁾ pieces	Weight (1 pcs) g
for Self Adhesive sTrip SAT5	10	Transparent	PROCAP5	1SNK900609R0000	20	0.70
for Self Adhesive sTrip SAT6	10	Transparent	PROCAP6	1SNK900612R0000	20	0.79
for Self Adhesive sTrip SAT8	10	Transparent	PROCAP8	1SNK900613R0000	20	1.00



UMH Universal wire markers holder

Markers and marking systems

5.2 mm 0.205 in spacing



Mounting Instructions



Install the UMH on the terminal blocks (strip mounting) and slide on the wire markers.

Features and Benefits

- Compatible with most of the wire markers available on the market (wire markers not supplied with UMH);
- Quickly installs on any SNK terminal blocks: Mounts in strips of 10 for 5.2 mm (0.205 in) spacing, individual mounting for other terminal block spacings.

Ordering Details

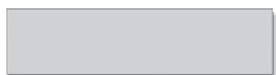
Description	Color	Type	Catalog Number	Pack ^(n°) pieces	Weight (1 pce) g
5.2 mm 0.205 in spacing	Grey	UMH	1SNK900611R0000	10	0.20

Main Technical Data

Material Specifications	Insulating material	Polyamide	
	Flammability	V0	
	NF F 16 101	I2F2	
Ambient temperature min/max	Service IEC 60068-2-1	-55 +110 °C	-67 +230 F
	Storage	-55 +110 °C	-67 +230 F
	Installing	-5 +40 °C	-23 +104 F

MCLH Label

Markers and marking systems



Features and Benefits

Identify your terminal blocks assembly with the self adhesive label adapted to the LH label holders.

Ordering Details

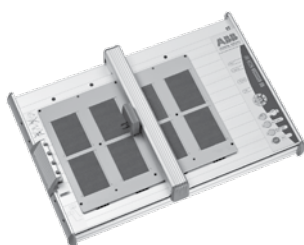
Description	Color	Type	Catalog Number	Pack ^(n°) pieces	Weight (1 pce) g
for LH label holder	White	MCLH	1SNK900630R0000	25	10.00
	Yellow	MCLH-YL	1SNK900633R0000	25	10.00
for LH-R1 label holder	White	MCLH-R1	1SNK900631R0000	25	10.00
	Yellow	MCLH-R1-YL	1SNK900634R0000	25	10.00

Main Technical Data

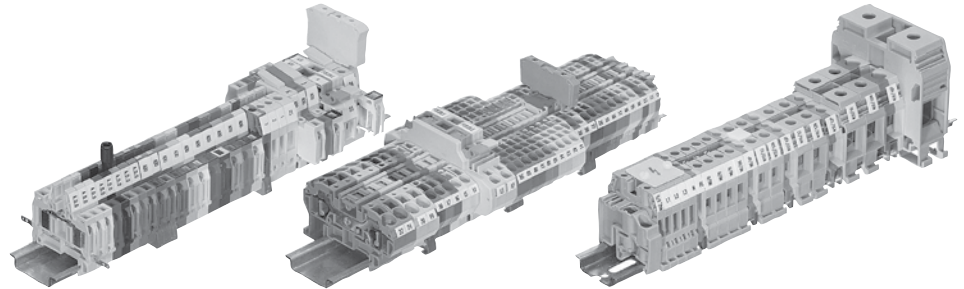
Material Specifications	Insulating material	PVC + Adhesive acrylic	
	Flammability	V0	
	NF F 16 101		
Ambient temperature min/max	Service IEC 60068-2-1	-55 +110 °C	-67 +230 F
	Storage	-55 +110 °C	-67 +230 F
	Installing	-5 +40 °C	-23 +104 F

Marking Systems

Description	Type	Catalog Number	Pack ^(n°) pieces	Weight (1 pce) g
Marking table	AMS 500 KIT	XUSP02636	1	12600.00



AMS 500



Type SNA Terminal blocks

Screw technology

- The classic connection
- Multiple wires per connection
- Available in several colors
- 24 AWG to 600 MCM

Spring technology

- The top entry connection
- One wire per connection
- 26-2 AWG

IDC technology

- The fastest connection known
- Vibration and corrosion proof
- Multiple wires, 24-12 AWG

Multiple wire termination UL approved, basic blocks

Terminal block type	Terminal block thickness	1 wire AWG	2 wire AWG	3 wire AWG
MA 2.5/5	5mm	22 to 12	18	20
M 4/6	6mm	22 to 10	22 to 14	22 or 20
M 6/8	8mm	22 to 8	22 to 14	22 to 16
M 10/10	10mm	20 to 6	20 to 12	20 or 18
M 16/12	12mm	6 to 4	14 to 8	14
M 35/16	16mm	10 to 1/0	10 to 4	-
M 70/22	22mm	4 to 2/0	4 or 2	4

UL File Number E60645

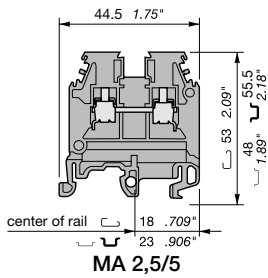
Worldwide approvals

USA	DEMKO / Denmark	Great Britain	NEMKO, DNV / Norway
Canada	Electricity Inspectorate Finland	MEEI / Hungary	SEMKO / Sweden
Austria	Germany	Netherlands	Switzerland
Commonwealth of Independent States (Formerly USSR)	Germ. Lloyd / Germany		

Feed through and ground terminal blocks

Screw clamp, DIN 1-3

MA 2,5/5 - 2.5 mm² blocks - 5 mm .200" spacing



Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.2 - 4 mm ²		22-12 AWG	22-12 AWG
mm ² / AWG	Stranded	0.22 - 2.5 mm ²			
Voltage	V	800		600	600
Current	A	24		30	25
Short circuit current (MA 2,5/5.P)	A / s	300A/1s			
Rated wire size	mm ² / AWG	2.5 mm ²		12 AWG	12 AWG
Wire stripping length	mm / inches			10 mm / .39"	
Recommended torque	Nm / lb.in			0.4-0.6 Nm / 3.5-5.3 lb.in	

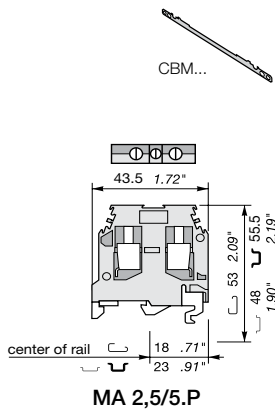
Selection

Description	Type	Packaging	Catalog number
Standard block grey	MA 2,5/5	50	011548603
Standard block white	MA 2,5/5	50	010505221
Standard block blue	MA 2,5/5.N	50	012548605
Standard block yellow	MA 2,5/5	50	010548612
Standard block orange	MA 2,5/5	50	010507520
Standard block black	MA 2,5/5	50	010507722
Standard block red	MA 2,5/5	50	040018427
Standard block beige	MA 2,5/5	50	019548604

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
End section	grey FEM6 2.8 mm	20	011836816
	blue FEM6 2.8 mm	20	012836810
	orange FEM6 2.8 mm	20	010312616
	yellow FEM6 2.8 mm	20	010306221
	green FEM6 2.8 mm	20	010312515
Separator end section	grey SCF6 3 mm	20	011870703
Assembled jumper bar (with IP20 protection)	2 poles BJMI5 24 A	10	017627816
	3 poles BJMI5 24 A	10	017627917
	4 poles BJMI5 24 A	10	017628005
	5 poles BJMI5 24 A	10	017628122
	10 poles BJMI5 24 A	10	017628223
Shield connector	CBM5 0.5 mm	20	017874514
	CBM8 0.8 mm	20	017874615

MA 2,5/5.P - 2.5 mm² ground block with rail contact - 5 mm .200" spacing



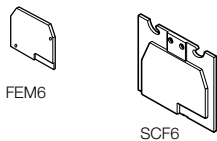
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.2 - 4 mm ²		22-12 AWG	22-12 AWG
mm ² / AWG	Stranded	0.22 - 2.5 mm ²			
Short circuit current	A / s	300A/1s			
Rated wire size	mm ² / AWG	2.5 mm ²		12 AWG	12 AWG
Wire stripping length	mm / inches			10 mm / .39"	
Recommended torque	Nm / lb.in			0.4-0.6 Nm / 3.5-5.3 lb.in	

Selection

Description	Type	Packaging	Catalog number
Ground block green/yellow Mounting on DIN 3 rail without screw	MA 2,5/5.P	50	016548827
Separator end section	D 2,5/5.P	50	016590905

Accessories

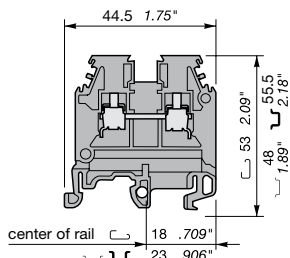
Description	Type	Packaging	Catalog number
End section	yellow FEM6 2.8 mm	20	010306221
Separator end section	grey SCF6 3 mm	20	011870703



Feed through and ground terminal blocks

Screw clamp, \sqsubset \sqsupset DIN 1-3

M 4/6 - 4 mm² blocks - 6 mm .238" spacing



M 4/6

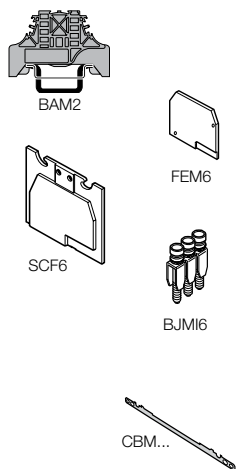
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.2 - 4 mm ²		22-10 AWG	22-10 AWG
mm ² / AWG	Stranded	0.22 - 4 mm ²			
Voltage	V	800		600	600
Current	A	32		30	25
Short circuit current (M 4/6.PI)	A / s	480A/1s			
Rated wire size	mm ² / AWG	4 mm ²		10 AWG	10 AWG
Wire stripping length	mm / inches	9.5 mm / .37"			
Recommended torque	Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in			

Selection

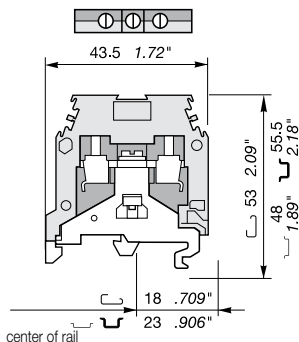
Description	Type	Packaging	Catalog number
Standard block grey	M 4/6	50	011511607
Standard block blue	M 4/6.N	50	012511601
Standard block yellow	M 4/6	50	010511616
Standard block orange	M 4/6	50	010500220
Standard block red	M 4/6	50	010503215
Standard block black	M 4/6	50	010503114
Standard block beige	M 4/6	50	019511600
Standard block brown	M 4/6	50	010520914
Standard block white	M 4/6	50	010505120
Standard block green	M 4/6	50	010500127
Standard block violet	M 4/6	50	020640405

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
End section	grey FEM6 2.8 mm	20	011836816
	blue FEM6 2.8 mm	20	012836810
	orange FEM6 2.8 mm	20	010312616
	yellow FEM6 2.8 mm	20	010306221
	green FEM6 2.8 mm	20	010312515
	white FEM6 2.8 mm	20	010331220
	beige FEM6 2.8 mm	20	019836817
	black FEM6 2.8 mm	20	010700525
Separator end section	grey SCF6 3 mm	20	011870703
Assembled jumper bar	2 poles BJMI5 32 A	10	017666300
(with IP20 protection)	3 poles BJMI5 32 A	10	017666401
	4 poles BJMI5 32 A	10	017666502
	5 poles BJMI5 32 A	10	017666603
	10 poles BJMI5 32 A	10	017666704
Shield connector	CBM5 0.5 mm	20	017874514
	CBM5 0.5 mm	20	017874615



M 4/6.P - 4 mm² ground block with rail contact - 6 mm .238" spacing



M 4/6.P

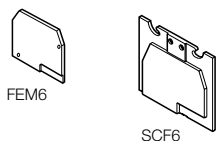
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.2 - 4 mm ²		22-10 AWG	24-10 AWG
mm ² / AWG	Stranded	0.22 - 4 mm ²			
Short circuit current	A / s	480A/1s			
Rated wire size	mm ² / AWG	4 mm ²		10 AWG	10 AWG
Wire stripping length	mm / inches	9.5 mm / .37"			
Recommended torque	Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in			

Selection

Description	Type	Packaging	Catalog number
Ground block green/yellow	M 4/6.P	50	016511316
Mounting on DIN 3 rail without screw			
Ground block green/yellow	D 2,5/5.P	50	016580901

Accessories

Description	Type	Packaging	Catalog number
End section	yellow FEM6 2.8 mm	20	010306221
Separator end section	grey SCF6 3 mm	20	011870703

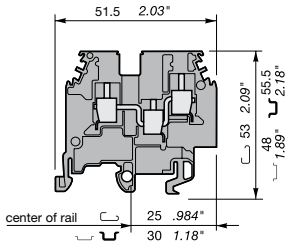


Feed through and ground terminal blocks

Single pole, multiclamp terminal blocks

Screw clamp, DIN 1-3

M 4/6.3A - 4 mm² blocks - 6 mm .238" spacing



M 4/6.3A

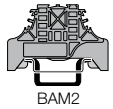
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.2 - 4 mm ²		22-10 AWG	12 AWG
mm ² / AWG	Stranded	0.22 - 4 mm ²			
Voltage	V	800		600	600
Current	A	32		20	25
Rated wire size	mm ² / AWG	4 mm ²		10 AWG	12 AWG
Wire stripping length	mm / inches			9 mm / .37"	
Recommended torque	Nm / lb.in			0.5-0.8 Nm / 4.4-7.1 lb.in	

Selection

Description	Type	Packaging	Catalog number
Standard block grey	M 4/6.3A	50	011546820
Standard block blue	M 4/6.3A.N	50	012546822
Standard block beige	M 4/6.3A	50	019546821

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
End section	grey FEM3A 3 mm	20	011657615
	blue FEM3A 3 mm	20	012657617
	yellow FEM3A 3 mm	20	010386220
Assembled jumper bar (with IP20 protection)	2 poles BJMI6 32 A	10	017666300
	3 poles BJMI6 32 A	10	017666401
	4 poles BJMI6 32 A	10	017666502
	5 poles BJMI6 32 A	10	017666603
	10 poles BJMI6 32 A	10	017666704



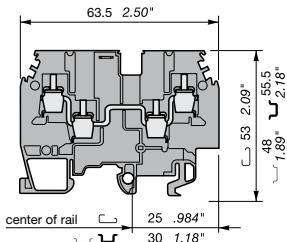
BAM2



FEM3A



BJMI6



M 4/6.4A

M 4/6.4A - 4 mm² blocks - 6 mm .238" spacing

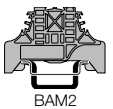
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.2 - 4 mm ²		22-10 AWG	12 AWG max.
mm ² / AWG	Stranded	0.22 - 4 mm ²			
Voltage	V	800		600	600
Current	A	32		20	25
Rated wire size	mm ² / AWG	4 mm ²		10 AWG	12 AWG
Wire stripping length	mm / inches			9.5 mm / .37"	
Recommended torque	Nm / lb.in			0.5-0.8 Nm / 4.4-7.1 lb.in	

Selection

Description	Type	Packaging	Catalog number
Standard block grey	M 4/6.4A	50	011547923
Standard block blue	M 4/6.4A.N	50	012547925
Standard block beige	M 4/6.4A	50	019547924

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
End section	grey FEM4A 3 mm	20	011662922
	blue FEM4A 3 mm	20	012662924
	yellow FEM4A 3 mm	20	010386321
Assembled jumper bar (with IP20 protection)	2 poles BJMI6 32 A	10	017666300
	3 poles BJMI6 32 A	10	017666401
	4 poles BJMI6 32 A	10	017666502
	5 poles BJMI6 32 A	10	017666603
	10 poles BJMI6 32 A	10	017666704



BAM2



FEM4A

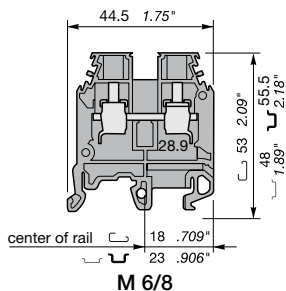


BJMI6

Feed through and ground terminal blocks

Screw clamp, DIN 1-3

M 6/8 - 6 mm² blocks - 8 mm .315" spacing



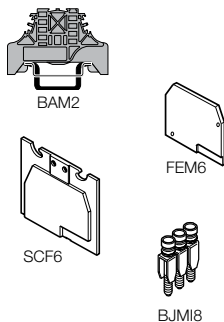
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.5 - 10 mm ²		22-8 AWG	24-8 AWG
mm ² / AWG	Stranded	0.5 - 6 mm ²			
Voltage	V	800		600	600
Current	A	41		50	55
Short circuit current (M 6/8.PI)	A / s	720A/1s			
Rated wire size	mm ² / AWG	6 mm ²		8 AWG	8 AWG
Wire stripping length	mm / inches	12mm / .47"			
Recommended torque	Nm / lb.in	0.8-1 Nm / 7.1-8.9 lb.in			

Selection

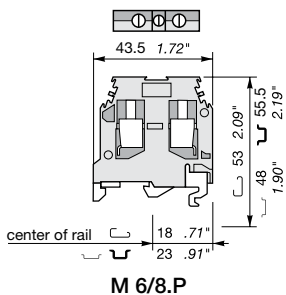
Description	Type	Packaging	Catalog number
Standard block grey	M 6/8	50	011511811
Standard block blue	M 6/8.N	50	012511813
Standard block orange	M 6/8	50	010500422
Standard block yellow	M 6/8	50	010511820
Standard block beige	M 6/8	50	019511812
Standard block black	M 6/8	50	040023915
Standard block red	M 6/8	50	040018621
Standard block white	M 6/8	50	040018722
Standard block green	M 6/8	50	010512822

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
End section	grey FEM6 2.8 mm	20	011836816
	blue FEM6 2.8 mm	20	012836810
	orange FEM6 2.8 mm	20	010312616
	yellow FEM6 2.8 mm	20	010306221
	green FEM6 2.8 mm	20	010312515
	white FEM6 2.8 mm	20	010331220
	beige FEM6 2.8 mm	20	019836817
	black FEM6 2.8 mm	20	010700525
Separator end section	grey SCF6 3 mm	20	011870703
Assembled jumper bar	2 poles BJMI8 41 A	10	017666916
(with IP20 protection)	3 poles BJMI8 41 A	10	017667013
	4 poles BJMI8 41 A	10	017667100
	5 poles BJMI8 41 A	10	017667201
	10 poles BJMI8 41 A	10	017667302



M 6/8.P - 6 mm² ground block with rail contact - 8 mm .315" spacing



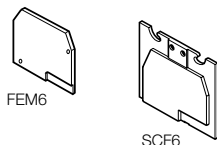
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.5 - 10 mm ²		22-8 AWG	24-8 AWG
mm ² / AWG	Stranded	0.5 - 6 mm ²			
Short circuit current (M 6/8.PI)	A / s	720A/1s			
Rated wire size	mm ² / AWG	6 mm ²		8 AWG	8 AWG
Wire stripping length	mm / inches	12mm / .47"			
Recommended torque	Nm / lb.in	0.8-1 Nm / 7.1-8.9 lb.in			

Selection

Description	Type	Packaging	Catalog number
Ground block green/yellow	M 6/8.P	50	016511417
Mounting on rail DIN 3 without screw			
Ground block green/yellow	D 6/8.P	50	016583021

Accessories

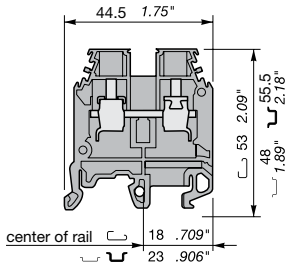
Description	Type	Packaging	Catalog number
End section	yellow FEM6 2.8 mm	20	010306221
Separator end section	grey SCF6 3 mm	20	011870703



Feed through and ground terminal blocks

Screw clamp, DIN 1-3

M 10/10 - 10 mm² blocks - 10 mm .394" spacing



M 10/10

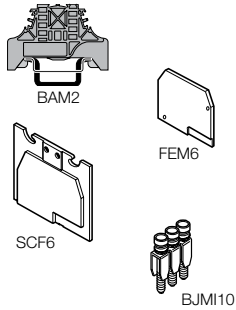
Characteristics	IEC		UL	CSA
	NFC	DIN		
Wire size	Solid	0.5 - 16 mm ²	20-6 AWG	18-6 AWG
mm ² / AWG	Stranded	0.5 - 10 mm ²		
Voltage	V	800	600	600
Current	A	57	65	70
Short circuit current (M 10/10.PI)	A / s	1200A/1s		
Rated wire size	mm ² / AWG	10mm ²	6 AWG	6 AWG
Wire stripping length	mm / inches		12 mm / .47"	
Recommended torque	Nm / lb.in	1.2-1.4 Nm / 10.6-12.4 lb.in		

Selection

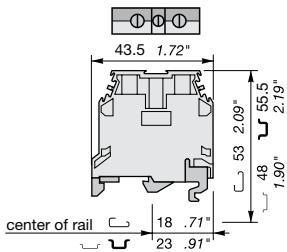
Description	Type	Packaging	Catalog number
Standard block grey	M 10/10	50	011512017
Standard block blue	M 10/10.N	50	012512011
Standard block yellow	M 10/10	50	010512026
Standard block beige	M 10/10	50	019512010
Standard block black	M 10/10	50	040018803
Standard block red	M 10/10	50	040018904
Standard block white	M 10/10	50	040019001

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
End section	grey FEM6 2.8 mm	20	011836816
	blue FEM6 2.8 mm	20	012836810
	orange FEM6 2.8 mm	20	010312616
	yellow FEM6 2.8 mm	20	010306221
	green FEM6 2.8 mm	20	010312515
	white FEM6 2.8 mm	20	010331220
	black FEM6 2.8 mm	20	010700525
	beige FEM6 2.8 mm	20	019836817
Separator end section	grey SCF6 3 mm	20	011870703
Assembled jumper bar	2 poles BJMI10 57 A	10	017667504
(with IP20 protection)	3 poles BJMI10 57 A	10	017667605
	4 poles BJMI10 57 A	10	017667706
	5 poles BJMI10 57 A	10	017667817
	10 poles BJMI10 57 A	10	017667910



M 10/10.P - 10 mm² ground / block with rail contact - 10 mm .394" spacing



M 10/10.P

Characteristics	IEC		UL	CSA
	NFC	DIN		
Wire size	Solid	0.5 - 16 mm ²	20-6 AWG	18-6 AWG
mm ² / AWG	Stranded	0.5 - 10 mm ²		
Short circuit current	A / s	1200A/1s		
Rated wire size	mm ² / AWG	10mm ²	6 AWG	6 AWG
Wire stripping length	mm / inches		12 mm / .47"	
Recommended torque	Nm / lb.in	1.2-1.4 Nm / 10.6-12.4 lb.in		

Selection

Description	Type	Packaging	Catalog number
Ground block green/yellow	M 10/10.P	50	016511510

Accessories

Description	Type	Packaging	Catalog number
Separator end section	grey SCF6 3 mm	20	011870703



Feed through and ground terminal blocks

Screw clamp, DIN 1-3

M 16/12 - 16 mm² blocks - 12 mm .473" spacing

Characteristics

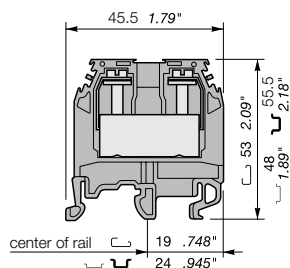
		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.5 - 25 mm ²		18-6 AWG	8-4 AWG
mm ² / AWG	Stranded	0.5 - 16 mm ²			
Voltage	V	800		600	600
Current	A	86		85	100
Short circuit current (M 16/12.PI)	A / s	1920A/1s			
Rated wire size	mm ² / AWG	16mm ²		6 AWG	4 AWG
Wire stripping length	mm / inches			14 mm / .55"	
Recommended torque	Nm / lb.in			1.2-1.4 Nm / 10.6-12.4 lb.in	

Selection

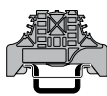
Description	Type	Packaging	Catalog number
Standard block grey	M 16/12	50	011512914
Standard block blue	M 16/12.N	50	012512916
Standard block yellow	M 16/12	50	010512923
Standard block beige	M 16/12	50	019512915
Standard block black	M 16/12	20	040019126
Standard block red	M 16/12	20	040019227
Standard block white	M 16/12	20	040019320

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
End section	grey FEM12 3 mm	20	011861801
	blue FEM12 3 mm	20	012861803
	yellow FEM12 3 mm	20	010306524
	beige FEM12 3 mm	20	019861802
Separator end section	grey SCF12 3 mm	20	011870703
Assembled jumper bar (with IP20 protection)	2 poles BJMI12 76 A	10	017962606
	3 poles BJMI12 76 A	10	017962810
	4 poles BJMI12 76 A	10	017962911
	5 poles BJMI12 76 A	10	017963016
	10 poles BJMI12 76 A	10	017963103



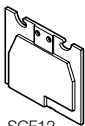
M 16/12



BAM2



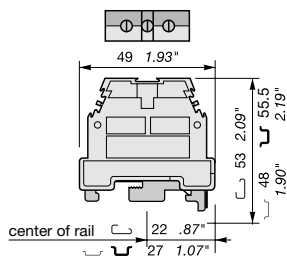
FEM12



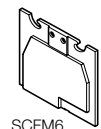
SCF12



BJMI12



M 16/12.P



SCFM6

M 16/12.P - 16 mm² ground block with rail contact - 12 mm .473" spacing

Characteristics

		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	4 - 25 mm ²		14-4 AWG	10-6 AWG
mm ² / AWG	Stranded	4 - 16 mm ²			
Short circuit current	A / s	1920A/1s			
Rated wire size	mm ² / AWG	16mm ²		4 AWG	6 AWG
Wire stripping length	mm / inches			14 mm / .55"	
Recommended torque	Nm / lb.in			1.2-1.4 Nm / 10.6-12.4 lb.in	

Selection

Description	Type	Packaging	Catalog number
Ground block green/yellow	M 16/12.P	20	016513023

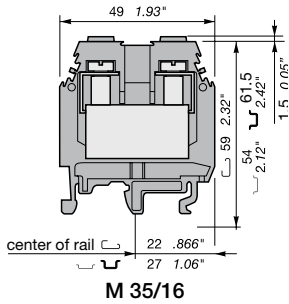
Accessories

Description	Type	Packaging	Catalog number
Separator end section	grey SCFM6 3 mm	20	011482505

Feed through and ground terminal blocks

Screw clamp, DIN 1-3

M 35/16 - 35 mm² blocks - 16 mm .630" spacing



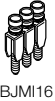
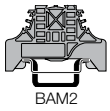
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	1 - 50 mm ²		10-0 AWG	10-0 AWG
mm ² / AWG	Stranded	1 - 35 mm ²			
Voltage	V	800		600	600
Current	A	125		150	140
Short circuit current (M 35/16.P)	A / s	4200A/1s			
Rated wire size	mm ² / AWG	35 mm ²		0 AWG	0 AWG
Wire stripping length	mm / inches			17 mm / .669"	
Recommended torque	Nm / lb.in			2.8-3 Nm / 24.9-26.7 lb.in	

Selection

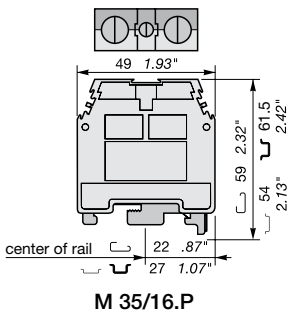
Description	Type	Packaging	Catalog number
Standard block grey	M 35/16	20	011512407
Standard block blue	M 35/16.N	20	012512401
Standard block yellow	M 35/16	20	010512416
Standard block beige	M 35/16	20	019512400
Standard block black	M 35/16	20	040019421
Standard block red	M 35/16	20	040019522
Standard block white	M 35/16	20	040019623

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
Assembled jumper bar 2 poles	BJMI16 110 A	10	020621700
(with IP20 protection) 3 poles	BJMI16 110 A	10	020621811
4 poles	BJMI16 110 A	10	020621912
5 poles	BJMI16 110 A	10	020622017
10 poles	BJMI16 110 A	10	020622104



M 35/16.P - 35 mm² ground block with rail contact - 16 mm .630" spacing



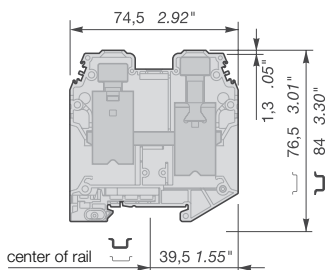
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	4 - 50 mm ²		10-0 AWG	10-0 AWG
mm ² / AWG	Stranded	4 - 35 mm ²			
Short circuit current	A / s	4200A/1s			
Rated wire size	mm ² / AWG	35 mm ²		0 AWG	0 AWG
Wire stripping length	mm / inches			17 mm / .67"	
Recommended torque	Nm / lb.in			2.8-3 Nm / 24.9-26.7 lb.in	

Selection

Description	Type	Packaging	Catalog number
Ground block green/yellow	M 35/16.P	20	016511114

Feed through and ground terminal blocks

Screw clamp, 𐀀 𐀁 DIN 1-3

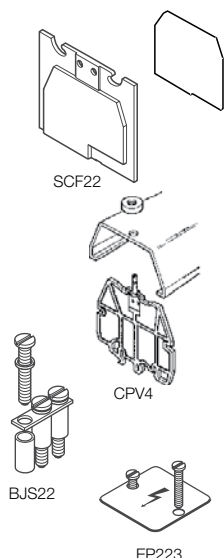


D 70/22 - 22 mm² blocks - 22 mm .868" spacing

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	16 - 95 mm ²			
mm ² / AWG	Stranded	16 - 70 mm ²		2-0000 AWG	2-0000 AWG
Voltage	V	1000		600	600
Current	A	192		159	159
Short circuit current (M 35/16.PI)	A / s	4200A/1s			
Rated wire size	mm ² / AWG	70 mm ²		0 AWG	0 AWG
Wire stripping length	mm / inches			25 mm ²	
Recommended torque	Nm / lb.in			6-7 Nm / 53.4-62.3 lb.in	

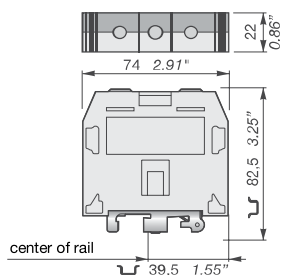
Selection

Description	Type	Packaging	Catalog number
Standard block grey	D 70/22	10	1SNA400305R1000
Standard block blue	D 70/22.N	10	1SNA400306R1100
Standard block yellow	D 70/22	10	1SNA400789R0000



Accessories

Description	Type	Packaging	Catalog number		
End stop	Closed block	-	-		
grey	SCF22	th. 3.0 mm	20	011385116	
Separator end section	beige	SCF22 V0	th. 3.0 mm	20	1SNA193851R1700
Separator end section	grey	SCFCV4 ①	th. 3.0 mm	10	011679713
for cover CPV	beige	SCFCV4 V0 ①	th. 3.0 mm	10	1SNA196797R1400
Protective cover		CPV4 (for SCFCV4...)		1	017679121
Jumper bar not assembled	BJS22 ②	2 poles	10	017331621	
	BJS22 ②	3 poles	10	017331722	
	BJS22 ②	5 poles	10	017331803	
	BJS22 ②	10 poles	10	017331904	
Screw for BJS		VSJ51		20	017332001
Washer for BJS		RDJ51		20	017333120
Protection label		EP223	3 blocks	10	017332724
		EP224	4 blocks	10	017332805
Screw for protection label		VSP22		20	1SNA400252R1200



D 70/22.P - 22 mm² blocks - 22 mm .866" spacing

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	16 - 95 mm ²		4-00 AWG	4-00 AWG
mm ² / AWG	Stranded	16 - 70 mm ²			
Voltage	V	1000		600	600
Current	A	232			
Short circuit current (M 35/16.PI)	A / s	8400A/1s		8088 A / 1s	8088 A / 1s
Rated wire size	mm ² / AWG	70 mm ²		0 AWG	0 AWG
Wire stripping length	mm / inches			25 mm	
Recommended torque	Nm / lb.in			6-7 Nm / 52-61 lb.in	

Selection

Description	Type	Packaging	Catalog number
Green/yellow	D 70/22.P	10	1SNA400772R1300

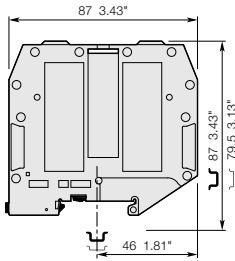
Accessories

Description	Type	Packaging	Catalog number
End section	yellow	Closed block	-
Separator end section	grey	Closed block	-

① End sections and circuit separators snapped on rails.
 ② Use of these accessories requires the user to cut out the partition.

Feed through and ground terminal blocks

Screw clamp, DIN 1-3



D 95/26 - 26 mm² blocks - 26 mm 1.02" spacing

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Solid	35 - 120 mm ²		2-0000 AWG	2-0000 AWG
	Stranded	35 - 95 mm ²			
Voltage	V	1000		600	600
Current	A	232		230	230
Short circuit current (M 35/16.PI)	A / s	4200A/1s			
Rated wire size	mm ² / AWG	95 mm ²		0 AWG	0 AWG
Wire stripping length	mm / inches			26 mm	
Recommended torque	Nm / lb.in			9.25 Nm / 81.7 lb.in	

Selection

Description	Type	Packaging	Catalog number
Standard block grey	D95/26	10	1SNA400370R2400
Standard block blue	D95/26.N	10	1SNA400371R1100
Standard block yellow	D95/26.YL	10	1SNA400791R0000

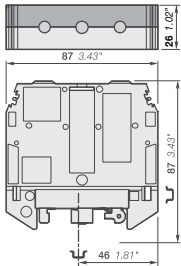


JB26-2

Accessories

Description	Type	Packaging	Catalog number
End stop	Closed block	-	-
Jumper bar	JB26-2 ⊕ 2 poles	5	1SNK926302R0000
	JB26-3 ⊕ 3 poles	5	1SNK926303R0000
	JB26-5 ⊕ 5 poles	5	1SNK926305R0000
	JB26-10 ⊕ 10 poles	5	1SNK926310R0000

10



D 95/26.P - 26 mm² blocks - 26 mm 1.02" spacing

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Solid	35 - 120 mm ²		2-0000 AWG	2-0000 AWG
	Stranded	35 - 95 mm ²			
Voltage	V	1000		600	600
Current	A	232			
Short circuit current (M 35/16.PI)	A / s	11400A/1s		12840 A/1s	12840 A/1s
Rated wire size	mm ² / AWG	95 mm ²		0 AWG	0 AWG
Wire stripping length	mm / inches			26 mm	
Recommended torque	Nm / lb.in			9.25 Nm / 81.7 lb.in	

Selection

Description	Type	Packaging	Catalog number
Green/yellow	D95/26.P	10	1SNA400620R1700

Accessories

Description	Type	Packaging	Catalog number
End section yellow	Closed block	-	-
Separator end section grey	Closed block	-	-

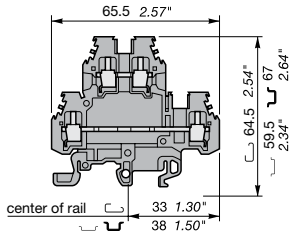
⊕ Use of these accessories requires the user to cut out the partition.

Feed through terminal blocks

Double-deck

Screw clamp, 2 1/2 DIN 1-3

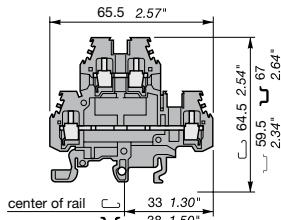
MA 2,5/5.D2 - 2.5 mm² blocks - 5 mm .200" spacing



MA 2,5/5.D2

Characteristics	IEC		UL	CSA
	NFC	DIN		
Wire size	Solid	0.2 - 4 mm ²	22-12 AWG	20-12 AWG
mm ² / AWG	Stranded	0.22 - 2.5 mm ²		
Voltage	V	630	300	300
Current	A	24	20	25
Rated wire size	mm ² / AWG	2.5 mm ²	12 AWG	12 AWG
Wire stripping length	mm / inches	9 mm / .354"		
Recommended torque	Nm / lb.in	0.4-0.6 Nm / 3.5-5.3 lb.in		

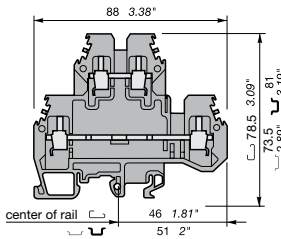
M 4/6.D2 - 4 mm² blocks - 6 mm .238" spacing



M 4/6.D2

Characteristics	IEC		UL	CSA
	NFC	DIN		
Wire size	Solid	0.2 - 4 mm ²	22-12 AWG	24-12 AWG
mm ² / AWG	Stranded	0.22 - 4 mm ²		
Voltage	V	800	600	300
Current	A	32	20	25
Rated wire size	mm ² / AWG	4 mm ²	12 AWG	12 AWG
Wire stripping length	mm / inches	8.5 mm / .33"		
Recommended torque	Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in		

M 6/8.D2 - 6 mm² blocks - 8 mm .315" spacing



M 6/8.D2

Characteristics	IEC		UL	CSA
	NFC	DIN		
Wire size	Solid	0.5 - 10 mm ²	18-8 AWG	8 AWG
mm ² / AWG	Stranded	0.5 - 6 mm ²		
Voltage	V	800	600	600
Current	A	41	50	45
Rated wire size	mm ² / AWG	6 mm ²	8 AWG	8 AWG
Wire stripping length	mm / inches	12 mm / .47"		
Recommended torque	Nm / lb.in	0.8-1 Nm / 7.1-8.9 lb.in		

MA 2,5/5.D2 Selection

Description	Type	Packaging	Catalog number
Standard block grey	MA 2,5/5.D2	50	011549013
Standard block blue	MA 2,5/5.D2.N	50	012549015
Standard block beige	MA 2,5/5.D2	50	019549014

M 4/6.D2 Selection

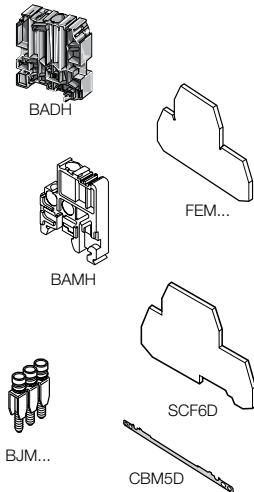
Standard block grey	M 4/6.D2	50	011527122
Standard block beige	M 4/6.D2	50	019527123
Standard block green	M 4/6.D2	50	010504421
Standard block white	M 4/6.D2	50	010504623
Standard block black	M 4/6.D2	50	010504724
Standard block red	M 4/6.D2	50	010504805
Standard block orange	M 4/6.D2	50	010504906
Standard block yellow	M 4/6.D2	50	010504522

M 6/8.D2 Selection

Standard block grey	M 6/8.D2	50	011550112
Standard block beige	M 6/8.D2	50	019550113

Accessories

Description	Type	Packaging	Catalog number
End stop	BADH 12 mm	50	011690027
	BAMH 9.1 mm	50	011483600
End section	grey FEM6D 1 mm ⊕	20	011849923
	blue FEM6D 1 mm ⊕	20	012849925
	grey FEM8D1 1 mm ⊕	20	011665625
	grey FEM8D2 4 mm ⊕	20	011665726
Separator end section	grey SCF6D 1 mm ⊕	20	011849517
Assembled jumper bar (with IP20 protection)	2 poles BJMI5D 24 A ⊕	10	017673621
	3 poles BJMI5D 24 A ⊕	10	017673722
	4 poles BJMI5D 24 A ⊕	10	017673803
	5 poles BJMI5D 24 A ⊕	10	017673904
	10 poles BJMI5D 24 A ⊕	10	017674011
	Assembled jumper bar (with IP20 protection)	2 poles BJMI6D 32 A ⊕	10
3 poles BJMI6D 32 A ⊕		10	017966921
4 poles BJMI6D 32 A ⊕		10	017967026
5 poles BJMI6D 32 A ⊕		10	017967113
10 poles BJMI6D 32 A ⊕		10	017967214
Assembled jumper bar (with IP20 protection)		2 poles BJMI8 41 A ⊕	10
	3 poles BJMI8 41 A ⊕	10	017667013
	4 poles BJMI8 41 A ⊕	10	017667100
	5 poles BJMI8 41 A ⊕	10	017667201
	10 poles BJMI8 41 A ⊕	10	017667302
	Shield connector	CBM5D 0.5 mm ⊕	50



⊕ Only for MA 2,5/5.D2...
 ⊕ Only for M 4/6.D2...
 ⊕ Only for M 6/8.D2...

Feed through terminal blocks

Triple - deck

Screw clamp,  DIN 3

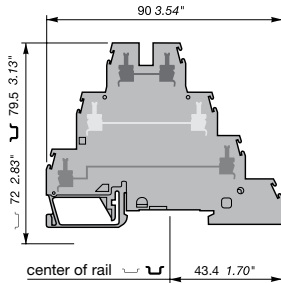
D 4/6.T3 - 4 mm² blocks - 6 mm .238" spacing

Characteristics

		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.2 - 4 mm ²		22-12 AWG	22-12 AWG
mm ² / AWG	Stranded	0.22 - 4 mm ²			
Voltage	V	500		300	300
Current	A	32		20	20
Rated wire size	mm ² / AWG	4 mm ²		12 AWG	12 AWG
Wire stripping length	mm / inches	9.5 mm / .37"			
Recommended torque	Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in			

Selection – No end section needed (closed block)

Description	Type	Packaging	Catalog number
Standard block grey	D 4/6.T3	25	029968301



M 4/6.T3

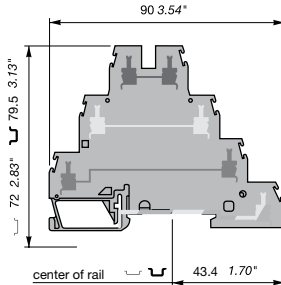
M 4/6.T3.P - 4 mm² block - 6 mm .238" spacing

Characteristics

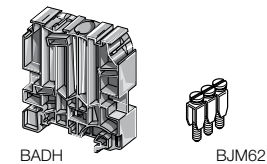
		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.2 - 4 mm ²		22-12 AWG	22-12 AWG
mm ² / AWG	Stranded	0.22 - 4 mm ²			
Voltage	V	500		300	300
Current	A	32		20	20
Short circuit current	A/s	480 A/1s			
Rated wire size	mm ² / AWG	4 mm ²		12 AWG	12 AWG
Wire stripping length	mm / inches	9.5 mm / .37"			
Recommended torque	Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in			

Selection – No end section needed (closed block)

Description	Type	Packaging	Catalog number
Standard block grey	M 4/6.T3.P	25	029968402



M 4/6.T3.P



Accessories

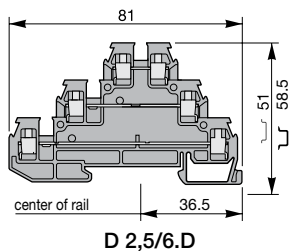
Description	Type	Packaging	Catalog number
End stop	BADH 12 mm	50	011690027
Assembled jumper bar (without IP20 protection)	2 poles BJM62 41 A	10	017321726
	3 poles BJM62 41 A	10	017321807
	4 poles BJM62 41 A	10	017321900
	5 poles BJM62 41 A	10	017322122
	10 poles BJM62 41 A	10	017322627

Three level sensor

Terminal blocks without ground connection

Screw clamp, U DIN 3

D 2,5/6.D - 2.5 mm² blocks - 6 mm .238" spacing



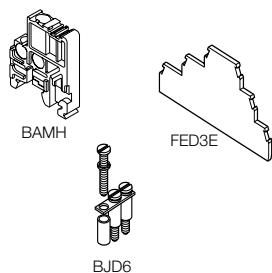
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.2 - 2.5 mm ²		20-12 AWG	22-14 AWG
mm ² / AWG	Stranded	0.22 - 2.5 mm ²			
Voltage	V	380 Gr.c		300	300
Current	A	22		26	20
Rated wire size	mm ² / AWG	2.5 mm ²		12 AWG	14 AWG
Wire stripping length	mm / inches	6 mm / .24"			
Recommended torque	Nm / lb.in	0.4-0.6 Nm / 3.5-5.3 lb.in			

Selection

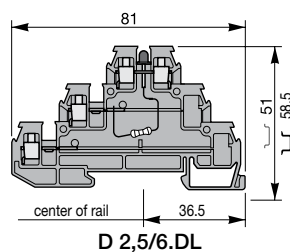
Description	Type	Packaging	Catalog number
Three level block for sensor grey	D 2,5/6	25	011554111

Accessories

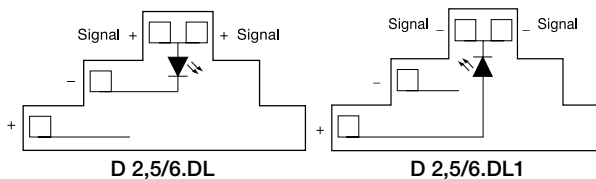
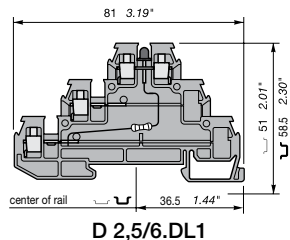
Description	Type	Packaging	Catalog number	
End stop	BAMH 9.1 mm	50	011483600	
End section grey	FED3E 3 mm	20	011677120	
Assembled jumper bar (without IP20 protection)	2 poles	BJD6 22 A	10	017802425
	3 poles	BJD6 22 A	10	017802526
	4 poles	BJD6 22 A	10	017802627
	5 poles	BJD6 22 A	10	017802720
	10 poles	BJD6 22 A	10	017803225



D 2,5/6.DL - 2.5 mm² blocks - 6 mm .238" spacing



Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.2 - 2.5 mm ²		20-12 AWG	22-14 AWG
mm ² / AWG	Stranded	0.22 - 2.5 mm ²			
Voltage	V	380 Gr.c		300 Ⓞ	300 Ⓞ
Current	A	22		26	20
Rated wire size	mm ² / AWG	2.5 mm ²		12 AWG	14 AWG
Wire stripping length	mm / inches	6 mm / .24"			
Recommended torque	Nm / lb.in	0.4-0.6 Nm / 3.5-5.3 lb.in			

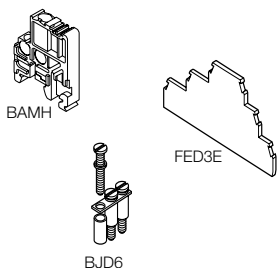


Selection

Description	Type	Packaging	Catalog number
Three level block for sensor with red LED indication grey	D 2,5/6.DL	25	011553705
LED indication grey	D 2,5/6.DL1	25	011553816

Accessories

Description	Type	Packaging	Catalog number	
End stop	BAMH 9.1 mm	50	011483600	
End section grey	FED3E 3 mm	20	011677120	
Assembled jumper bar (without IP20 protection)	2 poles	BJD6 22 A	10	017802425
	3 poles	BJD6 22 A	10	017802526
	4 poles	BJD6 22 A	10	017802627
	5 poles	BJD6 22 A	10	017802720
	10 poles	BJD6 22 A	10	017803225

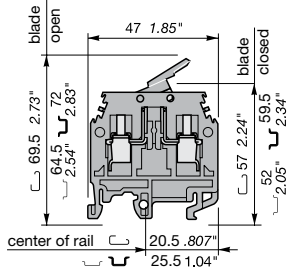


Ⓞ 24 VDC on LED circuit.

Heavy duty switch terminal blocks

Screw clamp,  DIN 1-3

M 6/8.SNB - 6 mm² blocks - 8 mm .315" spacing - blade switching



M 6/8.SNB

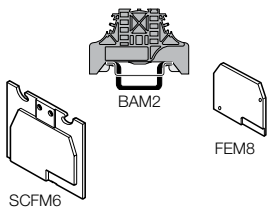
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Solid	0.5 - 10 mm ²		22-8 AWG	20-12 AWG
	Stranded	0.5 - 6 mm ²			
Voltage	V	400		300	300
Current	A	15		20	10
Rated wire size	mm ² / AWG	6mm ²		10 AWG	12 AWG
Wire stripping length	mm / inches	12 mm / .47"			
Recommended torque	Nm / lb.in	0.8-1 Nm / 7.1-8.9 lb.in			

Selection

Description	Type	Packaging	Catalog number
Standard block grey	M 6/8.SNB	50	011568825

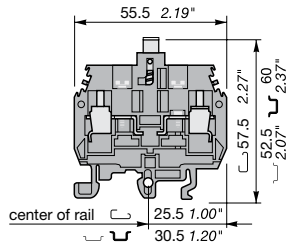
Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
End section	grey FEM8 3 mm	20	011337326
	orange FEM8 3 mm	20	010323002
Separator end section	grey SCFM6 3 mm	20	011482505



10

M 6/8.STP - 6 mm² blocks - 8 mm .315" spacing - push-turn knob switching



M 6/8.STP

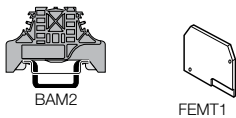
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Solid	0.5 - 10 mm ²		22-8 AWG	8 AWG
	Stranded	0.5 - 6 mm ²			
Voltage	V	500		600	600
Current	A	15		40	15
Rated wire size	mm ² / AWG	6mm ²		8 AWG	8 AWG
Wire stripping length	mm / inches	11 mm / .433"			
Recommended torque	Nm / lb.in	0.8-1 Nm / 7.1-8.9 lb.in			

Selection

Description	Type	Packaging	Catalog number
Yellow plunger	M 6/8.STP	25	011527720
Orange plunger	M 6/8.STP1	25	011552915

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
End section	grey FEMT1 2.8 mm	50	011313702

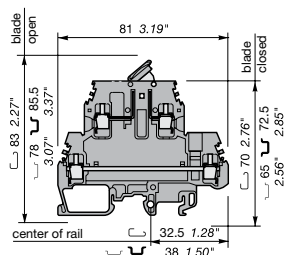


Heavy duty switch and fuse holder terminal blocks

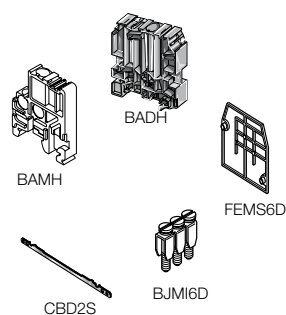
Double-deck

Screw clamp, DIN 1 - DIN 3

M 4/6.D2.SNBT - 4 mm² blocks - 6 mm .238" spacing - blade switch



M 4/6.D2.SNBT



Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Solid	0.5 - 4 mm ²		24-12 AWG	22-12 AWG
	Stranded	0.5 - 4 mm ²			
Voltage	V	400		300	300
Current	A	10		15	15
Rated wire size	mm ² / AWG	4 mm ²		12 AWG	12 AWG
Wire stripping length	mm / inches	9.5 mm / .374"			
Recommended torque	Nm / lb.in	0.5-0.6 Nm / 4.4-5.3 lb.in			

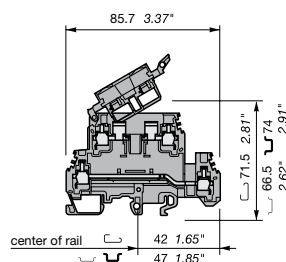
Selection

Description	Type	Packaging	Catalog number
Standard block grey	M 4/6.D2.SNBT	50	011556115

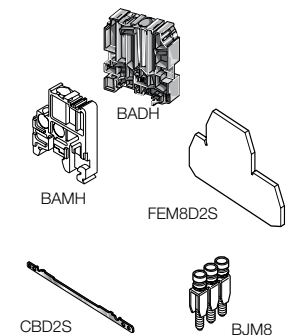
Accessories

Description	Type	Packaging	Catalog number
End stop	BADH 12 mm	50	011690027
	BAMH 9.1 mm	50	011483600
End section grey	FEMS6D 1.5 mm	20	011659105
Assembled jumper bar (without IP20 protection)	2 poles BJM16D 32 A ⊕	10	017966820
	3 poles BJM16D 32 A ⊕	10	017966921
	4 poles BJM16D 32 A ⊕	10	017967026
	5 poles BJM16D 32 A ⊕	10	017967113
	10 poles BJM16D 32 A ⊕	10	017967214
Shield connector	CBD2S	50	017840814

M 4/8.D2.SF - for fuses 5x20 mm .197x.787 in. and 5x25 mm .197x.984 in. - 4 mm² blocks - 8 mm .315" spacing



M 4/8.D2.SF



Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Solid	0.5 - 6 mm ²		24-12 AWG	24-12 AWG
	Stranded	0.5 - 4 mm ²			
Voltage	V	630 ⊕	300 ⊕	300 ⊕	300 ⊕
Current	A	6.3	20	20	20
Rated wire size	mm ² / AWG	4 mm ²	12 AWG	12 AWG	12 AWG
Wire stripping length	mm / inches	9.5 mm / .37"			
Recommended torque	Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in			

Selection

Description	Type	Packaging	Catalog number
Standard block grey	M 4/8.D2.SF	50	011560421
Standard block beige	M 4/8.D2.SF	50	019560422

Accessories

Description	Type	Packaging	Catalog number
End stop	BADH 12 mm	50	011690027
	BAMH 9.1 mm	50	011483600
End section grey	FEM8D2S 1.5 mm	20	011691307
Assembled jumper bar (without IP20 protection)	2 poles BJM8D 41 A ⊕	10	016852005
	3 poles BJM8D 41 A ⊕	10	016852122
	4 poles BJM8D 41 A ⊕	10	016852223
	5 poles BJM8D 41 A ⊕	10	016852824
	10 poles BJM8D 41 A ⊕	10	016897400
Shield connector	CBD2S	50	017840814

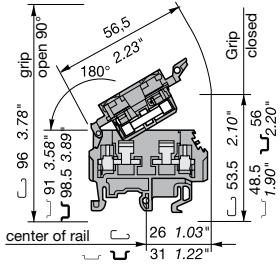
⊕ Lower deck only.
 ⊕ Insulation voltage of terminal block - operating voltage : according to fuse.

Fuse holder terminal blocks

5x20 mm .197x.787 in. and 5x25 mm .197x.984 in.

Screw clamp,  DIN 1 - DIN3

M 4/8.SF- 4 mm² blocks - 8 mm .315" spacing



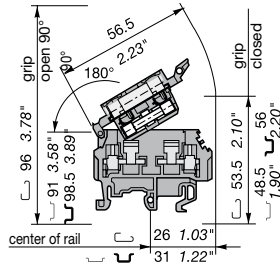
M 4/8.SF

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.5 - 6 mm ²		22-12 AWG	22-12 AWG
mm ² / AWG	Stranded	0.5 - 4 mm ²			
Voltage	V	630 ⊕		600 ⊕	250
Current	A	6.3		10	10
Rated wire size	mm ² / AWG	4 mm ²		12 AWG	12 AWG
Wire stripping length	mm / inches	9.5 mm / .37"			
Recommended torque	Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in			

Selection

Description	Type	Packaging	Catalog number
Standard block grey	M 4/8.SF	50	011565725
Block with test socket Ø2 mm grey	M 4/8.SF	50	011566222
Standard block orange	M 4/8.SF2	50	010513511
Standard block beige	M 4/8.SF	50	019565726

M 4/8.SFL - 4 mm² blocks - 8 mm .315" spacing



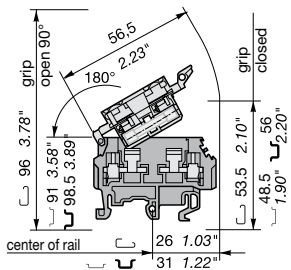
M 4/8.SFL

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.5 - 6 mm ²		22-12 AWG	22-12 AWG
mm ² / AWG	Stranded	0.5 - 4 mm ²			
Voltage	V	400		600	250
Current	A	6.3		10	10
Rated wire size	mm ² / AWG	4 mm ²		12 AWG	12 AWG
Wire stripping length	mm / inches	9.5 mm / .37"			
Recommended torque	Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in			

Selection

Description	Type	Packaging	Catalog number
Block w/ fusion indicator 110-230V neon grey	M 4/8.SFL	50	011566121
Block with fusion indicator 24V LED grey	M 4/8.SFD	50	011566323

M 4/8.SN - 4 mm² blocks - 8 mm .315" spacing



M 4/8.SN

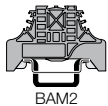
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.5 - 6 mm ²		22-12 AWG	24-12 AWG
mm ² / AWG	Stranded	0.5 - 4 mm ²			
Voltage	V	630 ⊕		600	250
Current	A	6.3		10	10
Rated wire size	mm ² / AWG	4 mm ²		12 AWG	12 AWG
Wire stripping length	mm / inches	9.5 mm / .37"			
Recommended torque	Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in			

Selection

Description	Type	Packaging	Catalog number
Standard block grey body/blue grip	M 4/8.SN	50	011565907

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
End section	grey FEM8S 1.5 mm	20	011695115
	orange FEM8S 1.5 mm	20	010392315

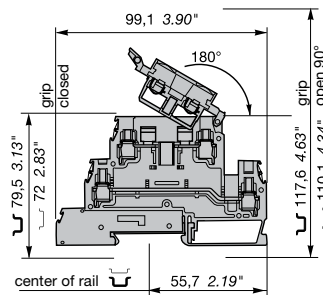


⊕ Insulation voltage of terminal block - operating voltage : according to fuse.
 ⊕ 400 V for block M 4/6.SFT

Fuse holder terminal blocks

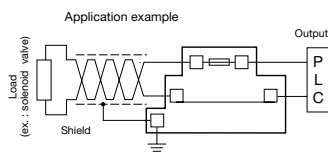
Double deck for 5x20 and 5 x 25mm fuses

Screw clamp, DIN 1 - DIN3



D 4/8.D2.P.SF

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Comp. clamp feed through	Solid	0.5 - 6 mm ²	20-10 AWG	20-10 AWG
		Stranded	0.5 - 4 mm ²	20-12 AWG	20-12 AWG
Comp. clamp ground	Solid		0.2 - 4 mm ²	20-10 AWG	20-10 AWG
	Stranded		0.22 - 4 mm ²	20-12 AWG	20-12 AWG
Voltage		V	300 Ⓞ	300 Ⓞ	300 Ⓞ
Current		A	6.3	6.3	6.3
Rated wire size		mm ² / AWG	4 mm ²	12 AWG	12 AWG
Wire stripping length		mm / inches		9.5 mm / .37"	
Recommended torque		Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in		

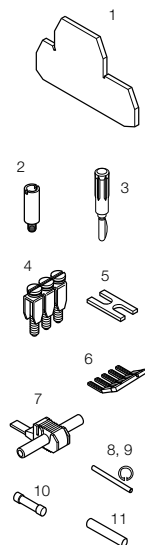


Selection

Description	Type	Packaging	Catalog number
Grey	D 4/8.D2.P.SF	25	040027020
Grey Neon 110-230 V	D 4/8.D2.P.SFL	25	040027115
Grey LED 24 V	D 4/8.D2.P.SFD	25	040027216

Accessories

Description	Type	Packaging	Catalog number
1 End section grey V0	FEM8D2S 1.5 mm	20	040027317
2 Test socket	AL2 Ⓞ DIA. 2mm	50	016304321
	AL3 Ⓞ DIA. 3mm	50	016326100
	AL4 Ⓞ DIA. 4mm	50	016326201
3 Test plug	FC2 DIA. 2mm	100	000786526
	FC4 DIA. 4mm	10	016786001
4 Assembled jumper bar (without IP20 protection)	2 poles BJM8 Ⓞ 41 A	10	016852005
	3 poles BJM8 Ⓞ 41 A	10	016852122
	4 poles BJM8 Ⓞ 41 A	10	016852223
	5 poles BJM8 Ⓞ 41 A	10	016852324
	10 poles BJM8 Ⓞ 41 A	10	016897400
5 Connector plate	EL6 35 A	10	017352721
6 Comb-type jumper bar 10 poles	PC81 35 A	10	017352311
7 IDC jumper	AD2,5 24 A	50	011420520
8 Assembly rod	2 poles TGA8	10	016867211
	3 poles TGA8	10	016867312
	4 poles TGA8	10	016867413
9 Assembly ring	ANT	10	016867514
10 Fuse 5 x 20	250 V FU520 0,5 A	10	000828815
	250 V FU520 1 A	10	000829013
	250 V FU520 2 A	10	000829100
	250 V FU520 3,15 A	10	000828916
	250 V FU520 5 A	10	000829201
	250 V FU520 6,3 A	10	000829201
11 Fuse 5 x 25	250 V FU525 1,6 A	10	016754622
	250 V FU525 2 A	10	016754723
	250 V FU525 2,5 A	10	016754804
	250 V FU525 4 A	10	016754905
	250 V FU525 6,3 A	10	016755002
11 Disconnect link bar	CN5	10	017937116



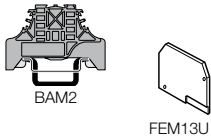
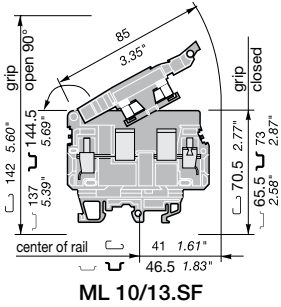
① Insulation voltage of terminal block - operating voltage : according to fuse.
 Ⓞ Only for lower deck.

Fuse holder terminal blocks & heavy duty switch

Terminal block with contact control pull lever

Screw clamp, C U DIN 1-3

ML 10/13.SF - for fuses 6.35x25.4 mm 1/4x1 in. and 6.35x32 mm 1/4x1 1/4 in. - 10 mm² blocks - 13 mm .512" spacing



Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.5 - 16 mm ²		22-10 AWG	22-8 AWG
mm ² / AWG	Stranded	0.5 - 10 mm ²			
Voltage	V	800 0		600	600
Current	A	16		25	25
Rated wire size	mm ² / AWG	10 mm ²		10 AWG	8 AWG
Wire stripping length	mm / inches	12 mm / .472"			
Recommended torque	Nm / lb.in	1.2-1.4 Nm / 10.6-12.3 lb.in			

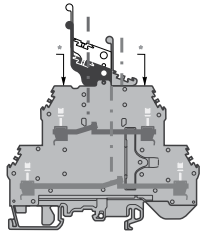
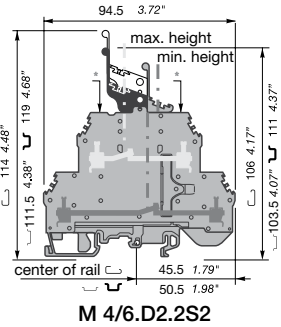
Selection

Description	Type	Packaging	Catalog number	
Standard block (no indicator)	black	ML 10/13.SF	20	019909513
Block with fusion indicator (Neon, 110 - 230 V)			20	019916800

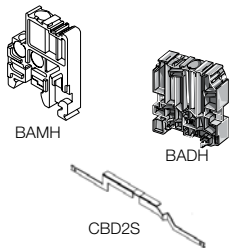
Other voltages available. Contact ABB.

Accessories

Description	Type	Packaging	Catalog number		
End stop	BAM2	9.9 mm	50	020635116	
End section	black	FEM13U	1.5 mm	10	019963524



M 4/6.D2.2S2.T



M 4/6.D2.2S2... - 4 mm² blocks - 6 mm .238" spacing

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.2 - 4 mm ²		24-10 AWG	24-10 AWG
mm ² / AWG	Stranded	0.2 - 4 mm ²			
Voltage	V	500		300	300
Current	A	10		10	10
Rated wire size	mm ² / AWG	4 mm ²		10 AWG	10 AWG
Wire stripping length	mm / inches	9.5 mm / .374"			
Recommended torque	Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in			

Selection

Description	Type	Packaging	Catalog number
Standard block grey	M 4/6.D2.2S2	25	019944425
Block grey with 4 tests DIA. 2 mm)	M 4/6.D2.2S2.T	25	019944801

Accessories

Description	Type	Packaging	Catalog number	
End stop	BADH	12 mm	50	011690027
	BAMH	9.1 mm	50	011483600
Shield connector	CBD2S		50	017840814

Fuse holder terminal blocks

For 10x38mm and Class CC fuse

Screw clamp, DIN 1-3



1SNA400728R1700

The new range of modular fuse holders provides:



- Safe operation,
- Fast and simple multiple pole assembly
- Quick fuse installation and replacement
- Blown fuse indicator for quick identification of fuse failures.

The Class CC fuse versions are rejection style with high breaking capacity (200 KA).

Modular fuse holders provide a wide fuse contact surface and have electrolytic silver plated copper contacts to ensure minimal contact resistance and reliable operation. The insulation material is UL94 V0.

Technical specifications

Wire size range	8-18 AWG
Class CC fuses	
Rated current	30 A
Rated voltage	600 V
10x38 fuses	
Rated current	32 A
Rated voltage	690 V
Blown fuse indicator	120-690 VAC

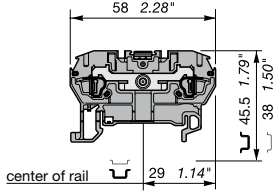
Designation	Catalog numbers	Description
For Class CC fuses		
DL16/17,5.SF.CC1	1SNA400728R1700	1 pole
DL16/17,5.SF.CC2	1SNA400729R1000	2 poles 
DL16/17,5.SF.CC3	1SNA400730R1500	3 poles
DL16/17,5.SFL.CC1	1SNA400731R0200	1 pole with blown fuse indicator
DL16/17,5.SFL.CC2	1SNA400747R1200	2 poles with blown fuse indicator
DL16/17,5.SFL.CC3	1SNA400748R2300	3 poles with blown fuse indicator
For 10x38 fuses ①		
DL16/17,5.SF	1SNA400732R0300	1 pole 
DL16/17,5.SF2	1SNA400739R1200	2 poles
DL16/17,5.SF3	1SNA400741R1400	3 poles
DL16/17,5.SN	1SNA400734R0500	Neutral pole
DL16/17,5.SFL	1SNA400733R0400	1 pole with blown fuse indicator
DL16/17,5.SFL2	XUST03370	2 poles with blown fuse indicator
DL16/17,5.SFL3	XUST03371	3 poles with blown fuse indicator
Accessories		
VRDL	1SNA400735R0600	Assembly clip
TGDL	1SNA400736R0700	Assembly rod

① This item will replace our current DL 10/17 (1SNA116438R1300 and 1SNA116439R1400)

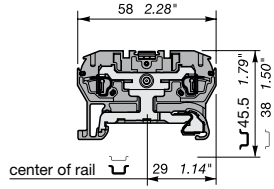
Feed through and ground terminal blocks

Spring clamp, U DIN 3

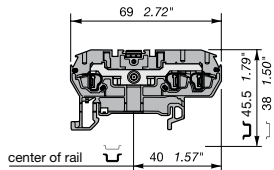
D 2,5/5...L - 2.5 mm² blocks - 5 mm .198" spacing



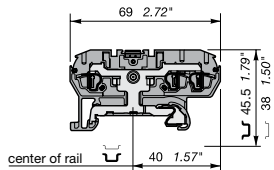
D 2,5/5.2L



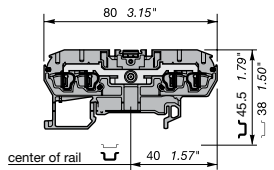
D 2,5/5.P.2L



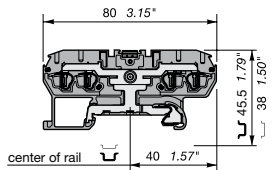
D 2,5/5.3L



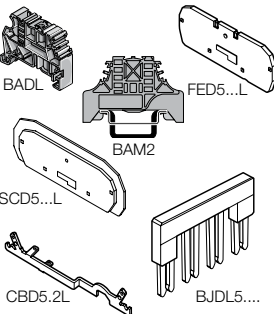
D 2,5/5.P.3L



D 2,5/5.4L



D 2,5/5.P.4L



Characteristics

		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Solid	0.12 - 4 mm ²		26-12 AWG	26-12 AWG
	Stranded	0.12 - 2.5 mm ²			
	Isolated ferrules	0.5 - 2.5 mm ²			
Voltage	V	600		600	600
Current	A	24		15	15
Short circuit current (D 2,5/5.Pl...L)	A / s	300 A/1s			
Short circuit current (D 2,5/5.P...L)	A / s	300 A/1s			
Rated wire size	mm ² / AWG	2.5 mm ²		12 AWG	12 AWG
Wire stripping length	mm / inches			9.5 mm / .37"	

D 2,5/5.2L Selection

Description	Type	Packaging	Catalog number
Standard block grey	D 2,5/5.2L	50	029002127
Standard block blue	D 2,5/5.N.2L	50	029002321
Standard block yellow	D 2,5/5.2L	50	029002725
Standard block orange	D 2,5/5.2L	50	029002220
Standard block red	D 2,5/5.2L	50	029002422
Standard block black	D 2,5/5.2L	50	029002624
Standard block green	D 2,5/5.2L	50	029002806
Standard block white	D 2,5/5.2L	50	029002523
Standard block brown	D 2,5/5.2L	50	029046400
Standard block violet	D 2,5/5.2L	50	029046501
Ground block green/yellow	D 2,5/5.P.2L ①	50	029002907

D 2,5/5.3L Selection

Standard block grey	D 2,5/5.3L	50	029003121
Standard block blue	D 2,5/5.N.3L	50	029003323
Standard block orange	D 2,5/5.3L	50	029003222
Standard block red	D 2,5/5.3L	50	029003424
Standard block black	D 2,5/5.3L	50	029003626
Standard block brown	D 2,5/5.3L	50	1SNS43000Z1081
Standard block white	D 2,5/5.3L	50	029003525
Standard block yellow	D 2,5/5.3L	50	029003727
Ground block green/yellow	D 2,5/5.P.3L ①	50	029003901

D 2,5/5.4L Selection

Standard block grey	D 2,5/5.4L	50	029001125
Standard block blue	D 2,5/5.N.4L	50	029001327
Standard block orange	D 2,5/5.4L	50	029001226
Ground block green/yellow	D 2,5/5.P.4L ①	50	029001905

Accessories

Description	Type	Packaging	Catalog number
End stop (light grey)	(screwless) BADL 9 mm	50	039990302
	(with screw) BAM2 9.9 mm	50	039996701
End section	grey FED5.2L 2.5 mm ②	20	029106124
	orange FED5.2L 2.5 mm ②	20	029106225
	grey FED5.3L 2.5 mm ③	20	029105122
	orange FED5.3L 2.5 mm ③	20	029105223
	grey FED5.4L 2.5 mm ④	20	029104120
	orange FED5.4L 2.5 mm ④	20	029104221
Separator	orange SCD5.2L 2.5 mm ②	20	029135204
	grey SCD5.2L 2.5 mm ③	20	029135103
	orange SCD5.3L 2.5 mm ③	20	029136206
	orange SCD5.4L 2.5 mm ④	20	029137200
	Jumper bar, IP20	2 poles BJDL5.2 24 A	50
	3 poles BJDL5.3 24 A	50	029110324
	4 poles BJDL5.4 24 A	50	029110425
	5 poles BJDL5.5 24 A	20	029110526
	10 poles BJDL5.10 24 A	20	029111026
Shield connector	CBD5.2L 0.5 mm ②	50	029107724

① With rail contact.
 ② Only for D 2,5/5...2L
 ③ Only for D 2,5/5...3L
 ④ Only for D 2,5/5...4L

Feed through and ground terminal blocks

Spring clamp, DIN 3

D 4/6...L - 4 mm² blocks - 6 mm .238" spacing

Characteristics

		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Solid	0.2 - 6 mm ²		24-10 AWG	24-10 AWG
	Stranded	0.2 - 4 mm ²			
	Isolated ferrules	0.5 - 4 mm ²			
Voltage	V	800		600	600
Current	A	32		25	25
Short circuit current (D 4/6.Pl...L)	A / s	480 A/1s			
Short circuit current (D 4/6.P...L)	A / s	480 A/1s			
Rated wire size	mm ² / AWG	4 mm ²		10 AWG	10 AWG
Wire stripping length	mm / inches			11 mm / .43"	

D 4/6.2L Selection

Description	Type	Packaging	Catalog number
Standard block grey	D 4/6.2L	50	029006107
Standard block blue	D 4/6.N.2L	50	029006301
Standard block orange	D 4/6.2L	50	029006200
Standard block black	D 4/6.2L	50	029006604
Standard block red	D 4/6.2L	50	029006402
Standard block yellow	D 4/6.2L	50	029006705
Standard block white	D 4/6.2L	50	1SNS430000Z0911
Standard block brown	D 4/6.2L	50	1SNS430000Z0912
Ground block green/yellow	D 4/6.P.2L ①	50	029006917

D 4/6.3L Selection

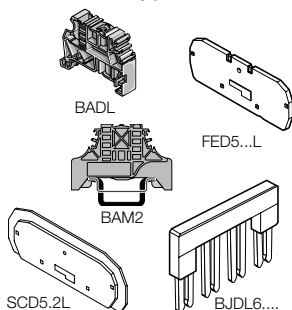
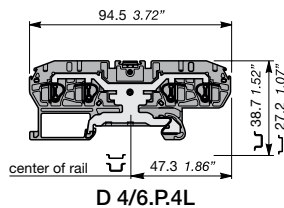
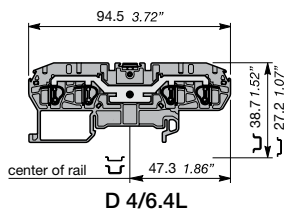
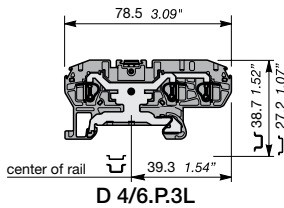
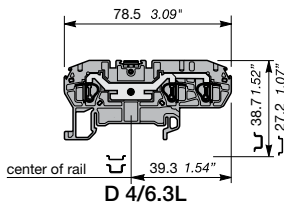
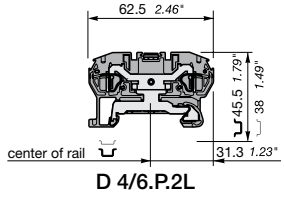
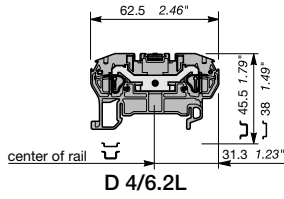
Description	Type	Packaging	Catalog number
Standard block grey	D 4/6.3L	50	029040506
Standard block blue	D 4/6.N.3L	50	029040700
Standard block orange	D 4/6.3L	50	029040607
Ground block green/yellow	D 4/6.P.3L ①	50	029040912

D 4/6.4L Selection

Description	Type	Packaging	Catalog number
Standard block grey	D 4/6.4L	50	029041006
Standard block blue	D 4/6.N.4	50	029041224
Standard block orange	D 4/6.4L	50	029041123
Ground block green/yellow	D 4/6.P.4L ①	50	029041426

Accessories

Description	Type	Packaging	Catalog number	
End stop (light grey)	(screwless)	BADL 9 mm	50	039990302
	(with screw)	BAM2 9.9 mm	50	039996701
End section	grey	FED5.2L 2.5 mm ②	20	029106124
	orange	FED5.2L 2.5 mm ②	20	029106225
	grey	FED6.3L 2.5 mm ③	20	029169424
	orange	FED6.3L 2.5 mm ③	20	029169525
	grey	FED6.4L 2.5 mm ④	20	029169626
	orange	FED6.4L 2.5 mm ④	20	029169727
Separator	orange	SCD5.2L 2.5 mm ②	20	029135204
	grey	SCD5.2L 2.5 mm ②	20	029135103
Jumper bar, IP20	2 poles	BJDL6.2 32 A	50	029112824
	3 poles	BJDL6.3 32 A	50	029112925
	4 poles	BJDL6.4 32 A	50	029119417
	5 poles	BJDL6.5 32 A	20	029119510

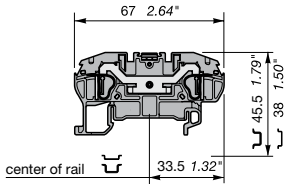


① With rail contact.
 ② Only for D 4/6...2L
 ③ Only for D 4/6...3L
 ④ Only for D 4/6...4L

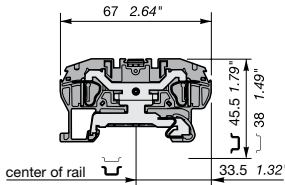
Feed through and ground terminal blocks

Spring clamp, U DIN 3

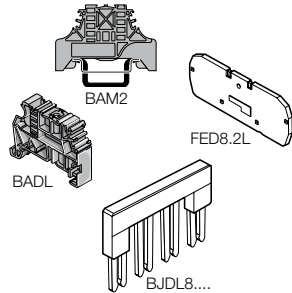
D 6/8.2L - 6 mm² blocks - 8 mm .315" spacing



D 6/8.2L



D 6/8.P.2L



Characteristics

Wire size mm ² / AWG	Solid Stranded Isolated ferrules	IEC		UL	CSA
		NFC	DIN		
		0.5 - 10 mm ²		22-8 AWG	22-8 AWG
		0.5 - 6 mm ²			
		0.5 - 6 mm ²			
Voltage	V	800		600	600
Current	A	41		40	40
Short circuit current (D6/8.PI.2L)	A / s	720 A/1s			
Short circuit current (D6/8.P.2L)	A / s	720 A/1s			
Rated wire size	mm ² / AWG	6 mm ²		8 AWG	8 AWG
Wire stripping length	mm / inches	12.5 mm / .49"			

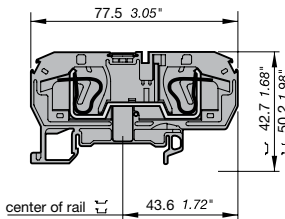
Selection

Description	Type	Packaging	Catalog number
Standard block grey	D 6/8.2L	50	029008124
Standard block blue	D 6/8.N.2L	50	029008326
Standard block orange	D 6/8.2L	50	029008225
Standard block black	D 6/8.2L	50	029008621
Standard block red	D 6/8.2L	50	029008427
Standard block yellow	D 6/8.2L	50	029008722
Ground block green/yellow	D 6/8.P.2L ⊕	50	029008904

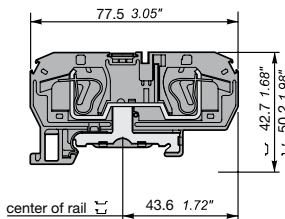
Accessories

Description	Type	Packaging	Catalog number
End stop (light grey) (screwless)	BADL 9 mm	50	039990302
(with screw)	BAM2 9.9 mm	50	039996701
End section grey	FED8.2L 2.5 mm	20	029116125
orange	FED8.2L 2.5 mm	20	029116226
Assembled jumper bar (with IP20 protection)	2 poles BJD8.2 41 A ⊕	50	029112216
	3 poles BJD8.3 41 A ⊕	50	029112317
	4 poles BJD8.4 41 A ⊕	50	029114424
	5 poles BJD8.5 41 A ⊕	20	029114525

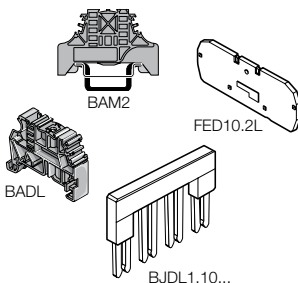
D 10/10.2L - 10 mm² blocks - 10 mm .394" spacing



D 10/10.2L



D 10/10.P.2L



Characteristics

Wire size mm ² / AWG	Solid Stranded	IEC		UL	CSA
		NFC	DIN		
		0.5 - 16 mm ²		20-6 AWG	20-6 AWG
		0.5 - 10 mm ²			
Voltage	V	1000		600	600
Current	A	57		50	50
Short circuit current (D 10/10.PI.2L)	A / s	1200 A/1s			
Short circuit current (D 10/10.P.2L)	A / s	1200 A/1s			
Rated wire size	mm ² / AWG	10 mm ²		6 AWG	6 AWG
Wire stripping length	mm / inches	12 mm / .47"			

Selection

Description	Type	Packaging	Catalog number
Standard block grey	D 10/10.2L	50	029029103
Standard block blue	D 10/10.N.2L	50	029029305
Standard block orange	D 10/10.2L	50	029029204
Standard block black	D 10/10.2L	50	029029600
Standard block red	D 10/10.2L	50	029029406
Standard block yellow	D 10/10.2L	50	029029701
Ground block green/yellow	D 10/10.P.2L ⊕	50	029029913

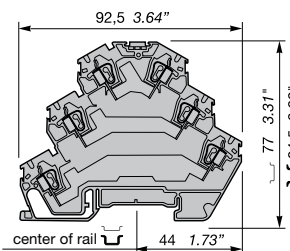
Accessories

Description	Type	Packaging	Catalog number
End stop (light grey) (screwless)	BADL 9 mm	50	039990302
(with screw)	BAM2 9.9 mm	50	039996701
End section grey	FED10.2L 2.5 mm	20	029146122
orange	FED10.2L 2.5 mm	20	029146223
Assembled jumper bar (with IP20 protection)	2 poles BJD1.10.2 57 A ⊕	50	029147225
	3 poles BJD1.10.3 57 A ⊕	50	029147427
	4 poles BJD1.10.4 57 A ⊕	50	029147621
	5 poles BJD1.10.5 57 A ⊕	50	029147803

⊕ With rail contact.
⊗ Except for D 6/8.P.2L
⊙ Except for D 10/10.P.2L

Feed through terminal blocks - 3 level

Spring clamp, DIN 3



D 2,5/5.T3.L

D 2,5/5.T3.L


Characteristics

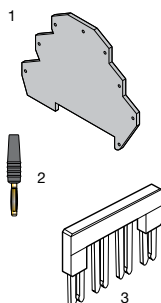
		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.14 - 4 mm ²	24-12 AWG	24-12 AWG	
mm ² / AWG	Stranded	0.14 - 2.5 mm ²	24-14 AWG	24-14 AWG	
Voltage	V	500	150	150	
Current	A	20	16	16	
Rated wire size	mm ² / AWG	2.5 mm ²	12	12	
Wire stripping length	mm / inches	9.5 mm / .37"			

Selection

Description	Type	Packaging	Catalog number
Grey	D 2,5/5.T3.L	25	1SNA290456R0000

Accessories

Description	Type	Packaging	Catalog number
1 End section	grey FED5.T3.L V0 th. 2.5 mm	20	1SNA291817R1700
2 Test plug	black FC2.MC  V2 DIA 2.0 mm	10	1SNA107239R0300
3 Assembled jumper bar (IP 20-24 A)	orange BJDL5.2 V0 2 poles	50	029110223
	BJDL5.3 V0 3 poles	50	029110324
	BJDL5.4 V0 4 poles	50	029110425
	BJDL5.5 V0 5 poles	20	029110526
	BJDL5.6 V0 6 poles	20	029110627
	BJDL5.7 V0 7 poles	20	029110720
	BJDL5.8 V0 8 poles	20	029110801
	BJDL5.9 V0 9 poles	20	029110902
	BJDL5.10 V0 10 poles	20	029111026



D 2,5/5.T1.L


Characteristics

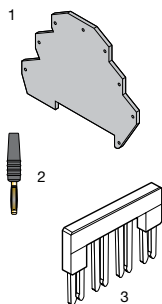
		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.14 - 4 mm ²	24-12 AWG	24-12 AWG	
mm ² / AWG	Stranded	0.14 - 2.5 mm ²	24-14 AWG	24-14 AWG	
Voltage	V	500	150	150	
Current	A	24	20	20	
Rated wire size	mm ² / AWG	2.5 mm ²	12	12	
Wire stripping length	mm / inches	9.5 mm / .37"			


Selection

Description	Type	Packaging	Catalog number
Grey	D 2,5/5.T1.L	25	1SNA290457R0100

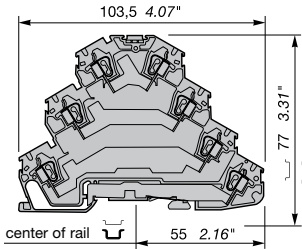
Accessories

Description	Type	Packaging	Catalog number
1 End section	grey FED5.T3.L V0 th. 2.5 mm	20	1SNA291817R1700
2 Test plug	black FC2.MC  V2 DIA 2.0 mm	10	1SNA107239R0300
3 Jumper bar (IP 20-24 A)	orange BJDL5.2 V0 2 poles	50	029110223
	BJDL5.3 V0 3 poles	50	029110324
	BJDL5.4 V0 4 poles	50	029110425
	BJDL5.5 V0 5 poles	20	029110526
	BJDL5.6 V0 6 poles	20	029110627
	BJDL5.7 V0 7 poles	20	029110720
	BJDL5.8 V0 8 poles	20	029110801
	BJDL5.9 V0 9 poles	20	029110902
	BJDL5.10 V0 10 poles	20	029111026



 The use of the test plug decreases the block's voltage rating; U = 200 V.

Feed through and ground terminal blocks - 4 level Spring clamp, DIN 3



D 2,5/5.T3.PL

D 2,5/5.T3.PL

Characteristics

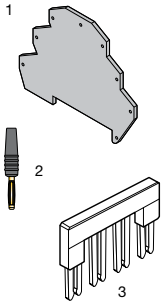
		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.14 - 4 mm ²	24-12 AWG	24-12 AWG	
mm ² / AWG	Stranded	0.14 - 2.5 mm ²	24-14 AWG	24-14 AWG	
Voltage	V	500	150	150	
Current	A	20	16	16	
Rated wire size	mm ² / AWG	2.5 mm ²	12	12	
Wire stripping length	mm / inches	9.5 mm / .37"			

Selection

Description	Type	Packaging	Catalog number
Grey	D 2,5/5.T3.PL	25	1SNA290458R1200

Accessories

Description	Type	Packaging	Catalog number
1 End section grey	FED5.T3.L V0 th. 2.5 mm	20	1SNA291818R2000
2 Test plug black	FC2.MC ① V2 DIA 2.0 mm	10	1SNA107239R0300
3 Assembled jumper bar orange (IP 20-24 A)	BJDL5.2 V0 2 poles	50	029110223
	BJDL5.3 V0 3 poles	50	029110324
	BJDL5.4 V0 4 poles	50	029110425
	BJDL5.5 V0 5 poles	20	029110526
	BJDL5.6 V0 6 poles	20	029110627
	BJDL5.7 V0 7 poles	20	029110720
	BJDL5.8 V0 8 poles	20	029110801
	BJDL5.9 V0 9 poles	20	029110902
	BJDL5.10 V0 10 poles	20	029111026



10

D 2,5/5.T1.PL

Characteristics

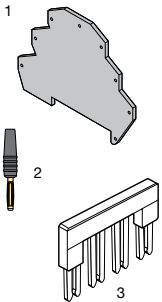
		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.14 - 4 mm ²	24-12 AWG	24-12 AWG	
mm ² / AWG	Stranded	0.14 - 2.5 mm ²	24-14 AWG	24-14 AWG	
Voltage	V	500	N/A	N/A	
Current	A	300	N/A	N/A	
Rated wire size	mm ² / AWG	2.5 mm ²	12	12	
Wire stripping length	mm / inches	9.5 mm / .37"			

Selection

Description	Type	Packaging	Catalog number
Grey	D 2,5/5.T1.PL	25	1SNA290459R1300

Accessories

Description	Type	Packaging	Catalog number
1 End section grey	FED5.T3.L V0 th. 2.5 mm	20	1SNA291818R2000
2 Test plug black	FC2.MC ① V2 DIA 2.0 mm	10	1SNA107239R0300
3 Jumper bar orange (IP 20-24 A)	BJDL5.2 V0 2 poles	50	029110223
	BJDL5.3 V0 3 poles	50	029110324
	BJDL5.4 V0 4 poles	50	029110425
	BJDL5.5 V0 5 poles	20	029110526
	BJDL5.6 V0 6 poles	20	029110627
	BJDL5.7 V0 7 poles	20	029110720
	BJDL5.8 V0 8 poles	20	029110801
	BJDL5.9 V0 9 poles	20	029110902
	BJDL5.10 V0 10 poles	20	029111026

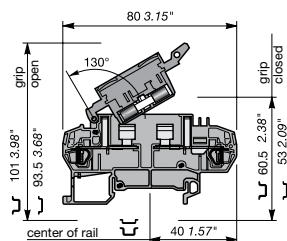


① The use of the test plug decreases the block's voltage rating: U = 200 V.

Fuse holder terminal blocks

5x20 mm .197x.787 in. and 5x25 mm .197x.984 in.
Spring clamp,  DIN 3

D 2,5/8.SFT.2L - 2.5 mm² blocks - 8 mm .315" spacing



D 2,5/8.SFT.2L

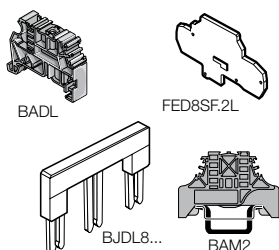
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Solid	0.12 - 4 mm ²		26-12 AWG	26-12 AWG
	Stranded	0.12 - 2.5 mm ²			
	Isolated ferrules	0.5 - 2.5 mm ²			
Voltage	V	630		600	600
Current	A	6.3		8	8
Rated wire size	mm ² / AWG	2.5 mm ²		12 AWG	12 AWG
Wire stripping length	mm / inches	9.5 mm / .37"			

Selection

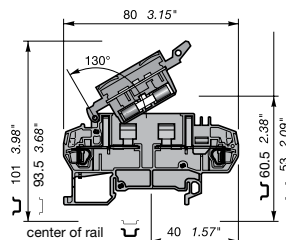
Description	Type	Packaging	Catalog number
Standard block grey	D 2,5/8.SFT.2L	50	029009126
Standard block orange	D 2,5/8.SFT.2L	50	029009227

Accessories

Description	Type	Packaging	Catalog number	
End stop (light grey)	(screwless)	BADL 9 mm	50	039990302
	(with screw)	BAM2 9.9 mm	50	039996701
End section	grey	FED8SF.2L 3 mm	20	029113117
	orange	FED8SF.2L 3 mm	20	029113210
Assembled jumper bar (with IP20 protection)	2 poles	BJDL8.2 24 A	50	029112216
	3 poles	BJDL8.3 24 A	50	029112317
	4 poles	BJDL8.4 24 A	50	029114424
	5 poles	BJDL8.5 24 A	20	029114525



D 2,5/8.S...T.2L - 2.5 mm² blocks - 8 mm .315" spacing



D 2,5/8.S...T.2L

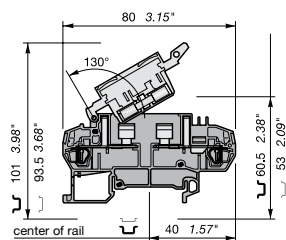
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Solid	0.12 - 4 mm ²		26-12 AWG	26-12 AWG
	Stranded	0.12 - 2.5 mm ²			
	Isolated ferrules	0.5 - 2.5 mm ²			
Voltage	V	630		600	600
Current	A	6.3		8	8
Rated wire size	mm ² / AWG	2.5 mm ²		12 AWG	12 AWG
Wire stripping length	mm / inches	9.5 mm / .37"			

Selection

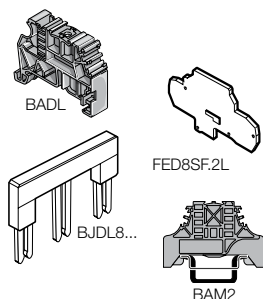
Description	Type	Packaging	Catalog number
Block with test socket ①	D 2,5/8.SFLT.2L	50	029009320
Block with test socket ②	D 2,5/8.SFDT.2L	50	029009421
Block with test socket ③	D 2,5/8.SFD1T.2L	50	029009522
Block with test socket, grey body/blue lever	D 2,5/8.SNT.2L	50	029009724

Accessories

Description	Type	Packaging	Catalog number	
End stop	(screwless)	BADL 9 mm	50	039990302
	(with screw)	BAM2 9.9 mm	50	039996701
End section	grey	FED8SF.2L 3 mm	20	029113117
	orange	FED8SF.2L 3 mm	20	029113210
Assembled jumper bar (with IP20 protection)	2 poles	BJDL8.2 24 A	50	029112216
	3 poles	BJDL8.3 24 A	50	029112317
	4 poles	BJDL8.4 24 A	50	029114424
	5 poles	BJDL8.5 24 A	20	029114525



D 2,5/8.SNT.2L



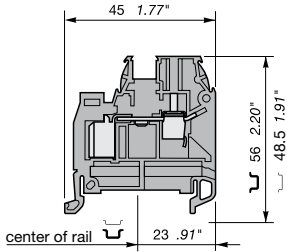
① Blown fuse indicator with neon lamp 110 V - 220 V
② Blown fuse indicator with LED 24 V
③ Blown fuse indicator with LED 48 V

Feed through and ground terminal blocks

Insulation displacement

ADO - Screw clamp, U DIN 3

D 2,5/5.ADO - 1 mm² blocks - 5 mm .198" spacing



D 2,5/5.ADO

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	0.2 - 4 mm ²	22-12 AWG	22-12 AWG
		Stranded	0.22 - 2.5 mm ²		
	ADO	Solid	0.2 - 1 mm ²	24-18 AWG	24-18 AWG
		Stranded	0.22 - 1 mm ²		
Voltage		V	1000	600	600
Current		A	13.5	7	7
Short circuit current (D2,5/5PI.ADO)		A / s	120 A/1s		
Rated wire size		mm ² / AWG	1 mm ²	18 AWG	18 AWG
Wire stripping length (screw)		mm / inches		9.5 mm / .37"	
Recommended torque (screw)		Nm / lb.in	0.4-0.6 / 3.5-5.3 lb.in		

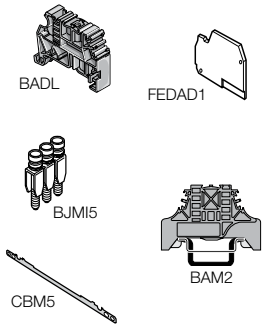
2 wires of the same gauge and nature per ADO connection

Selection

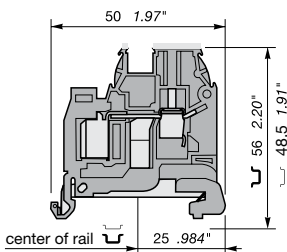
Description	Type	Packaging	Catalog number
Standard block grey	D 2,5/5.ADO	50	019955423
Standard block orange	D 2,5/5.ADO	50	019955524
Standard block blue	D 2,5/5.N.ADO	50	019955625
Standard block black	D 2,5/5.ADO	50	019955726
Standard block red	D 2,5/5.ADO	50	019955807
Standard block yellow	D 2,5/5.ADO	50	019956005
Standard block ivory	D 2,5/5.ADO	50	019955900
Standard block green	D 2,5/5.ADO	50	019956122

Accessories

Description	Type	Packaging	Catalog number	
End stop (light grey)	(screwless)	BADL 9 mm	50	039990302
	(with screw)	BAM2 9.9 mm	50	039996701
End section	grey	FEDAD1 3 mm	20	019933620
	blue	FEDAD1 3 mm	20	019933802
	yellow	FEDAD1 3 mm	20	019933903
Assembled jumper bar (with IP20 protection)	2 poles	BJMI5 24 A	10	017627816
	3 poles	BJMI5 24 A	10	017627917
	4 poles	BJMI5 24 A	10	017628005
	5 poles	BJMI5 24 A	10	017628122
	10 poles	BJMI5 24 A	10	017628223
Shield connector		CBM5 0.5 mm	50	017874514
		CBM8 0.8 mm	50	017874615



D 2,5/5.PADO - 1 mm² ground block with rail contact - 5 mm .198" spacing



D 2,5/5.PADO

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	0.2 - 4 mm ²	22-12 AWG	22-12 AWG
		Stranded	0.22 - 2.5 mm ²		
	ADO	Solid	0.2 - 1 mm ²	24-18 AWG	24-18 AWG
		Stranded	0.22 - 1 mm ²		
Short circuit current		A / s	120 A/1s		
Rated wire size		mm ² / AWG	1 mm ²	18 AWG	18 AWG
Wire stripping length (screw)		mm / inches		9.5 mm / .37"	
Recommended torque (screw)		Nm / lb.in	0.4-0.6 / 3.5-5.3 lb.in		

2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog number
Ground block green/yellow	D 2,5/5.PADO	50	039903005

Accessories

Description	Type	Packaging	Catalog number	
End section	grey	FEDAD1 3 mm	20	019933620
	yellow	FEDAD1 3 mm	20	019933903

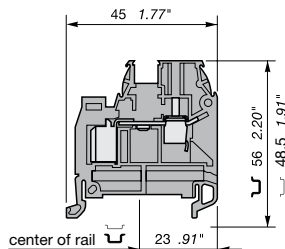


Feed through and ground terminal blocks

Insulation displacement

ADO - Screw clamp, DIN 3

D 4/6... .ADO - 1.5 mm² blocks - 6 mm .238" spacing



D 4/6... .ADO

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	0.2- 4 mm ²	22-10 AWG	22-10 AWG
		Stranded	0.22 - 4 mm ²		
	ADO	Solid	0.34 - 1.5 mm ²	22-16 AWG	22-16 AWG
		Stranded	0.34 - 1.5 mm ²		
Voltage		V	1000	600	600
Current		A	17.5	18	18
Short circuit current (D4/6.PI.ADO)		A / s	180 A/1s		
Rated wire size		mm ² / AWG	1.5 mm ²	16 AWG	16 AWG
Wire stripping length (screw)		mm / inches		9.5 mm / .37"	
Recommended torque (screw)		Nm / lb.in	0.5-0.8 / 4.4-7.1 lb.in		

2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog number
Standard block grey	D 4/6.ADO	50	019903415
Standard block orange	D 4/6.ADO	50	019903516
Standard block blue	D 4/6.N.ADO	50	019903617
Standard block black	D 4/6.ADO	50	019907122
Standard block red	D 4/6.ADO	50	019906900
Standard block yellow	D 4/6.ADO	50	019903922
Standard block ivory	D 4/6.ADO	50	019907005
Standard block green	D 4/6.ADO	50	019904007

Accessories

Description	Type	Packaging	Catalog number	
End stop (light grey)	(screwless)	BADL 9 mm	50	039990302
	(with screw)	BAM2 9.9 mm	50	039996701
End section	grey	FEDAD1 3 mm	20	019933620
	blue	FEDAD1 3 mm	20	019933802
	yellow	FEDAD1 3 mm	20	019933903
Assembled jumper bar (with IP20 protection)	2 poles	BJM16 32 A	10	017666300
	3 poles	BJM16 32 A	10	017666401
	4 poles	BJM16 32 A	10	017666502
	5 poles	BJM16 32 A	10	017666603
	10 poles	BJM16 32 A	10	017666704
Shield connector	CBM5	0.5 mm	50	017874514
	CBM8	0.8 mm	50	017874615



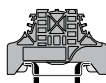
BADL



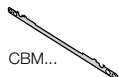
FEDAD1



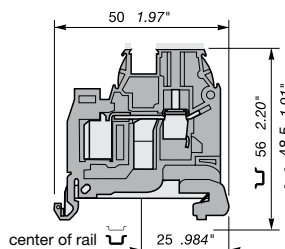
BJM16



BAM2



CBM...



D 4/6.P.ADO

D 4/6.P.ADO - 1.5 mm² ground block with rail contact - 6 mm .238" spacing

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	0.2- 4 mm ²	22-10 AWG	22-10 AWG
		Stranded	0.22 - 4 mm ²		
	ADO	Solid	0.34 - 1.5 mm ²	22-16 AWG	22-16 AWG
		Stranded	0.34 - 1.5 mm ²		
Short circuit current (D4/6.PI.ADO)		A / s	180 A/1s		
Rated wire size		mm ² / AWG	1.5 mm ²	16 AWG	16 AWG
Wire stripping length (screw)		mm / inches		9.5 mm / .37"	
Recommended torque (screw)		Nm / lb.in	0.5-0.8 / 4.4-7.1 lb.in		

2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog number
Ground block green body, yellow marking	D 4/6.P.ADO	50	019905001

Accessories

Description	Type	Packaging	Catalog number	
End section	yellow	FEDAD1 3 mm	20	019933903
	grey	FEDAD1 3 mm	20	019933620



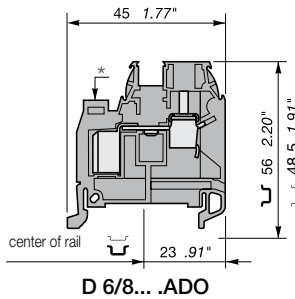
FEDAD1

Feed through and ground terminal blocks

Insulation displacement

ADO - Screw clamp, \cup DIN 3

D 6/8... .ADO - 2.5 mm² blocks - 8 mm .315" spacing



Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	0.2- 10 mm ²	22-8 AWG	22- 8 AWG
		Stranded	0.22 - 6 mm ²		
	ADO	Solid	1 - 2.5 mm ²	16-14 AWG	16-14 AWG
		Stranded	1 - 2.5 mm ²		
Voltage		V	1000	600	600
Current		A	24	25	25
Short circuit current (D6/8.PI.ADO)		A / s	300 A/1s		
Rated wire size		mm ² / AWG	2.5 mm ²	14 AWG	14 AWG
Wire stripping length (screw)		mm / inches		12 mm / .47"	
Recommended torque (screw)		Nm / lb.in	0.8-1 Nm / 7.1-8.9 lb.in		

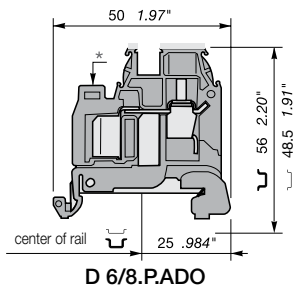
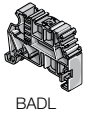
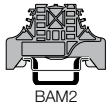
2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog number
Standard block grey	D 6/8.ADO	50	019904225
Standard block orange	D 6/8.ADO	50	019904326
Standard block blue	D 6/8.N.ADO	50	019904427
Standard block black	D 6/8.ADO	50	019907720
Standard block red	D 6/8.ADO	50	019907526
Standard block yellow	D 6/8.ADO	50	019907223
Standard block ivory	D 6/8.ADO	50	019907627
Standard block green	D 6/8.ADO	50	019907324

Accessories

Description	Type	Packaging	Catalog number	
End stop (light grey)	(screwless)	BADL 9 mm	50	039990302
	(with screw)	BAM2 9.9 mm	50	039996701
End section	grey	FEDAD1 3 mm	20	019933620
	blue	FEDAD1 3 mm	20	019933802
	yellow	FEDAD1 3 mm	20	019933903
Assembled jumper bar (with IP20 protection)	2 poles	BJMI8 41 A	10	017666916
	3 poles	BJMI8 41 A	10	017667013
	4 poles	BJMI8 41 A	10	017667100
	5 poles	BJMI8 41 A	10	017667201
	10 poles	BJMI8 41 A	10	017667302



D 6/8.P.ADO - 2.5 mm² ground block with rail contact - 8 mm .315" spacing

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	0.2- 10 mm ²	22-8 AWG	22- 8 AWG
		Stranded	0.22 - 6 mm ²		
	ADO	Solid	1 - 2.5 mm ²	16-14 AWG	16-14 AWG
		Stranded	1 - 2.5 mm ²		
Short circuit current (D6/8.PI.ADO)		A / s	300 A/1s		
Rated wire size		mm ² / AWG	2.5 mm ²	14 AWG	14 AWG
Wire stripping length (screw)		mm / inches		12 mm / .47"	
Recommended torque (screw)		Nm / lb.in	0.8-1 Nm / 7.1-8.9 lb.in		

2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog number
Ground block green body, yellow marking	D 6/8.P.ADO	50	019911826

Accessories

Description	Type	Packaging	Catalog number	
End section	grey	FEDAD1 3 mm	20	019933620
	yellow	FEDAD1 3 mm	20	019933903

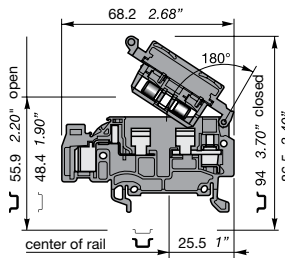


Fuse holder terminal blocks

5x20 mm .197x.787 in. and 5x25 mm .197x.984 in.

ADO - Screw clamp,  DIN 3

D 4/8.SF...I.ADO - 1.5 mm² blocks - 8 mm .315" spacing



D 4/8.SF...I.ADO

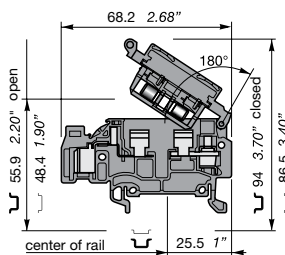
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	0.2 - 4 mm ²	22-10 AWG	22-10 AWG
		Stranded	0.22 - 4 mm ²		
	ADO	Solid	0.34 - 1.5 mm ²	22-16 AWG	22-16 AWG
		Stranded	0.34 - 1.5 mm ²		
Voltage		V	630 ⊕	600 ⊕	600 ⊕
Current		A	6.3	10	10
Rated wire size		mm ² / AWG	1.5 mm ²	16 AWG	16 AWG
Wire stripping length (screw)		mm / inches	9.5 mm / .37"		
Recommended torque (screw)		Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in		

2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog number
Standard block grey	D 4/8.SF.I.ADO	50	039978503
Standard block orange	D 4/8.SF.I.ADO	50	039978604
Block with Ø 2 mm test socket grey	D 4/8.SF2.I.ADO	50	039977712

D 4/8.SFL...I.ADO - 1.5 mm² blocks - 8 mm .315" spacing



D 4/8.SFL...I.ADO

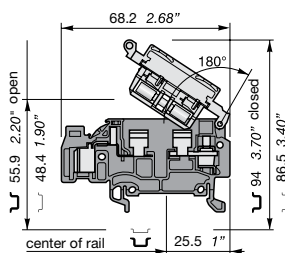
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	0.2 - 4 mm ²	22-10 AWG	22-10 AWG
		Stranded	0.22 - 4 mm ²		
	ADO	Solid	0.34 - 1.5 mm ²	22-16 AWG	22-16 AWG
		Stranded	0.34 - 1.5 mm ²		
Voltage		V	500	600	600
Current		A	6.3	10	10
Rated wire size		mm ² / AWG	1.5 mm ²	16 AWG	16 AWG
Wire stripping length (screw)		mm / inches	9.5 mm / .37"		
Recommended torque (screw)		Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in		

2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog number
Standard block grey ②	D 4/8.SFL.I.ADO	50	039978012
Standard block grey ③	D 4/8.SFD.I.ADO	50	039978107

D 4/8.SNN.I.ADO - 1.5 mm² blocks - 8 mm .315" spacing - neutral switch block



D 4/8.SNN.I.ADO

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	0.2 - 4 mm ²	22-10 AWG	22-10 AWG
		Stranded	0.22 - 4 mm ²		
	ADO	Solid	0.34 - 1.5 mm ²	22-16 AWG	22-16 AWG
		Stranded	0.34 - 1.5 mm ²		
Voltage		V	630	600	600
Current		A	10	10	10
Rated wire size		mm ² / AWG	1.5 mm ²	10/16 AWG	10/16 AWG
Wire stripping length (screw)		mm / inches	9.5 mm / .37"		
Recommended torque (screw)		Nm / lb.in	0.5-0.8 Nm / 4.4-7.1 lb.in		

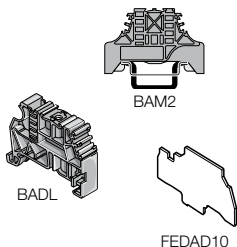
2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog Number
Standard block grey body, blue grip	D 4/8.SNN.I.ADO	50	039977823

Accessories

Description	Type	Packaging	Catalog number	
End stop (light grey)	screwless	BADL 9 mm	50	039990302
	with screw	BAM2 9.9 mm	50	039996701
End section	grey	FEDAD10 1.5 mm	20	039975827



⊕ Terminal block insulation voltage. Working voltage according to fuse.

② Blown-fuse indicator by 110 V - 230 V neon lamp (leakage current with neon lamp : < 0,5 mA (110 V) - < 0,7 mA (230 V)).

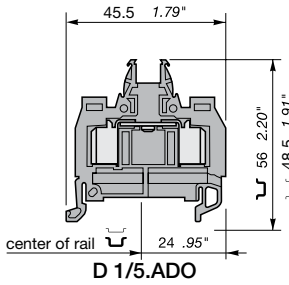
③ Blown-fuse indicator by LED 24 V (+24V labeled) (leakage current with LED 24 V or 48 V < 4,5 mA).

Feed through and ground terminal blocks

Insulation displacement

ADO - ADO, DIN 3

D 1/5.ADO - 1 mm² blocks - 5 mm .198" spacing



Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	-	-	-
		Stranded	-	-	-
ADO		Solid	0.2 - 1 mm ²	24-18 AWG	24-18 AWG
		Stranded	0.22 - 1 mm ²		
Voltage		V	1000	600	600
Current		A	13.5	7	7
Short circuit current (D 1/5.PI.ADO)		A / s	120 A/1s		
Rated wire size		mm ² / AWG	1 mm ²	18 AWG	18 AWG

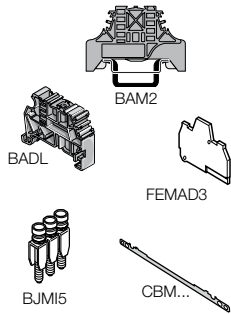
2 wires of the same gauge and nature per ADO connection

Selection

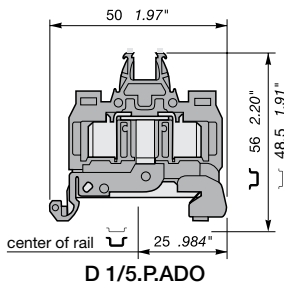
Description	Type	Packaging	Catalog Number
Standard block grey	D 1/5.ADO	50	019956324
Standard block orange	D 1/5.ADO	50	019956425
Standard block blue	D 1/5.N.ADO	50	019956526
Standard block black	D 1/5.ADO	50	019956627
Standard block red	D 1/5.ADO	50	019956720
Standard block yellow	D 1/5.ADO	50	019956902
Standard block ivory	D 1/5.ADO	50	019956801
Standard block green	D 1/5.ADO	50	019957007

Accessories

Description	Type	Packaging	Catalog number
End stop	screwless	BADL 9 mm	50 039990302
	with screw	BAM2 9.9 mm	50 039996701
End section	grey	FEMAD3 3 mm	20 019934105
	yellow	FEMAD3 3 mm	20 019934307
Assembled jumper bar (with IP20 protection)	2 poles	BJMI5 24 A	10 017627816
	3 poles	BJMI5 24 A	10 017627917
	4 poles	BJMI5 24 A	10 017628005
	5 poles	BJMI5 24 A	10 017628122
	10 poles	BJMI5 24 A	10 017628223
Shield connector		CBM5 0.5 mm	50 017874514
		CBM8 0.8 mm	50 017874615



D 1/5.P.ADO - 1 mm² ground block with rail contact - 5 mm .198" spacing



Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	-	-	-
		Stranded	-	-	-
ADO		Solid	0.2 - 1 mm ²	24-18 AWG	24-18 AWG
		Stranded	0.22 - 1 mm ²		
Short circuit current (D 1/5.PI.ADO)		A / s	120 A/1s	-	-
Rated wire size		mm ² / AWG	-	-	-

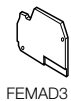
2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog number
Ground block, green body/yellow marking	D 1/5.P.ADO	50	039903122

Accessories

Description	Type	Packaging	Catalog number
End section	yellow	FEMAD3 3 mm	20 019934307
	grey	FEMAD3 3 mm	20 019934105



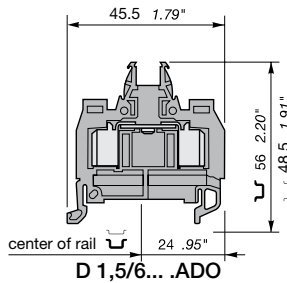


Feed through and ground terminal blocks

Insulation displacement

ADO - ADO, DIN 3

D 1,5/6... ADO - 1.5 mm² blocks - 6 mm .238" spacing



Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	—	—	—
		Stranded	—	—	—
	ADO	Solid	0.34 - 1.5 mm ²	22-16 AWG	22-16 AWG
		Stranded	0.34 - 1.5 mm ²		
Voltage		V	1000	600	600
Current		A	17.5	18	18
Short circuit current (D 1,5/6.PI.ADO)		A / s	180 A/1s		
Rated wire size		mm ² / AWG	1.5 mm ²	16 AWG	16 AWG

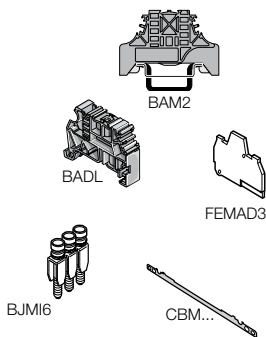
2 wires of the same gauge and nature per ADO connection

Selection

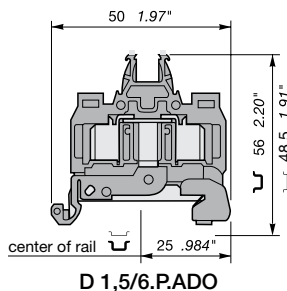
Description	Type	Packaging	Catalog number
Standard block grey	D 1,5/6.ADO	50	019905126
Standard block orange	D 1,5/6.ADO	50	019905227
Standard block blue	D 1,5/6.N.ADO	50	019905320
Standard block black	D 1,5/6.ADO	50	019908317
Standard block red	D 1,5/6.ADO	50	019908115
Standard block yellow	D 1,5/6.ADO	50	019908020
Standard block ivory	D 1,5/6.ADO	50	019908216
Standard block green	D 1,5/6.ADO	50	019905623

Accessories

Description	Type	Packaging	Catalog number	
End stop (light grey)	screwless	BADL 9 mm	50	039990302
	with screw	BAM2 9.9 mm	50	039996701
End section	grey	FEMAD3 3 mm	20	019934105
	yellow	FEMAD3 3 mm	20	019934307
Assembled jumper bar (with IP20 protection)	2 poles	BJMI6 32 A	10	017666300
	3 poles	BJMI6 32 A	10	017666401
	4 poles	BJMI6 32 A	10	017666502
	5 poles	BJMI6 32 A	10	017666603
	10 poles	BJMI6 32 A	10	017666704
Shield connector		CBM5 0.5 mm	50	017874514
		CBM8 0.8 mm	50	017874615



D 1,5/6.P.ADO - 1.5 mm² ground block with rail contact - 6 mm .238" spacing



Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	—	—	—
		Stranded	—	—	—
	ADO	Solid	0.34 - 1.5 mm ²	22-16 AWG	22-16 AWG
		Stranded	0.34 - 1.5 mm ²		
Short circuit current		A / s	180 A/1s		
Rated wire size		mm ² / AWG	1.5 mm ²	16 AWG	16 AWG

2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog Number
Ground block, green body/yellow marking	D 1,5/6.P.ADO	50	019909826

Accessories

Description	Type	Packaging	Catalog number	
End section	yellow	FEMAD3 3 mm	20	019934307
	grey	FEMAD3 3 mm	20	019934105



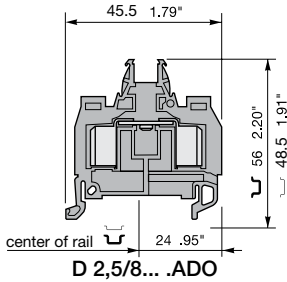


Feed through and ground terminal blocks

Insulation displacement

ADO - ADO, DIN 3

D 2,5/8... .ADO - 2.5 mm² blocks - 8 mm .315" spacing



Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	-	-	-
		Stranded	-	-	-
ADO	Screw	Solid	1 - 2.5 mm ²	16-14 AWG	16-14 AWG
		Stranded	1 - 2.5 mm ²	16-14 AWG	16-14 AWG
Voltage	V	1000	600	600	
Current	A	24	25	25	
Short circuit current (D 2,5/8.PI.ADO)		A / s	300 A/1s		
Rated wire size		mm ² / AWG	2.5 mm ²	16 AWG	16 AWG

2 wires of the same gauge and nature per ADO connection

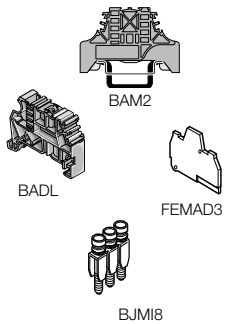
Selection

Description	Type	Packaging	Catalog number
Standard block grey	D 2,5/8.ADO	50	019905906
Standard block orange	D 2,5/8.ADO	50	019906003
Standard block blue	D 2,5/8.N.ADO	50	019906120
Standard block black	D 2,5/8.ADO	50	019908925
Standard block red	D 2,5/8.ADO	50	019908713
Standard block yellow	D 2,5/8.ADO	50	019909210
Standard block ivory	D 2,5/8.ADO	50	019908824
Standard block green	D 2,5/8.ADO	50	019914804

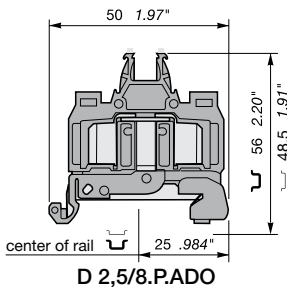
Accessories

Description	Type	Packaging	Catalog number
End stop (light grey)	screwless	BADL 9 mm	50
	with screw	BAM2 9.9 mm	50
End section	grey	FEMAD3 3 mm	20
	yellow	FEMAD3 3 mm	20
Assembled jumper bar (with IP20 protection)	2 poles	BJMI8 41 A	10
	3 poles	BJMI8 41 A	10
	4 poles	BJMI8 41 A	10
	5 poles	BJMI8 41 A	10
	6 poles	BJMI8 41 A	10
	10 poles	BJMI8 41 A	10

10



D 2,5/8.P.ADO - 2.5 mm² ground block with rail contact - 8 mm .315" spacing



Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size mm ² / AWG	Screw	Solid	-	-	-
		Stranded	-	-	-
ADO	Screw	Solid	1 - 2.5 mm ²	16-14 AWG	16-14 AWG
		Stranded	1 - 2.5 mm ²	16-14 AWG	16-14 AWG
Short circuit current		A / s	300 A/1s	-	-
Rated wire size		mm ² / AWG	2.5 mm ²	14 AWG	14 AWG

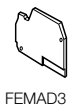
2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog number
Ground block, green body/yellow marking	D 2,5/8.P.ADO	50	019909117

Accessories

Description	Type	Packaging	Catalog number
End section	yellow	FEMAD3 3 mm	20
	grey	FEMAD3 3 mm	20





Fuse holder terminal blocks

5x20 mm .197x.787 in. and 5x25 mm .197x.984 in.

ADO - ADO, DIN 3

D 1,5/8.SFT.ADO - 1.5 mm² blocks - 8 mm .315" spacing

Characteristics

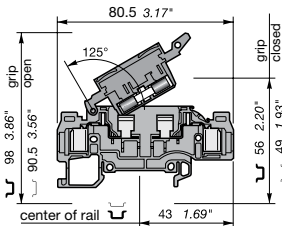
	Screw	Solid Stranded	IEC		UL	CSA
			NFC	DIN		
Wire size mm ² / AWG			-	-	-	-
	ADO	Solid Stranded	0.34 - 1.5 mm ² 0.34 - 1.5 mm ²		22-16 AWG	22-16 AWG
Voltage		V	630 Ⓣ	600 Ⓣ	600 Ⓣ	600 Ⓣ
Current		A	6.3	8	10	10
Rated wire size		mm ² / AWG	1.5 mm ²	16 AWG	16 AWG	16 AWG

2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog number
Standard block grey	D 1,5/8.SFT.ADO	50	019920811
Standard block orange	D 1,5/8.SFT.ADO	50	019920912

With DIA. 2 or 2.3 mm screw test socket for test



D 1,5/8.SFT.ADO

D 1,5/8.SF...T.ADO - 1.5 mm² blocks - 8 mm .315" spacing

Characteristics

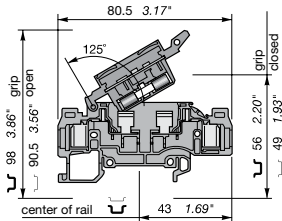
	Screw	Solid Stranded	IEC		UL	CSA
			NFC	DIN		
Wire size mm ² / AWG			-	-	-	-
	ADO	Solid Stranded	0.34 - 1.5 mm ² 0.34 - 1.5 mm ²		22-16 AWG	22-16 AWG
Voltage		V	500 Ⓣ	600 Ⓣ	600 Ⓣ	600 Ⓣ
Current		A	6.3	8	10	10
Rated wire size		mm ² / AWG	1.5 mm ²	16 AWG	16 AWG	16 AWG

2 wires of the same gauge and nature per ADO connection

Selection

Description	Type	Packaging	Catalog number
Standard block grey ②	D 1,5/8.SFLT.ADO	50	019921123
Standard block orange ③	D 1,5/8.SFDT.ADO	50	019921224

With DIA. 2 or 2.3 mm screw test socket for test



D 1,5/8.SF...T.ADO

D 1,5/8.SNNT.ADO - 1.5 mm² blocks - 8 mm .315" spacing

Characteristics

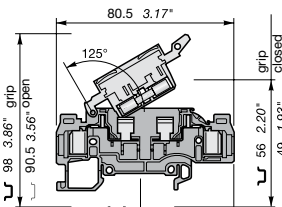
	Screw	Solid Stranded	IEC		UL	CSA
			NFC	DIN		
Wire size mm ² / AWG			-	-	-	-
	ADO	Solid Stranded	0.34 - 1.5 mm ² 0.34 - 1.5 mm ²		22-16 AWG	22-16 AWG
Voltage		V	630	600	600	600
Current		A	10	8	10	10
Rated wire size		mm ² / AWG	1.5 mm ²	16 AWG	16 AWG	16 AWG

2 wires of the same gauge and nature per ADO connection

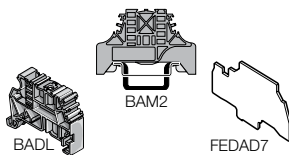
Selection

Description	Type	Packaging	Catalog number
Standard block grey body, blue grip	D 1,5/8.SNNT.ADO	50	019921006

With DIA. 2 or 2.3 mm screw test socket for test



D 1,5/8.SNNT.ADO



Accessories

Description	Type	Packaging	Catalog number	
End stop (light grey)	screwless	BADL 9 mm	50	039990302
	with screw	BAM2 9.9 mm	50	039996701
End section	grey	FEDAD7 1.5 mm	20	019938227

① Terminal block insulation voltage. Working voltage according to fuse.
 ② Blown-fuse indicator by 110 V - 230 V neon lamp (leakage current with neon lamp < 0,5 mA (110 V) - < 0,7 mA (230 V)).
 ③ Blown-fuse indicator by LED 24 V (+24V labeled) (leakage current with LED 24 V or 48 V < 4,5 mA).

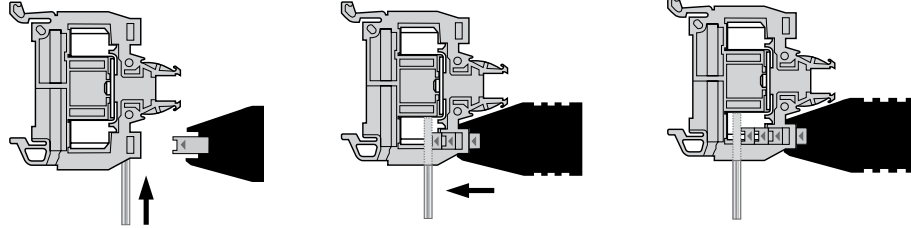
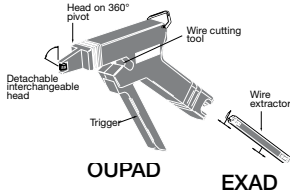


Accessories

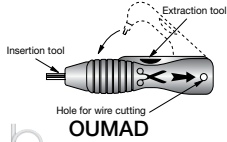
Insulation displacement Tools and test connectors

Tools

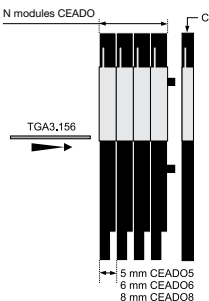
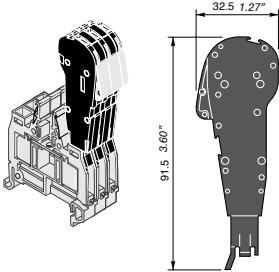
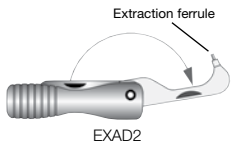
- Connection time savings
- Connection security
- Vibration proof
- Corrosion proof



- 1 Position the wire (not stripped) in the opening on the side of the block.
- 2 Position the tool in the recess on top of the block.
- 3 Pull the trigger fully.



10



Selection

Description	Type	Packaging	Catalog number
Semi-automatic tool	OUPAD	1	017894404
Wire extractor	EXAD	1	017864611
Replacement head kit	OUTA	1	020528403
Hand tool kit	OUMAD	1	017946606
Pneumatic tool kit	OUTAD	1	020571011
Extraction tool kit	EXAD2	1	020572100

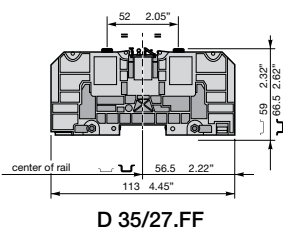
Test connectors on ADO jaw for terminal blocks

Selection

Description	Type	Packaging	Catalog number
Test connectors on ADO jaw	CEADO.5 spacing 5 mm	5	039934511
	CEADO.6 spacing 6 mm	5	039934612
	CEADO.6 spacing 8 mm	5	039934824
End module	CEADO.E th. 4.4 mm	1	039934115
Assembly rod for lever	TGA.156 DIA. 3 mm	1	020627714

Power terminal blocks with bistable foot and base mounting, \mathcal{U} DIN 3

D 35/27.FF - 35 mm² blocks - 27 mm 1.06" spacing



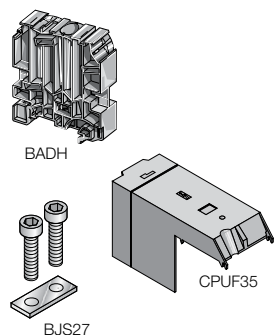
Characteristics			IEC		UL / CSA
			NFC ①	DIN ②	
Wire size mm ² / AWG	Lug	Solid wire	2.5 - 35 mm ²		1 AWG max.
	C4	Stranded wire	2.5 - 50 mm ² 2.5 - 35 mm ²		
Voltage	V		1000	600	
Current	A		125	125	
Rated wire size	mm ² / AWG		35 mm ²		1 AWG max.
Recommended wrench	Lug		H 10 mm		
	Central screw		6 mm Allen key		
Recommended torque	Lug		3 - 6 Nm / 26.1 - 52 lb.in		
	Central screw		6 - 12 Nm / 52 - 104 lb.in		

Selection

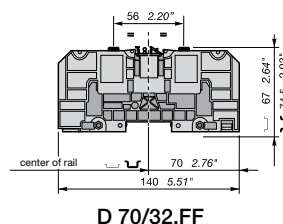
Description	Type	Packaging	Catalog number
Block with 2 studs M6 without cover grey	D 35/27.FF	10	019000120

Accessories

Description	Type	Packaging	Catalog number	
End stop	BADH 12 mm	50	011690027	
Rotating protective cover IP20 grey	CPUF35	10	019001616	
Jumper bar with CHc screw	2 poles	BJS27	5	020577213
	3 poles	BJS27	5	020577314



D 70/32.FF - 70 mm² blocks - 32 mm 1.26" spacing



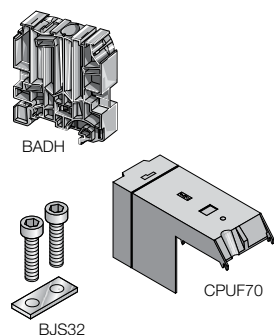
Characteristics			IEC		UL / CSA
			NFC ①	DIN ②	
Wire size mm ² / AWG	Lug	Lug	6 - 95 mm ²		000 AWG max.
	C6	Solid wire	6 - 70 mm ²		
		Stranded wire	6 - 70 mm ²		
Voltage	V		1000	600	
Current	A		192	170	
Rated wire size	mm ² / AWG		70 mm ²		000 AWG max.
Recommended wrench	Lug		H 13 mm		
	Central screw		6 mm Allen key		
Recommended torque	Lug		6 - 12 Nm / 52 - 104 lb.in		
	Central screw		6 - 12 Nm / 52 - 104 lb.in		

Selection

Description	Type	Packaging	Catalog number
Block with 2 studs M8 without cover grey	D 70/32.FF	10	019000221

Accessories

Description	Type	Packaging	Catalog number	
End stop	BADH 12 mm	50	011690027	
Rotating protective cover IP20 grey	CPUF70	10	019001717	
Jumper bar with CHc screw	2 poles	BJS32	5	020577415
	3 poles	BJS32	5	020577516

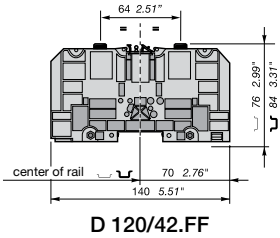


① NFC 20130
② DIN 46234

Power terminal blocks

with bistable foot and base mounting, \curvearrowright DIN 3

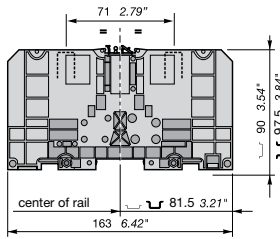
D 120/42.FF - 120 mm² blocks - 42 mm 1.65" spacing



D 120/42.FF

Characteristics			IEC		UL / CSA
			NFC ①	DIN ②	
Wire size mm ² / MCM	Lug	Solid wire	6 - 150 mm ²		300 MCM max.
	C8	Stranded wire	6 - 120 mm ²		
Rated voltage	V		1000		600
Rated current nominal	A		269		269
Rated wire size nominal	mm ² / MCM		120 mm ²		300 MCM max.
Recommended wrench	Lug		H 17 mm		
	Central screw		6 mm Allen key		
Recommended torque	Lug		10 - 20 Nm / 87 - 174 lb.in		
	Central screw		6 - 12 Nm / 52 - 104 lb.in		

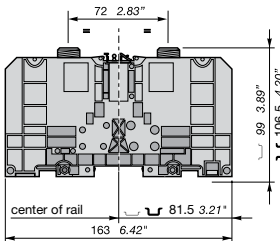
D 185/55.FF - 185 mm² blocks - 55 mm 2.16" spacing



D 185/55.FF

Characteristics			IEC		UL / CSA
			NFC ①	DIN ②	
Wire size mm ² / MCM	Lug	Solid wire	25 - 240 mm ²		500 MCM max.
	C11	Stranded wire	6 - 185 mm ²		
Rated voltage	V		1000		600
Rated current nominal	A		353		353
Rated wire size nominal	mm ² / MCM		185 mm ²		500 MCM max.
Recommended wrench	Lug		H 19 mm		
	Central screw		6 mm Allen key		
Recommended torque	Lug		14 - 30 Nm / 121 - 261 lb.in		
	Central screw		6 - 12 Nm / 52 - 104 lb.in		

D 300/55.FF - 300 mm² blocks - 55 mm 2.16" spacing



D 300/55.FF

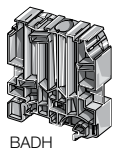
Characteristics			IEC		UL / CSA
			NFC ①	DIN ②	
Wire size mm ² / MCM	Lug	Solid wire	25 - 300 mm ²		1000 MCM max.
	C4	Stranded wire	6 - 300 mm ²		
Voltage	V		1000		600
Current	A		520		460
Rated wire size	mm ² / MCM		300 mm ²		1000 MCM max.
Recommended wrench	Lug		H 24 mm		
	Central screw		6 mm Allen key		
Recommended torque	Lug		25 - 50 Nm / 217 - 434 lb.in		
	Central screw		6 - 12 Nm / 52 - 104 lb.in		

Selection

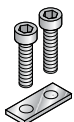
Description	Type	Packaging	Catalog number
Standard block without cover	Grey D 120/42.FF	5	019000322
Standard block without cover	Grey D 185/55.FF	5	019000423
Block 2 studs M16 without cover	Grey D 300/55.FF	5	019000524

Accessories

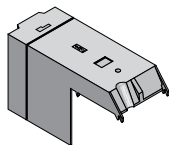
Description	Type	Packaging	Catalog number
End stop	BADH 12 mm	50	011690027
Rotating protective cover IP20	Grey CPUF120 ③	5	019001820
	Grey CPUF185 ④	5	019001921
Jumper bar with CHc screws	2 poles BJS42 ③	5	020577617
	3 poles BJS42 ③	5	020577710
Jumper bar with CHc screws	2 poles BJS551 ④	5	020577821
	3 poles BJS551 ④	5	020577922



BADH



BJS42
BJS551



CPUF120
CPUF185

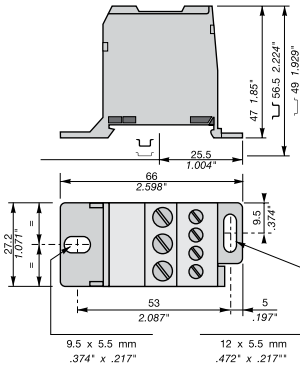
① NFC 20130
② DIN 46234
③ Only for block D 120/42.FF
④ For blocks D 185/55.FF and D 300/55.FF

Distribution blocks, single pole

Type BRU

Screw clamp, DIN 3

BRU 80 A



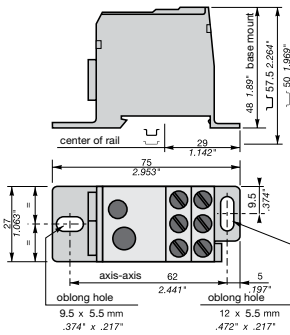
BRU 80 A

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.5 - 16 mm ²		22-6 AWG	18-6 AWG
mm ² / AWG	Stranded	0.5 - 10 mm ²			
Voltage	V	600		600	600
Current	A	80		80	80
Rated wire size	mm ² / AWG	3x16 mm ²		3x4 AWG	3x4 AWG
Inputs		6-16mm ²		8-4 AWG	
Outputs (4)		2.5-16mm ²		14-10 AWG	
Outputs (2) with ferrules		2.5-16mm ²		8-4 AWG	
Recommended torque	Nm / lb.in			0.8 Nm / 7 lb.in	

Selection

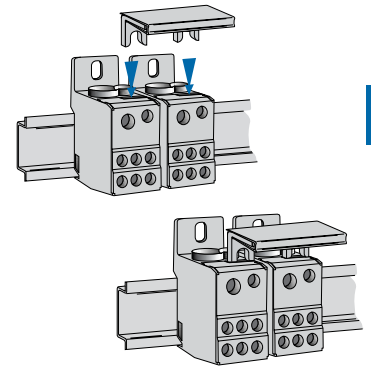
Description	Type	Packaging	Catalog number
Grey body	BRU 80 A	1	03562085

BRU 125 A - 35 mm² block - 27 mm 1.063" spacing



BRU 125 A

Characteristics		IEC		UL / CSA
		NFC	DIN	
Rated voltage	V	600		600
Rated current	A	125		115
Inputs: left input wire size	mm ² / AWG	10-35 mm ²		8-2 AWG
right input wire size	mm ² / AWG	6-16 mm ²		10- 6 AWG
Recommended torque	Nm / lb.in	3.5		31 lb.in
Recommended torque wrench		Allen key/4 mm		
Outputs: with ferrules	mm ² /AWG	4x2.5 to 16 mm ²		14 AWG to 6 AWG
without ferrules	mm ² /AWG	6x2.5 to 16 mm ²		14 AWG to 6 AWG
Recommended torque	Nm / lb.in	2 Nm		17.5 lb.in
Screwdriver		Posidriv Z2 or flat		



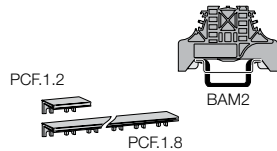
10

Selection

Description	Type	Packaging	Catalog number
Grey body	BRU 125 A	1	035620411

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
Jumper bar	PCF.1.2	1	035620512 ⊕
	PCF.1.8	1	035620613 ⊕



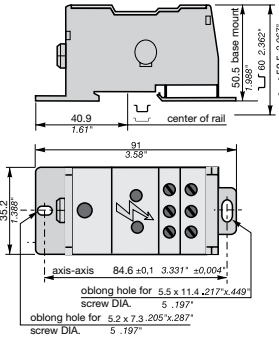
⊕ For BRU 125A only.

Distribution blocks, single pole

Type BRU

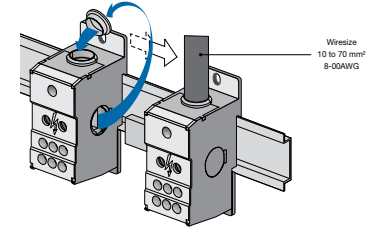
Screw clamp,  DIN 3

BRU 160 A - 70 mm² block - 35.2 mm 1.388" spacing



BRU 160 A

Characteristics		IEC		UL / CSA
		NFC	DIN	
Rated voltage	V	600	600	600
Rated current	A	160	160	160
Inputs (maximum wire size)				
left input wire size	mm ² /AWG	10-70 mm ²		8-00 AWG
right input wire size				
Recommended torque	Nm / lb.in	5		35.5 lb.in
Recommended torque wrench				Allen key/5 mm
Outputs: with ferrules	mm ² /AWG	6x2.5 to 16 mm ²		14 AWG to 6 AWG
without ferrules				
Recommended torque	Nm / lb.in	1.5 Nm		17.5 lb.in



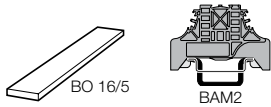
Wire size
10 to 70 mm²
8-00AWG

Selection

Description	Type	Packaging	Catalog number
Grey body	BRU 160 A	1	035620021

Accessories

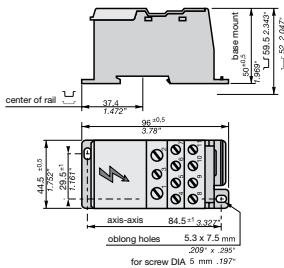
Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
Busbar	BO 16/5 2 poles	1	035620116
	BO 16/5 3 poles	1	035620217
	BO 16/5 4 poles	1	035620310



BO 16/5

BAM2

BRU 250 A - 120 mm² blocks - 44.5 mm 1.752" spacing



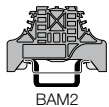
Characteristics		IEC		UL / CSA
		NFC	DIN	
Rated voltage	V	600	600	600
Rated current	A	160	160	160
Inputs (mini)				
max. wire size	mm ² /AWG	35-120 mm ²		2-0000 AWG
Recommended torque	Nm / lb.in	19		170 lb.in
Recommended torque wrench				Allen key/6 mm
Outputs: with ferrules	mm ² /AWG	2x2.5 to 25 mm ²		2x14 AWG to 4 AWG
without ferrules		2x2.5 to 35 mm ²		2x14 AWG to 2 AWG
Recommended torque	Nm / lb.in	3.5 Nm		31 lb.in
Wire size with/without ferrule	mm ² /AWG	5x2.5 to 16		5x14 AWG to 6 AWG
Recommended torque	Nm / lb.in	2 Nm		18 lb.in
Wire size with/without ferrule	mm ² /AWG	4x2.5 to 10		4x14AWG to 8 AWG
Recommended torque	Nm / lb.in	2 Nm		18 lb.in

Selection

Description	Type	Packaging	Catalog number
Grey body	BRU 250 A	1	017965715
Black body	BRU 250 ALU	1	035620714

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
Copper lug		1	XUS003154
Replacement cover for BRU 250 A		1	XUS003157
Replacement cover for BRU 250 ALU		1	XUS003158



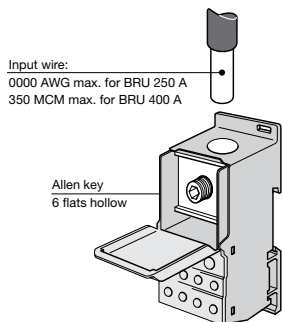
BAM2

Distribution blocks, single pole

Type BRU

Screw clamp,  DIN 3

BRU 400 A - 185 mm² block - 44.5 mm 1.752" spacing



BRU 250 A
BRU 400 A

Characteristics

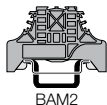
	V	IEC		UL / CSA
		NFC	DIN	
Rated voltage	600	600	600	600
Rated current	400	400	310	310
Inputs mini				
max. wire size	mm ² /AWG	95 - 185 mm ²	000 AWG-350 MCM	
Recommended torque	Nm / lb.in	25 Nm	230 lb.in	
Recommended torque wrench		Allen key/8 mm		
Outputs: with ferrules	mm ² /AWG	2x2.5 to 25	2x14 AWG to 4 AWG	
without ferrules		2x2.5 to 35	2x14 AWG to 2 AWG	
Recommended torque	Nm / lb.in	3.5 Nm	31 lb.in	
Wire size with/without ferrule	mm ² /AWG	5x2.5 to 16	5x14 AWG to 6 AWG	
Recommended torque	Nm / lb.in	2 Nm	18 lb.in	
Wire size with/without ferrule	mm ² /AWG	4x2.5 to 10	4x14 AWG to 8 AWG	
Recommended torque	Nm / lb.in	2 Nm	18 lb.in	

Selection

Description	Type	Packaging	Catalog number
Grey body	BRU 400 A	1	017965022

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116
Replacement cover for BRU 400A		1	XUS003157



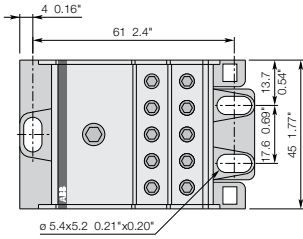
BAM2

Distribution blocks, single pole

Type BRU

Screw clamp,  DIN 3

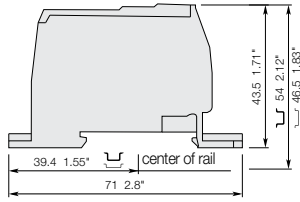
BRU 115 A - 50 mm² block - 45 mm 1.77" spacing



Characteristics		IEC	UL / CSA
Rated voltage	V	690	600
Rated current	A	125	115
Inputs mini			
Max. wire size	mm ² /AWG	10-50mm ²	8-2 AWG
Recommended torque	Nm / lb.in	6 Nm	31 lb.in
Recommended torque wrench		Allen key 6 flats/4 mm	
Outputs min			
Max wire size	mm ² /AWG	2.5 - 16 mm ²	14-4 AWG
Recommended torque	Nm / lb.in	3 Nm	17.5 lb.in

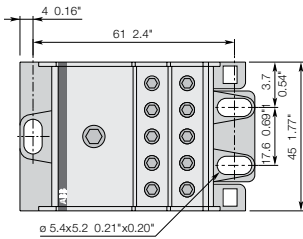
Selection

Description	Type	Packaging	Catalog number
Grey body	BRU 115	1	XUS002885



BRU 115 A

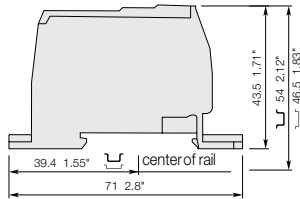
BRU 175 A - 70 mm² block - 45 mm 1.77" spacing



Characteristics		IEC	UL / CSA
Rated voltage	V	690	600
Rated current	A	175	175
Inputs mini			
Max. wire size	mm ² /AWG	16 - 70 mm ²	6 - 00 AWG
Recommended torque	Nm / lb.in	6 Nm	35.5 lb.in
Recommended torque wrench		Allen key 6 flats/5 mm	
Outputs min			
Max wire size	mm ² /AWG	2.5 - 16 mm ²	14 - 4 AWG
Recommended torque	Nm / lb.in	3 Nm	17.5 lb.in

Selection

Description	Type	Packaging	Catalog number
Grey body	BRU 175	1	XUS002886



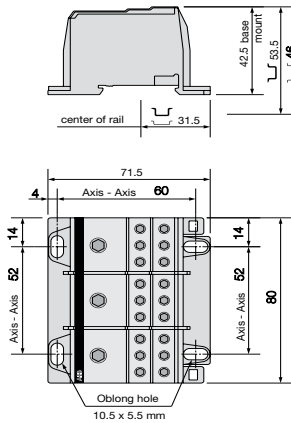
BRU 175 A

Distribution blocks, three pole

Type BRT

Screw clamp, DIN 3

BRT 115 A



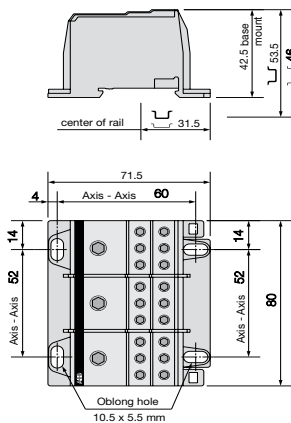
BRT 115 A

Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.5 - 16 mm ²		Input 8 to 2 AWG (per pole)	8 to 2 AWG (per pole)
mm ² / AWG	Stranded	0.5 - 16 mm ²		Output 14 to 4 AWG (per pole)	14 to 4 AWG (per pole)
Voltage	V	690		600	600
Current	A	125		115	115
Rated wire size	mm ² / AWG	10-35 mm ²		—	—
Recommended torque input	Nm / lb.in			6 Nm / 31 lb. in.	
Recommended torque output				3 Nm / 17.5 lb. in.	
Wire stripping length					
Input	mm / inches			15 mm / 0.59"	
Output				11 mm / 0.43"	

Selection

Description	Type	Packaging	Catalog number
Grey body	BRT 115 A	1	035620926

BRT 175 A



BRT 175 A

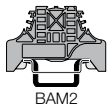
Characteristics		IEC		UL	CSA
		NFC	DIN		
Wire size	Solid	0.5 - 16 mm ²		Input 6 to 2/0 AWG (per pole)	6 to 2/0 AWG (per pole)
mm ² / AWG	Stranded	0.5 - 16 mm ²		Output 14 to 4 AWG (per pole)	14 to 4 AWG (per pole)
Voltage	V	690		600	600
Current	A	125		175	175
Rated wire size	mm ² / AWG	10-35 mm ²		—	—
Recommended torque input	Nm / lb.in			6 Nm / 31 lb. in.	
Recommended torque output				3 Nm / 17.5 lb. in.	
Wire stripping length					
Input	mm / inches			15 mm / 0.59"	
Output				11 mm / 0.43"	

Selection

Description	Type	Packaging	Catalog number
Grey body	BRT 175 A	1	035621021

Accessories

Description	Type	Packaging	Catalog number
End stop	BAM2 9.9 mm	50	020635116

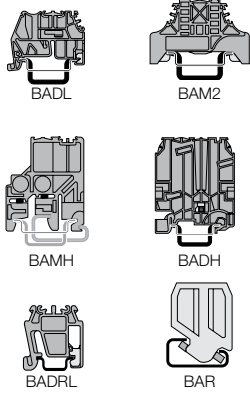


BAM2

Accessories

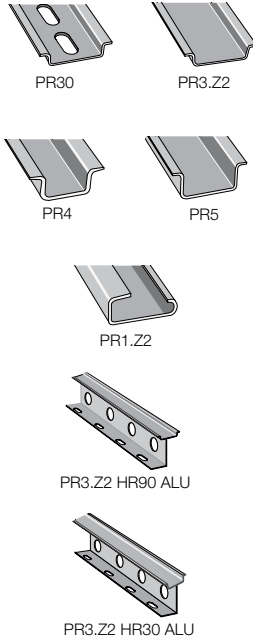
End stops

The end stops are mounted at the extremity of the terminal board assembly, giving additional support to the terminal blocks. For various types of marking, refer to the marker section



Description		Type		Packaging	Catalog number
End stop screwless DIN 3	grey	BADL	9 mm	50	039990302
End stop with screws DIN 3	light grey	BAM2	10 mm	50	039996701
	grey	BAM2	10 mm	50	020635116
	beige	BAM2	10 mm	50	029635100
High end stop with screws DIN 1 and DIN 3	grey	BAMH	9.1 mm	50	011483600
	beige	BAMH	9.1 mm	50	019483601
High end stop with screws DIN 3	grey	BADH	12 mm	50	011690027
End stop for miniblocks DIN 2	grey	BADRL	6.5 mm	50	019942021
Reversible end stop DIN 1	beige	BAR	10 mm	50	016451924

Mounting rails



Symmetrical white passivated galvanized steel prepunched rail	PR30	1 m	1	010150804
		2 m	1	017322005
Symmetrical white passivated galvanized steel rail	PR3.Z2	1 m	1	010151310
		2 m	1	017430017
Symmetrical white passivated galvanized steel rail	PR5	1 m	1	010151512
		2 m	1	016870022
Symmetrical white passivated galvanized steel rail	PR4	1 m	1	010151714
		2 m	1	016850012
Asymmetrical zinc white passivated galvanized steel rail	PR2	1 m	1	010167300
Extruded aluminum, prepunched	PR3.Z2 HR90 ALU	1 m	1	XUS001735
		2 m	1	XUS001736
Extruded aluminum, prepunched	PR3.Z2 HR30 ALU	1 m	1	XUS001737
		2 m	1	XUS001738

Test devices

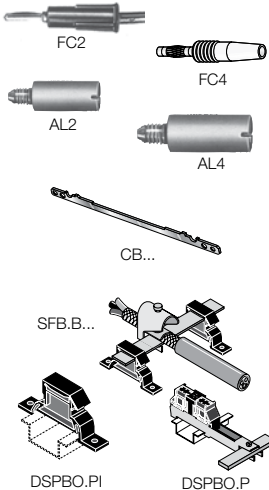
Test plug DIA. 2 mm		FC2		10	000786526
Test plug DIA. 4 mm		FC4		10	016786001
Test socket DIA. 2 mm for screw clamp/ ADO up to 8 mm spacing	one deck	AL2		50	016304321
	double deck	AL2		50	016307000
Test socket DIA. 4 mm for screw clamp blocks 8, 10, 12 mm spacing		AL4		50	016326201

Shield connectors

For screw clamp blocks: MA 2,5/2 ; MA 2,5/5.SNB ; M 4/6; MA 2,5/5.D2; M 4/6.D2	CBM5		50	017874514	
	CBM5D		50	017353024	
For spring clamp blocks: D 2,5/5.2L ; D 2,5/5.1.3L ; D 2,5/5.1.4L ; D 2,5/5.SNBT.2L		CBD5.2L		50	029107724
For ADO blocks: D 1/5.ADO ; D 1,5/6.ADO ; D 2,5/6.ADO ; D 4/6.ADO; D 2,5/5.SN.ADO ; D 4/6.SN.ADO; D 1/5.SNT2.ADO ; D 1,5/6.SNT2.ADO; D 4/6.D2.ADO ; D 1,5/6.D2.ADO		CBM5		50	017874514
		CBD1		1	017963406
		CBD2		50	017963507
		CBD2S		50	017840814

Shield terminals for collector bar

Shield diameter					
1,5 - 6,5	SFB.B1		10	020517014	
5 - 11	SFB.B2		10	020517101	
10 - 17	SFB.B3		10	020517202	
16 - 24	SFB.B4		10	020517303	
Collector bar 18 x 3 x 1000 mm	BO 318		10	020517505	
Bar holder (isolated from ground)	DSPBO.PI		10	020517606	
Bar holder (connected to the mounting rail)	DSPBO.P		10	020517707	



Accessories

DIN Rail cutters



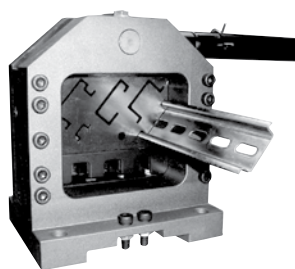
RLCUT02

Economy DIN rail cutter

Description	Type	Packaging	Catalog number
DIN 3 only rail cutter	RLCUT02	1	XUS002837

Features

- Lightweight, (only 6 lb.)
- Clean cuts in 3 seconds or less
- Fully portable: no need to mount on a bench
- Easily cuts all 35 mm x 7.5 mm (DIN46277-3) DIN rails
- Small dimensions: only 13.5" x 2.75" x 4.75" (350 x 66 x 118 mm)
- Available from stock
- Economically priced
- One year warranty



RLCUT01

DIN rail cutter

Description	Type	Packaging	Catalog number
DIN rail cutter	RLCUT01	1	XUS001772

Features

Cuts and punches:

- TS35 rail (35 mm x 7.5 mm standard symmetric rail)
- TS35C rail (35 mm heavy duty symmetric)
- TS35R rail (35 x 15 mm symmetric reinforced steel or aluminum)
- TS32 rail (32 mm asymmetric)

Also cuts:

- TS15 (15 mm miniature rail)
- 6 mm (~ 1/4") steel rods, threaded or not

Punches:

- An oblong hole 8.8 mm x 5 mm (0.35" x 0.20") in either direction on the axis of the rail.

Accessories included:

- 1m ruler (metric)
- End stop
- 730 mm (~28") high leverage handle

Accessories

Rail mounted receptacle



1SNA892461R1500

Selection

Description	Packaging	Catalog number
DIN rail mounted duplex receptacle	1	1SNA892461R1500

Technical data

Electrical ratings

Volts: 125
 Amps: 15 Amps Max.
 Wire range: 18-14 AWG
 Clamp torque: 3.5 - 5.3 lb. in. (0.4 - 0.6 Nm)

DIN rail mounting compatibility

Din 3 only

Materials information reference

Housing: 25% glass reinforced PA6/66
 Connectors: Chromium Oxide plated steel
 Operating temperatures: -40°C MIN +70°C MAX
 Flammability specs: Halogen-free, UL rated 94
 Ingress protection: IP20

Configuration

NEMA 5-15R

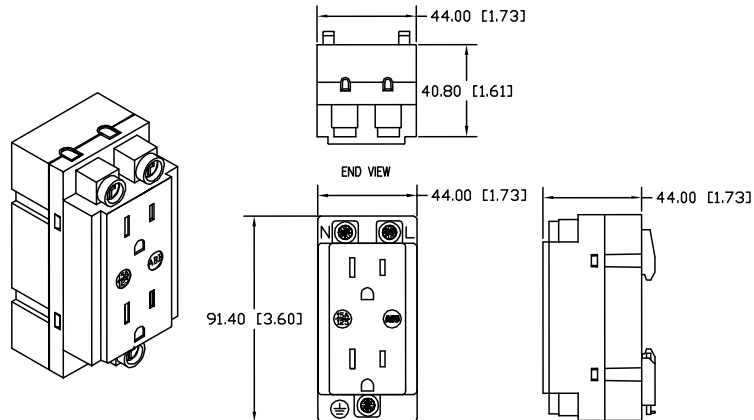
Color

Ivory

Approvals

UL, File # E233903

Approximate dimensions – (mm [in])

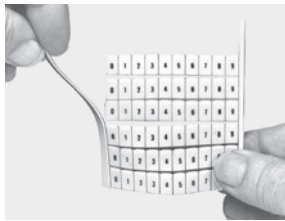


Marking

Marking for terminal blocks

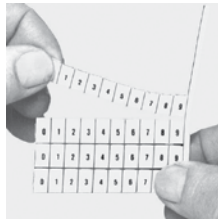
Selection table

Markers for blocks :	RC410	RC 510	RC610	RC810	RC1010	RC55	RC65	RCAL85
Screw/ADO								
5 mm spacing	POSSIBLE	○	◐	◐	◐	○	◐	◐
6 mm spacing	POSSIBLE	POSSIBLE	○	◐	◐	POSSIBLE	○	◐
8 mm spacing	POSSIBLE	POSSIBLE	POSSIBLE	○	◐	POSSIBLE	POSSIBLE	○
10 mm spacing	POSSIBLE	POSSIBLE	POSSIBLE	POSSIBLE	○	POSSIBLE	POSSIBLE	
12 mm spacing	POSSIBLE	POSSIBLE	POSSIBLE	POSSIBLE	○	POSSIBLE	POSSIBLE	POSSIBLE
16 mm spacing	POSSIBLE	POSSIBLE	POSSIBLE	POSSIBLE	○	POSSIBLE	POSSIBLE	POSSIBLE
Spring								
4 mm spacing	○	◐	◐	◐	◐	◐	◐	◐
5 mm spacing	POSSIBLE	○	◐	◐	◐	○	◐	◐
6 mm spacing	POSSIBLE	POSSIBLE	○	◐	◐	POSSIBLE	○	◐
8 mm	POSSIBLE	POSSIBLE	POSSIBLE	○	◐	POSSIBLE	POSSIBLE	○
10 mm	POSSIBLE	POSSIBLE	POSSIBLE	POSSIBLE	○	POSSIBLE	POSSIBLE	POSSIBLE
12 mm	POSSIBLE	POSSIBLE	POSSIBLE	POSSIBLE	○	POSSIBLE	POSSIBLE	POSSIBLE
16 mm	POSSIBLE	POSSIBLE	POSSIBLE	POSSIBLE	○	POSSIBLE	POSSIBLE	POSSIBLE
Power								
	POSSIBLE	POSSIBLE	POSSIBLE	○	◐	◐	◐	◐



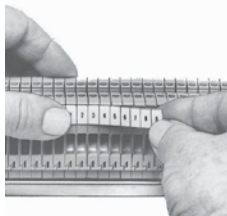
1

Remove one of the side bands of the card.



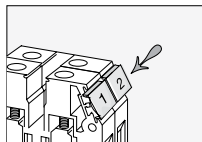
2

Separate the chosen strip from the rest of the card.

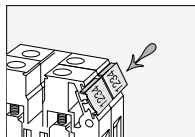


3

Press the first marker in place, hold it and slide your thumb on the rest of the strip.



Horizontal marking

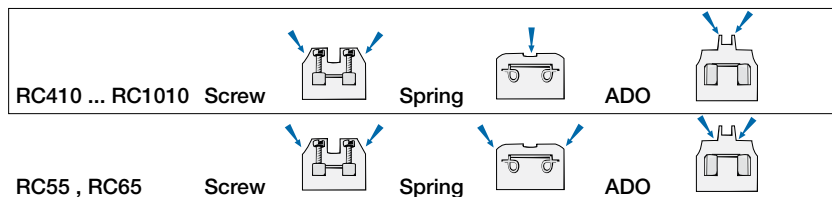


Vertical marking

Possible mounting : POSSIBLE

Recommended mounting : ○

Impossible mounting : ◐

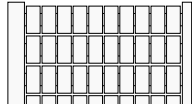


Marking for terminal blocks

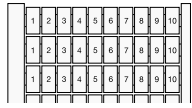
Standard RC marker cards

9 & 15 Digit catalog number selection

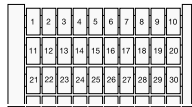
9 Digit catalog numbers



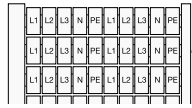
Marker sizes	RC410	RC55	RC510	RC65	RC610	RC810	RC1010
Blank cards	022900015	023000012	023100007	023200000	023300001	023400002	023800016



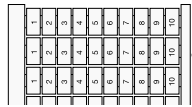
Horizontal marking							
10 strips from 1 to 10	022900203	023000200 (5)	023100225 (25)	023200226 (5)	023300227 (25)	023400220	1 to 8 023800204
10 strips from 11 to 20	022900304	023000301 (2)	023100326 (10)	023200327 (2)	023300320 (10)	023400321	9 to 16 023800305
10 strips from 21 to 30	022900405	023000402	023100427 (6)	023200420	023300421 (6)	023400422	17 to 24 023800406
10 strips from 31 to 40	022900506	023000503	023100520 (4)	023200521	023300522 (4)	023400523	25 to 32 023800507
10 strips from 41 to 50	022900607	023000604	023100621 (3)	023200622	023300623 (3)	023400624	33 to 40 023800600
10 strips from 51 to 60	022900700	023000705	023100722 (2)	023200723	023300724 (2)	023400725	41 to 48 023800701
10 strips from 61 to 70	022900811	023000816	023100803 (2)	023200804	023300805 (2)	023400806	49 to 56 023800812



From 1 to 100	022903002	023003007 (2)	023103024 (15)	023203025 (2)	023303026 (15)	023403027	1 to 80 023803003
From 101 to 200	022903127	023003124	023103111 (2)	023203112	023303113 (2)	023403114	81 to 160 023803120



20 times L1-L2-L3-N-PE		023013125	023113112	023213113	023313114 (2)		
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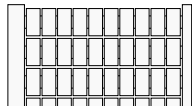


Vertical marking							
10 strips from 1 to 10	022904101	023004106	023104123 (5)	023204124	023304125 (5)	023404126	1 to 8 023805104
10 strips from 11 to 20	022904202	023004207	023104224 (3)	023204225	023304226 (3)	023404227	9 to 16 023805205
10 strips from 21 to 30	022904303	023004300	023104325 (2)	023204326	023304327 (2)	023404320	17 to 24 023805306
10 strips from 31 to 40	022904404	023004401	023104426 (2)	023204427	023304420 (2)	023404421	25 to 32 023805407

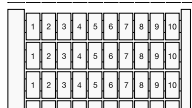


From 1 to 100	022906010	023006015	023106002 (8)	023206003	023306004 (8)	023406005	1 to 80 023808006
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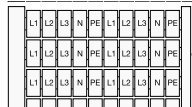
15 Digit catalog numbers



Marker sizes	RC410	RC55	RC510	RC65	RC610	RC810	RC1010
Blank cards	1SNA229000R1500	1SNA230000R1200	1SNA231000R0700	1SNA232000R0000	1SNA233000R0100	1SNA234000R0200	1SNA238000R1600



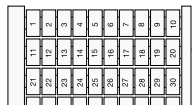
Horizontal marking							
10 strips from 1 to 10	1SNA229002R0300	1SNA230002R0000 (5)	1SNA231002R2500 (25)	1SNA232002R2600 (5)	1SNA233002R2700 (25)	1SNA234002R2000	1 to 8 1SNA238002R0400
10 strips from 11 to 20	1SNA229003R0400	1SNA230003R0100 (2)	1SNA231003R2600 (10)	1SNA232003R2700 (2)	1SNA233003R2000 (10)	1SNA234003R2100	9 to 6 1SNA238003R0500
10 strips from 21 to 30	1SNA229004R0500	1SNA230004R0200	1SNA231004R2700 (6)	1SNA232004R2000	1SNA233004R2100 (6)	1SNA234004R2200	17 to 24 1SNA238004R0600
10 strips from 31 to 40	1SNA229005R0600	1SNA230005R0300	1SNA231005R2000 (4)	1SNA232005R2100	1SNA233005R2200 (4)	1SNA234005R2300	25 to 32 1SNA238005R0700
10 strips from 41 to 50	1SNA229006R0700	1SNA230006R0400	1SNA231006R2100 (3)	1SNA232006R2200	1SNA233006R2300 (3)	1SNA234006R2400	33 to 40 1SNA238006R0000
10 strips from 51 to 60	1SNA229007R0000	1SNA230007R0500	1SNA231007R2200 (2)	1SNA232007R2300	1SNA233007R2400 (2)	1SNA234007R2500	41 to 48 1SNA238007R0100
10 strips from 61 to 70	1SNA229008R1100	1SNA230008R1600	1SNA231008R0300 (2)	1SNA232008R0400	1SNA233008R0500 (2)	1SNA234008R0600	49 to 56 1SNA238008R1200
From 1 to 100	1SNA229030R0200	1SNA230030R0700 (2)	1SNA231030R2400 (15)	1SNA232030R2500 (2)	1SNA233030R2600 (15)	1SNA234030R2700	1 to 80 1SNA238030R0300
From 101 to 200	1SNA229031R2700	1SNA230031R2400	1SNA231031R1100 (2)	1SNA232031R1200	1SNA233031R1300 (2)	1SNA234031R1400	81 to 160 1SNA238031R2000



20 times L1-L2-L3-N-PE		1SNA230131R2500	1SNA231131R1200 (2)	1SNA232131R1300	1SNA233131R1400 (2)		
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Vertical marking							
10 strips from 1 to 10	1SNA229041R0100	1SNA230041R0600	1SNA231041R2300 (5)	1SNA232041R2400	1SNA233041R2500 (5)	1SNA234041R2600	1 to 8 1SNA238051R0400
10 strips from 11 to 20	1SNA229042R0200	1SNA230042R0700	1SNA231042R2400 (3)	1SNA232042R2500	1SNA233042R2600 (3)	1SNA234042R2700	9 to 6 1SNA238052R0500
10 strips from 21 to 30	1SNA229043R0300	1SNA230043R0000	1SNA231043R2500 (2)	1SNA232043R2600	1SNA233043R2700 (2)	1SNA234043R2000	17 to 24 1SNA238053R0600
10 strips from 31 to 40	1SNA229044R0400	1SNA230044R0100	1SNA231044R2600 (2)	1SNA232044R2700	1SNA233044R2000 (2)	1SNA234044R2100	25 to 32 1SNA238054R0700



From 1 to 100	1SNA229060R1000	1SNA230060R1500	1SNA231060R0200 (8)	1SNA232060R0300	1SNA233060R0400 (8)	1SNA234060R0500	1 to 80 1SNA238080R0600
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Marking systems

Custom marking

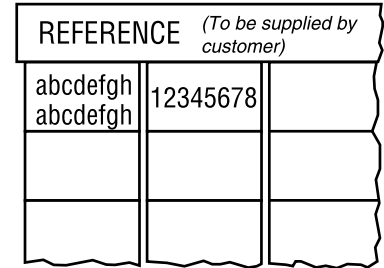
Custom marking

Use the table below to select the card type based on the marker size desired and the thickness of the terminal block. Select the top marking strip based on the terminal block thickness. For your ordering convenience, we have provided a top marking continuous strip template on page 10.121.

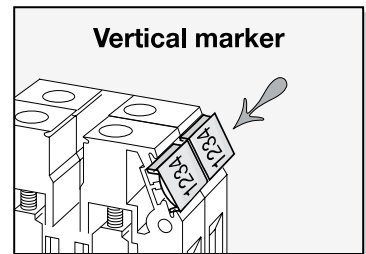
Recommended alphanumeric for ease of reading.

Card Type	Use With Terminal Block Thickness	One or Two Lines/Marker	
		Vertical Marking	Horizontal Marking
RC410, large 4 mm	4 mm	8	2
RC55, small 5 mm	5 mm	4	3
RC510, large 5 mm	5 mm	8	4
RC65, small 6 mm	6 mm	4	3
RC610, large 6 mm	6 mm	8	5
RC810, large 8 mm	8 mm and larger	8	6
RC1010, large 10 mm	10 mm and larger	8	6
Top Marking Card RCT610	6 mm	8	5
RCT810	8 mm	8	6
Top Marking Continuous Strip RTM7	6 mm to 12.5 mm	1-3	1-3
RTM9	16 mm	1-4	1-4

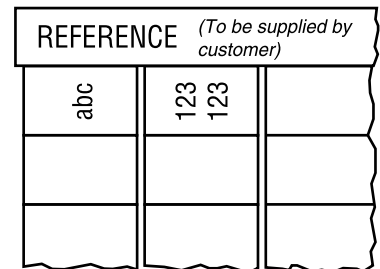
MARKER CARD



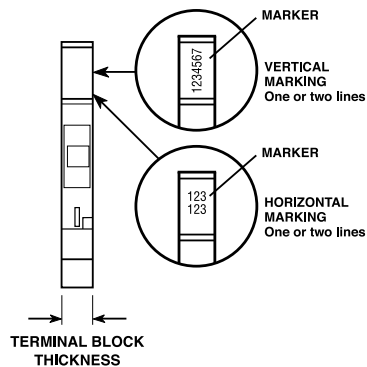
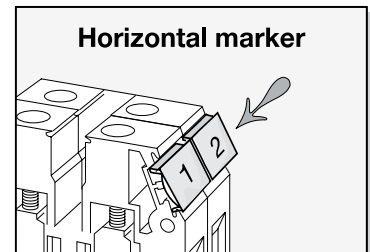
VERTICAL MARKING:
Part of 100 marker card, shown above.



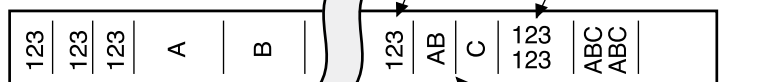
MARKER CARD



HORIZONTAL MARKING:
Part of 100 marker card, shown above.



TOP MARKING CONTINUOUS STRIP



See table above for marker specifications.

Vertical and horizontal marking can be mixed on a marker card or on a top marking strip.

Custom markers Order form

TO AVOID MISTAKES, PLEASE TYPE OR PRINT CLEARLY. INDICATE CAPITAL OR LOWER CASE LETTERS AS DESIRED. EACH MARKER WILL BE PRINTED EXACTLY AS YOU SPECIFY BELOW.

For consecutive marking, start at the top in the left most column and proceed to the bottom. Then start at the top in the next column to the right and proceed to the bottom. Repeat for other columns.

1 2 3 4																				
5 6 7																				

REFERENCE

- Vertical Marking →
- Horizontal Marking →
- For consecutive marking, mark from top to bottom. →

For each marker card specify your reference number, card type (RC55, RC610, RC7610 etc.), quantity, and marking direction. Call for price. If you prefer that Entelec select the card type, enter your terminal block P/N in the reference column.

Reference	Card Type	Quantity	Marking Direction	
			V	H

Ordered by: P.O. # _____

NAME _____

COMPANY _____

ADDRESS _____ MAIL STOP _____

CITY _____ STATE/PROVINCE _____ ZIP/CODE _____

PHONE () _____ EXT _____

FAX () _____ E-MAIL _____

REFERENCE NO(S) _____

Custom top marker continuous strips

Order form

How To Order Top Marker Continuous Strips

Entrelec supplies computer marked top marker continuous strips, RTM7 and RTM9, in lengths to 350 mm. The number of printed markers depends on the terminal block width.

To Specify Marker Spacing

The spacing between markers is equal to each terminal block's width. Use the ruler (drawn in mm to actual size and shown below the marking strip template) to measure the spacing desired between markers. To ensure accuracy, indicate the spacing just

above each marker. Draw vertical lines on the top marker strip template to separate markers. Our plotter will print these vertical lines onto your marker strip.

To Specify Alphanumerics

To avoid mistakes, please print clearly. Indicate capital or lower case letters as desired. Each top marker strip will be printed exactly as you specify on the template. See ordering examples.

(TIP: You may find the blank top marking template, below, easier to use when photocopied at twice the size.)
For additional copies, please photocopy the template.

ORDER FORM

THIS MARKER STRIP IS FOR USE ON TERMINAL BLOCKS WITH:

- 6, 8, 9.5, 10, 12, AND 12.5 MM WIDTHS
- 16 MM WIDTHS

Ordered By: _____ P.O. # _____

NAME _____

COMPANY _____

ADDRESS _____ MAIL STOP _____

CITY _____

STATE/PROVINCE _____ ZIP/CODE _____

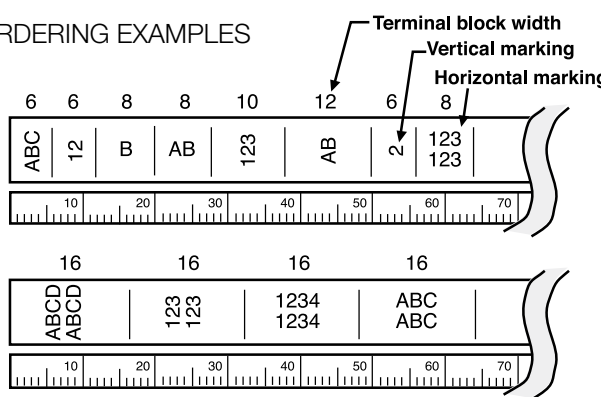
PHONE () _____ EXT _____

FAX () _____

E-MAIL _____

REFERENCE NO(S) _____

ORDERING EXAMPLES



Special Instructions

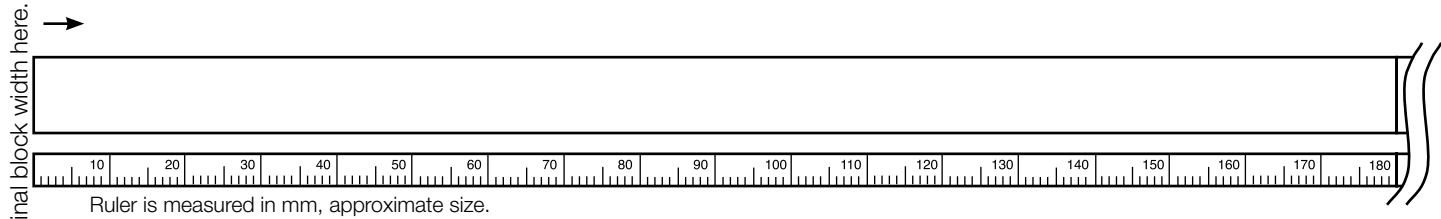
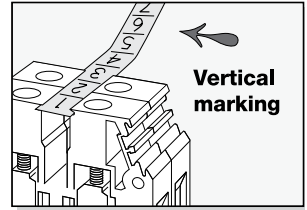
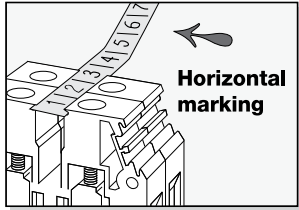
For blocks with 6-12.5 mm spacing: You can use 1-3 alphanumerics for vertical marking. For horizontal marking, the number of alphanumerics depends on the terminal block width. For ease of reading, 1-3 alphanumerics per row are recommended for blocks with 6-12.5 mm spacing.

For blocks with 16 mm spacing: For ease of reading, for vertical or horizontal marking, 1-4 alphanumerics per row are recommended for blocks with 16 mm spacing.

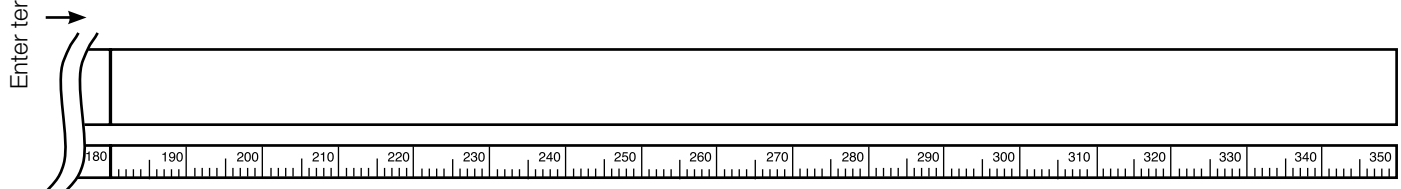
TOP MARKER CONTINUOUS STRIP TEMPLATE

The number of markers depends on the terminal block width (spacing). Draw vertical lines on the top marker strip template to separate markers. To ensure accuracy, indicate the terminal block width in mm, just above each marker. A line will be printed between each marker.

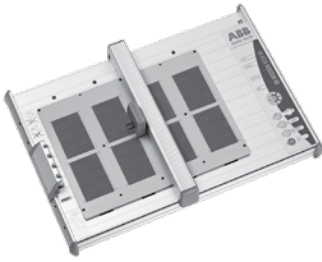
To avoid mistakes, please print clearly.



Ruler is measured in mm, approximate size.



Marking systems AMS 500



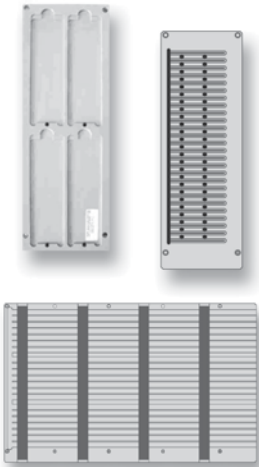
Marking table

Marking table

Description	Type	Packaging	Catalog number
Complete plotter kit	AMS 500	1	XUSP02636
Kit includes:			
1 Plotter, Model AMS500			
1 Template for 8 RC/RCT marker cards			
1 Plotter pen (.35 mm)			
5 Ink cartridges			
2 Cleaning cartridges			
1 Cleaner waste bottle			

Other available accessories

Description	Packaging	Catalog number
Ink cartridges (5)	1	XUSP01134
Plotter pen ink (30 ml bottle)	1	XUSP02530
Cleaning cartridge (2)	1	XUSP01135
Plotter pen cleaning fluid (50 ml bottle)	1	XUSP02531
Cleaner waste bottle	1	XUSP01139
Plotter pen (.18mm)	1	XUSP01551
Plotter pen (.25mm)	1	XUSP01132
Plotter pen (.35mm)	1	XUSP01133
Plotter pen (.50mm)	1	XUSP01552
Plotter pen (.70mm)	1	XUSP01548
Plotter pen (1.00mm)	1	XUSP01549
Disposable pen ED ink - Black (.18mm)	1	XUSP03511
Disposable pen ED ink - Blue (.18mm)	1	XUSP03512
Disposable pen ED ink - Red (.18mm)	1	XUSP03513
Disposable pen ED ink - Green (.18mm)	1	XUSP03514
Disposable pen ED ink - Black (.25mm)	1	XUSP03342
Disposable pen ED ink - Blue (.25mm)	1	XUSP03343
Disposable pen ED ink - Red (.25mm)	1	XUSP03344
Disposable pen ED ink - Green (.25mm)	1	XUSP03345
Disposable pen ED ink - Black (.35mm)	1	XUSP03346
Disposable pen ED ink - Blue (.35mm)	1	XUSP03347
Disposable pen ED ink - Red (.35mm)	1	XUSP03348
Disposable pen ED ink - Green (.35mm)	1	XUSP03349
Pen adaptor for permanent marker	1	XUSP03221
RC/RCT template (8 cards)	1	XUSP02633
RTM 7/9 template	1	XUSP01138
RPB-12 template (PCB strips)	1	XUSP01550
Pads for RC/RCT template	1	XUSP02629
Pads for RTM template	1	XUSP02630
Service kit for pen maintenance	1	XUSP02861



Templates

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Additional terminal block products

This Terminal Block section represents just a portion of the ABB terminal block product offering. For the complete offering please visit our website at www.abb.com/lowvoltage and follow the Terminal Block link on the left side of the page.

Marking systems

HTP500 thermal transfer printer



HTP500

Description

- Excellent print quality, resolution: 300 dpi
- Fast printing: up to 5,000 markers per hour
- Excellent marking durability
- Ease and flexibility of use in automatic, semi-automatic or manual mode



HTP500-FEED



HTP500-PL2



HTP500-PL2



RIB-B



HTP500

Ordering details

Description	Type	Package	Catalog number
Full kit including:	HTP500 KIT	–	1SNA235700R1500
- 1 HTP500 thermal transfer printer	HTP500	–	–
- software for HTP500 thermal transfer printer	HTS500	1	1SNA235702R0300
- support table	HTP500-BAS	1	1SNA235706R0700
- universal feeder for marker cards	HTP500-FEED	1	1SNA235703R0400
- support plate for ABB terminal block markers	HTP500-PL2	1	1SNA235705R0600
- universal support plate for wire markers	HTP500-PL	1	1SNA235704R0500
- black ribbon cassette	RIB-B	3	1SNA235710R0600
- cleaning cassette	HTP500-CLEAN	1	1SNA235714R2600
- power supply cable	HTP500-PW	1	1SNA235709R1200
- parallel cable	HTP500-LPT	1	1SNA235708R1100
- USB/parallel adapter cable	HTP500-USB	1	1SNA235719R0300
- wooden box for HTP500 kit	HTP500-WB	1	1SNA235717R2100

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Feeders and support plates

Description	Type	Package	Catalog number
Universal feeder for marker cards	HTP500-FEED	1	1SNA235703R0400
Support plate for ABB terminal block markers	HTP500-PL2	1	1SNA235705R0600

Accessories

Description	Type	Package	Catalog number
Black ribbon cassette	RIB-B	3	1SNA235710R0600
Red ribbon cassette for identification plates and adhesive labels	RIB-R	3	1SNA235711R2300
Red ribbon cassette for terminal blocks and wire markers	RIB-RS	3	1SNA235718R0200
Cleaning cassette	HTP500-CLEAN	1	1SNA235714R2600
Standard cleaning roll ø18	HTP500-ROLL	1	1SNA235715R2700
Printing head	HTP500-PRINT	1	1SNA235716R2000
Power supply cable	HTP500-PW	1	1SNA235709R1200
Parallel cable	HTP500-LPT	1	1SNA235708R1100
USB/parallel adapter cable	HTP500-USB	1	1SNA235719R0300
Dust cover for HTP500 and AMS 500 systems	DUST COVER	1	1SNA360161R1500
Wooden box for HTP500 kit	HTP500-WB	1	1SNA235717R2100

ABB's know-how provides the solution for your wiring.

Interfast pre-wiring system is recognized as a smart and efficient solution for a wide range of applications in various markets.

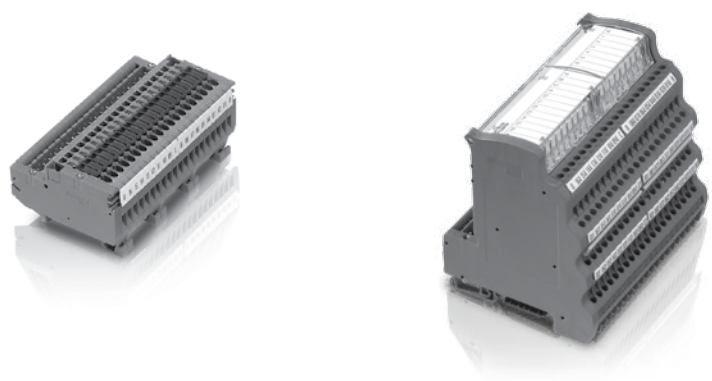
With its set of products fully designed to make your PLC wiring easy, Interfast meets all your requirements: relay switching, optocoupler isolation, or circuit protection.

Interfast can be used in the following sectors:

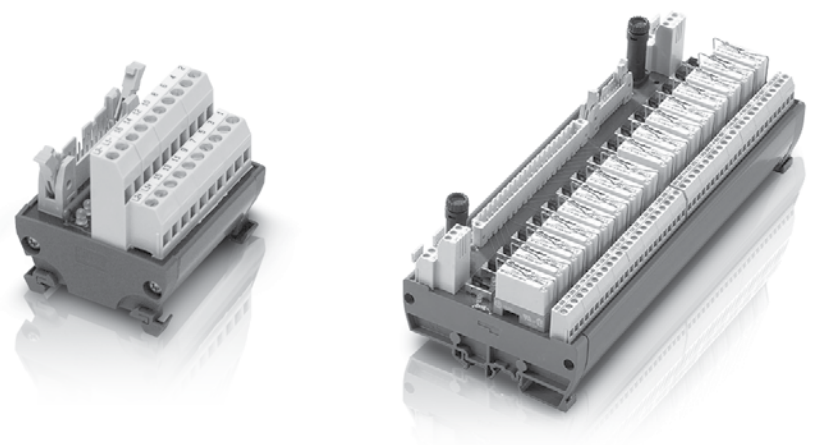
- Automotive
- Cement
- Chemical and petrochemical
- Electric power
- Metals
- Mining
- Oil & gas
- Pulp & paper
- Town planning infrastructures
- Water and wastewater.

ABB Exclusivity

Interfast MS - Modular system based on terminal block technology



Interfast PCB - Standard or compact modules



Interfast
Terminal blocks

Make your PLC wiring easy!

Connecting a PLC to components is hard work.

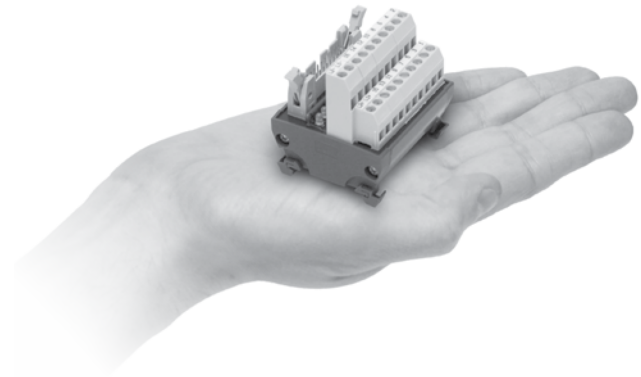
Transferring the different signals from your PLC to terminal blocks, using a single-wire connection system, requires a lot of time and accuracy. Fortunately, we have a solution for you!

Forget about the countless wires and the risk of contact reversal! Try Interfast, the pre-wiring system for PLCs by ABB.

You want to gain more space in your cabinet, try our new ultra-compact interface modules!

With a 50mm width and optimized dimensions, you gain up to 60% more space.

Save up to 98%
of installation time



The benefits that make Interfast so competitive, user-friendly and flexible:

You optimize the space in your cabinet.

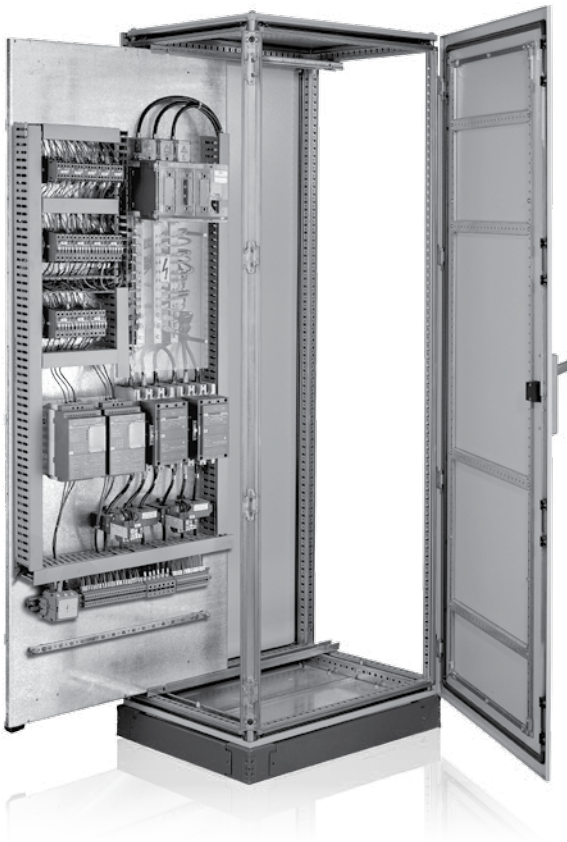
Our compact and ultra-compact interface modules ensure components are easy to handle inside the cabinet.

You reduce your costs.

Your wiring is less expensive since it takes less time. Plus, your consumption of cables, terminal blocks and other elements used in a classic wiring system, is dramatically reduced.

You save time.

The time you save on the wiring can be used for more demanding tasks.



Main features of our interface modules:

- 1 to 4-wire connection
- Input voltage up to 250 V
- Current up to 2 A
- Disconnect and protect channels
- Signal indicators
- Test points for current and voltage measurement
- IP20 protection
- PLC protection with fuse and I/O isolation (2.5 kV)
- Heavy-duty industrial connectors
- Relay for switching 16 A/250 V
- Pluggable relays and optocouplers
- Forcing and interrupting relay control
- Interface modules dedicated to solenoid valve control
- Various accessories to make your installation and maintenance easy
- More than 50 interface modules and 4 lengths of cables.

Choose flexibility

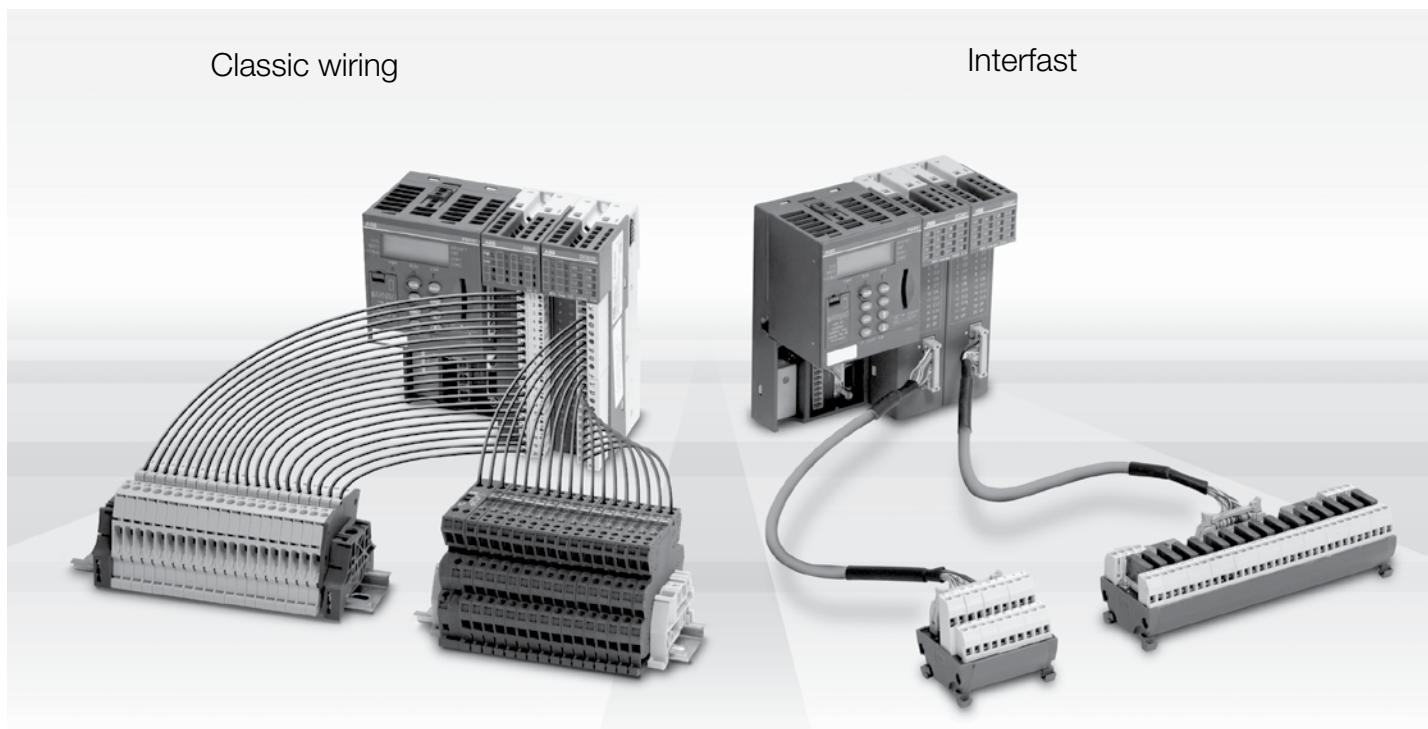
Whatever your PLC and I/O cards, ABB offers complete and pre-tested solutions adapted to your needs.

Interfast is a fast and error-free system.

The system is composed of three main parts:
 Front adaptors that simply plug into the I/O board
 Pre-wired and pre-tested cables available in different lengths and pluggable in a few seconds
 Passive and active interface modules that replace traditional terminal blocks.

Interfast offers pre-wired cables to connect with most of the PLCs existing on the market such as:

ABB
 Ge-Fanuc
 Mitsubishi
 Omron
 Rockwell
 Schneider
 Siemens.



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Your installation is flexible.

Thanks to our complete plug-and-play system, maintaining and replacing your installation has never been so easy.

Your wiring is reliable.

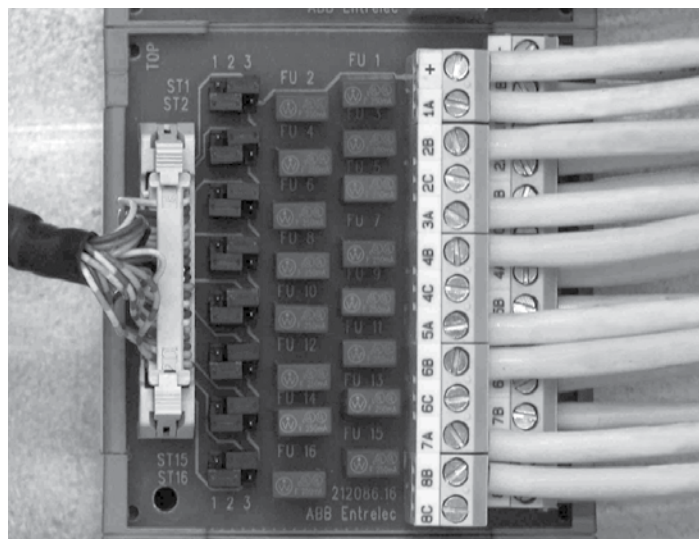
All our products are tested and wiring errors eliminated.

All your requirements are met


Find what you need in our wide range of interface modules. From simple connecting modules to decoupling modules, many applications can be covered! Plus, with our Modular System, design your own interface modules according to your own needs.


Everything is clear in your cabinet


Installation is clear, cable strands can be located easily.



Interfast series

Connecting Interfast MS with omniconnect connector	Without LED		With LED		
	Description	16-channel	8-channel	16-channel	8-channel
	Single wire	1SNA621017R1200	1SNA621016R1100		
	Single wire redundancy	1SNA631005R2100	1SNA631004R2000	1SNA631007R2300	1SNA631006R2200
	Single wire with fuse	1SNA631013R1000			
	Two wire	1SNA631025R1400	1SNA631024R1300	1SNA631027R1600	1SNA631026R1500
	Two, three or four wire	1SNA631055R2200	1SNA631054R2100	1SNA631061R2000	1SNA631060R0300
	Interruptible single wire	1SNA631017R1400	1SNA631016R1300		
	Interruptible two, three or four wire	1SNA631083R1700	1SNA631082R1600	1SNA631081R1500	1SNA631080R2000
	Description	32-channel		32-channel	
	Single wire	1SNA631001R2500		1SNA631003R2700	

Connecting Interfast PCB with HE10 connector	Without LED		With LED		
	Description	16-channel	8-channel	16-channel	8-channel
	Single wire	1SNA020867R2000		1SNA020870R0700	
	Two wire with fuse	1SNA020803R2100	1SNA020802R2000		
	Two or three wire	1SNA020868R0100		1SNA020871R2400	
	Three wire with fuse				1SNA020874R2700
	Interruptible single wire	1SNA020869R0200		1SNA020872R2500	
	Interruptible three wire with fuse			1SNA020873R2600	

Connecting Interfast PCB with omniconnect connector	Without LED		With LED		
	Description	16-channel	8-channel	16-channel	8-channel
	Single wire	1SNA020859R0000		1SNA020863R2400	
	Two or three wire	1SNA020860R0500		1SNA020864R2500	
	Three wire with fuse	1SNA020861R2200	1SNA020857R2600	1SNA020865R2600	1SNA020858R0700
	Interruptible single wire	1SNA020862R2300		1SNA020866R2700	

Decoupling Interfast MS with omniconnect connector	Description	16-channel	8-channel
	N relay output interface 1SPDT without led	1SNA631124R1400	
N relay output interface 1SPDT	1SNA631125R1500		
N/P relay output interface 1SPDT	1SNA631181R1600	1SNA631182R1700	
Universal interface without led	1SNA631151R2700	1SNA631158R0600	
Universal interface with led on the power supply	1SNA631179R0300	1SNA631177R2100	
Universal interface with led on the power supply and channels	1SNA631180R2100	1SNA631178R0200	

Decoupling Interfast PCB with omniconnect or HE10 connector	Description	16 relays with HE10	16 relays with omniconnect and HE10	8 relays with omniconnect
	N/P relay output interface 1NO	1SNA020954R2700	1SNA021080R1000 only omniconnect	
N/P relay output interface 1NO for solenoid valve control		1SNA020836R1100	1SNA020830R2700	
N/P relay output interface 1NO with fuse on common contact	1SNA020800R0200			
N/P relay output interface 1SPDT		1SNA020831R1400	1SNA020826R1700	
N/P relay output interface 1SPDT compact	1SNA020953R2600			
N/P relay output interface 1SPDT with fuse on common contact		1SNA020833R1600	1SNA020828R2100	
N/P relay output interface 1SPDT with interruptible terminal		1SNA020835R1000	1SNA020829R2200	
N/P relay output interface 1SPDT with coil override		1SNA020834R1700		
N/P relay output interface 1DPDT		1SNA020832R1500	1SNA020827R1000	
N/P relay input interface 1NO	1SNA020955R2000			
N/P relay input interface 1NO with fuse on common contact	1SNA020856R2500			

Tools ready to use and ready to "click"

Learn more about Interfast on the web from the ABB eMedia portal.

<http://www.web-emedial.com/interfast>

This library gives you access to all the latest eCat documentation for the whole range, online, anytime.

Our selection tool helps you to easily define a solution that suits your application.

The image displays a sequence of screenshots from the Interfast selection tool. The first screenshot shows the 'Interfast' product overview with the tagline 'The PLC pre-wiring system'. The second screenshot shows the 'Selection guides' menu with a blue arrow pointing to '2'. The third screenshot shows the 'Select the PLC module' step with a blue arrow pointing to '3'. The final, largest screenshot shows the 'Select the cable' step, which includes a table of cable options and a 'Your PLC pre-wiring system' summary.

Technology	Description	Levl.	Order code	Application	Micro-PC
Interfast MS	Single-wire interface	No	1SN4431017R1200	Power	656
Interfast MS	Single-wire interface with fast	No	1SN4431025R1100	Power	656
Interfast MS	Single-wire interface with fast	No	1SN4431013R1000	Power	656
Interfast MS	Two-wire interface	No	1SN4431025R1400	Power	656
Interfast MS	Two, three or four-wire interface	No	1SN4431056R2200	Power	656
Interfast MS	Interspliable single-wire interface	No	1SN4431017R1400	Power	656

Your PLC pre-wiring system

Interface
 Order code: 1SN44300R2100
 Description: 606-16-1
 Technology: PLC-Connector Interfaces
 Interfast MS
 With Levl: No
 Qty: 1

Cable
 Order code: 1SN44300R1000
 Description: LAF100UN04-00666
 Standard: IEC
 Length (m): 1
 Qty: 1

Front adaptor
 Order code:
 Description: Qty

PDFs: Catalogue page, Picture (eps), Picture (jpg), Download

10

Interfast catalog



Interfast:
the PLC pre-wiring system
Interface modules
catalog reference
No. 1SN44300R2100

Additional Interfast products

This Interfast section represents just a portion of the ABB Interfast product offering. For the complete offering please visit our website at www.web-emedial.com/interfast

Notes



11 - Power supplies



Features and benefits	11.1
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Approvals and marks.....	11.3

CP-D Range..... 11.5 – 11.12

Features and benefits	11.5
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Technical data	11.7 - 11.11
Technical diagrams	11.12
Approximate dimensions	11.12

CP-E Range

11.13 – 11.26

Features and benefits	11.13
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Technical data.....	11.15 - 11.23
Technical diagrams & wiring schematics	11.24 - 11.25
Approximate dimensions.....	11.26

CP-T Range

11.27 – 11.34

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Technical diagrams & approximate dimensions	11.33 - 11.34

CP-S, CP-C & CP-A Range

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Ordering details	11.36
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CP-B Range

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Electronic protection devices, EPD24.....

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Installation guidelines.....	11.57

Notes

Switch mode Power supplies

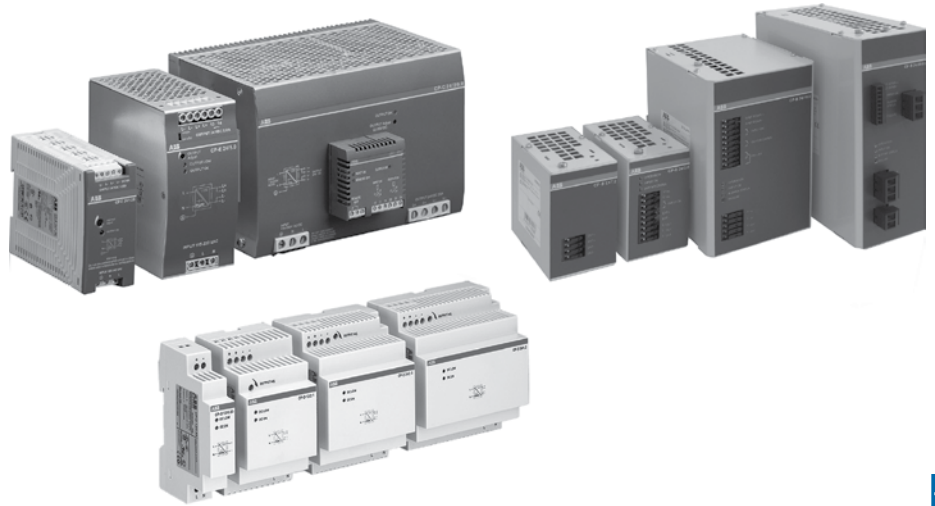


Switch mode power supplies

CP-D, CP-E, CP-T, CP-S
CP-C, CP-A, CP-B

Electronic protection device

EPD24



11

Special features of CP range primary switch power supplies

- Primary switch mode power supplies
 - High efficiency of approx. 90 %
 - Low power dissipation and low heating
 - Long lifetime
- Wide range of AC or DC supply voltages
 - World wide use also in high fluctuating networks and battery-powered plants
- Constant or adjustable output voltage (depending on type)
- Use in very harsh industrial environments
 - Reliable construction
 - According to EMC Directives EN 61000-6-2 (Interference immunity) & EN 61000-6-4 (Interference emission)
- Open-circuit, overload and short-circuit proof
- Integrated input fuse
- Safety
 - Closed construction
 - Touch-proof connecting terminals
 - Electrical isolation
- Easy and fast mounting
 - Mounting on DIN rail
- LED(s) for status indication
- Example of application
 - Supply of programmable logic controllers (PLC), e. g. AC31, AC500

Selection table

		CP-D						CP-E						CP-T						CP-S			CP-C					
Rated output current (Amps)		0.42	0.83	1.3	2.1	2.5	4.2	0.625	0.75	1.25	2.5	3	5	10	20	5	10	20	40	5	10	20	5	10	20	5	10	20
Rated output voltage	5 V DC																											
	12 V DC		■																									
	24 V DC	■		■																								
	48 V DC																											
10 W	12 V DC		■																									
	24 V DC	■																										
15 W	5 V DC																											
18 W	24 V DC								■																			
30 W	12 V DC																											
	24 V DC			■																								
	48 V DC																											
60 W	24 V DC																											
	48 V DC																											
100 W	24 V DC																											
120 W	12 V DC																											
	24 V DC																											
240 W	24 V DC																											
	48 V DC																											
480 W	24 V DC																											
	48 V DC																											
960 W	24 V DC																											
	48 V DC																											
Rated input voltage	100-240 V AC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	115 / 230 V AC auto select																											
	115-230 V AC																											
	110-240 V AC																											
	110-120 V AC																											
	220-240 V AC																											
400-500 V AC																												
Accessories	Redundancy unit	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Control module																											
	Messaging module																											
Structure of the type designation	CP-x y/z.z CP: Power supply x: Product range y: Rated output voltage z: Rated output current																											

11

Approvals and marks

		CP-D					
		CP-D 12/0.83	CP-D 12/2.1	CP-D 24/0.42	CP-D 24/1.3	CP-D 24/2.5	CP-D 24/4.2
■ existing □ pending							
Approvals							
	UL 508, CAN/CSA C22.2 No.14	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾
	UL 1310, CAN/CSA C22.2 No.223 (Class 2 Power Supply)	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	
	UL 60950, CAN/CSA C22.2 No.60950	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾
	GOST	■	■	■	■	■	■
	CCC	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾
Marks							
	CE	■	■	■	■	■	■
	C-Tick	□	□	□	□	□	□

		CP-E											CP-T											
		CP-E 5/3.0	CP-E 12/2.5	CP-E 12/10.0	CP-E 24/0.75	CP-E 24/1.25	CP-E 24/2.5	CP-E 24/5.0	CP-E 24/10.0	CP-E 24/20.0	CP-E 48/0.62	CP-E 48/1.25	CP-E 48/5.0	CP-E 48/10.0	CP-RUD	CP-T 24/5.0	CP-T 24/10.0	CP-T 24/20.0	CP-T 24/40.0	CP-T 48/5.0	CP-T 48/10.0	CP-T 48/20.0		
■ existing □ pending																								
Approvals																								
	UL 508, CAN/CSA C22.2 No.14	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾		■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	
	UL 1310, CAN/CSA C22.2 No.223 (Class 2 Power Supply)	■	■		■	■	■				■	■												
	ANSI/ISA-12.12 (Class I, Div. 2, hazardous locations) CAN/CSA C22.2 No. 213	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	
	UL 60950, CAN/CSA C22.2 No.60950	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾		■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	
	GOST	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	
	CCC	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾		■	■	■	■	■	■	■	■	
Marks																								
	CE	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	C-Tick	■	■	■	■	■	■	■	■	■	■	■	■	■	■	□	□	□	□	□	□	□	□	

		CP-S			CP-C			CP-A	CP-B					
		CP-S 24/5.0	CP-S 24/10.0	CP-S 24/20.0	CP-C 24/5.0	CP-C 24/10.0	CP-C 24/20.0	CP-C MM	CP-A RU	CP-A CM	CP-B 24/3.0	CP-B 24/10.0	CP-B 24/20.0	CP-B EXT.2
■ existing □ pending														
Approvals														
	UL 508, CAN/CSA C22.2 No.14	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾				■	■	■	■
	UL 508, CAN/CSA C22.2 No.14								□					
	UL 1604 (Class I, Div. 2, hazardous locations), CAN/CSA C22.2 No.213	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾							
	UL 60950, CAN/CSA C22.2 No.60950	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾					
	GOST	■	■	■	■	■	■	■	■	■	■	■	■	■
	CB scheme	■	■	■	■	■	■	■	■					
Marks														
	CE	■	■	■	■	■	■	■	■	■	■	■	■	■
	C-Tick	■	■	■	■	■	■	■	■	□				

¹⁾ Approvals refer to the rated input voltage U_{in}.



Type CP-D Switch mode Power supplies



Characteristics

- Output voltages 12 V, 24 V DC
- Adjustable output voltages (devices > 10 W)
- Output currents 0.42 A / 0.83 A / 1.3 A / 2.1 A / 2.5 A / 4.2 A
- Power range 10 W, 30 W, 60 W, 100 W
- Wide range input 100-240 V AC (90-264 V AC, 120-375 V DC)
- High efficiency of up to 89 %
- Low power dissipation and low heating
- Free convection cooling (no forced cooling with ventilators)
- Ambient temperature range during operation -40°C...+70 °C
- Open-circuit, overload and short-circuit stable
- Integrated input fuse
- U/I characteristic (fold-forward behavior at overload – no switch-off)
- LEDs for status indication
- Light-grey housing
- Approvals / Marks (depending on device, partly pending):



Benefits

Width and structural form ①

With their width between 18 and 90 mm, the CP-D range switch mode power supplies are ideally suited for installation in distribution panels.

Wide range input ②

Optimized for world-wide applications: The CP-D power supplies can be supplied with 90-264 V AC or 120-375 V DC.

Adjustable output voltage ③

The CP-D range types > 10 W feature a continuously adjustable output voltage. Thus, they can be optimally adapted to the application, e.g. compensating the voltage drop caused by a long line length.

CP-D Range Ordering details

Description

The CP-D range of modular power supply units in MDRC design (modular DIN rail components) is ideally suited for installation in distribution panels. This range offers devices with output voltages of 12 V DC and 24 V DC at output currents of 0.42 A to 4.2 A. Thanks to a high thermal efficiency corresponding to low power and heat dissipation, the devices can be operated without forced cooling. All devices feature the U/I output characteristic (fold forward behavior). All power supply units in the CP-D range are approved according to all relevant international standards.



CP-D 12/0.83, CP-D 24/0.42



CP-D 12/2.1, CP-D 24/1.3



CP-D 24/2.5

Ordering details

Input voltage range	Rated output voltage / current	Type	Catalog number	Weight (1 pce) kg (lb)
90-264 V AC/ 120-375 V DC	12 V DC / 0.83 A	CP-D 12/0.83	1SVR427041R1000	0.06 (0.13)
90-264 V AC/ 120-375 V DC	12 V DC / 2.1 A	CP-D 12/2.1	1SVR427043R1200	0.19 (0.41)
90-264 V AC/ 120-375 V DC	24 V DC / 0.42 A	CP-D 24/0.42	1SVR427041R0000	0.06 (0.13)
90-264 V AC/ 120-375 V DC	24 V DC / 1.3 A	CP-D 24/1.3	1SVR427043R0100	0.19 (0.41)
90-264 V AC/ 120-375 V DC	24 V DC / 2.5 A	CP-D 24/2.5	1SVR427044R0200	0.25 (0.56)
90-264 V AC/ 120-375 V DC	24 V DC / 4.2 A	CP-D 24/4.2	1SVR427045R0400	0.32 (0.71)

Ordering details - CP-D RU for decoupling of two CP-D power supply units

Input voltage range	Rated input current	Rated output voltage / current	Type	Catalog number	Weight (1 pce) kg (lb)
9-35 V DC	2 x 5 A	24 V DC / 1 x 10 A	CP-D RU	1SVR427049R0000	0.075 (0.165)

CP-D Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_n = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type	CP-D 12/0.83	CP-D 12/2.1
Input circuit - supply circuit		
Rated input voltage U_n	L, N 100-240 V AC	
Input voltage range	90-264 V AC / 120-375 V DC	
Frequency range AC	47-63 Hz	
Typical input current / typical power consumption	at 110 V AC 200 mA / 12.68 W	502 mA / 31.14 W
	at 230 V AC 128.3 mA / 13.01 W	277 mA / 31.2 W
Inrush current limiting	at 230 V AC 30 A (max. 3 ms)	50 A (max. 3 ms)
Power failure buffering time	min. 30 ms	
Internal input fuse	1 A slow-acting / 250 V AC	2 A slow-acting / 250 V AC
Power factor correction (PFC)	no	
Indication of operational states		
Output voltage	DC ON: green LED DC LOW: red LED	output voltage applied output voltage too low
Output circuit		
Rated output voltage	+ , -	++ , -- 12 V DC
Tolerance of the output voltage		$\pm 1\%$
Adjustment range of the output voltage	-	12-14 V DC
Rated output power	10 W	30 W
Rated output current I_r	$T_a \leq 60\text{ °C}$ 0.83 A	2.1 A
Derating of the output current	$60\text{ °C} < T_a \leq 70\text{ °C}$	2.5 %/°C
Maximum deviation with change of output voltage within the input voltage range	load change statical	1 % 1 %
Control time		< 1 ms
Starting time after applying the supply voltage	at I_r	1000 ms
Rise time	at rated load	typ. 1 ms
Residual ripple and switching peaks	BW = 20 MHz	50 mV
Parallel connection		yes, using CP-D RU
Series connection		yes, to increase voltage
Resistance to reverse feed		18 V / 1 s
Output circuit - No-load, overload and short-circuit behavior		
Characteristic curve of output		U/I characteristic curve
Short-circuit protection		continuous short-circuit stability
Short-circuit behavior		continuation with output power limiting
Current limiting at short circuit	typ. 1.4 A	typ. 5.9 A
Overload protection		output power limiting
Overvoltage protection		15-16.5 VDC
No-load protection		continuous no-load stability
Starting of capacitive loads		unlimited
General data		
Efficiency	typ. 78 %	typ. 82 %
Duty time	100 %	
Dimensions (W x H x D)	18 x 91 x 57.5 mm [0.71 x 3.58 x 2.26 in]	53 x 91 x 57.5 mm [2.09 x 3.58 x 2.26 in]
Weight	0.066 kg (0.13 lb)	0.196 kg (0.41 lb)
Material of housing	plastic	
Mounting	DIN rail (IEC/EN 60715), snap-on mounting without any tool	
Mounting position	horizontal	
Minimum distance to other units	horizontal / vertical	25 mm / 25 mm (0.98 in / 0.98 in)
Degree of protection	housing / terminals	IP20 / IP20
Protection class	II	

CP-D Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_n = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type		CP-D 12/0.83	CP-D 12/2.1
Electrical connection - Input circuit / Output circuit			
Wire size	fine-strand with wire end ferrule	0.2-1.5 mm ² (24-16 AWG)	0.2-2.5 mm ² (24-14 AWG)
	rigid	0.2-2.5 mm ² (26-12 AWG)	0.2-2.5 mm ² (24-12 AWG)
Stripping length		4-5 mm (0.16-0.2 in)	7 mm (0.28 in)
Tightening torque		0.6 Nm (5 lb.in)	0.7 Nm (6 lb.in)

Environmental data

Ambient temperature range	operation	-40...+70 °C	
	rated load	-40...+60 °C	
	storage	-40...+85 °C	
Damp heat (cyclic) (IEC/EN 60068-2-30)		4 x 24 cycles, 40 °C, 95 % RH	
Vibration (sinusoidal) (IEC/EN 60068-2-6)		50 m/s ² , 10 Hz - 2 kHz	
Shock (half-sine) (IEC/EN 60068-2-27)		40 m/s ² , 22 ms	

Isolation data

Rated insulation voltage U_i	input circuit / output circuit	3 kV AC
Pollution degree		2
Overvoltage category (UL/IEC/EN 60950-1)		II

Standards

Product standard	EN 61204
Low Voltage Directive	2006/95/EC
EMC Directive	2004/108/EC
Electrical safety	UL 508, UL 60950-1, EN 60950-1
Protective low voltage	SELV (EN 60950-1)

Electromagnetic compatibility

Interference immunity to		EN 61000-6-2	
electrostatic discharge	IEC/EN 61000-4-2	Level 4 (4 kV / 8 kV)	Level 4 (8 kV / 15 kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)	
electrical fast transient/burst	IEC/EN 61000-4-4	Level 4 (4 kV)	
surge	IEC/EN 61000-4-5	Level 3 (2 kV L-L)	
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)	
Interference emission		EN 61000-6-3	
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B	
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B	

Approvals and marks on page 11.3.

CP-D Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_{in} = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type	CP-D 24/0.42	CP-D 24/1.3	CP-D 24/2.5	CP-D 24/4.2
Input circuit - supply circuit	L, N			
Rated input voltage U_{in}	100-240 V AC			
Input voltage range	90-264 V AC / 120-375 V DC			
Frequency range AC	47-63 Hz			
Typical input current / typical power consumption	at 110 V AC 184 mA / 11.62 W	600 mA / 37.92 W	1120 mA / 69.3 W	1800 mA / 117.3 W
	at 230 V AC 120.6 mA / 12 W	344 mA / 38.16 W	660 mA / 70.1 W	900 mA / 114.4 W
Inrush current limiting	at 230 V AC 30 A (max. 3 ms)	50 A (max. 3 ms)	60 A (max. 3 ms)	
Power failure buffering time	min. 30 ms		min. 60 ms	
Internal input fuse	1 A slow-acting / 250 V AC	2 A slow-acting / 250 V AC		3.15 A slow-acting / 250 V AC
Power factor correction (PFC)	no			

Indication of operational states

Output voltage	DC ON: green LED DC LOW: red LED	output voltage applied output voltage too low		
Output circuit		+, -	++, --	
Rated output voltage	24 V DC			
Tolerance of the output voltage	$\pm 1\%$			
Adjustment range of the output voltage	-	24-28 V DC		
Rated output power	10 W	30 W	60 W	100 W
Rated output current I_o	$T_a \leq 60\text{ °C}$: 0.42 A	$T_a \leq 60\text{ °C}$: 1.3 A	$T_a \leq 55\text{ °C}$: 2.5 A	$T_a \leq 60\text{ °C}$: 4.2 A
Derating of the output current	$60\text{ °C} < T_a \leq 70\text{ °C}$: 2.5 %/°C	$60\text{ °C} < T_a \leq 70\text{ °C}$: 2.5 %/°C	$55\text{ °C} < T_a \leq 70\text{ °C}$: 2.5 %/°C	$60\text{ °C} < T_a \leq 70\text{ °C}$: 2.5 %/°C
Maximum load change statical deviation with change of output voltage within the input voltage range	1 %			
Control time	< 1 ms			
Starting time after applying the supply voltage	at I_o 1000 ms			
Rise time	at rated load typ. 1 ms			
Residual ripple and switching peaks	BW = 20 MHz 50 mV			
Parallel connection	yes, using CP-D RU			
Series connection	yes, to increase voltage			
Resistance to reverse feed	35 V / 1 s			

Output circuit - No-load, overload and short-circuit behavior

Characteristic curve of output	U/I characteristic curve			
Short-circuit protection	continuous short-circuit stability			
Short-circuit behavior	continuation with output power limiting			
Current limiting at short circuit	typ. 0.78 A	typ. 4.2 A	typ. 6.05 A	typ. 11.5 A
Overload protection	output power limiting			
Overvoltage protection	30-33 V DC			
No-load protection	continuous no-load stability			
Starting of capacitive loads	unlimited			

General data

Efficiency	typ. 80 %	typ. 83 %	typ. 86 %	typ. 89 %
Duty time	100 %			
Dimensions (W x H x D)	18 x 91 x 57.5 mm [0.71 x 3.58 x 2.26 in]	53 x 91 x 57.5 mm [2.09 x 3.58 x 2.26 in]	71 x 91 x 57.5 mm [2.80 x 3.58 x 2.26 in]	89.9 x 91 x 57.5 mm [3.54 x 3.58 x 2.26 in]
Weight	0.066 kg (0.13 lb)	0.196 kg (0.41 lb)	0.252 kg (0.55 lb)	0.386 kg / (0.72 lb)
Material of housing	plastic			
Mounting	DIN rail (IEC/EN 60715), snap-on mounting without any tool			
Mounting position	horizontal			
Minimum distance to other units	horizontal / vertical 25 mm / 25 mm (0.98 in / 0.98 in)			
Degree of protection	housing / terminals IP20 / IP20			
Protection class	II			

CP-D Range Technical data

Data at $T_a = 25\text{ °C}$, $U_n = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type	CP-D 24/0.42	CP-D 24/1.3	CP-D 24/2.5	CP-D 24/4.2
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Electrical connection - Input circuit / Output circuit

Wire size	fine-strand with wire end ferrule	0.2-1.5 mm ² (24-16 AWG)	0.2-2.5 mm ² (24-14 AWG)	
	rigid	0.2-2.5 mm ² (26-12 AWG)	0.2-2.5 mm ² (24-12 AWG)	
Stripping length		4-5 mm (0.16-0.2 in)	7 mm (0.28 in)	
Tightening torque		0.6 Nm (5 lb.in)	0.7 Nm (6 lb.in)	

Environmental data

Ambient temperature range	operation	-40...+70 °C		
	rated load	-40...+60 °C	-40...+55 °C	-40...+60 °C
	storage	-40...+85 °C		
Damp heat (cyclic) (IEC/EN 60068-2-30)		4 x 24 cycles, 40 °C, 95 % RH		
Vibration (sinusoidal) (IEC/EN 60068-2-6)		50 m/s ² , 10 Hz - 2 kHz		
Shock (half-sine) (IEC/EN 60068-2-27)		40 m/s ² , 22 ms		

Isolation data

Rated insulation voltage U_i	input circuit / output circuit	3 kV AC	4 kV AC	3 kV AC
Pollution degree		2		
Overvoltage category (UL/IEC/EN 60950-1)		II		

Standards

Product standard		EN 61204		
Low Voltage Directive		2006/95/EC		
EMC Directive		2004/108/EC		
Electrical safety		UL 508, UL 60950-1, EN 60950-1		
Protective low voltage		SELV (EN 60950-1)		

Electromagnetic compatibility

Interference immunity to electrostatic discharge	IEC/EN 61000-4-2	EN 61000-6-2		
		Level 4 (4 kV / 8 kV)	Level 4 (8 kV / 15 kV)	Level 4 (4 kV / 8 kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)		
electrical fast transient/burst	IEC/EN 61000-4-4	Level 4 (4 kV)		
surge	IEC/EN 61000-4-5	Level 3 (2 kV L-L)		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)		
Interference emission		EN 61000-6-3		
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B		
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B		

Approvals and marks on page 11.3.

CP-D Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_{in} = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type		CP- D RU
Input circuit - Supply circuit		IN 1 + + -, IN 2 + + -
Rated input voltage U_{in}		24 V DC
Input voltage range		9-35 V DC
Rated input current I_{in} per channel		5 A
Maximum input current per channel		10 A for 300 s
Transient overvoltage protection		no
Output circuit		OUT + + +, - - -
Rated output voltage U_{out}		24 V DC
Voltage drop		typ. 0.5 V
Rated output current I_{out}		10 A
Resistance to reverse feed		< 35 V
General data		
MTBF		on request
Duty time		100 %
Dimensions (W x H x D)	product dimensions	35 x 91 x 56.5 mm (1.38 x 3.58 x 2.22 in)
	packaging dimensions	134 x 94 x 48 mm (5.28 x 3.70 x 1.89 in)
Weight	net weight	0.075 kg (0.165 lb)
	gross weight	0.130 kg (0.286 lb)
Material of housing		plastic
Mounting		DIN rail, snap-on mounting without any tool
Mounting position		horizontal
Minimum distance to other units	horizontal / vertical	25 mm (0.98 in) / 25 mm (0.98 in)
Electrical connection - Input circuit / Output circuit		
Wire size	fine-strand with (out)	0.2-2.5 mm ² (24-14 AWG)
	wire end ferrule	
	rigid	
Stripping length		7.0 mm (0.28 in)
Tightening torque		0.67 Nm (6 lb.in)
Environmental data		
Ambient temperature range	operation	-40...+70 °C
	storage	-40...+85 °C
Relative humidity	RH at 40 °C	20-95 %, no condensation
Vibration (IEC/EN 60068-2-6)		Mounting by rail: 10-500 Hz, 2 G, along X, Y, Z each axis, 60 min for each axis
Shock (IEC/EN 60068-2-27)		15 G, 11 ms, 3 axis, 6 faces, 3 times for each face
Standards		
Product standard		IEC/EN 61204-3
Low Voltage Directive		2006/95/EC
EMC Directive		2004/108/EC
RoHS Directive		2002/95/EC
Electromagnetic compatibility		
Interference immunity to		EN 55024
electrostatic discharge	IEC/EN 61000-4-2	Level 3, air discharge 8 kV, contact discharge 4 kV
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3, 10 V/m
electrical fast transient/burst	IEC/EN 61000-4-4	Level 3, 2 kV / 5 kHz
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3, 10 V
Interference emission		EN 55022
high-frequency radiated	IEC/CISPR 22 / EN 55022	Class B
high-frequency conducted	IEC/CISPR 22 / EN 55022	Class B

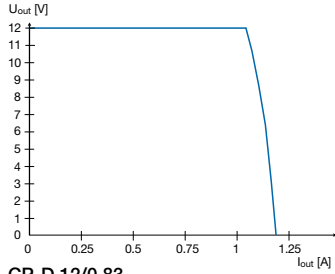
CP-D Range

Technical diagrams

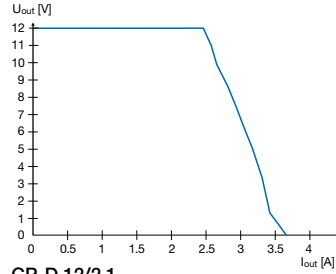
Approximate dimensions

Technical diagrams

Characteristic curve of output at $T_a = 25^\circ\text{C}$

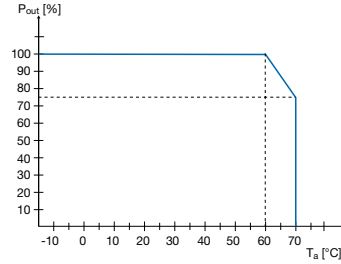


CP-D 12/0.83

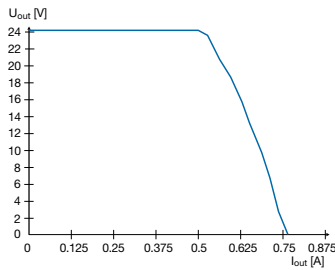


CP-D 12/2.1

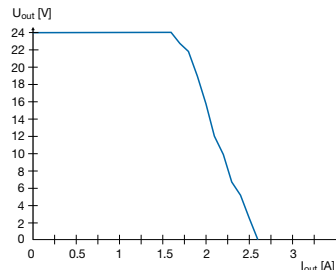
Characteristic curve of Temperature at rated output voltage



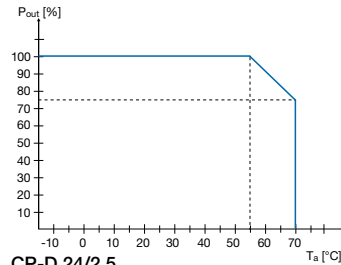
CP-D¹⁾



CP-D 24/0.42

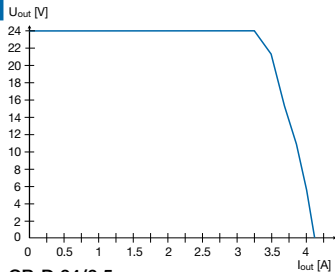


CP-D 24/1.3

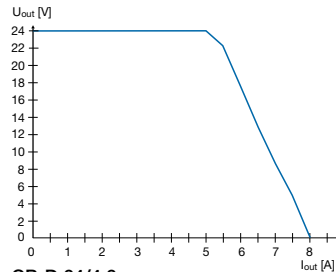


CP-D 24/2.5

11



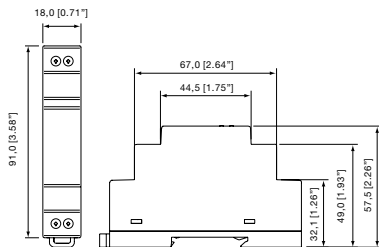
CP-D 24/2.5



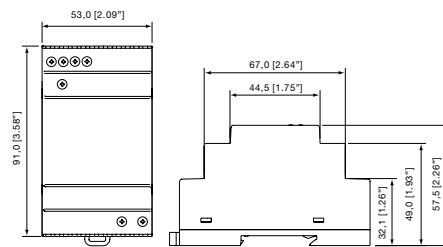
CP-D 24/4.2

¹⁾ except CP-D 24/2.5

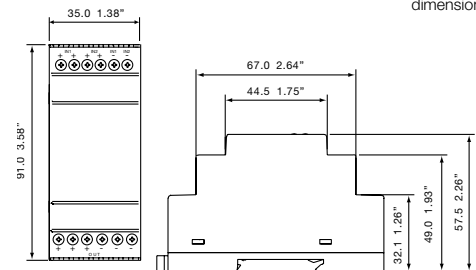
Dimensional drawings



CP-D 12/0.83, CP-D 24/0.42

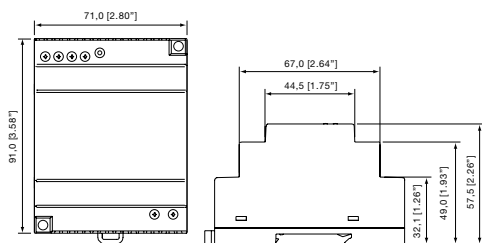


CP-D 12/2.1, CP-D 24/1.3

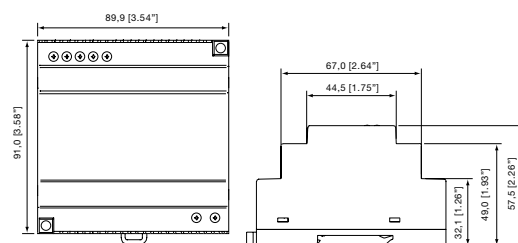


CP-D RU

dimensions in mm



CP-D 24/2.5



CP-D 24/4.2



Switch mode power supplies CP-E Range

Type CP-E Switch mode Power supplies



Characteristics

- Output voltages 5 V, 12 V, 24 V, 48 V DC
- Adjustable output voltages
- Output currents 0.625 A / 0.75 A / 1.25 A / 2.5 A / 3 A / 5 A / 10 A / 20 A
- Power range 15 W, 18 W, 30 W, 60 W, 120 W, 240 W, 480 W
- High efficiency of up to 90 %
- Low power dissipation and low heating
- Free convection cooling (no forced cooling with ventilators)
- Ambient temperature range during operation -40...+70 °C
- Open-circuit, overload and short-circuit stable
- Integrated input fuse
- U/I characteristic curve on devices > 18 W (fold-forward behavior at overload – no switch-off)
- Redundancy units offering true redundancy
- LED(s) for status indication
- Signalling output/contact for output voltage OK
- Transistor on 24 V devices > 18 W and < 120 W
- Relay on 24 V devices \geq 120 W
- Approvals / Marks
(depending on device, partly pending):



Benefits

Signalling output/contact

The CP-E range 24 V devices > 18 W offer an output/contact for monitoring of the output voltage and remote diagnosis.

Wide range input

Optimized for world-wide applications: The CP-E power supplies can be supplied within a wide range of AC or DC voltage.

Adjustable output voltage

The CP-E range types feature a continuously adjustable output voltage. Thus, they can be optimally adapted to the application, e.g. compensating the voltage drop caused by a long line length.

Redundancy units

For decoupling of parallelized power supply units m 40 V. Thus, true redundancy can be achieved.

CP-E Range

Description

The CP-E range offers units with output voltages from 5 V DC to 48 V DC at output currents of 0.625 A to 20 A. The high thermal efficiency of up to 90 %, corresponding to very low power and heat dissipation, allows operation without forced cooling. The functionality has been enhanced while the number of different types has been considerably reduced.

Of course all power supplies of the CP-E range are approved in accordance with all relevant international standards.



CP-E 5/3.0



CP-E 12/2.5



CP-E 24/0.75

Ordering details

Input voltage range	Rated output voltage / current	Type	Catalog number	Weight (1 pce) kg (lb)
90-264 V AC / 120-375 V DC	5 V DC / 3 A	CP-E 5/3.0	1SVR427033R3000	0.15 (0.33)
85-264 V AC / 90-375 V DC	12 V DC / 2.5 A	CP-E 12/2.5	1SVR427032R1000	0.29 (0.64)
90-132 V AC, 180-264 V AC / 210-375 V DC	12 V DC / 10 A	CP-E 12/10.0	1SVR427035R1000	1.00 (2.20)
90-264 V AC / 120-375 V DC	24 V DC / 0.75 A	CP-E 24/0.75	1SVR427030R0000	0.15 (0.33)
85-264 V AC / 90-375 V DC	24 V DC / 1.25 A	CP-E 24/1.25	1SVR427031R0000	0.29 (0.64)
85-264 V AC / 90-375 V DC	24 V DC / 2.5 A	CP-E 24/2.5	1SVR427032R0000	0.36 (0.79)
90-132 V AC, 180-264 V AC / 210-375 V DC	24 V DC / 5 A	CP-E 24/5.0	1SVR427034R0000	1.00 (2.20)
90-132 V AC, 180-264 V AC / 210-375 V DC	24 V DC / 10 A	CP-E 24/10.0	1SVR427035R0000	1.36 (3.01)
90-264 V AC / 120-375 V DC	24 V DC / 20 A	CP-E 24/20.0	1SVR427036R0000	1.90 (4.18)
85-264 V AC / 90-375 V DC	48 V DC / 0.625 A	CP-E 48/0.62	1SVR427030R2000	0.29 (0.64)
85-264 V AC / 90-375 V DC	48 V DC / 1.25 A	CP-E 48/1.25	1SVR427031R2000	0.36 (0.79)
90-132 V AC, 180-264 V AC / 210-375 V DC	48 V DC / 5 A	CP-E 48/5.0	1SVR427034R2000	1.36 (3.01)
90-264 V AC / 120-375 V DC	48 V DC / 10 A	CP-E 48/10.0	1SVR427035R2000	1.90 (4.19)

Ordering details - Redundancy units for decoupling of two CP-E power supply units

suitable for decoupling of CP-E power supply units	Description	Type	Catalog number	Weight (1 pce) kg (lb)
≤ 35 V and < 5 A	2 inputs each up to 2.5 A and 1 output up to 5 A	CP-RUD	1SVR423418R9000	0.15 (0.33)
≤ 40 V and ≥ 5 A	2 inputs each up to 20 A and 1 output up to 40 A	CP-A RU	1SVR427071R0000	0.89 (1.96)

CP-E Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_{in} = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type		CP-E 5/3.0	CP-E 12/2.5	CP-E 12/10.0
Input circuit		L, N		
Rated input voltage U_{in}		100-240 V AC		115 / 230 V AC auto select
Input voltage range		90-264 V AC / 120-375 V DC	85-264 V AC / 90-375 V DC	90-132 V AC, 180-264 V AC / 210-375 V DC
Frequency range AC		47-63 Hz		
Typical input current	at 115 V AC	335 mA	560 mA	2.2 A
	at 230 V AC	210 mA	330 mA	0.83 A
Typical power consumption		19.8 W	35.9 W	143 W
Inrush current limiting	at 115 V AC	10 A (max. 3 ms)	20 A (max. 3 ms)	24 A (max. 5 ms)
	at 230 V AC	18 A (max. 3 ms)	40 A (max. 3 ms)	48 A (max. 5 ms)
Discharge current	input / output	0.25 mA		
	input / PE	3.5 mA		
Power failure buffering time	at 115 V AC	min. 20 ms	min. 20 ms	min. 25 ms
	at 230 V AC	min. 75 ms	min. 30 ms	min. 30 ms
Internal input fuse		2 A slow-acting / 250 V AC		3.15 A slow-acting / 250 V AC
Power factor correction (PFC)		no		yes, passive, 0.7

Indication of operational states

Output voltage	green LED	OK: ┌: output voltage OK	OUTPUT OK: ┌: output voltage OK	OUTPUT OK: ┌: output voltage OK
	red LED	LOW: ┌: output voltage too low	-	OUTPUT LOW: ┌: output voltage too low

Output circuit		L+,L-	L+, L+, L-, L-	
Rated output voltage		5 V DC	12 V DC	
Tolerance of the output voltage			0...+1 %	
Adjustment range of the output voltage		4.5-5.75 V DC	12-14 V DC	11.4-14.5 V DC
Rated output power		15 W	30 W	120 W
Rated output current I_o	$T_a \leq 60\text{ °C}$	3.0 A	2.5 A	10 A
Derating of the output current	$60\text{ °C} < T_a \leq 70\text{ °C}$	2.5 %/°C		2.5 %/°C
Maximum deviation with	load change statical	±2 %	±0.5 %	±1 % (single mode) ±5 % (parallel mode)
	change of output voltage within the input voltage range	±1 %	±0.5 %	±0.5 %
Control time		< 2 ms		
Starting time after applying the supply voltage	at I_o	max. 1 s		
	with 3500 μF	-	max. 2 s	-
	with 7000 μF	max. 1.5 s	-	max. 1.5 s
Rise time	at rated load	max. 150 ms		
	with 3500 μF	-	max. 500 ms	-
	with 7000 μF	max. 500 ms	-	max. 500 ms
Fall time		max. 150 ms		
Residual ripple and switching peaks	BW = 20 MHz	50 mV		
Parallel connection		yes, to enable redundancy		configurable, to increase power, up to 3 devices, min. 0.1 I_o - max. 0.9 I_o
Series connection		yes, to increase voltage		yes, to increase voltage, max. 2 devices
Resistance to reverse feed		1 s - max. 7.5 V DC	1 s - max. 18 V DC	max. 18 V DC

Output circuit - No-load, overload and short-circuit behavior

Characteristic curve of output		Hiccup-mode	U/I characteristic curve	
Short-circuit protection		continuous short-circuit proof		
Short-circuit behavior		Hiccup-mode	continuation with output power limiting	
Overload protection		output power limiting		
No-load protection		continuous no-load stability		
Starting of capacitive loads		7000 μF	3500 μF	7000 μF

General data

Power dissipation		typ. 5 W	typ. 5.6 W	typ. 24 W
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CP-E Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_n = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type		CP-E 5/3.0	CP-E 12/2.5	CP-E 12/10.0
General data				
Power dissipation		typ. 5W	typ. 5.6 W	typ. 24W
Efficiency		typ. 75 %	typ. 84 %	typ. 84 %
Duty time		100 %		
Dimensions (W x H x D)		40.5 x 90 x 114 mm [1.59 x 3.54 x 4.49 in]	22.5 x 90 x 114 mm [0.89 x 3.54 x 4.49 in]	63.2 x 123.6 x 123.6 mm [2.49 x 4.87 x 4.87 in]
Weight		0.144 kg (0.33 lb)	0.287 kg (0.64 lb)	0.888 kg (2.20 lb)
Material of housing		Plastic		Metal
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool		
Mounting position		horizontal		
Minimum distance to other units	horizontal / vertical	25 mm / 25 mm (0.98 in / 0.98 in)		
Degree of protection	housing / terminals	IP20 / IP20		
Protection class		I		
Electrical connection - input circuit / output circuit				
Wire size	fine-strand with wire end ferrule			0.2-4 mm ² (24-11 AWG)
	fine-strand without wire end ferrule	0.2-2.5 mm ² (24-14 AWG)		0.2-6 mm ² (24-10 AWG)
	rigid			
Stripping length		6 mm (0.24 in)		8 mm (0.31 in)
Tightening torque	input / output	0.6 Nm (5 lb.in)		1.0 Nm (9 lb.in) / 0.62 Nm (5.5 lb.in)
Environmental data				
Ambient temperature range	operation	-20...+70 °C	-40...+70 °C	-35...+70 °C
	rated load	-20...+60 °C	-40...+60 °C	-35...+60 °C
	storage	-20...+85 °C	-40...+85 °C	-40...+85 °C
Damp heat (cyclic) (IEC/EN 60068-2-30)		95 % without condensation		
Vibration (sinusoidal) (IEC/EN 60068-2-6)		10-500 Hz, 2 G, along X, Y, Z each axis, 60 min. for each axis		
Shock (half-sine) (IEC/EN 60068-2-27)		15 G, 11 ms, 3 axes, 6 faces, 3 times for each face		
Isolation data				
Rated insulation voltage U_i	input circuit / output circuit	3 kV AC		
	input / PE	1.5 kV AC		
Pollution degree		2		
Overvoltage category (UL/IEC/EN 60950-1)		II		
Standards				
Product standard		EN 61204-3		
Low Voltage Directive		2006/95/EC		
EMC directive		2004/108/EC		
RoHS directive		2002/95/EC		
Electrical safety		EN 60950-1, UL 60950-1, UL 508	EN 60950-1, UL 60950-1, UL 508, EN 61558-1, EN 61558-2-17; EN 60204-1	
Protective low voltage		SELV (EN 60950)		
Electromagnetic compatibility				
Interference immunity to		IEC/EN 61000-6-2		
electrostatic discharge	IEC/EN 61000-4-2	Level 4 (air discharge 15 kV / contact discharge 8 kV)		
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)		
electrical fast transient/burst	IEC/EN 61000-4-4	Level 4 (4 kV / 2,5 kHz)	Level 4 (4 kV / 5 kHz)	
surge	IEC/EN 61000-4-5	L-L Level 3 (2 kV) / L-PE Level 4 (4 kV)		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 Vrms)		
power frequency magnetic fields	IEC/EN 61000-4-8	Level 4 (30 A/m)		
voltage dips, short interruptions and volt variations	IEC/EN 61000-4-11	dip: >95 % 10 ms / >30 % 500 ms interruptions: >95 % 5000 ms		
Interference emission		IEC/EN 61000-6-3		
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B		
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B		
limits for harmonic current emissions	IEC/EN 61000-3-2	Class D	Class A	Class D

Approvals and marks on page 11.3.

CP-E Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_n = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type	CP-E 24/0.75	CP-E 24/1.25	CP-E 24/2.5
Input circuit		L, N	
Rated input voltage U_n		100-240 V AC	
Input voltage range	90-264 V AC / 120-375 V DC	85-264 V AC / 90-375 V DC	
Frequency range AC		47-63 Hz	
Typical input current	at 115 V AC at 230 V AC	335 mA 210 mA	560 mA 330 mA
Typical power consumption		22.8 W	36.7 W
Inrush current limiting	at 115 V AC at 230 V AC	10 A (max. 3 ms) 18 A (max. 3 ms)	20 A (max. 3 ms) 40 A (max. 3 ms)
Discharge current	input / output input / PE		0.25 mA 3.5 mA
Power failure buffering time	at 115 V AC at 230 V AC	min. 20 ms min. 75 ms	min. 20 ms min. 30 ms
Internal input fuse		2 A slow-acting / 250 V AC	
Power factor correction (PFC)		no	

Indication of operational states

Output voltage	green LED	OK: ┌ └ output voltage OK	OUTPUT OK: ┌ └ output voltage OK
	red LED	LOW: ┌ └ output voltage too low	-

Output circuit	CP-E 24/0.75	CP-E 24/1.25	CP-E 24/2.5
Output circuit		L+, L-	L+, L+, L-, L-
Rated output voltage			24 V DC
Tolerance of the output voltage			0 ... +1 %
Adjustment range of the output voltage	21.6-28.8 V DC		24-28 V DC
Rated output power	18 W	30 W	60 W
Rated output current I_n	$T_a \leq 60\text{ °C}$ 0.75 A	1.25 A	2.5 A
Derating of the output current	$60\text{ °C} < T_a \leq 70\text{ °C}$ 3 %/°C		2.5 %/°C
Signalling output for output voltage OK	DC OK	-	Transistor
Maximum deviation with	load change statical change of output voltage within the input voltage range	±2 % ±1 %	±0.5 % ±0.5 %
Control time			< 2 ms
Starting time after applying the supply voltage	at I_n with 3500 µF with 7000 µF	- max. 1.5 s	max. 2 s -
Rise time	at rated load with 3500 µF with 7000 µF	- max. 500 ms	max. 150 ms -
Fall time			max. 150 ms
Residual ripple and switching peaks	BW = 20 MHz		50 mV
Parallel connection			yes, to enable redundancy
Series connection			yes, to increase voltage
Resistance to reverse feed			1 s - max. 35 V DC

Output circuit - No-load, overload and short-circuit behavior

Characteristic curve of output	Hiccup-mode	U/I characteristic curve	
Short-circuit protection		continuous short-circuit proof	
Short-circuit behavior	Hiccup-mode	continuation with output power limiting	
Overload protection		output power limiting	
No-load protection		continuous no-load stability	
Starting of capacitive loads	7000 µF	3500 µF	7000 µF
General data			
Power dissipation	typ. 4.45 W	typ. 5.5 W	typ. 8.8 W
Efficiency	typ. 77 %	typ. 86 %	typ. 89 %
Duty time		100 %	
Dimensions (W x H x D)	22.5 x 90 x 114 mm [0.89 x 3.54 x 4.49 in]	40.5 x 90 x 114 mm [1.59 x 3.54 x 4.49 in]	
Weight	0.143 kg (0.33 lb)	0.270 kg (0.64 lb)	0.331 kg (0.79 lb)
Material of housing		Plastic	

CP-E Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_m = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type	CP-E 24/0.75	CP-E 24/1.25	CP-E 24/2.5
	22.5 x 90 x 114 mm [0.89 x 3.54 x 4.49 in]	22.5 x 90 x 114 mm [0.89 x 3.54 x 4.49 in]	
Weight	0.143 kg (0.33 lb)	0.270 kg (0.64 lb)	0.331 kg (0.79 lb)
Mounting	DIN rail (IEC/EN 60715), snap-on mounting without any tool		
Mounting position	horizontal		
Minimum distance to other units	horizontal / vertical	25 mm / 25 mm (0.98 in / 0.98 in)	
Degree of protection	housing / terminals	IP20 / IP20	
Protection class	I		

Electrical connection - input circuit / output circuit

Wire size	fine-strand with wire end ferrule fine-strand without wire end ferrule rigid	0.2-2.5 mm ² (24-14 AWG)
Stripping length		6 mm (0.24 in)
Tightening torque	input / output	0.6 Nm (5 lb.in)

Environmental data

Ambient temperature range	operation	-20...+70 °C	-40...+70 °C
	rated load	-20...+60 °C	-40...+60 °C
	storage	-20...+85 °C	-40...+85 °C
Damp heat (cyclic) (IEC/EN 60068-2-30)		95 % without condensation	
Vibration (sinusoidal) (IEC/EN 60068-2-6)		10-500 Hz, 2 G, along X, Y, Z each axis, 60 min. for each axis	
Shock (half-sine) (IEC/EN 60068-2-27)		15 G, 11 ms, 3 axes, 6 faces, 3 times for each face	

Isolation data

Rated insulation voltage U_i	input circuit / output circuit	3 kV AC
	input / PE	1.5 kV AC
Pollution degree		2
Overvoltage category (UL/IEC/EN 60950-1)		II

Standards

Product standard	EN 61204-3	
Low Voltage Directive	2006/95/EC	
EMC directive	2004/108/EC	
RoHS directive	2002/95/EC	
Electrical safety	EN 50178, EN 60950-1, UL 60950-1, UL 508	EN 60950-1, UL 60950-1, UL 508, EN 61558-1, EN 61558-2-17; EN 60204-1
Protective low voltage	SELV (EN 60950)	

Electromagnetic compatibility

Interference immunity to		IEC/EN 61000-6-2	
electrostatic discharge	IEC/EN 61000-4-2	Level 4 (air discharge 15 kV / contact discharge 8 kV)	
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)	
electrical fast transient/burst	IEC/EN 61000-4-4	Level 4 (4 kV / 2.5 kHz)	Level 4 (4 kV / 5 kHz)
surge	IEC/EN 61000-4-5	L-L Level 3 (2 kV) / L-PE Level 4 (4 kV)	
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 Vrms)	
power frequency magnetic fields	IEC/EN 61000-4-8	Level 4 (30 A/m)	
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-11	dip: >95 % 10 ms / >30 % 500 ms interruptions: >95 % 5000 ms	
Interference emission		IEC/EN 61000-6-3	
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B	
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B	
limits for harmonic current emissions	IEC/EN 61000-3-2	Class D	Class A

Approvals and marks on page 11.3.

CP-E Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_{in} = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type		CP-E 24/5.0	CP-E 24/10.0	CP-E 24/20.0
Input circuit		L, N		
Rated input voltage U_{in}		115 / 230 V AC auto select		115-230 V AC
Input voltage range		90-132 V AC, 180-264 V AC / 210-375 V DC	90-132 V AC, 180-264 V AC / 210-375 V DC	90-264 V AC, 120-375 V DC
Frequency range AC		47-63 Hz		
Typical input current	at 115 V AC	2.2 A	4.0 A	4.9 A
	at 230 V AC	0.83 A	1.55 A	2.5 A
Typical power consumption		140 W	270 W	539 W
Inrush current limiting	at 115 V AC	24 A (max. 5 ms)	30 A (max. 5 ms)	25 A (max. 5 ms)
	at 230 V AC	48 A (max. 5 ms)	60 A (max. 5 ms)	50 A (max. 5 ms)
Discharge current	input / output	0.25 mA		
	input / PE	3.5 mA		
Power failure buffering time	at 115 V AC	min. 25 ms		min. 25 ms
	at 230 V AC	min. 30 ms		
Internal input fuse		3.15 A slow-acting / 250 V AC	6.3 A slow-acting / 250 V AC	10 A slow-acting / 250 V AC
Power factor correction (PFC)		yes, passive, 0.7		yes, active 115 V AC: 0.99 230 V AC: 0.97

Indication of operational states

Output voltage	green LED	OUTPUT OK:  : output voltage OK
	red LED	OUTPUT LOW:  : output voltage too low

Output circuit		L+, L+, L-, L-		
Rated output voltage		24 V DC		
Tolerance of the output voltage		0...+1 %		
Adjustment range of the output voltage		22.5-28.5 V DC		
Rated output power		120 W	240 W	480 W
Rated output current I_r	$T_a \leq 60\text{ °C}$	5 A	10 A	-
	$T_a \leq 55\text{ °C}$	-	-	20 A
Derating of the output current	$60\text{ °C} < T_a \leq 70\text{ °C}$	2.5 %/°C		-
	$55\text{ °C} < T_a \leq 70\text{ °C}$	-	-	2.5 %/°C
Signalling contact for output voltage OK	13-14	solid-state (max. 60 V DC, 0.3 A)		
Minimum fuse rating to achieve short-circuit protection	13-14	$\geq 60\text{ V DC}$, $\leq 0.3\text{ A}$ fast-acting		
Maximum deviation with load change statical		$\pm 1\%$ (single mode) $\pm 5\%$ (parallel mode)		
	change of output voltage within the input voltage range	$\pm 0.5\%$		
Control time		$< 2\text{ ms}$		
Starting time after applying the supply voltage	at I_r	max. 1 s		
	with 3500 μF	max. 1.5 s	-	-
	with 7000 μF	-	max. 1.5 s	
Rise time	at rated load	max. 150 ms		
	with 3500 μF	max. 500 ms	-	-
	with 7000 μF	-	max. 500 ms	
Fall time		max. 150 ms		
Residual ripple and switching peaks	BW = 20 MHz	50 mV	100 mV	
Parallel connection		configurable, to increase power, up to 3 devices, min. 0.1 I_r - max. 0.9 I_r		
Series connection		yes, to increase voltage, max. 2 devices		
Resistance to reverse feed		max. 35 V DC		

Output circuit - No-load, overload and short-circuit behavior

Characteristic curve of output		U/I characteristic curve	
Short-circuit protection		continuous short-circuit proof	
Short-circuit behavior		continuation with output power limiting	
Overload protection		output power limiting	
No-load protection		continuous no-load stability	
Starting of capacitive loads		3500 μF	7000 μF

CP-E Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_n = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type		CP-E 24/5.0	CP-E 24/10.0	CP-E 24/20.0
General data				
Power dissipation		typ. 20 W	typ. 35 W	typ. 63 W
Efficiency		typ. 86 %	typ. 89 %	typ. 89 %
Duty time		100 %		
Dimensions (W x H x D)		63.2 x 123.6 x 123.6 mm [2.49 x 4.87 x 4.87 in]	83 x 123.6 x 123.6 mm [3.27 x 4.87 x 4.87 in]	175 x 123.6 x 123.6 mm [6.89 x 4.87 x 4.87 in]
Weight		0.882 kg (2.20 lb)	1.334 kg (3.01 lb)	1.850 kg (4.19 lb)
Material of housing		Metal		
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool		
Mounting position		horizontal		
Minimum distance to other units	horizontal / vertical	25 mm / 25 mm (0.98 in / 0.98 in)		
Degree of protection	housing / terminals	IP20 / IP20		
Protection class		I		
Electrical connection - input circuit / output circuit				
Wire size	fine-strand with wire end ferrule	0.2-4 mm ² (24-11 AWG)		
	fine-strand without wire end ferrule	0.2-6 mm ² (24-10 AWG)		
	rigid			
Stripping length		8 mm (0.31 in)		
Tightening torque	input / output	1.0 Nm (9 lb.in) / 0.62 Nm (5.5 lb.in)		
Environmental data				
Ambient temperature range	operation	-35...+70 °C	-40...+70 °C	
	rated load	-35...+60 °C	-40...+60 °C	-40...+55 °C
	storage	-40...+85 °C	-40...+85 °C	
Damp heat (cyclic) (IEC/EN 60068-2-30)		95 % without condensation		
Vibration (sinusoidal) (IEC/EN 60068-2-6)		10-500 Hz, 2 G, along X, Y, Z each axis, 60 min. for each axis		
Shock (half-sine) (IEC/EN 60068-2-27)		15 G, 11 ms, 3 axes, 6 faces, 3 times for each face		
Isolation data				
Rated insulation voltage U_i	input circuit / output circuit	3 kV AC		
	input / PE	1.5 kV AC		
Pollution degree		2		
Overvoltage category (UL/IEC/EN 60950-1)		II		
Standards				
Product standard		EN 61204-3		
Low Voltage Directive		2006/95/EC		
EMC directive		2004/108/EC		
RoHS directive		2002/95/EC		
Electrical safety		EN 60950-1, UL 60950-1, UL 508, EN 61558-1, EN 61558-2-17; EN 60204-1		
Protective low voltage		SELV (EN 60950)		
Electromagnetic compatibility				
Interference immunity to		IEC/EN 61000-6-2		
electrostatic discharge	IEC/EN 61000-4-2	Level 4 (air discharge 15 kV / contact discharge 8 kV)		
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)		
electrical fast transient/burst	IEC/EN 61000-4-4	Level 4 (4 kV / 5 kHz)	Level 4 (4 kV / 2.5 kHz)	Level 4 (4 kV / 5 kHz)
surge	IEC/EN 61000-4-5	L-L Level 3 (2 kV) / L-PE Level 4 (4 kV)		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 Vrms)		
power frequency magnetic fields	IEC/EN 61000-4-6	Level 4 (30 A/m)		
voltage dips, short interruptions and voltages variations	IEC/EN 61000-4-6	dip: >95 % 10 ms / >30 % 500 ms interruptions: >95 % 5000 ms		
Interference emission		IEC/EN 61000-6-3		
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B		
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B		
limits for harmonic current emissions		Class D		

Approvals and marks on page 11.3.

CP-E Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_{in} = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type		CP-E 48/0.62	CP-E 48/1.25	CP-E 48/5.0	CP-E 48/10.0
Input circuit		L, N			
Rated input voltage U_n		100-240 V AC		115 / 230 V AC auto select	115-230 V AC
Input voltage range		85-264 V AC / 90-375 V DC		90-132 V AC, 180-264 V AC / 210-375 V DC	90-264 V AC, 120-375 V DC
Frequency range AC		47-63 Hz			
Typical input current	at 115 V AC	560 mA	1060 mA	4.0 A	4.9 A
	at 230 V AC	330 mA	590 mA	1.55 A	2.5 A
Typical power consumption		35.7 W		267 W	528 W
Inrush current limiting	at 115 V AC	20 A (max. 3 ms)	20 A (max. 3 ms)	30 A (max. 5 ms)	25 A (max. 5 ms)
	at 230 V AC	40 A (max. 3 ms)	40 A (max. 3 ms)	60 A (max. 5 ms)	50 A (max. 5 ms)
Discharge current	input / output	0.25 mA			
	input / PE	3.5 mA			
Power failure buffering time	at 115 V AC	min. 20 ms		min. 25 ms	min. 25 ms
	at 230 V AC	min. 30 ms			
Internal input fuse		2 A slow-acting / 250 V AC		6.3 A slow-acting / 250 V AC	10 A slow-acting / 250 V AC
Power factor correction (PFC)		no		yes, passive, 0.7	yes, active 115 V AC: 0.99 230 V AC: 0.97
Indication of operational states					
Output voltage	green LED	OUTPUT OK: ┌───┐ └───┘ output voltage OK			
	red LED	-	-	OUTPUT LOW: ┌───┐ └───┘ output voltage too low	
Output circuit		L+, L+, L-, L-			
Rated output voltage		48 V DC			
Tolerance of the output voltage		0...+1 %			
Adjustment range of the output voltage		48-55 V DC		47-56 V DC	
Rated output power		30 W	60 W	240 W	480 W
Rated output current I_o	$T_a \leq 60\text{ °C}$	0.625 A	1.25 A	5 A	-
	$T_a \leq 55\text{ °C}$	-	-	-	10 A
Derating of the output current	$60\text{ °C} < T_a \leq 70\text{ °C}$	-		2.5 %/°C	
	$55\text{ °C} < T_a \leq 70\text{ °C}$	-		2.5 %/°C	
Signalling output for output voltage OK	DC OK	-	-	-	-
Maximum deviation with	load change statical	±0.5 %		±1 % (single mode) ±5 % (parallel mode)	
	change of output voltage within the input voltage range	±0.5 %		±0.5 %	
Control time		< 2 ms			
Starting time after applying the supply voltage	at I_o	max. 1 s			
	with 3500 μF	max. 2 s	-	-	-
	with 7000 μF	-	max. 1.5 s	-	max. 1.5 s
Rise time	at rated load	max. 150 ms			
	with 3500 μF	max. 500 ms	-	-	-
	with 7000 μF	-	max. 500 ms	-	max. 500 ms
Fall time		max. 150 ms			
Residual ripple and switching peaks	BW = 20 MHz	50 mV		100 mV	
Parallel connection		yes, to enable redundancy		configurable, to increase power, up to 3 devices, min. 0.1 I - max. 0.9 I	
Series connection		yes, to increase voltage		yes, to increase voltage, max. 2 devices	
Resistance to reverse feed		1 s - max. 63 V DC			
Output circuit - No-load, overload and short-circuit behavior					
Characteristic curve of output		U/I characteristic curve			
Short-circuit protection		continuous short-circuit proof			
Short-circuit behavior		continuation with output power limiting			
Overload protection		output power limiting			
No-load protection		continuous no-load stability			
Starting of capacitive loads		3500 μF	7000 μF		
General data					
Power dissipation		typ. 4.9 W	typ. 7.8 W	typ. 32 W	typ. 60 W

CP-E Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_n = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type	CP-E 48/0.62	CP-E 48/1.25	CP-E 48/5.0	CP-E 48/10.0
Efficiency	typ. 86 %	typ. 89 %	typ. 90 %	typ. 89 %
Duty time	100 %			
Dimensions (W x H x D)	40.5 x 90 x 114 mm [1.59 x 3.54 x 4.49 in]		83 x 123.6 x 123.6 mm [3.27 x 4.87 x 4.87 in]	175 x 123.6 x 123.6 mm [6.89 x 4.87 x 4.87 in]
Weight	0.264 kg (0.58 lb)	0.316 kg (0.70 lb)	1.322 kg (2.91 lb)	1.839 kg (4.05 lb)
Material of housing	Plastic		Metal	
Mounting	DIN rail (IEC/EN 60715), snap-on mounting without any tool			
Mounting position	horizontal			
Minimum distance to other units	horizontal / vertical 25 mm / 25 mm (0.98 in / 0.98 in)			
Degree of protection	housing / terminals IP20 / IP20			
Protection class				

Electrical connection - input circuit / output circuit

Wire size	fine-strand with wire end ferrule	0.2-2.5 mm ² (24-14 AWG)	0.2-4 mm ² (24-11 AWG)
	fine-strand without wire end ferrule		0.2-6 mm ² (24-10 AWG)
	rigid		
Stripping length		6 mm (0.24 in)	8 mm (0.31 in)
Tightening torque	input / output	0.6 Nm (5 lb.in)	1.0 Nm (9 lb.in) / 0.62 Nm (5.5 lb.in)

Environmental data

Ambient temperature range	operation	-40...+70 °C	
	rated load	-40...+60 °C	-40...+55 °C
	storage	-40...+85 °C	
Damp heat (cyclic) (IEC/EN 60068-2-30)		95 % without condensation	
Vibration (sinusoidal) (IEC/EN 60068-2-6)		10-500 Hz, 2 G, along X, Y, Z each axis, 60 min. for each axis	
Shock (half-sine) (IEC/EN 60068-2-27)		15 G, 11 ms, 3 axes, 6 faces, 3 times for each face	

Isolation data

Rated insulation voltage U_i	input circuit / output circuit	3 kV AC
	input / PE	1.5 kV AC
Pollution degree		2
Overtoltage category (UL/IEC/EN 60950-1)		II

Standards

Product standard	EN 61204-3
Low Voltage Directive	2006/95/EC
EMC directive	2004/108/EC
RoHS directive	2002/95/EC
Electrical safety	EN 60950-1, UL 60950-1, UL 508, EN 61558-1, EN 61558-2-17; EN 60204-1
Protective low voltage	SELV (EN 60950)

Electromagnetic compatibility

Interference immunity to		IEC/EN 61000-6-2	
electrostatic discharge	IEC/EN 61000-4-2	Level 4 (air discharge 15 kV / contact discharge 8 kV)	
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)	
electrical fast transient/burst	IEC/EN 61000-4-4	Level 4 (4 kV / 5 kHz)	Level 4 (4 kV / 2.5 kHz)
surge	IEC/EN 61000-4-5	L-L Level 3 (2 kV) / L-PE Level 4 (4 kV)	
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V/m)	
power frequency magnetic fields	IEC/EN 61000-4-6	Level 4 (30 A/m)	
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-6	dip: >95 % 10 ms / >30 % 500 ms interruptions: >95 % 5000 ms	
Interference emission		IEC/EN 61000-6-3	
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B	
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B	
limits for harmonic current emissions		Class A	Class D

Approvals and marks on page 11.3.

CP-E Range

Technical data

Data at $T_a = 25\text{ }^\circ\text{C}$, unless otherwise indicated

Type	CP-RUD	CP- A RU
Input circuit - Supply circuit	A: U1+/-U ; B: U2+/-U	(+/-, +/-)
Rated input voltage U_{in}	24 V DC	24 V DC
Input voltage range	5-35 V DC	10-40 V DC
Rated input current I_{in} per channel	0.5-2.5 A	1-20 A
Maximum input current per channel	10 A for 300 s	30 A for 300 s
Transient overvoltage protection	no	yes
Output circuit	L+, L+, L+, L-, L-, L-	(+/-/-)
Rated output voltage U_{out}	24 V DC	24 V DC
Voltage drop	typ. 0.6 V, max. 0.7 V	typ. 0.6 V, max. 0.9 V
Rated output current I_{out}	0.5-5 A	1-40 A
Peak output current	20 A for 150 s	60 A for 300 s
Resistance to reverse feed	< 35 V	< 40 V
General data		
Dimensions (W x H x D)	22.5 x 78 x 100 mm (0.89 x 3.07 x 4.02 in)	56.5 (60 ¹⁾) x 130 x 135.5 mm (2.22 (2.36 ¹⁾) x 5.12 x 5.39 in)
Weight	0.135 kg (0.30 lb)	0.89 kg (1.96 lb)
Minimum distance to other units	horizontal / vertical	10 mm / 50 mm (0.39 in / 1.97 in)
Degree of protection	housing / terminals	IP20 / IP20
Material of housing	housing shell / cover	plastic / plastic
Protection class		aluminium / zinc-coated sheet steel III ²⁾
Mounting		DIN rail (IEC/EN 60715)
Mounting position		horizontal
Electrical connection - Input circuit / Output circuit		
Wire size	fine-strand with wire end ferrule	2.5-10 mm ² (14-8 AWG)
	fine-strand without wire end ferrule	0.5-10 mm ² (20-8 AWG)
	rigid	2 x 0.5-4 mm ² (2 x 20-12 AWG)
Stripping length	7 mm (0.28 in)	12 mm (0.47 in)
Tightening torque	0.6-0.8 Nm	1.2-1.5 Nm
Environmental data		
Ambient temperature range	operation rated load storage	-20...+60 °C -20...+60 °C -40...+85 °C
Damp heat (IEC/EN 60068-2-3)		93 % at 40 °C, no condensation
Climatic category (IEC/EN 60721)		3K3
Vibration (IEC/EN 60068-2-6)		
Shock (IEC/EN 60068-2-27)		
Isolation data		
Insulation voltage	between input / output / housing	500 V AC (routine test)
Pollution degree (EN 50178)		2
Standards		
Product standard		IEC/EN 61204
Low Voltage Directive		2006/95/EG
EMC Directive		2004/108/EG
Electrical safety	EN 50178	EN 50178, EN 60950, UL 60950, UL 508
Electromagnetic compatibility		
Interference immunity to		IEC/EN 61000-6-2
electrostatic discharge	IEC/EN 61000-4-2	Level 3 (air discharge ±8 kV, contact discharge ±6 kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)
electrical fast transient/burst	IEC/EN 61000-4-4	Level 3 (±2 kV)
surge	IEC/EN 61000-4-5	Level 1 (w0.5 kV)
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)
Interference emission		IEC/EN 61000-6-3
high-frequency radiated	IEC/CISPR 22 / EN 55022	Class B
high-frequency conducted	IEC/CISPR 22 / EN 55022	Class B

1) incl. lateral screw

2) This device is designed for connection to a safety extra-low voltage source. If no safety extra-low voltage is used at the input side, the lateral screw can be used for grounding of the housing (protection class I).

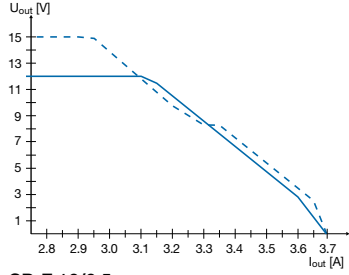
CP-E Range

Technical diagrams

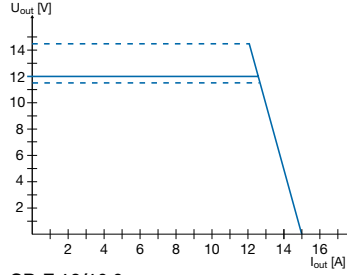
Wiring schematics

Technical diagrams

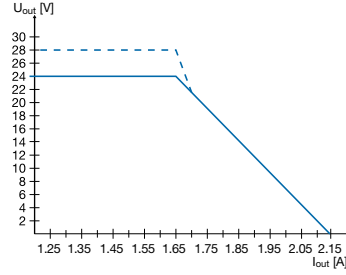
Output curve at $T_a = 25^\circ\text{C}$



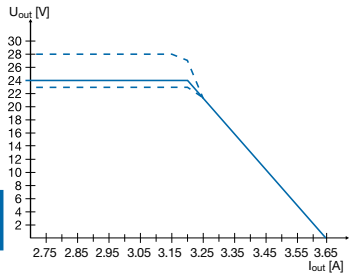
CP-E 12/2.5



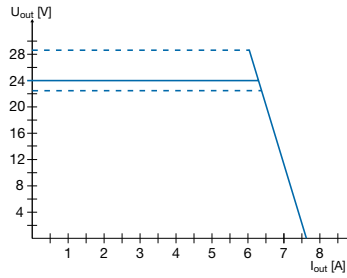
CP-E 12/10.0



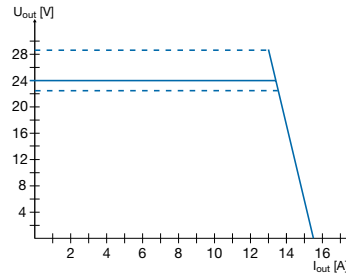
CP-E 24/1.25



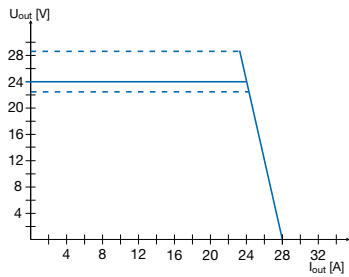
CP-E 24/2.5



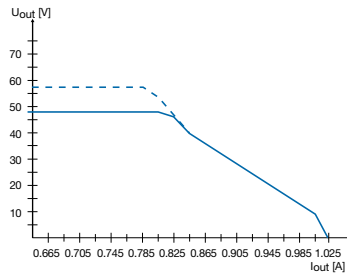
CP-E 24/5.0



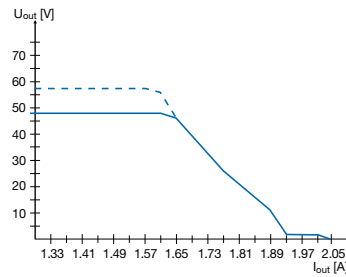
CP-E 24/10.0



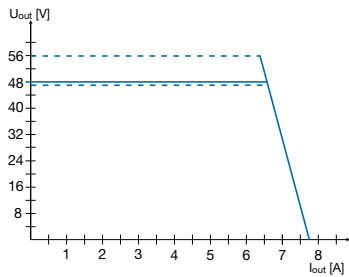
CP-E 24/20.0



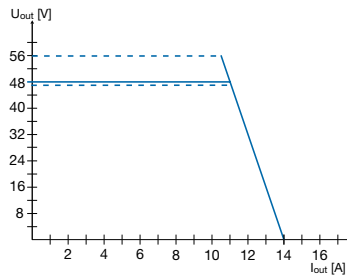
CP-E 48/0.62



CP-E 48/1.25

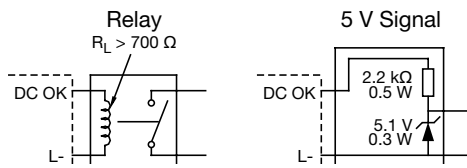


CP-E 48/5.0



CP-E 48/10.0

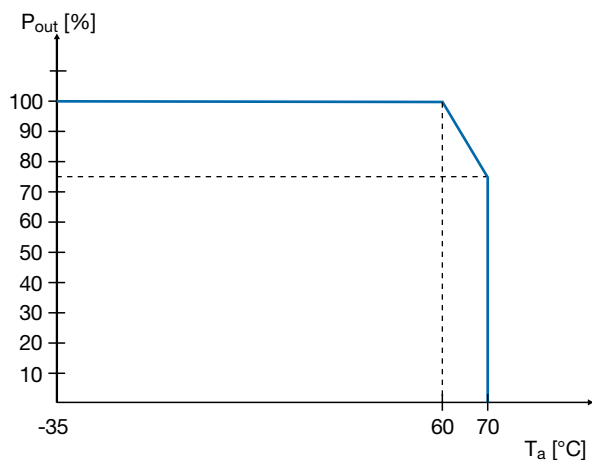
Wiring schematics



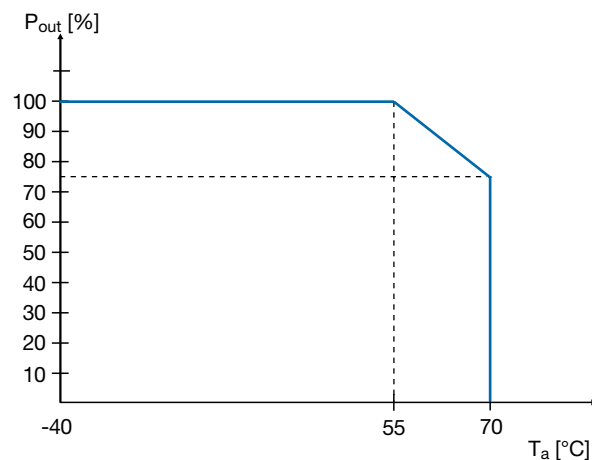
CP-E 24/1.25, CP-E 24/2.5

CP-E Range

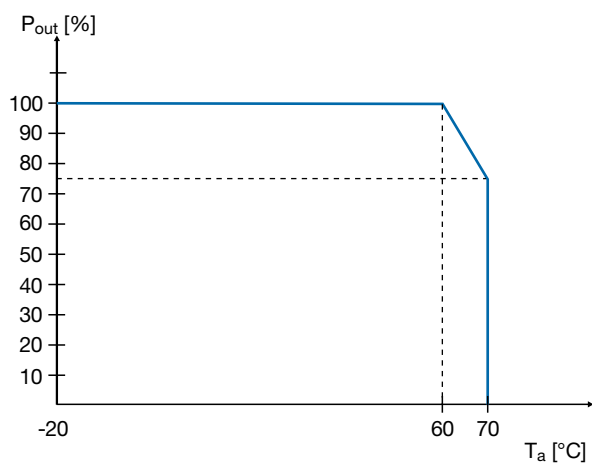
Technical diagrams



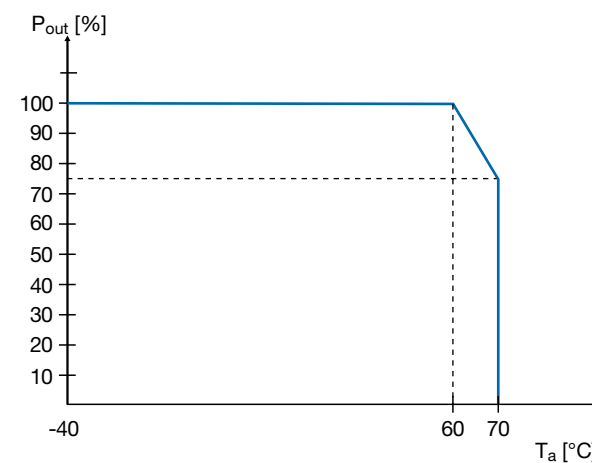
CP-E 12/10.0, CP-E 24/5.0



CP-E 24/20.0, CP-E 48/10.0



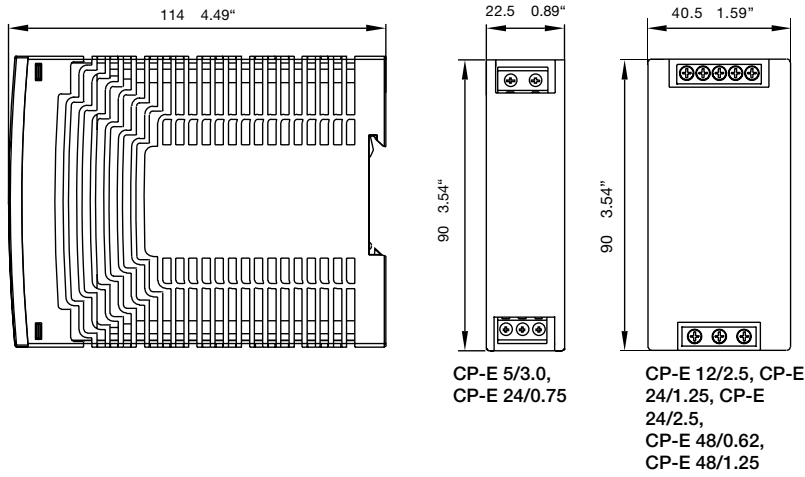
CP-E 5/3.0, CP-E 24/0.75



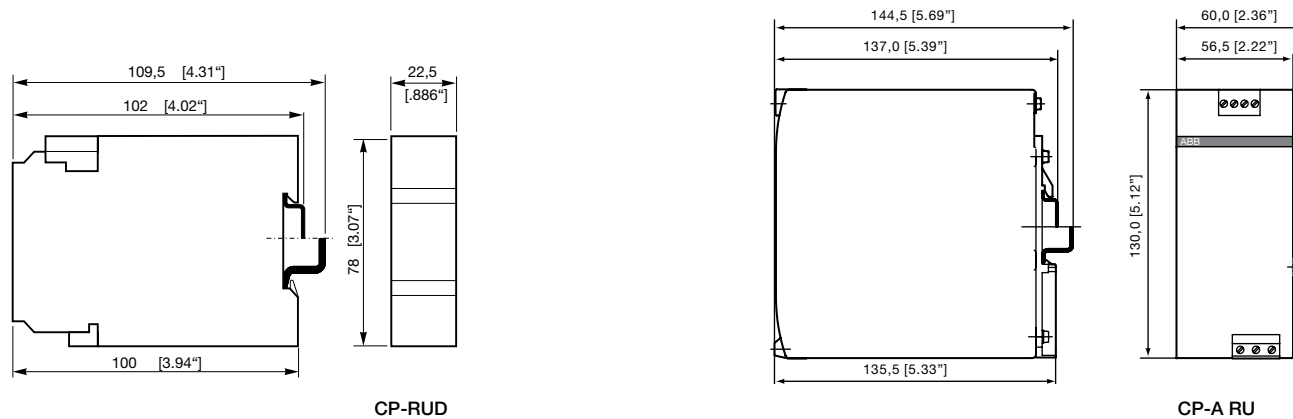
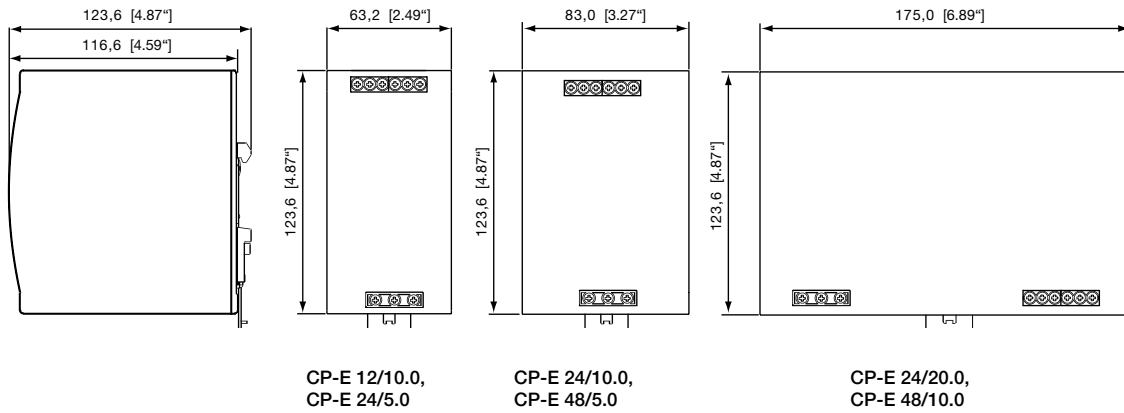
CP-E 12/2.5, CP-E 24/1.25, CP-E 48/0.62,
CP-E 24/2.5, CP-E 48/1.25, CP-E 24/10.0, CP-E 48/5.0

CP-E Range

Approximate dimensions



11





Switch mode power supplies CP-T Range



Type CP-T Switch mode Power supplies

Characteristics

- Rated output voltages 24 V, 48 V DC
- Output voltage adjustable via front-face rotary potentiometer "OUTPUT Adjust"
- Rated output currents 5 A, 10 A, 20 A, 40 A
- Rated output powers 120 W, 240 W, 480 W, 960 W
- Three-phase or two-phase operation (see derating note)
- Supply range 3 x 400 – 500 V AC (3 x 340 – 575 V AC, 480 – 820 V DC)
- Typical efficiency of 93 %
- Low power dissipation and low heating
- Free convection cooling (no forced cooling with ventilators)
- Ambient temperature range during operation -40...+70 °C 1)
- Open-circuit, overload and short-circuit stable
- Integrated input fuse
- Redundancy unit CP-A RU offering true redundancy, available as accessory
- LEDs for status indication
- Signalling contact "13-14" (solid state) for output voltage OK
- Approvals / marks (depending on device, partly pending):



Benefits

Signalling output

The devices of the CP-T series offer a solid state output for function monitoring and remote diagnostics.

Wide input range

Wide range input optimized for world-wide applications: The CP-T power supplies can be used in 340 - 575 V AC or 480 - 820 V DC supply systems.

Adjustable output voltage

The CP-T range feature a continuously adjustable output voltage. Thus, they can be optimally adapted to the application, e.g. compensating the voltage drop caused by a long line length.

¹⁾ 480 W variants: -30...+70°C

CP-T Range

Ordering details

Description

The CP-T range of three-phase power supply units is the youngest member of ABB's power supply family. In terms of design and functionality, the new range perfectly supplements

the existing products and extends the range appropriately. The devices can be supplied with a three-phase voltage as well as with two-phase mains. Here, ABB offers power supply units with 24 V DC and 48 V DC outputs with 5 A, 10 A, 20 A and 40 A and efficiency of up to 92 %. As in the case of all products, they are designed for an ambient temperature of up to 70 °C.

All products can be supplied within a AC supply voltage range between 340 to 575 V AC and an DC supply voltage range between 480 to 820VDC.



CP-T 24/5.0



CP-T 24/10.0, CP-T 48/5.0



CP-T 24/20.0, CP-T 48/10.0

Ordering details

Input voltage range	Rated output voltage / current	Type	Catalog number	Weight (1 pce) kg (lb)
340-575 V AC / 480-820 V DC	24 V DC / 5 A	CP-T 24/5.0	1SVR427054R0000	0.80 (1.77)
340-575 V AC / 480-820 V DC	24 V DC / 10 A	CP-T 24/10.0	1SVR427055R0000	1.05 (2.31)
340-575 V AC / 480-820 V DC	24 V DC / 20 A	CP-T 24/20.0	1SVR427056R0000	1.75 (3.86)
340-575 V AC / 480-820 V DC	24 V DC / 40 A	CP-T 24/40.0	1SVR427057R0000	3.20 (7.05)
340-575 V AC / 480-820 V DC	48 V DC / 5 A	CP-T 48/5.0	1SVR427054R2000	1.05 (2.31)
340-575 V AC / 480-820 V DC	48 V DC / 10 A	CP-T 48/10.0	1SVR427055R2000	1.75 (3.86)
340-575 V AC / 480-820 V DC	48 V DC / 20 A	CP-T 48/20.0	1SVR427056R2000	3.40 (7.50)

Ordering details - Redundancy units for decoupling of two CP-T power supply units

suitable for decoupling of two CP-24 V DC power supply units	Description	Type	Catalog number	Weight (1 pce) kg (lb)
≤ 40 V and < 5 A	2 inputs each up to 20 A and 1 output up to 40 A	CP-A RU	1SVR427071R0000	0.89 (1.96)

CP-T Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_{in} = 3 \times 400\text{ V AC}$ and rated values, unless otherwise indicated

Type	CP-T 24/5.0	CP-T 24/10.0	CP-T 24/20.0	CP-T 24/40.0
Input circuit	L1, L2, L3			
Rated input voltage U_n	3 x 400-500 V AC			
Input voltage range	340-575 V AC 480-820 V DC			
Frequency range AC	47-63 Hz			
Typical input current	0.36 A	0.65 A	1.1 A	1.72 A
Typical power consumption	135 W	270 W	538 W	1058 W
Inrush current limiting	10 A	20 A		30 A
Power failure buffering time	min. 20 ms			min. 15 ms
Internal input fuse	per phase 2 A / 600 V AC		T3.15 A / 500 V AC	T 5 A / 500 V AC
Recommended backup fuse	3 pole miniature circuit breaker ABB Type S203			
Power factor correction (PFC)	Yes, passive			
Discharge current	towards PE input / output		< 3.5 mA < 0.25 mA	
Indication of operational states				
Output voltage	OUTPUT OK: green LED OUTPUT LOW: red LED		output voltage OK output voltage too low	
Output circuit	L+, L+, L-, L-			
Rated output voltage	24 V DC			
Tolerance of the output voltage	0...+1 %			
Adjustment range of the output voltage	22.5-28.5 V DC			
Rated output power	120 W	240 W	480 W	960 W
Rated output current I	$T_a \leq 60\text{ °C}$ 5 A	10 A	20 A	40 A
Derating of the output current	$60\text{ °C} < T_a \leq 70\text{ °C}$		2.5 %/°C	
Signalling contact for output voltage OK	13-14 Threshold	solid state (max. 60 V DC, 0.3 A)		17.6-19.4 V
Minimum fuse rating to achieve short-circuit protection	13-14		500 V DC	
Maximum deviation with load change statical	$\pm 1\%$	$\geq 60\text{ V DC}$, $\leq 0.3\text{ A}$ fast-acting		$\pm 1\%$ (single mode) $\pm 5\%$ (parallel mode)
Control time at nominal load	change of output voltage within the input voltage range		$\pm 0.5\%$	
Starting time after applying the supply voltage	at I_r		< 2 ms max. 1 s	
Rise time	with 3500 μF at nominal load with 3500 μF		max. 1.5 s max. 150 ms max. 500 ms	
Fall time	with 3500 μF		max. 150 ms	
Residual ripple and switching peaks	BW = 20 MHz		100 mV	80 mV
Parallel connection	not supported	configurable, to increase power, up to 2 devices, reduction: (number of devices x I) x 0.9		to increase power, up to 2 devices, reduction:(number of devices x I) x 0.9, use active current balancing
Series connection	not supported		yes, to increase voltage, max. 2 devices	
Resistance to reverse feed	approx. 35 V			
Output circuit - No-load, overload and short-circuit behavior				
Characteristic curve of output	combined U/I characteristic curve and hiccup mode		U/I- or Hiccup-mode adjustable	hiccup / fold back behavior
Short-circuit protection	continuous short-circuit proof			
Short-circuit behavior	current limiting			
Overload protection	hiccup mode			
No-load protection	continuous no-load stability			
Overtemperature protection	yes, automatic recovery after temperature went down			
Starting of capacitive loads	3500 μF	7000 μF	7000 μF	7000 μF
General data				
Efficiency	typ. 89 %		typ. 90 %	
Duty time	100%			
Dimensions (W x H x D)	74.3 x 124 x 118.8 mm [2.92 x 4.88 x 4.68 in]	89 x 124 x 118.8 mm [3.5 x 4.88 x 4.68 in]	150 x 124 x 118.8 mm [5.91 x 4.88 x 4.68 in]	275.8 x 124 x 118.8 mm [10.86 x 4.88 x 4.68 in]
Weight	0.78 kg (1.72 lb)	1.045 kg (2.30 lb)	1.657 kg (3.653 lb)	3.275 kg (7.220 lb)
Material of housing	Metal			
Mounting	DIN rail (IEC EN 60715), snap-on mounting without any tool			
Mounting position	horizontal			
Minimum distance to other units	horizontal / vertical		25 mm / 25 mm (0.98 in / 0.98 in)	

CP-T Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_n = 3 \times 400\text{ V AC}$ and rated values, unless otherwise indicated

Type	CP-T 24/5.0	CP-T 24/10.0	CP-T 24/20.0	CP-T 24/40.0
Degree of protection	housing / terminals			
Protection class	IP20 / IP20			
Electrical connection - input circuit / output circuit				
Wire size				
fine-strand with wire end ferrule	0.2-4 mm ² (24-11 AWG)			Input circuit L1, L2, L3: 0.2-4 mm ² (24-11 AWG) Output circuit L+, L+, L-, L-: 0.5-10 mm ² (20-8 AWG) Signalling circuit: 0.2-4 mm ² (24-11 AWG)
fine-strand without wire end ferrule	0.2-6 mm ² (24-10 AWG)			Input circuit L1, L2, L3: 0.2-6 mm ² (24-11 AWG) Output circuit L+, L+, L-, L-: 0.5-16 mm ² (20-6 AWG) Signalling circuit: 0.2-6 mm ² (24-10 AWG)
rigid	0.2-6 mm ² (24-10 AWG)			Input circuit L1, L2, L3: 0.2-6 mm ² (24-11 AWG) Output circuit L+, L+, L-, L-: 0.5-16 mm ² (20-6 AWG) Signalling circuit: 0.2-6 mm ² (24-10 AWG)
Stripping length	8 mm (0.31 in)			
Tightening torque	input / output			1 Nm / 0.6 Nm
				1 Nm / 1.8 Nm

Environmental data

Ambient temperature range	operation	-40...+70 °C	-30...+70 °C	-40...+70 °C
	rated load	-40...+70 °C	-30...+70 °C	-40...+70 °C
	storage	-40...+85 °C		
Damp heat (cyclic) (IEC/EN 60068-2-30)	95 % without condensation			
Vibration (sinusoidal) (IEC/EN 60068-2-6)	10-500 Hz, 2G, each along X, Y, Z axes 6 min / cycle			
Shock (half-sine) (IEC/EN 60068-2-27)	Half sine wave, 15G, 11 ms, 3 axes, 6 Faces, 3 times for each face			

Isolation data

Rated insulation voltage U_i	input circuit / output circuit	3 kV AC
	input / PE	1.5 kV AC
Pollution degree		2

Standards

Product standard	EN 61204-3
Low Voltage Directive	2006/95/EN
EMC directive	2004/108/EN
RoHS directive	2002/95/EN
Electrical safety	EN 60950-1, UL 60950-1, UL 508, EN 61558-1, EN 61558-2-17; EN 60204-1
Protective low voltage	SELV

Electromagnetic compatibility

Interference immunity to electrostatic discharge	IEC/EN 61000-4-2	IEC/EN 61000-6-2
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 4 (air discharge 15 kV / contact discharge 8 kV) Level 3 (10 V/m)
electrical fast transient/burst	IEC/EN 61000-4-4	Level 4 (4 kV / 2.5 kHz) Level 4 (4 kV / 5 kHz)
surge	IEC/EN 61000-4-5	L-L Level 3 (2 kV) / L-PE Level 4 (4 kV)
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)
power frequency magnetic fields	IEC/EN 61000-4-8	Level 4 (30 A/m)
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-11	dips: >95 % 0.5 ms / >30 % 0.5 ms interruptions: >95 % 250 ms
Interference emission		IEC/EN 61000-6-3
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B
limits for harmonic current emissions	IEC/EN 61000-3-2	Class A

Approvals and marks on page 11.3.

CP-T Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_{in} = 3 \times 400\text{ V AC}$ and rated values, unless otherwise indicated

Type	CP-T 48/5.0	CP-T 48/10.0	CP-T 48/20.0
Input circuit	L1, L2, L3		
Rated input voltage U_{in}	3 x 400-500 V AC		
Input voltage range	340-575 V AC 480-820 V DC		
Frequency range AC	47-63 Hz		
Typical input current	0.65 A	1.1 A	1.72 A
Typical power consumption	264 W	535 W	1050 W
Inrush current limiting	20 A		
Power failure buffering time	min. 20 ms		
Internal input fuse	per phase		
Power factor correction (PFC)	2 A / 600 V AC	T3.15 A / 500 V AC	T 5 A / 500 V AC
Discharge current	towards PE input / output		
		yes, passive	< 3.5 mA
		< 0.25 mA	
Indication of operational states			
Output voltage	OUTPUT OK: green LED OUTPUT LOW: red LED	output voltage OK output voltage too low	
Output circuit	L+, L+, L-, L-		
Rated output voltage	48 V DC		
Tolerance of the output voltage	0...+1 %		
Adjustment range of the output voltage	47-56 V DC		
Rated output power	240 W	480 W	960 W
Rated output current I _o	5 A	10 A	20 A
Derating of the output current	$T_a \leq 60\text{ °C}$ $60\text{ °C} < T_a \leq 70\text{ °C}$		
Maximum deviation with	load change statical		
	change of output voltage within the input voltage range at rated load		
Control time	±1 % (single mode) ±5 % (parallel mode)		
Starting time after applying the supply voltage	at I _o with 7000 µF		
Rise time	at rated load with 7000 µF		
Fall time	max. 1 s max. 1.5 s		
Residual ripple and switching peaks	BW = 20 MHz		
Parallel connection	100 mV		
Series connection	yes, to increase voltage, max. 2 devices		
Resistance to reverse feed	approx. 35 V	approx. 63 V	approx. 63 V
Output circuit - No-load, overload and short-circuit behavior			
Characteristic curve of output	combined U/I and hiccup mode	U/I or hiccup mode, configurable	hiccup mode / fold back behavior
Short-circuit protection	continuous short-circuit proof		
Short-circuit behavior	current limiting		
Overload protection	hiccup mode		
No-load protection	continuous no-load stability		
Over temperature protection	yes, automatic recovery after temperature went down		
Starting of capacitive loads	7000 µF		
General data			
Efficiency	typ. 91 %		typ. 93 %
Duty time	100%		
Dimensions (W x H x D)	89 x 124 x 118.8 mm [3.5 x 4.88 x 4.68 in]	150 x 124 x 118.8 mm [5.91 x 4.88 x 4.68 in]	275.8 x 124 x 118.8 mm [10.86 x 4.88 x 4.68 in]
Weight	1.045 kg (2.30 lb)	1.657 kg (3.653 lb)	3.275 kg (7.22 lb)
Material of housing	Metal		
Mounting	DIN rail (IEC EN 60715), snap-on mounting without any tool		
Mounting position	horizontal		
Minimum distance to other units	horizontal / vertical		
Degree of protection	housing / terminals		
Protection class	IP20 / IP20		

CP-T Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_n = 3 \times 400\text{ V AC}$ and rated values, unless otherwise indicated

Type		CP-T 48/5.0	CP-T 48/10.0	CP-T 48/20.0
Wire size	fine-strand with wire end ferrule	0.2-4 mm ² (24-11 AWG)		0.2-4 mm ² (24-11 AWG) / 0.5-10 mm ² (20-6 AWG)
	fine-strand without wire end ferrule	0.2-6 mm ² (24-10 AWG)		
	rigid			
Stripping length		8 mm (0.31 in)		
Tightening torque	input / output	1 Nm / 0.6 Nm		1 Nm / 1.8 Nm

Environmental data

Ambient temperature range	operation	-40...+70 °C	-30...+70 °C	-40...+70 °C
	rated load	-40...+70 °C	-30...+60 °C	-40...+70 °C
	storage	-40...+70 °C	-40...+85 °C	-40...+70 °C
Damp heat (cyclic) (IEC/EN 60068-2-30)		95 % without condensation		
Vibration (sinusoidal) (IEC/EN 60068-2-6)		10-500 Hz, 2G, each along X, Y, Z axes 6 min / cycle		
Shock (half-sine) (IEC/EN 60068-2-27)		Half sine wave, 15G, 11 ms, 3 axes, 6 Faces, 3 times for each face		

Isolation data

Rated insulation voltage U_i	input circuit / output circuit	3 kV AC		
	input / PE	1.5 kV AC		
Pollution degree		2		

Standards

Product standard	IEC/EN 61204-3			
Low Voltage Directive	2006/95/EC			
EMC directive	2004/108/EC			
RoHS directive	2002/95/EC			
Electrical safety	EN 60950-1, UL 60950-1, UL 508, EN 61558-1, EN 61558-2-17; EN 60204-1			
Protective low voltage	SELV			

Electromagnetic compatibility

Interference immunity to		IEC/EN 61000-6-2		
electrostatic discharge	IEC/EN 61000-4-2	Level 4 (air discharge 15 kV / contact discharge 8 kV)		
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)		
electrical fast transient/burst	IEC/EN 61000-4-4	Level 4 (4 kV / 5 kHz)		
surge	IEC/EN 61000-4-5	L-L Level 3 (2 kV) / L-PE Level 4 (4 kV)		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)		
power frequency magnetic fields	IEC/EN 61000-4-8	Level 4 (30 A/m)		
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-11	dips: >95 % 0.5 ms / >30 % 0.5 ms interruptions: >95 % 250 ms		
Interference emission		IEC/EN 61000-6-3		
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B		
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B		
limits for harmonic current emissions	IEC/EN 61000-3-2	Class A		

Approvals and marks on page 11.3.

CP-T Range

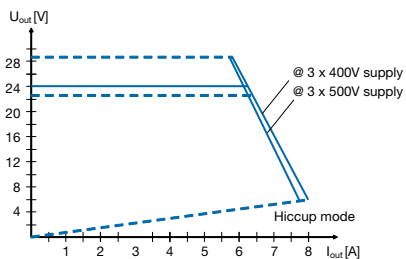
Technical diagrams

Approximate dimensions

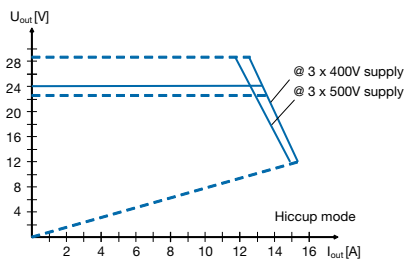
Technical diagrams

dimensions in mm

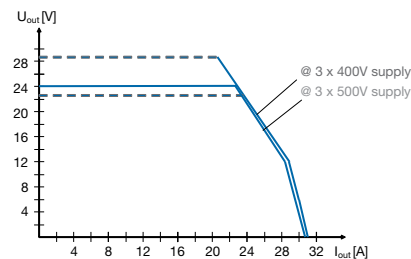
Output curve at $T_{ij} = 25\text{ }^{\circ}\text{C}$



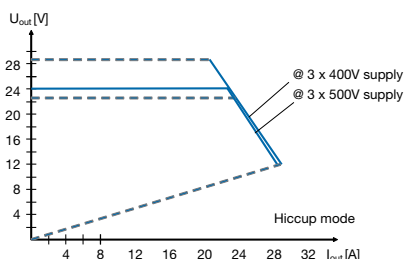
CP-T 24/5.0



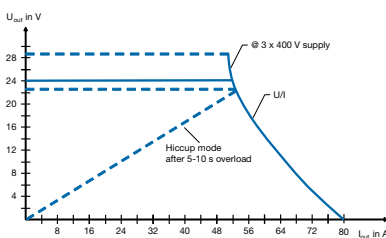
CP-T 24/10.0



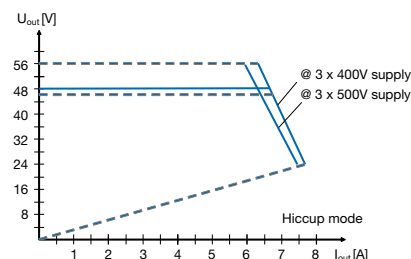
CP-T 24/20.0 U/I curve



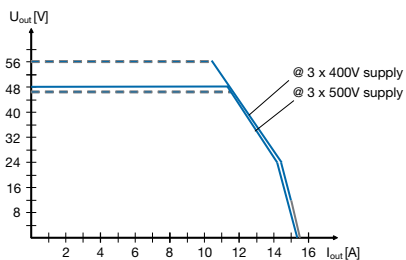
CP-T 24/20.0 Hiccup mode



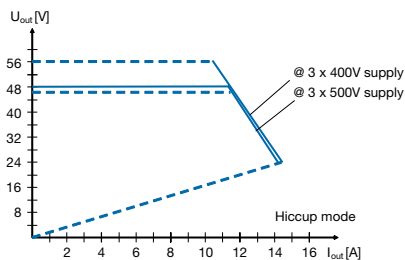
CP-T 24/40.0



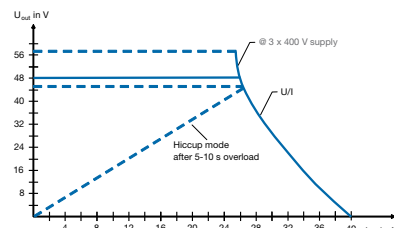
CP-T 48/5.0



CP-T 48/10.0 U/I curve



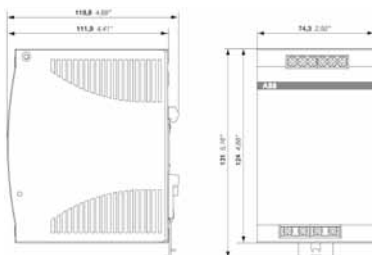
CP-T 48/10.0 Hiccup mode



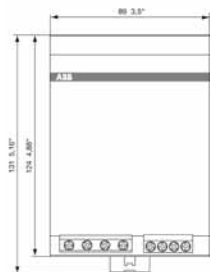
CP-T 48/20.0

Approximate dimensions

dimensions in mm



CP-T 24/5.0



CP-T 24/10.0, CP-T 48/5.0



CP-T 24/20.0, CP-T 48/10.0

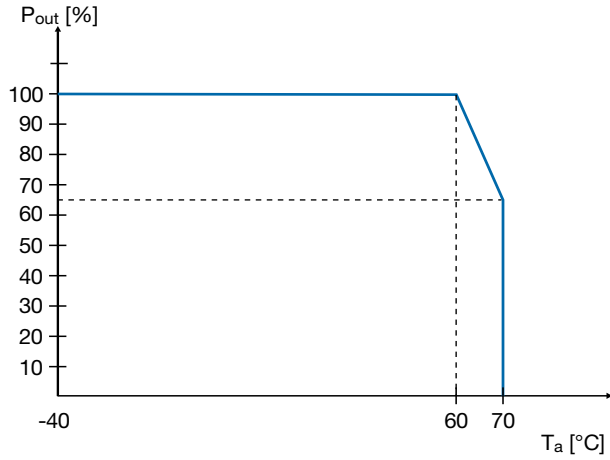


CP-T 24/40.0, CP-T 48/20.0

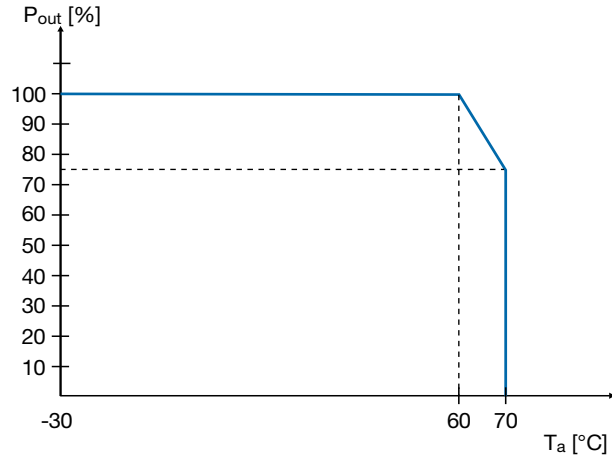
CP-T Range

Technical diagrams

Temperature curve at rated load

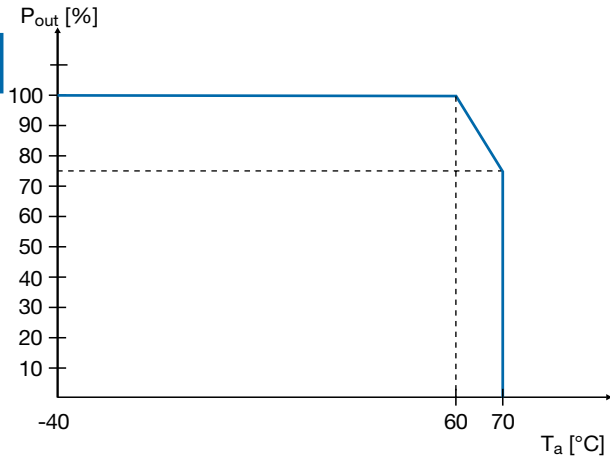


CP-T 24/40.0, CP-T 48/20.0



CP-T 24/20.0, CP-T 48/10.0

11



CP-T 24/10.0, CP-T 24/5.0, CP-T 48/5.0

Type CP-S, CP-C & CP-A Switch mode Power supplies



Switch mode power supplies CP-S, CP-C & CP-A Range



Characteristics CP-S and CP-C range

- Output current 5 A, 10 A and 20 A
- Integrated power reserve of up to 50 %
- 5 A and 10 A devices with pluggable connecting terminals
- Approvals / marks (depending on device, partly pending)



CP-S range

- 10 A and 20 A device with front-face selector switch to adjust rated input voltage range: 110-120 V AC or 220-240 V AC
- Output voltage fixed at 24 V DC
- Parallel operation for redundancy

CP-C range

- Wide range input 110-240 V AC (85-264 V AC, 100-350 V DC)
- Output voltage adjustable in a range of 22-28 V DC
- Parallel operation for increased capacity and redundancy
- Power factor correction (PFC) acc. to EN 61000-3-2
- Function module pluggable onto the front side

Messaging module CP-C MM:

- LED for status indication
- Relay outputs "Input OK" and "Output OK"
- REMOTE ON/OFF function to switch on and off the power supply externally
- Output voltage monitoring is only possible in decoupled parallel operation

CP-A range

Redundancy unit CP-A RU

- Redundancy unit with 2 inputs / channels for decoupling of 2 CP-S or 2 CP-C power supplies up to 20 A per input / channel and output up to 40 A
- True redundancy by 100 % decoupling with 2 integrated diodes

Control module CP-A CM

- Pluggable onto redundancy unit CP-A RU
- One relay output per monitored input / channel
- Threshold values adjustable (14-28 V)
- Indicates the presence of both input voltages (of the CP-A RU) via LEDs and energized output relays

Benefits

Integrated power reserve

The new CP-S and CP-C range power supplies feature an integrated power reserve of up to 50 %. No oversized electricity supply is needed, especially under heavy load conditions.

Pluggable connecting terminals

Extended flexibility in operation due to pluggable connecting terminals (this feature is not offered on all devices).

Adjustable output voltage

The CP-C range types feature a continuously adjustable output voltage from 22 to 28 V. Thus, they can be optimally adapted to the application, e.g. compensating the voltage drop caused by long line length.

Pluggable function modules

The CP-C range power supplies can be equipped with pluggable modules to add additional functions (e.g. messaging module). Thus, the power supplies can be ideally adapted to the relevant application.

CP-S, CP-C & CP-A Range

Ordering details

Description

The power supply units in the CP-S and CP-C range are ABB's high-end solutions. Designed with an integrated 50 % power reserve and an efficiency of approximately 89 % these are the perfect products for all complex, highly reliable applications. All the devices cover the U-I output characteristic and are built with thermal protection which switches off in case of overheating. In particular, the devices of the CP-C range feature a much broader functionality, including active power factor correction and pluggable function modules.

These products are designed to trip MCB's in the 24VDC output circuit. Coordination tables are available.



CP-S 24/5.0



CP-C 24/10.0



CP-S 24/20.0



CP-A RU + CP-A CM

Ordering details

Input voltage range	Rated output voltage / current	Type	Catalog number	Weight (1 pce) kg (lb)
85-264 V AC / 110-350 V DC	24 V DC / 5 A	CP-S 24/5.0	1SVR427014R0000	0.96 (2.11)
85-132 V AC, 184-264 V AC / 220-350 V DC	24 V DC / 10 A	CP-S 24/10.0	1SVR427015R0100	1.07 (2.35)
85-132 V AC, 184-264 V AC / 220-350 V DC	24 V DC / 20 A	CP-S 24/20.0	1SVR427016R0100	2.83 (6.23)
85-264 V AC / 110-350 V DC	24 V DC / 5 A	CP-C 24/5.0	1SVR427024R0000	0.96 (2.11)
85-264 V AC / 110-350 V DC	24 V DC / 10 A	CP-C 24/10.0	1SVR427025R0000	1.34 (2.95)
85-264 V AC / 110-350 V DC	24 V DC / 20 A	CP-C 24/20.0	1SVR427026R0000	3.15 (6.94)

Description	Type	Catalog number	Weight (1 pce) kg (lb)
Messaging module for CP-C range power supplies	CP-C MM	1SVR427081R0000	0.065 (0.14)
Redundancy unit	CP-A RU	1SVR427071R0000	0.89 (1.96)
Control module for CP-A RU redundancy units	CP-A CM	1SVR427075R0000	0.063 (0.14)

CP-S, CP-C & CP-A Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_{in} = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type		CP-C 24/5.0 CP-S 24/5.0	CP-C 24/10.0 CP-S 24/10.0	CP-C 24/20.0 CP-S 24/20.0
Input circuit - supply circuit		L, N		
Rated input voltage U_{in}	CP-C	110-240 V AC		
	CP-S	switch position 115 switch position 230	110-240 V AC	110-120 V AC 220-240 V AC
Input voltage range	CP-C	85-264 V AC / 100-350 V DC ¹⁾		
	CP-S	switch position 115 switch position 230	85-264 V AC / 100-350 V DC ¹⁾	85-132 V AC 184-264 V AC / 220-350 V DC ¹⁾
Frequency range AC		47-63 Hz		
Typical input current		CP-C at 110-240 V AC CP-S at 110-120 V AC CP-S at 220-240 V AC	approx. 2.2-1.2 A - -	approx. 2.6-1.2 A approx. 4.2-4.0 A approx. 2.4-2.2 A
Power consumption			typ. 135 W	typ. 269 W typ. 538 W
Inrush current limiting / I ² t (cold start)	CP-C CP-S		< 23 A / approx. 0.9 A ² s	< 33 A / approx. 0.2 A ² s < 40 A / approx. 1.8 A ² s < 40 A / approx. 1.9 A ² s < 70 A / approx. 8 A ² s
Power failure buffering time			min. 100 ms	min. 40 ms min. 40 ms
Transient overvoltage protection				varistors
Internal input fuse (apparatus protection, not accessible)			4 A (slow-acting)	6.3 A (slow-acting) 12 A (fast-acting)
Power factor correction (PFC)	CP-C CP-S			yes, active no

Indication of operational states

Output voltage	OUTPUT OK: green LED	 : output voltage OK
----------------	----------------------	---------------------------------------------------------------------------------------------------------

Output circuit

		L+, L+, L-, L- : short-circuit, no-load and overload proof		
Rated output voltage		24 V DC		
Tolerance of the output voltage	CP-C CP-S	±1 % -1...+5 %		
Adjustment range of the output voltage	CP-C CP-S	22-28 V DC, default setting 24 V ±0.5 % fixed		
Rated output power		120 W	240 W	480 W
Rated output current	$T_a \leq 60\text{ °C}$	5 A	10 A	20 A
Peak output current (power reserve)	$T_a \leq 40\text{ °C}$	typ. ≤ 7.25 A	typ. ≤ 12.25 A	typ. ≤ 22.5 A
Derating	$60\text{ °C} < T_a \leq 70\text{ °C}$	2.5 % per Kelvin temperature increase		
Deviation with	CP-C load change statical 10-90 % CP-S load change statical 10-90 % load change dynamical 10-90 % change of the input voltage of ±10 %	typ. < ±0.05 % typ. < ±0.1 % typ. < ±3 % typ. < ±0.05 %		
Control time		typ. < 1 ms		
Starting time after applying supply voltage	CP-C CP-S	< 200 ms	< 200 ms < 250 ms	typ. < 200 ms typ. < 300 ms
Rise time 10-90 %	CP-C CP-S	typ. < 30 ms	typ. < 4 ms typ. < 5 ms	typ. < 12 ms typ. < 15 ms
Residual ripple and switching peaks	BW = 20 MHz	typ. < 50 mV _{pp}		
Parallel connection		yes, up to 5 devices, to enable redundancy and to increase power, current not symmetrical (CP-S only redundancy)		
Series connection		yes, to increase voltage		
Resistance to reverse feed		approx. 35 V DC		

Output circuit - No-load, overload and short-circuit behavior

		see also U/I- and I/T-characteristic curves		
Characteristic curve of output		U/I characteristic curve with power reserve		
Current limiting at short circuit		approx. 11 A	approx. 19 A	approx. 25 A
Short-circuit protection		continuous short-circuit stability		
Overload protection		thermal protection		
Starting of capacitive loads		unlimited		

General data

Power dissipation		typ. < 15 W	typ. < 29 W	typ. < 58 W
Efficiency		typ. 89 %		
Discharge current for PE		< 3.5 mA		
MTBF	CP-C CP-S	500.000 h 350.000 h		
Dimensions (W x H x D)		56.5 (60 ²⁾ x 130 x 135.5 mm [2.22 (2.36 ²⁾ x 5.12 x 5.35 in]	90 (93.5 ²⁾ x 130 x 135.5 mm [3.54 (3.68 ²⁾ x 5.12 x 5.35 in]	200 (203.5 ²⁾ x 130 x 135.5 mm [7.87 (8.01 ²⁾ x 5.12 x 5.35 in]
Weight	CP-C CP-S	approx. 0.96 kg (2.12 lb)	approx. 1.34 kg (2.95 lb) approx. 1.07 kg (2.36 lb)	approx. 3.15 kg (6.94 lb) approx. 2.83 kg (6.23 lb)
Minimum distance to other units	horizontal / vertical	10 mm / 80 mm (0.39 in / 3.15 in)		
Degree of protection	housing / terminals	IP20 / IP20		
Material of housing	housing shell / cover	aluminium / zinc-coated sheet steel		

CP-S, CP-C & CP-A Range

Technical data

Data at $T_a = 25\text{ °C}$, $U_n = 230\text{ V AC}$ and rated values, unless otherwise indicated

Type	CP-C 24/5.0 CP-S 24/5.0	CP-C 24/10.0 CP-S 24/10.0	CP-C 24/20.0 CP-S 24/20.0
Protection class (EN 61140)	I		
Mounting	DIN rail (IEC/EN 60715), snap-on mounting		
Mounting position	horizontal		
Electrical connection - Input circuit			
Wire size	³⁾	³⁾	-
fine-strand with wire end ferrule			2.5-10 mm ² (14-8 AWG)
fine-strand without wire end ferrule	0.2-2.5 mm ² (24-14 AWG)		0.5-10 mm ² (20-8 AWG)
rigid			0.5-16 mm ² (20-6 AWG)
Stripping length	7 mm (0.28 in)		12 mm (0.47 in)
Tightening torque	0.4 Nm		1.2-1.5 Nm
Electrical connection - Output circuit			
Wire size	³⁾	³⁾	-
fine-strand with wire end ferrule			2.5-10 mm ² (14-8 AWG)
fine-strand without wire end ferrule	0.12-2.5 mm ² (26-14 AWG)		0.5-10 mm ² (20-8 AWG)
rigid			0.5-16 mm ² (20-6 AWG)
Stripping length	8 mm (0.31 in)		12 mm (0.47 in)
Tightening torque	0.4 Nm		1.2-1.5 Nm
Environmental data			
Ambient temperature range	operation	-25...+70 °C	
	rated load	0...+60 °C (without derating)	
	storage	-40...+85 °C	
Damp heat (IEC/EN 60068-2-3)		93 % at +40 °C, no condensation	
Climatic category (IEC/EN 60721)		3K3	
Vibration (IEC/EN 60068-2-6)			
Shock (IEC/EN 60068-2-27)			
Isolation data			
Rated insulation voltage U_i between all isolated circuits (IEC/EN 60950-1; EN 50178)	input / output	300 V	
	input / PE	300 V	
	output / PE	50 V	
Rated impulse withstand voltage U_{imp} between all isolated circuits (IEC/EN 60950-1; EN 50178)	input / output	4 kV; 1.2/50 μ s	
	input / PE	2.5 kV; 1.2/50 μ s	
	output / PE	500 V; 1.2/50 μ s	
Power-frequency withstand voltage test (test voltage) (routine test / type test)	input / output	1.5 kV AC / 3.0 kV AC	
	input / PE	1.5 kV AC / 3.0 kV AC	
	output / PE	500 V DC / 500 V DC	
Pollution degree (IEC/EN 60950-1; EN 50178)		2	
Overvoltage category (IEC/EN 60950-1; EN 50178)		II	
Standards			
Product standard		IEC/EN 61204	
Low Voltage Directive		2006/95/EC	
EMC Directive		2004/108/EC	
Electrical safety		EN 50178, EN 60950, UL 60950, UL 508	
Protective low voltage		SELV (EN 60950)	
Electromagnetic compatibility			
Interference immunity to		IEC/EN 61000-6-2	
electrostatic discharge	IEC/EN 61000-4-2	Level 4 (8 kV / 15 kV)	
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)	
electrical fast transient / burst	IEC/EN 61000-4-4	Level 4 (4 kV)	
surge	IEC/EN 61000-4-5	Level 4 (2 kV symmetrical, level 3 - 3 kV asymmetrical)	
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)	
Interference emission		IEC/EN 61000-6-3	
high-frequency radiated	IEC/CISPR 22; EN 55022	Class B	
high-frequency conducted	IEC/CISPR 22; EN 55022	Class B	

¹⁾ at $U > 264\text{ V}$ use additionally an appropriate external fuse

²⁾ with lateral screw

³⁾ pluggable connecting terminals, actuate only when power is off

Approvals and marks on page 11.3.

CP-S, CP-C & CP-A Range

Technical data

Data at Ta = 25 °C, Uin = 230 V AC and rated values, unless otherwise indicated

Type	CP-C MM	
Input circuit - Supply circuit		
Rated input voltage Uin	powered by the output circuit of the power supply	
Input voltage range	70-264 V AC / 80-350 V DC	
Power consumption	2.5 VA / 1.5 W	
Input circuit - Control circuit		
Kind of triggering	volt-free triggering	
Control input, control function	Remote OFF	remote off
Threshold "Switching-off power supply unit"	R m 1 k Ω	
Threshold "Switching-on power supply unit"	R M 10 k Ω	
Input current	typ. 1 mA (200 mA for 200 μ s)	
Maximum cable length to the control input	25 m - 100 pF/m	
Measuring circuit - INPUT		
Monitoring function	undervoltage monitoring of input voltage of the power supply unit	
Thresholds	85 V AC / 90 V DC	
Hysteresis, related to the threshold value	AC: typ. -8 % / DC -30 %	
Accuracy, tolerance	-5 % at AC and DC	
Maximum measuring cycle	typ. < 50 ms	
Measuring circuit - OUTPUT		
Monitoring function	undervoltage monitoring of output voltage of the power supply unit	
Thresholds	20 V DC	
Hysteresis, related to the threshold value	typ. 5 %	
Accuracy, tolerance	\pm 1 %	
Maximum measuring cycle	typ. < 10 ms	
Indication of operational states		
Remote off	REMOTE OFF: green LED	"REMOTE OFF" input R m 1k Ω
Status of power supply input	Input OK: green LED	relay "INPUT OK" energized
Status of power supply output	OUTPUT OK: green LED	relay "OUTPUT OK" energized
Output circuits		
Kind of output	11-12/14, 21-22/24	
Operating principle	relays, 2 x 1 c/o contacts	
Contact material	closed-circuit principle	
Rated voltage (VDE 0110, IEC/EN 60947-1)	AgNi	
Minimum switching voltage / Minimum switching current	250 V	
Maximum switching voltage / Maximum switching current	24 V / 10 mA	
Rated operating current Ie (IEC/EN 60947-1)	AC12 (resistive) at 230 V	250 V / 1 A
	AC15 (inductive) at 230 V	1 A
	DC12 (resistive) at 24 V	1 A
	DC13 (inductive) at 24 V	1 A
Mechanical lifetime	30 x 10 ⁶ switching cycles	
Electrical lifetime	0.1 x 10 ⁶ switching cycles	
Short circuit proof, maximum fuse rating	n/c contact	2 A, gL
	n/o contact	2 A, gL
General data		
Duty time	100 %	
Dimensions (W x H x D, when mounted)	56.5 x 54 x 24 mm (2.22 x 2.13 x 0.94 in)	
Weight	0.065 kg (0.14 lb)	
Degree of protection	housing / terminals	IP20 / IP20
Material of housing	Plastic	
Protection class (EN 61140)	II	
Mounting	snap-on mounting, without any tool	
Mounting position	plugged onto the power supply unit	
Electrical connection		
Wire size	fine-strand with wire end ferrule	0.2-2.5 mm ² (24-14 AWG)
	fine-strand without wire end ferrule	
	rigid	
Stripping length	0.2-4 mm ² (24-12 AWG)	
Tightening torque	7.5 mm (0.3 inch)	
Environmental data	0.4-0.6 Nm	
Ambient temperature range	operation	-25...+70 °C
	storage	-40...+85 °C

CP-S, CP-C & CP-A Range

Technical data

Data at Ta = 25 °C, Uin = 230 V AC and rated values, unless otherwise indicated

Type		CP-C MM
Damp heat (IEC/EN 60068-2-3)		93 % at +40 °C, no condensation
Climatic category (IEC/EN 60721)		3K3
Vibration (IEC/EN 60068-2-6)		
Shock (IEC/EN 60068-2-27)		
Isolation data		
Rated insulation voltage Ui (IEC/EN 60974-1, EN 50178, VDE 0160)		250 V
Protective separation (EN 50178, EN 60950) supply / measuring circuits / relay outputs		yes
Rated impulse withstand voltage Uimp between all isolated circuits (IEC 664, VDE 0110)		4 kV; 1.2/50 µs
Test voltage between all circuits (type test)		2.5 kV AC
Pollution degree (EN 60950)		2
Overvoltage category (EN 60950)		II
Standards		
Product standard		IEC/EN 61204
Low Voltage Directive		2006/95/EC
EMC Directive		2004/108/EC
Electrical safety		EN 50178, EN 60950, UL 60950, UL 508
Electromagnetic compatibility		
Interference immunity to		IEC/EN 61000-6-2
electrostatic discharge	IEC/EN 61000-4-2	Level 3 and 4 (6 kV / 8 kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)
electrical fast transient / burst	IEC/EN 61000-4-4	Level 4 and 2 (4 kV power input / 1 kV control input)
surge	IEC/EN 61000-4-5	Level 3 and 2 (4 kV symmetrical power input / 1 kV control input)
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level (10 V)
Interference emission		IEC/EN 61000-6-3
high-frequency radiated	IEC/CISPR 22; EN 55022	Class B
high-frequency conducted	IEC/CISPR 22; EN 55022	Class B

Approvals and marks on page 11.3.

CP-S, CP-C & CP-A Range

Technical data

Data at Ta = 25 °C, unless otherwise indicated

Type		CP-A RU	CP-A RU in combination with CP-A CM
Input circuit - Supply circuit			(+/-, +/-)
Rated input voltage U _{in}			24 V DC
Input voltage range per channel		10-28 V DC	13-28 V DC
Rated input current I _{in} per channel			1-20 A
Maximum input current per channel			30 A for 300 s
Transient overvoltage protection			yes
Output circuit			(+/-)
Rated output voltage U _{out}			24 V DC
Voltage drop			typ. 0.6 V, max. 0.9 V
Rated output current I _{out}			1-40 A
Output ratings per channel	Ta = 60 °C	10-28 V DC / 40 A	13-28 V DC / 40 A
	Ta = 70 °C	10-28 V DC / 30 A	13-28 V DC / 30 A
Derating	60 °C < Ta m 70 °C	2.5 % per Kelvin temperature increase	
Peak output current			60 A for 300 s
Resistance to reverse feed			< 40 V
General data			
Dimensions (W x H x D)		56.5 (60 1)) x 130 x 135.5 mm; (2.22 (2.36 1)) x 5.12 x 5.35 in)	
Weight		0.89 kg (1.96 lb)	
Minimum distance to other units	horizontal / vertical	10 mm / 50 mm (0.39 in / 1.97 in)	
Degree of protection	housing / terminals	IP20 / IP20	
Material of housing	housing shell / cover	aluminium / zinc-coated sheet steel	
Protection class		III 2)	
Mounting		DIN rail (IEC/EN 60715)	
Mounting position		horizontal	
Electrical connection - Input circuit / Output circuit			
Wire size	fine-strand with wire end ferrule	2.5-10 mm ² (14-8 AWG)	
	fine-strand without wire end ferrule	0.5-10 mm ² (20-8 AWG)	
	rigid	0.5-16 mm ² (20-6 AWG)	
Stripping length		12 mm (0.47 in)	
Tightening torque		1.2-1.5 Nm	
Environmental data			
Ambient temperature range	operation	-25...+70 °C	
	rated load	-25...+60 °C (without derating)	
	storage	-40...+85 °C	
Damp heat (IEC/EN 60068-2-3)		93 % at 40 °C, no condensation	
Climatic category (IEC/EN 60721)		3K3	
Vibration (IEC/EN 60068-2-6)			
Shock (IEC/EN 60068-2-27)			
Isolation data			
Insulation voltage	between input / output / housing	500 V AC (routine test)	
Pollution degree (EN 50178)		2	
	Standards		
Product standard		IEC/EN 61204	
Low Voltage Directive		2006/95/EC	
EMC Directive		2004/108/EC	
Electrical safety		EN 50178, EN 60950, UL 60950, UL 508	
Electromagnetic compatibility			
Interference immunity to		IEC/EN 61000-6-2	
electrostatic discharge	IEC/EN 61000-4-2	Level 3 (air discharge ±8 kV, contact discharge ±6 kV)	
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)	
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3 (±2 kV)	
surge	IEC/EN 61000-4-5	Level 1 (±0.5 kV)	
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)	
Interference emission		IEC/EN 61000-6-3	
high-frequency radiated	IEC/CISPR 22 / EN 55022	Class B	
high-frequency conducted	IEC/CISPR 22 / EN 55022	Class B	

¹⁾ incl. lateral screw

²⁾ This device is designed for connection to a safety extra-low voltage source. If no safety extra-low voltage is used at the input side, the lateral screw can be used for grounding of the housing (protection class I).

Approvals and marks on page 11.3.

CP-S, CP-C & CP-A Range

Technical data

Data at Ta = 25 °C, unless otherwise indicated

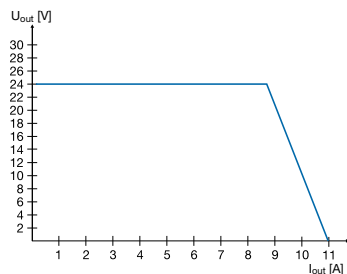
Type		CP-A CM
Input circuit - Supply circuit		
Rated input voltage U _{in}		24 V DC
Input voltage range		13-28 V DC
Rated input current	at rated sense load and 24 V DC	120 mA
Power consumption	at 24 V DC	approx. 1 W
Measuring circuit		
Monitoring function		11-12/14, 21-22/24 undervoltage monitoring
Measuring voltage		rated operational voltage
Thresholds		14-28 V
Hysteresis, related to the threshold value		fix: 3-5 %
Accuracy, tolerance		10 % of full-scale value
Maximum measuring cycle		6 ms
Indication of operational states		
Status of input 1	IN 1: green LED	L: voltage at input 1 > than threshold 1 = no faults present
Status of input 2	IN 2: green LED	L: voltage at input 2 > than threshold 2 = no faults present
Output status	OUT: green LED	L: U _{OUT} > 3 V = no faults present
Output circuit		
Kind of output		+, +, - relays, 2 x 1 c/o contact
Contact material		AgNi
Operating principle		closed-circuit principle
Rated operational voltage U _e (IEC/EN 60947-1, VDE 0110)		250 V
Minimum switching voltage / Minimum switching current		24 V / 10 mA
Maximum switching voltage / Maximum switching current		250 V / 1 A
Rated operational current I _e (IEC/EN 60947-5-1)	AC12 (resistive) at 230 V	1 A
	AC15 (inductive) at 230 V	1 A
	DC12 (resistive) at 24 V	1 A
	DC13 (inductive) at 24 V	1 A
Mechanical lifetime		30 x 10 ⁶ switching cycles
Electrical lifetime		0.1 x 10 ⁶ switching cycles
Rating according UL 508	General purpose (GP) 250 V AC	1 A
Maximum fuse rating to achieve short-circuit protection	n/o contact	2 A, gL
	n/c contact	2 A, gL
Sense output (+, +, -)		
Sense output voltage		1 SVR 427 075 R0000 13-28 V DC
Sense output current		0.1 A
Maximum fuse rating		For applications acc. UL the sense output shall be provided with a listed DC fuse 3 A
General data		
Duty time		100 %
Dimensions (W x H x D, when mounted)		56.5 x 54 x 24 mm (2.22 x 2.13 x 0.94 in)
Weight		0.063 kg (0.14 lb)
Degree of protection	housing / terminals	IP20 / IP20
Protection class		II
Mounting		snap-on mounting, without any tool
Mounting position		plugged onto the redundancy unit CP-A RU
Electrical connection		
Wire size	fine-strand with wire end ferrule	0.2-2.5 mm ² (24-14 AWG)
	fine-strand without wire end ferrule	
	rigid	0.2-4 mm ² (24-12 AWG)
Stripping length		7.5 mm (0.3 in)
Tightening torque		0.4-0.6 Nm
Isolation data		
Rated insulation voltage U _i (IEC/EN 60947-1, EN 50178, VDE 0160)		250 V
Rated impulse withstand voltage U _{imp} (type test) between all circuits (IEC 664, VDE 0110)		2.5 kV
Power-frequency withstand voltage test (routine test) between all circuits		1.2 kV AC
Protective separation (EN 50178) between input and output		yes
Pollution degree		2
Overvoltage category		II
Environmental data		
Ambient temperature range	operation	-25...+70 °C
	storage	-40...+85 °C
Damp heat (IEC/EN 60068-2-3)		93 %at 40 °C, no condensation
Climatic category (IEC/EN 60721)		3K3
Vibration (IEC/EN 60068-2-6)		
Shock (IEC/EN 60068-2-27)		

CP-S, CP-C & CP-A Range

Technical diagrams, Approximate dimensions

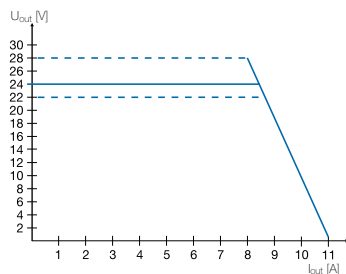
Technical diagrams

Output curve at 25 °C



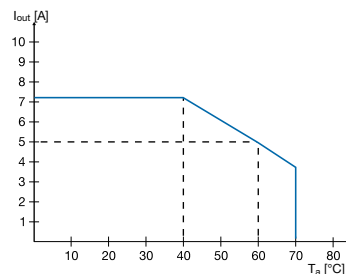
CP-S 24/5.0

Output curve at 25 °C

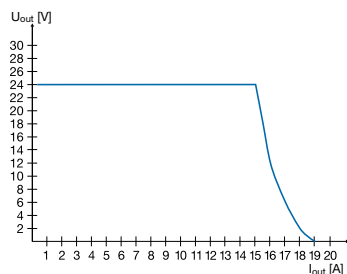


CP-C 24/5.0

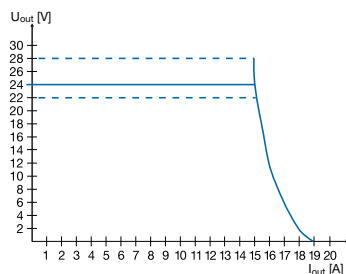
Temperature curve at $U_{out} = 24\text{ V DC}$



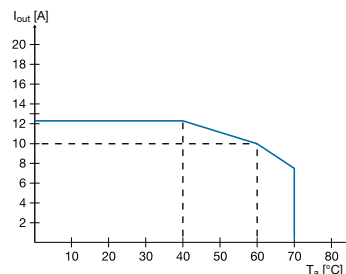
CP-S 24/5.0, CP-C 24/5.0



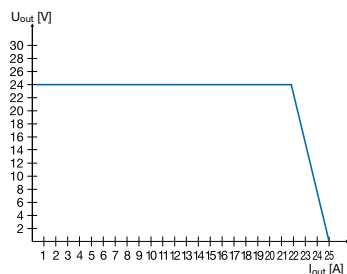
CP-S 24/10.0



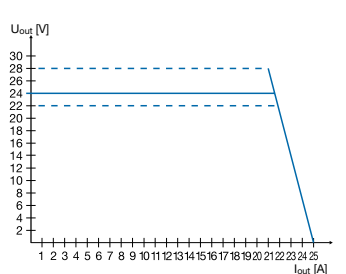
CP-C 24/10.0



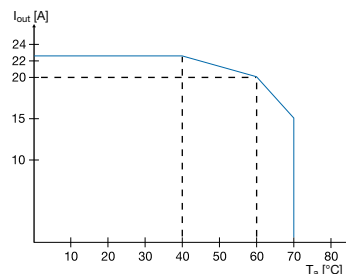
CP-S 24/10.0, CP-C 24/10.0



CP-S 24/20.0



CP-C 24/20.0

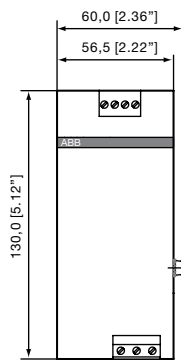
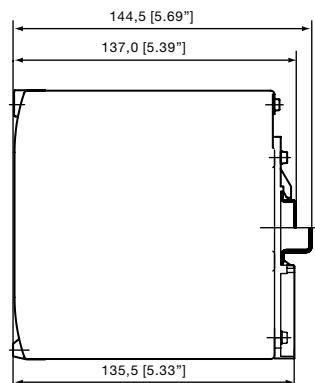


CP-S 24/20.0, CP-C 24/20.0

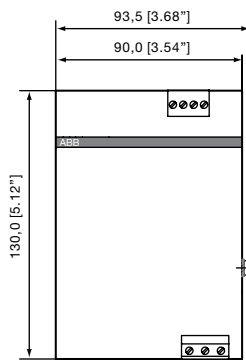
11

Approximate dimensions

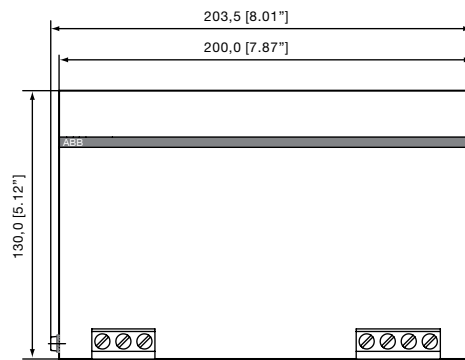
dimensions in mm



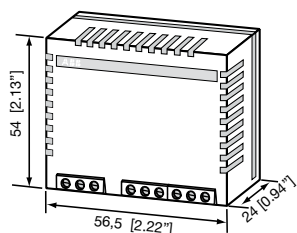
CP-S 24/5.0
CP-C 24/5.0
CP-A RU



CP-S 24/10.0
CP-C 24/10.0



CP-S 24/20.0
CP-C 24/20.0



CP-C MM
CP-A CM



Switch mode power supplies CP-B Range

Type CP-B Switch mode Power supplies



Power supply systems have to be highly reliable in most areas of energy management and automation technology.

Often batteries are used for supporting the supply system in case of mains failures. Batteries have limited lifetimes depending on environmental parameters and have to be maintained regularly, which causes efforts and costs.

Using the latest ultra-capacitor technology, ABB offers an innovative and completely maintenance free new product for buffering the 24 V DC supply in case of interrupted mains on the primary side of the switch mode power supply.

The CP-B range is an ultra-capacitor buffer energy storage for power supply units which ensures a short term uninterrupted power supply system. In case of a power loss, the energy stored in the capacitor guarantees that the load is continually provided up to several hundred seconds depending on the load current.

Characteristics

- 3 buffer modules for buffering 24 V DC:
CP-B 24/3.0 (3 A / 1 kW_s1))
CP-B 24/10.0 (10 A / 10 kW_s1))
CP-B 24/20.0 (20 A / 8 kW_s1))
 - CP-B 24/3.0 and CP-B 24/20.0 expandable with additional extension module(s) CP-B EXT.2 (2 kW_s1))
 - LEDs for status indication
 - Relay contacts for status messaging
 - Very high backup times (e.g. with CP-B 24/10.0 up to 8 minutes at 1 A load current)
 - Short charging times
 - High efficiency, higher than 90%
 - Wide temperature range
 - DIN rail mountable, compact housing
 - Advantages in comparison to battery buffers
 - Maintenance free
 - No deep discharge
 - Temperature resistant
 - approval (UL508, CSA22.2 No 14)
- 1) internal energy buffer

	CP-B 24/3.0	CP-B 24/10.0	CP-B 24/20.0	CP-B EXT.2
Catalog number	1SVR427060R0300	1SVR427060R1000	1SVR427060R2000	1SVR427065R0000
Rated input voltage	24 V DC	24 V DC	24 V DC	-
Rated current	3 A DC	10 A DC	20 A DC	3 A DC
Energy storage (min.)	1.000 Ws	10.000 Ws	8.000 Ws	2.000 Ws
Typical charging time at load current	100 %	65 s	134 s	135 s
	0 %	56 s	82 s	62 s
Typical buffering time ¹⁾ at load current	100 %	13 s	38 s	15 s
	50 %	28 s	76 s	30 s
	25 %	66 s	140 s	60 s
	10 %	148 s	380 s	150 s

$$^1) \text{ buffering time} = \frac{\text{energy storage} \times 0.9}{\text{current} \times \text{output voltage}}$$

CP-B Range

Ordering data

Description

Ultra capacitor based buffer units of the CP-B range offer highest reliability also in harsh environment. Due to the ultra-cap based technology the units are maintenance free, there will be no deep discharge and these products offer a very wide operational ambient temperature range.

CP-B range buffer units are an excellent solution to avoid voltage drops, for example in solar applications.



CP-B 24/3.0



CP-B 24/10.0



CP-B 24/20.0

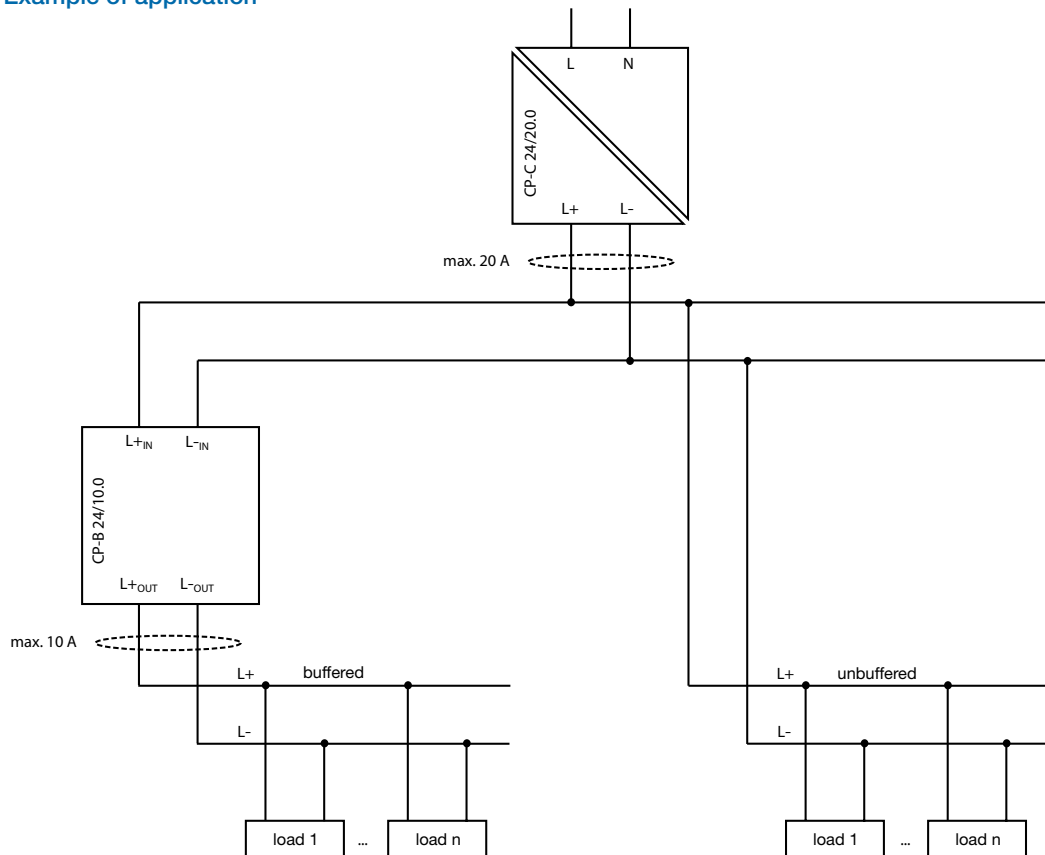
Ordering details

Rated input voltage	Rated current	Type	Catalog number	Weight (1 pce) kg (lb)
24 V DC	3 A DC	CP-B 24/3.0	1SVR427060R0300	0.55 (1.21)
	10 A DC	CP-B 24/10.0	1SVR427060R1000	2.10 (4.63)
	20 A DC	CP-B 24/20.0	1SVR427060R2000	2.20 (4.85)

Ordering details - Extension unit

Rated voltage	Voltage range	Type	Catalog number	Weight (1 pce) kg (lb)
24 V DC	0-26.4 V DC	CP-B EXT.2	1SVR427065R0000	1.00 (2.20)

Example of application



CP-B Range

Technical data

Data at Ta = 25 °C and rated values, unless otherwise indicated

Type		CP-B 24/3.0	CP-B 24/10.0	CP-B 24/20.0
Input circuit - Supply circuit			L+IN L-IN	
Rated input voltage U _{in}			24 V DC	
Input voltage range		23.7-26.4 V DC	23.9-27 V DC	23.4-27.4 V DC
Minimum charging potential		23.7 V DC	23.9 V DC	23.4 V DC
Rated input current		3 A DC	10 A DC	20 A DC
Inrush current limiting		50 A / 1 ms	35 A / 2 ms	35 A / 2 ms
Transient overvoltage protection		suppressor diode	varistor / suppressor diode	varistor / suppressor diode
Internal input fuse (apparatus protection, not accessible)		4 A slow acting	15 A (FK2)	30 A (FK2)
Kind of input	SHUT-DOWN	-	control input	control input
	rated voltage	-	24 V DC	24 V DC
	voltage range	-	6-45 V DC	6-45 V DC
Output circuit			L+OUT L-OUT L-OUT	
Rated output power		69 W	240 W	480 W
Rated output voltage U _{out}			24 V DC	
Output voltage (buffer mode)		23.0 V DC	23.2 V DC	23.2 V DC
Tolerance of the output voltage			+2..-10 %	
Rated output current I _r	Ta m 60 °C	3 A DC	10 A DC	20 A DC
Peak output current (fully loaded capacitors required)	Ta m 60 °C	6 A DC (min. 1.5 s)	20 A DC (10 A power supply + 10 A CP-B, min. 1.5 s)	40 A DC (min. 1.5 s)
Short-circuit protection (only via external fuse)			no continuous short-circuit stability	
Required external fuse		3.15 A slow acting	10 A slow acting	25 A slow acting
Power failure buffering time		load-dependent, min. 13 s at 100 % load	load-dependent, min. 38 s at 100 % load	load-dependent, min. 15 s at 100 % load
Overload protection			thermal protection	
Kind of output	INPUT OK		n/o contact	
	BUFFER STATUS	-	n/o contact	
	FAILURE	-	n/o contact	
Contact material			Ag + Au-clad	
Minimum switching voltage / Minimum switching current			5 V DC / 1 mA	
Maximum switching voltage / Maximum switching current		50 V AC / 1.0 A, 30 V DC / 0.5 A	125 V AC / 0.5 A, 60 V DC / 1 A	
Mechanical lifetime			5 x 10 ⁶ switching cycles	
Electrical lifetime			0.1 x 10 ⁶ switching cycles	
Maximum fuse rating to achieve short-circuit protection	n/o contact		1.0 A AC / 0.5 A DC	
General data				
Maximum internal power consumption		7 W	20 W	40 W
Power consumption with unloaded output		0.75 W	3 W	1.6 W
Energy storage (min.)		1000 Ws	10000 Ws	8000 Ws
Typical charging time at load current	100 %	65 s	134 s	135 s
	0 %	56 s	82 s	62 s
Typical buffering time at load current ¹⁾	100 %	13 s	38 s	15 s
	50 %	28 s	76 s	30 s
	25 %	66 s	140 s	60 s
	10 %	148 s	380 s	150 s
Efficiency			greater than 90 %	
Dimensions (W x H x D)	product dimensions	60 x 99 x 120 mm [2.36 x 3.90 x 4.72 in]	116 x 170 x 147 mm [4.57 x 6.69 x 5.79 in]	84 x 197 x 213 mm [3.31 x 7.76 x 8.39 in]
Weight	net weight	0.55 kg [1.21 lb]	2.1 kg [4.63 lb]	2.2 kg [4.85 lb]
Material	cover / housing shell		steel sheet powdered	
Mounting			DIN rail (IEC/EN 60715), snap-on mounting without any tool	
Mounting position			horizontal	
Minimum distance to other units	horizontal		not necessary	
	vertical		40 mm [1.58 in]	80 mm [3.15 in]
Pollution degree			2	
Degree of protection	housing / terminal		IP20	
Protection class (IEC/EN 61140)			III SELV / PELV (condition: power supply fulfills class III)	
Electrical connection - Input circuit / Output circuit		pull spring terminals	pull spring terminals	pluggable screw type terminals
Wire size	fine-strand with(out) wire end ferrule	0.08-1.0 mm ² (28-18 AWG)	0.08-1.5 mm ² (28-18 AWG)	0.2-4.0 mm ² (24-12 AWG)
	rigid	0.08-1.5 mm ² (28-16 AWG)	0.08-4.0 mm ² (28-16 AWG)	0.2-6.0 mm ² (24-10 AWG)
Stripping length		6.0 mm [0.24 in]		7.0 mm [0.28 in]
Signalling circuit				

CP-B Range

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Type		CP-B 24/3.0	CP-B 24/10.0	CP-B 24/20.0
Wire size	fine-strand with(out) wire end ferrule	0.08-1.0 mm ² (28-18 AWG)		0.14-1.0 mm ² (26-16 AWG)
	rigid	0.08-1.5 mm ² (28-16 AWG)		0.14-1.5 mm ² (28-16 AWG)
Stripping length		6.0 mm [0.24 in]		7.0 mm [0.28 in]
Environmental data				
Ambient temperature	operation	-40...+60 °C		-20...+60 °C
	storage	-40...+60 °C		-20...+60 °C
Standards				
Product standard		EN 50178		
Low Voltage Directive		2006/95/EC		
EMC Directive		2004/108/EC		
RoHS Directive		2002/95/EC		
Electrical safety		EN 50178, EN 60950, UL 508		
Electromagnetic compatibility				
Interference immunity to	electrostatic discharge	IEC/EN 61000-4-2	IEC/EN 61000-6-1, IEC/EN 61000-6-2 Level 3, 6 kV / 8 kV	
	radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3, 10 V/m (27-1000 MHz) / Level 2, 3 V/m (1400-2700 MHz)	
	electrical fast transient/burst	IEC/EN 61000-4-4	Level 3, 2(1) kV / 5 kHz	
	surge	IEC/EN 61000-4-5	Level 1, 0.5 kV	
	conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3, 10 V (150 kHz-80 MHz)	
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-11	buffered by ultra-capacitors		
		EN 61000-6-3, EN 61000-6-4		
Interference emission	high-frequency radiated	DIN EN 55011	B/C1	
	high-frequency conducted	DIN EN 55011	B/C1	

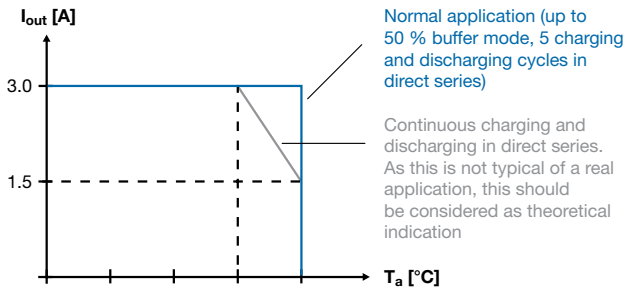
$${}^1) \text{ buffering time } \approx \frac{\text{energy storage} \times 0.9}{\text{load current} \times 23.0 \text{ V}}$$

Approvals and marks* on page 11.2.

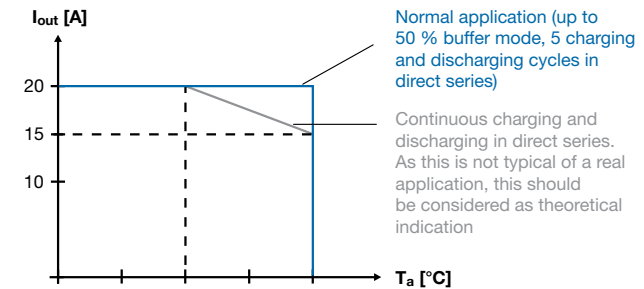
Technical diagrams

Output curve at $T_u = 25\text{ °C}$

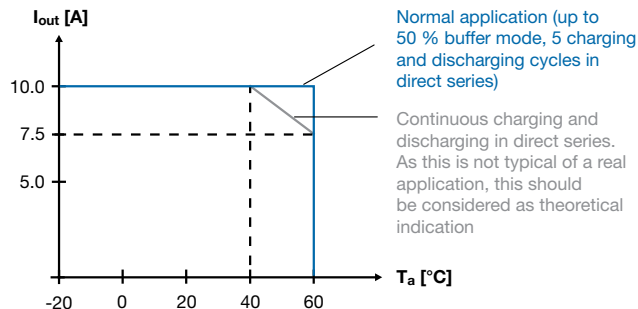
dimensions in mm



CP-B 24/3.0

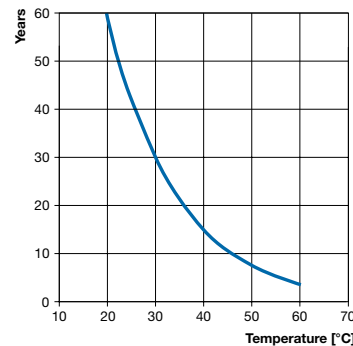


CP-B 24/20.0



CP-B 24/10.0

Characteristic curve of the temperature at rated load



Capacitor's life span over temperature

CP-B Range

Technical data

Data at Ta = 25 °C and rated values, unless otherwise indicated

Type		CP-B EXT 2.0
Extension circuit		EXT+ EXT+ EXT- EXT-
Voltage range		24 V DC
Rated current		0-26.4 V DC
Internal input fuse (apparatus protection, not accessible)		3 A DC
Short-circuit protection		4 A slow acting (PTC)
Overload protection		via internal 3 A fuse
		only in combination with CP-B 24/3.0 or CP-B 24/20.0
Indication of operational states		status information and fault messages of the buffer module apply
General data		
Power consumption without load		0.5 W
Energy storage (min.)		2000 Ws
Dimensions (W x H x D)		product dimensions
		60 x 99 x 120 mm [2.36 x 3.90 x 4.72 in]
		packaging dimensions
		85 x 220 x 170 mm [3.35 x 8.66 x 6.69 in]
Weight		net weight
		1.00 kg (0.20 lb)
Material		cover / housing shell
		steel sheet powdered
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool
Mounting position		horizontal
Minimum distance to other units		horizontal
		not necessary
		vertical
		40 mm [1.58 in]
Pollution degree		2
Degree of protection		housing / terminal
		IP20
Protection class (IEC/EN 61140)		III SELV / PELV (condition: power supply fulfills class III)
Electrical connection - Extension circuit		
Wire size		fine-strand with(out) wire end ferrule
		0.08-1.0 mm ² (28-18 AWG)
		rigid
		0.08-1.5 mm ² (28-16 AWG)
Stripping length		6.0 mm [0.24 in]
Signalling circuit		
Wire size		fine-strand with(out) wire end ferrule
		0.08-1.0 mm ² (28-18 AWG)
		rigid
		0.08-1.5 mm ² (28-16 AWG)
Stripping length		6.0 mm [0.24 in]
Environmental data		
Ambient temperature		operation
		-40...+60 °C
		storage
		-40...+60 °C
Standards		
Product standard		EN 50178
Low Voltage Directive		2006/95/EC
EMC Directive		2004/108/EC
RoHS Directive		2002/95/EC
Electrical safety		EN 50178, EN 60950, UL 508
Electromagnetic compatibility		
Interference immunity to		IEC/EN 61000-6-1, IEC/EN 61000-6-2
electrostatic discharge		IEC/EN 61000-4-2
		Level 3, 6 kV / 8 kV
radiated, radio-frequency, electromagnetic field		IEC/EN 61000-4-3
		Level 3, 10 V/m (27-1000 MHz) / Level 2, 3 V/m (1400-2700 MHz)
electrical fast transient/burst		IEC/EN 61000-4-4
		Level 3, 2(1) kV / 5 kHz
surge		IEC/EN 61000-4-5
		Level 1, 0.5 kV
conducted disturbances, induced by radio-frequency fields		IEC/EN 61000-4-6
		Level 3, 10 V (150 kHz-80 MHz)
voltage dips, short interruptions and voltage variations		IEC/EN 61000-4-11
		buffered by ultra-capacitors
Interference emission		EN 61000-6-3, EN 61000-6-4
high-frequency radiated		DIN EN 55011
		B/C1
high-frequency conducted		DIN EN 55011
		B/C1

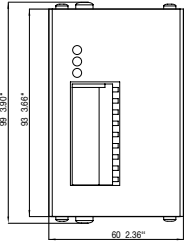
Approvals and marks on page 11.3.

CP-B Range

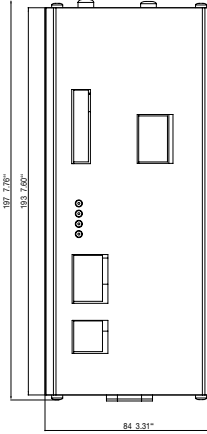
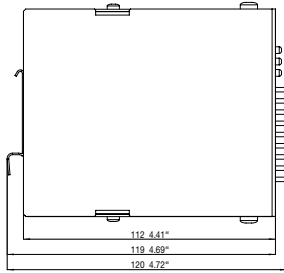
Approximate dimensions

Dimensional drawings

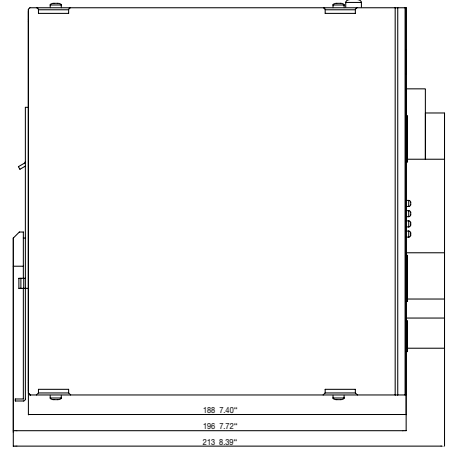
dimensions in mm



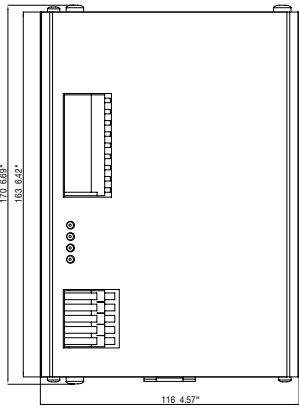
CP-B 24/3.0



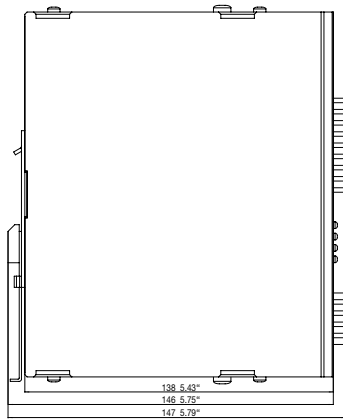
CP-B 24/20.0



11



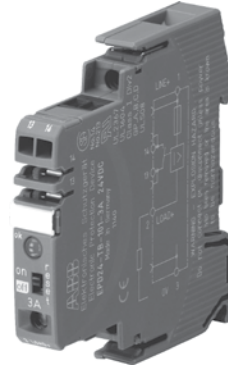
CP-B 24/10.0



Type EPD24 Electronic protection devices



Electronic protection devices EPD24



The protection devices EPD24 extend the ABB product range of Modular DIN rail components by electronic overcurrent protection modules for selective protection of 24V DC load circuits.

This protection is achieved by a combination of active electronic current limitation in the case of a short circuit and an overload deactivation from $1.1 \times I_n$ upwards.

If a fault occurs in a load circuit, the protection device EPD24 will detect this rapidly and reliably, disable the power output transistor and hence interrupt the current flow in the defective circuit. The maximum possible overcurrent is always limited to $1.3 \dots 1.8$ times the selected rated current. An activation of capacitive loads up to $20,000 \mu\text{F}$ is possible, deactivation only occurring in the case of overloads or short circuits. Selective deactivation of the defective current circuit means undefined error states and a complete system stop are prevented.

Features

- Selective load protection, one electronic tripping characteristic.
- Active current limitation for safe connection of capacitive loads up to $20,000 \mu\text{F}$ and on overload/short circuit.
- Current ratings $0.5 \text{ A} \dots 12 \text{ A}$.
- Reliable overload disconnection with $1.1 \times I_N$
- Manual ON/OFF button
- Clear status and failure indication through LED and integrated auxiliary contact.
- Integral fail-safe element adjusted to current rating.
- Width per unit only 12.5 mm.
- Rail mounting
- Ease of wiring through busbar LINE+ and 0 V as well as signal bars.
- UL and CSA-approvals allow international use of the devices.

Electronic protection devices

EPD24 Ordering details



EPD24-TB-101-3A

Ordering details

Rated current I_N A	bbn 40 16779 EAN	Type	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
0.5	829960	EPD24-TB-101-0.5A	2CDE601101R2905	4	0.065 (1.433)
1	829984	EPD24-TB-101-1A	2CDE601101R2001	4	0.065 (1.433)
2	830003	EPD24-TB-101-2A	2CDE601101R2002	4	0.065 (1.433)
3	830027	EPD24-TB-101-3A	2CDE601101R2003	4	0.065 (1.433)
4	830041	EPD24-TB-101-4A	2CDE601101R2004	4	0.065 (1.433)
6	830065	EPD24-TB-101-6A	2CDE601101R2006	4	0.065 (1.433)
8	830089	EPD24-TB-101-8A	2CDE601101R2008	4	0.065 (1.433)
10	830102	EPD24-TB-101-10A	2CDE601101R2010	4	0.065 (1.433)
12	830126	EPD24-TB-101-12A	2CDE601101R2012	4	0.065 (1.433)

Ordering details

Description	bbn 40 16779 EAN	Type	Catalog number	Pkg qty	Weight (1 pce) kg (lb)
Busbars for LINE+ and 0 V, grey insulation, length 500 mm ¹⁾	830140	EPD-BB500	2CDE605100R0500	10	0.2 (0.441)
Signal Bars for aux. contacts, grey insulation, length 21 mm	830164	EPD-SB21	2CDE605200R0021	10	0.4 (0.882)

¹⁾ Max. load with one line entry $I_{max} = 50$ A (recommended: mid line entry)
Max. load with two line entries $I_{max} = 63$ A

Electronic protection devices

EPD24 Technical data

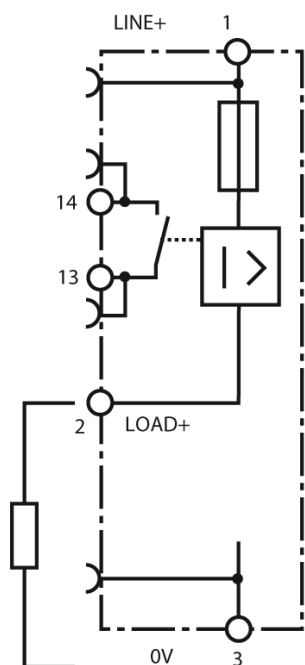
Wiring diagram

EPD24-TB-101

without signal input
with signal output F
(Single signal, N/O)

Operating condition: 13-14 closed

Fault condition: 13-14 open



Operating data

Operating voltage UB:	24 V DC (18...32 V)
Current rating IN:	fixed current ratings: 0.5, 1, 2, 3, 4, 6, 8, 10, 12 A
Closed current IO:	ON condition: typically 20...30 mA depending on signal output
Status indication by means of:	multicolor LED: Green: unit is ON load circuit / Power-MOSFET is switched on Orange: in the event of overload or short circuit until electronic disconnection Red: unit electronically disconnected load circuit/Power-MOSFET OFF undervoltage (UB < 8 V) after switch-on till the end of the delay period OFF: manually switched off or device is dead potential-free auxiliary contact F ON/OFF/ condition of switch

Load circuit

Load output	Power-MOSFET switching output (high side switch)
Overload disconnection	typically $1.1 \times I_N$ ($1.05...1.35 \times I_N$)
Short-circuit current IK	active current limitation
Trip time	see time/current characteristics
For electronic disconnection	typically 3 s at $I_{Load} > 1.1 \times I_N$ typically 100 ms...3 s at $I_{Load} > 1.8 \times I_N$ (or $1.5 \times I_N/1.3 \times I_N$)
Temperature disconnection	internal temperature monitoring with electronic disconnection
Low voltage monitoring	with hysteresis, no reset required:
load output	load »OFF« at $UB < 8 V$
Starting delay tStart	typically 0.5 sec after every switch-on and after applying UB
Disconnection of load circuit	electronic disconnection
Free-wheeling circuit	suitable external free-wheeling circuit to be used with inductive load
Several load outputs must not be connected in parallel	

Signal output

Electrical data	potential-free auxiliary contact max. 30 V DC/0.5 A, min. 10 V DC/10 mA
ON condition LED green	voltage UB applied, switch is in ON position no overload, no short circuit
OFF condition LED off	device switched off (switch is in OFF position) no voltage UB applied
Fault condition LED orange	overload condition $> 1.1 \times I_N$ up to electronic disconnection
Fault condition LED red	electronic disconnection upon overload or short circuit Device switched off with control signal (switch is in ON position)
Aux. contact	single signal, make contact contact open, terminal 13-14
Fault	signal output fault conditions no operating voltage UB ON/OFF switch is in OFF position red LED lighted (electronic disconnection)

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Electronic protection devices

EPD24 Technical data

General data

Fail-Safe element	backup fuse for EPD24 not required because of the integral redundant fail-safe element
Housing material	moulded
Mounting	symmetrical rail to EN 50022-35x7.5
Ambient temperature	0...+50 °C (without condensation, see EN 60204-1)
Storage temperature	-20...+70 °C
Humidity	96 hrs/95 % RH/40 °C to IEC 60068-2-78, test Cab. climate class 3K3 to EN 60721
Vibration	3 g, test to IEC 60068-2-6 test Fc
Degree of protection	housing: IP20 DIN 40050 terminals: IP20 DIN 40050
EMC	emission: EN 61000-6-3
(EMC directive, CE logo)	susceptibility: EN 61000-6-2
Isolations coordination (IEC 60934)	0.5 kV/pollution degree 2 reinforced insulation in operating area
Dielectric strength	max. 32 V DC (load circuit)
Isolation resistance (OFF condition)	n/a, only electronic disconnection
Approvals/Declarations of conformity	UL 2367 Solid State Overcurrent Protectors UL 1604, (class I, division 2, groups A, B, C, D) UL 508 CSA C22.2 No. 213 (class I, division 2) CSA C22.2 No. 142 CE logo
Dimensions (B x H x T)	12.5 x 80 x 83 mm
Weight	approx. 65 g
Terminals	Line+/LOAD+/0V
Screw terminals	M4
Max. cable cross section flexible with wire end ferrule w/wo plastic sleeve	0.5 – 10 mm ²
Multi-lead connection (2 identical cables) rigid/flexible	0.5 – 4 mm ²
Flexible with wire end ferrule without plastic sleeve	0.5 – 2.5 mm ²
Flexible with TWIN wire end ferrule with plastic sleeve	0.5 – 6 mm ²
Wire stripping length	10 mm
Tightening torque (EN 60934)	1.5 – 1.8 Nm
Terminals	aux. contacts
Screw terminals	M3
Max. cable cross section flexible with wire end ferrule w/wo plastic sleeve	0.25 - 2.5 mm ²
Wire stripping length	8 mm
Tightening torque (EN 60934)	0.5 Nm

Table 1: voltage drop, current limitation, max. load current

current rating I_N	typically voltage drop U_{ON} at I_N	active current limitation (typically)	max. load current at 100 % ON duty	
			$T_{ambient} = 40\text{ °C}$	$T_{ambient} = 40\text{ °C}$
0.5 A	70 mV	$1.8 \times I_N$	0.5 A	0.5 A
1 A	80 mV	$1.8 \times I_N$	1 A	1 A
2 A	130 mV	$1.8 \times I_N$	2 A	2 A
3 A	80 mV	$1.8 \times I_N$	3 A	3 A
4 A	100 mV	$1.8 \times I_N$	4 A	4 A
6 A	130 mV	$1.8 \times I_N$	6 A	5 A
8 A	120 mV	$1.5 \times I_N$	8 A	7 A
10 A	150 mV	$1.5 \times I_N$	10 A	9 A
12 A	180 mV	$1.3 \times I_N$	12 A	10.8 A

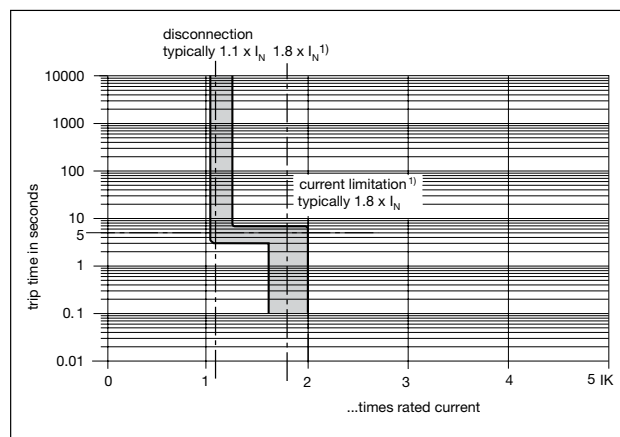
Attention: when mounted side-by-side without convection the ERD24 should not carry more than 80 % of its rated load with 100 % ON duty due to thermal effects.

Electronic protection devices

EPD24 Technical data

Time/Current characteristic curve ($T_{\text{ambient}} = 25\text{ °C}$)

- The trip time is typically 3 s in the range between $1.1 \times I_N$ and $1.8 \times I_N$ ¹⁾.
- Electronic current limitation occurs at typically $1.8 \times I_N$ ¹⁾ which means that under all overload conditions (independent of the power supply and the resistance of the load circuit) the max. overload before disconnection will not exceed $1.8 \times I_N$ times the current rating. Trip time is between 100 ms and 3 sec (depending on overload or at short circuit).
- Without this current limitation a considerably higher overload current would flow in the event of an overload or short circuit.



¹⁾ Current limitation typically $1.8 \times I_N$ at $I_N = 0.5\text{ A} \dots 6\text{ A}$
 Current limitation typically $1.5 \times I_N$ at $I_N = 8\text{ A}$ or 10 A
 Current limitation typically $1.3 \times I_N$ at $I_N = 12\text{ A}$

Maximum cable lengths

EPD24 reliably trips from $0\ \Omega$ up to max. circuit resistance R_{max} .

Calculation of R_{max}

Selected rating I_N (A)	3	6
Operating voltage U_s (V DC) (= 80 % of 24 V) ²⁾	19.2	19.2
Trip current $I_{\text{tr}} = 1.25 \times I_N$ (A) (EPD24 trips after 3 s)	3.75	7.50
$R_{\text{max}} (\Omega) = (U_s / I_{\text{tr}}) - 0.050$	5.07	2.51

²⁾ Voltage drop of EPD24 and tolerance of trip point (typically $1.1 \times I_N = 1.05 \dots 1.35 \times I_N$) have been taken into account

Selection table for the incoming cable lengths with different cable cross-sections

Cable cross section A (mm ²)	0.14	0.25	0.34	0.5	0.75	1.00	1.50
Cable length L (m) (= single length)	cable resistance (Ω) = $(\rho_c \times 2 \times L) / A$³⁾						
5	1.27	0.71	0.52	0.36	0.24	0.18	0.12
10	2.54	1.42	1.05	0.71	0.47	0.36	0.24
15	3.81	2.14	1.57	1.07	0.71	0.53	0.36
20	5.09	2.85	2.09	1.42	0.95	0.71	0.47
25	6.36	3.56	2.62	1.78	1.19	0.89	0.59
30	7.63	4.27	3.14	2.14	1.42	1.07	0.71
35	8.90	4.98	3.66	2.49	1.66	1.25	0.83
40	10.17	5.70	4.19	2.85	1.90	1.42	0.95
45	11.44	6.41	4.71	3.20	2.14	1.60	1.07
50	12.71	7.12	5.24	3.56	2.37	1.78	1.19
75	19.07	10.68	7.85	5.34	3.56	2.67	1.78
100	25.34	14.24	10.47	7.12	4.75	3.56	2.37
125	31.79	17.80	13.09	8.90	5.93	4.45	2.97
150	38.14	21.36	15.71	10.68	7.12	5.34	3.56
175	44.50	24.92	18.32	12.46	8.31	6.23	4.15
200	50.86	28.48	20.94	14.24	9.49	7.12	4.75
225	57.21	32.04	23.56	16.02	10.68	8.01	5.34
250	63.57	35.60	26.18	17.80	11.87	8.90	5.93

³⁾ Resistivity of copper $\rho_c = 0.0178 (\Omega \times \text{mm}^2) / \text{m}$

Example 3: mixed wiring: (Control cabinet --- sensor/actuator level)
 $R_1 = 40\text{ m}$ for 1.5 mm^2 and $R_2 = 5\text{ m}$ for 0.25 mm^2 :
 $R_1 = 0.95\ \Omega$, $R_2 = 0.71\ \Omega$, total **($R_1 + R_2$) = 1.66 Ω**

Example 1: max. length for 1.5 mm^2 and 3 A: **214 m**

Example 2: max. length for 1.5 mm^2 and 6 A: **106 m**

Electronic protection devices

EPD24 Approvals, safety instructions

Please note

The user must ensure that the cable cross sections of the relevant load circuit are suitable for the current rating of the EPD24 used. Automatic start-up of machinery after shut down must be prevented (Machinery Directive 98/37/EG and EN 60204-1). In the event of a short circuit or overload the load circuit will be disconnected electronically by the EPD24.

Information on UL approvals/CSA approvals



UL1604
UL File # E 339238



CSA C22.2 No. 213 (Class I, Division 2)
CSA File # 2305929

Operating Temperature Code T5

- This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only

WARNING:

- Exposure to some chemicals may degrade the sealing properties of materials used in the following device: relay

Sealant Material:

Generic Name: Modified diglycidyl ether of bisphenol A

Supplier: Fine Polymers Corporation

Type: Epi Fine 4616L-160PK

Casing Material:

Generic Name: Liquid Crystal Polymer

Supplier: Sumitomo Chemical

Type: E4008, E4009, or E6008

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RECOMMENDATION:

- Periodically inspect the device named above for any degradation of properties and replace if degradation is found

WARNING – EXPLOSION HAZARD:

- Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous
- Substitution of any components may impair suitability for Class I, Division 2



UL2367
Non-hazardous use - UL File # E 339236



UL 508
Non-hazardous use - UL File # E 149922



CSA C22.2 No. 14
CSA C22.2 No. 142 - CSA File # E 2305929

Class 2

Meets requirement for Class 2 current limitation (EPD24 ... -0,5 A/1 A/2 A/3 A)

Electronic protection devices

EPD24 Installation guidelines

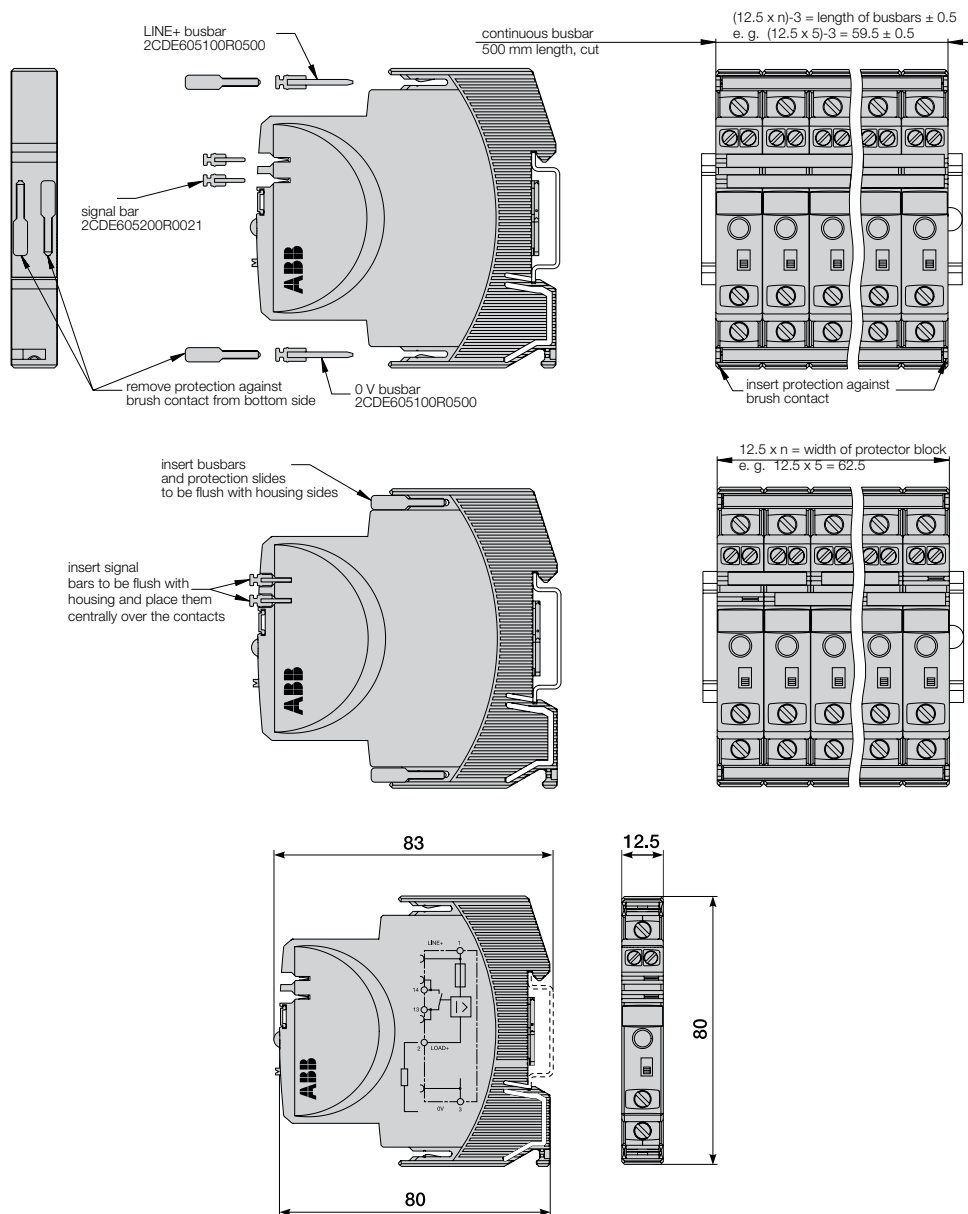
The EPD24 features an integral power distribution system.

The following wiring modes are possible with various pluggable current and signal busbars:

- LINE+ (24 V DC)
- 0 V

Caution: The electronic devices EPD24 require a 0 V connection

- Auxiliary contacts



Mounting procedure

Before wiring insert busbars into protector block. A maximum of 10 connection cycles are permissible using connecting busbars.

Recommendation

After 10 units the busbars should be interrupted and receive a new entry live.

Table of length for busbars

(Catalog number 2CDE605100R0500)

No. of units	2	3	4	5	6	7	8	9	10
Length of busbar (mm) ± 0.5 mm	22	34.5	47	59.5	72	84.5	97	109.5	122

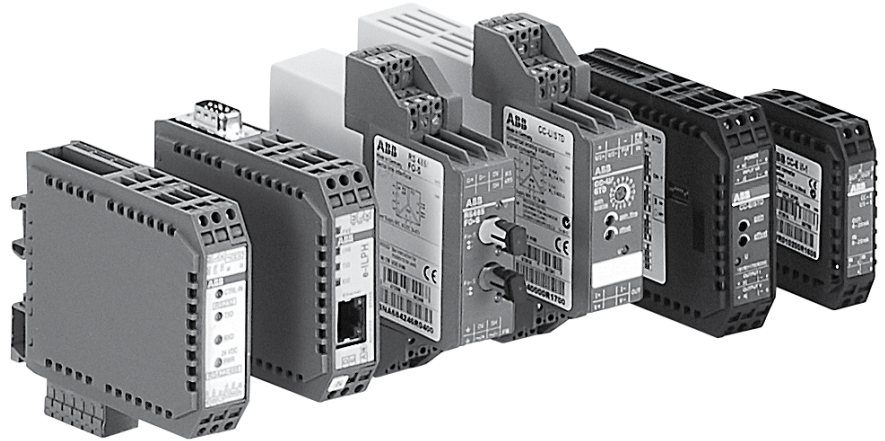


12 - Signal and data converters



General information	12.1
Analog signal converters	12.3 – 12.26
Features and benefits	12.3
Application, approvals and marks	12.4
Overview	12.5 - 12.6
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Technical diagrams, connection diagrams, approximate dimensions	12.25
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Benefits and advantages	12.30
Ordering details	12.31
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Technical data	12.35 - 12.44

Notes



Signal and data Converters

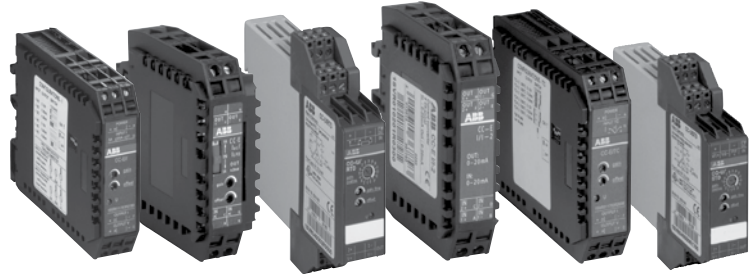
Nowadays various types of data transmission and interfaces are used in control processes. Nearly every process includes a control system that receives data either by means of analog signals or by data transmission. The data is then evaluated and the appropriate parameters are set. A reliable process control essentially depends on the faultless, untroubled and secure transmission and processing of these analog signals. There may however, arise numerous problems which can disturb or even block an ideal process sequence.

ABB's range of analog signal converters are ideally suited when existing electrical or physical values have to be converted into proportional standard signals or relay threshold signals.

The serial data converters from ABB allow the establishment of a communication between units with different communication standards.

In order to assure the process continuity, existing systems consistently have to be updated or connected to new devices. If the communication standard of the existing system and the connected device are different, serial data converters make the establishment of the communication possible.

Besides the conversion of signals, analog signal converters and serial data converters are suited for the amplification, filtering or separation of analog signals.



Product range for analog signal processing

CC-U range

- 8 different standard signal outputs on one device
- Input and output side universally configurable
- Also available with 2 threshold relay outputs
- Adjustment and operating elements on the front side
- Safe operation by electrical 3-way isolation
- Plug-in connecting terminals, unambiguously and clearly marked

Conversion, measurement and separation of

- Standard signals
- Signals of RTD sensors (PT10, PT100, PT1000)
- Thermocouple signals
- TRMS values of currents and voltages

Characteristics

- The required input and output ranges can be configured for all devices by means of directly accessible DIP switches positioned on the side.
- Due to the wide input range of the gain and offset stages all input signals between the minimum and the maximum input value can be universally converted to all common output signals.
- Devices for DC or AC (50/60 Hz) supply available.

CC-E range

- Universally configurable devices and single-function devices
- Adjustment and operating elements on the front side
- Safe operation by electrical 3-way isolation
- Unambiguous and clear connecting terminal markings

Conversion, measurement and separation of

- Standard signals (0-5 V, 0-10 V, 0-20 mA, 4-20 mA)
- Temperature signals of RTD sensors (PT 100)
- Thermocouple signals (types J and K)
- Current measurement signals (0-5 A, 0-20 A AC/DC)

Characteristics of single-function devices

- No adjustment or balancing necessary.

Characteristics of universal devices

- The required input and output ranges can be configured by means of directly accessible DIP switches positioned on the side
- Gain adjustment of $\pm 5\%$ by means of an adjustment potentiometer on the front-side
- Offset adjustment of $\pm 5\%$ by means of adjustment potentiometers on the front-side

Analog signal Converters

Analog signal converters

Application, approvals and marks

Applications for analog signal processing and correct solution using CC-E and CC-U converters

Nearly every process includes a control system that receives data by means of analog signals and then evaluates the data and sets the respective parameters correspondingly.

When transmitting analog signals numerous problems may arise which can disturb or even block an ideal behavior of the process.

Below we have listed some processing problems together with the respective solutions to solve these problems:

Signal conversion

Sometimes the available signals cannot be processed by the controller or the actuator. In this case, signal converters are required to convert the input signal (or different input signals) to the desired output signal.

Signal amplification

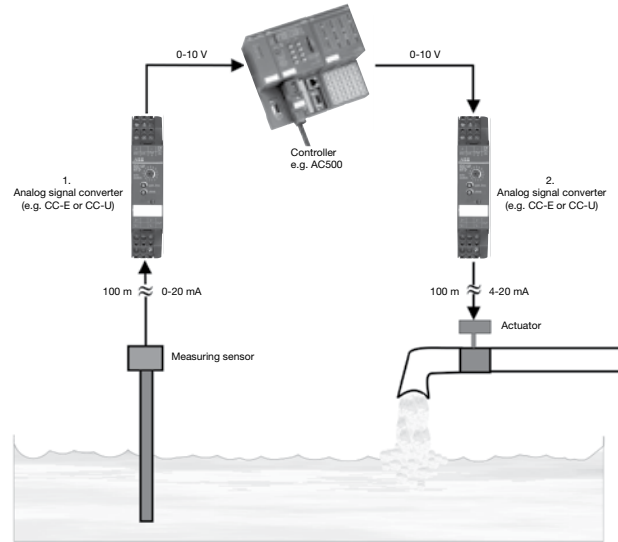
If long lines or high burdens have to be operated, it may be necessary to amplify the signal. CC analog signal converters require only low input power and provide high output power.

Thus, there are no restrictions for the converter's position on the line, i.e. it can be used

- for signal refreshing a at the end of the line (low input power)
- or for signal amplification b at the beginning of the line (high output power).

Signal filtering

Particularly on long lines or in rough industrial environments the signals are exposed to high electromagnetic interferences. The frequency of the coupled interference signals may be in the range of the common mains frequency (50 Hz) or even much higher (in case of frequency converters). According to the specific requirements, analog signal converters are available which provide reliable suppression of those interferences by means of an input low-pass filter.



Signal separation

Protection against overvoltage

The increased use of micro-electronics make controls much more sensitive against overvoltages, resulting from lightning discharges or switching processes. Suppression diodes are incorporated in the input of the CC analog signal converters which enable the converters to arrest overvoltages with low energy level (resulting from switching processes) by themselves. The products furthermore provide electrical isolation between input, output and supply circuit for protection of the controller connected to the output.

Protection against ground loops

If components are used which refer to ground, the measuring signals can be falsified by a so-called ground loop. In this case, certain parts of the signal are transmitted via earth and not via the analog transmission line, thus causing incorrect evaluation of the signal. The electrical isolation between the input and the output disconnects these ground loops and thus enables correct signal transmission.

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- existing
- ▲ existing for some devices
- pending

		CC-E/STD	CC-E/I	CC-U/STD	CC-U/STDR	CC-E/RTD	CC-U/RTD	CC-U/RTDR	CC-E/TC	CC-U/TC	CC-U/TCR	CC-E/I	CC-E I _{AC} /I _{LPO}	CC-U/I	CC-U/W
Approvals															
	UL 508, CAN/CSA C22.2 No.14	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	UL 1604 (Class I, Div 2, hazardous locations), CAN/CSA C22.2 No.213	▲		■		▲	■		▲	■		▲		■	■
	CB scheme				■			■			■				
	CCC				■			■			■				
Marks															
	CE	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	C-Tick	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Analog signal converters

Overview

CC-E/STD analog signal converter with 3-way electrical isolation

- 2 universally configurable devices (type CC-E/STD)
- 2x10 single-function devices
- "Plug and Work", no adjustment of single-function devices required

Loop-powered current/current isolator without external power supply for analog current signals of 0-20 mA and 4-20 mA

- Electrical isolation between input and output
- Very low internal voltage drop ≤ 2.5 V
- Available with one or two independent channels
- Width only 18 mm (1 and 2 channels)

CC-U/STD universal signal converter with 3-way electrical isolation

- More than 120 configurations possible
- Configurable output signal response on input voltage signal interruption (low fail safe / high fail safe)
- Adjustment and operating elements on the front
- Short-circuit proof signal outputs
- Plug-in connecting terminals for inputs, outputs and supply
- Very fast signal transmission enables use in control systems

CC-U/STDR universal signal converter for standard signals, with 2 threshold relay outputs and with 3-way electrical isolation

- Standard signal converter with 7 setting ranges
- 2 threshold relay outputs with one c/o contact each (threshold and respective hysteresis can be adjusted independently from each other)
- Open-circuit or closed-circuit principle configurable by means of a DIP switch
- 2 yellow LEDs for clear status indication of the output relays
- Plug-in connecting terminals for inputs, outputs and supply

CC-E/RTD temperature signal converter for RTD sensors, linearized with 3-way electrical isolation

- 2 universally configurable devices (type CC-E/RTD)
- 2x12 single-function devices
- "Plug and Work", no adjustment of single-function devices required
- Temperature signal converter for PT100 sensors
- 2- or 3-wire connection

CC-U/RTD universal signal converter for PT10, PT100, PT1000 temperature sensors (acc. to IEC 751 and JIS C 16041), linearized with 3-way electrical isolation

- Configurable output signal response on input signal interruption (low / high fail safe)
- Adjustment and operating elements on the front-side
- Short-circuit proof signal outputs
- Plug-in connecting terminals for inputs, outputs and supply
- 2- or 3-wire connection

CC-U/RTDR universal signal converter for temperature and resistance signals, with 2 threshold relay outputs and 3-way electrical isolation

- Temperature signal converter for PT100 signals (5 ranges up to 800 °C) and variable resistances from 0-380 Ω
- 2 threshold relay outputs with one c/o contact each (threshold and respective hysteresis can be adjusted independently from each other)
- Open-circuit or closed-circuit principle configurable by means of a DIP switch
- 2 yellow LEDs for clear status indication of the output relays
- Plug-in connecting terminals for inputs, outputs and supply
- 2- or 3-wire connection

Analog signal converters

Overview

CC-E/TC analog signal converter for thermocouple signals of the types J and K with 3-way electrical isolation

- 2 universally configurable devices (type CC-E/TC)
- 2x6 single-function devices
- "Plug and Work", no adjustment of single-function devices required

CC-U/TC universal signal converter for thermocouples with 3-way electrical isolation

- Temperature signal converter for thermo-couples of the types K, J, T, S, E, N, R, B
- Continuously adjustable voltage signal input 0-10 mV and 0-50 mV
- Differential temperature meas. possible ¹⁾
- Configurable output signal response on input signal interruption (low fail safe / high fail safe)
- Adjustment and operating elements on the front-side
- Short-circuit proof signal outputs
- Plug-in connecting terminals for inputs, outputs and supply

CC-U/TCR universal signal converter for thermocouples, with 2 threshold relay outputs and 3-way electrical isolation

- Temperature signal converter for thermocouples of the types K, J, T, S
- 2 threshold relay outputs with one change-over contact each (threshold and respective hysteresis can be adjusted independently from each other)
- Open-circuit or closed-circuit principle configurable by means of a DIP switch
- 2 yellow LEDs for clear status indication of the output relays
- Plug-in connecting terminals for inputs, outputs and supply

12 CC-E/I measuring converter for current signals 0-5 A, 0-20 A, AC/DC with 3-way electrical isolation

- 2 universally configurable devices (type CC-E/I)
- 2x6 single-function devices
- "Plug and Work", no adjustment of single-function devices required

CC-E I_{AC}/ILPO measuring converter without auxiliary power for sinusoidal currents 0-1 A, 0-5 A, output 4-20 mA

- Measuring converter for sinusoidal currents (0-1 A, 0-5 A)
- Measuring range selection by front-face sliding switch
- 4-20 mA output current in proportion to input current
- no additional power supply required

CC-U/I universal measuring converter for RMS values of 0-1 A and 0-5 A, with 3-way electrical isolation

- RMS converter for current signals up to 1 A and up to 5 A of any wave form (DC, DC with superimposed AC components, pure sinusoidal, triangular, phase-angle controlled, etc. in a measuring range of 0-600 Hz)
- Adjustment and operating elements on the front
- Short-circuit proof signal outputs
- Plug-in connecting terminals for inputs, outputs and supply

CC-U/V universal measuring converter for RMS values of 0-600 V, with 3-way electrical isolation

- RMS converter for voltage signals up to 600 V of any wave form (DC, DC with superimposed AC components, pure sinusoidal, triangular, phase-angle controlled, etc. in a measuring range of 0-600 Hz)
- Adjustment and operating elements on the front
- Short-circuit proof signal outputs
- Plug-in connecting terminals for inputs, outputs and supply

Standard signal converter

Ordering details

Description

Standard signal converters of the CC-E range are designed to convert all kind of input standard signals (V, mA) into output standard signals (V, mA).



CC-E/I



CC-E/VV



CC-E I/I-2



CC-U/STD

Standard signal converters

Supply voltage range	Input signal	Output signal	Type	Catalog number	Weight (1 pce) kg (lb)
24 V DC	0-5 V, 0-10 V 0-20 mA, 4-20 mA	0-5 V, 0-10 V	CC-E/STD1) 3)	1SVR011700R0000	0.088 (0.194)
		0-10 V	CC-E V/V	1SVR011710R2100	0.083 (0.183)
	0-20 mA	0-20 mA	CC-E V/I	1SVR011711R1600	0.084 (0.185)
		4-20 mA	CC-E V/I	1SVR011712R1700	0.084 (0.187)
		0-10 V	CC-E I/V	1SVR011713R1000	0.082 (0.181)
		0-20 mA	CC-E I/I	1SVR011714R1100	0.084 (0.187)
		4-20 mA	CC-E I/I	1SVR011715R1200	0.084 (0.185)
		0-10 V	CC-E I/V	1SVR011716R1300	0.084 (0.185)
		0-20 mA	CC-E I/I	1SVR011717R1400	
		4-20 mA	CC-E I/I	1SVR011718R2500	0.084 (0.187)
110-240 V AC	0-5 V, 0-10 V 0-20 mA, 4-20 mA	-10...+10 V	CC-E V/V	1SVR011719R2600	0.082 (0.181)
		0-5 V, 0-10 V 0-20 mA, 4-20 mA	CC-E/STD 3)	1SVR011705R2100	0.090 (0.198)
	0-20 mA	0-10 V	CC-E V/V	1SVR011720R2300	0.096 (0.212)
		0-20 mA	CC-E V/I	1SVR011721R1000	0.087 (0.192)
		4-20 mA	CC-E V/I	1SVR011722R1100	0.091 (0.200)
		0-10 V	CC-E V/V	1SVR011723R1200	0.091 (0.200)
		0-20 mA	CC-E V/I	1SVR011724R1300	0.088 (0.194)
		4-20 mA	CC-E V/I	1SVR011725R1400	
		0-10 V	CC-E V/V	1SVR011726R1500	0.096 (0.212)
		0-20 mA	CC-E V/I	1SVR011727R1600	0.087 (0.192)
loop powered	-10...+10 V 0-20 mA, 4-20 mA	4-20 mA	CC-E V/I	1SVR011728R2700	0.088 (0.194)
		-10...+10 V	CC-E V/V	1SVR011729R2000	0.086 (0.190)
	0-20 mA, 4-20 mA	CC-E I/I-12)	1SVR010200R1600	0.038 (0.084)	
24-48 V DC, 110-240 V AC, 100-300 V DC, 24 V AC	refer to table	refer to table 2 c/o	CC-E I/I-22)	1SVR010201R0300	0.044 (0.097)
			CC-U/STD	1SVR040000R1700	0.125 (0.276)
				1SVR040001R0400	0.126 (0.278)
			CC-U/STDR4)	1SVR040010R0000	0.142 (0.313)
				1SVR040011R2500	

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1) 1604 Class I, Div.2 (universal device)
 2) CC-E-I/I-1 has 1 channel, CC-E-I/I-1 has 2 channels
 3) 3-way electrical isolation
 4) with relay output

Temperature signal converters

Ordering details

RTD Converters



CC-E/RTD



CC-U/RTD

Supply voltage range	Input signal	Output signal	Type	Catalog number	Weight (1 pce) kg (lb)
24 V DC	refer to table	0-10 V, 0-20 mA, 4-20 mA	CC-E/RTD ¹⁾	1SVR011701R2500	0.091 (0.200)
		0-10 V	CC-E RTD/V	1SVR011730R2500	0.084 (0.185)
		0-20 mA	CC-E RTD/I	1SVR011731R1200	0.086 (0.190)
		4-20 mA	CC-E RTD/I	1SVR011732R1300	
	PT100 0...100 °C	0-10 V	CC-E RTD/V	1SVR011733R1400	0.083 (0.183)
		0-20 mA	CC-E RTD/I	1SVR011734R1500	0.084 (0.185)
		4-20 mA	CC-E RTD/I	1SVR011735R1600	0.084 (0.187)
		0-10 V	CC-E RTD/V	1SVR011736R1700	0.084 (0.185)
	PT100 -50...+50 °C	0-20 mA	CC-E RTD/I	1SVR011737R1000	0.084 (0.187)
		4-20 mA	CC-E RTD/I	1SVR011738R2100	0.101
		0-10 V	CC-E RTD/V	1SVR011739R2200	0.084 (0.185)
		0-20 mA	CC-E RTD/I	1SVR011740R0700	0.084 (0.187)
110-240 V AC	refer to table	0-10 V, 0-20 mA, 4-20 mA	CC-E/RTD	1SVR011706R2200	0.093 (0.205)
		0-10 V	CC-E RTD/V	1SVR011788R2400	0.086 (0.190)
		0-20 mA	CC-E RTD/I	1SVR011789R2500	0.088 (0.194)
		4-20 mA	CC-E RTD/I	1SVR011790R2200	0.089 (0.196)
	PT100 0...100 °C	0-10 V	CC-E RTD/V	1SVR011791R1700	0.087 (0.192)
		0-20 mA	CC-E RTD/I	1SVR011792R1000	0.089 (0.196)
		4-20 mA	CC-E RTD/I	1SVR011793R1100	
		0-10 V	CC-E RTD/V	1SVR011794R1200	0.087 (0.192)
	PT100 -50...+50 °C	0-20 mA	CC-E RTD/I	1SVR011795R1300	0.089 (0.196)
		4-20 mA	CC-E RTD/I	1SVR011796R1400	
		0-10 V	CC-E RTD/V	1SVR011797R1500	0.086 (0.190)
		0-20 mA	CC-E RTD/I	1SVR011798R2600	0.089 (0.196)
PT100 0...300 °C	4-20 mA	CC-E RTD/I	1SVR011799R2700	0.088 (0.194)	
	refer to table	refer to table 2 c/o	CC-U/RTD	1SVR040002R0500	0.126 (0.278)
				1SVR040003R0600	0.128 (0.282)
			CC-U/RTDR ³⁾	1SVR040012R2600	0.146 (0.322)
24-48 V DC, 100-300 V DC, 110-240 V AC, 24 V AC				1SVR040013R2700	0.148 (0.326)

1) 1604 Class I, Div.2 (universal device)
 2) CC-E-i/i-1 has 1 channel; CC-E-1/1-1 has 2 channels
 3) with relay output

Thermocouple converters

Ordering details



CC-E TC

Thermocouple converters

Supply voltage range	Input signal	Output signal	Type	Catalog number	Weight (1 pce) kg (lb)	
24 V DC	thermocouple types J and K	0-10 V, 0-20 mA, 4-20 mA	CC-E/TC ¹⁾	1SVR011702R2600	0.089 (0.196)	
		0-10 V	CC-E TC/V	1SVR011750R0100	0.087 (0.192)	
	type J 0...600 °C	0-20 mA	CC-E TC/I	1SVR011751R2600	0.084 (0.187)	
		4-20 mA	CC-E TC/I	1SVR011752R2700	0.102	
		0-10 V	CC-E TC/V	1SVR011753R2000	0.084 (0.185)	
		0-20 mA	CC-E TC/I	1SVR011754R2100		
	110-240 V AC	thermocouple types J and K	0-10 V, 0-20 mA, 4-20 mA	CC-E/TC	1SVR011707R2300	0.088 (0.194)
			0-10 V	CC-E TC/V	1SVR011760R0300	0.084 (0.187)
type J 0...600 °C		0-20 mA	CC-E TC/I	1SVR011761R2000	0.088 (0.194)	
		4-20 mA	CC-E TC/I	1SVR011762R2100	0.1 (0.220)	
		0-10 V	CC-E TC/V	1SVR011763R2200	0.086 (0.190)	
		0-20 mA	CC-E TC/I	1SVR011764R2300	0.088 (0.194)	
type K 0...1000 °C		4-20 mA	CC-E TC/I	1SVR011765R2400	0.086 (0.190)	
		24-48 V DC, 100-300 V DC, 110-240 V AC, 24 V AC	refer to table	refer to table 2 c/o	CC-U/TC	1SVR040004R0700
	1SVR040005R0000					0.128 (0.282)
	CC-U/TCR ¹⁾					1SVR040014R2000
1SVR040015R2100						

1) with relay output

Measuring converters

Ordering details



CC-E I_{AC}/ILPO



CC-U/I

Measuring converters

Supply voltage range	Input signal	Output signal	Type	Catalog number	Weight (1 pce) kg (lb)
24 V DC	0-5 A, 0-20 A, AC/DC	0-10 V, 0-20 mA, 4-20 mA	CC-E/I 1)	1SVR011703R2700	0.096 (0.212)
		0-10 V	CC-E I _{AC} /V 1)	1SVR011770R0500	0.090 (0.198)
	0-5 A, 0-20 A, AC	0-20 mA	CC-E I _{AC} /I 1)	1SVR011771R2200	0.092 (0.203)
		4-20 mA	CC-E I _{AC} /I 1)	1SVR011772R2300	
		0-10 V	CC-E I _{DC} /V 1)	1SVR011773R2400	0.092 (0.207)
		0-20 mA	CC-E I _{DC} /I 1)	1SVR011774R2500	0.091 (0.200)
		4-20 mA	CC-E I _{DC} /I 1)	1SVR011775R2600	0.093 (0.205)
110-240 V AC	0-5 A, 0-20 A, AC/DC	0-10 V, 0-20 mA, 4-20 mA	CC-E/I 1)	1SVR011708R0400	0.099 (0.218)
		0-10 V	CC-E I _{AC} /V 1)	1SVR011780R1100	0.092 (0.203)
	0-5 A, 0-20 A, AC	0-20 mA	CC-E I _{AC} /I 1)	1SVR011781R0600	0.092 (0.207)
		4-20 mA	CC-E I _{AC} /I 1)	1SVR011782R0700	0.095 (0.209)
		0-10 V	CC-E I _{DC} /V 1)	1SVR011783R0000	0.093 (0.205)
		0-20 mA	CC-E I _{DC} /I 1)	1SVR011784R0100	0.095 (0.209)
		4-20 mA	CC-E I _{DC} /I 1)	1SVR011785R1100	
250 V AC	0-1 A, 0-5 A, AC	4-20 mA	CC-E I _{AC} /ILPO 2)	1SVR010203R0500	0.052 (0.115)
24-48 V DC, 100-300 V DC, 110-240 V AC, 24 V AC	refer to table	refer to table	CC-U/I 3)	1SVR040006R0100	0.128 (0.282)
				1SVR040007R0200	0.127 (0.280)
			CC-U/V 4)	1SVR040008R1300	0.128 (0.282)
				1SVR040009R1400	

5) with relay output
 6) for sinusoidal currents
 7) for current RMS values
 8) for voltage RMS values

Analog signal converters

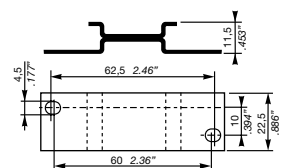
Accessories

Approximate dimensions

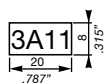
Accessories

For type	Width in mm	Type	Catalog number	Pkg qty	Weight (1 pce) g (oz)
CC-U	22.5	ADP.01	1SVR430029R0100	1	18.4 (0.65)
CC-U		MAR.01	1SVR366017R0100	10	0.19 (0.007)
CC-U	22.5	COV.01	1SVR430005R0100	1	5.2 (0.18)

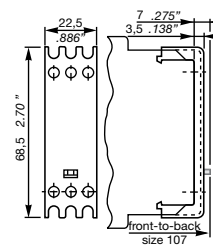
Approximate dimensions



ADP.01



MAR.01



Sealable cover - COV.01

Analog signal converters

Technical data

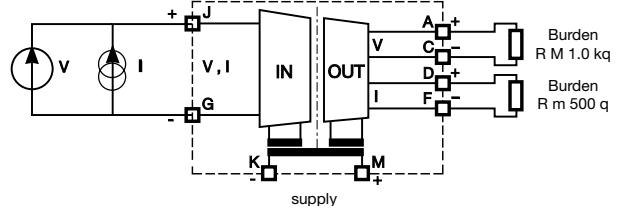
CC-E/STD, CC-E x/x (universal devices)

DIP switch settings

Input	Output	Switch							
		1	2	3	4	5	6	7	8
0...5 V	0...5 V	■	■	■	■	■	■	■	■
	0...10 V	■	■	■	■	■	■	■	■
	0...20 mA	■	■	■	■	■	■	■	■
	4...20 mA	■	■	■	■	■	■	■	■
0...10 V	0...5 V	■	■	■	■	■	■	■	■
	0...10 V	■	■	■	■	■	■	■	■
	0...20 mA	■	■	■	■	■	■	■	■
	4...20 mA	■	■	■	■	■	■	■	■
0...20 mA	0...5 V	■	■	■	■	■	■	■	■
	0...10 V	■	■	■	■	■	■	■	■
	0...20 mA	■	■	■	■	■	■	■	■
	4...20 mA	■	■	■	■	■	■	■	■
4...20 mA	0...5 V	■	■	■	■	■	■	■	■
	0...10 V	■	■	■	■	■	■	■	■
	0...20 mA	■	■	■	■	■	■	■	■
	4...20 mA	■	■	■	■	■	■	■	■

Legend	
■	ON
□	OFF

Wiring instruction



CC-U/STD

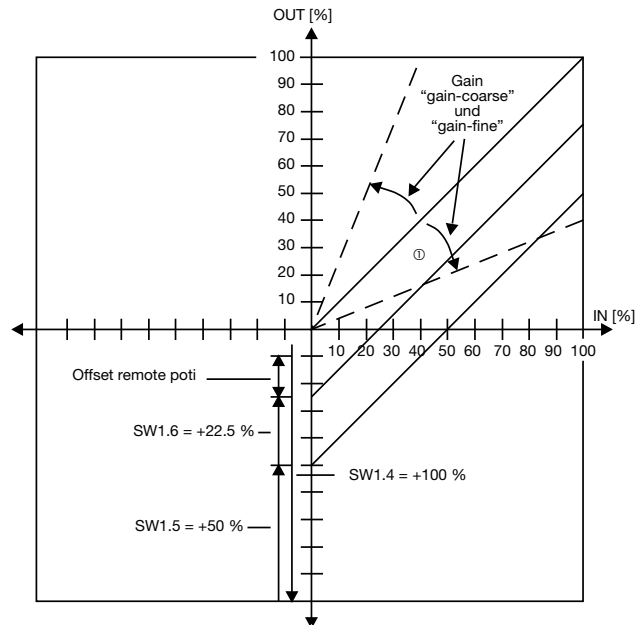
DIP switch settings

Input	Switch 1								Gain	Coarse Type
	1	2	3	4	5	6	7	8		
Potentiometer	■	■	■	■	■	■	■	■	0	C
0...50 mV	■	■	■	■	■	■	■	■	A...D	C
0...100 mV	■	■	■	■	■	■	■	■	4...5	5
0...250 mV	■	■	■	■	■	■	■	■	0...1	1
0...500 mV	■	■	■	■	■	■	■	■	7...9	8
0...1 V	■	■	■	■	■	■	■	■	3...4	3
0...2.5 V	■	■	■	■	■	■	■	■	0...0	0
0...5 V	■	■	■	■	■	■	■	■	5...7	6
0...10 V	■	■	■	■	■	■	■	■	2	2
1...5 V	■	■	■	■	■	■	■	■	7...9	8
2...10 V	■	■	■	■	■	■	■	■	2...4	3
-10...+10 V	■	■	■	■	■	■	■	■	0	0
0...125 mV	■	■	■	■	■	■	■	■	3...4	3
0...8 V	■	■	■	■	■	■	■	■	3...4	3
-22.5...+22.5 mV	■	■	■	■	■	■	■	■	B...F	D
-11...+11 V	■	■	■	■	■	■	■	■	0	0
2.5...7.5 V	■	■	■	■	■	■	■	■	5...7	6
3.33...9.99 V	■	■	■	■	■	■	■	■	3...4	4
10...0 V	■	■	■	■	■	■	■	■	2	2
100...0 mV	■	■	■	■	■	■	■	■	4...5	5
0...1 mA	■	■	■	■	■	■	■	■	A...D	B
0...20 mA	■	■	■	■	■	■	■	■	2...4	3
4...20 mA	■	■	■	■	■	■	■	■	4...5	4
10...50 mA	■	■	■	■	■	■	■	■	0...1	1
20...4 mA	■	■	■	■	■	■	■	■	4...5	4
20...0 mA	■	■	■	■	■	■	■	■	4...2	3
-0.45...+0.45 mA	■	■	■	■	■	■	■	■	B...F	D
-55...+55 mA	■	■	■	■	■	■	■	■	4...6	5
High fail safe *)	■	■	■	■	■	■	■	■	-	-
Low fail safe *)	■	■	■	■	■	■	■	■	-	-
No fail safe *)	■	■	■	■	■	■	■	■	-	-

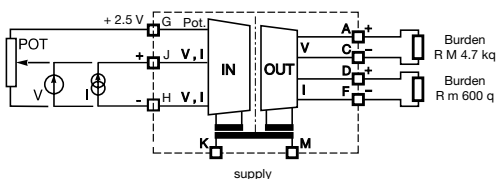
Output	Switch 2					
	1	2	3	4	5	6
0...5 V	■	■	■	■	■	■
0...10 V	■	■	■	■	■	■
1...5 V	■	■	■	■	■	■
2...10 V	■	■	■	■	■	■
-10...+10 V	■	■	■	■	■	■
-5...+5 V	■	■	■	■	■	■
-10...0 V	■	■	■	■	■	■
-5...0 V	■	■	■	■	■	■
0...6.66 V	■	■	■	■	■	■
-10...+3.33 V	■	■	■	■	■	■
-5...+1.66 V	■	■	■	■	■	■
0...8 V	■	■	■	■	■	■
0...4 V	■	■	■	■	■	■
-10...-2 V	■	■	■	■	■	■
-5...-1 V	■	■	■	■	■	■
1.25...6.25 V	■	■	■	■	■	■
-7.5...+2.5 V	■	■	■	■	■	■
-3.75...+1.25 V	■	■	■	■	■	■
1.66...8.33 V	■	■	■	■	■	■
-6.66...+6.66 V	■	■	■	■	■	■
-3.33...+3.33 V	■	■	■	■	■	■
-8...0 V	■	■	■	■	■	■
-4...0 V	■	■	■	■	■	■
0...1 mA	■	■	■	■	■	■
0...20 mA	■	■	■	■	■	■
4...20 mA	■	■	■	■	■	■
0...10 mA	■	■	■	■	■	■
0...0.5 mA	■	■	■	■	■	■
0...13.33 mA	■	■	■	■	■	■
0...666 μA	■	■	■	■	■	■
0...16 mA	■	■	■	■	■	■
0...800 μA	■	■	■	■	■	■
0...8 mA	■	■	■	■	■	■
0...400 μA	■	■	■	■	■	■
2.5...12.5 mA	■	■	■	■	■	■
125...625 μA	■	■	■	■	■	■
3.33...16.66 mA	■	■	■	■	■	■
166...833 μA	■	■	■	■	■	■
0.2...1 mA	■	■	■	■	■	■
2...10 mA	■	■	■	■	■	■
100...500 μA	■	■	■	■	■	■

Legend	
■	ON
□	OFF
□	no influence

Adjustment range



Wiring instruction

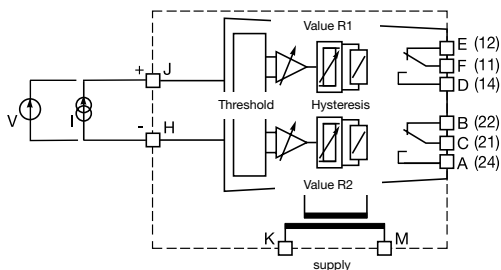


Analog signal converters

Technical data

CC-U/STDR with relay output

Wiring instruction

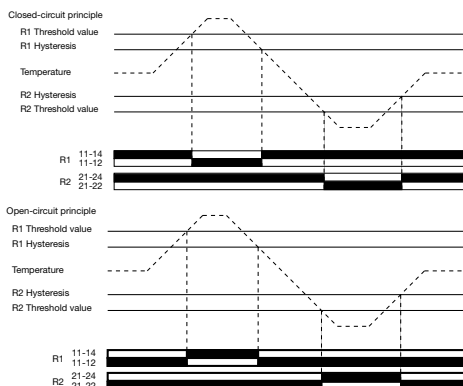


DIP switch settings

Input	Switch					
	1	2	3	4	5	6
0...0 V						
0...5 V	■					
0...1 V		■				
-10...+10 V			■			
1...5 V	■		■			
0...20 mA		■		■		
4...20 mA			■		■	
Output						
Closed-circuit principle						■
Open-circuit principle						■

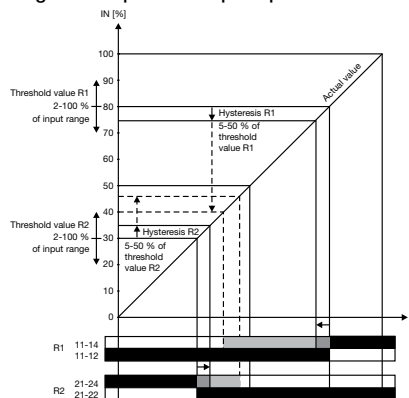
Legend	
■	ON
□	OFF
□	no influence

Function diagrams



Switching points

Switching points of the output relay depending on the input range, configuration open-circuit principle



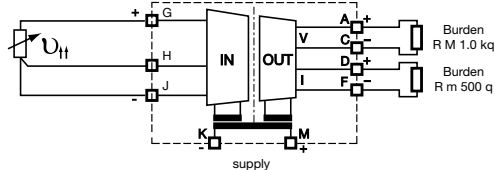
CC-E/RTD

DIP switch settings

Input	Output	Switch					
		1	2	3	4	5	6
0...100 °C	0...10 V						
	0-20 mA						
	4-20 mA						
0...300 °C	0-10 V						
	0-20 mA						
	4-20 mA						
0...500 °C	0-10 V						
	0-20 mA						
	4-20 mA						
-50...+50 °C	0-10 V						
	0-20 mA						
	4-20 mA						
-50...+250 °C	0-10 V						
	0-20 mA						
	4-20 mA						
-50...+450 °C	0-10 V						
	0-20 mA						
	4-20 mA						
High fail safe							
Low fail safe							

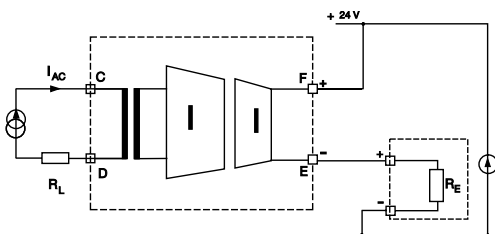
Legend	
■	ON
□	OFF
□	no influence

Wiring instruction



CC-E I_{AC}/ILPO

Wiring instruction



Analog signal converters

Technical data

CC-U/RTD

DIP switch settings

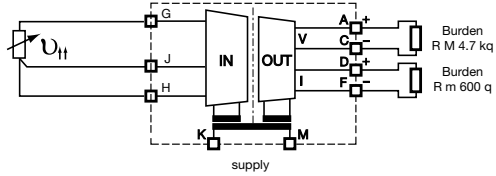
Type	Input Range	Switch 1						Switch 2						Gain Coarse	
		1	2	3	4	5	6	1	2	3	4	5	6		
PT10	0...500 °C														F
	0...550 °C														E
	0...600 °C														D
	0...650 °C														C
	0...700 °C														B
	0...750 °C														A
	0...800 °C														9
PT100	0...850 °C														8
	0...50 °C														F
	0...60 °C														E
	0...70 °C														B
	0...80 °C														A
	0...90 °C														9
	0...100 °C														8
PT1000	0...200 °C														3
	0...300 °C														2
	0...400 °C														1
	0...500 °C														0
	0...10 °C														8
	0...20 °C														3
	0...30 °C														2
Low fail safe *)	0...50 °C														0
	0...60 °C														0
High fail safe *)															-

Output	Switch 3					
	1	2	3	4	5	6
0...5 V						
0...10 V						
1...5 V						
2...10 V						
-10...+10 V						
-5...+5 V						
-10...0 V						
-5...0 V						
0...6.66 V						
-10...+3.33 V						
-5...+1.66 V						
0...8 V						
0...4 V						
-10...-2 V						
-5...-1 V						
1.25...6.25 V						
-7.5...+2.5 V						
-3.75...+1.25 V						
1.66...8.33 V						
-6.66...+6.66 V						
-3.33...+3.33 V						
-8...0 V						
-4...0 V						
0...1 mA						
0...20 mA						
4...20 mA						
0...10 mA						
0...0.5 mA						
0...13.33 mA						
0...666 µA						
0...16 mA						
0...800 µA						
0...8 mA						
0...400 µA						
2.5...12.5 mA						
125...625 µA						
3.33...16.66 mA						
166...833 µA						
0.2...1 mA						
2...10 mA						
100...500 µA						

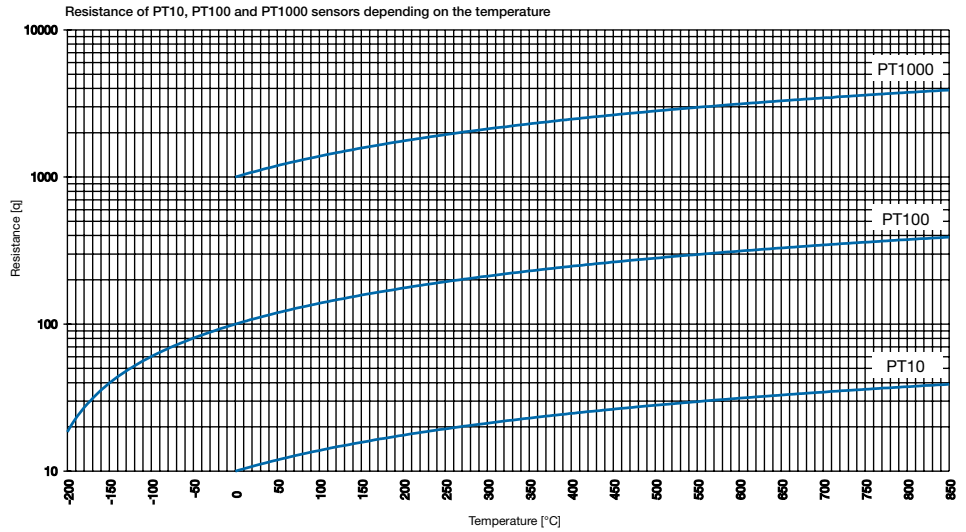
Legend	
■	ON
□	OFF
□	no influence

Wiring instruction

*) Detection of input signal interruptions:
If the input signal circuit is interrupted, the output signal changes to the adjusted minimum value (low fail safe) or maximum value (high fail safe).



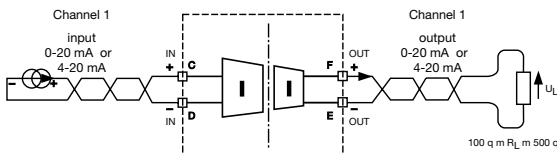
Characteristic curves



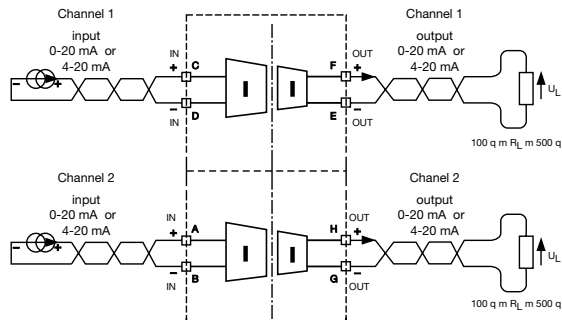
CC-E I/I-1 and CC-E I/I-2

Wiring instruction

CC-E I/I-1



CC-E I/I-2



Analog signal converters

Technical data

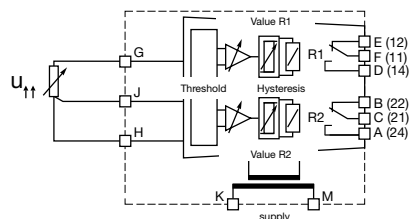
CC-U/RTDR with relay output

DIP switch settings

Input PT100	Switch					
	1	2	3	4	5	6
0...100 °C	■					
0...200 °C		■				
0...400 °C			■			
0...600 °C				■		
0...800 °C					■	
Output						
Closed-circuit principle						■
Open-circuit principle						

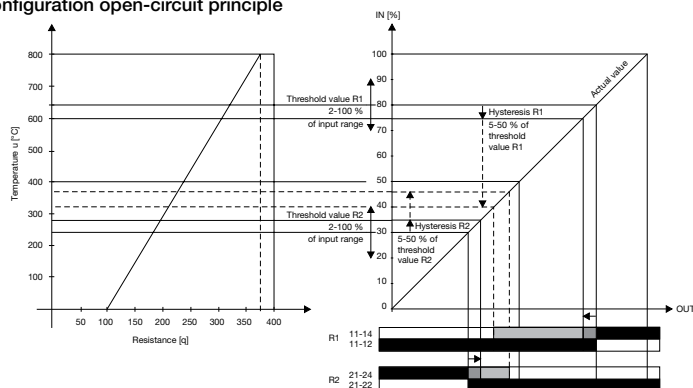
Legend	
■	ON
□	OFF
◻	no influence

Wiring instruction

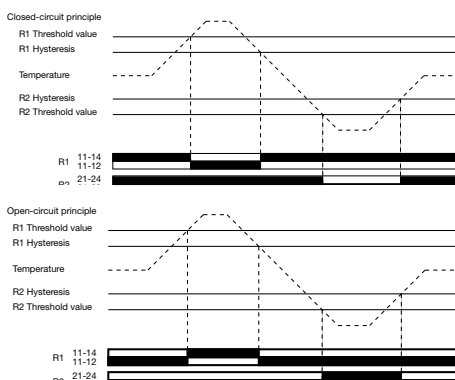


Switching points

Switching points of the output relay depending on the input range, configuration open-circuit principle



Function diagrams



CC-E/TC, CC-E/I

DIP switch settings CC-E/TC

Input	Output	Switch					
		1	2	3	4	5	6
TC-J: 0...600 °C	0...10 V	■	■	■	■	■	■
	0...20 mA 4...20 mA	■	■	■	■	■	■
TC-K: 0...1000 °C	0...10 V	■	■	■	■	■	■
	0...20 mA 4...20 mA	■	■	■	■	■	■
High fail safe							
Low fail safe							

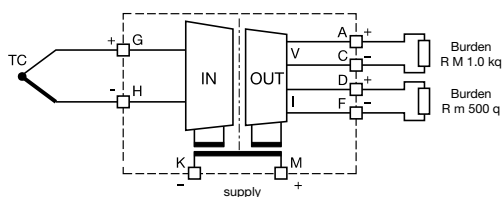
Legend	
■	ON
□	OFF
◻	no influence

DIP switch settings CC-E/I

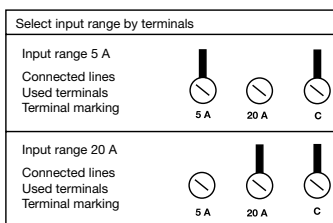
Input	Output	Switch					
		1	2	3	4	5	6
I - DC	0...10 V	■					
	0...20 mA	■					
I - AC	0...10 V	■					
	4...20 mA	■					

Legend	
■	ON
□	OFF

Wiring instruction CC-E/TC and CC-E/I



Input range selection - CC-E/I



Analog signal converters

Technical data

CC-U/V

DIP switch settings

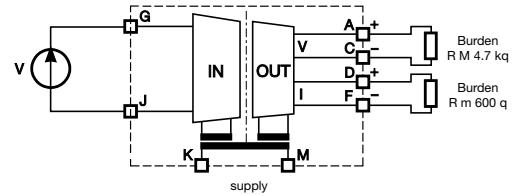
Output	Switch
	1 2 3 4 5 6
0...5 V	ON OFF OFF OFF OFF OFF
0...10 V	ON OFF OFF OFF OFF OFF
1...5 V	ON OFF OFF OFF OFF OFF
2...10 V	ON OFF OFF OFF OFF OFF
-10...+10 V	ON OFF OFF OFF OFF OFF
-5...+5 V	ON OFF OFF OFF OFF OFF
-10...0 V	ON OFF OFF OFF OFF OFF
-5...0 V	ON OFF OFF OFF OFF OFF
0...6.66 V	ON OFF OFF OFF OFF OFF
-10...+3.33 V	ON OFF OFF OFF OFF OFF
-5...+1.66 V	ON OFF OFF OFF OFF OFF
0...8 V	ON OFF OFF OFF OFF OFF
0...4 V	ON OFF OFF OFF OFF OFF
-10...-2 V	ON OFF OFF OFF OFF OFF
-5...-1 V	ON OFF OFF OFF OFF OFF
1.25...6.25 V	ON OFF OFF OFF OFF OFF
-7.5...+2.5 V	ON OFF OFF OFF OFF OFF
-3.75...+1.25 V	ON OFF OFF OFF OFF OFF
1.66...8.33 V	ON OFF OFF OFF OFF OFF
-6.66...+6.66 V	ON OFF OFF OFF OFF OFF
-3.33...+3.33 V	ON OFF OFF OFF OFF OFF
-8...0 V	ON OFF OFF OFF OFF OFF
-4...0 V	ON OFF OFF OFF OFF OFF
0...1 mA	ON OFF OFF OFF OFF OFF
0...20 mA	ON OFF OFF OFF OFF OFF
4...20 mA	ON OFF OFF OFF OFF OFF
0...10 mA	ON OFF OFF OFF OFF OFF
0...0.5 mA	ON OFF OFF OFF OFF OFF
0...13.33 μ A	ON OFF OFF OFF OFF OFF
0...666 μ A	ON OFF OFF OFF OFF OFF
0...16 mA	ON OFF OFF OFF OFF OFF
0...800 μ A	ON OFF OFF OFF OFF OFF
0...8 mA	ON OFF OFF OFF OFF OFF
0...400 μ A	ON OFF OFF OFF OFF OFF
2.5...12.5 mA	ON OFF OFF OFF OFF OFF
125...625 μ A	ON OFF OFF OFF OFF OFF
3.33...16.66 mA	ON OFF OFF OFF OFF OFF
166...833 μ A	ON OFF OFF OFF OFF OFF
0.2...1 mA	ON OFF OFF OFF OFF OFF
2...10 mA	ON OFF OFF OFF OFF OFF
100...500 μ A	ON OFF OFF OFF OFF OFF

Legend
 ON
 OFF
 no influence

Input range selection

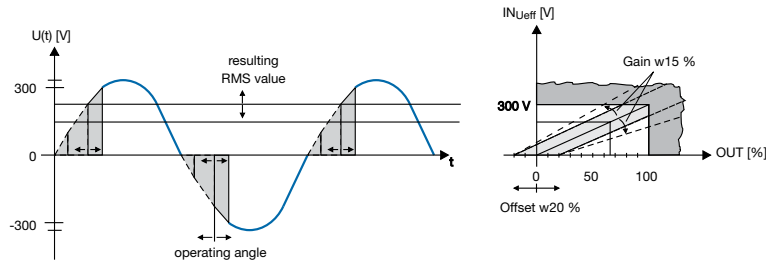
Selecting input range by front-face rotary switch	Switch position
0...100 V	1
0...150 V	2
0...250 V	3
0...300 V	4
0...400 V	5
0...450 V	6
0...550 V	7
0...600 V	8

Wiring instruction



Example of application

RMS measurement and conversion of a phase-angle controlled voltage signal $L1 = 230$ V



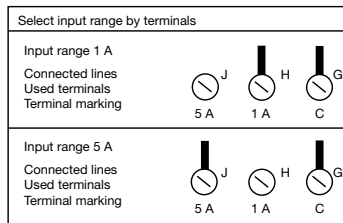
CC-U/I

DIP switch settings

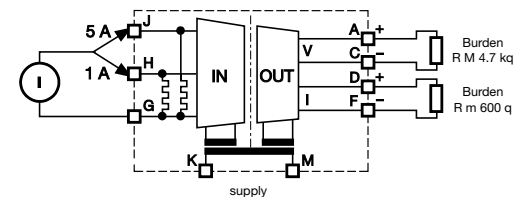
Output	Switch
	1 2 3 4 5 6
0...5 V	ON OFF OFF OFF OFF OFF
0...10 V	ON OFF OFF OFF OFF OFF
1...5 V	ON OFF OFF OFF OFF OFF
2...10 V	ON OFF OFF OFF OFF OFF
-10...+10 V	ON OFF OFF OFF OFF OFF
-5...+5 V	ON OFF OFF OFF OFF OFF
-10...0 V	ON OFF OFF OFF OFF OFF
-5...0 V	ON OFF OFF OFF OFF OFF
0...6.66 V	ON OFF OFF OFF OFF OFF
-10...+3.33 V	ON OFF OFF OFF OFF OFF
-5...+1.66 V	ON OFF OFF OFF OFF OFF
0...8 V	ON OFF OFF OFF OFF OFF
0...4 V	ON OFF OFF OFF OFF OFF
-10...-2 V	ON OFF OFF OFF OFF OFF
-5...-1 V	ON OFF OFF OFF OFF OFF
1.25...6.25 V	ON OFF OFF OFF OFF OFF
-7.5...+2.5 V	ON OFF OFF OFF OFF OFF
-3.75...+1.25 V	ON OFF OFF OFF OFF OFF
1.66...8.33 V	ON OFF OFF OFF OFF OFF
-6.66...+6.66 V	ON OFF OFF OFF OFF OFF
-3.33...+3.33 V	ON OFF OFF OFF OFF OFF
-8...0 V	ON OFF OFF OFF OFF OFF
-4...0 V	ON OFF OFF OFF OFF OFF
0...1 mA	ON OFF OFF OFF OFF OFF
0...20 mA	ON OFF OFF OFF OFF OFF
4...20 mA	ON OFF OFF OFF OFF OFF
0...10 mA	ON OFF OFF OFF OFF OFF
0...0.5 mA	ON OFF OFF OFF OFF OFF
0...13.33 μ A	ON OFF OFF OFF OFF OFF
0...666 μ A	ON OFF OFF OFF OFF OFF
0...16 mA	ON OFF OFF OFF OFF OFF
0...800 μ A	ON OFF OFF OFF OFF OFF
0...8 mA	ON OFF OFF OFF OFF OFF
0...400 μ A	ON OFF OFF OFF OFF OFF
2.5...12.5 mA	ON OFF OFF OFF OFF OFF
125...625 μ A	ON OFF OFF OFF OFF OFF
3.33...16.66 mA	ON OFF OFF OFF OFF OFF
166...833 μ A	ON OFF OFF OFF OFF OFF
0.2...1 mA	ON OFF OFF OFF OFF OFF
2...10 mA	ON OFF OFF OFF OFF OFF
100...500 μ A	ON OFF OFF OFF OFF OFF

Legend
 ON
 OFF
 no influence

Input range selection

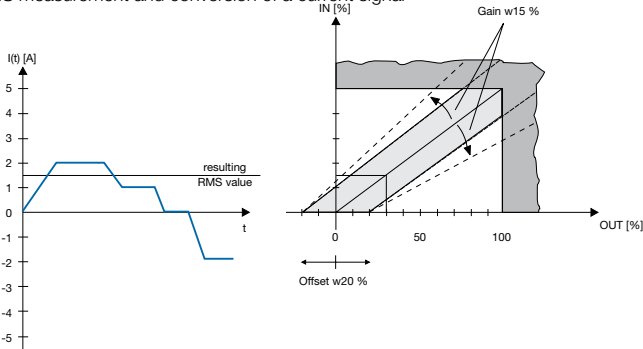


Wiring instruction



Example of application

RMS measurement and conversion of a current signal



Analog signal converters

Technical data

CC-U/TC

DIP switch settings

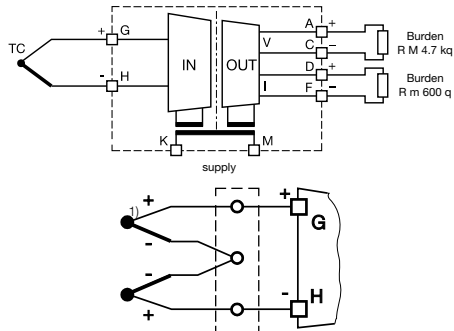
Output	Switch 3					
	1	2	3	4	5	6
0...5 V						
0...10 V						
1...5 V						
2...10 V						
-10...+10 V						
-5...+5 V						
-10...0 V						
-5...0 V						
0...6.66 V						
-10...+3.33 V						
-5...+1.66 V						
0...8 V						
0...4 V						
-10...-2 V						
-5...-1 V						
1.25...6.25 V						
7.5...+2.5 V						
-3.75...+1.25 V						
1.66...8.33 V						
-6.66...+6.66 V						
-3.33...+3.33 V						
-8...0 V						
-4...0 V						
0...1 mA						
0...20 mA						
4...20 mA						
0...10 mA						
0...0.5 mA						
0...13.33 mA						
0...666 µA						
0...16 mA						
0...800 µA						
0...8 mA						
0...400 µA						
2.5...12.5 mA						
125...625 µA						
3.33...16.66 mA						
166...833 µA						
0.2...1 mA						
2...10 mA						
100...500 µA						

Input	Range	Switch 1						Switch 2							
		1	2	3	4	5	6	1	2	3	4	5	6		
K	0-100...900 °C														
J	0-250...1350 °C														
T	0-100...750 °C														
S	0-100...400 °C														
E	-150...+400 °C														
N	0-250...1550 °C														
R	0-100...700 °C														
B	0-200...1000 °C														
M	0-100...650 °C														
L	0-200...1300 °C														
I	0-250...1350 °C														
H	0-450...1700 °C														
G	0-700...1750 °C														
F	9...2...10 mV														
D	0...10...50 mV														
C	Low fail safe *)														
A	High fail safe *)														

*) Detection of input signal interruptions:
If the input signal circuit is interrupted, the output signal changes to the adjusted minimum value (low fail safe) or maximum value (high fail safe).

Legend	
■	ON
□	OFF
□	no influence

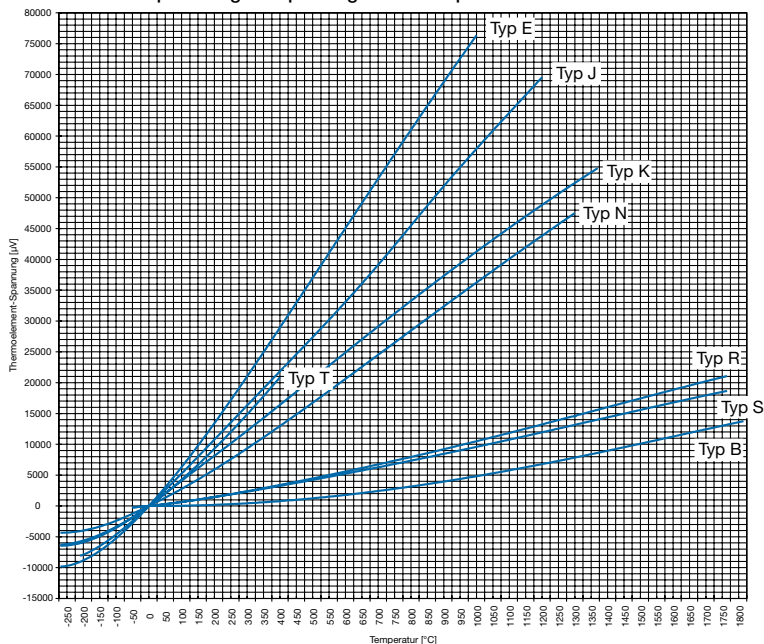
Wiring instruction



without cold-junction compensation:
switch SW2.2 = OFF

Characteristic curve

Thermocouple voltages depending on the temperature



Analog signal converters

Technical data

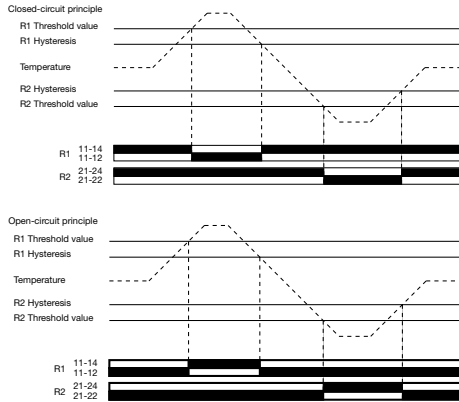
CC-U/TCR with relay output

DIP switch settings

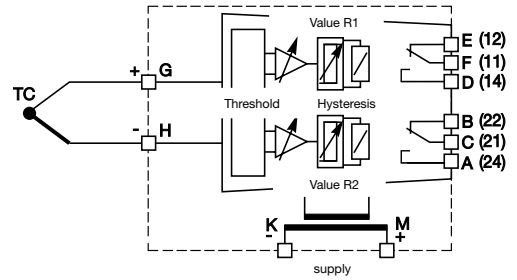
Type	Input Range	Switch					
		1	2	3	4	5	6
J	0...240 °C						
	0...480 °C						
	0...1200 °C						
K	0...250 °C						
	0...500 °C						
	0...1350 °C						
T	-150...+120 °C						
	0...220 °C						
	0...400 °C						
S	0...210 °C						
	0...380 °C						
	0...860 °C						
Output							
Closed-circuit principle							
Open-circuit principle							

Legend	
■	ON
□	OFF
□	no influence

Function diagrams



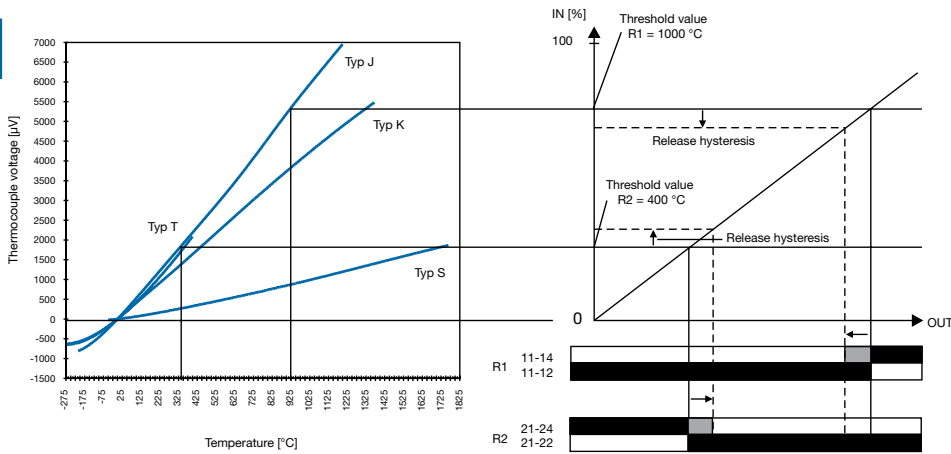
Wiring instruction



Switching points

Switching points of the output relay depending on the input range, configuration open-circuit principle

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Analog signal converters

Technical data

Type		CC-E/STD	CC-E/RTD ³⁾	CC-E/TC
Input circuits - Analog inputs	J-G-H	Current	Voltage	Temperature sensors
Input signal		Standard signals		PT100
Rated input range		0...20 mA / 4...20 mA	0...5 V / 0...10 V / -10...+10 V	-50...+500 °C
Limitation of input signals		+55 mA	± 11 V	
Influence of line resistance		-	< 0.01 %/Ω	< 0.5 % / 100 Ω
Gain adjustment range		± 5 % (universal devices)		
Offset adjustment range		± 5 % (universal devices)		
Input impedance		50 Ω	1 MΩ	-
Suppression at 50 Hz		-	-	> 35 dB
Common-mode rejection		-	100 dB	
Output circuits - Analog outputs	D-F, A-C	Current		Voltage
Output signal		0-20 mA, 4-20 mA		0-5 V, 0-10 V
Output burden		≤ 500 Ω		≥ 1.0 kΩ
Accuracy ¹⁾		± 0.5 % of full-scale		
Residual ripple		< 0.5 %		
Response time		200 μs	10 ms	
Transmission frequency		2 kHz	80 Hz	2 Hz (up to -3 dB)
Reaction to input circuit interruption		High fail safe: Output voltage > 115 % of measuring range ²⁾ Low fail safe: Output voltage < -0.6 V, output current = 0 mA		
Supply circuits	K-M	DC versions		AC versions
Supply voltage		24 V DC		110-240 V AC - 50/60 Hz
Supply voltage tolerance		-15...+15 %		-15...+10 %
Power consumption		1.5 W typ.		1.5 VA typ.
Indication of operational states		U: green LED		
General data		operation / storage		
Ambient temperature range		0...+60 °C / -20...+80 °C		
Temperature coefficient		± 500 ppm/°C		
Degree of protection (DIN 40050)		IP20		
Mounting position		ventilation slots on top and bottom		
Mounting		DIN rail (IEC/EN 60715), snap-on mounting		
Electrical connection		rigid		
Wire size		0.2-4 mm ² (24-12 AWG)		
		fine-strand with(out) wire end ferrule		
		0.2-2.5 mm ² (24-14 AWG)		
Stripping length		7 mm (0.28 inch)		
Tightening torque		0.5 Nm (4.4 lb.in)		
Electromagnetic compatibility		EN 61000-6-2		
Interference immunity		Level 3 (±6 kV / ±8 kV)		
electrostatic discharge (ESD)	IEC/EN 61000-4-2			
electromagnetic field (HF radiation resistance)	IEC/EN 61000-4-3	10 V/m		
fast transients (Burst)	IEC/EN 61000-4-4	Level 3 (±2 kV / 5 kHz)		
powerful impulses (Surge)	IEC/EN 61000-4-5	±2 kV / ±1 kV		
HF line emission	IEC/EN 61000-4-6	10 V		
Interference emission	EN 61000-6-4	Class B		
Isolation data		2.5 kV AC		
Test voltage between all isolated circuits				
Rated insulation voltage				

¹⁾ Includes non-linearity and factory setting, influenced by supply voltage and output load.

²⁾ Only -/RTD and -/TC: Single-function devices respond with Low fail safe to input signal interruptions.

³⁾ When connecting a 2-wire sensor, the terminals J and H have to be jumpered.

Analog signal converters

Technical data

Type		CC-E I/I
Input circuits - Analog inputs		
Current		
Input current I_{IN}		0-20 mA, 4-20 mA
Min. input current		< 100 μ A
Max. input current		50 mA ¹⁾ ($V_{IN} < 18$ V)
Input voltage U_{IN}		< 2.5 V + ($I_{IN} \times R_L$)
Input voltage drop U_i		< 2.5 V (20 mA, $R_L = 0 \Omega$)
Max. input voltage		18 V ¹⁾ ($I_{IN} < 50$ mA)
Output circuits		
Output current I_{OUT}		0-20 mA, 4-20 mA
Output load R_L		0-500 Ω
Output voltage U_{OUT}		$I_{OUT} \times R_L$
Residual ripple		< 20 mV _{pp} (500 Ω , 20 mA)
Response time (0-100 %)		< 15 ms (0-500 Ω , 20 mA), < 5 ms (500 Ω , 20 mA, 25 °C)
Accuracy		≤ 0.1 % of full-scale (20 mA)
Load influence (0-500 Ω)		$\leq \pm 0.05$ % / 100 Ω , ≤ -0.1 % / 100 Ω (25 °C)
General data		
Width of the enclosure		18 mm
Weight	1 channel	approx. 0.037 kg (0.082 (0.181) lb)
	2 channel	approx. 0.044 (0.097) kg (0.097 lb)
Mounting position		any
Degree of protection	enclosure / terminals	IP20 / IP20
Ambient temperature range	operation / storage	-25...+60 °C / -40...+85 °C
Temperature coefficient		< ± 50 ppm / °C
Mounting		DIN rail (IEC/EN 60715)
Electrical connection		
Wire size	rigid	0.2-4 mm ² (24-12 AWG)
	fine-strand with(out) wire end ferrule	0.2-2.5 mm ² (24-14 AWG)
Stripping length		7 mm (0.28 inch)
Tightening torque		0.5 Nm (4.4 lb.in)
Standards		
Product standard		EN 50178
Low Voltage Directive		2006/95/EC
EMC Directive		2004/108/EC
Electromagnetic compatibility		
Interference immunity		EN 61000-6-2
electrostatic discharge (ESD)	EN 61000-4-2	Level 3 (± 6 kV / ± 8 kV)
electromagnetic field (HF radiation resistance)	EN 61000-4-3	10 V/m
fast transients (Burst)	EN 61000-4-4	Level 3 (± 2 kV / 5 kH)
powerful impulses (Surge)	EN 61000-4-5	± 2 kV / ± 1 kV
HF line emission	EN 61000-4-6	10 V
magnetisches Feld	EN 61000-4-8	30 A/m
Interference emission		EN 61000-6-4
Radiated noise	EN 55011	Class B
Operational reliability (EN 68-2-6)		4 g
Mechanical resistance (EN 68-2-6)		10 g
Environmental testing (IEC 68-2-30 Db)		24 h cycle, 55 °C, 93 % rel., 96 h
Isolation data		
Insulation voltage input / output		500 V _{eff} / 50 Hz
Insulation voltage between channels		5 kV _{eff} / 50 Hz (device with 2 channels)
Pollution category		2
Overvoltage category		II

¹⁾ The input parameters have to be limited to the indicated maximum values.

Analog signal converters

Technical data

Type	CC-U/STD			CC-U/RTD ³⁾		CC-U/TC	
Input circuits - Analog inputs	J-G-H			Temperature sensors		Thermocouples (IEC 584-1 and 2)	
	Current	Voltage	Potentiometer				
Input signal	0-20 mA 4-20 mA 10-50 mA 0-1 mA	0-100 mV 0-1 V 0-5 V 1-5 V 0-10 V 2-10 V ± 10 V	470 Ω - 1 MΩ ²⁾	PT10, PT100, PT1000 (IEL 751 and JICC 1604)		TC.K TC.T TC.E TC.R	TC.J TC.S TC.N TC.B
Limitation of input signals	± 55 mA	± 11 V		-		-	
Rated input range	-	-	-	Max. temperature adjustable: 6-60 °C for PT1000 50-500 °C for PT100 500-850 °C for PT10		refer to temperature specs. of individual thermocouples	
Influence of line resistance	-	-	-	0.015 °C/Ω		< 0.01 % / 100 Ω	
Gain adjustment range (universal devices)	0.9-110 mA	45 mV - 22 V	-	see DIP switch settings			
Offset adjustment range (universal devices)	-137.5...+62.5 % for different ranges			± 5 %		± 10 %	
Input impedance	51 Ω	6 MΩ	3 GΩ	-		-	
without detection of input signal interruption	51 Ω	3.5 MΩ	9.5 GΩ	-		-	
with detection of input signal interruption	-	-	-	-		-	
Suppression at 50 Hz	-	-	-	-		> 40 dB	
Common-mode rejection	-	-	-	120 dB		105 dB	
Output circuits - Analog outputs	D-F, A-C			Current		Voltage	
Output signal				0-20 mA, 4-20 mA		0-5 V, 1-5 V, 0-10 V, 2-10 V, ± 10 V	
Output burden				≤ 600 Ω ≥		4.7 kΩ	
Accuracy 1)	±0.1 % of full-scale			±0.2 % of full-scale		±0.1 % of full-scale	
Residual ripple	-			< 0.15 %		-	
Response time	200 μs			10 ms		200 ms	
Transmission frequency	1 kHz			80 Hz		2 Hz (to -3 dB)	
Supply circuits	K-M						
Rated supply voltage				24-48 V DC		110-240 V AC	
Supply voltage range				24-48 V DC / 24 V AC		110-240 V AC / 100-300 V DC	
Supply voltage tolerance				DC: -15...+15 %		AC: -15...+10 %	
Rated frequency				0 Hz or 50/60 Hz			
Power consumption				2 W at 24 V DC		4.5 VA at 230 V AC	
Indication of operational states				U: green LED			
General data				-20...+60 °C / -40...+80 °C			
Ambient temperature range operation / storage							
Temperature coefficient	±150 ppm/°C			±250 ppm/°C		±200 ppm/°C at min. offset ±400 ppm/°C at max. offset	
Mounting position				any			
Mounting				DIN rail (IEC/EN 60715), snap-on mounting / screw mounting with adapter			
Electrical connection							
Wire size	rigid			plug-connector with screw terminals 0.2-2.5 mm ² (24-12 AWG)			
	fine-strand with(out) wire end ferrule			plug-connector with screw terminals 0.2-2.5 mm ² (24-12 AWG)			
Stripping length				7 mm (0.28 inch)			
Tightening torque				0.4 Nm (3.5 lb.in)			
Electromagnetic compatibility							
Interference immunity				EN 61000-6-2			
electrostatic discharge (ESD)	IEC/EN 61000-4-2			Level 3 (±6 kV / ±8 kV)			
electromagnetic field (HF radiation resistance)	IEC/EN 61000-4-3			10 V/m			
fast transients (Burst)	IEC/EN 61000-4-4			Level 3 (±2 kV / 5 kH)			
powerful impulses (Surge)	IEC/EN 61000-4-5			±2 kV / ±1 kV			
HF line emission	IEC/EN 61000-4-6			10 V			
Interference emission	EN 61000-6-4			Class B			
Isolation data							
Isolation test (between all isolated circuits)				1.5 kV			
Test voltage (between all isolated circuits)				1.5 kV / 50 Hz			

1) Includes non-linearity and factory setting, influenced by supply voltage and output load.
 2) Detection of an input signal break (fail safe) and resistance > 10 kΩ results in a linearity of ±0,2 %.
 3) When connecting a 2-wire sensor, the terminals J and H have to be jumpered.

Analog signal converters

Technical data

Type	CC-U/STDR		CC-U/RTDR 1)	CC-U/TCR
Input circuits - Analog inputs	J-H			
Measuring signal / input range	0-20 mA 4-20 mA	0-1 V / 1-5 V 0-10 / ±10 V	Temperature sensors PT100	Thermocouples (IEC 584-1 and 2) TC.K, TC.J TC.T, TC.S
Input resistance	approx. 50 Ω	approx. 1,5 MΩ		
Adjustable threshold	2-100 % of selected input range			
Adjustable hysteresis	5-50 % of threshold			
Repeat accuracy (constant parameters)	±0.5 % of full-scale			
Output circuits - Relay outputs	E-D-F, B-C-A		Relay, 2 c/o contacts	
Rated switching voltage	250 V AC			
Rated switching current	AC12 (resistive) 230 V AC15 (inductive) 230 V DC12 (resistive) 24 V DC13 (inductive) 24 V	4 A 3 A 4 A 2 A		
AC rating (UL 508)	Utilization category (Control Circuit Rating Code) max. rated operational voltage max. continuous thermal current at B 300 max. making/breaking apparent power at B 300	B 300 300 V AC 5 A 3600/360 VA		
Minimum switching voltage	12 V			
Minimum switching current / power	10 mA / 0.6 VA (W)			
Response time	10 ms			
Mechanical lifetime	30 x 10 ⁶ switching cycles			
Electrical lifetime	at AC12, 230 V, 4 A	0.1 Mio. switching cycles		
Supply circuits	K-M			
Rated supply voltage	24-48 V DC		110-240 V AC	
Supply voltage range	24-48 V DC / 24 V AC		110-240 V AC / 100-300 V DC	
Supply voltage tolerance	DC: -15...+15 %		AC: -15...+10 %	
Rated frequency	0 Hz or 50/60 Hz			
Power consumption	2 W at 24 V DC		4.5 VA at 230 V AC	
Indication of operational states				
Supply voltage	U: green LED			
1st / 2nd output relay energized	R1: yellow LED / R2: yellow LED			
General data				
Ambient temperature range	operation / storage	-20...+60 °C / -40...+80 °C		
Temperature coefficient	±300 ppm/°C			
Mounting position	any			
Mounting	DIN rail (IEC/EN 60715), snap-on mounting / screw mounting with adapter			
Electrical connection				
Wire size	rigid fine-strand with(out) wire end ferrule	plug-connector with screw terminals 0.2-2.5 mm ² (24-12 AWG) plug-connector with screw terminals 0.2-2.5 mm ² (24-12 AWG)		
Stripping length	7 mm (0.28 inch)			
Tightening torque	0.4 Nm (3.5 lb.in)			
Electromagnetic compatibility				
Interference immunity	EN 61000-6-2			
electrostatic discharge (ESD)	IEC/EN 61000-4-2	Level 3 (±6 kV / ±8 kV)		
electromagnetic field (HF radiation resistance)	IEC/EN 61000-4-3	10 V/m		
fast transients (Burst)	IEC/EN 61000-4-4	Level 3 (±2 kV / 5 kH)		
powerful impulses (Surge)	IEC/EN 61000-4-5	±2 kV / ±1 kV		
HF line emission	IEC/EN 61000-4-6	10 V		
Interference emission	EN 61000-6-4	Class B		
Isolation data				
Insulation voltage (between all isolated circuits)	2.5 kV			
Test voltage (between all isolated circuits)	2.5 kV			

1) When connecting a 2-wire sensor, the terminals J and H have to be jumpered.

Analog signal converters

Technical data

Type	CC-E/I		CC-E I _{AC} /ILPO
	J-G-H		C-D
Input circuits - Analog inputs	AC current	DC current	2 meas. ranges selectable
Rated input range	0-5 A / 0-20 A	0-5 A / 0-20 A	0-1 A / 0-5 A / sinusoidal
Measuring frequency			50/60 Hz
Overload capacity of inputs	input range 1	10 x I _{Nom} (50 A) for max. 1 s	10 x I _{Nom} (50 A) for max. 2 s
	input range 2	10 x I _{Nom} (200 A) for max. 1 s	10 x I _{Nom} (200 A) for max. 2 s
Gain adjustment range	±5 % (universal devices)		-
Offset adjustment range	±5 % (universal devices)		-
Input impedance / resistance	5A : 65 mΩ	20 A : 2.5 mΩ	5 mΩ
Output circuits - Analog outputs	D-F Current	A-C Voltage	F-E passive current output in proportion to input current
Output signal	0-20 mA / 4-20 mA	0-10 V	4-20 mA
Output burden / load	≤ 500 Ω	≥ 1.0 Ω	12 V DC: 150 Ω, 24 V DC: 750 Ω 30 V DC: 1050 Ω
Accuracy ¹⁾	± 2 % of full-scale		
Offset adjustment range	±5 % (universal device)		± 5 %
Gain adjustment range	±5 % (universal device)		± 20 %
Residual ripple	< 0.5 %		
Response time	0.5 s		0.6 s
Transmission frequency	DC or 50/60 Hz		AC: 50/60 Hz
Reaction to input circuit interruption	Low fail safe: output voltage < 200 mA, output current < 400 μA		-
Supply circuits	K-M	DC versions	AC versions
Supply voltage		24 V DC	110-240 V AC 50/60 Hz
Supply voltage tolerance		-15...+15 %	-15...+10 %
Power consumption		typ 1.5 W	typ 1.5 VA
			12-30 V DC
Indication of operational states			
Supply voltage	U: green LED		-
General data			
Ambient temperature range	operation / storage	0...+60 °C / -20...+80 °C	-20...+60 °C / -40...+80 °C
Temperature coefficient		± 500 ppm/°C	300 ppm/°C
Degree of protection (DIN 40050)		IP20	
Mounting position		ventilation slots on top and bottom	
Mounting		DIN rail (IEC/EN 60715), snap-on mounting	
Electrical connection			
Wire size	rigid	0.2-4 mm ² (24-12 AWG)	
	fine-strand with(out) wire end ferrule	0.2-2.5 mm ² (24-14 AWG)	
Stripping length		7 mm (0.28 inch)	
Tightening torque		0.5 Nm (4.4 lb.in)	
Electromagnetic compatibility			
Interference immunity		EN 61000-6-2	
electrostatic discharge (ESD)	IEC/EN 61000-4-2	Level 3 (±6 kV / ±8 kV)	
electromagnetic field (HF radiation resistance)	IEC/EN 61000-4-3	10 V/m	
fast transients (Burst)	IEC/EN 61000-4-4	Level 3 (±2 kV / 5 kHz)	
powerful impulses (Surge)	IEC/EN 61000-4-5	±2 kV / ±1 kV	
HF line emission	IEC/EN 61000-4-6	10 V	
Interference emission	EN 61000-6-4	Class B	
Isolation data			
Test voltage (between all isolated circuits)		2.5 kV AC	
Rated insulation voltage		-	250 V AC

¹⁾ Includes non-linearity and factory setting, influenced by supply voltage and output load.

Analog signal converters

Technical data

Type		CC-U/I	CC-U/V
Input circuits - Analog inputs	J-G-H	any current signals, RMS measurement	any voltage signals, RMS measurement
Rated input range		0-1 A 0-5 A	0-100 V, 0-200 V 0-300 V, 0-400 V 0-500 V, 0-600 V
Measuring frequency			0-600 Hz
Overload capacity of inputs	input range 1 input range 2	10 x I _{Nom} (10 A) for max. 2 s 10 x I _{Nom} (50 A) for max. 2 s	- -
Gain adjustment range			±15 %
Offset adjustment range			±20 %
Input impedance / resistance		1A: 60 mΩ, 5 A: 12 mΩ	> 800 kΩ
Output circuits - Analog outputs	D-F, A-C	Current	Voltage
Output signal		0-20 mA, 4-20 mA	0-5 V, 1-5 V, 0-10 V, 2-10 V, ± 10 V
Output load		≤ 600 Ω	≥ 4.7 kΩ
Accuracy ¹⁾			±0.5 % of full-scale
Temperature coefficient		±250 ppm/°C max.	±300 ppm/°C max.
Residual ripple			< 0.15 %
Response time			150 ms
Supply circuits	K-M		
Rated supply voltage		24-48 V DC	110-240 V AC
Supply voltage range		24-48 V DC, 24 V AC	110-240 V AC, 100-300 V DC
Supply voltage tolerance		DC: -15...+15 %	AC: -15...+10 %
Rated frequency			0 Hz or 50/60 Hz
Power consumption		2 W at 24 V DC	4.5 VA at 230 V AC

12 Indication of operational states

Supply voltage	U: green LED
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General data

Ambient temperature range	operation / storage	-20...+60 °C / -40...+80 °C
Mounting position		any
Mounting		DIN rail (IEC/EN 60715), snap-on mounting / screw mounting with adapter

Electrical connection

Wire size	rigid	plug-connector with screw terminals 0.2-2.5 mm ² (24-12 AWG)
	fine-strand with(out) wire end ferrule	plug-connector with screw terminals 0.2-2.5 mm ² (24-12 AWG)
Stripping length		7 mm (0.28 inch)
Tightening torque		0.4 Nm (3.5 lb.in)

Standards

Product standard		-
Low Voltage directive		2006/95/EG
EMC directive		2004/108/EG
RoHS directive		2002/95/EG

Electromagnetic compatibility

Interference immunity		EN 61000-6-2
electrostatic discharge (ESD)	IEC/EN 61000-4-2	Level 3 (±6 kV / ±8 kV)
electromagnetic field (HF radiation resistance)	IEC/EN 61000-4-3	10 V/m
fast transients (Burst)	IEC/EN 61000-4-4	Level 3 (±2 kV / 5 kHz)
powerful impulses (Surge)	IEC/EN 61000-4-5	±2 kV / ±1 kV
HF line emission	IEC/EN 61000-4-6	10 V
Interference emission	EN 61000-6-4	Class B

Isolation data

Insulation voltage (between all isolated circuits)		1.5 kV
Test voltage (between all isolated circuits)		1.5 kV / 50 Hz

¹⁾ Includes non-linearity and factory setting, influenced by supply voltage and output load.

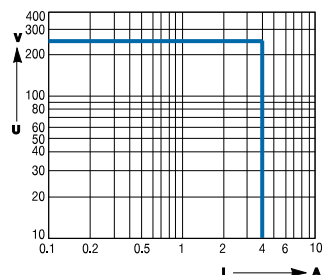
Analog signal converters

Technical diagrams, connection diagrams
Approximate dimensions

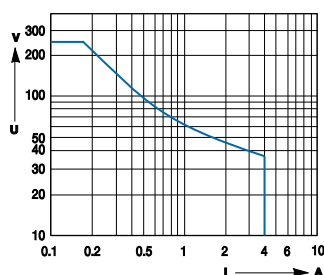
Technical diagrams

Load limit curves CC-U/xxR

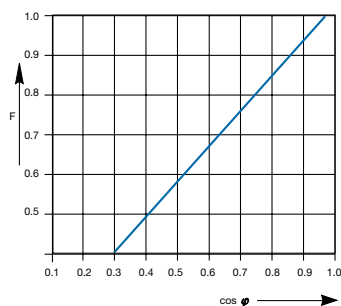
Resistive AC load



Resistive DC load



Derating curve



Connection diagram CC-U/x

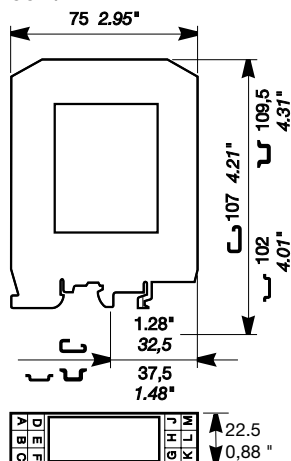
Width 22.5 mm (0.89 in)



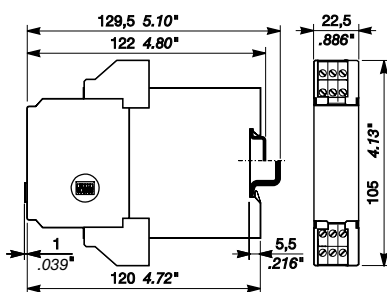
Dimensional drawings

Dimensions in mm and inches

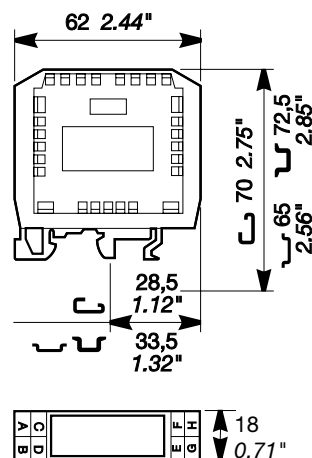
CC-E/x

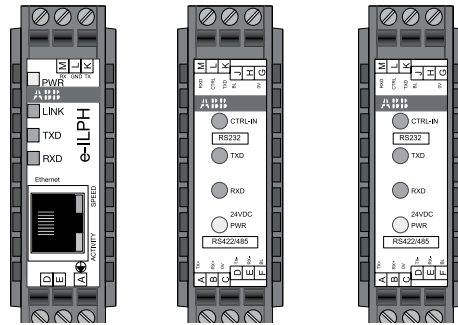


CC-U/x, CC-U/xR



CC-E I_{AC}/ILPO, CC-E I/I





In the field of industrial data transmission, various processes of data transmission and interfaces are used today. Already existing systems need to be updated or connected to new devices for continuity of process. When new communication functions are not build-in, ABB propose a range of converters to be able to use from the standard RS232 or RS485, to the Ethernet open products or the Optical Fiber.

Ethernet communication is now one of the main features need in open communication, ABB propose the e-ILPH to connect the serial devices to the web world.

Serial data Converters

Serial data converters Overview

Uses

Adaptation

The use of converters allows the connection of two devices using different interfaces.
To add new equipment to existing installations.

Galvanic Isolation

To protect sensitive equipment it is sometimes necessary to use converters which allow galvanic isolation.

To cross a disturbed environment

Some interfaces are more sensitive to noise. Electrically, it is preferable, in some cases, to change the interface or support.

Type of connection Immunity to noise

RS232	Low
RS422	High
RS485	High
CL	High
OF	Very high
Ethernet	High

Multipoint connections

Some equipment is only designed to communicate in RS232 point to point connection. To communicate with several devices it is then necessary to use converters RS232 to RS422, RS485, CL or OF to reach multipoint mode.

Type of connection	Connection
RS232	Point to point
RS422	12 points
RS485	32 points
CL	5-6 points
OF	32 points
Ethernet	Point to point or multipoint

Increase in the transmission and amplification distances of the signals

Every connection has its own limits, to increase the communication distances you only have to change the type of link (converter) or amplify the signal (Repeater) using an ILPH.

Type of connection	Max. distances *
RS232	15m
RS422	1.2km
RS485	1.2km
CL	300-500m
OF	4km
Ethernet	100 m with CAT5 cable

* Depending on transmission speed.

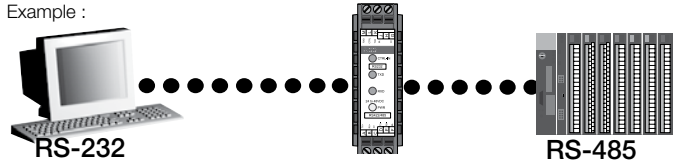
"World Wide" communication

Communication is more and more used with Ethernet support. The interests are to have a distant access, to use an already existing network and to upload information and data on a supervisor or a computer. The conversions from serial to Ethernet protocol are used to connect local network to Ethernet.

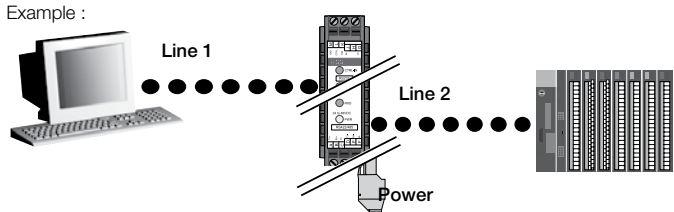
Protocol conversion

Modbus is one of the main protocols used in the industrial networks. The creation of Modbus/TCP allows an adapted access to the Ethernet network. So, the conversion between these 2 protocols is necessary.

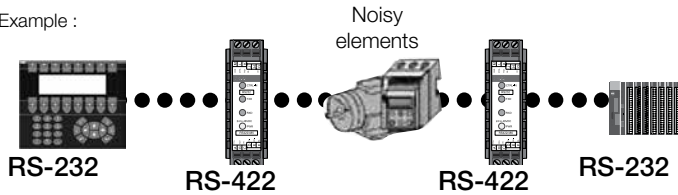
Example :



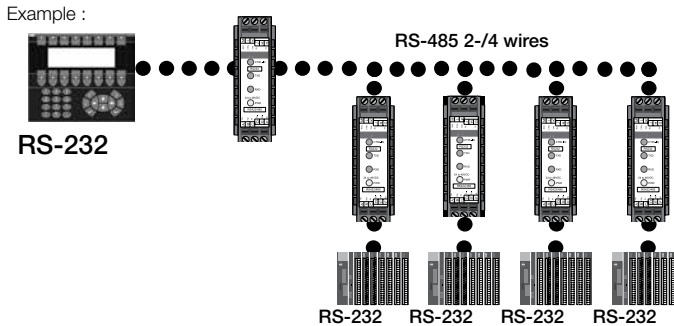
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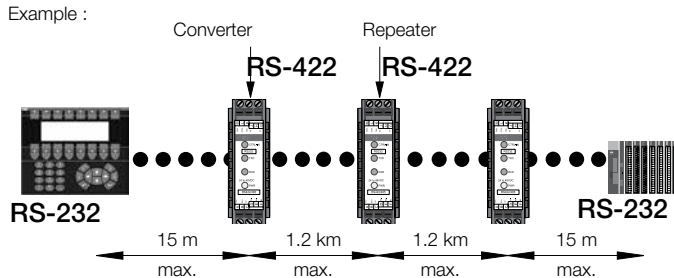
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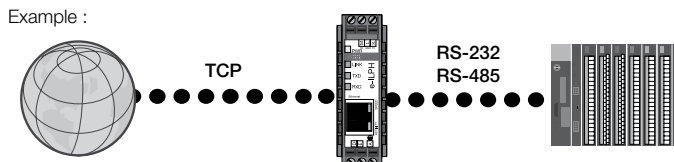
Example :



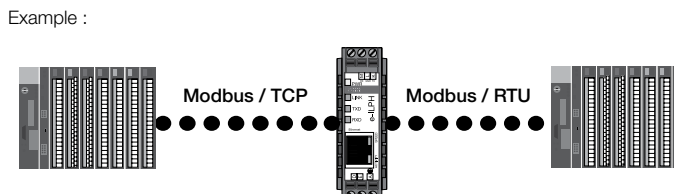
Example :



Example :



Example :



Serial data converters

Selection table

	RS232	RS422 / RS485	CL	OF-S	OF-P	Ethernet	24 V DC	24-48 V DC	110-240 V AC	24-42 V AC/DC	10-34 VDC, 10-24 VAC	Insulation *	Catalog number
RS232	■							■				In-Ps-Out	1SNA684234R2000
	■								■			In-Ps-Out	1SNA684244R0200
		■					■					Wi	1SNA684231R2500
		■					■					In-Out	1SNA684233R2700
		■						■				In-Ps-Out	1SNA684333R2300
		■							■			In-Ps-Out	1SNA684334R2400
			■				■					In-Out	1SNA684202R0100
				■						■		In-Ps-Out	1SNA684236R2200
				■						■		In-Ps-Out	1SNA684237R2300
					■					■		In-Ps-Out	1SNA684238R0400
RS422 /RS485		■					■					In-Out	1SNA684212R2200
			■				■					In-Out	1SNA684232R2600
RS485				■						■		In-Ps-Out	1SNA684246R0400
				■					■			In-Ps-Out	1SNA684247R0500
					■				■			In-Ps-Out	1SNA684248R1600
					■				■			In-Ps-Out	1SNA684249R1700
RS232 / RS485					■					■	In-Ps-Out	1SNA684252R0200	

* In=Input, Ps=Power supply, Out=Output, Wi=Without insulation

● **RS 232 - EIA-232 / V.24 / V.28**

Point-to-point connection
 Max. 15 m transmission distance
 Rate up to 19.2 kbit/s
 Full-duplex

● **RS 422 - EIA-422 / V.11**

Point-to-point connection
 (1 Transmitter - 10 Receivers)
 Differential voltage transmission
 Full-duplex
 Up to 1200 m / 10Mbit/s
 Good EMC characteristics

● **Current loop(TTY)**

Point-to-point / multi-point connection
 Active or passive current loop
 Full-duplex
 Up to 1200 m/19.2 kBit/s
 Good EMC characteristics

● **RS 485 - ISO/IEC/EIA-485**

Multi-point connection up to 32 units
 Differential voltage transmission
 Half-duplex on 1 pair
 Full-duplex on 2 pairs
 Up to 1200 m / 10Mbit/s
 Good EMC characteristics

● **Optical fiber interface**

Point-to-point connection
 Full-duplex
 From 40m up to 4km transmission distance
 according to optical fiber material (plastic / glass)
 and wavelength used up to 10 Mbit/s
 Excellent EMC characteristics

● **Ethernet Interface**

Point to point connexion or multipoint connection.
 Up to 100m using CAT5 cable without Hub or Switch
 10/100 Mbit/s
 Good EMC characteristics

Serial data converters

Benefits and advantages

ILPH RS 232 - 485 / Ethernet

Isolated RS232 or/and RS485 to Ethernet converter

- Triple galvanic isolation
- RS232 on SUBD 9 points or screw connectors
- RS485 on removable screw connectors
- Ethernet 10/100 Mbit/s, RJ45 connector
- Power supply 10-34 VDC et 10-24 VAC
- Possible to have a redundant 10-34 VDC power supply
- Economic with low consumption
- Up to 100m with CAT5 cable without Hub or Switch
- Good EMC characteristics
- Up to 2 Modbus®/TCP Masters

Available modes:

- Modbus®/TCP to Modbus® RTU conversion
- Transparent Client or Server mode
- SMTP mode (Mail send)

Standards: TPC/IP, TELNET, DHCP, FTP

- Specifics functions in Modbus® protocol:
- Concentrator (Asynchronous mode) up to 1200 words
- AC31 programming
- Modbus® Easy Net mode : this mode could be used to exchange data without a Modbus®/TCP master. The data are logged in a table and could be distributed to one or all the others e-ILPH participants on Ethernet.

ILPH RS 232 / RS 422 - 485

- 3 way galvanic isolated converter for RS 232 to RS 422-485 serial links.
- 3 way galvanic isolation between power supply and input/output
- RS 485 switch on 2 or 4 wires
- Baudrate up to 38.4 kbit/s
- Transmission distance up to 1200 m
- RS 485 1 or 2 pair handling
- Usable in "noisy" environments
- 24...48 V DC and 115...230 V AC power supply
- CE marking

ILPH RS 422 - 485 / RS 422 - 485

Galvanic isolated connection between an RS 422-485 (1 or 2 pairs) and an RS 422 485 (1 or 2 pairs) serial link. It amplifies the signal beyond the 1200 m limit distance of the RS 422-485 and only needs a minimum of 1.5 character delay time to switch off the RS 485 drivers.

- Galvanic isolation between power supply/output and input/output
- Baudrate up to 500 kbit/s (up to 200 m)
- Transmission distance up to 1200m at 38.4 kbit/s
- Usable in "noisy" environments
- 2/4 wires automatic handling
- 24 V DC power supply
- CE mark

ILPH RS 485 / FO

3 way galvanic isolated converter for RS 485 (1 pair) to optical fiber serial link glass (S) or plastic (P).

- 3 way galvanic isolation between power supply and input/output
- Baud rate up to 1.5 Mbit/s
- Available for glass fiber or plastic fiber
- Transmission distance up to 4 km
- Usable in "very noisy" environments
- 20...42 V AC/DC and 110...240 V AC/DC power supply
- CE marked

ILPH RS 232 / RS 422 - 485

RS 232 to RS 422-485 serial link without isolation

- Economic version without isolation
- Baudrate up to 38.4 kbit/s
- Transmission distance up to 1200 m
- RS 485 1 or 2 pair handling
- Usable in "noisy" environments
- 24 V DC power supply
- CE mark

ILPH RS 232 / RS 422 - 485

Galvanic isolated converter for RS 232 to RS 422-485 serial links.

- Galvanic isolation between input/output and output/power supply
- Baudrate up to 38.4 kbit/s
- Transmission distance up to 1200 m
- RS 485 1 or 2 pair handling
- Usable in "noisy" environments
- 24 V DC power supply
- CE mark

ILPH RS 232 / CL

Galvanic isolated Converter for RS 232 to current loop serial link.

- Galvanic isolation between power supply/current loop and RS 232/current loop
- Active/Passive 0...20 mA / 4...20 mA selectable
- Positive or negative logic selectable
- Baudrate up to 38.4 kbit/s
- Transmission distance up to 1200 m
- Usable in "noisy" environments
- 24 V DC power supply
- CE marking

ILPH RS 232 / RS 232

3 way galvanic isolator between RS 232 serial interface and another RS 232 serial interface.

- Ensures triple insulation between the 2 serial interfaces and between each and power supply
- Baudrate up to 19.2 kbit/s (up to 64 kbit/s depending on cable)
- Transmission distance up to 15 m
- Can be used in "noisy" environments
- Power supply from 24...48 V DC and 115...230 V AC CE marking

ILPH RS 232 / FO

- 3 way galvanic isolated Converter for RS 232 to optical fiber serial link glass (S) or plastic (P).
- 3 way galvanic isolation between power supply and input/output
- Baud rate up to 115.2 kbit/s
- Available for glass or plastic fiber
- Transmission distance up to 4 km
- Usable in "very noisy" environments
- 20...42 V AC/DC and 110...240 V AC/DC power supply
- CE marked

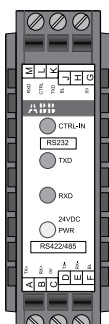
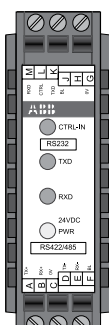
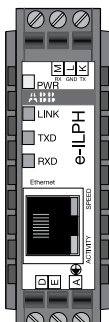
ILPH CL / RS 422 - 485

Galvanic isolated converter for current loop to RS 422-485 (1 or 2 pairs) serial link.

- Galvanic isolation between power supply/current loop and RS 422-485/current loop
- Active/passive 0...20 mA / 4...20 mA selectable
- Positive or negative logic selectable
- Baudrate up to 38.4 kbit/s (up to 2400 m)
- Transmission distance up to 2400 m (1200 m RS 485 and 1200 m current loop)
- Usable in "noisy" environments
- 24 V DC power supply
- CE marking

Serial data converters

Ordering details



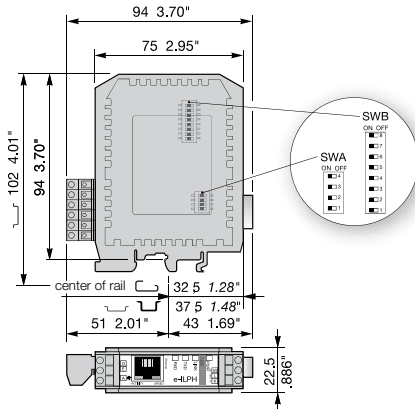
Description	Type	Catalog number	Weight (1 pce) kg (lb)
Serial data converter e-ILPH	ILPH RS 232-RS 485 / Ethernet	1SNA684252R0200	0.12 (0.265)
Serial link interface without galvanic isolation	ILPH RS 232 / RS 422-485	1SNA684231R2500	0.1 (0.220)
Serial link interface with galvanic isolation	ILPH RS 232 / RS 422-485	1SNA684233R2700	0.1 (0.220)
Serial link interface 3 way galvanic isolation	ILPH RS 232 / RS 422-485 (24-48 V DC power supply)	1SNA684333R2300	0.1 (0.220)
	ILPH RS 232 / RS 422-485 (115-230 V DC power supply)	1SNA684334R2400	
Serial link interface 3 way galvanic isolation	ILPH RS 232 / RS 232 (24-48 V DC power supply)	1SNA684234R2000	0.1 (0.220)
	ILPH RS 232 / RS 232 (115-230 V DC power supply)	1SNA684234R0200	
Serial link interface with galvanic isolation	ILPH RS 422 - 485 / RS 422 - 485 (24 V DC power supply)	1SNA684212R2200	0.1 (0.220)
	ILPH RS 232 / FO-S (24...42 V AC/DC power supply)	1SNA684236R2200	
Serial link interface 3 way galvanic isolation	ILPH RS 232 / FO-S (110...240 V AC/DC power supply)	1SNA684237R2300	0.15 (0.331)
	ILPH RS 232 / FO-P (24...42 V AC/DC power supply)	1SNA684238R0400	
	ILPH RS 232 / FO-P (110...240 V AC/DC power supply)	1SNA684239R0500	
Serial link interface 3 way galvanic isolation	ILPH RS 485 / FO-S (24...42 V AC/DC power supply)	1SNA684246R0400	0.15 (0.331)
	ILPH RS 485 / FO-S (110...240 V AC/DC power supply)	1SNA684247R0500	
	ILPH RS 485 / FO-P (24...42 V AC/DC power supply)	1SNA684248R1600	
	ILPH RS 485 / FO-P (110...240 V AC/DC power supply)	1SNA684249R1700	
Serial link interface with galvanic isolation	ILPH BdC /RS 422 - 485 (24 V DC power supply)	1SNA684232R2600	0.1 (0.220)
Serial link interface with galvanic isolation	ILPH RS 232 BdC (24 V DC power supply)	1SNA684202R0100	0.1 (0.220)

Serial data converters

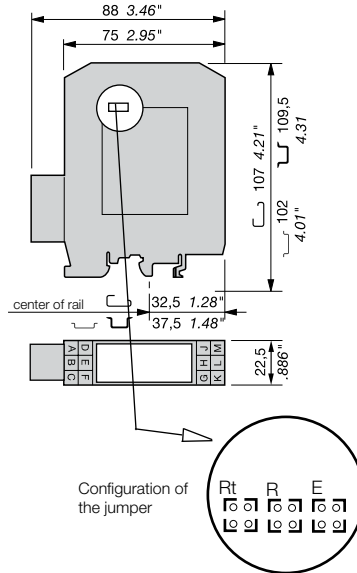
Jumper

Approximate dimensions

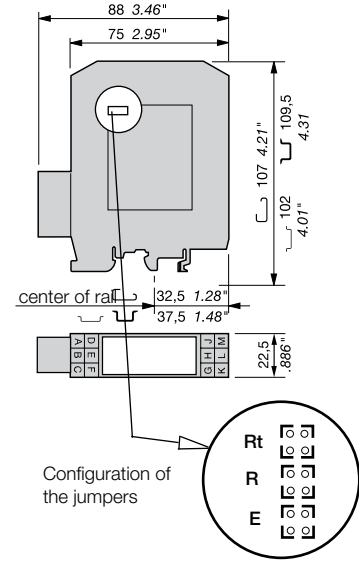
ILPH RS 232 - 485 Ethernet



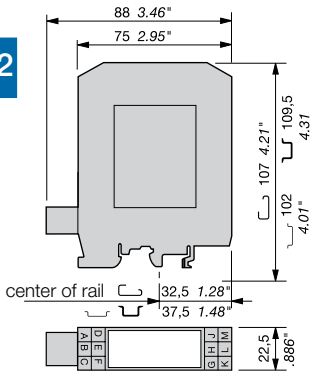
ILPH RS 232 - 485 Ethernet (without isolation)



ILPH RS 232 - 485 Ethernet (isolated)



ILPH RS 232 / RS 232



RS 485 LINK ON ONE PAIR

R		R ON/OFF	Jumper R in position	R ON/OFF
E		E ON/OFF	Jumper E in position	E ON/OFF

The Receiver and the Transmitter are activated alternately (never at the same time) depending on the status of the CTRL IN signal.

CTRL IN STATUS	ACTION ON RS 485
0 logic (+3V ≤ U ≤ +25V)	Transmitter active / Receiver inactive
1 logic (-25V ≤ U ≤ -3V)	Transmitter inactive / Receiver active
High impedance	Transmitter inactive / Receiver active

NOTE : For RS 232 products running the RTS (REQUEST TO SEND) signal, connect RTS to CTRL IN. Otherwise, connect M (Rx/D ILPH) to L (CTRL IN).

RS 485 LINK ON 2 PAIRS

R		R ON	Jumper R in position	R ON
E		E ON/OFF	Jumper E in position	E ON/OFF

Receiver permanently active

Transmitter controlled by the signal CTRL IN (see table for Transmitter operation as a function of CTRL IN)

RS 422 LINK ON TWO PAIRS

R		R ON	Jumper R in position	R ON
E		E ON	Jumper E in position	E ON

The Transmitter and Receiver are both permanently active.

POLARIZATION OF THE RS 422 - RS 485 LINE

The line must always be polarized. The ILPH is used to polarize the reception channel :
 Connection by 1 wire P+ (J1.1) with 5V (J1.4)
 Connection by 1 wire P- (J1.2) with 0V (J1.3)

ADAPTING THE RS 422 - RS 485 LINE

The line must always be adapted to the level of the reception channel of each subscriber forming the end of the bus. The ILPH is used to adapt the reception channel by setting the jumper Rt correctly :

Rt		* Line adaptation, Rt = 120 Ω (general case)
Rt		* Line adaptation, Rt = 220 Ω
Rt		* No line adaptation, Rt = ∞

RS 485 LINK ON ONE PAIR

R		R ON/OFF	Jumper R in position	R ON/OFF
E		E ON/OFF	Jumper E in position	E ON/OFF

The Receiver and the Transmitter are activated alternately (never at the same time) depending on the status of the CTRL IN signal.

CTRL IN STATUS	ACTION ON RS 485
0 logic (+3V ≤ U ≤ +25V)	Transmitter active / Receiver inactive
1 logic (-25V ≤ U ≤ -3V)	Transmitter inactive / Receiver active
High impedance	Transmitter inactive / Receiver active

CAUTION : For RS 232 products running the RTS (REQUEST TO SEND) signal, connect RTS to CTRL IN. Otherwise, connect M (Rx/D ILPH) to L (CTRL IN).

RS 485 LINK ON 2 PAIRS

R		R ON	Jumper R in position	R ON
E		E ON/OFF	Jumper E in position	E ON/OFF

Receiver permanently active

Transmitter controlled by the signal CTRL IN (see table for Transmitter operation as a function of CTRL IN)

RS 422 LINK ON TWO PAIRS

R		R ON	Jumper R in position	R ON
E		E ON	Jumper E in position	E ON

The Transmitter and Receiver are both permanently active.

POLARIZATION OF THE RS 422 - RS 485 LINE

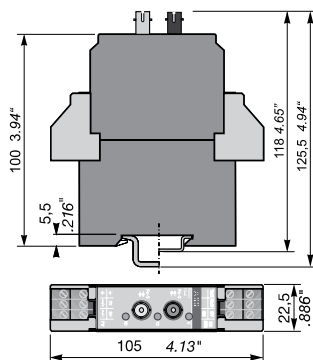
The line must always be polarized. The ILPH is used to polarize the reception channel :
 Connection by 1 wire P+ (J1.1) with 5V (J1.4)
 Connection by 1 wire P- (J1.2) with 0V (J1.3)

ADAPTING THE RS 422 - RS 485 LINE

The line must always be adapted to the level of the reception channel of each subscriber forming the end of the bus. The ILPH is used to adapt the reception channel by setting the jumper Rt correctly :

Rt		* Line adaptation, Rt = 120 Ω (general case)
Rt		* Line adaptation, Rt = 220 Ω
Rt		* No line adaptation, Rt = ∞

ILPH RS 232 / FO

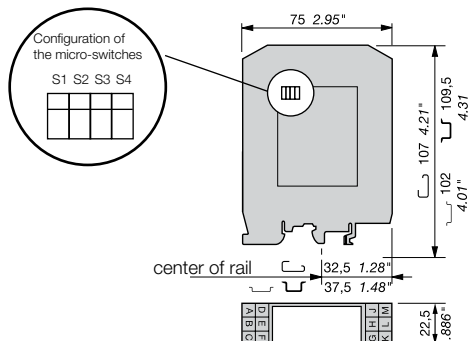


Serial data converters

Jumper, micro-switch

Approximate dimensions

ILPH RS 232 / CL



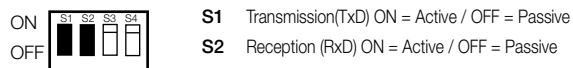
CONFIGURATION

The various configurations can be selected using the 4 micro-switches located inside the box.

OPERATING MODE ACTIVE OR PASSIVE

The Current Loop's Transmission and Reception can be independently in active or passive mode.

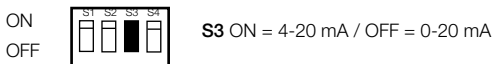
Select operating mode using **S1** and **S2**.



SIGNAL LEVEL

Select signal level 4-20 mA or 0-20 mA.

This selection is made using micro-switch S3



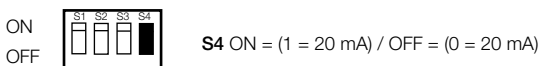
Caution :

It is not possible to select a 4-20 mA signal when the Reception is in active mode.

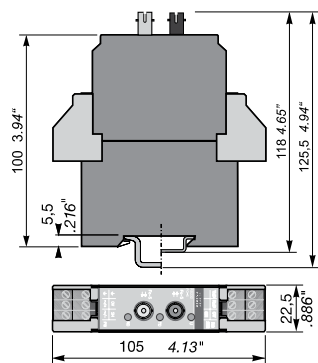
LOGIC LEVEL

Configuration : Positive logic (0 Logic = 20 mA) or negative logic (1 Logic = 20 mA)

using micro-switch S4

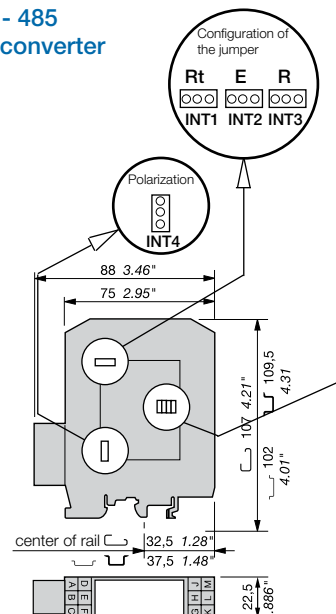


ILPH RS 485 / FO



ILPH CL / RS 422 - 485

Galvanic isolated converter for current loop



LINE AMPLIFIER CONFIGURATION

Configuration of amplifiers of the RS 422 - RS 485 (Receiver, Transmitter) line provides greater flexibility of use.

The various configurations can be selected using the 2 jumpers (R INT2, E INT1) located inside the box.

RS 485 LINK ON ONE PAIR



The Receiver and the Transmitter are activated alternately (never at the same time) depending on the status of the Current Loop Reception signal.

RS 485 LINK ON TWO PAIRS



Receiver permanently active. Transmitter controlled by the Current Loop Reception signal.

RS 422 LINK ON TWO PAIRS



The Receiver and the Transmitter are both permanently active.

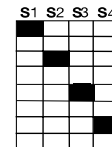
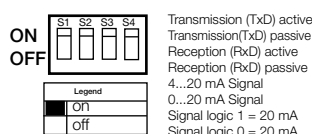
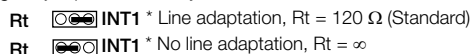
POLARIZATION OF THE RS 422 - RS 485 LINE

The line must always be polarized. The ILPH is used to polarize the reception channel :

Connection by 1 wire P+ (J1.1) with 5 Viso (J1.4)
Connection by 1 wire P- (J1.2) with 0 Viso (J1.3)

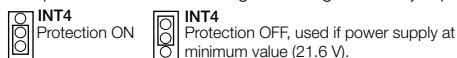
ADAPTING THE RS 422 - RS 485 LINE

The line must always be adapted to the level of the reception channel of each subscriber forming the end of the bus. The ILPH is used to adapt the reception channel by setting the jumper Rt correctly :



POLARIZATION

The polarization can be configured using the INT4 jumper.

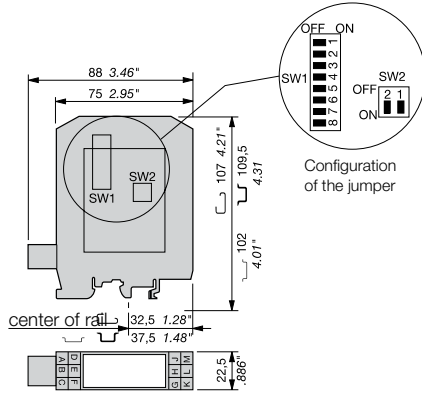


Serial data converters

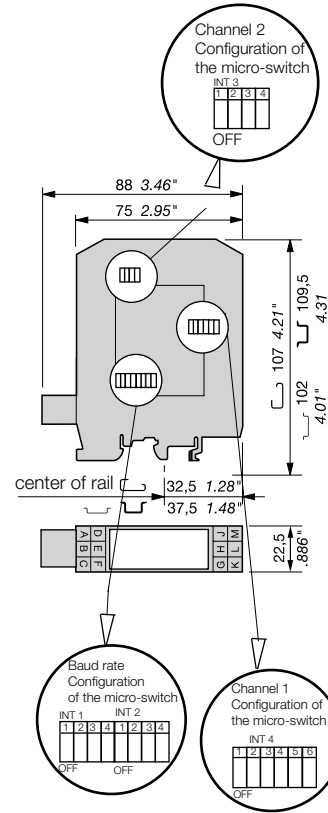
Jumper, micro-switch

Approximate dimensions

ILPH RS 232 - 485 Ethernet (3 way galvanic isolated)



ILPH RS 422 - 485 / RS 422 / - 485



RS 485 LINK ON ONE PAIR

Set SW1-1, SW1-3, SW1-6, SW1-7 and SW1-8 to position ON.

The receiver and the transmitter are activated alternately (never at the same time), depending on the status of the CTRL IN signal.

CTRL IN STATUS	Action on RS 485
0 Logic ($3V \leq U \leq +25V$)	Transmitter active / Receiver inactive
1 Logic ($-25V \leq U \leq -3V$)	Transmitter inactive / Receiver active
High impedance	Transmitter inactive / Receiver active

CAUTION : For RS 232 products running the RTS signal (REQUEST TO SEND), connect RTS to CTRL IN. Otherwise, set SW2-1 to position ON.

RS 485 LINK ON TWO PAIRS

Set SW1-1, SW1-3, SW1-7 in position OFF. Set SW1-6, SW1-8 in position ON.

The receiver is permanently active. The transmitter is controlled by the signal CTRL IN (see table for transmitter operation as a function of CTRL IN).

RS 422 LINK ON TWO PAIRS

Set SW1-1, SW1-3, SW1-7 and SW1-8 in position OFF. Set SW1-6 in position ON. Transmitter and receiver are both permanently active.

POLARIZATION OF THE RS 422 - RS 485 LINE

The ILPH is used to polarize the reception channel : Set SW1-4 and SW1-5 in position ON.

ADAPTING THE RS 422 - RS 485 LINE

The line must always be adapted to the level of the reception channel of each subscriber forming the end of the bus.

The ILPH is used to adapt the reception channel by setting the jumper SW1-2 correctly :

SW1-2 in position ON \Rightarrow line adaptation, $R_t = 120 \Omega$ (standard)

SW1-2 in position OFF \Rightarrow no line adaptation, $R_t = \infty$

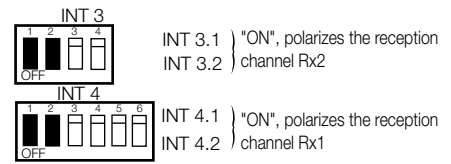
RS 422 - RS 485 DRIVERS CONTROL

The RS 422 - RS 485 Drivers Control (transmitters and receivers) makes the ILPH easy to use. The control of the 2 channels is completely automatic ; you only have to configure the baud rate needed.

The minimum turn off delay is about 1.5 character/ time from 27 μ s to 10 ms depending on the baud rate selected.

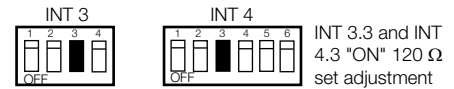
POLARIZATION OF THE RS 422 - RS 485 CONNECTIONS

The connections must always be polarized. The ILPH is used to polarize the reception channels :



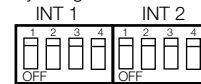
ADAPTING THE RS 422 - RS 485 CONNECTIONS

The connections must always be adjusted to the level of the reception channel of each subscriber forming the end of the bus. The ILPH is used to adjust the reception channel by setting the micro-switch INT 3.3 and INT 4.3.



BAUD RATE

By using the 8 micro-switches inside the box.



Permits to define up to 8 transmission speeds and to select the Full

Duplex operation mode (RS 422 / RS 422) in addition with the INT 3.4 INT 4.4 and INT 4.5 micro switches.

BAUD RATE	INT 1	INT 2	INT 3	INT 4
FULL DUPLEX	0 0 0 0	0 0 0 0	X X X 1	X X X 1 0 1
500 Kb/s	1 1 1 1	1 1 1 1	X X X 0	X X X 0 0 0
187.5 Kb/s	1 1 1 1	1 1 1 0	X X X 0	X X X 0 0 0
93.75 Kb/s	1 1 1 1	1 1 0 0	X X X 0	X X X 0 0 0
38.4 Kb/s	1 1 1 1	1 0 0 0	X X X 0	X X X 0 0 0
19.2 Kb/s	1 1 1 1	0 0 0 0	X X X 0	X X X 0 0 0
9.6 Kb/s	1 1 1 0	0 0 0 0	X X X 0	X X X 0 0 0
4.8 Kb/s	1 1 0 0	0 0 0 0	X X X 0	X X X 0 0 0
2.4 Kb/s	1 0 0 0	0 0 0 0	X X X 0	X X X 0 0 0
1.2 Kb/s	0 0 0 0	0 0 0 0	X X X 0	X X X 0 0 0

N_U = not used 1 = contact closed
X = zero 0 = contact open (aus) (off)

Serial data converters

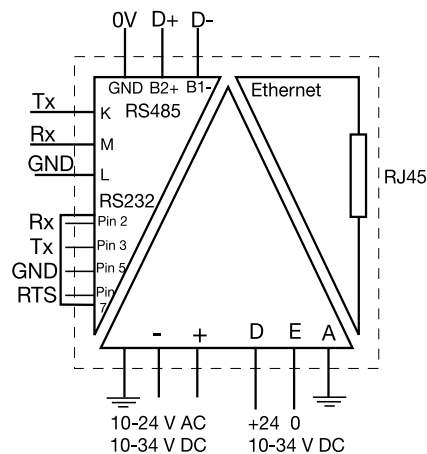
Technical data

Technical data

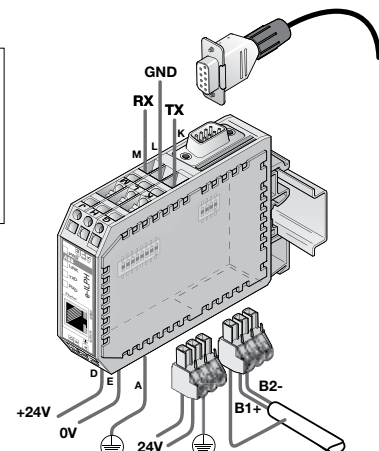
Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

		ILPH RS 232 - 485 / Ethernet
Power supply 1		
Voltage		10...34 V DC, 10...24 V AC
Voltage tolerance		-10%, +10%
Consumption		2 W max
Connections		coding screw removable connector 0 to 2.5 mm ² (22-14 AWG)
Power supply 2		
Voltage		10...34 V DC
Voltage tolerance		-10%, +10%
Consumption		2 W max
Connections		screw connector (AWG 20)
Serial link 1: RS 232		
Overvoltage protection		integrated
Baud rate / Transmission distance		max. 115.2 kbits/s / max. 15 m
Connections		2.5 mm ² screw connector (AWG 20) or male SubD 9 points
Serial link 2: RS 485		
Overvoltage protection		integrated
Line polarization		integrated
End line resistance		integrated
Baud rate / Transmission distance		max. 115.2 kbits/s / max. 1200 m
Connections		coding screw removable connector 0 to 2.5 mm ² (22-14 AWG)
Ethernet link		
Overvoltage protection		integrated
Baud rate / Transmission distance		10-100 Mbits/s / max. 100 m without Hub or Switch with CAT5 cable
Connections		RJ45 connector
Traffic indication		
Voltage		1 yellow LED
Status of signal		3 green LED (RxD, TxD, LINK), 2 amber or green LED (Speed, Activity)
EMC behavior		
Electrostatic discharge		EN 61000-4-2
Radiated electromagnetic field		EN 61000-4-3
Burst		EN 61000-4-4
Surge		EN 61000-4-5
Electromagnetic compatibility		EN 55022
Other characteristics		
Galvanic isolation between serial link / power supply / Ethernet link		750 VDC / 1500 VAC
Configuration of the operating mode		using internal switches or/and software (TELNET or HYPERTERMINAL)
Operating temperature		0°C ... +60°C
Storage temperature		-20°C ... +70°C
Mounting		any required
DIN rail fixing (EN 50002)		snap-on mounting
Wire size		2.5 mm ² / stranded with ferrule, 4 mm ² solid
Dimensions (WxDxH)		94 x 22.5 x 100 mm
Weight		120 g

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SubD9 connector
 pin 2 = RX
 pin 3 = TX
 pin 5 = GND
 pin 7 = RTS



Serial data converters

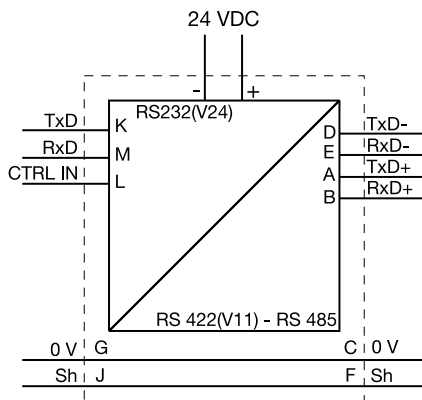
Technical data

Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

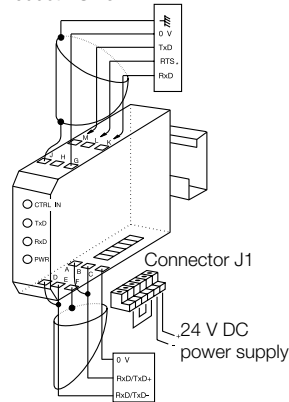
	ILPH RS 232 / RS 422 - 485 (without isolation)
Power supply	polarized
Voltage	24 V DC
Voltage tolerance	8.5...28 V DC
Supply current	100 mA max
Connections	removable screw connectors (AWG 20)
Serial link 1: RS 232	EIA RS 232 C / CCITT V24 V28
Overvoltage protection	integrated (transil 8 kV 1.2/50 μ s)
Baud rate / Transmission distance	max. 38.4 kbits/s / max. 1200 m
Connections	2.5 mm ² screw connectors (AWG 20)
Serial link 2: RS 422-485	EIA RS 485 and EIA RS 422 / CCITT V11
Overvoltage protection	integrated (transil 8 kV 1.2/50 μ s)
Baud rate / Transmission distance	max. 38.4 kbits / max. 1200 m
Connections	2.5 mm ² screw connectors (AWG 20)
Traffic indication	
Voltage	1 yellow LED
Connections	2 green LED (Rx/D, Tx/D)
EMC behavior	
Electrostatic discharge	EN 61000-4-2 level 3 6/8 kV
Radiated electromagnetic field	EN 61000-4-3 level 310 V/m
Burst	EN 61000-4-4 level 3 1 kV
Electromagnetic compatibility	EN 55022 class B
Other characteristics	
Galvanic isolation between serial link / power supply / Ethernet link	no
Configuration of the operating mode	using internal jumper
Operating temperature	0°C ... +50°C
Storage temperature	-25°C ... +80°C
Mounting	any required
DIN rail fixing (EN 50002)	snap-on mounting
Wire size	2.5 mm ² / stranded with ferrule, 4 mm ² solid
Dimensions (WxDxH)	88 x 22.5 x 100 mm
Weight	100 g

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RS 422 - RS 485
SERIAL LINK (2 wires)

Product RS 232



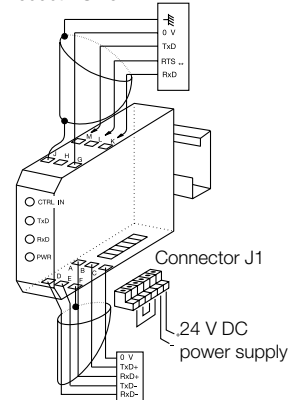
Product RS 422-RS 485

***CAUTION :**

When the RTS Signal is not activated, M terminal (Rx/D ILPH) has to be connected to L terminal (CTRL IN).

RS 422 - RS 485
SERIAL LINK (4 wires)

Product RS 232



Product RS 422-RS 485

**** CAUTION :**

To be connected to 2 wired RS 485 only (not possible for 4 wired RS 422).

When the RTS Signal is not activated, M terminal (Rx/D ILPH) has to be connected to L terminal (CTRL IN).

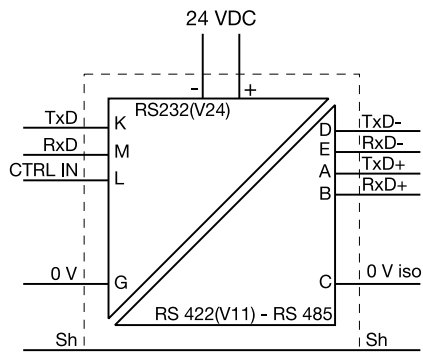
Serial data converters

Technical data

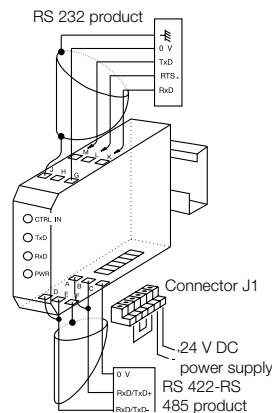
Technical data

Data at $T_a = 25^\circ\text{C}$ and rated values, unless otherwise indicated

	ILPH RS 232 / RS 422 - 485 (isolated)
Power supply	polarized
Voltage	24 V DC
Voltage tolerance	8.5...28 V DC
Supply current	100 mA max
Connections	Removable screw connectors (Omnicontact)
Serial link 1: RS 232	EIA RS 232 C / CCITT V24 V28
Overvoltage protection	integrated (transil 8 kV 1.2/50 μ s)
Baud rate / Transmission distance	max. 38.4 kbits/s / max. 15 m
Connections	2.5 mm ² screw connectors (AWG 20)
Serial link 2: RS 422-485	EIA RS 485 and EIA RS 422 / CCITT V11
Overvoltage protection	integrated (transil 8 kV 1.2/50 μ s)
Baud rate / Transmission distance	max. 38.4 kbits / max. 1200 m
Connections	2.5 mm ² screw connectors (AWG 20)
Traffic indication	
Voltage	1 yellow LED
Connections	3 green LED (Rx/D, Tx/D and CTRL-IN)
EMC behavior	
Electrostatic discharge	EN 61000-4-2 level 3 6/8 kV
Radiated electromagnetic field	EN 61000-4-3 level 310 V/m
Burst	EN 61000-4-4 level 3 1 kV
Electromagnetic compatibility	EN 55022 class B
Other characteristics	
Galvanic isolation between serial link / power supply / Ethernet link	500 V DC
Configuration of the operating mode	using internal jumper
Operating temperature	0°C ... +50°C
Storage temperature	-25°C ... +80°C
Mounting	any required
DIN rail fixing (EN 50002)	snap-on mounting
Wire size	2.5 mm ² / stranded with ferrule, 4 mm ² solid
Dimensions (WxDxH)	88 x 22.5 x 100 mm
Weight	100 g

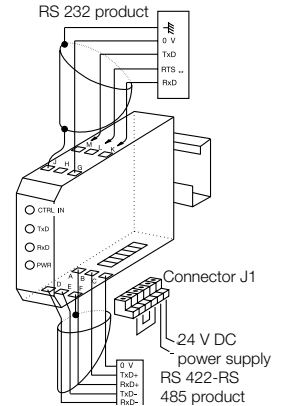


RS 422 - RS 485
2 WIRE SERIAL LINKS



*** CAUTION :**
If the RTS signal is not generated, connect M (Rx/D ILPH) to L (CTRL IN).

RS 422 - RS 485
4 WIRE SERIAL LINKS



**** CAUTION :**
Only to be connected for RS 485 two pairs (of no use for RS 422 two pairs). If the RTS signal is not generated, connect M (Rx/D ILPH) to L (CTRL IN).

Serial data converters

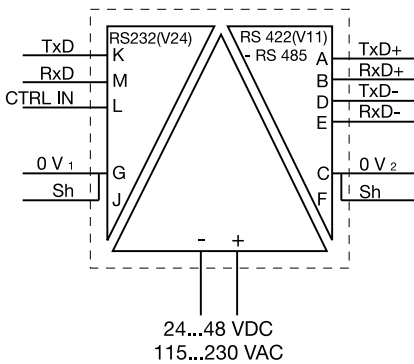
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Technical data

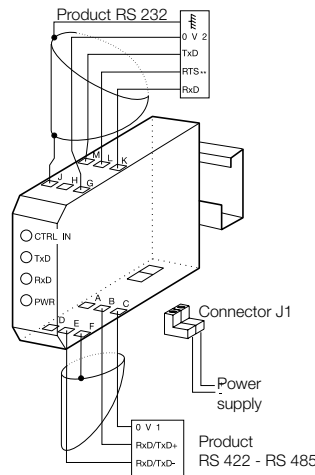
Data at $T_a = 25\text{ }^\circ\text{C}$ and rated values, unless otherwise indicated

ILPH RS 232 / RS 422 - 485 (3 way galvanic isolated)	
Power supply	
Voltage	24...48 V DC
Voltage tolerance	-15% ... +20%
Supply current	24 V DC < 110 mA, 48 V DC < 55 mA, 115 V AC < 40 mA, 230 V DC < 26 mA
Supply power	~ 3 W
Connections	Removable screw connector (Omnicconnect)
Serial link 1: RS 232	
Overvoltage protection	integrated (transil 8 kV 1.2/50 μs)
Baud rate / Transmission distance	max. 19,2 kbits/s / max. 15 m / 2500 pF
Connections	2.5 mm ² screw (AWG 20)
Serial link 2: RS 422-485	
Overvoltage protection	integrated (transil 8 kV 1.2/50 μs)
Baud rate / Transmission distance	max. 19,2 kbits/s / max. 15 m
Connections	2.5 mm ² screw (AWG 20)
Traffic indication	
Voltage	1 yellow LED
Connections	4 green LED (Rx/D, Rx/C/D, Tx/D, Tx/C/D)
EMC behavior	
Electrostatic discharge	EN 61000-4-2 level 3 6/8 kV
Radiated electromagnetic field	EN 61000-4-3 level 3 10 V/m
Burst	EN 61000-4-4 level 3 1 kV
Electromagnetic compatibility	EN 55022 class B
Other characteristics	
Galvanic isolation between RS 232 / Power supply / RSS 422-RS 485	1,5 kV
Configuration of the operating mode	No
Operating temperature	0°C ... +50°C
Storage temperature	-25°C ... +80°C
Mounting	any required
DIN rail fixing (EN 50002)	snap-on mounting
Wire size	2.5 mm ² / stranded with ferrule, 4 mm ² solid
Dimensions (WxDxH)	88 x 22,5 x 100 mm
Weight	100 g

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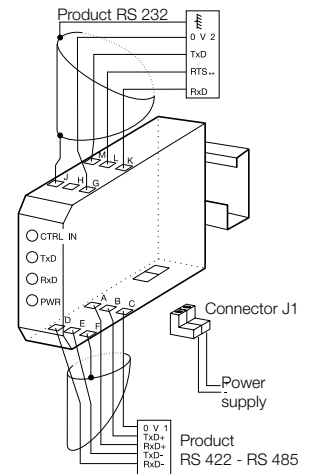


RS 422 - RS 485
2 WIRE SERIAL LINK



***CAUTION :**
When the RTS signal is not generated, set SW2-1 in position ON.

RS 422 - RS 485
4 WIRE SERIAL LINKS



****CAUTION :**
Only to be connected for RS 485 two pairs (of no use for RS 422 two pairs). If the RTS signal is not generated, set SW2-1 in position ON.

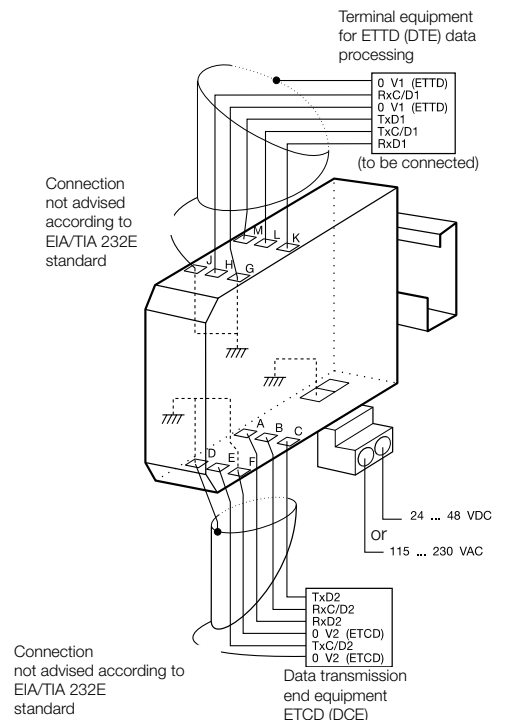
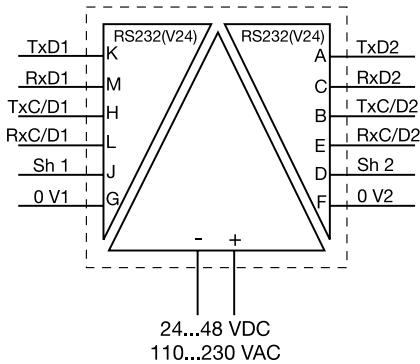
Serial data converters

Technical data

Technical data

Data at $T_a = 25^\circ\text{C}$ and rated values, unless otherwise indicated

		ILPH RS 232 / RS 232	
Power supply		DC model polarized	
Voltage	24...48 V DC	115...230 V AC (50/60Hz)	
Voltage tolerance	-15%...+20%	-15%...+15%	
Supply current	24 V DC < 155 mA; 48 V DC < 77 mA; 110 V AC < 40 mA; 230 V DC < 26 mA		
Supply power	~ 3.15 W	~ 3.15 VA	
Connections	Removable screw connector (Omniconnect)		
Interface 1: RS 232		EIA / TIA RS 232 new revision / CCITT V24 V28	
Overvoltage protection	integrated (transil 8 kV 1.2/50 μs)		
Transmission capacity / Transmission distance	max. 19.2 kbits/s / max. 15 m / 2500 pF		
Connections	2.5 mm ² screw (AWG 20)		
Interface 2: RS 232		EIA / TIA RS 232 new revision / CCITT V24 V28	
Overvoltage protection	integrated (transil 8 kV 1.2/50 μs)		
Transmission capacity / Transmission distance	max. 19.2 kbits/s / max. 15 m		
Connections	2.5 mm ² screw (AWG 20)		
Traffic indication		1 yellow LED	
Voltage			
Connections	4 green LED (Rx/D, Rx/C/D, Tx/D, Tx/C/D)		
EMC behavior			
Electrostatic discharge	EN 61000-4-2 level 3 6/8 kV		
Radiated electromagnetic field	EN 61000-4-3 level 3 10 V/m		
Burst	EN 61000-4-4 level 3 1 kV		
Electromagnetic compatibility	EN 55022 class B		
Other characteristics			
Galvanic isolation between serial link / power supply / Ethernet link	1.5 kV		
Configuration of the operating mode	No		
Operating temperature	0°C ... +50°C		
Storage temperature	-25°C ... +80°C		
Mounting	any required		
DIN rail fixing (EN 50002)	snap-on mounting		
Wire size	2.5 mm ² / stranded with ferrule, 4 mm ² solid		
Dimensions (WxDxH)	88 x 22.5 x 100 mm		
Weight	100 g		



Serial data converters

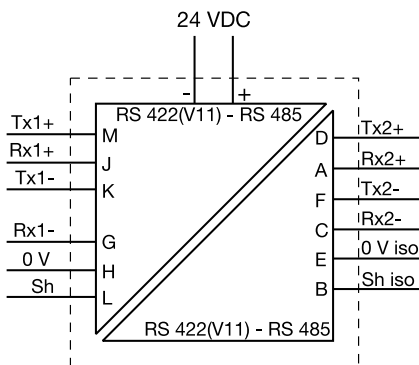
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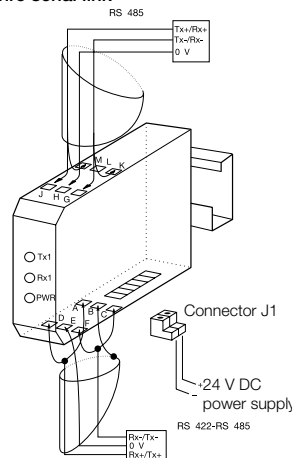
Data at $T_a = 25\text{ }^\circ\text{C}$ and rated values, unless otherwise indicated

	ILPH RS 422 - 485 / RS 422 - 485
Power supply	DC model polarized
Voltage	24 V DC
Voltage tolerance	+/-15%
Supply current	120 mA max.
Connections	Removable screw connector (Omnicconnect)
Interface 1: RS 422-485	EIA / RS 485 and EIA RS 422 / CCITT V11
Overvoltage protection	integrated (transil 8 kV 1.2/50 μs)
RS 485 data switching	Time switching / Time delay transmission/reception 27 μs ...10 ms
Baud rate / Transmission distance	from 1.2 to 500 kbits/s / max. 1200 m up to 38.4 kbit/s
Connections	2.5 mm ² screw (AWG 20)
Interface 2: RS 422-485	EIA / RS 485 and EIA RS 422 / CCITT V11
Overvoltage protection	integrated (transil 8 kV 1.2/50 μs)
RS 485 data switching	Time switching / Time delay transmission/reception 27 μs ...10 ms
Baud rate / Transmission distance	from 1.2 to 500 kbits/s / max. 1200 m up to 38.4 kbit/s
Connections	2.5 mm ² screw (AWG 20)
Traffic indication	
Voltage	1 yellow LED
Connections	2 green LED (Rx/D, Tx/D,)
EMC behavior	
Electrostatic discharge	EN 61000-4-2 level 3 6/8 kV
Radiated electromagnetic field	EN 61000-4-3 level 3 10 V/m
Burst	EN 61000-4-4 level 3 1 kV
Electromagnetic compatibility	EN 55022 class B
Other characteristics	
Galvanic isolation between RS 232 / Power supply / RSS 422-RS 485	500 V DC
Configuration of the operating mode	using internal DIP switches
Operating temperature	0 $^\circ\text{C}$... +50 $^\circ\text{C}$
Storage temperature	-25 $^\circ\text{C}$... +80 $^\circ\text{C}$
Mounting	any required
DIN rail fixing (EN 50002)	snap-on mounting
Wire size	2.5 mm ² / stranded with ferrule, 4 mm ² solid
Dimensions (WxDxH)	88 x 22.5 x 100 mm
Weight	100 g

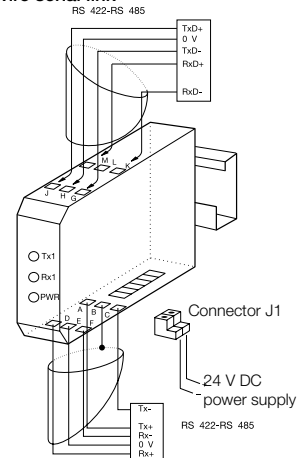
12



RS 422 - RS 485
2 wire serial link



RS 422 - RS 485
4 wire serial link



Caution :
The transmission channels of both RS 422 - RS 485 serial link interfaces always have to be independently polarized.

Serial data converters

Technical data

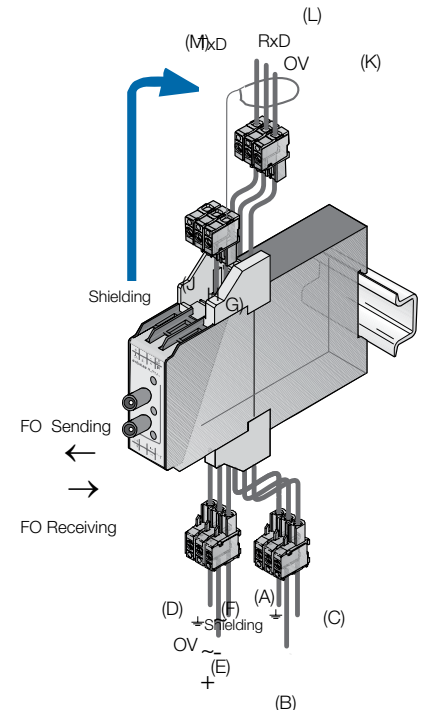
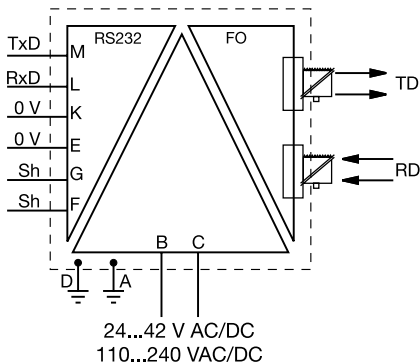
Signal converters

Technical data

Data at $T_a = 25^\circ\text{C}$ and rated values, unless otherwise indicated

		ILPH RS 232 / FO	
Power supplies			
Supply voltage	24...42 V AC/DC (50/60 Hz)	110...240 V AC/DC (50/60 Hz)	
Voltage tolerance	-15% ... +10%		-15% ... +10%
Connections	Omniconnect pluggable connector		
Interface 1: RS 232			
	CCITT V.24/DIN 66020- CCITT V.28 DIN 66259-EIA 232 E		
Protection	Integrated (transil 8 kV 1.2/50µs)		
Max. speed / max. distance	Max. 115.2 kbits/s / max. 15 m / 2500 pF		
Connections	Omniconnect pluggable connector		
Fiber optic interface 2			
	DIN VDE 0888-1		
Type of fiber / Connections	Multimode fiber		
Wave length	Glass : ST connector; Plastic : FSMA screw connector		
Max. transmission power	Glass : 820 nm; Plastic : 655 nm		
Max. reception power	Glass : 50/125 µm : -14.4 db/m; Glass : 62.5/125 µm : -14 db/m; Plastic : 980/1000 µm : -8 db/m		
Max. speed	Glass : -28 db/m; Plastic : -20 db/m		
Max. distance	Max. 115.2 kbits/s		
	Glass : 50/125 µm : 3 km; Glass : 62.5/125 µm : 4 km; Plastic : 980/1000 µm : 40 m		
Status indication			
Power supply / Data exchange	1 green LED / 2 green LEDs (Rx/D, Tx/D)		
EMC behavior			
Electrostatic discharge	EN 61000-4-2 Level 3 6/8 kV		
Radiated electromagnetic field	EN 61000-4-3 Level 3 10 V/m		
Burst	EN 61000-4-4 Level 3 1 kV		
Electromagnetic compatibility	EN 55022 Class B		
Other characteristics			
Galvanic isolation input / power supply / output	2.5 kV		
Operating temperature	-20°C ... +60°C		
Storage temperature	-40°C ... +85°C		
Mounting	Onto DIN Rail (EN 50002)		
Connections	14 AWG (2.5 mm ²) fine stranded / 12 AWG (4 mm ²) rigid		
Dimensions (WxDxH)	105 x 22.5 x 112 mm / 4.13 x 0.89 x 4.41"		
Weight	150 g / 0.33 lb		

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Serial data converters

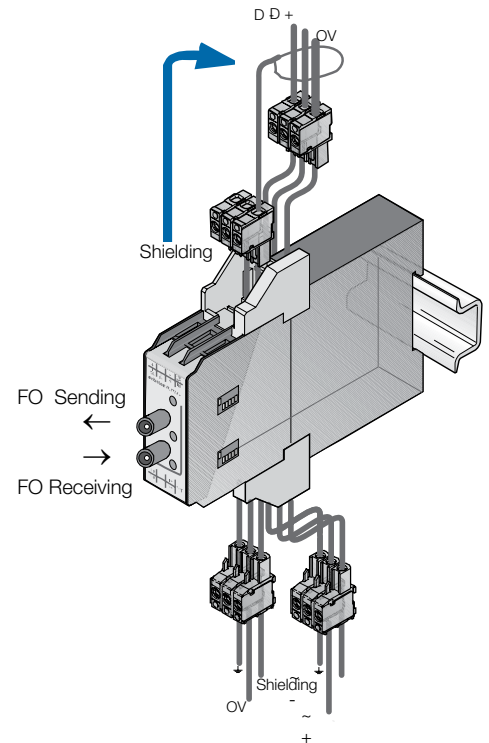
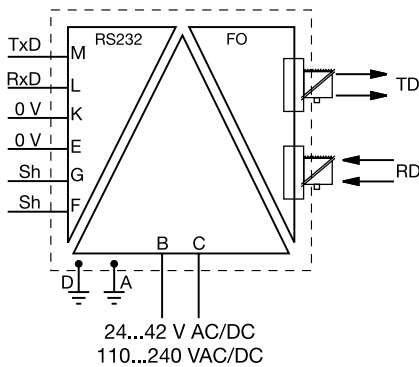
Technical data

Technical data

Data at $T_a = 25\text{ }^\circ\text{C}$ and rated values, unless otherwise indicated

		ILPH RS 485 / FO	
Power supplies			
Supply voltage	24...42 V AC/DC (50/60 Hz)	110...240 V AC/DC (50/60 Hz)	
Voltage tolerance	-15% ... +10%	-15% ... +10%	
Connections	Omniconnect pluggable connector		
Interface 1: RS 232			
Protection	ISO / IEC 8482 / DIN 66 259-4; EIA 485		
Max. speed / max. distance	Integrated (transil 8 kV 1.2/50 μ s) Max. 1.5 Mbits/s / max. 1200 m (38.4 kbit/s)		
Connections	Omniconnect pluggable connector		
Fiber optic interface 2			
Type of fiber / Connections	DIN VDE 0888-1 Multimode fiber Glass : ST connector; Plastic : FSMA screw connector		
Wave length	Glass : 820 nm; Plastic : 655 nm		
Max. transmission power	Glass : 50/125 μ m : -14.4 db/m; Glass : 62.5/125 μ m : -14 db/m; Plastic : 980/1000 μ m : -8 db/m		
Max. reception power	Glass : -28 db/m; Plastic : -20 db/m		
Max. speed	Max. 1.5 Mbits/s		
Max. distance	Glass : 50/125 μ m : 3 km; Glass : 62.5/125 μ m : 4 km; Plastic : 980/1000 μ m : 40 m		
Status indication			
Power supply / Data exchange	1 green LED / 2 green LEDs (Rx/D, Tx/D)		
EMC behavior			
Electrostatic discharge	EN 61000-4-2 Level 3 6/8 kV		
Radiated electromagnetic field	EN 61000-4-3 Level 3 10 V/m		
Burst	EN 61000-4-4 Level 3 1 kV		
Electromagnetic compatibility	EN 55022 Class B		
Other characteristics			
Galvanic isolation input / power supply / output	2.5 kV		
Operating temperature	-20 $^\circ$ C ... +60 $^\circ$ C		
Storage temperature	-40 $^\circ$ C ... +85 $^\circ$ C		
Mounting	Onto DIN Rail		
Connections	14 AWG (2.5mm ²) / fine stranded, 12 AWG (4 mm ²) rigid		
Dimensions (WxDxH)	105 x 22.5 x 112 mm / 4.13 x 0.89 x 4.41"		
Weight	150 g / 0.33 lb		

12



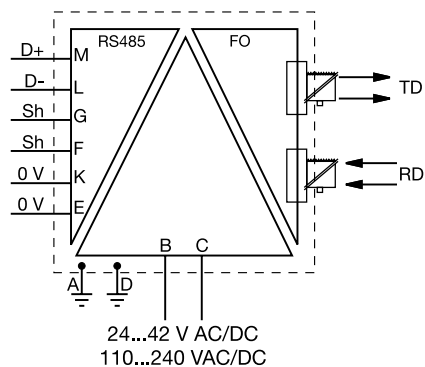
Serial data converters

Technical data

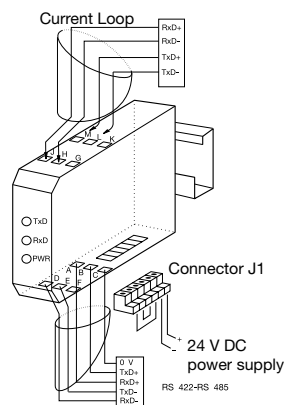
Technical data

Data at $T_a = 25^\circ\text{C}$ and rated values, unless otherwise indicated

	ILPH RS 422 - 485 (for current loop)
Power supply	DC model polarized
Voltage	24 V DC
Voltage tolerance	+/- 10%
Supply current	120 mA max.
Connections	Removable screw connector (Omniconnect)
Interface 1: Current loop	active/passive 0...20 mA / 4...20 mA, mode is settable
Logic level	0 = 20 mA or 1 = 20 mA, settable
Baud rate / Transmission distance	max. 38.4 kbit/s / max. 1200 m
Connections	2.5 mm ² screw (AWG 20)
Serial link 2: RS 422/485	EIA RS 485 and EIA RS 422 / CCITT V 11
Overvoltage protection	integrated (transil 8 kV 1.2/50 μs)
Baud rate / Transmission distance	max. 38.4 kbit/s / max. 1200 m
Connections	2.5 mm ² screw (AWG 20)
Traffic indication	
Voltage	1 yellow LED
Status of signal	2 green LED (RxD, TxD)
EMC behavior	
Electrostatic discharge	EN 61000-4-2 level 2 4/4 kV
Radiated electromagnetic field	EN 61000-4-3 level 3 10 V/m
Burst	EN 61000-4-4 level 1 0.5 kV
Electromagnetic compatibility	EN 55022 class B
Other characteristics	
Galvanic isolation between input / output and power supply / output	depending on Current Loop (active/passive); 500 V DC (active) / 2000 V DC (passive)
RS 422-485 power supply	500 V DC
Configuration of the operating mode	using internal DIP switches
Operating temperature	0°C ... +50°C
Storage temperature	-25°C ... +80°C
Mounting	any required
DIN rail fixing (EN 50002)	snap-on mounting
Wire size	2.5 mm ² / stranded with ferrule, 4 mm ² solid
Dimensions (WxDxH)	88 x 22.5 x 100 mm
Weight	100 g



RS 422 - RS 485
4 wire serial link

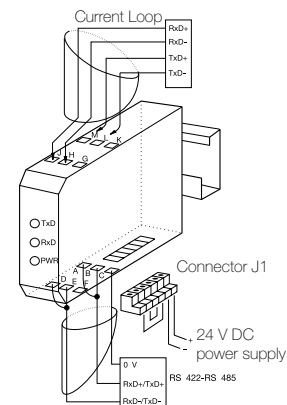


Note :
The TxD channel of the RS 422 - RS 485 link must be polarized independently too.

RS 422 - RS 485
2 wire serial link
CONNECTIONS

Example of connection with a CL (current Loop) product, Transmission (TxD) in active mode and Reception (RxD) in passive mode. Then, the ILPH must be configured and connected Reception (RxD) in passive mode and Transmission (TxD) in active mode.

Note : For any other configuration, see schematic diagram or front sticker of the product.



Serial data converters

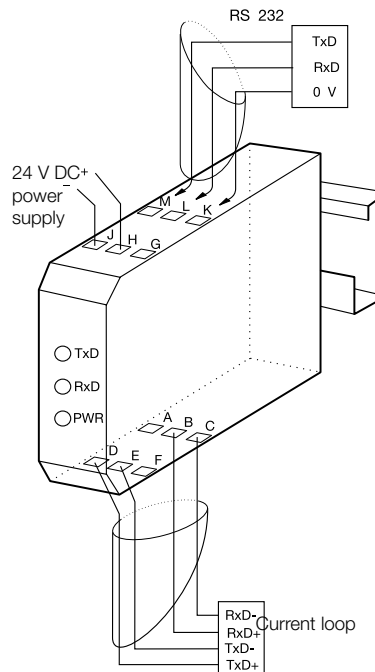
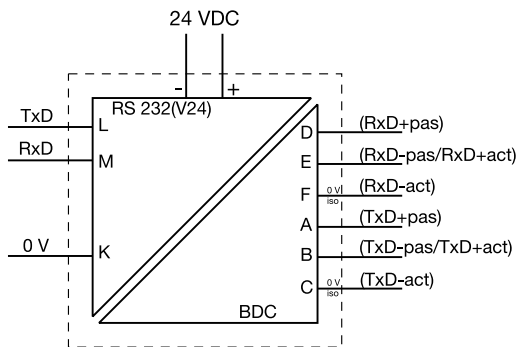
Technical data

Technical data

Data at $T_a = 25\text{ }^\circ\text{C}$ and rated values, unless otherwise indicated

	ILPH RS 223 / CL
Power supply	DC model polarized
Voltage	24 V DC
Voltage tolerance	+/-10%
Supply current	120 mA max.
Connections	Removable screw connector (Omnicontact)
Serial link 2: RS 232	EIA RS 232 C / CCITT V 24 V 28
Logic level	integrated (transil 8 kV 1.2/50 μs)
Baud rate / Transmission distance	max. 38.4 kbit/s / max. 15 m
Connections	2.5 mm ² screw (AWG 20)
BdC serial link 2: RS 422/485	active/passive 0...20 mA / 4...20 mA mode settable
Overvoltage protection	0=20 mA or 1=20 mA settable
Baud rate / Transmission distance	max. 38.4 kbit/s / max. 1200 m
Connections	2.5 mm ² screw (AWG 20)
Traffic indication	
Voltage	1 yellow LED
Status signal	2 green LED (RxD, TxD)
EMC behavior	
Electrostatic discharge	EN 61000-4-2 level 3 6/8 kV
Radiated electromagnetic field	EN 61000-4-3 level 3 10 V/m
Burst	EN 61000-4-4 level 3 1 kV
Electromagnetic compatibility	EN 55022 class B
Other characteristics	
Galvanic isolation between Current loop / RS 232	depending on current loop (active/passive) 500 V DC (active) / 2000 V DC (passive)
Galvanic isolation between Current loop / power supply	500 V DC (active) / 2000 V DC (passive)
Configuration of the operating mode	using internal DIP switches
Operating temperature	0 $^\circ\text{C}$... +50 $^\circ\text{C}$
Storage temperature	-25 $^\circ\text{C}$... +80 $^\circ\text{C}$
Mounting	any required
DIN rail fixing (EN 50002)	snap-on mounting
Wire size	2.5 mm ² / stranded with ferrule, 4 mm ² solid
Dimensions (WxDxH)	88 x 22.5 x 100 mm
Weight	100 g

12



CONNECTIONS

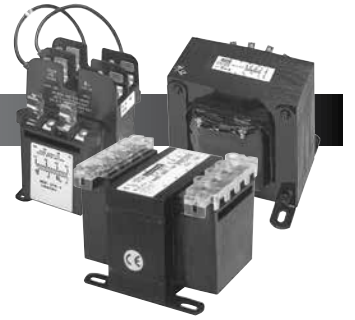
Example of connection with a CL (Current Loop) product,

Transmission (TxD) in active mode and Reception (RxD) in passive mode. Then, the ILPH must be configured and connected Reception (RxD) in passive mode and Transmission (TxD) in active mode.

CAUTION : For any other configuration, see schematic diagram or front sticker of the product.



13 - Transformers



Transformers..... 13.1 – 13.12

General information

Description.....	13.1
Catalog number explanation	13.2
Regulation	13.3
IEC-742, CB Scheme	13.4

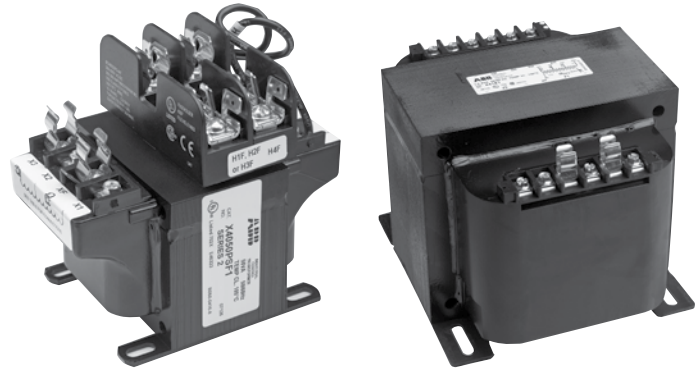
Ordering details

Transformers, 45-500 VA	13.5
Transformers, 750 - 5 kVA	13.6
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Accessories

IP20 Terminal covers	13.9
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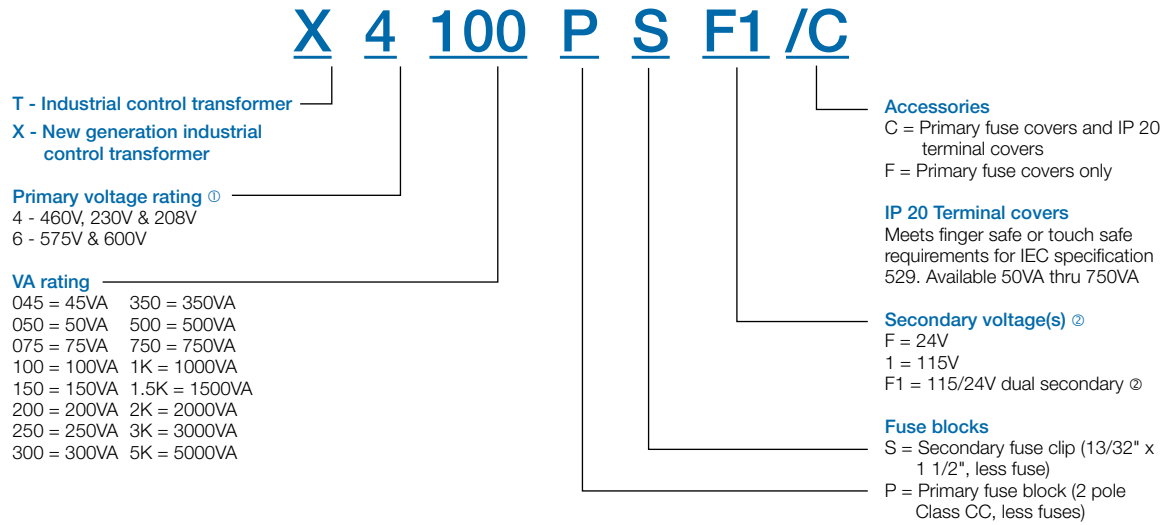


Description

- Epoxy encapsulated coils up through 750VA
- Epoxy resin impregnated coils 1 kVA to 5 kVA
- Provides stepped down voltages for machine tool control devices and industrial control panels
- Laminations of high quality silicon steel
- Minimum core loss
- Optimized performance
- Copper magnet wire providing the highest quality and efficient operation
- Molded-in terminals
- 80°C rise, 130°C insulation system
- 50/60 Hz
- UL File # E175311
- CSA File #LR27533
- IP 20 Touch safe covers available as an option

General information

Catalog number explanation



Example: X4050PSF1

- ABB Industrial control transformer
- Primary voltage: 460V, 230V and 208V
- 50 VA rating
- Primary & secondary fuse blocks provided
- Secondary voltage 115/24V
- Optional IP 20 terminal covers

① Consult factory for applications with different voltages.

② Whenever both secondary voltages are to be used at the same time, remove the secondary fuse clip and use a separate mounted 2 pole fuse block.

General information

Regulation

Regulation

Selecting a transformer for industrial control circuit applications requires knowledge of the following terms:

INRUSH VA is the product of load voltage (V) multiplied by the current (A) that is required during circuit start-up. It is calculated by adding the inrush VA requirements of all devices (contactors, timers, relays, pilot lights, solenoids, etc.), which will be energized together. Inrush VA requirements are best obtained from the component manufacturer.

SEALED VA is the product of load voltage (V) multiplied by the current (A) that is required to operate the circuit after initial start-up or under normal operating conditions. It is calculated by adding the sealed VA requirements of all electrical components of the circuit that will be energized at any given time. Sealed VA requirements are best obtained from the component manufacturer. Sealed VA is also referred to as steady state VA.

PRIMARY VOLTAGE is the voltage available from the electrical distribution system and its operational frequency, which is connected to the transformer supply voltage terminals.

SECONDARY VOLTAGE is the voltage required for load operation which is connected to the transformer load voltage terminals.

Once the circuit variables have been determined, transformer selection is a simple 5-step process as follows:

1. Determine the application inrush VA by using the following industry accepted formula:

$$\text{Application inrush VA} = \sqrt{(\text{INRUSH VA})^2 + (\text{SEALED VA})^2}$$

2. Refer to the Regulation Data chart. If the primary voltage is basically stable and does not vary by more than 5% from nominal, the 90% secondary voltage column should be used. If the primary voltage varies between 5 and 10% of nominal, the 95% secondary voltage column should be used.
3. After determining the proper secondary voltage column, read down until a value equal to or greater than the application inrush VA is found. In no case should a figure less than the Application Inrush VA be used.
4. Read left to the Transformer VA rating column to determine the proper transformer for this application. As a final check, make sure that the Transformer VA rating is equal to or greater than the total sealed requirements. If not, select a transformer with a VA rating equal to or greater than the total sealed VA.
5. Refer to transformer selection pages to determine the proper catalog number based on the transformer VA, and primary and secondary voltage requirements.

Inrush

Industrial control circuits and motor control loads typically require more current when they are initially energized than under normal operating conditions. This period of high current demand, referred to as inrush, may be as great as ten times the current required under steady state (normal) operation conditions and can last up to 40 milliseconds.

A transformer in a circuit subject to inrush will typically attempt to provide the load with the required current during the inrush period. However, it will be at the expense of the secondary voltage stability by allowing the voltage to the load to decrease as the current increases. This period of secondary voltage instability, resulting from increased current, can be of such a magnitude that the transformer is unable to supply sufficient voltage to energize the load.

This transformer must therefore be designed and constructed to accommodate the high inrush current, while maintaining secondary voltage stability. According to NEMA standards, the secondary voltage should typically be at 85% of the rated voltage.

Industrial Control Circuit Transformers by ABB Control Inc. are specifically designed and built to provide adequate voltage to the load while accommodating the high current levels present at inrush. These transformers deliver excellent secondary voltage regulation and meet or exceed the standards established by NEMA, ANSI, UL and CSA. Their hearty construction and excellent electrical characteristics assure reliable operation of electromagnetic devices and trouble-free performance.

Ⓞ For units with class 105°C insulation systems.
 Ⓟ For units with class 180°C insulation systems.

Regulation Data Chart

Transformer VA rating	Inrush VA at 20% power factor		
	95% secondary voltage	90% secondary voltage	85% secondary voltage
25	100	130	150
50	170	200	240
75	310	410	540
100	370	540	730
150	780	930	1150
200	810	1150	1450
250	1400	1900	2300
300	1900	2700	3850
350	3100	3650	4800
500	4000	5300	7000
750	8300	11000	14000
1000 Ⓞ	15000	21000	27000
1000 Ⓟ	9000	13000	18500
1500	10500	15000	205000
2000	17000	25500	34000
3000	24000	36000	47500
5000	55000	92500	115000

To comply with NEMA standards, which require all magnetic devices to operate successfully at 85% of rated voltage, the 90% secondary voltage column is most often used in selecting a transformer.

NOTE
 For UL overcurrent protection, see page 13.9

General information

IEC-742, CB Scheme

IEC-742

The requirements for industrial control circuit transformers to be used in the European Common Market are identified by the International Electrotechnical Commission (IEC) and specified under IEC-742, Non-Short Circuit Proof Isolating Transformers, under the Low Voltage Directive 73/23/EEC. Manufacturers of control transformers indicate compliance with these requirements by placing a CE mark on the product.

In addition to being able to handle the inrush requirements of industrial control circuits and motor loads, transformers built to the requirements of IEC-742 will exhibit several major construction differences from those manufactured in accordance with UL506. These construction differences will typically increase not only the physical size of the transformer when compared to those built only to UL requirements, but the inrush capability as well.

- The winding insulation thickness requirements, depending upon electrical currents, are comparable layer to layer for IEC-742 versus UL506. Winding to winding insulation requirements, however, may be twice that for IEC-742 compared to UL506.
- The electrical clearances between current carrying parts are one-third greater to comply with IEC-742 requirements for units up to 250VA with voltages up to 440 volts ac.
- The dielectric strength (hipot) test voltages are twice as long in duration to comply with IEC-742 compared to UL506 for all units and up to one-and-a-half times greater in magnitude on smaller VA sizes.
- Transformers manufactured to IEC-742 requirements will have a minimum of 10% higher overload capacity than those manufactured only to UL506 requirements.

I IEC-742 requires that transformers in a failure mode under excessive current (10 times the unit rating) must not exhibit flame or molten material. There is no comparable requirement under UL506.

While no requirement exists in IEC-742 for the electrical connections to be either finger safe or touch proof, the specification does state that IF a transformer is supplied with a cover to prevent incidental contact with current carrying parts, that cover must utilize two separate methods or places of securing it to the component, with neither being dependent upon the other. Additionally, one of these methods **MUST** require a tool to remove it.

IEC-529

The requirements for finger-safe or touch-proof electrical connections are identified by the International Electrotechnical Commission (IEC) under specification 529, Classification of Degrees of Protection Provided by Enclosures. These various degrees of protection are identified and differentiated by IP ratings.

A variety of IP ratings are defined in IEC-529 ranging from IP00, which provides no protection from contact, to IP68, which identifies dust-proof and water-proof protection. Optionally, IP ratings may contain additional and supplementary designators. The IP specification which most closely approximates protection to a human finger is IP20. This IP rating would be the most common degree of touch-proof connection for electrical components such as transformers.

IEC-529 protection requirements would most commonly apply to products which fall under the requirements of the Machinery Directive 89/392/EEC, as opposed to the Low Voltage Directive 73/23/EEC, which covers components such as control transformers. Over time, however, users subject to the requirements of the Machinery Directive and/or IEC-529 have expanded their interpretation of finger-safe or touch-proof electrical connections to include the components of the equipment, such as transformers.

CB Scheme

A CE mark indicates compliance to the applicable requirements of a particular product as outlined by the International Electrotechnical Commission (IEC) and by mutual agreement is recognized throughout the European Union. By itself, however, the CE mark may not necessarily be accepted as evidence of product compliance in countries outside of the European Union. Additionally, even countries within the European Union may require their own country's approval mark in addition to the CE mark. To that end, a system of mutual recognition and reciprocal acceptance has been developed which would allow product acceptance outside of the European Union and the ability to obtain the approval mark of countries within it.

The official title for this mutual acceptance agreement is The Scheme of the IECEE for Recognition of Results of Testing to Standards for Safety of Electrical Equipment (CB Scheme for short). The basis of the CB Scheme is a CB Test Certificate providing evidence that representative samples of a particular product have been tested to a particular IEC standard and successfully passed the required tests.

Each country participating in the CB Scheme, currently over 50, including East and West Europe, the Middle and Far East, and the Pacific Rim, has a representative agency, referred to as a National Certification Body, in the IECEE. Each participant has agreed that they will accept the test results of other members if such results are based on a reasonably harmonized IEC standard. Thus, by utilizing the CB Scheme, a manufacturer of product carrying a CE mark may be able to have that product accepted throughout the world, or obtain additional listing marks, with no further product testing being required.

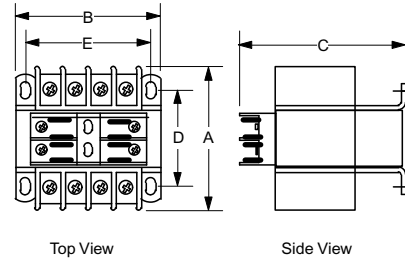
To utilize the CB Scheme, a manufacturer must present the appropriate test reports, along with a CB Test Certificate prepared by the National Certification Body responsible for the original product listing, to the National Certification Body of the country to which the product is being supplied. At such time as the reports are accepted, the product manufacturer may place the certification mark of the country on the product without the need for additional testing.

Transformers

45 - 500 VA



X4050PSF1



45 - 500 VA

Primary Voltage - 460/230/208V, 480/240V, 440/220/200V

Secondary Voltage - 115/24V, 120/25V, 110/23V

VA Rating	Catalog number	Number of Terminals	Output Amps 24/115	Included		Dimensions						
				Primary Fuse Block	Secondary Fuse Clip	A	B	C	D	E	Mounting Slots	
45	X4045SF1	4	1.90/0.39	Y	Y ⊕	Inches	4 1/2	3 1/8	3 1/8	2 7/8	2 1/2	3/16 x 7/16
						mm	115	76	80	72	64	5 x 12
50	X4050PSF1	4	2.08/0.44	Y	Y	Inches	4 1/2	3	4	2 7/8	2 1/2	3/16 x 7/16
						mm	115	76	102	72	64	5 x 12
75	X4075PSF1	4	3.13/0.65	Y	Y	Inches	4 1/2	3 3/8	4 3/8	2 3/4	2 3/4	3/16 x 7/16
						mm	114	86	110	71	71	5 x 12
100	X4100PSF1	4	4.17/0.87	Y	Y	Inches	4 1/2	3 3/4	4 5/8	3	3 1/8	3/16 x 7/16
						mm	115	95	118	76	80	5 x 12
150	X4150PSF1	4	6.25/1.30	Y	Y	Inches	5	3 3/4	4 5/8	3 1/8	3 1/8	3/16 x 7/16
						mm	128	95	118	80	80	5 x 12
200	X4200PSF1	4	8.33/1.74	Y	Y	Inches	4 3/8	4 1/2	5 1/4	3 3/4	3 3/4	3/16 x 7/16
						mm	111	114	134	76	95	5 x 12
250	X4250PSF1	4	10.42/2.17	Y	Y	Inches	4 3/4	4 1/2	5 1/4	3 3/4	3 3/4	3/16 x 7/16
						mm	120	114	134	76	95	5 x 12
300	X4300PSF1	4	12.50/2.61	Y	Y	Inches	6 1/8	5 1/4	6	3 7/8	4 3/8	5/16 x 1 1/16
						mm	155	133	151	98	111	8 x 27
350	X4350PSF1	6	14.58/3.04	Y	Y	Inches	6 1/8	5 1/4	6	3 7/8	4 3/8	5/16 x 1 1/16
						mm	155	133	151	98	111	8 x 27
500	X4500PSF1	6	20.84/4.35	Y	Y	Inches	7 1/8	5 1/4	5 1/8	5 3/8	4 3/8	5/16 x 1 1/16
						mm	155	133	131	136	111	8 x 27

Primary and secondary fusing

Primary Fuse Block	2 pole, Class CC, less fuses
Secondary Fuse Clip	13/32" x 1 1/2", Class CC, less fuse
Primary & Secondary Fusing	Class CC, for sizing see chart of page 13.11

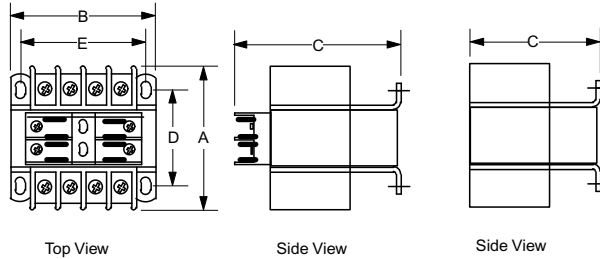
⊕ When both secondary voltages are to be used simultaneously, remove the secondary fuse clip and use a separately mounted, 2-pole fuse block.

Transformers

750 VA - 5 kVA



X41K1



750 VA - 5 kVA
Primary Voltage - 460/230/208V, 480/240V, 440/220/200V
Secondary Voltage - 115V, 120V, 110V

VA Rating	Catalog number	Number of Terminals	Output Amps	Included		Dimensions						
				Primary Fuse Block	Secondary Fuse Clip		A	B	C	D	E	Mounting Slots
750	X4750PS1	6	6.52	Y	Y	Inches	7 5/8	5 1/4	6	5 3/4	4 3/8	5/16 x 1 1/16
						mm	193	133	151	146	111	8 x 27
1000	X41K1	6	8.70	N	Y	Inches	7 1/8	6 3/8	5 3/8	4 1/2	5 5/16	5/16 x 1 1/16
						mm	181	162	137	114	135	8 x 17
1500	X41.5K1	6	13.04	N	Y	Inches	7 1/2	6 3/4	5 11/16	4 7/16	6 1/16	9/32 x 9/16
						mm	191	171	144	113	154	7 x 14
2000	X42K1	6	17.39	N	Y	Inches	8 1/4	6 3/4	5 11/16	5 1/4	6 1/16	9/32 x 9/16
						mm	210	171	144	133	154	7 x 14
3000	X43K1	6	26.09	N	Y	Inches	8 9/16	9	7 1/2	5 3/4	7 1/2	7/16 x 3/4
						mm	217	229	191	147	191	11 x 19
5000	X45K1	6	43.48	N	Y	Inches	10 1/2	9	10 3/16	6 1/2	6 1/2	7/16 x 3/4
						mm	267	229	259	165	165	11 x 19

13 Primary and secondary fusing

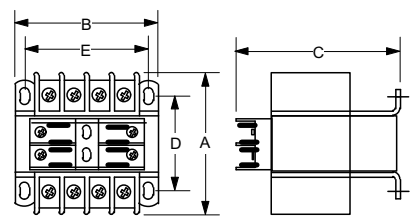
Primary Fuse Block	2 pole, Class CC, less fuses
Secondary Fuse Clip	13/32" x 1 1/2", Class CC, less fuse
Primary & Secondary Fusing	Class CC, for sizing see chart of page 13.11

Transformers

45-750 VA



T6045S1



Top View

Side View

45-750 VA

Primary Voltage - 600/575/550V

Secondary Voltage - 120V, 115V, 110V

Use Class CC fuse

VA Rating	Catalog number	Number of Terminals	Output Amps	Included		Dimensions						
				Primary Fuse Block	Secondary Fuse Clip	A	B	C	D	E	Mounting Slots	
45	T6045S1	4	0.43	Y	Y	Inches	3	3	2 9/16	2	2 1/2	13/64 x 3/8
						mm	76	76	65	51	64	5 x 10
50	T6050PS1	4	0.43	Y	Y	Inches	3	3	3 15/16	2	2 1/2	13/64 x 3/8
						mm	76	76	100	51	64	5 x 10
75	T6075PS1	4	0.65	Y	Y	Inches	3 1/2	3	3 15/16	2 1/2	2 1/2	13/64 x 3/8
						mm	89	76	100	64	64	5 x 10
100	T6100PS1	4	0.87	Y	Y	Inches	3 3/8	3 3/8	4 1/4	2 3/8	2 13/16	13/64 x 3/8
						mm	86	86	108	60	71	5 x 10
150	T6150PS1	4	1.3	Y	Y	Inches	4	3 3/4	4 9/16	2 7/8	3 1/8	13/64 x 3/8
						mm	102	95	116	73	79	5 x 10
200	T6200PS1	4	1.74	Y	Y	Inches	4	4 1/2	5 3/16	2 1/2	3 3/4	13/64 x 3/8
						mm	102	114	132	64	95	5 x 10
250	T6250PS1	4	2.17	Y	Y	Inches	4 3/8	4 3/8	5 3/16	2 7/8	3 3/4	13/64 x 3/8
						mm	111	111	132	73	95	5 x 10
300	T6300PS1	4	2.61	Y	Y	Inches	4 3/4	4 1/2	5 3/16	3 1/4	3 3/4	13/64 x 3/8
						mm	121	114	132	83	95	5 x 10
350	T6350PS1	6	3.04	Y	Y	Inches	5 1/4	4 1/2	5 3/16	3 3/4	3 3/4	13/64 x 3/8
						mm	133	114	132	95	95	5 x 10
500	T6500PS1	6	4.35	Y	Y	Inches	5 7/8	5 1/4	6 1/8	4 1/8	4 3/8	5/16 x 1 1/16
						mm	137	133	156	105	111	8 x 17
750	T6500PS1	6	6.52	Y	Y	Inches	7	5 1/4	6 1/8	4 3/8	4 3/8	5/16 x 1 1/16
						mm	178	133	156	146	111	8 x 17

Primary and secondary fusing

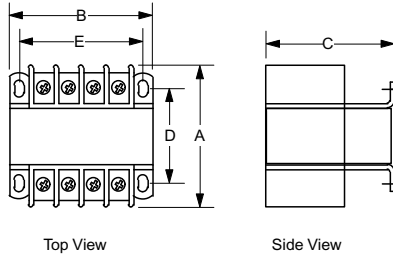
Primary Fuse Block	2 pole, Class CC, less fuses
Secondary Fuse Clip	13/32" x 1 1/2", Class CC, less fuse
Primary & Secondary Fusing	Class CC, for sizing see chart of page 13.11

Transformers

1 - 5 kVA



T61K1



1 - 5 kVA
Primary Voltage - 575/460/230V
Secondary Voltage - 115 - 95V
Use Class CC fuse

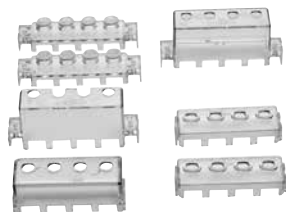
VA Rating	Catalog number	Number of Terminals	Output Amps	Included		Dimensions						
				Primary Fuse Block	Secondary Fuse Clip		A	B	C	D	E	Mounting Slots
1000	T61K1	6	6.52	N	Y	Inches	7 ¹ / ₈	6 ³ / ₈	5 ³ / ₈	4 ¹ / ₂	5 ³ / ₁₆	5 ¹ / ₁₆ x 1 ¹ / ₁₆
						mm	184	162	137	114	135	8 x 17
1500	T61.5K1	6	8.70	N	Y	Inches	8 ¹ / ₄	6 ³ / ₄	5 ¹¹ / ₁₆	5 ¹ / ₄	6 ¹ / ₁₆	9 ⁹ / ₃₂ x 9 ⁹ / ₁₆
						mm	210	171	144	133	154	7 x 14
2000	T62K1	6	13.04	N	Y	Inches	7 ⁹ / ₁₆	9	7 ⁹ / ₁₆	4 ³ / ₁₆	6 ¹ / ₂	7 ⁷ / ₁₆ x 3 ³ / ₄
						mm	192	229	192	106	165	11 x 19
3000	T63K1	6	17.39	N	Y	Inches	8 ⁵ / ₈	9	7 ⁹ / ₁₆	5 ¹ / ₄	6 ¹ / ₂	7 ⁷ / ₁₆ x 3 ³ / ₄
						mm	219	229	192	133	165	11 x 19
5000	T65K1	6	26.09	N	Y	Inches	13 ¹ / ₂	9	10 ³ / ₁₆	8 ¹ / ₄	6 ¹ / ₂	7 ⁷ / ₁₆ x 3 ³ / ₄
						mm	343	229	259	210	165	11 x 19

13

Primary and secondary fusing

Primary Fuse Block	2 pole, Class CC, less fuses
Secondary Fuse Clip	13/32" x 1 1/2", Class CC, less fuse
Primary & Secondary Fusing	Class CC, for sizing see chart of page 13.11

Accessories

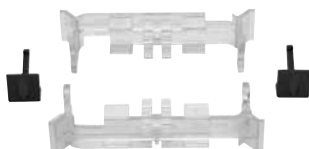


TPTC-1001

IP20 Terminal covers

Description	Catalog number
4-Terminal cover (45-300VA)	TPTC-1001
6-Terminal cover (350-5KVA)	TPTC-1002
Primary fuse cover (45-5KVA)	TPTC-1006

Meets finger safe or touch safe requirements for IEC specification 529. Available 50VA thru 750VA.



Class CC fuse blocks

Description	Catalog number
Primary fuse block kit	FKTP-1001

Technical data

Transformer terminology and FAQs

What is a transformer?

A transformer is a passive electrical device which is designed to change one voltage to another by magnetic induction.

What is an isolation transformer?

An isolation transformer, also referred to as an insulating transformer, is one where the primary and secondary windings are separate, as opposed to an autotransformer where the primary and secondary share a common winding.

What is a control transformer?

A control transformer is an isolation transformer designed to provide a high degree of secondary voltage stability (regulation) during a short period overload condition typically referred to as inrush. Control transformers are also referred to as Industrial Control Transformers, Machine Tool Transformers or Control Power Transformers (CPTs).

Can a control transformer be reversed connected?

A control transformer can be reverse connected. However, the output voltage will be less than nameplate due to the compensation factor of the windings.

Can a single phase transformer be used with a three phase source?

A single phase transformer can be used with a three phase source by connecting the primary leads to any two wires of the three phase system. The transformer output will be single phase.

Can a transformer be used at higher frequencies?

A transformer designed for 50/60HZ operation can be utilized at frequencies up to 400 HZ. However, at 400 HZ, the inrush capability will be reduced.

What is regulation?

Regulation is the change in output voltage when the load is reduced from rated value (full load) to zero (no load) with input voltage remaining constant.

Can transformers be used at ambients other than 40°C?

Transformers may be used at ambients less than 40°C at full nameplate capacity. For ambients above 40°C, they must be derated as follows:

Max. ambient temperature	Max. percent of load	
	180°C Units	105°C Units
40°C	100%	100%
50°C	90%	78%
60°C	79%	50%

What is the effect of altitude on a transformer?

A transformer may be used at full nameplate capacity up to 3300 feet (1000 meters). Above that altitude, the capacity of the transformer should be derated by 0.3% for each 300 feet of elevation above 3300 feet.

What is the effect of load on a control transformer?

A control transformer is designed to provide rated output voltage at full VA. As the load decreases, the output voltage will go up. Conversely, increases in load will result in lower output voltages. Typically, the smaller the VA size of the unit, the greater difference there is between no-load and full-load voltage.

What is temperature class?

Temperature class is the rating of the transformer insulation system. It is determined by adding the ambient temperature, temperature rise and hottest spot temperature. The standard insulation system classification per UL506, are as follows:

Ambient temperature	Average winding temperature rise*	Hot spot temperature	Temperature class
40°C	55°C	10°C	105°C
40°C	80°C	10°C	130°C
40°C	100°C	15°C	155°C
40°C	120°C	20°C	180°C

*Measured by change-in-resistance method

What is temperature rise?

Temperature rise is the difference between the average temperature of the transformer windings and the ambient temperature.

What is hot spot?

The hot spot is an allowance selected to approximate the difference between the highest temperature inside the transformer coil and the average temperature of the transformer coil.

Is one insulation system better than another?

One insulation system is not necessarily better than another. Each will typically provide a comparable life expectancy. The choice of an insulation system depends upon application, performance and cost considerations.

Why is a control transformer needed?

A control transformer is required to supply voltage to a load which requires significantly more current when initially energized than under normal steady state operating conditions. A control transformer is designed to provide secondary voltage stability under a short period of specific overload referred to as inrush.

Are control transformers current limiting?

A control transformer is not current limiting and will allow as much current to pass through as is demanded by the load. As such, a secondary overcurrent device should be utilized.

Will a control transformer regulate output voltage?

Control transformers are not voltage regulating. Because voltage changes are a function of the transformer's turns ratio, variations in input voltage will be proportionally reflected to the output.

What is duty cycle?

Duty cycle is the period and duration when a transformer will be loaded. The transformer is designed to run continuously at full load without exceeding the temperature limits. Transformers may also be operated for short time duty. Depending upon the time and cycle of the maximum load, the transformer VA size may be smaller than for continuous duty.

What is the value of encapsulation in control transformers?

Encapsulating the coils of a control transformer will help to protect the unit from moisture, dust, dirt and industrial contaminants. Encapsulation helps provide maximum protection in hostile environments while allowing the unit to run cooler than a non-encapsulated unit.

What effect does a control transformer have on electrical disturbances found on the line?

Because a control transformer has isolated primary and secondary windings, it will provide some degree of "clean-up" with regard to electrical noise, spikes, surges and transients. It will not, however, provide the same degree of power conditioning found in products designed for that purpose.

13

Technical data

UL Overcurrent protection

Primary & secondary

Overcurrent protection on both the primary and secondary sides of transformers are specified in UL508 and the National Electrical Code. The maximum acceptable ratings are shown below. Due to the high inrush currents present when a transformer is initially energized, it is recommended that the primary fuse be time delay, to prevent nuisance trips during startup.

Acceptable rating of primary overcurrent protection in amps

Primary voltage	VA Rating									
	50	75	100	150	200	250	300	350	500	750
115	1-1/4 (2)	1-8/10 (3-2/10)	2-1/2 (4)	3-1/2 (6-1/4)	5 (8)	5	6-1/4	7-1/2	10	15
120	1-1/4 (2)	1-8/10 (3)	2-1/4 (4)	3-1/2 (6-1/4)	5 (8)	5	6-1/4	7	10	15
200	3/4 (1-1/4)	1-1/8 (1-8/10)	1-1/2 (2-1/2)	2-1/4 (3-1/2)	3 (5)	3-1/2 (6-1/4)	4-1/2 (7-1/2)	5 (8)	6-1/4	9
208	6/10 (1-1/8)	1 (1-8/10)	1-4/10 (2-1/4)	2 (3-1/2)	2-8/10 (4-1/2)	3-1/2 (6)	4 (7)	5 (8)	6	9
220	6/10 (1-1/8)	1 (1-6/10)	1-1/4 (2-1/4)	2 (3-2/10)	2-1/2 (4-1/2)	3-2/10 (5-6/10)	4 (6-1/4)	4-1/2 (7-1/2)	5-6/10	8
230	6/10 (1)	8/10 (1-6/10)	1-1/4 (2)	1-8/10 (3-2/10)	2-1/2 (4)	3-2/10 (5)	3-1/2 (6-1/4)	4-1/2 (7-1/2)	5	8
240	6/10 (1)	8/10 (1-1/2)	1-1/4 (2)	1-8/10 (3)	2-1/4 (4)	3 (5)	3-1/2 (6-1/4)	4 (7)	5	7-1/2
277	1/2 (8/10)	8/10 (1-1/4)	1 (1-8/10)	1-6/10 (2-1/2)	2 (3-1/2)	2-1/2 (4-1/2)	3-2/10 (5)	3-1/2 (6-1/4)	5 (9)	6-1/4
380	3/10 (6/10)	1/2 (8/10)	3/4 (1-1/4)	1-1/8 (1-8/10)	1-1/2 (2-1/2)	1-8/10 (3-2/10)	2-1/4 (3-1/2)	2-1/2 (4-1/2)	3-1/2 (6-1/4)	5-6/10 (9)
400	3/10 (6/10)	1/2 (8/10)	3/4 (1-1/4)	1-1/8 (1-8/10)	1-1/2 (2-1/2)	1-8/10 (3)	2-1/4 (3-1/2)	2-1/2 (4)	3-1/2 (6-1/4)	5-6/10 (9)
415	3/10 (6/10)	1/2 (8/10)	6/10 (1-1/8)	1 (1-8/10)	1-4/10 (2-1/4)	1-8/10 (3)	2 (3-1/2)	2-1/2 (4)	3-1/2 (6)	5 (9)
440	3/10 (1/2)	1/2 (8/10)	6/10 (1-1/8)	1 (1-6/10)	1-1/4 (2-1/4)	1-6/10 (2-8/10)	2 (3-2/10)	2-1/4 (3-1/2)	3-2/10 (5-6/10)	5 (8)
460	3/10 (1/2)	4/10 (8/10)	6/10 (1)	8/10 (1-6/10)	1-1/4 (2)	1-6/10 (2-1/2)	1-8/10 (3-2/10)	2-1/4 (3-1/2)	3-2/10 (5)	4-1/2 (8)
480	3/10 (1/2)	4/10 (3/4)	6/10 (1)	8/10 (1-1/2)	1-1/4 (2)	1-1/2 (2-1/2)	1-8/10 (3)	2 (3-1/2)	3 (5)	4-1/2 (7-1/2)
550	1/4 (4/10)	4/10 (6/10)	1/2 (8/10)	8/10 (1-1/4)	1 (1-8/10)	1-1/4 (2-1/4)	1-6/10 (2-1/2)	1-8/10 (3)	2-1/2 (4-1/2)	4 (6-1/4)
575	1/4 (4/10)	3/10 (6/10)	1/2 (8/10)	3/4 (1-1/4)	1 (1-6/10)	1-1/4 (2)	1-1/2 (2-1/2)	1-8/10 (3)	2-1/2 (4)	3-1/2 (6-1/4)
600	2/10 (4/10)	3/10 (6/10)	1/2 (8/10)	3/4 (1-1/4)	8/10 (1-6/10)	1-1/4 (2)	1-1/2 (2-1/2)	1-6/10 (2-8/10)	2-1/4 (4)	3-1/2 (6-1/4)

The maximum rating of the overcurrent device is indicated in ().

All figures assume secondary overcurrent protection per UL/NEC.

Reference: NEC 430 - 72(c) exception #2, 450-3(b) 1 & 2, UL508 32.7, UL845 11.16 & 11.17.

Acceptable rating of secondary overcurrent protection in amps

Secondary voltage	VA Rating									
	50	75	100	150	200	250	300	350	500	750
23	3-1/2	5	7	10	12	15	20	20	30	45
24	3-2/10	5	6-1/4	10	12	15	20	20	30	40
25	3-2/10	5	6-1/4	10	12	15	15	20	25	40
90	8/10	1-1/4	1-8/10	2-1/2	3-1/2	4-1/2	5	6-1/4	9	12
95	8/10	1-1/4	1-6/10	2-1/2	3-1/2	4	5	6	8	12
100	8/10	1-1/4	1-6/10	2-1/2	3-2/10	4	5	5-6/10	8	12
110	3/4	1-1/8	1-1/2	2-1/4	3	3-1/2	4-1/2	5	7-1/2	10
115	6/10	1	1-4/10	2	2-8/10	3-1/2	4	5	7	10
120	6/10	1	1-1/4	2	2-1/2	3-2/10	4	4-1/2	6-1/4	10
220	3/10	1/2	3/4	1-1/8	1-1/2	1-8/10	2-1/4	2-1/2	3-1/2	5-6/10
230	3/10	1/2	6/10	1	1-4/10	1-8/10	2	2-1/2	3-1/2	5
240	3/10	1/2	6/10	1	1-1/4	1-6/10	2	2-1/4	3-2/10	5

If the rated secondary current is less than 9 amps, the maximum rating of the overcurrent device is 167%; 9 amps or more, the maximum rating of the overcurrent device is 125%. If 125% does not correspond to a standard fuse rating, the next highest standard rating may be used.

Reference: NEC 430 - 72(c) exception #2, 450-3(b) 1 & 2, UL508 32.7, UL845 11.16 & 11.17.

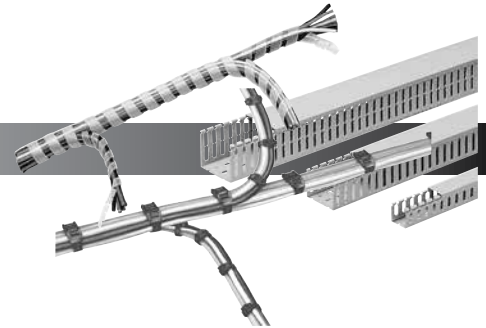
Technical data

Power loss

VA	Temp class	Watts loss
50	I2 105	16.2
75	I2 105	18.6
100	I2 105	21
150	I2 130	33.7
200	I2 130	40.1
250	I2 130	43.4
300	I2 130	48.4
350	I2 130	47.9
500	I2 130	57.1
750	I2 130	71.2
1000	180	99
1500	180	123.7
2000	180	147.3
3000	180	183.4
5000	180	241.2



14 - Wire duct, wire ties & spiral wrap



General information 14.1

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 High density, 4-6mm slot..... 14.3

 Tools and accessories..... 14.4

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Q-Ties..... 14.19 - 14.24

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 Technical data & approximate dimensions..... 14.22 - 14.24

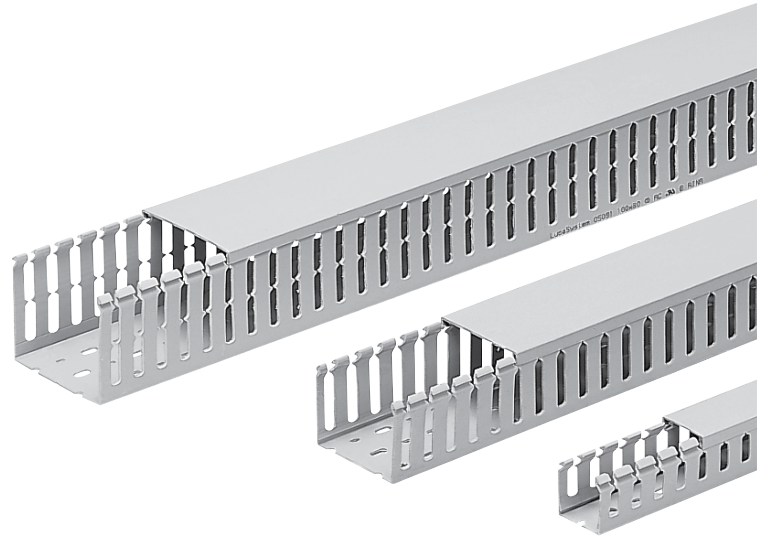
Wire duct, wire ties
& spiral wrap

Notes

Q-Duct wiring duct



Q-Duct Wiring duct



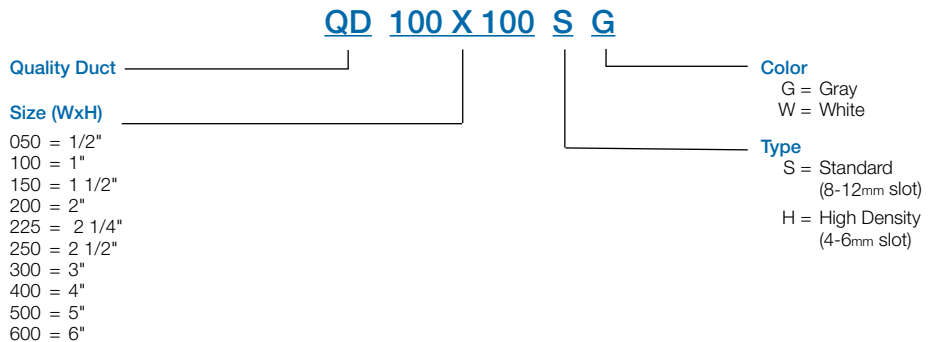
General information

ABB offers Q-Duct, a wide variety of wire duct and accessories. Wire duct bases are available in six nominal widths - 1/2" to 6" - and six nominal heights - 5/8" to 4". The top profile of the wire duct makes the covers easier to install and remove. The rounded shape of the ribs prevents abrasions to both the installer's hands and wires. The score line at the base of each rib enables a clean break to create openings for running wires. ABB wire duct is used in applications with rated voltages up to 1000 VAC and 1500 VDC.

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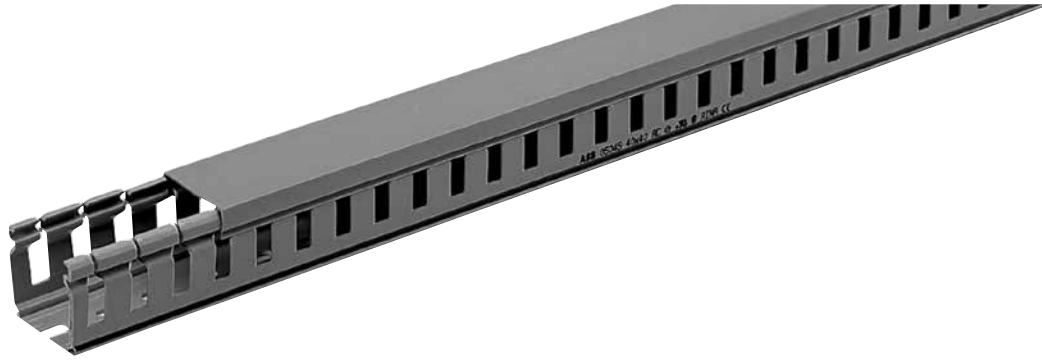
UL file number: E125800

Catalog number explanation



Wire duct, ties,
spiral wrap

Q-Duct Standard, 8-12mm slot^①



Dimensions WXH (in)	White Standard 8-12mm slot Catalog number	Gray Standard 8-12mm slot Catalog number	Dimensions WXH (mm)	Feet per package	Meters per package	Pieces per package
1/2 X 5/8	QD050X050SW	QD050X050SG	15 x 17	151	46	23
1 X 1 1/4	QD100X125SW	QD100X125SG	25 x 30	190.5	58	29
1 1/2 X 1 1/4	QD150X125SW	QD150X125SG	40 x 30	131.5	40	20
2 1/4 X 1 1/4	QD225X125SW	QD225X125SG	60 x 30	171	52	26
1 x 1 1/2	QD100X150SW	QD100X150SG	25 x 40	157.5	48	24
1 1/2 x 1 1/2	QD150X150SW	QD150X150SG	40 x 40	98.5	30	15
2 1/4 x 1 1/2	QD225X150SW	QD225X150SG	60 x 40	131	40	20
3 x 1 1/2	QD300X150SW	QD300X150SG	80 x 40	105	32	16
4 x 1 1/2	QD400X150SW	QD400X150SG	100 x 40	79	24	12
4 3/4 x 1 1/2	QD475X150SW	QD475X150SG	120 x 40	66	20	10
1 x 2 1/4	QD100X225SW	QD100X225SG	25 x 60	111.5	34	17
1 1/2 x 2 1/4	QD150X225SW	QD150X225SG	40 x 60	72	22	11
2 1/4 x 2 1/4	QD225X225SW	QD225X225SG	60 x 60	105	32	16
3 x 2 1/4	QD300X225SW	QD300X225SG	80 x 60	79	24	12
4 x 2 1/4	QD400X225SW	QD400X225SG	100 x 60	66	20	10
4 3/4 x 2 1/4	QD475X225SW	QD475X225SG	120 x 60	46	14	7
1 x 3	QD100X300SW	QD100X300SG	25 x 80	92	28	14
1 1/2 x 3	QD150X300SW	QD150X300SG	40 x 80	118	36	18
2 1/4 x 3	QD225X300SW	QD225X300SG	60 x 80	79	24	12
3 x 3	QD300X300SW	QD300X300SG	80 x 80	52	16	8
4 x 3	QD400X300SW	QD400X300SG	100 x 80	52	16	8
4 3/4 x 3	QD475X300SW	QD475X300SG	120 x 80	39	12	6
1 x 4	QD100X400SW	QD100X400SG	25 x 100	65.5	20	10
1 1/2 x 4	QD150X400SW	QD150X400SG	40 x 100	92	28	14
2 1/4 x 4	QD225X400SW	QD225X400SG	60 x 100	66	20	10
3 x 4	QD300X400SW	QD300X400SG	80 x 100	46	14	7
4 x 4	QD400X400SW	QD400X400SG	100 x 100	26	8	4
6 x 4	QD600X400SW	QD600X400SG	150 x 100	26	8	4

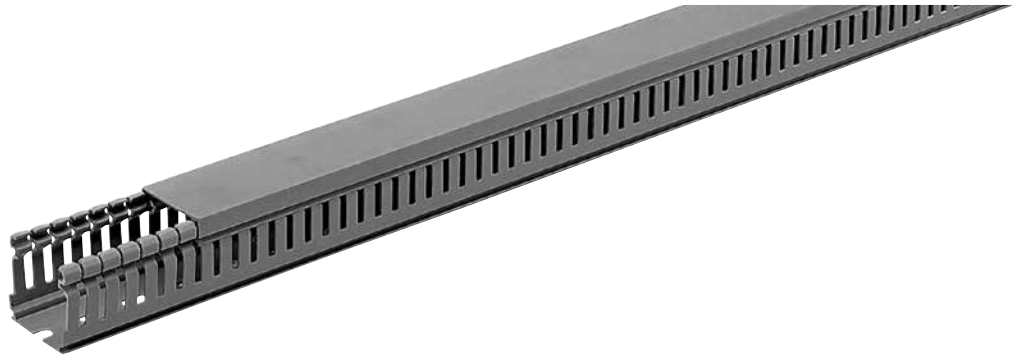
Sold in package quantity only. Order quantity must be equal to quantity shown in "Pieces per package" column. Wire duct cover included.

^① Wire duct cover included in price.

Q-Duct

High density, 4-6mm slot^①

Wire duct, ties,
spiral wrap



Dimensions WXH (in)	White High Density, 4-6mm slot Catalog number	Gray High Density, 4-6mm slot Catalog number	Dimensions WXH (mm)	Feet per package	Meters per package	Pieces per package
1/2 x 5/8	QD050X050HW	QD050X050HG	15 x 17	151	46	23
1 x 1 1/4	QD100X125HW	QD100X125HG	25 x 30	190.5	58	29
1 1/2 x 1 1/4	QD150X125HW	QD150X125HG	40 x 30	131.5	40	20
2 1/4 x 1 1/4	QD225X125HW	QD225X125HG	60 x 30	171	52	26
1 x 1 1/2	QD100X150HW	QD100X150HG	25 x 40	157.5	48	24
1 1/2 x 1 1/2	QD150X150HW	QD150X150HG	40 x 40	98.5	30	15
2 1/4 x 1 1/2	QD225X150HW	QD225X150HG	60 x 40	131	40	20
3 x 1 1/2	QD300X150HW	QD300X150HG	80 x 40	105	32	16
4 x 1 1/2	QD400X150HW	QD400X150HG	100 x 40	79	24	12
4 3/4 x 1 1/2	QD475X150HW	QD475X150HG	120 x 40	66	20	10
1 x 2 1/4	QD100X225HW	QD100X225HG	25 x 60	111.5	34	17
1 1/2 x 2 1/4	QD150X225HW	QD150X225HG	40 x 60	72	22	11
2 1/4 x 2 1/4	QD225X225HW	QD225X225HG	60 x 60	105	32	16
3 x 2 1/4	QD300X225HW	QD300X225HG	80 x 60	79	24	12
4 x 2 1/4	QD400X225HW	QD400X225HG	100 x 60	66	20	10
4 3/4 x 2 1/4	QD475X225HW	QD475X225HG	120 x 60	46	14	7
1 x 3	QD100X300HW	QD100X300HG	25 x 80	92	28	14
1 1/2 x 3	QD150X300HW	QD150X300HG	40 x 80	118	36	18
2 1/4 x 3	QD225X300HW	QD225X300HG	60 x 80	79	24	12
3 x 3	QD300X300HW	QD300X300HG	80 x 80	52	16	8
4 x 3	QD400X300HW	QD400X300HG	100 x 80	52	16	8
4 3/4 x 3	QD475X300HW	QD475X300HG	120 x 80	39	12	6
1 x 4	QD100X400HW	QD100X400HG	25 x 100	65.5	20	10
1 1/2 x 4	QD150X400HW	QD150X400HG	40 x 100	92	28	14
2 1/4 x 4	QD225X400HW	QD225X400HG	60 x 100	66	20	10
3 x 4	QD300X400HW	QD300X400HG	80 x 100	46	14	7
4 x 4	QD400X400HW	QD400X400HG	100 x 100	26	8	4
6 x 4	QD600X400HW	QD600X400HG	150 x 100	26	8	4

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Sold in package quantity only. Order quantity must be equal to quantity shown in "Pieces per package" column. Wire duct cover included.

① Wire duct cover included in price.

Q-Duct Tools and accessories

Spare wire duct covers



QDC050G

Dimensions width (in.)	Dimensions width (mm)	Grey Catalog number	White Catalog number	Feet per package	Meters per package	Pieces per package
1/2"	15	QDC050G	QDC050W	656	200	100
1"	25	QDC100G	QDC100W	197	60	30
1 1/2"	40	QDC150G	QDC150W	131	40	20
2 1/4"	60	QDC225G	QDC225W	79	24	12
3"	80	QDC300G	QDC300W	52	16	8
4"	100	QDC400G	QDC400W	157	48	24
4 3/4"	120	QDC475G	QDC475W	118	36	18
6"	150	QDC600G	QDC600W	92	28	14



Rapid DIN rail clips

Rapid clip for DIN rail

Item	Catalog number	Pieces per package
25mm base	QDRCD100B	20
40mm base	QDRCD150B	
60mm base	QDRCD225B	
80mm base	QDRCD300B	
100mm base	QDRCD400B	
120mm base	QDRCD500B	
150mm base	QDRCD600B	



QDWS8-12-150B

Wire stops

Item	Catalog number	Pieces per package
40mm base	QDWS8-12-150B	100
60mm base	QDWS8-12-225B	
80mm base	QDWS8-12-300	
100/120mm base	QDWS8-12-400	



QDCUTR

Duct shears

Item	Catalog number	Pieces per package
Wire duct hand cutting tool	QDCUTR	1



QDRVTGUN

Rivet gun

Item	Catalog number	Pieces per package
Rivet gun	QDRVTGUN	1



QDPR4MM

Rivets

Item	Catalog number	Pieces per package
4mm plastic rivet	QDPR4MM	100
6mm plastic rivet	QDPR6MM	



QDPL8-12-S

Plastic label tag

Item	Catalog number	Pieces per package
Suitable for wiring ducts with 8 1/2mm slots only	QDPL8-12-S	100

Tape

Item	Catalog number	Pieces per package
Adhesive tape 6mm wide x 50m long	QDAT6MMX50M	1
Adhesive tape 9mm wide x 50m long	QDAT9MMX50M	

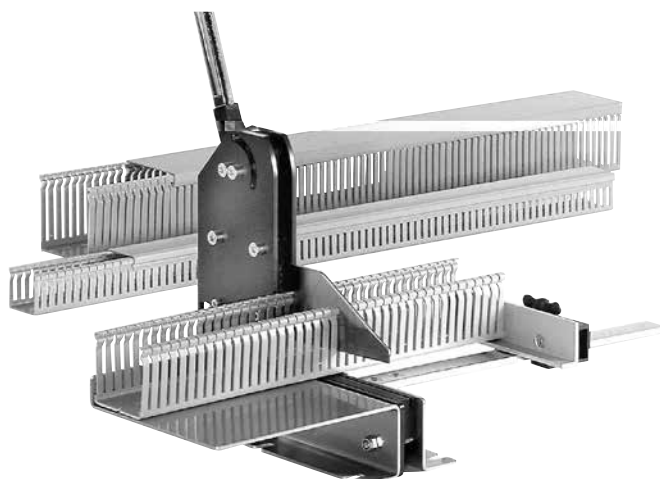
Plastic duct base

Item	Catalog number	Pieces per package
Plastic base	QDPDB	100

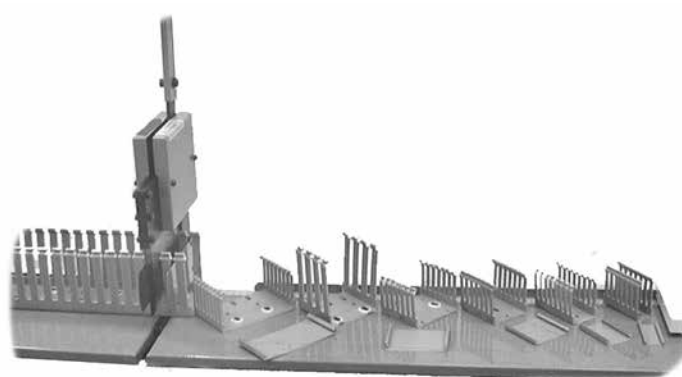
Q-Duct

Wire duct cutters

Industrial & production grade



Industrial grade



Production grade

Industrial grade

Description	Catalog number
Wire duct cutting machine - Industrial grade	XUS001628
Replacement blade	XUS001629

Technical features

- Length: 1450 mm
- Height: 950 mm
- Depth: 260 mm
- Blade length: 130 mm (maximum wire duct cutting width is 120 mm (5.0 in))
- Blade life: 250,000 cuts
- Blade life is based on usage of traditional PVC wiring duct. Use of halogen-free wiring or any other wiring duct containing abrasive material dramatically reduces the blade life
- Bench mounting material not included.

Production grade

Description	Catalog number
Wire duct cutting machine - Production grade	XUS002518
Replacement blade	XUS002519

Technical features

- Length: 1290 mm
- Height: 785 mm
- Depth: 285 mm
- Blade length: 136 mm (maximum wire duct cutting width is 120 mm (5.0 in))
- Blade life: 400,000 cuts
- Blade life is based on usage of traditional PVC wiring duct. Use of halogen-free wiring or any other wiring duct containing abrasive material dramatically reduces the blade life
- Calibrated scale
- Bench mounting material not included.

Q-Duct

Resistance to chemical agents

Technical data

Resistance to chemical agents

Chemical	Concentration	Temp. °C	Resistance
Acetic acid, hydrous	10%	50	①
Acetic acid	60%	50	①
Acetone	Traces	20	②
Acetone	100%	20	②
Acqua regia	—	20	①
Ammonia concentrate	88%	50	①
Ammonia, dry gas	100%	50	①
Ammonia, liquid	100%	20	③
Aniline, pure	100%	20	②
Arsenic acid, hydrous	concentrated	20	①
Barium hydroxide, hydr.	—	50	①
Beer	commercial	20	①
Benzene	—	20	②
Benzoic acid	—	20	③
Borax, hydrous	thinned	50	①
Boric acid, hydrous	thinned	50	①
Brandy	commercial	20	①
Bromide liquid	—	20	②
Butane gaseous	—	20	①
Butadiene	50%	50	①
Butanol	—	20	①
Butyric acid, hydrous	20%	20	①
Calcium chloride	—	50	①
Camphor oil	—	20	①
Carbon tetrachloride	—	20	③
Chlorine gaseous, dry	100%	20	①
Chlorine gaseous, moist	20%	20	③
Chlorine water	saturated	20	③
Chromic acid, hydrous	—	50	①
Citric acid, hydrous	—	50	①
Copper sulphate, hydrous	thinned	50	①
Diesel oil	—	20	①
Ethyl-alcohol	100% (in water)	20	①
Formaldehyde, hydrous	40%	50	①

Chemical	Concentration	Temp. °C	Resistance
Formic acid	100%	20	①
Freon 12	—	20	①
Gasoline	—	50	①
Glycerine, hydrous	—	50	①
Hydrochloric acid	saturated	50	①
Hydrogen	—	50	①
Linseed oil	—	50	①
Lubricating oils	—	50	①
Mineral oil	—	50	①
Molasses	—	20	④
Oils and fats	commercial	50	①
Oil of turpentine	commercial	20	①
Ozone	—	20	①
Paraffin wax	—	50	①
Photographic developer	commercial	50	①
Photographic emulsions	—	50	①
Potassium permanganate	6%	20	①
Propane, liquid	—	20	①
Salicylic acid	—	50	①
Sea water	—	50	①
Soda, hydrous	saturated	50	①
Sodium chloride	thinned	50	①
Spirits, all types	—	20	①
Sulphur	—	50	①
Sulphuric acid, hydrous	40%	50	①
Tannic acid	—	50	①
Tetrahydrofuran	—	20	②
Toluene	—	20	②
Urea, hydrous	—	50	①
Urine	—	50	①
Vinegar	commercial	50	①
Water	—	50	①
Wines, red & white	commercial	20	①
Zinc sulphate, hydrous	thinned	50	①

14

Technical data

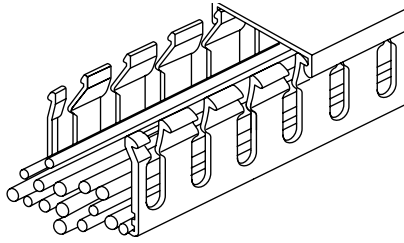
- Gray - RAL 7030
- White - RAL 9016
- Plastic insulating, shock-proof, self-extinguishing material in compliance with UL 94 VO Standard and resistant to abnormal heat and fire up to 960° (glow wire test) in compliance with IEC 695-2-1 Standard. UL File # E125800
- Minimum storage/transport temperature -5°C
- Minimum installation and usage temperature -15°C
- Maximum usage temperature +60°C
- Resistance to acids, oils and greases



Q-Duct

Wire capacity, 18-750 AWG

Wire duct, ties, spiral wrap



18 - 1 AWG

Gray 4/6 slot Catalog number	Gray 8/12 slot Catalog number	White 4/6 slot Catalog number	White 8/12 slot Catalog number	Size (mm)	Maximum number of wires according to AWG & mm ²												
					Size (inches)	Areas (mm ²)	18 0.82	16 1.3	14 2.1	12 3.3	10 5.3	8 8.4	6 13.3	4 21.2	3 26.7	2 33.6	1 42.4
QD050X050HG	QD050X050SG	QD050X050HW	QD050X050SW	15x17	1/2x5/8	110	67	42	26	16	10	6	4	2	2	1	1
QD100X125HG	QD100X125SG	QD100X125HW	QD100X125SW	25x30	1x1 1/4	490	298	188	116	74	46	29	18	11	9	7	5
QD150X125HG	QD150X125SG	QD150X125HW	QD150X125SW	40x30	1 1/2x1 1/4	890	542	342	211	134	83	52	33	20	16	13	10
QD225X125HG	QD225X125SG	QD225X125HW	QD225X125SW	60x30	2 1/4x1 1/4	1430	871	550	340	216	134	85	53	33	26	21	16
QD100X150HG	QD100X150SG	QD100X150HW	QD100X150SW	25x40	1x1 1/2	710	432	273	169	107	66	42	26	16	13	10	8
QD150X150HG	QD150X150SG	QD150X150HW	QD150X150SW	40x40	1 1/2x1 1/2	1260	768	484	300	190	118	75	47	29	23	18	14
QD225X150HG	QD225X150SG	QD225X150HW	QD225X150SW	60x40	2 1/4x1 1/2	2000	1219	769	476	303	188	119	75	47	37	29	23
QD300X150HG	QD300X150SG	QD300X150HW	QD300X150SW	80x40	3x1 1/2	2710	1652	1042	645	410	255	161	101	63	50	40	31
QD400X150HG	QD400X150SG	QD400X150HW	QD400X150SW	100x40	4x1 1/2	3460	2109	1330	823	524	326	205	130	81	64	51	40
QD475X150HG	QD475X150SG	QD475X150HW	QD475X150SW	120x40	4 3/4x1 1/2	4200	2560	1615	1000	636	396	250	157	99	78	62	49
QD100X225HG	QD100X225SG	QD100X225HW	QD100X225SW	25x60	1 x 2 1/4	1120	682	430	266	169	105	66	42	26	20	16	13
QD150X225HG	QD150X225SG	QD150X225HW	QD150X225SW	40x60	1 1/2x2 1/4	1970	1201	757	469	298	185	117	74	46	36	29	23
QD225X225HG	QD225X225SG	QD225X225HW	QD225X225SW	60x60	2 1/4x2 1/4	3060	1865	1176	728	463	288	182	115	72	57	45	36
QD300X225HG	QD300X225SG	QD300X225HW	QD300X225SW	80x60	3x2 1/4	4190	2554	1611	997	634	395	249	157	98	78	62	49
QD400X225HG	QD400X225SG	QD400X225HW	QD400X225SW	100x60	4x2 1/4	5320	3243	2046	1266	806	501	316	200	125	99	79	62
QD475X225HG	QD475X225SG	QD475X225HW	QD475X225SW	120x60	4 3/4x2 1/4	6330	3859	2434	1507	959	597	376	237	149	118	94	74
QD100X300HG	QD100X300SG	QD100X300HW	QD100X300SW	25x80	1x3	1540	939	592	366	233	145	91	57	36	28	22	18
QD150X300HG	QD150X300SG	QD150X300HW	QD150X300SW	40x80	1 1/2x3	2670	1628	1026	635	404	251	158	100	62	50	39	31
QD225X300HG	QD225X300SG	QD225X300HW	QD225X300SW	60x80	2 1/4x3	4140	2524	1592	985	627	390	246	155	97	77	61	48
QD300X300HG	QD300X300SG	QD300X300HW	QD300X300SW	80x80	3x3	5650	3445	2173	1345	856	533	336	212	133	105	84	66
QD400X300HG	QD400X300SG	QD400X300HW	QD400X300SW	100x80	4x3	7170	4371	2757	1707	1086	676	426	269	169	134	106	84
QD475X300HG	QD475X300SG	QD475X300HW	QD475X300SW	120x80	4 3/4x3	8570	5225	3296	2040	1298	808	510	322	202	160	127	101
QD100X400HG	QD100X400SG	QD100X400HW	QD100X400SW	25x100	1x4	1970	1201	757	469	298	185	117	74	46	36	29	23
QD150X400HG	QD150X400SG	QD150X400HW	QD150X400SW	40x100	1 1/2x4	3410	2079	1311	811	516	321	202	128	80	63	50	40
QD225X400HG	QD225X400SG	QD225X400HW	QD225X400SW	60x100	2 1/4x4	5300	3231	2038	1261	803	500	315	199	125	99	78	62
QD300X400HG	QD300X400SG	QD300X400HW	QD300X400SW	80x100	3x4	7190	4384	2765	1711	1089	678	427	270	169	134	106	84
QD400X400HG	QD400X400SG	QD400X400HW	QD400X400SW	100x100	4x4	9110	5554	3503	2169	1380	859	542	342	214	170	135	107
QD600X400HG	QD600X400SG	QD600X400HW	QD600X400SW	150x100	6x4	13,740	8378	5284	3271	2081	1296	817	516	324	257	204	162

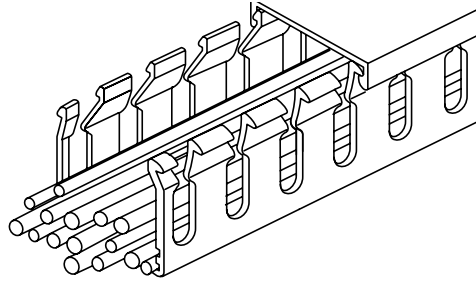
1/0 - 750 AWG

Gray 4/6 slot Catalog number	Gray 8/12 slot Catalog number	White 4/6 slot Catalog number	White 8/12 slot Catalog number	Size (mm)	Maximum number of wires according to AWG & mm ²														
					Size (inches)	Areas (mm ²)	1/0 53.5	2/0 67.4	3/0 85	4/0 107.2	250 127	300 152	350 177	400 203	500 253	600 304	750 380		
QD050X050HG	QD050X050SG	QD050X050HW	QD050X050SW	15x17	1/2x5/8	110	1	0	0	0	0	0	0	0	0	0	0	0	0
QD100X125HG	QD100X125SG	QD100X125HW	QD100X125SW	25x30	1x1 1/4	490	4	3	2	2	1	1	1	1	0	0	0	0	0
QD150X125HG	QD150X125SG	QD150X125HW	QD150X125SW	40x30	1 1/2x1 1/4	890	8	6	5	4	3	2	2	2	1	1	1	1	1
QD225X125HG	QD225X125SG	QD225X125HW	QD225X125SW	60x30	2 1/4x1 1/4	1430	13	10	8	6	5	4	3	2	2	2	2	2	2
QD100X150HG	QD100X150SG	QD100X150HW	QD100X150SW	25x40	1x1 1/2	710	6	5	4	3	2	2	2	1	1	1	1	0	0
QD150X150HG	QD150X150SG	QD150X150HW	QD150X150SW	40x40	1 1/2x1 1/2	1260	11	9	7	5	4	4	3	3	2	2	2	2	1
QD225X150HG	QD225X150SG	QD225X150HW	QD225X150SW	60x40	2 1/4x1 1/2	2000	18	14	11	9	7	6	5	4	3	3	3	2	2
QD300X150HG	QD300X150SG	QD300X150HW	QD300X150SW	80x40	3x1 1/2	2710	25	20	15	12	10	8	7	6	5	4	3	3	2
QD400X150HG	QD400X150SG	QD400X150HW	QD400X150SW	100x40	4x1 1/2	3460	32	25	20	16	13	11	9	8	6	5	4	3	2
QD475X150HG	QD475X150SG	QD475X150HW	QD475X150SW	120x40	4 3/4x1 1/2	4200	39	31	24	19	16	13	11	10	8	6	5	4	3
QD100X225HG	QD100X225SG	QD100X225HW	QD100X225SW	25x60	1x2 1/4	1120	10	8	6	5	4	3	3	2	2	1	1	1	1
QD150X225HG	QD150X225SG	QD150X225HW	QD150X225SW	40x60	1 1/2x2 1/4	1970	18	14	11	9	7	6	5	4	3	3	2	2	1
QD225X225HG	QD225X225SG	QD225X225HW	QD225X225SW	60x60	2 1/4x2 1/4	3060	28	22	18	14	12	10	8	7	6	5	4	3	2
QD300X225HG	QD300X225SG	QD300X225HW	QD300X225SW	80x60	3x2 1/4	4190	39	31	24	19	16	13	11	10	8	6	5	4	3
QD400X225HG	QD400X225SG	QD400X225HW	QD400X225SW	100x60	4x2 1/4	5320	49	39	31	24	20	17	15	13	10	8	7	6	5
QD475X225HG	QD475X225SG	QD475X225HW	QD475X225SW	120x60	4 3/4x2 1/4	6330	59	46	37	29	24	20	17	15	12	10	8	7	6
QD100X300HG	QD100X300SG	QD100X300HW	QD100X300SW	25x80	1x3	1540	14	11	9	7	6	5	4	3	3	2	2	2	1
QD150X300HG	QD150X300SG	QD150X300HW	QD150X300SW	40x80	1 1/2x3	2670	24	19	15	12	10	8	7	6	5	4	3	3	2
QD225X300HG	QD225X300SG	QD225X300HW	QD225X300SW	60x80	2 1/4x3	4140	38	30	24	19	16	13	11	10	8	6	5	4	3
QD300X300HG	QD300X300SG	QD300X300HW	QD300X300SW	80x80	3x3	5650	52	41	33	26	22	18	15	13	11	9	7	6	5
QD400X300HG	QD400X300SG	QD400X300HW	QD400X300SW	100x80	4x3	7170	67	53	42	33	28	23	20	17	14	11	9	7	6
QD475X300HG	QD475X300SG	QD475X300HW	QD475X300SW	120x80	4 3/4x3	8570	80	63	50	39	33	28	24	21	16	14	11	9	7
QD100X400HG	QD100X400SG	QD100X400HW	QD100X400SW	25x100	1x4	1970	18	14	11	9	7	6	5	4	3	3	2	2	1
QD150X400HG	QD150X400SG	QD150X400HW	QD150X400SW	40x100	1 1/2x4	3410	31	25	20	15	13	11	9	8	6	5	4	3	2
QD225X400HG	QD225X400SG	QD225X400HW	QD225X400SW	60x100	2 1/4x4	5300	49	39	31	24	20	17	14	13	10	8	6	5	4
QD300X400HG	QD300X400SG	QD300X400HW	QD300X400SW	80x100	3x4	7190	67	53	42	33	28	23	20	17	14	11	9	7	6
QD400X400HG	QD400X400SG	QD400X400HW	QD400X400SW	100x100	4x4	9110	85	67	53	42	35	29	25	22	18	14	11	9	7
QD600X400HG	QD600X400SG	QD600X400HW	QD600X400SW	150x100	6x4	13,740	128	101	80	64	54	45	38	33	27	22	18	14	11

Wire duct, ties,
spiral wrap

Q-Duct

Wire capacity, 800-1000 AWG



800 - 1000 AWG

Gray 4/6 slot Catalog number	Gray 8/12 slot Catalog number	White 4/6 slot Catalog number	White 8/12 slot Catalog number	Nominal size (mm)	Nominal size (inches)	Usable areas (mm ²)	Maximum number of wires according to AWG and cable section (mm ²)	
							800 405	1000 508
QD050X050HG	QD050X050SG	QD050X050HW	QD050X050SW	15x17	1/2x5/8	110	0	0
QD100X125HG	QD100X125SG	QD100X125HW	QD100X125SW	25x30	1x1 1/4	490	0	0
QD150X125HG	QD150X125SG	QD150X125HW	QD150X125SW	40x30	1 1/2x1 1/4	890	1	0
QD225X125HG	QD225X125SG	QD225X125HW	QD225X125SW	60x30	2 1/4x1 1/4	1430	1	1
QD100X150HG	QD100X150SG	QD100X150HW	QD100X150SW	25x40	1x1 1/2	710	0	0
QD150X150HG	QD150X150SG	QD150X150HW	QD150X150SW	40x40	1 1/2x1 1/2	1260	1	1
QD225X150HG	QD225X150SG	QD225X150HW	QD225X150SW	60x40	2 1/4x1 1/2	2000	2	1
QD300X150HG	QD300X150SG	QD300X150HW	QD300X150SW	80x40	3x1 1/2	2710	3	2
QD400X150HG	QD400X150SG	QD400X150HW	QD400X150SW	100x40	4x1 1/2	3460	4	3
QD475X150HG	QD475X150SG	QD475X150HW	QD475X150SW	120x40	4 3/4x1 1/2	4200	5	4
QD100X225HG	QD100X225SG	QD100X225HW	QD100X225SW	25x60	1 x 2 1/4	1120	1	—
QD150X225HG	QD150X225SG	QD150X225HW	QD150X225SW	40x60	1 1/2x2 1/4	1970	2	1
QD225X225HG	QD225X225SG	QD225X225HW	QD225X225SW	60x60	2 1/4x2 1/4	3060	3	3
QD300X225HG	QD300X225SG	QD300X225HW	QD300X225SW	80x60	3x2 1/4	4190	5	4
QD400X225HG	QD400X225SG	QD400X225HW	QD400X225SW	100x60	4x2 1/4	5320	6	5
QD475X225HG	QD475X225SG	QD475X225HW	QD475X225SW	120x60	4 3/4x2 1/4	6330	7	6
QD100X300HG	QD100X300SG	QD100X300HW	QD100X300SW	25x80	1x3	1540	1	—
QD150X300HG	QD150X300SG	QD150X300HW	QD150X300SW	40x80	1 1/2x3	2670	3	2
QD225X300HG	QD225X300SG	QD225X300HW	QD225X300SW	60x80	2 1/4x3	4140	5	4
QD300X300HG	QD300X300SG	QD300X300HW	QD300X300SW	80x80	3x3	5650	6	5
QD400X300HG	QD400X300SG	QD400X300HW	QD400X300SW	100x80	4x3	7170	8	7
QD475X300HG	QD475X300SG	QD475X300HW	QD475X300SW	120x80	4 3/4x3	8570	10	8
QD100X400HG	QD100X400SG	QD100X400HW	QD100X400SW	25x100	1x4	1970	2	—
QD150X400HG	QD150X400SG	QD150X400HW	QD150X400SW	40x100	1 1/2x4	3410	4	3
QD225X400HG	QD225X400SG	QD225X400HW	QD225X400SW	60x100	2 1/4x4	5300	6	5
QD300X400HG	QD300X400SG	QD300X400HW	QD300X400SW	80x100	3x4	7190	8	7
QD400X400HG	QD400X400SG	QD400X400HW	QD400X400SW	100x100	4x4	9110	11	8
QD600X400HG	QD600X400SG	QD600X400HW	QD600X400SW	150x100	6x4	13,740	16	13

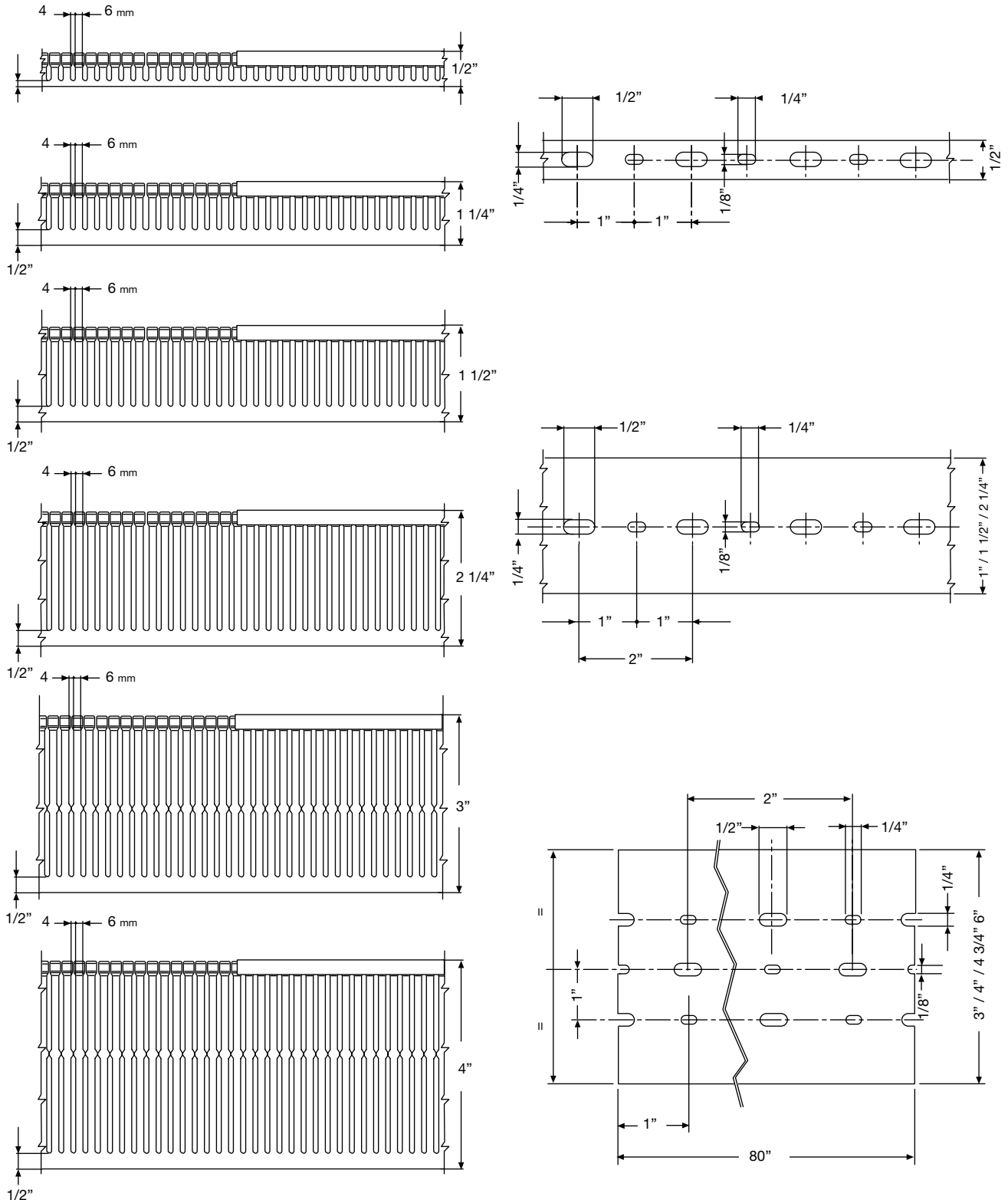
14

Q-Duct

Approximate dimensions

Thermoplastic wiring ducts with 4/6mm slots

CEI 23-22 Standard applies to plastic wiring ducts and their accessories to be used in the mechanical protection and support of cables in switchboards, in application with a maximum rated voltage of 1000 V in alternate current and 1500 V in direct current. Thermoplastic wiring ducts have obtained the IMQ certification.

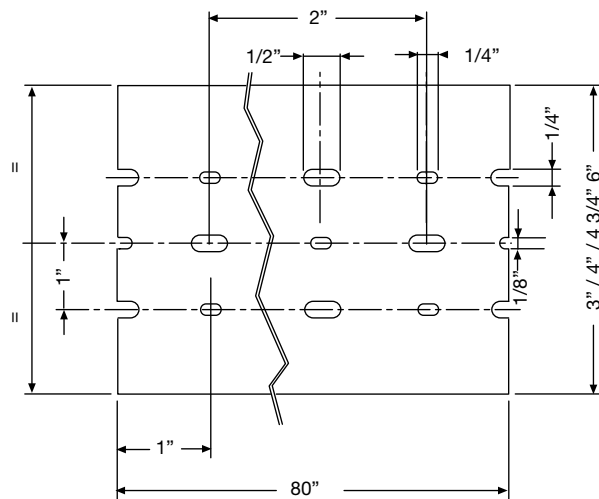
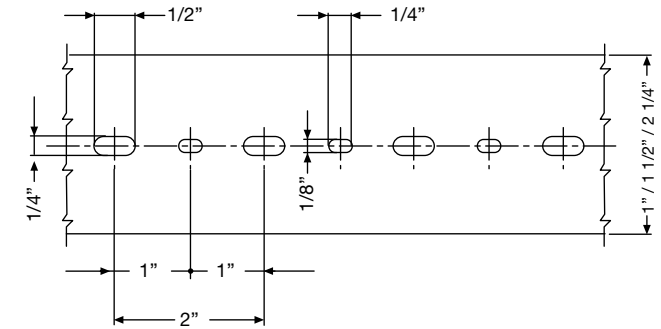
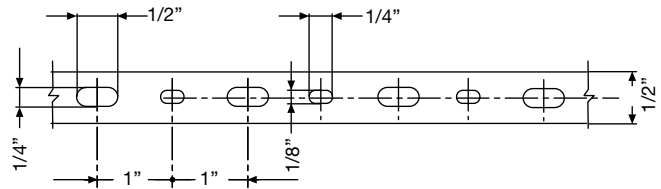
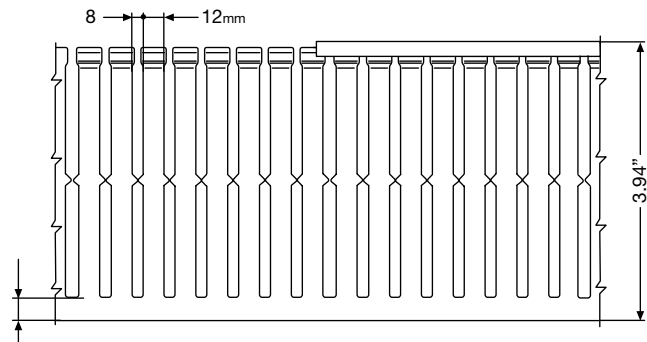
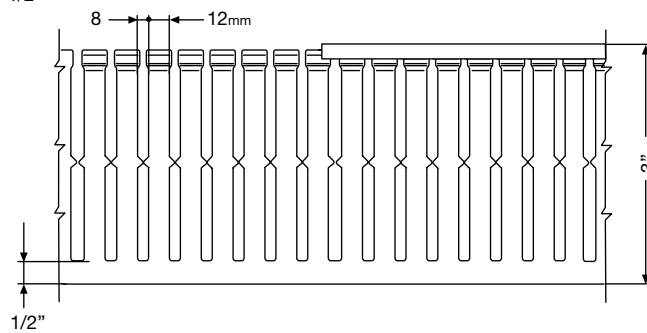
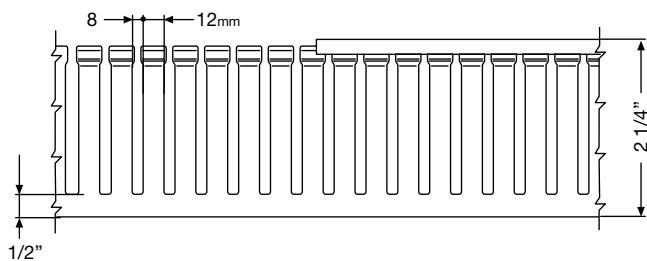
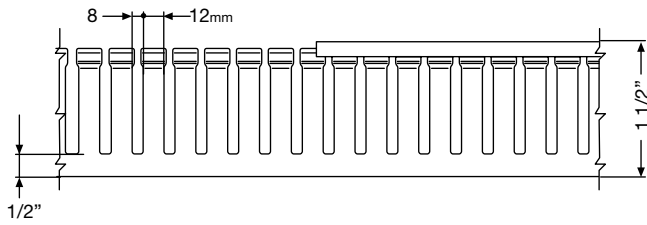
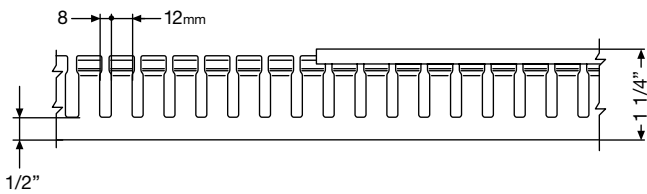
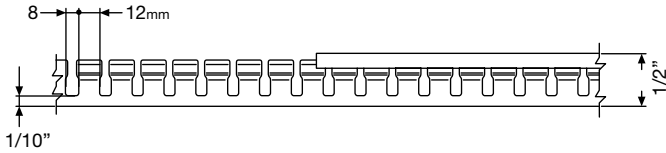


Q-Duct

Approximate dimensions

Thermoplastic wiring ducts with 8/12mm slots

CEI 23-22 Standard applies to plastic wiring ducts and their accessories to be used in the mechanical protection and support of cables in switchboards, in application with a maximum rated voltage of 1000 V in alternate current and 1500 V in direct current. Thermoplastic wiring ducts have obtained the IMQ certification.



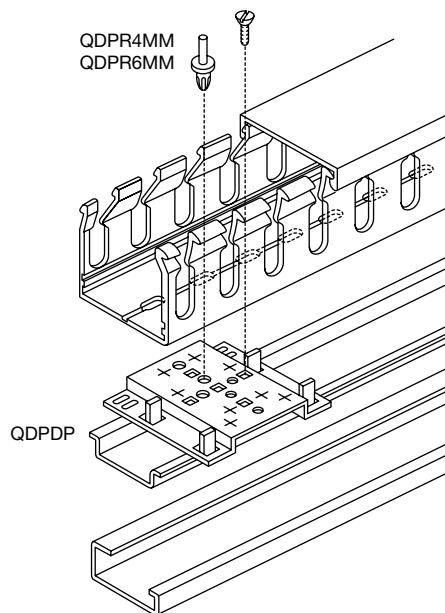
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Q-Duct

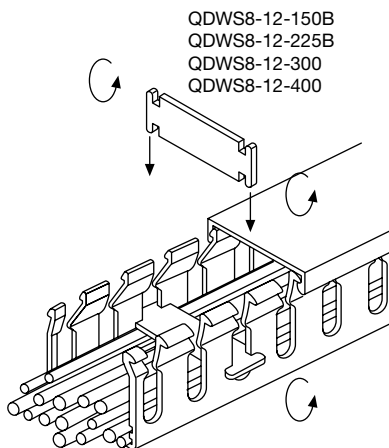
Approximate dimensions
Thermoplastic wiring ducts

Wire duct, ties,
spiral wrap

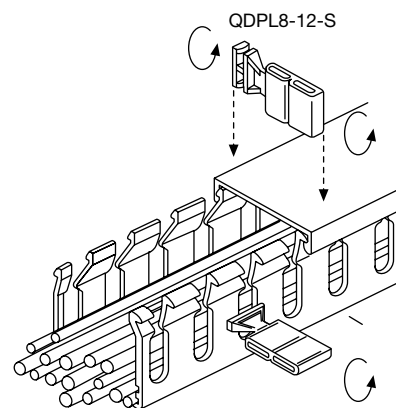
Plastic rivets and wiring duct bases



Plastic cable retainers



Plastic label tag



Wire duct, ties,
spiral wrap

Q-Duct

Catalog number cross-reference

Standard density: 8 - 12mm slot

Size (W x H)	ABB Catalog number		Length/Piece		Pieces/ Package (Minimum order Quantity)	Feet Per Package	Meters Per Package	Panduit catalog number (cover not included)		Iboco catalog number (cover included)	
	Gray	White	Feet	Meters				Gray	White	Gray	White
1/2" x 1/2"	QD050X050SG	QD050X050SW	6.6	2	23	152	46	G.5X.5LG6	G.5X.5WH6	T1-0506G	T1-0506W
1" x 1 1/4"	QD100X125SG	QD100X125SW	6.6	2	29	191	58	G1X1LG6	G1X1WH6	T1-1010G	T1-1010W
1 1/2" x 1 1/4"	QD150X125SG	QD150X125SW	6.6	2	20	132	40	G1.5X1LG6	G1.5X1WH6	-	-
2 1/4" x 1 1/4"	QD225X125SG	QD225X125SW	6.6	2	26	172	52	G2X1LG6	G2X1WH6	-	-
1" x 1 1/2"	QD100X150SG	QD100X150SW	6.6	2	24	158	48	G1X1.5LG6	G1X1.5WH6	T1-1015	T1-1015W
1 1/2" x 1 1/2"	QD150X150SG	QD150X150SW	6.6	2	15	99	30	G2X1.5LG6	G2X1.5WH6	T1-1515G	T1-1515W
2 1/4" x 1 1/2"	QD225X150SG	QD225X150SW	6.6	2	20	132	40	G2X1.5LG6	G2X1.5WH6	T1-2215G	T1-2215W
3" x 1 1/2"	QD300X150SG	QD300X150SW	6.6	2	16	106	32	-	-	T1-3015G	T1-3015W
4" x 1 1/2"	QD400X150SG	QD400X150SW	6.6	2	12	79	24	G4X1.5LG6	G4X1.5WH6	T1-4015G	T1-4015W
4 3/4" x 1 1/2"	QD475X150SG	QD475X150SW	6.6	2	10	66	20	-	-	-	-
1" x 2 1/4"	QD100X225SG	QD100X225SW	6.6	2	17	112	34	G1X2LG6	G1X2WH6	T1-1022G	T1-1022W
1 1/2" x 2 1/4"	QD150X225SG	QD150X225SW	6.6	2	11	73	22	G1.5X2LG6	G1.5X2WH6	T1-1522G	T1-1522W
2 1/4" x 2 1/4"	QD225X225SG	QD225X225SW	6.6	2	16	106	32	G2X2LG6	G2X2WH6	T1-2222G	T1-2222W
3" x 2 1/4"	QD300X225SG	QD300X225SW	6.6	2	12	79	24	G3X2LG6	G3X2WH6	T1-3022G	T1-3022W
4" x 2 1/4"	QD400X225SG	QD400X225SW	6.6	2	10	66	20	G4X2LG6	G4X2WH6	T1-4022G	T1-4022W
4 3/4" x 2 1/4"	QD475X225SG	QD475X225SW	6.6	2	7	46	14	-	-	-	-
1" x 3"	QD100X300SG	QD100X300SW	6.6	2	14	92	28	G1X3LG6	G1X3WH6	T1-1030G	T1-1030W
1 1/2" x 3"	QD150X300SG	QD150X300SW	6.6	2	18	119	36	G1.5X3LG6	G1.5X3WH6	T1-1530G	T1-1530W
2 1/4" x 3"	QD225X300SG	QD225X300SW	6.6	2	12	79	24	G2X3LG6	G2X3WH6	T1-2230G	T1-2230W
3" x 3"	QD300X300SG	QD300X300SW	6.6	2	8	53	16	G3X3LG6	G3X3WH6	T1-3030G	T1-3030W
4" x 3"	QD400X300SG	QD400X300SW	6.6	2	8	53	16	G4X3LG6	G4X3WH6	T1-4030G	T1-4030W
4 3/4" x 3"	QD475X300SG	QD475X300SW	6.6	2	6	40	12	-	-	-	-
1" x 4"	QD100X400SG	QD100X400SW	6.6	2	10	66	20	G1X4LG6	G1X4WH6	T1-1040G	T1-1040W
1 1/2" x 4"	QD150X400SG	QD150X400SW	6.6	2	14	92	28	G1.5X4LG6	G1.5X4WH6	T1-1540G	T1-1540W
2 1/4" x 4"	QD225X400SG	QD225X400SW	6.6	2	10	66	20	G2X4LG6	G2X4WH6	T1-2240G	T1-2240W
3" x 4"	QD300X400SG	QD300X400SW	6.6	2	7	46	14	G3X4LG6	G3X4WH6	T1-3040G	T1-3040W
4" x 4"	QD400X400SG	QD400X400SW	6.6	2	4	26	8	G4X4LG6	G4X4WH6	T1-4040G	T1-4040W
6" x 4"	QD600X400SG	QD600X400SW	6.6	2	4	26	8	G6X4LG6	G6X4WH6	T1-6040G	T1-6040W

Q-Duct

Catalog number cross-reference

Wire duct, ties,
spiral wrap

High density: 4-6mm slot

Size (W x H)	ABB Catalog number		Length/Piece		Pieces/ Package (Minimum order Quantity)	Feet Per Package	Meters Per Pack- age	Panduit catalog number (cover not included)		Iboco catalog number (cover included)	
	Gray	White	Feet	Meters				Gray	White	Gray	White
1/2" x 1/2"	QD050X050HG	QD050X050HW	6.6	2	23	152	46	-	-	-	-
1" x 1 1/4"	QD100X125HG	QD100X125HW	6.6	2	29	191	58	F1X1LG1	F1X1WH1	-	-
1 1/2" x 1 1/4"	QD150X125HG	QD150X125HW	6.6	2	20	132	40	F1.5X1LG6	F1.5X1WH6	-	-
2 1/4" x 1 1/4"	QD225X125HG	QD225X125HW	6.6	2	26	172	52	F2X1LG6	F2X1WH6	-	-
1" x 1 1/2"	QD100X150HG	QD100X150HW	6.6	2	24	158	48	F1X1.5LG6	F1X1.5WH6	T1E-1015G	T1E-1015W
1 1/2" x 1 1/2"	QD150X150HG	QD150X150HW	6.6	2	15	99	30	F1.5X1.5LG6	F1.5X1.5WH6	T1E-1515G	T1E-1515W
2 1/4" x 1 1/2"	QD225X150HG	QD225X150HW	6.6	2	20	132	40	F2X1.5LG6	F2X1.5WH6	T1E-2215G	T1E-2215W
3" x 1 1/2"	QD300X150HG	QD300X150HW	6.6	2	16	106	32	-	-	T1E-3015G	T1E-3015W
4" x 1 1/2"	QD400X150HG	QD400X150HW	6.6	2	12	79	24	-	-	T1E-4015G	T1E-4015W
4 3/4" x 1 1/2"	QD475X150HG	QD475X150HW	6.6	2	10	66	20	-	-	-	-
1" x 2 1/4"	QD100X225HG	QD100X200HW	6.6	2	17	112	34	F1X2LG6	F1X2WH6	T1E-1022G	T1E-1022W
1 1/2" x 2 1/4"	QD150X225HG	QD150X225HW	6.6	2	11	73	22	F1.5X2LG6	F1.5X2WH6	T1E-1522G	T1E-1522W
2 1/4" x 2 1/4"	QD225X225HG	QD225X225HW	6.6	2	16	106	32	F2X2LG6	F2X2WH6	T1E-2222G	T1E-2222W
3" x 2 1/4"	QD300X225HG	QD300X225HW	6.6	2	12	79	24	F3X2LG6	F3X2WH6	T1E-3022G	T1E-3022W
4" x 2 1/4"	QD400X225HG	QD400X225HW	6.6	2	10	66	20	F4X2LG6	F4X2WH6	T1E-4022G	T1E-4022W
4 3/4" x 2 1/4"	QD475X225HG	QD475X225HW	6.6	2	7	46	14	-	-	-	-
1" x 3"	QD100X300HG	QD100X300HW	6.6	2	14	92	28	F1X3LG6	F1X3WH6	T1E-1030G	T1E-1030W
1 1/2" x 3"	QD150X300HG	QD150X300HW	6.6	2	18	119	36	F1.5X3LG6	F1.5X3WH6	T1E-1530G	T1E-1530W
2 1/4" x 3"	QD225X300HG	QD225X300HW	6.6	2	12	79	24	F2X3LG6	F2X3WH6	T1E-2230G	T1E-2230W
3" x 3"	QD300X300HG	QD300X300HW	6.6	2	8	53	16	F3X3LG6	F3X3WH6	T1E-3030G	T1E-3030W
4" x 3"	QD400X300HG	QD400X300HW	6.6	2	8	53	16	F4X3LG6	F4X3WH6	T1E-4030G	T1E-4030W
4 3/4" x 3"	QD475X300HG	QD475X300HW	6.6	2	6	40	12	-	-	-	-
1" x 4"	QD100X400HG	QD100X400HW	6.6	2	10	66	20	F1X4LG6	F1X4WH6	-	-
1 1/2" x 4"	QD150X400HG	QD150X400HW	6.6	2	14	92	28	F1.5X4LG6	F1.5X4WH6	-	-
2 1/4" x 4"	QD225X400HG	QD225X400HW	6.6	2	10	66	20	F2X4LG6	F2X4WH6	-	-
3" x 4"	QD300X400HG	QD300X400HW	6.6	2	7	46	14	F3X4LG6	F3X4WH6	-	-
4" x 4"	QD400X400HG	QD400X400HW	6.6	2	4	26	8	F4X4LG6	F4X4WH6	T1E-4040G	T1E-4040W
6" x 4"	QD600X400HG	QD600X400HW	6.6	2	4	26	8	-	-	-	-

Wire duct sample kits

Wire duct sample kits

Description	Catalog number
Standard Cable Tie - Sample Kit	QT-SAMPL-STDITIES
Large Cable Tie - Sample Kit	QT-SAMPL-LGTIES
Cable Tie Mounting Bases - Sample Kit	QT-SAMPL-MBA
Standard Wire Duct (Gray) - Sample Kit	QD-SAMPL-STDG
Standard Wire Duct (White) - Sample Kit	QD-SAMPL-STDW
High Density Wire Duct (Gray) - Sample Kit	QD-SAMPL-HIDENSG
Square Flexible Wire Duct - Sample Kit	QD-SAMPL-SQR
Round Flexible Wire Duct - Sample Kit	QD-SAMPL-RND
Spiral Wrap - Sample Kit	QD-SAMPL-SPIRAL



Locate QR Code Reader
on smart device APP site

Wire Duct Sample kits are available for order through your ABB sales representative.

Q-Flex Flexible wiring duct



Q-Flex Flexible wiring duct



Flexible wiring duct (Square - Gray) - 20" length per piece

Dimensions WXH (in)	Dimensions WXH (mm)	Catalog number	Pieces per package
1/2 x 1/2	12.5 x 12.5	QDF050X050G	112
5/8 x 5/8	16 x 16	QDF058X058G	84
3/4 x 3/4	20 x 20	QDF075X075G	112
1 x 1	25 x 25	QDF100X100G	70
1 1/4 x 1 1/4	30 x 30	QDF125X125G	50
1 1/2 x 1 1/2	40 x 40	QDF150X150G	50
2 x 2	50 x 50	QDF200X200G	32

Flexible wiring duct (Round - White) - 19.5" length per piece

Inside diameter (in)	Inside diameter (mm)	Catalog number	Pieces per package
3/8	10	QT-10	700
3/4	20	QT-20	350
1 1/2	30	QT-30	200
1 3/4	40	QT-40	100

Sold in package quantity only. Order quantity must be equal to quantity shown in "pieces per package" column.

Technical data

- RAL 7040 Gray
- Plastic, insulating, shock-proof, self-extinguishing material in compliance with UL 94 V2 Standard and resistant to permanent temperature of 80°C and peaks up to 110°C in compliance with IEC 216 Standards
- Resistant to acids, oils and greases
- Ribs alternate and angle slightly inwards to make it easier to insert and extract cables
- No covers so cables can be constantly monitored
- Possibility of fastening using screws and rivets or bi-adhesive tape which sticks strongly to the steel (pre-mounted)
- Suitable for connecting panels and doors with compass-opening mechanisms and in general for applications where cabling is subject to bending and twisting
- Standard 500mm length

Wire duct, ties,
spiral wrap

Notes

Q-Wrap spiral wrap



Q-Wrap Spiral wrap



Height in (mm)	Width in (mm)	Diameter Min / Max in (mm)	Translucent Polyethylene Catalog number	Self-extinguishing Polyethylene Catalog number	Length per roll (feet)	Length per roll (meters)
.12 (3)	.2 (5)	.08 (2) / .47 (12)	Q12P164C	Q12SEP164	164	50
.24 (6)	.31 (8)	.2 (5) / 2.20 (56)	Q25P82C	Q24SEP82	82	25
.39 (10)	.43 (11)	.47 (12) / 3.94 (100)	Q39P82C	Q39SEP82	82	25
.47 (12)	.51 (13)	.55 (14) / 5.12 (130)	Q47P82C	Q47SEP82	82	25

Features and benefits

- Options available:
 - Translucent polyethylene
 - Self-extinguishing polyethylene
- For forming of bundles and grouping of wires
- Mechanical protection of cables
- Flexible connections between panel and door

Wire duct, ties,
spiral wrap

Notes

Q-Ties tie wraps

ABB

Q-Ties
Tie wraps



Features

- Easy to install and remove
- Provides protection to the wire bundle
- Available in white and black

Applications

- Fast and economical grouping of wire bundles
- Joining groups of wires and/or tubing
- Flexible connections between door and panel

Q-Ties Cable ties



White



Black

Item	Catalog number	Pieces (per package)
White (6x6) Polyamide		
3.86" (98mm) x 0.10" (2.5mm)	QT400-10W	100
5.31" (135mm) x 0.10" (2.5mm)	QT525-10W	100
6.30" (160mm) x 0.10" (2.6mm)	QT625-10W	100
5.51" (140mm) x 0.14" (3.6mm)	QT550-14W	100
7.87" (200mm) x 0.14" (3.6mm)	QT800-14W	100
11.42" (290mm) x 0.14" (3.6mm)	QT1100-14W	100
7.01" (178mm) x 0.19" (4.8mm)	QT700-14W	100
11.42" (290mm) x 0.19" (4.8mm)	QT1100-17W	100
14.17" (360mm) x 0.19" (4.8mm)	QT1400-17W	100
9.45" (240mm) x 0.31" (7.8mm)	QT800-30W	100
11.81" (300mm) x 0.31" (7.8mm)	QT1100-30W	100
14.37" (365mm) x 0.31" (7.8mm)	QT1400-30W	100
17.72" (450mm) x 0.31" (7.8mm)	QT1700-35W	100
21.26" (540mm) x 0.31" (7.8mm)	QT2150-35W	100
30.71" (780mm) x 0.35" (9.0mm)	QT3075-35W	100
White (6x6 Bulk) Polyamide		
3.86" (98mm) x 0.10" (2.5mm)	QT400-10WB	1000
5.31" (135mm) x 0.10" (2.5mm)	QT525-10WB	1000
6.30" (160mm) x 0.10" (2.6mm)	QT625-10WB	1000
5.51" (140mm) x 0.14" (3.6mm)	QT550-10WB	1000
7.87" (200mm) x 0.14" (3.6mm)	QT800-14WB	1000
Black (6x6) Polyamide		
3.86" (98mm) x 0.10" (2.5mm)	QT400-10B	100
5.31" (135mm) x 0.10" (2.5mm)	QT525-10B	100
5.51" (140mm) x 0.14" (3.6mm)	QT550-10B	100
6.30" (160mm) x 0.10" (2.6mm)	QT625-10B	100
7.87" (200mm) x 0.14" (3.6mm)	QT800-14B	100
11.42" (290mm) x 0.14" (3.6mm)	QT1100-14B	100
7.01" (178mm) x 0.19" (4.8mm)	QT700-17B	100
11.42" (290mm) x 0.19" (4.8mm)	QT1100-17B	100
14.17" (360mm) x 0.19" (4.8mm)	QT1400-17B	100
9.45" (240mm) x 0.31" (7.8mm)	QT800-30B	100
11.81" (300mm) x 0.31" (7.8mm)	QT1100-30B	100
14.37" (365mm) x 0.31" (7.8mm)	QT1400-30B	100
17.72" (450mm) x 0.31" (7.8mm)	QT1700-35B	100
21.26" (540mm) x 0.31" (7.8mm)	QT2150-35B	100
30.71" (780mm) x 0.35" (9.0mm)	QT3075-35B	100
Black (6x6 Bulk) Polyamide		
3.86" (98mm) x 0.10" (2.5mm)	QT400-10BB	1000
5.31" (135mm) x 0.10" (2.5mm)	QT525-10BB	1000
6.30" (160mm) x 0.10" (2.6mm)	QT625-10BB	1000
5.51" (140mm) x 0.14" (3.6mm)	QT550-10BB	1000
7.87" (200mm) x 0.14" (3.6mm)	QT800-14BB	1000
Black (12 Polyamide)		
4.53" (115mm) x 0.24" (6mm)	QT400-24B	100
7.09" (180mm) x 0.24" (6mm)	QT700-24B	100
5.20" (132mm) x 0.35" (9mm)	QT450-35B	100
7.09" (180mm) x 0.35" (9mm)	QT700-35B	100
10.24" (260mm) x 0.35" (9mm)	QT1050-35B	100
14.17" (360mm) x 0.35" (9mm)	QT1400-35B	100

Sold in package quantity only.

Q-Ties Accessories

Cable tie accessories



QTAB-C



QTAB-B



QTCTR



QTSM-B



QTP-INB



QTOCTCTR

Item	Catalog number	Pieces per package ①
Self-adhesive base for cable ties (clear)	QTAB-C	50
Self-adhesive base for cable ties (black)	QTAB-B	50
Screw mounted base for cable ties (clear)	QTSM-C	100
Screw mounted base for cable ties (black)	QTSM-B	100
Cable tie cutter	QTCTR	1
Screw mounted base for cable ties (clear)	QTSMB	25
Push-in base for cable ties	QTP-INB	25
Outer cable tie cutter	QTOCTCTR	1

① Sold in package quantity only.

Q-Ties

Technical data & approximate dimensions

General features

- Self extinguishing class according to UL 94: V2
- Manufactured in 6/6 nylon; Colorless for general uses
- Better stored at mild temperatures, away from heat and excessively dry conditions
- Black cable ties are UV resistant; excellent for outdoor applications

Thermal properties

- Suitable for use at temperatures from -40° to +85°C
- Softening point VICAT VST/B/50-DIN 53460 over 200°C

Electrical characteristics









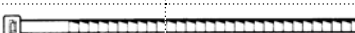
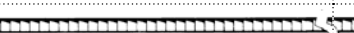

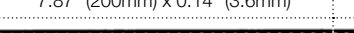

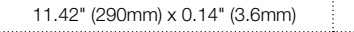
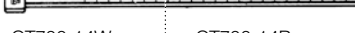
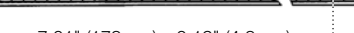


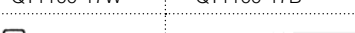
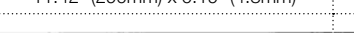
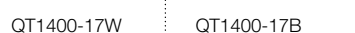
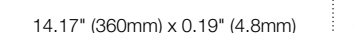


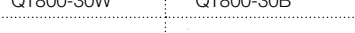
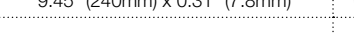
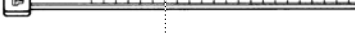
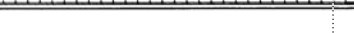

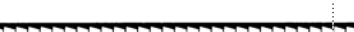
- Dielectric endurance 50,000 V/mm

Chemical characteristics

- Good resistance to bases, oil, grease, hydrocarbons, acetone, chlorales
- Limited concentrated acid resistance
- Dissolved by phenol and formic acid

Mechanical characteristics

- Bending point DIN 53452 110 M Pa
- Load point DIN 53457 2800 M Pa
- Resilience DIN 53453 6-8 KJ/m²
- Yield point DIN 53456 80 M Pa
- Stretch point DIN 53455 35%
- Hardness DIN 53456 125 N/mm²

White polyamide catalog number	Black polyamide catalog number	Size L x W In (mm) x In (mm)	Tightening diameter		Tensile strength	
			Minimum In (mm)	Maximum In (mm)	N	Lbs.
 QT400-10W	 QT400-10B	3.86" (98mm) x 0.10" (2.5mm)	0.04" (1mm)	0.83" (21mm)	80	176
 QT525-10W	 QT525-10B	5.31" (135mm) x 0.10" (2.5mm)	0.04" (1mm)	1.26" (32mm)	80	176
 QT625-10W	 QT625-10B	6.30" (160mm) x 0.10" (2.6mm)	0.04" (1mm)	1.57" (40mm)	80	176
 QT550-14W	 QT550-14B	5.51" (140mm) x 0.14" (3.6mm)	0.08" (2mm)	1.38" (35mm)	130	286
 QT800-14W	 QT800-14B	7.87" (200mm) x 0.14" (3.6mm)	0.08" (2mm)	1.97" (50mm)	130	286
 QT1100-14W	 QT1100-14B	11.42" (290mm) x 0.14" (3.6mm)	0.08" (2mm)	3.15" (80mm)	130	286
 QT700-14W	 QT700-14B	7.01" (178mm) x 0.19" (4.8mm)	0.08" (2mm)	1.77" (45mm)	220	484
 QT1100-17W	 QT1100-17B	11.42" (290mm) x 0.19" (4.8mm)	0.14" (3.5mm)	3.11" (79mm)	220	484
 QT1400-17W	 QT1400-17B	14.17" (360mm) x 0.19" (4.8mm)	0.14" (3.5mm)	4.06" (103mm)	220	484
 QT800-30W	 QT800-30B	9.45" (240mm) x 0.31" (7.8mm)	0.14" (3.5mm)	2.48" (63mm)	540	1188
 QT1100-30W	 QT1100-30B	11.81" (300mm) x 0.31" (7.8mm)	0.16" (4mm)	3.15" (80mm)	540	1188
 QT1400-30W	 QT1400-30B	14.37" (365mm) x 0.31" (7.8mm)	0.31" (8mm)	3.94" (100mm)	540	1188
 QT1700-35W	 QT1700-35B	17.72" (450mm) x 0.31" (7.8mm)	1.38" (35mm)	5.12" (130mm)	540	1188
 QT2150-35W	 QT2150-35B	21.26" (540mm) x 0.31" (7.8mm)	1.38" (35mm)	6.22" (158mm)	540	1188
 QT3075-35W	 QT3075-35B	30.71" (780mm) x 0.35" (9.0mm)	1.26" (32mm)	9.17" (233mm)	700	1540

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Q-Ties

Technical data

Approximate dimensions

General features

- Self extinguishing class according to UL 94: V2
- Manufactured in 12 nylon
- Moisture absorption less than 1%
- Black cable ties are UV resistant; excellent for outdoor applications

Thermal properties

- Suitable for use at temperatures from -45° to +85°C
- Softening point VICAT VST/B/50-DIN 53460 over 160°C

Electrical characteristics

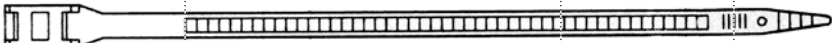

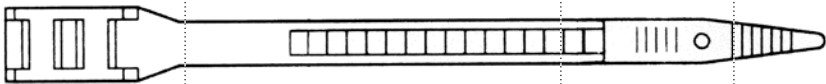
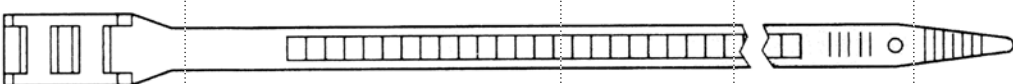
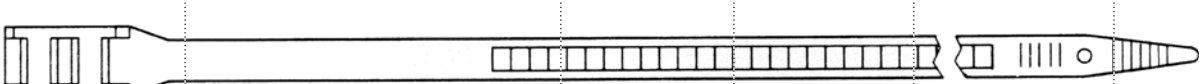

- Dielectric endurance 28,000 V/mm

Chemical characteristics

- Good resistance to bases, oil, grease, hydrocarbons, acetone, chlorales
- Limited resistance to nitric and chromic acid
- Dissolved by phenol and formic acids

Mechanical characteristics

- Bending point DIN 53452 20 M Pa
- Load point DIN 53457 420 M Pa
- Breaking load point DIN 53455 61 M Pa
- Resilience 20°C DIN 53453 KJ/m not broken
- Yield point DIN 53456 24 M Pa
- Stretch point DIN 53455 37%
- Hardness G2 Shore D

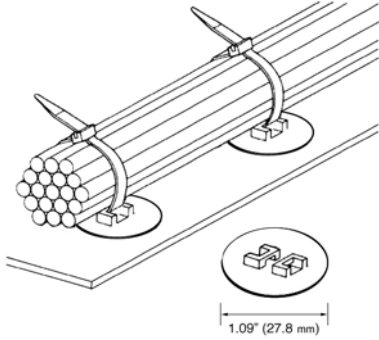
Black polyamide catalog number	Size L x W In (mm) x In (mm)	Tightening diameter		Tensile strength	
		Minimum In (mm)	Maximum In (mm)	N	Lbs.
 QT400-24B	4.53" (115mm) x 0.24" (6mm)	0.20" (5mm)	0.98" (25mm)	280	616
 QT700-24B	7.09" (180mm) x 0.24" (6mm)	0.35" (9mm)	1.77" (45mm)	280	616
 QT450-35B	5.20" (132mm) x 0.35" (9mm)	0.31" (8mm)	1.06" (26mm)	390	858
 QT700-35B	7.09" (180mm) x 0.35" (9mm)	0.39" (10mm)	1.57" (40mm)	390	858
 QT1050-35B	10.24" (260mm) x 0.35" (9mm)	1.02" (26mm)	2.44" (62mm)	540	1188
 QT1400-35B	14.17" (360mm) x 0.35" (9mm)	1.02" (26mm)	3.66" (93mm)	540	1188

Q-Ties

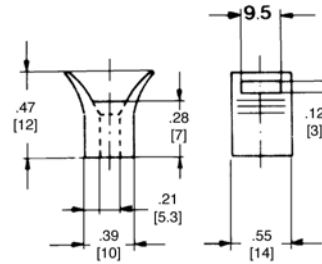
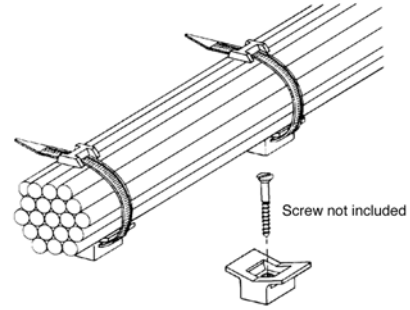
Approximate dimensions

00.00 Inches
00.00 [Millimeters]

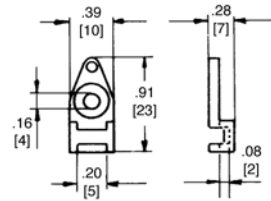
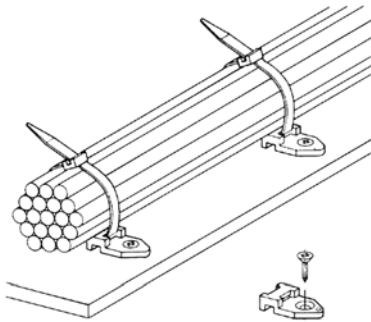
QTAB-C & QTAB-B
Self-adhesive base for cable ties



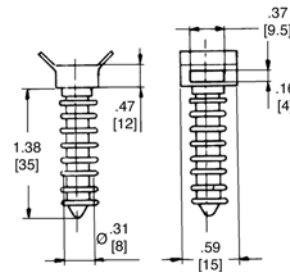
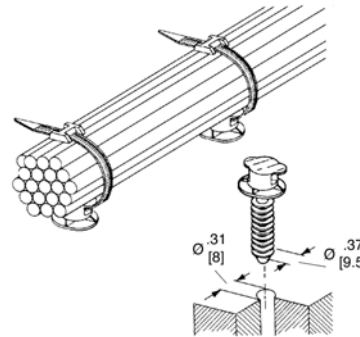
QTSMB
Screw-mounted base for cable ties



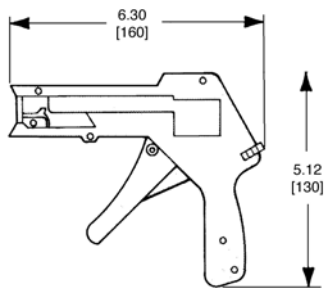
QTSM-C & QTSM-B
Screw-mounted base for cable ties



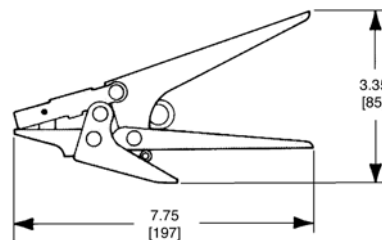
QTP-INB
Push-in base for cable ties



QTCTR
Cable tie cutter



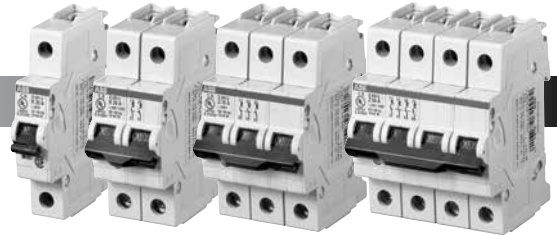
QTOCTCTR
Cable tie cutter



14



15 - Miniature circuit breakers



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UL & IEC Series

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S200 UL 489 Series Miniature circuit breakers



S200
UL 489 Series



Description

The S200 Series miniature circuit breaker offers a compact solution for protection requirements. The S200U AND S200UP devices are UL 489 tested current limiting and DIN rail mounted.

The S200U and S200UP is available with application-specific trip characteristics to provide maximum circuit protection.

The breakers offer thermal-magnetic trip protection according to K and Z characteristics.

For the worldwide market, the breakers carry UL, CSA, IEC, CE and many other agency approvals and certifications.

Features

- UL current limiting
- Fast breaking time (2.3 – 2.5 ms)
- Bus connection system
- Wide range of accessories
- Available with variable depth handle mechanism
- CE certified and marked
- DIN rail mounting
- Finger safe terminals
- Multi-function terminals
- Suitable for reverse feed but S200UDC has polarity
- UL 489 Listed - branch circuit protective device. UL File #E212323

	S200U	S200UP	SU200PR	S200UDC
Amperage	0.2 – 63	0.2 – 25	0.2 – 35A ; 40 – 63A	1 – 63
Voltage	240 VAC	480Y/277VAC	480Y/277 VAC ; 240 VAC	60-125 VDC
Poles	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4	1, 2
Trip characteristics	K, Z	K, Z	K	K, Z
Interrupting ratings	Up to 25 kA: IEC 60947-2 10 kA: UL 489 10 kA: CSA 22.2 No. 5	Up to 25 kA: IEC 60947-2 10 kA: UL 489 10 kA: CSA 22.2 No. 5	10kA: UL489 10kA: CSA 22.2 No.5	14 kA: UL489 14 kA: CSA 22.2 No. 5
Auxiliary contacts	Yes	Yes	Yes	Yes
Bell alarm	Yes	Yes	Yes	Yes
Shunt trip	Yes	Yes	Yes	Yes
Bus bar	Yes	Yes	No	Yes

S200U-K, 240 VAC

Branch circuit protection
UL 489, CSA 22.2 No. 5

K



S201U-K



S202U-K



S203U-K



S204U-K

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.2	S201U-K0.2	3	0.2	S203U-K0.2
	0.3	S201U-K0.3		0.3	S203U-K0.3
	0.5	S201U-K0.5		0.5	S203U-K0.5
	0.75	S201U-K0.75		0.75	S203U-K0.75
	1	S201U-K1		1	S203U-K1
	1.6	S201U-K1.6		1.6	S203U-K1.6
	2	S201U-K2		2	S203U-K2
	3	S201U-K3		3	S203U-K3
	4	S201U-K4		4	S203U-K4
	5	S201U-K5		5	S203U-K5
	6	S201U-K6		6	S203U-K6
	8	S201U-K8		8	S203U-K8
	10	S201U-K10		10	S203U-K10
	15	S201U-K15		15	S203U-K15
	16	S201U-K16		16	S203U-K16
	20	S201U-K20		20	S203U-K20
25	S201U-K25	25	S203U-K25		
2	30	S201U-K30	4	30	S203U-K30
	32	S201U-K32		32	S203U-K32
	40	S201U-K40		40	S203U-K40
	50	S201U-K50		50	S203U-K50
	60	S201U-K60		60	S203U-K60
	63	S201U-K63		63	S203U-K63
	0.2	S202U-K0.2		0.2	S204U-K0.2
	0.3	S202U-K0.3		0.3	S204U-K0.3
	0.5	S202U-K0.5		0.5	S204U-K0.5
	0.75	S202U-K0.75		0.75	S204U-K0.75
	1	S202U-K1		1	S204U-K1
1.6	S202U-K1.6	1.6	S204U-K1.6		
2	S202U-K2	2	S204U-K2		
3	S202U-K3	3	S204U-K3		
4	S202U-K4	4	S204U-K4		
5	S202U-K5	5	S204U-K5		
6	S202U-K6	6	S204U-K6		
8	S202U-K8	8	S204U-K8		
10	S202U-K10	10	S204U-K10		
15	S202U-K15	15	S204U-K15		
16	S202U-K16	16	S204U-K16		
20	S202U-K20	20	S204U-K20		
25	S202U-K25	25	S204U-K25		
3	30	S202U-K30	4	30	S204U-K30
	32	S202U-K32		32	S204U-K32
	40	S202U-K40		40	S204U-K40
	50	S202U-K50		50	S204U-K50
	60	S202U-K60		60	S204U-K60
	63	S202U-K63		63	S204U-K63

Tripping characteristic K

UL 489
240 VAC
10 kA

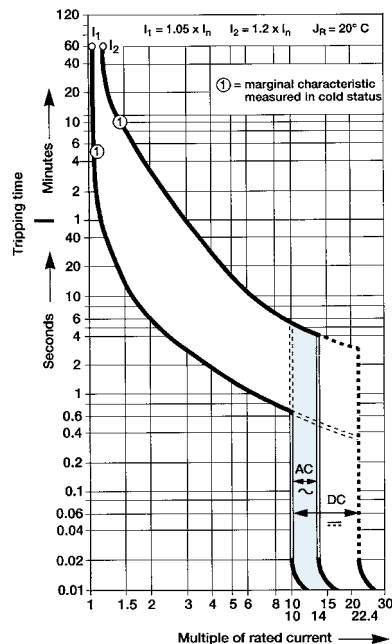
Inductive loads

- K Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.9 - 15.13

Technical data – See page 15.14 - 15.16



Note: This breaker for AC use only

S200U-Z, 240 VAC

Branch circuit protection
UL 489, CSA 22.2 No. 5

Z



S201U-Z



S202U-Z



S203U-Z



S204U-Z

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.5	S201U-Z0.5	3	0.5	S203U-Z0.5
	1	S201U-Z1		1	S203U-Z1
	1.6	S201U-Z1.6		1.6	S203U-Z1.6
	2	S201U-Z2		2	S203U-Z2
	3	S201U-Z3		3	S203U-Z3
	4	S201U-Z4		4	S203U-Z4
	5	S201U-Z5		5	S203U-Z5
	6	S201U-Z6		6	S203U-Z6
	8	S201U-Z8		8	S203U-Z8
	10	S201U-Z10		10	S203U-Z10
	15	S201U-Z15		15	S203U-Z15
	16	S201U-Z16		16	S203U-Z16
	20	S201U-Z20		20	S203U-Z20
	25	S201U-Z25		25	S203U-Z25
	30	S201U-Z30		30	S203U-Z30
2	0.5	S202U-Z0.5	4	0.5	S204U-Z0.5
	1	S202U-Z1		1	S204U-Z1
	1.6	S202U-Z1.6		1.6	S204U-Z1.6
	2	S202U-Z2		2	S204U-Z2
	3	S202U-Z3		3	S204U-Z3
	4	S202U-Z4		4	S204U-Z4
	5	S202U-Z5		5	S204U-Z5
	6	S202U-Z6		6	S204U-Z6
	8	S202U-Z8		8	S204U-Z8
	10	S202U-Z10		10	S204U-Z10
	15	S202U-Z15		15	S204U-Z15
	16	S202U-Z16		16	S204U-Z16
	20	S202U-Z20		20	S204U-Z20
	25	S202U-Z25		25	S204U-Z25
	30	S202U-Z30		30	S204U-Z30
1	32	S201U-Z32	3	32	S203U-Z32
	40	S201U-Z40		40	S203U-Z40
	50	S201U-Z50		50	S203U-Z50
	60	S201U-Z60		60	S203U-Z60
	63	S201U-Z63		63	S203U-Z63
	2	32		S202U-Z32	4
40		S202U-Z40	40	S204U-Z40	
50		S202U-Z50	50	S204U-Z50	
60		S202U-Z60	60	S204U-Z60	
63		S202U-Z63	63	S204U-Z63	

Tripping characteristic Z

UL 489
240 VAC
10 kA

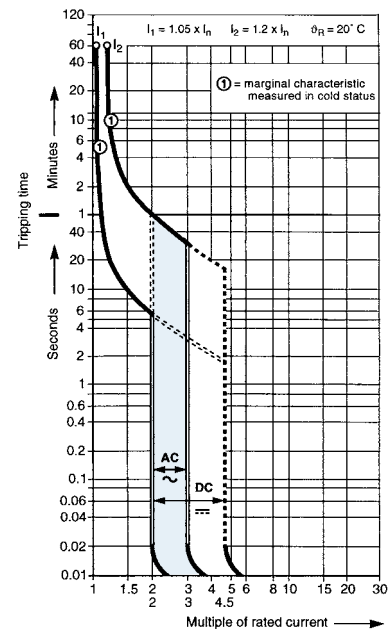
Resistive loads

- Z Curve
- Designed to provide maximum protection with a very low short circuit trip setting
- Example: semiconductors, control circuits

Accessories & technical data

Accessories – See page 15.9 - 15.13

Technical data – See page 15.14 - 15.16



Note: This breaker for AC use only

S200UP-K, 480Y/277 VAC

Branch circuit protection

UL 489, CSA 22.2 No. 5

K



S201UP-K



S202UP-K



S203UP-K



S204UP-K

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.2	S201UP-K0.2	3	0.2	S203UP-K0.2
	0.3	S201UP-K0.3		0.3	S203UP-K0.3
	0.5	S201UP-K0.5		0.5	S203UP-K0.5
	0.75	S201UP-K0.75		0.75	S203UP-K0.75
	1	S201UP-K1		1	S203UP-K1
	1.6	S201UP-K1.6		1.6	S203UP-K1.6
	2	S201UP-K2		2	S203UP-K2
	3	S201UP-K3		3	S203UP-K3
	4	S201UP-K4		4	S203UP-K4
	5	S201UP-K5		5	S203UP-K5
	6	S201UP-K6		6	S203UP-K6
	8	S201UP-K8		8	S203UP-K8
	10	S201UP-K10		10	S203UP-K10
	15	S201UP-K15		15	S203UP-K15
	16	S201UP-K16		16	S203UP-K16
20	S201UP-K20	20	S203UP-K20		
25	S201UP-K25	25	S203UP-K25		
2	0.2	S202UP-K0.2	4	0.2	S204UP-K0.2
	0.3	S202UP-K0.3		0.3	S204UP-K0.3
	0.5	S202UP-K0.5		0.5	S204UP-K0.5
	0.75	S202UP-K0.75		0.75	S204UP-K0.75
	1	S202UP-K1		1	S204UP-K1
	1.6	S202UP-K1.6		1.6	S204UP-K1.6
	2	S202UP-K2		2	S204UP-K2
	3	S202UP-K3		3	S204UP-K3
	4	S202UP-K4		4	S204UP-K4
	5	S202UP-K5		5	S204UP-K5
	6	S202UP-K6		6	S204UP-K6
	8	S202UP-K8		8	S204UP-K8
	10	S202UP-K10		10	S204UP-K10
	15	S202UP-K15		15	S204UP-K15
	16	S202UP-K16		16	S204UP-K16
20	S202UP-K20	20	S204UP-K20		
25	S202UP-K25	25	S204UP-K25		

Tripping characteristic K

UL 489
480Y/277 VAC
10 kA

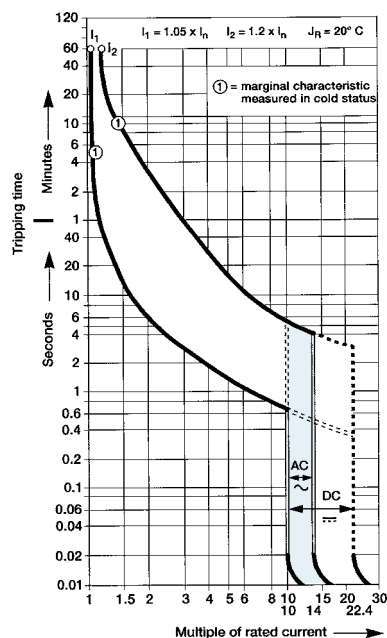
Inductive loads

- K Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.9 - 15.13

Technical data – See page 15.14 - 15.16



Note: This breaker for AC use only

S200UP-Z, 480Y/277 VAC

Branch circuit protection

UL 489, CSA 22.2 No. 5

Z

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.5	S201UP-Z0.5	3	0.5	S203UP-Z0.5
	1	S201UP-Z1		1	S203UP-Z1
	1.6	S201UP-Z1.6		1.6	S203UP-Z1.6
	2	S201UP-Z2		2	S203UP-Z2
	3	S201UP-Z3		3	S203UP-Z3
	4	S201UP-Z4		4	S203UP-Z4
	5	S201UP-Z5		5	S203UP-Z5
	6	S201UP-Z6		6	S203UP-Z6
	8	S201UP-Z8		8	S203UP-Z8
	10	S201UP-Z10		10	S203UP-Z10
	15	S201UP-Z15		15	S203UP-Z15
	16	S201UP-Z16		16	S203UP-Z16
	20	S201UP-Z20		20	S203UP-Z20
25	S201UP-Z25	25	S203UP-Z25		
2	0.5	S202UP-Z0.5	4	0.5	S204UP-Z0.5
	1	S202UP-Z1		1	S204UP-Z1
	1.6	S202UP-Z1.6		1.6	S204UP-Z1.6
	2	S202UP-Z2		2	S204UP-Z2
	3	S202UP-Z3		3	S204UP-Z3
	4	S202UP-Z4		4	S204UP-Z4
	5	S202UP-Z5		5	S204UP-Z5
	6	S202UP-Z6		6	S204UP-Z6
	8	S202UP-Z8		8	S204UP-Z8
	10	S202UP-Z10		10	S204UP-Z10
	15	S202UP-Z15		15	S204UP-Z15
	16	S202UP-Z16		16	S204UP-Z16
	20	S202UP-Z20		20	S204UP-Z20
25	S202UP-Z25	25	S204UP-Z25		



S201UP-Z



S202UP-Z



S203UP-Z



S204UP-Z

Tripping characteristic Z

UL 489
480Y/277 VAC
10 kA

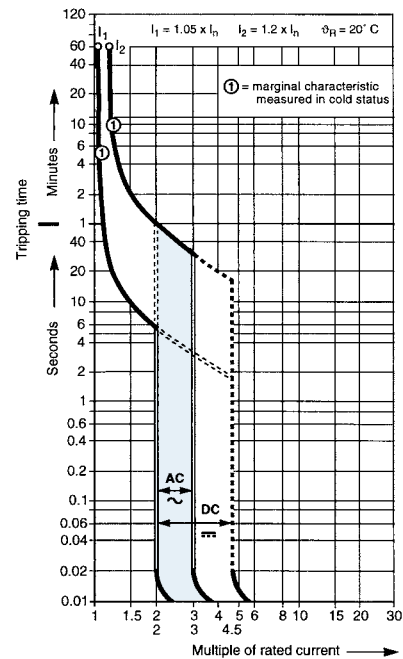
Resistive loads

- Z Curve
- Designed to provide maximum protection with a very low short circuit trip setting
- Example: semiconductors, control circuits

Accessories & technical data

Accessories – See page 15.9 - 15.13

Technical data – See page 15.14 - 15.16



Note: This breaker for AC use only

SU200PR-K, 480Y/277 VAC, Ring tongue

Branch circuit protection

UL489, CSA 22.2 No.5

K



SU201PR-K0.2



SU202PR-K0.2



SU203PR-K0.2



SU204PR-K0.2

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.2	SU201PR-K0.2	3	0.2	SU203PR-K0.2
	0.3	SU201PR-K0.3		0.3	SU203PR-K0.3
	0.5	SU201PR-K0.5		0.5	SU203PR-K0.5
	0.75	SU201PR-K0.75		0.75	SU203PR-K0.75
	1	SU201PR-K1		1	SU203PR-K1
	1.6	SU201PR-K1.6		1.6	SU203PR-K1.6
	2	SU201PR-K2		2	SU203PR-K2
	3	SU201PR-K3		3	SU203PR-K3
	4	SU201PR-K4		4	SU203PR-K4
	5	SU201PR-K5		5	SU203PR-K5
	6	SU201PR-K6		6	SU203PR-K6
	8	SU201PR-K8		8	SU203PR-K8
	10	SU201PR-K10		10	SU203PR-K10
	13	SU201PR-K13		13	SU203PR-K13
	15	SU201PR-K15		15	SU203PR-K15
	16	SU201PR-K16		16	SU203PR-K16
20	SU201PR-K20	20	SU203PR-K20		
25	SU201PR-K25	25	SU203PR-K25		
30	SU201PR-K30	30	SU203PR-K30		
32	SU201PR-K32	32	SU203PR-K32		
35	SU201PR-K35	35	SU203PR-K35		
40	SU201PR-K40	40	SU203PR-K40		
50	SU201PR-K50	50	SU203PR-K50		
60	SU201PR-K60	60	SU203PR-K60		
63	SU201PR-K63	63	SU203PR-K63		
2	0.2	SU202PR-K0.2	4	0.2	SU204PR-K0.2
	0.3	SU202PR-K0.3		0.3	SU204PR-K0.3
	0.5	SU202PR-K0.5		0.5	SU204PR-K0.5
	0.75	SU202PR-K0.75		0.75	SU204PR-K0.75
	1	SU202PR-K1		1	SU204PR-K1
	1.6	SU202PR-K1.6		1.6	SU204PR-K1.6
	2	SU202PR-K2		2	SU204PR-K2
	3	SU202PR-K3		3	SU204PR-K3
	4	SU202PR-K4		4	SU204PR-K4
	5	SU202PR-K5		5	SU204PR-K5
	6	SU202PR-K6		6	SU204PR-K6
	8	SU202PR-K8		8	SU204PR-K8
	10	SU202PR-K10		10	SU204PR-K10
	13	SU202PR-K13		13	SU204PR-K13
	15	SU202PR-K15		15	SU204PR-K15
	16	SU202PR-K16		16	SU204PR-K16
20	SU202PR-K20	20	SU204PR-K20		
25	SU202PR-K25	25	SU204PR-K25		
30	SU202PR-K30	30	SU204PR-K30		
32	SU202PR-K32	32	SU204PR-K32		
35	SU202PR-K35	35	SU204PR-K35		
40	SU202PR-K40	40	SU204PR-K40		
50	SU202PR-K50	50	SU204PR-K50		
60	SU202PR-K60	60	SU204PR-K60		
63	SU202PR-K63	63	SU204PR-K63		

Tripping characteristic K

UL 489
480Y/277 VAC
10 kA

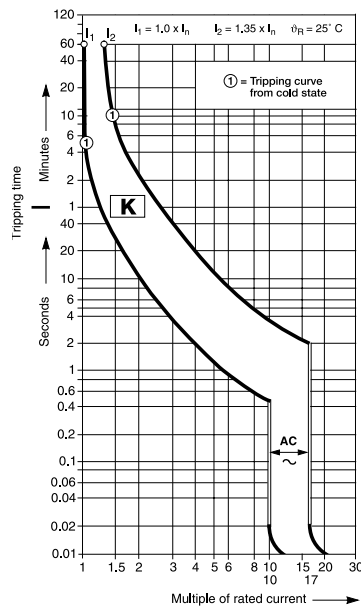
Inductive loads

- K Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.9 - 15.13

Technical data – See page 15.14 - 15.16



S200UDC-K, 1 pole 60 VDC, 2 pole 125 VDC

Branch circuit protection

UL 489, CSA 22.2 No. 5

K



S201UDC-K1



S202UDC-K1

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	1	S201UDC-K1	2	1	S202UDC-K1
	1.6	S201UDC-K1.6		1.6	S202UDC-K1.6
	2	S201UDC-K2		2	S202UDC-K2
	3	S201UDC-K3		3	S202UDC-K3
	4	S201UDC-K4		4	S202UDC-K4
	5	S201UDC-K5		5	S202UDC-K5
	6	S201UDC-K6		6	S202UDC-K6
	8	S201UDC-K8		8	S202UDC-K8
	10	S201UDC-K10		10	S202UDC-K10
	13	S201UDC-K13		13	S202UDC-K13
	15	S201UDC-K15		15	S202UDC-K15
	16	S201UDC-K16		16	S202UDC-K16
	20	S201UDC-K20		20	S202UDC-K20
	25	S201UDC-K25		25	S202UDC-K25
30	S201UDC-K30	30	S202UDC-K30		
32	S201UDC-K32	32	S202UDC-K32		
40	S201UDC-K40	40	S202UDC-K40		
50	S201UDC-K50	50	S202UDC-K50		
60	S201UDC-K60	60	S202UDC-K60		
63	S201UDC-K63	63	S202UDC-K63		

NOTE: Standard UL 489 (only DC; please note polarity of device).

Tripping characteristic K

UL 489
480Y/277 VAC
14 kA

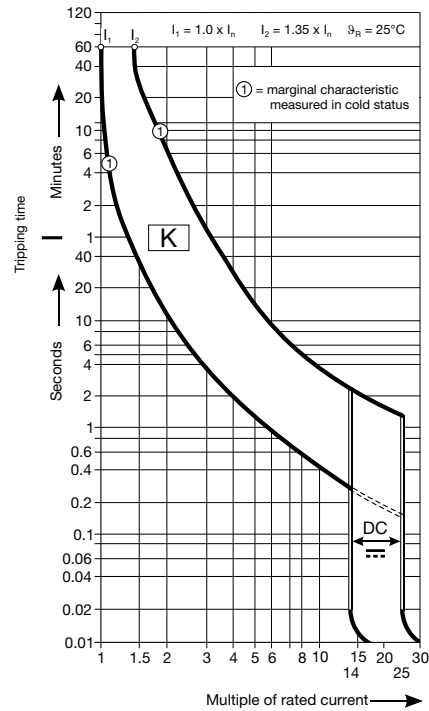
Inductive loads

- K Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.9 - 15.13

Technical data – See page 15.14 - 15.16



S200UDC-Z, 1 pole 60 VDC, 2 pole 125 VDC

Branch circuit protection

UL 489, CSA 22.2 No. 5

Z



S201UDC-K1



S202UDC-K1

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	1	S201UDC-Z1	2	1	S202UDC-Z1
	1.6	S201UDC-Z1.6		1.6	S202UDC-Z1.6
	2	S201UDC-Z2		2	S202UDC-Z2
	3	S201UDC-Z3		3	S202UDC-Z3
	4	S201UDC-Z4		4	S202UDC-Z4
	5	S201UDC-Z5		5	S202UDC-Z5
	6	S201UDC-Z6		6	S202UDC-Z6
	8	S201UDC-Z8		8	S202UDC-Z8
	10	S201UDC-Z10		10	S202UDC-Z10
	13	S201UDC-Z13		13	S202UDC-Z13
	15	S201UDC-Z15		15	S202UDC-Z15
	16	S201UDC-Z16		16	S202UDC-Z16
	20	S201UDC-Z20		20	S202UDC-Z20
	25	S201UDC-Z25		25	S202UDC-Z25
	30	S201UDC-Z30		30	S202UDC-Z30
32	S201UDC-Z32	32	S202UDC-Z32		
40	S201UDC-Z40	40	S202UDC-Z40		
50	S201UDC-Z50	50	S202UDC-Z50		
60	S201UDC-Z60	60	S202UDC-Z60		
63	S201UDC-Z63	63	S202UDC-Z63		

NOTE: Standard UL 489 (only DC; please note polarity of device).

Tripping characteristic Z

UL 489

480Y/277 VAC

14 kA

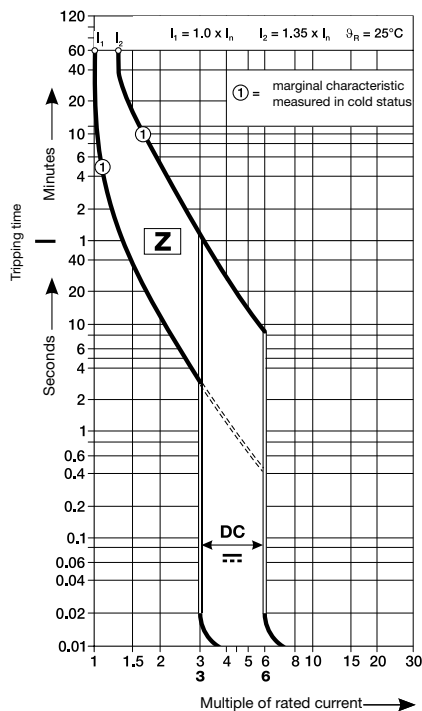
Resistive loads

- Z Curve
- Designed to provide maximum protection with a very low short circuit trip setting
- Example: semiconductors, control circuits

Accessories & technical data

Accessories – See page 15.9 - 15.13

Technical data – See page 15.14 -15.16



Accessories

S200U, S200UP, SU200PR & S200UDC UL 489, CSA 22.2 No. 5

Auxiliary contacts

The auxiliary contacts will signal whether the breaker is in the ON or OFF position.



S2C-H6RU

Description	Catalog number
For field mounting: right side	S2C-H6RU

Bell alarm

The bell alarm includes a set of contacts that will only signal when the breaker has tripped. Typically the contacts would be connected to an alarm or bell to signal the operator that an overcurrent trip has occurred. The bell alarm also includes a test button for testing the alarm contacts without opening the breaker.



S2C-S6RU

Description	Catalog number
For field mounting: right side	S2C-S6RU

Rotary operating mechanism

Allows "through the door" operation.



S2C-DH

Description	Catalog number
Handle mechanism	S2C-DH

Shunt trip

For remote tripping of breaker, a shunt trip device can be added to the MCB. The solenoid device opens the breaker after control voltage is applied.

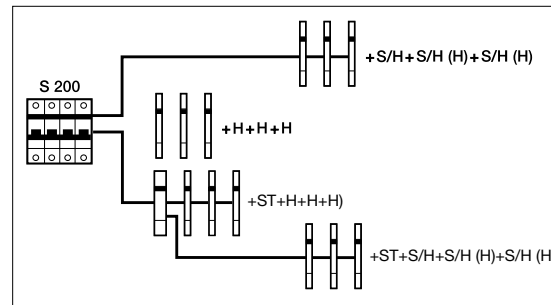


S2C-A1U

Description	Catalog number
For field mounting: right side 12...60 VAC/DC	S2C-A1U
For field mounting: right side 110...415 VAC 110...250 VDC	S2C-A2U

NOTE: For shafts and handles, refer to parts in the MCCB section.

Possible mounting arrangements of MCB accessories



Legend

Auxiliary contact	H
Bell alarm/Auxiliary contact	S/H
Bell alarm/Auxiliary contact used as auxiliary contact	S/H (H)
Shunt trip	ST

NOTE: Right hand mount accessories cannot be used in conjunction with S2C-DH, Rotary operating mechanism.

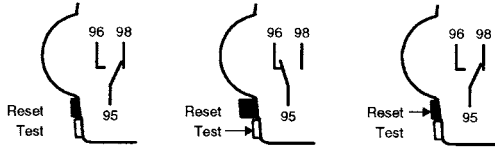
Accessories

S200U, S200UP, S200UDC & SU200PR
UL 489, CSA 22.2 No. 5

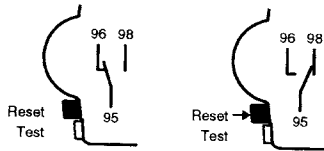
Connection drawings

Bell alarm S2C-S6RU

In ON and OFF position after hand operation



In OFF position after tripping

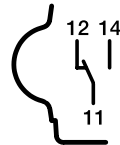


Auxiliary contact S2C-H6RU

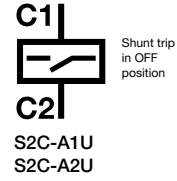
Auxiliary contact in ON position



Auxiliary contact in OFF position

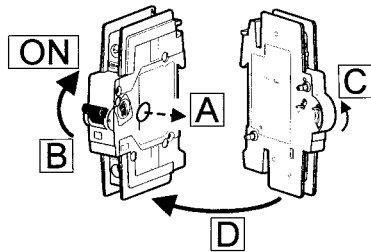


Shunt trip S2C-A...U



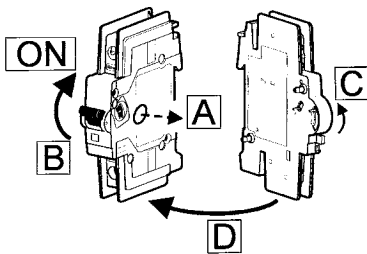
Mounting

Addition of a S2C-H6RU auxiliary contact

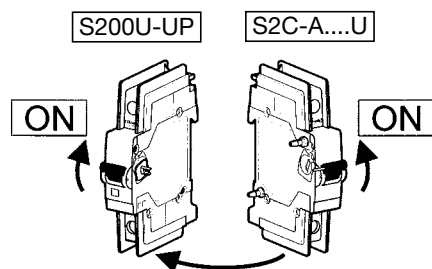


Addition of a S2C-S6RU bell alarm contact

15



Addition of a S2C-A...U shunt trip

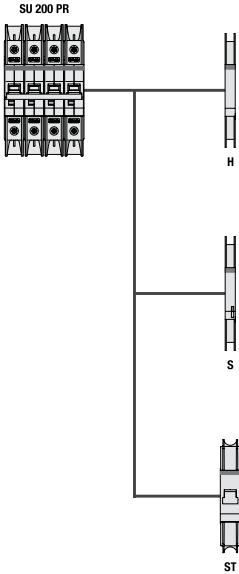


Accessories

SU200PR

UL 489, CSA 22.2 No. 5

SU200PR Accessory overview



- H Auxiliary contact S2C-H6RU
- S Signal contact S2C-S6RU
- ST Shunt trip S2C-A...U

SU200PR Instructions for use

Ring Tongue Details

Only or ring cable lugs	Insulated only Rated voltage 480Y/277 V AC	A	B	C
	Insulated only Rated voltage 240/240 V AC	max. 11.0 mm (0.43")	max. 12.2 mm (0.48")	Suitable for M5 (0.20")
		A	B	C
		max. 14.0 mm (0.55")	max. 12.2 mm (0.48")	Suitable for M5 (0.20")

CU only
 60/75°C
 (140/167°F)

max. 2.0 mm
 (0.08")

PZ 2 Torque: 2.8 Nm (25lb-in)

Ring Tongue Terminal, Special purpose - Not for general use

Installation Instructions

Please insert or withdraw the cable lug only when the screw is completely open.

Please make sure that the terminal screw penetrates the ring lug hole properly and completely during tightening.

Please ensure that the screw is securely tightened before applying any mechanical force on the cable / cable lug.

$< 2.8 \text{ Nm}$
 2.8 Nm

Do not apply abnormal downward pressure on the screw during tightening or loosening of the screw.

$F = \text{max, } 30 \text{ N}$
 $F = \text{Maximum to operate}$

Please follow the Ring Tongue Details on the rear of this sheet.

Accessories

S200U, S200UP & S200UDC

UL 489, CSA 22.2 No. 5

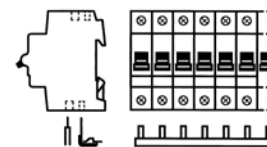
UL approved busbars UL file # E250145

UL 489 busbar cannot be cut.

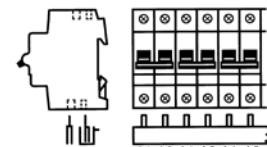


PS2/6/16 BP

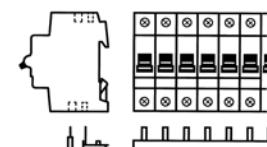
For use on:	Amp rating	Number of poles	Phases	Busbar length (mm)	Catalog number
S200U	80	6	1	103.2	PS 1/6/16BP
S200UP		12	1	208.8	PS 1/12/16BP
S201UDC		18	1	314.4	PS 1/18/16BP
S200U	80	6	2	103.2	PS 2/6/16BP
S200UP		12	2	208.8	PS 2/12/16BP
S201UDC		18	2	314.4	PS 2/18/16BP
S200U	80	6	3	103.2	PS 3/6/16BP
S200UP		12	3	208.8	PS 3/12/16BP
S201UDC		18	3	314.4	PS 3/18/16BP



1 Phase



2 Phase



3 Phase



BSK-BP

Busbar tooth covers for BS...BP (UL 489)

Description	Catalog number
Covers three unused poles of busbar	BSK-BP



AST35/15BP



SZ-ESPBP

Feeder terminals for PS...BP (UL 489)

Description	Catalog number
Terminal, insulated with pin contact	AST35/15BP
Feeder Terminal, single-pole terminal, can be mounted side by side, feed on the pin of the busbar	SZ-ESK BP

Technical data

S200U, S200UP, SU200PR & S200UDC

UL 489, CSA 22.2 No. 5

Miniature
circuit breakers
S200

Technical data	S200U	S200UP	SU200PR	S200UDC
Specifications:	UL 489, C 22.2 No. 5, IEC 60947-2			UL 489, VDE 0660
UL File-Number:	E 212323, UL, Current limiting series ratings			E212323, UL
No. of poles:	1, 2, 3 & 4			1, 2
Tripping characteristics:	K, Z		K	K, Z
Rated current:	0.2 (K) 0.5 (Z) ... 63 A	0.2 (K) 0.5 (Z) ... 25 A	0.2 ... 63A	1 - 63 A
Rated voltage:	Single pole: 240VAC Multi pole: 240VAC	Single pole: 277VAC Multi pole: 480Y/277VAC	Single pole: 277VAC (<=35A); 240VAC (>35A) Multi pole: 480Y/277VAC (<=35A); 240VAC (>35A)	1P: 60 V DC 2P:125 V DC ⊕
Short circuit capacity:	10 kA			14 kA
Frequency:	50/60 Hz			50/60 Hz
Degree of protection:	IP 20		IP20, IP40 in enclosure w/cover	IP 20
Mounting position:	Vertical and horizontal		Any	Vertical and horizontal
Fixing:	35 mm DIN rail			35 mm DIN rail
Clamps only for Cu:	18-4 AWG (0.75 ... 25 mm ²)			18-4 AWG (0.75 ... 25 mm ²)
Service life, mech. and at rated load:	20,000 operations		6000 operations (AC) 1 cycle (1s-ON, 9S-OFF)	20,000 operations
Tightening torque:	25 in. lbs (2.8 Nm)			25 in. lbs (2.8 Nm)
Ambient temperature:	- 25 °C ... + 55 °C/- 13 °F ... + 131 °F			- 25 °C ... + 55 °C/- 13 °F ... + 131 °F
Shock resistance:	30 g at least 2 impacts shock, duration 13 ms		25 g, 2 shocks - 13ms	30 g at least 2 impacts shock, duration 13 ms

Auxiliary contact S2C-H6RU and S2C-S6RU

Rated current:	10
Rated voltage AC / DC:	24
Contact:	1 pole double throw
Connection capacity mm ²	18 - 14 AWG (0.75...2.5 mm ²)
Tightening torque:	11 in.lbs (1.2 Nm)
Shock resistance acc. to DIN IEC 68-2-6:	5 g, 20 frequency cycles 5...150...5 Hz at 24 VAC/DC, 5 mA auto-reclosing < 10 ms
Mechanical service life:	10,000 operations

Shunt trip		Type	S2C-A1U	S2C-A2U
Rated voltage	AC	V	12 ... 60	110 ... 415
	DC	V	12 ... 60	110 ... 250
Max. release duration		ms	<10	<10
Min. release voltage	AC	V	7	55
	DC	V	10	80
Consumption on release	AC	VA	40 ... 200	55 ... 210
	DC	VA	40 ... 200	55 ... 110
Coil resistance		Ω	3.7	225
Terminals		AWG/mm ²	18...6 / 0.75 - 16	18...6 / 0.75 - 16
Tightening torque		in.lbs/Nm	18 / 2	18 / 2

⊕ Poles connected in series.

Technical data

S200U, S200UP, SU200PR & S200UDC

UL 489, CSA 22.2 No. 5

Internal resistance and power loss

Internal resistance per pole in mΩ, power loss per pole in W.

Type	Rated current A	Device series K		Device series Z	
		mΩ	W	mΩ	W
S200U S200UP	0.2	42500	1.7	–	–
	0.3	20000	1.8	–	–
	0.5	6340	1.6	10100	2.5
	0.75	2500	1.4	–	–
	1	1400	1.4	2270	2.3
	1.6	625	1.6	1100	2.8
	2	460	1.8	619	2.5
	3	211	1.9	211	1.9
	4	163	2.6	163	2.6
	6	67	2.4	104	3.7
	8	45	2.9	55	3.5
	10	19	1.9	21	2.1
	13	–	–	–	–
	16	8.2	2.1	10.9	2.8
	20	7.3	2.9	7.3	2.9
	25	5.6	3.5	5.6	3.5
	32	4.1	4.2	4.1	4.2
	40	4.0	6.4	4.0	6.4
	50	1.2	3.0	1.8	4.4
	63	1.3	5.2	1.3	5.2

Type	Rated current A	Device series K		Device series Z	
		mΩ	W	mΩ	W
S200UDC	1	1400	1.4	2270	2.3
	1.6	625	1.6	1100	2.8
	2	460	1.8	619	2.5
	3	211	1.9	211	1.9
	4	153	2.6	163	2.5
	6	67	2.4	104	3.7
	8	45	2.9	55	3.5
	10	19	1.9	21	2.1
	13	–	–	–	–
	16	8.2	2.1	10.9	2.8
	20	7.3	2.0	7.3	2.9
	25	5.6	3.5	5.6	3.5
	32	4.1	4.2	4.1	4.2
	40	4.0	6.4	4.0	6.4
	50	1.2	3.0	1.8	4.4
	63	1.3	5.2	1.3	5.2

SU200PR

Rated current A	Internal resistance per pole ¹⁾	
	mΩ	Power loss per pole ¹⁾ W
0.2	25300	1.01
0.3	13700	1.23
0.5	4740	1.19
0.75	2067	1.16
1	1270	1.27
1.5	610	1.56
2	442	1.77
3	140	1.26
4	109	1.75
5	50	1.26
6	54	1.94
8	22	1.41
10	18.2	1.82
13	14.8	2.50
15	8.1	1.83
16	11.1	2.83
20	8.5	3.40
25	5.5	3.43
30	3.8	3.39
32	4.6	4.70
35	3.9	4.76
40	2.8	4.40
50	1.7	4.25
60	1.7	6.18
63	1.9	7.56

⁴⁾ Internal resistances and power loss are subject to application-specific and environment-specific conditions and are therefore to be considered as typical values.

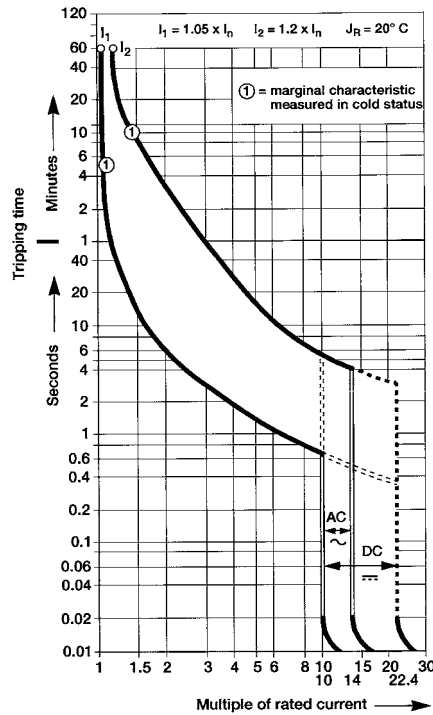
Technical data

S200U, S200UP, SU200PR & S200UDC

UL 489, CSA 22.2 No. 5

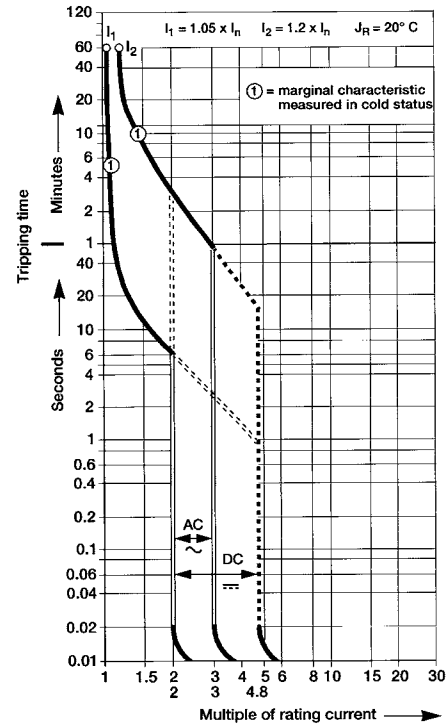
Tripping characteristic K (68 °F)

Breaker calibration temperature 68°F
See chart below for temperature DeRating



Tripping characteristic Z (68 °F)

Breaker calibration temperature 68°F
See chart below for temperature DeRating



Temperature derating

Max. operating current values depending on the ambient temperature for a circuit-breaker of characteristics type K and Z

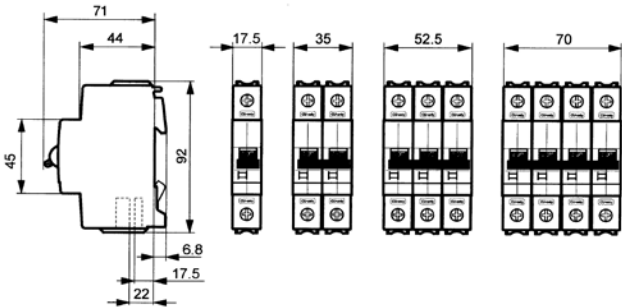
K and Z I_n (A)	Ambient temperature T (°C/°F)												
	-40/-40	-30/-22	-20/-4	-10/14	0/32	10/50	20/68	30/86	40/104	50/122	60/140	70/158	
0.5	0.66	0.64	0.61	0.59	0.56	0.53	0.50	0.47	0.43	0.40	0.35	0.31	
1.0	1.32	1.27	1.22	1.17	1.12	1.06	1.00	0.94	0.87	0.79	0.71	0.61	
1.6	2.12	2.04	1.96	1.88	1.79	1.70	1.60	1.50	1.39	1.26	1.13	0.98	
2.0	2.65	2.55	2.45	2.35	2.24	2.12	2.00	1.87	1.73	1.58	1.41	1.22	
3.0	4.0	3.8	3.7	3.5	3.4	3.2	3.0	2.8	2.6	2.4	2.1	1.8	
4.0	5.3	5.1	4.9	4.7	4.5	4.2	4.0	3.7	3.5	3.2	2.8	2.4	
6.0	7.9	7.6	7.3	7.0	6.7	6.4	6.0	5.6	5.2	4.7	4.2	3.7	
8.0	10.8	10.2	9.8	9.4	8.9	8.5	8.0	7.5	6.9	6.3	5.7	4.9	
10.0	13.2	12.7	12.2	11.7	11.2	10.6	10.0	9.4	8.7	7.9	7.1	6.1	
13.0	17.2	16.6	15.9	15.2	14.5	13.8	13.0	12.2	11.3	10.3	9.2	8.0	
16.0	21.2	20.4	19.6	18.8	17.9	17.0	16.0	15.0	13.9	12.6	11.3	9.8	
20.0	26.5	25.5	24.5	23.5	22.4	21.2	20.0	18.7	17.3	15.8	14.1	12.2	
25.0	33.1	31.9	30.6	29.3	28.0	26.5	25.0	23.4	21.7	19.8	17.7	15.3	
32.0	42.3	40.8	39.2	37.5	35.8	33.9	32.0	29.9	27.7	25.3	22.6	19.6	
40.0	52.9	51.0	49.0	46.9	44.7	42.4	40.0	37.4	34.6	31.6	28.3	24.5	
50.0	66.1	63.7	61.2	58.6	55.9	53.0	50.0	46.8	43.3	39.5	35.4	30.6	
63.0	83.3	80.3	77.2	73.9	70.4	66.8	63.0	58.9	54.6	49.8	44.5	38.6	

Approximate dimensions

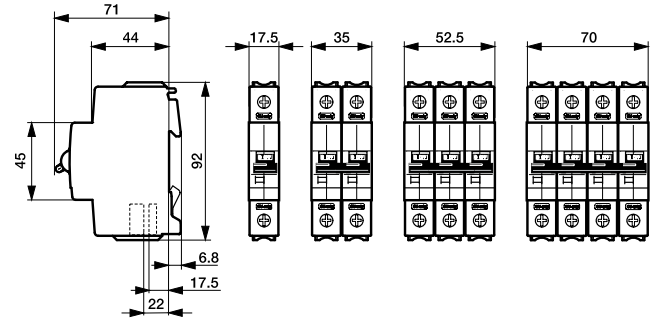
S200U, S200UP, S200UDC & SU200PR
UL 489, CSA 22.2 No. 5

Approximate dimensions in mm

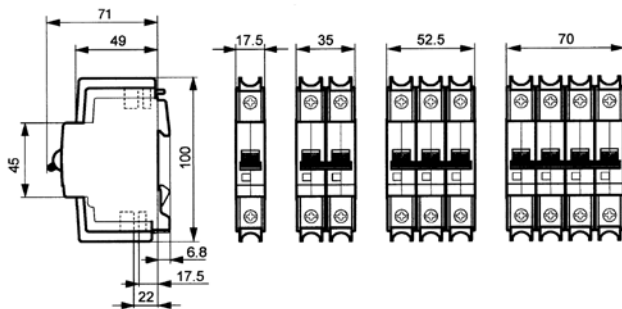
S200U



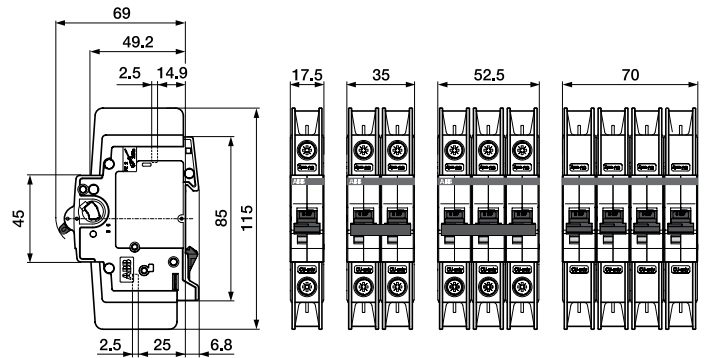
S200UDC



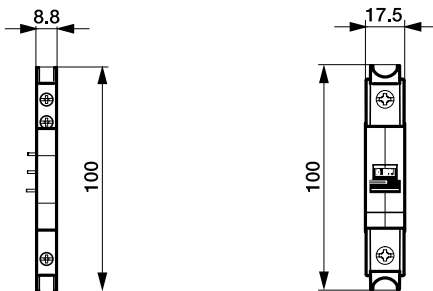
S200UP



SU200PR



S2C-H6RU, S2C-S6RU S2C-A..U



S200 UL 1077 Series Supplementary protective devices



S200

Supplementary protective devices
UL 1077 Series



Description

The S200 UL 1077 Series miniature supplementary protector offers a compact solution for protection requirements. The S200 devices are DIN rail mounted.

The S200 is available with application-specific trip characteristics to provide maximum circuit protection.

The supplementary protectors offer thermal-magnetic trip protection according to B, C, D, K and Z characteristics.

For the worldwide market, the breakers carry UL, CSA, IEC, CE and many other agency approvals and certifications.

Features

- Energy limiting
- Fast breaking time (2.3 – 2.5 ms)
- Bus connection system
- Wide range of accessories
- Available with variable depth handle mechanism
- CE certified and marked
- DIN rail mounting
- Finger safe terminals
- Multi-function terminals
- Suitable for reverse feed
- UL1077 Recognized supplemental protective device. UL file # E76126

	S200	S200P	S200PR	S280UC
Amperage	0.5 – 63 A	0.2 – 63 A	0.2 – 63A	0.2 – 63 A
Voltage	480Y/277 VAC	480Y/277 VAC	240 VAC	250/500 VDC
Poles	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4
Trip characteristics	B, C, D, K	B, C, D, K, Z	K	K, Z
Interrupting ratings	6 kA: IEC 60898 6 kA: UL 1077 6 kA: CSA 22.2 No. 235	Up to 25kA: IEC 60947-2 10kA: UL 1077	10kA: UL1077 10kA: CSA 22.2 No.235	Up to 6kA: IEC 60947-2 10kA: UL 1077 6 kA: CSA 22.2 No. 235
Auxiliary contacts	Yes	Yes	Yes	Yes
Bell alarm	Yes	Yes	Yes	Yes
Shunt trip	Yes	Yes	Yes	Yes
Undervoltage release	Yes	Yes	Yes	Yes
Bus bar	Yes	Yes	No	Yes

S200-B, 480Y/277 VAC

Supplemental protectors

UL 1077, CSA 22.2, No. 235

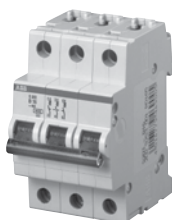
B



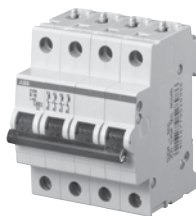
S201-B



S202-B



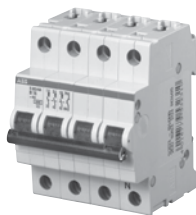
S203-B



S204-B



S201-BNA



S203-BNA

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	6	S201-B6	3	6	S203-B6
	10	S201-B10		10	S203-B10
	13	S201-B13		13	S203-B13
	16	S201-B16		16	S203-B16
	20	S201-B20		20	S203-B20
	25	S201-B25		25	S203-B25
	32	S201-B32		32	S203-B32
	40	S201-B40		40	S203-B40
	50	S201-B50		50	S203-B50
	63	S201-B63		63	S203-B63
1 + NA	6	S201-B6NA	3 + NA	6	S203-B6NA
	10	S201-B10NA		10	S203-B10NA
	13	S201-B13NA		13	S203-B13NA
	16	S201-B16NA		16	S203-B16NA
	20	S201-B20NA		20	S203-B20NA
	25	S201-B25NA		25	S203-B25NA
	32	S201-B32NA		32	S203-B32NA
	40	S201-B40NA		40	S203-B40NA
	50	S201-B50NA		50	S203-B50NA
	63	S201-B63NA		63	S203-B63NA
2	6	S202-B6	4	6	S204-B6
	10	S202-B10		10	S204-B10
	13	S202-B13		13	S204-B13
	16	S202-B16		16	S204-B16
	20	S202-B20		20	S204-B20
	25	S202-B25		25	S204-B25
	32	S202-B32		32	S204-B32
	40	S202-B40		40	S204-B40
	50	S202-B50		50	S204-B50
	63	S202-B63		63	S204-B63

Tripping characteristic B

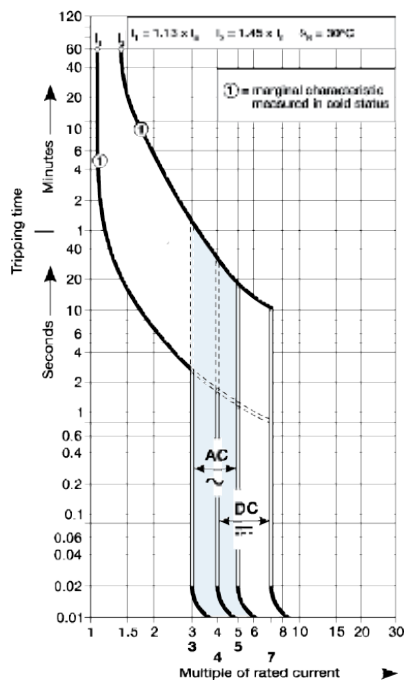
UL 1077
480Y/277VAC
6 kA

Resistive loads

- B Curve
- Designed for use in cable protection applications
- Example: control circuits, lighting

Accessories & technical data

Accessories – See page 15.31 - 15.34
Technical data – See page 15.35 - 15.36



Note: Switching neutral is noted by "NA" in the catalog number.

S200-C, 480Y/277 VAC

Supplemental protectors

UL 1077, CSA 22.2, No. 235

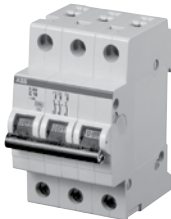
C



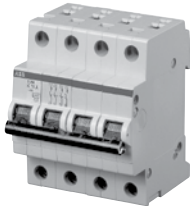
S201-C



S202-C



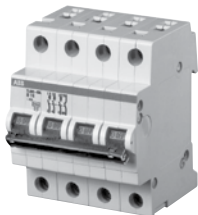
S203-C



S204-C



S201-CNA



S203-CNA

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number		
1	0.5	S201-C0.5	3	0.5	S203-C0.5		
	1	S201-C1		1	S203-C1		
	1.6	S201-C1.6		1.6	S203-C1.6		
	2	S201-C2		2	S203-C2		
	3	S201-C3		3	S203-C3		
	4	S201-C4		4	S203-C4		
	6	S201-C6		6	S203-C6		
	8	S201-C8		8	S203-C8		
	10	S201-C10		10	S203-C10		
	13	S201-C13		13	S203-C13		
	16	S201-C16		16	S203-C16		
	20	S201-C20		20	S203-C20		
	25	S201-C25		25	S203-C25		
	1 + NA	32		S201-C32	3 + NA	32	S203-C32
40		S201-C40	40	S203-C40			
50		S201-C50	50	S203-C50			
63		S201-C63	63	S203-C63			
0.5		S201-C0.5NA	0.5	S203-C0.5NA			
1		S201-C1NA	1	S203-C1NA			
1 + NA	1.6	S201-C1.6NA	3 + NA	1.6	S203-C1.6NA		
	2	S201-C2NA		2	S203-C2NA		
	3	S201-C3NA		3	S203-C3NA		
	4	S201-C4NA		4	S203-C4NA		
	6	S201-C6NA		6	S203-C6NA		
	8	S201-C8NA		8	S203-C8NA		
	10	S201-C10NA		10	S203-C10NA		
	13	S201-C13NA		13	S203-C13NA		
	16	S201-C16NA		16	S203-C16NA		
	20	S201-C20NA		20	S203-C20NA		
	25	S201-C25NA		25	S203-C25NA		
	32	S201-C32NA		32	S203-C32NA		
	1 + NA	40		S201-C40NA	3 + NA	40	S203-C40NA
		50		S201-C50NA		50	S203-C50NA
63		S201-C63NA	63	S203-C63NA			
0.5		S202-C0.5	4	0.5		S204-C0.5	
1		S202-C1		1		S204-C1	
1.6		S202-C1.6		1.6		S204-C1.6	
2	S202-C2	2		S204-C2			
3	S202-C3	3		S204-C3			
4	S202-C4	4		S204-C4			
6	S202-C6	6		S204-C6			
8	S202-C8	8		S204-C8			
10	S202-C10	10		S204-C10			
13	S202-C13	13		S204-C13			
16	S202-C16	16		S204-C16			
20	S202-C20	20		S204-C20			
25	S202-C25	25		S204-C25			
2	32	S202-C32		4	32	S204-C32	
	40	S202-C40	40		S204-C40		
	50	S202-C50	50		S204-C50		
	63	S202-C63	63		S204-C63		

Tripping characteristic C

UL 1077
480Y/277 VAC
6 kA

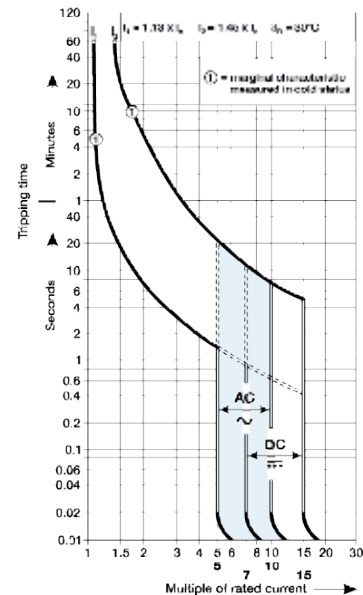
Resistive loads

- C Curve
- Designed for use with medium magnetic start up currents
- Example: lighting, control panels

Accessories & technical data

Accessories – See page 15.31 - 15.34

Technical data – See page 15.35 - 15.36



Note: Switching neutral is noted by "NA" in the catalog number.

S200-D, 480Y/277 VAC

Supplemental protectors

UL 1077, CSA 22.2, No. 235

D



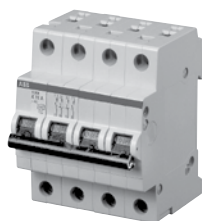
S201-D



S202-D



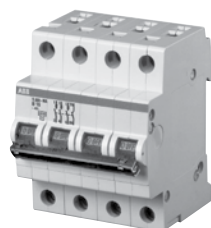
S203-D



S204-D



S201-DNA



S203-DNA

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.5	S201-D0.5	3	0.5	S203-D0.5
	1	S201-D1		1	S203-D1
	1.6	S201-D1.6		1.6	S203-D1.6
	2	S201-D2		2	S203-D2
	3	S201-D3		3	S203-D3
	4	S201-D4		4	S203-D4
	6	S201-D6		6	S203-D6
	8	S201-D8		8	S203-D8
	10	S201-D10		10	S203-D10
	13	S201-D13		13	S203-D13
	16	S201-D16		16	S203-D16
	20	S201-D20		20	S203-D20
	25	S201-D25		25	S203-D25
	1 + NA	32		S201-D32	3 + NA
40		S201-D40	40	S203-D40	
50		S201-D50	50	S203-D50	
63		S201-D63	63	S203-D63	
0.5		S201-D0.5NA	0.5	S203-D0.5NA	
1		S201-D1NA	1	S203-D1NA	
1.6	S201-D1.6NA	1.6	S203-D1.6NA		
2	S201-D2NA	2	S203-D2NA		
3	S201-D3NA	3	S203-D3NA		
4	S201-D4NA	4	S203-D4NA		
6	S201-D6NA	6	S203-D6NA		
8	S201-D8NA	8	S203-D8NA		
10	S201-D10NA	10	S203-D10NA		
13	S201-D13NA	13	S203-D13NA		
16	S201-D16NA	16	S203-D16NA		
20	S201-D20NA	20	S203-D20NA		
25	S201-D25NA	25	S203-D25NA		
2	0.5	S202-D0.5	4	0.5	S204-D0.5
	1	S202-D1		1	S204-D1
	1.6	S202-D1.6		1.6	S204-D1.6
	2	S202-D2		2	S204-D2
	3	S202-D3		3	S204-D3
	4	S202-D4		4	S204-D4
	6	S202-D6		6	S204-D6
	8	S202-D8		8	S204-D8
	10	S202-D10		10	S204-D10
	13	S202-D13		13	S204-D13
	16	S202-D16		16	S204-D16
	20	S202-D20		20	S204-D20
	25	S202-D25		25	S204-D25
	2	32		S202-D32	4
40		S202-D40	40	S204-D40	
50		S202-D50	50	S204-D50	
63		S202-D63	63	S204-D63	

Tripping characteristic D

UL 1077
480Y/277 VAC
6 kA

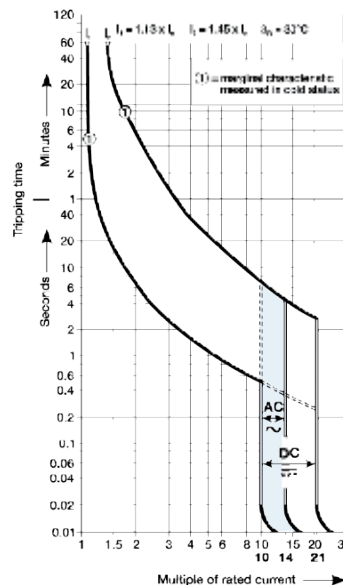
Inductive loads

- D Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.31 - 15.34

Technical data – See page 15.35 - 15.36



Note: Switching neutral is noted by "NA" in the catalog number.

S200-K, 480Y/277 VAC

Supplemental protectors

UL 1077, CSA 22.2, No. 235

K



S201-K



S202-K



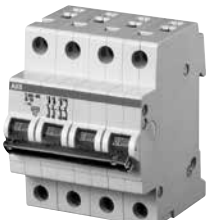
S203-K



S204-K



S201-KNA



S203-KNA

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.5	S201-K0.5	3	0.5	S203-K0.5
	1	S201-K1		1	S203-K1
	1.6	S201-K1.6		1.6	S203-K1.6
	2	S201-K2		2	S203-K2
	3	S201-K3		3	S203-K3
	4	S201-K4		4	S203-K4
	5	S201-K5		5	S203-K5
	6	S201-K6		6	S203-K6
	8	S201-K8		8	S203-K8
	10	S201-K10		10	S203-K10
	13	S201-K13		13	S203-K13
	15	S201-K15		15	S203-K15
	16	S201-K16		16	S203-K16
	20	S201-K20		20	S203-K20
	25	S201-K25		25	S203-K25
1 + NA	0.5	S201-K0.5NA	3 + NA	0.5	S203-K0.5NA
	1	S201-K1NA		1	S203-K1NA
	1.6	S201-K1.6NA		1.6	S203-K1.6NA
	2	S201-K2NA		2	S203-K2NA
	3	S201-K3NA		3	S203-K3NA
	4	S201-K4NA		4	S203-K4NA
	6	S201-K6NA		6	S203-K6NA
	8	S201-K8NA		8	S203-K8NA
	10	S201-K10NA		10	S203-K10NA
	13	S201-K13NA		13	S203-K13NA
	16	S201-K16NA		16 <td S203-K16NA	
	20	S201-K20NA		20	S203-K20NA
	25	S201-K25NA		25	S203-K25NA
	32	S201-K32NA		32	S203-K32NA
	40	S201-K40NA		40	S203-K40NA
50	S201-K50NA	50	S203-K50NA		
63	S201-K63NA	63	S203-K63NA		
2	0.5	S202-K0.5	4	0.5	S204-K0.5
	1	S202-K1		1	S204-K1
	1.6	S202-K1.6		1.6	S204-K1.6
	2	S202-K2		2	S204-K2
	3	S202-K3		3	S204-K3
	4	S202-K4		4	S204-K4
	5	S202-K5		5	S204-K5
	6	S202-K6		6	S204-K6
	8	S202-K8		8	S204-K8
	10	S202-K10		10	S204-K10
	13	S202-K13		13	S204-K13
	15	S202-K15		15	S204-K15
	16	S202-K16		16	S204-K16
	20	S202-K20		20	S204-K20
	25	S202-K25		25	S204-K25
32	S202-K32	32	S204-K32		
40	S202-K40	40	S204-K40		
50	S202-K50	50	S204-K50		
60	S202-K60	60	S204-K60		
63	S202-K63	63	S204-K63		

Tripping characteristic K

UL 1077
480Y/277 VAC
6 kA

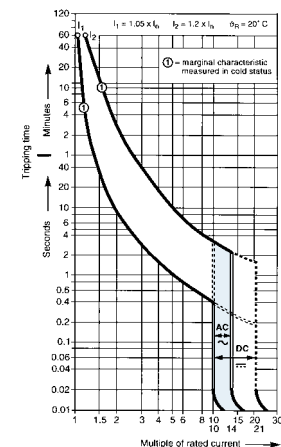
Inductive loads

- K Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.31 - 15.34

Technical data – See page 15.35 - 15.36



Note: Switching neutral is noted by "NA" in the catalog number.

S200-Z, 480Y/277 VAC

Supplemental protectors

UL 1077, CSA 22.2, No. 235

Z



S201-Z0.5



S202-Z0.5



S203-Z0.5



S204-Z0.5

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.5	S201-Z0.5	3	0.5	S203-Z0.5
	1	S201-Z1		1	S203-Z1
	1.6	S201-Z1.6		1.6	S203-Z1.6
	2	S201-Z2		2	S203-Z2
	3	S201-Z3		3	S203-Z3
	4	S201-Z4		4	S203-Z4
	6	S201-Z6		6	S203-Z6
	10	S201-Z10		10	S203-Z10
	13	S201-Z13		13	S203-Z13
	16	S201-Z16		16	S203-Z16
	20	S201-Z20		20	S203-Z20
	25	S201-Z25		25	S203-Z25
	32	S201-Z32		32	S203-Z32
	40	S201-Z40		40	S203-Z40
50	S201-Z50	50	S203-Z50		
63	S201-Z63	63	S203-Z63		
2	0.5	S202-Z0.5	4	0.5	S204-Z0.5
	1	S202-Z1		1	S204-Z1
	1.6	S202-Z1.6		1.6	S204-Z1.6
	2	S202-Z2		2	S204-Z2
	3	S202-Z3		3	S204-Z3
	4	S202-Z4		4	S204-Z4
	6	S202-Z6		6	S204-Z6
	10	S202-Z10		10	S204-Z10
	13	S202-Z13		13	S204-Z13
	16	S202-Z16		16	S204-Z16
	20	S202-Z20		20	S204-Z20
	25	S202-Z25		25	S204-Z25
	32	S202-Z32		32	S204-Z32
	40	S202-Z40		40	S204-Z40
50	S202-Z50	50	S204-Z50		
63	S202-Z63	63	S204-Z63		

Tripping characteristic Z

UL 1077
480Y/277VAC
6 kA

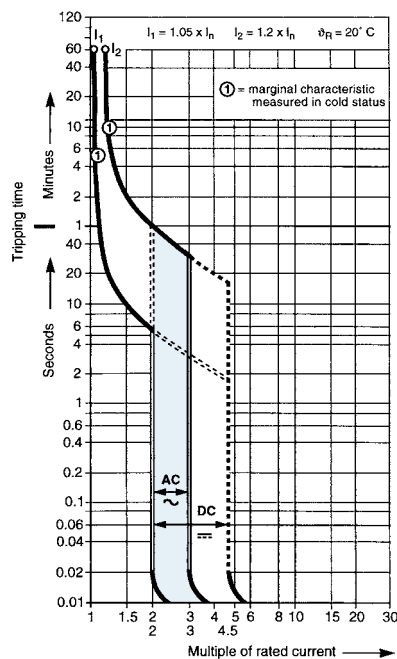
Resistive loads

- Z Curve
- Designed to provide maximum protection with a very low short circuit trip setting
- Example: semiconductors

Accessories & technical data

Accessories – See page 15.31 - 15.34

Technical data – See page 15.35 - 15.36



S200P-B, 480Y/277 VAC

Supplemental protectors

UL 1077, CSA 22.2, No. 235

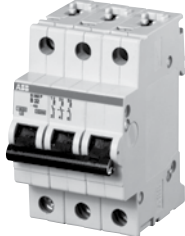
B



S210P-B6



S210P-B6



S210P-B6



S210P-B6

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	6	S201P-B6	3	6	S203P-B6
	10	S201P-B10		10	S203P-B10
	13	S201P-B13		13	S203P-B13
	16	S201P-B16		16	S203P-B16
	20	S201P-B20		20	S203P-B20
	25	S201P-B25		25	S203P-B25
	32	S201P-B32		32	S203P-B32
	40	S201P-B40		40	S203P-B40
	50	S201P-B50		50	S203P-B50
2	6	S202P-B6	4	6	S204P-B6
	10	S202P-B10		10	S204P-B10
	13	S202P-B13		13	S204P-B13
	16	S202P-B16		16	S204P-B16
	20	S202P-B20		20	S204P-B20
	25	S202P-B25		25	S204P-B25
	32	S202P-B32		32	S204P-B32
	40	S202P-B40		40	S204P-B40
	50	S202P-B50		50	S204P-B50
	63	S202P-B63	63	S204P-B63	

Tripping characteristic B

UL 1077
480Y/277 VAC
10 kA

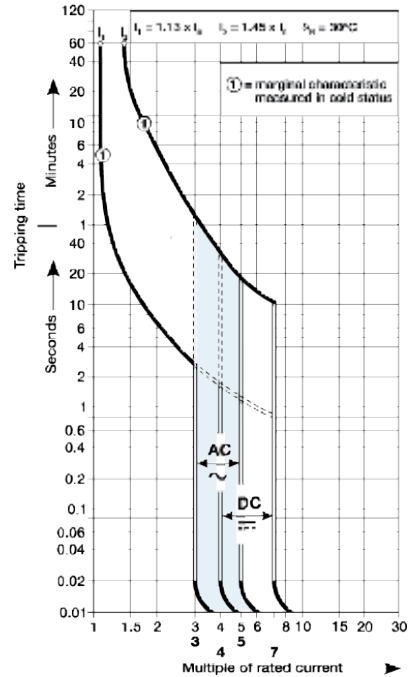
Resistive loads

- B Curve
- Designed for use in cable protection applications
- Example: Control circuits, lighting

Accessories & technical data

Accessories – See page 15.31 - 15.34

Technical data – See page 15.35 - 15.36



S200P-C, 480Y/277 VAC

Supplemental protectors

UL 1077, CSA 22.2, No. 235

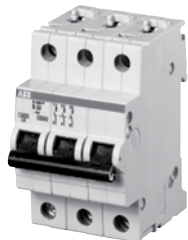
C



S210P-B6



S210P-B6



S210P-B6

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.5	S201P-C0.5	3	0.5	S203P-C0.5
	1	S201P-C1		1	S203P-C1
	1.6	S201P-C1.6		1.6	S203P-C1.6
	2	S201P-C2		2	S203P-C2
	3	S201P-C3		3	S203P-C3
	4	S201P-C4		4	S203P-C4
	6	S201P-C6		6	S203P-C6
	8	S201P-C8		8	S203P-C8
	10	S201P-C10		10	S203P-C10
	13	S201P-C13		13	S203P-C13
	16	S201P-C16		16	S203P-C16
	20	S201P-C20		20	S203P-C20
	2	0.5		S202P-C0.5	
1		S202P-C1	1	S203P-C1	
1.6		S202P-C1.6	1.6	S203P-C1.6	
2		S202P-C2	2	S203P-C2	
3		S202P-C3	3	S203P-C3	
4		S202P-C4	4	S203P-C4	
6		S202P-C6	6	S203P-C6	
8		S202P-C8	8	S203P-C8	
10		S202P-C10	10	S203P-C10	
13		S202P-C13	13	S203P-C13	
16		S202P-C16	16	S203P-C16	
20		S202P-C20	20	S203P-C20	
25		S202P-C25	25	S203P-C25	
32	S202P-C32	32	S203P-C32		
40	S202P-C40	40	S203P-C40		
50	S202P-C50	50	S203P-C50		
63	S202P-C63	63	S203P-C63		

Tripping characteristic C

UL 1077
480Y/277 VAC
10 kA

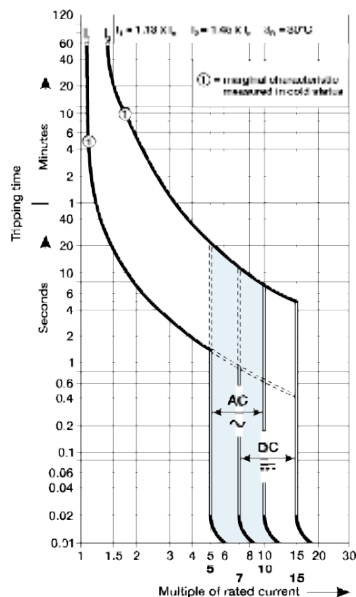
Resistive loads

- C Curve
- Designed for use with medium magnetic start up currents
- Example: Lighting, control panels

Accessories & technical data

Accessories – See page 15.31 - 15.34

Technical data – See page 15.35 - 15.36



S200P-D, 480Y/277 VAC

Supplemental protectors

UL 1077, CSA 22.2, No. 235

D



No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.5	S201P-D0.5	3	0.5	S203P-D0.5
	1	S201P-D1		1	S203P-D1
	1.6	S201P-D1.6		1.6	S203P-D1.6
	2	S201P-D2		2	S203P-D2
	3	S201P-D3		3	S203P-D3
	4	S201P-D4		4	S203P-D4
	6	S201P-D6		6	S203P-D6
	8	S201P-D8		8	S203P-D8
	10	S201P-D10		10	S203P-D10
	13	S201P-D13		13	S203P-D13
	16	S201P-D16		16	S203P-D16
	20	S201P-D20		20	S203P-D20
	25	S201P-D25		25	S203P-D25
	32	S201P-D32		32	S203P-D32
40	S201P-D40	40	S203P-D40		
50	S201P-D50	50	S203P-D50		
63	S201P-D63	63	S203P-D63		
2	0.5	S202P-D0.5	3	0.5	S203P-D0.5
	1	S202P-D1		1	S203P-D1
	1.6	S202P-D1.6		1.6	S203P-D1.6
	2	S202P-D2		2	S203P-D2
	3	S202P-D3		3	S203P-D3
	4	S202P-D4		4	S203P-D4
	6	S202P-D6		6	S203P-D6
	8	S202P-D8		8	S203P-D8
	10	S202P-D10		10	S203P-D10
	13	S202P-D13		13	S203P-D13
	16	S202P-D16		16	S203P-D16
	20	S202P-D20		20	S203P-D20
	25	S202P-D25		25	S203P-D25
	32	S202P-D32		32	S203P-D32
40	S202P-D40	40	S203P-D40		
50	S202P-D50	50	S203P-D50		
63	S202P-D63	63	S203P-D63		

Tripping characteristic D

UL 1077
480Y/277 VAC
10 kA

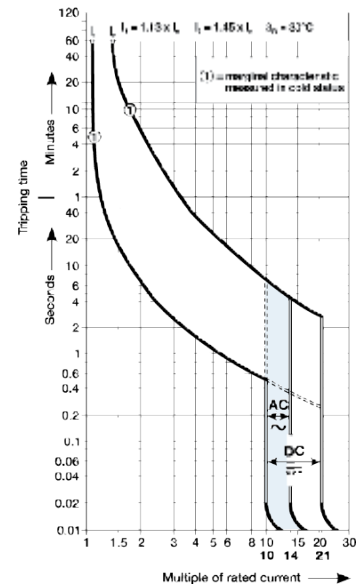
Inductive loads

- D Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.31 - 15.34

Technical data – See page 15.35 - 15.36



S200P-K, 480Y/277 VAC

Supplemental protectors

UL 1077, CSA 22.2, No. 235

K



S201P-K



S202P-K



S203P-K

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.2	S201P-K0.2	3	0.2	S203P-K0.2
	0.3	S201P-K0.3		0.3	S203P-K0.3
	0.5	S201P-K0.5		0.5	S203P-K0.5
	0.75	S201P-K0.75		0.75	S203P-K0.75
	1	S201P-K1		1	S203P-K1
	1.6	S201P-K1.6		1.6	S203P-K1.6
	2	S201P-K2		2	S203P-K2
	3	S201P-K3		3	S203P-K3
	4	S201P-K4		4	S203P-K4
	6	S201P-K6		6	S203P-K6
	8	S201P-K8		8	S203P-K8
	10	S201P-K10		10	S203P-K10
	13	S201P-K13		13	S203P-K13
	16	S201P-K16		16	S203P-K16
20	S201P-K20	20	S203P-K20		
25	S201P-K25	25	S203P-K25		
32	S201P-K32	32	S203P-K32		
2	40	S201P-K40	3	40	S203P-K40
	50	S201P-K50		50	S203P-K50
	63	S201P-K63		63	S203P-K63
	0.2	S202P-K0.2		0.2	S202P-K0.2
	0.3	S202P-K0.3		0.3	S202P-K0.3
	0.5	S202P-K0.5		0.5	S202P-K0.5
	0.75	S202P-K0.75		0.75	S202P-K0.75
1	S202P-K1	1	S202P-K1		
1.6	S202P-K1.6	1.6	S202P-K1.6		
2	S202P-K2	2	S202P-K2		
3	S202P-K3	3	S202P-K3		
4	S202P-K4	4	S202P-K4		
6	S202P-K6	6	S202P-K6		
8	S202P-K8	8	S202P-K8		
10	S202P-K10	10	S202P-K10		
13	S202P-K13	13	S202P-K13		
16	S202P-K16	16	S202P-K16		
20	S202P-K20	20	S202P-K20		
25	S202P-K25	25	S202P-K25		
32	S202P-K32	32	S202P-K32		
40	S202P-K40	40	S202P-K40		
50	S202P-K50	50	S202P-K50		
63	S202P-K63	63	S202P-K63		

Tripping characteristic K

UL 1077
480Y/277 VAC
10 kA

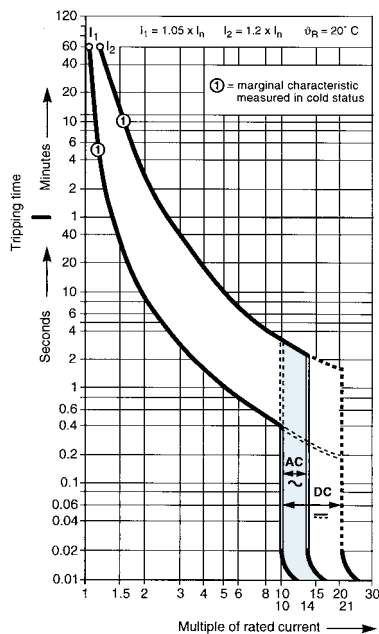
Inductive loads

- K Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.31 - 15.34

Technical data – See page 15.35 - 15.36



15

S200P-Z, 480Y/277 VAC

Supplemental protectors

UL 1077, CSA 22.2, No. 235

Z

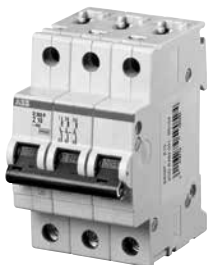
No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.5	S201P-Z0.5	3	0.5	S203P-Z0.5
	1	S201P-Z1		1	S203P-Z1
	1.6	S201P-Z1.6		1.6	S203P-Z1.6
	2	S201P-Z2		2	S203P-Z2
	3	S201P-Z3		3	S203P-Z3
	4	S201P-Z4		4	S203P-Z4
	6	S201P-Z6		6	S203P-Z6
	8	S201P-Z8		8	S203P-Z8
	10	S201P-Z10		10	S203P-Z10
	16	S201P-Z16		16	S203P-Z16
	20	S201P-Z20		20	S203P-Z20
	25	S201P-Z25		25	S203P-Z25
	32	S201P-Z32		32	S203P-Z32
	40	S201P-Z40		40	S203P-Z40
50	S201P-Z50	50	S203P-Z50		
63	S201P-Z63	63	S203P-Z63		
2	0.5	S202P-Z0.5	3	0.5	S203P-Z0.5
	1	S202P-Z1		1	S203P-Z1
	1.6	S202P-Z1.6		1.6	S203P-Z1.6
	2	S202P-Z2		2	S203P-Z2
	3	S202P-Z3		3	S203P-Z3
	4	S202P-Z4		4	S203P-Z4
	6	S202P-Z6		6	S203P-Z6
	8	S202P-Z8		8	S203P-Z8
	10	S202P-Z10		10	S203P-Z10
	16	S202P-Z16		16	S203P-Z16
	20	S202P-Z20		20	S203P-Z20
	25	S202P-Z25		25	S203P-Z25
	32	S202P-Z32		32	S203P-Z32
	40	S202P-Z40		40	S203P-Z40
50	S202P-Z50	50	S203P-Z50		
63	S202P-Z63	63	S203P-Z63		



S201P-Z



S202P-Z



S203P-Z

Tripping characteristic Z

UL 1077
480Y/277 VAC
10 kA

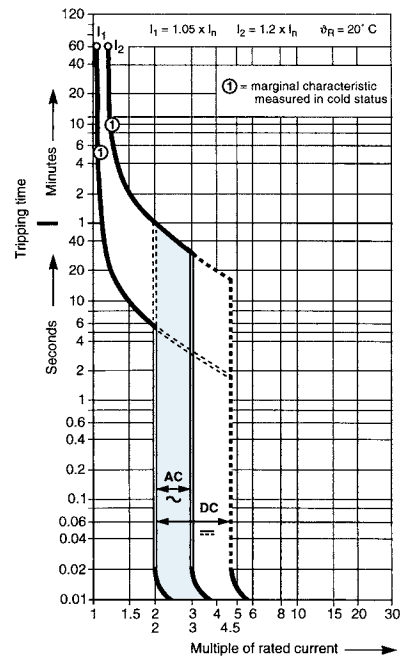
Resistive loads

- Z Curve
- Designed to provide maximum protection with a very low short circuit trip setting
- Example: semiconductors

Accessories & technical data

Accessories – See page 15.31 - 15.34

Technical data – See page 15.35 - 15.36



S200PR-K, 240 VAC, Ring tongue

Supplemental protectors

UL1077, CSA 22.2 No. 235

K



S201PR-K0.2



S202PR-K0.2



S203PR-K0.2



S203PR-K0.2

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.2	S201PR-K0.2	3	0.2	S203PR-K0.2
	0.3	S201PR-K0.3		0.3	S203PR-K0.3
	0.5	S201PR-K0.5		0.5	S203PR-K0.5
	0.75	S201PR-K0.75		0.75	S203PR-K0.75
	1	S201PR-K1		1	S203PR-K1
	1.6	S201PR-K1.6		1.6	S203PR-K1.6
	2	S201PR-K2		2	S203PR-K2
	3	S201PR-K3		3	S203PR-K3
	4	S201PR-K4		4	S203PR-K4
	5	S201PR-K5		5	S203PR-K5
	6	S201PR-K6		6	S203PR-K6
	8	S201PR-K8		8	S203PR-K8
	10	S201PR-K10		10	S203PR-K10
	13	S201PR-K13		13	S203PR-K13
	15	S201PR-K15		15	S203PR-K15
	16	S201PR-K16		16	S203PR-K16
20	S201PR-K20	20	S203PR-K20		
25	S201PR-K25	25	S203PR-K25		
30	S201PR-K30	30	S203PR-K30		
32	S201PR-K32	32	S203PR-K32		
35	S201PR-K35	35	S203PR-K35		
40	S201PR-K40	40	S203PR-K40		
50	S201PR-K50	50	S203PR-K50		
60	S201PR-K60	60	S203PR-K60		
63	S201PR-K63	63	S203PR-K63		
2	0.2	S202PR-K0.2	4	0.2	S204PR-K0.2
	0.3	S202PR-K0.3		0.3	S204PR-K0.3
	0.5	S202PR-K0.5		0.5	S204PR-K0.5
	0.75	S202PR-K0.75		0.75	S204PR-K0.75
	1	S202PR-K1		1	S204PR-K1
	1.6	S202PR-K1.6		1.6	S204PR-K1.6
	2	S202PR-K2		2	S204PR-K2
	3	S202PR-K3		3	S204PR-K3
	4	S202PR-K4		4	S204PR-K4
	5	S202PR-K5		5	S204PR-K5
	6	S202PR-K6		6	S204PR-K6
	8	S202PR-K8		8	S204PR-K8
	10	S202PR-K10		10	S204PR-K10
	13	S202PR-K13		13	S204PR-K13
	15	S202PR-K15		15	S204PR-K15
	16	S202PR-K16		16	S204PR-K16
20	S202PR-K20	20	S204PR-K20		
25	S202PR-K25	25	S204PR-K25		
30	S202PR-K30	30	S204PR-K30		
32	S202PR-K32	32	S204PR-K32		
35	S202PR-K35	35	S204PR-K35		
40	S202PR-K40	40	S204PR-K40		
50	S202PR-K50	50	S204PR-K50		
60	S202PR-K60	60	S204PR-K60		
63	S202PR-K63	63	S204PR-K63		

Tripping characteristic K

UL 1077

480Y/277 VAC

10 kA

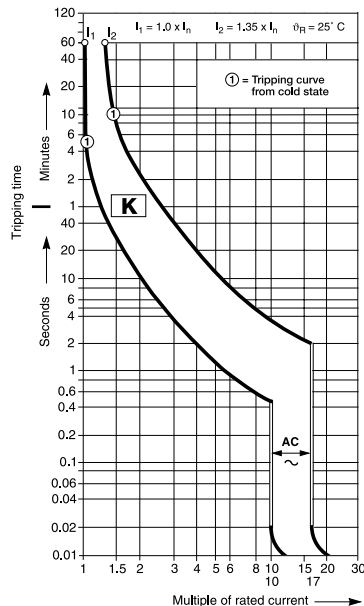
Inductive loads

- K Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.31 - 15.34

Technical data – See page 15.35 - 15.36



S280UC-K, 500 VDC

Supplemental protectors

UL 1077, CSA 22.2, No. 235

K



S281UC-K



S282UC-K



S283UC-K

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0,2	S281UC-K0.2	3	0,2	S283UC-K0.2
	0,3	S281UC-K0.3		0,3	S283UC-K0.3
	0,5	S281UC-K0.5		0,5	S283UC-K0.5
	0,75	S281UC-K0.75		0,75	S283UC-K0.75
	1	S281UC-K1		1	S283UC-K1
	1,6	S281UC-K1.6		1,6	S283UC-K1.6
	2	S281UC-K2		2	S283UC-K2
	3	S281UC-K3		3	S283UC-K3
	4	S281UC-K4		4	S283UC-K4
	6	S281UC-K6		6	S283UC-K6
	8	S281UC-K8		8	S283UC-K8
	10	S281UC-K10		10	S283UC-K10
	16	S281UC-K16		16	S283UC-K16
	20	S281UC-K20		20	S283UC-K20
25	S281UC-K25	25	S283UC-K25		
2	32	S281UC-K32	3	32	S283UC-K32
	40	S281UC-K40		40	S283UC-K40
	50	S281UC-K50		50	S283UC-K50
	63	S281UC-K63		63	S283UC-K63
	0,2	S282UC-K0.2		0,2	S283UC-K0.2
	0,3	S282UC-K0.3		0,3	S283UC-K0.3
	0,5	S282UC-K0.5		0,5	S283UC-K0.5
	0,75	S282UC-K0.75		0,75	S283UC-K0.75
	1	S282UC-K1		1	S283UC-K1
	1,6	S282UC-K1.6		1,6	S283UC-K1.6
2	S282UC-K2	2	S283UC-K2		
3	S282UC-K3	3	S283UC-K3		
4	S282UC-K4	4	S283UC-K4		
6	S282UC-K6	6	S283UC-K6		
8	S282UC-K8	8	S283UC-K8		
10	S282UC-K10	10	S283UC-K10		
16	S282UC-K16	16	S283UC-K16		
20	S282UC-K20	20	S283UC-K20		
25	S282UC-K25	25	S283UC-K25		
32	S282UC-K32	32	S283UC-K32		
40	S282UC-K40	40	S283UC-K40		
50	S282UC-K50	50	S283UC-K50		
63	S282UC-K63	63	S283UC-K63		

Tripping characteristic K

UL 1077
250/500 VDC
10 kA

Inductive loads

- K Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformer

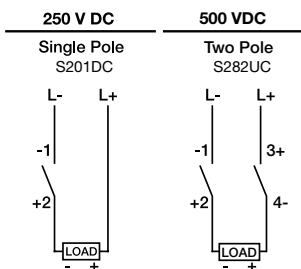
Accessories & technical data

Accessories – See page 15.31 - 15.34

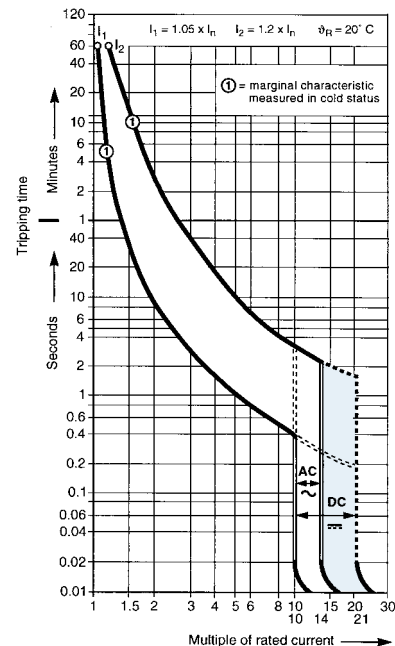
Technical data – See page 15.35 - 15.36

Direct current applications

The S280UC differs from standard miniature circuit breakers in that the UC versions include a permanent magnet which aids in the extinguishing of the arc during medium and high level faults. It is necessary to observe the correct polarity and current direction when connecting the UC breakers. Two examples of correct connection are shown.



Termination points are marked on all UC type MCBs, points one (1) and four (4) are negative and points two (2) and three (3) are positive.



S280UC-Z, 500 VDC

Supplemental protectors

UL 1077, CSA 22.2, No. 235

Z



S281UC-Z



S282UC-Z



S283UC-Z

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.5	S281UC-Z0.5	3	0.5	S283UC-Z0.5
	1	S281UC-Z1		1	S283UC-Z1
	1.6	S281UC-Z1.6		1.6	S283UC-Z1.6
	2	S281UC-Z2		2	S283UC-Z2
	3	S281UC-Z3		3	S283UC-Z3
	4	S281UC-Z4		4	S283UC-Z4
	6	S281UC-Z6		6	S283UC-Z6
	8	S281UC-Z8		8	S283UC-Z8
	10	S281UC-Z10		10	S283UC-Z10
	16	S281UC-Z16		16	S283UC-Z16
	20	S281UC-Z20		20	S283UC-Z20
	25	S281UC-Z25		25	S283UC-Z25
	32	S281UC-Z32		32	S283UC-Z32
	40	S281UC-Z40		40	S283UC-Z40
50	S281UC-Z50	50	S283UC-Z50		
63	S281UC-Z63	63	S283UC-Z63		
2	0.5	S282UC-Z0.5	3	0.5	S283UC-Z0.5
	1	S282UC-Z1		1	S283UC-Z1
	1.6	S282UC-Z1.6		1.6	S283UC-Z1.6
	2	S282UC-Z2		2	S283UC-Z2
	3	S282UC-Z3		3	S283UC-Z3
	4	S282UC-Z4		4	S283UC-Z4
	6	S282UC-Z6		6	S283UC-Z6
	8	S282UC-Z8		8	S283UC-Z8
	10	S282UC-Z10		10	S283UC-Z10
	16	S282UC-Z16		16	S283UC-Z16
	20	S282UC-Z20		20	S283UC-Z20
	25	S282UC-Z25		25	S283UC-Z25
	32	S282UC-Z32		32	S283UC-Z32
	40	S282UC-Z40		40	S283UC-Z40
50	S282UC-Z50	50	S283UC-Z50		
63	S282UC-Z63	63	S283UC-Z63		

Tripping characteristic Z

UL 1077
250/500 VDC
10 kA

Resistive loads

- Z Curve
- Designed to provide maximum protection with a very low short circuit trip setting
- Example: semiconductors

Accessories & technical data

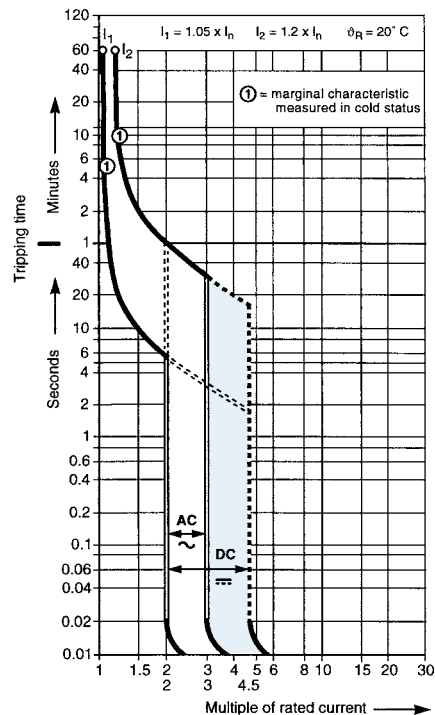
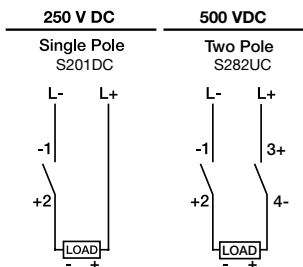
Accessories – See page 15.31 - 15.34

Technical data – See page 15.35 - 15.36

Direct current applications

The S280UC differs from standard miniature circuit breakers in that the UC versions include a permanent magnet which aids in the extinguishing of the arc during medium and high level faults. It is necessary to observe the correct polarity and current direction when connecting the UC breakers. Two examples of correct connection are shown.

Termination points are marked on all UC type MCBs, points one (1) and four (4) are negative and points two (2) and three (3) are positive.



Accessories

S200, S200P & S200PR

UL 1077, CSA 22.2, No. 235

Auxiliary contacts

The auxiliary contacts will signal whether the breaker is in the ON or OFF position.

Description	Catalog number
For field mounting: right side	S2C-H6R



S2C-H6R

Bell alarm - signal contact

The bell alarm includes a set of contacts that will only signal when the breaker has tripped. Typically the contacts would be connected to an alarm or bell to signal the operator that an overcurrent trip has occurred. The bell alarm also includes a test button for testing the alarm contacts without opening the breaker.

Description	Catalog number
For field mounting: right side	S2C-S/H6R ①

Shunt trip

For remote tripping of breaker, a shunt trip device can be added to the MCB. The solenoid device opens the breaker after control voltage is applied.

Description	Catalog number
For field mounting: right side	
A1-12-60 VAC (12 – 60 VDC)	S2C-A1
A2-110-415 VAC (110 – 250 VDC)	S2C-A2



S2C-A

Undervoltage release

When control voltage drops below approximately 50 % of rated voltage, the UVR opens the breaker. The breaker can not be operated unless proper control voltage is first applied to the UVR coil.

Description	Catalog number
For field mounting: right side	
12 VDC	S2C-UA 12
24 VAC/VDC	S2C-UA 24
48 VAC/VDC	S2C-UA 48
110 VAC/VDC	S2C-UA 110
220 VAC/VDC	S2C-UA 230
380 VAC	S2C-UA 400



S2C-UA

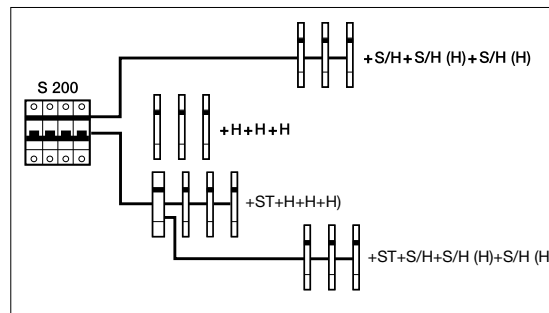


SA 1



SA 2

Possible mounting arrangements of MCB accessories



Legend	
Auxiliary contact	H
Bell alarm/Auxiliary contact	S/H
Bell alarm/Auxiliary contact used as auxiliary contact	S/H (H)
Shunt trip	ST
Undervoltage release	UR

Locking devices

Description	Catalog number
Locking devices, 3 mm	SA1
Padlock with 2 keys	SA2

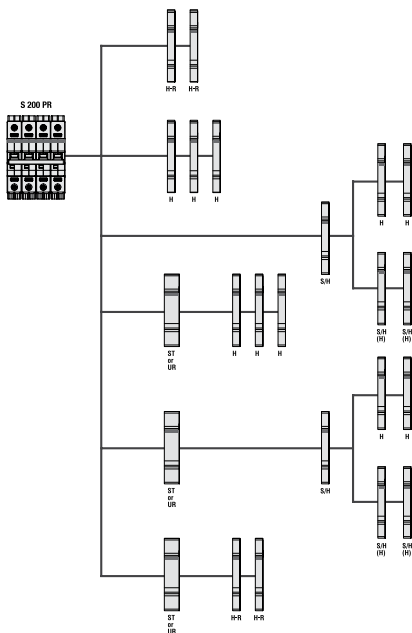
① Combination bell alarm/auxiliary contact.

Accessories

S200PR

UL 1077, CSA 22.2, No. 235

S200PR Accessory overview



- H Auxiliary contact S2C-H6R
- H-R Auxiliary contact S2C-H6-...R
- S/H Signal/Auxiliary contact S2C-S/H6R
- S/H (H) Signal/Auxiliary contact S2C-S/H6R used as auxiliary contact
- ST Shunt trip S2C-A...
- UR Undervoltage release S2C-UA

S200PR Instructions for use

Ring Tongue Details

Only or ring cable lugs	Insulated only Rated voltage 480V/277 V AC	A	B	C
	Insulated only Rated voltage 240/240 V AC	max. 11.0 mm (0.43")	max. 12.2 mm (0.48")	Suitable for M5 (0.20")
		A	B	C
		max. 14.0 mm (0.55")	max. 12.2 mm (0.48")	Suitable for M5 (0.20")

CU only
 60/75°C
 (140/167°F)

max. 2.0 mm
 (0.08")

PZ 2 Torque: 2.8 Nm (25lb-in)

Ring Tongue Terminal, Special purpose - Not for general use

Installation Instructions

Please insert or withdraw the cable lug only when the screw is completely open.

Please make sure that the terminal screw penetrates the ring lug hole properly and completely during tightening.

Please ensure that the screw is securely tightened before applying any mechanical force on the cable / cable lug.

< 2.8 Nm
 2.8 Nm
 2

Do not apply abnormal downward pressure on the screw during tightening or loosening of the screw.

F= max, 30 N
 F= Maximum to operate

Please follow the Ring Tongue Details on the rear of this sheet.

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Accessories

S280UC

UL 1077, CSA 22.2, No. 235



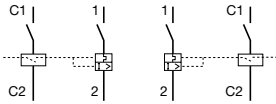
S2-A1

Shunt trips

Function: remote opening of the device when a voltage is applied
Suitable for MCBs S 280 and S 280 UC series.

Description	Catalog number
12-60 VAC/VDC shunt trip	S2-A1
110-415 VAC and 110-250 VDC shunt trip	S2-A2

S2-A1 I
S2-A2 I

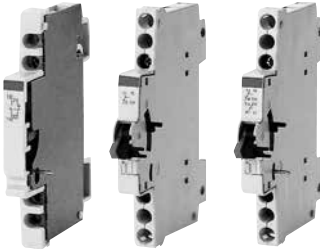


Auxiliary contacts

Function: indication of the position of the device's contacts
Suitable for MCBs S 280 and S 280 UC series

Signal contacts

Function: indication of the position of the device's contacts only after the automatic release of the MCBs and RCBOs due to an overload or a short-circuit
Suitable for MCBs S 280 and S 280 UC series



Description	Catalog number
Auxiliary contact 1 NO + 1 NC (1/2 module)	S2-H11
Auxiliary contact 2 NO (1/2 module)	S2-H20
Auxiliary contact 2 NC (1/2 module)	S2-H02
Auxiliary contact 1 NO + 1 NC (1/2 module) with Faston connections	S2-H11X
Auxiliary contact 2 NO (1/2 module) with Faston connections	S2-H20X
Auxiliary contact 2 NC (1/2 module) with Faston connections	S2-H02X
Auxiliary contact 2 NO + 1 NC (1/2 module)	S2-H21
Auxiliary contact 1 NO + 2 NC (1/2 module)	S2-H12
Auxiliary contact 3 NO (1/2 module)	S2-H30
Auxiliary contact 3 NC (1/2 module)	S2-H03
Signal contact (1/2 module)	S2-S
Signal contact + Auxiliary contact (1/2 module)	S2-S/H

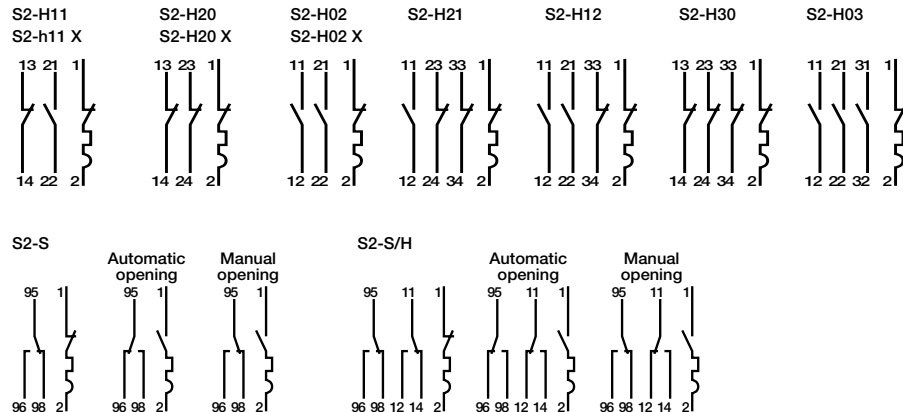
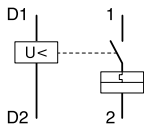


S2-UA12

Undervoltage release

Function: protection of the load in the event of a voltage drop (between 70% and 35% of its rated value); positive safety (device's tripping when the voltage is disconnected) emergency stop by means of a button.
Suitable for MCBs S 280 and S 280 UC series.

Description	Catalog number
Undervoltage release 12V DC (1 module)	S2-UA12
Undervoltage release 24V AC/DC (1 module)	S2-UA24
Undervoltage release 48V AC/DC (1 module)	S2-UA48
Undervoltage release 110V AC/DC (1 module)	S2-UA110
Undervoltage release 220V AC/DC (1 module)	S2-UA220
Undervoltage release 380V AC (1 module)	S2-UA380



Accessories

S280UC

UL 1077, CSA 22.2, No. 235

Hand operated neutral

The hand operated neutral has to be mounted to the left side of the MCB and be snapped on the DIN rail. It is used for measuring duties where the neutral conductor must be in the open position. Due to the special design of the handle - when switching ON the MCB – the neutral will make before the MCB is closed. The S2C - Nt is not to switch with a tool (screw driver).

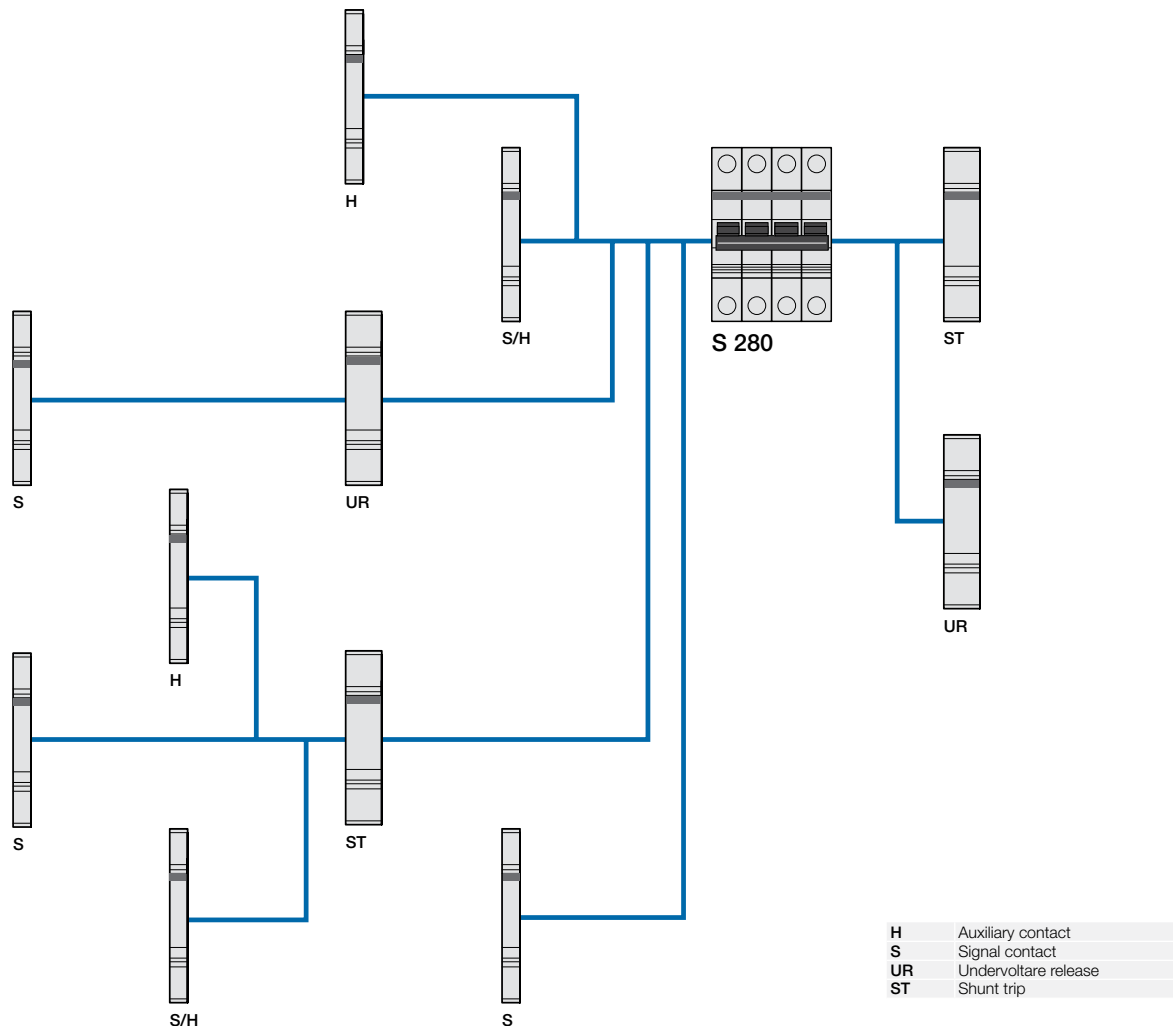
Description	Catalog number
Hand operated neutral	S2-NT

Schemes for combination and technical features

Auxiliary elements for MCBs S 280 series

Miniature
circuit breakers
S200

Combination between auxiliary elements and S 280



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Technical characteristics of auxiliary and signal contacts

Type		S2-H11 I S2-H11 X	S2-H20 I S2-H20 X	S2-H02 I S2-H02 X	S2-H21	S2-H12	S2-H30	S2-H03
Description		1NO+1NC	2NO	2NC	2NO+1NC	1NO+2NC	3NO	3NC
Alternating current	Ue [V]				240	415		
	Ie [A]				6	2		
Direct current	Ue [V]			24	60	110	250	
	Ie [A]			4	2	1.5	1	
Min. operating voltage	[V]				12 a.c.-12 d.c.			
Min. operating current	[mA]				12			
Terminals	[mm ²]				up to 2x1.5			
Dielectric strength	[kV]				3			
Resistance to short-circuit at 240 V a.c.	[A]				1000 (protected with S 2 breaker characteristic K - 6 A)			
Impulse voltage withstand capacity	[kV]				4			
Tightening torque	[Nm]				0.7			
Dimensions (WxDxH)	[mm]				8.75x68x90			

NB: the auxiliary contacts S2-H11 X, S2-H20 X, S2-H02 X differ from the contacts S2-H11, S2-H20, S2-H02 in that they do not have a terminal to tighten the cable which is replaced by a bayonet for the Faston connection.

Technical features

Auxiliary elements for MCBs S 280 series

Technical characteristics of shunt trips

Type		S2-A1	S2-A2
Rated voltage	[V]		
	a.c.	12 - 60	110 - 415
	d.c.	12 - 60	110 - 250
Max. release duration	[ms]	<10	<10
Min. release voltage	[V]		
	a.c.	7	55
	d.c.	10	80
Consumption on release	[VA]		
	12 V a.c.	35	
	12 V d.c.	30	
	24 V a.c.	140	
	24 V d.c.	100	
	48 V a.c.	600	
	48 V d.c.	330	
	110 V a.c.		40
110 V d.c.		40	
220 V a.c.		180	
	220 V d.c.		170
Coil resistance	[Ω]	3.7	225
Terminals	[mm ²]	25	25
Tightening torque	[Nm]	2	2
Dimens.(WxDxH)	[mm]	17.5x68x90	17.5x68x90

Technical characteristics of undervoltage releases

Type		S2-UA 12	S2-UA 24	S2-UA 48	S2-UA 110	S2-UA 220	S2-UA 380
Standards		VDE0660 part I - IEC EN 60947.1					
Rated voltage	[V] a.c.	-	24	48	110	220-240	380
	[V] d.c.	12	24	-	110	220-240	380
Frequency	[Hz]	50...60					
Release trip	[V]	0.35 Un ≤ V ≤ 0.7 Un					
Terminals	[mm ²]	2 x 1.5					
Consumption	[mA]	10					
Resistance to corrosion	[°C/RH]	const. climatic cond.: 23/83-40/93-55/20; var. climatic cond.: 25/95-40/93					
Protection degree		IP20					
Tightening torque	[Nm]	0.4					
Dimensions (WxDxH)	[mm]	17.5x68x90					

S2-S

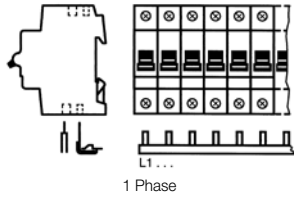
S2-SH

1 change over						2 change over
		240	415			
		6	2			
	250	110	60	24		
	0.5	1	1	4		
		12 a.c.-12 d.c.				
		12				
		up to 2x1.5				
		3				
		1000 (protected with S 2 breaker characteristic K - 6 A)				
		4				
		0.7				
		8.75x68x90				

Accessories

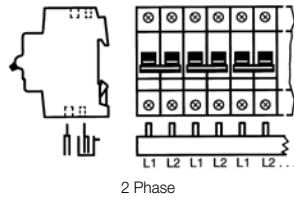
S200 & S200P

UL 1077, CSA 22.2, No. 235 (suitable for cutting)



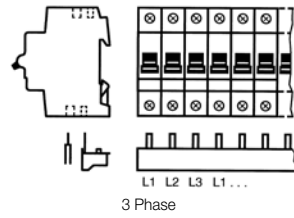
1 Phase

For use on:	Amp rating	Number of poles	Phases	Busbar length (mm)	End cap catalog number	Catalog number
S200	63	60	1	986	PS-END0	PS1/60SP
S200 P	80	60	1	986	PS-END0	PS1/60/16SP



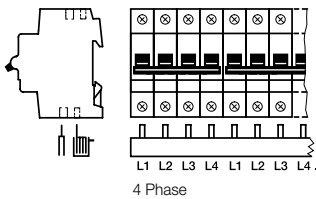
2 Phase

For use on:	Amp rating	Number of poles	Phases	Busbar length (mm)	End cap catalog number	Catalog number
S200	63	58	2	1035	PS-ENDSP	PS2/58SP
S200 P	80	58	2	1035	PS-ENDSP	PS2/58/16SP



3 Phase

For use on:	Amp rating	Number of poles	Phases	Busbar length (mm)	End cap catalog number	Catalog number
S200	63	60	3	1065	PSB-ENDSP	PS3/60SP
S200 P	80	60	3	1065	PSB-ENDSP	PS3/60/16SP



4 Phase

For use on:	Amp rating	Number of poles	Phases	Busbar length (mm)	End cap catalog number	Catalog number
S200	80	60	4	1056	PS-END1	PS4/60/16SP

NOTE

ALL BUSBARS MAY BE CENTER FED IN ORDER TO INCREASE AMPACITY UP TO 130 A.

NOTE

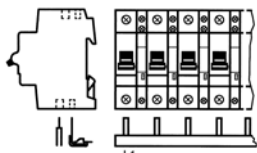
BUSBARS MAY BE USED ON LINE OR LOAD SIDE OF MCBS

Accessories

S200 & S200P

UL 1077, CSA 22.2, No. 235

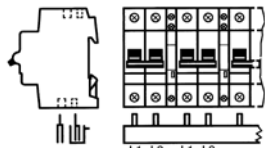
1 Phase with 1 auxiliary



1 Phase + Aux

For use on:	Amp rating	Number of poles	Phases	Busbar length (mm)	End cap catalog number	Catalog number
S200 & S200 P	63	38	1	1044	–	PS1/38H
	80	38	1	1044	–	PS1/38/16H

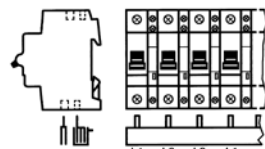
2 Phase with 1 auxiliary



2 Phase + Aux

For use on:	Amp rating	Number of poles	Phases	Busbar length (mm)	End cap catalog number	Catalog number
S200 & S200 P	80	48	2	1065	PS-ENDSP	PS2/48/16SP

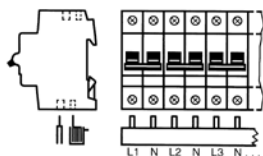
3 Phase with 1 auxiliary



3 Phase + Aux

For use on:	Amp rating	Number of poles	Phases	Busbar length (mm)	End cap catalog number	Catalog number
S200 & S200 P	80	39	3	980	PS-ENDSP	PS3/39/16SP

3 Phase + N, for use with 2 pole-MCBs on 3 phase/4W system



3 Phase + N

For use on:	Amp rating	Number of poles	Phases	Busbar length (mm)	End cap catalog number	Catalog number
S200 & S200 P	80	58	4	1048	PS-END1SP	PS4/58/16NSP

NOTE

ALL BUSBARS MAY BE CENTER FED IN ORDER TO INCREASE AMPACITY UP TO 130 A.

NOTE

BUSBARS MAY BE USED ON LINE OR LOAD SIDE OF MCBS

Accessories

S200 & S200P

UL 1077, CSA 22.2, No. 235



BSK-SP

Busbar tooth covers

Description	Catalog number
Covers five unused poles of busbar	BSK-SP



PS2/6/16 SP

Feeder terminals

Description	Catalog number
Insulated with pin contact, 35mm sq.	AST35/15SP
For side by side mounting; feed on pin of busbar, 50mm sq.	SZ-ESKSP



AST35/15SP



SZ-ESK SP

Technical data

S200, S200P, S200PR & S280UC

UL 1077, CSA 22.2, No. 235

Technical data	S200	S200P	S200PR	S280UC
Specifications:	UL 1077, CSA C 22.2, VDE 0660, 60898, 60947-2		UL1077, CSA 22.2 No. 235, IEC 60947-2	UL1077, CSA 22.2, No. 235
UL File-Number:	E 76126 UL CL	E 76126 UL CL	E 76126 UL CL	-
No. of poles:	1, 2, 3 & 4	1, 2, 3 & 4	1, 2, 3 & 4	1, 2, 3
Tripping characteristics:	B, C, D, K & Z	B, C, D, K & Z	K	K, Z
Rated current:	0.5-63 A	0.2-63 A	0.2-63 A	0.2-63 A
Rated voltage:	Multi pole, 480Y/277 VAC		1 pole, 277 VAC, Multi pole, 480Y/277 VAC	1 pole, 250 VDC, 230 VAC, Multipole, 500 VDC, 480 VAC
Short circuit capacity:	S200 6kA; S200P 10 kA		10 kA	4.5 kA (10 kA, 60 VD 1P, 125 VDC, 2P)
Frequency:	50/60 Hz		50/60 Hz	50/60 Hz
Degree of protection:	IP 20		IP 20, IP40 in enclosure w/cover	IP 20
Mounting position:	Vertical, horizontal		Any	Any
Fixing:	35mm DIN rail			
Clamps only for Cu:	18-4 AWG			
Service life, mech. and at rated load:	20,000 operations		6000 ops (AC), 1 cycle (1s -ON, 9s -OFF)	6000 ops (AC/DC), 1 cycle (1s -ON, 9s -OFF)
Tightening torque:	25 in. lbs (2.8 Nm)			17.5 in. lbs (2.5 Nm)
Ambient temperature:	-25°C ... -13°F / 70°C ... 158°F		-25°C ... +55°C	-25°C ... +55°C
Shock resistance:	30 g at least 3 impacts, shock duration of 11 ms		25g, 2 shocks, 13ms	30g, 3 shocks, 11ms

Auxiliary contact S2C-H6R and Signal contact S2C-S6R for S200, S200P & S200PR

Rated current:	10
Rated voltage AC / DC:	24
Contact:	1 pole, single throw
Connection capacity mm ²	18 – 14 AWG (0.75...2.5)
Tightening torque:	11 in. lbs (1.2 Nm)
Shock resistance acc. to DIN IEC 68-2-6:	5 g, 20 frequency cycles 5...150...5 Hz at 24 VAC/DC, 5 mA auto-reclosing < 10 ms
Mechanical service life:	10,000 operations

Shunt trip

		S2C-A1	S2C-A2
Rated voltage	AC	12 ... 60 V	110 ... 415 V
	DC	12 ... 60 V	110 ... 250 V
Max. release duration		< 10 ms	< 10 ms
Min. release voltage	AC	7 V	55 V
	DC	10 V	80 V
Consumption on release	AD	40 ... 200 VA	55 ... 210 VA
	DC	40 ... 200 VA	55 ... 110 VA
Coil resistance		3.7 Ω	225 Ω
Terminals		18...6/0.75 – 16 AWG/mm ²	18...6/0.75 – 16 AWG/mm ²
Tightening torque		18/2 in.lbs/Nm	18/2 in.lbs/Nm

Undervoltage release

		S2C-UA 12 DC	S2C-UA 24 AC	S2C-UA 24 DC	S2C-UA 48 AC	S2C-UA 48 DC	S2C-UA 110 AC	S2C-UA 110 DC	S2C-UA 230 AC	S2C-UA 230 DC	S2C-UA 400 AC
Standards		IEC/EN 60947-1									
Rated voltage	AC	12 V	24 V	24 V	48 V	48 V	110 V	110 V	230 V	230 V	400 V
	DC										
Frequency		50 ... 60 Hz									
Release trip		0.35 UnOVO 0.7 Un V									
Terminals		2 x 16/2 x 1.5 AWG/mm ²									
Consumption		0.2 VA	3.6 VA	2 VA	3.6 VA	2.1 VA	3.5 VA	2.2 VA	3.7 VA	2.3 VA	2.4 VA
Resistance to corrosion		constant atmosphere: 23/83 – 40/93 – 55/20; variable atmosphere: 25/95 – 40/93 °C/RH									
Protection degree		IPXXB/IP2X									
Tightening torque		3.5/0.4 in.lbs/Nm									

Technical data

S200, S200P & S200PR

UL 1077, CSA 22.2, No. 235

Miniature
circuit breakers
S200

Internal resistance and power loss

Internal resistance per pole in mΩ, power loss per pole in W

Type	Rated current A	Device series B, C, D [Ⓞ]		Device series K		Device series Z	
		mΩ	W	mΩ	W	mΩ	W
S200 & S200P	0.5	5500	1.4	6340	1.6	10100	2.5
	1	1440	1.4	1550	1.6	2270	2.3
	1.6	630	1.6	695	1.8	1100	2.8
	2	460	1.8	460	1.9	619	2.5
	3	150	1.3	165	1.5	202	1.8
	4	110	1.8	120	2.0	149	2.4
	6	55	2.0	52	1.9	104	3.7
	8	15	1.0	38	2.5	53.9	3.45
	10	13.3	1.3	12.6	1.26	17.5	1.7
	13	13.3	2.3	12.6	1.26	-	-
	16	7.0	1.8	7.7	2.0	10.9	2.8
	20	6.25	2.5	6.7	2.7	6.0	2.4
	25	5.0	3.2	4.6	2.9	4.1	2.6
	32	3.6	3.7	3.5	3.6	2.8	2.9
	40	3.0	4.8	2.8	4.5	2.5	4.1
	50	1.3	3.25	1.25	2.9	1.8	4.4
	63	1.2	4.8	0.7	5.2	1.3	5.2

Ⓞ Current intensities 0.5 - 4 apply exclusively to C-type trip characteristics

S200PR

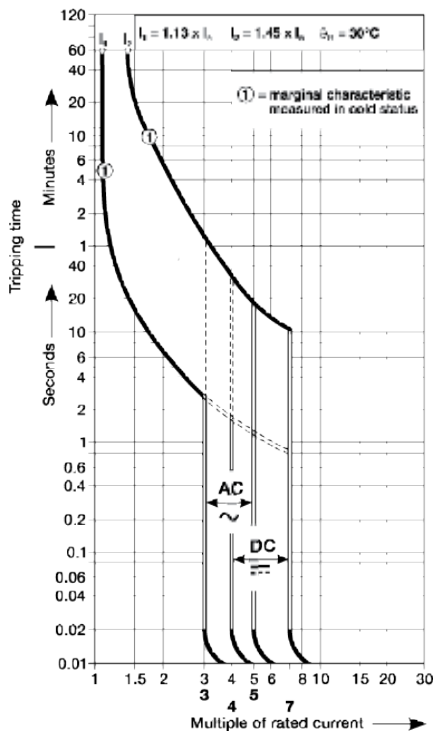
Rated current A	Internal resistance per pole ⁴⁾ mΩ	Power loss per pole ⁴⁾ W
0.3	13700	1.23
0.5	4740	1.19
0.75	2067	1.16
1	1270	1.27
1.5	610	1.56
2	442	1.77
3	140	1.26
4	109	1.75
5	50	1.26
6	54	1.94
8	22	1.41
10	18.2	1.82
13	14.8	2.50
15	8.1	1.83
16	11.1	2.83
20	8.5	3.40
25	5.5	3.43
30	3.8	3.39
32	4.6	4.70
35	3.9	4.76
40	2.8	4.40
50	1.7	4.25
60	1.7	6.18
63	1.9	7.56

Temperature derating

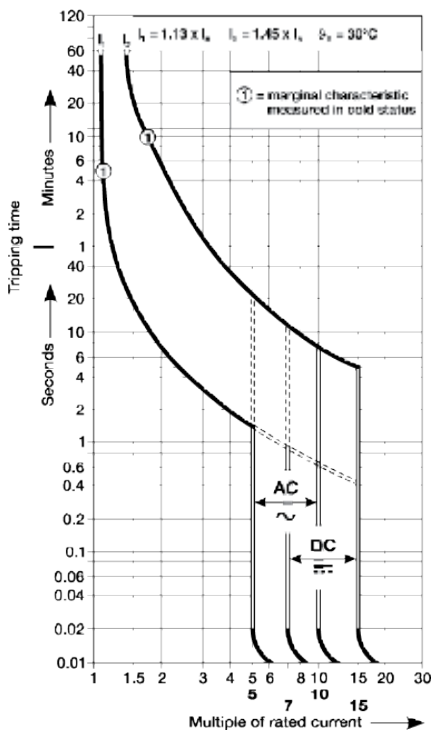
Max operating current depending on the ambient temperature of a circuit breaker characteristics type B, C and D

B, C, D, K, & Z	Ambient Temperatures T (C°/F°)											
	-40/-40	-30/-22	-20/-4	-10/14	0/32	10/50	20/68	30/86	40/104	50/122	60/140	70/158
Amps	0.67	0.65	0.62	0.60	0.58	0.55	0.53	0.50	0.47	0.44	0.41	0.37
	1.33	1.29	1.25	1.20	1.15	1.11	1.05	1.00	0.94	0.88	0.82	0.75
	2.13	2.07	2.00	1.92	1.85	1.77	1.69	1.60	1.51	1.41	1.31	1.19
	2.67	2.58	2.49	2.40	2.31	2.21	2.11	2.00	1.89	1.76	1.63	1.49
	4.0	3.9	3.7	3.6	3.5	3.3	3.2	3.0	2.8	2.6	2.4	2.2
	5.3	5.2	5.0	4.8	4.6	4.4	4.2	4.0	3.8	3.5	3.3	3.0
	8.0	7.7	7.5	7.2	6.9	6.6	6.3	6.0	5.7	5.3	4.9	4.5
	10.7	10.3	10.0	9.6	9.2	8.8	8.4	8.0	7.5	7.1	6.5	6.0
	13.3	12.9	12.5	12.0	11.5	11.1	10.5	10.0	9.4	8.8	8.2	7.5
	17.3	16.8	16.2	15.6	15.0	14.4	13.7	13.0	12.3	11.5	10.6	9.7
	21.3	20.7	20.0	19.2	18.5	17.7	16.9	16.0	15.1	14.1	13.1	11.9
	26.7	25.8	24.9	24.0	23.1	22.1	21.1	20.0	18.9	17.6	16.3	14.9
	33.3	32.3	31.2	30.0	28.9	27.6	26.4	25.0	23.6	22.0	20.4	18.6
	42.7	41.3	39.9	38.5	37.0	35.4	33.7	32.0	30.2	28.2	26.1	23.9
	53.3	51.6	49.9	48.1	46.2	44.2	42.2	40.0	37.7	35.3	32.7	29.8
	66.7	64.5	62.4	60.1	57.7	55.3	52.7	50.0	47.1	44.1	40.8	37.3
	84.0	81.3	78.6	75.7	72.7	69.6	66.4	63.0	59.4	55.6	51.4	47.0
	112.6	107.2	102.1	97.2	92.6	88.2	84.0	80.0	76.0	72.2	68.6	65.2
140.7	134.0	127.6	121.6	115.8	110.3	105.0	100.0	95.0	90.3	85.7	81.5	
175.9	167.5	159.5	151.9	144.7	137.8	131.3	125.0	118.8	112.8	107.2	101.8	

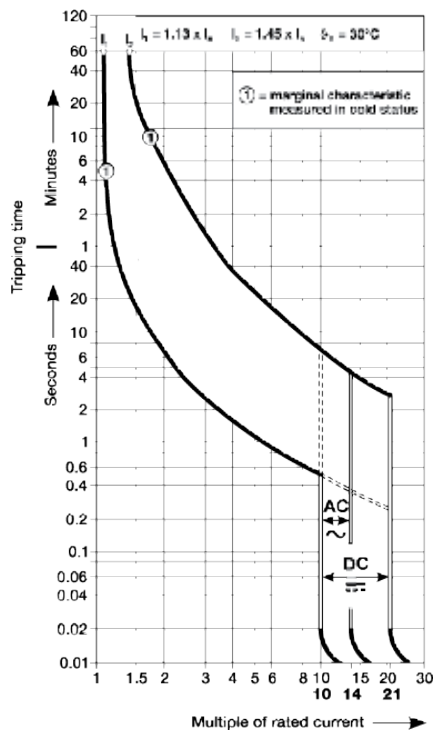
Tripping characteristic B



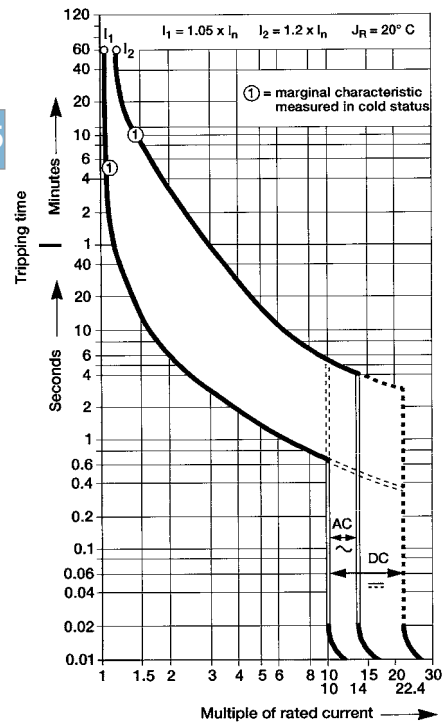
Tripping characteristic C



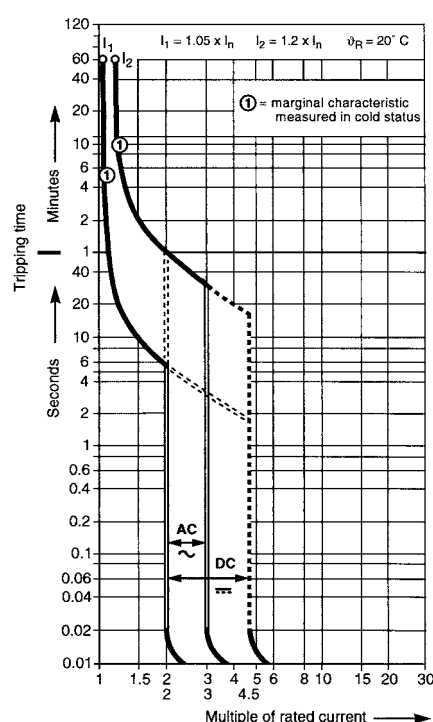
Tripping characteristic D



Tripping characteristic K



Tripping characteristic Z



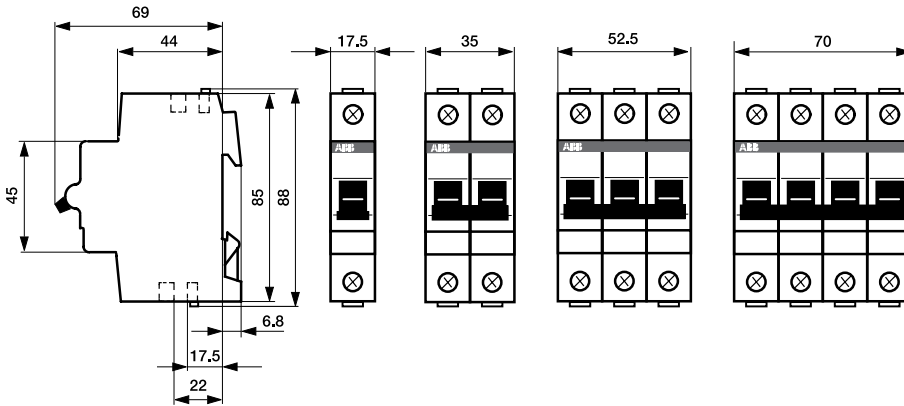
15

Approximate dimensions

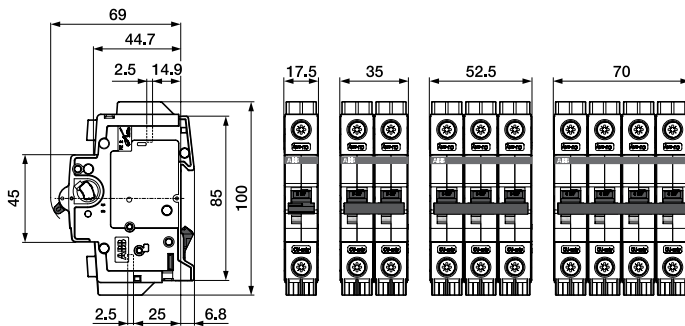
S200, S200P, S200PR

UL 1077, CSA 22.2, No. 235

S200, S200P



S200PR



SU200PR Instructions for use

Ring Tongue Details

Only or ring cable lugs	Insulated only 	A	B	C
	Rated voltage 480Y/277 V AC	max. 11.0 mm (0.43")	max. 12.2 mm (0.48")	Suitable for M5 (0.20")
Insulated only 	Rated voltage 240/240 V AC	A	B	C
	max. 14.0 mm (0.55")	max. 12.2 mm (0.48")	Suitable for M5 (0.20")	

CU only
 60/75°C
 (140/167°F)

max. 2.0 mm
 (0.08")

PZ 2 Torque: 2.8 Nm (25lb-in)

Ring Tongue Terminal, Special purpose - Not for general use

Installation Instructions

Please insert or withdraw the cable lug only when the screw is completely open.

Please make sure that the terminal screw penetrates the ring lug hole properly and completely during tightening.

Please ensure that the screw is securely tightened before applying any mechanical force on the cable / cable lug.

$< 2.8 \text{ Nm}$
 2.8 Nm

Do not apply abnormal downward pressure on the screw during tightening or loosening of the screw.

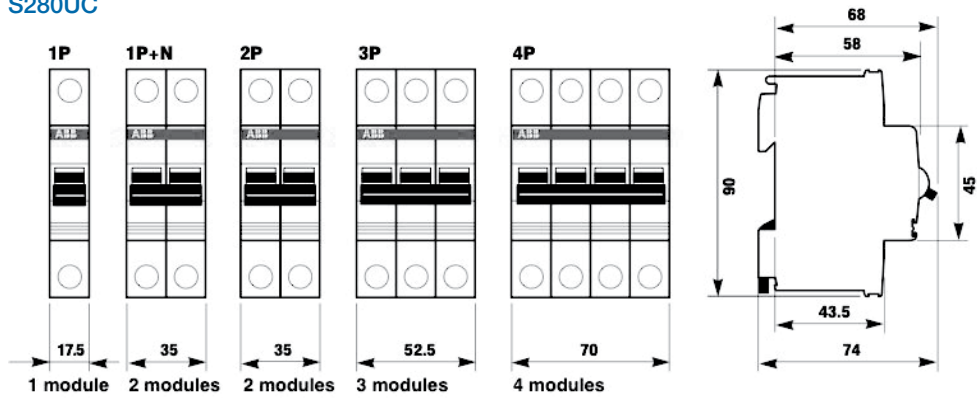
$F = \text{max. } 30 \text{ N}$
 $F = \text{Maximum to operate}$

Please follow the Ring Tongue Details on the rear of this sheet.

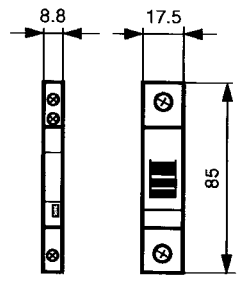
Approximate dimensions

S280UC, S2C-H6R, S2C-A...U
UL 1077, CSA 22.2, No. 235

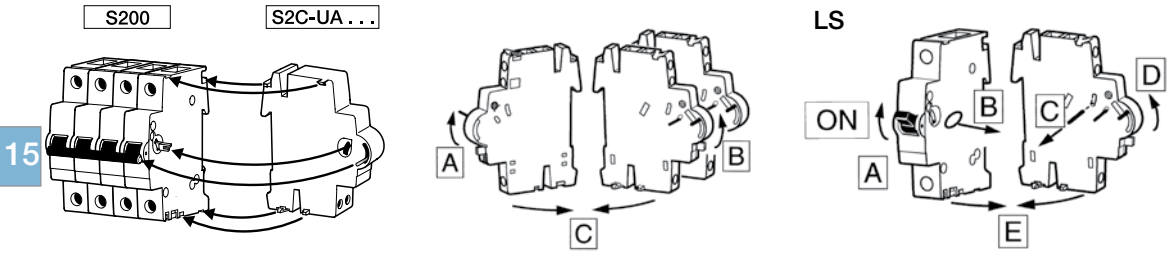
S280UC



S2C-H6R, S2C-A... S2C



Addition of S2C-A...U



15

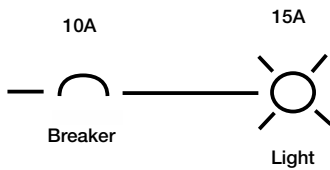
Introduction

The circuit breaker plays an important role in providing over-current protection and a disconnect means in electrical networks. Recent advancements in circuit breaker technology has increased breaker performance and protection.

Overload

A slow and small overcurrent situation that causes the ampacity and temperature of the circuit to gradually increase over time. This type of event is characterized by a slight increase in the load (ampacity) on the circuit and is interrupted by the thermal trip unit of the breaker.

Thermal Example

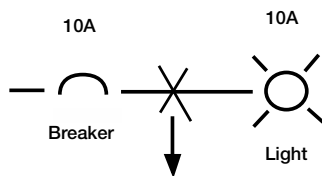


The light draws more than 10 amps for an extended period of time creating a thermal overload.

Short circuit

A rapid and intense overcurrent situation that causes the ampacity of the circuit to increase. This type of event is characterized by a dramatic increase in the load (ampacity) on the circuit and is interrupted by the magnetic trip unit of the breaker.

Magnetic Example

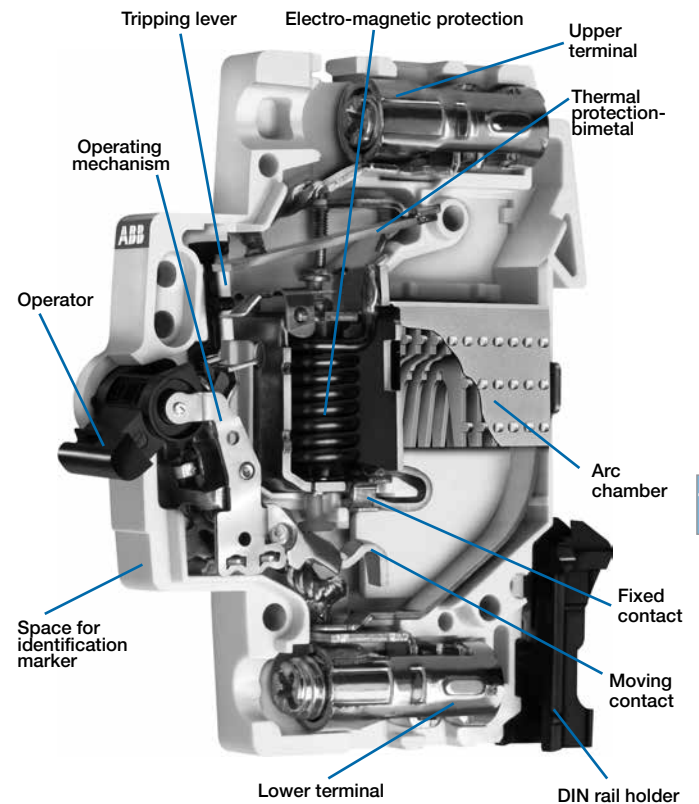


The wire connected between the light and breaker is cut and shorted to ground creating a short circuit.

Breaker definition

A breaker is a device designed to isolate a circuit during an overcurrent event without the use of a fusible element. A breaker is a resettable protective device that protects against two types of overcurrent situations; Overload and Short Circuit.

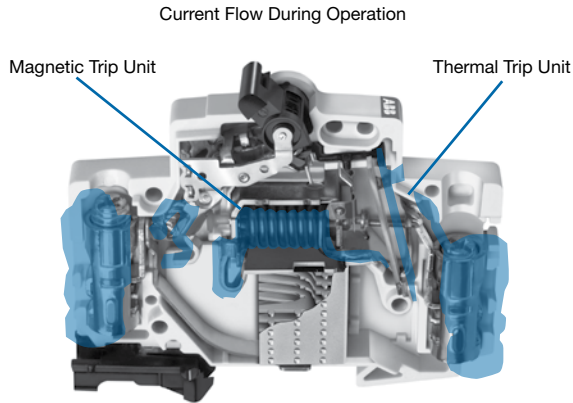
ABB current limiting breaker



Circuit breaker construction

Thermal / Magnetic trip units definition

ABB Current Limiting Breakers use an electromechanical (Thermal / Magnetic) trip unit to open the breaker contacts during an overcurrent event. The thermal trip unit is temperature sensitive and the magnetic trip unit is current sensitive. Both units act independently and mechanically with the breaker's trip mechanism to open the breaker's contacts.



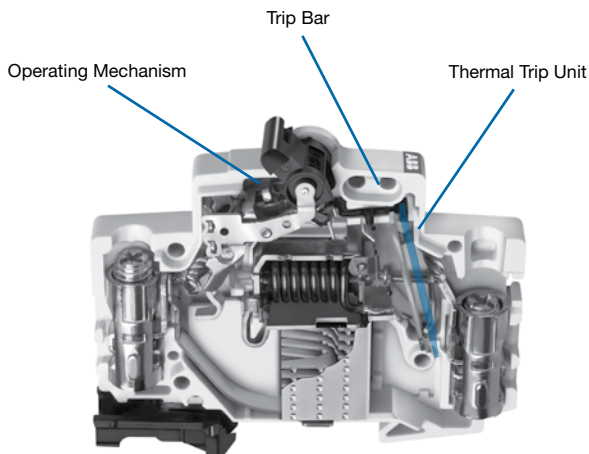
All highlighted components are energized during operation

Overload protection

The thermal trip unit protects against a continuous overload. The thermal unit is comprised of a bimetal element located behind the circuit breaker trip bar and is part of the breaker's current carrying path. When there is an overload, the increased current flow heats the bimetal causing it to bend. As the bimetal bends it pulls the trip bar which opens the breaker's contacts.

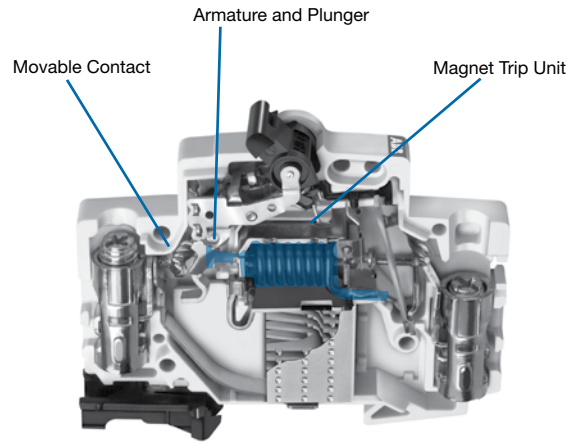
The time required for the bimetal to bend and trip the breaker varies inversely with the current. Because of this, the tripping time becomes quicker as current increases in magnitude.

Overload protection is applicable to any installation, conductor, or component which can be subjected to low-magnitude but long-time over-currents. Low-magnitude, long-time over-currents can be dangerous because they reduce the life of the electrical installation, conductor, and components and if left unchecked could result in fire.



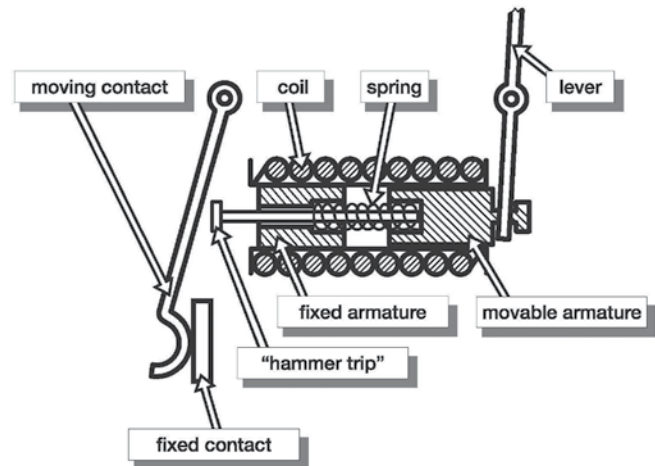
Magnetic trip units (short circuit protection)

The Magnetic trip unit protects against a short circuit. The magnetic trip unit is comprised of an electromagnet and an armature.



Components of a magnetic trip unit

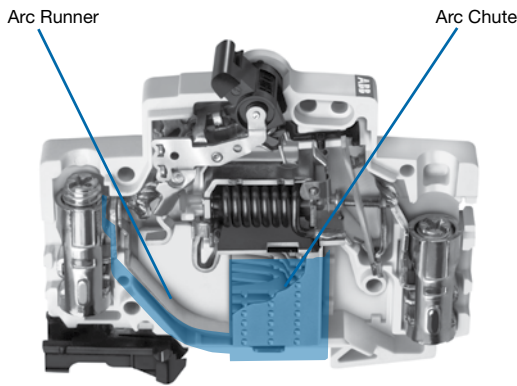
When there is a short circuit, a high magnitude of current passes through the coils creating a magnetic field that attracts the movable armature towards the fixed armature. The hammer trip is pushed against the movable contact and the contacts are opened. The opening of the breaker's contacts during a short circuit is complete in .5 milli-seconds.



Arc runners / Arc chutes

The arc runner and arc chute limit and dissipate the arc energy during the interruption of an overload or short circuit event.

During an overload or short circuit event, the contacts of the breaker separate and an electrical arc is formed between the contacts through air. The arc is moved into the arc chute by “running” the arc down the interior of the breaker along the arc runner. When the arc reaches the arc chute it is broken into small segmented arcs. The segmented arcs split the overall energy level into segments less than 25V. Each 25V segment does not have a high enough energy level to maintain an arc and all energy is naturally dissipated.



Breaker curves

Thermal Trip Unit (region one)

The first sloping region of the breaker curve is a graphical representation of the tripping characteristics of the thermal trip unit. This portion of the curve is sloped due to the nature of the thermal trip unit. The trip unit bends to trip the breaker's trip bar in conjunction with a rise in amperage (temperature) over time. As the current on the circuit increases, the temperature rises, the faster the thermal element will trip.

Example using the curve below: If you had a 10A breaker and the circuit was producing 30 amps of current, the breaker would trip between 2 seconds and 1 minute. In this example you would find the circuit current on the bottom of the graph (Multiples of rated current). The first line is 10 amps (10 amp breaker x a multiple of one), the second line is 20 amps (10 amp breaker x multiple of 2), and the third line is 30 amps (10amp breaker x multiple of 3). Next you would trace the vertical 30A line up until it intersects the red portion of the breaker thermal curve. If you follow the horizontal lines, on both sides of the red curve, to the left you will see that the breaker can trip as fast as 2 seconds and no slower than 1 minute.

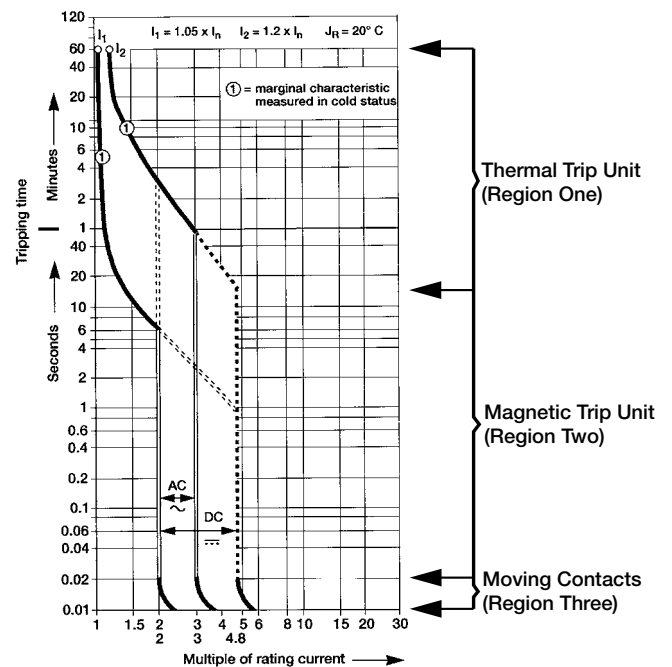
Magnetic Trip Unit (region two)

This region of the breaker curve is the instantaneous trip unit. ABB's miniature circuit breaker's instantaneous trip unit interrupts a short circuit in 2.3 to 2.5 milliseconds. Because of this the curve has no slope and is graphically represented as a vertical straight line.

Example using the curve above: If you had a 10 amp breaker the magnetic trip element would interrupt a short circuit between 10 and 30 amps (10 amp breaker x multiple of 2 and 3) in 2.3 to 2.5 milliseconds.

Breaker Contacts (region three)

This region of the curve is the time required for the contacts of the breaker to begin to separate. The contacts will open in less than .5 milliseconds and is graphically represented by the bottom vertical portion of the curve.



Circuit breaker current limitation

Current limiting definitions

All ABB Miniature Circuit Breakers are UL tested and certified as current limiting protective devices. Current limiting circuit breakers provide a higher level of circuit protection than a typical zero point external breakers.

UL AC 60Hz cycle

UL defines an AC cycle as the potential energy of the wave form traveling from Zero-to-Positive amplitude, Positive-to-Zero amplitude, Zero-to-Negative amplitude, Negative-to-Zero amplitude 60 times in one second. One cycle is completed every 16.6 milliseconds.

UL breaker current limiting

UL defines breaker current limitation as a breaker that interrupts and isolates a fault in less than 1/2 of an AC cycle. 1/2 a cycle is completed in 8.3 milliseconds.

NEC240.2 current limiting

A device that, when interrupting current in its current-limiting range, reduces the current flowing in the faulted circuit to a magnitude substantially less than that obtainable in the same circuit if the device were replaced with a solid conductor having comparable impedance.

IEC 60947-2 current limiting circuit breaker

A circuit breaker with sufficiently short trip time to prevent the short-circuit current from reaching the peak value which would otherwise be reached.

ABB current limiting breakers

ABB current limiting breakers can interrupt and isolate a fault in 1/8 of an AC cycle. The breaker fault interruption is completed in 2.3 to 2.5 milliseconds.

Zero point extinguishing breakers

A typical zero point extinguishing breaker interrupts a fault and does not isolate the energy. The breaker allows an arc to be present between the open contacts until the AC wave form crosses zero. When the wave form crosses zero, the potential energy is zero and the arc (fault) naturally extinguishes. The arc could be present for up to 8.3 milliseconds.

Current limiting breakers and electrical networks

Current Limitation

When a short-circuit condition occurs, the “ideal” current limiting circuit breaker opens before the current waveform can reach its full potential magnitude which occurs at 1/4 cycle (4.17ms). ABB’s current limiting breakers can interrupt a fault in about 1/2 cycle or 2.3ms to 2.5ms.

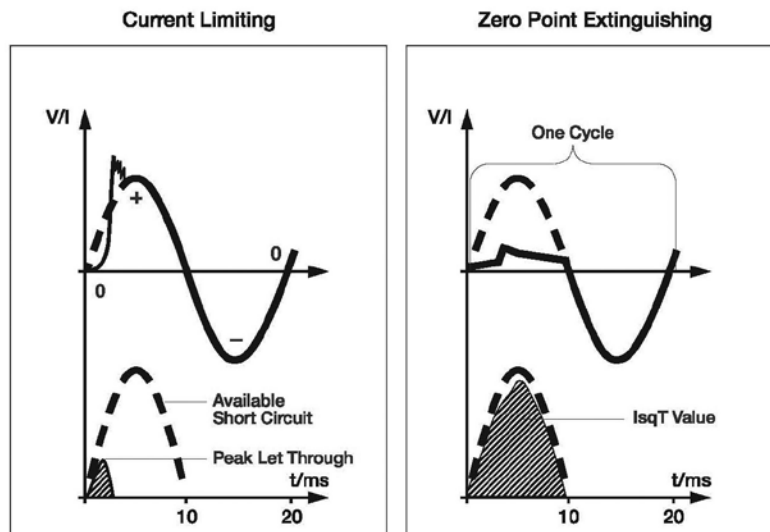
ABB’s current limiting breakers interrupt a short circuit in less than 1/8 cycle and limit the amount of current that can reach a circuit. Limiting the available current on the circuit provides additional protection against network, breaker, or bus damage and prevents the tripping of upstream breakers (selective coordination).

IsqT

The true destructive nature of a short circuit is measured by the time it is available combined with the peak value of the short circuit. The IsqT (Amps Squared over Time) value represents the amount of energy available on a network during a short circuit and is represented by the shaded area on the graph below.

During a short circuit both magnetic forces and thermal energy combine to damage devices on the electrical network. The level of thermal energy and magnetic forces are directly proportional to the square of the current. The magnetic forces vary as a square of the peak current available and the thermal energy varies as a square of the RMS (root mean square) current available. ABB’s current limiting breakers will limit the let-through energy to a fraction (1/100th) of the value which is available from the network. By comparison, a Zero Crossing breaker would let-through approximately 100 times as much destructive energy as the current limiting circuit breaker [(100,000A / 10,000A) squared – 100X].

ABB’s current limiting breakers limit the short circuit current to a relatively small magnitude in a extremely short time, which dramatically limits a short circuit’s destructive energy.



Current limiting and zero crossing breakers

During the initial stages of a short circuit a breaker's contacts open to interrupt the circuit. After the contacts open an arc forms in the air between the contacts on both the current limiting and zero crossing breaker contacts. What distinguishes a current limiting breaker from a zero crossing breaker is what each breaker does after an arc is formed between the open contacts.

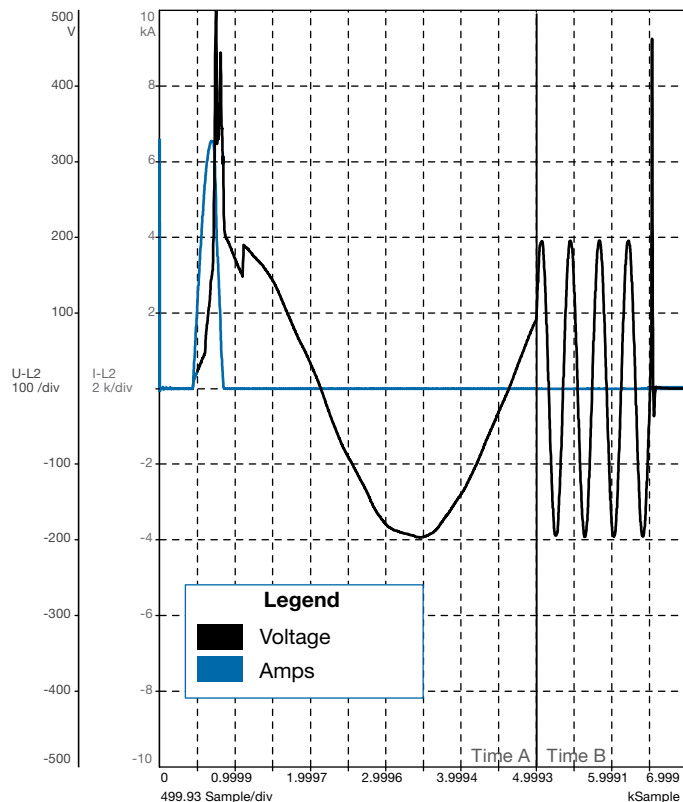
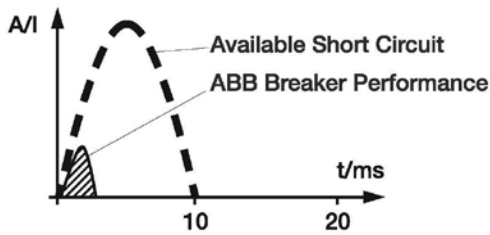
A current limiting breaker "runs" the arc down the breaker arc runner into an arc chute that extinguishes the arc.

A zero crossing breaker does not attempt to extinguish the arc. The breaker is designed to withstand the energy of the arc long enough for the waveform to cross zero. When the wave form crosses zero the potential energy is zero and the arc naturally extinguishes itself.

ABB's current limiting breakers interrupt the arc energy in 2.3ms to 2.5ms (1/8 cycle) and a zero crossing breaker allows the arc to be present for up to 8.3ms (1/2 cycle). A zero crossing breaker will let through 100 times as much energy as an ABB current limiting breaker.

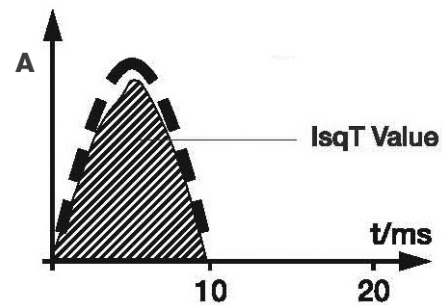
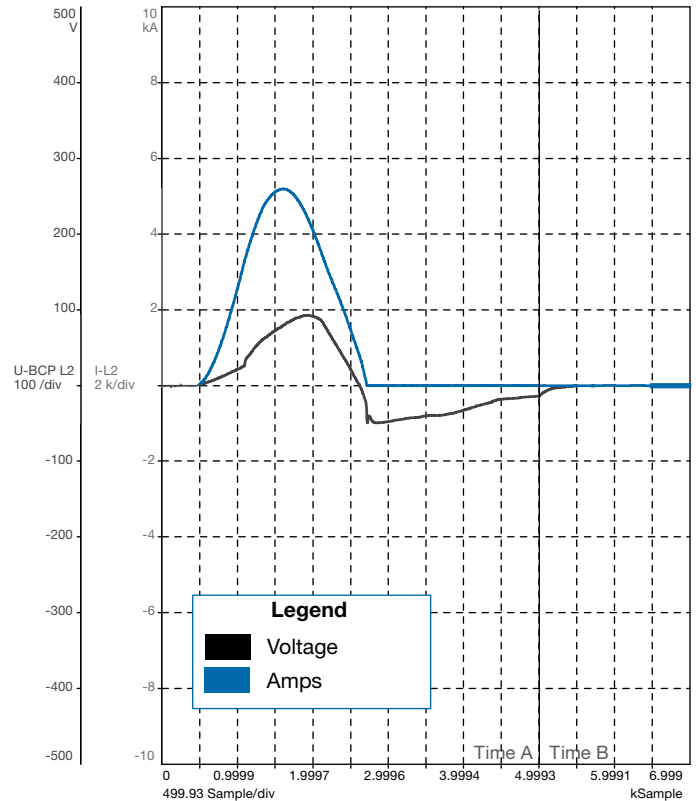
Current limiting example

The lab test report below details a 20A S200 series current limiting breaker interrupting a 28kA fault in 1.7 milliseconds. The total "I Square T" value is 32.0kA.



Zero crossing example

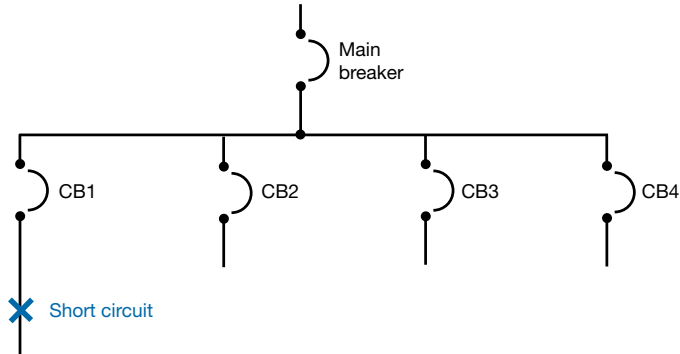
The test report below details a 20A Zero Point Extinguishing breaker interrupting a 9kA fault in 9 milliseconds. The total "I Square T" value is 104.0kA.



Selective coordination and series ratings

IEC 60497-1 selective coordination definition

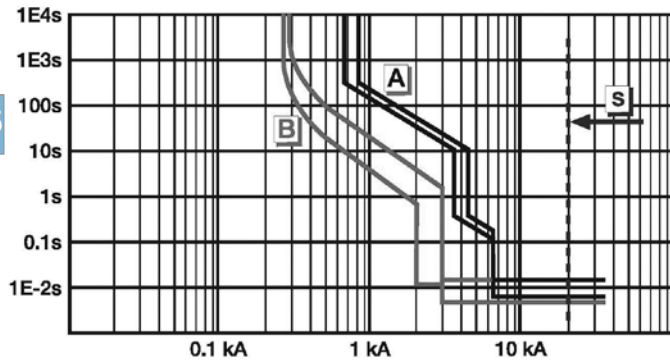
Coordination between the operating characteristics of two or more over-current protection devices, so that when an over-current within established limits occurs, the device designated to operate within those limits trips whereas the other do not trip.



Example of breaker coordination

When an over-current event occurs at the branch breaker level (CB1), and the event is within the operating characteristics of the breaker, then the branch breaker should interrupt the circuit (open) and the main breaker should remain closed and energized. The chart below gives a graphical representation of a downstream branch breaker (B curve) and a main breaker (A curve) with coordination. The separation between the curves allows the branch breaker to react to the fault and the main breaker remain closed and energized.

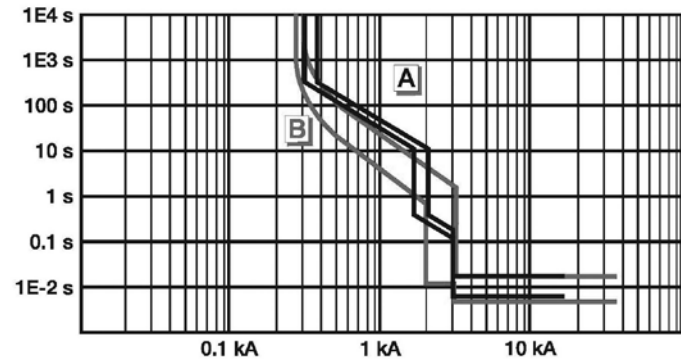
Coordination



Example of no breaker coordination

Selective breaker coordination is not achieved when there is an overload event at the branch breaker level (MCB1) and both the branch breaker and main breaker interrupt the circuit (open). When there is no breaker coordination several circuits lose power that should remain operational during and after the overload event. The chart below gives a graphical representation of a downstream branch breaker (B curve) and a main breaker (A curve) without coordination. There is no separation between the curves. The branch breaker will react to a fault and the main breaker will open and de-energize all circuits downstream.

No Coordination



Problems in coordination occur when the branch breaker allows the "I Square T" value of the short circuit to rise to a level that is in the operating range of the up-stream main breaker. Proper breaker coordination is easier to achieve with the use of current limiting breakers at the branch level.

Selective coordination and current limiting breakers

Recent improvements in ABB circuit breaker technology has pushed the performance of breakers to the same level as fuses. The reaction time and tripping characteristics of current limiting breakers are now on par with fuses. This allows ABB to provide a high level of coordination between branch breakers and the main. A current limiting branch breaker will limit the "I Square T" value well below the level of the operating range of the upstream main breaker.

ABB's current limiting branch breakers can coordinate between the main breaker up to 35kA.

Selective coordination and zero crossing breakers

Zero crossing breakers do not limit the "I Square T" value. They wait for the wave form to cross zero and allow a high level of let-through energy to pass through the system. The "I Square T" value of a zero crossing breaker is high enough that the main breaker will likely trip during a short circuit. With zero crossing breakers it is extremely difficult to coordinate between branch and main breakers.

A typical zero crossing breaker's coordination level is below 10kA. There are a few manufactures that have achieved coordination between a branch zero crossing breaker and the main by slowing the performance (protection) of the main breaker.

Series ratings –vs- selective coordination

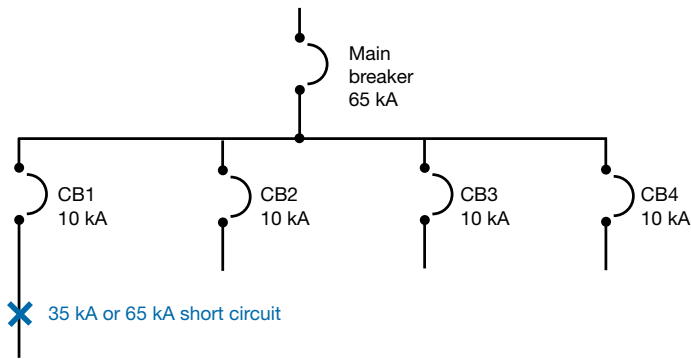
Selective coordination

Selective coordination is achieved when there is a short circuit on a branch circuit breaker, the branch breaker opens and isolates the fault, and the main breaker remains closed. The rating is usually a value above the “stand alone” interrupting rating of the branch breaker and the “stand alone” rating of the main breaker.

Example:

65kA rated main breaker
10kA rated branch breaker
Coordination between the two breakers up to 35kA

There can be a short circuit on the branch breaker up to 35kA where the branch will open (CB1) and the main breaker will remain closed. Although the branch has a 10kA “stand alone” rating both the breakers work together to limit the available short circuit to allow the branch (CB1) to isolate the fault.



Series ratings

Series ratings are different from coordination ratings. Unlike coordination ratings where the branch opens and the main remains closed, a series rated combination is one where both the branch and main breakers open and work together to isolate the fault.

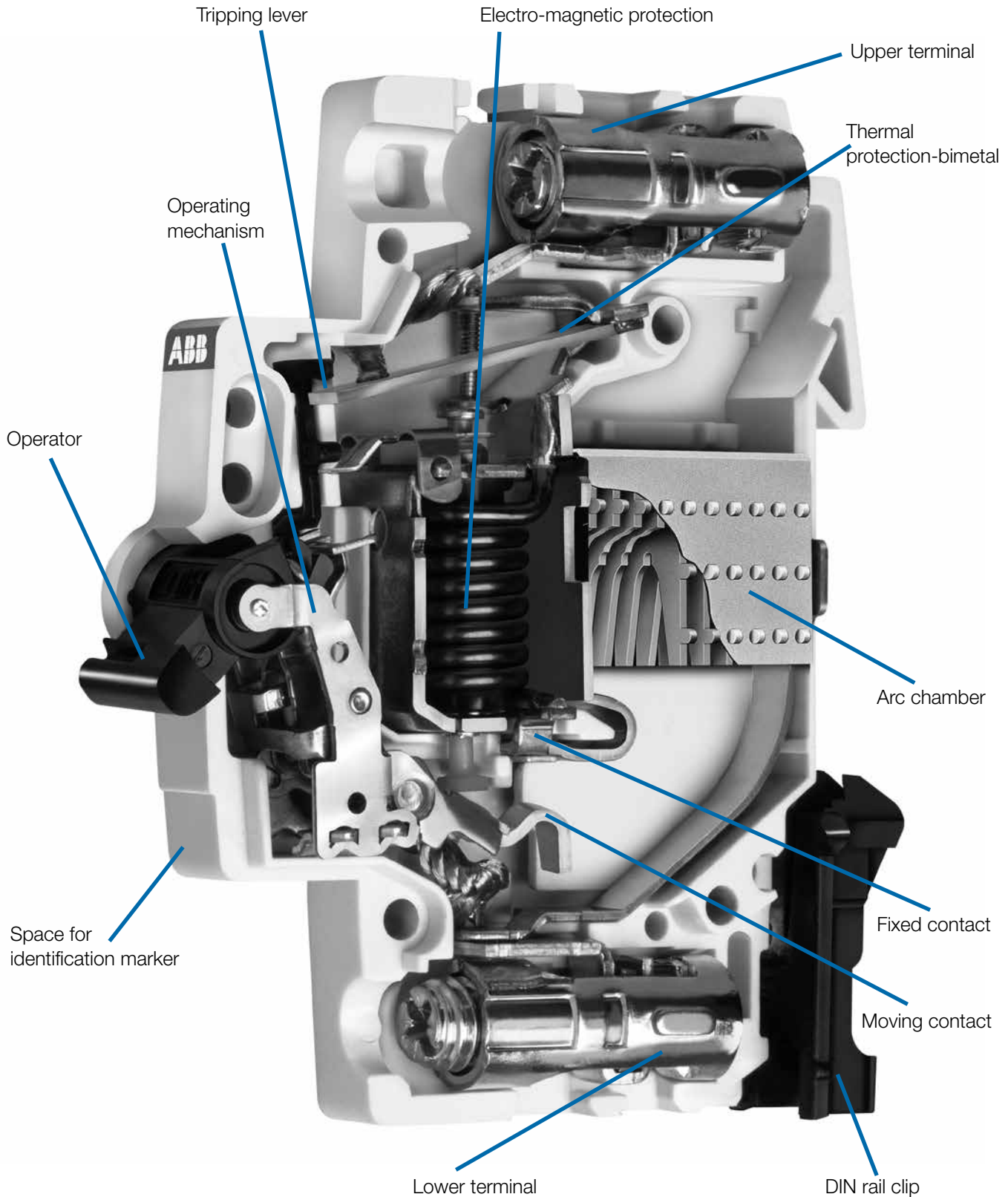
The series rating combination of two breakers is equal to the “stand alone” interrupting value of the main breaker. This is a result of the main breaker let-through value being lower than the “stand alone” interrupting value of the branch breaker. During a short circuit the main breaker will limit the energy to a level that is below the “stand alone” value of the branch breaker.

Example:

65kA rated main breaker
10kA rated branch breaker
Series combination rating between the two breakers up to 65kA

There can be a short circuit on the branch breaker up to 65kA where the branch will open and the main breaker will open. Although the branch breaker (CB1) has a 10kA “stand alone” rating the main breaker has a let-through value below 10kA. If there is a fault up to 65kA on the network the main breaker will limit the energy to a value less than the rating of the branch breaker (CB1). Both breakers will trip (no coordination) but the network can safely withstand a fault of 65kA.

Miniature circuit breaker cutaway





S800

High performance circuit breakers
UL 489 Series



Description

The S800 high performance MCB offers a compact solution to circuit protection. The S800 devices are DIN rail mounted. The S800 is available with application-specific trip characteristics to provide maximum circuit protection.

The breakers offer thermal-magnetic trip protection according to Z and K characteristics.

For the worldwide market, the breakers carry CSA, IEC, CE and many other agency approvals.

Features

- Energy limiting
- Fast breaking time (2.3 – 2.5 ms)
- Wide range of accessories
- DIN rail mounting
- Finger safe terminals
- Multi-function terminals
- Ring tongue compatible
- UL489 File # E312425

S800U

Amperage	10 – 100 A
Voltage	240 VAC
Poles	1, 2, 3, 4 poles
Trip characteristics	Z, K
Interrupting ratings	30kA: UL 489, single pole 50kA: UL 489, multi-pole
Auxiliary contacts	Yes
Bell alarm	Yes
Shunt trip	Yes
Undervoltage release	Yes
Ring tongue	Yes

S800U-K, 240 VAC

Branch circuit protection

UL 489

K



S801U-K



S802U-K



S803U-K



S804U-K

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	10	S801U-K10	3	10	S803U-K10
	15	S801U-K15		15	S803U-K15
	20	S801U-K20		20	S803U-K20
	25	S801U-K25		25	S803U-K25
	30	S801U-K30		30	S803U-K30
	40	S801U-K40		40	S803U-K40
	50	S801U-K50		50	S803U-K50
	60	S801U-K60		60	S803U-K60
	70	S801U-K70		70	S803U-K70
	80	S801U-K80		80	S803U-K80
2	90	S801U-K90	4	90	S803U-K90
	100	S801U-K100		100	S803U-K100
	10	S802U-K10		10	S804U-K10
	15	S802U-K15		15	S804U-K15
	20	S802U-K20		20	S804U-K20
	25	S802U-K25		25	S804U-K25
	30	S802U-K30		30	S804U-K30
	40	S802U-K40		40	S804U-K40
	50	S802U-K50		50	S804U-K50
	60	S802U-K60		60	S804U-K60
70	S802U-K70	70	S804U-K70		
80	S802U-K80	80	S804U-K80		
90	S802U-K90	90	S804U-K90		
100	S802U-K100	100	S804U-K100		

Tripping characteristic K

UL 489
240 VAC
30 kA, single pole
50 kA, multi-pole

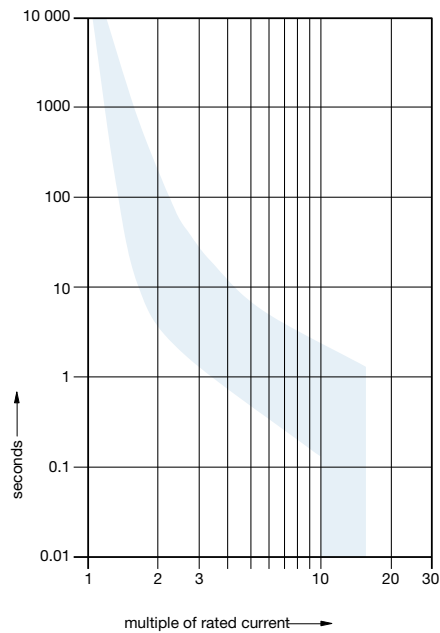
Resistive loads

- K Curve
- Designed for use in cable protection applications
- Example: control circuits, lighting

Accessories & technical data

Accessories – See page 15.52

Technical data – See page 15.76 - 15.82



S800U-Z, 240 VAC

Branch circuit protection

UL 489

Z



S801U-Z



S802U-Z



S803U-Z



S804U-Z

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	10	S801U-Z10	3	10	S803U-Z10
	15	S801U-Z15		15	S803U-Z15
	20	S801U-Z20		20	S803U-Z20
	25	S801U-Z25		25	S803U-Z25
	30	S801U-Z30		30	S803U-Z30
	40	S801U-Z40		40	S803U-Z40
	50	S801U-Z50		50	S803U-Z50
	60	S801U-Z60		60	S803U-Z60
	70	S801U-Z70		70	S803U-Z70
	80	S801U-Z80		80	S803U-Z80
2	90	S801U-Z90	4	90	S803U-Z90
	100	S801U-Z100		100	S803U-Z100
	10	S802U-Z10		10	S804U-Z10
	15	S802U-Z15		15	S804U-Z15
	20	S802U-Z20		20	S804U-Z20
	25	S802U-Z25		25	S804U-Z25
	30	S802U-Z30		30	S804U-Z30
	40	S802U-Z40		40	S804U-Z40
	50	S802U-Z50		50	S804U-Z50
	60	S802U-Z60		60	S804U-Z60
70	S802U-Z70	70	S804U-Z70		
80	S802U-Z80	80	S804U-Z80		
90	S802U-Z90	90	S804U-Z90		
100	S802U-Z100	100	S804U-Z100		

Tripping characteristic Z

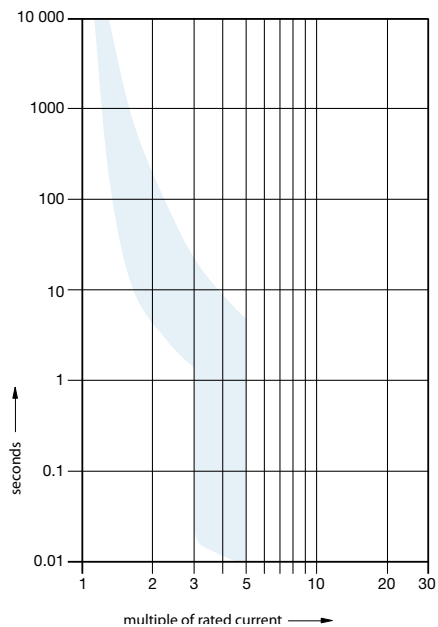
UL 489
240 VAC
30 kA, single pole
50 kA, multi-pole

Resistive loads

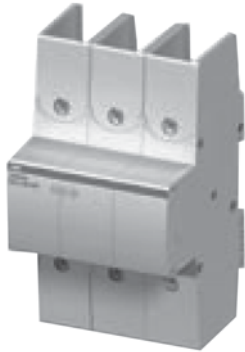
- Z Curve
- Designed for use in cable protection applications
- Example: control circuits, lighting

Accessories & technical data

Accessories – See page 15.52
Technical data – See page 15.76 - 15.82



S803W-SCL-SR UL Short circuit current limiter Self-resetting



S803W-SCL-SR

UL version short circuit current limiter, self resetting, 3 pole

Item	Catalog number
32A Self resetting current limiter	S803W-SCL32-SR
63A Self resetting current limiter	S803W-SCL63-SR
100A Self resetting current limiter	S803W-SCL100-SR

Technical data

Rated voltage	600 VAC per UL508
Short circuit current rating according to UL508, CSA 22.2	480 VAC 50/60 Hz, 65 kA
	600 VAC 50/60 Hz, 65 kA

Approved combinations with motor starter

Downstream devices	Upstream devices		
	S803W-SCL-SR		
Self resetting short-circuit limiter			
Rated current I_e [A]	32	63	100

MS/MO325

0.1–2.5	■	■	■
4	■	■	■
6.3	■	■	■
9	■	■	■
12.5	■	■	■
16	■	■	■
20		■	■
25		■	■

MS/MO132

0.1–2.5	■	■	
4	■	■	
6.3	■	■	■
10	■	■	■
16	■	■	■
20		■	■
25		■	■
32		■	■

– Combinations with S500-K and S500-KM on request

■ Applies for all voltages according to the table below

S803W-SCL-SR

Rated ultimate short-circuit breaking capacity

Short-circuit rating according to UL 508, CSA 22.2

(AC) 50/60 Hz 480 V	[kA]	65
(AC) 50/60 Hz 600 V	[kA]	65

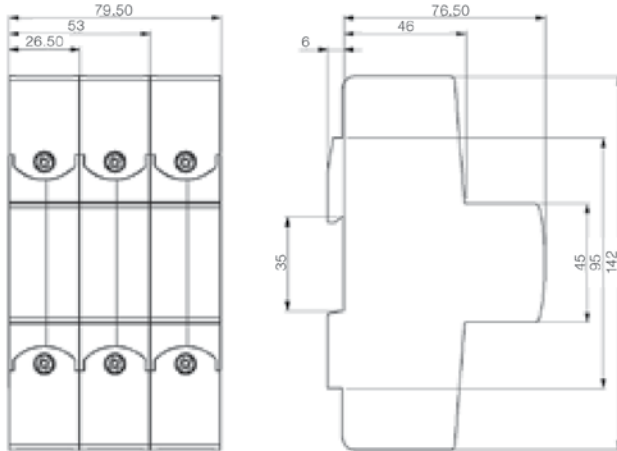
$I_{cu} = I_{cs}$ according to IEC 60947-2

(AC) 50/60 Hz 240/415 V	[kA]	100
(AC) 50/60 Hz 254/440 V	[kA]	100
(AC) 50/60 Hz 277/480 V	[kA]	65
(AC) 50/60 Hz 289/500 V	[kA]	65
(AC) 50/60 Hz 346/600 V	[kA]	65
(AC) 50/60 Hz 400/690 V	[kA]	50

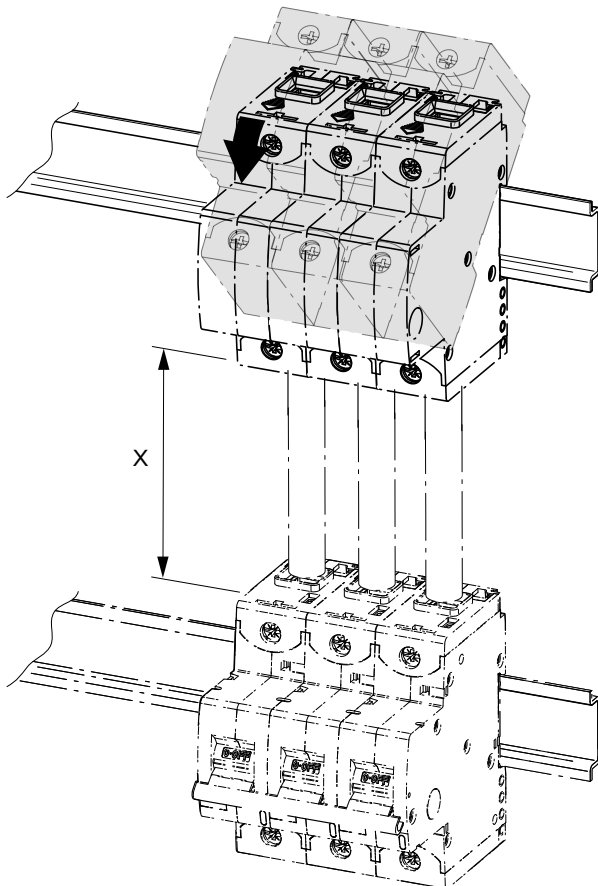
S803W-SCL-SR UL508 Short circuit current limiter

Approximate dimensions

Miniature
circuit breakers
S800



Minimum cable length between S803W-SCL-SR and downstream devices (Connection has to be short-circuit proofed acc. to IEC 61439-1)



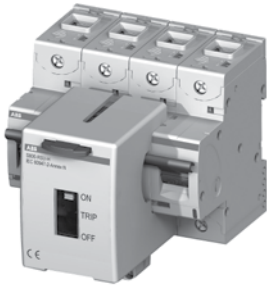
MS/M0325
MS/M0132
S800

S800-SCL-SR	min. length X	min. cross section
32 A	80 mm	6 mm ²
63 A	80 mm	16 mm ²
100/125 A	250 mm	35 mm ²

S800W-RSU Remote sensing unit UL489



S800W-RSU



S800W-RSU mounted on MCB



S800-RSU-CP

Remote switching unit

Item	Catalog number
Remote switching unit S800W-RSU	S800W-RSU

S800-RSU cable including plug

Item	Catalog number
3 meter cable 0.5mm ² (AWG20) including 10 pole Micro Fit 3.0 plug	S800-RSU-CP

Key Features

- The remote Switching unit S800W-RSU has a brushless high precision DC motor to ensure fast remote control operation.
- Low power consumption
- Short switching times
- The S800W-RSU is mounted on any multipole S800 High Performance MCB
- Installation and wiring can be field installable
- The connection is done by a 10-pole Micro Fit 3.0 (not included in delivery)
- The S800W-RSU can be operated by a standard pushbutton or drive by a PLC

Switching times

- OFF -> ON <<500ms
from signal to contact closing
- ON -> OFF <<250ms
from signal to contact opening
- TRIP -> OFF -> ON <<1500ms
from signal to contact closing

For differing requirements, please contact your local ABB partner

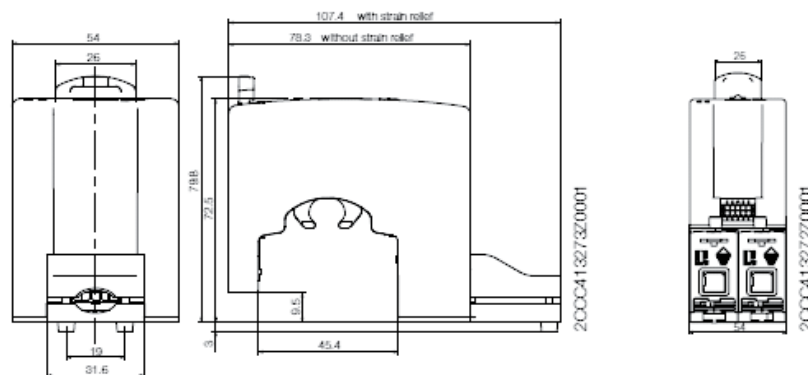
Safety intelligence

- Inputs are deactivated when detecting manual use
- All outputs become active when spindle is rotated more than 360 degrees
- S800W-RSU is locked for 5 minutes after three switching attempts leading to a trip
- Manual switch off possible for 3 & 4 pole devices

Technical specifications

Operational voltage	24 VDC
Current consumption I_{ms}	2,5
Standby current $I_{standby}$	< 50mA
Switching time OFF-ON	< 500 msec
Switching time ON-OFF	<250 mse
Ambient operation temperature	-25...+70°C
Number of switching operations	10.000
Maximum cable lengths(AWG20/ 0.5mm ²)	10m
Degree of protection (mounted)	IP2
Weight	300 gr
Connection	10 pole Micro Fit 3.0

Approximate dimensions





S800

High performance circuit breakers
IEC Series



Description

The S800 high performance MCB offers a compact solution to circuit protection. The S800 devices are IEC tested current limiting and DIN rail mounted. The S800 is available with application-specific trip characteristics to provide maximum circuit protection.

The breakers offer thermal-magnetic trip protection according to B, C, D & K characteristics.

For the worldwide market, the breakers carry CSA, IEC, CE and many other agency approvals.

Features

- Current limiting
- Fast breaking time (2.3 – 2.5 ms)
- Wide range of accessories
- DIN rail mounting
- Finger safe terminals
- Multi-function terminals
- Ring tongue compatible

S800S

Amperage	10 – 125 A
Voltage	690 VAC
Poles	1, 2, 3, 4
Trip characteristics	B, C, D, K
Interrupting ratings	50 kA : IEC
Auxiliary contacts	Yes
Bell alarm	Yes
Shunt trip	Yes
Undervoltage release	Yes
Ring tongue	Yes

S800S-B, 690 VAC IEC

B



S801U-B



S802U-B



S803U-B



S804U-B

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	10	S801S-B10	3	10	S803S-B10
	13	S801S-B13		13	S803S-B13
	16	S801S-B16		16	S803S-B16
	20	S801S-B20		20	S803S-B20
	25	S801S-B25		25	S803S-B25
	32	S801S-B32		32	S803S-B32
	40	S801S-B40		40	S803S-B40
	50	S801S-B50		50	S803S-B50
	63	S801S-B63		63	S803S-B63
	80	S801S-B80		80	S803S-B80
	100	S801S-B100		100	S803S-B100
	125	S801S-B125		125	S803S-B125
2	10	S802S-B10	4	10	S804S-B10
	13	S802S-B13		13	S804S-B13
	16	S802S-B16		16	S804S-B16
	20	S802S-B20		20	S804S-B20
	25	S802S-B25		25	S804S-B25
	32	S802S-B32		32	S804S-B32
	40	S802S-B40		40	S804S-B40
	50	S802S-B50		50	S804S-B50
	63	S802S-B63		63	S804S-B63
	80	S802S-B80		80	S804S-B80
	100	S802S-B100		100	S804S-B100
	125	S802S-B125		125	S804S-B125

Tripping characteristic B

IEC
690 VAC
50 kA

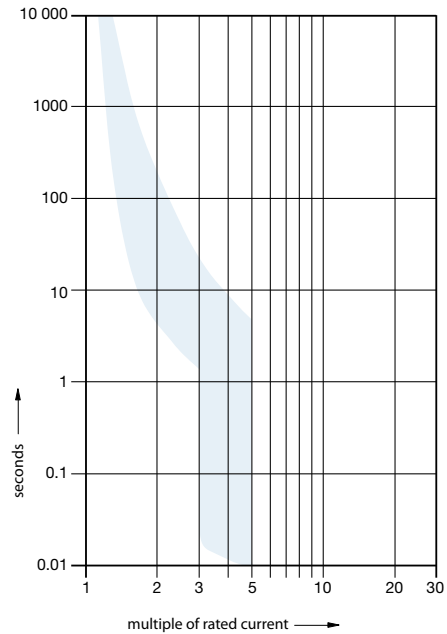
Resistive loads

- B Curve
- Designed for use in cable protection applications
- Example: control circuits, lighting

Accessories & technical data

Accessories – See page 15.52

Technical data – See page 15.76 - 15.82



S800S-C, 690 VAC IEC

C



S801S-C



S802S-C



S803S-C



S804S-C

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	10	S801S-C10	3	10	S803S-C10
	13	S801S-C13		13	S803S-C13
	16	S801S-C16		16	S803S-C16
	20	S801S-C20		20	S803S-C20
	25	S801S-C25		25	S803S-C25
	32	S801S-C32		32	S803S-C32
	40	S801S-C40		40	S803S-C40
	50	S801S-C50		50	S803S-C50
	63	S801S-C63		63	S803S-C63
	80	S801S-C80		80	S803S-C80
2	100	S801S-C100	4	100	S803S-C100
	125	S801S-C125		125	S803S-C125
	10	S802S-C10		10	S804S-C10
	13	S802S-C13		13	S804S-C13
	16	S802S-C16		16	S804S-C16
	20	S802S-C20		20	S804S-C20
	25	S802S-C25		25	S804S-C25
	32	S802S-C32		32	S804S-C32
	40	S802S-C40		40	S804S-C40
	50	S802S-C50		50	S804S-C50
63	S802S-C63	63	S804S-C63		
80	S802S-C80	80	S804S-C80		
100	S802S-C100	100	S804S-C100		
125	S802S-C125	125	S804S-C125		

Tripping characteristic C

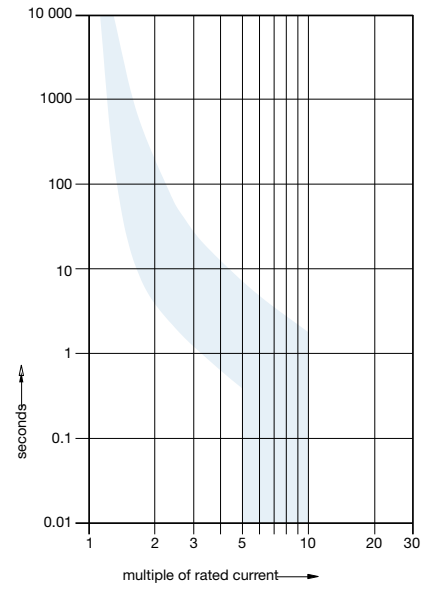
IEC
690 VAC
50 kA

Resistive loads

- C Curve
- Designed for use with medium magnetic start up currents
- Example: lighting, control panels

Accessories & technical data

Accessories – See page 15.52
Technical data – See page 15.76 - 15.82



S800S-D, 690 VAC IEC

D



S801S-D



S802S-D



S803S-D



S804S-D

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	10	S801S-D10	3	10	S803S-D10
	13	S801S-D13		13	S803S-D13
	16	S801S-D16		16	S803S-D16
	20	S801S-D20		20	S803S-D20
	25	S801S-D25		25	S803S-D25
	32	S801S-D32		32	S803S-D32
	40	S801S-D40		40	S803S-D40
	50	S801S-D50		50	S803S-D50
	63	S801S-D63		63	S803S-D63
	80	S801S-D80		80	S803S-D80
2	100	S801S-D100	4	100	S803S-D100
	125	S801S-D125		125	S803S-D125
	10	S802S-D10		10	S804S-D10
	13	S802S-D13		13	S804S-D13
	16	S802S-D16		16	S804S-D16
	20	S802S-D20		20	S804S-D20
	25	S802S-D25		25	S804S-D25
	32	S802S-D32		32	S804S-D32
	40	S802S-D40		40	S804S-D40
	50	S802S-D50		50	S804S-D50
63	S802S-D63	63	S804S-D63		
80	S802S-D80	80	S804S-D80		
100	S802S-D100	100	S804S-D100		
125	S802S-D125	125	S804S-D125		

Tripping characteristic D

IEC
690 VAC
50 kA

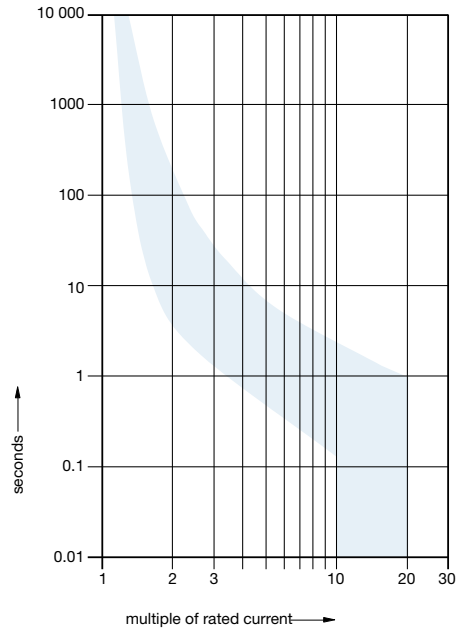
Inductive loads

- D Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.52

Technical data – See page 15.76 - 15.82



S800S-K, 690 VAC IEC

K



S801S-K



S802S-K



S803S-K



S804S-K

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	10	S801S-K10	3	10	S803S-K10
	13	S801S-K13		13	S803S-K13
	16	S801S-K16		16	S803S-K16
	20	S801S-K20		20	S803S-K20
	25	S801S-K25		25	S803S-K25
	32	S801S-K32		32	S803S-K32
	40	S801S-K40		40	S803S-K40
	50	S801S-K50		50	S803S-K50
	63	S801S-K63		63	S803S-K63
	80	S801S-K80		80	S803S-K80
2	100	S801S-K100	4	100	S803S-K100
	125	S801S-K125		125	S803S-K125
	10	S802S-K10		10	S804S-K10
	13	S802S-K13		13	S804S-K13
	16	S802S-K16		16	S804S-K16
	20	S802S-K20		20	S804S-K20
	25	S802S-K25		25	S804S-K25
	32	S802S-K32		32	S804S-K32
	40	S802S-K40		40	S804S-K40
	50	S802S-K50		50	S804S-K50
63	S802S-K63	63	S804S-K63		
80	S802S-K80	80	S804S-K80		
100	S802S-K100	100	S804S-K100		
125	S802S-K125	125	S804S-K125		

Tripping characteristic K

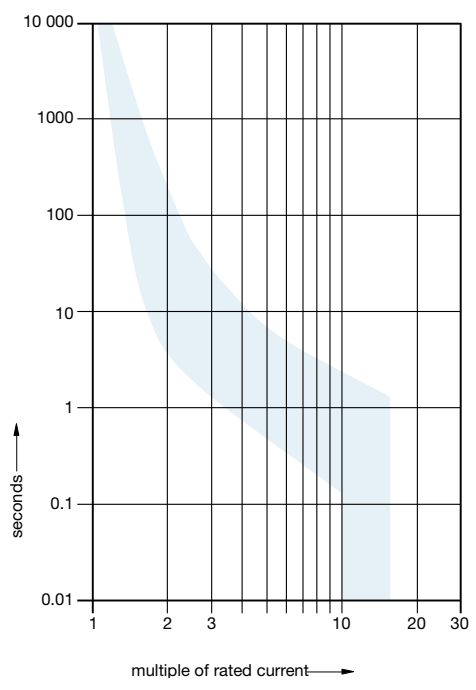
IEC
690 VAC
50 kA

Inductive loads

- K Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.52
Technical data – See page 15.76 - 15.82



Accessories

S800U & S800S

UL & IEC



S800-SOR

Shunt trip

For remote tripping of breaker, a shunt trip device can be added to the MCB. The device opens the breaker after control voltage is applied.

Description (for field mounting, left side)	Catalog number
Shunt operation release 24 VAC/DC	S800-SOR24
Shunt operation release 48...130 VAC/DC	S800-SOR130
Shunt operation release 110...250 VAC/DC	S800-SOR250



S800-UVR

Undervoltage release

When control voltage drops below approximately 50 % of rated voltage, the UVR opens the breaker. The breaker can not be operated unless proper control voltage is first applied to the UVR coil.

Description	Catalog number
Under voltage release 24...36 VAC/DC	S800-UVR36
Under voltage release 48...60 VAC/DC	S800-UVR60
Under voltage release 110...130 VAC/DC	S800-UVR130
Under voltage release 220...250 VAC/DC	S800-UVR250



S800-AUX

Auxiliary contacts

The auxiliary contacts will signal whether the breaker is in the ON or OFF position.

Description	Catalog number
Auxiliary contact	S800-AUX



S800-AUX/ALT

Bell alarm

The bell alarm includes a set of contacts that will only signal when the breaker has tripped. Typically the contacts would be connected to an alarm or bell to signal the operator that an overcurrent trip has occurred. The bell alarm also includes a test button for testing the alarm contacts without opening the breaker.

Description	Catalog number
Bell alarm	S800-AUX/ALT

Accessories

S800U & S800S

UL & IEC

Ring tongue adaptor



S800-RT2125

Description	Catalog number
Ring terminal cable connection, 40-125A	S800-RT2125

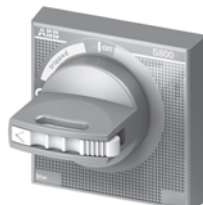
Rotary operating mechanism

Allows “through the door” operation.



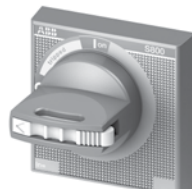
S800-RD

Description	Catalog number
Handle mechanism	S800-RD



S800-RHE-H

Description	Catalog number
Grey rotary handle	S800-RHE-H



S800-RHE-EM

Description	Catalog number
Red rotary handle	S800-RHE-EM



S800-RHE-S

Description	Catalog number
Shaft extension	S800-RHE-S

UL Locking device



S800U-PLL

Description	Catalog number
Padlock not included	S800U-PLL

		S800U	
Characteristics		K, Z	
Rated operational current I_n	[A]	10...100	
Pole		1..4	
Rated operational voltage U_n compliant to UL 489			
(AC) 50/60 Hz	[V]	240	
Rated ultimate short-circuit breaking capacity compliant to UL489			
(AC) 50/60 Hz 240 V	Single-pole	[kA]	30
(AC) 50/60 Hz 240 V	Multipole	[kA]	50
Rated operational voltage U_n compliant to IEC 60947-2			
(AC)	[V]	240/415	
Rated ultimate short-circuit breaking capacity I_{cu} compliant to IEC 60947-2			
(AC) 50/60 Hz 240/415 V	Single-pole	[kA]	30
(AC) 50/60 Hz 240/415 V	Multipole	[kA]	50
Rated service short-circuit breaking capacity I_{cs} compliant to IEC 60947-2			
(AC) 50/60 Hz 240/415 V	Single-pole	[kA]	25
(AC) 50/60 Hz 240/415 V	Multipole	[kA]	40
Connections C_u		10...30 A	14–2 AWG
		40...100 A	8–1 AWG
Rated frequency		50/60	
Tightening torque	[Hz]	3,5 (31 in.lb.)	
Protection category	[Nm]	IP40	
		(actuating end only)	
Mounting position		any	
Contacts		cadmium-free	
Permissible ambient temperature	[°C]	–25...+60	
Standards		UL 489	
		IEC 60947-2	
		CSA22.2 NO.5-02	
Approval		cULus	
		File E312425	

Technical data

S800U

UL

Typical internal resistances
and power losses at 25°C
ambient temperature

Rated current I_n	Internal resistance R_i	Power loss P_v
[A]	[mΩ] K, Z	[W] K, Z
10	15.2	1.5
15	12.1	2.7
20	8.7	3.5
25	6.8	4.2
30	3.1	2.8
40	2.3	3.7
50	1.7	4.3
60	1.6	5.8
70	1.0	4.9
80	1.0	6.4
90	0.8	6.5
100	0.8	8.3

Influence of ambient
temperature

Devices mounted singly (specifications in A)

S800U-K, -Z

I_n [A]	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
10	10.9	10.7	10.4	10.0	9.6	9.3	9.0	8.7	8.4	8.0	7.6
15	16.5	16.0	15.6	15.0	14.4	14.0	13.5	13.0	12.6	12.0	11.4
20	22.0	21.4	20.8	20.0	19.2	18.6	18.0	17.4	16.8	16.0	15.2
25	27.5	26.8	26.0	25.0	24.0	23.3	22.5	21.8	21.0	20.0	19.0
30	33.1	32.1	31.2	30.0	28.8	27.9	27.0	26.1	25.2	24.0	22.9
40	44.0	42.8	41.6	40.0	38.4	37.2	36.0	34.8	33.6	32.0	30.9
50	55.1	53.5	52.0	50.0	48.0	46.5	45.0	43.5	42.0	40.0	38.3
60	66.2	64.2	62.4	60.0	57.6	55.8	54.0	52.2	50.4	48.0	46.0
70	76.9	74.9	72.8	70.0	67.2	65.1	63.0	60.9	58.8	56.0	53.4
80	88.0	85.6	83.2	80.0	76.8	74.4	72.0	69.6	67.1	64.0	61.6
90	99.1	96.3	93.6	90.0	86.4	83.7	81.0	78.3	75.6	72.0	69.5
100	110.5	107.0	104.0	100.0	96.0	93.0	90.0	87.0	83.8	80.0	77.8

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Technical data

S800S

IEC

Internal resistance and power loss

Internal resistance per pole in mΩ, power loss per pole in W

Type	Rated current A	Device series	Power loss
		B C D K mΩ	B C D K W
S800S	10	15.2	1.5
	13	12.1	2.0
	16	12.1	3.1
	20	8.7	3.5
	25	6.8	4.2
	32	3.1	3.1
	40	2.3	3.7
	50	1.7	4.3
	63	1.6	6.2
	80	1.0	6.4
	100	0.8	8.3
	125	0.6	9.4

Temperature derating

Max. operating current values depending on the ambient temperature for a circuit-breaker in load circuit of type B, C, D, & K characteristics.

S800S-B, -C, -D In [A]	Ambient temperature T (°C/°F)										
	10/50	15/59	20/68	25/77	30/86	35/95	40/104	45/113	50/122	55/131	60/140
10	11.2	11.0	10.7	10.4	10.0	9.6	9.3	9.0	8.7	8.4	8.0
13	14.6	14.3	13.9	13.5	13.0	12.5	12.1	11.7	11.3	10.9	10.4
16	17.9	17.6	17.1	16.6	16.0	15.4	14.9	14.4	13.9	13.4	12.8
20	22.4	22.0	21.4	20.8	20.0	19.2	18.6	18.0	17.4	16.8	16.0
25	28.0	27.5	26.8	26.0	25.0	24.0	23.3	22.5	21.8	21.0	20.0
32	35.8	35.2	34.2	33.3	32.0	30.7	29.8	28.8	27.8	26.9	25.6
40	44.8	44.0	42.8	41.6	40.0	38.4	37.2	36.0	34.8	33.6	32.0
50	56.0	55.0	53.5	52.0	50.0	48.0	46.5	45.0	43.5	42.0	40.0
63	70.6	69.3	67.4	65.5	63.0	60.5	58.6	56.7	54.8	52.9	50.4
80	89.6	88.0	85.6	83.2	80.0	76.8	74.4	72.0	69.6	67.2	64.0
100	112.0	110.0	107.0	104.0	100.0	96.0	93.0	90.0	87.0	84.0	80.0
125	140.0	137.5	133.8	130.0	125.0	120.0	116.3	112.5	108.8	105.0	100.0

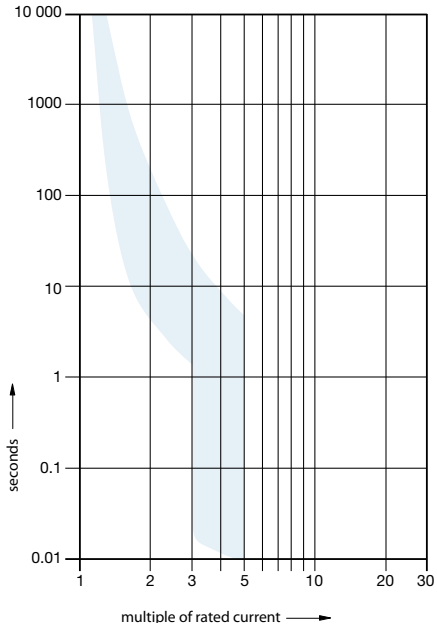
15

S800S-K In [A]	Ambient temperature T (°C/°F)										
	10/50	15/59	20/68	25/77	30/86	35/95	40/104	45/113	50/122	55/131	60/140
10	11.9	11.6	11.2	11.0	10.7	10.4	10.0	9.6	9.3	9.0	8.7
13	15.6	15.1	14.6	14.3	13.9	13.5	13.0	12.5	12.1	11.7	11.3
16	19.1	18.6	17.9	17.6	17.1	16.6	16.0	15.4	14.9	14.4	13.9
20	23.9	23.2	22.4	22.0	21.4	20.8	20.0	19.2	18.6	18.0	17.4
25	29.9	29.1	28.0	27.5	26.8	26.0	25.0	24.0	23.3	22.5	21.8
32	38.2	37.2	35.8	35.2	34.2	33.3	32.0	30.7	29.8	28.8	27.8
40	47.8	46.5	44.8	44.0	42.8	41.6	40.0	38.4	37.2	36.0	34.8
50	59.7	58.1	56.0	55.0	53.5	52.0	50.0	48.0	46.5	45.0	43.5
63	75.3	73.2	70.6	69.3	67.4	65.5	63.0	60.5	58.6	56.7	54.8
80	95.6	93.0	89.6	88.0	85.6	83.2	80.0	76.8	74.4	72.0	69.6
100	119.5	116.2	112.0	110.0	107.0	104.0	100.0	96.0	93	90.0	87.0
125	149.4	145.3	140.0	137.5	133.8	130.0	125.0	120.0	116.3	112.5	108.8

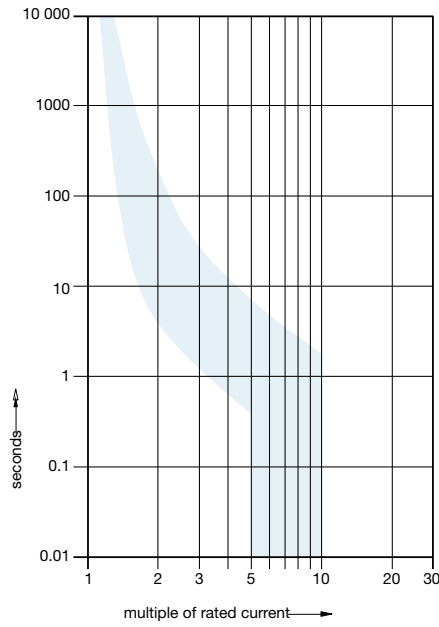
Technical data
S800S
IEC

Miniature
circuit breakers
S800

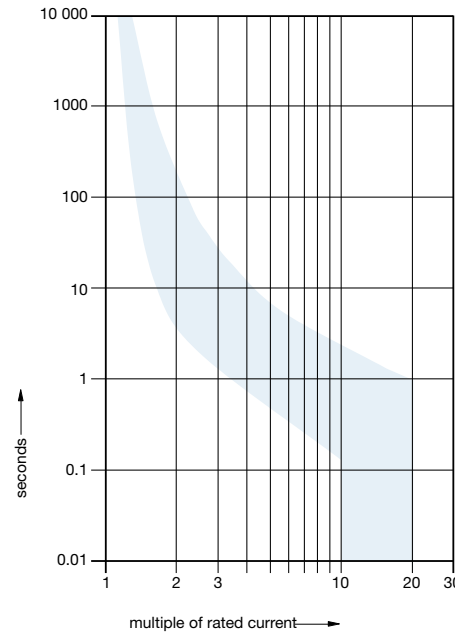
Tripping Characteristic B



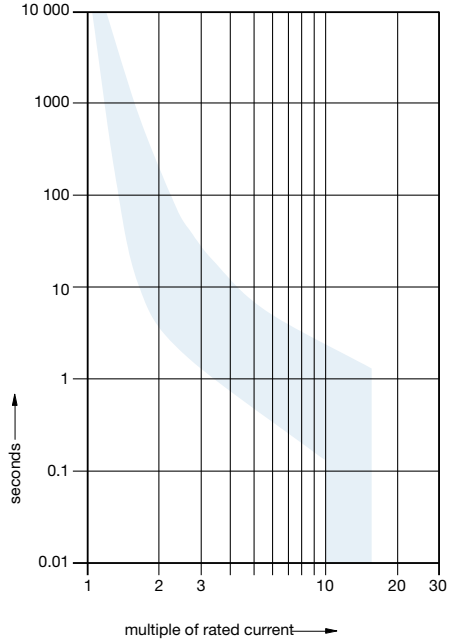
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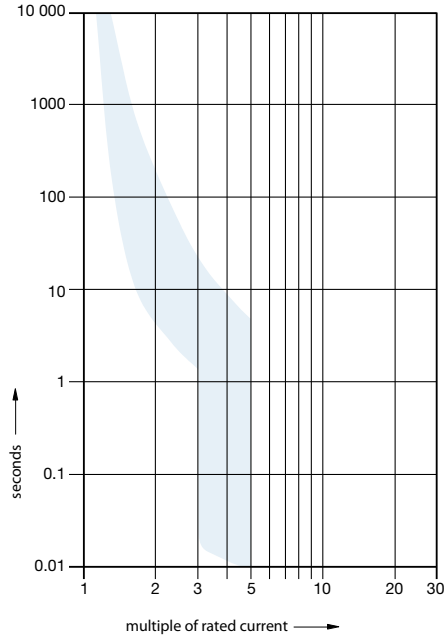
Tripping Characteristic D



Tripping Characteristic K



Tripping Characteristic Z



Technical data S800U & S800S Accessories

Auxiliary contact S800-AUX

	S800-AUX
Usage category	AC15 400/2 A-UL AC15 240/ -UL DC13 250/0.55 A125 V/1.1A-IEC DC13 125 V/1.1A DC13 60 V/2A DC13 24 V/4A
Continuous thermal current I_n	6 A
Rated insulation voltage U_i	690 V
Number of contacts	2
Surge U_{test} (1.2/50 μ s)	6 kV
Degree of protection	3
Function of contact	Changeover contacts
Connection Cu	1 x 2.5 mm ² 2 x 1.5 mm ²
Tightening torque	1 Nm
Ensured contacts during shake test acc. to IEC 68-2-6	5g, 20 frequency cycle at 24 VAC/DC, 5mA brief interrupt <10 ms
AC/DC supply	any EN 60715
Mounting on DIN top hat rail	EN 60715 IP20
Type of protection	IP20
Permissible ambient temperature for operations	-25...+60 °C; -13 °F... 140 °F
Storage temperature	-40...+70 °C; -40 °F... 158 °F
Mechanical device service life	6000 switching cycles
I_{cu} with S450E	1000 A
Resistance to vibration	IEC 60068-2-27; IEC 60068-2; EN 61373 Cat.1/class B

Undervoltage release S800-UVR

	S800-UVR36	S800-UVR60	S800-UVR130	S800-UVR250
Rated voltage U_e	24...36 VAC/DC	48...60 VAC/DC	110...130 VAC/DC	220...250 VAC/DC
Operating range				
Operating opening	35...70% U_e			
Operating closing	85% U_e			
Rated insulation voltage U_i	690 V			
Coil pull in consumption	1 W, 14 vA	1 W, 25 vA	1 W, 41 vA	1 W, 91 vA
Rated frequency	DC; 50/60 Hz			
Protection degree	3			
Connection Cu	1...35 cable			
Tightening torque	min.3/ max.4 Nm			
AC/DC supply	any			
DIN top hat rail	EN 60715			
Type of protection	IP20 IP40 (only actuation side)			
Permissible ambient temperature of operations	-25...+60 °C; -13 °F... 140 °F			
Storage temperature	-40...+70 °C; -40 °F... 158 °F			
Resistance to vibration	IEC 60068-2-27; IEC 60068-2; EN61373 Cat.1/class B			

Technical data

S800U & S800S

Accessories

Miniature
circuit breakers
S800

Combined auxiliary and bell alarm

Usage category	AC15 400/2A-UL AC15 240/6A-UL DC13 250/0.55A125V/1.1A-IEC DC13 125V/1.1A-IEC DC13 60V/2A DC13 24V/4A
Continuous thermal current I_n	6 A
Rated insulation voltage U_i	690 V
Number of contacts	2 (1x AUX, 1 x AUX/ALT)
Surge U_{test} (1.2/50 μ s)	6 kV
Degree of protection	3
Function of contact	Changeover contacts
Connection Cu	1 x 2.5 mm ² 2 x 1.5 mm ²
Tightening torque	1 Nm
Ensured contacts during shake test acc. to IEC 68-2-6	5g, 20 frequency cycle 5...150...5Hz at 24VAC/DC, 5mA brief interrupt <10ms
AC/DC supply	any EN 60715
Mounting on DIN top hat rail	EN 60715
Type of protection	IP20
Permissible ambient temperature for operations	-25 °C... 60 °C; -13 °F... 140 °F
Storage temperature	-40 °C... 70 °C; -40 °F... 150 °F
mech. Device service life	6000 switching cycles
I_{cu} with S450E	1000 A
Resistance to vibration	IEC 60068-2-27; IEC 60068-2; EN 61373 Cat.1/class B

Shunt operation release – S800-SOR

	S800-SOR24	S800-SOR130	S800-SOR250	S800-SOR400
Rated voltage U_e	24 VAC/DC	48...130 VAC/DC	110...250 VAC/DC	220...250
Operating range	70... 110% U_e			
Rated insulation voltage U_i	690 V			
Coil pull in consumption	19.2 W/vA	On request		
Rated frequency	DC; 50/60 Hz			
Degree of protection	3			
Connection Cu	1...35 AWG			
Tightening torque	min.3/ max.4 Nm			
AC/DC supply	any			
DIN top hat rail	EN 60715			
Type of protection	IP20; IP40 (only actuation side)			
Permissible ambient temperature of operations	-25 °C... 60 °C; -13 °F... 140 °F			
Storage temperature	-40 °C... 70 °C; -40 °F... 158 °F			
Resistance to vibration	IEC 60068-2-27; IEC 60068-2; EN61373 Cat.1/class B			

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Technical data

Backup

S800S - S200 @ 230/400 V

L.	Char.	E.		S800S								
		B, C, D, K		50								
		I _{cu} [kA]	I _n [A]	25	32	40	50	63	80	100	125	
S200	B	6	6	50	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50	50
			25			50	50	50	50	50	50	50
			32				50	50	50	50	50	50
			40					50	50	50	50	50
			50						50	50	50	50
			63							50	50	50

L.	Char.	E.		S800S								
		B, C, D, K		50								
		I _{cu} [kA]	I _n [A]	25	32	40	50	63	80	100	125	
S200P	B	25	6...16	50	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50	
			25			50	50	50	50	50	50	
			32				50	50	50	50	50	
		15	40					50	50	50	50	
			50						50	50	50	
			63							50	50	
											50	

L.	Char.	E.		S800S								
		B, C, D, K		50								
		I _{cu} [kA]	I _n [A]	25	32	40	50	63	80	100	125	
S200	C	6	0.5...6	50	50	50	50	50	50	50	50	50
			8	50	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50	50
			25			50	50	50	50	50	50	50
			32				50	50	50	50	50	50
			40					50	50	50	50	50
			50						50	50	50	50
			63							50	50	50

L.	Char.	E.		S800S								
		B, C, D, K		50								
		I _{cu} [kA]	I _n [A]	25	32	40	50	63	80	100	125	
S200P	C	25	0.5...16	50	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50	
			25			50	50	50	50	50	50	
			32				50	50	50	50	50	
		15	40					50	50	50	50	
			50						50	50	50	
			63							50	50	
											50	

LEGEND

E. = supply side
L. = load side
Back-up limit values are specified in kA

Technical data

Selectivity

S800S - S200 @ 230/400 V

		E.		S800S							
L.	Char.	I _{cu} [kA]	B								
			50								
			I _n [A]	25	32	40	50	63	80	100	125
S200	B	6	6			0.4	0.5	0.7	1	1.5	2.6
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
			32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

		E.		S800S								
L.	Char.	I _{cu} [kA]	B									
			50									
			I _n [A]	25	32	40	50	63	80	100	125	
S200	D	6	0.5	T	T	T	T	T	T	T	T	T
			1	0.8	4.5	T	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T	T
			2	0.3	0.5	0.7	2.3	T	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	T	T	
			4		0.4	0.4	0.7	1	1.7	3	T	
			6				0.6	0.8	1.2	2	3.6	
			8					0.7	0.9	1.3	2	
			10						0.9	1.3	2	
			13							1	1.5	
			16								1.5	
			20									
			25									
			32									
			40									
			50									
			63									

		E.		S800S								
L.	Char.	I _{cu} [kA]	B									
			50									
			I _n [A]	25	32	40	50	63	80	100	125	
S200	C	6	0.5	T	T	T	T	T	T	T	T	T
			1	3.3	T	T	T	T	T	T	T	T
			1.6	0.6	1.3	T	T	T	T	T	T	T
			2	0.4	0.7	1.3	T	T	T	T	T	T
			3		0.4	0.6	0.7	1.1	2.6	T	T	
			4		0.4	0.6	0.7	1	1.7	3.1	T	
			6			0.4	0.5	0.7	1	1.5	2.6	
			8				0.4	0.6	0.7	1	1.4	
			10				0.4	0.6	0.7	1	1.4	
			13					0.5	0.7	0.9	1.3	
			16						0.7	0.9	1.3	
			20							0.9	1.3	
			25							0.9	1.3	
			32							0.8	1.1	
			40							0.8	1.1	
			50								1	
			63								0.9	

		E.		S800S								
L.	Char.	I _{cu} [kA]	B									
			50									
			I _n [A]	25	32	40	50	63	80	100	125	
S200	K	6	0.5	T	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T	T
			1.6	0.5	1	2.1	T	T	T	T	T	T
			2	0.3	0.5	0.7	2.1	T	T	T	T	
			3		0.4	0.5	0.7	1.2	2.5	T	T	
			4		0.4	0.4	0.7	1	1.7	3	T	
			6				0.6	0.8	1.2	2	3.6	
			8					0.7	0.9	1.3	2	
			10						0.9	1.3	2	
			13							1	1.5	
			16								1.5	
			20									
			25									
			32									
			40									
			50									
			63									

LEGEND

E. = supply side
L. = load side
Back-up limit values are specified in kA

Technical data

Selectivity

S800S - S200 @ 230/400 V

L.	Char.	E.		S800S							
		I _n [A]	I _{cu} [kA]	C							
				50							
S200	B	6	6	0.4	0.5	0.7	0.9	1.4	2.4	4.8	
			10	0.3	0.4	0.5	0.7	0.9	1.3	2	
			13		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			16		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			20			0.4	0.5	0.7	0.9	1.2	1.8
			25			0.4	0.5	0.7	0.9	1.2	1.8
			32				0.5	0.6	0.8	1	1.4
			40					0.6	0.8	1	1.4
			50						0.7	0.9	1.3
			63							0.9	1.2

L.	Char.	E.		S800S								
		I _n [A]	I _{cu} [kA]	C								
				50								
S200	D	6	0.5	T	T	T	T	T	T	T	T	T
			1	2.1	T	T	T	T	T	T	T	T
			1.6	0.8	2.3	T	T	T	T	T	T	T
			2	0.4	0.7	2.3	T	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.2	T	T	T	
			4	0.3	0.4	0.7	1	1.4	2.6	T	T	
			6		0.4	0.6	0.8	1.1	1.8	3.2	T	
			8			0.5	0.7	0.9	1.2	1.8	2.8	
			10				0.7	0.9	1.2	1.8	2.8	
			13					0.7	1	1.4	2	
			16						1	1.4	2	
			20							1	1.4	
			25								1.4	
			32									
			40									
			50									
63												

L.	Char.	E.		S800S							
		I _n [A]	I _{cu} [kA]	C							
				50							
S200	C	6	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	0.6	T	T	T	T	T	T	T
			2	0.5	1	T	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.1	T	T	T
			4	0.3	0.4	0.7	1	1.5	2.6	T	T
			6		0.4	0.5	0.7	0.9	1.4	2.4	4.8
			8		0.3	0.4	0.5	0.7	0.9	1.3	2
			10		0.3	0.4	0.5	0.7	0.9	1.3	2
			13		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			16		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			20			0.4	0.5	0.7	0.9	1.2	1.8
			25			0.4	0.5	0.7	0.9	1.2	1.8
			32				0.5	0.6	0.8	1	1.4
			40					0.6	0.8	1	1.4
			50						0.7	0.9	1.3
63							0.9	1.2			

L.	Char.	E.		S800S							
		I _n [A]	I _{cu} [kA]	C							
				50							
S200	K	6	0.5	T	T	T	T	T	T	T	T
			1	2.1	T	T	T	T	T	T	T
			1.6	0.8	2.3	T	T	T	T	T	T
			2	0.4	0.7	2.3	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.2	T	T	T
			4	0.3	0.4	0.7	1	1.4	2.6	T	T
			6		0.4	0.6	0.8	1.1	1.8	3.2	T
			8			0.5	0.7	0.9	1.2	1.8	2.8
			10				0.7	0.9	1.2	1.8	2.8
			13					0.7	1	1.4	2
			16						1	1.4	2
			20							1	1.4
			25								1.4
			32								
			40								
			50								
63											

LEGEND

E. = supply side
L. = load side
Back-up limit values are specified in kA

Technical data

Selectivity

S800S - S200 @ 230/400 V

Miniature
circuit breakers
S800

		E.		S800S							
L.	Char.	I _{cu} [kA]	D								
			50								
			I _n [A]	25	32	40	50	63	80	100	125
S200	B	6	6	0.5	1	1.2	2	2.8	T	T	T
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	T
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	T
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
			32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

		E.		S800S									
L.	Char.	I _{cu} [kA]	D										
			50										
			I _n [A]	25	32	40	50	63	80	100	125		
S200	D	6	0.5	T	T	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T	T	
			4	0.7	1	2.2	4.4	T	T	T	T	T	
			6	0.6	0.8	1.5	2.5	3.6	T	T	T	T	
			8	0.5	0.7	1.1	1.5	2	4	5.5	T	T	
			10	0.5	0.7	1.1	1.5	2	4	5.5	T	T	
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2	T	
			16			0.9	1.2	1.5	2.6	3.4	5.2	T	
			20				0.9	1.1	1.8	2.2	3.2	T	
			25					1.1	1.8	2.2	3.2	T	
			32						1.7	2	2.9	T	
			40							1.9	2.6	T	
			50								2.2	T	
			63									T	

		E.		S800S								
L.	Char.	I _{cu} [kA]	D									
			50									
			I _n [A]	25	32	40	50	63	80	100	125	
S200	C	6	0.5	T	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T	T
			2	T	T	T	T	T	T	T	T	T
			3	0.7	2.2	4.4	T	T	T	T	T	
			4	0.7	1.3	2.2	4.4	T	T	T	T	
			6	0.5	1	1.2	2	2.8	T	T	T	
			8	0.4	0.6	0.8	1.1	1.4	2.8	3.9	T	
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	T	
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6	
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6	
			20			0.8	1.1	1.3	2.3	3	4.7	
			25			0.8	1.1	1.3	2.3	3	4.7	
			32				0.9	1.1	1.9	2.4	3.7	
			40					1.1	1.9	2.4	3.7	
			50						1.5	1.9	2.3	
63							1.7	2.3				

		E.		S800S								
L.	Char.	I _{cu} [kA]	D									
			50									
			I _n [A]	25	32	40	50	63	80	100	125	
S200	K	6	0.5	T	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T	
			4	0.7	1	2.2	4.4	T	T	T	T	
			6	0.6	0.8	1.5	2.5	3.6	T	T	T	
			8	0.5	0.7	1.1	1.5	2	4	5.5	T	
			10	0.5	0.7	1.1	1.5	2	4	5.5	T	
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2	
			16			0.9	1.2	1.5	2.6	3.4	5.2	
			20				0.9	1.1	1.8	2.2	3.2	
			25					1.1	1.8	2.2	3.2	
			32						1.7	2	2.9	
			40							1.9	2.6	
			50								2.2	
			63									

LEGEND

E. = supply side
L. = load side
Back-up limit values are specified in kA

Technical data

Selectivity

S800S - S200 @ 230/400 V

L.	Char.	E.		S800S									
		I _{cu} [kA]	I _n [A]	B									
				50									
S200P	B	25	6			0.4	0.5	0.7	1	1.5	2.6		
			10			0.4	0.6	0.7	1	1.4			
			13					0.5	0.7	0.9	1.3		
			16						0.7	0.9	1.3		
			20							0.9	1.3		
			25							0.9	1.3		
	15	32							0.8	1.1			
		40							0.8	1.1			
		50								1			
		63									0.9		

L.	Char.	E.		S800S									
		I _{cu} [kA]	I _n [A]	C									
				50									
S200P	B	25	6			0.4	0.5	0.7	1	1.5	2.6		
			10			0.4	0.6	0.7	1	1.4			
			13					0.5	0.7	0.9	1.3		
			16						0.7	0.9	1.3		
			20							0.9	1.3		
			25							0.9	1.3		
	15	32							0.8	1.1			
		40							0.8	1.1			
		50								1			
		63									0.9		

L.	Char.	E.		S800S									
		I _{cu} [kA]	I _n [A]	B									
				50									
S200P	C	25	0.5	T	T	T	T	T	T	T	T	T	T
			1	3.3	T	T	T	T	T	T	T	T	T
			1.6	0.6	1.3	T	T	T	T	T	T	T	T
			2	0.4	0.7	1.2	T	T	T	T	T	T	T
			3			0.6	0.7	1.1	2.6	8.8	T		
			4			0.6	0.7	1	1.7	3.1	7		
	15	6			0.4	0.5	0.7	1	1.5	2.6			
		8				0.4	0.6	0.7	1	1.4			
		10				0.4	0.6	0.7	1	1.4			
		13					0.5	0.7	0.9	1.3			
		16						0.7	0.9	1.3			
		20							0.9	1.3			
		25							0.9	1.3			

L.	Char.	E.		S800S								
		I _{cu} [kA]	I _n [A]	C								
				50								
S200P	C	25	0.5	T	T	T	T	T	T	T	T	T
			1	3.3	T	T	T	T	T	T	T	T
			1.6	0.6	1.3	T	T	T	T	T	T	T
			2	0.4	0.7	1.3	T	T	T	T	T	T
			3			0.4	0.6	0.7	1.1	2.6	8.8	T
			4			0.4	0.6	0.7	1	1.7	3.1	7
	15	6			0.4	0.5	0.7	1	1.5	2.6		
		8				0.4	0.6	0.7	1	1.4		
		10				0.4	0.6	0.7	1	1.4		
		13					0.5	0.7	0.9	1.3		
		16						0.7	0.9	1.3		
		20							0.9	1.3		
		25							0.9	1.3		

L.	Char.	E.		S800S								
		I _{cu} [kA]	I _n [A]	B								
				50								
S200P	K	25	0.2	T	T	T	T	T	T	T	T	T
			0.3	T	T	T	T	T	T	T	T	T
			0.5	T	T	T	T	T	T	T	T	T
			0.75	T	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T	
			1.6	0.5	1	2.3	T	T	T	T	T	
	15	2	0.3	0.5	0.7	2.1	T	T	T	T		
		3		0.4	0.5	0.7	1.2	2.5	8.6	T		
		4		0.4	0.4	0.7	1	1.7	3	7.7		
		6				0.6	0.8	1.2	2	3.6		
		8					0.7	0.9	1.3	2		
		10						0.9	1.3	2		
		13							1	1.5		

L.	Char.	E.		S800S							
		I _{cu} [kA]	I _n [A]	C							
				50							
S200P	K	25	0.2	T	T	T	T	T	T	T	T
			0.3	T	T	T	T	T	T	T	T
			0.5	T	T	T	T	T	T	T	T
			0.75	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T
	15	2	0.3	0.5	0.7	2.3	T	T	T	T	
		3		0.4	0.5	0.7	1.2	2.5	8.6	T	
		4		0.4	0.4	0.7	1	1.7	3	7.7	
		6				0.6	0.8	1.2	2	3.6	
		8					0.7	0.9	1.3	2	
		10						0.9	1.3	2	
		13							1	1.5	

LEGEND

E. = supply side
L. = load side
Back-up limit values are specified in kA

15

Technical data

Selectivity

S800S - S200P @ 230/400 V

Miniature
circuit breakers
S800

		E.		S800S							
L.	Char.			D							
		I _{cu} [kA]		50							
		I _n [A]	25	32	40	50	63	80	100	125	
S200P	B	25	6	0.5	1	1.2	2	2.8	9.9	21.3	T
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
			32				0.9	1.1	1.9	2.4	3.7
		15	40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

		E.		S800S							
L.	Char.			D							
		I _{cu} [kA]		50							
		I _n [A]	25	32	40	50	63	80	100	125	
S200P	C	25	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	T	T	T	T	T	T	T	T
			3	0.7	2.2	4.4	T	T	T	T	T
			4	0.7	1.3	2.2	4.4	7.7	T	T	T
			6	0.5	1	1.2	2	2.8	9.9	22	T
			8	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
			15	32				0.9	1.1	1.9	2.4
		40						1.1	1.9	2.4	3.7
		50							1.5	1.9	2.3
		63								1.7	2.3

		E.		S800S							
L.	Char.			D							
		I _{cu} [kA]		50							
		I _n [A]	25	32	40	50	63	80	100	125	
S200P	K	25	0.2	T	T	T	T	T	T	T	T
			0.3	T	T	T	T	T	T	T	T
			0.5	T	T	T	T	T	T	T	T
			0.75	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T
			4	0.7	1	2.2	4.4	7.7	T	T	T
			6	0.6	0.8	1.5	2.5	3.6	12.1	24.2	T
			8	0.5	0.7	1.1	1.5	2	4	5.5	9.9
			10	0.5	0.7	1.1	1.5	2	4	5.5	9.9
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2
			16			0.9	1.2	1.5	2.6	3.4	5.2
		20				0.9	1.1	1.8	2.2	3.2	
		25						1.8	2.2	3.2	
		15	32						1.7	2	2.9
			40							1.9	2.6
			50								2.2
			63								

LEGEND

E. = supply side
L. = load side
Back-up limit values are specified in kA

Technical data

Selectivity

S800S - S280 @ 230/400 V

		E.		S800S							
L.		Char.		B, C, D, K							
		I _{cu} [kA]		50							
		I _n [A]		25	32	40	50	63	80	100	125
S280	B	10	6	50	50	50	50	50	50	50	50
			10	50	50	50	25	20	16	16	16
		25	13	50	50	50	25	20	16	16	16
			16	50	50	50	25	20	16	16	16
			20		50	50	25	20	16	16	16
			25			50	25	20	16	16	16
		15	32				25	20	16	16	16
			40					20	16	16	16
		10	50						16	16	16
			63							16	16

		E.		S800S							
L.		Char.		B, C, D, K							
		I _{cu} [kA]		50							
		I _n [A]		25	32	40	50	63	80	100	125
S400E	B	6	6	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

		E.		S800S							
L.		Char.		B, C, D, K							
		I _{cu} [kA]		50							
		I _n [A]		25	32	40	50	63	80	100	125
S280	C	10	3	50	50	50	50	50	50	50	50
			4	50	50	50	50	50	50	50	50
			6	50	50	50	50	50	50	50	50
			8	50	50	50	25	20	16	16	16
		25	10	50	50	50	25	20	16	16	16
			13	50	50	50	25	20	16	16	16
			16	50	50	50	25	20	16	16	16
			20		50	50	25	20	16	16	16
		15	25			50	25	20	16	16	16
			32				25	20	16	16	16
10	40					20	16	16	16		
	50						16	16	16		
63								16	16		

		E.		S800S							
L.		Char.		B, C, D, K							
		I _{cu} [kA]		50							
		I _n [A]		25	32	40	50	63	80	100	125
S400E	C	6	0.5...6	50	50	50	50	50	50	50	50
			8	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
63								50	50		

		E.		S800S							
L.		Char.		B, C, D, K							
		I _{cu} [kA]		50							
		I _n [A]		25	32	40	50	63	80	100	125
S280	K, Z	10	3	50	50	50	50	50	50	50	50
			4	50	50	50	50	50	50	50	50
			6	50	50	50	50	50	50	50	50
			8	50	50	50	25	20	16	16	16
		25	10	50	50	50	25	20	16	16	16
			13	50	50	50	25	20	16	16	16
			16	50	50	50	25	20	16	16	16
			20		50	50	25	20	16	16	16
		15	25			50	25	20	16	16	16
			32				25	20	16	16	16
10	40					20	16	16	16		
	50						16	16	16		
63								16	16		

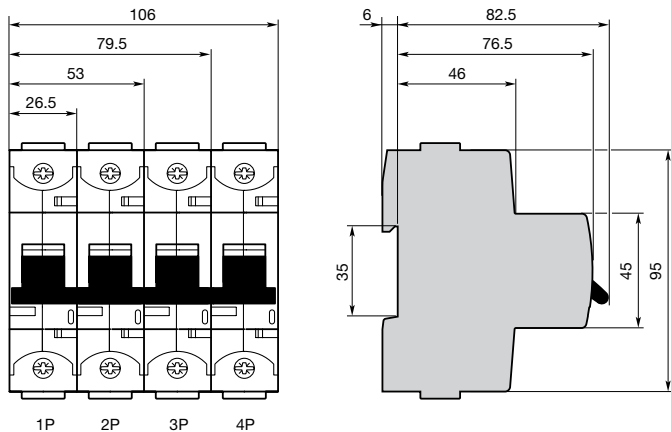
LEGEND

E. = supply side
L. = load side
Back-up limit values are specified in kA

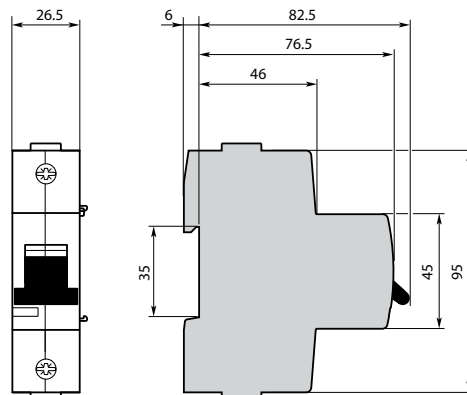
Approximate dimensions S800U & S800S UL & IEC

Dimension drawings in mm

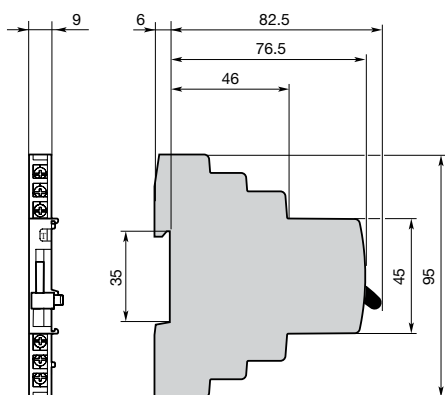
S800S & S800U



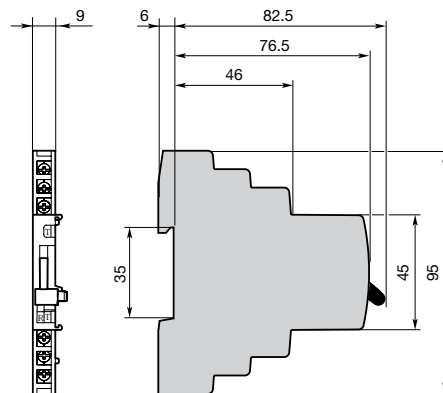
S800-SOR & S800-UVR



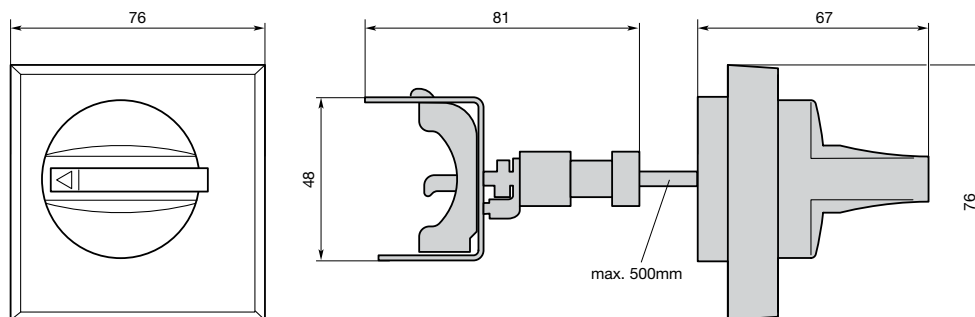
S800-AUX



S800-AUX/ALT



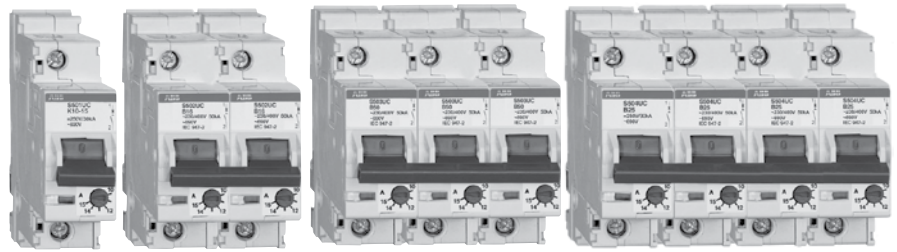
S800-RD & S800-RHE



S500 UL 1077 Series Miniature circuit breakers



S500 Series
UL 1077



Description

The S500 high performance MCB offers a compact solution to circuit protection. The S500 devices are UL tested current limiting and DIN rail mounted. The S500 is available with application-specific trip characteristics to provide maximum circuit protection.

The breakers offer thermal-magnetic trip protection according to B and K characteristics.

For the worldwide market, the breakers carry CSA, IEC, CE and many other agency approvals.

Features

- High breaking capacity
- Fast breaking time (2.3 - 2.5 ms)
- Adjustable trip unit
- DIN rail mounting
- Finger safe terminals
- Multi-functional terminals
- Wide range of accessories
- UL 1077 recognized 600 VAC and 600 VDC versions
- UL1077 AC adjustable K
- UL1077 DC adjustable B, K
- UL File # E167556
- IEC #E60497-2

	S500	S500UC
Amperage	0.1 – 45 A	0.1 – 63 A
Voltage	UL: 600Y/277 VAC IEC: 690 VAC	UL: 250 VDC per pole (600 VDC for 4P) IEC: 250 VDC per pole (750 VDC for 4P)
Poles	1, 2, 3	1, 2, 3, 4
Trip characteristics	K	B, K
Interrupting ratings	Up to 30 kA: UL 1077 Up to 30 kA: CSA C22.2	30 kA: UL 1077 30 kA: CSA C22.2
Auxiliary contacts	Yes	Yes
Bell alarm	Yes	Yes
Shunt trip	No	No
Undervoltage release	No	No
Bus bar	Yes	Yes

S500-K, UL 600Y/277 VAC / IEC 690 VAC

Supplemental protection
UL 1077, CSA 22.2, IEC

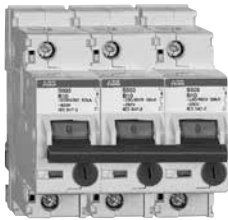
K



S501-K



S502-K



S503-K

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.1 – 0.15	S501-K0.15	3	0.1 – 0.15	S503-K0.15
	0.14 – 0.21	S501-K0.21		0.14 – 0.21	S503-K0.21
	0.2 – 0.3	S501-K0.3		0.2 – 0.3	S503-K0.3
	0.28 – 0.42	S501-K0.42		0.28 – 0.42	S503-K0.42
	0.38 – 0.58	S501-K0.58		0.38 – 0.58	S503-K0.58
	0.53 – 0.8	S501-K0.8		0.53 – 0.8	S503-K0.8
	0.73 – 1.1	S501-K1.1		0.73 – 1.1	S503-K1.1
	1 – 1.5	S501-K1.5		1 – 1.5	S503-K1.5
	1.4 – 2.1	S501-K2.1		1.4 – 2.1	S503-K2.1
	2 – 3	S501-K3		2 – 3	S503-K3
	2.8 – 4.2	S501-K4.2		2.8 – 4.2	S503-K4.2
	3.8 – 5.8	S501-K5.8		3.8 – 5.8	S503-K5.8
	5.3 – 8	S501-K8		5.3 – 8	S503-K8
	7.3 – 11	S501-K11		7.3 – 11	S503-K11
	10 – 15	S501-K15		10 – 15	S503-K15
	14 – 20	S501-K20		14 – 20	S503-K20
	18 – 26	S501-K26		18 – 26	S503-K26
	2	0.1 – 0.15		S502-K0.15	3
0.14 – 0.21		S502-K0.21	0.14 – 0.21	S503-K0.21	
0.2 – 0.3		S502-K0.3	0.2 – 0.3	S503-K0.3	
0.28 – 0.42		S502-K0.42	0.28 – 0.42	S503-K0.42	
0.38 – 0.58		S502-K0.58	0.38 – 0.58	S503-K0.58	
0.53 – 0.8		S502-K0.8	0.53 – 0.8	S503-K0.8	
0.73 – 1.1		S502-K1.1	0.73 – 1.1	S503-K1.1	
1 – 1.5		S502-K1.5	1 – 1.5	S503-K1.5	
1.4 – 2.1		S502-K2.1	1.4 – 2.1	S503-K2.1	
2 – 3		S502-K3	2 – 3	S503-K3	
2.8 – 4.2		S502-K4.2	2.8 – 4.2	S503-K4.2	
3.8 – 5.8		S502-K5.8	3.8 – 5.8	S503-K5.8	
5.3 – 8		S502-K8	5.3 – 8	S503-K8	
7.3 – 11		S502-K11	7.3 – 11	S503-K11	
10 – 15		S502-K15	10 – 15	S503-K15	
14 – 20		S502-K20	14 – 20	S503-K20	
18 – 26		S502-K26	18 – 26	S503-K26	
23 – 32		S502-K32	23 – 32	S503-K32	
29 – 37	S502-K37	29 – 37	S503-K37		
34 – 41	S502-K41	34 – 41	S503-K41		
38 – 45	S502-K45	38 – 45	S503-K45		

Tripping characteristic K

UL 1077	IEC
600 VAC	690 VAC
Up to 30 kA	Up to 30 kA

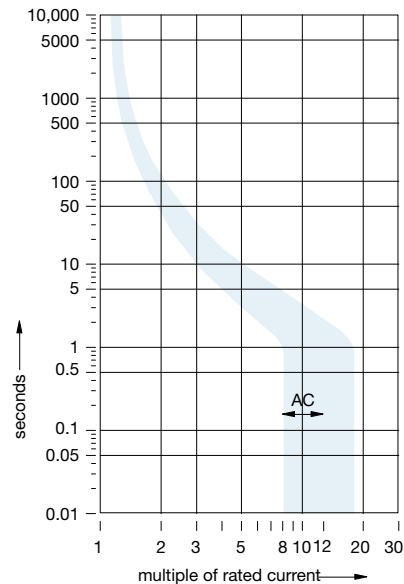
Inductive loads

- K Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.71

Technical data – See page 15.76 - 82



S500UC-B, 250 VDC per pole (600 VDC 4P) UL/IEC (750 VDC 4P)

Supplemental protectors, UL1077, CSA 22.2, IEC

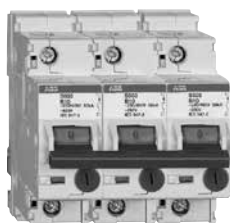
B



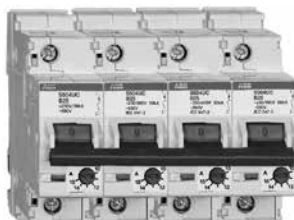
S501UC-B



S502UC-B



S503UC-B



S504UC-B

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	6	S501UC-B6	3	6	S503UC-B6
	10	S501UC-B10		10	S503UC-B10
	13	S501UC-B13		13	S503UC-B13
	16	S501UC-B16		16	S503UC-B16
	20	S501UC-B20		20	S503UC-B20
	25	S501UC-B25		25	S503UC-B25
	32	S501UC-B32		32	S503UC-B32
	40	S501UC-B40		40	S503UC-B40
	50	S501UC-B50		50	S503UC-B50
2	6	S502UC-B6	4	6	S504UC-B6
	10	S502UC-B10		10	S504UC-B10
	13	S502UC-B13		13	S504UC-B13
	16	S502UC-B16		16	S504UC-B16
	20	S502UC-B20		20	S504UC-B20
	25	S502UC-B25		25	S504UC-B25
	32	S502UC-B32		32	S504UC-B32
	40	S502UC-B40		40	S504UC-B40
	50	S502UC-B50		50	S504UC-B50
	63	S502UC-B63	63	S504UC-B63	

Tripping characteristic B

UL 1077	IEC
250 VDC per pole (600 VDC 4P)	250 VDC per pole (750 VDC 4P)
30 kA	30 kA

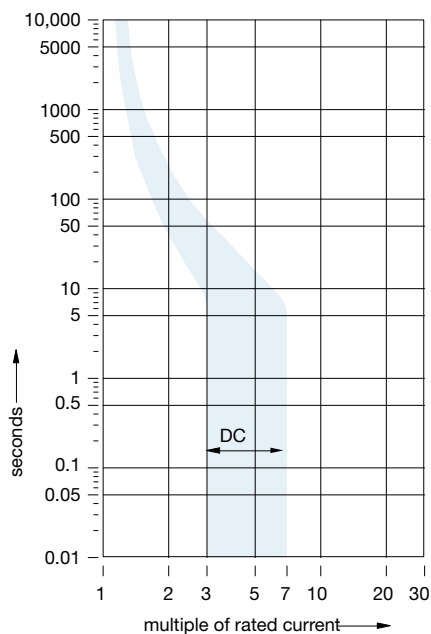
Inductive loads

- B Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.71

Technical data – See page 15.76 - 82



S500UC-K, 250 VDC per pole (600 VDC 4P) UL/IEC (750 VDC 4P)

Supplemental protectors, UL1077, CSA 22.2, IEC

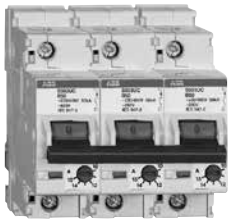
K



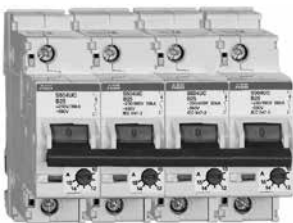
S501UC-K



S502UC-K



S503UC-K



S504UC-K

No. of poles	Rated current	Catalog number	No. of poles	Rated current	Catalog number
1	0.1 – 0.15	S501UC-K0.15	3	0.1 – 0.15	S503UC-K0.15
	0.14 – 0.21	S501UC-K0.21		0.14 – 0.21	S503UC-K0.21
	0.2 – 0.3	S501UC-K0.3		0.2 – 0.3	S503UC-K0.3
	0.28 – 0.42	S501UC-K0.42		0.28 – 0.42	S503UC-K0.42
	0.38 – 0.58	S501UC-K0.58		0.38 – 0.58	S503UC-K0.58
	0.53 – 0.8	S501UC-K0.8		0.53 – 0.8	S503UC-K0.8
	0.73 – 1.1	S501UC-K1.1		0.73 – 1.1	S503UC-K1.1
	1 – 1.5	S501UC-K1.5		1 – 1.5	S503UC-K1.5
	1.4 – 2.1	S501UC-K2.1		1.4 – 2.1	S503UC-K2.1
	2 – 3	S501UC-K3		2 – 3	S503UC-K3
	2.8 – 4.2	S501UC-K4.2		2.8 – 4.2	S503UC-K4.2
	3.8 – 5.8	S501UC-K5.8		3.8 – 5.8	S503UC-K5.8
	5.3 – 8	S501UC-K8		5.3 – 8	S503UC-K8
	7.3 – 11	S501UC-K11		7.3 – 11	S503UC-K11
	10 – 15	S501UC-K15		10 – 15	S503UC-K15
	14 – 20	S501UC-K20		14 – 20	S503UC-K20
	18 – 26	S501UC-K26		18 – 26	S503UC-K26
	23 – 32	S501UC-K32		23 – 32	S503UC-K32
29 – 37	S501UC-K37	29 – 37	S503UC-K37		
34 – 41	S501UC-K41	34 – 41	S503UC-K41		
38 – 45	S501UC-K45	38 – 45	S503UC-K45		
2	0.1 – 0.15	S502UC-K0.15	4	0.1 – 0.15	S504UC-K0.15
	0.14 – 0.21	S502UC-K0.21		0.14 – 0.21	S504UC-K0.21
	0.2 – 0.3	S502UC-K0.3		0.2 – 0.3	S504UC-K0.3
	0.28 – 0.42	S502UC-K0.42		0.28 – 0.42	S504UC-K0.42
	0.38 – 0.58	S502UC-K0.58		0.38 – 0.58	S504UC-K0.58
	0.53 – 0.8	S502UC-K0.8		0.53 – 0.8	S504UC-K0.8
	0.73 – 1.1	S502UC-K1.1		0.73 – 1.1	S504UC-K1.1
	1 – 1.5	S502UC-K1.5		1 – 1.5	S504UC-K1.5
	1.4 – 2.1	S502UC-K2.1		1.4 – 2.1	S504UC-K2.1
	2 – 3	S502UC-K3		2 – 3	S504UC-K3
	2.8 – 4.2	S502UC-K4.2		2.8 – 4.2	S504UC-K4.2
	3.8 – 5.8	S502UC-K5.8		3.8 – 5.8	S504UC-K5.8
	5.3 – 8	S502UC-K8		5.3 – 8	S504UC-K8
	7.3 – 11	S502UC-K11		7.3 – 11	S504UC-K11
	10 – 15	S502UC-K15		10 – 15	S504UC-K15
	14 – 20	S502UC-K20		14 – 20	S504UC-K20
	18 – 26	S502UC-K26		18 – 26	S504UC-K26
	23 – 32	S502UC-K32		23 – 32	S504UC-K32
29 – 37	S502UC-K37	29 – 37	S504UC-K37		
34 – 41	S502UC-K41	34 – 41	S504UC-K41		
38 – 45	S502UC-K45	38 – 45	S504UC-K45		

Tripping characteristic K

UL 1077	IEC
250 VDC per pole (600 VDC 4P)	250 VDC per pole (750 VDC 4P)
30 kA	30 kA

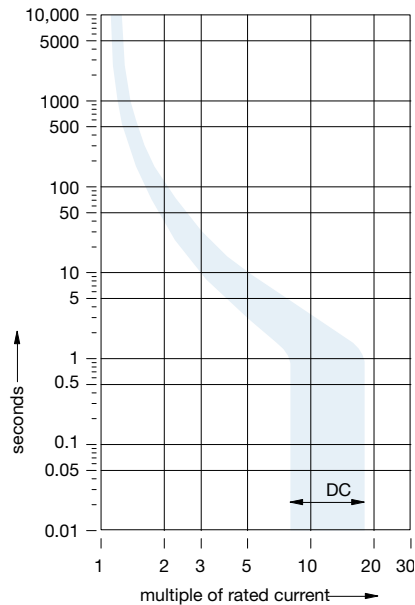
Inductive loads

- K Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers

Accessories & technical data

Accessories – See page 15.71

Technical data – See page 15.76 - 82



Accessories S500 UL1077



S500-H11, -H20

Auxiliary contacts

The auxiliary contacts will signal whether the breaker is in the ON or OFF position.

Description	Catalog number
For field mounting; left side	S500-H11 S500-H20
1 N.O./1 N.C. 2 N.O.	



S500-S11, -S20

Bell alarm

The bell alarm includes a set of contacts that will only signal when the breaker has tripped. Typically the contacts would be connected to an alarm or bell to signal the operator that an overcurrent trip has occurred. The bell alarm also includes a test button for testing the alarm contacts without opening the breaker.

Description	Catalog number
For field mounting; left side	S500-S11 S500-S20
1 N.O./1 N.C. 2 N.O.	

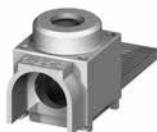


S500-RD3

Handle mechanism

Description	Catalog number
Handle mechanism	S500-RD3

For use with 1-4 pole S500 MCBs and disconnect switch selector handles with 5mm shafts.



S500-K1

Power feed terminal - Accepts into 2/0 AWG

Description	Catalog number
Rear mount terminal	S500-K2

Rear mount terminal - Accepts into 2/0 AWG

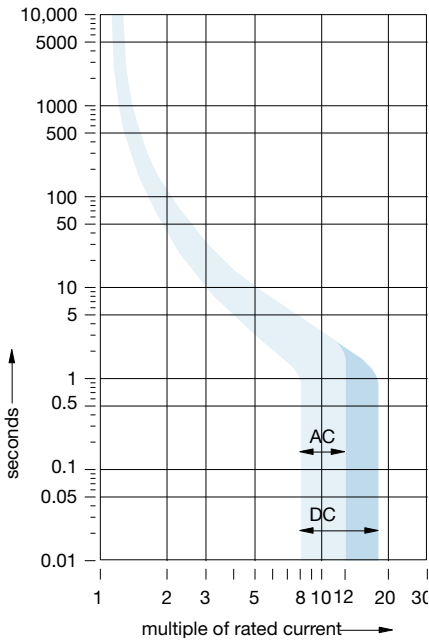
Description	Catalog number
Accepts 4AWG/25mm	S500-K1

Technical data

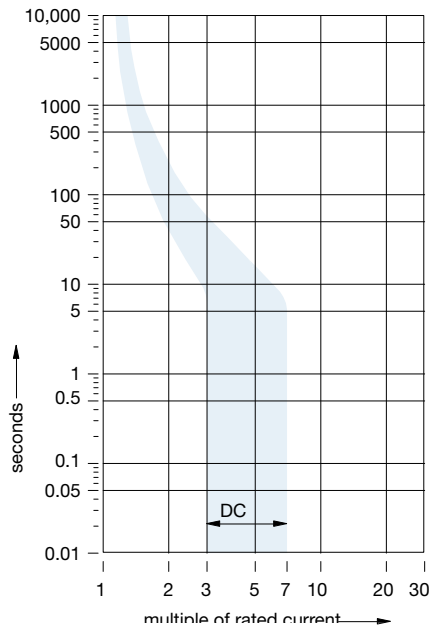
S500-K & S500UC-B, K

Technical data	S500-K	S500UC-B, K
Approvals	1077 C22.2 - No. 235	1077 C22.2 - No. 235
Number of poles	1, 2, 3	1, 2, 3, 4
Tripping characteristic	K	B, K
Rated currents	0.1 to 45 A	B: 6 - 63 A; K: 0.15 - 45 A
Rated voltage	480Y/277 VAC, 600Y/346 VAC	250 VDC per pole (600 VDC 4 pole)
Frequency	50/60 Hz	50/60 Hz
Mounting position	vertical, horizontal	vertical, horizontal
Standard mounting	35mm DIN rail	35mm DIN rail
Clamps only for CU	16 - 4 AWG	16 - 4 AWG
Service life, mechanical at rated load	20,000	20,000
Ambient temperature	40°C... 104°F	40°C... 104°F

Tripping characteristic K



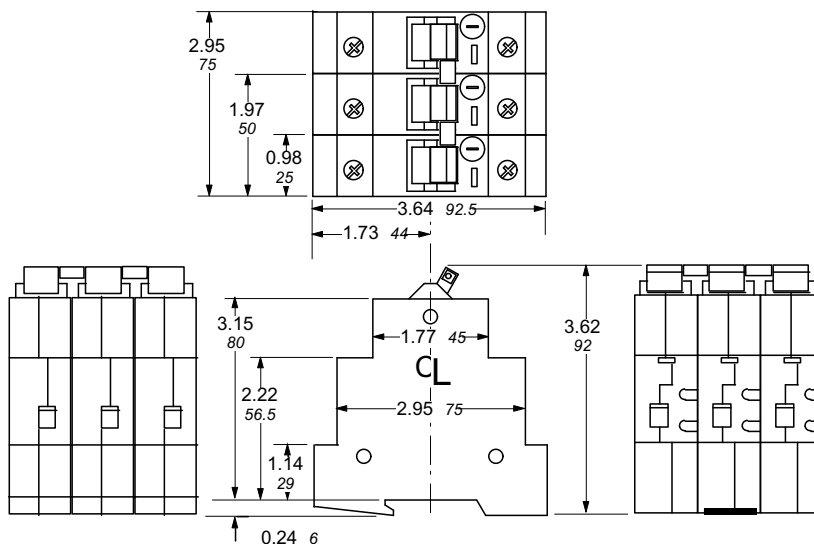
Tripping characteristic B



15

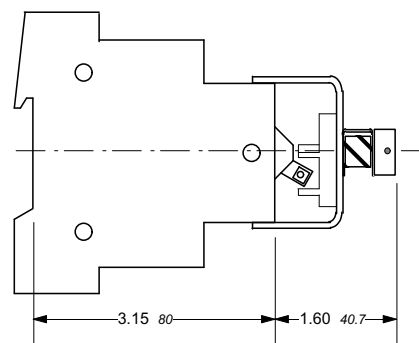
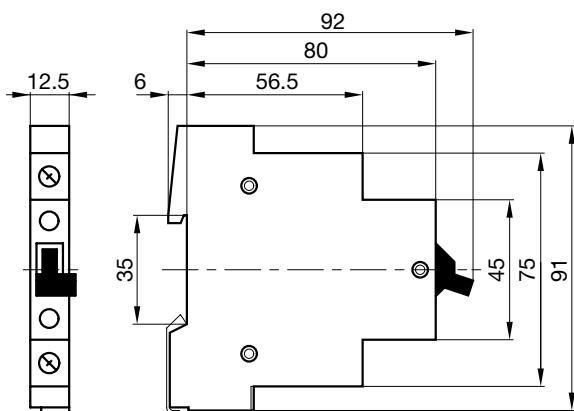
Approximate dimensions S500 & Accessories

S500

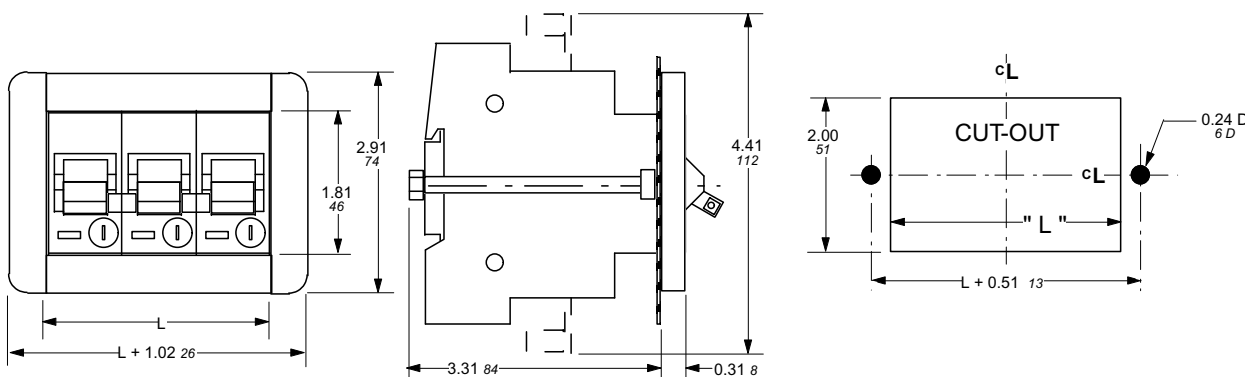


S500-H11, S500-H20 S500-S11, S500-S20

S500-RD3 Handle mechanism



S500 Front mounting kit





Miniature circuit breakers Technical data



S201UP-K



S201UP-K



S201-B



S201P-Z



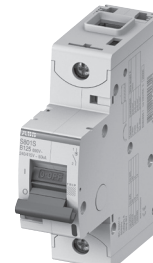
S201PR-K0.2



S201UDC-K1



S501-K



S801U-B

S200

UL489

S200U-K	15.90
S200U-Z	15.90
S200UP-K	15.90
S200UP-Z	15.90
SU200PR-K	15.91
S200UDC-K	15.91
S200UDC-Z	15.91

UL1077

S200-B	15.92
S200-C, D	15.92
S200-K	15.92
S200-Z	15.92
S200P-B	15.93
S200P-C	15.93
S200P-D	15.93
S200P-K	15.93
S200P-Z	15.94
S200PR-K	15.94
S280UC-K	15.94
S280UC-Z	15.94

S800

UL489

S800U-K, Z	15.95
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IEC

S800S-B	15.95
S800S-C	15.95
S800S-D	15.95
S800S-K	15.96

S500

UL1077

S500-K	15.97
S500UC-B, K	15.97

Technical data

S200U-K, S200U-Z, S200UP-K, S200UP-Z

Item	S200U-K	S200U-Z	S200UP-K	S200UP-Z
Approvals:				
UL	489	489	489	489
CSA	C22.2 No. 5	C22.2 No. 5	C22.2 No. 5	C22.2 No. 5
VDE	0660	0660	0660	0660
IEC	898, 60947-2	898, 60947-2	898, 60947-2	898
Number of Poles:	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4
Tripping Characteristic:	K	Z	K	Z
Rated Currents:	0.2 to 63A	0.2 to 63A	0.2 to 25A	0.2 to 25A
Minimum Operating Voltage:	12V	12V	12V	12V
UL/CSA Rated Voltage & Interrupting Capacity:				
Frequency:	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
120VAC	10kA	10kA	10kA	10kA
240 VAC	10kA	10kA	10kA	10kA
277 VAC	—	—	10kA	10kA
277/480 VAC	—	—	10kA	10kA
60VDC	15kA	15kA	15kA	15kA
125VDC	15kA	15kA	15kA	15kA
250VDC	—	—	—	—
500VDC	—	—	—	—
IEC Rated Voltage				
Frequency:	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Rated Voltage				
IEC Single Pole	240/415VAC, 220VDC	240/415VAC, 60VDC	240/415VAC, 220VDC	240/415VAC, 220VDC
IEC Multi-Pole	415VAC, 440VDC	415VAC, 110VDC	415VAC, 440VDC	415VAC, 440VDC
Production Category:	IP20	IP20	IP20	IP20
Depth of Unit Per DIN 43880:	68mm/ 2.68 in.	68mm/ 2.68 in.	68mm/ 2.68 in.	68mm/ 2.68 in.
Mounting Position:	Vertical / horizontal	Vertical / horizontal	Vertical / horizontal	Vertical / horizontal
Standard Mounting:	35mm DIN rail	35mm DIN rail	35mm DIN rail	35mm DIN rail
Main and Shunt Trip Terminals:				
Wire Size	18-4 AWG/.82-21.2mm ²	18-4 AWG/.82-21.2mm ²	18-4 AWG/.82-21.2mm ²	18-4 AWG/.82-21.2mm ²
Torque	17.5 in-lbs. / 1.978 Nm	17.5 in-lbs. / 1.978 Nm	17.5 in-lbs. / 1.978 Nm	17.5 in-lbs. / 1.978 Nm
Tool	# 2 Posidrive	# 2 Posidrive	# 2 Posidrive	# 2 Posidrive
Accessory Terminals				
Wire Size	18-16 AWG/.82-1.3mm ²	18-16 AWG/.82-1.3mm ²	18-16 AWG/.82-1.3mm ²	18-16 AWG/.82-1.3mm ²
Torque	4.5 in-lbs./ .51nm	4.5 in-lbs./ .51nm	4.5 in-lbs./ .51nm	4.5 in-lbs./ .51nm
Tool	# 1 Posidrive	# 1 Posidrive	# 1 Posidrive	# 1 Posidrive
Service Life at Rated Load:	No Load 20,000 operations	No Load 20,000 operations Full Load 10,000 operations	No Load 20,000 operations Full Load 10,000 operations	No Load 20,000 operations Full Load 10,000 operations
Ambient Temperatures:				
Minimum	-25°C... -13°F	-25°C... -13°F	-25°C... -13°F	-25°C... -13°F
Maximum	70°C... 158°F	70°C... 158°F	70°C... 158°F	70°C... 158°F
Storage Temperatures:				
Minimum	-40°C... -40°F	-40°C... -40°F	-40°C... -40°F	-40°C... -40°F
Maximum	70°C... 158°F	70°C... 158°F	70°C... 158°F	70°C... 158°F
Shock Resistance:	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms
Vibration Resistance:	5g, 20 cycles, 5 Hz, 150 Hz	5g, 20 cycles, 5 Hz, 150 Hz	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ 1n	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ 1n
Disconnecting Neutral Rating:	—	—	—	—

Technical data

SU200PR-K, S200UDC-K, S200UDC-Z

Miniature
circuit breakers
Technical data

Item	SU200PR-K	S200UDC-K	S200UDC-Z
Approvals:			
UL	489	489	489
CSA	CS22.2 No. 5	—	—
VDE	0660	0660	0660
IEC	60947-2	—	—
Number of Poles:	1,2,3,4	1, 2	1, 2
Tripping Characteristic:	K	K	Z
Rated Currents:	0.2 to 63A	1 to 63A	1 to 63A
Minimum Operating Voltage:	12 VAC	—	—
UL/CSA Rated Voltage & Interrupting Capacity:			
Frequency:	50/60 Hz	50/60 Hz	50/60 Hz
120VAC	10 kA	—	—
240 VAC	10 kA	—	—
277 VAC	10 kA	—	—
277/480 VAC	10 kA	—	—
60VDC	—	14 kA	14 kA
125VDC	—	—	—
250VDC	—	—	—
500VDC	—	—	—
IEC Rated Voltage Frequency:	50/60 Hz	50/60 Hz	50/60 Hz
Rated Voltage			
IEC Single Pole	240 VAC	—	—
IEC Multi-Pole	400 VAC	—	—
Production Category:	IP20	IP20	IP20
Depth of Unit Per DIN 43880:	68mm/ 2.68 in.	68mm/ 2.68 in.	68mm/ 2.68 in.
Mounting Position:	Any	Vertical / horizontal	Vertical / horizontal
Standard Mounting:	35mm DIN rail	35mm DIN rail	35mm DIN rail
Main and Shunt Trip Terminals:			
Wire Size	18-4 AWG/.82-21.2 mm ²	18-4 AWG/.82-21.2 mm ²	18-4 AWG/.82-21.2 mm ²
Torque	25 in.-lbs. / 2.8 Nm	17.5 in.-lbs. / 1.978 Nm	17.5 in.-lbs. / 1.978 Nm
Tool	# 2 Posidrive	# 2 Posidrive	# 2 Posidrive
Accessory Terminals			
Wire Size	18-16 AWG/.82-1.3mm ²	18-16 AWG/.82-1.3mm ²	18-16 AWG/.82-1.3mm ²
Torque	4.5 in.-lbs. / .51 Nm	4.5 in.-lbs. / .51 Nm	4.5 in.-lbs. / .51 Nm
Tool	# 1 Posidrive	# 1 Posidrive	# 1 Posidrive
Service Life at Rated Load:	6000 operations (AC), 1 cycle (1s-ON, 9s-OFF)	Full Load 10,000 operations	Full Load 10,000 operations
Ambient Temperatures:			
Minimum	-25°C... -13°F	-25°C... -13°F	-25°C... -13°F
Maximum	55°C	70°C... 158°F	70°C... 158°F
Storage Temperatures:			
Minimum	-40°C... -40°F	-40°C... -40°F	-40°C... -40°F
Maximum	70°C... 158°F	70°C... 158°F	70°C... 158°F
Shock Resistance:	25g minimum of 2 impacts, shock duration of 13 ms	30g minimum of 2 impacts, shock duration of 13 ms	30g minimum of 2 impacts, shock duration of 13 ms
Vibration Resistance:	5g, 20 cycles, 5-150, 5Hz with load 0.8in	5g, 20 cycles, 5 Hz, 150 Hz	5g, 20 cycles, 5 Hz, 150 Hz
Disconnecting Neutral Rating:	—	—	—

Technical data

S200-B; S200-C, D; S200-K; S200-Z

Item	S200-B	S200-C, D	S200-K	S200-Z
Approvals:				
UL	1077	1077	1077	1077
CSA	C22.2 No. 235	C22.2 No. 235	C22.2 No. 235	C22.2 No. 235
VDE	0641, 0660	0660	0660	0660
IEC	898, 60947-2	898, 60947-2	898, 60947-2	898, 60947-2
Number of Poles:	1,2,3,4, 1+N, 3+N	1,2,3, 1+N, 3+N	1,2,3,4, 1+N, 3+N	1,2,3,4, 1+N, 3+N
Tripping Characteristic:	B	C, D	K	K
Rated Currents:	6 to 63A	0.5 to 63A	0.5 to 63A	0.5 to 63A
Minimum Operating Voltage:	12VAC	12VAC	12 V	12 V
UL/CSA Rated Voltage & Interrupting Capacity:	Single pole Multi pole	Single pole Multi pole	Single pole Multi pole	Single pole Multi pole
Frequency:	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
120VAC	10 kA —	10 kA —	10 kA —	10 kA —
240 VAC	6 kA 10 kA	6 kA 10 kA	6 kA 10 kA	6 kA 10 kA
277 VAC	6 kA —	6 kA —	6 kA —	6 kA —
277/480 VAC	— 6 kA	— 6 kA	— 6 kA	— 6 kA
60VDC	10 kA 10 kA	10 kA 10 kA	10 kA 10 kA	10 kA 10 kA
125VDC	10 kA 10 kA	10 kA 10 kA	10 kA 10 kA	10 kA 10 kA
250VDC	— —	— —	— —	— —
500VDC	— —	— —	— —	— —
IEC Rated Voltage				
Frequency:	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Rated Voltage				
IEC Single Pole	240/415 VAC, 60 VDC	240/415 VAC, 60 VDC	240/415 VAC, 60 VDC	240/415 VAC, 60 VDC
IEC Multi-Pole	415 VAC, 110 VDC	415 VAC, 110 VDC	415 VAC, 110 VDC	415 VAC, 110 VDC
Production Category:	IP20	IP20	IP20	IP20
Depth of Unit Per DIN 43880:	68mm/ 2.68 in.	68mm/ 2.68 in.	68mm/ 2.68 in.	68mm/ 2.68 in.
Mounting Position:	Vertical / horizontal	Vertical / horizontal	Vertical / horizontal	Vertical / horizontal
Standard Mounting:	35mm DIN rail	35mm DIN rail	35mm DIN rail	35mm DIN rail
Main and Shunt Trip Terminals:				
Wire Size	18-4 AWG/.82-21.2 mm ²	18-4 AWG/.82-21.2 mm ²	18-4 AWG/.82-21.2 mm ²	18-4 AWG/.82-21.2 mm ²
Torque	17.5 in-lbs. / 1.978 Nm	17.5 in-lbs. / 1.978 Nm	17.5 in-lbs. / 1.978 Nm	17.5 in-lbs. / 1.978 Nm
Tool	# 2 Posidrive	# 2 Posidrive	# 2 Posidrive	# 2 Posidrive
Accessory Terminals				
Wire Size	18-16 AWG/.82-1.3 mm ²	18-16 AWG/.82-1.3 mm ²	18-16 AWG/.82-1.3 mm ²	18-16 AWG/.82-1.3 mm ²
Torque	4.5 in-lbs./ .51 Nm	4.5 in-lbs./ .51 Nm	4.5 in-lbs./ .51 Nm	4.5 in-lbs./ .51 Nm
Tool	# 1 Posidrive	# 1 Posidrive	# 1 Posidrive	# 1 Posidrive
Service Life at Rated Load:	No Load 20,000 operations Full Load 10,000 operations	No Load 20,000 operations Full Load 10,000 operations	No Load 20,000 operations Full Load 10,000 operations	No Load 20,000 operations Full Load 10,000 operations
Ambient Temperatures:				
Minimum	-25°C... -13°F	-25°C... -13°F	-25°C... -13°F	-25°C... -13°F
Maximum	70°C... 158°F	70°C... 158°F	70°C... 158°F	70°C... 158°F
Storage Temperatures:				
Minimum	-40°C... -40°F	-40°C... -40°F	-40°C... -40°F	-40°C... -40°F
Maximum	70°C... 158°F	70°C... 158°F	70°C... 158°F	70°C... 158°F
Shock Resistance:	30g minimum of 2 impacts, shock duration of 13 ms	30g minimum of 2 impacts, shock duration of 13 ms	30g minimum of 2 impacts, shock duration of 13 ms	30g minimum of 2 impacts, shock duration of 13 ms
Vibration Resistance:	5g, 20 cycles, 5 Hz, 150 Hz	5g, 20 cycles, 5 Hz, 150 Hz	5g, 20 cycles, 5 Hz, 150 Hz	5g, 20 cycles, 5 Hz, 150 Hz
Disconnecting Neutral Rating:	6 kA switching	6 kA switching	6 kA switching	6 kA switching

Technical data

S200-P-B; S200P-C; S200P-D; S200P-K

Miniature
circuit breakers
Technical data

Item	S200P-B		S200P-C		S200P-D		S200P-K	
Approvals:								
UL	1077		1077		1077		1077	
CSA	C22.2 No. 235		C22.2 No. 235		C22.2 No. 235		—	
VDE	0660		0660		0660		0660	
IEC	898, 60947-2		898, 60947-2		898, 60947-2		898, 60947-2	
Number of Poles:	1,2,3,4, 1+N, 3+N		1,2,3,4, 1+N, 3+N		1,2,3,4, 1+N, 3+N		1,2,3,4, 1+N, 3+N	
Tripping Characteristic:	K		K		K		K	
Rated Currents:	0.5 to 63A		0.5 to 63A		0.5 to 63A		0.2 to 63A	
Minimum Operating Voltage:	12 V		12 V		12 V		12 V	
UL/CSA Rated Voltage & Interrupting Capacity:	Single pole	Multi pole	Single pole	Multi pole	Single pole	Multi pole	Single pole	Multi pole
Frequency:	50/60 Hz		50/60 Hz		50/60 Hz		50/60 Hz	
120VAC	10 kA	—	10 kA	—	10 kA	—	10 kA	—
240 VAC	6 kA	10 kA	6 kA	10 kA	6 kA	10 kA	10 kA	10 kA
277 VAC	6 kA	—	6 kA	—	6 kA	—	10 kA	—
277/480 VAC	—	6 kA	—	6 kA	—	6 kA	—	10 kA
60VDC	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	15 kA	15 kA
125VDC	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	15 kA	15 kA
250VDC	—	—	—	—	—	—	—	—
500VDC	—	—	—	—	—	—	—	—
IEC Rated Voltage								
Frequency:	50/60 Hz		50/60 Hz		50/60 Hz		50/60 Hz	
Rated Voltage								
IEC Single Pole	240/415 VAC, 60 VDC		240/415 VAC, 60 VDC		240/415 VAC, 60 VDC		240/415 VAC, 60 VDC	
IEC Multi-Pole	415 VAC, 110 VDC		415 VAC, 110 VDC		415 VAC, 110 VDC		415 VAC, 110 VDC	
Production Category:	IP20		IP20		IP20		IP20	
Depth of Unit Per DIN 43880:	68mm/ 2.68 in.		68mm/ 2.68 in.		68mm/ 2.68 in.		68mm/ 2.68 in.	
Mounting Position:	Vertical / horizontal		Vertical / horizontal		Vertical / horizontal		Vertical / horizontal	
Standard Mounting:	35mm DIN rail		35mm DIN rail		35mm DIN rail		35mm DIN rail	
Main and Shunt Trip Terminals:								
Wire Size	18-4 AWG/.82-21.2 mm ²		18-4 AWG/.82-21.2 mm ²		18-4 AWG/.82-21.2 mm ²		18-4 AWG/.82-21.2 mm ²	
Torque	17.5 in.-lbs. / 1.978 Nm		17.5 in.-lbs. / 1.978 Nm		17.5 in.-lbs. / 1.978 Nm		17.5 in.-lbs. / 1.978 Nm	
Tool	# 2 Posidrive		# 2 Posidrive		# 2 Posidrive		# 2 Posidrive	
Accessory Terminals								
Wire Size	18-16 AWG/.82-1.3 mm ²		18-16 AWG/.82-1.3 mm ²		18-16 AWG/.82-1.3 mm ²		18-16 AWG/.82-1.3 mm ²	
Torque	4.5 in.-lbs./ .51 Nm		4.5 in.-lbs./ .51 Nm		4.5 in.-lbs./ .51 Nm		4.5 in.-lbs./ .51 Nm	
Tool	# 1 Posidrive		# 1 Posidrive		# 1 Posidrive		# 1 Posidrive	
Service Life at Rated Load:	No Load 20,000 operations Full Load 10,000 operations		No Load 20,000 operations Full Load 10,000 operations		No Load 20,000 operations Full Load 10,000 operations		No Load 20,000 operations Full Load 10,000 operations	
Ambient Temperatures:								
Minimum	-25°C... -13°F		-25°C... -13°F		-25°C... -13°F		-25°C... -13°F	
Maximum	70°C... 158°F		70°C... 158°F		70°C... 158°F		70°C... 158°F	
Storage Temperatures:								
Minimum	-40°C... -40°F		-40°C... -40°F		-40°C... -40°F		-40°C... -40°F	
Maximum	70°C... 158°F		70°C... 158°F		70°C... 158°F		70°C... 158°F	
Shock Resistance:	30g minimum of 2 impacts, shock duration of 13 ms		30g minimum of 2 impacts, shock duration of 13 ms		30g minimum of 2 impacts, shock duration of 13 ms		30g minimum of 2 impacts, shock duration of 13 ms	
Vibration Resistance:	5g, 20 cycles, 5 Hz, 150 Hz		5g, 20 cycles, 5 Hz, 150 Hz		5g, 20 cycles, 5 Hz, 150 Hz		5g, 20 cycles, 5 Hz, 150 Hz	
Disconnecting Neutral Rating:	6 kA switching		6 kA switching		6 kA switching		—	

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Technical data

S200P-Z; S200PR-K; S280UC-K; S280C-Z

Item	S200P-Z		S200PR-K	S280UC-K		S280UC-Z	
Approvals:	1077		489	1077		1077	
UL	—		CS22.2 No. 5	22.2, No. 235		22.2, No. 235	
CSA	—		0660	0660		0660	
VDE	898, 60947-2		60947-2	898, 60947-2		898, 60947-2	
IEC	—		—	—		—	
Number of Poles:	1,2,3,4		1,2,3,4	1,2,3		1,2,3	
Tripping Characteristic:	Z		K	K		Z	
Rated Currents:	0.5 to 63A		0.2 to 63A	0.2 to 63A		0.5 to 63A	
Minimum Operating Voltage:	12 V		12 VAC	12 V		12 V	
UL/CSA Rated Voltage & Interrupting Capacity:	Single pole	Multi pole		Single pole	Multi pole	Single pole	Multi pole
Frequency:	50/60 Hz		50/60 Hz	50/60 Hz		50/60 Hz	
120VAC	10 kA	—	10 kA	10 kA	6 kA	10 kA	—
240 VAC	10 kA	10 kA	10 kA	10 kA	6 kA	10 kA	10 kA
277 VAC	10 kA	—	10 kA	10 kA	6 kA	10 kA	—
277/480 VAC	—	—	10 kA	—	4.5 kA for 0.2-40 A 5 kA for 50-63 A	—	4.5 kA for 0.2-40 A 5 kA for 50-63 A
60VDC	15 kA	15 kA	—	10 kA	10 kA	10 kA	10 kA
125VDC	15 kA	15 kA	—	10 kA	—	10 kA	10 kA
250VDC	—	—	—	4.5 kA	4.5 kA	4.5 kA	4.5 kA
500VDC	—	—	—	—	4.5 kA	—	4.5 kA
IEC Rated Voltage	50/60 Hz		50/60 Hz	50/60 Hz		50/60 Hz	
Frequency:	50/60 Hz		50/60 Hz	50/60 Hz		50/60 Hz	
Rated Voltage	240/415 VAC, 220 VDC		240 VAC	240/415VAC, 220VDC		240/415VAC, 220VDC	
IEC Single Pole	415 VAC, 440 VDC		400 VAC	415VAC, 440VDC		415VAC, 440VDC	
IEC Multi-Pole	—		—	—		—	
Production Category:	IP20		IP20	IP20		IP20	
Depth of Unit Per DIN 43880:	68mm/ 2.68 in.		68mm/ 2.68 in.	68mm/ 2.68 in.		68mm/ 2.68 in.	
Mounting Position:	Vertical / horizontal		Any	Vertical / horizontal		Vertical / horizontal	
Standard Mounting:	35mm DIN rail		35mm DIN rail	35mm DIN rail		35mm DIN rail	
Main and Shunt Trip Terminals:	18-4 AWG/.82-21.2 mm ²		18-4 AWG/.82-21.2 mm ²	18-4 AWG/.82-21.2 mm ² for 0.2 - 40A		18-4 AWG/.82-21.2 mm ² for 0.5 - 40A	
Wire Size	17.5 in-lbs. / 1.978 Nm # 2 Posidrive		25 in-lbs. / 2.8 Nm # 2 Posidrive	18-2 AWG for 50 A & above 17.5 in-lbs. / 1.978 Nm # 2 Posidrive		18-2 AWG for 50 A & above 17.5 in-lbs. / 1.978 Nm # 2 Posidrive	
Torque	—		—	—		—	
Tool	—		—	—		—	
Accessory Terminals	18-16 AWG/.82-1.3 mm ²		18-16 AWG/.82-1.3 mm ²	18-16 AWG/.82-1.3 mm ²		18-16 AWG/.82-1.3 mm ²	
Wire Size	4.5 in-lbs./ .51 Nm # 1 Posidrive		4.5 in-lbs./ .51 Nm # 1 Posidrive	4.5 in-lbs./ .51 Nm # 1 Posidrive		4.5 in-lbs./ .51 Nm # 1 Posidrive	
Torque	—		—	—		—	
Tool	—		—	—		—	
Service Life at Rated Load:	No Load 20,000 operations Full Load 10,000 operations		6000 operations (AC), 1 cycle (1s-ON, 9s-OFF)	No Load 20,000 operations Full Load 10,000 operations		No Load 20,000 operations Full Load 10,000 operations	
Ambient Temperatures:	-25°C... -13°F		-25°C... -13°F	-25°C... -13°F		-25°C... -13°F	
Minimum	70°C... 158°F		55°C	70°C... 158°F		70°C... 158°F	
Maximum	—		—	—		—	
Storage Temperatures:	-40°C... -40°F		-40°C... -40°F	-40°C... -40°F		-40°C... -40°F	
Minimum	70°C... 158°F		70°C... 158°F	70°C... 158°F		70°C... 158°F	
Maximum	—		—	—		—	
Shock Resistance:	30g minimum of 2 impacts, shock duration of 13 ms		25g minimum of 2 impacts, shock duration of 13 ms	30g minimum of 2 impacts, shock duration of 13 ms		30g minimum of 2 impacts, shock duration of 13 ms	
Vibration Resistance:	5g, 20 cycles, 5 Hz, 150 Hz		5g, 20 cycles, 5-150, 5Hz with load 0.8in	5g, 20 cycles, 5 Hz, 150 Hz		5g, 20 cycles, 5 Hz, 150 Hz	
Disconnecting Neutral Rating:	—		—	—		—	

Technical data

S800U-K, Z; S800S-B, S800S-C, S800S-D

Miniature
circuit breakers
Technical data

Item	S800U-K, Z	S800S-B	S800S-C	S800S-D
Approvals:				
UL	489, E312425	—	—	—
CSA	22.2 No. 5.1	—	—	—
VDE	—	—	—	—
IEC	60947-2	60947-2	60947-2	60947-2
Number of Poles:	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4
Tripping Characteristic:	K	B	C	D
Rated Currents:	10 to 100A	10 to 125A	10 to 125A	10 to 125A
Minimum Operating Voltage:	—	400/690VAC	400/690VAC	400/690VAC
UL/CSA Rated Voltage & Interrupting Capacity:				
Frequency:	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
120VAC	—	—	—	—
240 VAC	50 kA multi, 30 kA single	50 kA multi, 30 kA single; IEC	50 kA multi, 30 kA single; IEC	50 kA multi, 30 kA single; IEC
277 VAC	—	—	—	—
277/480 VAC	—	—	—	—
60VDC	—	—	—	—
125VDC	—	—	—	—
250VDC	—	—	—	—
500VDC	—	—	—	—
IEC Rated Voltage Frequency:	—	50/60 Hz	50/60 Hz	50/60 Hz
Rated Voltage	—	690 VAC	690 VAC	690 VAC
IEC Single Pole	—	—	—	—
IEC Multi-Pole	—	—	—	—
Production Category:	IP20	IP20	IP20	IP20
Depth of Unit Per DIN 43880:	—	—	—	—
Mounting Position:	Vertical / horizontal	Vertical / horizontal	Vertical / horizontal	Vertical / horizontal
Standard Mounting:	35mm DIN rail	35mm DIN rail	35mm DIN rail	35mm DIN rail
Main and Shunt Trip Terminals:				
Wire Size	1... 25	1... 25	1... 25	1... 25
Torque	35 in-lbs. / 4 Nm	35 in-lbs. / 4 Nm	35 in-lbs. / 4 Nm	35 in-lbs. / 4 Nm
Tool	—	—	—	—
Accessory Terminals				
Wire Size	1... 35	1... 35	1... 35	1... 35
Torque	35 in-lbs./4 Nm	35 in-lbs./4 Nm	35 in-lbs./4 Nm	35 in-lbs./4 Nm
Tool	—	—	—	—
Service Life at Rated Load:	6,000 operations	6,000 operations	6,000 operations	6,000 operations
Ambient Temperatures:				
Minimum	-25°C... -13°F	-25°C... -13°F	-25°C... -13°F	-25°C... -13°F
Maximum	60°C... 140°F	60°C... 140°F	60°C... 140°F	60°C... 140°F
Storage Temperatures:				
Minimum	-40°C... -40°F	-40°C... -40°F	-40°C... -40°F	-40°C... -40°F
Maximum	70°C... 158°F	70°C... 158°F	70°C... 158°F	70°C... 158°F
Shock Resistance:	—	—	—	—
Vibration Resistance:	—	—	—	—
Disconnecting Neutral Rating:	—	—	—	—

Technical data

S800S-K

Item	S800S-K
Approvals:	
UL	—
CSA	—
VDE	—
IEC	60947-2
Number of Poles:	1,2,3,4
Tripping Characteristic:	K
Rated Currents:	10 to 125A
Minimum Operating Voltage:	400/690 VAC
UL/CSA Rated Voltage & Interrupting Capacity:	
Frequency:	50/60 Hz
120VAC	—
240 VAC	50 kA multi; 30 kA single; IEC
277 VAC	—
277/480 VAC	—
60VDC	—
125VDC	—
250VDC	—
500VDC	—
IEC Rated Voltage	
Frequency:	50/60 Hz
Rated Voltage	
IEC Single Pole	690 VAC
IEC Multi-Pole	—
Production Category:	IP20
Depth of Unit Per DIN 43880:	—
Mounting Position:	Vertical / horizontal
Standard Mounting:	35mm DIN rail
Main and Shunt Trip Terminals:	
Wire Size	1... 25
Torque	35 in-lbs. / 4 Nm
Tool	—
Accessory Terminals	
Wire Size	1... 35
Torque	35 in-lbs./4 Nm
Tool	—
Service Life at Rated Load:	6,000 operations
Ambient Temperatures:	
Minimum	-25°C... -13°F
Maximum	60°C... 140°F
Storage Temperatures:	
Minimum	-40°C... -40°F
Maximum	70°C... 158°F
Shock Resistance:	—
Vibration Resistance:	—
Disconnecting Neutral Rating:	—

Technical data

S500-K, Z; S500UC-B, K

Item	S500-K, Z
Approvals: UL CSA VDE IEC	1077 C22.2 - No. 235 0641/6.78 —
No. of poles:	1,2,3, +N, +NA
Tripping characteristic:	K
Rated currents:	0.1 to 45A
Rated voltage: UL/CSA single pole UL/CSA multi pole IEC single pole	277VAC 600VAC 690VAC
Rated interrupting capacity:	
Single pole	0.15-25A – 30KA/240VAC 14KA/277VAC 26-45A – 18KA/240VAC 14KA/277VAC
Multi-pole	0.15-45A – 14KA/480VAC 6KA/600VAC
Frequency:	50/60Hz
Mounting position:	Vertical / horizontal
Standard mounting:	35mm DIN rail
Terminals:	16-4AWG / 1-25mm ²
Service life at rated load:	20,000 operations
Calibration temperature:	40°C

Item	S500UC-B, K
Approvals: UL CSA VDE	1077 C22.2 0660
No. of poles:	1,2,3, 4
Tripping characteristic:	B, K
Rated currents:	B: 6 to 63A K: 0.15 to 45A
Rated voltage: UL single pole UL multi pole IEC multi pole	277VAC/250VDC 600VAC/600VDC 690VAC/750VDC
Rated interrupting capacity:	
	B single pole: 6 – 25A 18KA/240VAC 14KA/277VAC 30KA/250VDC 32 – 63A 30KA/240VAC 14KA/277VAC 30KA/250VDC B two-pole: 6 – 63A 14KA/480VAC 6KA/600VAC 30KA/500VDC B three-pole: 6 – 63A 14KA/480VAC 6KA/600VAC 30KA/600VDC K single pole: 0.15 – 25A 30KA/240VAC 14KA/277VAC 30KA/250VDC 32 – 45A 18KA/240VAC 14KA/277VAC 30KA/250VDC K two-pole: 0.15 – 45A 14KA/480VAC 6KA/600VAC 30KA/500VDC K three-pole: 0.5 – 45A 14KA/480VAC 6KA/600VAC 30KA/600VDC
Frequency:	50/60Hz
Mounting position:	Vertical / horizontal
Standard mounting:	35mm DIN-rail
Terminals:	16-4AWG / 1-25mm ²
Service life at rated load:	20,000 operations

Notes



16 - DIN Rail circuit protective devices



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Notes

OVR Series Surge protective devices



Surge protective devices

OVR NE12 products

OVR DIN rail products



General information

Introduction

What is a transient surge?

A transient surge is a sudden (shorter than a millisecond) rise in the flow of power. Voltage can peak at 12x the nominal system voltage. Transient surges result from a number of sources, the most common of which are internal, such as load switching and even normal equipment operations. In fact, approximately 80% of transients are generated internally. External transients are the result of lightning and load switching by utilities and upstream facilities.

Internal load switching

Switching on/off any elements that create a sudden variation of load will also cause a sudden change in current flow and generate transient surges.

Lightning strikes

A lightning strike (direct or indirect) can have a destructive or disturbing effect on installations located up to several miles from the actual point of the strike. During a storm, underground cables can transmit energy from a lightning strike to equipment installed inside buildings.

A lightning protection device (such as a lightning rod or Faraday cage) installed on a building to protect against the risk of a direct strike can increase the risk of damage to electrical equipment connected to the main power supply near or inside the building.

The lightning protection device diverts the high strike current to ground, considerably raising the potential of the ground close to the building on which it is installed. This causes overvoltages on the electrical equipment directly via the ground terminals and induced via the underground supply cables.

Switching effects on power distribution

The switching of transformers, motors or inductances in general, variation of load, disconnection of circuit breakers or cut outs lead to overvoltages that penetrate a building. The closer the building is to a generating station, substation or upstream switching point, the higher the overvoltages may be.

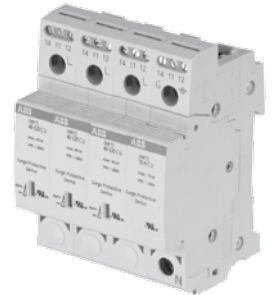
Facilities and operations left unprotected are highly susceptible to the damaging effects of transients. Such as:

- Catastrophic equipment failure
- Immediate operation shutdown
- Long term disruption of business
- Expensive equipment repair and replacement
- Data losses, system resets and network down time

In order to ensure protection from transient surges, installation of surge protective devices (SPD) is a must.

ABB has a long history of engineering and manufacturing quality surge protective devices. This brochure will provide all the information needed to select the proper products to begin protecting any facility or operation. ABB's family of surge protective devices include the following:

- OVR NE12 enclosed SPD for service entrance locations
- OVR DIN rail AC SPD for equipment protection
- OVR PV DIN rail DC SPD for photovoltaic installations
- OVR DIN rail data line SPD for sensitive communications networks



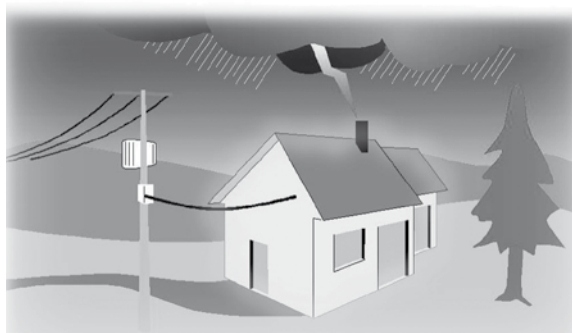
General information

General points on lightning and its risks

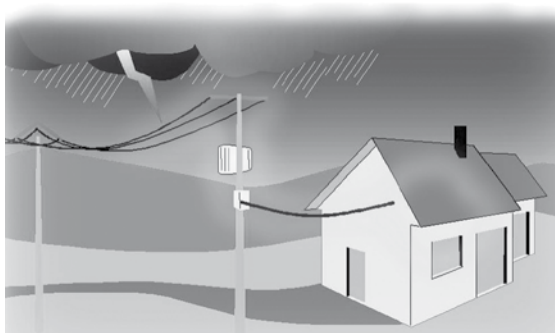
Overvoltages due to direct lightning strikes

These can take two forms:

- When lightning strikes a lightning conductor or the roof of a building which is grounded, the lightning current is dissipated into the ground. The impedance of the ground and the current flowing through it create large difference of potential: this is the overvoltage. This overvoltage then propagates throughout the building via the cables, damaging equipment along the way.
- When lightning strikes an overhead low voltage line, the strike produces high currents which penetrate into the building creating large overvoltages. The damage caused by this type of overvoltage is usually catastrophic (e.g. fire in the electrical switchboard causing the destruction of buildings and industrial equipment) and results in explosions.



Direct lightning strike on a lightning conductor or the roof of a building

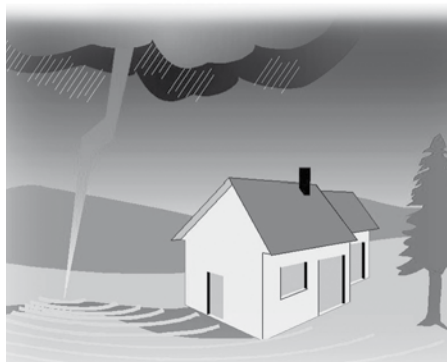


Direct lightning strike on an overhead line

Overvoltages due to the indirect effects of lightning strikes

Overvoltages are also produced when lightning strikes in the vicinity of a building, due to the increase in potential of the ground at the point of impact. The electromagnetic fields created by the lightning current generate inductive and capacitive coupling, leading to other overvoltages. Within a radius up to several kilometers, the electromagnetic field caused by lightning in clouds can also create sudden increases in voltage.

Although less spectacular than in the previous case, irreparable damage is also caused to sensitive equipment such as fax machines, computer power supplies and safety and communication systems.



Increase in ground potential



Magnetic field



Electrostatic field

General information

Terminology of SPD electrical characteristics

SPD terminology

8/20 wave:

Current waveform which passes through equipment when subjected to an overvoltage (low energy).

Type 2 surge protective device (SPD)

Permanently connected SPDs intended for installation on the load side of the service equipment overcurrent device, including SPDs located at a branch panel. It has successfully passed testing to the standard with the 8/20 wave (class II test).

Metal oxide varistor (MOV)

A varistor is an electronic component with a "diode like" nonlinear current-voltage characteristic, used to protect circuits against excessive transient voltages. Most commonly composed of metal oxides.

Maximum continuous operating voltage (MCOV, U_o)

The maximum designated root mean square (rms) value of power frequency voltage that may be applied continuously between the terminals of the SPD.

Nominal discharge current (I_n)

Peak current value of an 8/20 waveform which the SPD is rated for based on the test program.

Maximum discharge current (I_{max})

Peak current value of an 8/20 waveform which can be safely discharged by the SPD, with an amplitude complying with the class II operating test sequence. $I_{max} > I_n$

Short circuit current rating (SCCR)

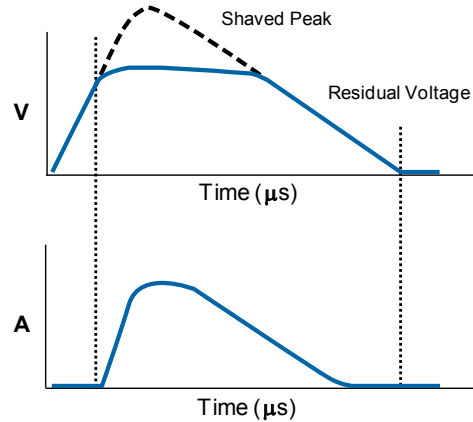
Maximum symmetrical fault current, at rated voltage, that the SPD can withstand without sustaining damage that exceeds acceptable criteria or creates a hazardous operating condition.

Voltage protection rating (VPR)

The value of the VPR is determined as the nearest highest value, taken from Table 63.1 of ANSI/UL 1449 3rd Edition, to the measured limiting voltage determined during the transient voltage surge suppression test using the combination wave generator at a setting of 6kV, 3kA.

Voltage protection level (U_p or U_{res})

The voltage let through by the SPD while diverting surge current to ground must not exceed the voltage withstand value of the equipment connected downstream.



* Graph depicts an 8/20 μ s wave

Notes:

Test wave 8/20 μ s according to IEEE # C62.62-200/UL 1449

The first number corresponds to the time from 10% to 90% of its peak value (8 μ s).

The second number corresponds to the time taken for the wave to descend to 50% of its peak value (20 μ s).

Common mode and / or differential mode protection

Common mode

Common mode overvoltages appear between the live conductors and ground, e.g. phase/ground or neutral/ground. A live conductor not only refers to the phase conductors but also to the neutral conductor.

This overvoltage mode destroys equipment connected to ground (class I equipment) and also equipment not connected to ground (class II equipment) which is located near a grounded mass and which does not have sufficient electrical isolation (a few kilovolts).

Class II equipment not located near a grounded mass is theoretically protected from this type of attack.

Differential mode

Differential mode overvoltages circulate between live conductors: phase/phase or phase/neutral.

These overvoltages have a potentially high damaging effect for all equipment connected to the electrical network, especially 'sensitive' equipment.

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Note:
Common mode overvoltages affect all grounding systems.



General information

UL 1449 Update to 3rd Edition

Surge Protective
Devices

The Underwriters Laboratories (UL) standard for surge protective devices (SPDs) has been the primary safety standard for surge protection since the first edition was published in 1985, and updated to the second edition in 1996.

The objective of UL 1449 has always been to increase safety in terms of surge protection. Thus, major changes have recently been made to the surge protection standard.

The latest edition, known as UL 1449 3rd Edition, was published on September 29, 2006 and took effect September 2009, and is now also an ANSI standard. A revision was made on February 8, 2011.

To avoid confusion, the objective of this paper is to explain and summarize the major changes made to the standard.

The key updates are:

- Change in the standard's name
- The different type designations of surge protective devices
- The measured voltage protection level
- The Nominal discharge current

Change in the standard's name: From TVSS to SPDs

Prior to UL 1449 3rd Edition taking effect, the devices this standard covers were known as Transient Voltage Surge Suppressors (TVSS), operating on power circuits not exceeding 600 V. With the inception of the 3rd Edition, these devices are now known as Surge Protective Devices (SPDs), and may operate on power circuits not exceeding 1000 V.

This new designation moves the UL standard closer to the international designation and to IEC standards. The new edition is now renamed UL Standard for Safety for Surge Protective Devices, UL 1449.

The different type designations of surge protective devices

The new UL 1449 3rd Edition places SPDs into five different Type categories based on installation location within an electrical system. While Type 1, Type 2 and Type 3 categories refer to different types of SPDs that can be installed at specific locations, Type 4 and Type 5 categories refer to components used in an SPDs configuration.

Type 1 – “Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service equipment overcurrent device.”

Type 2 – “Permanently connected SPDs intended for installation on the load side of the service equipment overcurrent device.”



Type 3 – “Point of utilization SPDs, installed at a minimum conductor length of 10 meters (30 feet) from the electrical service panel.”

Type 4 – Component assemblies – “Component assembly consisting of one or more Type 5 components together with a disconnect (integral or external) or a means of complying with the limited current tests.”

Type 1, 2, 3 – Component assemblies – “Consists of a Type 4 component assembly with internal or external short circuit protection.”

Type 5 – “Discrete component surge suppressors, such as MOVs that may be mounted on a PWB, connected by its leads or provided within an enclosure with mounting means and wiring terminations.”

These new categories are by far the major changes applied to UL 1449 3rd Edition. SPDs installation location is now taken into account. The closer an SPD is installed to the equipment, the better the protection is. This is a push in the direction of providing stepped protection including external and internal surge protection.

The measured voltage protection level

One of the last changes found in the new UL 1449 3rd Edition, is the modification in the measured voltage protection level. The Measured Limiting Voltage (MLV) is the maximum magnitude of voltage measured at the application of a specific impulse wave shape.

When applying a certain surge current on the SPD the measured voltage at the device terminals is the so called “let-through voltage.” In UL 1449 2nd Edition, the let-through voltage was referred to as Suppressed Voltage Rating (SVR) and was calculated with a 0.5 kA surge wave form at 6 kV. The new designation is Voltage Protection Rating (VPR) and is calculated with a 3 kA surge wave form at 6 kV.

General information

Terminology of SPD electrical characteristics



The nominal discharge current: I_n

The nominal discharge current, known as I_n test, is new to UL 1449, coming from the IEC standard.

During the test, the SPD is subjected to 15 impulses at the selected nominal discharge current. In order to pass, the SPD cannot create a shock or fire hazard during the test, and nothing in the surge path can open during or after the test. The nominal discharge current values, with a 8/20 μ s wave shape, are selected by the manufacturer as follows:

Type 1: 10 or 20 kA

Type 2: 3, 5, 10 or 20 kA

Type 1, Type 2 and Type 4 SPDs (intended for Type 1 or Type 2 applications) are subjected to this test.

Sources: Underwriters Laboratories Inc., Standard for Safety, Surge Protective Devices (UL 1449 Third Edition, 2011)

The MLV will allow comparison of different types of SPDs with regards to the let-through voltage. However, it is important to note that the surge current used to measure the let-through voltage is six times higher in the 3rd Edition than in the 2nd Edition. This means that, comparing the obsolete SVR designation with the new VPR ratings will not be valid, as VPR ratings will of course be higher than SVR ratings.

OVR Series NE12 products



Product introduction

OVR NE12 enclosed SPD

Introduction

The OVR NE12 enclosed surge protective device (SPD) is the latest addition to ABB's extensive range of surge protection products. It is designed to be installed at the service entrance, thereby protecting the entire facility from the harmful effects of transient surges. These surges are the result of:

- Direct and indirect lightning strikes
- Power company load switching
- Upstream load switching at other facilities

Extensive damage and expensive repairs can result from these types of disturbances if surge protection is not present.

Features & benefits

The OVR NE12 is a multistage protector with fast acting varistor (MOV) and EMI/RFI noise attenuation filter to limit overvoltage to values compatible with the sensitive equipment connected to the network. In addition to the OVR NE12, ABB recommends adding OVR DIN rail SPDs at branch panels and equipment, creating a multi-level approach to protection.

General

- NEMA 12 enclosure
- All mode protection (L-L/L-N/L-G/N-G)
- Auxiliary contacts for remote monitoring
- Safety disconnect, fused
- LED power on/fault indicator
- Audible alarm

MOV technology

- 160kA or 320kA per phase
- Replaceable MOV blocks
- Visual and audible MOV replacement indication

Surge counter/diagnostic LCD display (optional)

- Count of surges 2kA and higher with time and date
- Visual diagnostic information

Applications

The OVR NE12 is suitable for protection for all manner of facilities and operations. It is designed with a NEMA Type 12 enclosure, and rated as a Type 2 SPD, requiring indoor installation on the load side of the main breaker or fuse.

Here are some examples of operations that would benefit from an OVR NE12 enclosed SPD:

- Critical power (hospitals, data centers, etc)
- Renewable energy
- Water/wastewater
- Communications
- Manufacturing
- Commercial

Specifications

- **Approvals: UL 1449 - 3rd Edition Listed, UL 1283, CSA 22.2 No. 8**
- Type 2 Surge Protective Device
- NEMA 12 enclosure
- Three service voltages (AC): 240/120V Split phase, 480V Delta and 480/277V Wye
- 160kA or 320kA per phase protection
- Short circuit current rating (SCCR): 200kA

ABB recommends the installation of the OVR NE12 enclosed SPD wherever uptime is a critical element of a facility or operation.



Product selection

OVR NE12 enclosed SPD

Surge Protective
Devices

Choosing the correct model

There are three steps to choosing the correct OVR NE12 model:

1) Select service voltage

Consult qualified personnel if the facility or operation service voltage is unknown.

The OVR NE12 is available in three service voltages:

- 480V Delta
- 480Y/277V
- 240/120V Split phase

2) Select the surge capacity (I_{max})

The surge capacity is the maximum discharge current (I_{max}) per phase. Each MOV is capable of withstanding multiple surges below the maximum surge level.

Two protection levels are available:

- 160kA per phase
- 320kA per phase

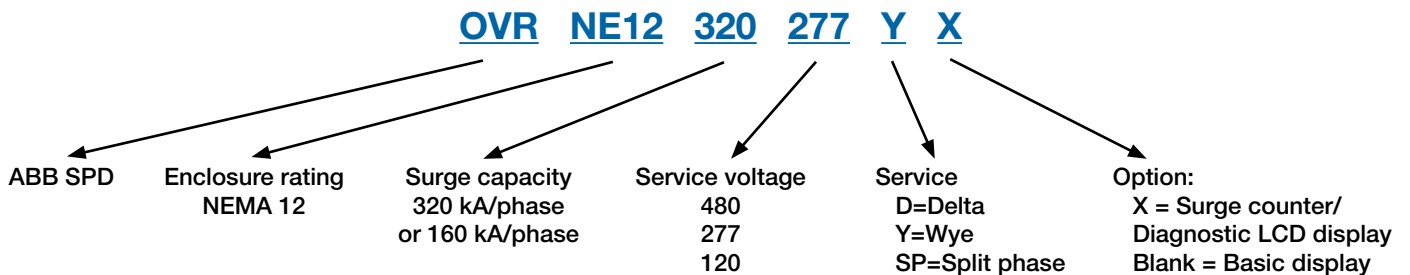
3) Choose a basic display or the surge counter/diagnostic LCD display

- Basic display: LED lights and alarm
- Surge counter/diagnostic LCD display: LED lights, alarm and LCD screen displaying percentage protection level, surge count and last surge date

Once these three steps are complete, consult the tables below and on Page 16.10 to select the unit. If technical assistance is required, please call ABB Technical Support at (888) 385-1221 option #4.



OVR NE12 enclosed SPD part number diagram



Designation	Service voltage	Features		
		Default visualization Green/red LED	Audible alarm	Surge counter
OVR NE12 320 480D X	480V Delta	Yes	Yes	Yes
OVR NE12 160 480D X	480V Delta	Yes	Yes	Yes
OVR NE12 320 277Y X	480Y/277V	Yes	Yes	Yes
OVR NE12 160 277Y X	480Y/277V	Yes	Yes	Yes
OVR NE12 320 120SP X	240/120V Split phase	Yes	Yes	Yes
OVR NE12 160 120SP X	240/120V Split phase	Yes	Yes	Yes
OVR NE12 320 480D	480V Delta	Yes	Yes	No
OVR NE12 160 480D	480V Delta	Yes	Yes	No
OVR NE12 320 277Y	480Y/277V	Yes	Yes	No
OVR NE12 160 277Y	480Y/277V	Yes	Yes	No
OVR NE12 320 120SP	240/120V Split phase	Yes	Yes	No
OVR NE12 160 120SP	240/120V Split phase	Yes	Yes	No

Product selection

OVR NE12 enclosed SPD

OVR NE12 enclosed SPD

Surge capacity per phase kA	Service voltage	Catalog number	Description
320	480V Delta	OVRNE12320480DX	OVR NE12 enclosed SPD, 480V Delta, 320kA, w/ Surge counter
		OVRNE12320480D	OVR NE12 enclosed SPD, 480V Delta, 320kA
	480Y/277V	OVRNE12320277YX	OVR NE12 enclosed SPD, 480Y/277V, 320kA, w/ Surge counter
		OVRNE12320277Y	OVR NE12 enclosed SPD, 480Y/277V, 320kA
	240/120V SP	OVRNE12320120SPX	OVR NE12 enclosed SPD, 240/120V Split phase, 320kA, w/ Surge counter
		OVRNE12320120SP	OVR NE12 enclosed SPD, 240/120V Split Phase, 320kA
160	480V Delta	OVRNE12160480DX	OVR NE12 enclosed SPD, 480V Delta, 160kA, w/ Surge counter
		OVRNE12160480D	OVR NE12 enclosed SPD, 480V Delta, 160kA
	480Y/277V	OVRNE12160277YX	OVR NE12 enclosed SPD, 480Y/277V, 160kA, w/ Surge counter
		OVRNE12160277Y	OVR NE12 enclosed SPD, 480Y/277V, 160kA
	240/120V SP	OVRNE12160120SPX	OVR NE12 enclosed SPD, 240/120V Split phase, 160kA, w/ Surge counter
		OVRNE12160120SP	OVR NE12 enclosed SPD, 240/120V Split phase, 160kA

Replacement power supply and MOV block ¹⁾

Surge capacity kA	Service voltage	Catalog number	Description
160	480V Delta	OVR1N160480PS	OVR NE12 Power supply, 480V Delta, 160kA
		OVR1N160480	OVR NE12 MOV, 480V Delta, 160kA
	480Y/277V	OVR1N160277PS	OVR NE12 Power supply, 480Y/277V, 160kA
		OVR1N160277	OVR NE12 MOV, 480Y/277V, 160kA
	240/120V SP	OVR1N160120PS	OVR NE12 Power supply, 240/120V split phase, 160kA
		OVR1N160120	OVR NE12 MOV, 240/120V split phase, 160kA

¹⁾ Consult the OVR NE12 installation and operation manual (document number 1SXU430222M0201) for power supply and MOV block replacement instructions

Service parts and accessories

Description	Catalog number	Extended description
3P SW 100A J FUSE 600V*	OS100GJ03	Fusible disconnect switch - 480V Delta and 240/120V split phase
3P+N SW 100A J FUSE 600V*	OS100GJ04N2	Fusible disconnect switch - 480Y/277V
PSTL HDL 6X65MM BLACK	OHB65J6	Enclosure door handle for fusible disconnect switch
PSTL SHAFT 6X150MM	EXP6X150	Metal shaft for fusible disconnect switch
3P LUG KIT 100A FUSED (6 LUGS)	OZXA-24	Terminal lug kit
WALL MOUNTING BRACKETS (4)	AA1206	Enclosure mounting brackets

* Fuses by others (Type J 100A)

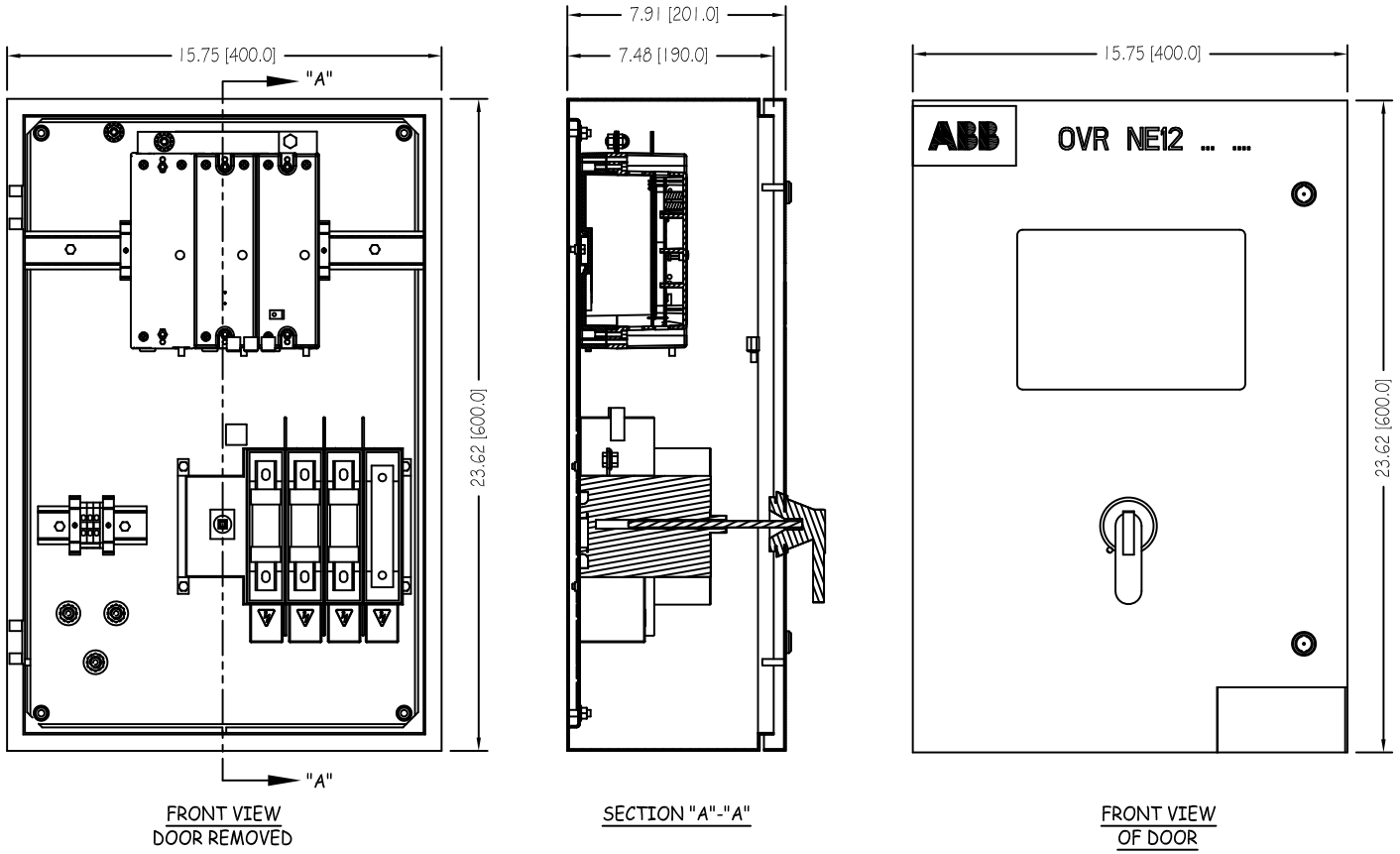
Technical data

OVR NE12 enclosed SPD

Surge Protective
Devices

		OVRNE12320480DX OVRNE12320480D OVRNE12160480DX OVRNE12160480D	OVRNE12320277YX OVRNE12320277Y OVRNE12160277YX OVRNE12160277Y	OVRNE12320120SPX OVRNE12320120SP OVRNE12160120SPX OVRNE12160120SP
Technical characteristics				
Service voltage		480V Delta	480/277V Wye	240/120V Split phase
Application		Service entrance	Service entrance	Service entrance
Phases		3	3	2
Mode of protection		L-L / L-N / L-G / N-G	L-L / L-N / L-G / N-G	L-L / L-N / L-G / N-G
Surge capacity/phase (I_{max})	kA	160 or 320	160 or 320	160 or 320
Maximum continuous operating voltage (MCOV)	V	550	320	150
Voltage protection rating (VPR - UL 3rd Ed.)				
L-N	V	/	1200	900
L-L	V	1800	2000	1200
L-G	V	1800	1200	800
N-G	V	/	1200	800
Nominal discharge current (I_n)	kA	10	10	10
Short circuit current rating (SCCR)	kA	200	200	200
AC power frequency	Hz	50-60	50-60	50-60
Thermal fuse		Type J 100A	Type J 100A	Type J 100A
EMI/RFI filtering	dB	-30	-30	-30
Mechanical characteristics				
Connection terminals	Inches	1/4 - 5/16 - 3/8 - 1/2	1/4 - 5/16 - 3/8 - 1/2	1/4 - 5/16 - 3/8 - 1/2
Terminal torque	Nm	6-75	6-75	6-75
Auxiliary contact connection terminals	AWG	22 - 12	22 - 12	22 - 12
Auxiliary contact terminal torque	Nm	1	1	1
Front display		Yes	Yes	Yes
LED indicators		Yes	Yes	Yes
Audible alarm		Yes	Yes	Yes
Auxiliary contact		Yes	Yes	Yes
Surge counter		Yes - Option "X"	Yes - Option "X"	Yes - Option "X"
Enclosure material		Painted steel	Painted steel	Painted steel
Enclosure rating		NEMA 12	NEMA 12	NEMA 12
Dimensions H x W x D (approx.)	Inches	24" x 16" x 8"	24" x 16" x 8"	24" x 16" x 8"
Weight (approx.)	lbs	40	40	40
Miscellaneous characteristics				
Stocking temperature		32°F (0°C) to 104°F (40°C)	32°F (0°C) to 104°F (40°C)	32°F (0°C) to 104°F (40°C)
Operating temperature		32°F (0°C) to 104°F (40°C)	32°F (0°C) to 104°F (40°C)	32°F (0°C) to 104°F (40°C)
Maximum altitude		6600 feet (2000 m)	6600 feet (2000 m)	6600 feet (2000 m)
Fire resistance according to UL 94		V0	V0	V0
Approvals		ANSI/UL 1449 3rd Ed. Meets IEEE requirements	ANSI/UL 1449 3rd Ed. Meets IEEE requirements	ANSI/UL 1449 3rd Ed. Meets IEEE requirements
Replacement MOV block				
		OVR1N160480PS (power supply) OVR1N160480	OVR1N160277PS (power supply) OVR1N160277	OVR1N160120PS (power supply) OVR1N160120

Approximate dimensions OVR NE12 enclosed SPD





OVR Series DIN rail products



Product introduction

OVR DIN rail SPD

Introduction

Over 80% of transient surges are caused by internal sources such as load switching and normal equipment operations. The installation of ABB OVR UL 1449 3rd Edition pluggable AC DIN rail SPDs will combat these surges and provide protection to valuable equipment and help keep an operation up and running. This new product range is approved as Type 4 recognized components and is usable in Type 2 applications. These products are of the same high quality as ABB UL 1449 2nd Edition devices, with improved safety as a result of additional testing required by the UL 1449 3rd Edition standard. Installation at branch panels, control panels and terminal equipment is recommended to provide the most complete protection.

Features & benefits

The OVR DIN rail SPDs utilize fast acting metal oxide varistor (MOV) technology to limit overvoltage to values compatible with the sensitive equipment connected to the network.

End of life indicator

This feature is standard on all ABB pluggable OVR DIN rail surge protectors. Each cartridge is equipped with a mechanical indicator which is green when the SPD is operational and protecting the system, and turns red when it has reached end of life. When this occurs, the cartridge must be replaced to guarantee protection.

Pluggable

The ability to efficiently maintain equipment is a key focus topic for industrial facilities. For this reason, ABB OVR DIN rail SPDs (excluding data line products) now utilize pluggable cartridges. Should one or more cartridges reach end of life, the electrical circuit does not have to be isolated, nor does the whole device have to be removed. Simply pull the dead cartridge from its housing and plug in a new one.

Remote indication (Optional - "TS" designation)

This function, achieved by wiring an integrated 3-point 1A volt-free contact, enables the operational state of the SPD to be monitored remotely.

Technical features of the remote indicator

- 1 NO (normally open) contact and 1 NC (normally closed) contact
- Min. load: 12 VDC - 10 mA
- Max. load: 250 VAC - 1 A
- Connection cross section: 1.5 mm² (16 AWG)

Specifications

- **UL 1449 3rd Edition - Type 4 Recognized Component**
- I_{max} - 15kA and 40kA
- Maximum continuous operating voltage (U_c) - 175, 320, 440, 550 and 660 VAC
- Configuration - 1L, 2L, 3L, N, 1N, 2N, 3N

ABB recommends a multi-level approach to surge protection. Combining OVR DIN rail SPDs with the OVR NE12 enclosed SPD will ensure the facility or operation is fully protected.



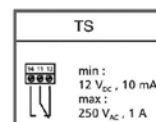
End-of-life indicator



NOTE: A surge protector that has reached end of life does not interrupt service, it simply disconnects itself, and the system is no longer protected.



NOTE: Pluggable surge protector cartridges are equipped with a "key" matched to each part number base, preventing incorrect replacements.



Wiring schematic
Remote indication contact



Surge protector fitted with
the remote indication option



Product selection

OVR DIN rail SPD

Choosing the correct model

1) Determine the service voltage

Consult qualified personnel if the facility or operation service voltage is unknown.

2) Select the SPD maximum continuous operating voltage (MCOV, U_c)

The MCOV should correspond to the service voltage.

Example: If the service voltage is 480V Delta, an SPD with 550V or 660V MCOV will be required.

Surge protection devices must also provide a level of protection compatible with the withstand voltage of the equipment. This withstand voltage depends on the type of equipment and its sensitivity. The incoming surge protector may not provide adequate protection by itself, as certain electrical phenomena may greatly increase its residual voltage if cable lengths exceed 10m. A second SPD may be necessary. See Coordination below.

3) Select the SPD surge capacity (I_{max})

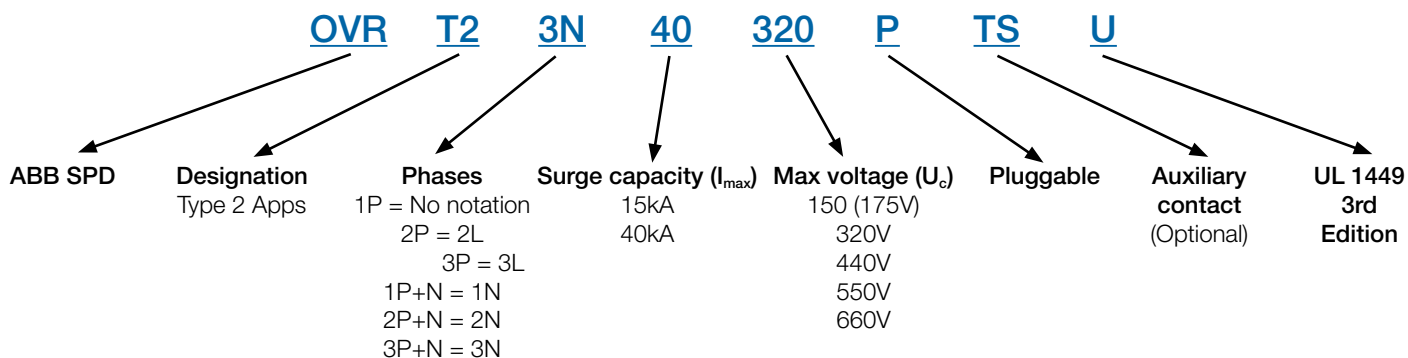
Surge capacity is the amount of energy the SPD can withstand from a single surge event. The higher the surge capacity, the longer the device will protect the system. A second surge protector may be required if the surge capacity of the first is not capable of diverting all surge current to ground. See Coordination below.

4) Remote monitoring (Optional)

Integrated auxiliary contact for remote monitoring available on models with "TS" designation.

Consult the Service Voltage and Location table on page 16.16 for help in the selection of SPDs.

OVR DIN rail SPD - Part number diagram



Complete facility protection

Installing surge protection at the main distribution panel is only the beginning of protecting the entire operation. As most transient surges are created internally, it is necessary to install surge protection at sub-distribution panels (equipment protection) to be fully protected. Stepping down the I_{max} level from the service entrance panel toward equipment to be protected is recommended.

For example, if a 40kA I_{max} SPD is installed in the main distribution panel, then 15kA I_{max} SPDs should be installed in sub-distribution panels for equipment protection.

Coordination

It may be necessary to add a second surge protector, wired to the incoming unit, to achieve the required voltage protection and/or surge capacity. For Type 2 or 4 SPDs, installing this second unit a minimum of 1m from the first unit will allow the two to work together, achieving the required protection.

Wiring rules

The impedance of the cables increases the voltage across the connected equipment. Therefore, the length of the cable between the surge protector and the equipment should be minimized.

The surge protective device should be installed as close to the equipment to be protected as possible. If this is not possible (the equipment is over 30m from the panel), then a second surge protector must be installed.

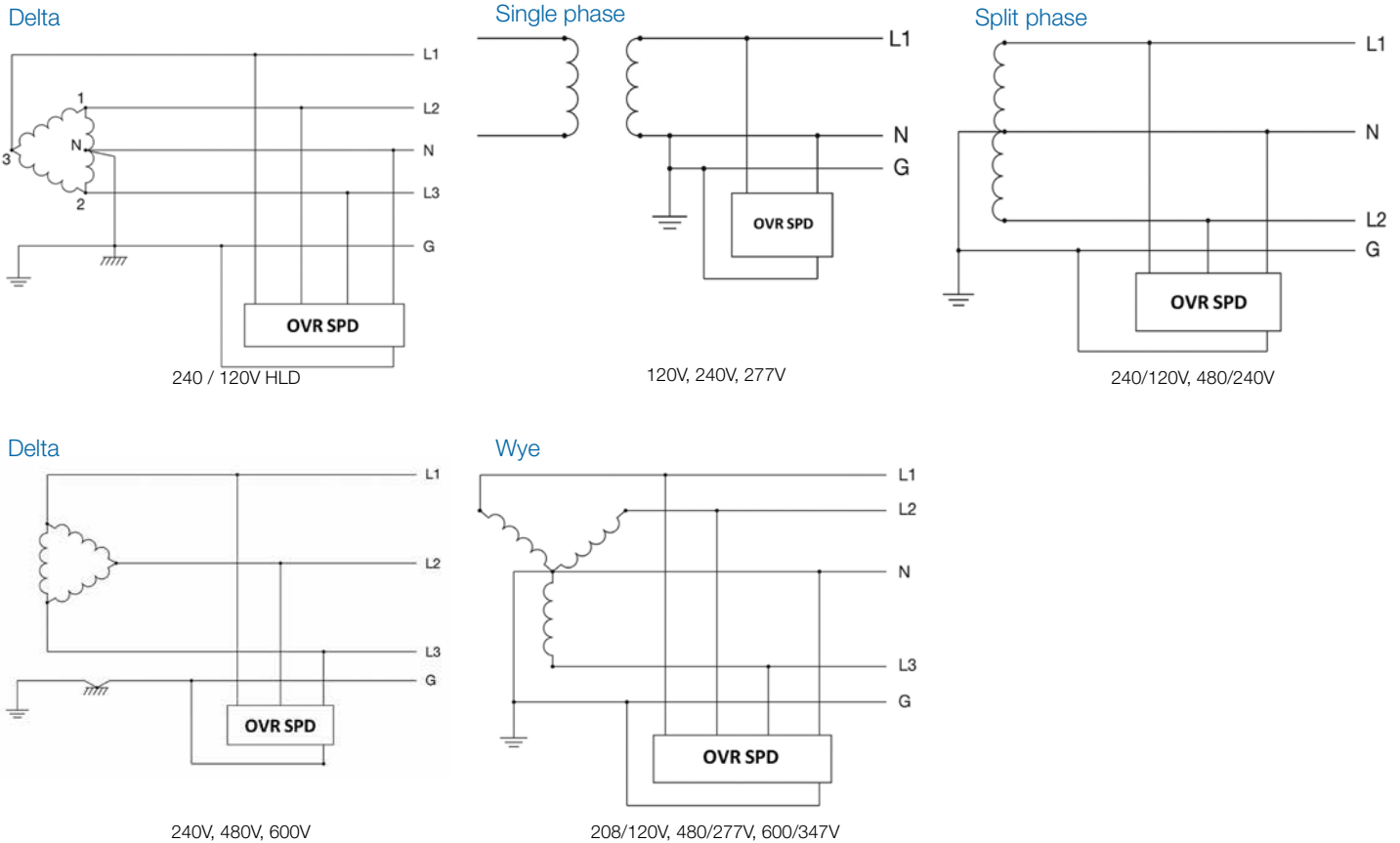
Product selection

Service voltage and location

Service voltage and location

Network	Service voltage	Number of wires	Service entrance	Main distribution panel	Sub-distribution panel
			OVR NE12 enclosed SPD	OVR DIN rail SPD	OVR DIN rail SPD
Delta	240/120V HLD	4W+G	----	OVRT23N40320PTSU	OVRT23N15320PU
	240V	3W+G	----	OVRT23L40320PTSU	OVRT23L15320PU
	480V	3W+G	OVRNE12320480D(X) OVRNE12160480D(X)	OVRT23L40550PTSU	OVRT23L40550PTSU
	600V	3W+G	----	3 x OVRT240660PTSU	3 x OVRT240660PTSU
Single phase	120V	2W+G	----	OVRT21N40150PTSU	OVRT21N15150PU
	240V	2W+G	----	OVRT21N40320PTSU	OVRT21N15320PU
	277V	2W+G	----	OVRT21N40320PTSU	OVRT21N15320PU
Split phase	240/120V	3W+G	OVRNE12320120SP(X) OVRNE12160120SP(X)	OVRT22N40150PTSU	OVRT22N15150PU
	480/240V	3W+G	----	OVRT22N40320PTSU	OVRT22N15320PU
Wye	208/120V	4W+G	----	OVRT23N40150PTSU	OVRT23N15150PU
	480/277V	4W+G	OVRNE12320277Y(X) OVRNE12160277Y(X)	OVRT23N40320PTSU	OVRT23N15320PU
	600/347V	4W+G	----	OVRT23N40440PTSU	OVRT23N40440PTSU

General wiring diagrams - DIN rail devices



NOTE: Multiple pole SPDs shown. Wiring diagrams for reference only.

Product selection OVR DIN rail SPD

Surge Protective
Devices

Consult the Service Voltage and Location table on page 16.16 for proper SPD selection. The following tables also present information on service voltage compatibility. Please note that multiple SPDs may be required depending on service voltage. Contact ABB Technical Support with any questions.

One pole

Catalog number	Service voltage ¹⁾	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge
OVRT215150PU	120V Single Phase, 240/120V Split Phase, 208/120V Wye	15	No	OVRT215150CU
OVRT215320PU	240/120V HLD, 240V Delta, 240V Single Phase, 277V Single Phase, 480/240V Split Phase, 480/277V Wye	15	No	OVRT215320CU
OVRT240150PU	120V Single Phase, 240/120V Split Phase, 208/120V Wye	40	No	OVRT240150CU
OVRT240150PTSU	120V Single Phase, 240/120V Split Phase, 208/120V Wye	40	Yes	OVRT240150CU
OVRT240320PU	240/120V HLD, 240V Delta, 240V Single Phase, 277V Single Phase, 480/240V Split Phase, 480/277V Wye	40	No	OVRT240320CU
OVRT240320PTSU	240/120V HLD, 240V Delta, 240V Single Phase, 277V Single Phase, 480/240V Split Phase, 480/277V Wye	40	Yes	OVRT240320CU
OVRT240440PTSU	600/347V Wye	40	Yes	OVRT240440CU
OVRT240550PTSU	480V Delta	40	Yes	OVRT240550CU
OVRT240660PTSU	600V Delta	40	Yes	OVRT240660CU

1) May require multiple SPDs

Two pole

Catalog number	Service voltage ¹⁾	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge ²⁾
OVRT22L15150PU	120V Single phase, 240/120V Split phase, 208/120V Wye	15	No	OVRT215150CU
OVRT22L15320PU	240/120V HLD, 240V Delta, 240V Single phase, 277V Single phase, 480/240V Split phase, 480/277V Wye	15	No	OVRT215320CU
OVRT22L40150PTSU	120V Single phase, 240/120V Split phase, 208/120V Wye	40	Yes	OVRT240150CU
OVRT22L40320PTSU	240/120V HLD, 240V Delta, 240V Single phase, 277V Single phase, 480/240V Split phase, 480/277V Wye	40	Yes	OVRT240320CU

1) May require multiple SPDs

2) May require up to two replacement cartridges

Three pole

Catalog number	Service voltage ¹⁾	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge ²⁾
OVRT23L15150PU	240/120V Split phase, 208/120V Wye	15	No	OVRT215150CU
OVRT23L15320PU	240/120V HLD, 240V Delta, 480/240V Split phase, 480/277V Wye	15	No	OVRT215320CU
OVRT23L40150PTSU	240/120V Split phase, 208/120V Wye	40	Yes	OVRT240150CU
OVRT23L40320PTSU	240/120V HLD, 240V Delta, 480/240V Split phase, 480/277V Wye	40	Yes	OVRT240320CU
OVRT23L40440PTSU	240V Delta, 480/240V Split phase, 600/347V Wye	40	Yes	OVRT240440CU
OVRT23L40550PTSU	480V Delta	40	Yes	OVRT240550CU

1) May require multiple SPDs

2) May require up to three replacement cartridges

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Product selection OVR DIN rail SPD

One pole + neutral

Catalog number	Service voltage ¹⁾	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge ²⁾
OVRT21N15150PU	120V Single phase, 240/120V Split phase, 208/120V Wye	15	No	OVRT215150CU, OVRT270NCU
OVRT21N15320PU	240/120V HLD, 240V Single phase, 277V Single phase, 480/240V Split phase, 480/277V Wye	15	No	OVRT215320CU, OVRT270NCU
OVRT21N40150PTSU	120V Single phase, 240/120V Split phase, 208/120V Wye	40	Yes	OVRT240150CU, OVRT270NCU
OVRT21N40320PTSU	240/120V HLD, 240V Single phase, 277V Single phase, 480/240V Split phase, 480/277V Wye	40	Yes	OVRT240320CU, OVRT270NCU
OVRT21N40440PTSU	600/347V Wye	40	Yes	OVRT240440CU, OVRT270NCU
OVRT21N40550PTSU	600/347V Wye	40	Yes	OVRT240550CU, OVRT270NCU
OVRT21N40660PTSU	600/347V Wye	40	Yes	OVRT240660CU, OVRT270NCU

1) May require multiple SPDs

2) May require up to one phase and one neutral replacement cartridges

Two pole + neutral

Catalog number	Service voltage ¹⁾	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge ²⁾
OVRT22N15150PU	240/120V Split phase, 208/120V Wye	15	No	OVRT215150CU, OVRT270NCU
OVRT22N15320PU	240/120V HLD, 480/240V Split phase, 480/277V Wye	15	No	OVRT215320CU, OVRT270NCU
OVRT22N40150PTSU	240/120V Split phase, 208/120V Wye	40	Yes	OVRT240150CU, OVRT270NCU
OVRT22N40320PTSU	240/120V HLD, 480/240V Split phase, 480/277V Wye	40	Yes	OVRT240320CU, OVRT270NCU
OVRT22N40440PTSU	600/347V Wye	40	Yes	OVRT240440CU, OVRT270NCU
OVRT22N40550PTSU	600/347V Wye	40	Yes	OVRT240550CU, OVRT270NCU
OVRT22N40660PTSU	600/347V Wye	40	Yes	OVRT240660CU, OVRT270NCU

1) May require multiple SPDs

2) May require up to two phase and one neutral replacement cartridges.

Product selection

OVR DIN rail SPD

Surge Protective
Devices

Three pole + neutral

Catalog number	Service voltage	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge ¹⁾
OVRT23N15150PU	208/120V Wye	15	No	OVRT215150CU OVRT270NCU
OVRT23N15320PU	480/277V Wye, 240/120V HLD	15	No	OVRT215320CU OVRT270NCU
OVRT23N40150PTSU	208/120V Wye	40	Yes	OVRT240150CU OVRT270NCU
OVRT23N40320PTSU	480/277V Wye, 240/120V HLD	40	Yes	OVRT240320CU OVRT270NCU
OVRT23N40440PTSU	600/347V Wye	40	Yes	OVRT240440CU OVRT270NCU
OVRT23N40550PTSU	600/347V Wye	40	Yes	OVRT240550CU OVRT270NCU
OVRT23N40660PTSU	600/347V Wye	40	Yes	OVRT240660CU OVRT270NCU

1) May require up to three phase and one neutral replacement cartridges

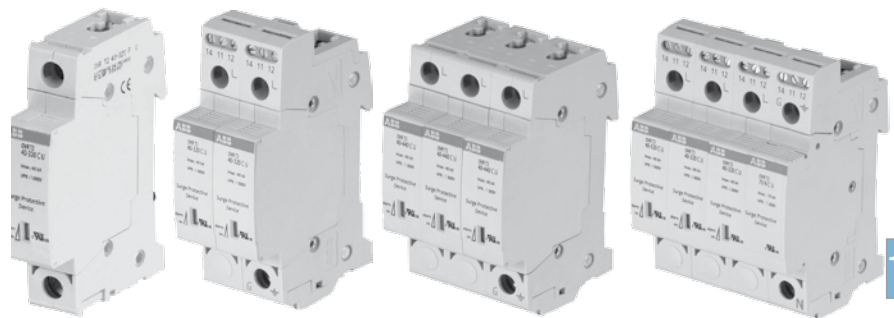
Neutral

Catalog number	Service voltage	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge
OVRT270NPU	HLD, Single Phase, Split Phase and Wye	70	No	OVRT270NCU

Replacement cartridges

Catalog number
OVRT215150CU
OVRT215320CU
OVRT240150CU
OVRT240320CU
OVRT240440CU
OVRT240550CU
OVRT240660CU
OVRT270NCU

NOTE: These replacement cartridges are usable only with the new OVR DIN rail product range shown in this brochure.



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Technical data

OVR DIN rail SPD

Electrical characteristics

Type / Test class

UL 1449 3rd Ed. - Type 4 for Type 2
apps

IEC 61 643-1 2nd Ed - T2 / II

Frequency	Hz	50-60
Response time	ns	<25
Operating current (I_o)	mA	<0.1
Short circuit withstand current (I_{scst})	kA	200
Integrated thermal disconnecter		Yes
State indicator		Yes
Safety reserve		No
Remote indicator		Optional
Disconnecter	Circuit breaker - B or C curve	A ≤125
	Class J fuse	A ≤100

Mechanical characteristics

Wire range - solid wire	AWG	4-14
Wire range - stranded wire	AWG	6-14
Stripping length	in	0.5
Tightening torque	in-lbs	24.5
Degree of protection		NEMA 1

Remote indicator (Optional)

Type of contact		1 NO / 1 NC
Minimum load		12 VDC / 10 mA
Maximum load		250 VAC / 1 A
Connection cross section	AWG	16

Miscellaneous characteristics

Operating temperature	F	-40° to 176°
Maximum altitude	ft	6562
Color of housing / Fire resistance according to UL 94		Gray RAL 7035 / V-0
Reference standards		UL 1449 3rd Ed, IEC 61 643-1 2nd Ed

Technical data

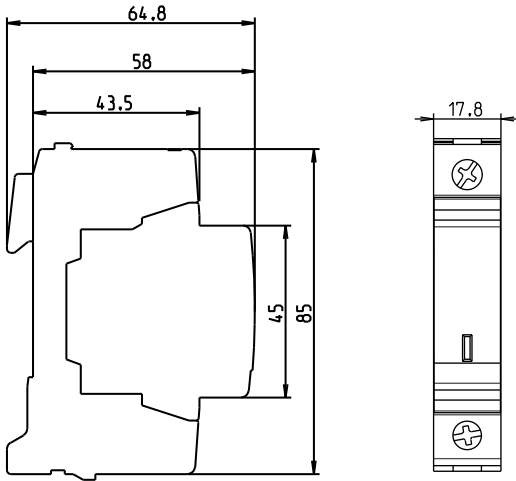
OVR DIN rail SPD

Surge Protective
Devices

Catalog number	Max. discharge current (I_{max} 8/20 μ s, kA)	Maximum continuous operating voltage (U _c)	Voltage protection rating, kV
OVRT215150PU	15	175	0.6
OVRT215320PU	15	320	1.0
OVRT240150PU	40	175	0.6
OVRT240150PTSU	40	175	0.6
OVRT240320PU	40	320	1.0
OVRT240320PTSU	40	320	1.0
OVRT240440PTSU	40	440	1.3
OVRT240550PTSU	40	550	1.7
OVRT240660PTSU	40	660	1.9
OVRT270NPU	70	255	1.2
OVRT22L15150PU	15	175	0.6
OVRT22L15320PU	15	320	1.0
OVRT22L40150PTSU	40	175	0.6
OVRT22L40320PTSU	40	320	1.0
OVRT23L15150PU	15	175	0.6
OVRT23L15320PU	15	320	1.0
OVRT23L40150PTSU	40	175	0.6
OVRT23L40320PTSU	40	320	1.0
OVRT23L40440PTSU	40	440	1.3
OVRT23L40550PTSU	40	550	1.7
OVRT21N15150PU	15	175	0.6 / 0.7 (L-N / L-G)
OVRT21N15320PU	15	320	1.0 / 1.1 (L-N / L-G)
OVRT21N40150PTSU	40	175	0.6 / 0.7 (L-N / L-G)
OVRT21N40320PTSU	40	320	1.0 / 1.1 (L-N / L-G)
OVRT21N40440PTSU	40	440	1.3 / 1.4 (L-N / L-G)
OVRT21N40550PTSU	40	550	1.7 / 1.8 (L-N / L-G)
OVRT21N40660PTSU	40	660	1.9 / 2.0 (L-N / L-G)
OVRT22N15150PU	15	175	0.6 / 1.2 / 0.7 (L-N / N-G / L-G)
OVRT22N15320PU	15	320	1.0 / 1.2 / 1.1 (L-N / N-G / L-G)
OVRT22N40150PTSU	40	175	0.6 / 1.2 / 0.7 (L-N / N-G / L-G)
OVRT22N40320PTSU	40	320	1.0 / 1.2 / 1.1 (L-N / N-G / L-G)
OVRT22N40440PTSU	40	440	1.3 / 1.2 / 1.4 (L-N / N-G / L-G)
OVRT22N40550PTSU	40	550	1.7 / 1.2 / 1.8 (L-N / N-G / L-G)
OVRT22N40660PTSU	40	660	1.9 / 1.2 / 2.0 (L-N / N-G / L-G)
OVRT23N15150PU	15	175	0.6 / 1.2 / 0.7 (L-N / N-G / L-G)
OVRT23N15320PU	15	320	1.0 / 1.2 / 1.1 (L-N / N-G / L-G)
OVRT23N40150PTSU	40	175	0.6 / 1.2 / 0.7 (L-N / N-G / L-G)
OVRT23N40320PTSU	40	320	1.0 / 1.2 / 1.1 (L-N / N-G / L-G)
OVRT23N40440PTSU	40	440	1.3 / 1.2 / 1.4 (L-N / N-G / L-G)
OVRT23N40550PTSU	40	550	1.7 / 1.2 / 1.8 (L-N / N-G / L-G)
OVRT23N40660PTSU	40	660	1.9 / 1.2 / 2.0 (L-N / N-G / L-G)

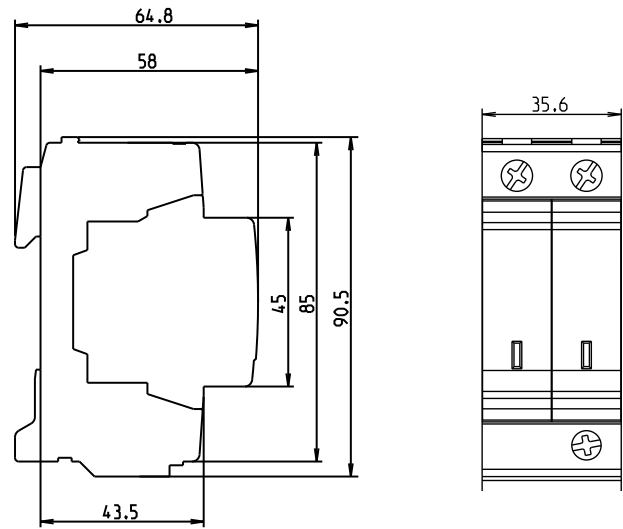
Approximate dimensions OVR DIN rail SPD

One pole

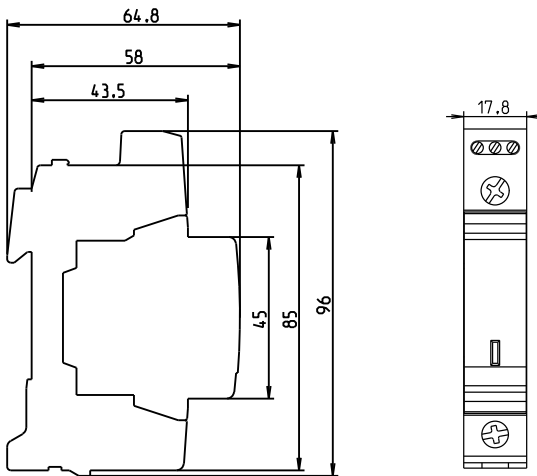


OVRT215150PU
OVRT215320PU
OVRT240150PU
OVRT240320PU
OVRT270NPU

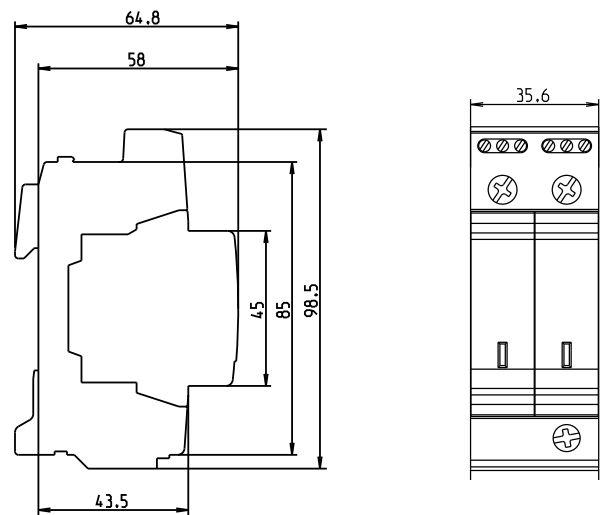
Two pole



OVRT22L15150PU
OVRT22L15320PU



OVRT240150PTSU
OVRT240320PTSU
OVRT240440PTSU
OVRT240550PTSU
OVRT240660PTSU



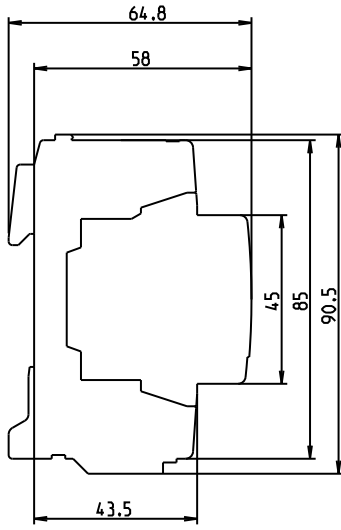
OVRT22L40150PTSU
OVRT22L40320PTSU

Approximate dimensions

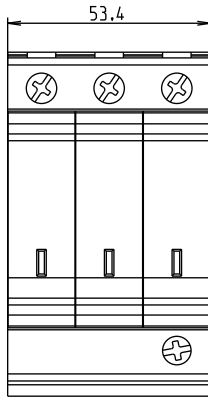
OVR DIN rail SPD

Surge Protective
Devices

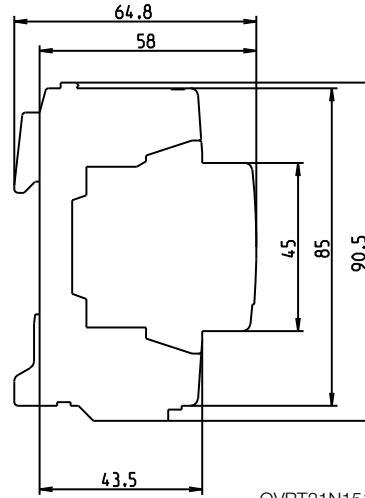
Three pole



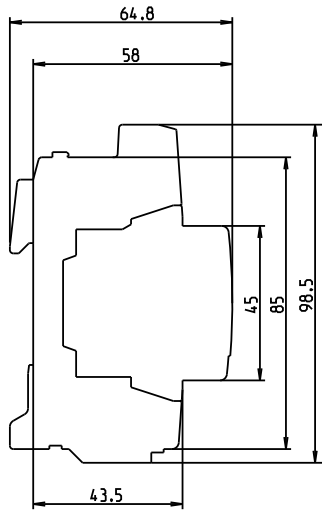
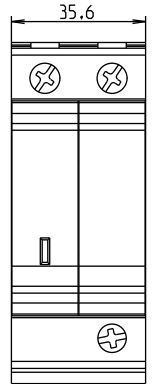
OVRT23L15150PU
OVRT23L15320PU



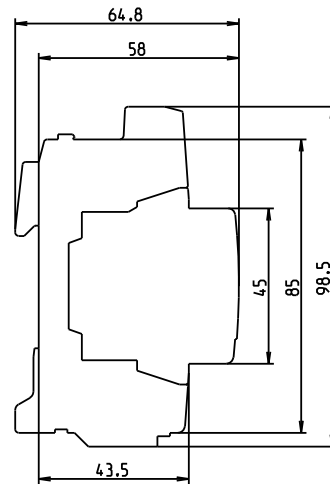
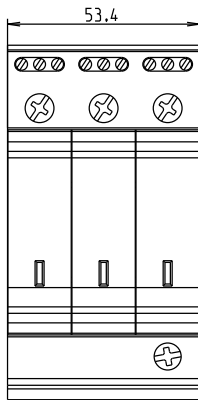
One pole + neutral



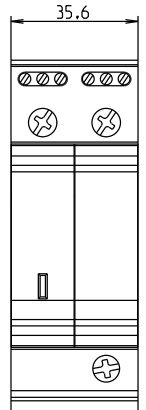
OVRT21N15150PU
OVRT21N15320PU



OVRT23L40150PTSU
OVRT23L40320PTSU
OVRT23L40440PTSU
OVRT23L40550PTSU

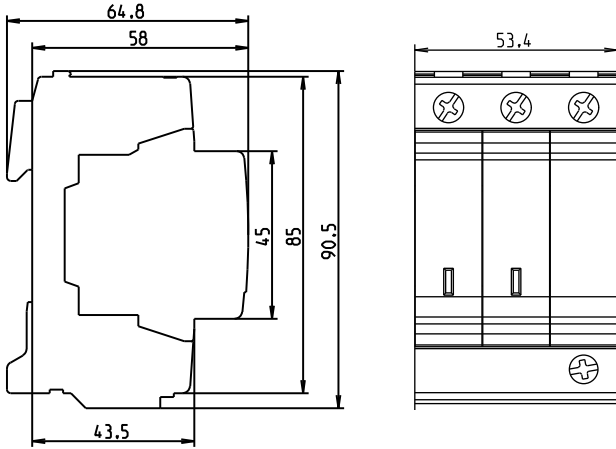


OVRT21N40150PTSU
OVRT21N40320PTSU
OVRT21N40440PTSU
OVRT21N40550PTSU
OVRT21N40660PTSU



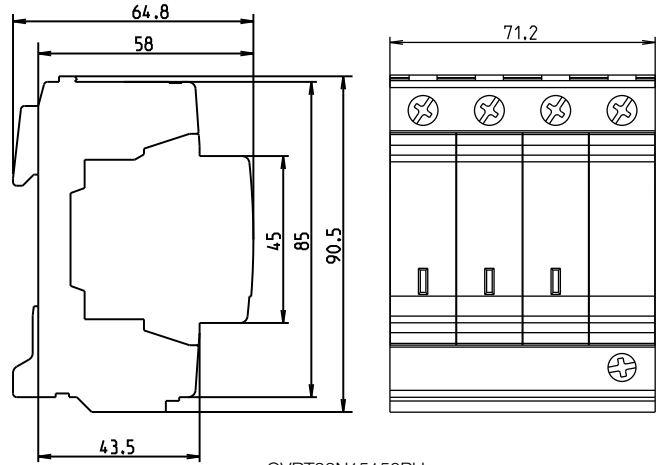
Approximate dimensions OVR DIN rail SPD

Two pole + neutral

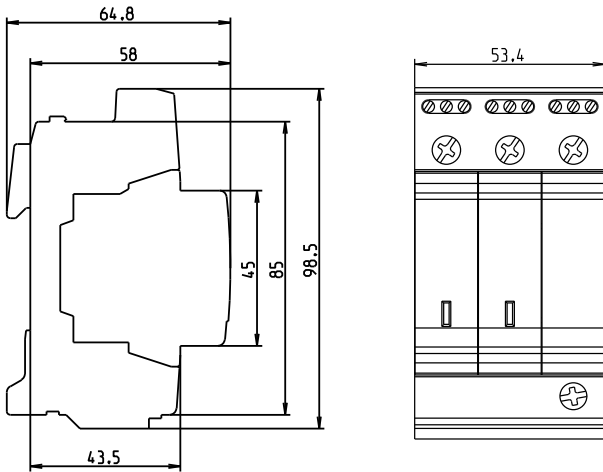


OVRT22N15150PU
OVRT22N15320PU

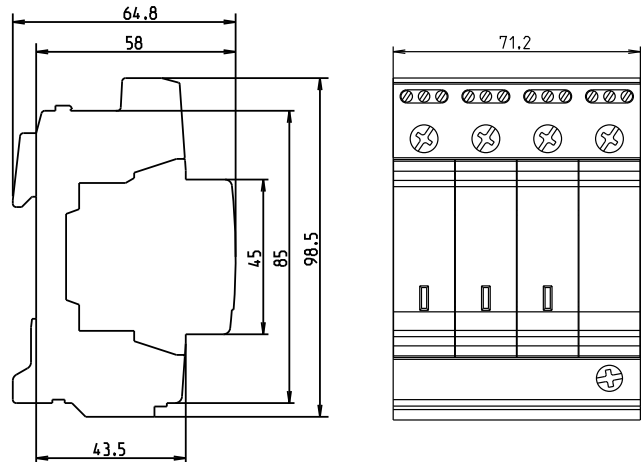
Three pole + neutral



OVRT23N15150PU
OVRT23N15320PU



OVRT22N40150PTSU
OVRT22N40320PTSU
OVRT22N40440PTSU
OVRT22N40550PTSU
OVRT22N40660PTSU



OVRT23N40150PTSU
OVRT23N40320PTSU
OVRT23N40440PTSU
OVRT23N40550PTSU
OVRT23N40660PTSU

UL 1449 2nd Edition to 3rd Edition

Cross reference

Surge Protective
Devices

Previous ABB catalog number - UL 1449 2nd Edition parts	New ABB catalog number - UL 1449 3rd Edition parts	
OVR15150	OVRT215150PU	
OVR15150SP		
OVR15275		
OVR40150P	OVRT215320PU	
OVR40150		
OVR40150SP	OVRT240150PU	
OVR65150SP		
OVR40150SPTS		OVRT240150PTSU
OVR40275P		
OVR40275SP		OVRT240320PU
OVR40-320P		
OVR65275SP		
OVR100275SP		
OVR40320SP		
OVR65320SP		
OVR100320SP		
OVR40275SPTS	OVRT240320PTSU	
OVR40320SPTS		
OVR65275SPTS		
OVR100320SPTS		
OVR15275PTS		
OVR40440	OVRT240440PTSU	
OVR40440SP		
OVR40-320D440P		
OVR40440SPTS		
OVR65440SPTS		
OVR15440		
OVR65440SP		
OVR100440S		
OVR100440SP		
OVR15550		OVRT240550PTSU
OVR65550S		
OVR40550		
OVR40550S		
OVR40660PTS	OVRT240660PTSU	
OVR40660P		
OVR40660SP		
OVR40660SPTS		
OVR15660		
OVR40660S		
OVR65660S	OVRT270NPU	
OVR65NP		
OVR100NP		

Previous ABB catalog number - UL 1449 2nd Edition parts	New ABB catalog number - UL 1449 3rd Edition parts
OVR3L15275P	OVRT23L15320PU
OVR3L40275SP	OVRT23L40320PTSU
OVR3L65275SP	
OVR3N15150	OVRT23N15150PU
OVR3N15320	OVRT23N15320PU
OVR3N40150SP	OVRT23N40150PTSU
OVR3N40320PTS	OVRT23N40320PTSU
OVR3N15275	
OVR3N40320P	
OVR3N40320SPTS	
OVR3N100320SPTS	
OVR3N40275SP	
OVR3N65275SP	
OVR3N40320SP	
OVR3N65320SP	
OVR3N65320SPTS	
OVR3N100320SP	OVRT23N40440PTSU
OVRN340320SPTS	
OVR3N40440SP	
OVRN365440S	OVRT21N15150PU
OVR3N65440SP	
OVR1N15150	OVRT21N40150PTSU
OVR1N15150SPTS	
OVR1N40150SP	
OVR1N40150SPTS	
OVR1N65150SP	OVRT21N40320PTSU
OVRN140275P	
OVRN140275PTS	OVRT23L40440PTSU + OVRT240440PTSU
OVR4L65440S	

Photovoltaic surge protection OVR PV DIN rail SPD

Introduction

Providing power with photovoltaic (PV) solar panels is an ever increasing part of public utilities' renewable energy portfolios, designed to provide electricity in an economical manner, within the context of regulations and scarce resources. Installations are frequently in isolated areas, and combined with the large surface area of a group of panels, the risk of damage from direct and indirect lightning strikes is high.

To mitigate this risk, ABB recommends the installation of OVR PV surge protective devices on the DC portion of the system. ABB provides a wide range of surge protection devices that have been specifically designed for photovoltaic systems.

The main features of the OVR PV surge protectors are:

- Built-in thermal protection with 25A DC breaking capacity
- Removable cartridges for easy maintenance with no need to isolate the line
- Remote signalling contact for monitoring the operating status (TS versions)
- No subsequent short-circuit current
- No risk if the polarity is reversed
- Approvals: UL 1449 3rd Ed, IEC



OVR PV DIN rail SPD

Catalog number	Maximum continuous operating voltage, U_{cpv}	Max. discharge current ($I_{max} 8/20_{\mu s}$, kA)	Aux. contact - remote monitoring	Number of poles	Replacement cartridge
OVRPV15600PU	600	15	No	3	OVRPV15600CU
OVRPV15600PTSU	600	15	Yes	3	OVRPV15600CU
OVRPV40600PU	600	40	No	3	OVRPV40600CU
OVRPV40600PTSU	600	40	Yes	3	OVRPV40600CU
OVRPV15800PU	800	15	No	3	OVRPV15800CU
OVRPV15800PTSU	800	15	Yes	3	OVRPV15800CU
OVRPV40800PU	800	40	No	3	OVRPV40800CU
OVRPV40800PTSU	800	40	Yes	3	OVRPV40800CU
OVRPV151000PU	1000	15	No	3	OVRPV151000CU
OVRPV151000PTSU	1000	15	Yes	3	OVRPV151000CU
OVRPV401000PU	1000	40	No	3	OVRPV401000CU
OVRPV401000PTSU	1000	40	Yes	3	OVRPV401000CU

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Replacement cartridges

Catalog number
OVRPV15600CU
OVRPV15800CU
OVRPV151000CU
OVRPV40600CU
OVRPV40800CU
OVRPV401000CU

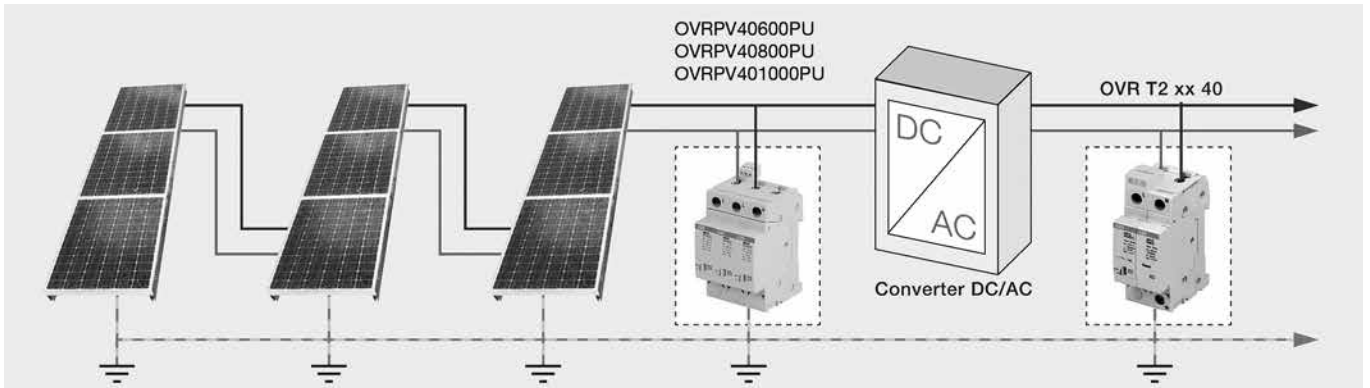


Photovoltaic surge protection

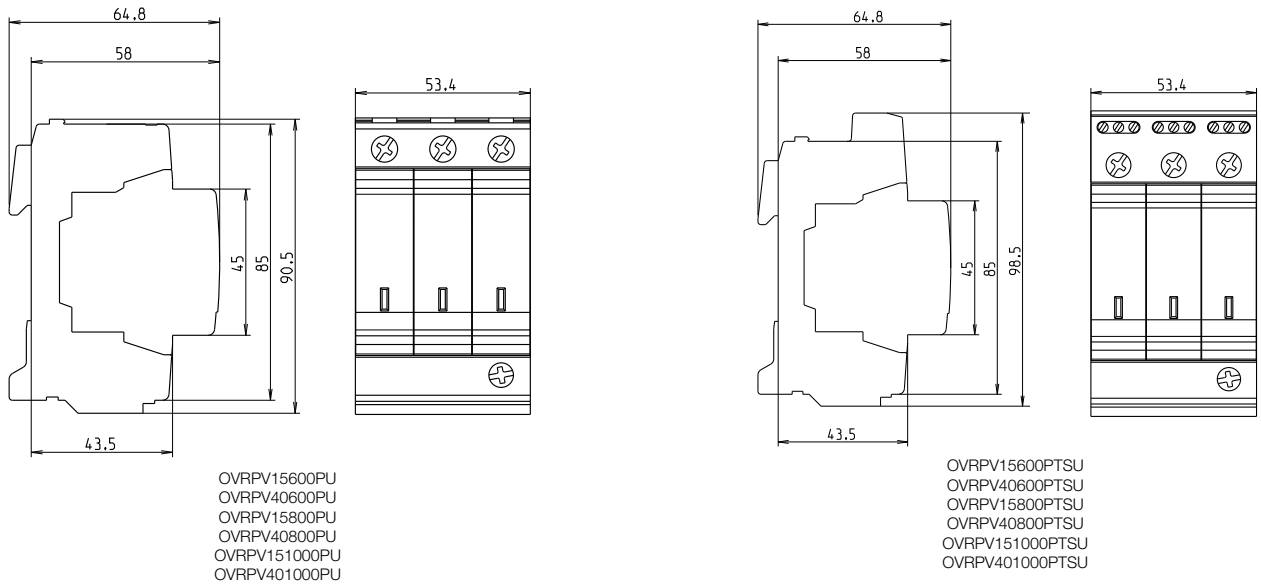
OVR PV DIN rail SPD

Surge Protective
Devices

Installation of OVR SPD on photovoltaic networks



OVR PV approximate dimensions



Data line surge protection OVR DIN rail SPD

Introduction

In order to ensure complete protection for equipment in a facility, telecommunication lines entering the installation must have surge protection. Doing so will keep computers, fax machines and other data and communications equipment safe.

The main features of OVR data line surge protectors are:

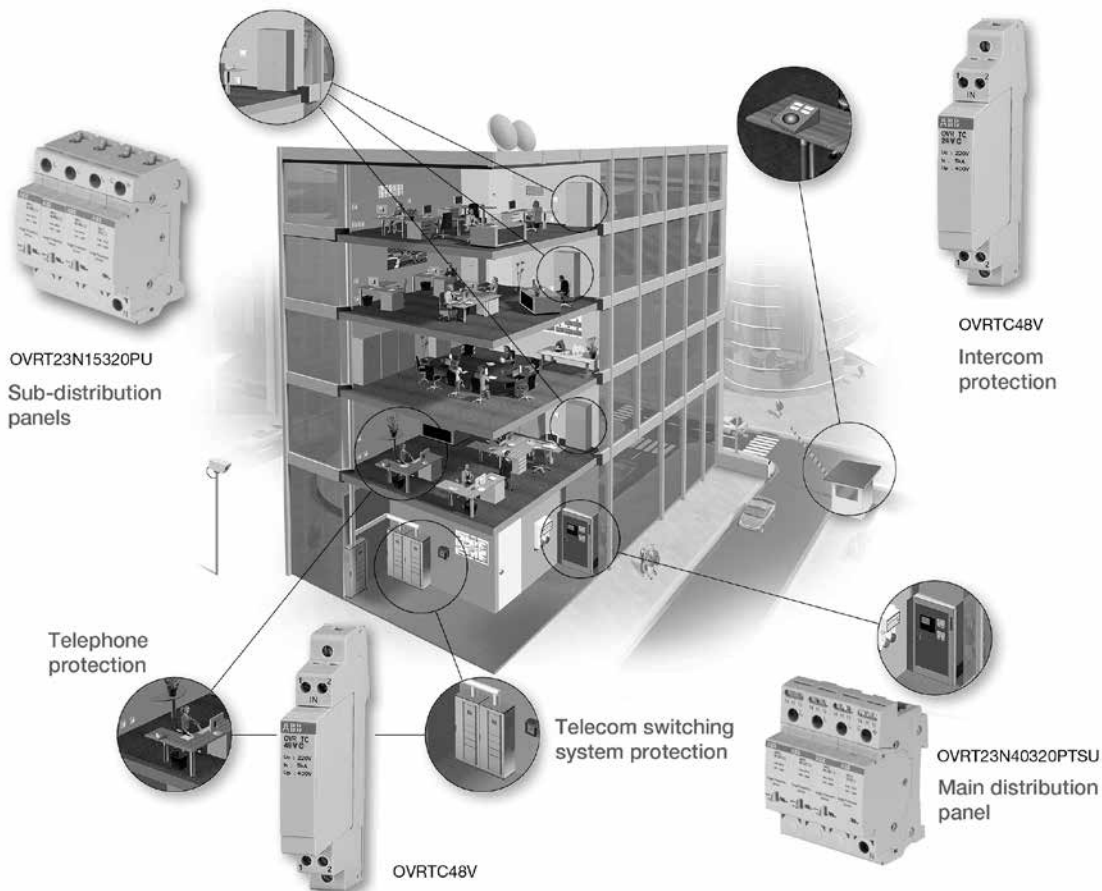
- 10kA maximum discharge current
- Nominal voltage: 6, 12, 24, 48 and 200 VDC
- Visual life indicator
- UL 497B approved

OVR data line DIN Rail SPD

Catalog number	Maximum continuous operating voltage (U _c)	Max. discharge current (I _{max} , 8/20μs, kA)
OVRTC06V	7	10
OVRTC12V	14	10
OVRTC24V	27	10
OVRTC48V	53	10
OVRTC200V ¹⁾	220	10
OVRTC200FR	220	10

¹⁾ Connection type is parallel. All other parts, series.

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Description

The F200 Series residual current devices offer a wide range of product for all of your fault protection needs.

A & AC

A large offering for standard instantaneous and selective AC and A types.

All sizes up to 63 mA with sensitivity thresholds up to 1 A are offered in all possible pole configurations.

ABB RCDs carry many marks and approvals for the worldwide market.

Features

RCDs assure protection to equipment against current leakage to earth.

UL 1053

UL file number: E244046

Type	F200AC AC	F200A A
Amperage (A)	16,25,40,63,80,100,125 ^①	16,25,40,63,80,100,125 ^①
Voltage	Up to 480 VAC	Up to 480 VAC
Sensitivity (mA)	0.01, 0.03, 0.1, 0.3, 0.5	0.01, 0.03, 0.1, 0.3, 0.5
Type	-	F200A AP-R A
Amperage (A)	-	25,40,63,80,100,125 ^①
Voltage	-	Up to 480 VAC
Sensitivity (mA)	-	0.03
Type	F200AC S AC	F200A S A
Amperage (A)	40,63	40,63,100,125 ^①
Voltage	Up to 480 VAC	Up to 480 VAC
Sensitivity (mA)	0.1, 0.3, 0.5, 1.0	0.1, 0.3, 0.5, 1.0

^① 125A versions are not UL approved.

F200AC

F200 Series

AC Type



F202AC



F204AC



No. of poles	Rated residual current mA	Rated current A	Catalog number	
2	10	16	F202AC-16/0.01	
		30	25	F202AC-25/0.03
			40	F202AC-40/0.03
	63		F202AC-63/0.03	
	80		F202AC-80/0.03	
	100		F202AC-100/0.03	
	100	25	F202AC-25/0.1	
		40	F202AC-40/0.1	
		63	F202AC-63/0.1	
		80	F202AC-80/0.1	
		100	F202AC-100/0.1	
	300	25	F202AC-25/0.3	
		40	F202AC-40/0.3	
		63	F202AC-63/0.3	
		80	F202AC-80/0.3	
		100	F202AC-100/0.3	
500	25	F202AC-25/0.5		
	40	F202AC-40/0.5		
	63	F202AC-63/0.5		
	80	F202AC-80/0.5		
	100	F202AC-100/0.5		

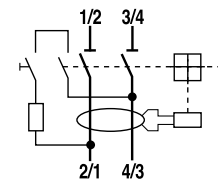
No. of poles	Rated residual current mA	Rated current A	Catalog number
4	30	25	F204AC-25/0.03
		40	F204AC-40/0.03
		63	F204AC-63/0.03
		80	F204AC-80/0.03
		100	F204AC-100/0.03
		125	F204AC-125/0.03 ^⓪
	100	25	F204AC-25/0.1
		40	F204AC-40/0.1
		63	F204AC-63/0.1
		80	F204AC-80/0.1
		100	F204AC-100/0.1
		125	F204AC-125/0.1 ^⓪
	300	25	F204AC-25/0.3
		40	F204AC-40/0.3
		63	F204AC-63/0.3
		80	F204AC-80/0.3
		100	F204AC-100/0.3
		125	F204AC-125/0.3 ^⓪
	500	25	F204AC-25/0.5
		40	F204AC-40/0.5
		63	F204AC-63/0.5
		80	F204AC-80/0.5
		100	F204AC-100/0.5
		125	F204AC-125/0.5 ^⓪

Type AC

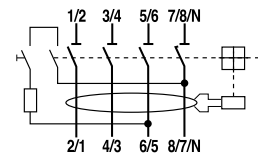
- Suitable for protection against AC earth leakage current
- 2 & 4 poles
- 16-125 A range
- Can be used as a main device providing ground fault protection against earth leakage for several MCB branch devices

Technical data

Technical data – See page 16.36



F202AC



F204AC

^⓪ 125A versions are not UL approved.

F200AC S

F200 Series

AC Type



F202AC S



F204AC S



No. of poles	Rated residual current mA	Rated current A	Catalog number
2	100	40	F202ACS-40/0.1
		63	F202ACS-63/0.1
	300	40	F202ACS-40/0.3
		63	F202ACS-63/0.3
	500	40	F202ACS-40/0.5
		63	F202ACS-63/0.5
	1000	40	F202ACS-40/1.0
		63	F202ACS-63/1.0

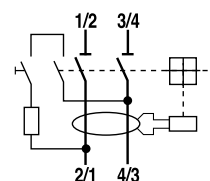
No. of poles	Rated residual current mA	Rated current A	Catalog number
4	100	40	F204ACS-40/0.1
		63	F204ACS-63/0.1
	300	40	F204ACS-40/0.3
		63	F204ACS-63/0.3
	500	40	F204ACS-40/0.5
		63	F204ACS-63/0.5
	1000	40	F204ACS-40/1.0
		63	F204ACS-63/1.0

Type AC S (Selectivity)

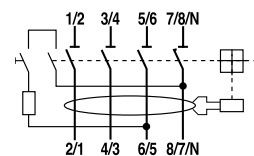
- Intentional tripping delay, permitting selectivity with downstream instantaneous devices
- 5kA surge current resistance
- Suitable for protection against AC earth leakage current
- 2 & 4 poles
- 40 and 63 A range
- Can be used as a main device providing ground fault protection against earth leakage for several MCB branch devices

Technical data

Technical data – See page 16.36



F202AC S



F204AC S

F200A

F200 Series

A Type



F202A



F204A



No. of poles	Rated residual current mA	Rated current A	Catalog number	
2	10	16	F202A-16/0.01	
		30	25	F202A-25/0.03
			40	F202A-40/0.03
			63	F202A-63/0.03
			80	F202A-80/0.03
			100	F202A-100/0.03
	100	25	F202A-25/0.1	
		40	F202A-40/0.1	
		63	F202A-63/0.1	
		80	F202A-80/0.1	
		100	F202A-100/0.1	
	300	25	F202A-25/0.3	
		40	F202A-40/0.3	
		63	F202A-63/0.3	
		80	F202A-80/0.3	
100		F202A-100/0.3		
500	25	F202A-25/0.5		
	40	F202A-40/0.5		
	63	F202A-63/0.5		
	80	F202A-80/0.5		
		100	F202A-100/0.5	

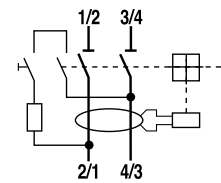
No. of poles	Rated residual current mA	Rated current A	Catalog number
4	30	25	F204A-25/0.03
		40	F204A-40/0.03
		63	F204A-63/0.03
		80	F204A-80/0.03
		100	F204A-100/0.03
		125	F204A-125/0.03 ①
	100	25	F204A-25/0.1
		40	F204A-40/0.1
		63	F204A-63/0.1
		80	F204A-80/0.1
		100	F204A-100/0.1
		125	F204A-125/0.1 ①
	300	25	F204A-25/0.3
		40	F204A-40/0.3
		63	F204A-63/0.3
		80	F204A-80/0.3
		100	F204A-100/0.3
		125	F204A-125/0.3 ①
	500	25	F204A-25/0.5
		40	F204A-40/0.5
		63	F204A-63/0.5
		80	F204A-80/0.5
		100	F204A-100/0.5
		125	F204A-125/0.5 ①

Type A

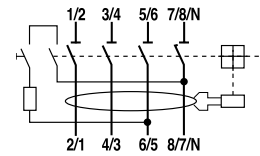
- Suitable for protection against AC and pulsating DC earth leakage current
- 2 & 4 poles
- 16-125 A range
- Can be used as a main device providing ground fault protection against earth leakage for several MCB branch devices

Technical data

Technical data – See page 16.36



F202A



F204A

① 125A versions are not UL approved.

F200A AP-R

F200 Series

A Type



F202A AP-R



F204A AP-R



No. of poles	Rated residual current mA	Rated current A	Catalog number
2	30	25	F202A-25/0.03APR
		40	F202A-40/0.03APR
		63	F202A-63/0.03APR
		80	F202A-80/0.03APR
		100	F202A-100/0.03APR

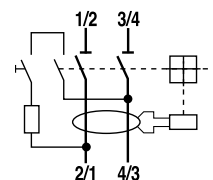
No. of poles	Rated residual current mA	Rated current A	Catalog number
4	30	25	F204A-25/0.03APR
		40	F204A-40/0.03APR
		63	F204A-63/0.03APR
		80	F204A-80/0.03APR
		100	F204A-100/0.03APR
		125	F204A-125/0.03APR ①

Type A AP-R (High Immunity)

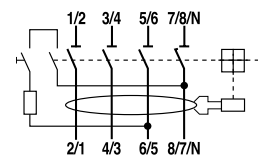
- Resistance to unwanted tripping (high immunity)
- 3kA surge current resistance
- Suitable for protection against AC and pulsating DC earth leakage current
- 2 & 4 poles
- 25-125 A range
- Can be used as a main device providing ground fault protection against earth leakage for several MCB branch devices

Technical data

Technical data – See page 16.36



F202A AP-R



F204A AP-R

① 125A versions are not UL approved.

F200A S

F200 Series

A Type



F202A S



F204A S



No. of poles	Rated residual current mA	Rated current A	Catalog number
2	100	40	F202AS-40/0.1
		63	F202AS-63/0.1
		100	F202AS-100/0.1
	300	40	F202AS-40/0.3
		63	F202AS-63/0.3
		100	F202AS-100/0.3
	500	40	F202AS-40/0.5
		63	F202AS-63/0.5
		100	F202AS-100/0.5
	1000	40	F202AS-40/1.0
		63	F202AS-63/1.0
		100	F202AS-100/1.0

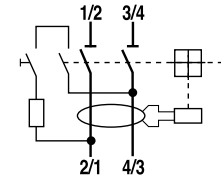
No. of poles	Rated residual current mA	Rated current A	Catalog number
4	100	40	F204AS-40/0.1
		63	F204AS-63/0.1
		100	F204AS-100/0.1
	300	40	F204AS-40/0.3
		63	F204AS-63/0.3
		100	F204AS-100/0.3
	500	40	F204AS-40/0.5
		63	F204AS-63/0.5
		100	F204AS-100/0.5
	1000	40	F204AS-40/1.0
		63	F204AS-63/1.0
		100	F204AS-100/1.0

Type A S (Selectivity)

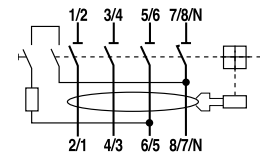
- Intentional tripping delay, permitting selectivity with downstream instantaneous devices
- 5kA surge current resistance
- Suitable for protection against AC and pulsating DC earth leakage current
- 2 & 4 poles
- 40-125 A range
- Can be used as a main device providing ground fault protection against earth leakage for several MCB branch devices

Technical data

Technical data – See page 16.36



F202A S



F204A S

Ⓢ 125A versions are not UL approved.

Technical data

Functions and classification criteria

RCDs

Power loss of RCDs

RCCBs F200 series

Rated Current in [A]	Power loss [W]	
	2P	4P
16	1.5	-
25	2.0	4.8
40	4.8	8.4
63	7.2	13.2

Performance in altitude of RCDs

Up to the height of 2000 m, ABB RCDs do not undergo any alterations in their rated performances. Over this height the properties of the atmosphere change in terms of composition, dielectric capacity, cooling capacity and pressure, therefore the performances of the RCDs undergo derating, which can basically be measured in terms of variations in significant parameters, such as the maximum operating voltage and the rated current.

F200

Altitude [m]	2000	3000	4000
Rated service voltage U_e [V]	400	380	380
Rated current in	I_n	$0.96 \times I_n$	$0.93 \times I_n$

Introduction

Residual current devices (RCD) have always played an important role in circuit protection by detecting leakage to ground for equipment in many installations. RCD's are used in unison with a circuit protective device in industrial applications in the United States. The following guide will give an insight to the construction, mechanical operation, and applications of RCD's.

RCD Definitions

Important definitions:

Earth leakage current

Current that flows between line to line or line to earth.

Residual current

The sum of the values of the electric currents in all live conductors

Fault current

Current that flows between line to line or line to earth.

Earth fault

When a conductive path is accidentally induced between a line and the earth

RCD Definition

RCD's provide ground fault protection to equipment by monitoring the leakage of current to ground. An RCD will trip when a ground fault is detected in excess of the trip rating of the device. An RCD is designed to disconnect a circuit whenever it detects that the electrical current is unbalanced between the phase conductor and the neutral conductor. An imbalance may be caused by phase leaking to ground.

Difference between type A and AC

Types of RCD's

Type AC

Must be used for protection against AC earth leakage current.



Type A

Must be used for protection against AC and pulsating DC (rectified AC) earth leakage current. The type A RCD must be installed in any circuit where the main supply is likely to be rectified. Some examples of applications where this would apply are motor speed controllers (drives) and power tools.

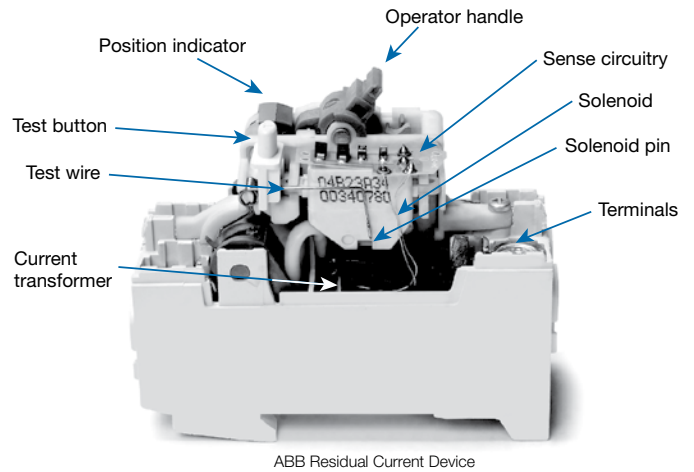
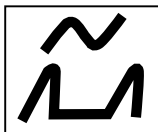
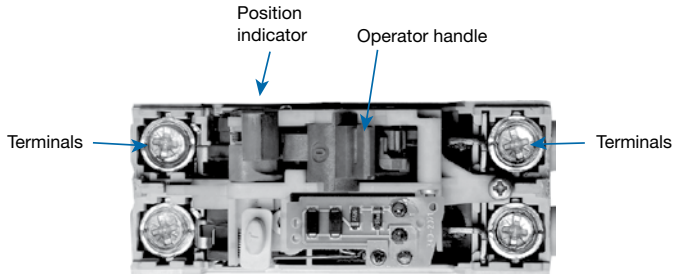


ABB Residual Current Device

RCD Mechanical operation

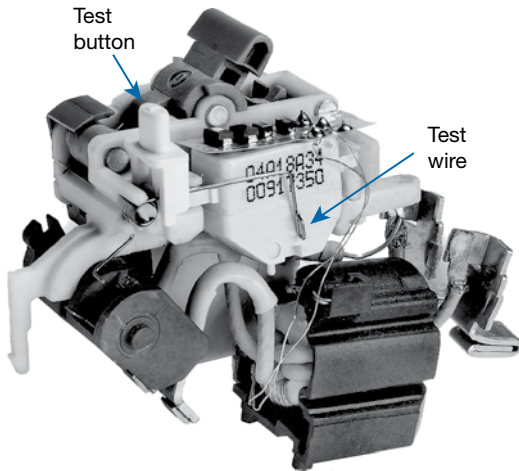
Main Incoming Supply and Terminals

The main incoming and the grounded neutrals are connected to the terminals. The operator handle places the RCD in the on and off position as the position indicator shows.



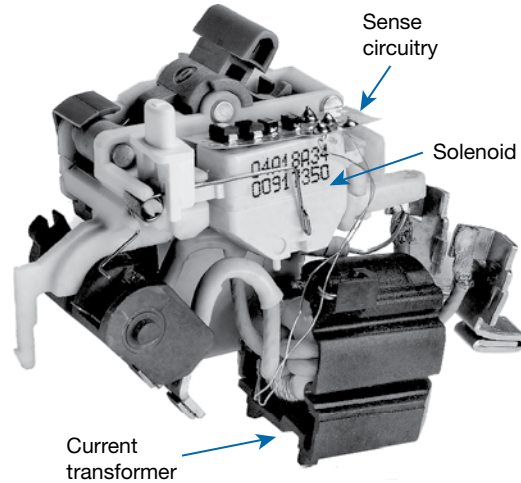
Test button and Test Wire

When the test button is pressed it allows the correct operation of the device to be verified by passing a small current through the test wire. This simulates a leakage to ground by creating an imbalance in the current transformer (CT).



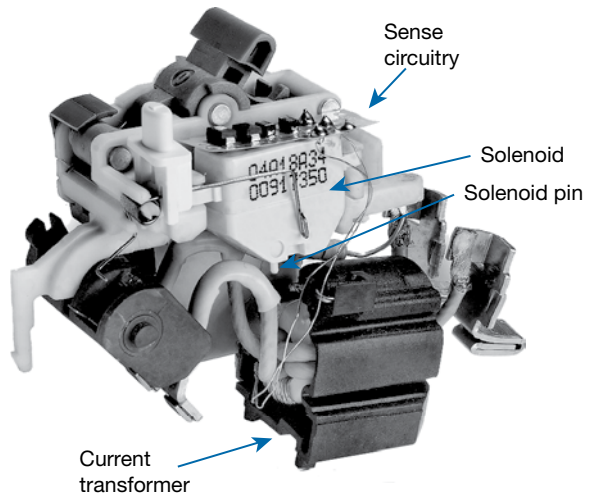
Current Transformer and Sense Circuitry

The current transformer surrounds the neutral and L1 conductors. During normal operation, all of the current being carried through the L1 conductor returns up through the neutral conductor. Therefore the currents in the two conductors are equal and opposite. When a leakage to ground occurs it causes some of the current to take a path to ground and creates an imbalance in the current between the two conductors. This imbalance in current induces a current in the current transformer (CT) which is then picked up by the sense circuitry. The sense circuitry then actuates the solenoid and the contacts are forced apart by a spring, terminating the electricity supply to the device.



Solenoid

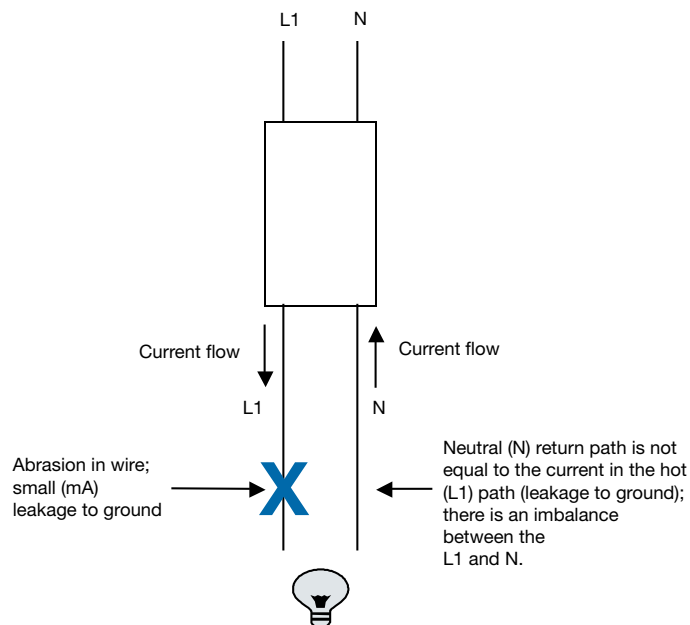
Once an imbalance has been detected by the CT, there is voltage induced on the CT. The voltage travels through the connected copper wires to the sense circuitry and the solenoid is actuated. The plunger at the bottom of the solenoid is then pushed out to trip the breaker.



Application manual

Difference between RCD and MCB

Example of current leakage to ground



Difference between RCD and MCB

Miniature Circuit Breaker (MCB)

A miniature circuit breaker (MCB) is a device designed to isolate a circuit during an overcurrent event without the use of a fusible element. A breaker is a resettable protective device that protects against two types of overcurrent situations; overload and short circuit.

Residual Current Device (RCD)

A residual current device (RCD) is a device designed to provide protection against voltage leakage to ground. *RCD's are sensitive to a 30-300mA. RCD's are mechanical devices that contain a CT and a solenoid.* RCD's are designed to protect equipment, not wires against overload and short circuit situations. For this reason, an RCD should always be used in conjunction with an MCB in order to provide full protection from overload and leakage to ground.

Ground Fault Interrupter (GFI)

GFI Definition (NEC): A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device.

A ground fault interrupter (GFI) is a device designed to measure the current between the hot wire and neutral wire. Like the RCD, the GFI will open the closed contacts in order to protect against damage. A GFI is sensitive to 5mA and higher and is designed to protect people, not equipment.

A GFI is an electric device that contains a printed circuit board (PCB). GFI's have a "pigtail" wire at the end that carries a signal to the PCB that tells the contacts to open when a current imbalance is detected between the two conductors.

Technical data

F200AC, F200A

Item	F200AC	F200AC S
Approvals:		
UL	1053	1053
CSA	-	-
VDE	-	-
IEC	-	-
Number of Poles:	2, 4	2, 4
Rated Currents:	16, 25, 40, 63, 80, 100, 125 ^⓪	40, 63
Operating Voltage:	Up to 480 VAC	Up to 480 VAC
Production Category:	IP20	IP20
Depth of Unit Per DIN 43880:	68mm/ 2.68 in.	68mm/ 2.68 in.
Mounting Position:	vertical, horizontal	vertical, horizontal
Standard Mounting:	35mm DIN rail	35mm DIN rail
Main and Shunt Trip Terminals:		
Wire Size	18-4 AWG/.82-21.2mm ²	18-4 AWG/.82-21.2mm ²
Torque	17.5 in-lbs./1.978 nm	17.5 in-lbs./1.978 nm
Tool	#2 Posidrive	#2 Posidrive
Accessory Terminals		
Wire Size	18-16 AWG/.82-1.3mm ²	18-16 AWG/.82-1.3mm ²
Torque	4.5 in-lbs./.51nm	4.5 in-lbs./.51nm
Tool	# 1 Posidrive	# 1 Posidrive
Service Life at Rated Load:	No Load 20,000 operations Full Load 10,000 operations	No Load 20,000 operations Full Load 10,000 operations
Shock Resistance:	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms
Vibration Resistance:	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ 1n	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ 1n

Item	F200A	F200A AP-R	F200A S
Approvals:			
UL	1053	1053	1053
CSA	-	-	-
VDE	-	-	-
IEC	-	-	-
Number of Poles:	2, 4	2, 4	2, 4
Rated Currents:	16, 25, 40, 63, 80, 100, 125 ^⓪	25, 40, 63, 80, 100, 125 ^⓪	40, 63, 100, 125 ^⓪
Operating Voltage:	Up to 480 VAC	Up to 480 VAC	Up to 480 VAC
Production Category:	IP20	IP20	IP20
Depth of Unit Per DIN 43880:	68mm/ 2.68 in.	68mm/ 2.68 in.	68mm/ 2.68 in.
Mounting Position:	vertical, horizontal	vertical, horizontal	vertical, horizontal
Standard Mounting:	35mm DIN rail	35mm DIN rail	35mm DIN rail
Main and Shunt Trip Terminals:			
Wire Size	18-4 AWG/.82-21.2mm ²	18-4 AWG/.82-21.2mm ²	18-4 AWG/.82-21.2mm ²
Torque	17.5 in-lbs./1.978 nm	17.5 in-lbs./1.978 nm	17.5 in-lbs./1.978 nm
Tool	#2 Posidrive	#2 Posidrive	#2 Posidrive
Accessory Terminals			
Wire Size	18-16 AWG/.82-1.3mm ²	18-16 AWG/.82-1.3mm ²	18-16 AWG/.82-1.3mm ²
Torque	4.5 in-lbs./.51nm	4.5 in-lbs./.51nm	4.5 in-lbs./.51nm
Tool	# 1 Posidrive	# 1 Posidrive	# 1 Posidrive
Service Life at Rated Load:	No Load 20,000 operations Full Load 10,000 operations	No Load 20,000 operations Full Load 10,000 operations	No Load 20,000 operations Full Load 10,000 operations
Shock Resistance:	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms
Vibration Resistance:	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ 1n	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ 1n	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ 1n

^⓪ 125A versions are not UL approved.

E90 Series Fuseholders and fuse disconnectors



Fuseholders and fuse disconnectors E90 Series



Description

E90 fuseholders and fuse disconnectors can be used in a variety of applications where electrical protection and isolation are required.

E 90 Fuse switch disconnectors

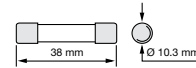
E 90 series fuse switch disconnectors are designed for switching circuits under load, providing protection against short circuits and overloads. The case is made of self-extinguishing thermoplastic material resistant to high temperatures (all materials are UL listed) while the contact clips are in silver plated copper.

E 90 fuse switch disconnectors can be sealed or padlocked to ensure operator safety during maintenance. For easy and quick installation E 90 range is totally compatible with connecting bars, terminals and caps of S 200 MCBs.

Thanks to cURus approval, they can be installed in UL certified machines.

E90 fuse disconnectors for 10.3 x 38 mm fuses (AC-22B)

No. of poles	Modules	Rated Current I _n A	Catalog number
1	1	32	E91/32
1	1	32	E91/32s
1+N	2	32	E91N/32
1+N	2	32	E91N/32s
2	2	32	E92/32
3	3	32	E93/32
3+N	4	32	E93N/32
4	4	32	E94/32



s: version with blown fuse indicator light.



Type		E 90/32
Fuse	[mm]	10 x 38
Current type		a.c. / d.c.
Rated frequency	[Hz]	50-60
Rated current	[A]	32
Max power dissipation	[W]	3
Tightening torque	[Nm]	PZ2 2-2.5
Terminal cross section	[mm ²]	25
Protection degree		IP20
Can be padlocked (open)		■
Can be sealed (closed)		■

IEC 60947-3		
Rated operating voltage	[V]	400
Utilization category		AC-22B
Markings		IMQ, NF

Alternate current characteristics according to IEC 60947-3		
Rated operating voltage	[V]	690
Utilization category		AC-22B

Direct current characteristics according to IEC 60947-3		
Rated operating voltage	[V]	690
Utilization category		DC-20B ①

IEC 60269-1		
Rated a.c. voltage	[V]	690
Rated d.c. voltage	[V]	690

IEC 60269-2		
Fuse system		F
Rated a.c. voltage	[V]	690
Rated d.c. voltage	[V]	440
Breaking capacity	[kA]	200 (a.c.) – 100 (d.c.)

IEC 60269-3		
Fuse system		B
Rated a.c. voltage	[V]	400

IEC 60269-4		
Fuse system		F
Rated a.c. voltage	[V]	690
Rated d.c. voltage	[V]	690

UL 4248		
Markings		cURus

① If the product is used with direct current, switching under load is not permitted. In this case, the warning "do not open under load" must be visible in the front of the device.

E 90 Fuse switch disconnectors

Technical data

Materials

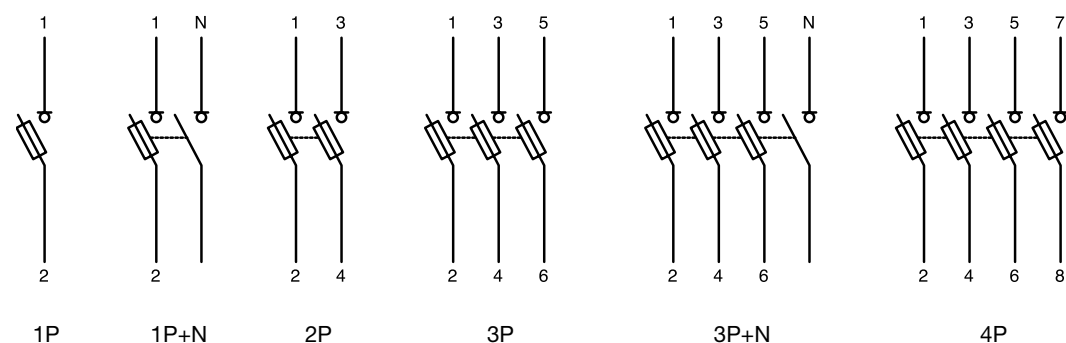
Plastic parts	Case:	Material PA 6 +30% glass fibre
		Self-extinguishing class: V2 (UL94)
		Temperature resistance: 130 °C
	Opening handle	Material PA 66 +25% glass fibre
		Self-extinguishing class V0 (UL94)
		Temperature resistance: 140 °C
Metal parts	Clips	Silver plated copper
	Clip spring	Stainless steel
	Terminals	Galvanized steel

The E 90 series is environmental friendly and protects the health of people: all used materials are conform to the RoHS and REACH directives and they completely exclude hazardous substances and halogen.

Utilization category

Current type	Utilization category	Typical applications
Alternating current	AC-20A - AC-20B	Connecting and disconnecting under no load (in this case the devices must be marked "Do not disconnect under load")
	AC-21A - AC-21B	Switching of resistive loads, including moderate overloads
	AC-22A - AC-22B	Switching of mixed resistive/inductive loads, including moderate overloads
	AC-23A - AC-23B	Switching of motors and other highly inductive loads
Direct current	DC-20A - DC-20B	Connecting and disconnecting under no load (in this case the devices must be marked "Do not open under load")
	DC-21A - DC-21B	Switching of resistive loads, including moderate overloads
	DC-22A - DC-22B	Switching of mixed resistive / inductive loads, including moderate overloads
	DC-23A - DC-23B	Switching of motors or other highly inductive loads
	Suffix A	Frequent use
	Suffix B	Infrequent use

Electrical symbols



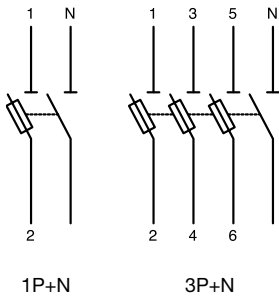
E 90h Fuseholders

E 90h fuseholders are suitable for protection against overloads and short circuits. Available in a single module 1P+N version and in a three-module 3P+N version, they are designed for use with gG and aM cylindrical fuse links. The body is made from self-extinguishing material resistant to high temperatures, while the contact clips are in silver-plated copper. E 90h fuseholders can be sealed or padlocked to assure operator safety during maintenance.



Note: NF mark is available on custom versions with left sided neutral for French market

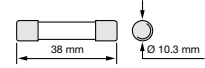
Electrical symbols



E90h fuseholders for 10.3 x 38 mm fuses

No. of poles	Modules	Rated Current I _n , A	Catalog number
1+N	1	32	E91hN/32
1+N	1	32	E91hN/32s
3+N	3	32	E93hN/32

s: version with blown fuse indicator light.



Technical data

Type	E 90hN/32	
Fuse	[mm]	10 x 38
Current type		a.c. / d.c.
Rated frequency	[Hz]	50-60
Rated current	[A]	32
Max power dissipation	[W]	3
Tightening torque	[Nm]	PZ2 0.8-1.2
Terminal cross section	[mm ²]	16
Protection degree		IP20
Can be padlocked (open)		■
Can be sealed (closed)		■

IEC 60269-1

Rated a.c. voltage	[V]	690
Rated d.c. voltage	[V]	690

IEC 60269-2

Fuse system		F
Rated a.c. voltage	[V]	690
Rated d.c. voltage	[V]	440
Breaking capacity	[kA]	200 (a.c.) – 100 (d.c.)

IEC 60269-3

Fuse system		B
Rated a.c. voltage	[V]	400
Markings		IMQ

IEC 60269-4

Fuse system		F
Rated a.c. voltage	[V]	690
Rated d.c. voltage	[V]	690

UL 4248

Mark		cURus
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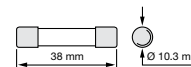
E 90 PV Fuse disconnectors

E 90 PV series fuse disconnectors (UL approved), designed for operating voltages of 1000 V d.c. with utilization category DC-20B, are particularly suited for protection against overcurrents of photovoltaic systems. The single-pole or two-pole E 90 PV disconnectors for 10.3 x 38 mm cylindrical fuse links offer a reliable, compact and affordable solution for photovoltaic installations. Versions with blown fuse indicator allow to check whether the fuse is still working correctly or not.



E90 PV fuse disconnectors for 10.3 x 38 mm fuses (DC-20B)

No. of poles	Modules	Rated Current I _n A	Catalog number
1	1	32	E91/32PV
1	1	32	E91/32PVs
2	2	32	E92/32PV
2	2	32	E92/32PVs



s: version with blown fuse indicator light



Note: CCC mark is available on custom versions for Chinese market

Technical data

Type	E 90/32 PV	
Fuse	[mm]	10 x 38
Current type		d.c.
Rated frequency	[Hz]	-
Rated current	[A]	32
Max power dissipation	[W]	3
Tightening torque	[Nm]	PZ2 2-2.5
Terminal cross section	[mm ²]	25
Protection degree		IP20
Can be padlocked (open)		■
Can be sealed (closed)		■

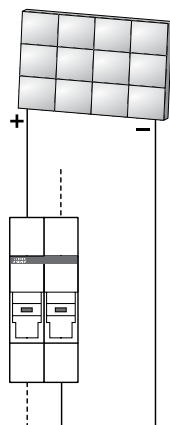
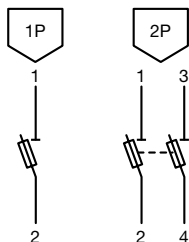
Fuse indicator LED



IEC 60947-3		
Rated operating voltage	[V]	1000
Utilization category		DC-20B
UL 4248		
Mark		cULus

Wiring of E 90 PV with blown fuse indicator light in direct current

Electrical symbols



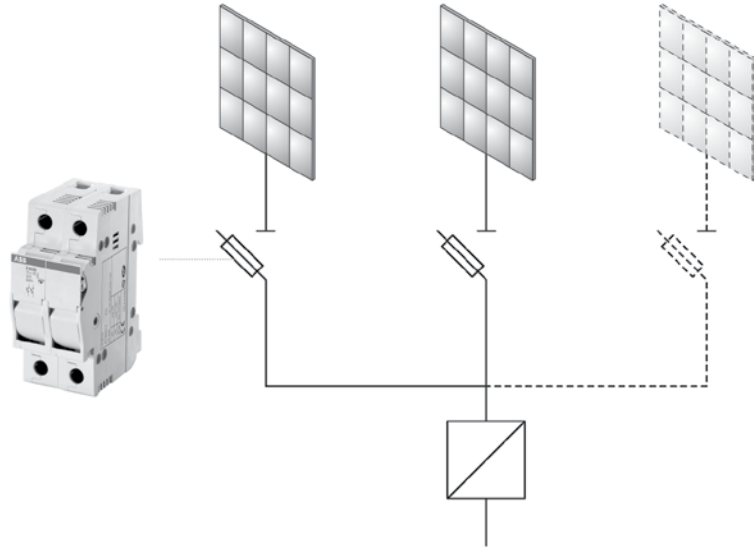
In direct current systems, since the LED allows the current to flow only from positive to negative, the wiring of the blown fuse indicator version should follow the current direction as shown in the diagram.

E 90 PV Fuse disconnectors

Protection and disconnection of 1000 V DC lines

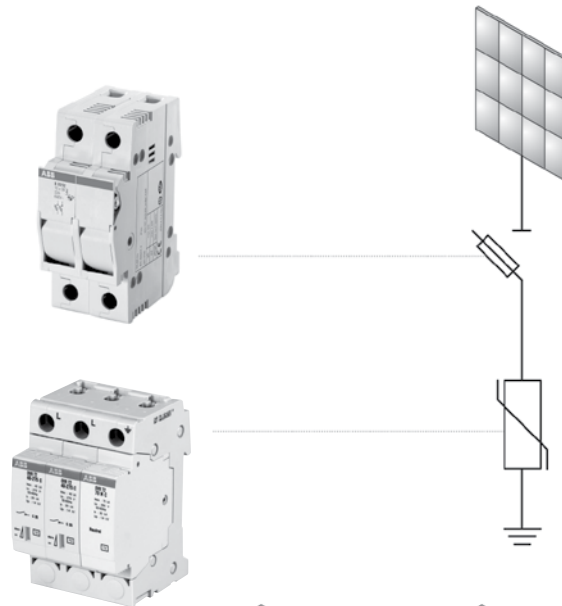
String protection

To avoid equipment damage on DC lines and to ensure isolation of the PV system in case of maintenance, E90 PV disconnecter fuses can be installed downstream the inverter to protect each single string. The fuses must be selected according to the rated current of the line and to the maximum dissipated power.



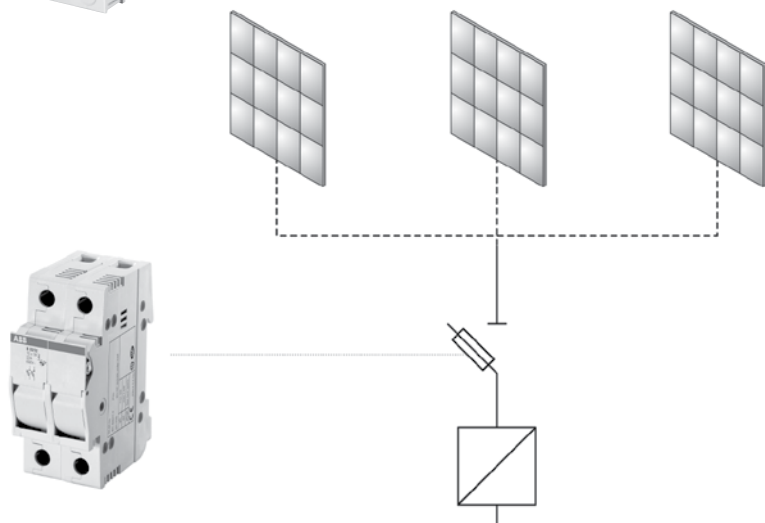
Back-up download

When the loc short circuit current, at the point of installation, is greater than 100 A DC, the OVR PVs Surge Protective Devices require a back-up protection with a specific type gR fuse.



DC side of the inverter

For small size photovoltaic systems, E 90 PV fuse disconnectors can be used to protect the DC side of the inverter. The fuse should be chosen according to the rated current of the inverter.



E 90 Class CC fuseholders

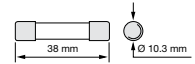
The E 90 fuse carriers for Class CC cylindrical fuse links are specifically designed for the North American market in compliance with the UL standards. In accordance with the reference standards UL 4248-1 and UL 4248-4, they come in voltage and current ratings up to 600V and 30A. They are available in 1P, 1P+N, 2P, 3P, 3P+N and 4P versions. They can be padlocked open and sealed closed.

The E 90 fuse carriers are the ideal solution for process control and industrial systems, automation systems, industrial installations and control circuits.



E90 fuseholders for Class CC 10.4 x 38 mm fuses

No. of poles	Modules	Rated Current I _n , A	Catalog number
1	1	30	E91/30
1	1	30	E91/30s
1+N	2	30	E91N/30
2	2	30	E92/30
3	3	30	E93/30
3+N	4	30	E93N/30
4	4	30	E94/30



s: version with blown fuse indicator light.

Technical data

		30A
Rated voltage U _n	[V]	600 a.c. /d.c.
Rated current I _n	[A]	30
Rated frequency	[Hz]	50-60
Fuse size	[mm]	10.4 x 38.1
Tightening torque	[Nm]	PZ2 2-2.5
Rated temperature	[°C]	75
Can be sealed closed		■
Can be padlocked open		■
Markings		UL CSA
Standards		UL 4248-1 (General) UL 4248-4 (Class CC)

E 930 Fuse disconnectors

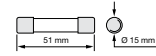
The E 930 fuse disconnector range, for current of 50 A and 125 A, is specifically intended for industrial circuit protection. The E 930 can carry any type of cylindrical fuses 14x51 and 22x58 mm, they are padlockable in open position to ensure operator safety during maintenance operations. The E 930 also support MCR microswitches, through which you can get a complete remote monitoring of the device state. The microswitch makes it possible to report: the fuse intervention, the opening of the drawer and the fuse absence with closed drawer.



E931/50

E930 fuse disconnectors for 14 x 51 mm fuses (AC-20B)

No. of poles	Modules	Rated Current I _n , A	Catalog number
1	1.5	50	E931/50
1+N	3	50	E931N/50
2	3	50	E932/50
3	4.5	50	E933/50
3+N	6	50	E933N/50



E930 fuse disconnectors for 22 x 58 mm fuses (AC-20B)

No. of poles	Modules	Rated Current I _n , A	Catalog number
1	2	125	E931/125
1+N	4	125	E931N/125
2	4	125	E932/125
3	6	125	E933/125
3+N	8	125	E933N/125

Microswitches for E930 series fuse disconnectors

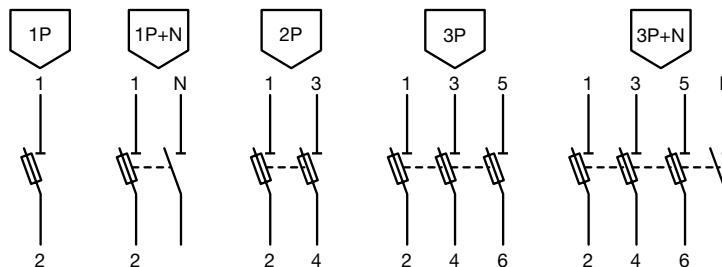
No. of poles	Modules	Rated Current I _n , A	Catalog number
1	1	50	E930/MCR1P50
3	3	50	E930/MCR3P50
1	1	125	E930/MCR1P125
3	3	125	E930/MCR3P125

Technical data

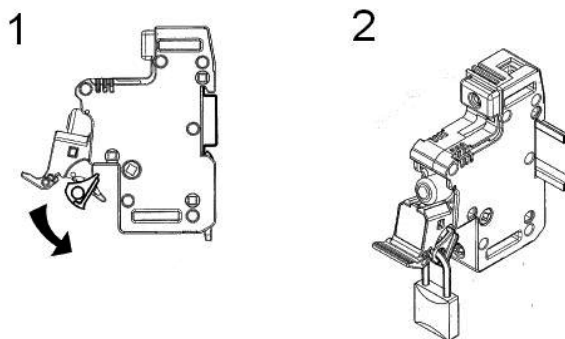
		50 A	125 A
Rated voltage U _n	[V]		750 a.c./d.c.
Insulation voltage	[V]		8000
Rated current I _n	[A]	50	125
Short circuit current I _{cc}	[A]		see fuse link
Rated frequency	[Hz]		50-60
Fuse size	[mm]	14 x 51	22 x 58
Utilization category			AC-20B/DC-20B
Max power dissipation	[W]	5	9.5
Terminals	[mm ²]	25	35
Can be sealed closed			■
Can be padlocked open			■
Protection degree			IP20
Markings			UL, CSA
Standards			IEC 60947-3

E 930 Fuseholders

Electrical symbols



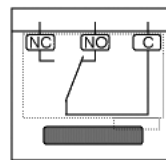
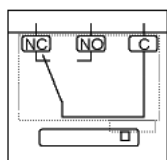
Padlocked in open position



State of the E 930/MCR microswitch contact

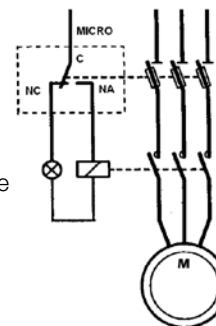
Closed fuseholders with fuse

Open fuseholders without fuse



Microswitch functions

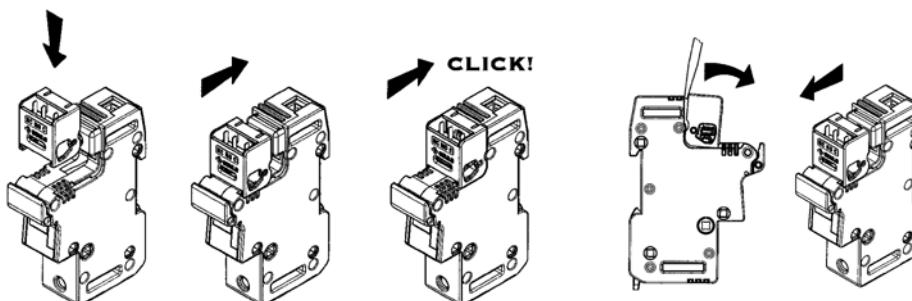
- a - fuse blown : indicates fuse break condition
- b - pre-opening: indicates when the fuseholders cover is open
- c - presence: indicates when the cover is closed but there is no fuse



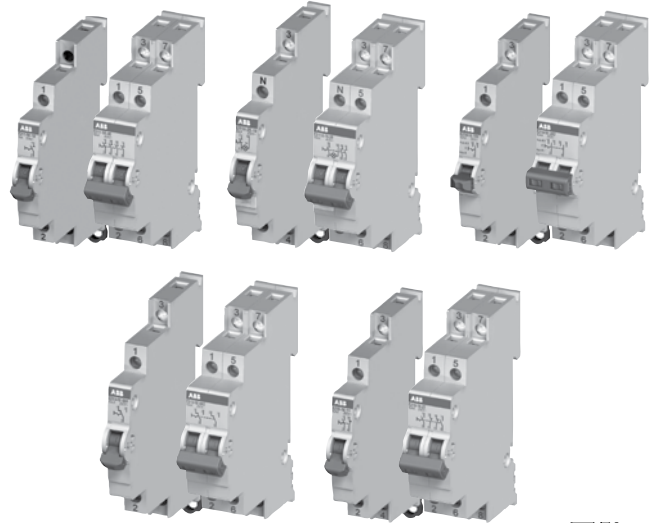
Microswitch assembly and disassembly steps

1- assembly

2- disassembly



Notes



Description

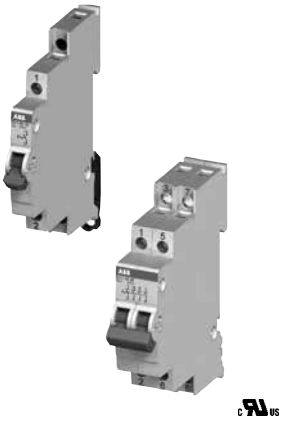
These devices are specifically made for commanding loads and signalling electrical conditions in any low-voltage switchboard. They are available in half module or 1 module, depending on the contact-layout. The devices with indicator lights are equipped with a LED, which grants an optimum illumination with very low consumption.

The functions of these devices are particularly switching, pushing and signalling electrical conditions in any installations (low-voltage area)

General new features

- Space-saving through 9mm modules
- All terminals equipped with Pozidrive 1 screws
- Safe connection due to cage-clamp
- LED with bright colors and available in three different voltage ranges
- Different lens and button colors
- Compliance to international standards

E210 Switches

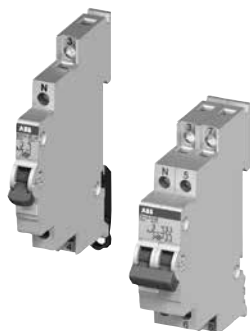


E211-... ON-OFF switches

Contacts	Rated voltage	Power loss	Width	Catalog number
	VAC	W	mm	
Rated current = 16A				
1 NO	250	0.32	9	E211-16-10
2 NO	230/400	0.82	9	E211-16-20
3 NO	230/400	1.14	18	E211-16-30
4 NO	230/400	1.64	18	E211-16-40
Rated current = 25A				
1 NO	250	0.75	9	E211-25-10
2 NO	230/400	1.95	9	E211-25-20
3 NO	230/400	2.70	18	E211-25-30
4 NO	230/400	3.90	18	E211-25-40
Rated current = 32A				
1 NO	250	1.12	9	E211-32-10
2 NO	230/400	2.73	9	E211-32-20
3 NO	230/400	3.85	18	E211-32-30
4 NO	230/400	5.46	18	E211-32-40

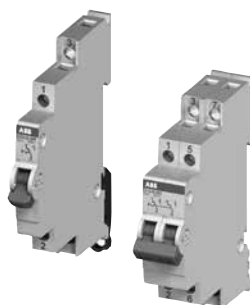
E211-... ON-OFF switch devices are used to switch indicators or other electrical components (like fan's, air-conditions, e.g.). The new On-Off switches distinguish themselves through simple handling, easy mounting and optimal functionality.

E210 Switches



E211X-... ON-OFF switches with yellow LED for contact indication LED voltage 115-250 VAC

Contacts	Rated voltage	Power loss	LED color	Width	Catalog number
	VAC	W		mm	
Rated current = 16A					
1 NO	250	0.50	Yellow	9	E211X-16-10
2 NO	230/400	1.00	Yellow	18	E211X-16-20
3 NO	230/400	1.50	Yellow	18	E211X-16-30
Rated current = 25A					
1 NO	250	0.75	Yellow	9	E211X-25-10
2 NO	230/400	1.95	Yellow	18	E211X-25-20
3 NO	230/400	2.70	Yellow	18	E211X-25-30



E213-... Change over switches

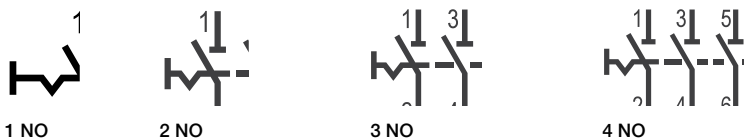
Contacts	Rated voltage	Power loss	LED color	Width	Catalog number
	VAC	W		mm	
Rated current = 16A					
1 CO	250	0.32	-	9	E213-16-001
2 CO	250	0.82	-	18	E213-16-002
Rated current = 25A					
1 CO	250	0.40	-	9	E213-25-001
2 CO	250	0.88	-	18	E213-25-002

The new change-over switches distinguish themselves through simple handling, easy mounting and optimal functionality. Example applications include opening and closing of electrically operated flaps.



Terminal assignment

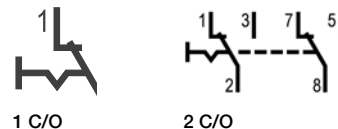
ON / OFF switch



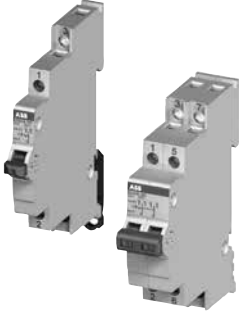
OFF switches with indicator lamps



Change-over switches



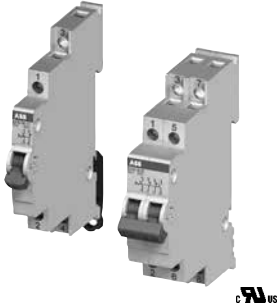
E210 Switches



E214-... Group switches (I-0-II, manual-OFF-automatic)

Contacts	Rated voltage	Power loss	Width	Catalog number
	VAC	W	mm	
Rated current = 16A				
1 CO	250	0.32	9	E214-16-101
2 CO	250	0.82	18	E214-16-202
Rated current = 25A				
1 CO	250	0.40	9	E214-25-101
2 CO	250	0.88	18	E214-25-202

The new Group switches can be used to control the main installation of an emergency supply. Such devices distinguish themselves through simple handling, easy mounting and optimal functionality.



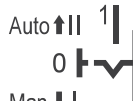
E218-... Control switches

Contacts	Rated voltage	Power loss	Width	Catalog number
	VAC	W	mm	
Rated current = 16A				
1NO+1NC	250	0.50	9	E218-16-11
2NO+2NC	250	1.00	18	E218-16-22
3NO+1NC	250	1.50	18	E218-16-31
Rated current = 25A				
1NO+1NC	250	0.75	18	E218-25-11

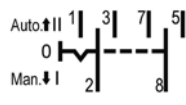
These devices can be used in distribution board for any control function. The new control switches distinguish themselves through simple handling, easy mounting and optimal functionality.

Terminal assignment

Group switches



1-pole

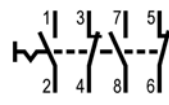


2-pole

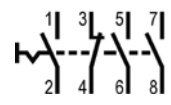
Control switches



1 NO + 1 NC



2 NO + 2 NC



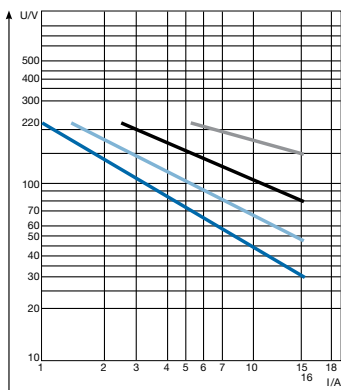
3 NO + 1 NC

E210 Switches

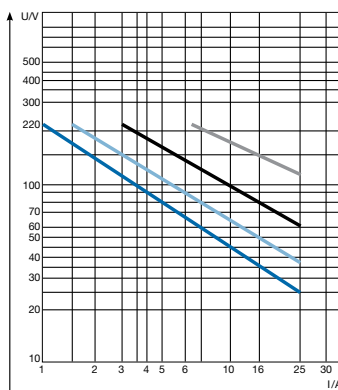
Technical data

Switching capacity		according to EN 60669-1
Isolating properties		according to EN 60669-2-4; IEC/EN 60947-3
Utilization category		AC-22A; DC-22A acc. IEC/EN60947-3
Short-circuit withstand capacity [kA]		3
Rated voltage U_n [V]		250/400 in accordance with EN 240 in accordance UL 508
Lowest operating voltage		24 V; 25 mA
Rated current I_n [A]		16, 25, 32
LED current [mA]		5
Rated frequency [Hz]		50/60
Modules [No]		0.5 or 1
Sealable		in ON and OFF position
Climatic resistance		according to IEC 60068-2-2 (Dry heat) IEC 60068-2-30 (Damp heat) IEC 60068-2-1 (Cold)
Ambient temperature [°C/°F]		-25°C/-13°F to +55°C/+131°F
Storage temperature [°C]		-40°C to +70°C
Connection capacity [mm ²]		from 1x1 mm ² to 1x6 mm ² or 2x2.5 mm ² massive; Flexible up 1x0.75 mm ² to 2x1.5 mm ² with connector sleeve or pin end connector
Tightening torque [Nm]		1.2 - 1.5
Positive opening		according to EN 60204-1
Standards		DIN EN 60669-1 *VDE 0632-1 DIN EN 60669-2-4 *VDE 0632-2-4 UL 508
Approvals		VDE, UL, GOST, CCC

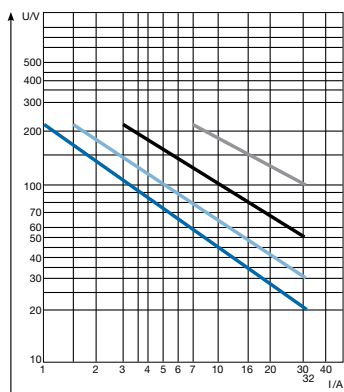
DC switching capacity E211 16A



DC switching capacity E211 25A



DC switching capacity E211 32A



- Ohmic load
 - Normally-open contact
 - Normally-closed contact
- Load with time constant $t = 15\text{ms}$ (inductive load)
 - Normally-open contact
 - Normally-closed contact

E210 Pushbuttons with and without LEDs



Pushbuttons without and with LED

The new products are available in 9 mm widths (= 0.5 modules). The devices can be used in distribution boards and are all distinguished by their simple handling, ease of mounting and optimal functionality. The pushbuttons are used for remote control in all kinds of electrical installation (e.g. public, industrial). The range offers three different voltages. (Ranges: 12-48 V AC/DC; 115-250 V AC and 110-220 V DC).

E215-... Pushbuttons (6 different button colors)

Contacts	Rated voltage	Power loss	Button color	Width	Catalog number
	VAC	W		mm	
Rated current = 16A					
1NO+1NC	250	0.50	Grey	9	E215-16-11B
1NO+1NC	250	0.50	Red	9	E215-16-11C
1NO+1NC	250	0.50	Green	9	E215-16-11D
1NO+1NC	250	0.50	Yellow	9	E215-16-11E
1NO+1NC	250	0.50	Black	9	E215-16-11F
1NO+1NC	250	0.50	Blue	9	E215-16-11G

E217-... Luminous pushbuttons (5 different LED colors)

Contacts	Rated voltage	Power loss	Button color	Width	Catalog number
	VAC	W		mm	
Rated current = 16A					
LED Voltage range - 115-250VAC					
1NO	250	1.10	White	9	E217-16-10B
1NO	250	1.10	Red	9	E217-16-10C
1NO	250	1.10	Green	9	E217-16-10D
1NO	250	1.10	Yellow	9	E217-16-10E
1NO	250	1.10	Blue	9	E217-16-10G
1NC	250	1.10	White	9	E217-16-01B
1NC	250	1.10	Red	9	E217-16-01C
1NC	250	1.10	Green	9	E217-16-01D
1NC	250	1.10	Yellow	9	E217-16-01E
1NC	250	1.10	Blue	9	E217-16-01G

E210 Pushbuttons with and without LEDs

Command Devices
E210 Series



E217-... Luminous pushbuttons (5 different LED colors)

Contacts	Rated voltage	Power loss	Button color	Width	Catalog number
	VAC	W		mm	

Rated current = 16A

LED voltage range - 12-48VAC/DC

1NO	250	0.72	White	9	E217-16-10B48
1NO	250	0.72	Red	9	E217-16-10C48
1NO	250	0.72	Green	9	E217-16-10D48
1NO	250	0.72	Yellow	9	E217-16-10E48
1NO	250	0.72	Blue	9	E217-16-10G48
1NC	250	0.72	White	9	E217-16-01B48
1NC	250	0.72	Red	9	E217-16-01C48
1NC	250	0.72	Green	9	E217-16-01D48
1NC	250	0.72	Yellow	9	E217-16-01E48
1NC	250	0.72	Blue	9	E217-16-01G48

LED voltage range - 110-220VDC

1NO	250	1.50	White	9	E217-16-10B220
1NO	250	1.50	Red	9	E217-16-10C220
1NO	250	1.50	Green	9	E217-16-10D220
1NO	250	1.50	Yellow	9	E217-16-10E220
1NO	250	1.50	Blue	9	E217-16-10G220
1NC	250	1.50	White	9	E217-16-01B220
1NC	250	1.50	Red	9	E217-16-01C220
1NC	250	1.50	Green	9	E217-16-01D220
1NC	250	1.50	Yellow	9	E217-16-01E220
1NC	250	1.50	Blue	9	E217-16-01G220

E210 Indicator lights with LEDs



E219-... Indicator Lights with LED (5 different colors)

Single indicator light - LED Voltage range = 115-250 V AC

Button color	Power loss	Width	Catalog number
	W	mm	
White	0.47	9	E219-B
Red	0.47	9	E219-C
Green	0.47	9	E219-D
Yellow	0.47	9	E219-E
Blue	0.47	9	E219-G

The new products are available in 9 mm width (= 0.5 modules) and can be used for indicating any operational condition such as signalling loss of a phase. The range offers three different voltages. (Ranges: 12-48 V AC/DC; 115-250 V AC and 110-220 V DC).



Single indicator light - LED Voltage range = 12-48 V AC/DC

Button color	Power loss	Width	Catalog number
	W	mm	
White	0.40	9	E219-B48
Red	0.40	9	E219-C48
Green	0.40	9	E219-D48
Yellow	0.40	9	E219-E48
Blue	0.40	9	E219-G48

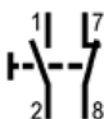


Single indicator light - LED Voltage range = 110-220 V DC

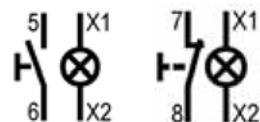
Button color	Power loss	Width	Catalog number
	W	mm	
White	1.00	9	E219-B220
Red	1.00	9	E219-C220
Green	1.00	9	E219-D220
Yellow	1.00	9	E219-E220
Blue	1.00	9	E219-G220

Terminal assignment

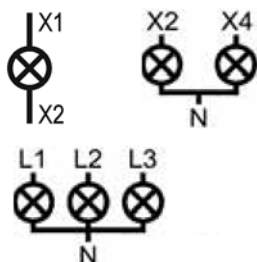
Pushbutton



Luminous Pushbutton



Indicator Light



Technical data

Pushbuttons and Single indicator light

Rated Voltage Un	[V]	250/400
Lowest operat. voltage		24 V; 25 mA
Rated current In	[A]	16
LED current	[mA]	5
Rated frequency	[Hz]	50/60
Modules	[No]	0.5
Tightening torque	[Nm]	1.2 - 1.5
Standards		EN 60669-1; EN 62094-1; UL 508
Approvals		Pushbuttons: VDE, UL, GOST, CCC Single Indicator light: VDE, UL, GOST

E210 Accessories



E210-DH

Dummy housing for 9 mm wide units

Item	Catalog number
Dummy housing for 9mm wide units	E210-DH

The modular width of 18 mm must be complied with to use the devices in the SMISLINE socket system. The dummy housing is ready-made with two expanding connectors. Always snap on dummy housing on the left.

Padlock

Item	Catalog number
to use for 9 and 18mm wide units	E210-ASV9

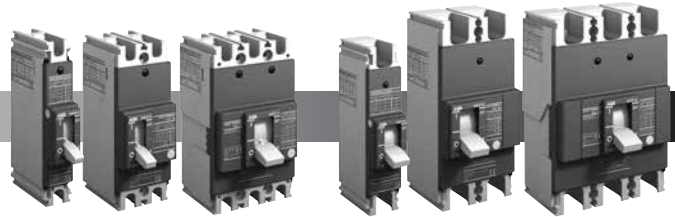


E210-ASV9

Notes



17 - Molded case circuit breakers



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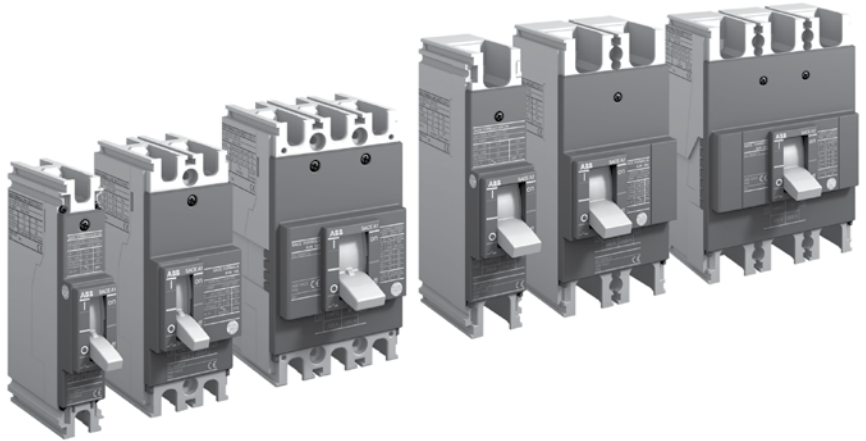
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Notes



Introduction

ABB's FORMULA molded case circuit breaker line offers simplicity and quality in some of the smallest dimensions available. The A1 breaker frame size ranges in amperes from 15 through 100 and the A2 breaker frame size ranges from 125 through 250 amperes. All UL FORMULA circuit breakers offer protection trip units that have fixed thermal and magnetic threshold values and are standard as a fixed version with front terminals.

Standards

UL 489 & IEC 60947-2

Dimensions (W x D x H):

1 pole: 1.00 x 2.36 x 5.12

2 pole: 2.00 x 2.36 x 5.12

3 pole: 3.00 x 2.36 x 5.12

Weight:

1 pole: 0.54 lbs

2 pole: 1.04 lbs

3 pole: 1.54 lbs

Available accessories:

Shunt opening release (2p & 3p)

Undervoltage release (2p & 3p)

Auxiliary contacts (2p & 3p)

Termination kits (1p, 2p & 3p)

Padlocks (1p, 2p & 3p)

Direct and extended rotary handles (3p)

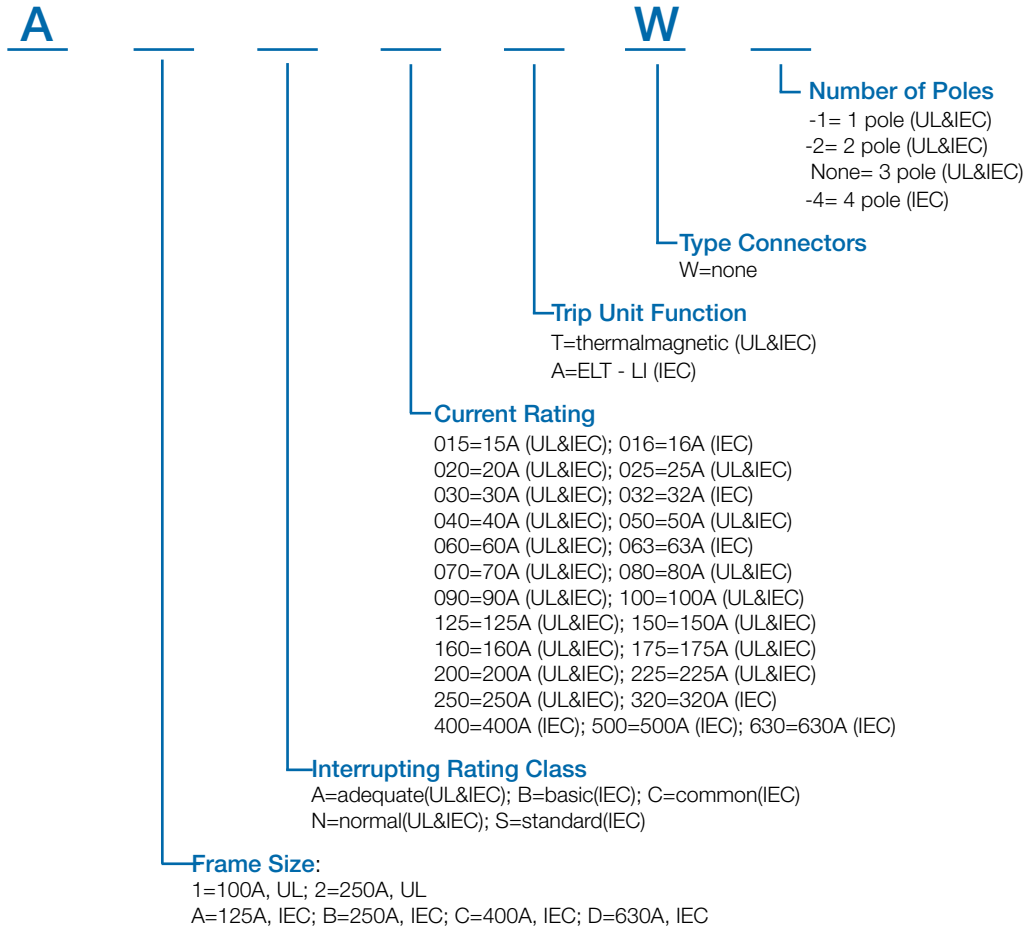
Circuit breakers for power distribution

Technical data

		A1				A2			
Frame size	A	100				250			
Rated current, I _n	A	15...100				125...250			
Poles [Nr]	Nr	1, 2, 3				1, 2, 3			
Rated service voltage, U _e (AC) 50-60 Hz	V	240 (1p, 2p, 3p)				240 (1p, 2p, 3p)			
(DC)	V	125 (1p), 250 (2p,3p)				125 (1p), 250 (2p,3p)			
Versions		Fixed				Fixed			
Performance Level		A		N		A		N	
Poles	Nr	1	2, 3	1	2, 3	1	2, 3	1	2, 3
Rated ultimate short circuit breaking capacity, I _{cu}		UL 489				UL 489			
Interrupting rating @ 240 V 50-60 Hz (AC)	kA	10	10	18	25	10	10	14	25
Interrupting rating @ 125 V (DC) 1 pole (in 2012)	kA	5	-	10	-	5	-	10	-
Interrupting rating @ 250 V (DC) 2 poles in series (2p, 3p) (in 2012)	kA	-	5	-	10	-	10	-	25
Reference Standard		UL 489				UL 489			
Isolation behavior		Yes				Yes			
Fixing onto DIN rail		DIN EN 50022				DIN EN 50022			
Dimensions (Width x Depth x Height)									
1 pole	in	1.00 x 2.36 x 5.12				1.38 x 2.36 x 5.91			
2 poles	in	2.00 x 2.36 x 5.12				2.76 x 2.36 x 5.91			
3 poles	in	3.00 x 2.36 x 5.12				4.13 x 2.36 x 5.91			
Weight									
1 pole	lbs	0.54				0.82			
2 poles	lbs	1.04				1.61			
3 poles	lbs	1.54				2.43			
Trip Unit - Thermomagnetic TMF		Yes				Yes			

Circuit breakers for power distribution

Catalog number explanation



A1
100A



1 Pole



2 Pole



3 Pole

A1 - 100A Frame TMF, thermal magnetic fixed - fixed mount (F), front terminals (F)

Breaker	IC at 240VAC	Rating (A)	Magnetic trip	1 pole catalog number	2 pole catalog number	3 pole catalog number
A1A	10kA	15	400	A1A015TW-1	A1A015TW-2	A1A015TW
		20	400	A1A020TW-1	A1A020TW-2	A1A020TW
		25	400	A1A025TW-1	A1A025TW-2	A1A025TW
		30	400	A1A030TW-1	A1A030TW-2	A1A030TW
		40	400	A1A040TW-1	A1A040TW-2	A1A040TW
		50	500	A1A050TW-1	A1A050TW-2	A1A050TW
		60	600	A1A060TW-1	A1A060TW-2	A1A060TW
		70	700	A1A070TW-1	A1A070TW-2	A1A070TW
		80	800	A1A080TW-1	A1A080TW-2	A1A080TW
		90	900	A1A090TW-1	A1A090TW-2	A1A090TW
		100	1000	A1A100TW-1	A1A100TW-2	A1A100TW
A1N	1 pole 18kA 2-3 pole 25kA	15	400	A1N015TW-1	A1N015TW-2	A1A015TW
		20	400	A1N020TW-1	A1N020TW-2	A1A020TW
		25	400	A1N025TW-1	A1N025TW-2	A1A025TW
		30	400	A1N030TW-1	A1N030TW-2	A1A030TW
		40	400	A1N040TW-1	A1N040TW-2	A1A040TW
		50	500	A1N050TW-1	A1N050TW-2	A1A050TW
		60	600	A1N060TW-1	A1N060TW-2	A1A060TW
		70	700	A1N070TW-1	A1N070TW-2	A1A070TW
		80	800	A1N080TW-1	A1N080TW-2	A1A080TW
		90	900	A1N090TW-1	A1N090TW-2	A1A090TW
		100	1000	A1N100TW-1	A1N100TW-2	A1A100TW

A2
250A, 600Y/347V, 480V Δ
Thermal-magnetic



1 Pole



2 Pole



3 Pole

A2 - 250A Frame TMF, thermal magnetic fixed - fixed mount (F), front terminals (F)

Breaker	IC at 240VAC	Rating (A)	Magnetic trip	1 pole catalog number	2 pole catalog number	3 pole catalog number
A2A	10kA	125	1250	A2A125TW-1	A2A125TW-2	A2A125TW
		150	1500	A2A150TW-1	A2A150TW-2	A2A150TW
		175	1750	A2A175TW-1	A2A175TW-2	A2A175TW
		200	2000	A2A200TW-1	A2A200TW-2	A2A200TW
		225	2250	A2A225TW-1	A2A225TW-2	A2A225TW
		250	2500	A2A250TW-1	A2A250TW-2	A2A250TW
A1N	1 pole 18kA 2-3 pole 25kA	125	1250	A2N125TW-1	A2N125TW-2	A2N125TW
		150	1500	A2N150TW-1	A2N150TW-2	A2N150TW
		175	1750	A2N175TW-1	A2N175TW-2	A2N175TW
		200	2000	A2N200TW-1	A2N200TW-2	A2N200TW
		225	2250	A2N225TW-1	A2N225TW-2	A2N225TW
		250	2500	A2N250TW-1	A2N250TW-2	A2N250TW

Accessories

Electrical

A1 - A2



Cabled service release
SOR-C and UVR-C

Shunt opening release (SOR)

Frame size	Voltage	Catalog number
A1 - A2	12VDC	KA2S9
	24-30VAC/DC	KA2S8
	48-60VAC/DC	KA2S7
	110-127VAC	KA2S4
	220-240VAC	KA2S2

The shunt opening release allows for opening of the circuit breaker by means of a non-permanent electrical control. Operation of the release is guaranteed for a voltage between 70% and 110% of the power supply rated voltage value.

Undervoltage release (UVR)

Frame size	Voltage	Catalog number
A1 - A2	24-30VAC/DC	KA2U8
	48VAC/DC	KA2U7
	60VAC/DC	KA2U5
	110-127VAC	KA2U4
	220-240VAC	KA2U2

The undervoltage release ensures opening of the circuit breaker for lack/lowering of the release power supply voltage. Operation of the release is guaranteed for a voltage between 70% and 35% of the power supply rated voltage value. After tripping, the circuit breaker can be closed again starting from a voltage higher than 85% of the power supply rated voltage value.



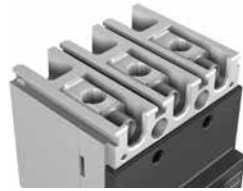
Auxiliary contacts (AUX) & early auxiliary contacts (AUE)

Frame size	Description	2 Pole Catalog number	3 Pole Catalog number
A1 - A2	AUX-C 1Q+1SY 250 VAC/DC	KA2AS-2	KA2AS
	AUX-C 2Q+1SY 250 VAC/DC	KA2AS2-2	KA2AS2
	AUX-C 1Q+1SY 24 VDC	KA2ASAU-2	KA2ASAU
	AUX-C 2Q+1SY 24 VDC	KA2AS2AU-2	KA2AS2AU
	AUX-C 250V 1 CONT. SPARE PART*	KA2ASSP	KA2ASSP
	AUE 2 CONTACTS x RHx	-	KA2RH-EM

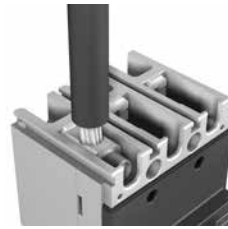
The auxiliary contacts allow information about the state of the circuit breaker to be available through an electronic signal to another apparatus. The early auxiliary contacts are normally open contacts which allow the undervoltage release to be supplied in advance prior to the closing of the main contacts in direct and extended rotary handle operating mechanisms.

① Electrical/mechanical accessories cannot be installed on single pole breakers.
 ② Rated 480Y/277 VAC for 15A.
 ③ When protected by a OCPD with appropriate ratings.

Accessories Mechanical A1 - A2



Terminal FCCuAl



Terminal FCCuAl with cable

Front terminals for copper aluminum cables - FCCuAl

Frame size	Description	1 piece catalog number	2 piece catalog number	3 piece catalog number	4 piece catalog number	6 piece catalog number
A1	KIT FC CuAl A1 80A	KA1080-1	KA1080-2	KA1080-3	KA1080-4	KA1080-6
	KIT FC CuAl A1 100A	KA1100-1	KA1100-2	KA1100-3	KA1100-4	KA1100-6
A2	KIT FC CuAl A2 225A*	KA2225-1	KA2225-2	KA2225-3	KA2225-4	KA2225-6
	KIT FC CuAl A2 250A	KA2250-1	KA2250-2	KA2250-3	KA2250-4	KA2250-6

* 250A Cu cables and 225A Al cables



Terminal F



Terminal F with cable lug

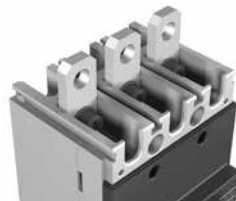


Terminal F with busbar

Front terminals - F

Frame size	Description	1 piece catalog number	2 piece catalog number	3 piece catalog number	4 piece catalog number	6 piece catalog number
A1	KIT F A1	KA1F-1	KA1F-2	KA1F-3	KA1F-4	KA1F-6
A2	KIT F A2	KA2F-1	KA2F-2	KA2F-3	KA2F-4	KA2F-6

Front terminals are supplied as standard with all FORMULA circuit breakers.



Terminal EF



Terminal EF with busbar

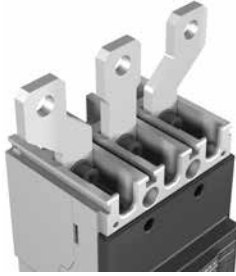
Front extended terminals - EF (IEC only)

Frame size	Description	1 piece catalog number	2 piece catalog number	3 piece catalog number	4 piece catalog number	6 piece catalog number
A1	KIT EF A1	KA1EF-1	KA1EF-2	KA1EF-3	KA1EF-4	KA1EF-6
A2	KIT EF A2	KA2EF-1	KA2EF-2	KA2EF-3	KA2EF-4	KA2EF-6

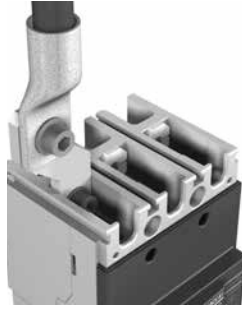
Accessories

Mechanical

A1 - A2



Terminal ES



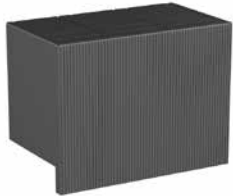
Terminal ES with cable lug



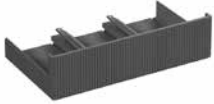
Terminal ES with busbar

Front extended spread terminals - ES (IEC only)

Frame size	Description	1 piece catalog number	2 piece catalog number	3 piece catalog number	4 piece catalog number	6 piece catalog number
A1	KIT ES A1	-	KA1ES-2	KA1ES-3	KA1ES-4	KA1ES-6
A2	KIT ES A2	-	KA2ES-2	KA2ES-3	KA2ES-4	KA2ES-6



High terminal cover (HTC)

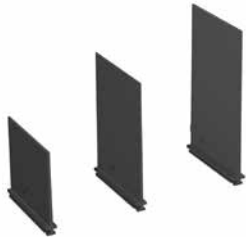


Low terminal cover (LTC)

Terminal covers - low profile (LTC) and high profile (HTC)

Frame size	Description	Catalog number
A1	LTC 3p - 2pcs	KA1LTC-3
	HTC 3p - 2pcs	KA1HTC-3
A2	LTC 3p - 2pcs	KA2LTC-3
	HTC 3p - 2pcs	KA2HTC-3
A1 - A2	Sealable screws for terminal covers*	KA2SSW-T
	Sealable screws for front*	KA2SSW-F

* IEC rated only



Phase barriers

Phase barriers - low profile and high profile

Frame size	Description	2-Piece catalog number	4-Piece catalog number
A1	PB 50mm	KA1PBL-2	KA1PBL-3
A2	PB 80mm	KA2PBL-2	KA2PBL-3
A1 - A2	PB 100mm	KA2PBH-2	KA2PBH-3

17



Direct handle (RHD)

Direct mount rotary handle (RHD)

Frame size	Description	Catalog number
A1 - A2	RHD A1-A2 STANDARD DIRECT	KA2RHD
	RHD A1-A2 EMERGENCY DIRECT	KA2RHDEM

Accessories

Mechanical

A1 - A2



Extended handle (RHE)

Extended mount rotary handle (RHE)

Frame size	Description	Catalog number
A1 - A2	RHE KIT A1-A2 STANDARD EXTENDED	KA2RHE
	RHE KIT A1-A2 EMERGENCY EXTENDED	KA2RHEEM
	RHE A1-A2 BASE	KA2RHE-B
	RHE A1-A2 SHAFT	KA2RHE-S
	RHE A1-A2 STANDARD HANDLE	KA2RHE-H
	RHE A1-A2 EMERGENCY HANDLE	KA2RHE-HEM



Fixed padlock in open position (PLL)

Padlocks for lever operating mechanism (PLL)

Frame size	Description	Catalog number
A1 - A2	PLL - removable in open position (1p, 2p, 3p)	KA2LDOR
	PLL - fixed in open position (3p)	KA2LDOR
	PLL - fixed in open and closed position (3p)	KA2LD



Fixed padlock in open and closed position (PLL)



Removable padlock in open position (PLL)



Key lock for direct handle

Key lock on handle and front lever operating mechanism (RHL) (IEC only)

Frame size	Description	Catalog number
A1 - A2	RHL-D open position, different keys	KA2RHLO
	RHL-S open position, type A key	KA2RHLO-A
	RHL-S open position, type B key	KA2RHLO-B
	RHL-S open position, type C key	KA2RHLO-C
	RHL-S open position, type D key	KA2RHLO-D
	RHL-D open and closed position, different keys	KA2RHHL

Bracket for fixing on DIN rail (IEC only)

Frame size	Description	Catalog number
A1 - A2	Bracket for 1p, 2p, 3p	KA2DIN



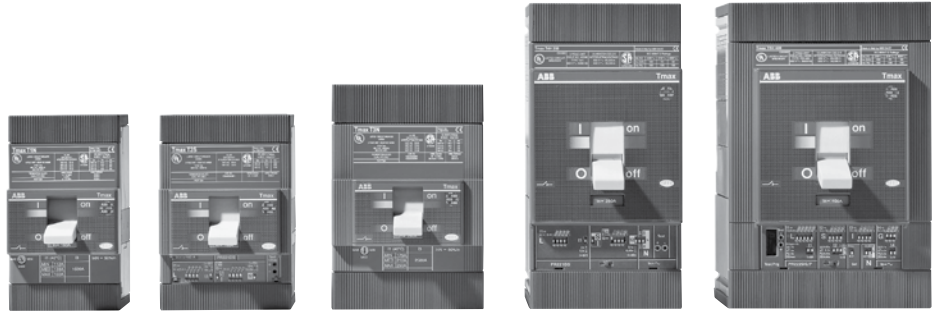
Bracket for DIN rail

Notes

Tmax Molded case circuit breakers



Tmax Molded case circuit breakers



Introduction

ABB is once again demonstrating its commitment to new product development and its superiority in product technology. Never before has the industry seen such high performance, versatility and standardization in a range of molded case circuit breakers.

The ABB Tmax line of circuit breakers, with a range up to 3000A, has several key features that go along with its very small size:

- Double insulation – this construction characteristic allows for the UL Listed field installation of internal accessories without exposure to energized parts.
- Complete range of electrical and mechanical accessories
- Positive operation – breakers from ABB ensure that the toggle indicates the precise position of the moving contacts. This guarantees safe and reliable signaling by the device.
- Installation – Tmax molded case circuit breakers can be installed in panels and switchboards in either the horizontal or vertical planes while being fed from either end without any derating of their performance characteristics.
- Interrupting ratings at 480VAC up to 150kAIC.
- Compact size
- All Tmax molded case circuit breakers are UL Listed and IEC rated for global application and acceptance.
- All versions of the Tmax family are suitable for reverse feed applications.

The ABB Tmax product line has the performance and accessories to satisfy all industry requirements in the 600VAC to 600VDC ranges.

Frame sizes — Nine basic sizes

The ABB Tmax series includes nine basic frame sizes as well as the T1 single pole with the range rated from 15A to 3000A at 480VAC. The various versions carry the following interrupting capacities:

- **B** Basic breaking capacity
- **N** Normal breaking capacity
- **S** Standard breaking capacity
- **H** High breaking capacity
- **L** Extra high breaking capacity
- **V** Very high breaking capacity

Derived versions

- Thermal magnetic
- Electronic
- Molded case switches
- Motor circuit protectors (MCPs)
- Direct current (DC) rated

ABB Tmax versions

- Fixed: all models
- Drawout or plug-in: T2, T3, Ts3, T4, T5, T6, T7 & T7M
- UL File #E93565 (breakers and MCPs)
#E116596 (Accessories)
#E116595 (Molded case switches)

Selection Guide

Circuit breakers for power distribution

T1 – Ts3



T1 1P



T1



T2



T3



Ts3

Type		Tmax T1 1p	Tmax T1	Tmax T2	Tmax T3	Tmax Ts3	Tmax Ts3	
Frame size	[A]	100	100	100	225	150	225	
Number of poles	[Nr]	1	3-4	3-4	3-4	2-3-4	2-3-4	
Rated voltage	AC (50-60Hz)	[V]	347	600Y/347	480	600Y/347	600	480
	DC	[V]		500		500	600	500
Interrupting ratings		B	N	S H	N S	N H L	N H L	
	240V AC	[kA rms]	50 ②	65 150	50 65	65 100 150	65 100 150	
	277V AC	[kA rms]	18 ①					
	347V AC	[kA rms]	14 ①					
	480V AC	[kA rms]		22 ②	35 65	25 35	25 50 85 ⑤	25 50 65
	600Y/347V AC	[kA rms]		10		10 10		
	600V AC	[kA rms]					14 14 25	
	250V DC (2 poles in series)	[kA rms]		25		25 35		
500V DC (3 poles in series)	[kA rms]		25		25 35			
500V DC (2 poles in series)	[kA rms]					35 50 65	20 35 50	
600V DC (3 poles in series)	[kA rms]					20 35 50		
Trip units	TMF	■	■	■	■	■	■	
	TMD/TMA							
	ELT			■				
	MA			■	■	■	■	
	Electronic			■				
Dimensions	H	[in/mm]	5.12/130	5.12/130	5.12/130	5.9/150	6.7/170	6.7/170
	W 3p	[in/mm]	1/25.4	3/76	3.54/90	4.13/105	4.13/105	4.13/105
	D	[in/mm]	2.76/70	2.76/70	2.76/70	2.76/70	4.07/103.5	4.07/103.5
Mechanical life	[No. operations]	25000	25000	25000	25000	25000	25000	

① In15A = 10kA@277VAC 10kA@347VAC
 ② In15A = 35kA@240VAC 14kA@480Y/277 VAC
 ③ T5 600 with electronic trip units only and in three pole version
 ④ 2p breakers: available only in N interrupting rating
 ⑤ In from 15A up to 30A=65kA@480V AC

Selection Guide

Circuit breakers for power distribution

T4 – T8



T4



T5



T6



T7



T8

Type		Tmax T4	Tmax T5	Tmax T6	Tmax T7/T7M	Tmax T8	
Frame size	[A]	250	400-600 ③	800	1000-1200	1600, 2000, 2500 & 3000	
Number of poles	[Nr]	2-3-4 ④	2-3-4 ④	3-4	3-4	3-4	
Rated voltage	AC (50-60Hz)	[V]	600	600	600	600	
	DC	[V]	600	600	600	600	
Interrupting ratings		N S H L V	N S H L V	N S H L	S H L	V	
	240V AC	[kA rms]	65 100 150 200 200	65 100 150 200 200	65 100 200 200	65 100 150	125
	277V AC	[kA rms]					
	347V AC	[kA rms]					
	480V AC	[kA rms]	25 35 65 100 150	25 35 65 100 150	35 50 65 100	50 65 100	125
	600Y/347V AC	[kA rms]					
	600V AC	[kA rms]	18 25 35 65 100	18 25 35 65 100	20 25 35 42	25 50 65	100
	250V DC (2 poles in series)	[kA rms]					
500V DC (3 poles in series)	[kA rms]						
500V DC (2 poles in series)	[kA rms]	25 35 50 65 100	25 35 50 65 100	35 35 50 65			
600V DC (3 poles in series)	[kA rms]	16 25 35 50 65	16 25 35 50 65	20 20 35 50			
Trip units	TMF		■				
	TMD/TMA		■	■			
	ELT						
	MA						
	Electronic		■	■	■	■	
Dimensions	H	[in/mm]	8.07/205	8.07/205	10.55/268	10.55/268	15 / 382
	W 3p	[in/mm]	4.13/105	5.51/140	8.26/210	8.26/210	16.8 / 427
	D	[in/mm]	4.07/103.5	4.07/103.5	4.07/103.5	6.06/154 (toggle) 7/178 (motor)	11.2 / 282
Mechanical life	[No. operations]	20,000	20,000	20,000	10,000	15,000	

① In15A = 10kA@277 VAC 10kA@347 VAC
 ② In15A = 35kA@240 VAC 14kA@480Y/277 VAC
 ③ T5 600 with electronic trip units only and in three pole version-
 ④ 2p T4N250 and T5N400 available only in N interrupting capacity.
 ⑤ In from 15A up to 30A=65kA@480 VAC
 ⑥ Applies to MCS only.

General information

Catalog number explanation

T3 S 080 T W - 4 xxx

● **Accessories** (added in alpha-numeric order) ①

- A = Auxiliary Switch
- S_ = Shunt trip with voltage code
- U_ = Undervoltage release with voltage code

● **Number of poles**

- 1 = 1 pole (T1 only)
- 2 = 2 pole
- 4 = 4 pole
- None = 3 pole

● **Type connectors**

- W = None
- L = Lugs included

● **Trip unit function**

- B = LS/I (AC only)
- D = Molded Case Switch (MCS)
- T = Thermal-magnetic
- M = Magnetic only (MCP)
- E5 = Electronic MCP (AC only)
- C = LSI (AC only)
- E = LSIG (AC only)
- CZ = LSI/PD ②
- EZ = LSIG/PD ②
- P = LI - LCD Display ③
- R = LSI - LCD Display ③
- S = LSIG - LCD Display ③

● **Current rating**

- 015 = 15A
- 080 = 80A
- 100 = 100A
- 225 = 225A
- 250 = 250A
- 400 = 400A
- 600 = 600A
- 800 = 800A
- 1200 = 1200A

● **Interrupting rating class**

- B = Basic
- N = Normal
- S = Standard
- H = High
- L = Extra High
- V = Very high
- Q = 100% Rated

● **Frame size**

- T1 = 100A
- T2 = 100A
- T3 = 225A
- Ts3 = 225A
- T4 = 250A
- T5 = 400A, 600A
- T6 = 600A, 800A
- T7 = 1000A, 1200A (toggle)



① Consult ABB for factory installed accessories.

② Trip unit with communication module.

③ Available on T7 toggle version only.

T1

100A, 600Y/347V, 480V Δ

Thermal-magnetic



T1

Dimensions 3P Fixed Version 5.12H x 3.00W x 2.76D
Weight 2.34 (lbs)

General

The T1 breaker family ranges from 15 through 100 amperes. The T1 trip units are non-interchangeable and use the very latest technology in electromagnetic relays for overcurrent trip protection. Thermal overload protection is provided by heat sensitive bimetals. Short circuit protection for the breaker is accomplished using a precise magnetic coil. State of the art construction in contacts and arcing chambers aid in limiting damaging fault currents through the protected circuits.

Standards

The UL489/CSA 22.2 version of T1 also carries an IEC-60947-2 rating.

Versions

The T1 frame is available in two versions:

- T = Thermal-magnetic, fixed
- D = Molded case switch

Performance levels

The T1 breaker has two performance levels available:

- B = Basic single pole
- N = Normal three pole

Number of poles

The T1 molded case circuit breaker is available in single, three and four pole versions. Estimate 4 pole pricing by adding 35% to the 3 pole price and contact your ABB sales person for details.

Molded case switches

UL489 switches include no overcurrent protection except for a high instantaneous trip mechanism for self protection.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	Continuous rating	B (1 pole)	N
240VAC	15 – 100A	—	50 ①
347VAC	15A	10	—
	20 – 100A	14	—
480VAC Δ	15A ②	—	14
	20 – 100A	—	22
600Y/347VAC	15 – 100A	—	10
250VDC 2 pole series	15 – 100A	—	25
500VDC 3 pole series	15 – 100A	—	25

IEC 60947-2 Interrupting capacity (kA RMS)

Voltage	Continuous rating	B (1 pole)	N
230VAC	15 – 100A	25 ③	50
415VAC	15 – 100A	—	36
690VAC	15 – 100A	—	6
500VDC 3 pole series	15 – 100A	—	36

① In 15A 35kA @ 240VAC.
 ② 15A available in 480Y/277 VAC only.
 ③ Interrupting capacity for 16-20A is 16kA

T1

100A, 600Y/347V, 480V Δ

Thermal-magnetic/Molded Case Switch

T1B TMF – Single pole thermal magnetic fixed 1

Breaker	IC at 277VAC	Rating (A)	Magnetic trip (A)	1 pole, 277VAC catalog number
T1B	10kA	15	1000	T1B015TL-1
		20	1000	T1B020TL-1
	18kA	25	1000	T1B025TL-1
		30	1000	T1B030TL-1
		40	1000	T1B040TL-1
		50	1500	T1B050TL-1
		60	1500	T1B060TL-1
		70	1500	T1B070TL-1
		80	1500	T1B080TL-1
		90	1500	T1B090TL-1
		100	1500	T1B100TL-1

T1N TMF – 3 pole thermal magnetic fixed

Breaker	IC at 480VAC	Rating (A)	Magnetic trip (A)	3 pole, 600Y/347VAC/500VDC catalog number
T1N	14kA	15	1000	T1N015TL ②
		20	1000	T1N020TL
	22kA	25	1000	T1N025TL
		30	1000	T1N030TL
		40	1000	T1N040TL
		50	1500	T1N050TL
		60	1500	T1N060TL
		70	1500	T1N070TL
		80	1500	T1N080TL
		90	1500	T1N090TL
		100	1500	T1N100TL

T1N TMF – 100% Rated thermal-magnetic

Breaker	IC at 480VAC	Rating (A)	Magnetic trip (A)	3 pole, 600Y/347VAC/500VDC catalog number
T1N	14kA	15 ①	100	T1NQ015TL
		20	1000	T1NQ020TL
	22kA	25	1000	T1NQ025TL
		30	1000	T1NQ030TL
		40	1000	T1NQ040TL
		50	1500	T1NQ050TL
		60	1500	T1NQ060TL
		70	1500	T1NQ070TL
		80	1500	T1NQ080TL
		90	1500	T1NQ090TL
		100	1500	T1NQ100TL

T1N-D – Molded case switch

Breaker	Interrupting capacity ③	Rating (A)	Magnetic trip (A)	480VAC/500VDC catalog number
T1-D	240V, 50kA	100	1000	T1N100DL

① Electrical/mechanical accessories cannot be installed on single pole breakers.

② Rated 480Y/277 VAC for 15A.

③ When protected by a OCPD with appropriate ratings.

T2

100A, 480V Δ

Thermal-magnetic/electronic/current limiting

Dimensions 3P Fixed Version 5.12H x 3.54W x 2.76D

Weight 2.84 (lbs)



T2

General

The T2 breaker family ranges from 15 through 100 amperes. The T2 trip units are non-interchangeable and use the very latest technology in electromagnetic relays for overcurrent trip protection as well as a version with microprocessor-based electronic trip unit. Thermal overload protection is provided by heat sensitive bimetals. State of the art construction in contacts and arcing chambers aid in limiting damaging fault currents through the protected circuits.

Standards

The UL489/CSA 22.2 version of T2 also carries an IEC-60947-2 rating.

Versions

The T2 frame is available in four versions:

- T = Thermal-magnetic, fixed
- B = Adjustable LS/I electronic
- M = Magnetic only (MCP)
- E5 = Electronic instantaneous only (MCP)

Trip functions

These tripping functions are available:

- L = Long time
- S = Short time
- I = Instantaneous

Performance levels

The T2 breaker has two performance levels available:

- S = Standard
- H = High - UL Current Limiting

Number of poles

The T2 is available in three and four pole versions. Estimate 4 pole pricing by adding 35% to the 3 pole price and contact your ABB sales person for details.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	Continuous rating	S	H
240VAC	15 – 100A	65	150
480VAC Δ	15 – 100A	35	65

IEC 60947-2 Interrupting capacity (kA RMS)

Voltage	Continuous rating	S	H
230VAC	15 – 100A	85	100
415VAC	15 – 100A	50	70
690VAC	15 – 100A	7	8
500VDC 3 pole series	15 – 100A	50	70

T2

100A, 480V Δ

Thermal-magnetic/current limiting

T2 – 100A TMF thermal magnetic fixed

Breaker	IC at 480VAC	Rating (A)	Magnetic trip (A)	3 pole, 480VAC Catalog number
T2S	35kA	15	500	T2S015TW
		20	500	T2S020TW
		25	500	T2S025TW
		30	500	T2S030TW
		40	500	T2S040TW
		50	500	T2S050TW
		60	600	T2S060TW
		70	700	T2S070TW
		80	800	T2S080TW
		90	900	T2S090TW
		100	1000	T2S100TW
T2H UL current limiting	65kA	15	500	T2H015TW
		20	500	T2H020TW
		25	500	T2H025TW
		30	500	T2H030TW
		40	500	T2H040TW
		50	500	T2H050TW
		60	600	T2H060TW
		70	700	T2H070TW
		80	800	T2H080TW
		90	900	T2H090TW
		100	1000	T2H100TW

T2 – 100A TMF, 100% rated thermal magnetic fixed

Breaker	IC at 480VAC	Rating (A)	Magnetic trip (A)	3 pole, 480VAC Catalog number
T2S	35kA	15	500	T2SQ015TW
		20	500	T2SQ020TW
		25	500	T2SQ025TW
		30	500	T2SQ030TW
		40	500	T2SQ040TW
		50	500	T2SQ050TW
		60	600	T2SQ060TW
		70	700	T2SQ070TW
		80	800	T2SQ080TW
		90	900	T2SQ090TW
		100	1000	T2SQ100TW
T2H UL current limiting	65kA	15	500	T2HQ015TW
		20	500	T2HQ020TW
		25	500	T2HQ025TW
		30	500	T2HQ030TW
		40	500	T2HQ040TW
		50	500	T2HQ050TW
		60	600	T2HQ060TW
		70	700	T2HQ070TW
		80	800	T2HQ080TW
		90	900	T2HQ090TW
		100	1000	T2HQ100TW

T2

100A, 480V Δ, 100% rated

Electronic/Current limiting/MCP

T2 – 100A Frame, electronic trip unit (AC only)

Breaker	IC at 480VAC	Trip unit type	CT rating	3 pole, 480VAC catalog number
T2S	35kA	PR221DS-LS/I	25A	T2S025BW
			60A	T2S060BW
			100A	T2S100BW
T2H UL Current Limiting	65kA	PR221DS-LS/I	25A	T2H025BW
			60A	T2H060BW
			100A	T2H100BW

T2 – 100A Frame 100% rated, electronic trip unit (AC only)

Breaker	IC at 480VAC	Trip unit type	CT rating	3 pole, 480VAC catalog number
T2S	35kA	PR221DS-LS/I	25A	T2SQ025BW
			60A	T2SQ060BW
			100A	T2SQ100BW
T2H UL Current Limiting	65kA	PR221DS-LS/I	25A	T2HQ025BW
			60A	T2HQ060BW
			100A	T2HQ100BW

T2 – 100A Frame, instantaneous only (MCP)

Breaker	IC at 480VAC	Trip unit type	Rating	Adjustment range	3 pole, 480VAC Catalog number
T2S	35kA	Mag only	20A	120 - 240	T2S020MW
			50A	300 - 600	T2S050MW
			100A	600 - 1200	T2S100MW
T2H	65kA	Mag only	20A	120 - 240	T2H020MW
			50A	300 - 600	T2H050MW
			100A	600 - 1200	T2H100MW

T2 – 100A Frame, instantaneous only, electronic (MCP - AC only)

Breaker	IC at 480VAC	Trip unit type	Rating	Adjustment range	3 pole, 480VAC Catalog number
T2S	35kA	Instantaneous only	25A	25 - 250	T2S025E5W
			60A	60 - 600	T2S060E5W
			100A	100 - 1000	T2S100E5W
T2H	65kA	Instantaneous only	25A	25 - 250	T2H025E5W
			60A	60 - 600	T2H060E5W
			100A	100 - 1000	T2H100E5W

T3

225A, 600Y/347V, 480V Δ

Thermal-magnetic

Dimensions 3P Fixed Version 5.9H x 4.13W x 2.76D
Weight 5.45 (lbs)



T3

General

The T3 breaker family ranges from 60 through 225 amperes. The T3 trip units are non-interchangeable and use the very latest technology in electromagnetic relays for overcurrent trip protection. Thermal overload protection is provided by heat sensitive bimetals. Short circuit protection begins at 10 times the thermal rating of the breaker using a precise magnetic coil. State of the art construction in contacts and arcing chambers aid in limiting damaging fault currents through the protected circuits.

Standards

The UL489/CSA 22.2 version of T3 also carries an IEC-60947-2 rating.

Versions

The T3 frame is available in three versions:

- T = Thermal-magnetic, fixed
- M = Magnetic only (MCP)
- D = Molded case switch

Performance levels

The T3 breaker has two performance levels available:

- N = Normal
- S = Standard

Number of poles

The T3 molded case circuit breaker is available in three and four pole versions. Estimate 4 pole pricing by adding 35% to the 3 pole price and contact your ABB sales person for details.

Molded case switches

UL489 switches include no overcurrent protection except for a high instantaneous trip mechanism for self protection.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	Continuous rating	N	S
240VAC	60 – 225A	50	65
480VAC Δ	60 – 225A	25	35
600Y/347VAC	60 – 225A	10	10
250VDC 2 pole series	60 – 225A	25	35
500VDC 3 pole series	60 – 225A	25	35

IEC 60947-2 Interrupting capacity (kA RMS)

Voltage	Continuous rating	N	S
230VAC	60 – 225A	50	85
415VAC	60 – 225A	36	50
690VAC	60 – 225A	5	8
750VDC 3 pole series	60 – 225A	36	50

T3

225A, 600Y/347V, 480V Δ

Thermal-magnetic

T3 – 225A Frame TMF, thermal magnetic fixed

Breaker	IC at 480VAC	Rating (A)	Magnetic trip (A)	3 pole, 480VAC/500VDC Catalog number
T3N	25kA	60	600	T3N060TW
		70	700	T3N070TW
		80	800	T3N080TW
		90	900	T3N090TW
		100	1000	T3N100TW
		125	1250	T3N125TW
		150	1500	T3N150TW
		175	1750	T3N175TW
		200	2000	T3N200TW
		225	2250	T3N225TW
		T3S	35kA	60
70	700			T3S070TW
80	800			T3S080TW
90	900			T3S090TW
100	1000			T3S100TW
125	1250			T3S125TW
150	1500			T3S150TW
175	1750			T3S175TW
200	2000			T3S200TW
225	2250			T3S225TW

T3 – 225A Frame TMF, 100% rated thermal magnetic fixed

Breaker	IC at 480VAC	Rating (A)	Magnetic trip (A)	3 pole, 600/347V VAC/500VDC Catalog number
T3N	25kA	60	600	T3NQ060TW
		70	700	T3NQ070TW
		80	800	T3NQ080TW
		90	900	T3NQ090TW
		100	1000	T3NQ100TW
		125	1250	T3NQ125TW
		150	1500	T3NQ150TW
		175	1750	T3NQ175TW
		200	2000	T3NQ200TW
		225	2250	T3NQ225TW
		T3S	35kA	60
70	700			T3SQ070TW
80	800			T3SQ080TW
90	900			T3SQ090TW
100	1000			T3SQ100TW
125	1250			T3SQ125TW
150	1500			T3SQ150TW
175	1750			T3SQ175TW
200	2000			T3SQ200TW
225	2250			T3SQ225TW

T3

225A, 600Y/347V, 480V Δ
MCP/Molded case switch

T3 — 225A Frame instantaneous only, (MCP)

Breaker	IC at 488-VAC	Trip unit type	Rating	Adjustment range	3 pole, 480VAC Catalog number
T3S	35kA	Mag only	100A	600 - 1200	T3S100MW
			125A	750 - 1500	T3S125MW
			150A	900 - 1800	T3S150MW
			200A	1200 - 2400	T3S200MW

T3S-D — Molded case switch

Breaker	Interrupting capacity ①	Rating (A)	Magnetic trip (A)	3 pole, 480VAC/500VDC Catalog number
T3S-D	240V, 65kA	150	1500	T3S150DW
	480V, 35kA	225	2250	T3S225DW

① When protected by a OCPD with appropriate ratings.

Ts3

150A, 600V Δ, 225A, 480V Δ

Thermal magnetic



Ts3

Dimensions 3P Fixed Version 6.7H x 4.13W x 4.07D
Weight 6.75 (lbs)

General

The Ts3 breaker family ranges from 15 through 225 amperes. The Ts3 trip mechanisms are non-interchangeable and use sensitive electromagnetic relays for overcurrent trip protection. Heat sensitive bimetals are used for thermal overcurrent protection. Short circuit current protection begins at 10 times the thermal rating of the breaker and uses a magnetic coil principle.

Standards

The UL489/CSA 22.2 version of Ts3 also carries an IEC-60947-2 rating.

Versions

To meet all application needs, the Ts3 is available in various versions:

- T = Thermal-magnetic
- D = Molded case switch
- M = Magnetic only (MCP)

Performance level

Each version is also available in different maximum fault interrupting levels

- N = Normal
- H = High
- L = Extra high

Number of poles

The Ts3 is available in two, three and four pole versions. Estimate 4 pole pricing by adding 35% to the 3 pole price and contact your ABB sales person for details.

Molded case switches

UL489 switches include no overcurrent protection except for a high instantaneous trip mechanism for self protection.

UL/CSA Interrupting capacity (kA RMS) UL489 / CSA C22.2

Voltage	N	H	L
150AF, 15A-150A			
240 VAC	65	100	150
480 VAC	25	50	85 ^①
600 VAC	14	14	25
500 VDC	35	50	65
600 VDC	20	35	50
225AF, 175A-225A			
240 VAC	65	100	150
480 VAC	25	50	65
600 VAC	–	–	–
500 VDC	20	35	50
600 VDC	–	–	–
IEC-60947-2 Interrupting capacity (kA RMS)			
230 VAC	65	100	170
415 VAC	35	65	85
690 VAC	14	18	20
750 VDC ^②	20	35	50

Ts3

150A, 600V Δ, 225A, 480V Δ
Thermal magnetic

Ts3

150A 600VAC/225A 480VAC
Thermal Magnetic Trip Units

Breaker	IC at 480VAC kA	Rating	Magnetic trip	2 pole, 600VAC/500VDC catalog number	3 pole, 600VAC/DC catalog number
Ts3N	25	15A	500A	Ts3N015TW-2	Ts3N015TW
		20A	500A	Ts3N020TW-2	Ts3N020TW
		25A	500A	Ts3N025TW-2	Ts3N025TW
		30A	500A	Ts3N030TW-2	Ts3N030TW
		35A	500A	Ts3N035TW-2	Ts3N035TW
		40A	500A	Ts3N040TW-2	Ts3N040TW
		50A	500A	Ts3N050TW-2	Ts3N050TW
		60A	600A	Ts3N060TW-2	Ts3N060TW
		70A	700A	Ts3N070TW-2	Ts3N070TW
		80A	800A	Ts3N080TW-2	Ts3N080TW
		90A	900A	Ts3N090TW-2	Ts3N090TW
		100A	1000A	Ts3N100TW-2	Ts3N100TW
		125A	1250A	Ts3N125TW-2	Ts3N125TW
		150A	1500A	Ts3N150TW-2	Ts3N150TW

Breaker	IC at 480VAC kA	Rating	Magnetic trip	2 pole, 600VAC/500VDC catalog number	3 pole, 600VAC/DC catalog number
Ts3H	50	15A	500A	Ts3H015TW-2	Ts3H015TW
		20A	500A	Ts3H020TW-2	Ts3H020TW
		25A	500A	Ts3H025TW-2	Ts3H025TW
		30A	500A	Ts3H030TW-2	Ts3H030TW
		35A	500A	Ts3H035TW-2	Ts3H035TW
		40A	500A	Ts3H040TW-2	Ts3H040TW
		50A	500A	Ts3H050TW-2	Ts3H050TW
		60A	600A	Ts3H060TW-2	Ts3H060TW
		70A	700A	Ts3H070TW-2	Ts3H070TW
		80A	800A	Ts3H080TW-2	Ts3H080TW
		90A	900A	Ts3H090TW-2	Ts3H090TW
		100A	1000A	Ts3H100TW-2	Ts3H100TW
		125A	1250A	Ts3H125TW-2	Ts3H125TW
		150A	1500A	Ts3H150TW-2	Ts3H150TW

Breaker	IC at 480VAC kA	Rating	Magnetic trip	2 pole, 600VAC/500VDC catalog number	3 pole, 600VAC/DC catalog number
Ts3L	65	15A	500A	Ts3L015TW-2	Ts3L015TW
		20A	500A	Ts3L020TW-2	Ts3L020TW
		25A	500A	Ts3L025TW-2	Ts3L025TW
		30A	500A	Ts3L030TW-2	Ts3L030TW
	85	35A	500A	Ts3L035TW-2	Ts3L035TW
		40A	500A	Ts3L040TW-2	Ts3L040TW
		50A	500A	Ts3L050TW-2	Ts3L050TW
		60A	600A	Ts3L060TW-2	Ts3L060TW
		70A	700A	Ts3L070TW-2	Ts3L070TW
		80A	800A	Ts3L080TW-2	Ts3L080TW
		90A	900A	Ts3L090TW-2	Ts3L090TW
		100A	1000A	Ts3L100TW-2	Ts3L100TW
		125A	1250A	Ts3L125TW-2	Ts3L125TW
		150A	1500A	Ts3L150TW-2	Ts3L150TW

NOTE: See pages 17.71 - 17.83 for electrical/mechanical accessories.

Ts3

150A, 600V Δ, 225A, 480V Δ, 100% rated
Thermal magnetic

Ts3**150A 600VAC/225A 480VAC**

Thermal Magnetic Trip Units 100% Rated

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole 600VAC/DC catalog number
Ts3NQ	25	15A	500A	Ts3NQ015TW
		20A	500A	Ts3NQ020TW
		25A	500A	Ts3NQ025TW
		30A	500A	Ts3NQ030TW
		35A	500A	Ts3NQ035TW
		40A	500A	Ts3NQ040TW
		50A	500A	Ts3NQ050TW
		60A	600A	Ts3NQ060TW
		70A	700A	Ts3NQ070TW
		80A	800A	Ts3NQ080TW
		90A	900A	Ts3NQ090TW
		100A	1000A	Ts3NQ100TW
		125A	1250A	Ts3NQ125TW
		150A	1500A	Ts3NQ150TW

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole catalog number
Ts3LQ	65kA	15A	500A	Ts3LQ015TW
		20A	500A	Ts3LQ020TW
		25A	500A	Ts3LQ025TW
		30A	500A	Ts3LQ030TW
		35A	500A	Ts3LQ035TW
	85kA	40A	500A	Ts3LQ040TW
		50A	500A	Ts3LQ050TW
		60A	600A	Ts3LQ060TW
		70A	700A	Ts3LQ070TW
		80A	800A	Ts3LQ080TW
		90A	900A	Ts3LQ090TW
		100A	1000A	Ts3LQ100TW
		125A	1250A	Ts3LQ125TW
		150A	1500A	Ts3LQ150TW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole catalog number
Ts3HQ	50kA	15A	500A	Ts3HQ015TW
		20A	500A	Ts3HQ020TW
		25A	500A	Ts3HQ025TW
		30A	500A	Ts3HQ030TW
		35A	500A	Ts3HQ035TW
		40A	500A	Ts3HQ040TW
		50A	500A	Ts3HQ050TW
		60A	600A	Ts3HQ060TW
		70A	700A	Ts3HQ070TW
		80A	800A	Ts3HQ080TW
		90A	900A	Ts3HQ090TW
		100A	1000A	Ts3HQ100TW
		125A	1250A	Ts3HQ125TW
		150A	1500A	Ts3HQ150TW

Ts3

150/225A 600VAC

MCP/Molded case switch

Magnetic only (MCP)

Breaker	IC at 480VAC	Trip unit type	Rating	Adjustment range	3 pole 600VAC Catalog number
Ts3L	25	Magnetic only	3	12-36	Ts3L003MW
	25	Magnetic only	5	20-60	Ts3L005MW
	25	Magnetic only	10	40-120	Ts3L010MW
	25	Magnetic only	25	100-300	Ts3L025MW
	85	Magnetic only	50	200-600	Ts3L050MW
Ts3L	85	Magnetic only	100	400-1200	Ts3L100MW
	85	Magnetic only	125	500-1500	Ts3L125MW
	85	Magnetic only	150	600-1500	Ts3L150MW
	65	Magnetic only	175 ①	700-2100	Ts3L175MW
	65	Magnetic only	200 ①	800-2400	Ts3L200MW

Molded case switch ②

Type	IC at 480V (2)	Magnetic trip	Amps	3 pole 600V catalog number
Ts3H	50	1500	150	Ts3H150DW
	50	2250	225 ①	Ts3H225DW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

T4

250A, 600V Δ

Electronic and thermal magnetic

Dimensions 3P Fixed Version 8.07H x 4.13W x 4.07D
Weight 6.18 (lbs)



T4

General

The T4 breaker is a 250 amp frame with either a microprocessor based over current protective trip system or a thermal magnetic trip unit.

Standards

The UL489/CSA 22.2 version of T4 also carries an IEC-60947-2 rating.

Versions

To meet all application requirements, the T4 is available in the following versions:

- T = Thermal-magnetic
- B = Selectable & adjustable LI or LS
- C = Adjustable LSI
- E = Adjustable LSIG
- D = Molded Case Switch
- E5 = Electronic instantaneous only (MCP)

Trip functions

These trip functions are available:

- L = Long time
- S = Short time
- I = Instantaneous
- G = Ground fault

Performance levels

Each version is also available in different maximum fault interrupting levels:

- N = Normal
- S = Standard
- H = High - UL Current Limiting
- L = Extra high
- V = Very high - UL Current Limiting

Number of poles ^③

The T4 is available in two, three and four pole versions. Estimate 4 pole pricing by adding 35% to the 3 pole price and contact your ABB sales person for details.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	N	S	H	L	V
240VAC	65	100	150	200	200
480VAC	25	35	65	100	150
600VAC	18	25	35	65	100
500VDC ^①	25	35	50	65	100
600VDC ^②	16	25	35	50	65

IEC 60947-2 Interrupting capacity (kA RMS)

Voltage	N	S	H	L	V
230VAC	70	85	100	200	200
415VAC	36	50	70	120	200
690VAC	20	25	40	70	80
750VDC ^②	16	25	36	50	70

^① 2 poles in series.

^② 3 poles in series.

^③ 2 pole breakers available in N version only. 4 pole breakers available in N and H version only.

T4

250A, 600V Δ

Adjustable thermal magnetic

20A - 250A Frame

Breaker	IC at 480VAC	Rating	Magnetic trip	2 pole, 600VAC/600VDC catalog number	3 pole, 600VAC/600VDC catalog number
T4N	25	125A	625-1250	T4N125TW-2	T4N125TW
		150A	750-1500	T4N150TW-2	T4N150TW
		200A	1000-2000	T4N200TW-2	T4N200TW
		250A	1250-2500	T4N250TW-2	T4N250TW
T4S	35	125A	625-1250	-	T4S125TW
		150A	750-1500	-	T4S150TW
		200A	1000-2000	-	T4S200TW
		250A	1250-2500	-	T4S250TW
T4H UL Current Limiting	65	125A	625-1250	-	T4H125TW
		150A	750-1500	-	T4H150TW
		200A	1000-2000	-	T4H200TW
		250A	1250-2500	-	T4H250TW
T4L	100	125A	625-1250	-	T4L125TW
		150A	750-1500	-	T4L150TW
		200A	1000-2000	-	T4L200TW
		250A	1250-2500	-	T4L250TW
T4V UL Current Limiting	150	125A	625-1250	-	T4V125TW
		150A	750-1500	-	T4V150TW
		200A	1000-2000	-	T4V200TW
		250A	1250-2500	-	T4V250TW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

T4

250A, 600V Δ 100% rated

Adjustable thermal magnetic

30A - 250A Frame 100% rated

Breaker	IC at 480 VAC kA	Rating	Magnetic trip	3 pole, 600VAC/600VDC Catalog number
T4N	25	125A	625-1250	T4NQ125TW
		150A	750-1500	T4NQ150TW
		200A	1000-2000	T4NQ200TW
		250A	1250-2500	T4NQ250TW
T4S	35	125A	625-1250	T4SQ125TW
		150A	750-1500	T4SQ150TW
		200A	1000-2000	T4SQ200TW
		250A	1250-2500	T4SQ250TW
T4H UL Current Limiting	65	125A	625-1250	T4HQ125TW
		150A	750-1500	T4HQ150TW
		200A	1000-2000	T4HQ200TW
		250A	1250-2500	T4HQ250TW
T4L	100	125A	625-1250	T4LQ125TW
		150A	750-1500	T4LQ150TW
		200A	1000-2000	T4LQ200TW
		250A	1250-2500	T4LQ250TW
T4V UL Current Limiting	150	125A	625-1250	T4VQ125TW
		150A	750-1500	T4VQ150TW
		200A	1000-2000	T4VQ200TW
		250A	1250-2500	T4VQ250TW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

T4

250A, 600V Δ

Electronic (AC only)

100A Frame, electronic trip unit (AC only)

Breaker	IC at 480VAC kA	Trip Unit	2 pole, 600V catalog number	3 pole, 600V catalog number
T4N	25	PR221 LS/I	T4N100BW-2	T4N100BW
		PR222 LSI	T4N100CW-2	T4N100CW
		PR222 LSIG	T4N100EW-2	T4N100EW
T4S	35	PR221 LS/I	-	T4S100BW
		PR222 LSI	-	T4S100CW
		PR222 LSIG	-	T4S100EW
T4H UL Current Limiting	65	PR221 LS/I	-	T4H100BW
		PR222 LSI	-	T4H100CW
		PR222 LSIG	-	T4H100EW
T4L	100	PR221 LS/I	-	T4L100BW
		PR222 LSI	-	T4L100CW
		PR222 LSIG	-	T4L100EW
T4V UL Current Limiting	150	PR221 LS/I	-	T4V100BW
		PR222 LSI	-	T4V100CW
		PR222 LSIG	-	T4V100EW

150A Frame, electronic trip unit (AC only)

Breaker	IC at 480VAC kA	Trip Unit	2 pole, 600V catalog number	3 pole, 600V catalog number
T4N	25	PR221 LS/I	T4N150BW-2	T4N150BW
		PR222 LSI	T4N150CW-2	T4N150CW
		PR222 LSIG	T4N150EW-2	T4N150EW
T4S	35	PR221 LS/I	-	T4S150BW
		PR222 LSI	-	T4S150CW
		PR222 LSIG	-	T4S150EW
T4H UL Current Limiting	65	PR221 LS/I	-	T4H150BW
		PR222 LSI	-	T4H150CW
		PR222 LSIG	-	T4H150EW
T4L	100	PR221 LS/I	-	T4L150BW
		PR222 LSI	-	T4L150CW
		PR222 LSIG	-	T4L150EW
T4V UL Current Limiting	150	PR221 LS/I	-	T4V150BW
		PR222 LSI	-	T4V150CW
		PR222 LSIG	-	T4V150EW

250A Frame, electronic trip unit (AC only)

Breaker	IC at 480VAC kA	Trip Unit	2 pole, 600V catalog number	3 pole, 600V catalog number
T4N	25	PR221 LS/I	T4N250BW-2	T4N250BW
		PR222 LSI	T4N250CW-2	T4N250CW
		PR222 LSIG	T4N250EW-2	T4N250EW
T4S	35	PR221 LS/I	-	T4S250BW
		PR222 LSI	-	T4S250CW
		PR222 LSIG	-	T4S250EW
T4H UL Current Limiting	65	PR221 LS/I	-	T4H250BW
		PR222 LSI	-	T4H250CW
		PR222 LSIG	-	T4H250EW
T4L	100	PR221 LS/I	-	T4L250BW
		PR222 LSI	-	T4L250CW
		PR222 LSIG	-	T4L250EW
T4V UL Current Limiting	150	PR221 LS/I	-	T4V250BW
		PR222 LSI	-	T4V250CW
		PR222 LSIG	-	T4V250EW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

T4

250A, 600V Δ, 100% Rated Electronic (AC only)

100A Frame - 100% rated, electronic trip unit (AC only)

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V catalog number
T4N	25	PR221 LS/I	T4NQ100BW
		PR222 LSI	T4NQ100CW
		PR222 LSIG	T4NQ100EW
T4S	35	PR221 LS/I	T4SQ100BW
		PR222 LSI	T4SQ100CW
		PR222 LSIG	T4SQ100EW
T4H UL Current Limiting	65	PR221 LS/I	T4HQ100BW
		PR222 LSI	T4HQ100CW
		PR222 LSIG	T4HQ100EW
T4L	100	PR221 LS/I	T4LQ100BW
		PR222 LSI	T4LQ100CW
		PR222 LSIG	T4LQ100EW
T4V UL Current Limiting	150	PR221 LS/I	T4VQ100BW
		PR222 LSI	T4VQ100CW
		PR222 LSIG	T4VQ100EW

250A Frame - 100% rated, electronic trip unit (AC only)

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V catalog number
T4N	25	PR221 LS/I	T4NQ250BW
		PR222 LSI	T4NQ250CW
		PR222 LSIG	T4NQ250EW
T4S	35	PR221 LS/I	T4SQ250BW
		PR222 LSI	T4SQ250CW
		PR222 LSIG	T4SQ250EW
T4H UL Current Limiting	65	PR221 LS/I	T4HQ250BW
		PR222 LSI	T4HQ250CW
		PR222 LSIG	T4HQ250EW
T4L	100	PR221 LS/I	T4LQ250BW
		PR222 LSI	T4LQ250CW
		PR222 LSIG	T4LQ250EW
T4V UL Current Limiting	150	PR221 LS/I	T4VQ250BW
		PR222 LSI	T4VQ250CW
		PR222 LSIG	T4VQ250EW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

150A Frame - 100% rated, electronic trip unit (AC only)

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V catalog number
T4N	25	PR221 LS/I	T4NQ150BW
		PR222 LSI	T4NQ150CW
		PR222 LSIG	T4NQ150EW
T4S	35	PR221 LS/I	T4SQ150BW
		PR222 LSI	T4SQ150CW
		PR222 LSIG	T4SQ150EW
T4H UL Current Limiting	65	PR221 LS/I	T4HQ150BW
		PR222 LSI	T4HQ150CW
		PR222 LSIG	T4HQ150EW
T4L	100	PR221 LS/I	T4LQ150BW
		PR222 LSI	T4LQ150CW
		PR222 LSIG	T4LQ150EW
T4V UL Current Limiting	150	PR221 LS/I	T4VQ150BW
		PR222 LSI	T4VQ150CW
		PR222 LSIG	T4VQ150EW

T4

250A, 600V Δ

Instantaneous only, MCP/Molded case switch

Instantaneous only MCPs

T4 - 250A Frame magnetic only (MCP - AC only)

Breaker	IC at 480VAC	Trip unit type	Rating	Adjustment range	3 pole, 600VAC Catalog number
T4N	25kA	Instantaneous only	100A	100-1000	T4N100E5W
			150A	150-1500	T4N150E5W
			250A	250-2500	T4N250E5W
T4S	35kA	Instantaneous only	100A	100-1000	T4S100E5W
			150A	150-1500	T4S150E5W
			250A	250-2500	T4S250E5W
T4H	65kA	Instantaneous only	100A	100-1000	T4H100E5W
			150A	150-1500	T4H150E5W
			250A	250-2500	T4H250E5W
T4L	100kA	Instantaneous only	100A	100-1000	T4L100E5W
			150A	150-1500	T4L150E5W
			250A	250-2500	T4L250E5W

Molded case switch ①

Type	IC at 480VAC	Amps	Magnetic trip	3 pole 600V catalog number
T4N-D	25kA	250	3000	T4N250DW
T4S-D	35kA	250	3000	T4S250DW
T4H-D	65kA	250	3000	T4H250DW
T4L-D	100kA	250	3000	T4L250DW
T4V-D	150kA	250	3000	T4V250DW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

T5

400/600A, 600V Δ

Electronic and thermal magnetic



T5

Dimensions 3P Fixed Version 8.07H x 5.51W x 4.07D
Weight 8.55 (lbs)

General

The T5 breaker is a 400/600 amp frame with either a microprocessor based over current protective trip system or a thermal magnetic trip unit. ③

Standards

The UL489/CSA 22.2 version of T5 also carries an IEC-60947-2 rating.

Versions

To meet all application requirements, the T5 is available in the following versions:

- T = Thermal-magnetic
- B = Selectable & adjustable LI or LS
- C = Adjustable LSI
- E = Adjustable LSIG
- D = Molded Case Switch
- E5 = Electronic instantaneous only (MCP)

Trip functions

These trip functions are available:

- L = Long time
- S = Short time
- I = Instantaneous
- G = Ground fault

Performance levels

Each version is also available in different maximum fault interrupting levels:

- N = Normal
- S = Standard
- H = High - UL Current Limiting
- L = Extra high
- V = Very high - UL Current Limiting

Number of poles ④

The T5 is available in two, three and four pole versions. Estimate 4 pole pricing by adding 35% to the 3 pole price and contact your ABB sales person for details.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	N	S	H	L	V
240VAC	65	100	150	200	200
480VAC	25	35	65	100	150
600VAC	18	25	35	65	100
500VDC ①	25	35	50	65	100
600VDC ②	16	25	35	50	65

IEC 60947-2 Interrupting capacity (kA RMS)

Voltage	N	S	H	L	V
230VAC	70	85	100	200	200
415VAC	36	50	70	120	200
690VAC	20	25	40	70	80
750VDC ②	16	25	36	50	70

① 2 poles in series.

② 3 poles in series.

③ T5 600A not available with thermal magnetic trip unit.

④ 2 pole available in N version only. 4 pole available in N and H version only.

T5

400/600A, 600V Δ

Thermal magnetic ①

300A - 400A Frames - thermal-magnetic trip units

Breaker	IC at 480VAC kA	Rating	Magnetic trip	2 pole, 600VAC/500VDC catalog number	3 pole, 600VAC/600VDC catalog number
T5N	25	300A	1500-3000	T5N300TW-2	T5N300TW
		400A	2000-4000	T5N400TW-2	T5N400TW
T5S	35	300A	1500-3000	-	T5S300TW
		400A	2000-4000		T5S400TW
T5H UL Current Limiting	65	300A	1500-3000	-	T5H300TW
		400A	2000-4000		T5H400TW
T5L	100	300A	1500-3000	-	T5L300TW
		400A	2000-4000		T5L400TW
T5V UL Current Limiting	150	300A	1500-3000	-	T5V300TW
		400A	2000-4000		T5V400TW

300A - 400A Frames - 100% rated, thermal-magnetic

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole, 600VAC/600VDC Catalog number
T5N	25	300A	1500-3000	T5NQ300TW
		400A	2000-4000	T5NQ400TW
T5S	35	300A	1500-3000	T5SQ300TW
		400A	2000-4000	T5SQ400TW
T5H UL Current Limiting	65	300A	1500-3000	T5HQ300TW
		400A	2000-4000	T5HQ400TW
T5L	100	300A	1500-3000	T5LQ300TW
		400A	2000-4000	T5LQ400TW
T5V UL Current Limiting	150	300A	1500-3000	T5VQ300TW
		400A	2000-4000	T5VQ400TW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

T5

400/600A, 600V Δ

Electronic (AC only)

300A Frame, electronic trip unit (AC only)

Breaker	IC at 480VAC kA	Trip Unit	2 pole, 600V catalog number	3 pole, 600V catalog number
T5N	25	PR221 LS/I	T5N300BW-2	T5N300BW
		PR222 LSI	T5N300CW-2	T5N300CW
		PR222 LSIG	T5N300EW-2	T5N300EW
T5S	35	PR221 LS/I	-	T5S300BW
		PR222 LSI	-	T5S300CW
		PR222 LSIG	-	T5S300EW
T5H UL Current Limiting	65	PR221 LS/I	-	T5H300BW
		PR222 LSI	-	T5H300CW
		PR222 LSIG	-	T5H300EW
T5L	100	PR221 LS/I	-	T5L300BW
		PR222 LSI	-	T5L300CW
		PR222 LSIG	-	T5L300EW
T5V UL Current Limiting	150	PR221 LS/I	-	T5V300BW
		PR222 LSI	-	T5V300CW
		PR222 LSIG	-	T5V300EW

400A Frame, electronic trip unit (AC only)

Breaker	IC at 480VAC kA	Trip Unit	2 pole, 600V catalog number	3 pole, 600V catalog number
T5N	25	PR221 LS/I	T5N400BW-2	T5N400BW
		PR222 LSI	T5N400CW-2	T5N400CW
		PR222 LSIG	T5N400EW-2	T5N400EW
T5S	35	PR221 LS/I	-	T5S400BW
		PR222 LSI	-	T5S400CW
		PR222 LSIG	-	T5S400EW
T5H UL Current Limiting	65	PR221 LS/I	-	T5H400BW
		PR222 LSI	-	T5H400CW
		PR222 LSIG	-	T5H400EW
T5L	100	PR221 LS/I	-	T5L400BW
		PR222 LSI	-	T5L400CW
		PR222 LSIG	-	T5L400EW
T5V UL Current Limiting	150	PR221 LS/I	-	T5V400BW
		PR222 LSI	-	T5V400CW
		PR222 LSIG	-	T5V400EW

600A Frame, electronic trip unit (AC only) ①

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V catalog number
T5N	25	PR221 LS/I	T5N600BW
		PR222 LSI	T5N600CW
		PR222 LSIG	T5N600EW
T5S	35	PR221 LS/I	T5S600BW
		PR222 LSI	T5S600CW
		PR222 LSIG	T5S600EW
T5H	65	PR221 LS/I	T5H600BW
		PR222 LSI	T5H600CW
		PR222 LSIG	T5H600EW
T5L	100	PR221 LS/I	T5L600BW
		PR222 LSI	T5L600CW
		PR222 LSIG	T5L600EW
T5V	150	PR221 LS/I	T5V600BW
		PR222 LSI	T5V600CW
		PR222 LSIG	T5V600EW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

① T5 600A not available in 2 pole version.

T5

400/600A, 600V Δ, 100% Rated ①

Electronic (AC only)

300A Frame – 100% rated, electronic trip units (AC only)

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V catalog number
T5N	25	PR221 LS/I	T5NQ300BW
		PR222 LSI	T5NQ300CW
		PR222 LSIG	T5NQ300EW
T5S	35	PR221 LS/I	T5SQ300BW
		PR222 LSI	T5SQ300CW
		PR222 LSIG	T5SQ300EW
T5H UL Current limiting	65	PR221 LS/I	T5HQ300BW
		PR222 LSI	T5HQ300CW
		PR222 LSIG	T5HQ300EW
T5L	100	PR221 LS/I	T5LQ300BW
		PR222 LSI	T5LQ300CW
		PR222 LSIG	T5LQ300EW
T5V UL Current limiting	150	PR221 LS/I	T5VQ300BW
		PR222 LSI	T5VQ300CW
		PR222 LSIG	T5VQ300EW

400A Frame – 100% rated, electronic trip units (AC only)

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V catalog number
T5N	25	PR221 LS/I	T5NQ400BW
		PR222 LSI	T5NQ400CW
		PR222 LSIG	T5NQ400EW
T5S	35	PR221 LS/I	T5SQ400BW
		PR222 LSI	T5SQ400CW
		PR222 LSIG	T5SQ400EW
T5H UL Current limiting	65	PR221 LS/I	T5HQ400BW
		PR222 LSI	T5HQ400CW
		PR222 LSIG	T5HQ400EW
T5L	100	PR221 LS/I	T5LQ400BW
		PR222 LSI	T5LQ400CW
		PR222 LSIG	T5LQ400EW
T5V UL Current limiting	150	PR221 LS/I	T5VQ400BW
		PR222 LSI	T5VQ400CW
		PR222 LSIG	T5VQ400EW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

T5

400/600A, 600V Δ

Instantaneous only, MCP/Molded case switch

T5 - 400A Frame, magnetic only (MCP - AC only)

Breaker	IC at 480VAC	Trip unit type	Rating	Adjustment range	3 pole, 600VAC Catalog number
T5N	25kA	Instantaneous only	300A	300-3000	T5N300E5W
			400A	400-4000	T5N400E5W
T5S	35kA	Instantaneous only	300A	300-3000	T5S300E5W
			400A	400-4000	T5S400E5W
T5H	65kA	Instantaneous only	300A	300-3000	T5H300E5W
			400A	400-4000	T5H400E5W
T5L	100kA	Instantaneous only	300A	300-3000	T5L300E5W
			400A	400-4000	T5L400E5W

T5 - 600A Frame, magnetic only (MCP - AC only)

Breaker	IC at 480VAC	Trip unit type	Rating	Adjustment range	3 pole, 600VAC Catalog number
T5N	25kA	Instantaneous only	600A	600-6000	T5N600E5W
T5S	35kA	Instantaneous only	600A	600-6000	T5S600E5W
T5H	65kA	Instantaneous only	600A	600-6000	T5H600E5W
T5L	100kA	Instantaneous only	600A	600-6000	T5L600E5W

Molded case switch ①

Type	IC at 480VAC	Amps	Magnetic trip	3 pole 600V catalog number
T5N-D	25kA	400	5000	T5N400DW
T5S-D	35kA	400	5000	T5S400DW
T5H-D	65kA	400	5000	T5H400DW
T5L-D	100kA	400	5000	T5L400DW
T5V-D	150kA	400	5000	T5V400DW
T5N-D	25kA	600	6000	T5N600DW
T5S-D	35kA	600	6000	T5S600DW
T5H-D	65kA	600	6000	T5H600DW
T5L-D	100kA	600	6000	T5L600DW
T5V-D	150kA	600	6000	T5V600DW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

① When protected by a OCPD with appropriate ratings.

T6

600A, 800A, 600V Δ

Thermal magnetic and electronic

Dimensions 3P Fixed Version 10.55H x 8.26W x 4.07D
Weight 20.9 (lbs)



T6

General

The T6 breaker is an 800 amp frame with either a microprocessor based over current protective trip system or a thermal magnetic trip unit. The T6 is available as a 600 or 800A frame.

Standards

The UL489/CSA 22.2 version of T6 also carries an IEC-60947-2 rating.

Versions

To meet all application requirements, the T6 is available in the following versions:

- T = Thermal-magnetic, fixed
- B = Selectable & adjustable LI or LS
- C = Adjustable LSI
- E = Adjustable LSIG
- D = Molded Case Switch
- E5 = Electronic instantaneous only (MCP)

Trip functions

These trip functions are available:

- L = Long time
- S = Short time
- I = Instantaneous
- G = Ground fault

Performance levels

Each version is also available in different maximum fault interrupting levels:

- N = Normal
- S = Standard
- H = High
- L = Extra high

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	N	S	H	L
240VAC	65	100	200	200
480VAC	35	50	65	100
600VAC	20	25	35	42
500VDC ①	35	35	50	65
600VDC ②	20	20	35	50

IEC 60947-2 Interrupting capacity (kA RMS)

Voltage	N	S	H	L
230VAC	70	85	100	200
415VAC	36	50	70	100
690VAC	20	22	25	30
750VDC ②	16	20	36	50

17 Number of poles ③

The T6 is available as a three and four pole breaker. Estimate 4 pole pricing by adding 35% to the 3 pole price and contact your ABB sales person for details.

① 2 poles in series.
 ② 3 poles in series.
 ③ 4 pole available N and H version only.

T6

600A, 800A, 600V Δ

Thermal magnetic and electronic

T6

600A, 800A, 600V

Thermal Magnetic Trip Units

Breaker	IC at 480 VAC kA	Rating	Magnetic trip	3 pole, 600VAC/600VDC catalog number
T6N	35	600A	3000 - 6000A	T6N600TW
		800A	4000 - 8000A	T6N800TW
T6S	50	600A	3000 - 6000A	T6S600TW
		800A	4000 - 8000A	T6S800TW
T6H	65	600A	3000 - 6000A	T6H600TW
		800A	4000 - 8000A	T6H800TW
T6L	100	600A	3000 - 6000A	T6L600TW
		800A	4000 - 8000A	T6L800TW

T6

600A, 800A, 600V

Thermal Magnetic Trip Units 100% rated

Breaker	IC at 480 VAC kA	Rating	Magnetic trip	3 pole, 600VAC/600VDC catalog number
T6N	35	600A	3000 - 6000A	T6NQ600TW
		800A	4000 - 8000A	T6NQ800TW
T6S	50	600A	3000 - 6000A	T6SQ600TW
		800A	4000 - 8000A	T6SQ800TW
T6H	65	600A	3000 - 6000A	T6HQ600TW
		800A	4000 - 8000A	T6HQ800TW
T6L	100	600A	3000 - 6000A	T6LQ600TW
		800A	4000 - 8000A	T6LQ800TW

T6

600A, 600V

Electronic Trip Units

Breaker	IC at 480VAC	Trip type	Adjustment	3 pole, 600VAC catalog number
T6N	35	PR221	LS/I	T6N600BW
		PR222	LSI	T6N600CW
		PR222	LSIG	T6N600EW
T6S	50	PR221	LS/I	T6S600BW
		PR222	LSI	T6S600CW
		PR222	LSIG	T6S600EW
T6H	65	PR221	LS/I	T6H600BW
		PR222	LSI	T6H600CW
		PR222	LSIG	T6H600EW
T6L	100	PR221	LS/I	T6L600BW
		PR222	LSI	T6L600CW
		PR222	LSIG	T6L600EW

T6

800A, 600V

Electronic Trip Units

Breaker	IC at 480VAC	Trip type	Adjustment	3 pole, 600VAC catalog number
T6N	35	PR221	LS/I	T6N800BW
		PR222	LSI	T6N800CW
		PR222	LSIG	T6N800EW
T6S	50	PR221	LS/I	T6S800BW
		PR222	LSI	T6S800CW
		PR222	LSIG	T6S800EW
T6H	65	PR221	LS/I	T6H800BW
		PR222	LSI	T6H800CW
		PR222	LSIG	T6H800EW
T6L	100	PR221	LS/I	T6L800BW
		PR222	LSI	T6L800CW
		PR222	LSIG	T6L800EW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

T6

600A, 800A, 600V Δ

Thermal magnetic and electronic

T6 600A, 600V Δ Electronic Trip Units 100% Rated

Breaker	IC at 480VAC	Trip type	Adjustment	3 pole, 600VAC catalog number
T6N	35	PR221	LS/I	T6NQ600BW
		PR222	LSI	T6NQ600CW
		PR222	LSIG	T6NQ600EW
T6S	50	PR221	LS/I	T6SQ600BW
		PR222	LSI	T6SQ600CW
		PR222	LSIG	T6SQ600EW
T6H	65	PR221	LS/I	T6HQ600BW
		PR222	LSI	T6HQ600CW
		PR222	LSIG	T6HQ600EW
T6L	100	PR221	LS/I	T6LQ600BW
		PR222	LSI	T6LQ600CW
		PR222	LSIG	T6LQ600EW

T6 800A, 600V Electronic Trip Units 100% Rated

Breaker	IC at 480VAC	Trip type	Adjustment	3 pole, 600VAC catalog number
T6N	35	PR221	LS/I	T6NQ800BW
		PR222	LSI	T6NQ800CW
		PR222	LSIG	T6NQ800EW
T6S	50	PR221	LS/I	T6SQ800BW
		PR222	LSI	T6SQ800CW
		PR222	LSIG	T6SQ800EW
T6H	65	PR221	LS/I	T6HQ800BW
		PR222	LSI	T6HQ800CW
		PR222	LSIG	T6HQ800EW
T6L	100	PR221	LS/I	T6LQ800BW
		PR222	LSI	T6LQ800CW
		PR222	LSIG	T6LQ800EW

T6 600A, 600V Δ Electronic Trip Units Instantaneous Only

Breaker	IC at 480VAC	kA	Trip type	Adjustment Range	3 pole, 600VAC catalog number
T6N	35		PR221	600-6000	T6N600E5W
T6S	50		PR221	600-6000	T6S600E5W
T6H	65		PR221	600-6000	T6H600E5W
T6L	100		PR221	600-6000	T6L600E5W

T6 800A, 600V Electronic Trip Units Instantaneous Only

Breaker	IC at 480VAC	kA	Trip type	Adjustment Range	3 pole, 600VAC catalog number
T6N	35		PR221	800-8000	T6N800E5W
T6S	50		PR221	800-8000	T6S800E5W
T6H	65		PR221	800-8000	T6H800E5W
T6L	100		PR221	800-8000	T6L800E5W

T6 800A, 600V Molded Case Switch

Breaker	IC at 480VAC ①	Amp	Magnetic Trip	3 pole, 600VAC catalog number
T6H	65	800	10,000	T6H800DW

① When protected by a OCPD with appropriate ratings.

T7 (Toggle)

1000A, 1200A, 600V Δ

Electronic

Dimensions 3P Fixed Version 10.55H x 8.26W x 6.06D
Weight 21.4 (lbs)



T7

General

The T7 breaker is a 1200 amp frame with a microprocessor based over current protective trip system.

Standards

The UL489/CSA 22.2 version of T7 also carries an IEC-60947-2 rating.

Versions

To meet all application requirements, the T7 is available in the following versions:

- B = Selectable & adjustable LI or LS — Dip switch settings
- C = Adjustable LSI — Dip switch settings
- E = Adjustable LSI — Dip switch settings
- D = Molded Case Switch
- P = LI — LCD display
- R = LSI — LCD display
- S = LSI — LCD display

Trip functions

These trip functions are available:

- L = Long time
- S = Short time
- I = Instantaneous
- G = Ground fault

Performance levels

Each version is also available in different maximum fault interrupting levels:

- S = Standard
- H = High
- L = Extra high

Number of poles ^①

The T7 is available as a 3 and 4 pole breaker. Estimate 4 pole pricing by adding 35% to the 3 pole price and contact your ABB sales person for details.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	S	H	L
240VAC	65	100	150
480VAC	50	65	100
600VAC	25	50	65

IEC 60947-2 Interrupting capacity (kA RMS)

Voltage	S	H	L
230VAC	85	100	200
415VAC	50	70	120
690VAC	30	42	50

^① 4 Pole available S, H and L version.

T7

1000A, 1200A, 600V Δ

Electronic

T7S, 1000A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip type	Adjustment	3 pole, 600VAC catalog number
T7S	50	PR231/P	LS/I	T7S1000BW
		PR232/P	LSI	T7S1000CW
		PR331/P	LSIG	T7S1000EW
		PR332/P	LI	T7S1000PW
		PR332/P	LSI	T7S1000RW
		PR332/P	LSIG	T7S1000SW

T7L, 1000A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip type	Adjustment	3 pole, 600VAC catalog number
T7L	100	PR231/P	LS/I	T7L1000BW
		PR232/P	LSI	T7L1000CW
		PR331/P	LSIG	T7L1000EW
		PR332/P	LI	T7L1000PW
		PR332/P	LSI	T7L1000RW
		PR332/P	LSIG	T7L1000SW

T7S, 1200A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip type	Adjustment	3 pole, 600VAC catalog number
T7S	50	PR231/P	LS/I	T7S1200BW
		PR232/P	LSI	T7S1200CW
		PR331/P	LSIG	T7S1200EW
		PR332/P	LI	T7S1200PW
		PR332/P	LSI	T7S1200RW
		PR332/P	LSIG	T7S1200SW

T7L, 1200A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip type	Adjustment	3 pole, 600VAC catalog number
T7L	100	PR231/P	LS/I	T7L1200BW
		PR232/P	LSI	T7L1200CW
		PR331/P	LSIG	T7L1200EW
		PR332/P	LI	T7L1200PW
		PR332/P	LSI	T7L1200RW
		PR332/P	LSIG	T7L1200SW

NOTE: See pages 17.71-17.83 for electrical/mechanical accessories.

T7H, 1000A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip type	Adjustment	3 pole, 600VAC catalog number
T7H	65	PR231/P	LS/I	T7H1000BW
		PR232/P	LSI	T7H1000CW
		PR331/P	LSIG	T7H1000EW
		PR332/P	LI	T7H1000PW
		PR332/P	LSI	T7H1000RW
		PR332/P	LSIG	T7H1000SW

T7H, 1200A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip type	Adjustment	3 pole, 600VAC catalog number
T7H	65	PR231/P	LS/I	T7H1200BW
		PR232/P	LSI	T7H1200CW
		PR331/P	LSIG	T7H1200EW
		PR332/P	LI	T7H1200PW
		PR332/P	LSI	T7H1200RW
		PR332/P	LSIG	T7H1200SW

T7

1000A, 1200A, 600V Δ

Electronic, 100% rated

T7S, 1000A, 600V

Electronic, 100% rated

Breaker	IC at 480VAC kA	Trip type	Adjustment	3 pole, 600VAC Catalog number
T7S	50	PR231/P	LS/I	T7SQ1000BW
		PR232/P	LSI	T7SQ1000CW
		PR331/P	LSIG	T7SQ1000EW
		PR332/P	LI	T7SQ1000PW
		PR332/P	LSI	T7SQ1000RW
		PR332/P	LSIG	T7SQ1000SW

T7L, 1000A, 600V

Electronic, 100% rated

Breaker	IC at 480VAC kA	Trip type	Adjustment	3 pole, 600VAC Catalog number
T7L	100	PR231/P	LS/I	T7LQ1000BW
		PR232/P	LSI	T7LQ1000CW
		PR331/P	LSIG	T7LQ1000EW
		PR332/P	LI	T7LQ1000PW
		PR332/P	LSI	T7LQ1000RW
		PR332/P	LSIG	T7LQ1000SW

T7S, 1200A, 600V

Electronic, 100% rated

Breaker	IC at 480VAC kA	Trip type	Adjustment	3 pole, 600VAC Catalog number
T7S	50	PR231/P	LS/I	T7SQ1200BW
		PR232/P	LSI	T7SQ1200CW
		PR331/P	LSIG	T7SQ1200EW
		PR332/P	LI	T7SQ1200PW
		PR332/P	LSI	T7SQ1200RW
		PR332/P	LSIG	T7SQ1200SW

T7L, 1200A, 600V

Electronic, 100% rated

Breaker	IC at 480VAC kA	Trip type	Adjustment	3 pole, 600VAC Catalog number
T7L	100	PR231/P	LS/I	T7LQ1200BW
		PR232/P	LSI	T7LQ1200CW
		PR331/P	LSIG	T7LQ1200EW
		PR332/P	LI	T7LQ1200PW
		PR332/P	LSI	T7LQ1200RW
		PR332/P	LSIG	T7LQ1200SW

NOTE: See pages 17.71 - 17.83 for electrical/mechanical accessories.

T7H, 1000A, 600V

Electronic, 100% rated

Breaker	IC at 480VAC kA	Trip type	Adjustment	3 pole, 600VAC Catalog number
T7H	65	PR231/P	LS/I	T7HQ1000BW
		PR232/P	LSI	T7HQ1000CW
		PR331/P	LSIG	T7HQ1000EW
		PR332/P	LI	T7HQ1000PW
		PR332/P	LSI	T7HQ1000RW
		PR332/P	LSIG	T7HQ1000SW

T7H, 1200A, 600V

Electronic, 100% rated

Breaker	IC at 480VAC kA	Trip type	Adjustment	3 pole, 600VAC Catalog number
T7H	65	PR231/P	LS/I	T7HQ1200BW
		PR232/P	LSI	T7HQ1200CW
		PR331/P	LSIG	T7HQ1200EW
		PR332/P	LI	T7HQ1200PW
		PR332/P	LSI	T7HQ1200RW
		PR332/P	LSIG	T7HQ1200SW

T7

1200A, 600V Δ

Electronic/Molded case switch

T7

1200A, 600V

Molded case switch

Breaker	IC at 480VAC kA ①	Amp	Magnetic trip	3 pole, 600VAC Catalog number
T7H	-	1200	20,000	T7H1200DW

NOTE: See pages 17.67 - 17.79 for electrical/mechanical accessories.

T7

1000 - 1200A, 600V

Motor circuit protection

Electronic trip, instantaneous only

Breaker	IC at 480VAC kA ①	Amp	Catalog number
T7S	50	1000	T7S1000E5W
T7H	65	1000	T7H1000E5W
T7L	100	1000	T7L1000E5W
T7S	50	1200	T7S1200E5W
T7H	65	1200	T7H1200E5W
T7L	100	1200	T7L1200E5W

NOTE: See pages 17.71 - 17.83 for electrical/mechanical accessories.

① When protected by a OCPD with appropriate ratings.

T7M (Stored energy) 1000A, 1200A, 600V Δ Electronic

Dimensions 3P Fixed Version 10.55H x 8.26W x 7D
Weight 24.25 (lbs)



T7M

General

The T7M breaker is a stored energy 1200A frame with a microprocessor based overcurrent protective trip system.

Standards

The UL489/CSA 22.2 version of T7M also carries an IEC-60947-2 rating.

Versions

To meet all application requirements, the T7M is available in the following versions:

- B = Selectable & adjustable LI or LS — Dip switch setting
- C = Adjustable LSI — Dip switch setting
- E = Adjustable LSIG — Dip switch setting
- D = Molded Case Switch
- P = LI — LCD display
- R = LSI — LCD display
- S = LSIG — LCD display

Trip functions

These trip functions are available:

- L = Long time
- S = Short time
- I = Instantaneous
- G = Ground fault

Performance levels

Each version is also available in different maximum fault interrupting levels:

- S = Standard
- H = High
- L = Extra high

Number of poles

The T7M is available as a three and four pole breaker.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	S	H	L
240VAC	65	100	150
480VAC	50	65	100
600VAC	25	50	65

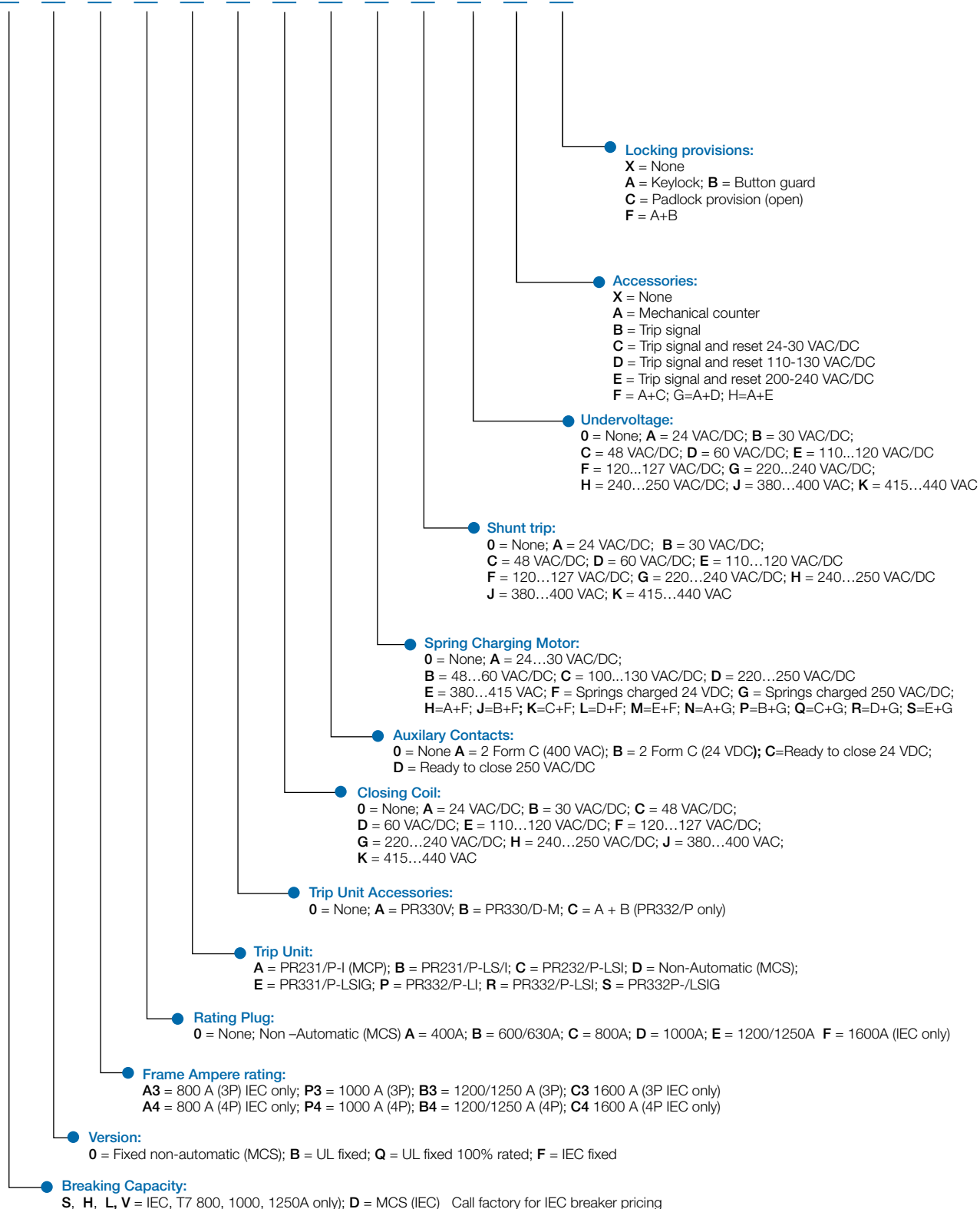
IEC 60947-2 Interrupting capacity (kA RMS)

Voltage	S	H	L
230VAC	85	100	200
415VAC	50	70	120
690VAC	30	42	50

T7M

1000A, 1200A, 600V Δ
Electronic

T 7 M



T7M

1000A, 1200A, 600V Δ - Three Pole Electronic

T7M-S, 1000A, 600V Electronic

Breaker	IC at 480VAC kA	Trip unit	3 pole, 600V Catalog number
T7M-S	50	PR231/P-LS/I	T7MSBP3DB000000XX
		PR232/P-LSI	T7MSBP3DC000000XX
		PR331/P-LSIG	T7MSBP3DE000000XX
		PR332/P-LI	T7MSBP3DP000000XX
		PR332/P-LSI	T7MSBP3DR000000XX
		PR332/P-LSIG	T7MSBP3DS000000XX

T7M-S, 1200A, 600V Electronic

Breaker	IC at 480VAC kA	Trip unit	3 pole, 600V Catalog number
T7M-S	50	PR231/P-LS/I	T7MSBB3EB000000XX
		PR232/P-LSI	T7MSBB3EC000000XX
		PR331/P-LSIG	T7MSBB3EE000000XX
		PR332/P-LI	T7MSBB3EP000000XX
		PR332/P-LSI	T7MSBB3ER000000XX
		PR332/P-LSIG	T7MSBB3ES000000XX

T7M-H, 1000A, 600V Electronic

Breaker	IC at 480VAC kA	Trip unit	3 pole, 600V Catalog number
T7M-H	65	PR231/P-LS/I	T7MHBP3DB000000XX
		PR232/P-LSI	T7MHBP3DC000000XX
		PR331/P-LSIG	T7MHBP3DE000000XX
		PR332/P-LI	T7MHBP3DP000000XX
		PR332/P-LSI	T7MHBP3DR000000XX
		PR332/P-LSIG	T7MHBP3DS000000XX

T7M-H, 1200A, 600V Electronic

Breaker	IC at 480VAC kA	Trip unit	3 pole, 600V Catalog number
T7M-H	65	PR231/P-LS/I	T7MHBB3EB000000XX
		PR232/P-LSI	T7MHBB3EC000000XX
		PR331/P-LSIG	T7MHBB3EE000000XX
		PR332/P-LI	T7MHBB3EP000000XX
		PR332/P-LSI	T7MHBB3ER000000XX
		PR332/P-LSIG	T7MHBB3ES000000XX

T7M-L, 1000A, 600V Electronic

Breaker	IC at 480VAC kA	Trip unit	3 pole, 600V Catalog number
T7M-L	100	PR231/P-LS/I	T7MLBP3DB000000XX
		PR232/P-LSI	T7MLBP3DC000000XX
		PR331/P-LSIG	T7MLBP3DE000000XX
		PR332/P-LI	T7MLBP3DP000000XX
		PR332/P-LSI	T7MLBP3DR000000XX
		PR332/P-LSIG	T7MLBP3DS000000XX

T7M-L, 1200A, 600V Electronic

Breaker	IC at 480VAC kA	Trip unit	3 pole, 600V Catalog number
T7M-L	100	PR231/P-LS/I	T7MLBB3EB000000XX
		PR232/P-LSI	T7MLBB3EC000000XX
		PR331/P-LSIG	T7MLBB3EE000000XX
		PR332/P-LI	T7MLBB3EP000000XX
		PR332/P-LSI	T7MLBB3ER000000XX
		PR332/P-LSIG	T7MLBB3ES000000XX

T7M

1000A, 1200A, 600V Δ - Three Pole Electronic 100% Rated

T7M-S, 1000A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	3 pole, 600V Catalog number
T7M-S	50	PR231/P-LS/I	T7MSQP3DB000000XX
		PR232/P-LSI	T7MSQP3DC000000XX
		PR331/P-LSIG	T7MSQP3DE000000XX
		PR332/P-LI	T7MSQP3DP000000XX
		PR332/P-LSI	T7MSQP3DR000000XX
		PR332/P-LSIG	T7MSQP3DS000000XX

T7M-S, 1200A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	3 pole, 600V Catalog number
T7M-S	50	PR231/P-LS/I	T7MSQB3EB000000XX
		PR232/P-LSI	T7MSQB3EC000000XX
		PR331/P-LSIG	T7MSQB3EE000000XX
		PR332/P-LI	T7MSQB3EP000000XX
		PR332/P-LSI	T7MSQB3ER000000XX
		PR332/P-LSIG	T7MSQB3ES000000XX

T7M-H, 1000A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	3 pole, 600V Catalog number
T7M-H	65	PR231/P-LS/I	T7MHQP3DB000000XX
		PR232/P-LSI	T7MHQP3DC000000XX
		PR331/P-LSIG	T7MHQP3DE000000XX
		PR332/P-LI	T7MHQP3DP000000XX
		PR332/P-LSI	T7MHQP3DR000000XX
		PR332/P-LSIG	T7MHQP3DS000000XX

T7M-H, 1200A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	3 pole, 600V Catalog number
T7M-H	65	PR231/P-LS/I	T7MHQB3EB000000XX
		PR232/P-LSI	T7MHQB3EC000000XX
		PR331/P-LSIG	T7MHQB3EE000000XX
		PR332/P-LI	T7MHQB3EP000000XX
		PR332/P-LSI	T7MHQB3ER000000XX
		PR332/P-LSIG	T7MHQB3ES000000XX

T7M-L, 1000A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	3 pole, 600V Catalog number
T7M-L	100	PR231/P-LS/I	T7MLQP3DB000000XX
		PR232/P-LSI	T7MLQP3DC000000XX
		PR331/P-LSIG	T7MLQP3DE000000XX
		PR332/P-LI	T7MLQP3DP000000XX
		PR332/P-LSI	T7MLQP3DR000000XX
		PR332/P-LSIG	T7MLQP3DS000000XX

T7M-L, 1200A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	3 pole, 600V Catalog number
T7M-L	100	PR231/P-LS/I	T7MLQB3EB000000XX
		PR232/P-LSI	T7MLQB3EC000000XX
		PR331/P-LSIG	T7MLQB3EE000000XX
		PR332/P-LI	T7MLQB3EP000000XX
		PR332/P-LSI	T7MLQB3ER000000XX
		PR332/P-LSIG	T7MLQB3ES000000XX

T7M

1000A, 1200A, 600V Δ - Four Pole Electronic

T7M-S, 1000A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	4 pole, 600V Catalog number
T7M-S	50	PR231/P-LS/I	T7MSBP4DB000000XX
		PR232/P-LSI	T7MSBP4DC000000XX
		PR331/P-LSIG	T7MSBP4DE000000XX
		PR332/P-LI	T7MSBP4DP000000XX
		PR332/P-LSI	T7MSBP4DR000000XX
		PR332/P-LSIG	T7MSBP4DS000000XX

T7M-S, 1200A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	4 pole, 600V Catalog number
T7M-S	50	PR231/P-LS/I	T7MSBB4EB000000XX
		PR232/P-LSI	T7MSBB4EC000000XX
		PR331/P-LSIG	T7MSBB4EE000000XX
		PR332/P-LI	T7MSBB4EP000000XX
		PR332/P-LSI	T7MSBB4ER000000XX
		PR332/P-LSIG	T7MSBB4ES000000XX

T7M-H, 1000A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	4 pole, 600V Catalog number
T7M-H	65	PR231/P-LS/I	T7MHBP4DB000000XX
		PR232/P-LSI	T7MHBP4DC000000XX
		PR331/P-LSIG	T7MHBP4DE000000XX
		PR332/P-LI	T7MHBP4DP000000XX
		PR332/P-LSI	T7MHBP4DR000000XX
		PR332/P-LSIG	T7MHBP4DS000000XX

T7M-H, 1200A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	4 pole, 600V Catalog number
T7M-H	65	PR231/P-LS/I	T7MHBB4EB000000XX
		PR232/P-LSI	T7MHBB4EC000000XX
		PR331/P-LSIG	T7MHBB4EE000000XX
		PR332/P-LI	T7MHBB4EP000000XX
		PR332/P-LSI	T7MHBB4ER000000XX
		PR332/P-LSIG	T7MHBB4ES000000XX

T7M-L, 1000A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	4 pole, 600V Catalog number
T7M-L	100	PR231/P-LS/I	T7MLBP4DB000000XX
		PR232/P-LSI	T7MLBP4DC000000XX
		PR331/P-LSIG	T7MLBP4DE000000XX
		PR332/P-LI	T7MLBP4DP000000XX
		PR332/P-LSI	T7MLBP4DR000000XX
		PR332/P-LSIG	T7MLBP4DS000000XX

T7M-L, 1200A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	4 pole, 600V Catalog number
T7M-L	100	PR231/P-LS/I	T7MLBB4EB000000XX
		PR232/P-LSI	T7MLBB4EC000000XX
		PR331/P-LSIG	T7MLBB4EE000000XX
		PR332/P-LI	T7MLBB4EP000000XX
		PR332/P-LSI	T7MLBB4ER000000XX
		PR332/P-LSIG	T7MLBB4ES000000XX

T7M

1000A, 1200A, 600V Δ - Four Pole Electronic 100% Rated

T7M-S, 1000A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	4 pole, 600V Catalog number
T7M-S	50	PR231/P-LS/I	T7MSQP4DB000000XX
		PR232/P-LSI	T7MSQP4DC000000XX
		PR331/P-LSIG	T7MSQP4DE000000XX
		PR332/P-LI	T7MSQP4DP000000XX
		PR332/P-LSI	T7MSQP4DR000000XX
		PR332/P-LSIG	T7MSQP4DS000000XX

T7M-S, 1200A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	4 pole, 600V Catalog number
T7M-S	50	PR231/P-LS/I	T7MSQB4EB000000XX
		PR232/P-LSI	T7MSQB4EC000000XX
		PR331/P-LSIG	T7MSQB4EE000000XX
		PR332/P-LI	T7MSQB4EP000000XX
		PR332/P-LSI	T7MSQB4ER000000XX
		PR332/P-LSIG	T7MSQB4ES000000XX

T7M-H, 1000A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	4 pole, 600V Catalog number
T7M-H	65	PR231/P-LS/I	T7MHQP4DB000000XX
		PR232/P-LSI	T7MHQP4DC000000XX
		PR331/P-LSIG	T7MHQP4DE000000XX
		PR332/P-LI	T7MHQP4DP000000XX
		PR332/P-LSI	T7MHQP4DR000000XX
		PR332/P-LSIG	T7MHQP4DS000000XX

T7M-H, 1200A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	4 pole, 600V Catalog number
T7M-H	65	PR231/P-LS/I	T7MHQB4EB000000XX
		PR232/P-LSI	T7MHQB4EC000000XX
		PR331/P-LSIG	T7MHQB4EE000000XX
		PR332/P-LI	T7MHQB4EP000000XX
		PR332/P-LSI	T7MHQB4ER000000XX
		PR332/P-LSIG	T7MHQB4ES000000XX

T7M-L, 1000A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	4 pole, 600V Catalog number
T7M-L	100	PR231/P-LS/I	T7MLQP4DB000000XX
		PR232/P-LSI	T7MLQP4DC000000XX
		PR331/P-LSIG	T7MLQP4DE000000XX
		PR332/P-LI	T7MLQP4DP000000XX
		PR332/P-LSI	T7MLQP4DR000000XX
		PR332/P-LSIG	T7MLQP4DS000000XX

T7M-L, 1200A, 600V

Electronic

Breaker	IC at 480VAC kA	Trip unit	4 pole, 600V Catalog number
T7M-L	100	PR231/P-LS/I	T7MLQB4EB000000XX
		PR232/P-LSI	T7MLQB4EC000000XX
		PR331/P-LSIG	T7MLQB4EE000000XX
		PR332/P-LI	T7MLQB4EP000000XX
		PR332/P-LSI	T7MLQB4ER000000XX
		PR332/P-LSIG	T7MLQB4ES000000XX

T7M

1200A, 600V Δ - Molded Case Switch

T7M

1200A, 600V

Molded case switch

Breaker	IC at 480VAC kA	Amp	Magnetic override	3 pole, 600VAC Catalog number
T7M-H	-	1200	20,000	T7MH0B30D000000XX

T7M

1000 - 1200A, 600V

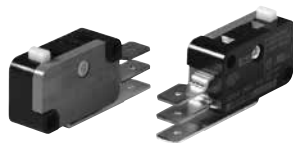
Motor circuit protection
Electronic trip, instantaneous only

Breaker	IC at 480VAC kA	Amp	Catalog number
T7M-S	50	1000	T7MSBP3DA000000XX
T7M-H	65	1000	T7MHBP3DA000000XX
T7M-L	100	1000	T7MLBP3DA000000XX
T7M-S	50	1200	T7MSBB3EA000000XX
T7M-H	65	1200	T7MHBB3EA000000XX
T7M-L	100	1200	T7MLBB3EA000000XX

Accessories

Electrical

T7M



KT7MXC1

Closing coils ①		Field installation Catalog number
T7M	415...440 VAC	KT7MXC1
	380...400 VAC	KT7MXC2
	240...250 VAC/DC	KT7MXC3
	220...240 VAC/DC	KT7MXC4
	120...127 VAC/DC	KT7MXC5
	110...120 VAC/VDC	KT7MXC6
	60 VAC/DC	KT7MXC7
	48 VAC/DC	KT7MXC8
	30 VAC/DC	KT7MXC9
	24 VAC/DC	KT7MXC0

Auxiliary contacts		Field installation Catalog number
T7/T7M	2 Form C 400 VAC	KT7XAS2
	2 Form C 24 VDC	KT7XAS2-AU

Ready to close auxiliaries (IEC)		Field installation Catalog number
T7M	24 VDC	KT7MX-RTC24V
	250 VAC/DC	KT7MX-RTC250V

Signals the circuit breaker is ready to accept a close signal if the following five conditions are met:

- Circuit breaker is open
- Any opening coil de-energized
- Opening solenoid armed
- Closing springs are charged
- Any undervoltage coil energized

Trip signal		Field/factory installation Catalog number
T7M	Contact for signalling electronic trip unit tripped ①	KT7MTS



KT7MXM*

Spring charging motor ①		Field installation Catalog number
T7M	380...415 VAC	KT7MXM2
	220...250 VAC/DC	KT7MXM3
	100...130 VAC/DC	KT7MXM5
	48...60 VAC/DC	KT7MXM7
	24...30 VAC/DC	KT7MXM9

Spring charged contacts (IEC)		Field installation Catalog number
T7M	Contact signalling springs charged 24 VDC	KT7MX-SC24V
	Contact signalling springs charged 250 VAC/DC	KT7MX-SC250V



KT7XU*

Shunt trip		Field installation Catalog number
T7/T7M	415...440 VAC	KT7XS1
	380...400 VAC	KT7XS2
	240...250 VAC/DC	KT7XS3
	220...240 VAC/DC	KT7XS4
	120...127 VAC/DC	KT7XS5
	110...120 VAC/DC	KT7XS6
	60 VAC/DC	KT7XS7
	48 VAC/DC	KT7XS8
	30 VAC/DC	KT7XS9
		24 VAC/DC

Undervoltage		Field installation Catalog number
T7/T7M	415...440 VAC	KT7XU1
	380...400 VAC	KT7XU2
	240...250 VAC/DC	KT7XU3
	220...240 VAC/DC	KT7XU4
	120...127 VAC/DC	KT7XU5
	110...120 VAC/DC	KT7XU6
	60 VAC/DC	KT7XU7
	48 VAC/DC	KT7XU8
	30 VAC/DC	KT7XU9
		24 VAC/DC

Trip reset (IEC)		Field installation Catalog number
T7M	Trip reset command 24-30 VAC/DC	KT7MX-TR9
	Trip reset command 110-130 VAC/DC	KT7MX-TR5
	Trip reset command 200-240 VAC/DC	KT7MX-TR4

Allows remote circuit breaker resetting following a trip of the overcurrent release

① Not Suitable for T7 toggle version.
② Always supplied with PR332/P trip units

Accessories

Mechanical

T7M

Terminal lugs

Frame Size	Wire Size	Catalog number (3 pieces)	Catalog number (4 pieces)
T7/T7M ①	(4) 4/0-500 kxmil	KT7X1200-3 ①	KT7X1200-4 ①

Terminal covers - Low profile - kit includes two pieces-fixed breakers

Frame Size	Catalog number (3 pole)	Catalog number (4 pole)
T7/T7M ②	KT7XLTC-3	KT7XLTC-4

Terminal covers - High profile - kit includes two pieces

Frame Size	Catalog number (3 pole)	Catalog number (4 pole)
T7/T7M	KT7XHTC-3	KT7XHTC-4

Phase barriers - Low profile 100mm - 3.93 in

Frame Size	Catalog number 4 pcs (3 pole)	Catalog number 6 pcs (4 pole)
T7/T7M	KT7PBL-3 ②	KT7PBL-4

Phase barriers - High profile 200mm - 7.87 in

Frame	Catalog number 4 pcs (3 pole)	Catalog number 6 pcs (4 pole)
T7/T7M	KT7PBH-3	KT7PBH-4



KT7MXMC

Mechanical operation counter ③

Frame	Field/factory installation Catalog number
T7M	Mechanical counter ③ KT7MXMC

Transparent protection for buttons ③

Frame	Field/factory installation Catalog number
T7M	Button Guard ③ KT7MXPG



KT7XPG

Padlock provision ③

Frame	Field/factory installation Catalog number
T7M	Padlock-open ③ KT7MXLDO

Key locks

Frame Size	Key lock open position	Field/factory installation Catalog number
T7M	Key lock on breaker open position key lock # 20005 ③	KT7MKL2
	Key lock on breaker open position different keys ③	KT7MKL1



KT7MKL*

Mechanical interlock

Frame	Catalog part number
T7M/T7M	Cable T7 KT7XMLC
	Mechanical interlock plate - drawout KT7XMLPW
	Mechanical interlock plate - fixed KT7XMLPF

IP54 door protection ③

Frame	Field Installation Catalog number
T7M	Protective cover ③ KT7MXDC

① Comes standard with high profile terminal covers.

② Fixed breakers only

③ Not Suitable for T7 toggle version

Accessories

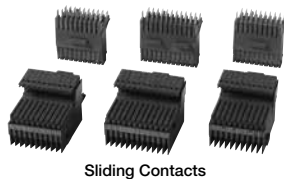
Mechanical

T7M

Draw-out kits

Frame	Adaptor moving part	Fixed Part
T7M 3 Pole with horizontal/vertical terminals	KT7XWMK	KT7WFHR

Sliding contact blocks



Sliding Contacts

T7M - Drawout	Moving part breaker	Fixed part cradle
Left Block Spring charging motor Spring charged contact Ready to close contact Early auxiliary contact Contact for trip coil trip release Trip reset	KT7XSCMP-L	KT7XSCFP-L
Center Block PR331 PR332	KT7XSCMP-C	KT7XSCFP-C
Right Block Auxiliary contacts Shunt trip Closing coil Undervoltage release	KT7XSCMP-R	KT7XSCFP-R

If at least one of the accessories in the table is installed on the breaker - respective pair of contact blocks must be installed on the fixed part (cradle) and the moving part (breaker)

Position key lock

Locks drawout breaker in racked-in/test-isolated/racked-out	Catalog number
Key #20005	KT7XPL2
Different keys	KT7XPL1

Position lock accessory

Added to position lock allows breaker to be locked in racked out position only	Catalog number
Position lock accessory	KT7XPLA

Rating plugs (UL)

	Catalog number	
T7/T7M	400A Rating plug	KT7X0400RP
	600A Rating plug	KT7X0600RP
	800A Rating plug	KT7X0800RP
	1000A Rating plug	KT7X1000RP
	1200A Rating plug	KT7X1200RP

Modules for T7M PR332 trip units

	Catalog number	
T7/T7M	Voltage module ①	PR330/VT7MX1
	Communication module (Modbus RTU)	PR330/D-M

External units

	Catalog number	
T7/T7M	Battery power supply unit ②	PR030/B
	External Bluetooth communication module Includes diagnostic software for Modbus/Bluetooth networks	BT030
	Test configuration unit	PR010/T
	Allows tripping of all electronic trip units for Tmax (except PR33x)	K7TUT
	Current sensor for external neutral	KT7NCT

Accessory connector

For wiring to internal accessories	Catalog number
	KT7XAC



PR330/D-M

Technical data T7/T7M

Shunt trips, closing coil,
Undervoltage & spring charging motor

Standard shunt trip

Inrush Power Consumption	T7/T7M	
	AC (VA)	DC (W)
Voltage		
24 VAC/DC	300	300
30 VAC/DC	300	300
48 VAC/DC	300	300
60 VAC/DC	300	300
110...120 VAC/DC	300	300
120...127 VAC/DC	300	300
220...240 VAC/DC	300	300
240...240 VAC/DC	300	300
380...400 VAC	300	—
415...440 VAC	300	—
Opening time (ms)	20	20

Undervoltage

Inrush Power Consumption	T7/T7M	
	AC (VA)	DC (W)
Voltage		
24 VAC/DC	3.5	3.5
30 VAC/DC	3.5	3.5
110...120 VAC/DC	3.5	3.5
120...127 VAC/DC	3.5	3.5
220...240 VAC	3.5	3.5
240...250 VAC/DC	3.5	3.5
380...400 VAC	3.5	—
415...440 VAC	3.5	—
Opening time (ms)	≤ 25	≤ 25

Closing coil

Inrush Power Consumption	T7M	
	AC (VA)	DC (W)
Voltage		
24 VAC/DC	300	300
30 VAC/DC	300	300
48 VAC/DC	300	300
60 VAC/DC	300	300
110...120 VAC/DC	300	300
120...127 VAC/DC	300	300
220...240 VAC/DC	300	300
240...240 VAC/DC	300	300
380...400 VAC	300	—
415...440 VAC	300	—
Opening time (ms)	20	20

Spring charging motor

Power Consumption	T7M	
	AC (VA)	DC (W)
Voltage		
24...30 VAC/DC	≤ 100	≤ 100
48...60 VAC/DC	≤ 100	≤ 100
100...130 VAC/DC	≤ 100	≤ 100
220...250 VAC/DC	≤ 100	≤ 100
380...415 VAC	≤ 100	—
Opening voltage (% Un)	85-110	85-110
Charging time (s)	8-10	8-10

T8

1600/2000/2500/3000A, 600VAC Δ

Electronic trip



T8

Dimensions	3P Fixed Version 15.0H x 16.8W x 11.2D
Weight	161 lbs (1600, 2000, 2500A) 236 lbs (3000A)

General

The T8 is available in a 1600A, 2000A, 2500A, 3000A frame with a microprocessor over current protective trip system.

Standards

The UL489/CSA 22.2 version of the T8 also carries an IEC-60947-2 rating.

Versions

To meet all application requirements the T8 is available in the following versions:

- C = Adjustable LSI PR232/P-T8 Dip switch settings
- D = Molded Case Switch
- E = Adjustable LSI PR331/P Dip switch settings
- P = Adjustable LI PR332/P LCD Display
- R = Adjustable LSI PR332/P LCD Display
- S = Adjustable LSI PR332/P LCD Display
- Rc = Residual Current (IEC, 3 pole, under 3200A only)

Trip functions

These trip functions are available:

- L = Long time
- S = Short time
- I = Instantaneous
- G = Ground fault

Performance levels

Each version is also available at the following maximum fault interrupting level:

- V = Very high

Number of poles

The T8 is available in three and four pole versions.

UL489/CSA C22.2 Interrupting capacity (kA RMS)

Voltage	V
240VAC	125
480VAC	125
600VAC	100
DC	—

IEC 60947-2 Interrupting capacity (kA RMS)

Voltage	V
230VAC	130
415VAC	130
440VAC	100
690VAC	80
DC	—

T8

Catalog number explanation

T 8 V

Locking provisions:

X = None; **A** = Keylock
B = Button guard; **C** = Padlock provision; **D** = A+B; **E** = A+C
T = Heavy duty padlock;
9 = Extra heavy duty padlock

Accessories

X = None; **A** = Mechanical counter; **B** = Bell Alarm
C = Bell Alarm w/remote reset, 24..30 VAC/DC
D = Bell Alarm w/remote reset 110..130 VAC/DC
E = Bell Alarm w/remote reset 220..240 VAC/DC
F = A+B; **G** = A+C; **H** = A+D; **J** = A+E

Undervoltage

0 = None
A = 24 VDC; **B** = 30 VAC/DC
C = 48 VAC/DC; **D** = 60 VAC/DC
E = 110..120 VAC/DC; **F** = 125..127 VAC/DC
G = 220..240 VAC/DC; **H** = 250 VAC/DC
J = 380..400 VAC; **K** = 440 VAC

Second shunt trip:

L = 24 VDC; **M** = 30 VAC/DC
N = 48 VAC/DC; **P** = 60 VAC/DC
Q = 110..120 VAC/DC; **R** = 125..127 VAC/DC
S = 220..240 VAC/DC; **T** = 250 VAC/DC
U = 380..400 VAC; **V** = 440..480 VAC

Shunt trip

0 = None
A = 24 VDC; **B** = 30 VAC/DC; **C** = 48 VAC/DC;
D = 60 VAC/DC; **E** = 110..120 VAC/DC
F = 120..127 VAC/DC; **G** = 220..240 VAC/DC;
H = 240..250 VAC/DC; **J** = 380..400 VAC;
K = 440 VAC

Spring charging motor:

0 = None
A = 24..30 VAC/DC; **B** = 48..60 VAC/DC;
C = 100..130 VAC/DC; **D** = 220..250 VAC/DC

Contacts:

0 = None
A = 4 aux contacts; (supplied as standard for breakers with PR332 trip units)
B = 4 aux contacts digital (24V)
D = UV energ NO; **E** = UV energ NC;
F = A+D; **G** = A+E; **H** = B+D; **J** = B+E

Closing Coil:

0 = None
A = 24 VDC; **B** = 30 VAC/DC; **C** = 48 VAC/DC; **D** = 60 VAC/DC; **E** = 110..120 VAC/DC;
F = 120..127 VAC/DC; **G** = 220..240 AC/DC; **H** = 240..250 VAC/DC; **J** = 380..400 VAC; **K** = 440VAC

Trip Unit Accessories: PR332/P ONLY

0 = None
B = Voltage measuring module; **C** = Modbus module

Trip Unit:

C = PR331/P-T8-LSI; **D** = Non-Automatic (MCS); **E** = PR331/P-LSIG;
P = PR332/P-LI; **R** = PR332/P-LSI; **S** = PR332/P-LSIG; **H** = PR332/P-LSIRc (IEC)

Rating Plug:

D = 1000; **E** = 1200; **F** = 1600; **G** = 2000; **H** = 2500; **J** = 3000, 3200; **0** = Non-Automatic (MCS)

Frame Amp Rating:

C3 = 1600 (3P UL only); **D3** = 2000 (3P); **E3** = 2500 (3P); **F3** = 3000 UL/3200 IEC (3P)
C4 = 1600 (4P UL only); **D4** = 2000 (4P); **E4** = 2500 (4P); **F4** = 3000 UL/3200 IEC (4P)

Version:

B = UL Fixed; **Q** = UL Fixed 100% Rated; **F** = IEC Fixed; **0** = Fixed Non-Automatic (MCS)

Breaking capacity:

V = Very High; **L** (IEC only. Call factory for IEC breaker pricing.)

T8

1600/2000/2500/3000A 600VΔ - Three Pole Electronic (AC Only)

1600A Frame, electronic trip unit (AC only) standard horizontal terminals

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VBC3FC000000XX
		PR331 LSIG (Dip Switch)	T8VBC3FE000000XX
		PR332 LI (LCD)	T8VBC3FP00A000XX ①
		PR332 LSI (LCD)	T8VBC3FR00A000XX ①
		PR332 LSIG (LCD)	T8VBC3FS00A000XX ①

2500A Frame, electronic trip unit (AC only) standard horizontal terminals

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VBE3HC000000XX
		PR331 LSIG (Dip Switch)	T8VBE3HE000000XX
		PR332 LI (LCD)	T8VBE3HP00A000XX ①
		PR332 LSI (LCD)	T8VBE3HR00A000XX ①
		PR332 LSIG (LCD)	T8VBE3HS00A000XX ①

2000A Frame, electronic trip unit (AC only) standard horizontal terminals

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VBD3GC000000XX
		PR331 LSIG (Dip Switch)	T8VBD3GE000000XX
		PR332 LI (LCD)	T8VBD3GP00A000XX ①
		PR332 LSI (LCD)	T8VBD3GR00A000XX ①
		PR332 LSIG (LCD)	T8VBD3GS00A000XX ①

3000A Frame, electronic trip unit (AC only) standard with vertical terminals - Required

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VBF3JC000000XX
		PR331 LSIG (Dip Switch)	T8VBF3JE000000XX
		PR332 LI (LCD)	T8VBF3JP00A000XX ①
		PR332 LSI (LCD)	T8VBF3JR00A000XX ①
		PR332 LSIG (LCD)	T8VBF3JS00A000XX ①

① Includes 4 open/closed auxiliary contacts as standard

T8

1600/2000/2500/3000A 600VΔ - Three Pole Electronic (AC Only) 100% Rated

1600A Frame, electronic trip unit (AC only) standard horizontal terminals

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VQC3FC000000XX
		PR331 LSIG (Dip Switch)	T8VQC3FE000000XX
		PR332 LI (LCD)	T8VQC3FP00A000XX ①
		PR332 LSI (LCD)	T8VQC3FR00A000XX ①
		PR332 LSIG (LCD)	T8VQC3FS00A000XX ①

2500A Frame, electronic trip unit (AC only) standard with vertical terminals - Required

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VQE3HC000000XX
		PR331 LSIG (Dip Switch)	T8VQE3HE000000XX
		PR332 LI (LCD)	T8VQE3HP00A000XX ①
		PR332 LSI (LCD)	T8VQE3HR00A000XX ①
		PR332 LSIG (LCD)	T8VQE3HS00A000XX ①

2000A Frame, electronic trip unit (AC only) standard horizontal terminals

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VQD3GC000000XX
		PR331 LSIG (Dip Switch)	T8VQD3GE000000XX
		PR332 LI (LCD)	T8VQD3GP00A000XX ①
		PR332 LSI (LCD)	T8VQD3GP00A000XX ①
		PR332 LSIG (LCD)	T8VQD3GR00A000XX ①

3000A Frame, electronic trip unit (AC only) standard with vertical terminals - Required

Breaker	IC at 480VAC kA	Trip Unit	3 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VQF3JC000000XX
		PR331 LSIG (Dip Switch)	T8VQF3JE000000XX
		PR332 LI (LCD)	T8VQF3JP00A000XX ①
		PR332 LSI (LCD)	T8VQF3JR00A000XX ①
		PR332 LSIG (LCD)	T8VQF3JS00A000XX ①

① Includes 4 open/closed auxiliary contacts as standard

T8

1600/2000/2500/3000A 600VΔ — Four pole Electronic (AC Only)

1600A Frame, electronic trip unit (AC only) standard horizontal terminals

Breaker	IC at 480VAC kA	Trip Unit	4 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VBC4FC000000XX
		PR331 LSIG (Dip Switch)	T8VBC4FE000000XX
		PR332 LI (LCD)	T8VBC4FP00A000XX ①
		PR332 LSI (LCD)	T8VBC4FR00A000XX ①
		PR332 LSIG (LCD)	T8VBC4FS00A000XX ①

2500A Frame, electronic trip unit (AC only) standard horizontal terminals

Breaker	IC at 480VAC kA	Trip Unit	4 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VBE4HC000000XX
		PR331 LSIG (Dip Switch)	T8VBE4HE000000XX
		PR332 LI (LCD)	T8VBE4HP00A000XX ①
		PR332 LSI (LCD)	T8VBE4HR00A000XX ①
		PR332 LSIG (LCD)	T8VBE4HS00A000XX ①

2000A Frame, electronic trip unit (AC only) standard horizontal terminals

Breaker	IC at 480VAC kA	Trip Unit	4 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VBD4GC000000XX
		PR331 LSIG (Dip Switch)	T8VBD4GE000000XX
		PR332 LI (LCD)	T8VBD4GP00A000XX ①
		PR332 LSI (LCD)	T8VBD4GR00A000XX ①
		PR332 LSIG (LCD)	T8VBD4GS00A000XX ①

3000A Frame, electronic trip unit (AC only) standard with vertical terminals - Required

Breaker	IC at 480VAC kA	Trip Unit	4 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VBF4JC000000XX
		PR331 LSIG (Dip Switch)	T8VBF4JE000000XX
		PR332 LI (LCD)	T8VBF4JP00A000XX ①
		PR332 LSI (LCD)	T8VBF4JR00A000XX ①
		PR332 LSIG (LCD)	T8VBF4JS00A000XX ①

① Includes 4 open/closed auxiliary contacts as standard

T8

1600/2000/2500/3000A 600VΔ — Four pole Electronic (AC Only) 100% Rated

1600A Frame, electronic trip unit (AC only) standard horizontal terminals

Breaker	IC at 480VAC kA	Trip Unit	4 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VQC4FC000000XX
		PR331 LSI (Dip Switch)	T8VQC4FE000000XX
		PR332 LI (LCD)	T8VQC4FP00A000XX ①
		PR332 LSI (LCD)	T8VQC4FR00A000XX ①
		PR332 LSI (LCD)	T8VQC4FS00A000XX ①

2500A Frame, electronic trip unit (AC only) standard vertical terminals - Required

Breaker	IC at 480VAC kA	Trip Unit	4 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VQE4HC000000XX
		PR331 LSI (Dip Switch)	T8VQE4HE000000XX
		PR332 LI (LCD)	T8VQE4HP00A000XX ①
		PR332 LSI (LCD)	T8VQE4HR00A000XX ①
		PR332 LSI (LCD)	T8VQE4HS00A000XX ①

2000A Frame, electronic trip unit (AC only) standard horizontal terminals

Breaker	IC at 480VAC kA	Trip Unit	4 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VQD4GC000000XX
		PR331 LSI (Dip Switch)	T8VQD4GE000000XX
		PR332 LI (LCD)	T8VQD4GP00A000XX ①
		PR332 LSI (LCD)	T8VQD4GR00A000XX ①
		PR332 LSI (LCD)	T8VQD4GS00A000XX ①

3000A Frame, electronic trip unit (AC only) standard with vertical terminals - Required

Breaker	IC at 480VAC kA	Trip Unit	4 pole, 600V Catalog number
T8V	125	PR232 LSI (Dip Switch)	T8VQF4JC000000XX
		PR331 LSI (Dip Switch)	T8VQF4JE000000XX
		PR332 LI (LCD)	T8VQF4JP00A000XX ①
		PR332 LSI (LCD)	T8VQF4JR00A000XX ①
		PR332 LSI (LCD)	T8VQF4JS00A000XX ①

① Includes 4 open/closed auxiliary contacts as standard

T8

2000/2500/3000A 600VΔ

Molded Case Switch

T8V-D

Rated Voltage	
AC	600VAC
DC	—
Magnetic Override	40000

2000A Frame, standard horizontal terminals

Breaker	3 pole, 600V Catalog number
T8V-D	T8V0D30D000000XX

2500A Frame, standard horizontal terminals

Breaker	3 pole, 600V Catalog number
T8V-D	T8V0E30D000000XX

3000A Frame, standard with vertical terminals - Required

Breaker	3 pole, 600V Catalog number
T8V-D	T8V0F30D000000XX

T8

Accessories, electrical

UL Rating plugs		Catalog number
T8	1000A Rating plug	KT81000RP
	1200A Rating plug	KT81200RP
	1600A Rating plug	KT81600RP
	2000A Rating plug	KT82000RP
	2500A Rating plug	KT82500RP
	3000A Rating plug	KT83000RP

Accessories for trip units		Field/factory installation Catalog number
T8	Communication module (Modbus (RTU))	PR330/D-M ②
	External wireless communication module	BT030
	Power supply unit	PR030/B
	Voltage module, 3 pole ③	PR330/V-T83
	Voltage module, 4 pole ③	PR330/V-T84

Current sensor for external neutral		Field installation Catalog number
T8	Current sensor for external neutral 1000A-3000A	KT8NCT

Closing coil		Field/factory installation Catalog number
T8	440 VAC	KE6C1
	380...400VAC	KE6C2
	240...250 VAC/DC	KE6C3
	220...240 VAC/DC	KE6C4
	120...127 VAC/DC	KE6C5
	110...120 VAC/DC	KE6C6
	60 VAC/DC	KE6C7
	48 VAC/DC	KE6C8
	30 VAC/DC	KE6C9
	24 VDC	KE6C0

Auxiliary contacts		Field/factory installation Catalog number
T8	4 open/closed PR232-T8/PR331	KT8A4
	4 open/closed PR332 ①	KT8A4-PR332
	4 open/closed 24V PR232-T8/PR331	KT8A4D
	4 open/closed 24V PR332	KT8A4D-PR332

Bell alarm		Field/factory installation Catalog number
T8	Allows visual signaling (mechanical) and remote signaling (electrical) of circuit breaker opening by overcurrent release	DE6TBA

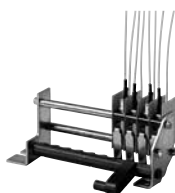
Bell alarm with remote reset command		Field/factory installation Catalog number
T8	Remote setting of circuit breaker after opening by overcurrent release 220-240 VAC/DC	DE6TBAR4
	Remote setting of circuit breaker after opening by overcurrent release 110-130 VAC/DC	DE6TBAR5
	Remote setting of circuit breaker after opening by overcurrent release 24-30 VAC/DC	DE6TBAR9

Contact signaling undervoltage de-energized		Field/factory installation Catalog number
T8	NC UV signaling contact	KE6UE01
	NO UV signaling contact	KE6UE10

Spring charging motor		Field/factory installation Catalog number
T8	24...30 VAC/DC	KE6M9
	48...60 VAC/DC	KE6M7
	100...130 VAC/DC	KE6M5
	220...250 VAC/DC	KE6M3



KE6C*



KT8A4



KE6M*

① Included as standard on breakers ordered with PR332 trip unit

② Discount schedule SAT (T0)

③ Factory install only.

T8 Accessories, electrical



KE6S*

Shunt trip		Field/factory installation Catalog number
T8	440 VAC	KE6S1
	380...400 VAC	KE6S2
	240...250 VAC/DC	KE6S3
	220...240 VAC/DC	KE6S4
	120...127 VAC/DC	KE6S5
	110...120 VAC/DC	KE6S6
	60 VAC/DC	KE6S7
	48 VAC/DC	KE6S8
	30 VAC/DC	KE6S9
	24 VDC	KE6S0

Second shunt trip ①		Field/factory installation Catalog number
T8	440 VAC	KE6S1-2
	380...400 VAC	KE6S2-2
	240...250 VAC/DC	KE6S3-2
	220...240 VAC/DC	KE6S4-2
	120...127 VAC/DC	KE6S5-2
	110...120 VAC/DC	KE6S6-2
	60 VAC/DC	KE6S7-2
	48 VAC/DC	KE6S8-2
	30 VAC/DC	KE6S9-2
	24 VDC	KE6S0-2



KE6U*

Undervoltage		Field/factory installation Catalog number
T8	440 VAC	KE6U1
	380...400 VAC	KE6U2
	240...250 VAC	KE6U3
	220...240 VAC/DC	KE6U4
	120...127 VAC/DC	KE6U5
	110...120 VAC/DC	KE6U6
	60 VAC/DC	KE6U7
	48 VAC/DC	KE6U8
	30 VAC/DC	KE6U9
	24 VDC	KE6U0

① May be used in place undervoltage.

T8

Accessories, mechanical



KE6PG

Key lock in open position		Field/factory installation Catalog number
T8	Key lock n. 20005 ①	KT8KL2
	Key lock n. 20006	KT8KL3
	Key lock n. 20007	KT8KL4
	Key lock n. 20008	KT8KL5
	Key lock different keys	KT8KL1

Padlocking button cover		Field/factory installation Catalog number
T8	3-4mm locks (padlocks not supplied)	KE6PD1
	HD padlock device	KE6PDHD1
	Extra HD padlock device	KE6PDHD2

Button guard		Field/factory installation Catalog number
T8	Protective cover for opening and closing pushbuttons	KE6PG

Mechanical operation counter		Field/factory installation Catalog number
T8	Indicates the number of mechanical operations	KE6MC

Phase barriers-top terminals only		Field installation Catalog number
T8	Low 100mm 2 pcs (3P)	KT8PBL-3
	Low 100mm 3 pcs (4P)	KT8PBL-4
	High 200mm 2 pcs (3P)	KT8PBH-3
	High 200mm 4 pcs (4P)	KT8PBH-4

IP54 door protection		Field installation Catalog number
T8	Protective cover	KE6DC

Vertical terminals		Field installation Catalog number	
T8	Rear Vertical Terminals (2)	Set of six	KT82500VR-6
		Set of eight	KT82500VR-8

Cable terminals		Wire size	Field installation Catalog number
T8	Mechanical Lugs (set of 3)	1/0-750 kcmil (4)	K8TL
		1/0-750 kcmil (6)	K8TM

① Key lock number when factory installed is 20005.

T8

Technical data

Absorbed power on inrush

Shunt trip, Second shunt trip, closing coil Voltage	AC	DC
24 VDC	—	200
30 VAC/DC	200	200
48 VAC/DC	200	200
60 VAC/DC	200	200
110...120 VAC/DC	200	200
120...127 VAC/DC	200	200
220...240 VAC/DC	200	200
380...400 VAC	200	—
440 VAC	200	—
Opening time shunt trip - Second shunt trip (ms)	≤ 60	≤ 60
Closing time closing coil (ms)	≤ 80	≤ 80

Spring charging motor

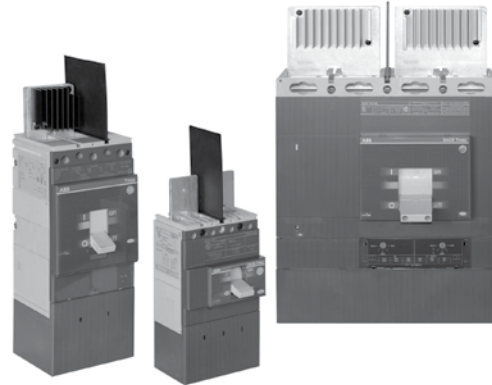
Shunt trip, Second shunt trip, closing coil Rated Voltage	AC	DC
24...30	24...30	24...30
48...60	48...60	48...60
100...130	100...130	100...130
220...250	220...250	220...250
Operating voltage (%Un)	85-110	85...110
Power consumption on inrush	500 VA	500 W
Inrush time (s)	0.2	0.2
Charging time (s)	4-5	4-5

Tmax UL489B Photovoltaic circuit breakers



Tmax

UL489B Photovoltaic circuit breakers



Introduction

Thanks to its experience with Tmax UL, ABB is proposing a complete range of products in accordance to UL489B, a new standard, whose requirements cover molded case circuit breakers and molded case switches rated up to 1000V DC, intended for use with photovoltaic systems. A complete range of MCCB and MCS is available up to 1000A for use at 1000V DC, complete with jumpers for connection of poles in series.

Standards

UL489B

Dimensions

All PV breakers are the same size as their standard UL/IEC counterparts.

Weights

T1 - 3.2 lbs.
T4 - 6.18 lbs.
T5 - 8.55 lbs.
T6 - 20.9 lbs.
T7 - 24.25 lbs.

Accessories

Standard Tmax accessories are able to work with all UL 489B units.

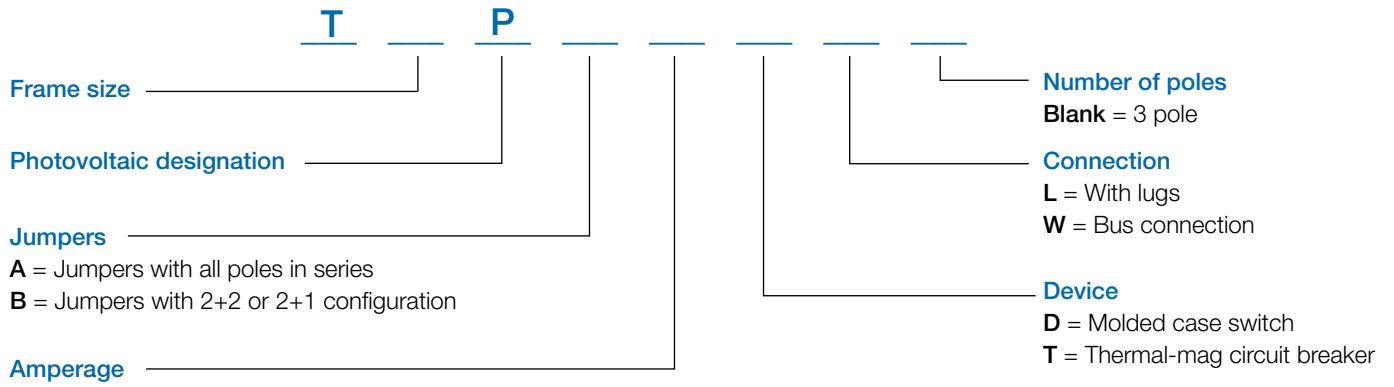
Jumpers come standard with all breakers in either all poles in series or 2+1 or 2+2.

Breakers without lug kits come with terminals to connect to Busbar poles in series for installation options.

General information

Catalog number explanation

Catalog number explanation



Tmax UL489B

Molded case circuit breakers and switches

Tmax
MCCBs

T4 - 200A Frame TMA, Thermal magnetic adjustable

IC at 1000VDC	Rating	Lugs	Poles in Series	Catalog number
3kA	40A	Yes	2+1	T4PB040TL
			3	T4PA040TL
3kA	50A	Yes	2+1	T4PB050TL
			3	T4PA050TL
3kA	80A	Yes	2+1	T4PB080TL
			3	T4PA080TL
3kA	100A	Yes	2+1	T4PB100TL
			3	T4PA100TL
3kA	125A	Yes	2+1	T4PB125TL
			3	T4PA125TL
3kA	150A	Yes	2+1	T4PB150TL
			3	T4PA150TL
3kA	200A	Yes	2+1	T4PB200TL
			3	T4PA200TL

T5 - 400A Frame TMA, Thermal magnetic adjustable

IC at 1000VDC	Rating	Lugs	Poles in Series	Catalog number
5kA	400A	Yes	2+1	T5PB400TL
			3	T5PA400TL
5kA	400A	No	2+1	T5PB400TW
			3	T5PA400TW

T6 - 800A Frame TMA, Thermal magnetic adjustable

IC at 1000VDC	Rating	Lugs	Poles in Series	Catalog number
10kA	600A	Yes	2+2	T6PB600TL-4
			4	T6PA600TL-4
10kA	800A	No	2+2	T6PB800TW-4
			4	T6PA800TW-4

NOTE: All poles in series is for use in grounded systems.
2+1 or 2+2 configurations are for ungrounded systems.

T1-D 100A Molded case switch

Rating	Lugs	Poles in Series	Catalog number
100A	Yes	2+2	T1PB100DL-4
		4	T1PA100DL-4

T4-D 200A Molded case switch

Rating	Lugs	Poles in Series	Catalog number
200A	Yes	2+1	T4PB200DL
		3	T4PA200DL

T5-D 400A Molded case switch

Rating	Lugs	Poles in Series	Catalog number
400A	Yes	2+1	T5PB400DL
		3	T5PA400DL
400A	No	2+1	T5PB400DW
		3	T5PA400DW

T6-D 800A Frame molded case switch

Rating	Lugs	Poles in Series	Catalog number
600A	Yes	2+2	T6PB600DL-4
		4	T6PA600DL-4
800A	No	2+2	T6PB800DW-4
		4	T6PA800DW-4

T7-D 1000A Molded case switch

Rating	Lugs	Poles in Series	Catalog number
1000A	Yes	2+2	T7MPB1000DL-4
		4	T7MPA1000DL-4

Tmax UL489B

Jumper kit accessories

T1-D

Description	Rating	Poles in Series	Catalog number
JUMPER KIT T1PV 100A 4P 2+2PS LUG UL	100A	2+2	KT1PB100-L
JUMPER KIT T1PV 100A 4P 4PS LUG UL		4	KT1PA100-L

T4-D

Description	Rating	Poles in Series	Catalog number
JUMPER KIT T4PV 100A 3P 2+1PS LUG UL	100A	2+1	KT4PB100-L
JUMPER KIT T4PV 100A 3P 3PS LUG UL		3	KT4PA100-L
JUMPER KIT T4PV 200A 3P 2+1PS LUG UL	200A	2+1	KT4PB200-L
JUMPER KIT T4PV 200A 3P 3PS LUG UL		3	KT4PA200-L

T5-D

Description	Rating	Poles in Series	Catalog number
JUMPER KIT T5PV 400A 3P 2+1PS LUG UL	400A	2+1	KT5PB400-L
JUMPER KIT T5PV 400A 3P 3PS LUG UL		3	KT5PA400-L
JUMPER KIT T5PV 400A 3P 2+1PS BUS UL		2+1	KT5PB400-W
JUMPER KIT T5PV 400A 3P 3PS BUS UL		3	KT5PA400-W

T6-D

Description	Rating	Poles in Series	Catalog number
JUMPER KIT T6PV 600A 4P 2+2PS LUG UL	600A	2+2	KT6PB600-L
JUMPER KIT T6PV 600A 4P 4PS LUG UL		4	KT6PA600-L
JUMPER KIT T6PV 800A 4P 2+2PS BUS UL	800A	2+2	KT6PB800-W
JUMPER KIT T6PV 800A 4P 4PS BUS UL		4	KT6PA800-W

T7-D

Description	Rating	Poles in Series	Catalog number
JUMPER KIT T7PV 1000A 4P 2+2PS LUG UL	1000A	2+2	KT7PB1000-L
JUMPER KIT T7PV 1000A 4P 4PS LUG UL		4	KT7PA1000-L

NOTE: See pages 17.71-17.83 for additional electrical/mechanical accessories

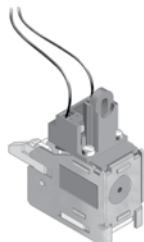
Accessories

Electrical

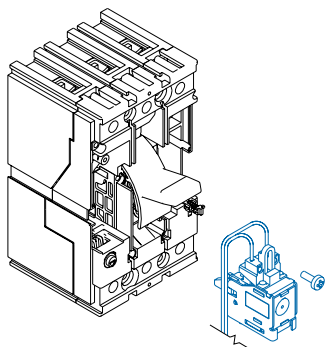
T1 - T7

Shunt trips -(Standard) ①

For remote opening of circuit breaker. Guaranteed operation for a voltage of between 75-110% of the rated power supply voltage. T1-T6 mounts in the left hand cavity cannot be used with UVR on 2-3P breakers



KT3S4



T1 with KT3S4



T7 X1 Shunt trip - UVR

Frame Size	Voltage	Factory Installation ①	Field Installation
		Catalog number suffix	Catalog number
T1-T3	480 - 500VAC	S1	KT3S1
	220-250VAC/DC	S2	KT3S2
	380 - 440VAC	S3	KT3S3
	110 - 125VAC/DC	S4	KT3S4
	48 - 60VAC/DC	S7	KT3S7
	24 - 30VAC/DC	S8	KT3S8
Ts3	12VDC	S9	KT3S9
	480VAC/250VDC	S1	KTS3S1
	240 VAC	S2	KTS3S2
	120VAC/125VDC	S4	KTS3S4
	48VDC	S7	KTS3S7
	24VAC/VDC	S8	KTS3S8
T4, T5, T6 ③	12VDC	S9	KTS3S9
	480-500VAC	S1	KT5S1
	220/250VAC/DC	S2	KT5S2
	380-440VAC	S3	KT5S3
	110-125VAC/DC	S4	KT5S4
	48-60VAC/DC	S7	KT5S7
T7	24VAC/DC	S8	KT5S8
	12VDC	S9	KT5S9
	415-440VAC	S1	KT7XS1
	380-400VAC	S2	KT7XS2
	240-250VAC/DC	S3	KT7XS3
	220-240VAC/DC	S4	KT7XS4
	120-127VAC/DC	S5	KT7XS5
	110-120VAC/DC	S6	KT7XS6
	60VAC/DC	S7	KT7XS7
	48VAC/DC	S8	KT7XS8
30VAC/DC	S9	KT7XS9	
24VAC/DC	S0	KT7XS0	

Shunt trip connector (REQUIRED for Ts3) ②

Ts3	Fixed Mount ②	Included when shunt trip factory installed	Field Kit
			KTS3C-SU
	Draw-out ②	Included when shunt trip factory installed	KTS3C-SUP

Shunt trips (Permanent Supply) ①

For remote opening of circuit breaker. Guaranteed operation for a voltage of between 75-110% of the rated power supply voltage. These shunt trips have much lower power consumption.

Frame Size	Voltage	Factory Installation ①	Field Installation
		Catalog number suffix	Catalog number
Ts3	24VDC	SA	KTS3SA
	120VAC	SB	KTS3SB
T4, T5, T6 ③	24-30VDC	SA	KT5SA
	110/120VAC	SB	KT5SB

Shunt trip connector (REQUIRED for Ts3) ②

Ts3	Fixed Mount ②	Included when shunt trip factory installed	Field Kit
			KTS3C-SU
	Draw-out ②	Included when shunt trip factory installed	KTS3C-SUP

① For factory installation add suffix given to end of circuit breaker catalog number per accessory format.

② Must be ordered separately for field installation.

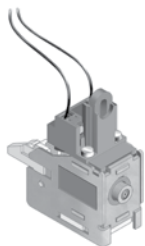
Accessories

Electrical

T1 - T7

Undervoltage release - UVR

Will trip circuit breaker when connected voltage drops to 35-70% of the undervoltage release voltage rating. Will allow circuit breaker to close when voltage is approximately 85% of the rated voltage. T1-T6 mounts in the left hand cavity cannot be used with shunt trip on 2-3P breakers



KT3U2



T7 X1 Shunt trip - UVR

Frame Size	Voltage	Factory Installation ①	Field Installation
		Catalog number suffix	Catalog number
T1-T3	480 - 500VAC	U1	KT3U1
	220-250VAC/DC	U2	KT3U2
	380 - 440VAC	U3	KT3U3
	110 - 125VAC/DC	U4	KT3U4
	60VAC/DC	U5	KT3U5
	48VAC/DC	U7	KT3U7
	24 - 30VAC/DC	U8	KT3U8
	Ts3	480VAC	U1
240VAC		U2	KTS3U2
24VAC		U3	KTS3U3
120VAC		U4	KTS3U4
250VDC		U5	KTS3U5
125VDC		U6	KTS3U6
48VDC		U7	KTS3U7
24VDC		U8	KTS3U8
T4, T5, T6	480-500VAC	U1	KT5U1
	220/250VAC/DC	U2	KT5U2
	380-440VAC	U3	KT5U3
	110-125VAC/DC	U4	KT5U4
	60VAC/DC	U5	KT5U5
	48VAC/DC	U7	KT5U7
	24VAC/DC	U8	KT5U8
	T7	415-440VAC	U1
380-400VAC		U2	KT7XU2
240-250VAC/DC		U3	KT7XU3
220-240VAC/DC		U4	KT7XU4
120-127VAC/DC		U5	KT7XU5
110-120VAC/DC		U6	KT7XU6
60VAC/DC		U7	KT7XU7
48VAC/DC		U8	KT7XU8
30VAC/DC		U9	KT7XU9
24VAC/DC		U0	KT7XU0

Undervoltage trip connector (REQUIRED for Ts3) ②

Ts3	Mounting	Field Kit	
		Included when under voltage factory installed	Catalog number
Ts3	Fixed Mount ②	Included when under voltage factory installed	KTS3C-SU
	Plug-In/Draw-out ②	Included when under voltage factory installed	KTS3C-SUP

① For factory installation add suffix given to end of circuit breaker catalog number per accessory format.

② Must be ordered separately for field installation.

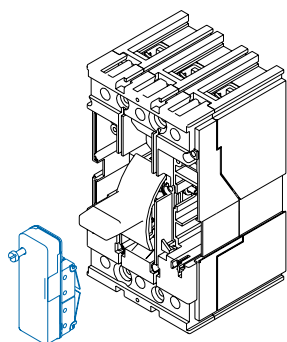
Accessories

Electrical

T1 - T7

Auxiliary contacts - AUX ①

Auxiliary contacts are for indication of the circuit breaker open-closed. Bell alarm contacts (BA) can be used to indicate circuit breaker tripped.



T1 with K3TAS

	Frame Size	Factory Installation ①	Field Installation
		Catalog number suffix	Catalog number
T1-T3 ②	1 Form C + 1BA	A	KT3AS
	3 Form C + 1BA	A3	KT3AS3
	3 Form C + 1BA 24VDC	A3AU	KT3AS3-AU
T2	T2 PR221DS 1 Form C + 1BA	A	KT2AS-E
Ts3	2 Form C	A	KTS3AS
	1 Form C + 1 BA	BA	KTS3BA
T4, T5, T6 ②	1 Form C + 1BA 250VAC/VDC	A	KT5AS
	2 Form C 400VAC/250VDC	A2	KT5AS2-B
	3 Form C + 1BA 250VAC/VDC	A3	KT5AS3
	3 Form C + 1BA 24VDC	A3AU	KT5AS3-AU
T7	1 Form C + 1BA 400VAC/250VDC	A	KT7AS
	2 Form C 400VAC/250VDC	A2	KT7AS2
	1 Form C + 1BA 24VDC	AAU	KT7AS-AU
	2 Form C 24VDC	A2AU	KT7AS2-AU
	3 Form C + 1BA 400VAC/250VDC	A3	KT7AS3
	3 Form C + 1BA 24VDC	A3AU	KT7AS3-AU
Ts3	Fixed Mount ③	Included	Field Kit KTS3C-AB
	Plug-In / Drawout ③	Included	KTS3C-ABP



KTS3AS

① For factory installation add suffix to end of breaker part number per accessory format .

② Not compatible for T2 with PR221 DS trip unit.

③ Must be ordered separately for field installation.

Accessories

Motor operators

T1 - T7

Electrical operators

Allows remote opening and closing of circuit breaker

Frame size	Voltage	Catalog number
------------	---------	----------------

Solenoid operator

T1-T3	48 - 60VDC	KT3M1
	110 - 250VAC/DC	KT3M2

Direct action motor operator

Ts3	240VAC/250VDC	KTS3M2
	120VAC/125VDC	KTS3M4
	48VDC	KTS3M7
	24VDC	KTS3M8

Motor operator connector (REQUIRED for Ts3) ①

Ts3	Fixed Mount ①	KTS3C-M
	Plug-In / Draw-out ①	KTS3C-MP

Stored energy motor operator

T4, T5	220-250VAC/DC	KT5M2
	110--125-VAC/DC	KT5M4
	48-60VDC	KT5M7
	24VDC	KT5M8

Contact for remote/manual operation (stored energy operator)

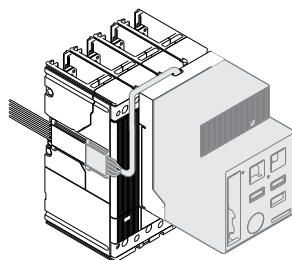
T4, T5, T6	-	KT5MA
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Stored energy motor operator

T6	220-250VAC/DC	KT6M2
	110--125-VAC/DC	KT6M4
	48-60VDC	KT6M7
	24VDC	KT6M8
	380VAC	KT6M3



KT3M1



KT5M2



KTS3M2

① Must be ordered separately for field installation.

Accessories

Trip units

T4 - T7

Tmax
MCCBs

Frame Size	Rating plug	Catalog number
Rating plugs (UL)		
T7	400A Rating plug	KT7X0400RP
	600A Rating plug	KT7X0600RP
	800A Rating plug	KT7X0800RP
	1000A Rating plug	KT7X1000RP
	1200A Rating plug	KT7X1200RP

Modules for T7 PR332 trip units

T7	Voltage module ②	PR330/VT7
	Communication module (Modbus RTU)	PR330/D-M

External units

	Test and configuration unit ③	PR010/T
	Trip coil test-all Tmax electronic trip unit except PR33*	K7TUT
	External Bluetooth communication module ① Includes diagnostic software for Modbus / Bluetooth networks	BT030
	Battery power supply unit ①	PR030/B

Not suitable for UL applications.

T7 - Allows remote opening when used with PR330/D-M and shunt trip

T7M - Allows remote opening and closing when used with PR330//D-M. shunt trip and closing coil

Actuator module (IEC)

T7	Actuator module ②	PR330/R-T7
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Neutral current transformers (required for 4 wire ground fault systems)

T4	100A	KT4NCT-100
	150A	KT4NCT-150
	250A	KT4NCT-250
T5	300A	KT5NCT-300
	400A	KT5NCT-400
T6	600A	KT6NCT-600
	800A	KT6NCT-800

Current sensor for external neutral

T7	400 - 1200A	KT7NCT
----	-------------	--------

① Always supplied with PR332/P trip unit.

② Factory installed only.

Technical data

Shunt trips, Undervoltages

T1 - T7

Standard shunt trip

Voltage	Inrush Power Consumption							
	T1,T2,T3		Ts3		T4,T5,T6		T7	
	AC (VA)	DC (W)	AC (VA)	DC (W)	AC (VA)	DC (W)	AC (VA)	DC (W)
12 VDC	-	50	-	120	-	150	-	-
24 VAC/DC	-	-	100	100 or 4 ①	-	-	300	300
24...30 VAC/DC	50	50	-	-	150	150	-	-
30 VAC/DC	-	-	-	-	-	-	300	300
48 VAC/DC	-	-	-	120	-	-	300	300
48...60 VAC/DC	60	60	-	-	150	150	-	-
60 VAC/DC	-	-	-	-	-	-	300	300
100...120 VAC/DC	-	-	100 or 4 ①	-	-	-	300	300
120...127 VAC/DC	-	-	-	-	-	-	300	300
110...127 VAC 110...125 VDC	50	50	-	120	150	150	-	-
220...240 VAC/DC	-	-	-	-	-	-	300	300
220...240 VAC 220...250 VDC	50	50	100	120	150	150	-	-
240...250 VAC/DC	-	-	-	-	-	-	300	300
380...400 VAC	-	-	-	-	-	-	300	-
380...440 VAC	55	-	-	-	150	-	-	-
415...440 VAC	-	-	-	-	-	-	300	-
480 VAC	-	-	100	-	-	-	-	-
480...525 VAC	55	-	-	-	150	-	-	-
Opening Time (ms)	15	15	≤15	≤15	15	15	20	20

Permanent supply shunt trip

Voltage	T4,T5,T6	
	AC (VA)	DC (W)
24 VAC/DC	4	4
100...120 VAC	4	-

Undervoltage

Voltage	Power consumption during permanent operation							
	T1,T2,T3		Ts3		T4, T5, T6		T7	
	AC (VA)	DC (W)	AC (VA)	DC (W)	AC (VA)	DC (W)	AC (VA)	DC (W)
24 VAC/DC	-	-	6	3	-	-	3.5	3.5
24...30 VAC/DC	1.5	1.5	-	-	6	3	-	-
30 VAC/DC	-	-	-	-	-	-	3.5	3.5
48 VAC/DC	1	1	6	3	6	3	-	-
60 VAV/DC	1	1	-	-	6	3	-	-
110...120 VAC/DC	-	-	6	-	-	-	3.5	3.5
120...127 VAC/DC	-	-	-	-	-	-	3.5	3.5
110...127 VAC 110...125 VDC	2	2	-	-	6	3	-	-
220...240 VAC/DC	-	-	-	-	-	-	3.5	3.5
220...240 VAC 220...250 VDC	2.5	2.5	-	3	6	3	-	-
220...250 VAC	-	-	6	-	-	-	-	-
240...250 VAC/DC	-	-	-	-	-	-	3.5	3.5
380...400 VAC	-	-	-	-	-	-	3.5	-
380...440 VAC	3	-	-	-	6	-	-	-
415 - 440 VAC	-	-	-	-	-	-	3.5	-
480...525 VAC	4	-	-	-	6	-	-	-
480 VAC	-	-	6	-	-	-	-	-
Opening Time (ms)	15	15	≤18	≤18	≤25	≤25	≤25	≤25

① Shunt trip permanent supply

Technical data

Electrical operators

T1 - T6

Electrical operator, T1-T3

Rated Voltage		AC	DC
		-	48...60
		110...250	110...250
Operating Voltage		85...110% Un	
Inrush power absorption during operation		1800 (VA)	1000 (W)
Power on stand by		< 100 (mW)	
Time	opening (s)	< 0.1	
	closing (s)	< 0.1	
Minimum control impulse time on opening and closing (ms)		>100	

This unit is permanently supplied on stand by, a control is applied by means of external contact in a low power circuit.

Contact characteristics:

Voltage AC/DC=24V

Current 50 mA

Electrical operator, T4-T5

Voltage		AC	DC
		-	24
		-	48...60
		110...125	110...125
		220-250	220-250
		380	-
Operating Voltage		85...110%	
Inrush power consumption		≤ 300VA	≤ 300W
In service power consumption		≤150VA	≤150W
Duration	opening (s)	1.5	
	closing (s)	< 0.1	
	resetting (s)	3	
Minimum duration of the opening and closing command impulse (ms)		≥100	

Electrical operator, Ts3

Rated Voltage		AC	DC
		-	24
		-	48...60
		120	125
		240	250
		440	-
Operating Voltage		85...110 % Un	
Inrush power absorption		500 (VA)	500 (W)
Service power absorption		350 (VA)	350 (W)
Time constant (ms)		18	
Duration	opening (s)	0.1	
	closing (s)	0.1	
Minimum duration of the opening and closing command impulse (ms)		≥150	

Electrical operator, T6

Voltage		AC	DC
		-	24
		-	48...60
		110-125	110-125
		220-250	220-250
		380	-
Operating Voltage		85...110%	
Inrush power consumption		≤ 400VA	≤ 400W
In service power consumption		≤150VA	≤150W
Duration	opening (s)	3	
	closing (s)	< 0.1	
	resetting (s)	5	
Minimum duration of the opening and closing command impulse (ms)		≥100	

Accessories

Mechanical

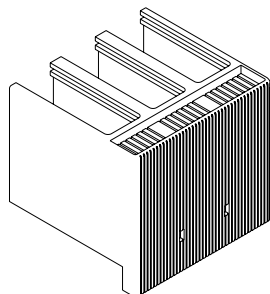
T1 - T7

Standard cable terminal



KT3100-3

Frame	Wire Size	Catalog number (set of 3)	Catalog number (set of 4)
T1	14 AWG-1/0	Integral	Integral
T2	14 AWG-1/0	KT2100-3	KT2100-4
T3	14 AWG - 1/0	KT3100-3	KT3100-4
	4 AWG - 300 kcmil	KT3225-3	KT3225-4
Ts3	14-2	K3TA	K3TA-4
	14-1/0	K4TB	K4TB-4
	2-4/0	K4TC	K4TC-4
	4-300 kcmil	K4TD	K4TD-4
T4	14 AWG-1/0	KT4100-3	KT4100-4
	6 AWG-350 kcmil	KT4250-3	KT4250-4
T5 ①	250 kcmil-500 kcmil	KT5300-3	KT5300-4
T5 ①③	(2) 3/0-250 kcmil	KT5400-3	KT5400-4
T5 ②	(2) 3/0-500 kcmil	KT5600-3	—
T6	(2) 250-500 kcmil	K6TH	K6TH-4
T6 ①	(3) 2/0-400 kcmil	K6TJ	K6TJ-4
T7 ①	(4) 4/0-500 kcmil	KT7X1200-3	KT7X1200-4



KT1HTC-3

Standard cable lug kits with power control taps

Frame	Wire Size	Catalog number (set of 3)	Catalog number (set of 4)
T3	14 AWG - 1/0	KT3100-3C	KT3100-4C
	4 AWG - 300 kcmil	KT3225-3C	KT3225-4C
Ts3	14 AWG-1/0	K4TBC	K4TBC-4
	2 AWG-4/0	K4TCC	K4TCC-4
	4 AWG-300 kcmil	K4TDC	K4TDC-4
T4	14 AWG-1/0	KT4100-3C	KT4100-4C
	6 AWG-350 kcmil	KT4250-3C	KT4250-4C
T5 ③	250 kcmil-500 kcmil	KT5300-3C	KT5300-4C
T5 ①③	(2) 3/0-250 kcmil	KT5400-3C	KT5400-4C
T6	(2) 250-500 kcmil	K6THC	K6THC-4
T6 ①	(3) 2/0-400 kcmil	K6TJC	K6TJC-4

Terminal covers for fixed breakers - Low profile-kit includes two pieces



KT4LTC-3

Frame	Catalog number (3 pole)	Catalog number (4 pole)
T1	KT1LTC-3	KT1LTC-4
T2	KT2LTC-3	KT2LTC-4
T3	KT3LTC-3	KT3LTC-4
Ts3	KTS3LTC-3	KTS3LTC-4
T4	KT4LTC-3	KT4LTC-4
T5	KT5LTC-3	KT5LTC-4
T6	KT6LTC-3	KT6LTC-4
T7	KT7XLTC-3	KT7XLTC-4

Terminal covers for fixed breakers - High profile-kit includes two pieces

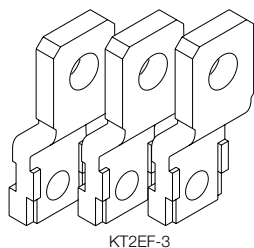
Frame	Catalog number (3 pole)	Catalog number (4 pole)
T1	KT1HTC-3	KT1HTC-4
T2	KT2HTC-3	KT2HTC-4
T3	KT3HTC-3	KT3HTC-4
Ts3	KTS3HTC-3	KTS3HTC-4
T4	KT4HTC-3	KT4HTC-4
T5	KT5HTC-3	KT5HTC-4
T6	KT6HTC-3	KT6HTC-4
T7	KT7XHTC-3	KT7XHTC-4

① Comes standard with high profile terminal covers.
 ② Uses front extended spreaded terminals... refer to technical catalog.
 ③ Not suitable for use on T5 600A.

Accessories

Mechanical

T1 - T7

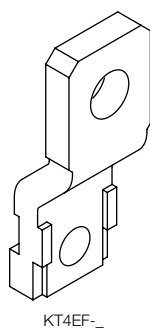


Phase barriers - Low profile 100mm-3.93 in

Frame	4 pcs (3p)	6 pcs (4p)
T1-T3	KT3PBL-3	KT3PBL-4
T4-T5	KT5PBL-3	KT5PBL-4
T6	KT6PBL-3	KT6PBL-4
T7	KT7PBL-3	KT7PBL-4

Phase barriers - High profile 200mm-7.87 in

Frame	4 pcs (3p)	6 pcs (4p)
T1-T3	KT3PBH-3	KT3PBH-4
T4-T5	KT5PBH-3	KT5PBH-4
T7	KT7PBH-3	KT7PBH-4

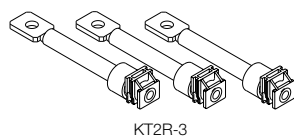


Saddle terminals for Copper Cables - IEC

Frame	Catalog number (Set of 3)	Catalog number (Set of 4)
T2	KT2100S-3	KT2100S-4
T3	KT3225S-3	KT3225S-4
Ts3	K4TES	K4TES-4
T4	KT4250S-3	KT4250S-4
T5	KT5300S-3	KT5300S-4

Extended front terminals

Frame	Catalog number (set of 3)	Catalog number (set of 4)
T1	KT1EF-3	KT1EF-4
T2	KT2EF-3	KT2EF-4
T3	KT3EF-3	KT3EF-4
Ts3	KTS3EF-3	KTS3EF-4
T4	KT4EF-3	KT4EF-4
T5	KT5EF-3	KT5EF-4



Rear terminals ①

Frame	Catalog number (set of 3)	Catalog number (set of 4)
T2	KT2R-3	KT2R-4
T3	KT3R-3	KT3R-4
T4	KT4R-3	KT4R-4
T5	KT5R-3	KT5R-4
T6	KT6R-3	KT6R-4
T7	KT7R-3	KT7R-4

Distribution cable lug kit ②

Frame	Wire Size	Catalog number (set of 3)	Catalog number (set of 4)
T3	(6) #14-6	KT3TN	KT3TN-4
Ts3	(6) #14-6	KTS3TN	KTS3TN-4
T4	(6) #14-6	KT4TN	KT4TN-4
T5	(6) #14-1/0	KT5TGD	KT5TGD-4

① Includes low profile terminal cover.
② Includes high profile terminal cover.

Accessories

Mechanical

T1 - T7

Padlock locking device

Frame	Style	Locking Position	Breaker Mounting	Catalog number
T1,T2,T3	PLL	OPEN/CLOSED	Fixed	KT3LD
		OPEN		KT3LDO
Ts3	FLD	OPEN	Fixed, Plug-In	KTS3FLD
			Draw-Out	KTS3FLDW
T4-T5	FLD	OPEN	Fixed, Plug-In	KT5FLD
			Draw-out	KT5FLDW
T6	FLD	OPEN	Fixed, Plug-In	KT6FLD
			Draw-out	KT6FLDW
T7	PLL	OPEN	Fixed, Drawout	KT7LDO

Keylocks-rotary handle mechanism

Frame	Style	Locking Position	Keys	Catalog number
T1,T2,T3	RHL	OPEN/CLOSED	Different	KT3RHL3
Ts3	-	OPEN	Different	KTS3KLF
T4-T5	KLF-D	OPEN	Different	KT5KLF
T6	KLF-D	OPEN	Different	KT6KLF
T7	KLF-D	OPEN	Different	KT7KLF



KT5RH

Direct mount rotary operator handle

Frame	Breaker Mounting	Catalog number
T1, T2, T3	Fixed, Plug-In	KT3RH
Ts3	Fixed, Plug-In	KTS3RH
Ts3	Draw-out	KTS3RHW
T4-T5	Fixed, Plug-In	KT5RH
T4-T5	Draw-Out	KT5RHW
T6	Fixed, Draw-out	KT6RH
T6	Draw-out	KT6RHW
T7	Fixed, Draw-out	KT7RH

Variable depth handle operators

Frame	NEMA rating	Mechanism catalog number	Shaft catalog number	Handle catalog number
T1-T3	1,3R,12	-	-	OHB65J6 OHY65J6
	4, 4X	KT3VD-M	EXP6X430 (16.9") Ⓣ	OHB80L6 OHY80L6
	1	-	KT3VD-S (11.8")	KT3VD-H
Ts3	1,3R,12	-	EXP10X148 (5.8") Ⓣ	OHB95J10 OHY95J10
	4,4X	KTS3VD-M	EXP10X225 (8.9")	OHB95L10 OHY95L10
	-	-	EXP10X500 (19.7")	-
	1	-	KTS3VD-S (20")	KTS3VD-H
T4-T5	1,3R,12	-	EXP10X148 (5.8")	OHB95J10 OHY95J10
	4,4X	KT5VD-M	EXP10X225 (8.9")	OHB95L10 OHY95L10
	-	-	EXP10X500 (19.7")	-
	1	-	KT5VD-S (19.7")	KT5VD-H
T6	1,3R,12	-	EXP10X148 (5.8")	OHB125J10 OHY125J10
	4,4X	KT6VD-M	EXP10X225 (8.9")	OHB125L10
	-	-	EXP10X500 (19.7")	-
	1	-	KT6VD-S (19.7")	KT6VD-H
T7	1,3R,12	-	EXP10X148 (5.8")	OHB175J10 OHY175J10
	4, 4X	KT7VD-M	EXP10X225 (8.9")	OHB175L10
	-	-	EXP10X500 (19.7")	-
	1	-	KT7VD-S (19.7")	KT7VD-H



OHY65J6



OHY125J10

Ⓣ Discount schedule H6.

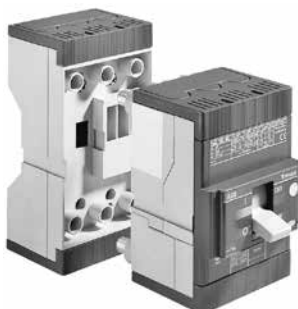
Accessories

Mechanical

T1 - T7

Plug-in kits ①

Frame	Catalog number Adapter moving part	Catalog number fixed part
T2 - 3 pole with front terminals	KT2PMK	KT2PFF
T3 - 3 pole with front terminals	KT3PMK	KT3PFF
T2-T3 Fixed parts accept the same cable and rear terminal kits as the circuit breakers		
Ts3 3 pole with front terminals	KTS3PMK	KTS3PFF
Ts3 3 pole with rear terminals		KTS3PFR
T4 3 pole with extended front terminal	KT4PMK	KT4PFEF
T4 3 pole with rear horizontal terminals		KT4PFHR
T4 3 pole with rear vertical terminals		KT4PFVR



KT2PFF + KT2PMK (on back of breaker) +
breaker

T5, 400A

T5 400A 3 pole with extended front terminal	KT5PMK	KT5PFEF
T5 400A 3 pole with rear horizontal terminal		KT5PFHR
T5 400A 3 pole with rear vertical terminal		KT5PFVR

T5, 600A

T5 600A 3 pole with extended front terminal	KT56PMK	KT56PFEF
T5 600A 3 pole with rear horizontal terminal		KT56PFHR
T5 600A 3 pole with rear vertical terminal		KT56PFVR

Plug connectors, T1-T3

Required when adding accessories to plug-in breakers

Plug Connector	Catalog number
Shunt trip or UVR	KT3PC-3
1 form C plus 1 BA	KT3PC-6
3 form C plus 1 BA	KT3PC-12

Adaptors, T4-T6

Required when adding accessories to plug-in or drawout breakers

Adaptors	Catalog number
1 form C plus 1 BA	KT5ADP-6
Shunt trip/UVR	KT5ADP-5
Stored energy operator	KT5ADP-10
Stored energy operator plus shunt trip/UVR	KT5ADP-10
3 form C plus 1BA	KT5ADP-12

Testing extension, T4 - T6

Extension	Catalog number
5 pin for blank tests w/service release	KT5EXT-5
6 pin for blank tests w/aux contacts (1+1) service and residual current releases	KE5EXT-6
10 pin for blank tests w/motor operator and early contacts	KT5EXT-10
12 pin for blank tests w/aux contacts (3+1)	KT5EXT-12



KT4PMK (on back of
breaker)

KT4PFVR

① Plug connectors (T2-T3), Adaptors (T4-T5), required when adding accessories to plug-in breakers.

Accessories

T1 - T7

Draw-out kits ①

Item	Catalog number Adaptor moving part	Catalog Number Fixed part
Ts3 3 pole with front terminals	KTS3WMK	KTS3WFF ②
Ts3 3 pole with rear terminals		KTS3WFR ②
T4 3 pole with extended front terminal	KT4WMK	KT4WFEF
T4 3 pole with rear horizontal terminals		KT4WFHR
T4 3 pole with rear vertical terminals		KT4WFVR
T5 3 pole with extended front terminal	KT5WMK	KT5WFEF
T5 3 pole with rear horizontal terminal		KT5WFHR
T5 3 pole with rear vertical terminal		KT5WFVR
T5 3 pole with extended front terminal, 600A	KT56WMK	KT56WFEF
T5 3 pole with rear horizontal terminal, 600A		KT56WFHR
T5 3 pole with rear vertical terminal, 600A		KT56WFVR
T6 3 pole with extended front terminal	KT6WMK	KT6WFEF ③
T6 3 pole with rear horizontal terminal		KT6WFHR ③
T6 3 pole with rear vertical terminal		KT6WFVR
T7 3 pole with horizontal/vertical terminals	KT7XWMK	KT7WFHR ②



KT4WMK (on back of breaker)



KT5WFVR

Adaptors – T4-T6

Required when adding accessories to plug-in or drawout breakers

Adaptors	Catalog number
1 form C plus 1 BA	KT5ADP-6
Shunt trip/UVR	KT5ADP-5
Stored energy operator	KT5ADP-10
Stored energy operator plus shunt trip/UVR	KT5ADP-10
3 form C plus 1BA	KT5ADP-12

Sliding contact blocks – T7-Draw-out

Item	Moving Part Breaker	Fixed Part Cradle
Left Block		
Spring charging motor	KT7XSCMP-L	KT7SCFP-L
Spring charged contact		
Ready to close contact		
Early auxiliary contact		
Contact for trip coil release trip		
Trip rest		
Center Block		
PR331	KT7XSCMP-C	KT7XSCFP-C
PR332		
Right Block		
Auxiliary contacts	KT7XSCMP-R	KT7XSCFP-R
Shunt trip		
Closing Coil		
Undervoltage release		

If at least one of the accessories in table is installed on the breaker - respective pair of contact blocks must be installed on the fixed part (cradle) and the moving part. (breaker)

Position key lock – T7 - T7M-X1

Item	Catalog number
Key #20005	KT7XPL2
Different key	KT7XPL1

Locks drawout breaker in racked-in / test isolation / racked-out position.

Position key lock accessory – T7 - T7M-X1

Item	Catalog number
Key lock accessory	KT7XPLA

Accessory added to position key lock allows breaker to be locked in racked-out position only.

① Adaptors (T4-T6), Sliding contact blocks (T7) required when adding accessories to draw-out breakers.

② Comes standard with horizontal terminals field convertible to vertical

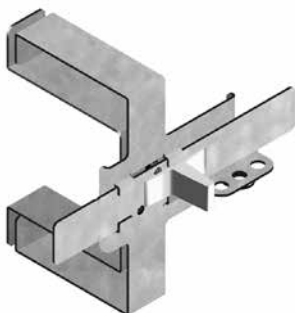
③ IEC

Accessories

T1 - T7

DIN rail adapters

Item	Catalog Number
T1/T2 (mounts on 35 mm DIN rail 15mm high)	KT2DIN
T3 (mounts on 35mm DIN rail 15mm high)	KT3DIN
Ts3 (mounts on 75 mm DIN rail)	KTS3DIN



KT3MIF2

Mechanical interlocks

Item	Catalog Number
T1-T3	
Sliding bar interlock-front mounted (2 Breakers)	KT3MIF2
Sliding bar interlock-front mounted (3 Breakers)	KT3MIF3
T3	
Rear Interlock-horizontal	KT3MI-H
Rear Interlock-vertical	KT3MI-V
TS3	
Horizontal	KTS3MI-H
Vertical	KTS3MI-V
T4-T5 ①	
Interlock frame	
Mechanical Interlock frame-horizontal	KT5MIR-HB
Mechanical Interlock frame-vertical	KT5MIR-VB
Plate type	
A T4 (F-P-W) T4 (F-P-W)	KT5MIR-PA
B T4 (F-P-W) T5 400 (F-P-W) OR T5 600 (F)	KT5MIR-PB
C T4 (F-P-W) T5 600 (P-W)	KT5MIR-PC
D T5 (F-P-W) T5 400 (F-P-W) OR 630 (F)	KT5MIR-PD
E T4 (F-P-W) T5 600 (P-W)	KT5MIR-PE
F T4 (F-P-W) T5 600 (P-W)	KT5MIR-PF
T6	
Horizontal	KT6MI-H
Vertical	KT6MI-V
T7 ②	
Cable T7-X1	KT7XMLC
Mech. interlock plate-fixed	KT7XMLPF
Mech. interlock plate-draw-out	KT7XMLPW

Flange cable mechanisms

Item	Catalog Number	
Handles		
T1 - T3	NEMA 1, 3R, 12	OHF1C12T
	NEMA 4, 4X	OHF1C4T
Ts3 - T5	NEMA 1, 3R, 12	OHF1C12
	NEMA 4, 4X	OHF1C4
Mechanisms		
T1 - T2	MKCT2	
T3	MKCT3	
T4 - Ts3	MKCT4	
T5	MKCT5	
Cables		
36"	OXC1L36	
48"	OXC1L48	
60"	OXC1L60	
72"	OXC1L72	
84"	OXC1L84	
96"	OXC1L96	
108"	OXC1L108	

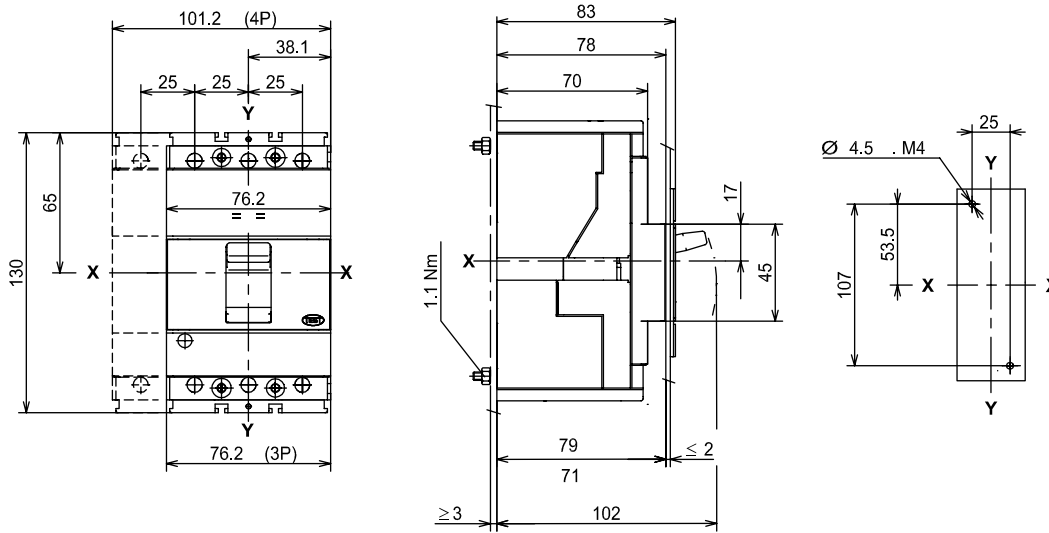


OHF1C12T

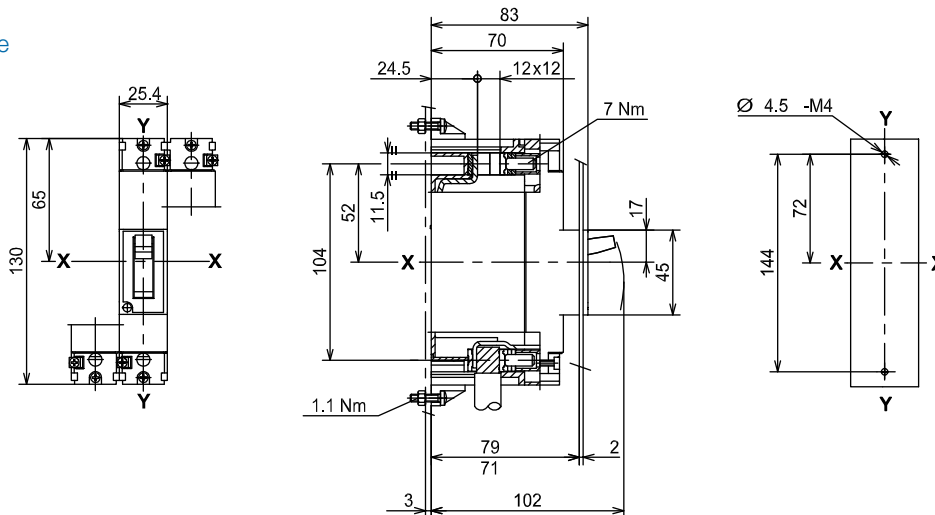
① T4-T5 Complete assembly consists of one interlock frame and one plate.
 ② To interlock two circuit breakers, you have to order a cable kit and two plates.

Approximate dimensions T1 & T2

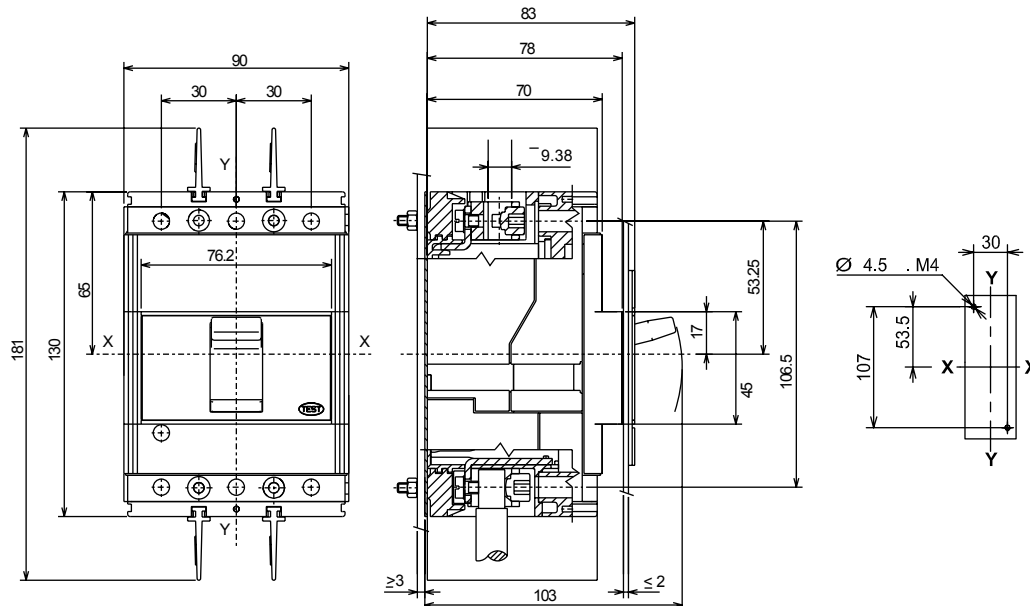
T1 – 3 pole



T1 – Single pole



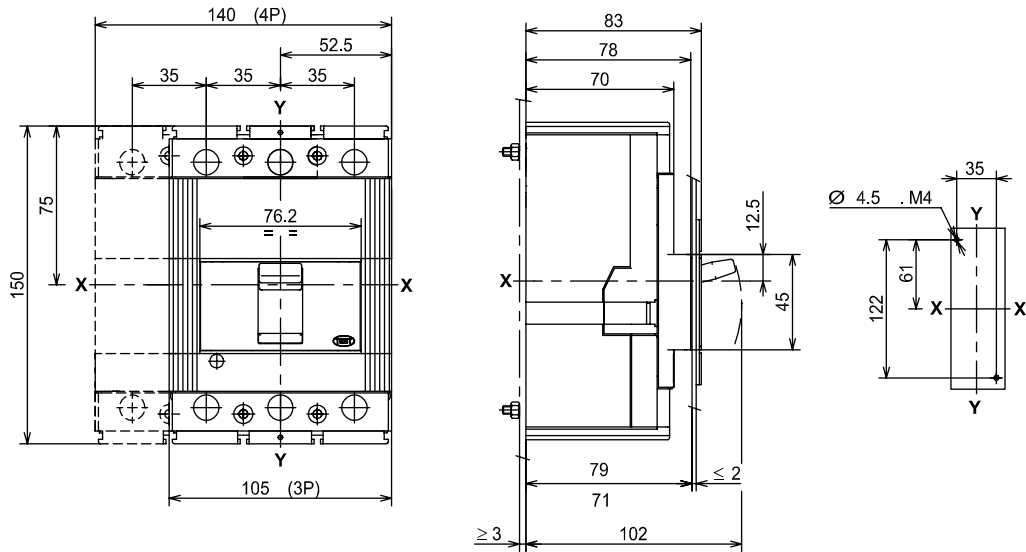
17 T2 – 2 & 3 pole



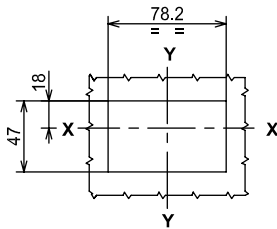
Approximate dimensions T3

Tmax
MCCBs

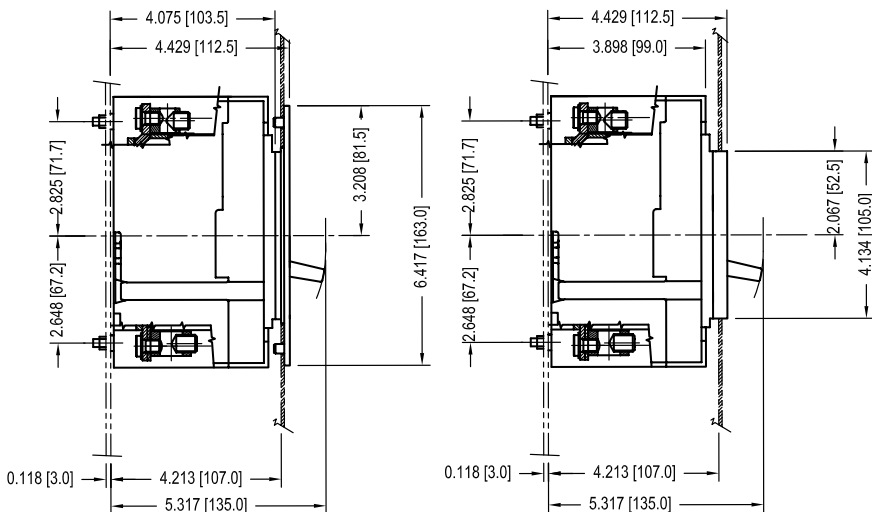
T3 — 2 & 3 pole



Door cut-out for Tmax without faceplate

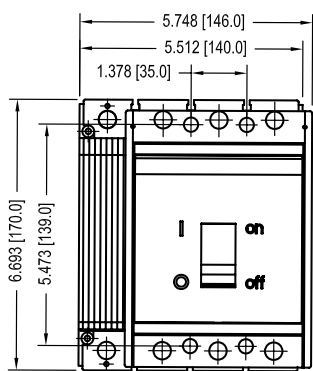


Approximate dimensions T3S

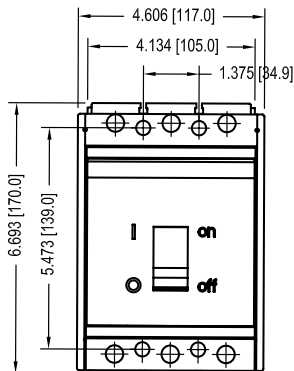


**T3S 3 & 4 POLE
SIDE VIEW
WITH FLANGE**

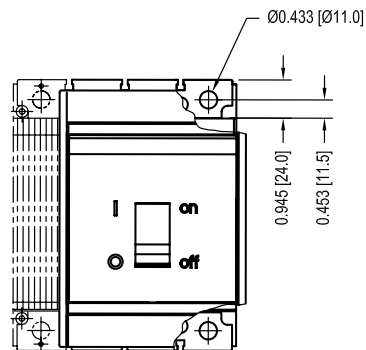
**T3S 3 & 4 POLE
SIDE VIEW
WITHOUT FLANGE**



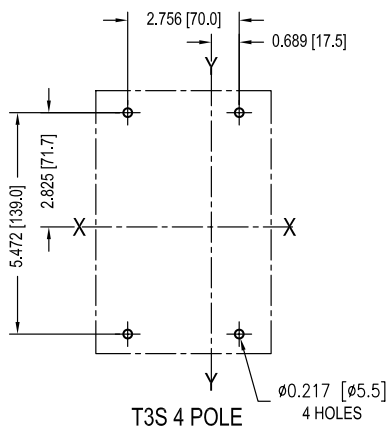
**T3S 4 POLE
FRONT VIEW**



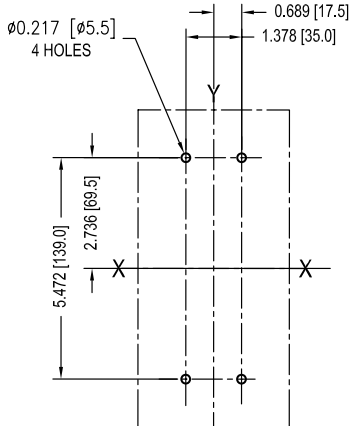
**T3S 3 POLE
FRONT VIEW**



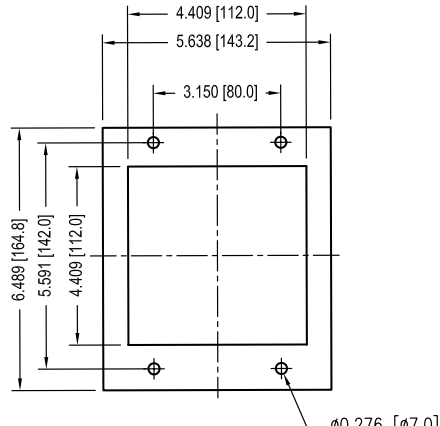
**T3S 3 & 4 POLE
FRONT CONNECTION
FRONT VIEW**



**T3S 4 POLE
DRILLING
FRONT VIEW**



**T3S 3 POLE
DRILLING
FRONT VIEW**



**T3S 3 POLE
HANDLE DOOR
CUT-OUT**

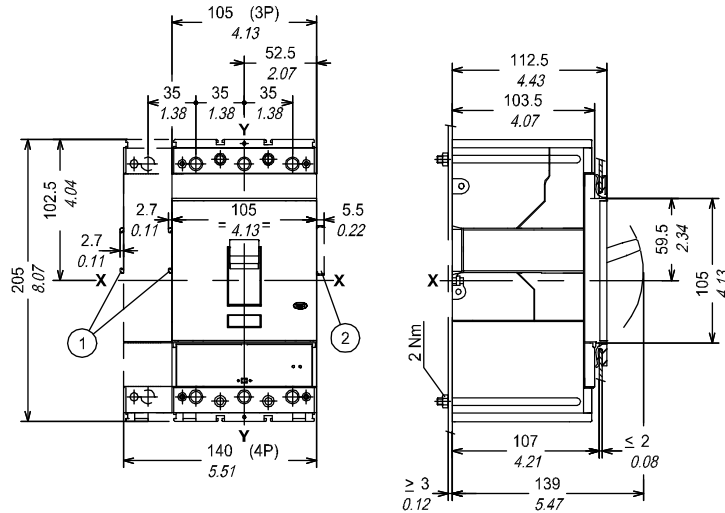
Approximate dimensions T4

Tmax
MCCBs

Fixed circuit breaker

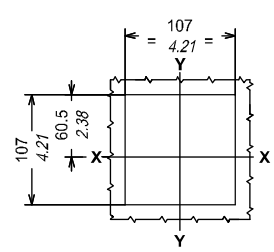
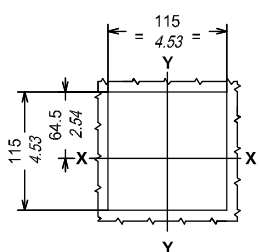
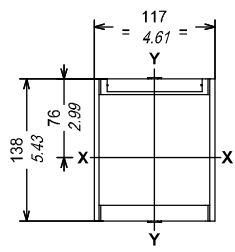
Caption

- ① Overall dimensions with cabled accessories mounted (SOR-C, UVR-C, RC221-222)
- ② Overall dimensions with cabled auxiliary contacts mounted (only 3Q 15Y)



Flange for compartment door

Drilling templates of the compartment door



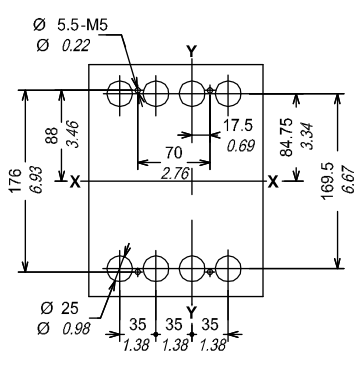
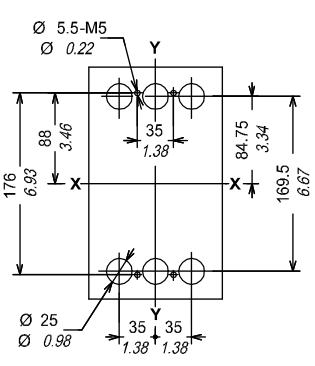
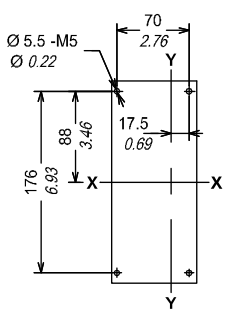
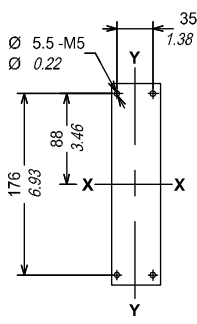
3-4 POLES
With flange

3-4 POLES
Without flange

Drilling templates for support sheet

For front terminals

For rear terminals



3 POLES

4 POLES

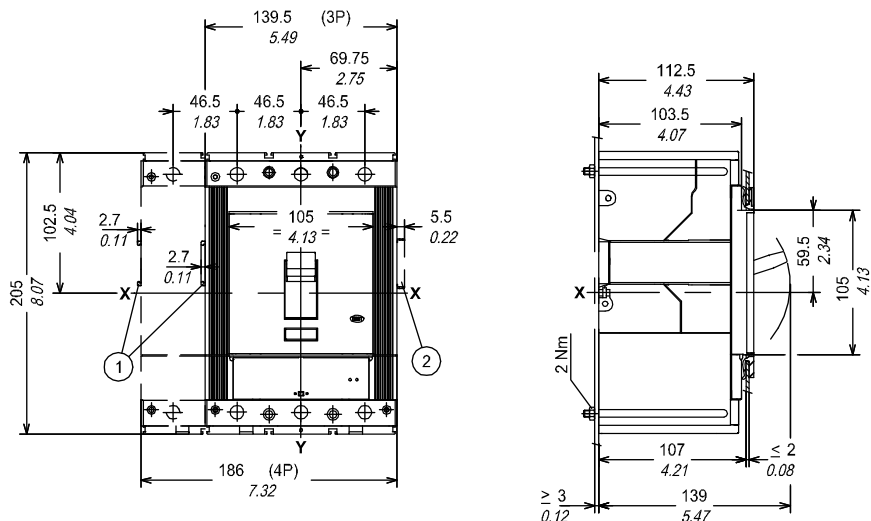
Approximate dimensions T5

Fixed circuit breaker

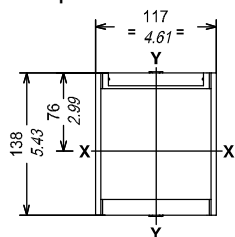
Fixing on sheet

Caption

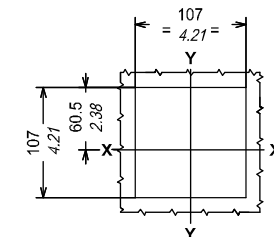
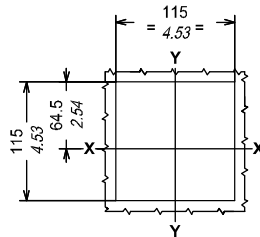
- ① Overall dimensions with cabled accessories mounted (SOR-C, UVR-C, RC221-222)
- ② Overall dimensions with cabled auxiliary contacts mounted (only 3Q 15Y)



Flange for compartment door



Drilling templates of the compartment door

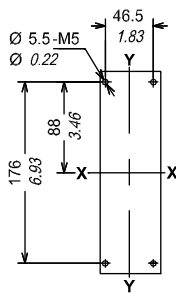


With flange (3-4 POLES)

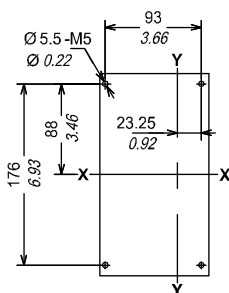
Without flange (3-4 POLES)

Drilling templates for support sheet

For front terminals

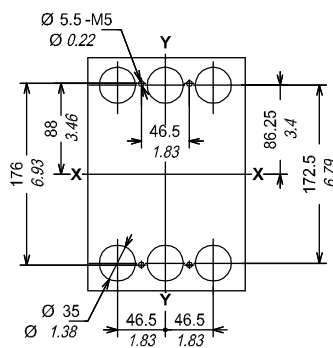


3 POLES

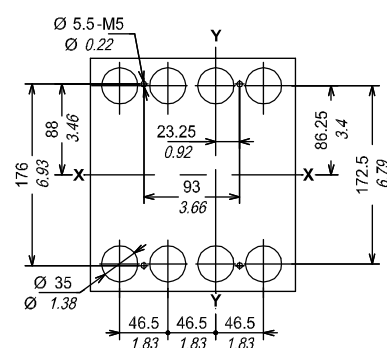


4 POLES

For rear terminals



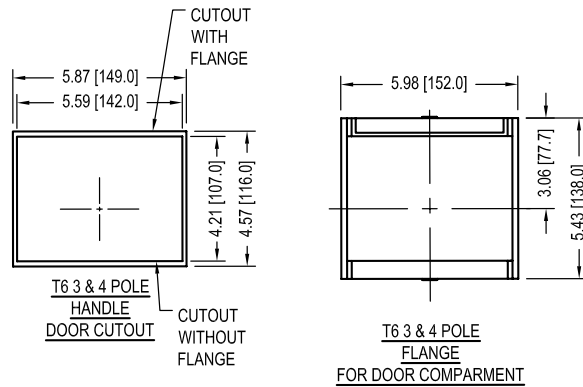
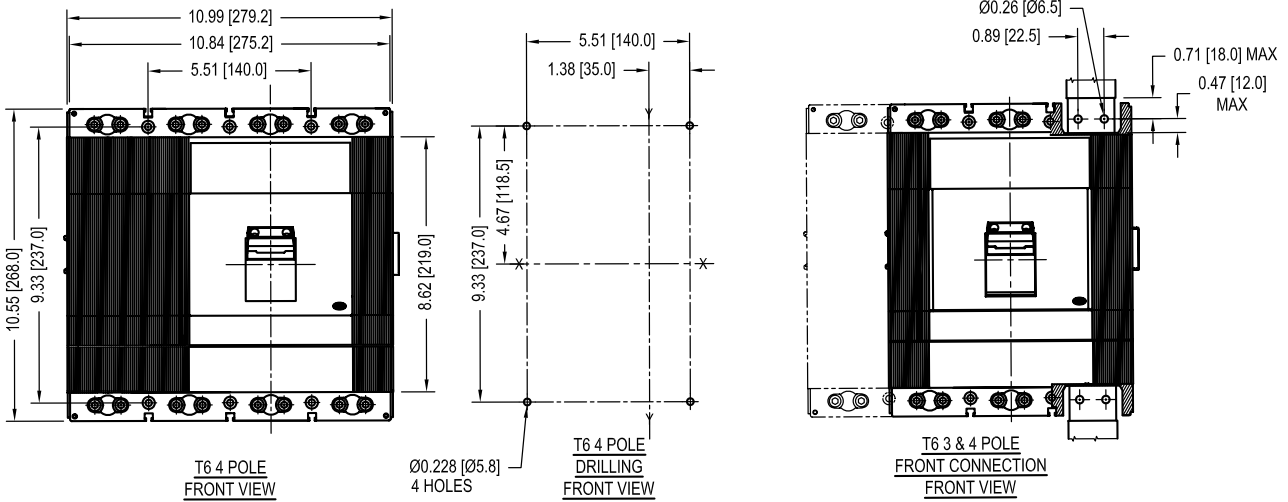
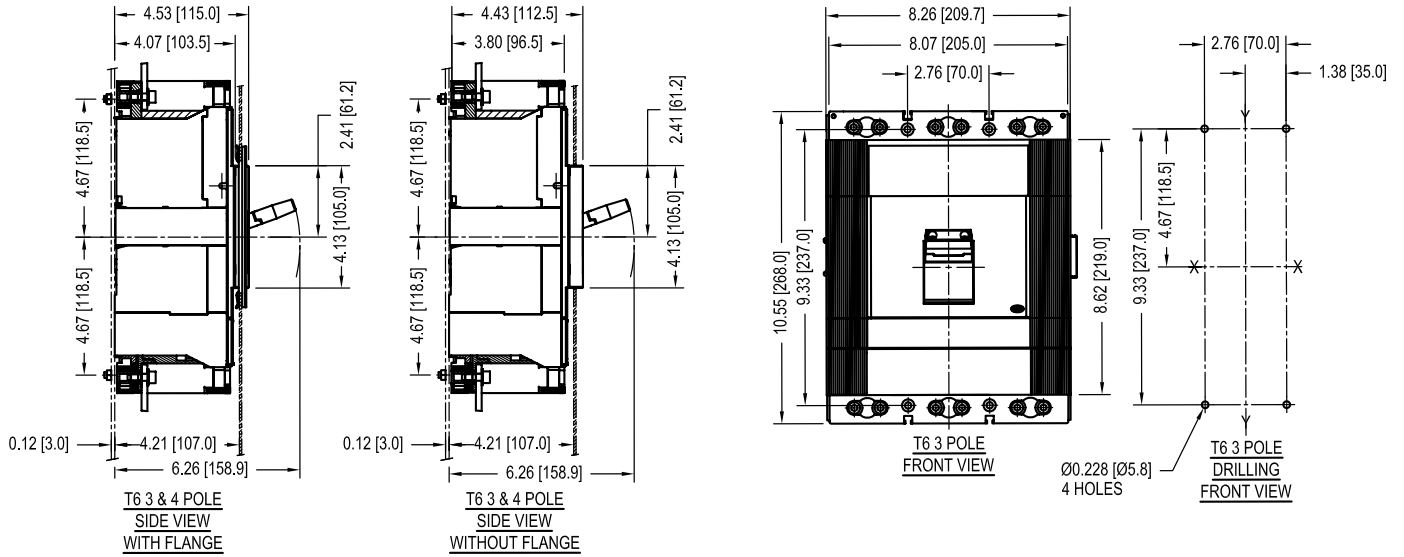
3 POLES



4 POLES

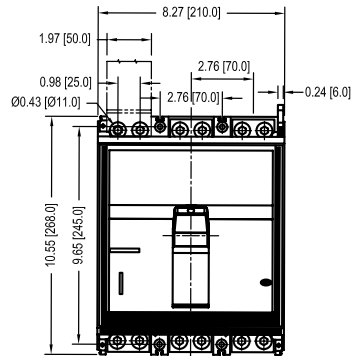
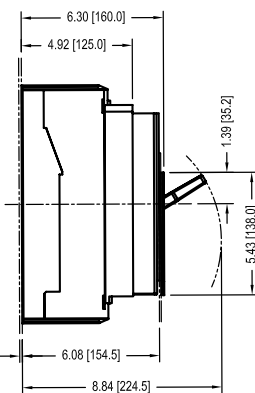
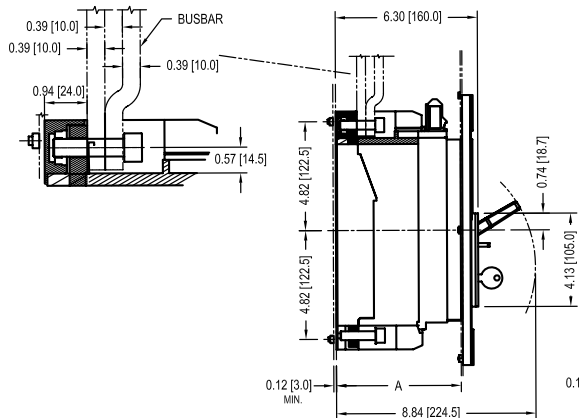
Approximate dimensions T6

Tmax
MCCBs



Approximate dimensions

T7

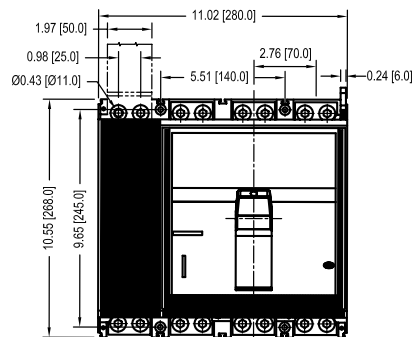


T7 3 POLE
FRONT VIEW

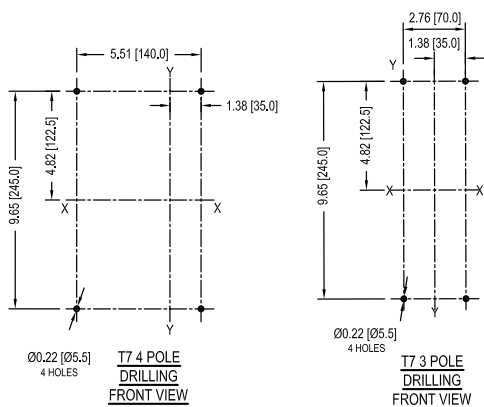
	WITH FLANGE	WITHOUT FLANGE
A	4.92 [125.0] - 5.55 [141.0]	5.79 [147.0]

T7 3 & 4 POLE
SIDE VIEW
WITH FLANGE

T7 3 & 4 POLE
SIDE VIEW
WITH REDUCED FLANGE

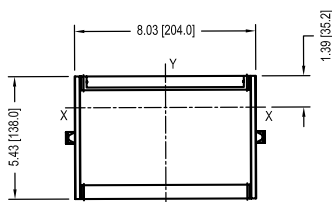


T7 4 POLE
FRONT VIEW

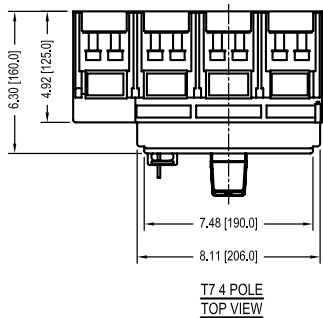


T7 4 POLE
DRILLING
FRONT VIEW

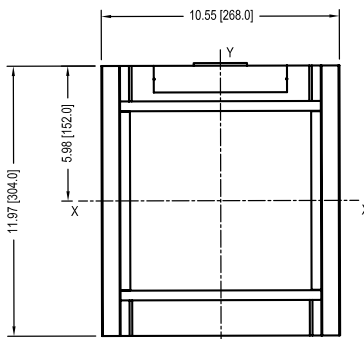
T7 3 POLE
DRILLING
FRONT VIEW



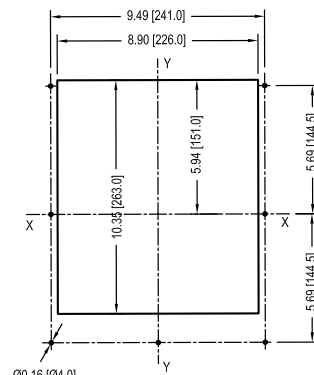
T7 3 & 4 POLE REDUCED
FLANGE FOR DOOR
COMPARTMENT



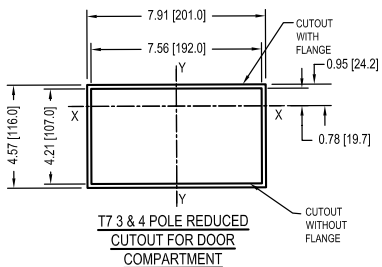
T7 4 POLE
TOP VIEW



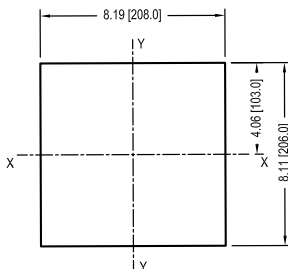
T7 3 & 4 POLE FLANGE
FOR DOOR
COMPARTMENT



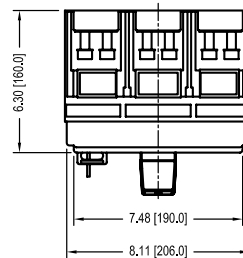
T7 3 & 4 POLE CUTOUT FOR
DOOR COMPARTMENT
WITH FLANGE



T7 3 & 4 POLE REDUCED
CUTOUT FOR DOOR
COMPARTMENT



T7 3 & 4 POLE
CUTOUT FOR DOOR
COMPARTMENT

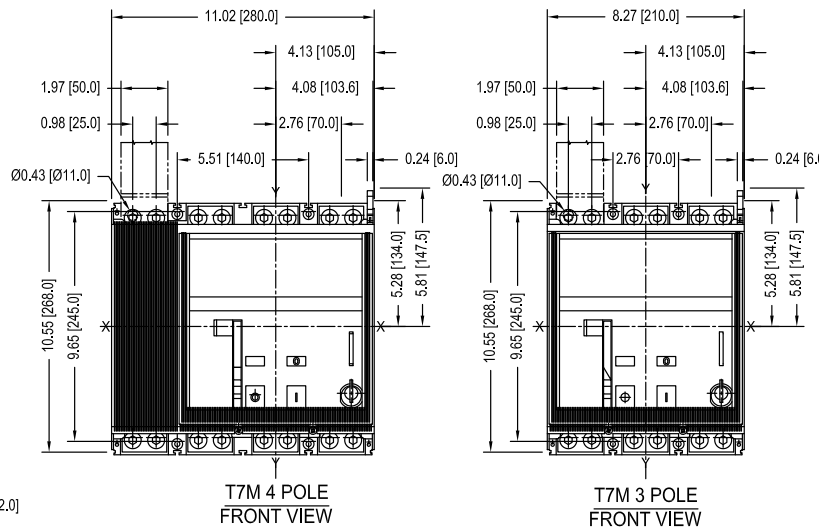
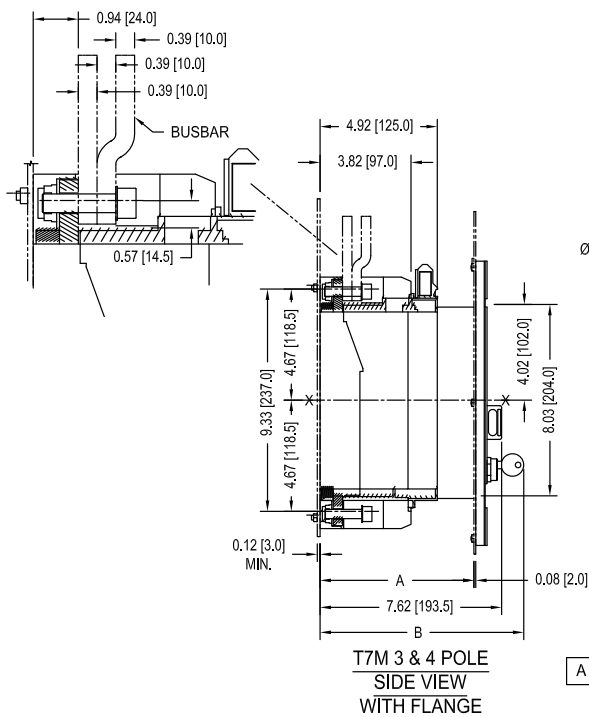


T7 3 POLE
TOP VIEW

Approximate dimensions

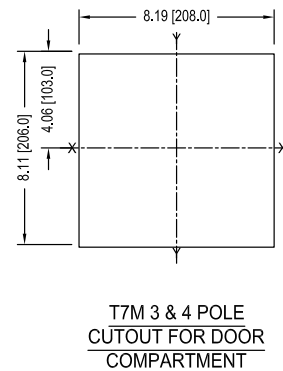
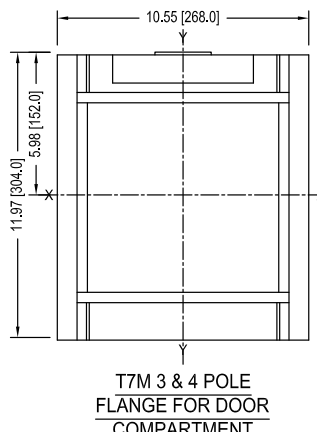
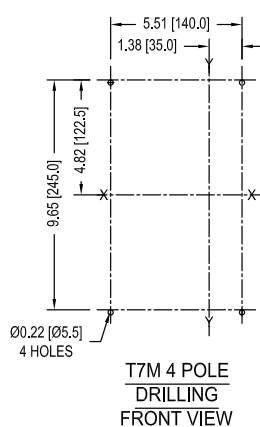
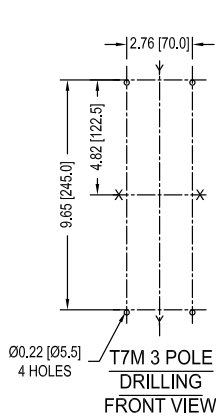
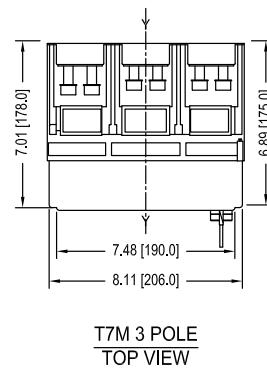
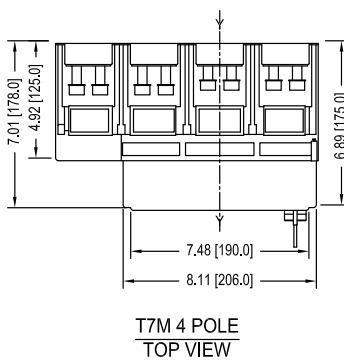
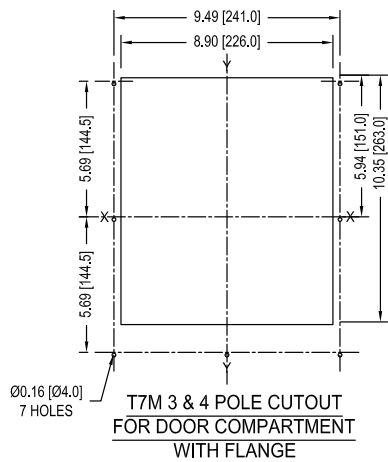
T7M

Fixed, 3 Pole, front terminals



	WITH FLANGE	WITHOUT FLANGE
A	4.92 [125.0]-6.46 [164.0]	6.69 [170.0]
B	8.19 [208.0]	8.50 [216.0]

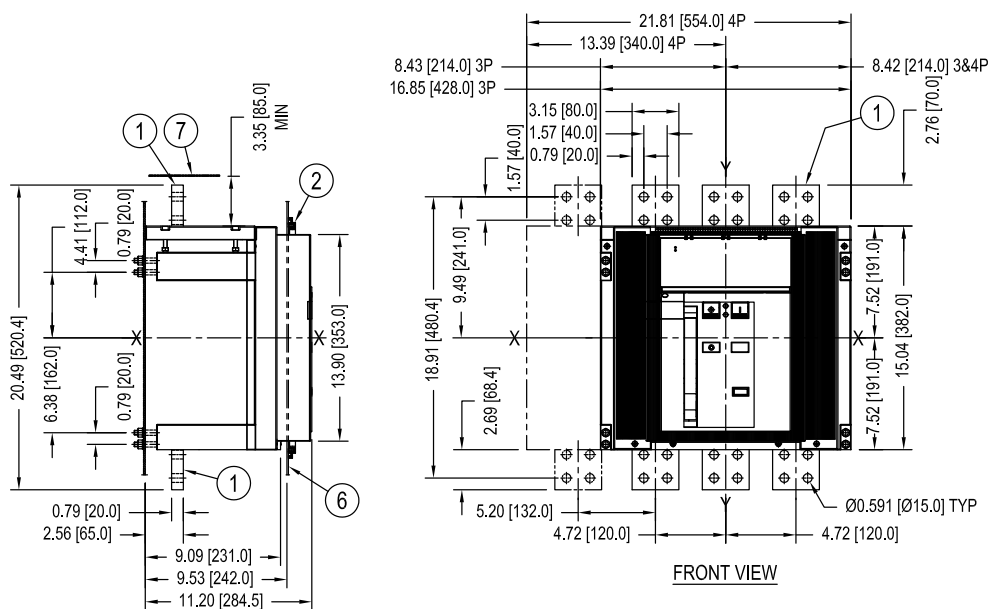
	STANDARD	RONIS	PROFALUX	KIRK	CASTEL
B	8.19 [208.0]	8.50 [216.0]	8.82 [224.0]	NO	NO



Approximate dimensions

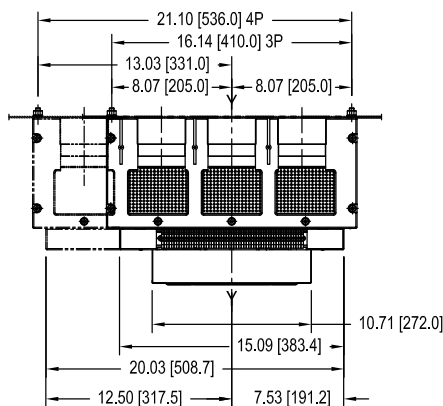
T8, Fixed, 3 pole, front terminals

1600A, 2000A, 2500A



SIDE VIEW

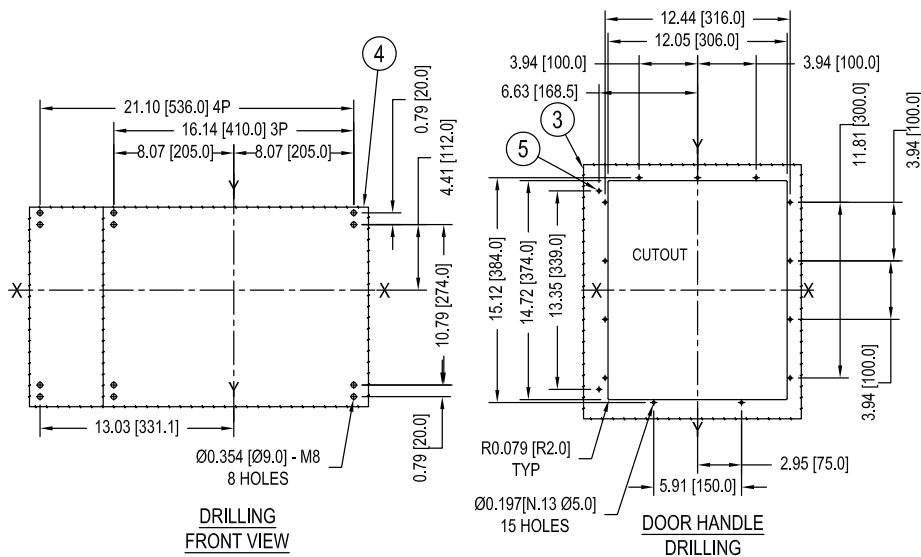
FRONT VIEW



TOP VIEW

CAPTION:

- 1 - FRONT TERMINALS
- 2 - FLANGE FOR THE COMPARTMENT DOOR
- 3 - PANEL DOOR DRILLING TEMPLATE
- 4 - CIRCUIT BREAKER FIXING PANEL DRILLING TEMPLATE (USE M8 SCREWS)
- 5 - NO. 2 HOLES FOR IP54 PROTECTION
- 6 - PANEL DOOR INTERNAL PLATE REFERENCE
- 7 - INSULATING BARRIER



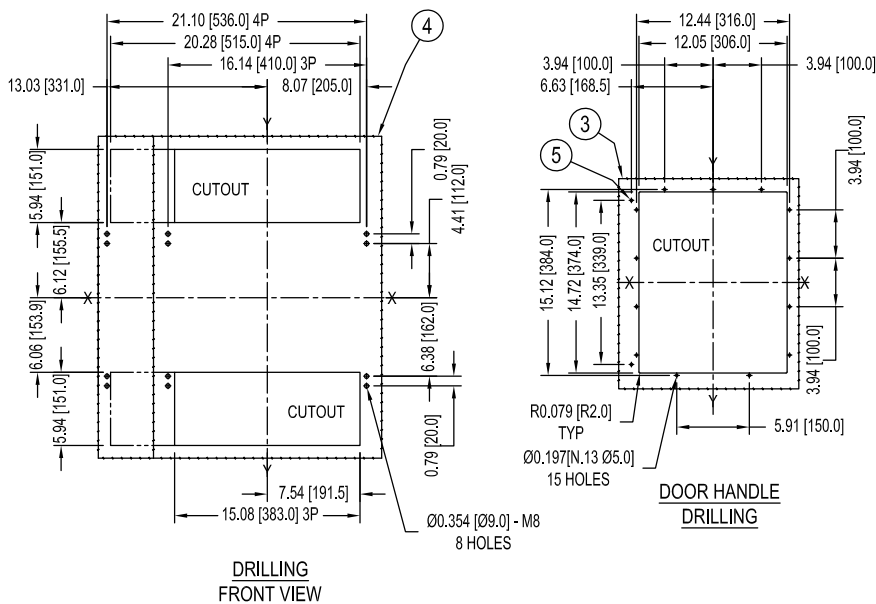
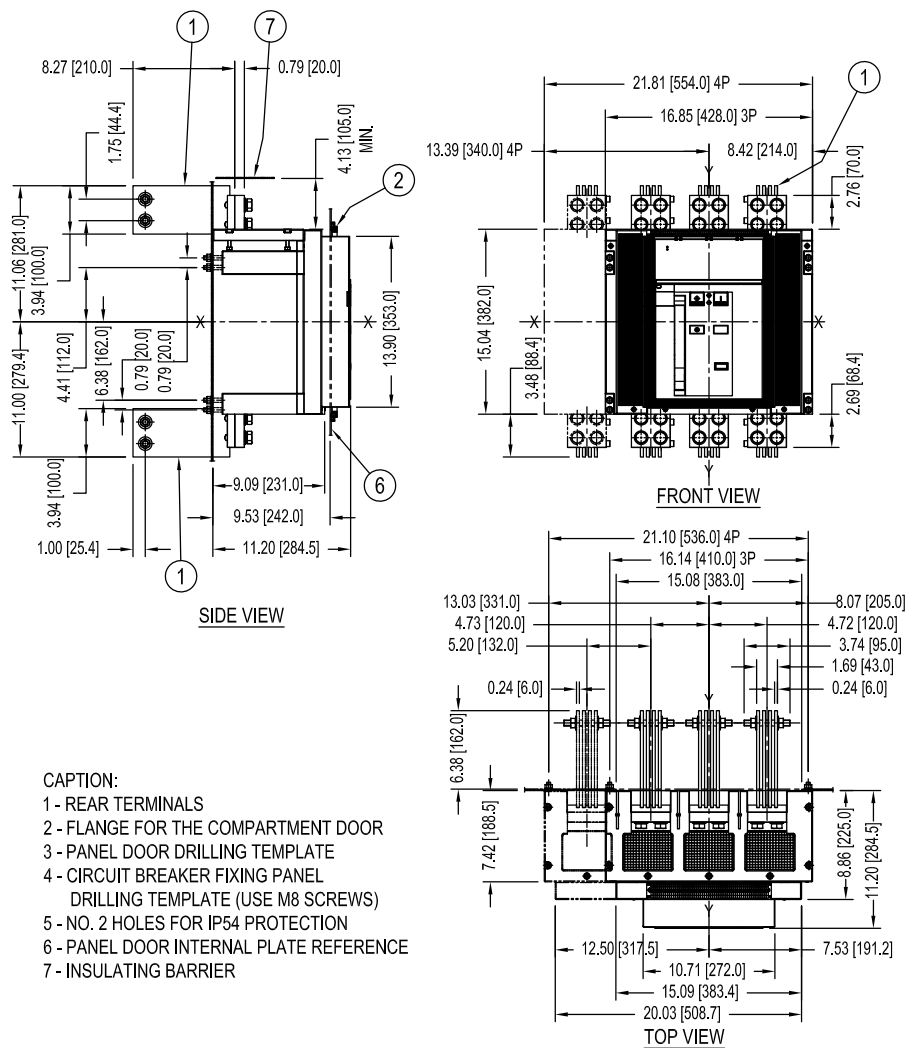
DRILLING FRONT VIEW

DOOR HANDLE DRILLING

Approximate dimensions

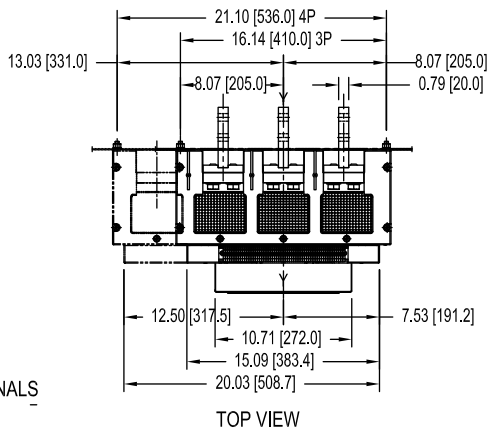
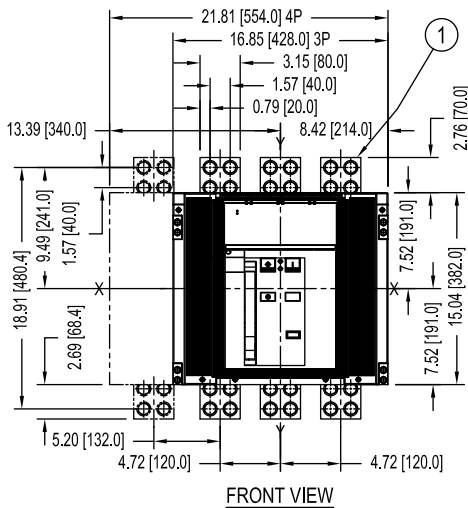
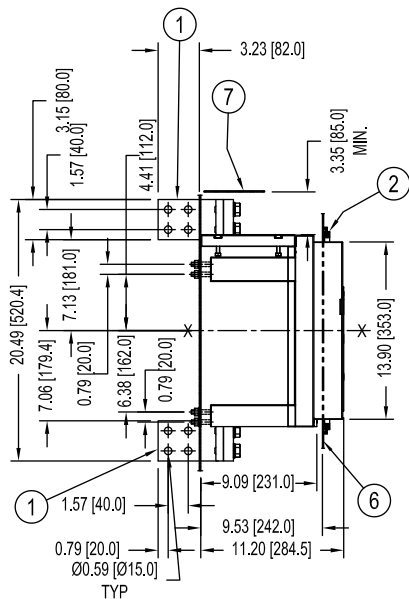
T8, Fixed, Vertical rear terminals

80% rated 3000A; 100% rated 2500A, 3000A



Approximate dimensions

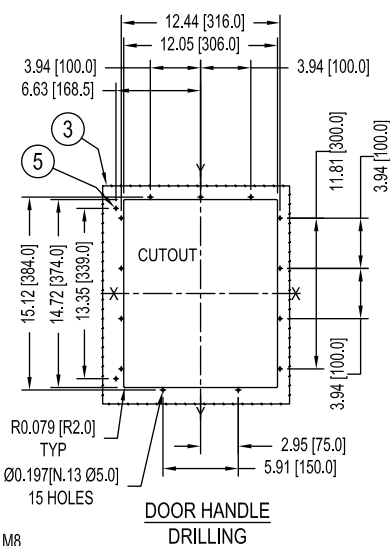
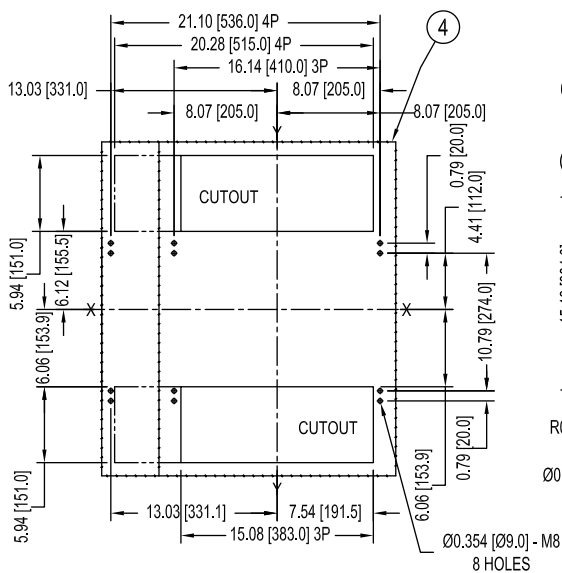
T8, Fixed, Optional vertical rear terminals (KT82500VR-x)
1600A/2000A/2500A



CAPTION:

- 1 - REAR TERMINALS
- 2 - FLANGE FOR THE COMPARTMENT DOOR
- 3 - PANEL DOOR DRILLING TEMPLATE
- 4 - CIRCUIT BREAKER FIXING PANEL
DRILLING TEMPLATE (USE M8 SCREWS)
- 5 - NO. 2 HOLES FOR IP54 PROTECTION
- 6 - PANEL DOOR INTERNAL PLATE REFERENCE
- 7 - INSULATING BARRIER

SHOWN WITH OPTIONAL KT82500VR-6 TERMINALS

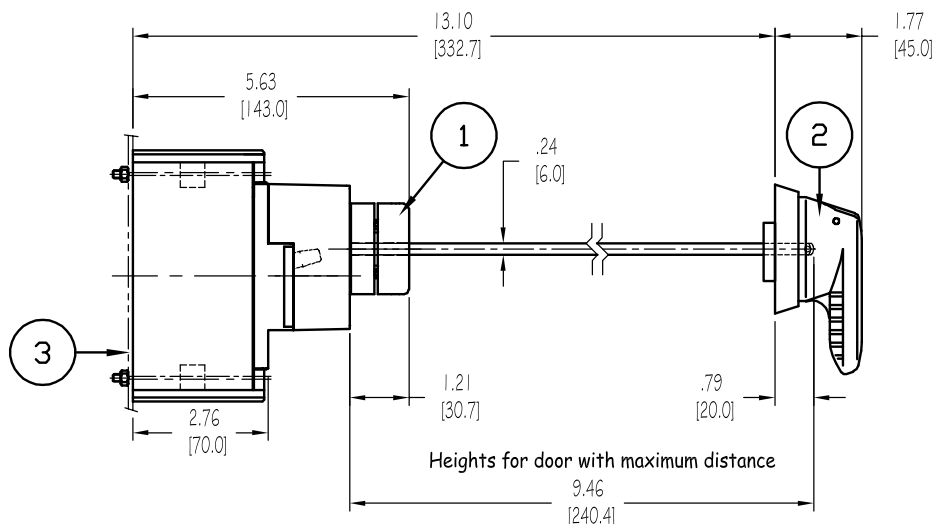


Approximate dimensions

T1 - T3

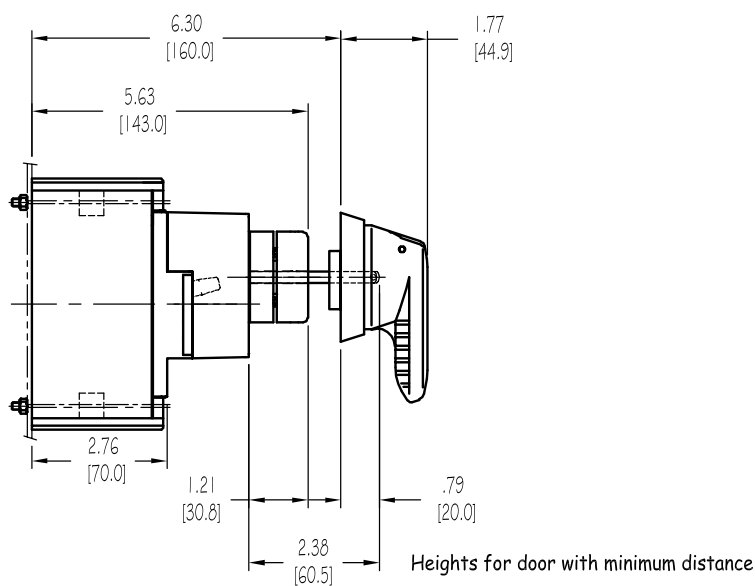
Variable depth mechanism with OHB handle

Pistol handle operating mechanism on the compartment door



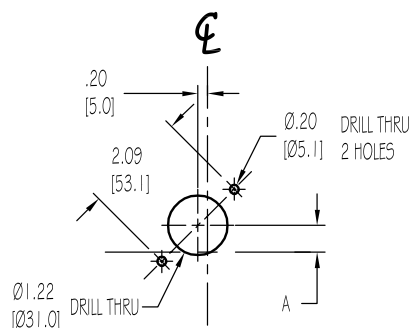
Caption

- ① Transmission unit
- ② Pistol handle operating mechanism on the compartment door
- ③ Insulating plate



Drilling template of the compartment door

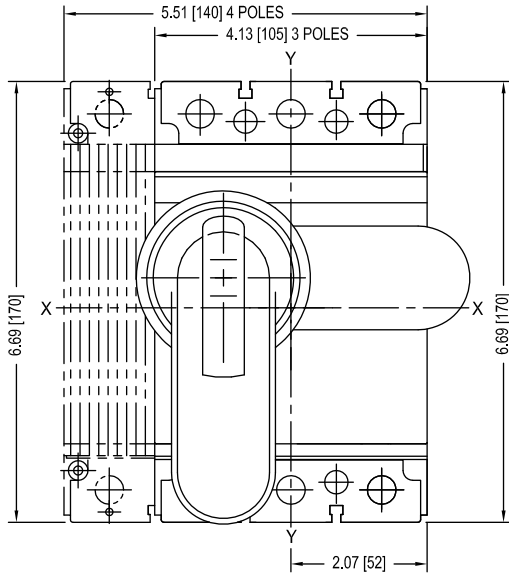
A	
T1 - T2	T3
0.55 [13.97]	0.37 [9.4]



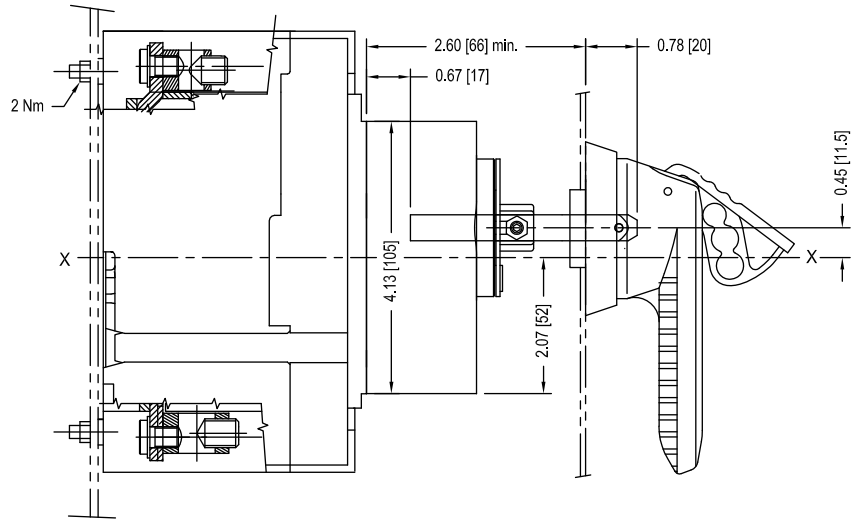
Approximate dimensions

Ts3

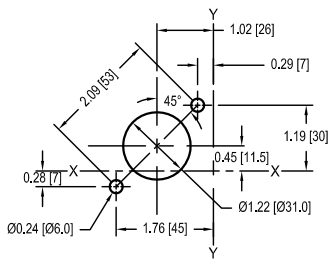
Variable depth mechanism with OHB handle



FRONT VIEW



SIDE VIEW



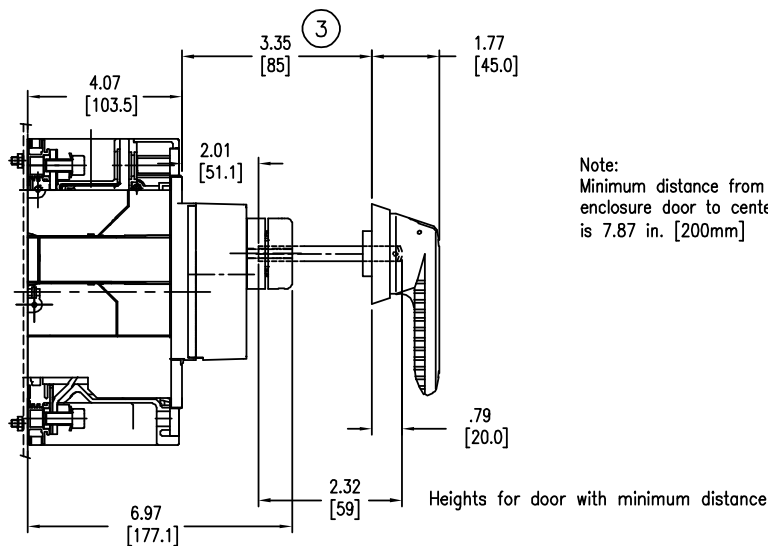
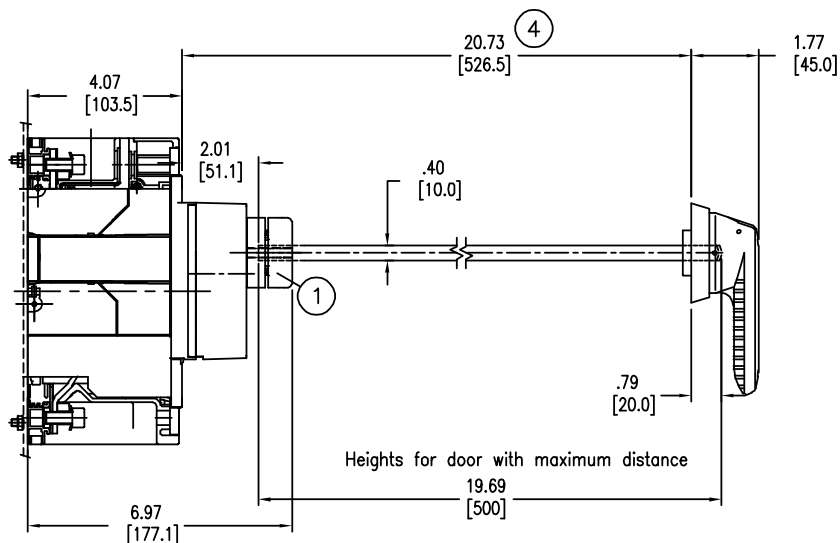
OHV HANDLE DRILLING

Approximate dimensions

T4 - T5

Variable depth mechanism with OHB handle

Pistol handle operating mechanism on the compartment door

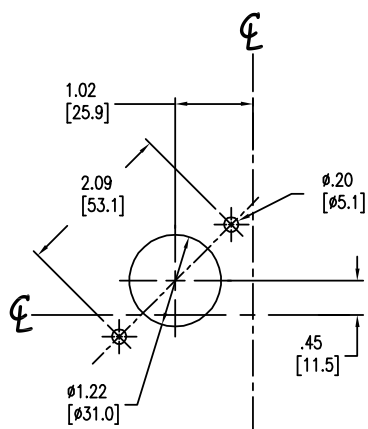


Note:
Minimum distance from hinge of enclosure door to center of shaft is 7.87 in. [200mm]

Caption

- ① Transmission unit
- ② Pistol handle operating mechanism on the compartment door
- ③ Minimum distance from the front door with accessory
- ④ Maximum distance from the front door with accessory

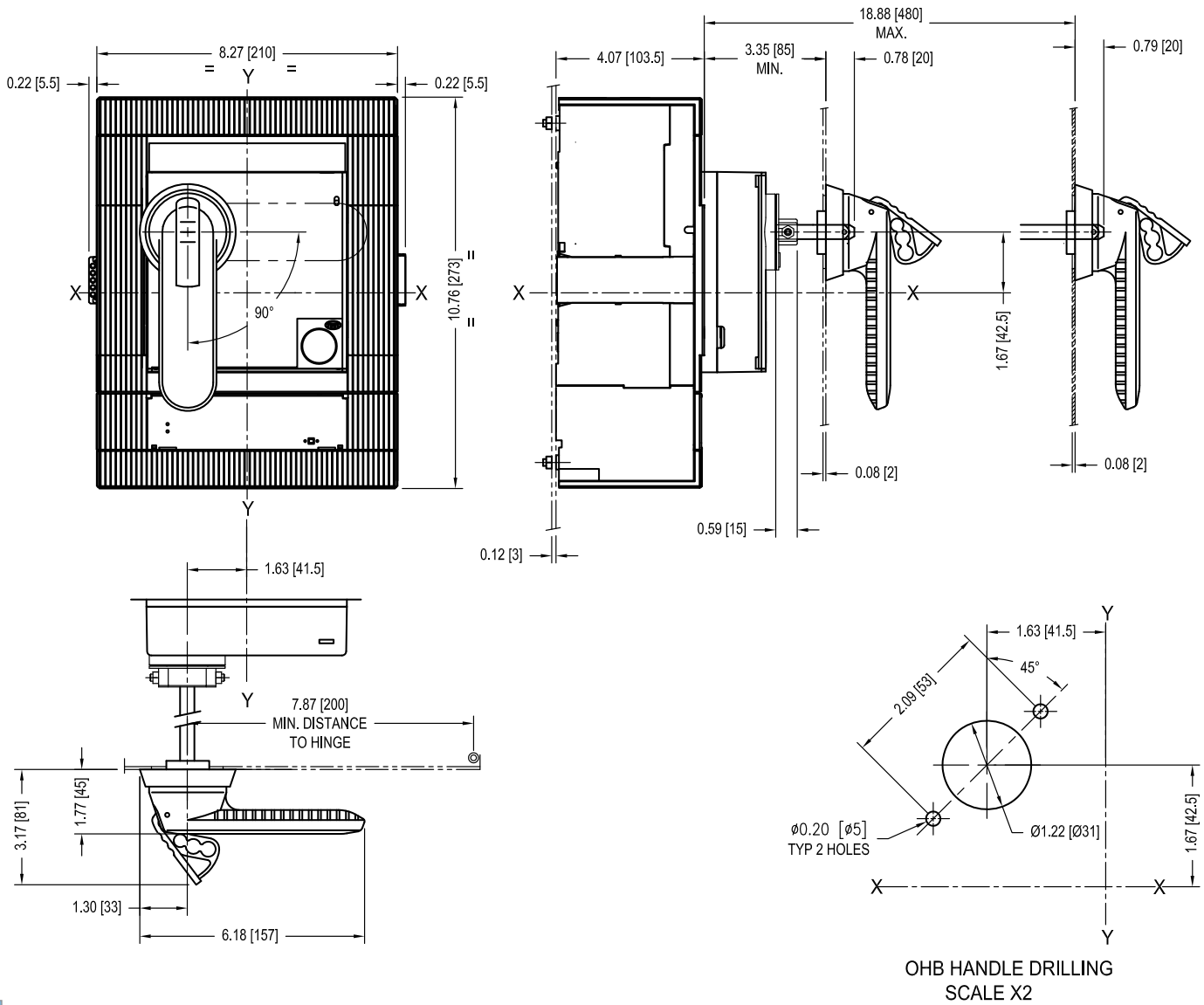
Drilling template of the compartment door



Approximate dimensions

T6

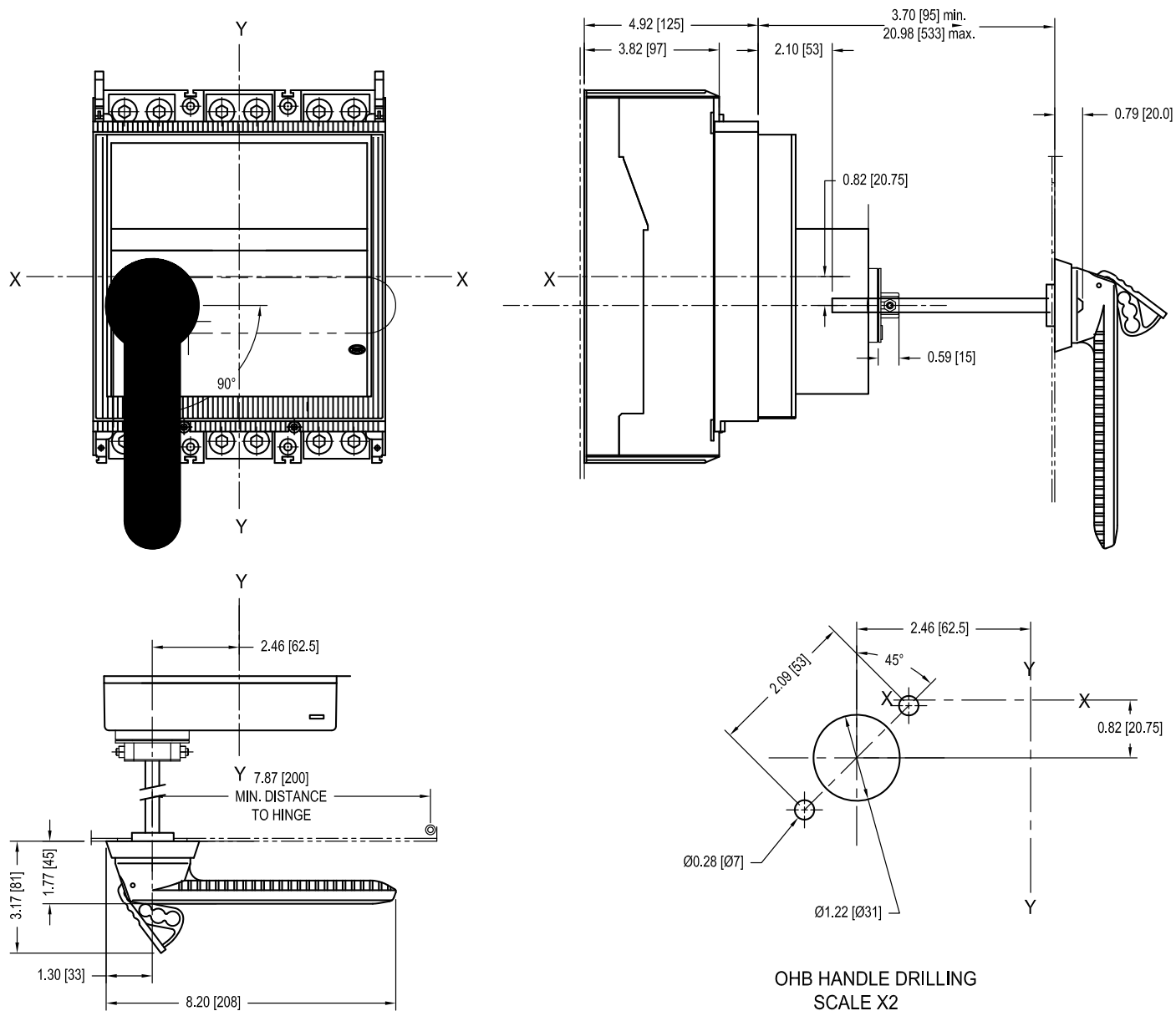
Variable depth mechanism



Approximate dimensions

T7

Variable depth mechanism



Notes



18 - Emax power breakers

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Notes

Emax / X1 by Emax Power breakers



Power breakers Emax / X1 by Emax



Emax

ABB's Emax series of low voltage power circuit breakers embodies over half a century's experience and technological development in power circuit breakers. The Emax offers a series of breakers that is totally innovative in its technological design, ease of installation and use, making it the ideal solution for the growing requirements of designers, switchboard and switchgear manufacturers, installers, OEMs and users.

The Emax power circuit breakers are UL listed and meet the ANSI and IEC Standards for low voltage power circuit breakers.

ABB Emax power circuit breakers are available in five different models with rated continuous current from 800A to 6300A and rated short-circuit current range from 42kA to 200kA (480V).

UL File # E194191 (breakers)
E194425 (accessories)

Catalog references:

UL Technical catalog 1SDC200005D0203; IEC Technical catalog 1SDC200006D0208

X1 by Emax

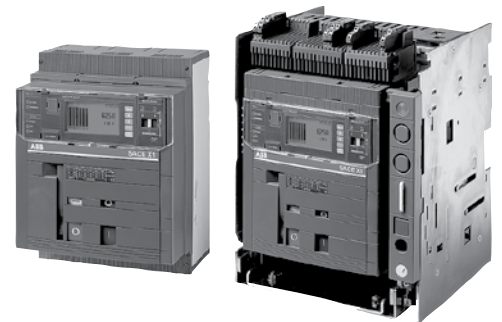
X1 by Emax, with the same performance as an air circuit breaker but with extremely compact dimensions.

X1 by Emax is the best solution for all those applications where dimensions are an important and determining factor in selecting the circuit breaker but without necessarily having to give up high rated current breaking capacity and short-time withstand current values.

X1 by Emax is available in one model with rated current I_u up to 1600A, high I_{cw} for selective circuit breakers and for the current limiting version, an incredible I_{cu} of 150 kA at 415 VAC. **For accessories, refer to pages 17.52-17.55 and 17.71-17.83.**

Catalog reference:

UL Technical catalog 1SDC200018D0201; IEC Technical catalog 1SDC200009D0203



18

Ordering technical catalogs

To order the above referenced catalogs, visit our web site at:

www.abbnow.com/PublicSite/home/LiteratureResources.htm

General information

Catalog number explanation

Emax breaker

D

Locking provisions: X=none;
A=keylock (open)
B=button guard
C=padlock provision (open)
D=withdrawable position lock (connected, test, and disconnected positions)
E=withdrawable position lock (test, and disconnected positions)
F=A+B; G=A+C; H=A+D; J=A+E; K=B+D; L=B+E;
M=C+D; N=C+E; P=A+B+D; Q=A+B+E; R=A+C+D;
S=A+C+E; T=heavy duty padlock provision (open); U=A+T; V=T+D;
W=T+E; Y=A+T+D; Z=A+T+E
9 = Extra heavy duty padlock provision (open)

Accessories: X=none;
A=mechanical counter; **B** = bell alarm
C=bell alarm w/remote reset 24-30VAC/DC
D=bell alarm w/remote reset 110-130VAC/DC
E=bell alarm w/remote reset 220-240VAC/DC
F=A+B; G=A+C; H=A+D; J=A+E

Undervoltage trip or second shunt trip (50/60 Hz):

0= none
Undervoltage trip:
A=24VDC; **B**=30VAC/DC; **C**=48VAC/DC; **D**=60VAC/DC; **E**=110-120VAC/DC
F=120-127VAC/DC; **G**=220-240VAC/DC; **H**=240-250VAC/DC
J=380-400VAC; **K**=440-480VAC
Second shunt trip:
L=24VAC/DC; **M**=30VAC/DC; **N**=48VAC/DC; **P**=60VAC/DC
Q=110-120VAC/DC; **R**=120-127VAC/DC; **S**=220-240VAC/DC
T=240-250VAC/DC; **U**=380-400VAC; **V**=440-480VAC

Shunt trip (50/60 Hz):

0 = none
A=24VDC; **B**=30VAC/DC; **C**=48VAC/DC; **D**=60VAC/DC **E**=110-120VAC/DC;
F=120-127VAC/DC; **G**=220-240VAC/DC; **H**=240-250VAC/DC; **J**=380-400VAC;
K=440-480VAC; **L**=Special low (E1/E2/E3)

Spring charging motor: (includes spring charged signal)

0=none, **A**=24-30VAC/VDC, **B**=48-60VAC/VDC, **C**=110-130VAC/VDC, **D**=220-250VAC/VDC,
E=spring charged signal only

Contacts:

A=4 aux; **B**=10 aux; **D**=UV energ. N.O.; **E**=UV energ. NC; **F**=A & D; **G**=A & E; **H**=B & D; **J** = B & E
0 = No aux contacts (non-automatic only)
 (15 auxiliary contacts available as separate accessory)

Closing coil (50/60 Hz)

0=none; **A**=24VDC; **B**=30VAC/DC; **C**=48VAC/DC; **D**=60VAC/DC; **E**=110-120VAC/DC
F=120-127VAC/DC; **G**=220-240VAC/DC; **H**=240-250VAC/DC; **J**=380-400VAC **K**=440-480VAC

Trip unit accessories: (not compatible with PR121/P)

A=PR120/K4C; **B**=PR120/V (bottom terminals; supplied as std on PR123/P); **C**=PR120/D-M; **D**=PR120/D-BT;
E=A+B; **F**=A+C; **G**=A+D; **H**=A+B+C; **I**=A+B+D; **J**=B+C+D; **K**=A+C+D; **L**=A+B+C+D; **M**=B+C;
N=PR120/V (top terminals); **P**=A+N; **Q**=A+N+C; **R**=A+N+D; **S**=N+C+D; **T**=A+N+C+D; **U**=N+C; **V**=B+D;
W=N+D; **0**=none

Trip unit: **A**=PR121/P, LI; **B**=PR121/P, LSI; **C**=PR121/P, LSIG; **D**=non-automatic; **E**=PR122/P, LI; **F**=PR122/P, LSI;
G=PR122/P, LSIG; **H**=PR122/P, LSIRc (IEC); **J**=PR123/P, LSI + PR120/V; **K**=PR123/P, LSIG + PR120/V

Version: **B**=UL fixed^①; **D**=UL drawout, less cradle; **F**=IEC fixed; **W**=IEC drawout, less cradle

Rating plug: **A**=400; **B**=600/630 (UL/IEC); **C**=800; **D**=1000; **E**=1200/1250 (UL/IEC); **F**=1600; **G**=2000; **H**=2500; **J**=3000 (UL);
K=3200, **L**=3600 (UL); **M**=4000; **N**=5000; **P**=6300 (IEC); **R** = 100^②; **S** = 200^②; **T** = 250^②;
0=None (Non-automatic only); **U**=6000 (UL)

Frame ampere rating: **A**=800; **B**=1200/1250 (UL/IEC); **C**=1600; **D**=2000; **E**=2500; **F**=3200; **G**=3600; **H**=4000; **J**=5000;
N=6300 (IEC); **M**=6000 (UL); **P**=1000 (IEC); **R**=250^③

Breaking capacity: **B**=basic; **N**=normal; **S**=standard; **H**=high; **V**=very high; **L**=limiting; **Q**=1150VAC (IEC); **X**=200kA^②

Frame size: **1**=E1, 3P; **2**=E2, 3P; **3**=E3, 3P; **4**=E4, 3P; **6**=E6, 3P;
A=E1, 4P; **B**=E2, 4P; **C**=E3, 4P; **D**=E4, 4P; (50% neutral); **F**=E6, 4P (50% neutral); **G**=E4, 4P (100% neutral); **H**=E6, 4P (100% neutral)

① Except E3 3200A (only vertical terminals), all other frame sizes come standard with horizontal terminals. For vertical terminals conversion kit, see page 18.43.

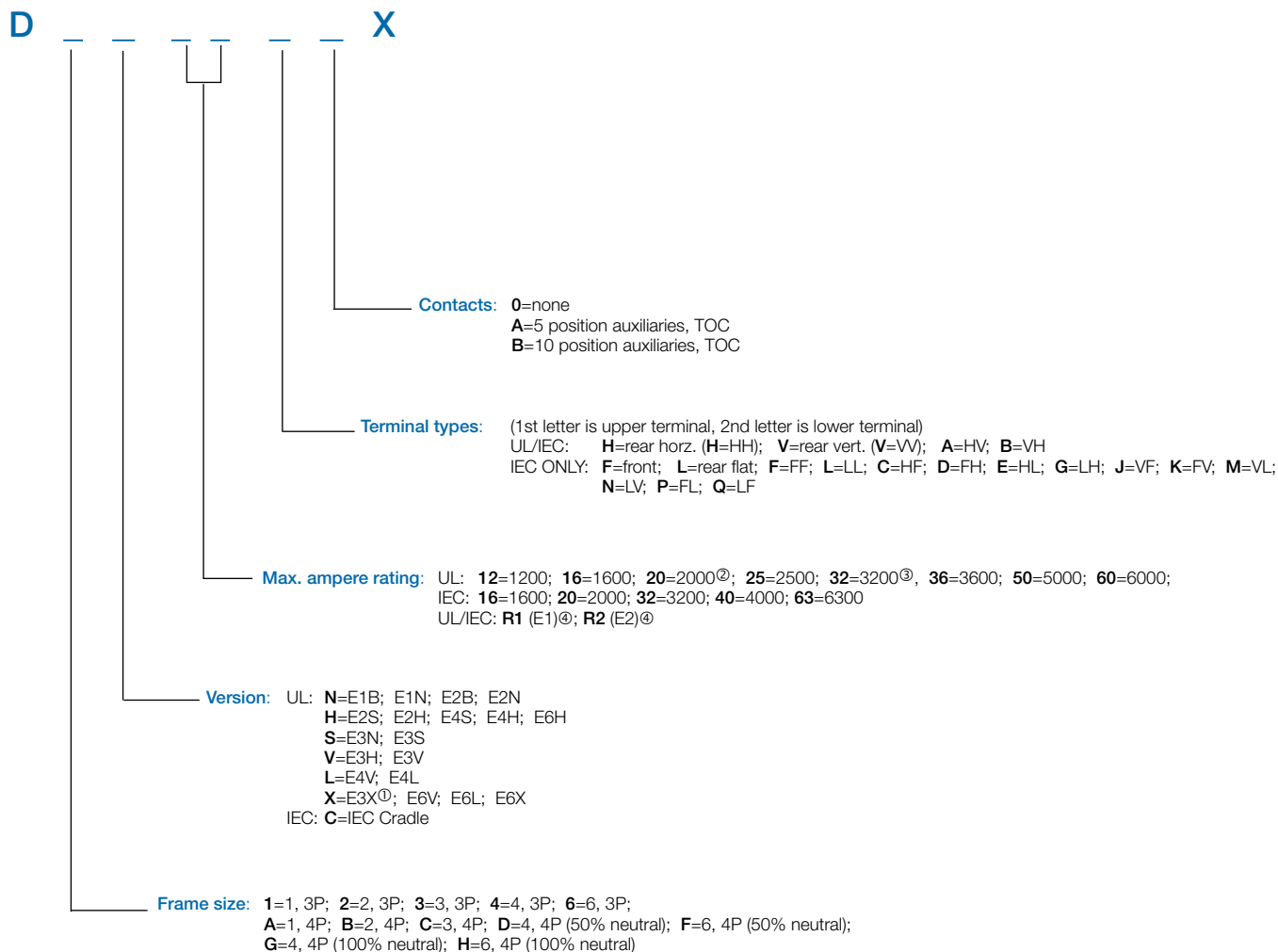
② Available as E3 up to 2000A and E6 up to 5000A.

③ Consult factory.

General information

Catalog number explanation

Emax cradle (fixed part)



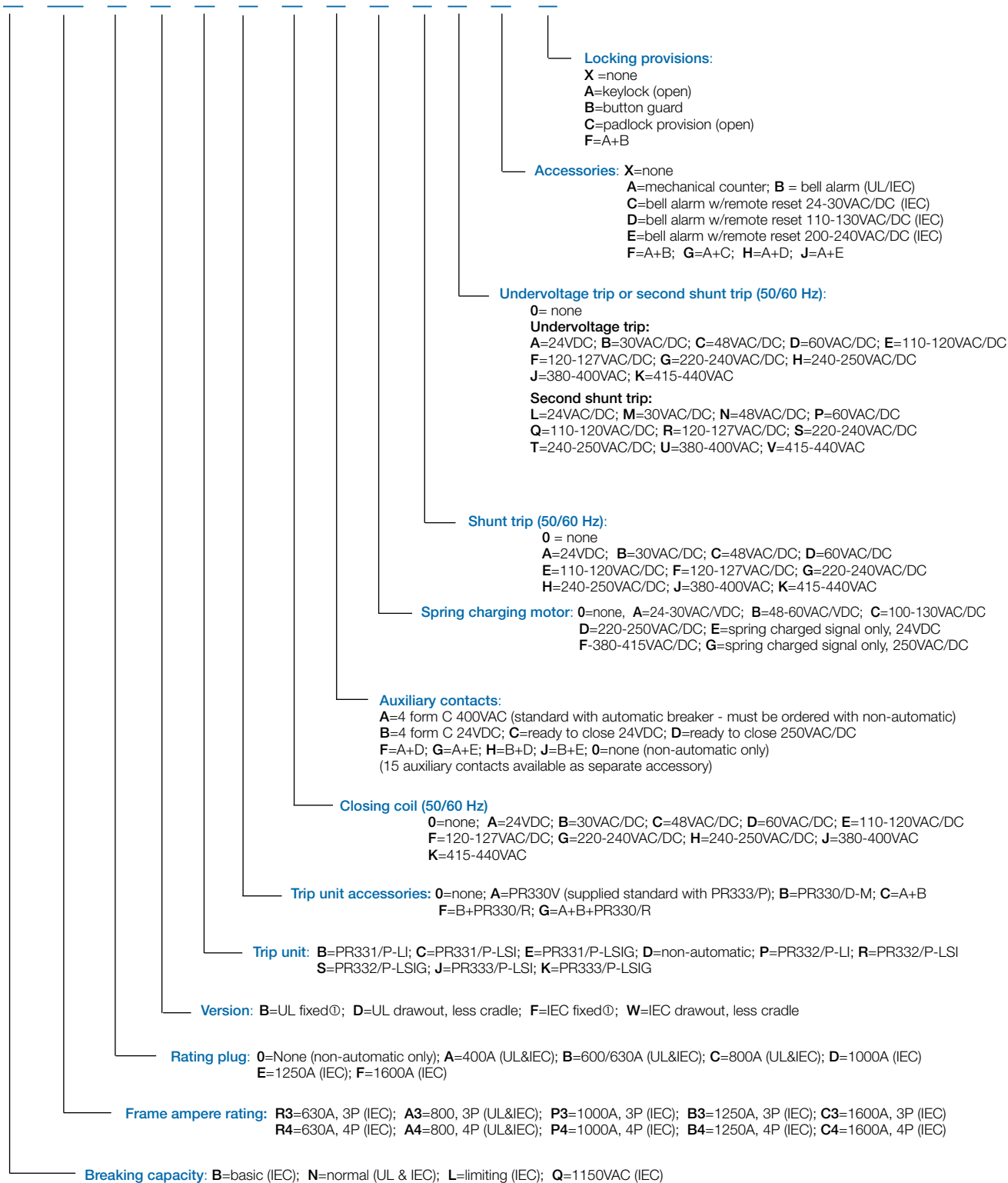
① Available as E3 up to 2000A
② Vertical only on E3 up to 2000A
③ Vertical only
④ Consult factory

General information

Catalog number explanation

X1 by Emax breaker

X1



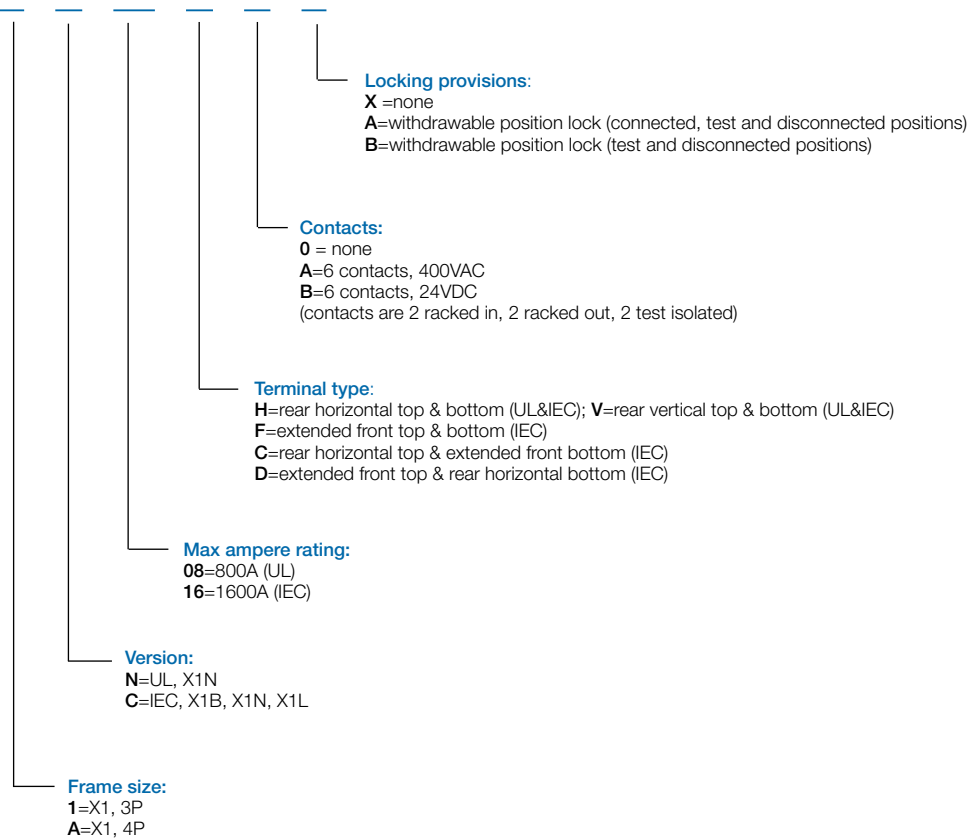
⓪ Front termination is standard on the fixed version of X1. Alternate termination kits are available as optional kits.
 NOTE: For accessories, refer to pages 17.52-17.55 and 17.71-17.83.

General information

Catalog number explanation

X1 by Emax cradle

X1



Selection guide UL Circuit breakers

Common data

Voltages	Rated maximum voltage	[V]	635
	Rated voltage	[V]	600
	Test voltage (1 min. 50/60 Hz)	[kV]	2.2
Service temperature		[°C]	-25...+70 ①
Storage temperature		[°C]	-40...+70
Frequency		[Hz]	50-60
Number of poles			3-4
Version			Fixed withdrawable



		X1		E1		E2			
		A	N-A	B-A	N-A	B-A	N-A	S-A	H-A
Levels of performance	A	800	800	800	1600	800	800	800	
	A	-	1200	1200	-	1200	1200	1200	
	A	-	-	-	-	1600	1600	1600	
	A	-	-	-	-	-	-	-	
	A	-	-	-	-	-	-	-	
	A	-	-	-	-	-	-	-	
Capacity of neutral pole for 4p circuit breakers	[% I _N]	100	100	100	100	100	100	100	
Rated short circuit current									
	240 V	[kA]	50	42	50	42	65	65	85
	480 V	[kA]	50	42	50	42	50	65	85
	600 V	[kA]	35	42	50	42	50	65	65
Rated short time current		[kA]	42	42	50	42	50	65	65

Trip units								
PR121/P-A		-	•	•	•	•	•	•
PR122/P-A		-	•	•	•	•	•	•
PR123/P-A		-	•	•	•	•	•	•
PR331/P-A		•	-	-	-	-	-	-
PR332/P-A		•	-	-	-	-	-	-
PR333/P-A		•	-	-	-	-	-	-

Trip times								
Make time (max)	[ms]	80	80	80	80	80	80	80
Break time (<ST current) (max)	[ms]	70	70	70	70	70	70	70
Break time (>ST current) (max)	[ms]	30	30	30	30	30	30	12

Overall dimensions					
Fixed	H	[mm/in]	268/10.6	418/16.5	418/16.5
	W 3p	[mm/in]	210/8.27	296/11.65	296/11.65
	W 4p	[mm/in]	280/11.02	386/15.2	386/15.2
	D	[mm/in]	181/7.1	302/11.9	302/11.9
Draw out	H	[mm/in]	343/13.5	461/18.15	461/18.15
	W 3p	[mm/in]	284/11.2	324/12.8	324/12.8
	W 4p	[mm/in]	354/13.9	414/16.3	414/16.3
	D	[mm/in]	254/10	396.5/15.6	396.5/15.6

Weights (Circuit breaker complete with trip unit, terminals (RH), CS., No accessories)					
Fixed	3p	[kg/lbs]	11/24.3	45/99.2	50/110.25
	4p	[kg/lbs]	14/30.9	54/119.1	61/134.51
Draw out	3p	[kg/lbs]	32/70.6	70/154.4	78/171.99
	4p	[kg/lbs]	42.6/93.9	82/180.1	93/205.07

		X1 N-A	E1 B-A / N-A		E2 B-A / N-A / S-A / H-A		
Continuous current rating (at 40 °C)	[A]	800	800	1200	800	1200	1600
Mechanical life with regular ordinary maintenance	[No. operations x 1000]	12.5	20	20	20	20	20
Frequency of operations	[Operations/hour]	60	30	30	30	30	30
Electrical life	[No. operations x 1000]	6	10	10	10	10	10
Frequency of operations	[Operations/hour]	30	30	30	30	30	30

① For special Emax low temperature breakers (-40°C), consult factory.

Selection guide UL Circuit breakers

Emax
Power breakers



E3					E4					E6					
N-A	S-A	H-A	V-A	X-A	S-A	H-A	V-A	L-A	H-A/f ①	H-A	V-A	L-A	X-A	H-A/f ①	X-A/f ①
2000	800	800	800	800	3200	3200	3200	3200	3200	4000	4000	4000	4000	4000	4000
2500	1200	1200	1200	1200	3600	3600	3600	3600	3600	5000	5000	5000	5000	5000	5000
-	1600	1600	-	-	-	-	-	-	-	-	6000②	-	-	-	-
-	2000	2000	2000	2000	-	-	-	-	-	-	-	-	-	-	-
-	2500	2500	2500	-	-	-	-	-	-	-	-	-	-	-	-
-	3200	3200	3200	-	-	-	-	-	-	-	-	-	-	-	-
100	100	100	100	100	50	50	50	50	100	50	50	50	50	100	100

65	85	85	125	200	85	100	100	125	100	125	125	150	200	125	200
50	65	85	125	200	65	85	100	125	85	85	125	150	200	85	200
50	65	85	10	14	65	85	100	100	85	85	100	100	100	85	100
50	65	65	85	14	65	85	100	100	85	100	100	100	100	100	100

•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
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-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30

418/16.5	438/17.24	418/16.5	418/16.5	418/16.5	418/16.5
404/15.91	404/15.91	566/22.28	-	782/30.79	-
530/20.87	530/20.87	656/25.83	746/29.4	908/35.75	1034/40.71
302/11.9	302/11.9	302/11.9	302/11.9	302/11.9	302/11.9
461/18.15	481/18.94	461/18.15	461/18.15	461/18.15	461/18.15
432/17.01	432/17.01	594/23.39	-	810/31.89	-
558/21.97	558/21.97	684/26.93	774/30.5	936/36.85	1062/41.81
396.5/15.6	396.5/15.6	396.5/15.6	396.5/15.6	396.5/15.6	396.5/15.6

66/145.53	70/154.4	97/213.89	-	140/308.7	-
80/176.4	84/185.2	117/257.99	125/275.6	160/352.8	185/407.93
104/229.32	106/233.7	147/324.14	-	210/463.05	-
125/275.63	128/282.2	165/363.83	200/441	240/529.20	275/606.38

E3 N-A / S-A / H-A / V-A / X-A						E4 S-A / H-A / V-A / L-A / H-A/f				E6 H-A / V-A / L-A / X-A / H-A/f / X-A/f			
800	1200	1600	2000	2500	3200	3200		3600		4000		5000	
15③	15③	15③	15③	15	15	8		8		8		8	
30	30	30	30	30	30	30		30		30		30	
10④	10④	10④	8④	8	8	5		5		5		3	
30	30	30	30	30	30	30		30		30		30	

① 4 pole only.

Neutral pole rating

- E1-E3 = 100% rating
- E4-E6 = 50% rating

② 6000A only available in 3P, drawout; Width= 41.81 /1062 [in/mm]

③ 10 for E3X-A

④ 1.5 for E3X-A

Non-automatic switches UL

The switches share the same frames and accessories as the circuit breakers, with the only difference the absence of the trip unit.

The switch is available in both three-pole and four-pole fixed and draw out version and is identified by the code "/MS" (on the label). The electrical characteristics of the switches are given in the following table.



		X1	E1		E2	
Emax UL switch-disconnectors						
Level of performance		N-A/MS	B-A/MS	N-A/MS	B-A/MS	S-A/MS
Frame size	[A]	800	800	800	1600	800
	[A]	-	1200	1200	-	1200
	[A]	-	-	-	-	1600
	[A]	-	-	-	-	-
	[A]	-	-	-	-	-
Number of poles		3 / 4	3 / 4	3 / 4	3 / 4	3 / 4
Capacity of neutral pole for 4p circuit breakers	[% I _n]	100	100	100	100	100
Rated voltage	[V]	480	600	600	600	600
Rated maximum voltage	[V]	508	635	635	635	635
Test voltage (1min. 50/60 Hz)	[kV]	2.2	2.2	2.2	2.2	2.2
Frequency	[Hz]	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60
Rated short time current	[kA]	42	42	50	42	50
Version		F - W	F - W	F - W	F - W	F - W

Overall dimensions

Fixed	H	[mm/in]	268/10.55	418/16.46	418/16.46
	W 3p	[mm/in]	210/8.27	296/11.65	296/11.65
	W 4p	[mm/in]	280/11.02	386/15.20	296/11.65
	D	[mm/in]	181/7.13	302/11.89	302/11.89
Draw out	H	[mm/in]	343/13.50	461/18.15	461/18.15
	W 3p	[mm/in]	284/11.18	324/12.76	324/12.76
	W 4p	[mm/in]	354/13.94	414/16.30	414/16.30
	D	[mm/in]	254/10.00	396.5/15.61	396.5/15.61

Weights

Fixed	3p	[kg/lbs]	11/24.26	45/99.23	50/110.25
	4p	[kg/lbs]	14/30.87	54/119.07	61/134.51
Draw out	3p	[kg/lbs]	32/70.56	70/154.35	78/171.99
	4p	[kg/lbs]	42.6/93.93	82/180.81	93/205.07

Non-automatic switches UL

Emax
Power breakers



E3



E4



E6

E3			E4				E6		
N-A/MS	S-A/MS	V-A/MS	S-A/MS	H-A/MS	V-A/MS	H-Af/MS ①	H-A/MS	H-Af/MS ①	V-A/MS ①
2000	800	800	3200	3200	3200	3200	4000	4000	6000
2500	1200	1200	3600	3600	3600	3600	5000	5000	-
-	1600	1600	-	-	-	-	-	-	-
-	2000	2000	-	-	-	-	-	-	-
-	2500	2500	-	-	-	-	-	-	-
-	3200	3200	-	-	-	-	-	-	-
3 / 4	3 / 4	3 / 4	3 / 4	3 / 4	3 / 4	4	3 / 4	4	3
100	100	100	50	50	50	100	50	100	-
600	600	600	600	600	600	600	600	600	600
635	635	635	635	635	635	635	635	635	635
2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60
50	85	85	65	85	100	85	100	100	100
F - W	F - W	F - W	F - W	F - W	F - W	F - W	F - W	F - W	W

418/16.46	418/16.46	418/16.50	418/16.50	418/16.50	-
404/15.91	566/22.28	-	782/30.79	-	-
530/20.87	656/25.83	746/29.40	908/35.75	1034/40.71	-
302/11.89	302/11.89	302/11.89	302/11.89	302/11.89	-
461/18.15	461/18.15	461/18.15	461/18.15	461/18.15	461/18.15
432/17.01	594/23.39	-	810/31.89	-	1062/41.81
558/21.97	684/26.93	774/30.50	936/36.85	1062/41.81	-
396.5/15.61	396.5/15.61	396.5/15.60	396.5/15.60	396.5/15.60	396.5/15.60
66/145.53	97/213.89	-	140/308.70	-	-
80/176.40	117/257.99	125/275.6	160/352.80	185/407.93	-
104/229.32	147/324.14	-	210/463.05	-	210/463.05
125/275.63	165/363.83	200/441	240/529.20	275/606.38	-

① 4 pole only.

Neutral pole rating:

- E1-E3 = 100% rating
- E4-E6 = 50% rating

Electronic trip units

Rating plugs for UL circuit breakers

Rating plugs

Type of circuit breaker	Rated current I_n	I_n [A] 400	600	800	1000	1200	1600	2000	2500	3000	3200	3600	4000	5000	6000
E1B	800	•	•	•											
	1200	•	•	•	•	•									
E2B	1600	•	•	•	•	•	•								
	800	•	•	•											
E2N	800	•	•	•											
	1200	•	•	•	•	•									
	1600	•	•	•	•	•	•								
E2S	800	•	•	•											
	1200	•	•	•	•	•									
	1600	•	•	•	•	•	•								
E2H	800	•	•	•											
	1200	•	•	•	•	•									
	1600	•	•	•	•	•	•								
E3N	2000	•	•	•	•	•	•	•							
	2500	•	•	•	•	•	•	•	•						
E3S	800	•	•	•											
	1200	•	•	•	•	•									
	1600	•	•	•	•	•	•								
	2000	•	•	•	•	•	•	•							
	2500	•	•	•	•	•	•	•	•						
	3200	•	•	•	•	•	•	•	•	•	•				
E3H	800	•	•	•											
	1200	•	•	•	•	•									
	1600	•	•	•	•	•	•								
	2000	•	•	•	•	•	•	•							
	2500	•	•	•	•	•	•	•	•						
	3200	•	•	•	•	•	•	•	•	•	•				
E3V	800	•	•	•											
	1200	•	•	•	•	•									
	1600	•	•	•	•	•	•								
	2000	•	•	•	•	•	•	•							
	2500	•	•	•	•	•	•	•	•						
E4S	3200			•	•	•	•	•	•	•	•	•			
	3600			•	•	•	•	•	•	•	•	•	•		
E4H	3200			•	•	•	•	•	•	•	•	•			
	3600			•	•	•	•	•	•	•	•	•	•		
E4V	3200			•	•	•	•	•	•	•	•	•			
	3600			•	•	•	•	•	•	•	•	•	•		
E4L	3200			•	•	•	•	•	•	•	•	•			
	3600			•	•	•	•	•	•	•	•	•	•		
E6H	4000			•	•	•	•	•	•	•	•	•	•		
	5000			•	•	•	•	•	•	•	•	•	•	•	
E6V	4000			•	•	•	•	•	•	•	•	•	•		
	5000			•	•	•	•	•	•	•	•	•	•	•	
	6000			•	•	•	•	•	•	•	•	•	•	•	•
E6L	4000			•	•	•	•	•	•	•	•	•	•		
	5000			•	•	•	•	•	•	•	•	•	•	•	

① See page 18.40 for rating plugs sold separately.

Fixed breakers 3 & 4 pole UL

3 Pole

UL	Frame Amps	Interrupting Ratings kA, 480V
E1B	800	42
E1N	800	50
E2N	800	50
E2S	800	65
E2H	800	85
E3S	800	65
E3H	800	85
E3V	800	125
E3X	800	200
E1B	1200	42
E1N	1200	50
E2N	1200	50
E2S	1200	65
E2H	1200	85
E3S	1200	65
E3H	1200	85
E3V	1200	125
E3X	1200	200
E2B	1600	42
E2N	1600	50
E2S	1600	65
E2H	1600	85
E3S	1600	65
E3H	1600	85
E3V	1600	125
E3X	1600	200
E3N	2000	50
E3S	2000	65
E3H	2000	85
E3V	2000	125
E3X	2000	200
E3N	2500	50
E3S	2500	65
E3H	2500	85
E3V	2500	125
E3S	3200	65
E3H	3200	85
E3V	3200	125
E4S	3200	65
E4H	3200	85
E4V	3200	100
E4L	3200	150
E4S	3600	65
E4H	3600	85
E4V	3600	100
E4L	3600	150
E6H	4000	85
E6V	4000	125
E6L	4000	150
E6X	4000	200
E6H	5000	85
E6V	5000	125
E6L	5000	150
E6X	5000	200

4 Pole

UL	Frame Amps	Interrupting Ratings kA, 480V
E1B	800	42
E1N	800	50
E2N	800	50
E2S	800	65
E2H	800	85
E3S	800	65
E3H	800	85
E3V	800	125
E3X	800	200
E1B	1200	42
E1N	1200	50
E2N	1200	50
E2S	1200	65
E2H	1200	85
E3S	1200	65
E3H	1200	85
E3V	1200	125
E3X	1200	200
E2B	1600	42
E2N	1600	50
E2S	1600	65
E2H	1600	85
E3S	1600	65
E3H	1600	85
E3V	1600	125
E3X	1600	200
E3N	2000	50
E3S	2000	65
E3H	2000	85
E3V	2000	125
E3X	2000	200
E3N	2500	50
E3S	2500	65
E3H	2500	85
E3V	2500	125
E3S	3200	65
E3H	3200	85
E3V	3200	125
E4S	3200	65
E4H	3200	85
E4V	3200	100
E4L	3200	150
E4S	3600	65
E4H	3600	85
E4V	3600	100
E4L	3600	150
E6H	4000	85
E6V	4000	125
E6L	4000	150
E6X	4000	200
E6H	5000	85
E6V	5000	125
E6L	5000	150
E6X	5000	200

Standard features – manually operated UL breaker

- Rear horizontal terminals except for E3 3200A
- PR121 trip unit with LI protection functions
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- 2NO & 2NC auxiliary contacts for open/closed position indication
- Lifting plates
- Current transformers
- Terminal box

Neutral pole rating (Standard)

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

⓪ Special 100% neutral pole rating available.

Withdrawable breakers

3 & 4 pole

UL

3 Pole

UL	Frame Amps	Interrupting Ratings kA, 480V
E1B	800	42
E1N	800	50
E2N	800	50
E2S	800	65
E2H	800	85
E3S	800	65
E3H	800	85
E3V	800	125
E3X	800	200
E1B	1200	42
E1N	1200	50
E2N	1200	50
E2S	1200	65
E2H	1200	85
E3S	1200	65
E3H	1200	85
E3V	1200	125
E3X	1200	200
E2B	1600	42
E2N	1600	50
E2S	1600	65
E2H	1600	85
E3S	1600	65
E3H	1600	85
E3V	1600	125
E3X	1600	200
E3N	2000	50
E3S	2000	65
E3H	2000	85
E3V	2000	125
E3X	2000	200
E3N	2500	50
E3S	2500	65
E3H	2500	85
E3V	2500	125
E3S	3200	65
E3H	3200	85
E3V	3200	125
E4S	3200	65
E4H	3200	85
E4V	3200	100
E4L	3200	150
E4S	3600	65
E4H	3600	85
E4V	3600	100
E4L	3600	150
E6H	4000	85
E6V	4000	125
E6L	4000	150
E6X	4000	200
E6H	5000	85
E6V	5000	125
E6L	5000	150
E6X	5000	200
E6V	6000	125

4 Pole

UL	Frame Amps	Interrupting Ratings kA, 480V
E1B	800	42
E1N	800	50
E2N	800	50
E2S	800	65
E2H	800	85
E3S	800	65
E3H	800	85
E3V	800	125
E3X	800	200
E1B	1200	42
E1N	1200	50
E2N	1200	50
E2S	1200	65
E2H	1200	85
E3S	1200	65
E3H	1200	85
E3V	1200	125
E3X	1200	200
E2B	1600	42
E2N	1600	50
E2S	1600	65
E2H	1600	85
E3S	1600	65
E3H	1600	85
E3V	1600	125
E3X	1600	200
E3N	2000	50
E3S	2000	65
E3H	2000	85
E3V	2000	125
E3X	2000	200
E3N	2500	50
E3S	2500	65
E3H	2500	85
E3V	2500	125
E3S	3200	65
E3H	3200	85
E3V	3200	125
E4S	3200	65
E4H	3200	85
E4V	3200	100
E4L	3200	150
E4S	3600	65
E4H	3600	85
E4V	3600	100
E4L	3600	150
E6H	4000	85
E6V	4000	125
E6L	4000	150
E6X	4000	200
E6H	5000	85
E6V	5000	125
E6L	5000	150
E6X	5000	200

Standard features – electrically operated breaker

Moving part

- Rear horizontal terminals except for E3 3200A
- PR121 trip unit with LI protection feature
- Spring charging motor
- Shunt trip
- Closing coil
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- 2NO & 2NC auxiliary contacts for open-closed position indication
- Lifting plates
- Current transformers
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts
- Anti-racking out device (not available with YU)

① Special 100% neutral pole rating available.

Standard features – electrically operated breaker

Fixed part

- Safety shutters
- Rear horizontal terminals
- Sliding contacts
- Anti-insertion lock
- Ground connection

Neutral pole rating (Standard)

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

Non-automatic switches

Fixed switches (without trip unit & c.t.s.), 3 & 4 pole

UL

3 Pole

UL	Frame Amps	Rated Short Time Current, kA
E1B	800	42
E1N	800	50
E2N	800	50
E2S	800	65
E3S	800	65
E3V	800	85
E1B	1200	42
E1N	1200	50
E2N	1200	50
E2S	1200	65
E3S	1200	65
E3V	1200	85
E2B	1600	42
E2N	1600	50
E2S	1600	65
E3S	1600	65
E3V	1600	85
E3N	2000	50
E3S	2000	65
E3V	2000	85
E3N	2500	50
E3S	2500	65
E3V	2500	85
E3S	3200	65
E3V	3200	85
E4S	3200	65
E4H	3200	85
E4V	3200	100
E4S	3600	65
E4H	3600	85
E4V	3600	100
E6H	4000	100
E6H	5000	100

4 Pole

UL	Frame Amps	Rated Short Time Current, kA
E1B	800	42
E1N	800	50
E2N	800	50
E2S	800	65
E3S	800	65
E3V	800	85
E1B	1200	42
E1N	1200	50
E2N	1200	50
E2S	1200	65
E3S	1200	65
E3V	1200	85
E2B	1600	42
E2N	1600	50
E2S	1600	65
E3S	1600	65
E3V	1600	85
E3N	2000	50
E3S	2000	65
E3V	2000	85
E3N	2500	50
E3S	2500	65
E3V	2500	85
E3S	3200	65
E3V	3200	85
E4S	3200	65
E4H	3200	85
E4V	3200	100
E4S	3600	65
E4H	3600	85
E4V	3600	100
E6H	4000	100
E6H	5000	100

Standard features – manually operated UL switch

- Rear horizontal terminals except for E3 3200A
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Terminal box

Neutral pole rating (Standard)

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

⓪ Special 100% neutral pole rating available.

Non-automatic switches

Withdrawable switches (without trip unit & c.t.s.), 3 pole UL

3 Pole

UL	Frame Amps	Rated Short Time Current, kA
E1B	800	42
E1N	800	50
E2N	800	50
E2S	800	65
E3S	800	65
E3V	800	85
E1B	1200	42
E1N	1200	50
E2N	1200	50
E2S	1200	65
E3S	1200	65
E3V	1200	85
E2B	1600	42
E2N	1600	50
E2S	1600	65
E3S	1600	65
E3V	1600	85
E3N	2000	50
E3S	2000	65
E3V	2000	85
E3N	2500	50
E3S	2500	65
E3V	2500	85
E3S	3200	65
E3V	3200	85
E4S	3200	65
E4H	3200	85
E4V	3200	100
E4S	3600	65
E4H	3600	85
E4V	3600	100
E6H	4000	100
E6H	5000	100
E6V	6000	100

Standard features – manually operated switch

Moving part

- Rear horizontal terminals except for E3 3200A
- Manual mechanical close and open pushbuttons
- Circuit breaker open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts
- Anti-racking out device (not available with YU)

Standard features – manually operated switches

Fixed part

- Safety shutters
- Rear horizontal terminals except where noted
- Sliding contacts
- Anti-insertion lock
- Ground connection

Neutral pole rating (Standard)

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

Non-automatic switches

Withdrawable switches (without trip unit & c.t.s.), 4 pole

UL

4 Pole

UL	Frame Amps	Rated Short Time Current, kA
E1B	800	42
E1N	800	50
E2N	800	50
E2S	800	65
E3S	800	65
E3V	800	85
E1B	1200	42
E1N	1200	50
E2N	1200	50
E2S	1200	65
E3S	1200	65
E3V	1200	85
E2B	1600	42
E2N	1600	50
E2S	1600	65
E3S	1600	65
E3V	1600	85
E3N	2000	50
E3S	2000	65
E3V	2000	85
E3N	2500	50
E3S	2500	65
E3V	2500	85
E3S	3200	65
E3V	3200	85
E4S	3200	65
E4H ⊕	3200	85
E4V	3200	100
E4S	3600	65
E4H ⊕	3600	85
E4V	3600	100
E6H ⊕	4000	100
E6H ⊕	5000	100

Standard features – manually operated switch

Moving part

- Rear horizontal terminals except for E3 3200A
- Manual mechanical close and open pushbuttons
- Circuit breaker open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts
- Anti-racking out device (not available with YU)

Standard features – manually operated switches

Fixed part

- Safety shutters
- Rear horizontal terminals except where noted
- Sliding contacts
- Anti-insertion lock
- Ground connection

Neutral pole rating (Standard)

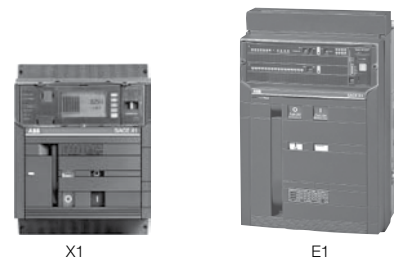
- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

⊕ Special 100% neutral pole rating available.

Selection guide IEC Circuit breakers

Common data

Voltages			
Rated service voltage	U_e	[V]	690 ~
Rated insulation voltage	U_i	[V]	1000
Rated impulse withstand voltage	U_{imp}	[kV]	12
Service temperature		[°C]	-25...+70 ①
Storage temperature		[°C]	-40...+70
Frequency	f	[Hz]	50-60
Number of poles			3-4
Version			Fixed-Withdrawable



X1

E1

Levels of performance	X1			E1				
	B	N	L	B	N			
Currents: rated uninterrupted current (at 40 °C)	I_u	[A]	630	630	630	800	800	
		[A]	800	800	800	1000	1000	
		[A]	1000	1000	1000	1250	1250	
		[A]	1250	1250	1250	1600	1600	
		[A]	1600	1600	-	-	-	
		[A]	-	-	-	-	-	
Current carrying capacity of neutral pole for 4-pole cbs		[% I_u]	100	100	100	100	100	
Rated ultimate short-circuit breaking capacity	I_{cu}	220/230/380/400/415 V~	[kA]	42	65	150	42	50
		440 V~	[kA]	42	65	130	42	50
		500/525 V~	[kA]	42	50	100	42	50
		660/690 V~	[kA]	42	50	60	42	50
			[kA]	42	50	150	42	50
Rated service short-circuit breaking capacity	I_{cs}	220/230/380/400/415 V~	[kA]	42	50	130	42	50
		440 V~	[kA]	42	50	100	42	50
		500/525 V~	[kA]	42	42	45	42	50
		660/690 V~	[kA]	42	42	15	42	50
			[kA]	42	42	36	36	36
Rated short/time withstand current	I_{cw}	(1s)	[kA]	88.2	143	330	88.2	105
		(3s)	[kA]	88.2	143	286	88.2	105
			[kA]	88.2	121	220	88.2	105
			[kA]	88.2	121	132	88.2	105
			[kA]	88.2	121	132	88.2	105
Rated making capacity in short-circuit (peak value)	I_{cm}	220/230/380/400/415 V~	[kA]	88.2	143	330	88.2	105
		440 V~	[kA]	88.2	143	286	88.2	105
		500/525 V~	[kA]	88.2	121	220	88.2	105
		660/690 V~	[kA]	88.2	121	132	88.2	105
Category of use	CEI EN 60947-2		B	B	A	B	B	
Isolation behavior	CEI EN 60947-2		•	•	•	•	•	
Overcurrent protection								
Electronic releases for applications in AC			•	•	•	•	•	
Operating times								
Closing time (max)		[ms]	80	80	80	80	80	
Breaking time for $I < I_{cw}$ (max) ②		[ms]	70	70	70	70	70	
Breaking time for $I > I_{cw}$ (max)		[ms]	30	30	12	30	30	
Overall dimensions								
Fixed: H = 418 mm - D = 302 mm	L	(3/4 poles)	[mm]	H=268 mm - D=181 mm - L(3/4)=210/280			296/386	
Withdrawable: H = 461 mm - D = 396.5 mm	L	(3/4 poles)	[mm]	H=343 mm - D=254 mm - L(3/4)=284/354			324/414	
Weights (circuit-breaker complete with releases and CT, accessories excluded)								
Fixed 3/4 poles		[kg]	11/14	11/14	11/14	45/54	45/54	
Withdrawable 3/4 poles (including the fixed part)		[kg]	32/42.6	32/42.6	32/42.6	70/82	70/82	

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			X1 B	X1 N	X1 L	E1 B-N		
Rated uninterrupted current (at 40 °C)	I_u	[A]	800	1250	1600	800	1000/1250	1600
Mechanical life with regular ordinary maintenance		[No. operations x 1000]	12.5	12.5	12.5	25	25	25
Frequency of operations		[Operations/hour]	60	60	60	60	60	60
Electrical life	(440 V ~)	[No. operations x 1000]	6	4	3	10	10	10
	(690 V ~)	[No. operations x 1000]	3	2	1	10	8	8
Frequency of operations		[Operations/hour]	30	30	30	30	30	30

① For special Emax low temperature breakers (-40°C), consult factory.
② Without intentional delays.

Selection guide IEC Circuit breakers

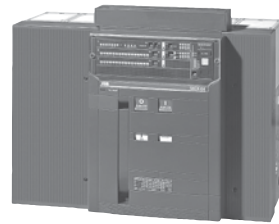
Emax
Power breakers



E2



E3



E4



E6

E2				E3					E4			E6		
B	N	S	L	N	S	H	V	L	S	H	V	H	V	
1600	1000	800	1250	2500	1000	800	800	2000	4000	3200	3200	4000	4000	
2000	1250	1000	1600	3200	1250	1000	1250	2500	-	4000	4000	5000	5000	
-	1600	1250	-	-	1600	1250	1600	-	-	-	-	6300	6300	
-	2000	1600	-	-	2000	1600	2000	-	-	-	-	-	-	
-	-	2000	-	-	2500	2000	2500	-	-	-	-	-	-	
-	-	-	-	-	3200	2500	3200	-	-	-	-	-	-	
-	-	-	-	-	-	3200	-	-	-	-	-	-	-	
100	100	100	100	100	100	100	100	100	50	50	50	50	50	
42	65	85	130	65	75	100	130	130	75	100	150	100	150	
42	65	85	110	65	75	100	130	110	75	100	150	100	150	
42	55	65	85	65	75	85	100	85	75	100	130	100	130	
42	55	65	85	65	75	85	100	85	75	85	100	100	100	
42	65	85	130	65	75	85	100	130	75	100	125	100	125	
42	65	85	110	65	75	85	100	110	75	100	125	100	125	
42	55	65	65	65	75	85	85	65	75	100	130	100	100	
42	55	65	65	65	75	85	85	65	75	85	100	100	100	
42	55	65	10	65	75	75	85	15	75	100	100	100	100	
42	42	42	-	65	65	65	65	-	75	75	75	85	85	
88.2	143	187	286	1143	165	220	286	286	165	220	330	220	330	
88.2	143	187	252	143	165	220	286	286	165	220	330	220	330	
88.2	121	143	187	143	165	187	220	187	165	220	286	220	286	
88.2	121	143	187	143	165	187	220	187	165	187	220	220	220	
B	B	B	A	B	B	B	B	A	B	B	B	B	B	
•	•	•	•	•	•	•	•	•	•	•	•	•	•	
•	•	•	•	•	•	•	•	•	•	•	•	•	•	
80	80	80	80	80	80	80	80	80	80	80	80	80	80	
70	70	70	70	70	70	70	70	70	70	70	70	70	70	
30	30	30	12	30	30	30	30	12	30	30	30	30	30	
296/386				404/530					566/656			782/908		
324/414				432/558					594/684			810/936		
50/61	50/61	50/61	52/63	66/80	66/80	66/80	66/80	72/83	97/117	97/117	97/117	140/160	140/160	
78/93	78/93	78/93	80/95	104/125	104/125	104/125	104/125	110/127	147/165	147/165	147/165	210/240	210/240	

E2 B-N-S				E2 L		E3 N-S-H-V							E3 L		E4 S-H-V				
800	1000	1600	2000	1250	1600	800	1000	1600	2000	2500	3200	3200	2000	2500	3200	4000	4000	5000	6300
25	25	25	25	20	20	20	20	20	20	20	20	20	15	15	15	15	12	12	12
60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
12	15	12	10	4	3	12	12	10	9	8	6	6	2	1.8	7	5	4	3	2
12	15	10	8	3	2	12	12	10	9	7	5	5	1.5	1.3	7	4	4	2	1.5
30	30	30	30	20	20	20	20	20	20	20	20	20	20	20	10	10	10	10	10

Circuit breakers for specific applications IEC 6097-2

	X1	E1	E2
--	----	----	----

Circuit-breakers with full section neutral conductor

Poles	[No]	Standard version	Standard version	Standard version
Current carrying capacity of the neutral of 4p circuit-breakers	[% I _u]			
I _u (40 °C)	[A]			
U _e	[V~]			
I _{cu} (220...415 V)	[kA]			
I _{cs} (220...415 V)	[kA]			
I _{cw} (1s)	[kA]			
I _{cw} (3s)	[kA]			

Switch-disconnectors

		X1B/MS	E1B/MS	E1N/MS	E2B/MS	E2N/MS	E2S/MS
Poles	[No]	3-4	3-4	3-4	3-4	3-4	3-4
I _u (40 °C)	[A]	1000-1250-1600	800-1000-1250-1600	800-1000-1250-1600	1600-2000	1000-1250-1600-2000	1000-1250-1600-2000
U _e	[V~]	690	690	690	690	690	690
I _{cw} (1s)	[kA]	42	42	50	42	42	42
I _{cw} (3s)	[kA]	-	36	36	42	42	42
I _{cm} (220...440 V)	[kA]	88.2	88.2	105	88.2	121	143

Circuit-breakers for applications up to 1150 V AC

		X1B/E		E2B/E	E2N/E
Poles	[No]	3-4		3-4	3-4
I _u (40 °C)	[A]	630-800-1000-1250-1600		1600-2000	1250-1600-2000
U _e	[V~]	1150		1150	1150
I _{cu} (1150 V)	[kA]	25		20	30
I _{cs} (1150 V)	[kA]	20		20	30
I _{cw} (1s)	[kA]	25		20	30

Switch-disconnectors for applications up to 1150 V AC

		X1B/E MS		E2B/E MS	E2N/E MS
Poles	[No]	3-4		3-4	3-4
I _u (40 °C)	[A]	1000-1250-1600		1600-2000	1250-1600-2000
U _e	[V~]	1150		1150	1150
I _{cw} (1s)	[kA]	25		20	30
I _{cm} (1150 V)	[kA]	52.5		40	63

Isolating truck

			E1 CS	E2 CS
I _u (40 °C)	[A]		1250	2000

Earthing switch with making capacity

			E1 MTP	E2 MTP
I _u (40 °C)	[A]		1250	2000

18 Earthing truck

			E1 MTP	E2 MT
I _u (40 °C)	[A]		1250	2000

(*) The performance at 1000 V is 50 kA

Circuit breakers for specific applications IEC 6097-2

Emax
Power breakers

E3			E4			E6	
			E4S/f 4 100	E4H/f 4 100		E6H/f 4 100	
			4000	3200-4000		4000-5000-6300	
			690	690		690	
			80	100		100	
			80	100		100	
			80	85		100	
			75	75		100	
E3N/MS 3-4 2500-3200	E3S/MS 3-4 1000-1250-1600- 2000-2500-3200	E3V/MS 3-4 800-1250-1600- 2000-2500-3200	E4S/MS 3-4 4000	E4H/MS 3-4 3200-4000	E4H/f MS 4 3200-4000	E6H/MS 3-4 4000-5000-6300	E6H/f MS 4 4000-5000-6300
690	690	690	690	690	690	690	690
65	75	85	75	100	85	100	100
65	65	65	75	75	75	85	85
143	165	187	165	220	187	220	220
	E3H/E 3-4 1250-1600-2000- 2500-3200			E4H/E 3-4 3200-4000		E6H/E 3-4 4000-5000-6300	
	1150			1150		1150	
	30			65		65	
	30			65		65	
	30(*)			65		65	
	E3H/E MS 3-4 1250-1600-2000- 2500-3200			E4H/E MS 3-4 3200-4000		E6H/E MS 3-4 4000-5000-6300	
	1150			1150		1150	
	30			65		65	
	63			143		143	
	E3 CS 3200			E4 CS 4000		E6 CS 6300	
	E3 MTP 3200			E4 MTP 4000		E6 MTP 6300	
	E3 MT 3200			E4 MT 4000		E6 MT 6300	

Fixed breakers

3 & 4 pole

IEC

3 Pole

IEC	Frame Amps	Interrupting Ratings kA, 415V
E1B	800	42
E1N	800	50
E2S	800	85
E3H	800	100
E3V	800	130
E1B	1000	42
E1N	1000	50
E2N	1000	65
E2S	1000	85
E3S	1000	75
E3H	1000	100
E1B	1250	42
E1N	1250	50
E2N	1250	65
E2S	1250	85
E2L	1250	130
E3S	1250	75
E3H	1250	100
E3V	1250	130
E1B	1600	42
E1N	1600	50
E2B	1600	42
E2N	1600	65
E2S	1600	85
E2L	1600	130
E3S	1600	75
E3H	1600	100
E3V	1600	130
E2B	2000	42
E2N	2000	65
E2S	2000	85
E3S	2000	75
E3H	2000	100
E3V	2000	130
E3L	2000	130
E3N	2500	65
E3S	2500	75
E3H	2500	100
E3V	2500	130
E3L	2500	130
E3N	3200	65
E3S	3200	75
E3H	3200	100
E3V	3200	130
E4H	3200	100
E4V	3200	150
E4S	4000	75
E4H	4000	85
E4V	4000	100
E6H	4000	100
E6V	4000	150
E6H	5000	100
E6V	5000	150
E6H	6300	100
E6V	6300	150

4 Pole

IEC	Frame Amps	Interrupting Ratings kA, 415V
E1B	800	42
E1N	800	50
E2S	800	85
E3H	800	100
E3V	800	130
E1B	1000	42
E1N	1000	50
E2N	1000	65
E2S	1000	85
E3S	1000	75
E3H	1000	100
E1B	1250	42
E1N	1250	50
E2N	1250	65
E2S	1250	85
E2L	1250	130
E3S	1250	75
E3H	1250	100
E3V	1250	130
E1B	1600	42
E1N	1600	50
E2B	1600	42
E2N	1600	65
E2S	1600	85
E2L	1600	130
E3S	1600	75
E3H	1600	100
E3V	1600	130
E2B	2000	42
E2N	2000	65
E2S	2000	85
E3S	2000	75
E3H	2000	100
E3V	2000	130
E3L	2000	130
E3N	2500	65
E3S	2500	75
E3H	2500	100
E3V	2500	130
E3L	2500	130
E3N	3200	65
E3S	3200	75
E3H	3200	100
E3V	3200	130
E4H	3200	100
E4V	3200	150
E4S	4000	75
E4H	4000	85
E4V	4000	100
E6H	4000	100
E6V	4000	150
E6H	5000	100
E6V	5000	150
E6H	6300	100
E6V	6300	150

Standard features – manually operated breaker

Fixed breaker

- Rear horizontal terminals
- PR121 trip unit with LI protection functions
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- 2NO & 2NC auxiliary contacts for open-closed position indication
- Lifting plates
- Current transformers
- Terminal box

Neutral pole rating (Standard)

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

⓪ Special 100% neutral pole rating available.

Withdrawable breakers 3 & 4 pole IEC

3 Pole

IEC	Frame Amps	Interrupting Ratings kA, 415V
E1B	800	42
E1N	800	50
E2S	800	85
E3H	800	100
E3V	800	130
<hr/>		
E1B	1000	42
E1N	1000	50
E2N	1000	65
E2S	1000	85
E3S	1000	75
E3H	1000	100
<hr/>		
E1B	1250	42
E1N	1250	50
E2N	1250	65
E2S	1250	85
E2L	1250	130
E3S	1250	75
E3H	1250	100
E3V	1250	130
<hr/>		
E1B	1600	42
E1N	1600	50
E2B	1600	42
E2N	1600	65
E2S	1600	85
E2L	1600	130
E3S	1600	75
E3H	1600	100
E3V	1600	130
<hr/>		
E2B	2000	42
E2N	2000	65
E2S	2000	85
E3S	2000	75
E3H	2000	100
E3V	2000	130
E3L	2000	130
<hr/>		
E3N	2500	65
E3S	2500	75
E3H	2500	100
E3V	2500	130
E3L	2500	130
<hr/>		
E3N	3200	65
E3S	3200	75
E3H	3200	100
E3V	3200	130
E4H	3200	100
E4V	3200	150
<hr/>		
E4S	4000	75
E4H	4000	85
E4V	4000	100
E6H	4000	100
E6V	4000	150
<hr/>		
E6H	5000	100
E6V	5000	150
<hr/>		
E6H	6300	100
E6V	6300	150

4 Pole

IEC	Frame Amps	Interrupting Ratings kA, 415V
E1B	800	42
E1N	800	50
E2S	800	85
E3H	800	100
E3V	800	130
<hr/>		
E1B	1000	42
E1N	1000	50
E2N	1000	65
E2S	1000	85
E3S	1000	75
E3H	1000	100
<hr/>		
E1B	1250	42
E1N	1250	50
E2N	1250	65
E2S	1250	85
E2L	1250	130
E3S	1250	75
E3H	1250	100
E3V	1250	130
<hr/>		
E1B	1600	42
E1N	1600	50
E2B	1600	42
E2N	1600	65
E2S	1600	85
E2L	1600	130
E3S	1600	75
E3H	1600	100
E3V	1600	130
<hr/>		
E2B	2000	42
E2N	2000	65
E2S	2000	85
E3S	2000	75
E3H	2000	100
E3V	2000	130
E3L	2000	130
<hr/>		
E3N	2500	65
E3S	2500	75
E3H	2500	100
E3V	2500	130
E3L	2500	130
<hr/>		
E3N	3200	65
E3S	3200	75
E3H	3200	100
E3V	3200	130
E4S	3200	75
E4H	3200	100
E4V	3200	150
<hr/>		
E4S	4000	75
E4H	4000	85
E4V	4000	100
E6H	4000	100
E6V	4000	150
<hr/>		
E6H	5000	100
E6V	5000	150
<hr/>		
E6H	6300	100
E6V	6300	150

Standard features – electrically operated breaker

Moving part

- PR121 trip unit with LI protection functions
- Spring charging motor
- Shunt trip
- Closing coil
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- 2NO & 2NC auxiliary contacts for open-closed position indication
- Lifting plates
- Current transformers
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts

⓪ Special 100% neutral pole rating available.

Standard features – electrically operated breaker

Fixed part

- Safety shutters
- Rear horizontal terminals
- Sliding contacts
- Anti-insertion lock
- Ground connection

Neutral pole rating (Standard)

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

Non-automatic switches

Fixed switches (Without trip unit & c.t.s.), 3 & 4 pole

IEC

3 Pole

IEC	Frame Amps	Rated Short Time Current, kA
E1B	800	42
E1N	800	50
E3V	800	85
E1B	1000	42
E1N	1000	50
E2N	1000	55
E2S	1000	65
E3S	1000	75
E1B	1250	42
E1N	1250	50
E2N	1250	55
E2S	1250	65
E3S	1250	75
E3V	1250	85
E1B	1600	42
E1N	1600	50
E2B	1600	42
E2N	1600	55
E2S	1600	65
E3S	1600	75
E3V	1600	85
E2B	2000	42
E2N	2000	55
E2S	2000	65
E3S	2000	75
E3V	2000	85
E3N	2500	65
E3S	2500	75
E3V	2500	85
E3N	3200	65
E3S	3200	75
E3V	3200	85
E4H	3200	100
E4S	4000	75
E4H	4000	100
E6H	4000	100
E6H	5000	100
E6H	6300	100

4 Pole

IEC	Frame Amps	Rated Short Time Current, kA
E1B	800	42
E1N	800	50
E3V	800	85
E1B	1000	42
E1N	1000	50
E2N	1000	55
E2S	1000	65
E3S	1000	75
E1B	1250	42
E1N	1250	50
E2N	1250	55
E2S	1250	65
E3S	1250	75
E3V	1250	85
E1B	1600	42
E1N	1600	50
E2B	1600	42
E2N	1600	55
E2S	1600	65
E3S	1600	75
E3V	1600	85
E2B	2000	42
E2N	2000	55
E2S	2000	65
E3S	2000	75
E3V	2000	85
E3N	2500	65
E3S	2500	75
E3V	2500	85
E3N	3200	65
E3S	3200	75
E3V	3200	85
E4H ⊕	3200	100
E4S	4000	75
E4H	4000	100
E4H ⊕	4000	85
E6H ⊕	4000	100
E6H ⊕	5000	100
E6H ⊕	6300	100

Standard features – manually operated switch

- Rear horizontal terminals
- Manual mechanical close and open pushbuttons
- Circuit breaker open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Terminal box

Neutral pole rating (Standard)

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

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⊕ Special 100% neutral pole rating available.

Non-automatic switches

Withdrawable switches (Without trip unit & c.t.s.), 3 & 4 pole

IEC

3 Pole

IEC	Frame Amps	Rated Short Time Current, kA
E1B	800	42
E1N	800	50
E3V	800	85
E1B	1000	42
E1N	1000	50
E2N	1000	55
E2S	1000	65
E3S	1000	75
E1B	1250	42
E1N	1250	50
E2N	1250	55
E2S	1250	65
E3S	1250	75
E3V	1250	85
E1B	1600	42
E1N	1600	50
E2B	1600	42
E2N	1600	55
E2S	1600	65
E3S	1600	75
E3V	1600	85
E2B	2000	42
E2N	2000	55
E2S	2000	65
E3S	2000	75
E3V	2000	85
E3N	2500	65
E3S	2500	75
E3V	2500	85
E3N	3200	65
E3S	3200	75
E3V	3200	85
E4H	3200	100
E4S	4000	75
E4H	4000	100
E6H	4000	100
E6H	5000	100
E6H	6300	100

4 Pole

IEC	Frame Amps	Rated Short Time Current, kA
E1B	800	42
E1N	800	50
E3V	800	85
E1B	1000	42
E1N	1000	50
E2N	1000	55
E2S	1000	65
E3S	1000	75
E1B	1250	42
E1N	1250	50
E2N	1250	55
E2S	1250	65
E3S	1250	75
E3V	1250	85
E1B	1600	42
E1N	1600	50
E2B	1600	42
E2N	1600	55
E2S	1600	65
E3S	1600	75
E3V	1600	85
E2B	2000	42
E2N	2000	55
E2S	2000	65
E3S	2000	75
E3V	2000	85
E3N	2500	65
E3S	2500	75
E3V	2500	85
E3N	3200	65
E3S	3200	75
E3V	3200	85
E4H ⊕	3200	100
E4S	4000	75
E4H	4000	100
E4H ⊕	4000	85
E6H ⊕	4000	100
E6H ⊕	5000	100
E6H ⊕	6300	100

Standard features – manually operated switch

Moving part

- Manual mechanical close and open pushbuttons
- Circuit breaker open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts

Standard features – manually operated switch

Fixed part

- Safety shutters
- Rear horizontal terminals
- Sliding contacts
- Anti-insertion lock
- Ground connection

Neutral pole rating (Standard)

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

⊕ Special 100% neutral pole rating available.

Notes



Emax DC

The Emax range of low voltage circuit breakers is completed by the new Emax DC series of circuit breakers for direct current applications complying with the UL1066 and IEC 50947-2 standards. Thanks to the exclusive technology applied to the new PR122/DC and PR123/DC trip units, the Emax DC range allow all installation requirements to be met and protection up to 600V DC / 5000A (UL only) and 1000V DC / 5000A (IEC only).

Catalog reference:

UL Technical catalog available Q1 2013.

IEC Technical catalog 1SDC200012D0202

Ordering technical catalogs

To order the above referenced catalogs, visit our web site at:

www.abbnw.com/PublicSite/home/LiteratureResources.htm

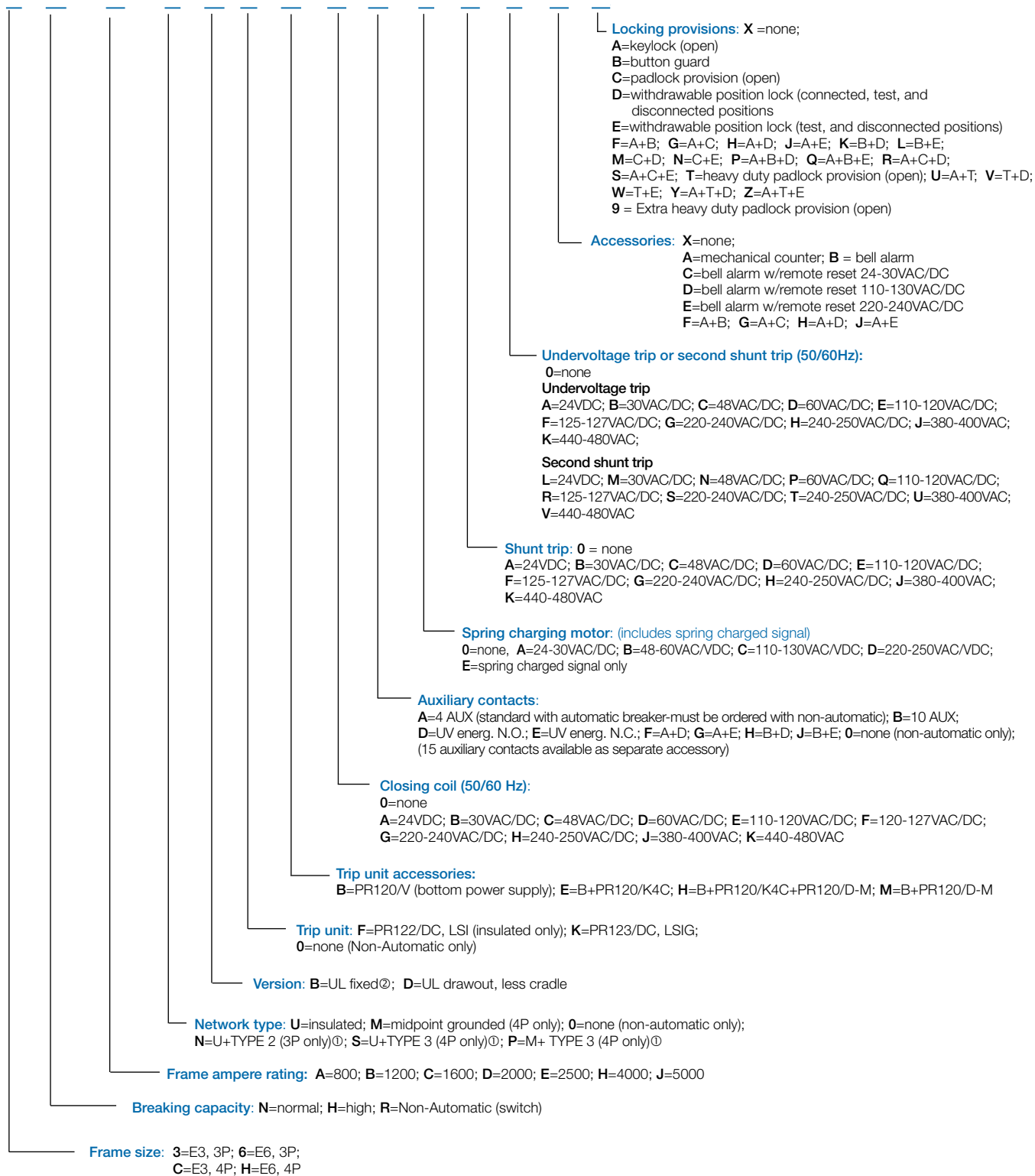
Emax DC Power breakers

General information

Catalog number explanation

Emax DC breaker (UL only)

M



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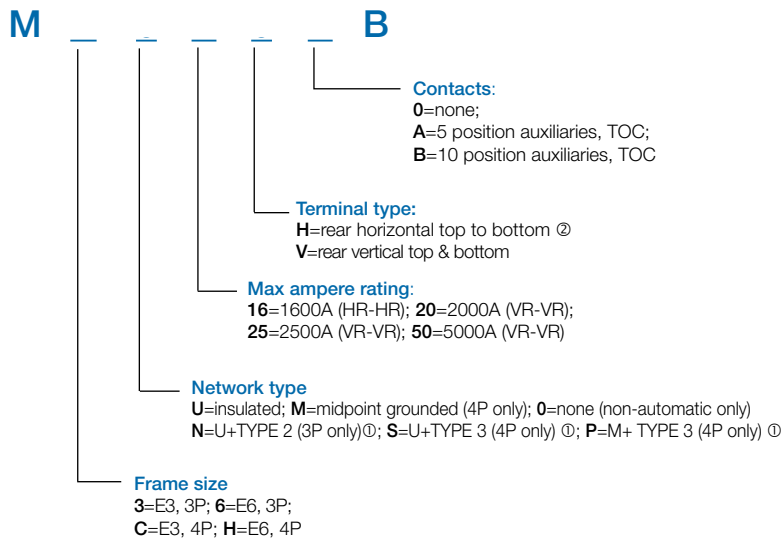
Ⓛ For network type explanation, see page 18.30.

Ⓛ Horizontal terminals are standard up to 1600A for automatic and non-automatic circuit breakers; for vertical terminals, see page 18.44 for conversion kit.

General information

Catalog number explanation

Emax DC cradle (UL only)



① For network type explanation, see page 18.30.
 ② Available as E3 up to 1600A.

Selection guide

Emax DC UL circuit breakers

Common data

Voltages		
Rated service voltage U_e	V-	600
Rated insulation voltage U_i	V	600
Rated impulse withstand voltage U_{imp}	kV	12
Operating temperature	°C	-25...+70
Storage temperature	°C	-40...+70
Number of poles		3 - 4
Versions		Fixed - withdrawable



		E3		E6	
		N-A/DC		H-A/DC	
Levels of performance					
Frame size I_u	A	800			
	A	1200			
	A	1600			
	A	2000			
	A	2500			
	A	-		4000	
	A	-		5000	
Rated short circuit					
@ 600 V DC (3p)	kA	60		65	
@ 600 V DC (4p)	kA	60		65	
Rated short-time current (0.5 sec)	kA	60		65	
Rated short-time current (0.4 sec) ①	kA	60		-	
Trip times					
Make time (max)	ms	80		80	
Break time (max)	ms	60		60	
Overall dimensions					
Fixed: H=418 mm/16.46 in; D=302 mm/11.89 in.					
W (3/4 poles)	mm	404/530		782/908	
W (3/4 poles)	in	15.91/20.82		30.79/35.78	
Withdrawable: H=461 mm/18.15 in - D=396.5 mm/15.61 in					
W (3/4 poles)	mm	432/558		810/936	
W (3/4 poles)	in	17.01/21.97		31.89/36.85	
Weights					
Fixed					
3/4 poles	kg	66/80		140/160	
3/4 poles	lbs	145/176		308/353	
Withdrawable					
3/4 poles (including the fixed part)	kg	104/125		210/240	
3/4 poles (including the fixed part)	lbs	229/275		463/529	

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		E3				E6	
	I_u	800 1200	1600	2000	2500	4000	5000
Life with regular maintenance	No. of operations						
Mechanical	x 1000	20	20	20	20	12	12
Electrical, 600 VDC	x 1000	12	10	9	7	4	2

① Without intentional delays.

Non-automatic switches Emax DC UL

The Emax DC UL MS range of switch-disconnectors make it possible to cover any installation requirement up to 600 V DC / 5000A. They are particularly switchable for use as bus-ties or main switch disconnectors in direct current plants.

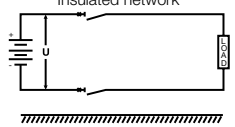
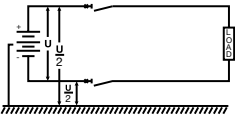
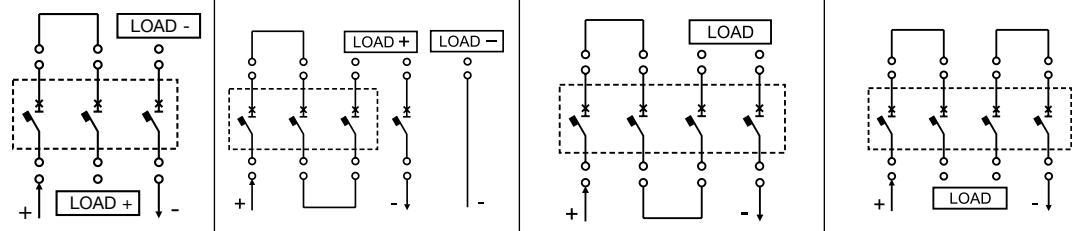
The switch-disconnectors are available in both three-pole and four-pole fixed and drawout versions. They maintain all the overall dimensions and fixing points of the standard circuit breaker.

The switch-disconnectors share the same accessories as the circuit breaker, with the only difference the absence of the trip unit.

		E3N-A/DC MS		E6H-A/DC MS	
Rated current (@ 40°C) I_U	A	800	–	–	–
	A	1200	–	–	–
	A	1600	–	–	–
	A	2000	–	–	–
	A	2500	–	–	–
	A	–	–	4000	–
	A	–	–	–	5000
	A	–	–	–	–
Poles		3	4	3	4
Rated service voltage U_g	V	600	600	600	600
Rated short-time current I_{cw} (0.5s) ①	kA	60	60	65	65
Rated making capacity I_{cm}	% I_{cw}	100	100	100	100

① 0.4s only for E3 800.

Type of network Emax DC UL

	E3 & E6 3 poles	E3 & E6 3 poles	E3 & E6 4 poles	E3 & E6 4 poles
Positive polarity	2 poles in series	3 poles in series	3 poles in series	2 poles in series
Negative polarity	1 pole	-	1 pole	2 poles in series
Insulated network 	✓	✓	✓	✓
Network with the mid-point earthed 			✓	✓
	Type 1	Type 2	Type 3	Type 4
Connection diagram 				

Versions and connections Emax DC UL

Emax DC circuit breakers are available in the fixed or withdrawable and in the three pole or four pole versions. Emax DC UL circuit breakers use several poles in series to break the fault. Special connection busbars, known as "U connections", are mounted on the circuit breaker terminals in order to complete the connections.

The power supply availability is from lower terminals only.

The standard connection for 3 pole breakers is 2 poles in series plus 1 pole and the standard connection for 4 pole breakers is 2 poles in series plus 2 poles in series. Connection of 3 poles in series for 3 pole breakers and 3 poles in series plus 1 pole for 4 pole breakers is available as a special option.

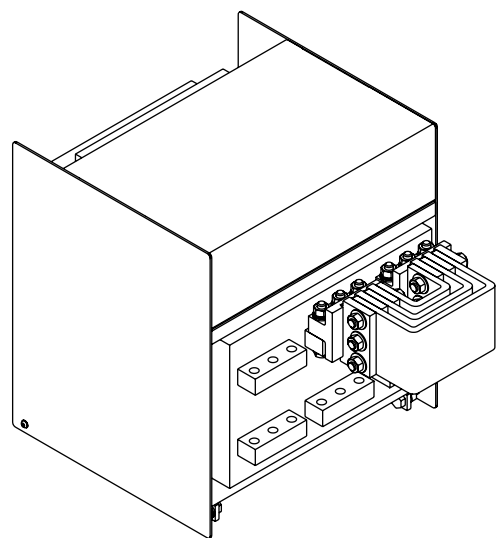
The fixed portions (cradle) of the circuit breakers are fitted with different terminals according to the frame of the circuit breaker.

Below is a table regarding the terminal type of the circuit breakers.

CB Type	Terminal type
E3N-A/DC 800	Horizontal or vertical
E3N-A/DC 1200	Horizontal or vertical
E3N-A/DC 1600	Horizontal or vertical
E3N-A/DC 2000	Vertical
E3N-A/DC 2500	Extended vertical + heat sink
E6H-A/DC 4000	Extended vertical + heat sink
E6H-A/DC 5000	Extended vertical + heat sink

Withdrawable circuit breaker

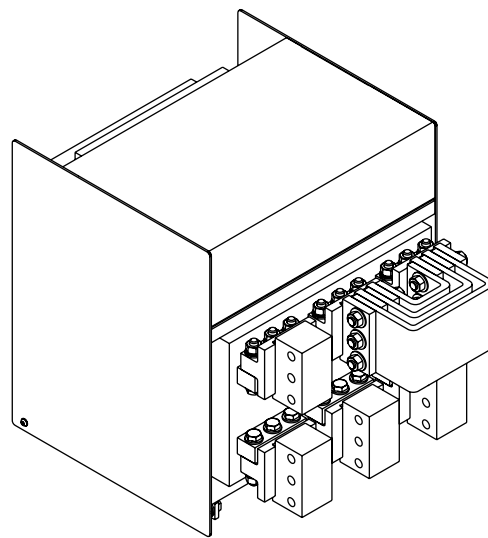
Horizontal rear terminals



Power supply from
lower terminals

Withdrawable circuit breaker

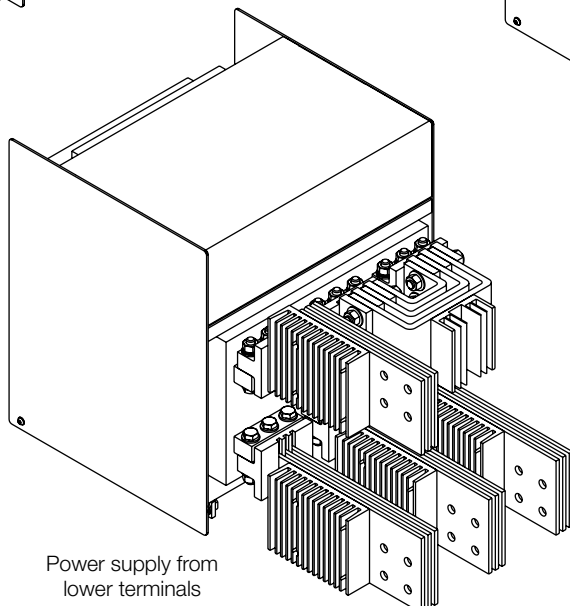
Vertical rear terminals



Power supply from
lower terminals

Withdrawable circuit breaker

Extended vertical rear terminals



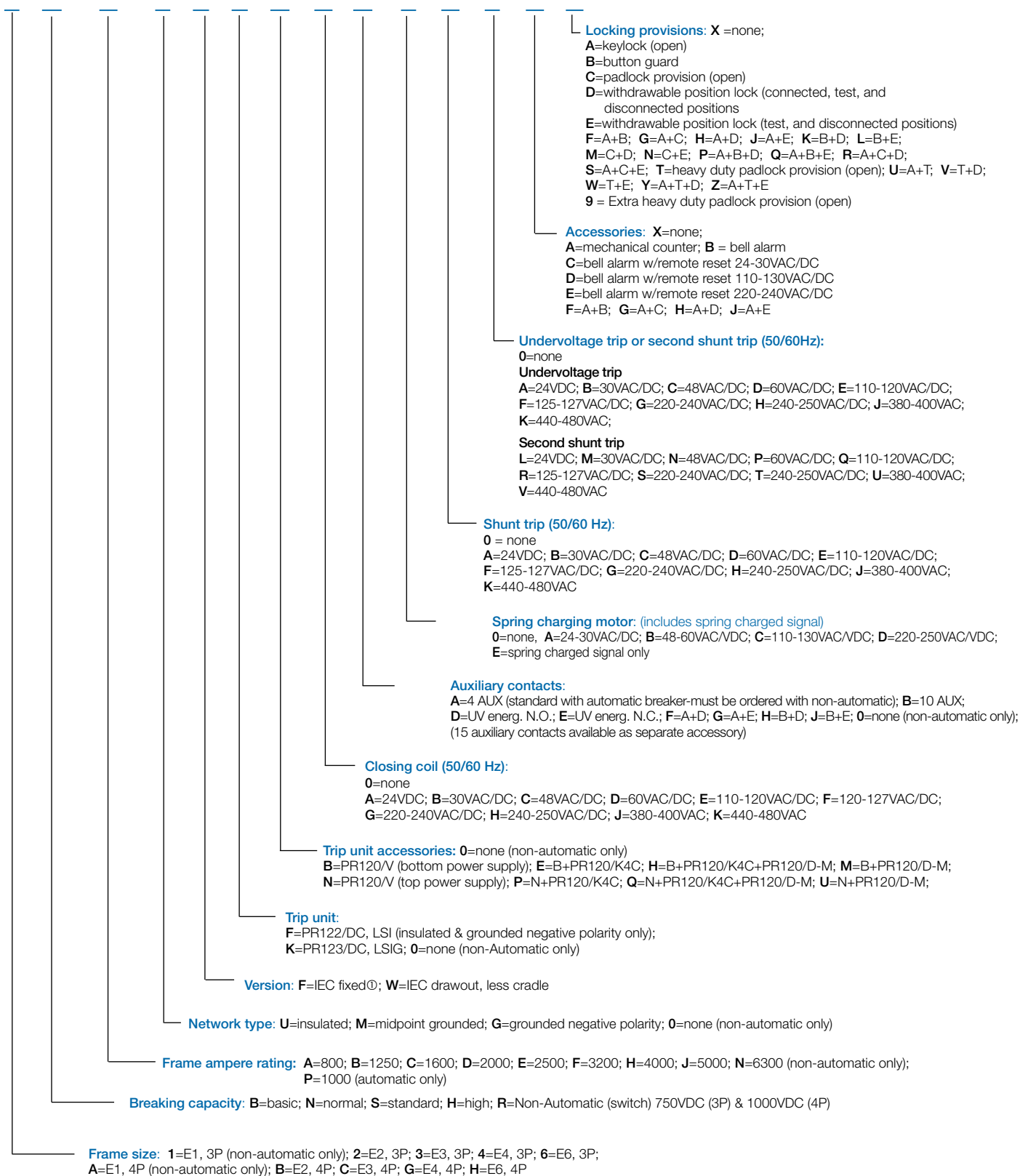
Power supply from
lower terminals

General information

Catalog number explanation

Emax DC breaker (IEC only)

B



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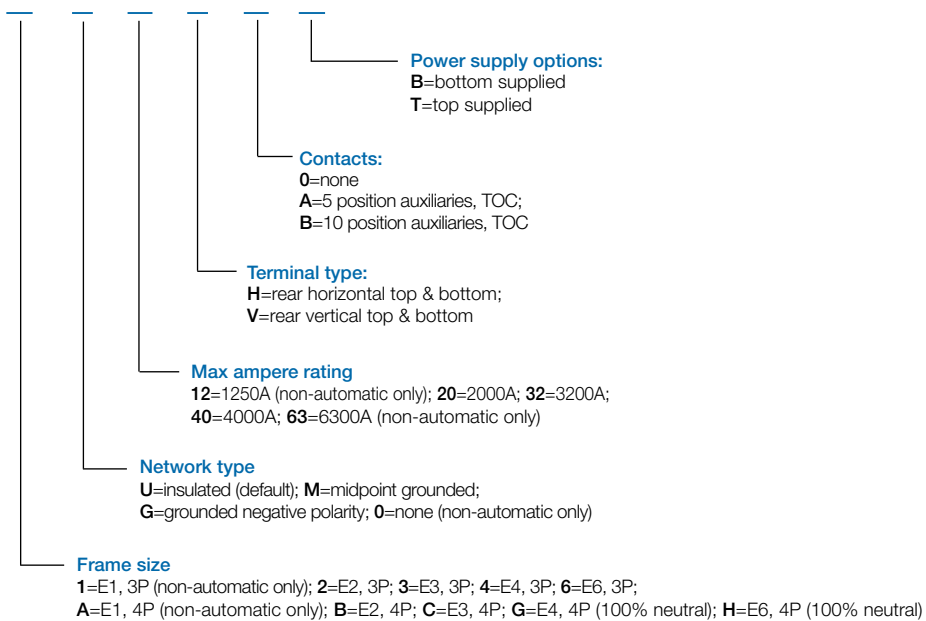
⓪ Fixed version is supplied with vertical terminals for automatic circuit breaker and with horizontal terminals for non-automatic circuit breakers.
NOTE: For network type explanation, see page 18.36.

General information

Catalog number explanation

Emax DC cradle (IEC only)

B



Selection guide

Emax DC IEC circuit breakers

Common data

Voltages		
Rated service voltage U_e	V-	1000
Rated insulation voltage U_i	V	1000
Rated impulse withstand voltage U_{imp}	kV	12
Operating temperature	°C	-25...+70
Storage temperature	°C	-40...+70
Number of poles		3 - 4
Versions		Fixed - withdrawable



		E2		E3			E4		E6	
		B	N	N	H	S	H	H		
Levels of performance										
Rated uninterrupted current (at 40°C) I_u	A	800	-	800	-	-	-	-	-	-
	A	1000	-	1000	-	-	-	-	-	-
	A	1250	-	1250	-	-	-	-	-	-
	A	1600	1600	1600	1600	1600	-	-	-	-
	A	-	-	2000	2000	2000	-	-	-	-
	A	-	-	2500	2500	2500	-	-	-	-
	A	-	-	-	-	3200	3200	-	-	3200
	A	-	-	-	-	-	-	-	-	4000
	A	-	-	-	-	-	-	-	-	5000
Rated service short circuit breaking current I_{cs}	% I_{cu}	kA	100%	100%	100%	100%	100%	100%	100%	100%
Rated short time withstand current I_{cw} (0.5s)										
@ 500 V DC (3p)	kA	35	50	60	65	75	100	100	100	100
@ 750 V DC (3p)	kA	25	25	40	40	65	65	65	65	65
@ 750 V DC (4p)	kA	25	40	50	50	65	65	65	65	65
@ 1000 V DC (4p)	kA	25	25	35	40	50	65	65	65	65
Rated short circuit making current I_{cm}	% I_{cu}	kA	100%	100%	100%	100%	100%	100%	100%	100%
Category of use (according to CEI EN 60947-2)			B	B	B	B	B	B	B	B
Isolation behavior (according to CEI EN 60947-2)			■	■	■	■	■	■	■	■
Overcurrent protection										
Electronic trip units for DC applications			■	■	■	■	■	■	■	■
Operating times										
Closing time (max)	ms	80	80	80	80	80	80	80	80	80
Breaking time for $I > I_{cw}$ (max) ①	ms	60	60	60	60	60	60	60	60	60
Overall dimensions										
Fixed: H=418 mm D=302 mm W (3/4 poles)	mm	296/386	296/386	404/530	404/530	566/656	566/656	782/908		
Withdrawable: H=451 mm D=396.5 mm W (3/4 poles)	mm	324/414	324/414	432/558	432/558	594/684	594/684	610/936		
Weights										
Fixed 3/4 poles	kg	50/61	50/61	66/80	66/80	97/117	97/117	140/160		
Withdrawable 3/4 poles (including the fixed part)	kg	50/61	50/61	66/80	66/80	147/165	147/165	210/240		

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		E2		E3			E4		E6				
		800	1600	800	1600	2000	2500	1600	2000	2500	3200	4000	5000
I_u		1000	1250	1000	1250								
Life with regular maintenance	No. of operations												
Mechanical	x 1000	25	25	20	20	20	20	15	15	15	12	12	12
Electrical, 1000 VDC	x 1000	15	10	12	10	9	7	7	7	7	5	4	2

① Without intentional delays.

Non-automatic switches Emax DC IEC

The Emax DC IEC MS range of switch-disconnectors make it possible to cover any installation requirements up to 1000 V DC/6300A.

The switch disconnectors are available in both three-pole and four-pole fixed and drawout versions. They maintain all the overall dimensions and fixing points of the standard breaker. The drawout circuit breakers must be associated with the fixed parts in a special version for applications at 750/1000V DC.

The switch-disconnectors share the same accessories as the circuit breaker, with the only difference being the absence of the trip unit.

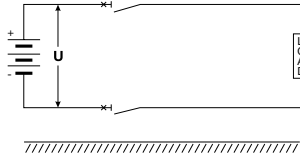
		E1B/E MS		E2N/E MS		E3H/E MS		E4H/E MS		E6H/E MS	
Rated current (@ 40°C) I_N	A	800		1250		1250		3200		5000	
	A	1250		1600		1600		4000		6300	
	A	-		2000		2000		-		-	
	A	-		-		2500		-		-	
	A	-		-		3200		-		-	
Poles		3	4	3	4	3	4	3	4	3	4
Rated service voltage U_s	V	750	1000	750	1000	750	1000	750	1000	750	1000
Rated insulation voltage U_i	V	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Rated impulse withstand voltage U_{imp}	kV	12	12	12	12	12	12	12	12	12	12
Rated short time withstand current I_{cw} (1s)	kA	20	20 [Ⓞ]	25	25 [Ⓞ]	40	40 [Ⓞ]	65	65	65	65
Rated making current I_{cm}	% I_{cw}	100	100	100	100	100	100	100	100	100	100

NOTE: By means of an extreme protection relay with maximum timing of 500 ms, the I_{cu} breaking current is the same as the I_{cw} value (1s).

Ⓞ The performance at 750 V are:
for E1B/E MS I_{cw} =25kA
for E2N/E MS I_{cw} =40kA
for E3H/E MS I_{cw} =50kA

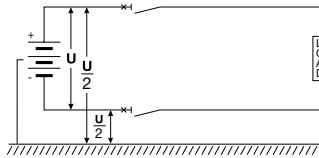
Type of network Emax DC IEC

Insulated network



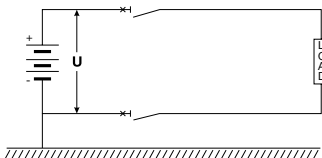
Rated voltage (Ue)	Ue ≤ 500		500V ≤ Ue ≤ 750V		750V ≤ Ue ≤ 1000V
POLES	3p	4p	3p	4p	4p
Power supply from lower terminals (Lower Supply)					
Power supply from upper terminals (Upper Supply)					

Network with earthed mid-point



Rated voltage (Ue)	Ue ≤ 500V		500V ≤ Ue ≤ 750V	750V ≤ Ue ≤ 1000V
Poles	3p	4p	4p	4p
Power supply from lower terminals (Lower Supply)				
Power supply from upper terminals (Upper Supply)				

Network with earthed negative polarity



Rated voltage (Ue)	Ue ≤ 500 ¹⁾	
Poles	3p	4p
Power supply from lower terminals (Lower Supply)		
Power supply from upper terminals (Upper Supply)		

Versions and connections Emax DC IEC

Versions and connections

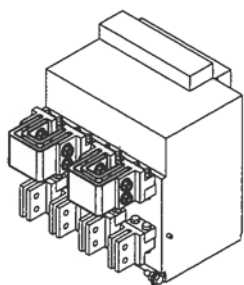
All DC IEC Emax circuit breakers for direct current have several poles in series involved in breaking the fault; for this reason, a special connections busbar (known as a "U connection kit") are mounted on the circuit breaker terminals.

Selection of the power supply side, from the lower or upper terminals, must only be made at the time of ordering and cannot be modified later by the customer.

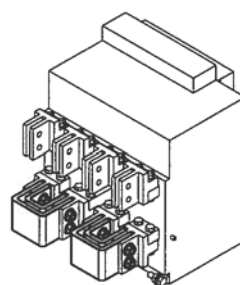
The fixed circuit breakers are fitted with vertical terminals, whereas it is possible to select between vertical and horizontal terminals for circuit breakers in the withdrawable version.

Fixed circuit breaker

Vertical rear terminals



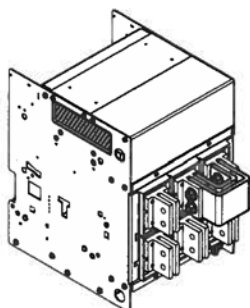
Power supply from lower terminals



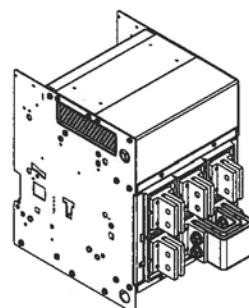
Power supply from upper terminals

Withdrawable circuit breaker

Vertical rear terminals

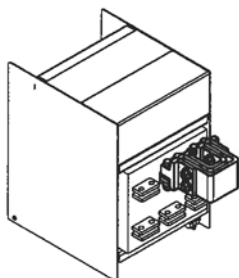


Power supply from lower terminals

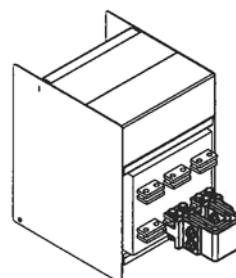


Power supply from upper terminals

Horizontal rear terminals



Power supply from lower terminals



Power supply from upper terminals

Notes

Accessories

Power breakers



Power breakers
Accessories

Power circuit breakers

Accessories

UL & IEC

Trip units ① (NOT for use with Emax DC)

Description	Catalog number
PR121/P-LI	PR121/P-LI
PR121/P-LSI	PR121/P-LSI
PR121/P-LSIG	PR121/P-LSIG
PR122/P-LI	PR122/P-LI
PR122/P-LSI	PR122/P-LSI
PR122/P-LSIRc (IEC only)	PR122/P-LSIRc
PR122/P-LSIG	PR122/P-LSIG
PR123/P-LSI (Standard with PR120/V)	PR123/P-LSI
PR123/P-LSIG (Standard with PR120/V)	PR123/P-LSIG

Rating plugs (NOT for use with Emax DC)

UL	Description	E1	E2	E3	E4	E6	Catalog number
	400A Rating plug	X	X	X			DE0400RP
	600A Rating plug	X	X	X			DE0600RP
	800A Rating plug	X	X	X	X	X	DE0800RP
	1000A Rating plug	X	X	X	X	X	DE1000RP
	1200A Rating plug	X	X	X	X	X	DE1200RP
	1600A Rating plug		X	X	X	X	DE1600RP
	2000A Rating plug			X	X	X	DE2000RP
	2500A Rating plug			X	X	X	DE2500RP
	3000A Rating plug			X	X	X	DE3000RP
	3200A Rating plug			X	X	X	DE3200RP
	3600A Rating plug				X	X	DE3600RP
	4000A Rating plug					X	DE4000RP
	5000A Rating plug					X	DE5000RP
	6000A Rating plug					X	DE6000RP
IEC		E1	E2	E3	E4	E6	
	400A Rating plug	X	X	X			DE0400RP
	630A Rating plug	X	X	X			DE0630RP
	800A Rating plug	X	X	X	X	X	DE0800RP
	1000A Rating plug	X	X	X	X	X	DE1000RP
	1250A Rating plug	X	X	X	X	X	DE1250RP
	1600A Rating plug	X	X	X	X	X	DE1600RP
	2000A Rating plug		X	X	X	X	DE2000RP
	2500A Rating plug			X	X	X	DE2500RP
	3000A Rating plug			X	X	X	DE3000RP
	3200A Rating plug			X	X	X	DE3200RP
	4000A Rating plug				X	X	DE4000RP
	5000A Rating plug					X	DE5000RP
	6300A Rating plug					X	DE6300RP

Trip unit optional features

Description	Catalog number
Signaling Unit	PR021/K
Signaling Module 4 output with independent terminals	PR120/K4
Signaling Module 4 + 1 input with common terminal	PR120/K4C
Voltage Measuring Module	PR120/V
Communication Module (Modbus RTU)	PR120/D-M
Bluetooth Wireless Communication Module internal	PR120/D-BT

Test kits

Description	Catalog number
Bluetooth wireless communication module external	BT030
Test and configuration unit	PR010/T
EKIP Connect communication software	EKIP
Hand-held battery (standard w/PR122 & 123)	PR030/B
RRD Remote racking device	KERRD
RRD Adapter kit	KERRDKIT

① Must order rating plug separately when ordering trip unit separately.

Power circuit breakers

Accessories

UL & IEC

Emax
Power breakers

Electrical and mechanical accessories

Description	Catalog number
Shunt trip coil (included in the electrically operated breaker)	
Rated voltage	
24V	KE6S0
30V	KE6S9
48V	KE6S8
60V	KE6S7
110/120V	KE6S6
120/127V	KE6S5
220/240V	KE6S4
250V	KE6S3
380/400V	KE6S2
440/480V	KE6S1
Second shunt trip coil (includes accessory support) ①	
24V	KE6S0-2
30V	KE6S9-2
48V	KE6S8-2
60V	KE6S7-2
110/120V	KE6S6-2
120/127V	KE6S5-2
220/240V	KE6S4-2
250V	KE6S3-2
380/400V	KE6S2-2
440/480V	KE6S1-2
Closing coil (included in the electrically operated breaker)	
24V	KE6C0
30V	KE6C9
48V	KE6C8
60V	KE6C7
110/120V	KE6C6
120/127V	KE6C5
220/240V	KE6C4
250V	KE6C3
380/400V	KE6C2
440/480V	KE6C1
Spring charging motor with limit switch and electrical indication charged spring (included in the electrically operated breaker)	
24/30V	KE6M9
48/60V	KE6M7
100/130V	KE6M5
220/250V	KE6M3
Spring charged signal only	KE6SC
Instantaneous under voltage trip release	
24V	KE6U0
30V	KE6U9
48V	KE6U8
60V	KE6U7
110/120V	KE6U6
120/127V	KE6U5
220/240V	KE6U4
250V	KE6U3
380/400V	KE6U2
440/480V	KE6U1
Energized undervoltage release signalling contact	
Auxiliary contact normally open	KE6UE10
Auxiliary contact normally closed	KE6UE01

Description	Catalog number
Auxiliary contacts for breakers ② (NOT for use with Emax DC)	
Rated 5A-250VAC / 0.3A –125VDC	
4 auxiliary open/closed contacts (PR121/ non-automatic switch)	KE6A4
4 auxiliary open/closed contacts for digital signals (PR121/ non-automatic switch)	KE6A4D
4 auxiliary open/closed contacts (2NO+2NC+PR122/3)	KE6A4-PR122/3
4 auxiliary open/closed contacts (2NO+2NC+PR122/3) for digital signals	KE6A4-PR122/3D
10 auxiliary open/closed contacts (PR121/non-automatic switch)	KE6A10
10 auxiliary open/closed contacts for digital signals (PR121/ non-automatic switch)	KE6A10D
10 auxiliary open/closed contacts (5NO+5NC+PR122/3)	KE6A10-PR122/3
10 auxiliary open/closed contacts (5NO+5NC+PR122/3) for digital signals	KE6A10-PR122/3D
15 additional auxiliary contacts for field installation on fixed breakers (connected to breaker with flexible cable) ③	KE6A15
15 additional auxiliary contacts for field installation on withdrawable breakers (connected to breaker with flexible cable) ③	KE6A15-W
Auxiliary contacts for switches	
2NO + 2NC	KE6A4
5NO + 5NC	KE6A10
Auxiliary contacts for service/test/disconnected position indication	
Cradle mounted	
5 auxiliary contacts	KE6PS1
10 auxiliary contacts for E1/2 - 3 pole	KE2PS3
10 auxiliary contacts for E1/2 - 4 pole	KE2PS4
10 auxiliary contacts for E3 - 3 pole	KE3PS3
10 auxiliary contacts for E3 - 4 pole	KE3PS4
10 auxiliary contacts for E4/6 - 3 & 4 pole	KE6PS2
Mechanical operation counter	
	KE6MC
Bell alarm	
Electrical signalling of overcurrent release tripped, Bell alarm contact	DE6TBA
Bell alarm w/remote reset	
Electrical signalling of overcurrent release tripped with remote reset 220-240V AC/DC	DE6TBAR4
Electrical signalling of overcurrent release tripped with remote reset 110-130V AC/DC	DE6TBAR5
Electrical signalling of overcurrent release tripped with remote reset 24-30V AC/DC	DE6TBAR9

- ① Order as alternative to UV trip.
 ② For field installation, order auxiliary contacts for corresponding trip unit/non-automatic switch.
 ③ For mounting on fixed breaker, also requires accessory KE6MLP.

Power circuit breakers

Optional features

UL & IEC

Locks and interlocks

Description	Catalog number
Button guard	KE6PG
Key lock in open position	
Key lock N. 20005 ①	DE6KL2
Key lock N. 20006	DE6KL3
Key lock N. 20007	DE6KL4
Key lock N. 20008	DE6KL5
Key lock different keys	DE6KL1
Padlocking provision	
3 - 4mm locks	KE6PD1
3 - 5/16 locks	KE6PDHD2
Extra heavy duty	KE6PDEHD9
Key and padlocking device to lock the breaker in disconnected, test or connected position (position lock)	
Key + padlocking 20005	DE6PL
Key + padlocking 20006	DE6PL3
Key + padlocking 20007	DE6PL4
Key + padlocking 20008	DE6PL5
Key + padlocking different keys	DE6PL1
Accessory to lock the breaker in test or disconnected position only ②	
Position lock	KE6PLA
Padlocking device for the safety shutters on the cradle	
Cradle padlock	KE6SP

① Keylock number when factory installed is N3004222.

② Also requires position lock.

External accessories

Neutral current transformers, UL & IEC (NOT for use with Emax DC) Required for 4 wire ground fault systems

For breaker	Amps	Catalog number
E1 – E2	400	KE2NCT
	800	
	1000	
	1200	
	1250	
	1600	
	2000	
E3	400	KE3NCT
	800	
	1000	
	1200	
	1250	
	1600	
	2000	
	2500	
E4	1600	KE4NCT ①
	2000	
	2500	
	3200	
	4000	
E6	3200	KE6NCT ①
	4000	
	5000	
	6300	

Mechanical interlocks ②

Mechanical interlocks (base plate for fixed circuit breakers)

For breaker	Interlock type	Catalog number
E1 – E6	All	KE6MLP

NOTE: order for fixed circuit breaker only; order one accessory for each fixed breaker.

Interlock for fixed circuit breaker/ fixed part of withdrawable circuit breaker (cable attachment plate)

For breaker	Interlock type	Catalog number
E1 – E6	A, B, D	KE6MLA
	C	KE6MLC

NOTE: order one accessory for each fixed circuit breaker/ fixed part of withdrawable circuit breaker

Interlock for fixed circuit breaker/ moving part of withdrawable circuit breaker (internal interlocking shaft)

For breaker	Interlock type	Catalog number
E1 – E2	All	KE2ML
E3		KE3ML
E4, 3 pole		KE4ML-3
E4, 4 pole/ E6, 3 pole		KE6ML-3
E6, 4 pole		KE6ML-4

NOTE: order one accessory for each fixed circuit breaker/ mobile part of withdrawable circuit breaker

Interlock cables

For breaker	Interlock type	Horizontal catalog number	Vertical catalog number
E1 – E6	A	KE6MLC-HA	KE6MLC-VA
	B	KE6MLC-HB	KE6MLC-VB
	C	KE6MLC-HC	KE6MLC-VC
	D	KE6MLC-HD	KE6MLC-VD

NOTE: order one type of cable for each interlock

Electronic time delay for undervoltage release (IEC only)

Voltage	Time delay	Field installation catalog number
24/30V	0.5-1-1.5-2-3.5 s	KE6TL9
48V		KE6TL8
60V		KE6TL7
110/125V		KE6TL5
220/250V		KE6TL3

Transparent front cover (IP54)

Item	For breaker	Catalog number
Different keys	E1 - E6	KE6DC
Same keys		KE6SC

Kirk key lock adaptor plate - in open position

For breaker	Catalog number
E1 – E2 fixed breaker, 3-4 pole	KE6KKC-E2F
E1 – E2 withdrawable breaker, 3-4 pole	KE6KKC-E2W
E3 fixed breaker, 3-4 pole	KE6KKC-E3F
E3 withdrawable breaker, 3-4 pole	KE6KKC-E3W
E4 fixed breaker, 3 pole	KE6KKC-E4F
E4 withdrawable breaker, 3 pole	KE6KKC-E4W
E6 fixed breaker, 3 pole	KE6KKC-E6F
E6 withdrawable breaker, 3 pole	KE6KKC-E6W
E4 fixed breaker, 4 pole	KE6KKC-E4F-4
E4 withdrawable breaker, 4 pole	KE6KKC-E4W-4
E6 fixed breaker, 4 pole	KE6KKC-E6F-4
E6 withdrawable breaker, 4 pole	KE6KKC-E6W-4

NOTE: Provision for kirk lock (kirk key lock not included; use lock Type F – 1 inch bolt projection in withdrawn position).

Kit for converting fixed breaker with rear horizontal terminals to rear vertical – set of three terminals (UL only) ③

(NOT for use with Emax DC)

Description	Catalog number
E1, 3P	KE1FHRVR
E2, 3P	KE2FHRVR
E3 (12, 16, 20), 3P	KE3FHRVR
E3 (25), 3P	KE3F25HRVR
E4, 3P	KE4FHRVR
E6, 3P	KE6FHRVR

Kit for converting fixed breaker with rear horizontal terminals to rear vertical – set of three terminals (IEC only) ④

(NOT for use with Emax DC)

Description	Catalog number
E1, 3P	1SDA038052R1
E2, 3P	1SDA038053R1
E3, 3P	1SDA038054R1
E4, 3P	1SDA038055R1
E6, 3P	1SDA038056R1

① KE4NCT & KE6NCT are 100% rated. For 50% rated neutrals on E4 & E6, use KE2NCT & KE3NCT.

② Order as an alternative to auxiliary contacts (see page 18.41) and kirk key lock.

③ For 4 pole version, consult factory.

④ For 4 pole version, consult factory.

Emax DC

Kit for converting fixed breaker with rear horizontal terminals to rear vertical - set of three terminals

(ONLY for use with Emax DC)

Description	Catalog number
E3 (8, 12,16), 3P	KE3FHRVRDC3
E3 (8, 12,16), 4P	KE3FHRVRDC4

Emax lug kit - set of three terminals (UL only) ①

(NOT for use with Emax DC)

For breaker	Catalog number
E1, front terminals	KE1CLK4600
E1, rear terminals	KE1CLK4600S
E2, front terminals	KE2CLK4600
E2, rear terminals	KE2CLK4600S
E3, front terminals	KE3CLK6600
E3, rear terminals	KE3CLK6600S
E4, front terminals	KE4CLK10600
E4, rear terminals	KE4CLK10600S
E6, front terminals	KE6CLK12600
E6, rear terminals	KE6CLK12600S

Spare parts ②

Description	Catalog number
Racking crank	1SDA038092R1
Door escutcheon	1SDA038096R1
Support plate for auxiliary releases	1SDA038339R1
Lifting plates	1SDA038093R1

① For dimensions, see pages 18.91 - 18.100.

② For a complete list, refer to Spare Parts catalog, 1SDC001007D0202.

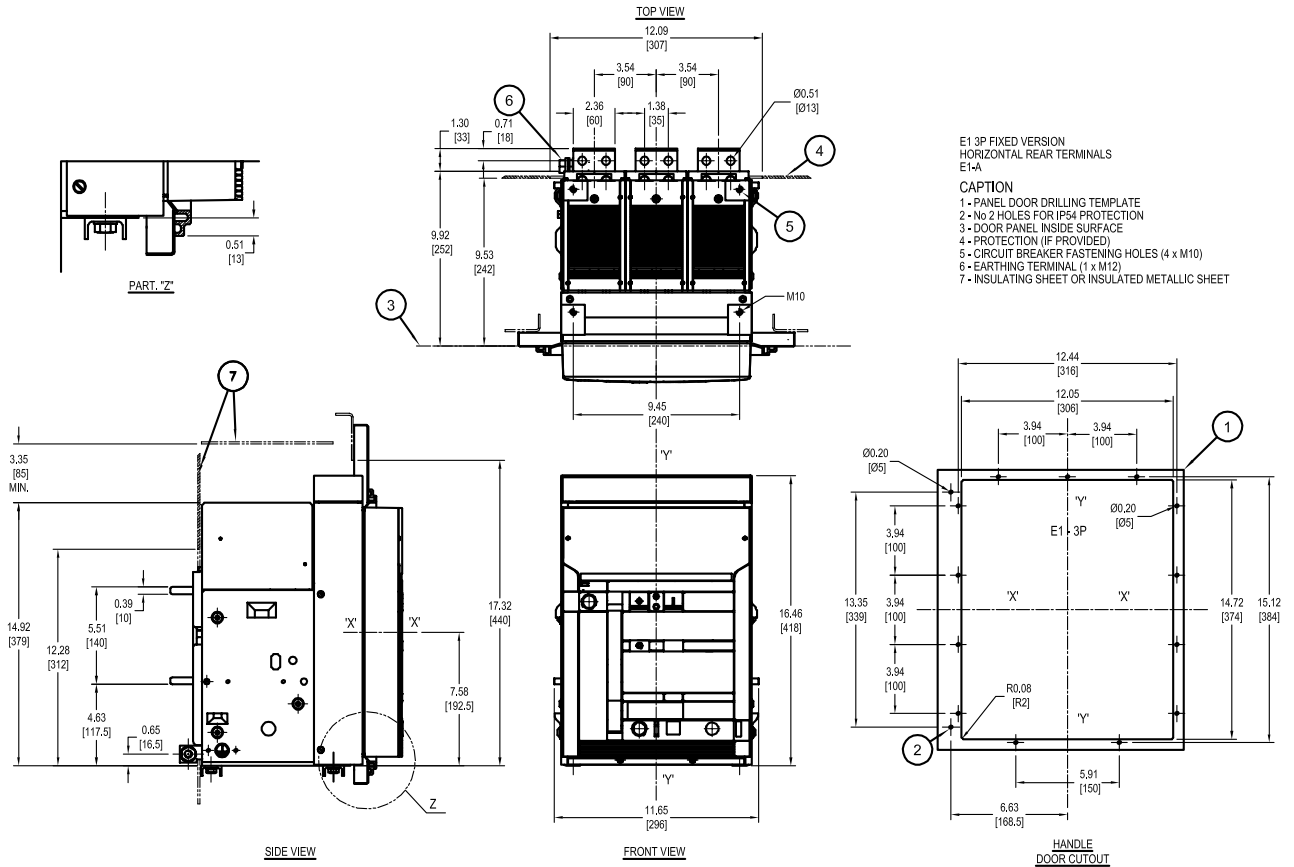
Approximate dimensions (for UL version) ①

E1, fixed with horizontal rear terminals

3 pole

← 00.00 → Inches
00.00 → [Millimeters]

← 00.00 → Inches
00.00 → [Millimeters]



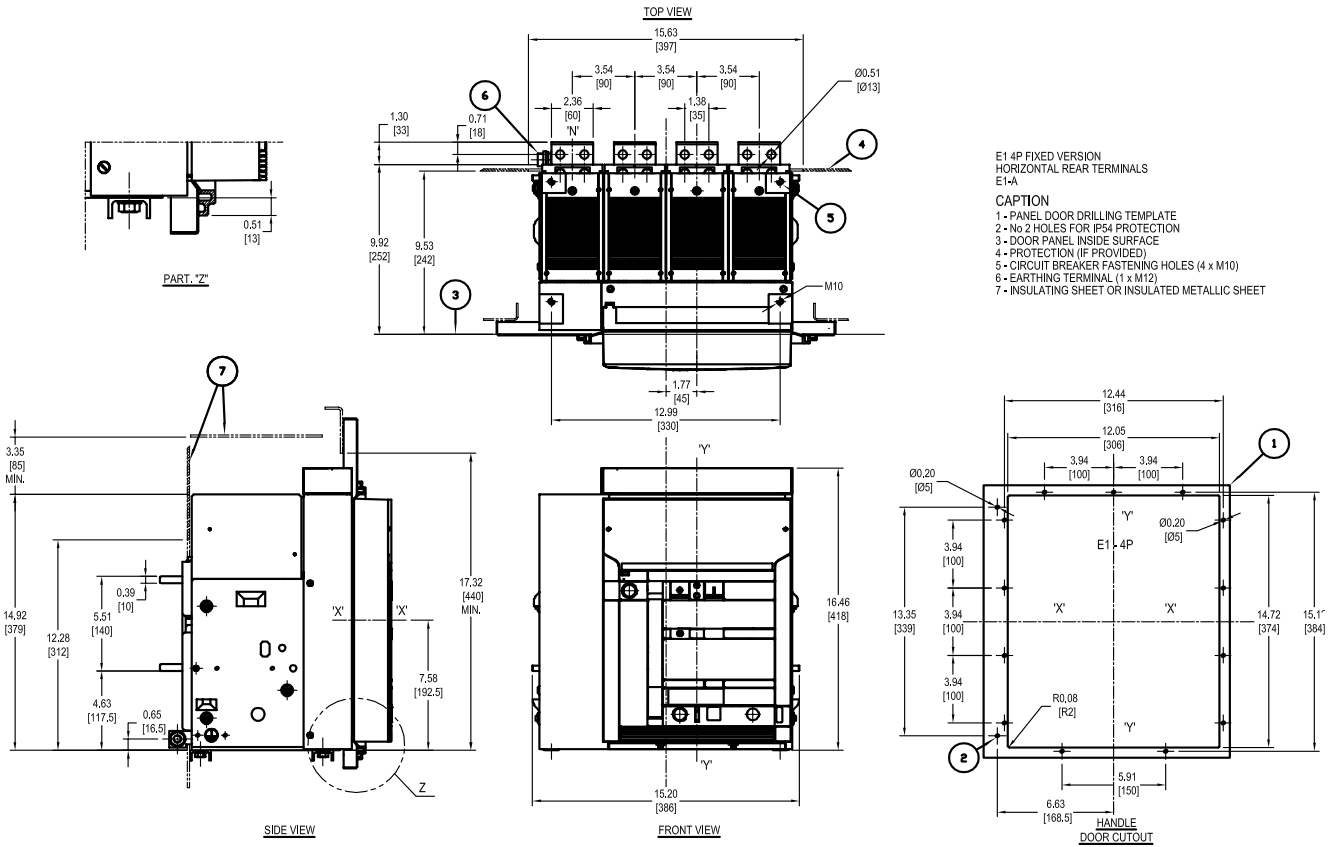
© For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E1, fixed with horizontal rear terminals

4 pole

← 00.00 → Inches
00.00 → [Millimeters]



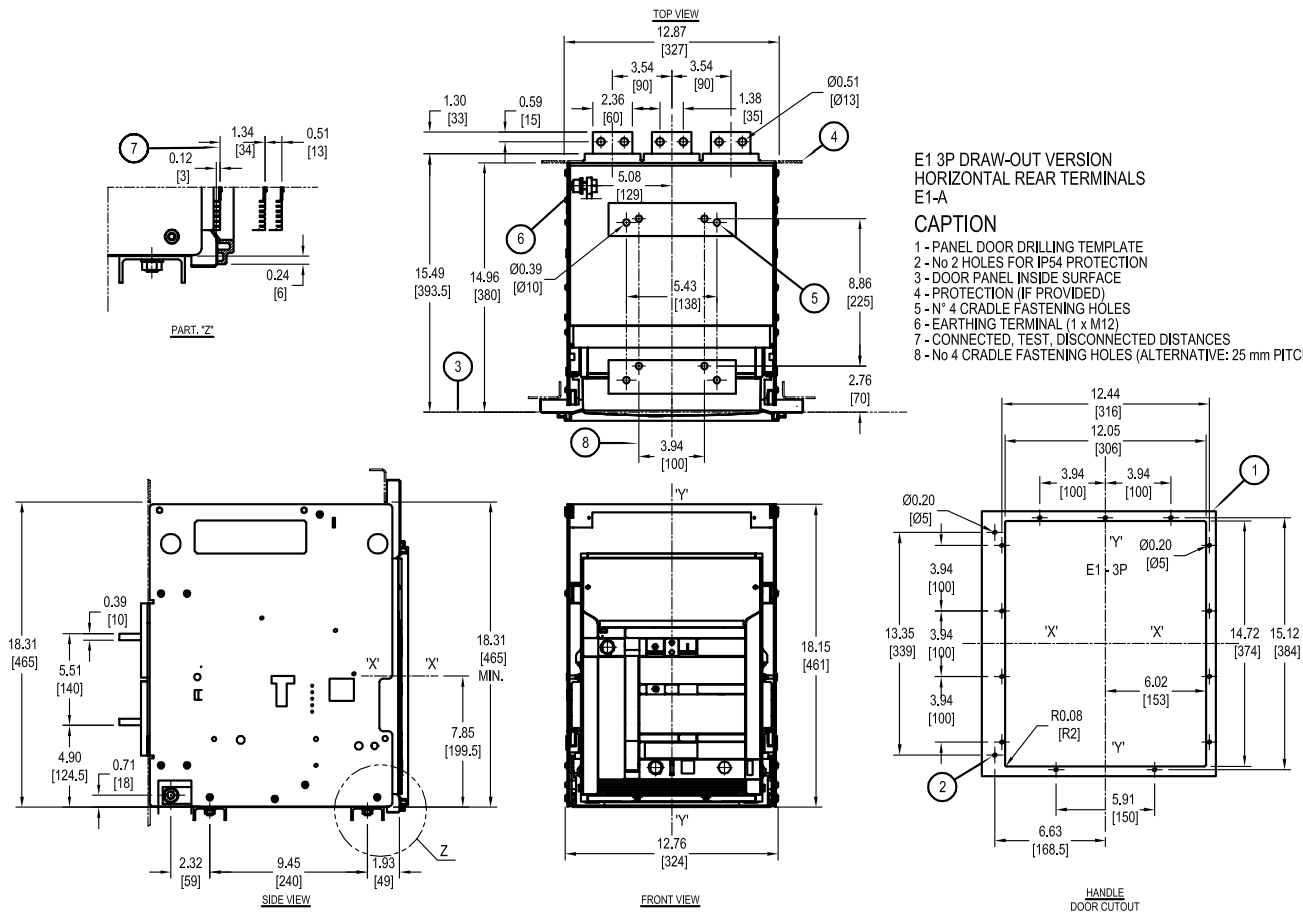
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E1, withdrawable with horizontal rear terminals

3 pole

← 00.00 Inches
00.00 → [Millimeters]



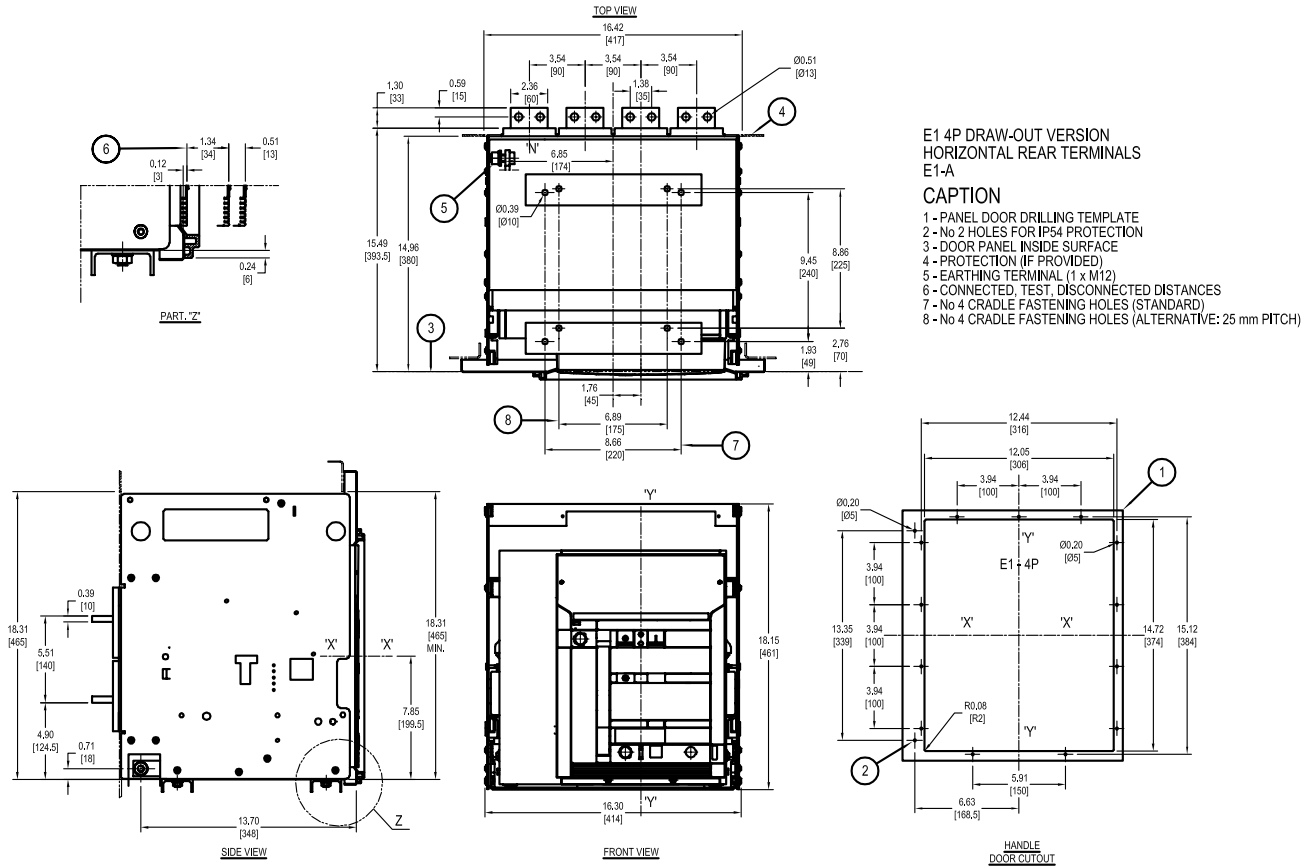
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E1, withdrawable with horizontal rear terminals

4 pole

00.00 Inches
00.00 [Millimeters]



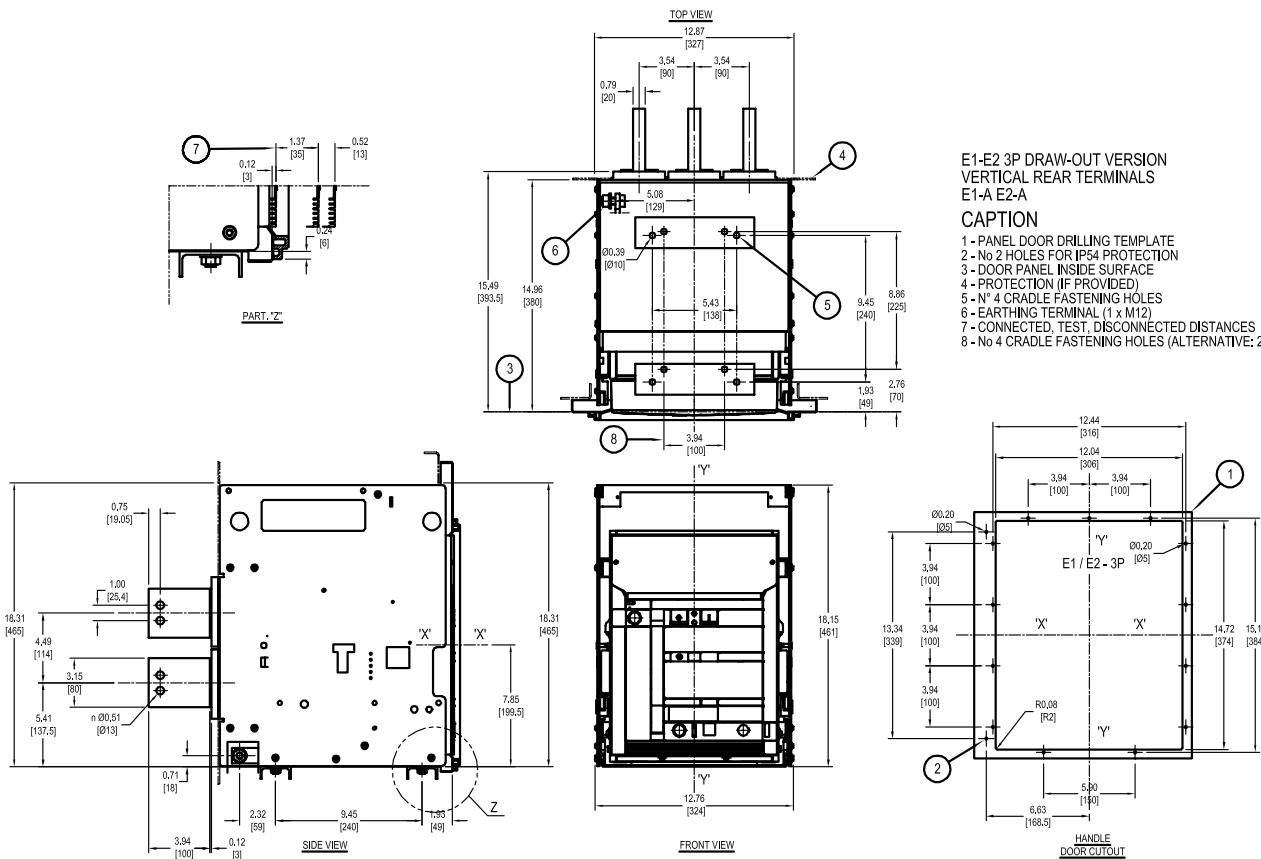
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E1 - E2, withdrawable with vertical rear terminals

3 pole

← 00.00 Inches
00.00 → [Millimeters]



E1-E2 3P DRAW-OUT VERSION
VERTICAL REAR TERMINALS
E1-A E2-A

CAPTION

- 1 - PANEL DOOR DRILLING TEMPLATE
- 2 - No 2 HOLES FOR IP54 PROTECTION
- 3 - DOOR PANEL INSIDE SURFACE
- 4 - PROTECTION (IF PROVIDED)
- 5 - N° 4 CRADLE FASTENING HOLES
- 6 - EARTHING TERMINAL (1 x M12)
- 7 - CONNECTED, TEST, DISCONNECTED DISTANCES
- 8 - No 4 CRADLE FASTENING HOLES (ALTERNATIVE: 25 mm PITCH)

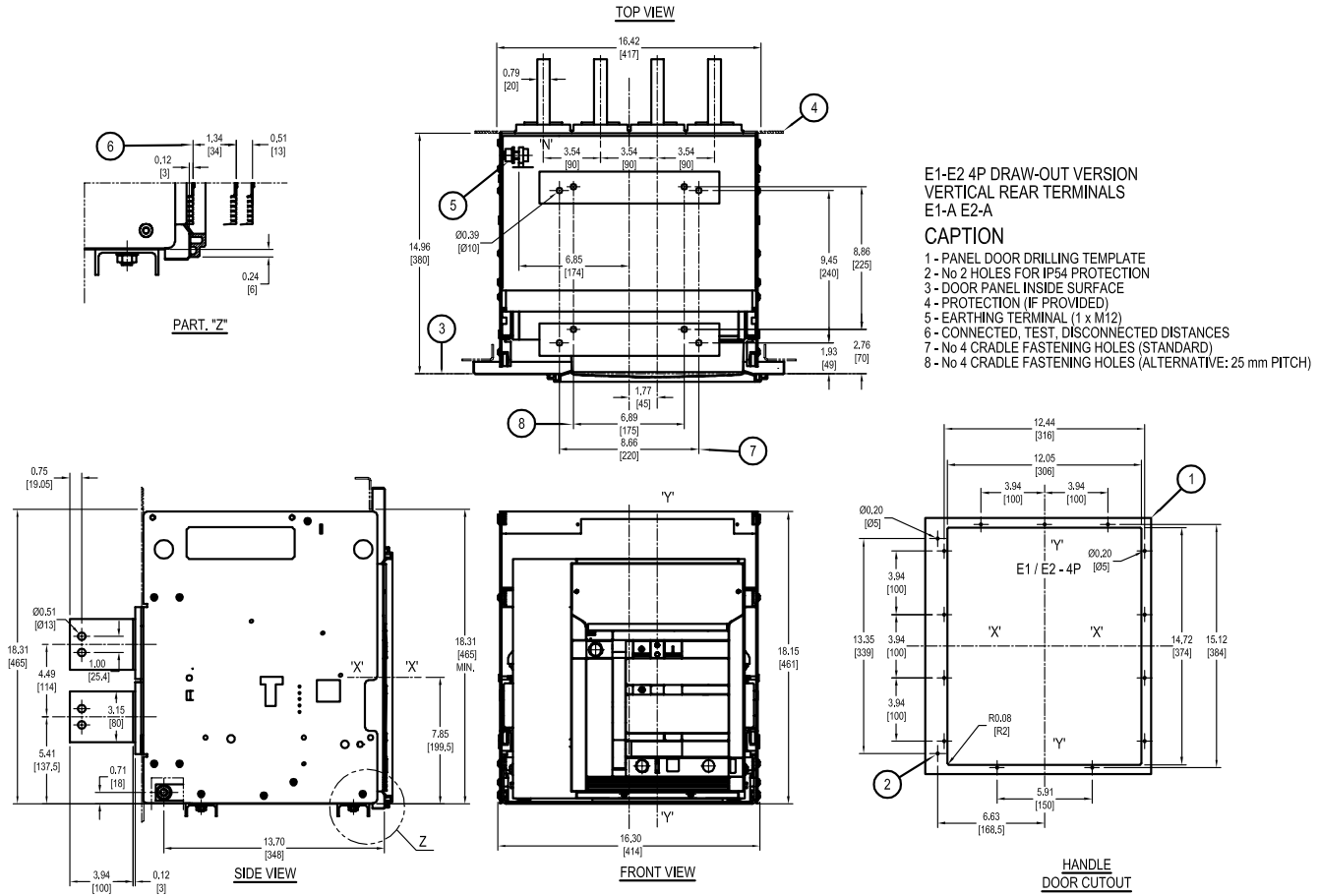
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E1 - E2, withdrawable with vertical rear terminals

4 pole

00.00 Inches
00.00 [Millimeters]



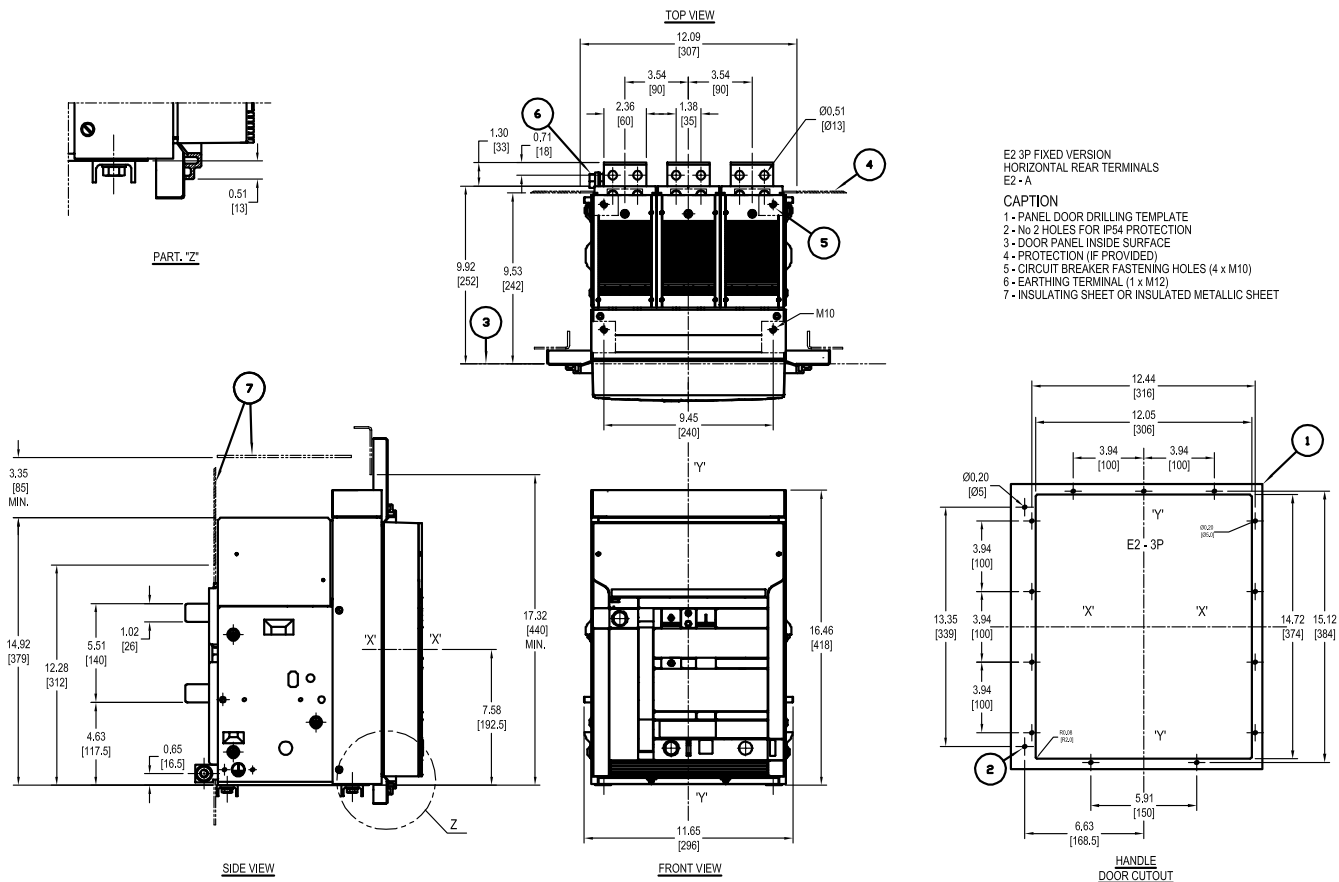
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E2, fixed with horizontal rear terminals

3 pole

00.00 Inches
00.00 [Millimeters]



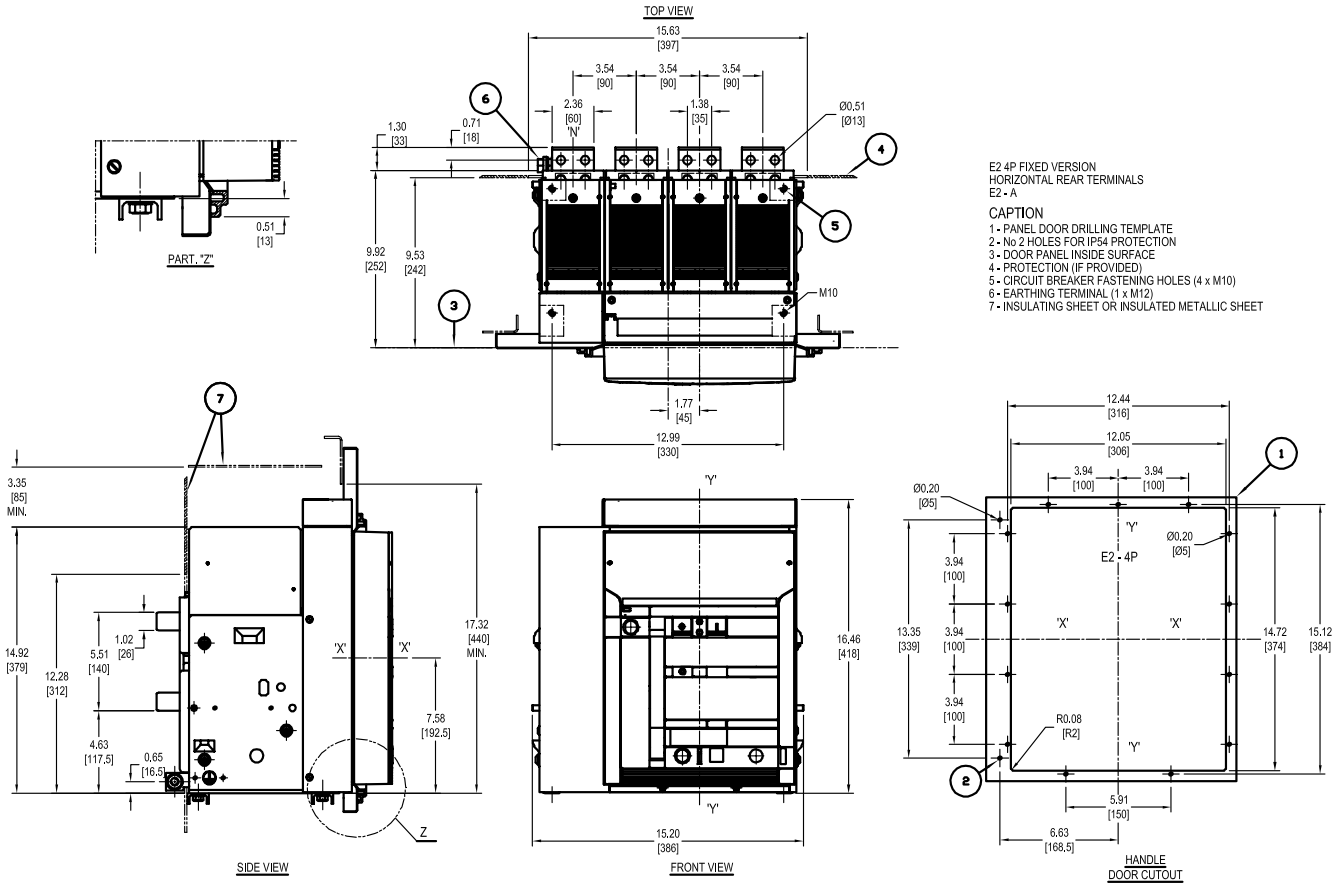
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E2, fixed with horizontal rear terminals

4 pole

← 00.00 → Inches
00.00 → [Millimeters]



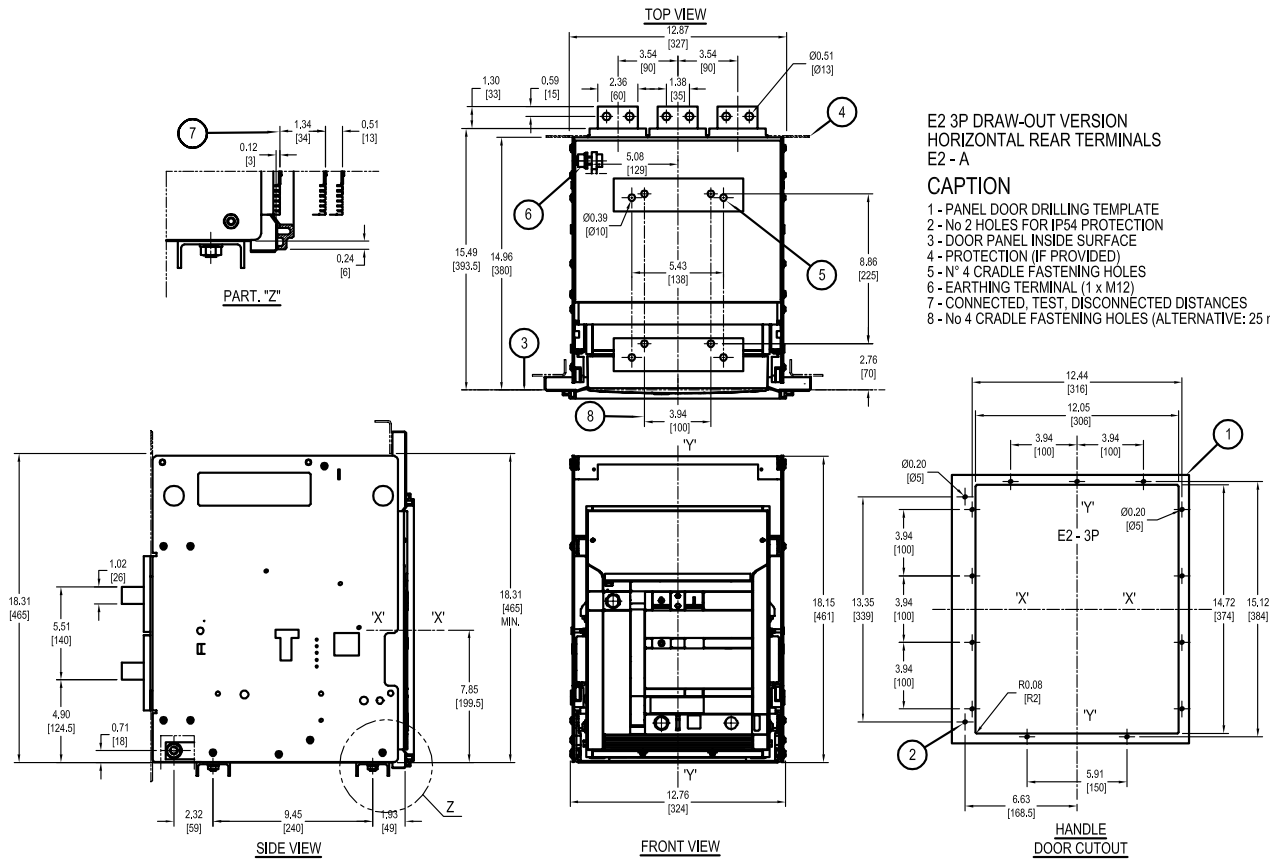
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E2, withdrawable with horizontal rear terminals

3 pole

← 00.00 → Inches
00.00 [Millimeters]



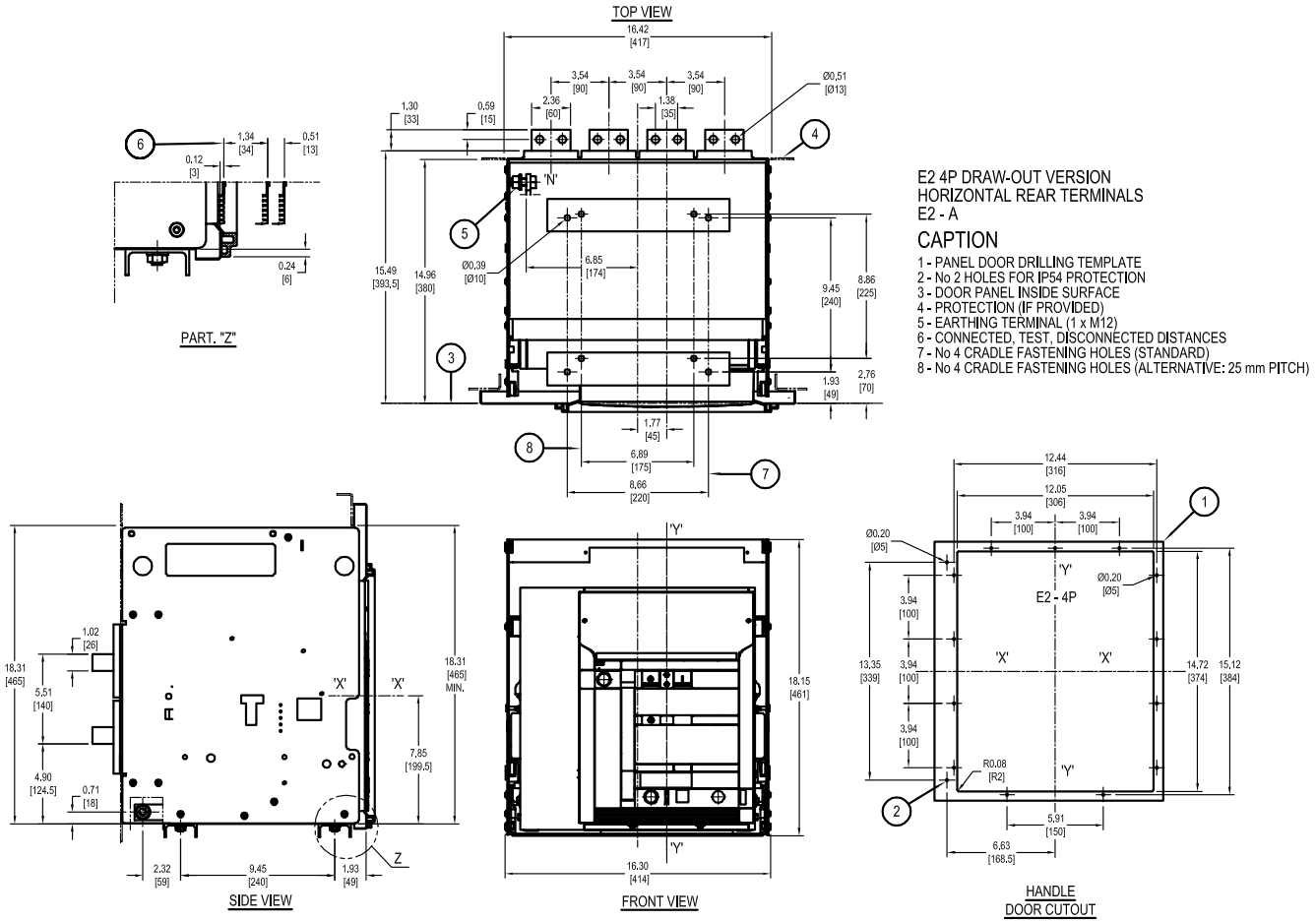
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E2, withdrawable with horizontal rear terminals

4 pole

00.00 Inches
00.00 [Millimeters]



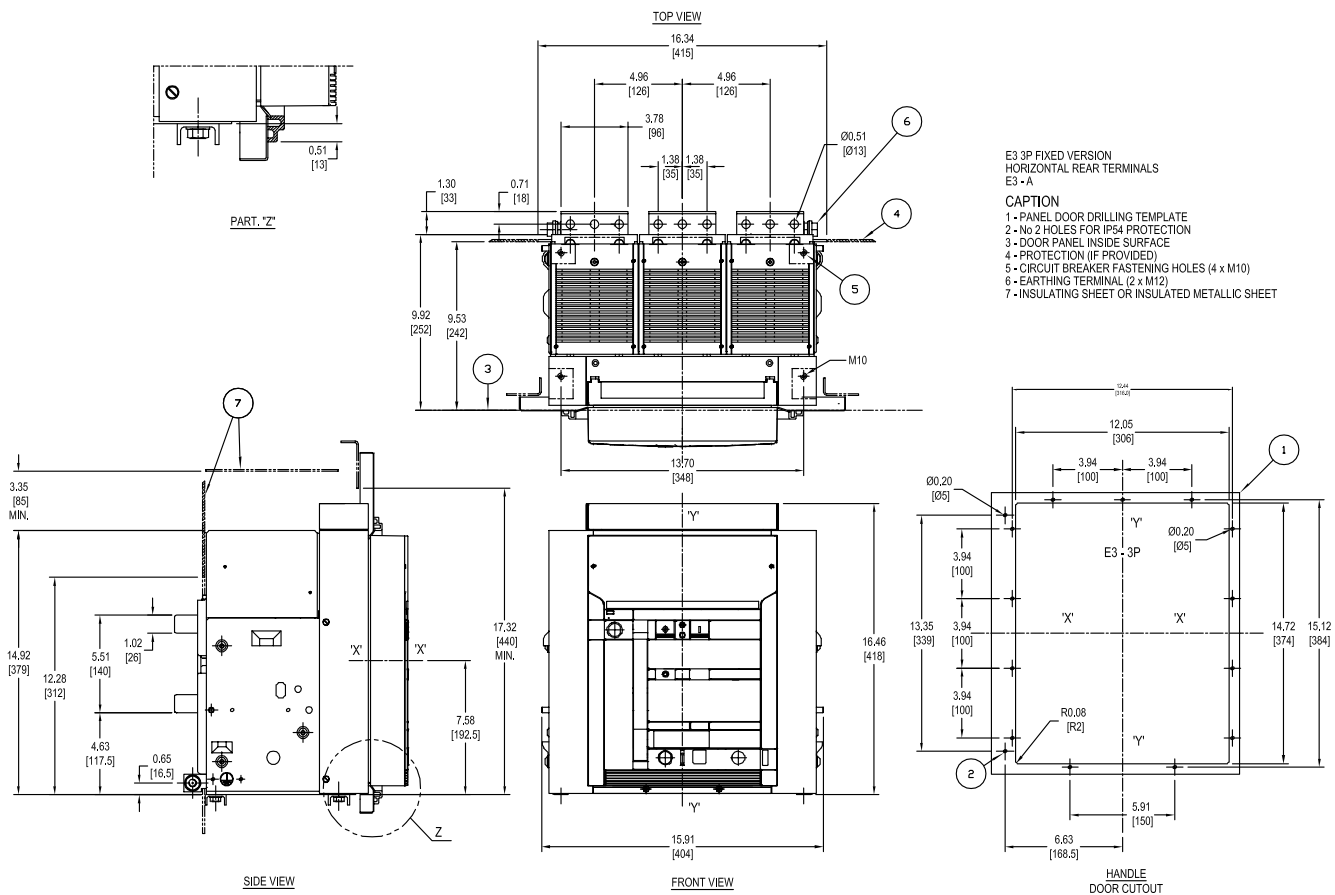
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E3, fixed with horizontal rear terminals

3 pole

00.00 Inches
00.00 [Millimeters]



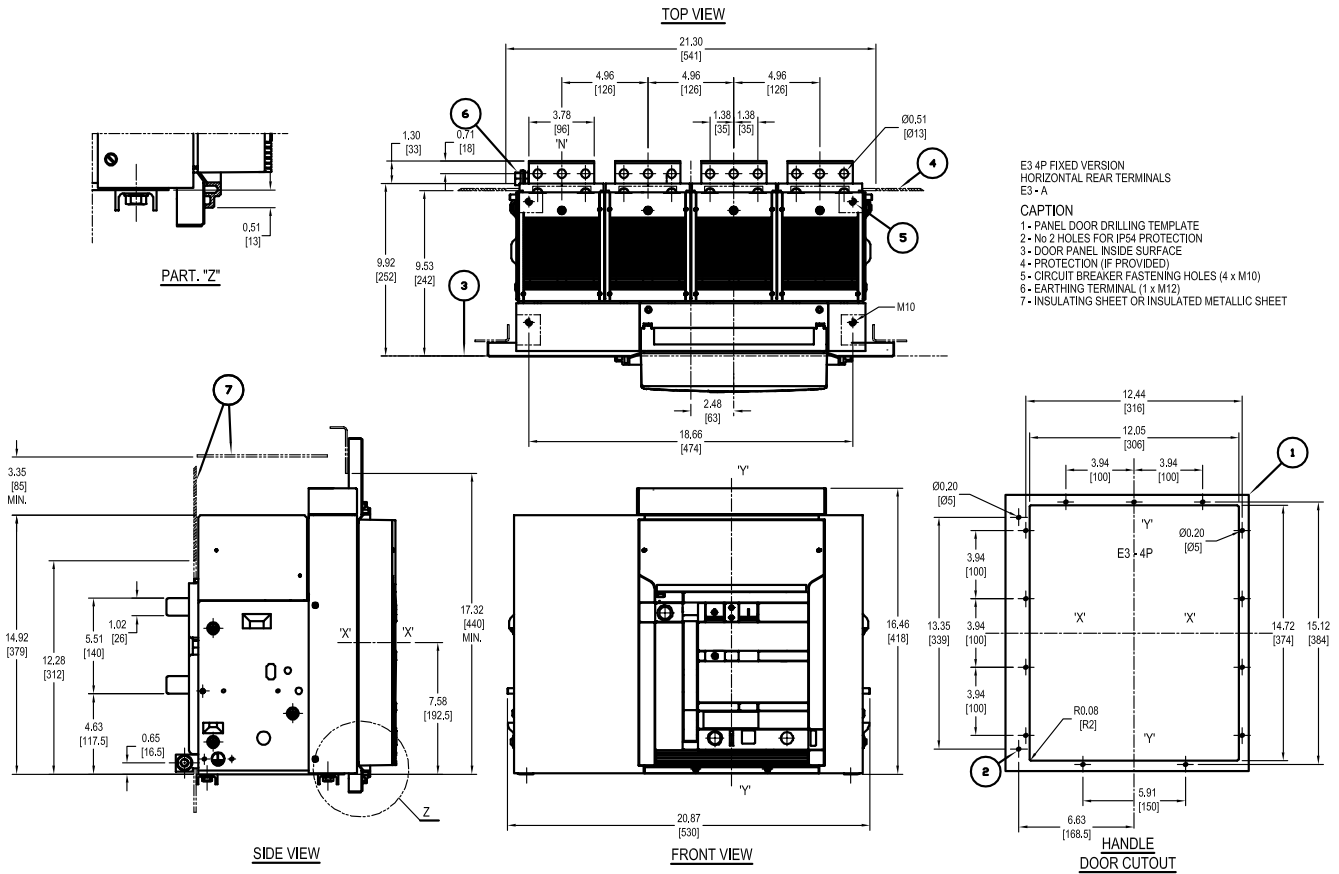
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E3, fixed with horizontal rear terminals

4 pole

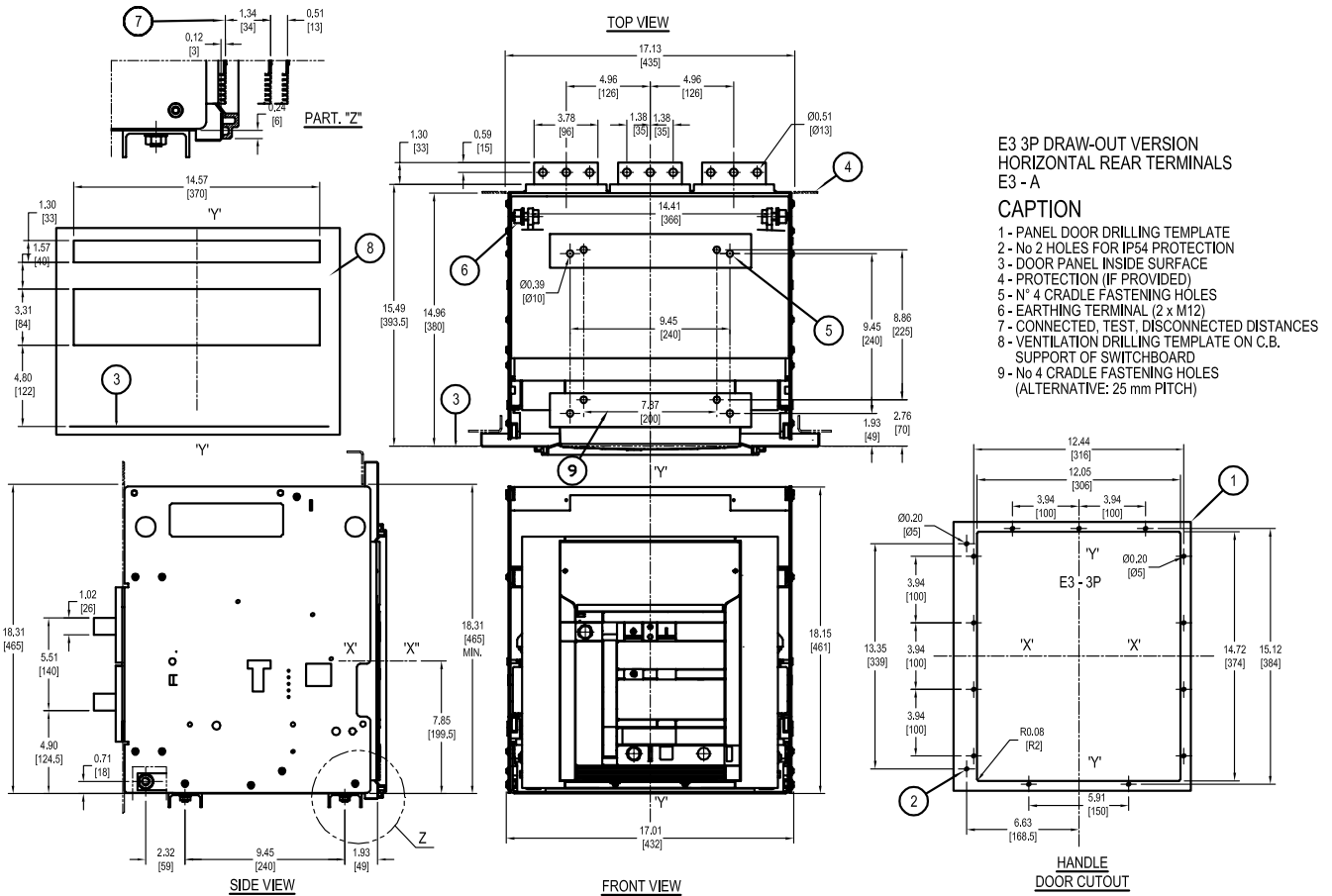
← 00.00 → Inches
00.00 → [Millimeters]



① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ① E3, withdrawable with horizontal rear terminals 3 pole

← 00.00 Inches
00.00 [Millimeters] →



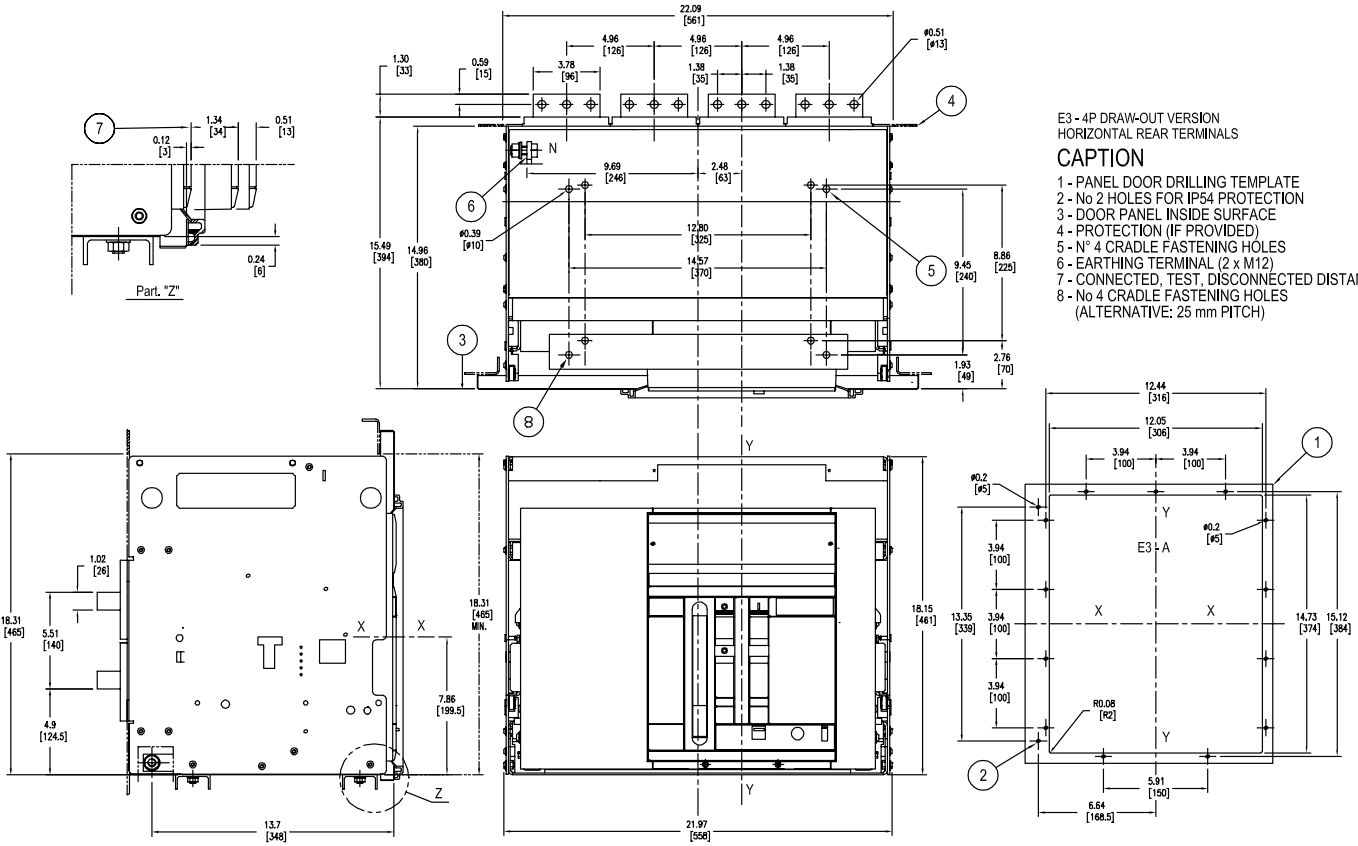
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E3, withdrawable with horizontal rear terminals

4 pole

← 00.00 → Inches
00.00 → Millimeters



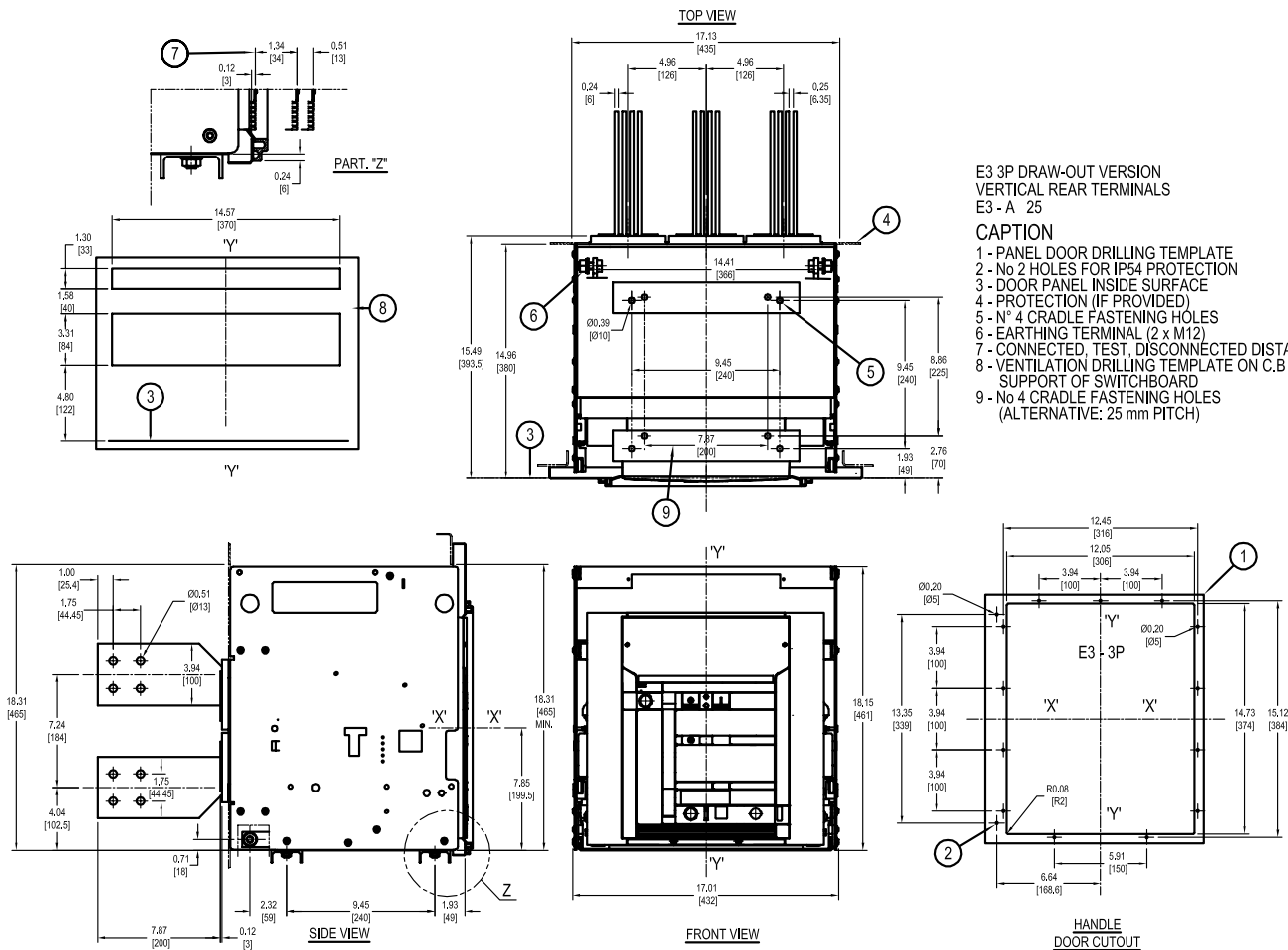
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E3 (2500A), withdrawable with vertical rear terminals

3 pole

← 00.00 Inches
00.00 [Millimeters] →



E3 3P DRAW-OUT VERSION
VERTICAL REAR TERMINALS
E3 - A 25

CAPTION

- 1 - PANEL DOOR DRILLING TEMPLATE
- 2 - No 2 HOLES FOR IP54 PROTECTION
- 3 - DOOR PANEL INSIDE SURFACE
- 4 - PROTECTION (IF PROVIDED)
- 5 - No 4 CRADLE FASTENING HOLES
- 6 - EARTHING TERMINAL (2 x M12)
- 7 - CONNECTED, TEST, DISCONNECTED DISTANCES
- 8 - VENTILATION DRILLING TEMPLATE ON C.B. SUPPORT OF SWITCHBOARD
- 9 - No 4 CRADLE FASTENING HOLES (ALTERNATIVE: 25 mm PITCH)

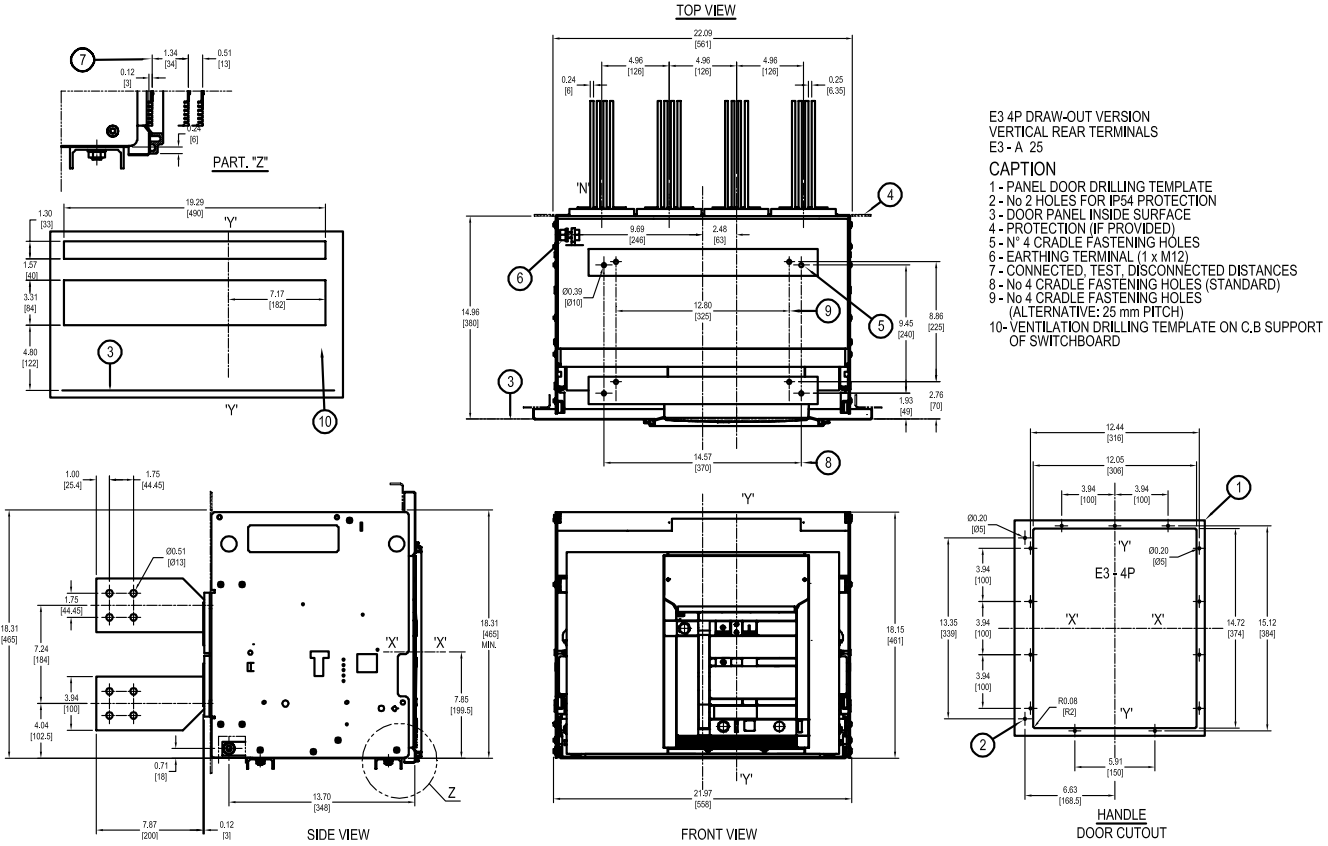
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E3 (2500A), withdrawable with vertical rear terminals

4 pole

← 00.00 Inches
00.00 → [Millimeters]

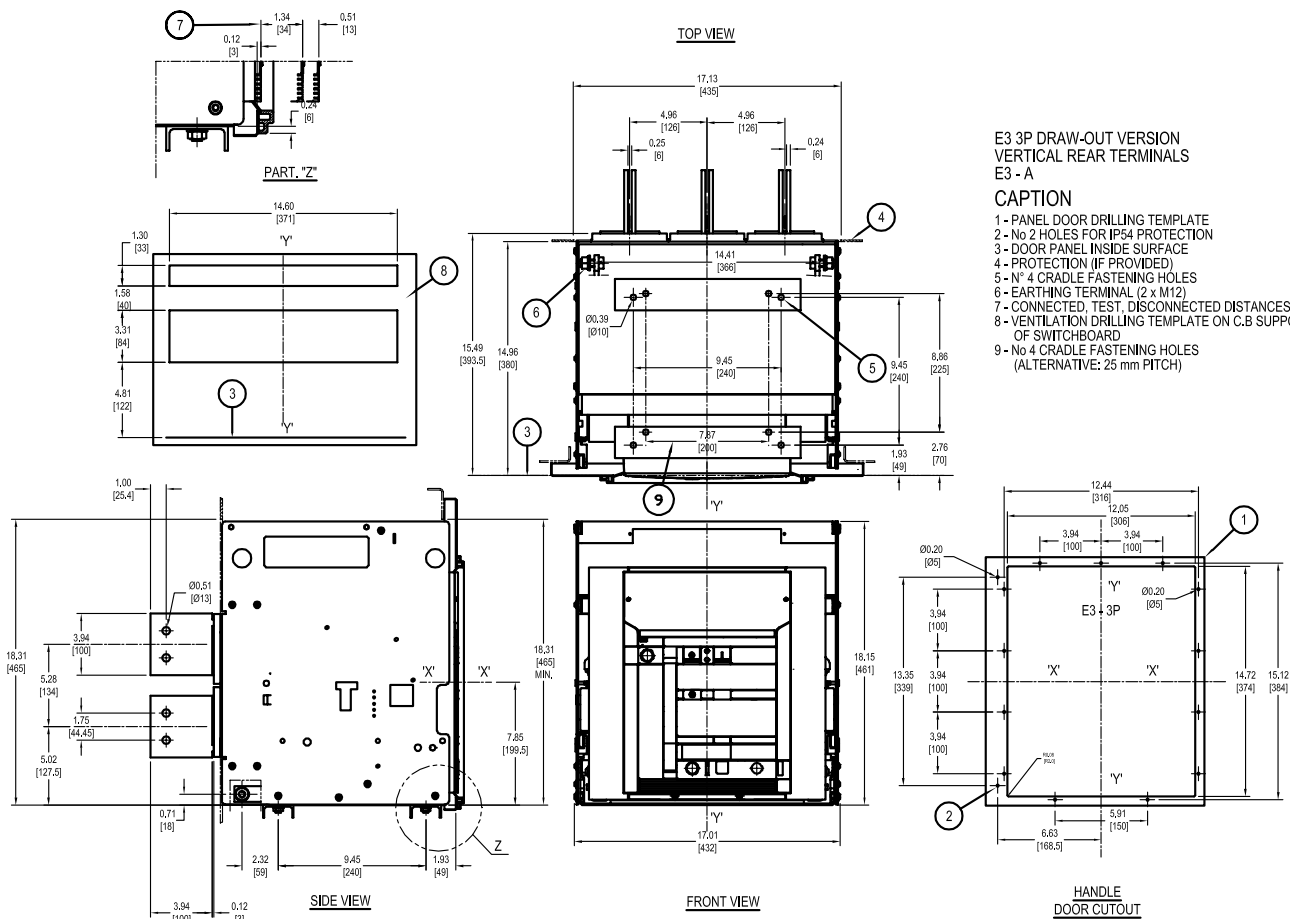


① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E3 (1200A/1600A/2000A), withdrawable with Vertical rear terminals, 3 pole

00.00 Inches
00.00 [Millimeters]

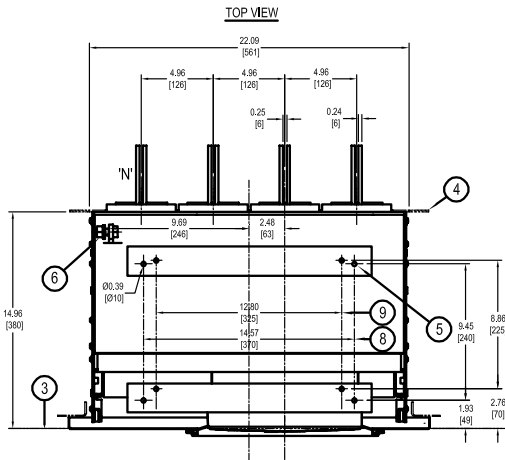
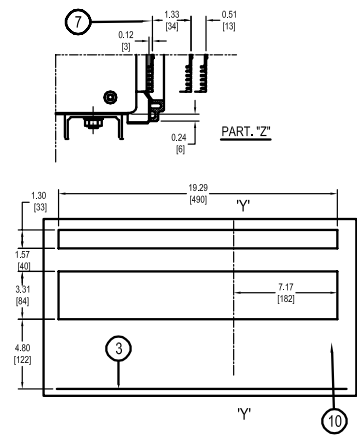


① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

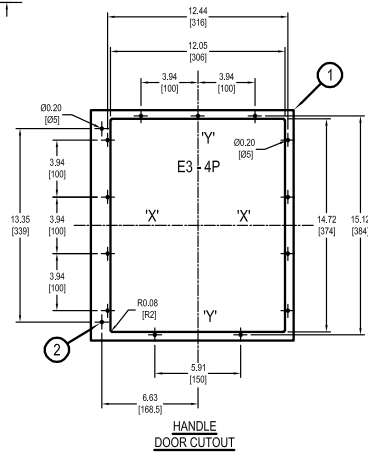
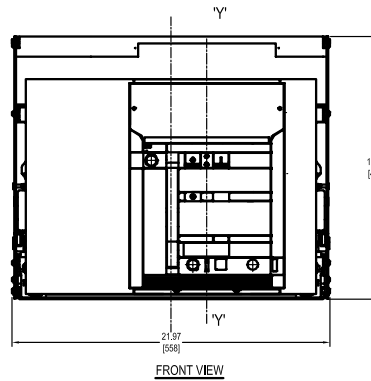
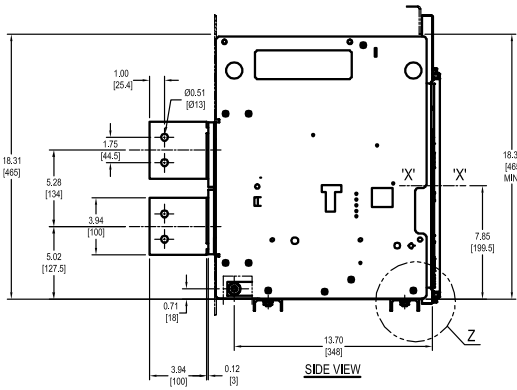
Approximate dimensions (for UL version) ①

E3 (1200A/1600A/2000A), withdrawable with Vertical rear terminals, 4 pole

← 00.00 → Inches
00.00 → [Millimeters]



- E3 4P DRAW-OUT VERSION
VERTICAL REAR TERMINALS
E3 - A
- CAPTION**
- 1 - PANEL DOOR DRILLING TEMPLATE
 - 2 - No 2 HOLES FOR IP54 PROTECTION
 - 3 - DOOR PANEL INSIDE SURFACE
 - 4 - PROTECTION (IF PROVIDED)
 - 5 - N° 4 CRADLE FASTENING HOLES
 - 6 - EARTHING TERMINAL (1 x M12)
 - 7 - CONNECTED, TEST, DISCONNECTED DISTANCES
 - 8 - No 4 CRADLE FASTENING HOLES (STANDARD)
 - 9 - No 4 CRADLE FASTENING HOLES (ALTERNATIVE: 25 mm PITCH)
 - 10 - VENTILATION DRILLING TEMPLATE ON C.B SUPPORT OF SWITCHBOARD

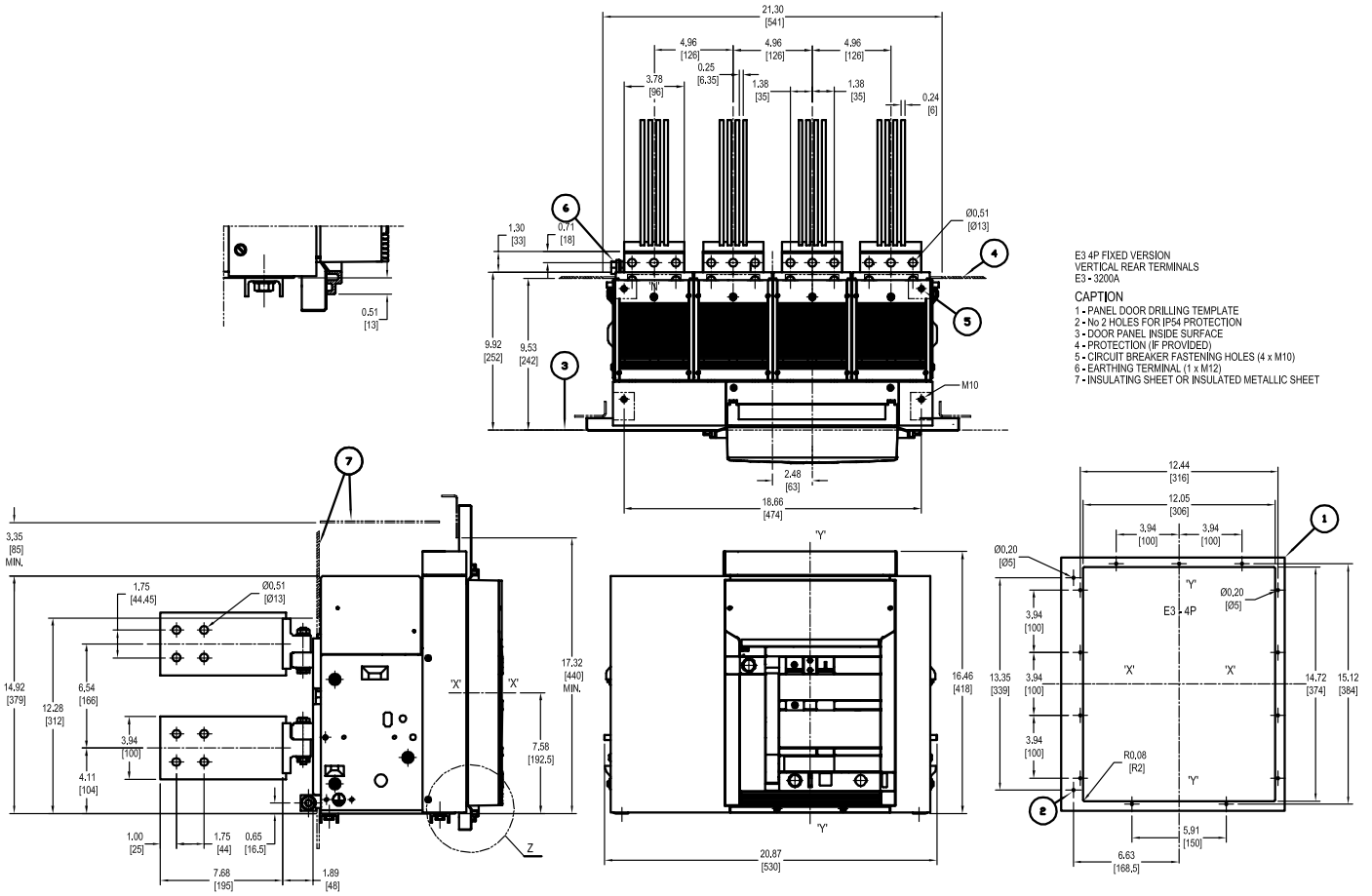


① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E3 (3200A), fixed with Vertical rear terminals, 4 pole

00.00 Inches
00.00 [Millimeters]

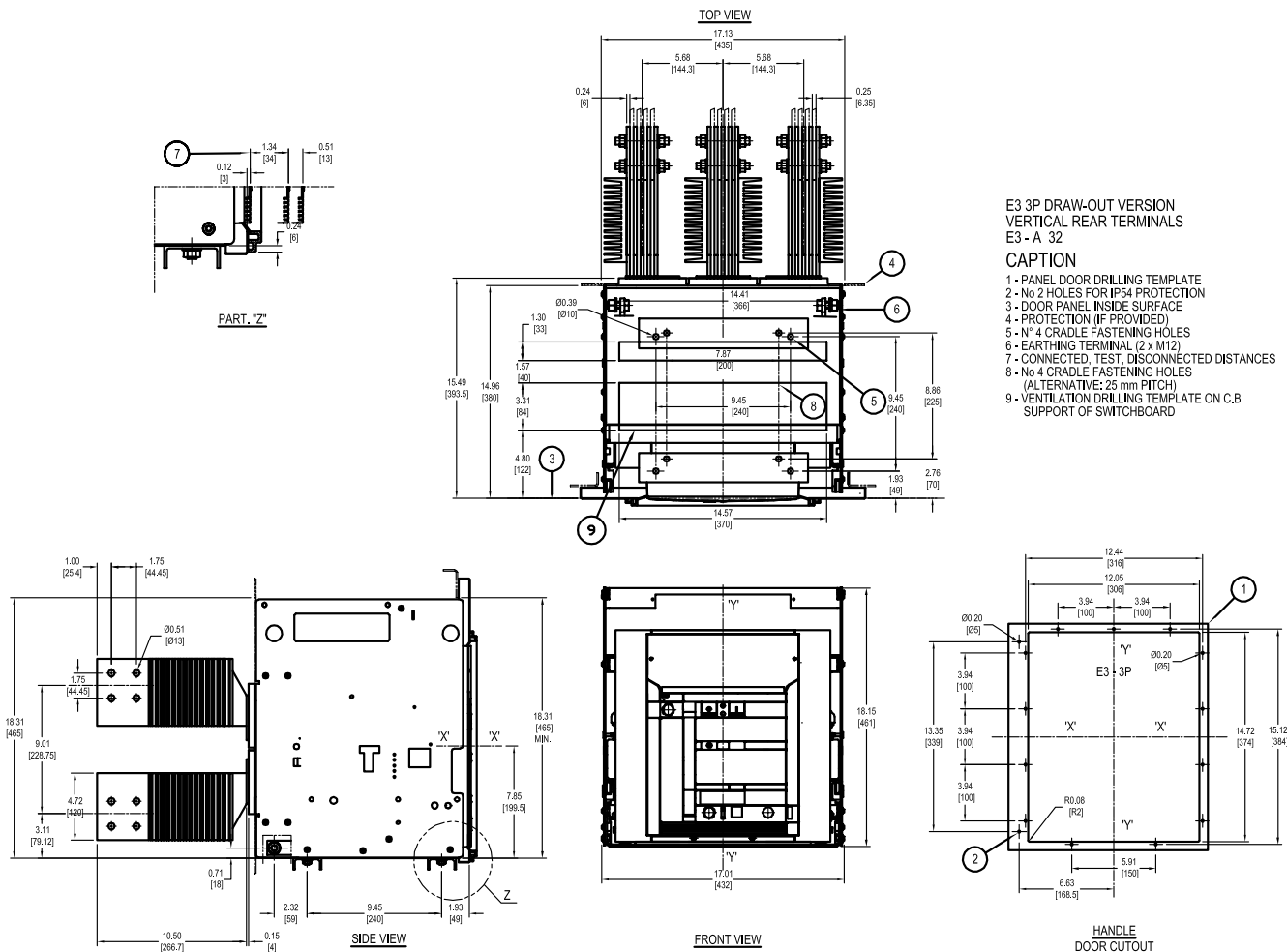


① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E3 (3200A), withdrawable with Vertical rear terminals, 3 pole

← 00.00 Inches
00.00 (Millimeters) →

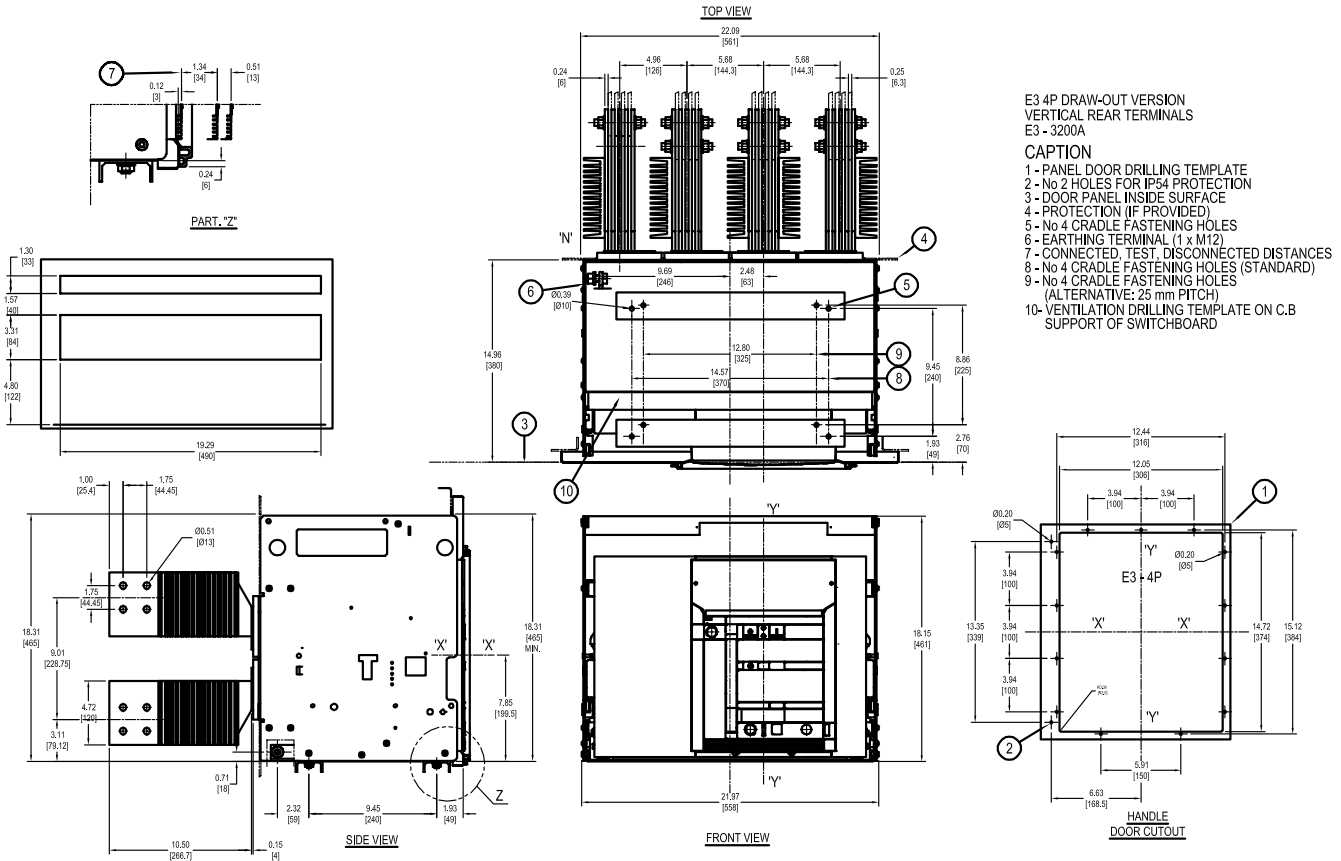


① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E3 (3200A), withdrawable with Vertical rear terminals, 4 pole

← 00.00 → Inches
00.00 → [Millimeters]

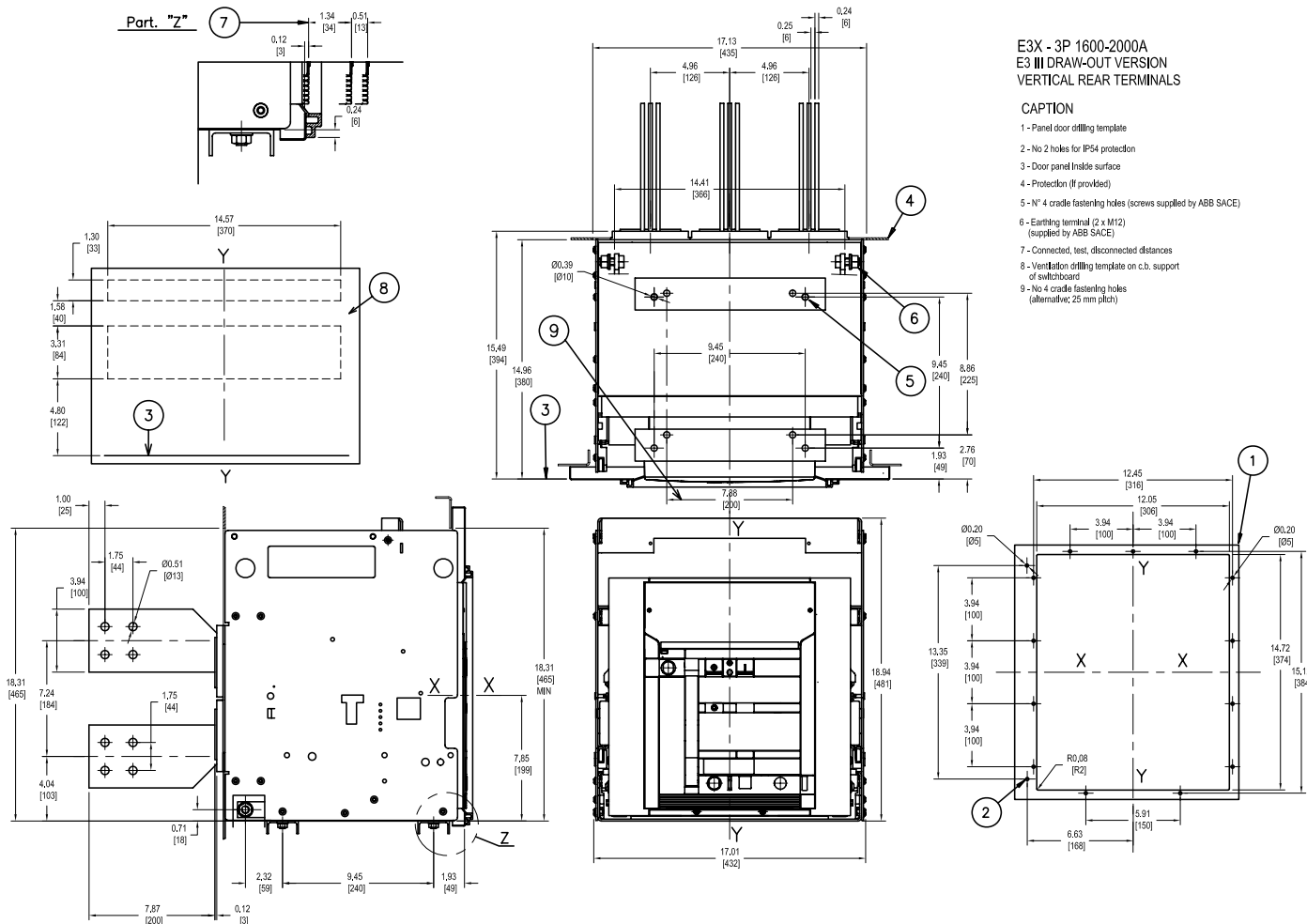


① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E3X Draw-out with Vertical rear terminals, 3 pole, 800-2000A

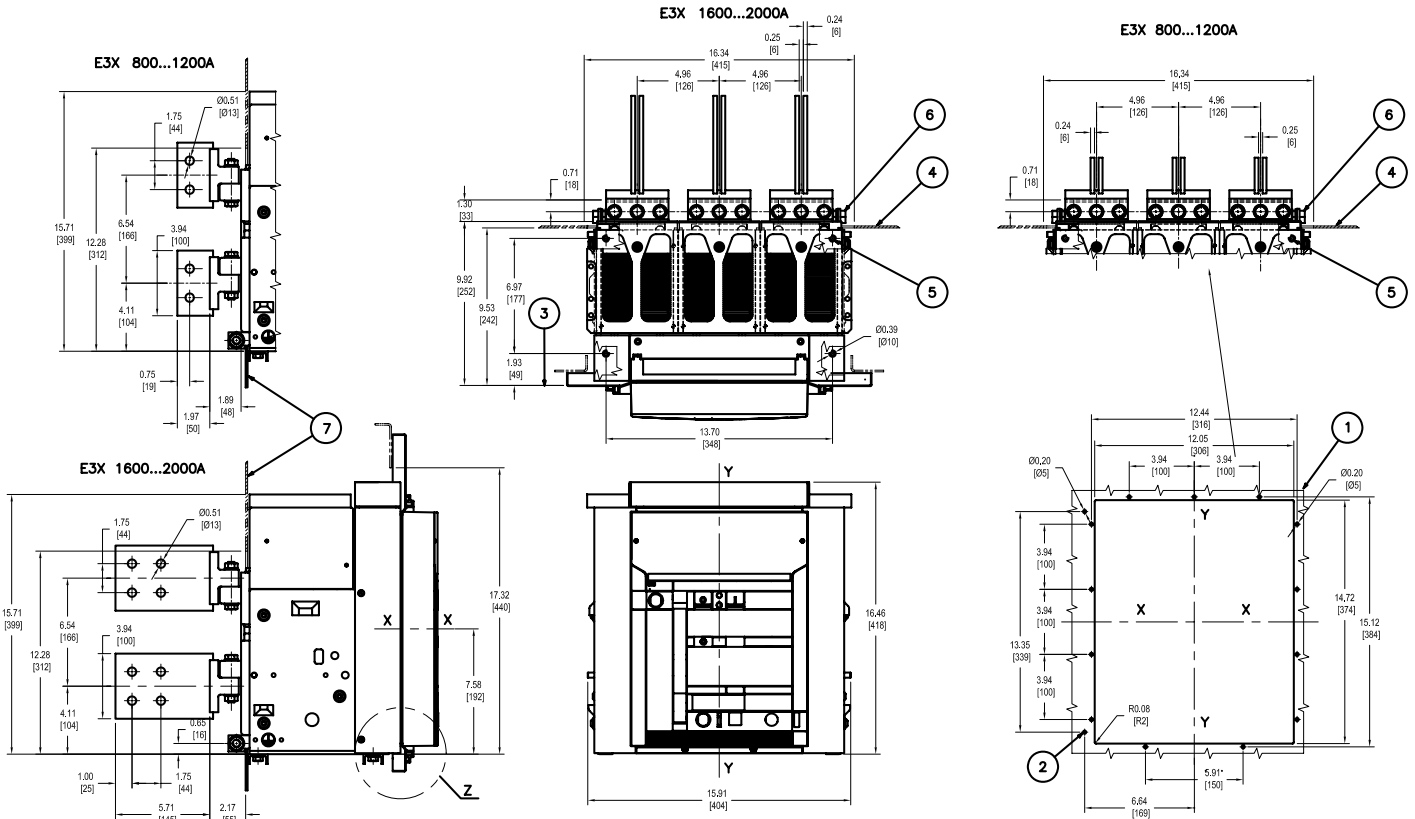
00.00 Inches
00.00 [Millimeters]



① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

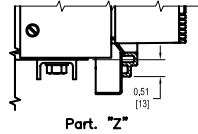
Approximate dimensions (for UL version) ①
E3X Fixed with
Vertical rear terminals, 3 pole, 800-2000A

00.00 Inches
00.00 [Millimeters]



E3X FIXED VERTICAL REAR TERMINALS

- CAPTION
- 1- PANEL DOOR DRILLING TEMPLATE
 - 2- No. 2 HOLES FOR IP54 PROTECTION
 - 3- DOOR PANEL INSIDE SURFACE
 - 4- PROTECTION (IF PROVIDED)
 - 5- CIRCUIT BREAKER FASTENING HOLES (4xM10)
 - 6- EARTHING TERMINALS (2xM12) (SUPPLIED BY ABB SACE)
 - 7- INSULATING SHEET OR INSULATED METALLIC SHEET

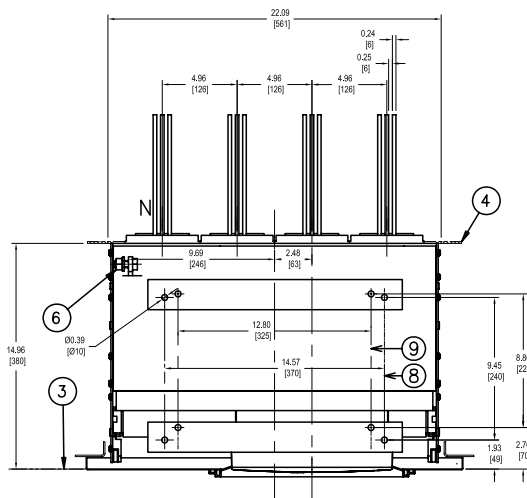
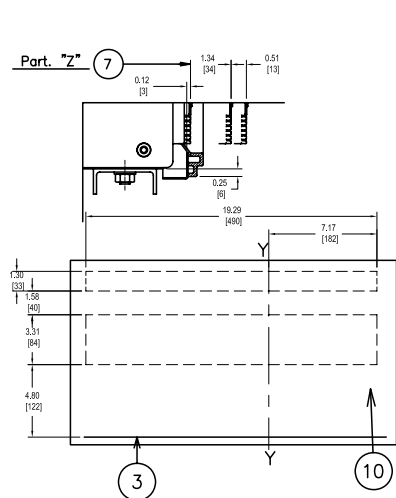


① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E3X Draw-out with Vertical rear terminals, 4 pole, 1600-2000A

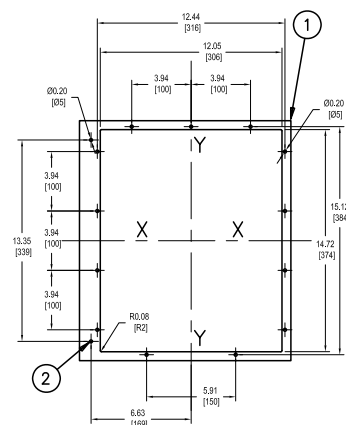
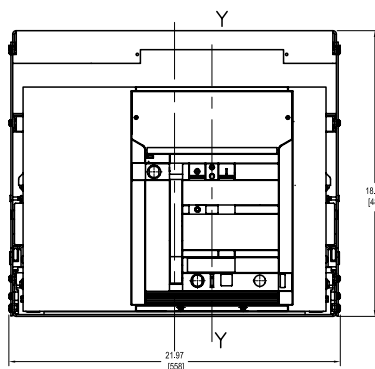
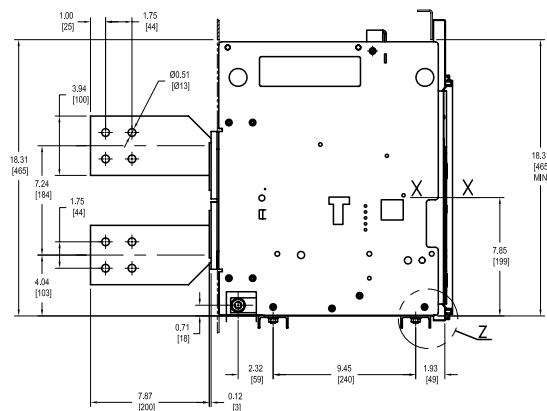
← 00.00 Inches
00.00 (Millimeters) →



E3X-A 4P 1600-200A
E3 IV DRAW-OUT VERSION
VERTICAL REAR TERMINALS

CAPTION

- 1 - Panel door drilling template
- 2 - No 2 holes for IP54 protection
- 3 - Door panel inside surface
- 4 - Protection (if provided)
- 6 - Earthing terminal (1 x M12) (supplied by ABB SACE)
- 7 - Connected, test, disconnected distances
- 8 - No 4 cradle fastening holes (Standard)
- 9 - No 4 cradle fastening holes (alternative: 25 mm pitch)
- 10 - Ventilation drilling template on c.b. support of switchboard

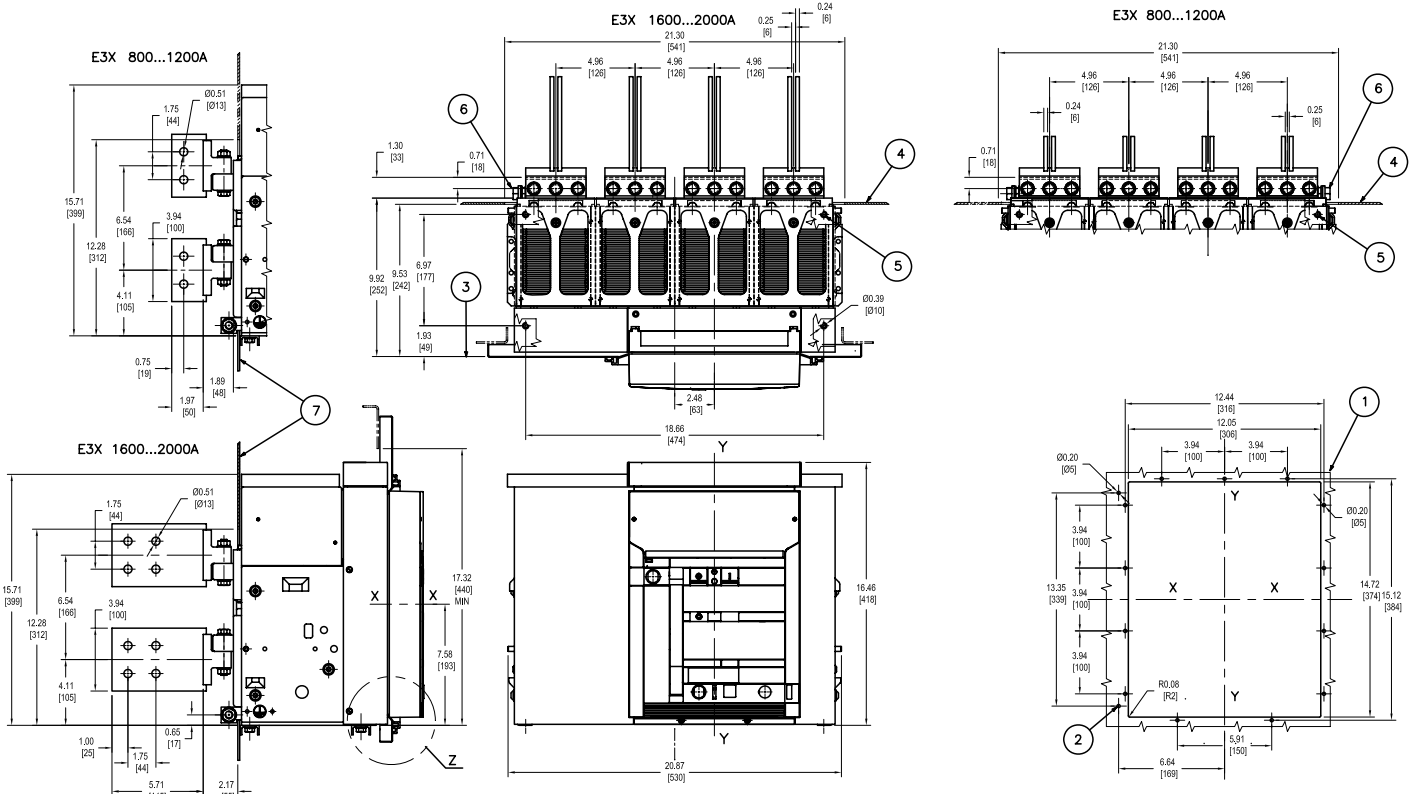


① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

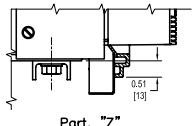
E3X Fixed with Vertical rear terminals, 4 pole, 800-2000A

← 00.00 → Inches
00.00 → [Millimeters]



E3X IV FIXED VERTICAL REAR TERMINALS

- CAPTION
- 1- PANEL DOOR DRILLING TEMPLATE
 - 2- No. 2 HOLES FOR IP54 PROTECTION
 - 3- DOOR PANEL INSIDE SURFACE
 - 4- PROTECTION (IF PROVIDED)
 - 5- CIRCUIT BREAKER FASTENING HOLES (4xM10)
 - 6- EARTHING TERMINALS (2xM12) (SUPPLIED BY ABB SACE)
 - 7- INSULATING SHEET OR INSULATED METALLIC SHEET



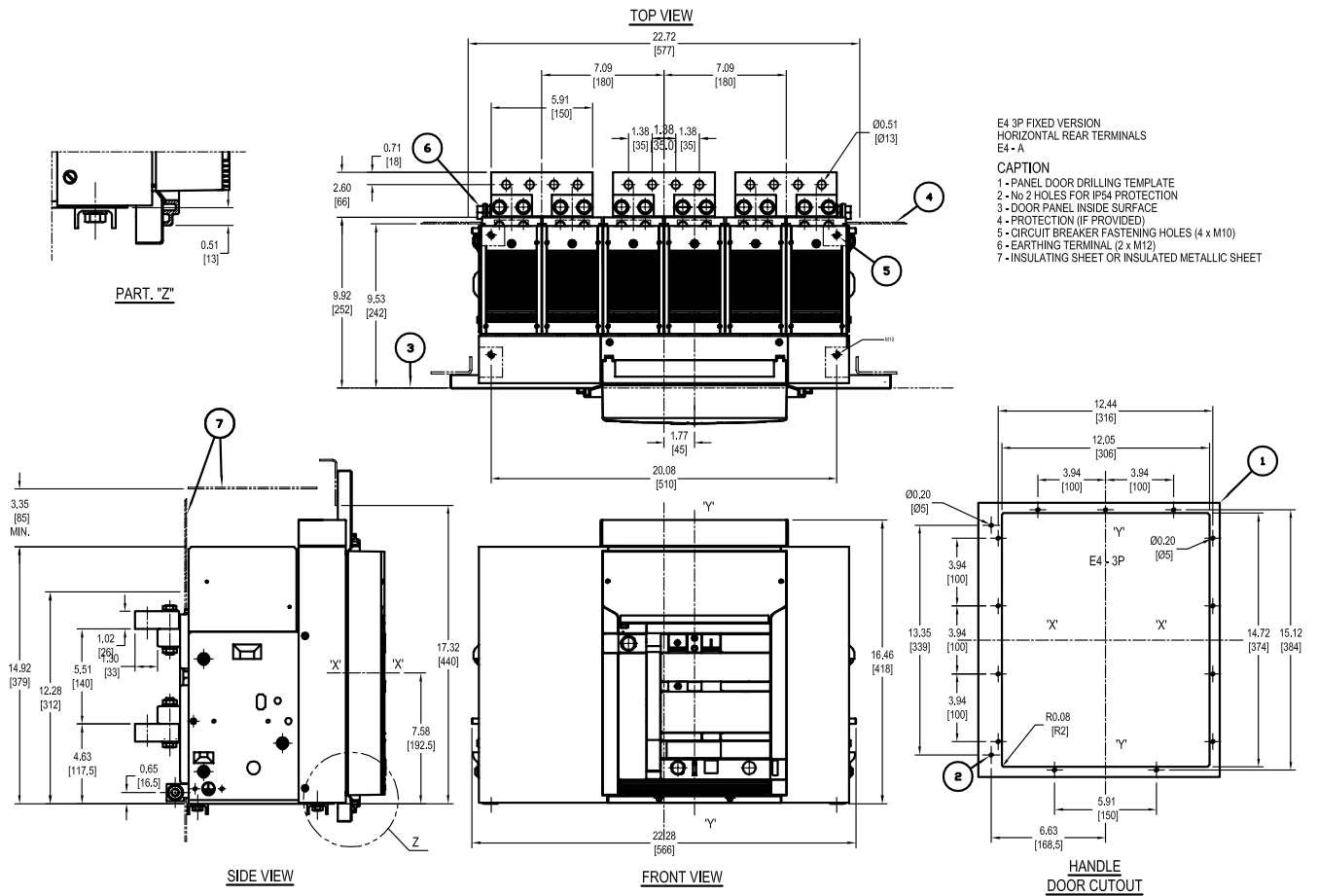
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E4, fixed with horizontal rear terminals

3 pole

← 00.00 Inches
00.00 → [Millimeters]



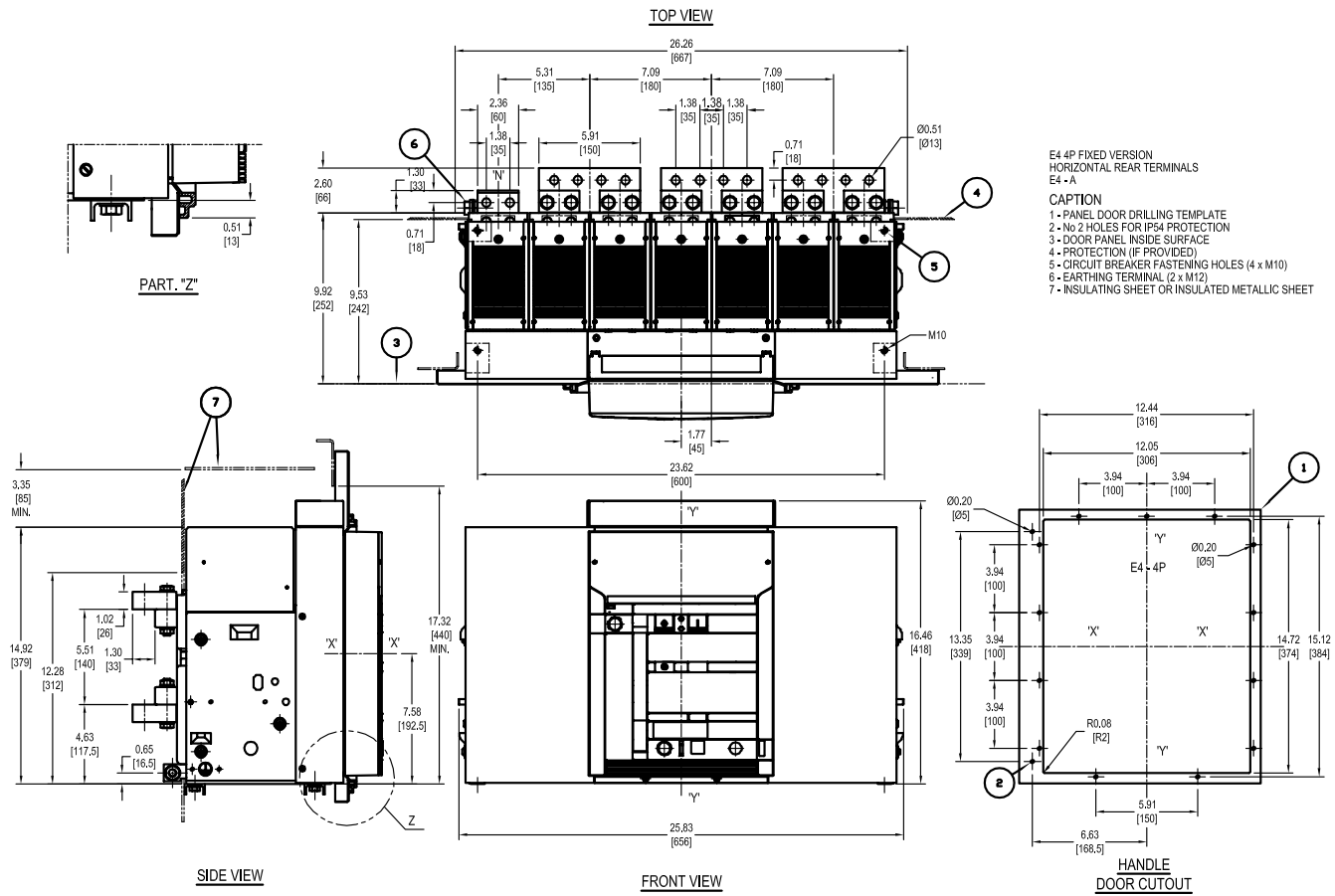
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E4, fixed with horizontal rear terminals

4 pole (50% neutral)

← 00.00 → Inches
00.00 [Millimeters]



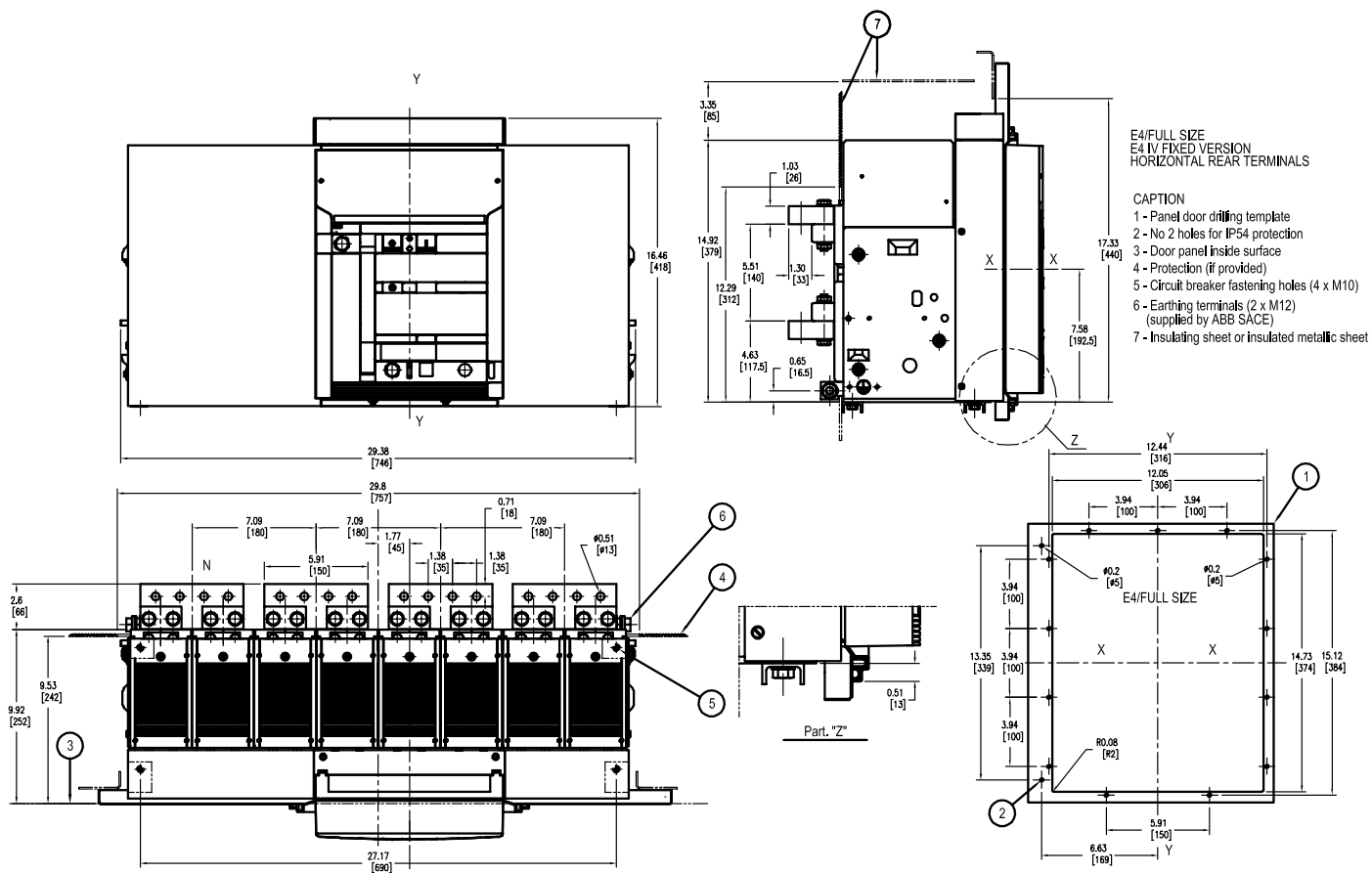
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E4, fixed with horizontal rear terminals

4 pole (100% neutral)

← 00.00 Inches
00.00 → [Millimeters]



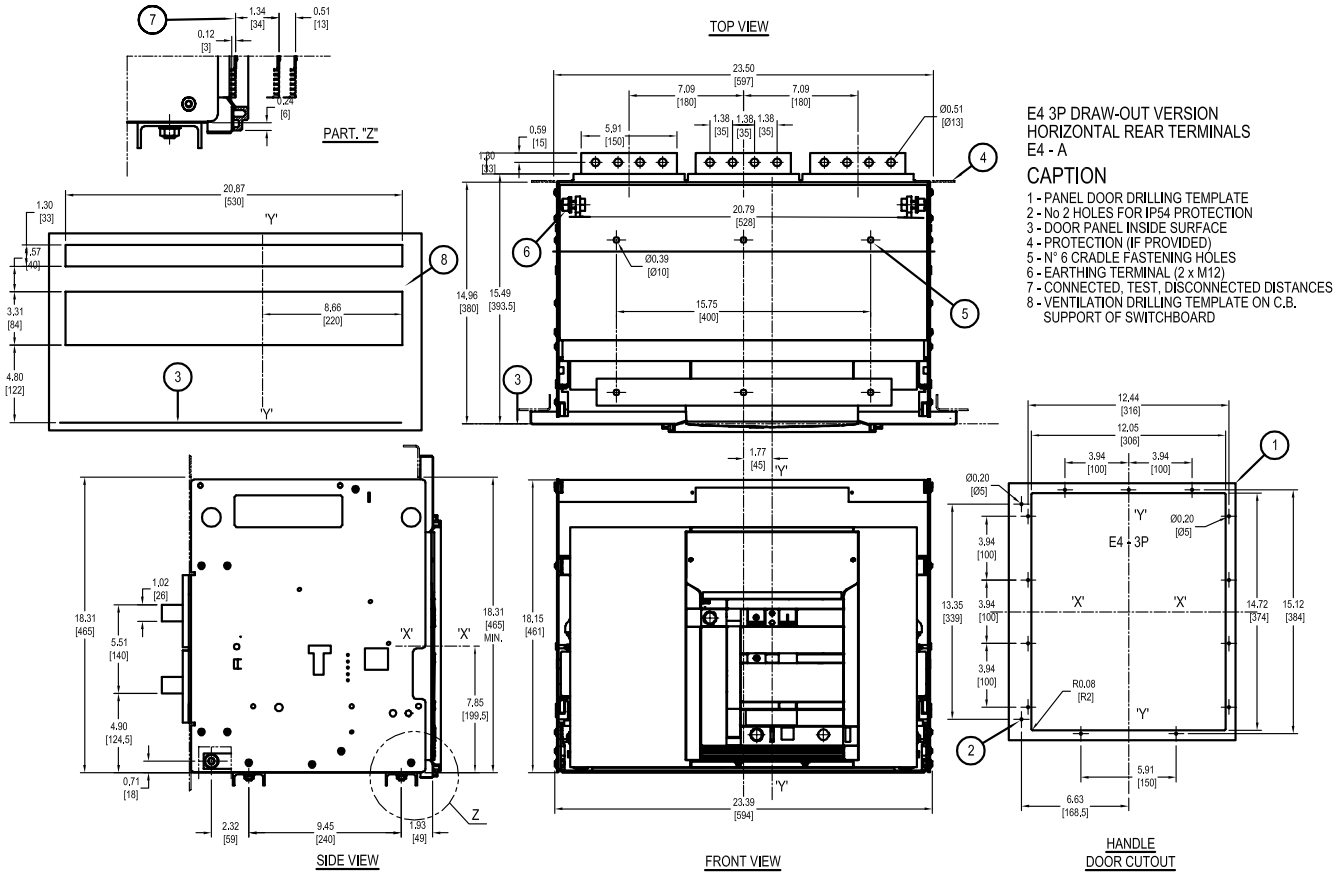
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E4, withdrawable with horizontal rear terminals

3 pole

← 00.00 → Inches
00.00 → [Millimeters]



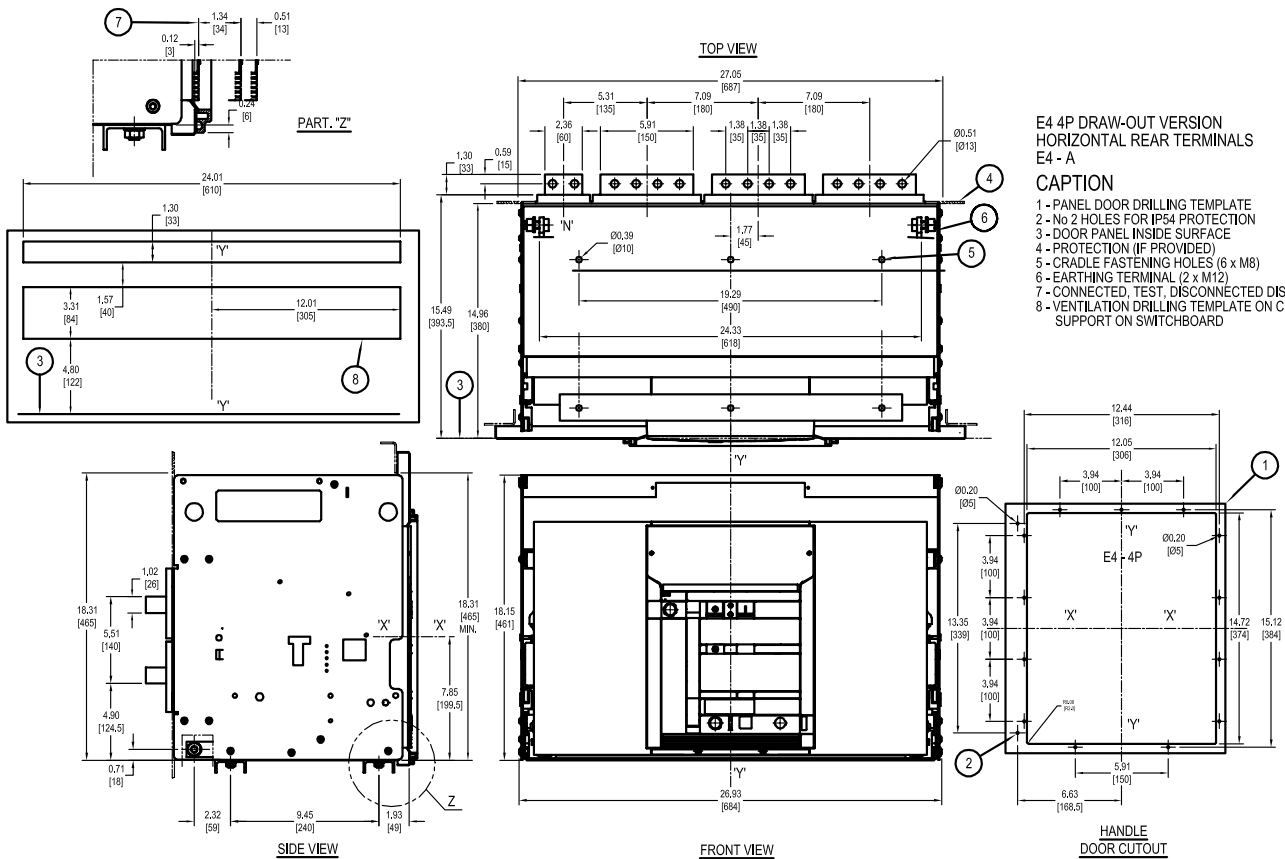
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E4, withdrawable with horizontal rear terminals

4 pole (50% neutral)

← 00.00 Inches
00.00 Millimeters →



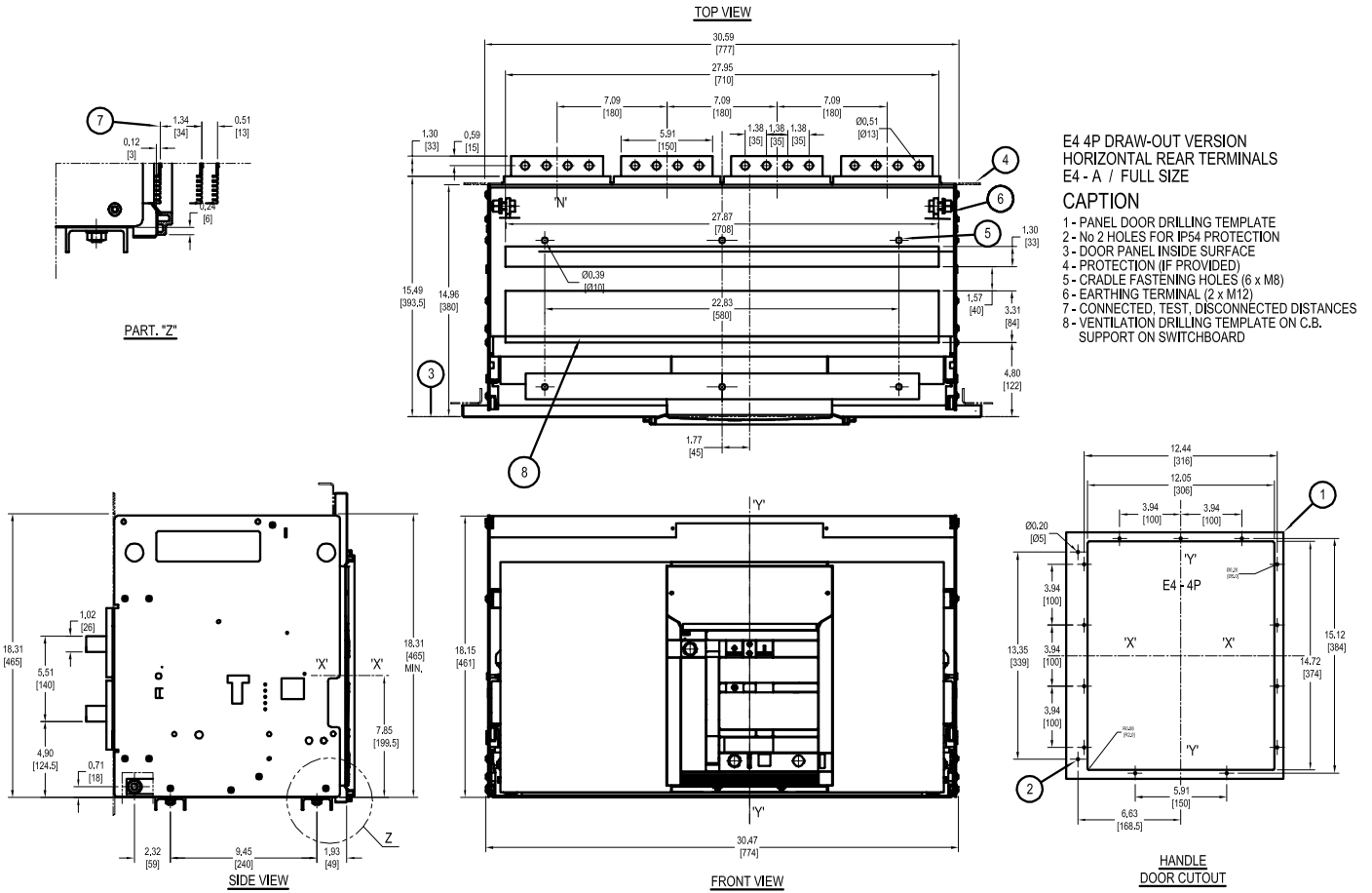
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E4, withdrawable with horizontal rear terminals

4 pole (100% neutral)

← 00.00 → Inches
00.00 → Millimeters



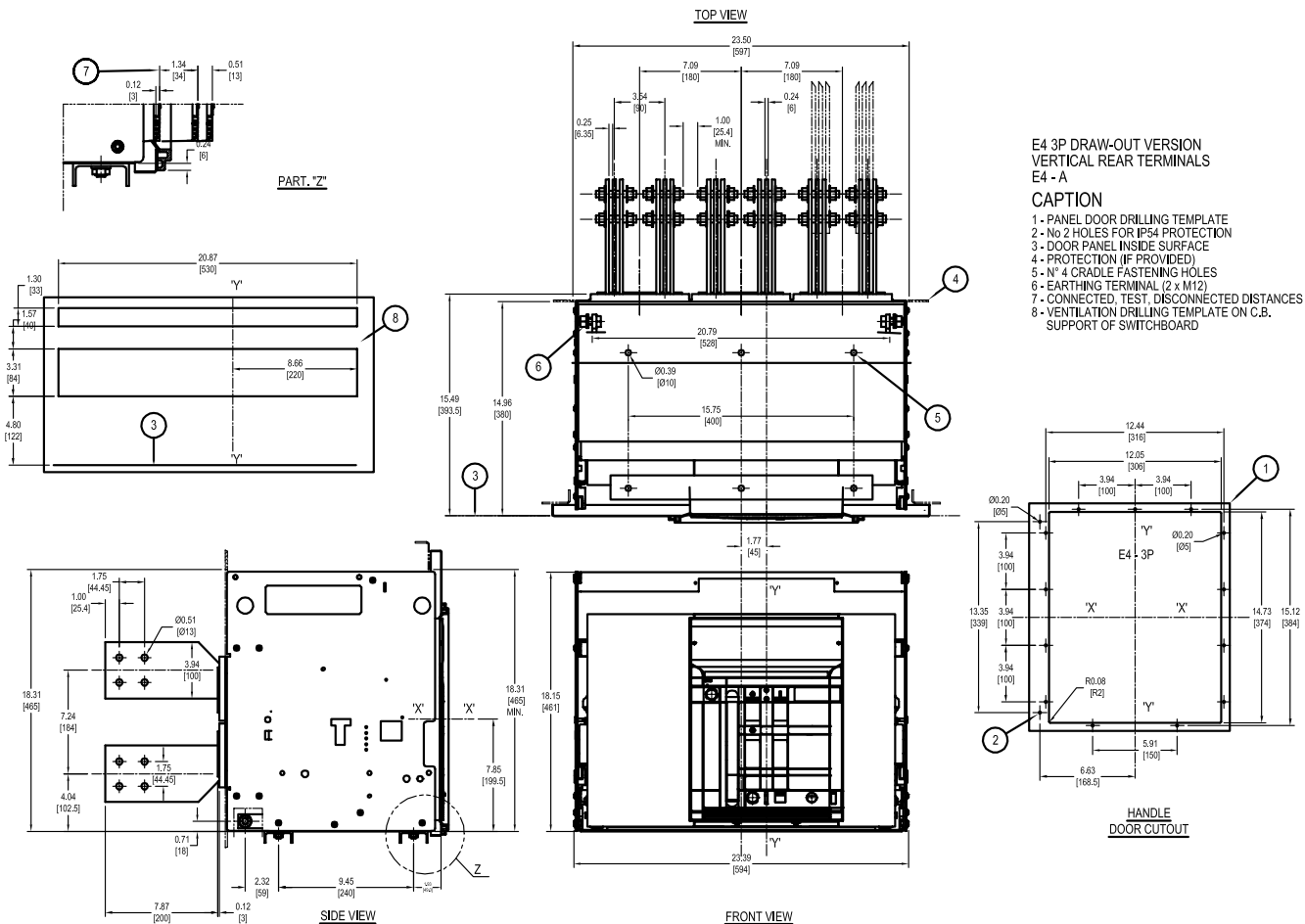
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E4, withdrawable with vertical rear terminals

3 pole

← 00.00 Inches
00.00 → [Millimeters]



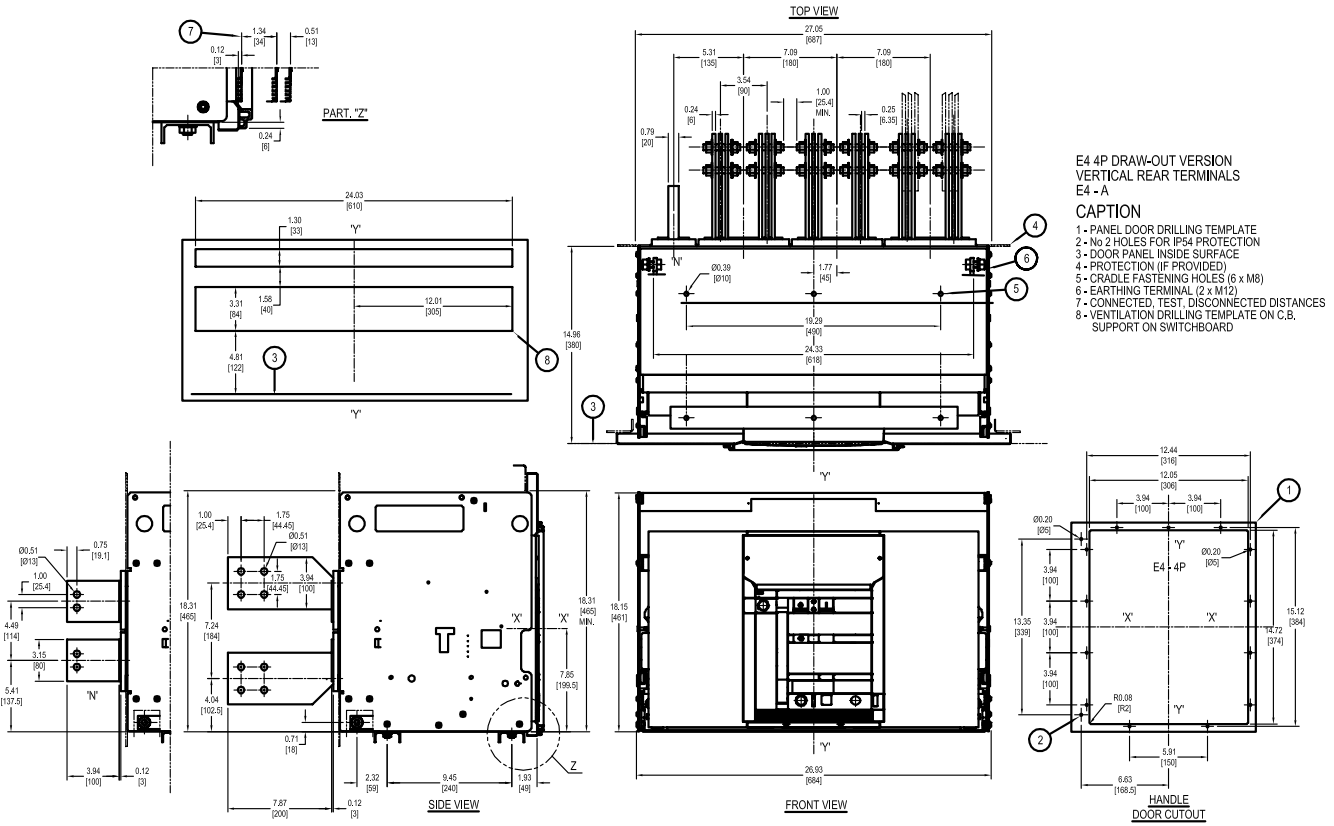
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E4, withdrawable with vertical rear terminals

4 pole (50% neutral)

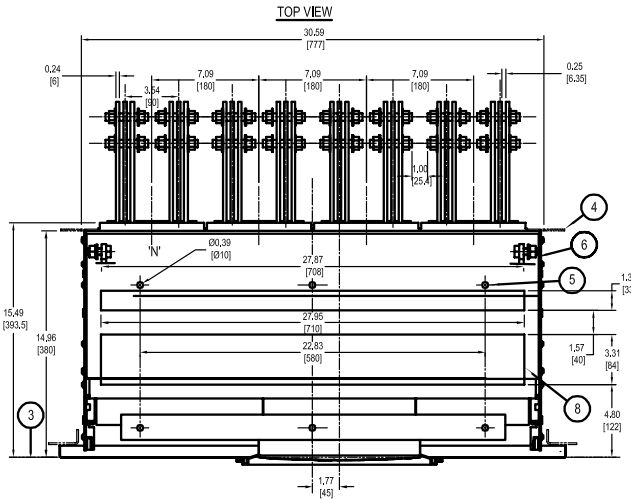
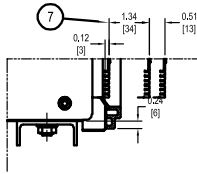
00.00 Inches
00.00 [Millimeters]



① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①
E4, withdrawable with vertical rear terminals
4 pole (100% neutral)

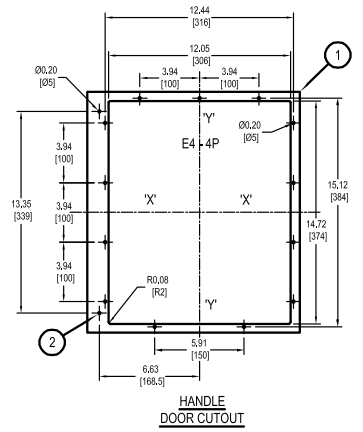
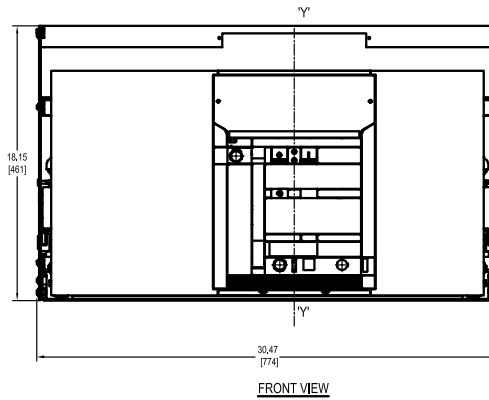
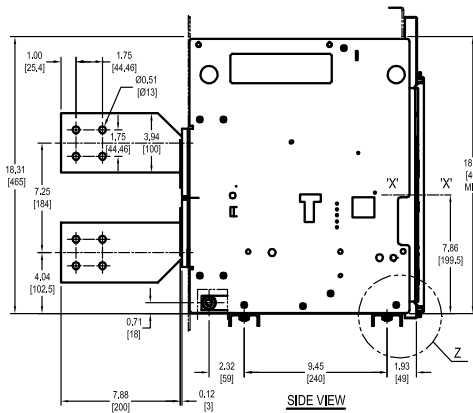
← 00.00 → Inches
00.00 → Millimeters



E4 4P DRAW-OUT VERSION
VERTICAL REAR TERMINALS
E4 - A / FULL SIZE

CAPTION

- 1 - PANEL DOOR DRILLING TEMPLATE
- 2 - No 2 HOLES FOR IP54 PROTECTION
- 3 - DOOR PANEL INSIDE SURFACE
- 4 - PROTECTION (IF PROVIDED)
- 5 - CRADLE FASTENING HOLES (6 x M8)
- 6 - EARTHING TERMINAL (2 x M12)
- 7 - CONNECTED, TEST, DISCONNECTED DISTANCES
- 8 - VENTILATION DRILLING TEMPLATE ON C.B. SUPPORT ON SWITCHBOARD



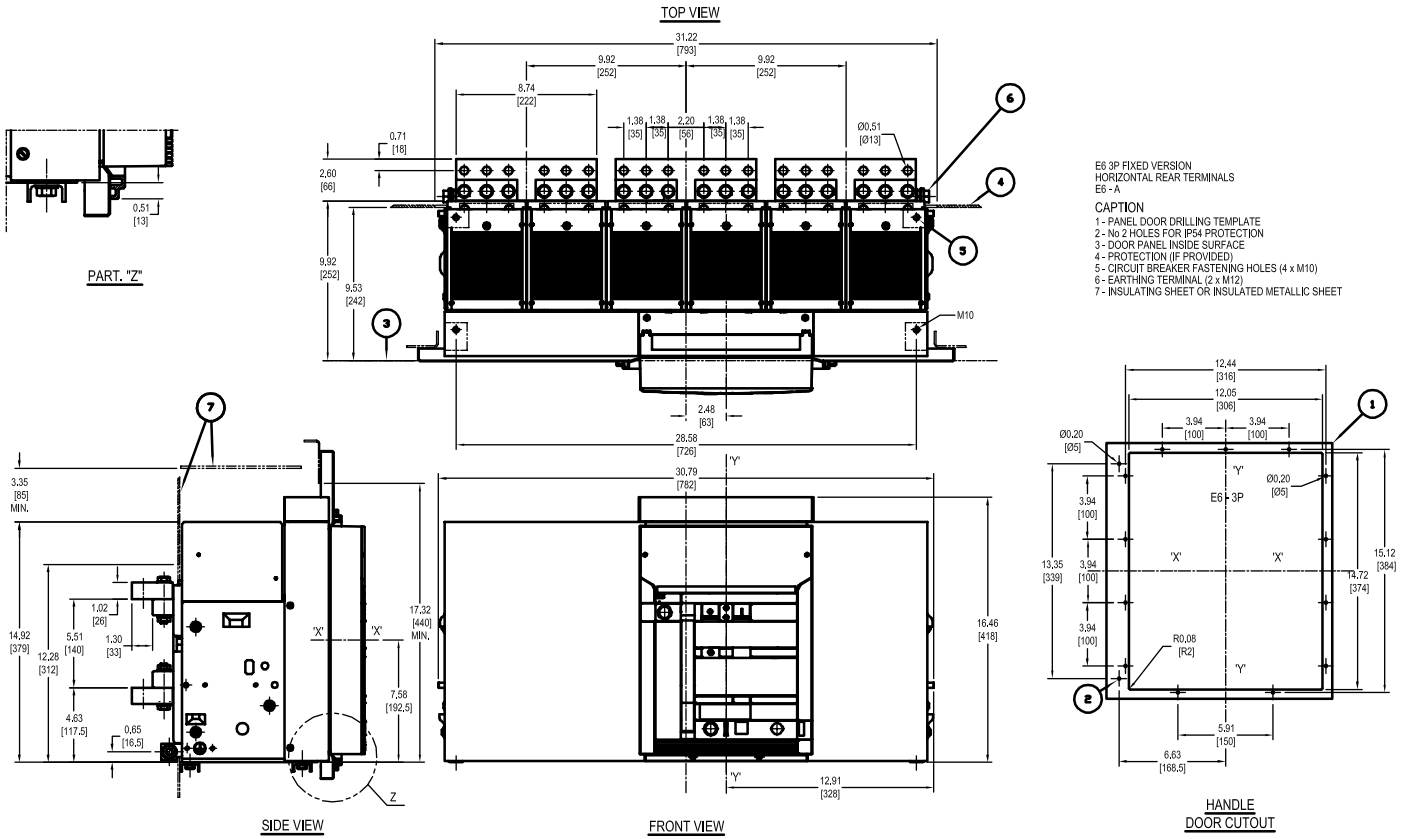
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E6, fixed with horizontal rear terminals

3 pole

← 00.00 → Inches
00.00 → [Millimeters]



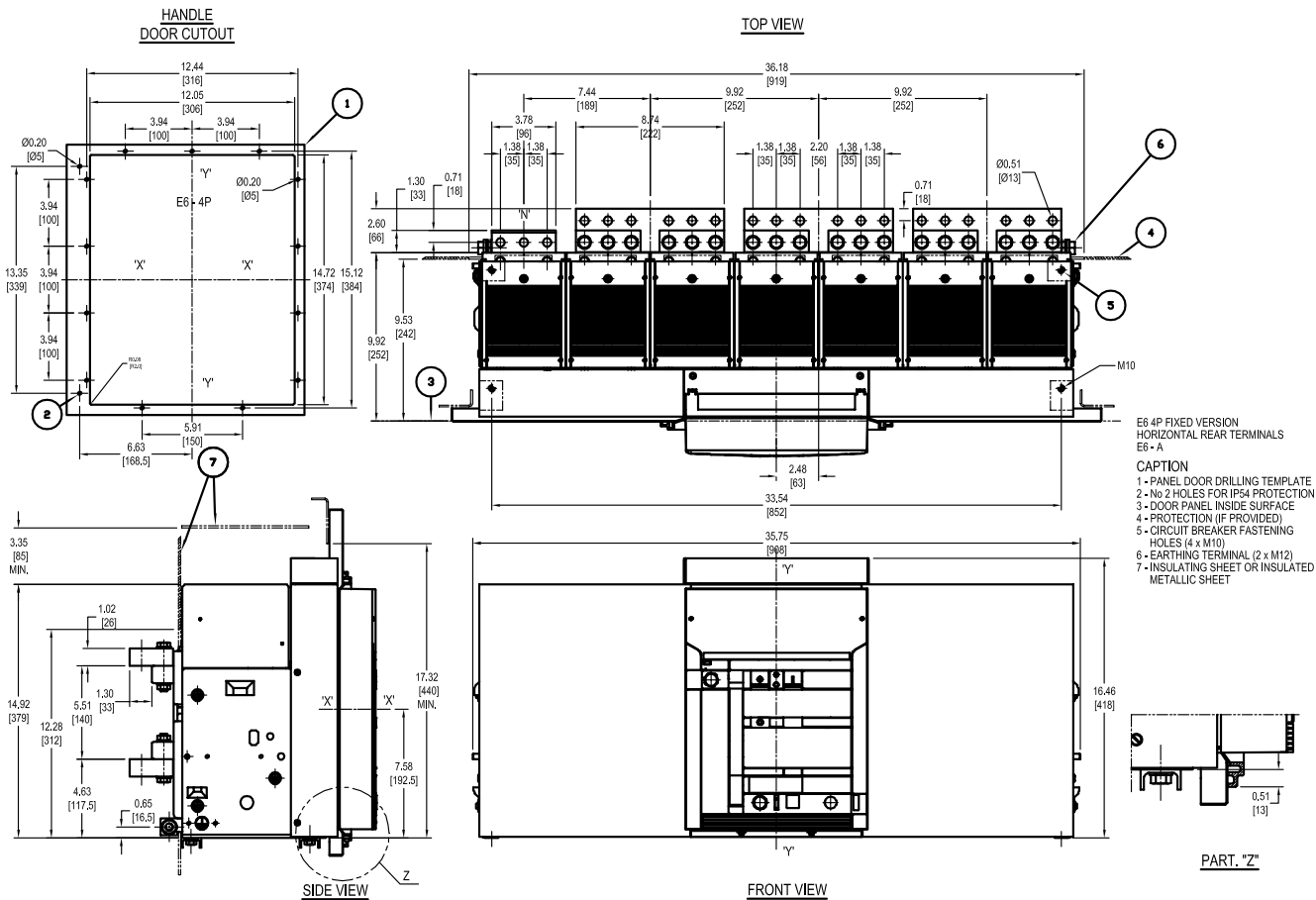
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E6, fixed with horizontal rear terminals

4 pole (50% neutral)

00.00 Inches
00.00 [Millimeters]



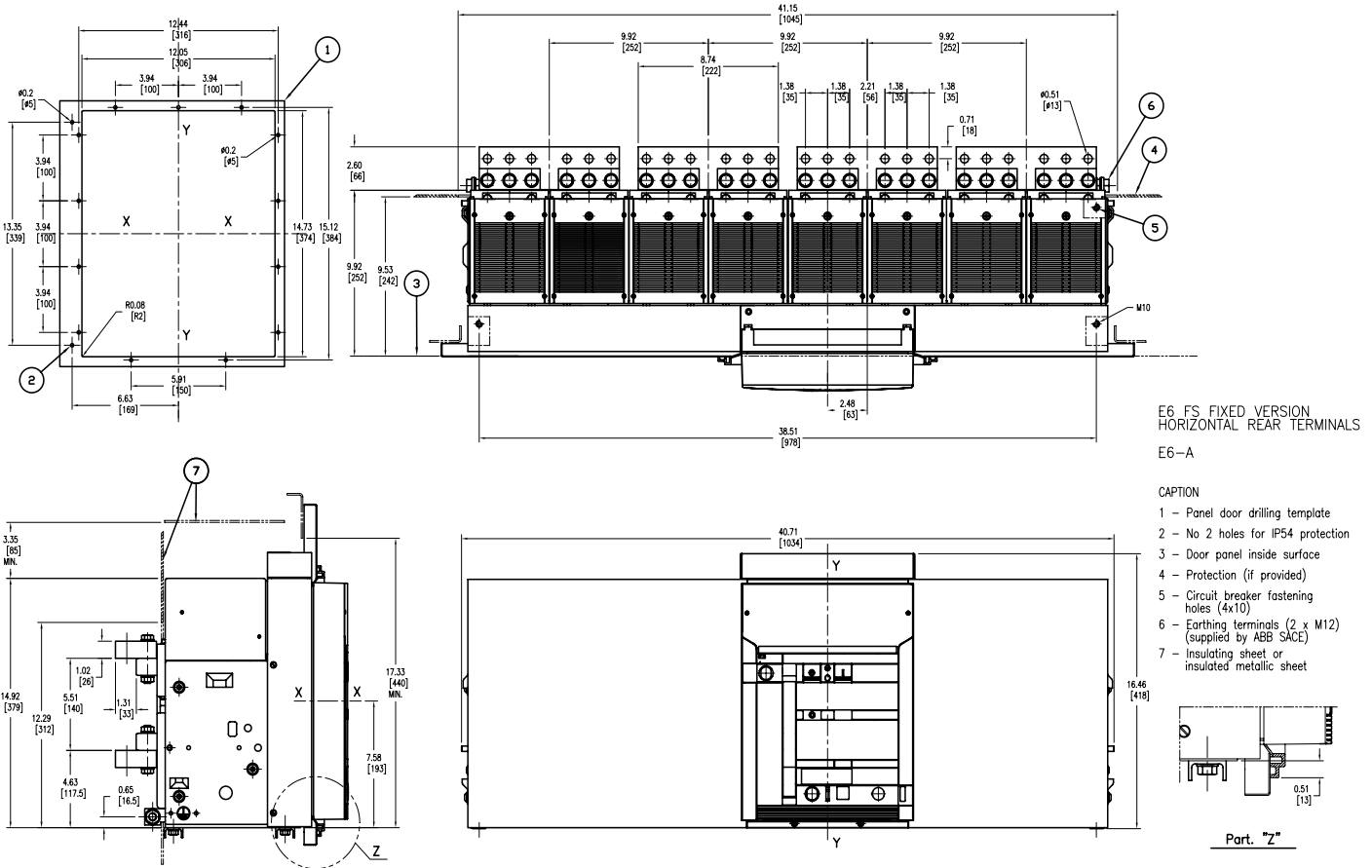
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E6, fixed with horizontal rear terminals

4 pole (100% neutral)

00.00 Inches
00.00 [Millimeters]



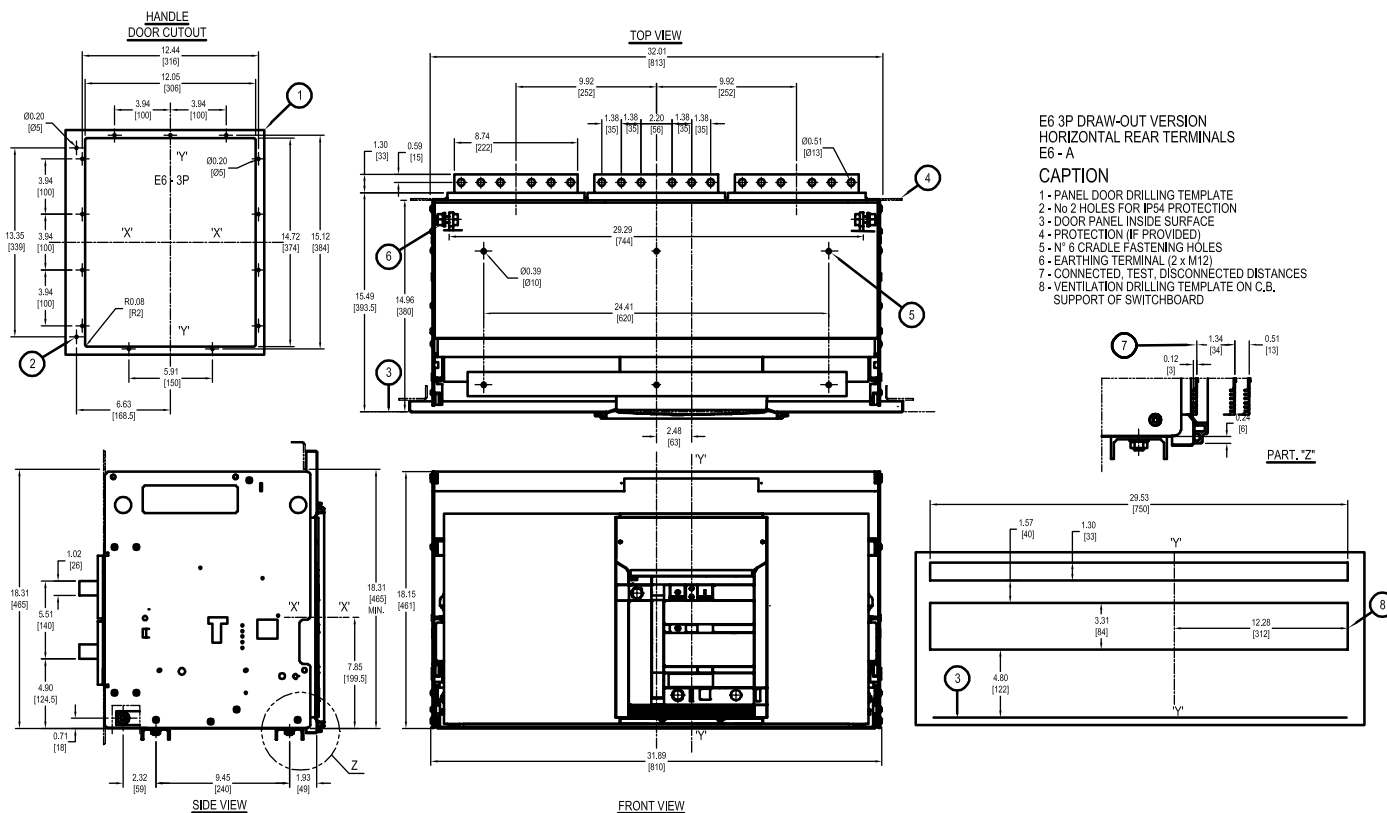
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E6, withdrawable with horizontal rear terminals

3 pole

00.00 → Inches
00.00 → [Millimeters]



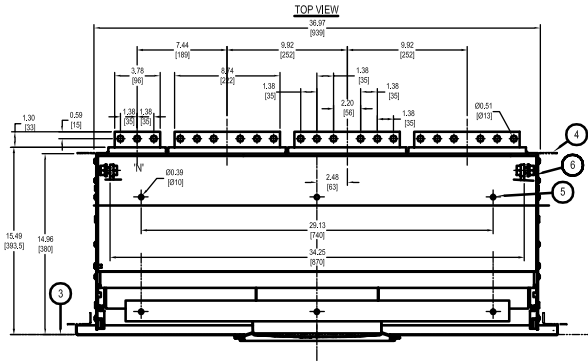
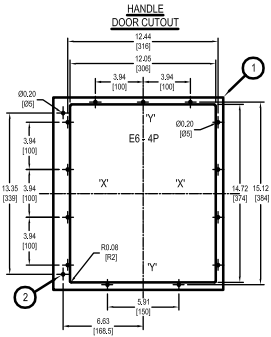
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E6, withdrawable with horizontal rear terminals

4 pole (50% neutral)

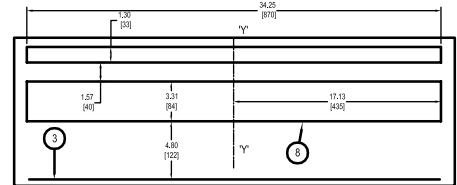
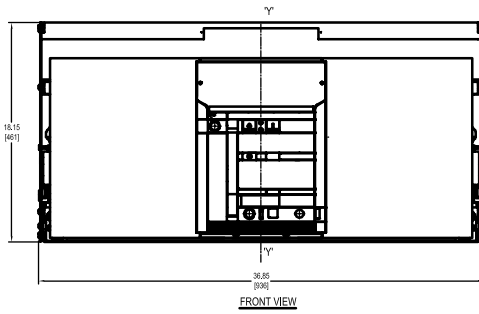
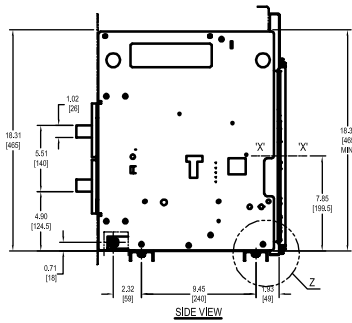
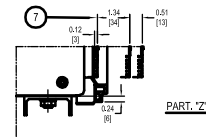
← 00.00 → Inches
00.00 → [Millimeters]



E6 4P DRAW-OUT VERSION
HORIZONTAL REAR TERMINALS
E6 - A

CAPTION

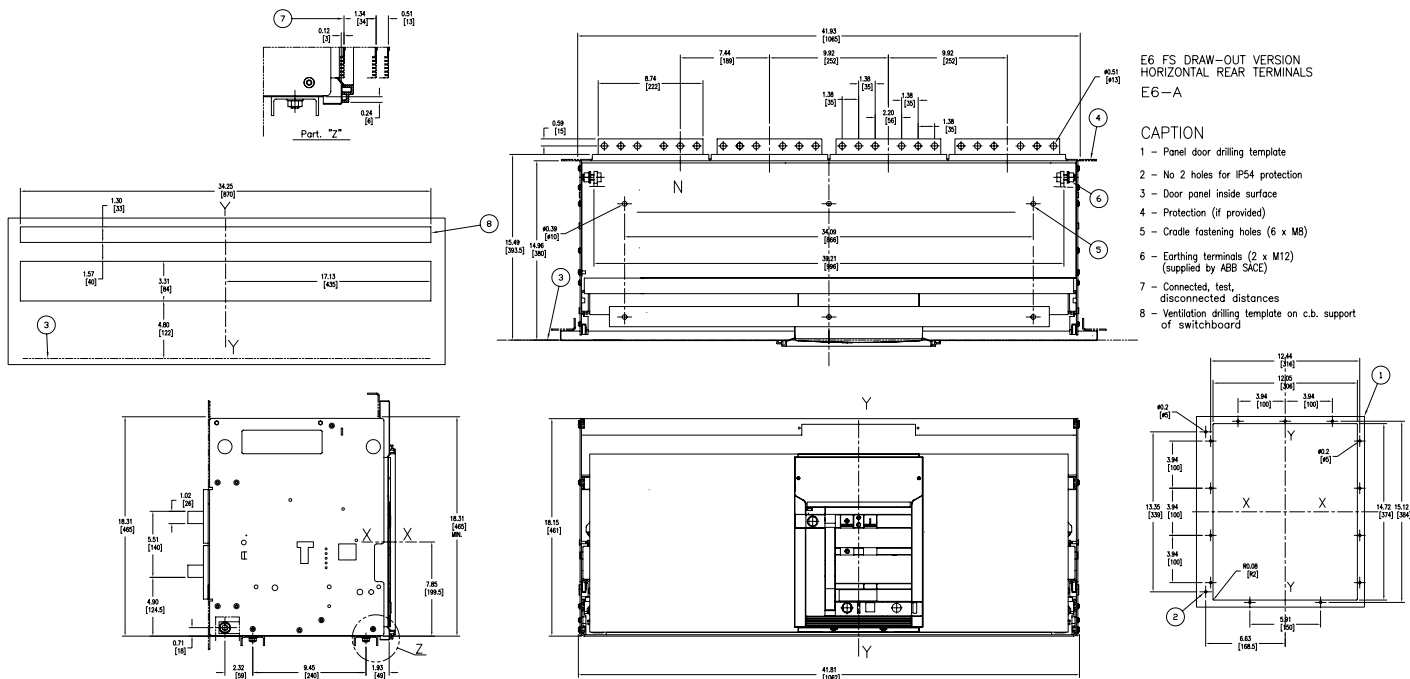
- 1 - PANEL DOOR DRILLING TEMPLATE
- 2 - NO 2 HOLES FOR IP54 PROTECTION
- 3 - DOOR PANEL INSIDE SURFACE
- 4 - PROTECTION (IF PROVIDED)
- 5 - CRADLE FASTENING HOLES (6 x M8)
- 6 - EARTHING TERMINAL (2 x M12)
- 7 - CONNECTED, TEST, DISCONNECTED DISTANCES
- 8 - VENTILATION DRILLING TEMPLATE ON C.B. SUPPORT ON SWITCHBOARD



① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ① E6, withdrawable with horizontal rear terminals 4 pole (100% neutral)

00.00 Inches
00.00 [Millimeters]



E6 FS DRAW-OUT VERSION
HORIZONTAL REAR TERMINALS
E6-A

- CAPTION
- 1 - Panel door drilling template
 - 2 - No 2 holes for IP54 protection
 - 3 - Door panel inside surface
 - 4 - Protection (if provided)
 - 5 - Cradle fastening holes (6 x M8)
 - 6 - Earthing terminals (2 x M12) (supplied by ABB SACE)
 - 7 - Connected, test, disconnected distances
 - 8 - Ventilation drilling template on c.b. support of switchboard

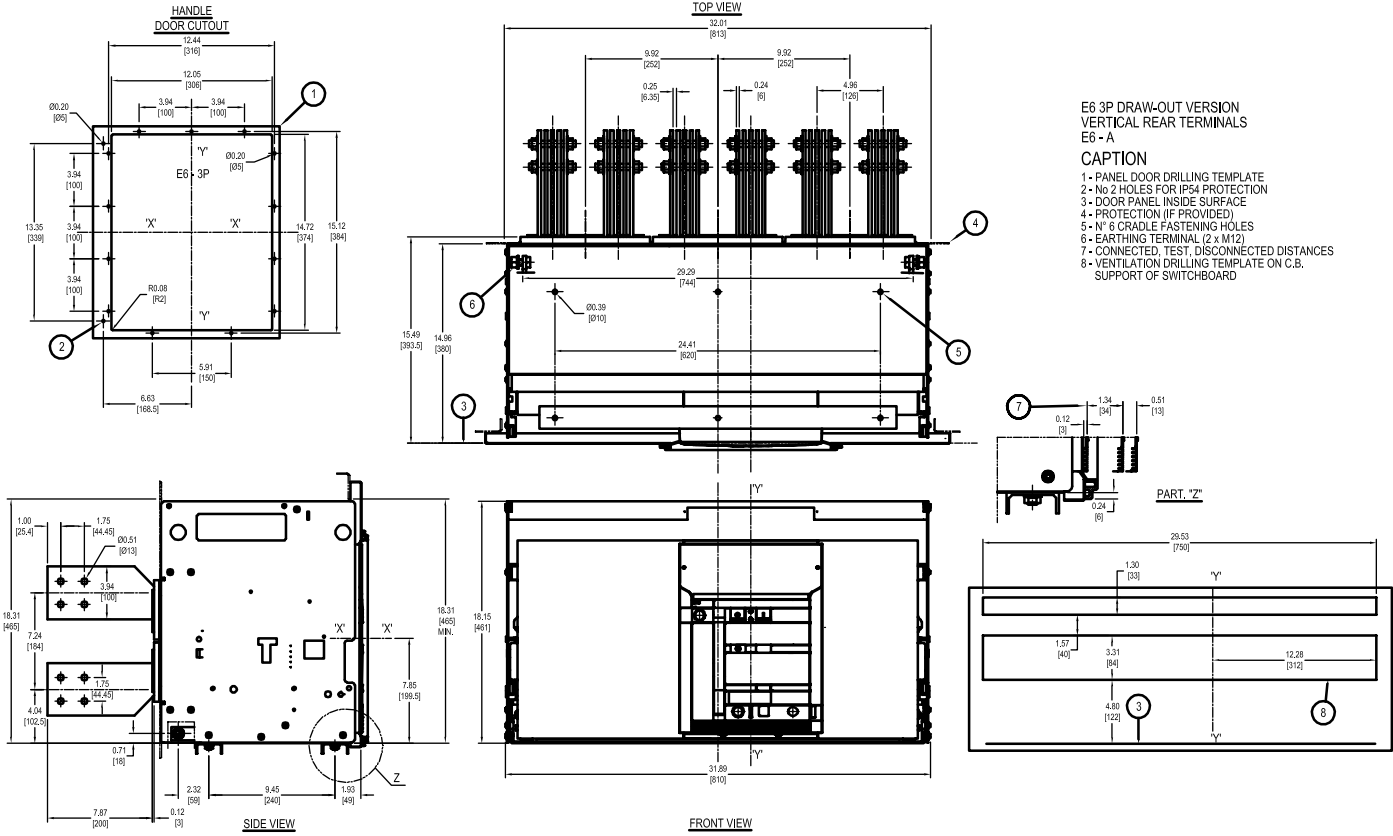
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E6, withdrawable with vertical rear terminals

3 pole

← 00.00 → Inches
00.00 → [Millimeters]



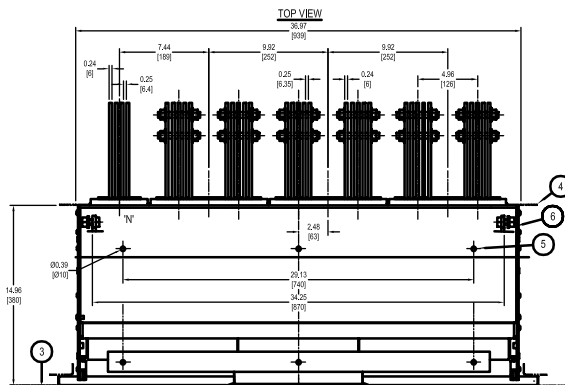
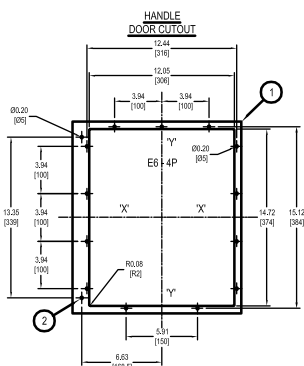
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

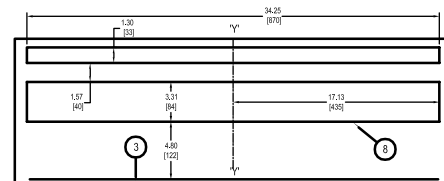
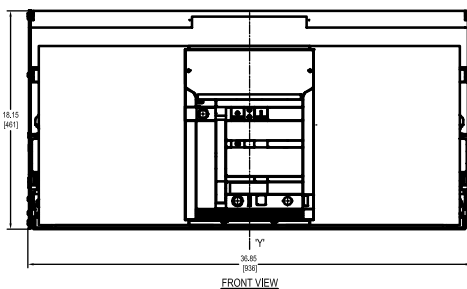
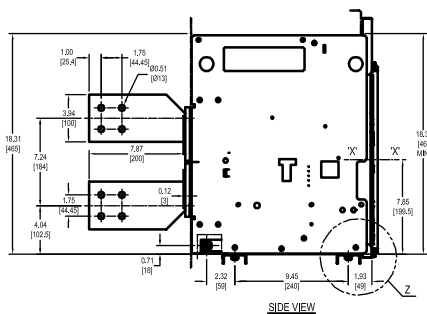
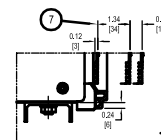
E6, withdrawable with vertical rear terminals

4 pole (50% neutral)

← 00.00 Inches
00.00 [Millimeters]



E6 4P DRAW-OUT VERSION
VERTICAL REAR TERMINALS
E6 - A
CAPTION
1 - PANEL DOOR DRILLING TEMPLATE
2 - NO 2 HOLES FOR IP54 PROTECTION
3 - DOOR PANEL INSIDE SURFACE
4 - PROTECTION (IF PROVIDED)
5 - CRADLE FASTENING HOLES (6 x M8)
6 - EARTHING TERMINAL (2 x M12)
7 - CONNECTED, TEST, DISCONNECTED DISTANCES
8 - VENTILATION DRILLING TEMPLATE ON C.B. SUPPORT ON SWITCHBOARD



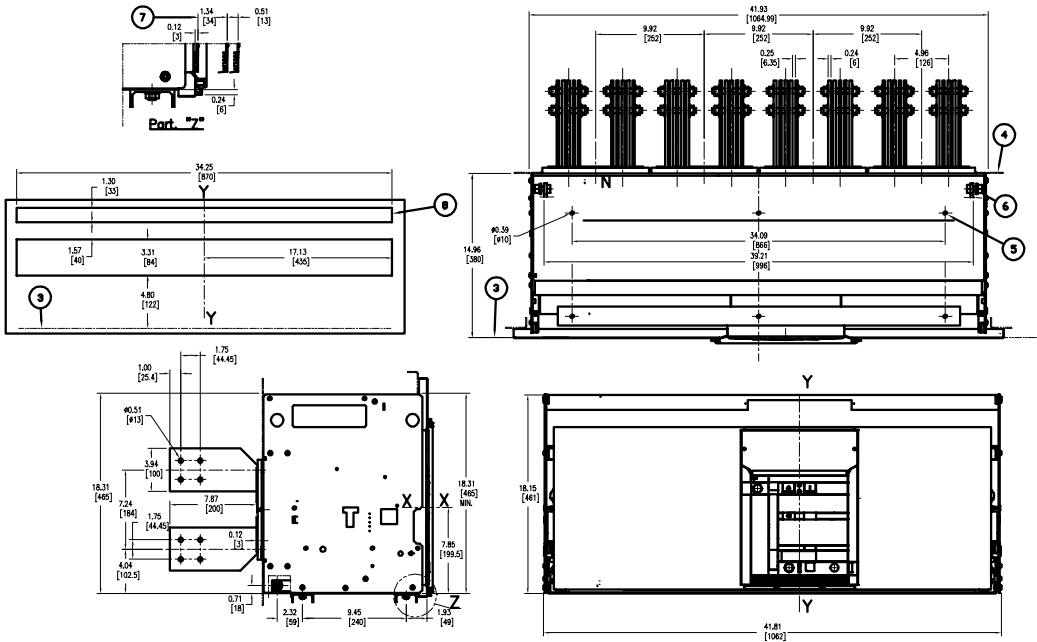
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E6, withdrawable with vertical rear terminals

4 pole (100% neutral)

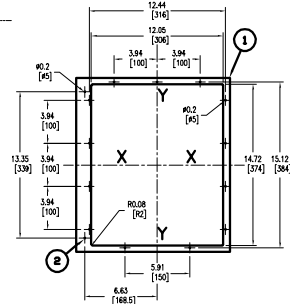
← 00.00 → Inches
00.00 → [Millimeters]



E6 FS DRAW-OUT VERSION VERTICAL REAR TERMINALS E6-A

CAPTION

- 1 - Panel door drilling template
- 2 - No 2 holes for IP54 protection
- 3 - Door panel inside surface
- 4 - Protection (if provided)
- 5 - Cradle fastening holes (6 x M8)
- 6 - Earthing terminals (2 x M12) (supplied by ABB SACE)
- 7 - Connected, test, disconnected distances
- 8 - Ventilation drilling template on c.b. support on switchboard



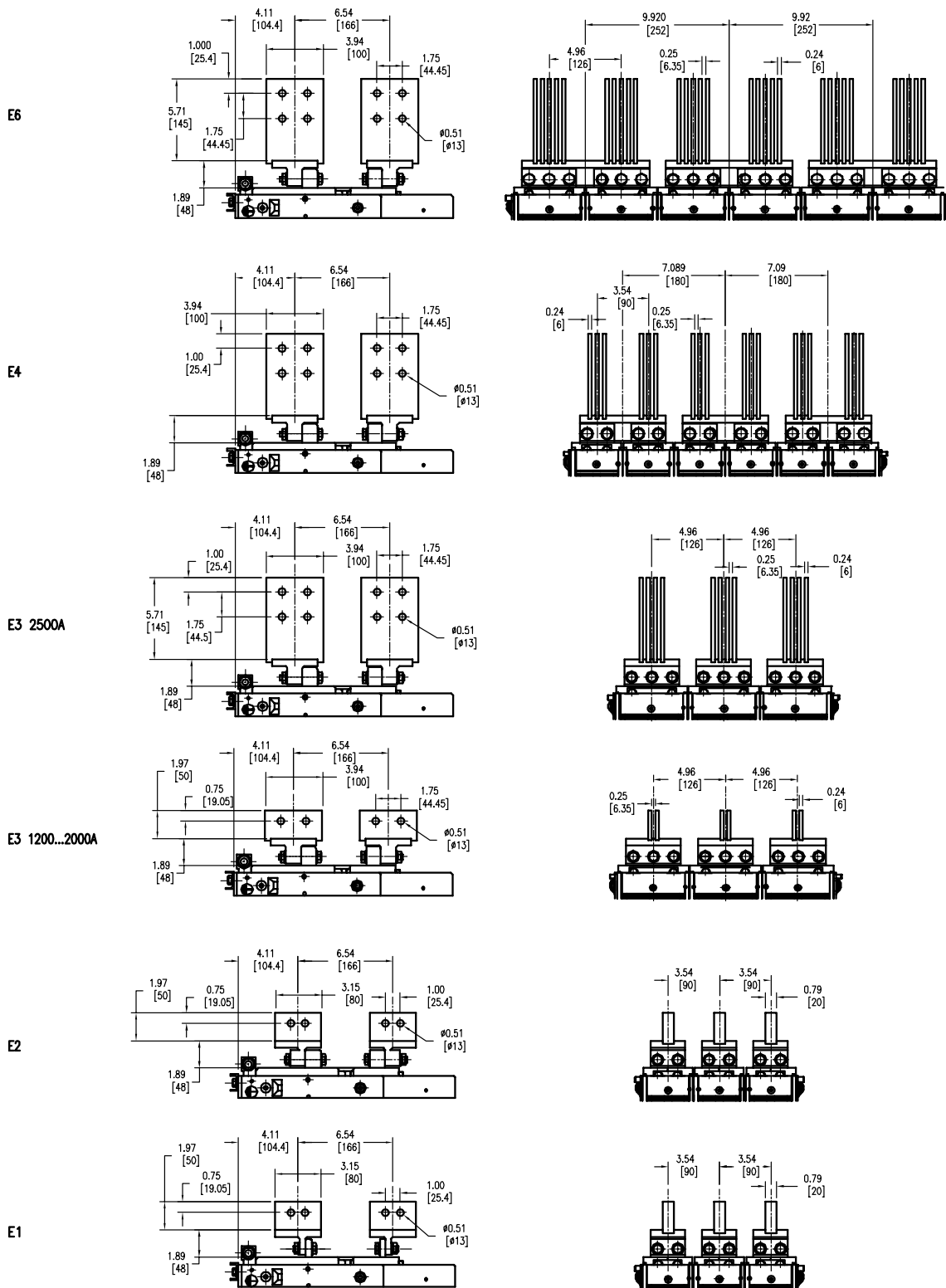
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E1 - E6, fixed with vertical rear terminals

3 pole

00.00 Inches
00.00 [Millimeters]



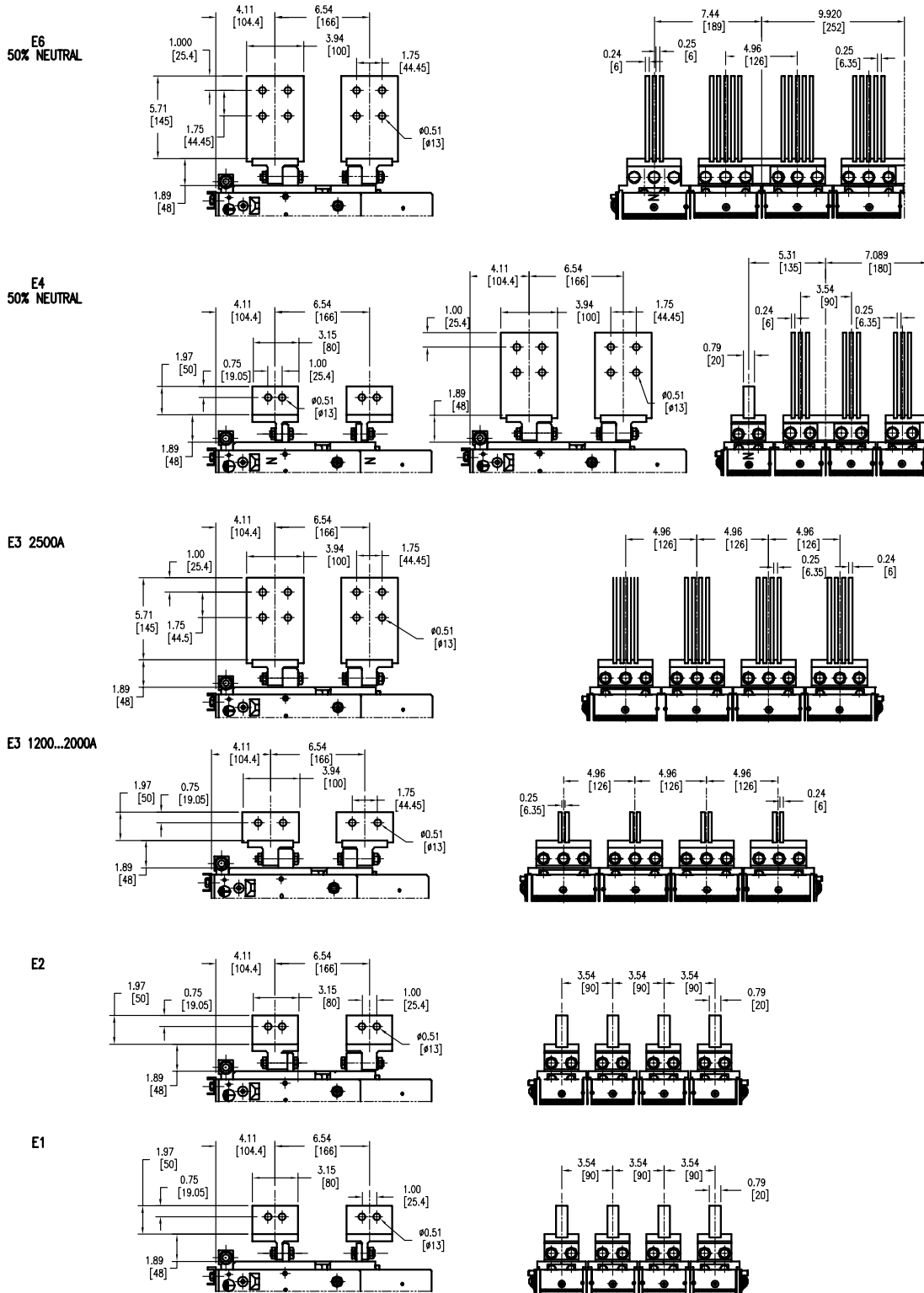
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions (for UL version) ①

E1 - E6, fixed with vertical rear terminals

4 pole

← 00.00 → Inches
00.00 → [Millimeters]



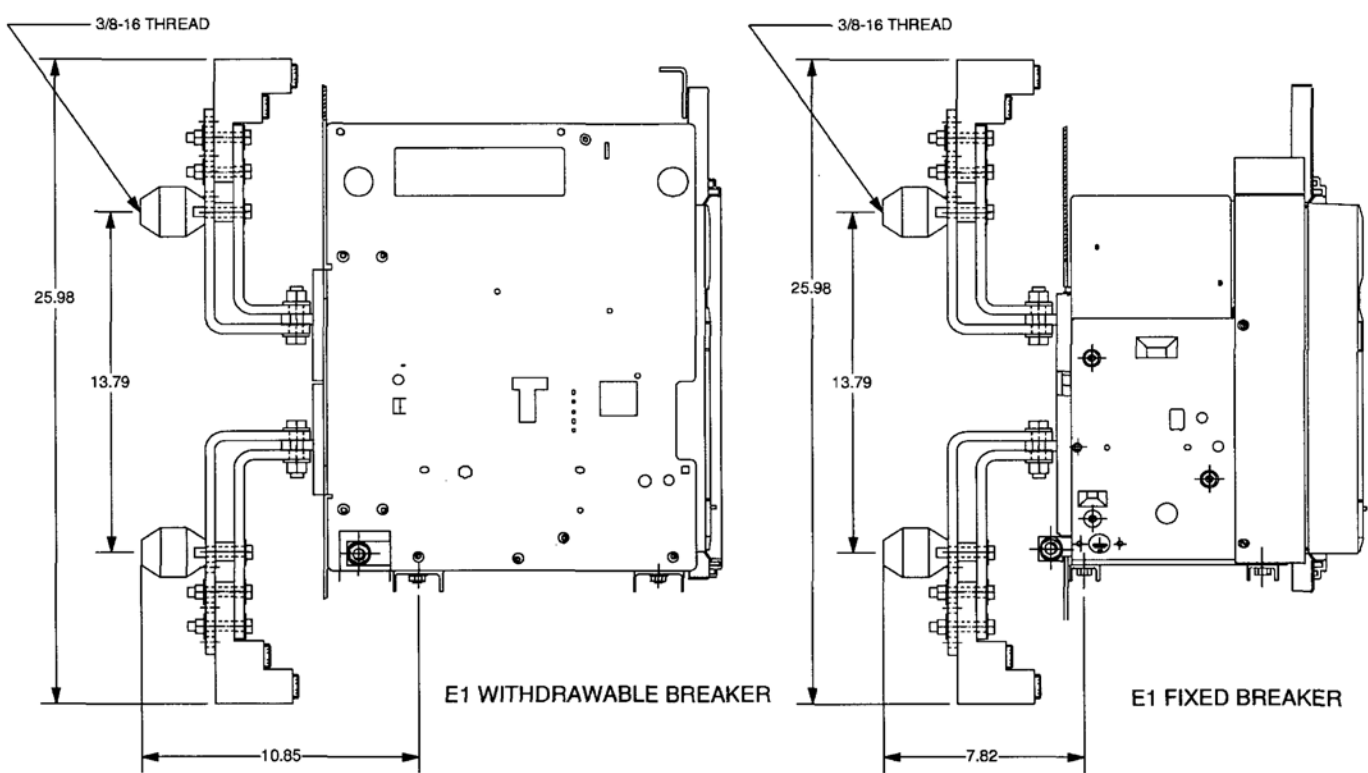
① For IEC dimensions, see Emax technical catalog 1SDC200006D0208.

Approximate dimensions

Emax lug kit

E1, front terminals

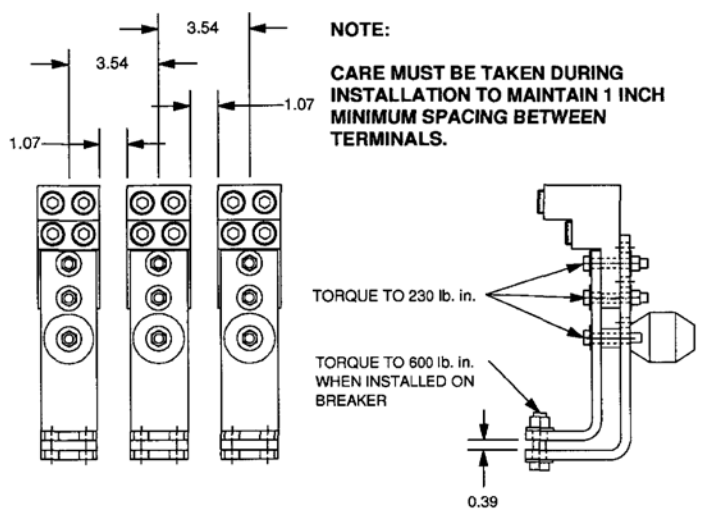
00.00 Inches
00.00 [Millimeters]



LUG KIT CONTAINS LUGS AND HARDWARE FOR THREE TERMINALS.
KIT CONTAINS:

- (3) CABLE LUGS
 - (3) SHORT BUSBARS
 - (3) LONG BUSBARS
 - (3) ALUMINUM SPACERS
 - (3) INSULATING STANDOFFS
- BUSBAR MOUNTING HARDWARE**
- (6) HX HD BOLTS, 1/2-13 X 2.00" LG
 - (6) HEX NUTS, 1/2-13
 - (12) BELLEVILLE SPRING WASHERS, 1/2"
- LUG MOUNTING HARDWARE**
- (6) HX HD BOLTS, 3/8-16 X 2.25" LG
 - (6) HEX NUTS, 3/8-16
 - (12) BELLEVILLE SPRING WASHERS, 3/8"
- INSULATING STANDOFF MOUNTING HARDWARE**
- (3) HX HD BOLTS, 3/8-16 X 2" LG
 - (3) FLAT WASHERS, 3/8"
 - (3) SPLIT LOCKWASHERS, 3/8"

ASSEMBLE LIKE THIS FOR E1 BREAKER



Wire range: #2 - 600 kcmils AL9CU
(4) Wires per Phase

Kit contains hardware and lugs for three terminals.

Tightening Torque for Lug to Busbar: 230 lb. in.
Wire Torque: 375 lb. in.
Lug Socket Size is 3/8"

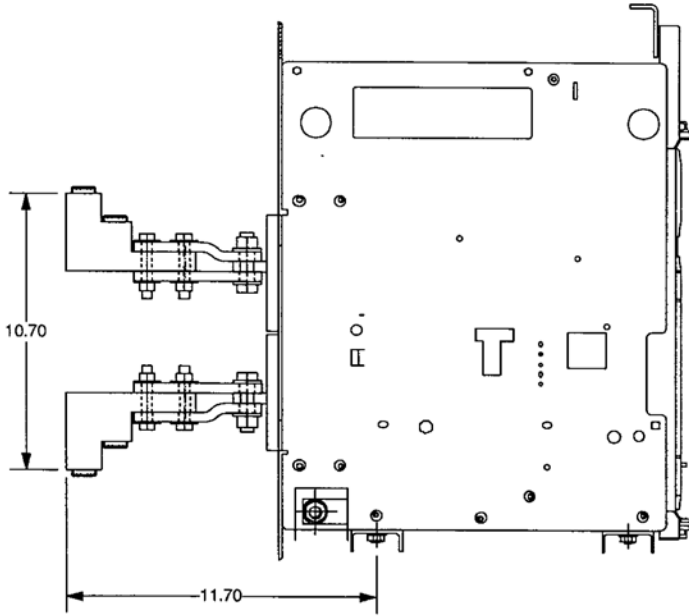
Tightening Torque for Busbar to Breaker Terminal: 600 lb. in.

Approximate dimensions

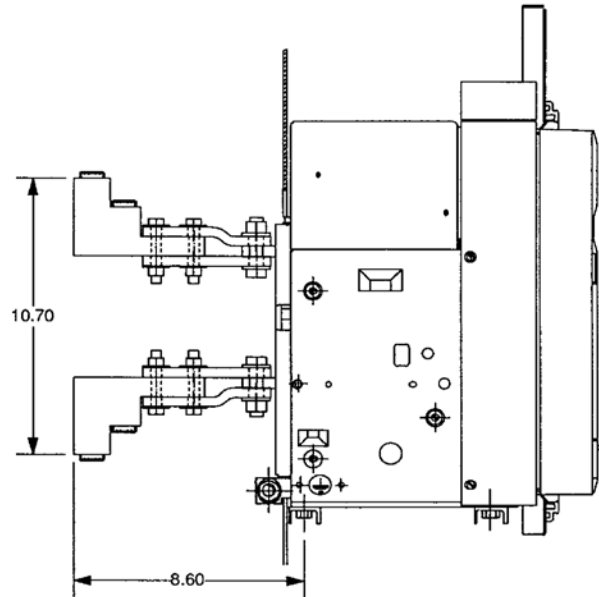
Emax lug kit

E1, rear terminals

00.00 Inches
00.00 [Millimeters]



E1 WITHDRAWABLE BREAKER



E1 FIXED BREAKER

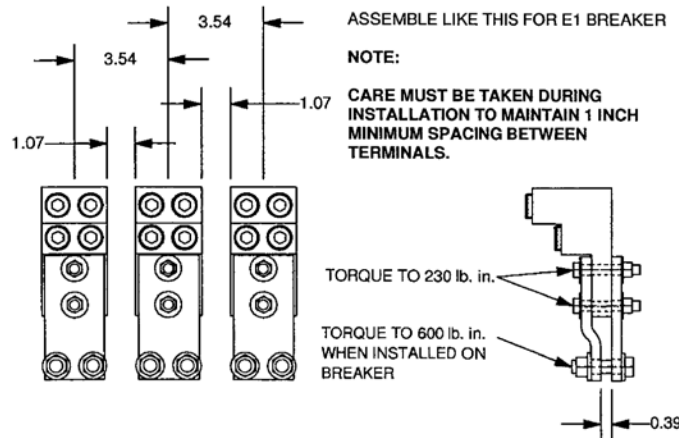
LUG KIT CONTAINS LUGS AND HARDWARE FOR THREE TERMINALS.

KIT CONTAINS:

- (3) CABLE LUGS
- (3) STRAIGHT BUSBARS
- (3) OFFSET BUSBARS

- BUSBAR MOUNTING HARDWARE**
- (6) HX HD BOLTS, 1/2-13 X 2.00" LG
 - (6) HEX NUTS, 1/2-13
 - (12) BELLEVILLE SPRING WASHERS, 1/2"

- LUG MOUNTING HARDWARE**
- (6) HX HD BOLTS, 3/8-16 X 2.25" LG
 - (6) HEX NUTS, 3/8-16
 - (12) BELLEVILLE SPRING WASHERS, 3/8"



Wire range: #2 - 600 kcmils AL9CU
(4) Wires per Phase

Kit contains hardware and lugs for three terminals.

Tightening Torque for Lug to Busbar: 230 lb. in.
Wire Torque: 375 lb. in.
Lug Socket Size is 3/8"

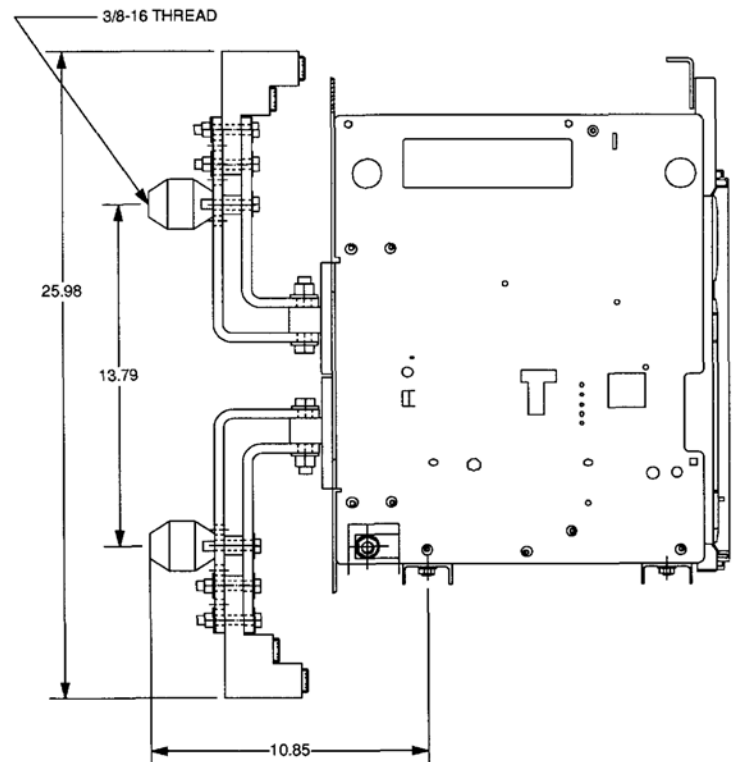
Tightening Torque for Busbar to Breaker Terminal: 600 lb. in.

Approximate dimensions

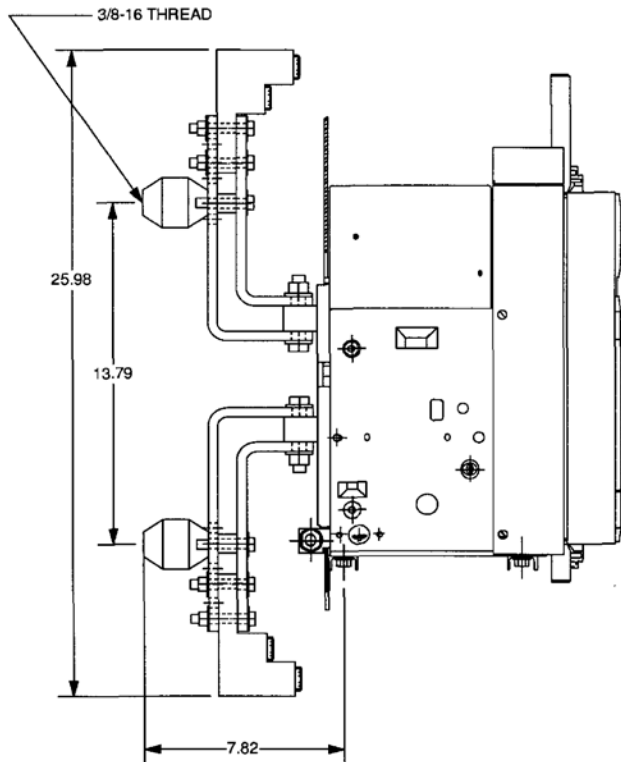
Emax lug kit

E2, front terminals

00.00 Inches
00.00 [Millimeters]



E2 WITHDRAWABLE BREAKER



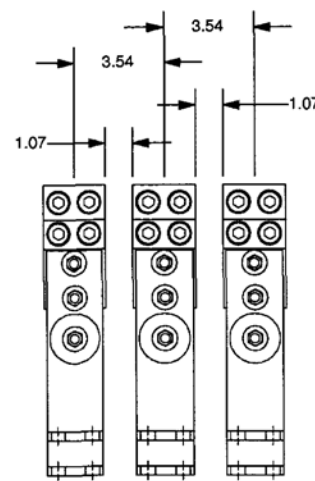
E2 FIXED BREAKER

LUG KIT CONTAINS LUGS AND HARDWARE FOR THREE TERMINALS.

KIT CONTAINS:

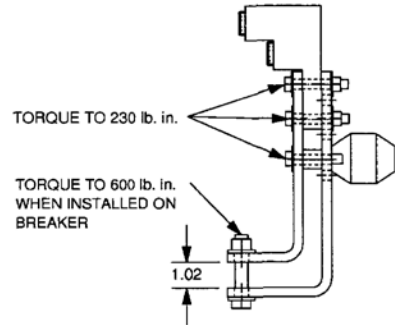
- (3) CABLE LUGS
 - (3) SHORT BUSBARS
 - (3) LONG BUSBARS
 - (3) ALUMINUM SPACERS
 - (3) INSULATING STANDOFFS
- BUSBAR MOUNTING HARDWARE
- (6) HX HD BOLTS, 1/2-13 X 2.75" LG
 - (6) HEX NUTS, 1/2-13
 - (12) BELLEVILLE SPRING WASHERS, 1/2"
- LUG MOUNTING HARDWARE
- (6) HX HD BOLTS, 3/8-16 X 2.25" LG
 - (6) HEX NUTS, 3/8-16
 - (12) BELLEVILLE SPRING WASHERS, 3/8"

- INSULATING STANDOFF MOUNTING HARDWARE
- (3) HX HD BOLTS, 3/8-16 X 2" LG
 - (3) FLAT WASHERS, 3/8"
 - (3) SPLIT LOCKWASHERS, 3/8"



ASSEMBLE LIKE THIS FOR E2 BREAKER

NOTE:
CARE MUST BE TAKEN DURING
INSTALLATION TO MAINTAIN 1 INCH
MINIMUM SPACING BETWEEN
TERMINALS.



Wire range: #2 - 600 kcmils AL9CU
(4) Wires per Phase

Kit contains hardware and lugs for three terminals.

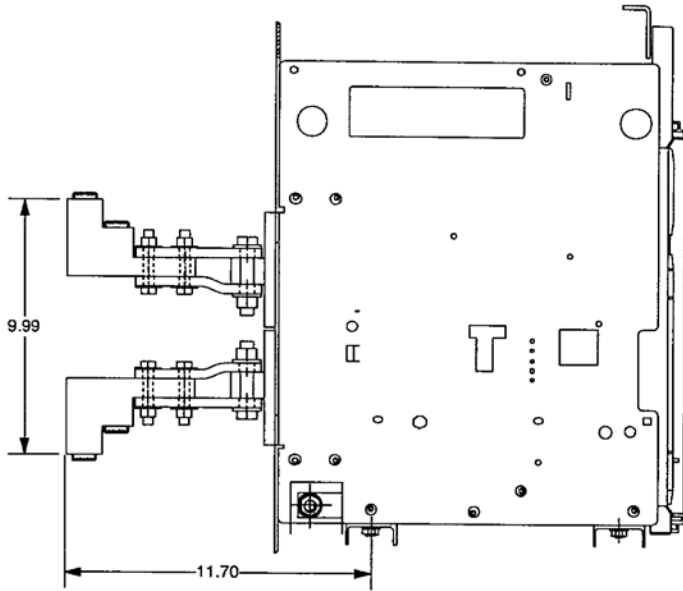
Tightening Torque for Lug to Busbar: 230 lb. in.
Wire Torque: 375 lb. in.
Lug Socket Size is 3/8"

Tightening Torque for Busbar to Breaker Terminal: 600 lb. in.

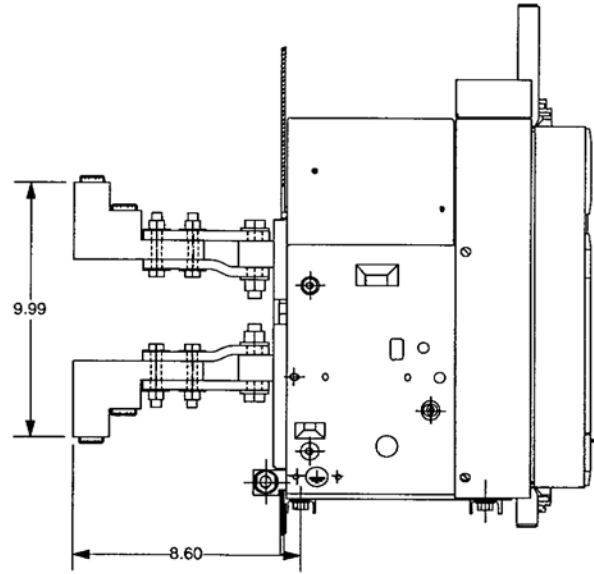
Approximate dimensions

Emax lug kit
E2, rear terminals

00.00 Inches
00.00 [Millimeters]



E2 WITHDRAWABLE BREAKER

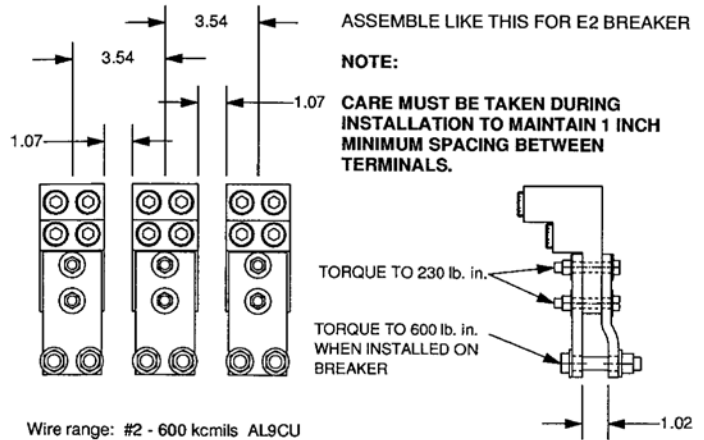


E2 FIXED BREAKER

LUG KIT CONTAINS LUGS AND HARDWARE FOR THREE TERMINALS.

KIT CONTAINS:

- (3) CABLE LUGS
 - (3) STRAIGHT BUSBARS
 - (3) OFFSET BUSBARS
- BUSBAR MOUNTING HARDWARE
- (6) HX HD BOLTS, 1/2-13 X 2.75" LG
 - (6) HEX NUTS, 1/2-13
 - (12) BELLEVILLE SPRING WASHERS, 1/2"
- LUG MOUNTING HARDWARE
- (6) HX HD BOLTS, 3/8-16 X 2.25" LG
 - (6) HEX NUTS, 3/8-16
 - (12) BELLEVILLE SPRING WASHERS, 3/8"



Wire range: #2 - 600 kcmils AL9CU
(4) Wires per Phase

Kit contains hardware and lugs for three terminals.

Tightening Torque for Lug to Busbar: 230 lb. in.
Wire Torque: 375 lb. in.
Lug Socket Size is 3/8"

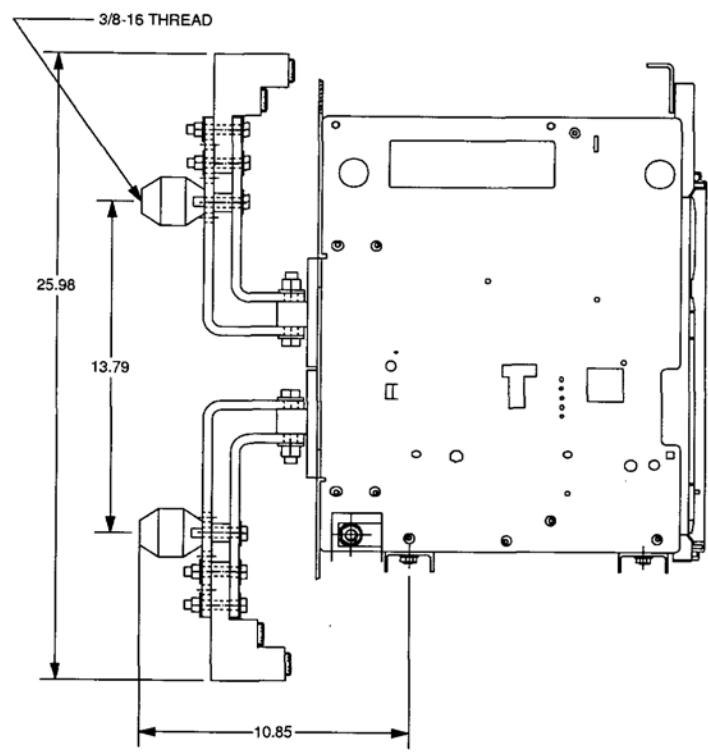
Tightening Torque for Busbar to Breaker Terminal: 600 lb. in.

Approximate dimensions

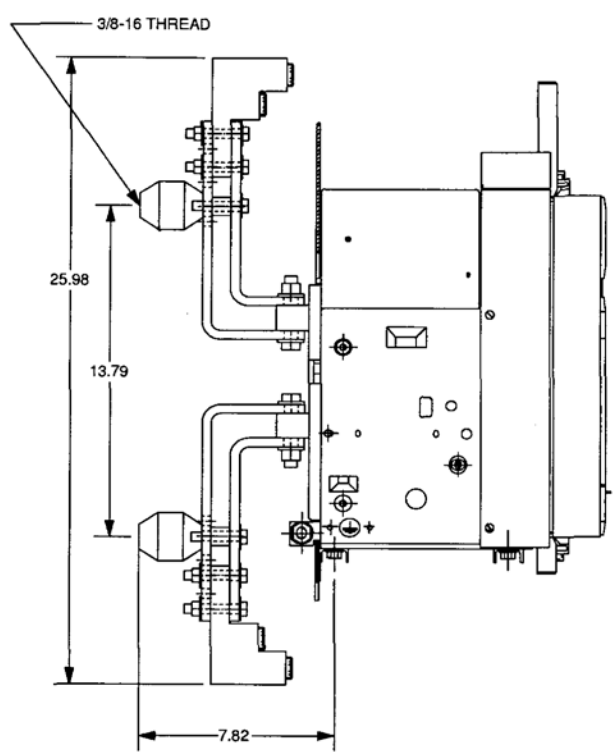
Emax lug kit

E3, front terminals

00.00 Inches
00.00 [Millimeters]



E3 WITHDRAWABLE BREAKER



E3 FIXED BREAKER

LUG KIT CONTAINS LUGS AND HARDWARE FOR THREE TERMINALS.

KIT CONTAINS:

- (3) CABLE LUGS D 1281
- (3) CABLE LUGS D 1459
- (3) SHORT BUSBARS
- (3) LONG BUSBARS
- (3) ALUMINUM SPACERS
- (3) INSULATING STANDOFFS

BUSBAR MOUNTING HARDWARE
 (9) HX HD BOLTS, 1/2-13 X 2.75" LG
 (9) HEX NUTS, 1/2-13
 (18) BELLEVILLE SPRING WASHERS, 1/2"

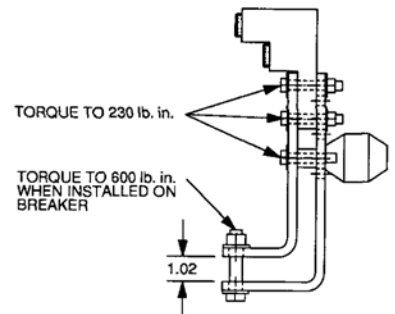
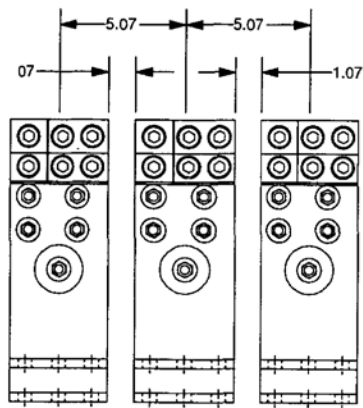
LUG MOUNTING HARDWARE
 (12) HX HD BOLTS, 3/8-16 X 2.25" LG
 (12) HEX NUTS, 3/8-16
 (24) BELLEVILLE SPRING WASHERS, 3/8"

INSULATING STANDOFF MOUNTING HARDWARE
 (3) HX HD BOLTS, 3/8-16 X 2.00" LG
 (3) FLAT WASHERS, 3/8"
 (3) SPLIT LOCKWASHERS, 3/8"

ASSEMBLE LIKE THIS FOR E3 BREAKER

NOTE:

CARE MUST BE TAKEN DURING INSTALLATION TO MAINTAIN 1 INCH MINIMUM SPACING BETWEEN TERMINALS.



Wire range: #2 - 600 kcmils AL9CU
 (6) Wires per Phase

Kit contains hardware and lugs for three terminals.

Tightening Torque for Lug to Busbar: 230 lb. in.
 Wire Torque: 375 lb. in.
 Lug Socket Size is 3/8"

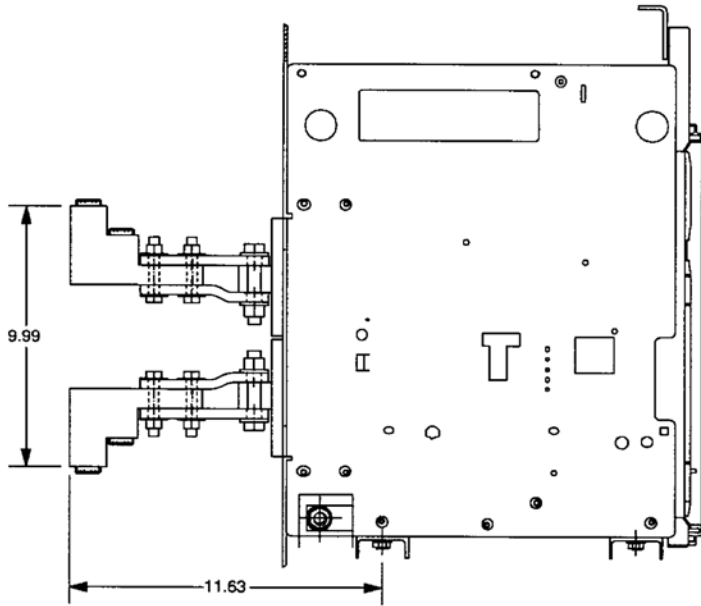
Tightening Torque for Busbar to Breaker Terminal: 600 lb. in.

Approximate dimensions

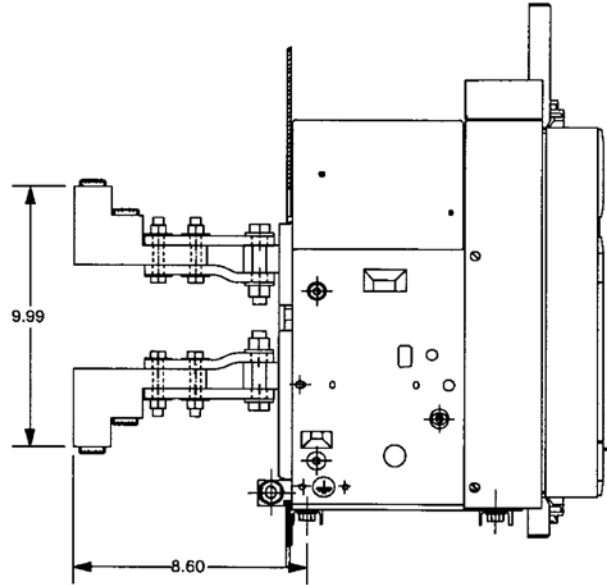
Emax lug kit

E3, rear terminals

00.00 Inches
00.00 [Millimeters]



E3 WITHDRAWABLE BREAKER



E3 FIXED BREAKER

LUG KIT CONTAINS LUGS AND HARDWARE FOR THREE TERMINALS.

KIT CONTAINS:

- (3) CABLE LUGS D 1281
- (3) CABLE LUGS D 1459
- (3) STRAIGHT BUSBARS
- (3) OFFSET BUSBARS

BUSBAR MOUNTING HARDWARE

- (9) HX HD BOLTS, 1/2-13 X 2.75" LG
- (9) HEX NUTS, 1/2-13
- (18) BELLEVILLE SPRING WASHERS, 1/2"

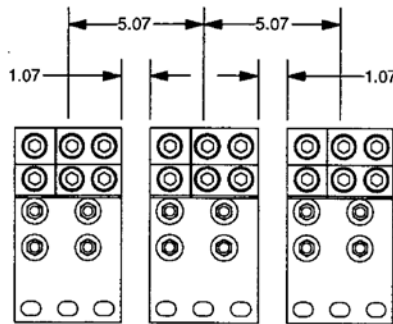
LUG MOUNTING HARDWARE

- (12) HX HD BOLTS, 3/8-16 X 2.25" LG
- (12) HEX NUTS, 3/8-16
- (24) BELLEVILLE SPRING WASHERS, 3/8"

ASSEMBLE LIKE THIS FOR E3 BREAKER

NOTE:

CARE MUST BE TAKEN DURING INSTALLATION TO MAINTAIN 1 INCH MINIMUM SPACING BETWEEN TERMINALS.

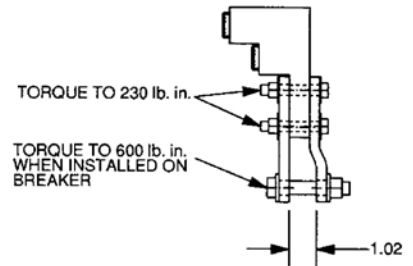


Wire range: #2 - 600 kcmils AL9CU
(6) Wires per Phase

Kit contains hardware and lugs for three terminals.

Tightening Torque for Lug to Busbar: 230 lb. in.
Wire Torque: 375 lb. in.
Lug Socket Size is 3/8"

Tightening Torque for Busbar to Breaker Terminal: 600 lb. in.

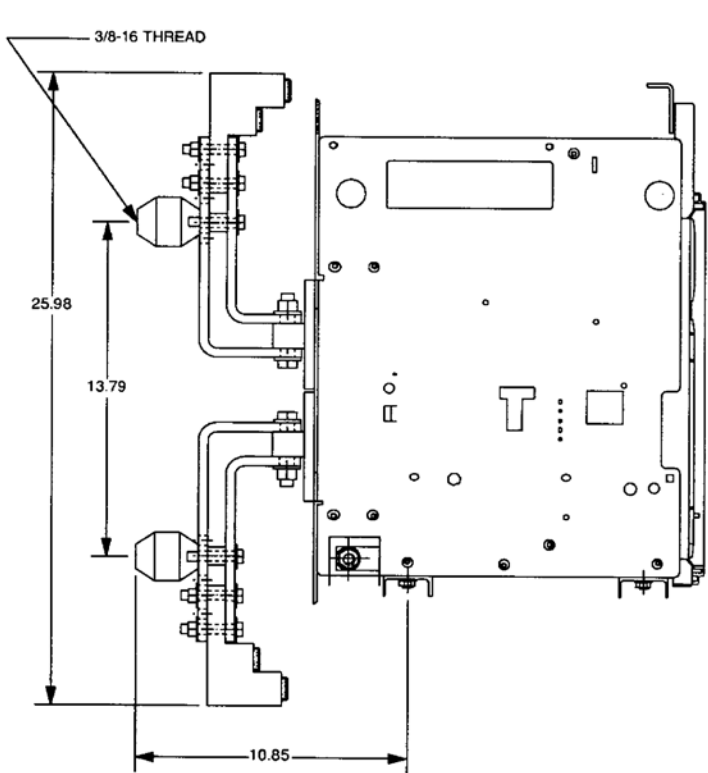


Approximate dimensions

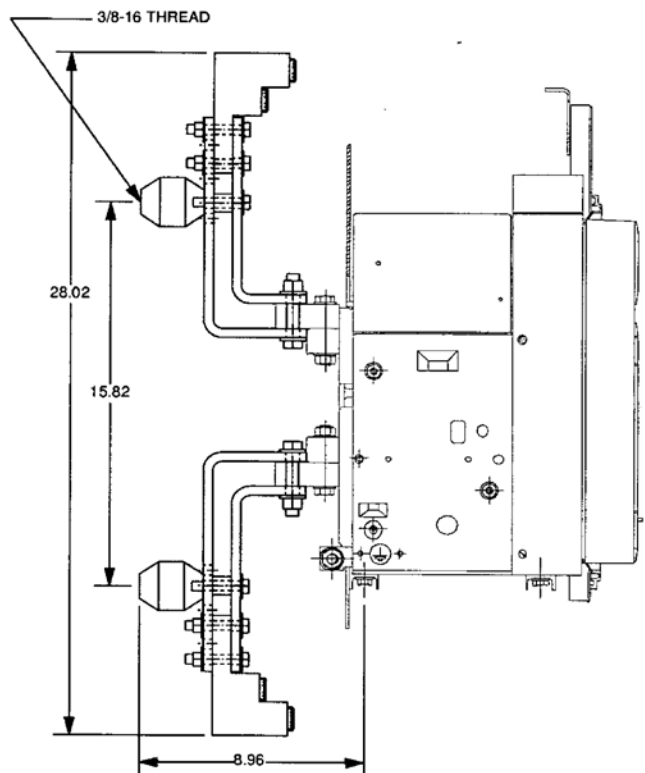
Emax lug kit

E4, front terminals

00.00 Inches
00.00 [Millimeters]



E4 WITHDRAWABLE BREAKER



E4 FIXED BREAKER

LUG KIT CONTAINS LUGS AND HARDWARE FOR THREE TERMINALS.

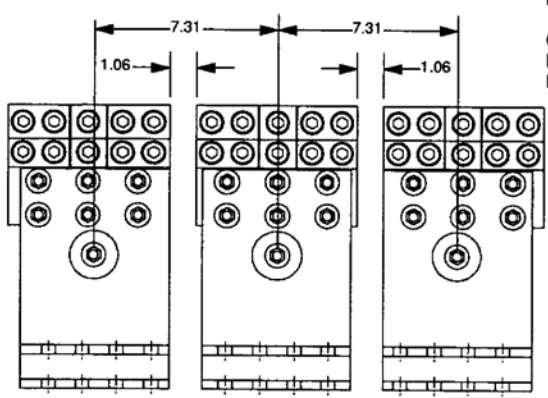
KIT CONTAINS:

- (6) CABLE LUGS D 1281
- (3) CABLE LUGS D 1459
- (3) SHORT BUSBARS
- (3) LONG BUSBARS
- (3) ALUMINUM SPACERS
- (3) INSULATING STANDOFFS

- BUSBAR MOUNTING HARDWARE**
- (12) HX HD BOLTS, 1/2-13 X 2.75" LG
 - (12) HEX NUTS, 1/2-13
 - (24) BELLEVILLE SPRING WASHERS, 1/2"

- LUG MOUNTING HARDWARE**
- (18) HX HD BOLTS, 3/8-16 X 2.25" LG
 - (18) HEX NUTS, 3/8-16
 - (36) BELLEVILLE SPRING WASHERS, 3/8"

- INSULATING STANDOFF MOUNTING HARDWARE**
- (3) HX HD BOLTS, 3/8-16 X 2" LG
 - (3) FLAT WASHERS, 3/8"
 - (3) SPLIT LOCKWASHERS, 3/8"



Wire range: #2 - 600 kcmils AL9CU
(10) Wires per Phase

Kit contains hardware and lugs for three terminals.

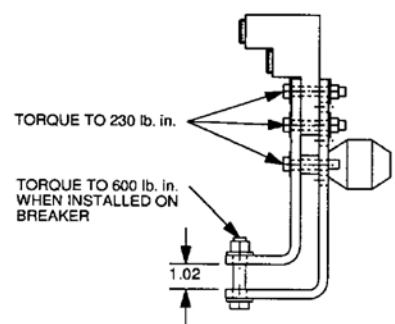
Tightening Torque for Lug to Busbar: 230 lb. in.
Wire Torque: 375 lb. in.
Lug Socket Size is 3/8"

Tightening Torque for Busbar to Breaker Terminal: 600 lb. in.

ASSEMBLE LIKE THIS FOR E4 BREAKER

NOTE:

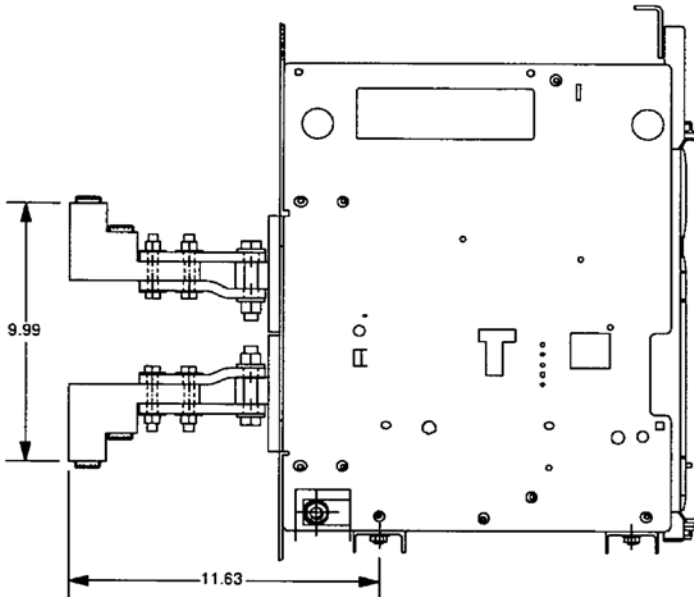
CARE MUST BE TAKEN DURING INSTALLATION TO MAINTAIN 1 INCH MINIMUM SPACING BETWEEN TERMINALS.



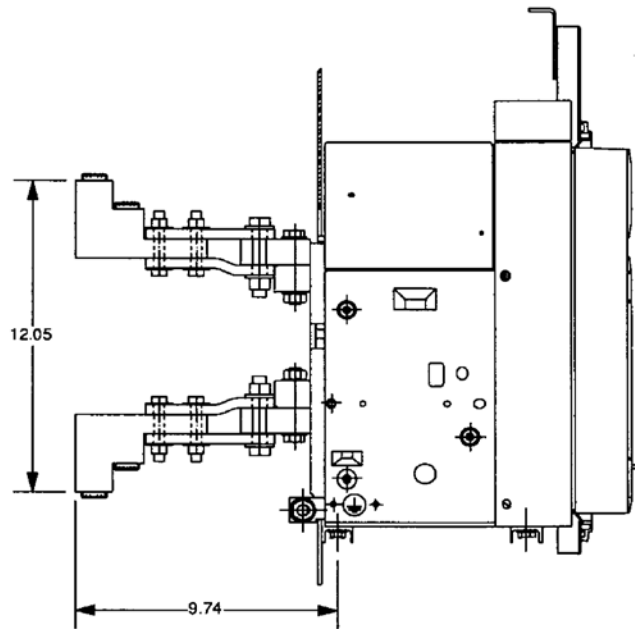
Approximate dimensions

Emax lug kit
E4, rear terminals

00.00 — Inches
00.00 — [Millimeters]



E4 WITHDRAWABLE BREAKER

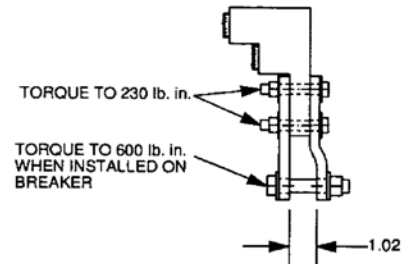
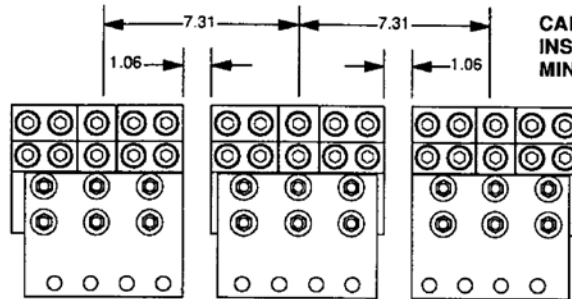


E4 FIXED BREAKER

ASSEMBLE LIKE THIS FOR E4 BREAKER

NOTE:

CARE MUST BE TAKEN DURING INSTALLATION TO MAINTAIN 1 INCH MINIMUM SPACING BETWEEN TERMINALS.



LUG KIT CONTAINS LUGS AND HARDWARE FOR THREE TERMINALS.

KIT CONTAINS:

- (6) CABLE LUGS D 1281
- (3) CABLE LUGS D 1459
- (3) STRAIGHT BUSBARS
- (3) OFFSET BUSBARS

BUSBAR MOUNTING HARDWARE

- (12) HX HD BOLTS, 1/2-13 X 2.75" LG
- (12) HEX NUTS, 1/2-13
- (24) BELLEVILLE SPRING WASHERS, 1/2"

LUG MOUNTING HARDWARE

- (18) HX HD BOLTS, 3/8-16 X 2.25" LG
- (18) HEX NUTS, 3/8-16
- (36) BELLEVILLE SPRING WASHERS, 3/8"

Wire range: #2 - 600 kcmils AL9CU
(10) Wires per Phase

Kit contains hardware and lugs for three terminals.

Tightening Torque for Lug to Busbar: 230 lb. in.
Wire Torque: 375 lb. in.
Lug Socket Size is 3/8"

Tightening Torque for Busbar to Breaker Terminal: 600 lb. in.

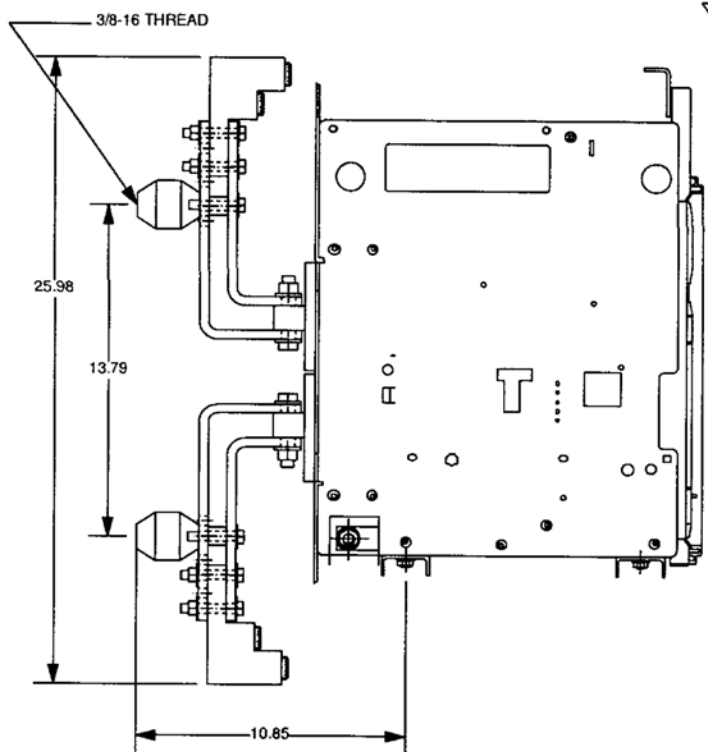
Isco D 1459
Isco D 1281

Approximate dimensions

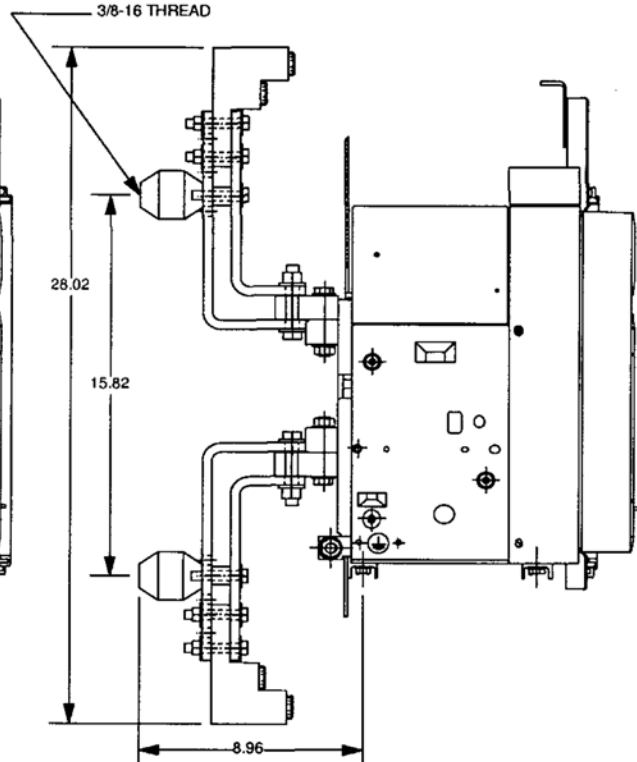
Emax lug kit

E6, front terminals

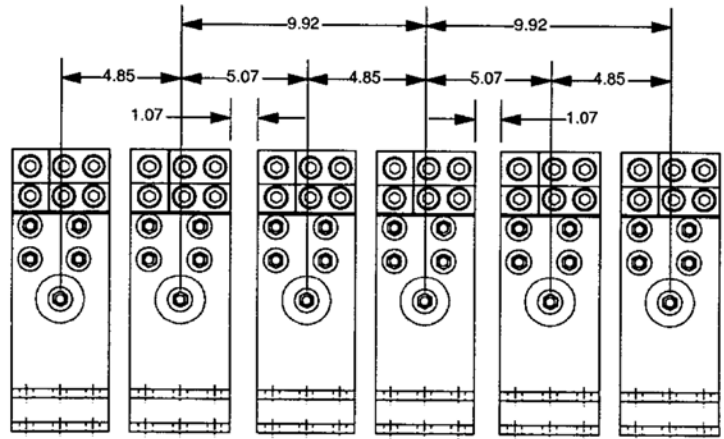
00.00 Inches
00.00 (Millimeters)



E6 WITHDRAWABLE BREAKER



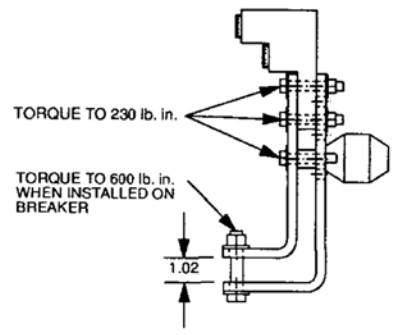
E6 FIXED BREAKER



ASSEMBLE LIKE THIS FOR E6 BREAKER

NOTE:

CARE MUST BE TAKEN DURING INSTALLATION TO MAINTAIN 1 INCH MINIMUM SPACING BETWEEN TERMINALS.



LUG KIT CONTAINS LUGS AND HARDWARE FOR THREE TERMINALS.
KIT CONTAINS:

- (6) CABLE LUGS D 1281
- (6) CABLE LUGS D 1459
- (6) SHORT BUSBARS
- (6) LONG BUSBARS
- (6) ALUMINUM SPACERS
- (6) INSULATING STANDOFFS

- BUSBAR MOUNTING HARDWARE
- (18) HX HD BOLTS, 1/2-13 X 2.75" LG
 - (18) HEX NUTS, 1/2-13
 - (36) BELLEVILLE SPRING WASHERS, 1/2"

- LUG MOUNTING HARDWARE
- (24) HX HD BOLTS, 3/8-16 X 2.25" LG
 - (24) HEX NUTS, 3/8-16
 - (48) BELLEVILLE SPRING WASHERS, 3/8"

- INSULATING STANDOFF MOUNTING HARDWARE
- (6) HX HD BOLTS, 3/8-16 X 2.00" LG
 - (6) FLAT WASHERS, 3/8"
 - (6) SPLIT LOCKWASHERS, 3/8"

Wire range: #2 - 600 kcmils ALSCU
(12) Wires per Phase

Kit contains hardware and lugs for three terminals.

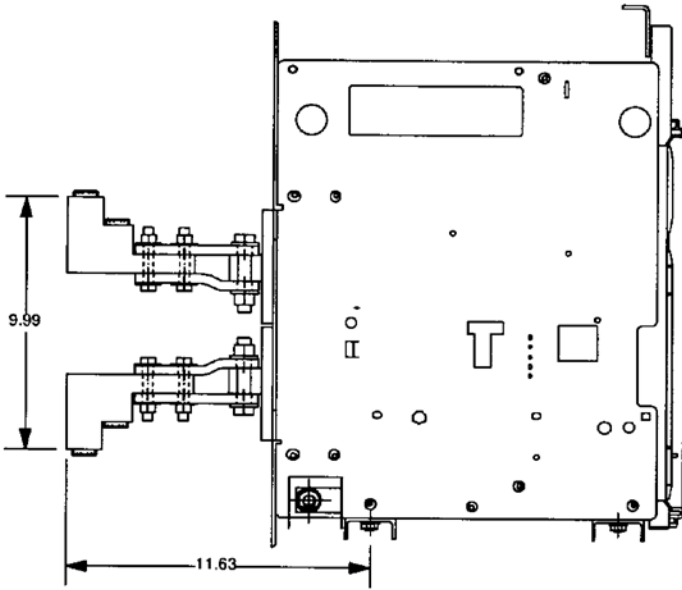
Tightening Torque for Lug to Busbar: 230 lb. in.
Wire Torque: 375 lb. in.
Lug Socket Size is 3/8"

Tightening Torque for Busbar to Breaker Terminal: 600 lb. in.

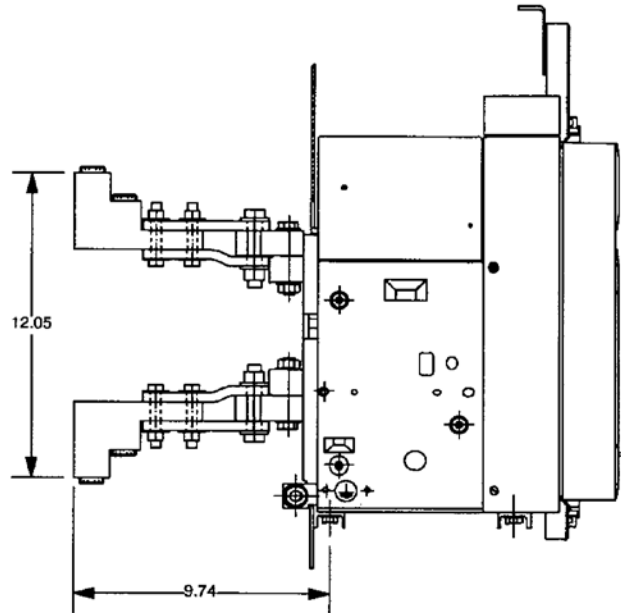
Approximate dimensions

Emax lug kit
E6, rear terminals

00.00 Inches
00.00 [Millimeters]



E6 WITHDRAWABLE BREAKER

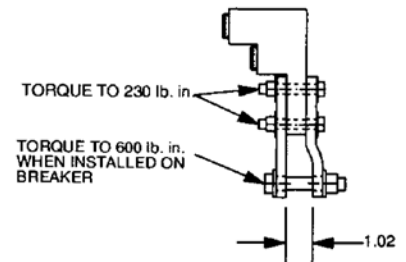
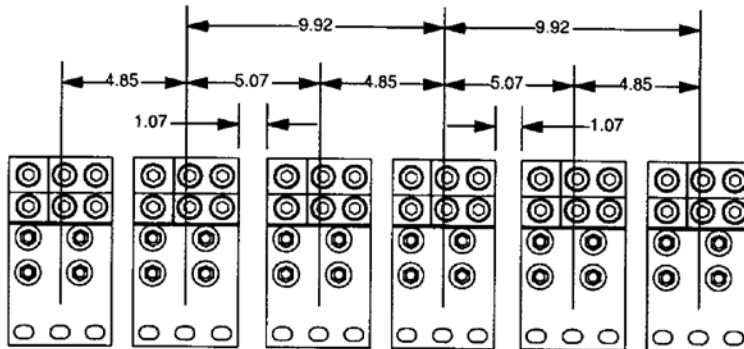


E6 FIXED BREAKER

ASSEMBLE LIKE THIS FOR E6 BREAKER

NOTE:

CARE MUST BE TAKEN DURING INSTALLATION TO MAINTAIN 1 INCH MINIMUM SPACING BETWEEN TERMINALS.



LUG KIT CONTAINS LUGS AND HARDWARE FOR THREE TERMINALS.
KIT CONTAINS:

- (6) CABLE LUGS D 1281
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- (6) STRAIGHT BUSBARS
- (6) OFFSET BUSBARS

- BUSBAR MOUNTING HARDWARE**
- (18) HX HD BOLTS, 1/2-13 X 2.75" LG
 - (18) HEX NUTS, 1/2-13
 - (36) BELLEVILLE SPRING WASHERS, 1/2"

- LUG MOUNTING HARDWARE**
- (24) HX HD BOLTS, 3/8-16 X 2.25" LG
 - (24) HEX NUTS, 3/8-16
 - (48) BELLEVILLE SPRING WASHERS, 3/8"

Wire range: #2 - 600 kcmils AL9CU
(12) Wires per Phase

Kit contains hardware and lugs for three terminals.

Tightening Torque for Lug to Busbar: 230 lb. in.
Wire Torque: 375 lb. in.
Lug Socket Size is 3/8"

Tightening Torque for Busbar to Breaker Terminal: 600 lb. in.



19 - Disconnect switches



Non-fusible and fusible disconnect switches19.1 - 19.6

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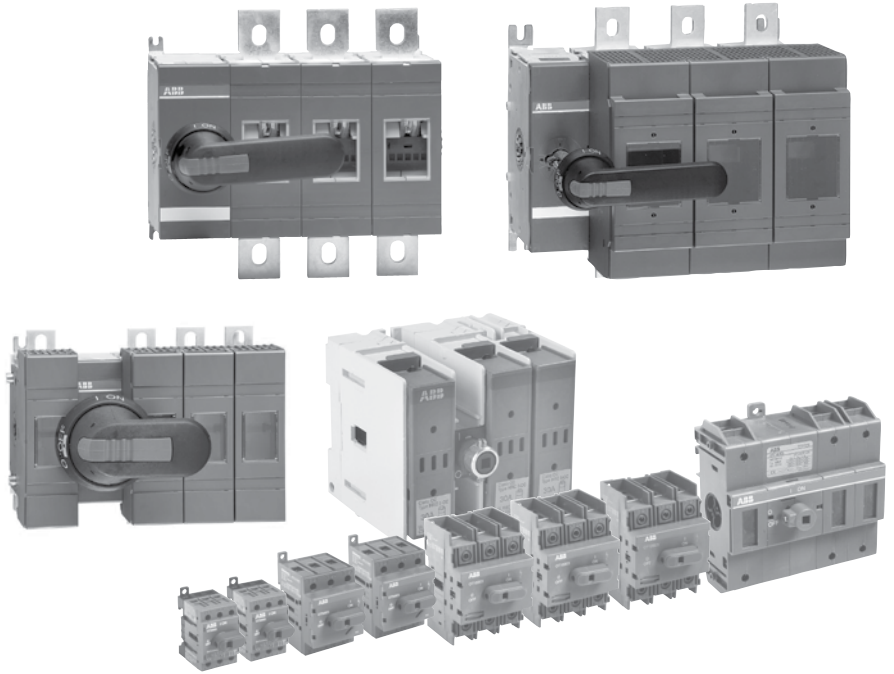
Approximate dimensions19.67 - 19.91

Non-fusible & fusible Disconnect switches



Non-fusible & fusible disconnect switches

General information



Versatility

ABB disconnect switches are designed to offer maximum versatility in many ways.

Broad range

ABB's open style non-fusible switches have seventeen amperage sizes from 16A – 3150A. The fusible range is 30A - 1200A. All sizes are compact, heavy duty, 600V disconnect switches. Many sizes are available in 2, 3, 4, 6, and 8 pole configurations.

Compact size

The non-fusible disconnect switches' compact dimensions allow panel size reduction in new applications or easily retrofit into space-sensitive existing installations. The fusible switch occupies little more panel space than the appropriate fuses.

General information

International acceptance

UL listed, CSA approved, IEC rated, CE marked, and most other international standards.

UL98 (CSA 22.2 No.4) — UL File # E101914, CSA File #LR58077

For OT30 - OT1200, OS30A - 1200A switches with OT/OS OH_pistol grip handles

Suitable for use as motor disconnects or industrial control panel disconnects on service entrance equipment, panelboards, switchboards, industrial control equipment, motor control centers, etc. and are horsepower and ampere rated.

UL508 (CSA 22.2 No. 14) — UL File # E63822, CSA File #LR58247

For OT16 - OT80 switches, OH_selector handles

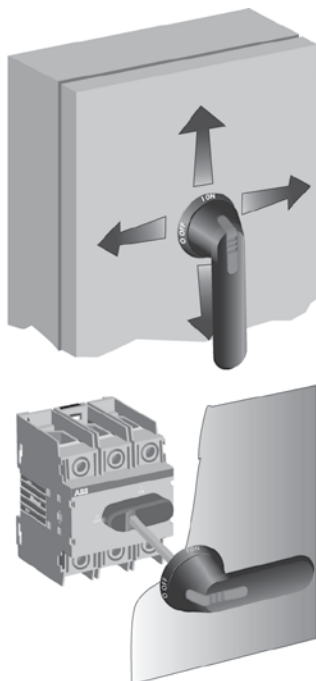
Suitable for use in equipment or machinery as motor controllers & motor disconnects and are horsepower and ampere rated.

IEC

Tested in accordance to IEC 947-1 and 3, IEC 664, IEC 269, and IEC 204.

CE

Compliance with the European Machine Directive IEC 204 (EN 60204).



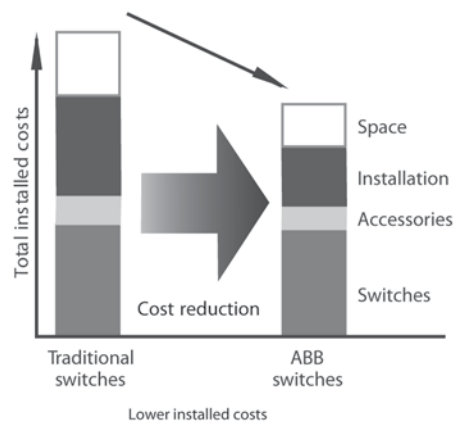
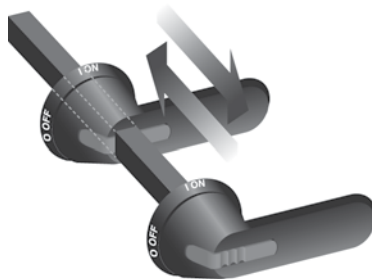
Installation options

Rotary through the door: available in all sizes, non-fusible 16A – 3150A; fusible 30A - 1200A.

Flange: versions available in 30A - 1200A sizes.

A rotary disconnect switch may be installed nearly anywhere in a control panel — mounting is not limited to the upper right hand corner of the panel.

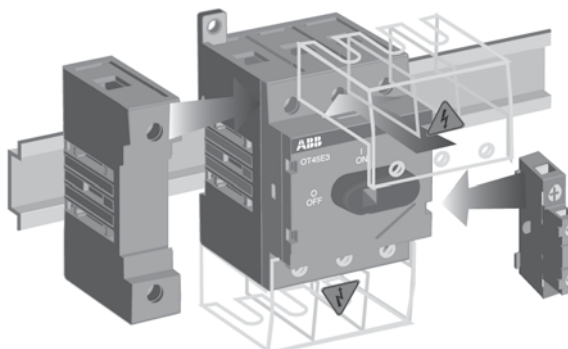
Mount the switch where it conveniently fits in your panel and simply install the handle on the door, in line with the switch. The switch and handle are mechanically linked through an easily adjusted shaft. This allows fast and easy installation into panels of different depths and layouts.



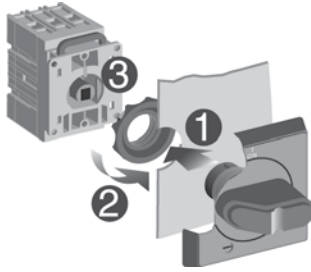
19

Broad range of accessories

- Handles — UL/NEMA type 1, 3R, 4, 4X, 12; IP54, 65, 66
- Auxiliary contacts available for every switch size
- Additional power poles
- Additional terminal poles (neutrals & grounds)
- Terminal shrouds
- 6 & 8 pole mechanisms
- Transfer mechanisms
- Bypass mechanisms
- Mechanical interlock mechanisms
- Electro-mechanical interlock mechanisms



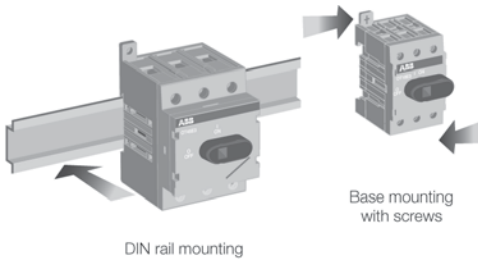
General information



Mounting

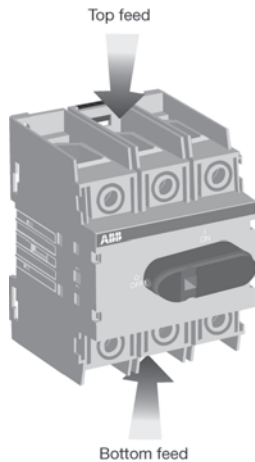
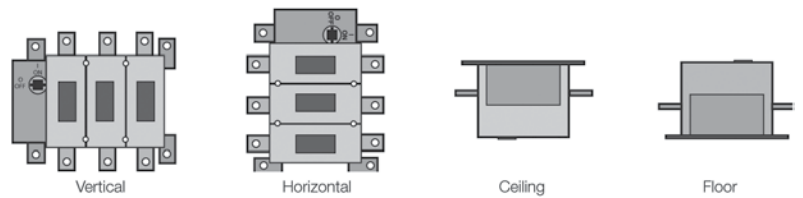
Disconnect switches offer several mounting possibilities:

- Door mounting on an enclosure door or sidewall for non-fusible, 16A – 100A
- DIN rail mounting for non-fusible, 16A – 100A; and fusible, OS30 - OS100
- Base mounting with screws for all switch sizes



Mounting positions

Disconnect switches offer several mounting possibilities:



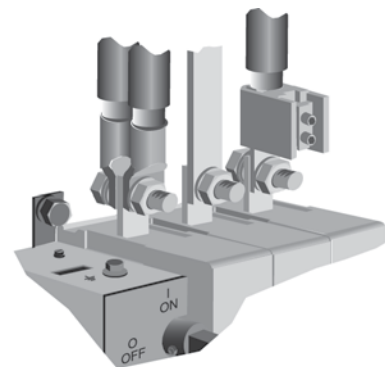
Incoming power feeds

Disconnect switches can be used equally well with either top or bottom incoming power feeds.

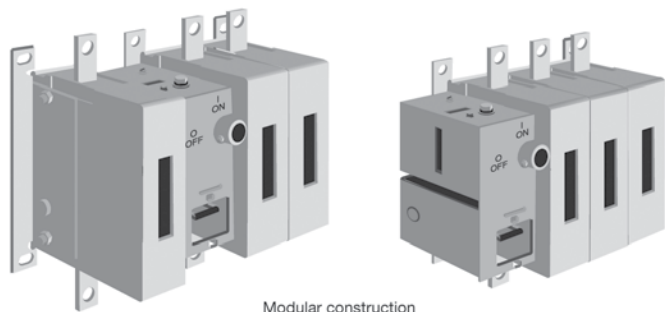
Terminal connections

Versatile connecting possibilities for non-fusible and fusible switches

- Ring tongue crimp on lugs
- Direct bus
- Terminal lugs



General information



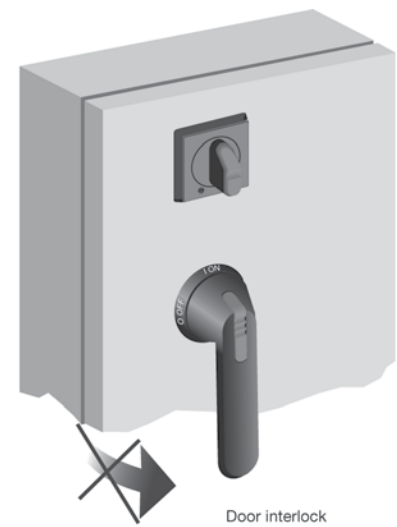
Modular construction

Finger proof

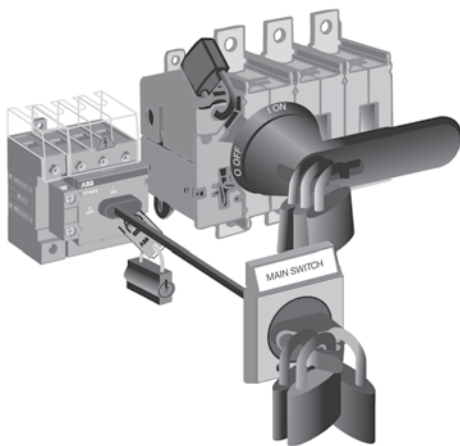
Dead-front construction plus terminal shrouds reduce the risk of touching live parts, improving the safety and reliability of the installation.

Door interlock

The handle and shaft provide a door interlock; the door can not be opened when the switch is in the "ON" position. NOTE: Some handles provide a method for qualified personnel to circumvent the door interlock. This is commonly referred to as a "defeater" mechanism.



Door interlock



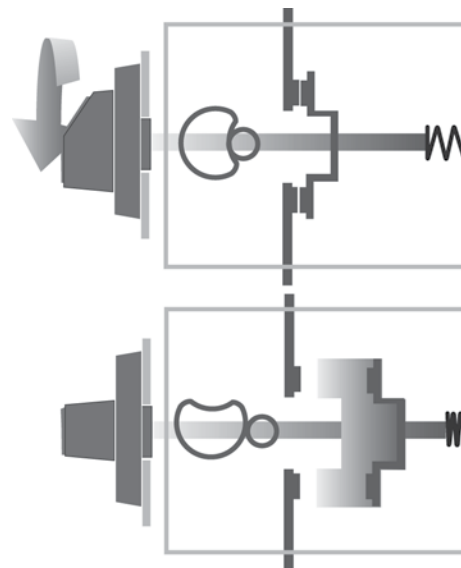
Handle and mechanism padlocked OFF

Padlockable

Handles can be padlocked in the "OFF" position with up to three padlocks. Additionally, the switch mechanism can be directly padlocked in the "OFF" position when the door is open. NOTE: Some handles can be ordered with the ability to padlock in both the "ON" & "OFF" positions, please consult your ABB sales office.

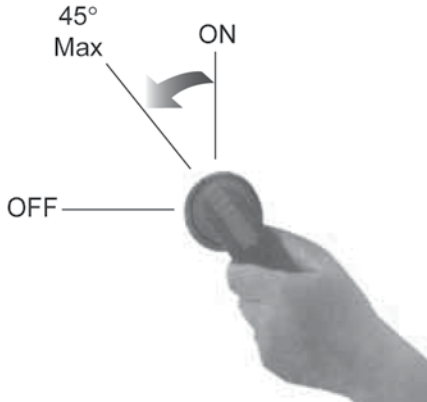
Positive opening operation

All switches operate according to the "positive opening operation" principle. This means the contacts are opened and closed by a driven mechanism, a solid moving bridge, not merely springs. This provides reliable position indication to the user; if the switch is in the "OFF" position, the contacts are open.



Positive opening operation

General information



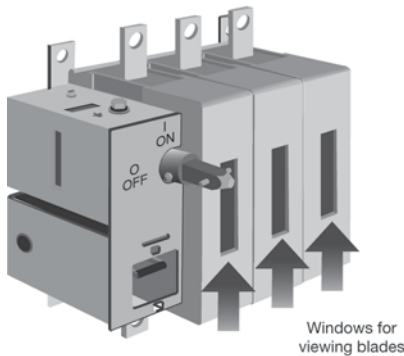
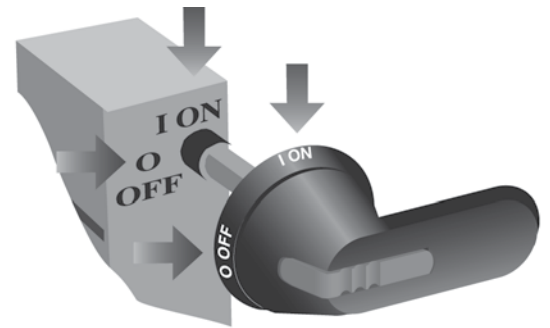
Welded contact protection

Positive opening operation safeguards users in case of welded contacts due to an overload or short circuit. The switch can not reach the “OFF” position unless the contacts are truly open. If any or all of the contacts are welded shut, the switch mechanism will only allow the handle to operate a maximum of 45°. This safeguards personnel by:

- Alerting them a problem has occurred
- Maintaining the door interlock and
- Not allowing a padlock to be inserted

Clear position indication

All switches and handles have clear “ON” and “OFF” designations. Whether the door is open or closed, it is possible to simply look at the switch and determine if the switch is “ON” or “OFF”.



Visible blades

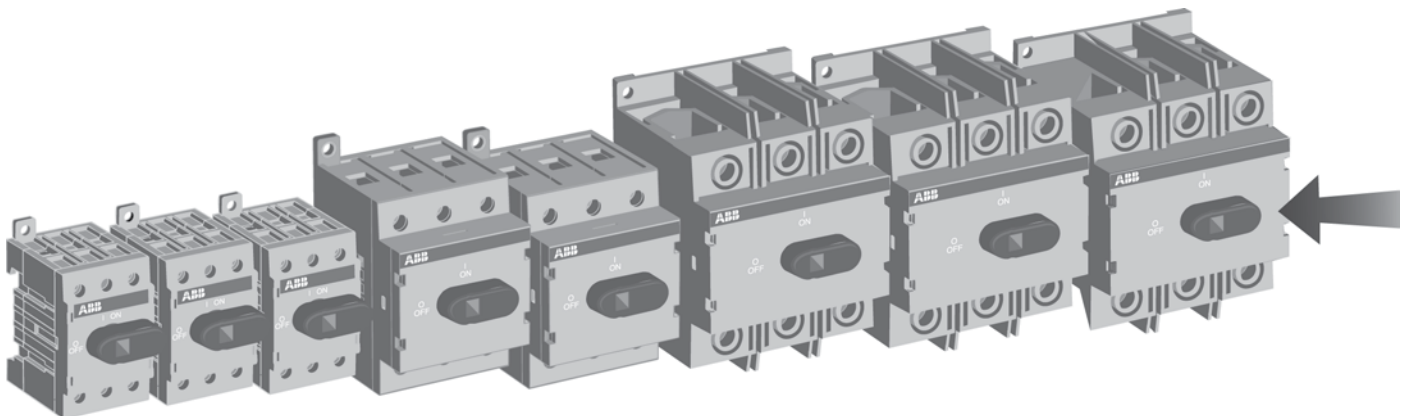
Visible blades offer additional safety for non-fusible switches, 100A — 1200A

Track resistant material

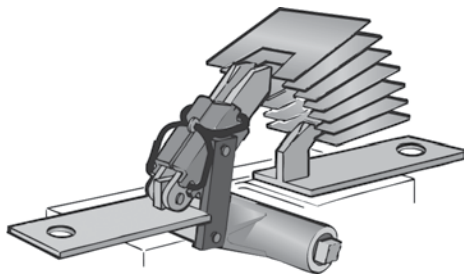
Excellent track resistant material, CTI > 600V, IEC 112, reduces the risk of flash-over between phases in even the most severe circumstances.

Constant control for non-fusible disconnect switches

The OT16F3 to OT100F3 provide the user with constant control over the power circuit. Whether the enclosure door is open or closed, qualified personnel have the ability to manually operate the switch. This is most meaningful when qualified personnel are working with the enclosure door open: In case of an emergency down-stream, the main three phase power can be disconnected immediately using the black, direct mounted handle.

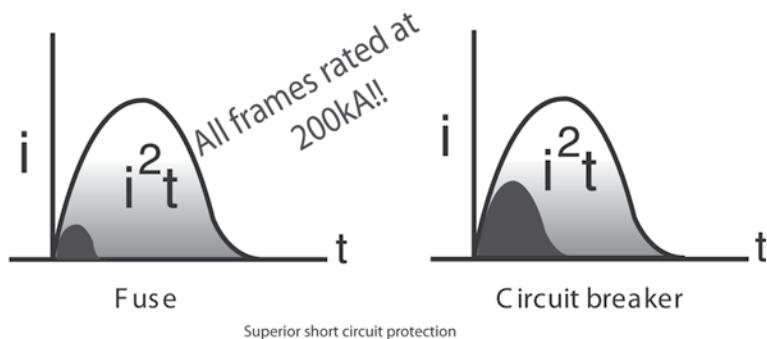


General information



High performance

The mechanism is quick-make/quick-break, meaning the contacts operate independently of the speed and force at which the handle is operated. This, in combination with unique, patented self-cleaning contacts, provides a long, reliable, electrical life.



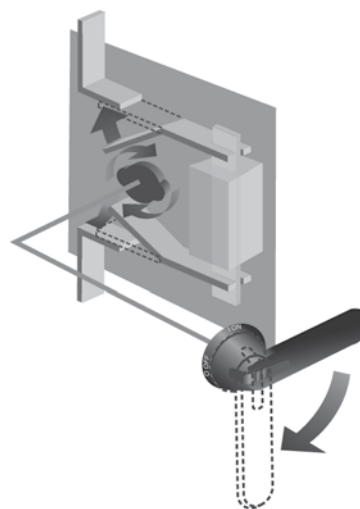
Superior short circuit protection

Fuses efficiently limit the peak let-through current, i^2t , during a fault better than any other product, contributing to safety and reliability. Selectivity and coordination are easily accomplished with fused protection. Fusible disconnect switches accept a wide range of fuses:

- Class CC 30A
- Class J 30A – 600A
- Class L 800A – 1200A

Fuse isolation

Fused switches contain contacts on both sides of the fuse. The fuses are totally isolated in the “OFF” position, reducing the risk of shock to authorized personnel — even if the switch has been back fed.



Fuse isolation

Non-fusible Disconnect switches



Non-fusible disconnect switches

16A – 3150A, 600VAC

200-600A, 1000VDC

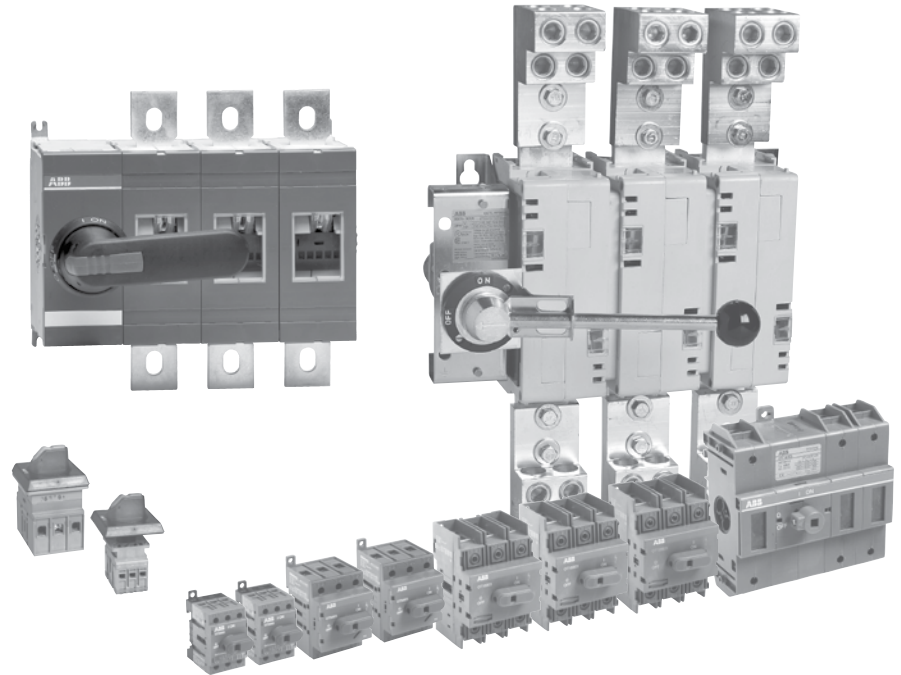


ABB SwitchLine includes 16 different amperage sizes from 16A to 3150A. The basic construction provides flexibility, safety, and high performance in an extremely compact size. ABB SwitchLine is a perfect choice for all switching applications from industrial motor control to construction safety switches.

International acceptance

UL listed, CSA approved, IEC rated, CE marked, and most other international standards.

UL98 (CSA 22.2 No.4) – UL File # E101914, CSA File #LR58077

For OT30, OT60, OT100, OT200, OT400, OT600, OT800, OT1200

OETL-NF1600 – OETL-NF2000 switches, OH_ pistol grip handles

Suitable for use as motor disconnects or industrial control panel disconnects on service entrance equipment, panelboards, switchboards, industrial control equipment, motor control centers, etc. and are horsepower rated and ampere rated.

UL508 (CSA 22.2 No. 14) – UL File # E63822, CSA File #LR58247

For OT16 – OT80 switches, OH_ selector handles

Suitable for use in equipment or machinery as motor controllers & motor disconnects and are horsepower and ampere rated.

IEC

Tested in accordance to IEC 947-1 and 3, IEC 664, IEC 269, and IEC 204

CE

Compliance with the European Machine Directive IEC 204 (EN 60204)

Disconnect
switches
Non-fusible

General information

Selection guide

OT16F3 – OT100F3



OT16F3 OT25F3 OT40F3

OT63F3 OT80F3

OT30F3 OT60F3 OT100F3

Catalog number	3 pole	OT16F3	OT25F3	OT40F3	OT63F3	OT80F3	OT30F3	OT60F3	OT100F3
General purpose amp rating	A	20	30	40	60	80	30	60	100
Approvals ①									
	2 pole	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3 pole	UL508 & IEC	UL508 & IEC	UL508 & IEC	UL508 & IEC	UL508 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC
	4 pole	UL508 & IEC	UL508 & IEC	UL508 & IEC	UL508 & IEC	UL508 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC
Technical ratings – UL, CSA ②									
Max operating voltage	V	600	600	600	600	600	600	600	600
Max horsepower rating									
Three phase									
240V	HP	5	7.5	10	15	20	10	20	30
480V	HP	10	15	20	30	40	20	40	50
600V	HP	10	20	25	30	40	30	40	50
Single phase									
120V	HP	1	1.5	2	2	2	2	3	5
240V	HP	2	3	5	5	5	5	7.5	15
Technical ratings – IEC ③									
Rated insulation and operational voltage. AC20 and DC20	V	750	750	750	750	750	750	750	750
Rated thermal current, I _n									
AC 20/DC 20 open	A	25	32	40	63	80	40	63	115
AC 20/DC 20 enclosed	A	25	32	40	63	80	40	63	115
AC 21A ≤500V	A	16	25	32	63	80	40	63	100
AC 21A ≤690V	A	16	25	32	63	80	40	63	100
Rated operational power AC23									
400/415V	kW	7.5	9	11	22	37	15	18.5	37
690V	kW	7.5	9	11	15	18.5	15	15	37
Physical characteristics									
Weight ④	3 pole	lb	0.24	0.24	0.24	0.59	0.59	0.79	0.79
Dimension	3 pole								
	H	in	2.68	2.68	2.68	3.60	3.60	3.94	3.94
	W	in	1.38	1.38	1.38	2.07	2.07	2.76	2.76
	D	in	2.20	2.20	2.20	2.85	2.85	2.95	2.95
Accessories									
Terminal lug kit		Integral	Integral	Integral	Integral	Integral	Integral	Integral	Integral
Terminal shroud		•	•	•	•	•	•	•	•
Auxiliary contact		•	•	•	•	•	•	•	•
Shaft/handle diameter		6mm .24" x .24"	6mm .24" x .24"	6mm .24" x .24"	6mm .24" x .24"	6mm .24" x .24"	6mm .24" x .24"	6mm .24" x .24"	6mm .24" x .24"
Handle UL/NEMA type									
Type 1, 3R, 12		•	•	•	•	•	•	•	•
Type 1, 3R, 4, 4X, 12		•	•	•	•	•	•	•	•
Handle type									
Selector		•	•	•	•	•	—	•	—
Pistol		•	•	•	•	•	•	•	•
Recommended pistol handle length		45 - 65mm	45 - 65mm	45 - 65mm	45 - 65mm	45 - 65mm	45 - 65mm	45 - 65mm	45 - 65mm
Maximum recommended shaft length		290mm	290mm	290mm	290mm	290mm	290mm	290mm	290mm
Conversion kits									
6 pole		•	•	•	•	•	•	•	•
Transfer		•	•	•	•	•	•	•	•
Bypass		•	•	•	•	•	•	•	•
Mechanical interlock		•	•	•	•	•	•	•	•
Electrical interlock		—	—	—	—	—	—	—	—

• = Available
— = Not available

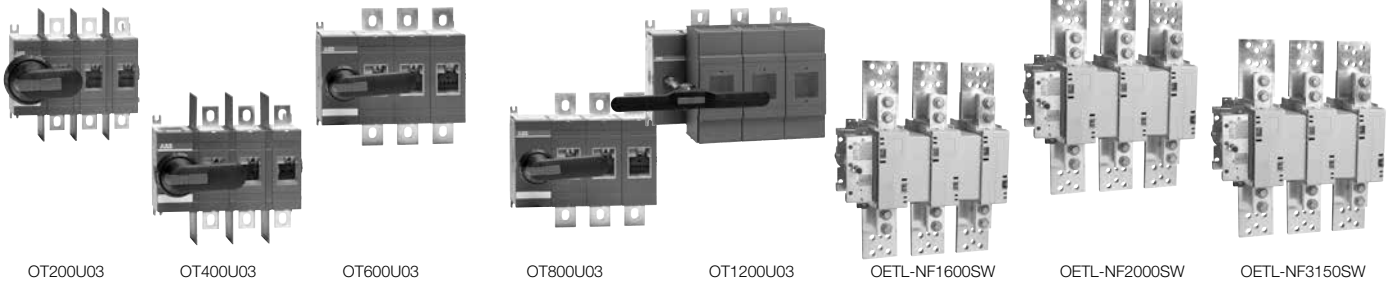
① UL listed switches are also CSA approved.
② For complete technical information please see page 19.55-19.71.
③ Switch only.

General information

Selection guide

OT200 – OT1200 & OETL-NF1600 – OETL-NF3150

Disconnect
switches
Non-fusible



Catalog number	3 pole	OT200U03	OT400U03	OT600U03	OT800U03	OT1200U03	OETL-NF1600	OETL-NF2000	OETL-NF3150
General purpose amp rating	A	200	400	600	800	1200	1600	2000	3150
Approvals ①	2 pole 3 pole 4 pole	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC IEC	UL98 & IEC UL98 & IEC IEC	UL98 & IEC UL98 & IEC IEC	IEC IEC IEC
Technical ratings – UL, CSA ②									
Max operating voltage	V	600	600	600	600	600	600	480	600
Max horsepower rating									
Three phase									
240V	HP	75	125	200	250	—	—	—	—
480V	HP	150	250	450	500	—	—	—	—
600V	HP	200	350	500	600	—	—	—	—
Single phase									
120V	HP	—	—	—	—	—	—	—	—
240V	HP	—	—	—	—	—	—	—	—
Technical ratings – IEC ③									
Rated insulation and operational voltage, AC20 and DC20	V	1000	1000	1000	1000	1000	1000	1000	1000
Rated thermal current, I _m									
AC 20/DC 20 open	A	250	400	800	1250	1600	2500	2500	3150
AC 20/DC 20 enclosed	A	250	400	800	1250	1600	2300	2300	2600
AC 21A ≤500V	A	250	400	800	1250	1600	2500④	2500④	3150④
≤690V	A	250	400	800	1250	1600	2500④	2500④	3150④
Rated operational power AC23									
400/415V	kW	132	220	400	400	400	400	400	400
690V	kW	240	355	800	—	—	—	—	—
Physical characteristics									
Weight ⑤ 3 pole	lb	2.9	5.7	11.4	35.9	38.55	127.7	127.7	127.7
Dimension 3 pole									
H in		6.69	8.66	10	19.09	19.09	25.04	25.04	25.04
W in		6.67	8.7	10.64	14.29	14.29	18.43	18.43	18.43
D in		3.30	3.35	5.56	4.92	4.92	10.67	10.67	10.67
Accessories									
Terminal lug kit		OZXA-200	OZXA-400	OZXA-800	OZXA-1200	OZXA-1200	OZXA-28	OZXA-28/2	OZXA-28/2
Terminal shroud		•	•	•	•	•	—	—	—
Auxiliary contact		•	•	•	•	•	•	•	•
Shaft/handle diameter		6mm .24" x .24"	12mm .47" x .47"	12mm .47" x .47"	12mm .47" x .47"	12mm .47" x .47"	12mm .47" x .47"	12mm .47" x .47"	12mm .47" x .47"
Handle UL/NEMA type									
Type 1, 3R, 12		•	•	•	•	•	•	•	•
Type 1, 3R, 4, 4X, 12		•	•	•	•	•	•	•	•
Handle type									
Selector		—	—	—	—	—	—	—	—
Pistol		•	•	•	•	•	•	•	•
Recommended pistol handle length		65 - 80mm	125 - 175mm	125 - 175mm	125 - 175mm	125 - 175mm	125 - 175mm	125 - 175mm	125 - 175mm
Maximum recommended shaft length		290mm	595mm	595mm	595mm	595mm	595mm	595mm	595mm
Conversion kits									
6 pole		•	•	•	•	•	—	—	—
Transfer		•	•	•	•	•	—	—	—
Bypass		•	•	•	•	•	—	—	—
Mechanical interlock		•	•	•	•	•	•	•	•
Electrical interlock		•	•	•	•	•	•	•	•

S = Standard feature
• = Available
— = Not available

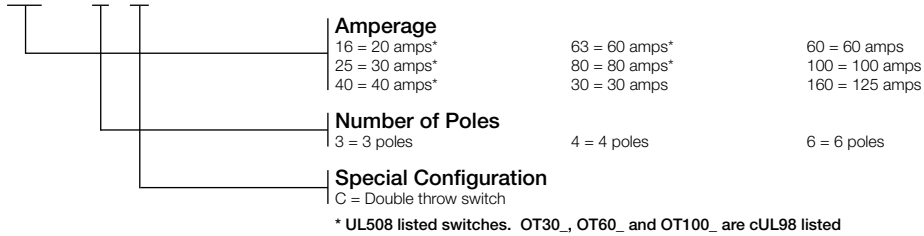
① UL listed switches are also CSA approved.
② For complete technical information please see page 19.55-19.71.
③ Switch only
④ IEC 947-3 Utilization Category B, Infrequent operation

Selection information

Standard part number designation ①

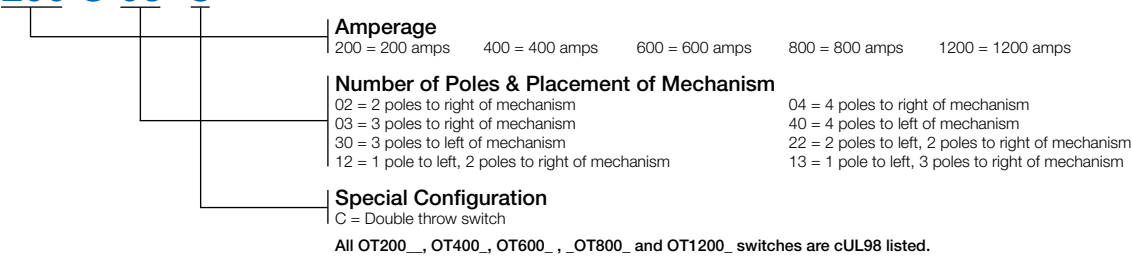
Non-Fusible OT Switches (16 to 100A)

OT 16 F 3 C



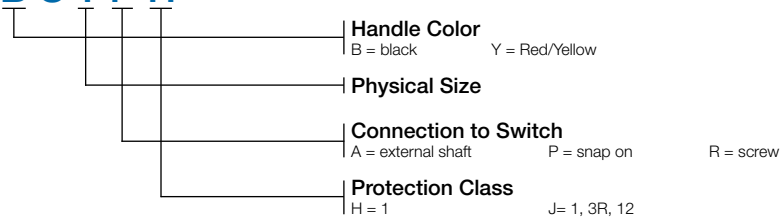
Non-Fusible OT Switches (200A and above)

OT 200 U 03 C



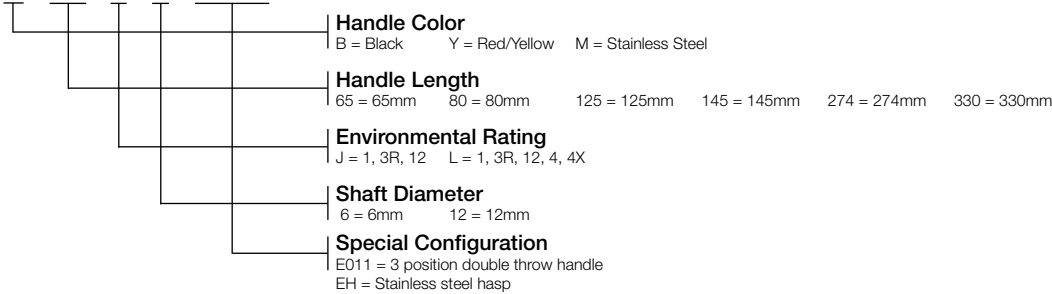
Selector Handles

OHB S 1 P H



Pistol Handles

OHB 65 J 6 E011



① Part designation keys are provided for reference only. Not all variations or configurations are available.

Base & DIN rail mounted ① 16A - 3150A

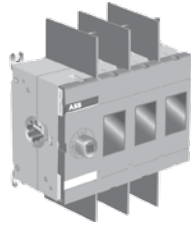
Disconnect
switches
Non-fusible

For a complete assembly,
please select one of each:

- 1 switch (page 19.11)
- 1 handle (page 19.30)
- 1 shaft (page 19.32)
- 1 terminal lug kit (page 19.34)

NOTE: For additional accessories, see
pages 19.29 - 19.42.

(Lug kits only necessary on switches 200A and above)



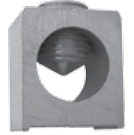
OT200U03



OXP6X210



OHB80J6



OZXA-200

UL only	UL general purpose amp rating	IEC AC21 amp rating	2 Pole	3 Pole	4 Pole ②	6 Pole ③				
			Catalog number	Catalog number	Catalog number	Catalog number				
UL 508	20	16	—	OT16F3	—	OT16F6				
	30	25	—	OT25F3	—	OT25F6				
	40	40	—	OT40F3	—	OT40F6				
	60	63	—	OT63F3	—	OT63F6				
	80	80	—	OT80F3	—	OT80F6				
UL 98	30	40	—	OT30F3	—	OT30F6				
	60	63	—	OT60F3	—	OT60F6				
	100	115	—	OT100F3	—	OT100F6				
	200	250	250	OT200U02	OT200U03 OT200U30 OT200U12	OT200U04 OT200U40 OT200U22	— — —			
				400	630	400	OT400U02	OT400U03 OT400U30 OT400U12	OT400U04 OT400U40 OT400U22	— — —
							600	800	600	OT600U02
	800	1250	800							OT800U02
				1200	1600	1200				OT1200U02
							1600	2500 ④	1600	OETL-NF16002SW
	2000	2500 ④	1600							OETL-NF20002SW
				-	3150 ④	1600				OETL-NF31502SW

Bulk packed 3 Pole, 600V Switches ⑤

UL only	UL general purpose amp rating	IEC AC21 amp rating	Bulk pack Quantity	Catalog number
UL508	20	16	50	OT16F3/B50
	30	25	50	OT25F3/B50
	40	40	50	OT40F3/B50
	60	63	50	OT63F3/B50
	80	80	50	OT80F3/B50
UL98	30	40	25	OT30F3/B25
	60	63	25	OT60F3/B25
	100	115	25	OT100F3/B25

① Above 100A, base mount with screws only.

② A snap on fourth pole may be added on 16-100A switches.

③ For a 6 or 8 pole switch 200 amp and above, a conversion mechanism accessory kit can be used with two 3 or 4 pole switches. See page 19.40.

④ Vertical busbar provided as standard on OETL-NF1600-OETL-NF3150 switches. For alternate back or edgewise mounting busbar, see page 19.38.

⑤ Order quantity is 1.

Door mounted ① 16 - 100A

For a complete assembly,
please select one of each: ②

1 switch (page 19.12)

1 handle (page 19.30)

NOTE: For additional accessories, see
pages 19.29 - 19.42.



OT63FT3

+



OHBS2RJ



UL only	UL general purpose amp rating	IEC AC21 amp rating	3 Pole ③	Bulk packs	
			Catalog number	Bulk pack quantity	Bulk pack Catalog number
UL508	20	16	OT16FT3	50	OT16FT3/B50
	30	25	OT25FT3	50	OT25FT3/B50
	40	40	OT40FT3	50	OT40FT3/B50
	60	63	OT63FT3	50	OT63FT3/B50
	80	80	OT80FT3	50	OT80FT3/B50
UL98	30	40	OT30FT3	25	OT30FT3/B25
	60	63	OT60FT3	25	OT60FT3/B25
	100	115	OT100FT3	25	OT100FT3/B25

① Door mounted switches do not provide door interlock

② Door mounted switches do not require shafts

③ A snap on fourth pole may be added

④ The environmental rating of the pistol handle derates to NEMA 1 when used in conjunction with the OHZX6 adapter.

Disconnect
switches
Non-fusible

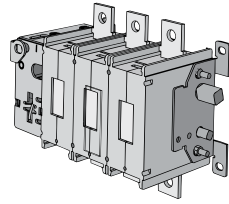
Other configurations

Side operated

30 - 600A

For a complete assembly,
please select one of each:

- 1 switch
- 1 handle
- 1 shaft
- 1 terminal lug kit



OETL-NF400-S

+

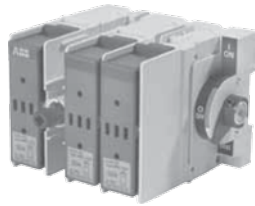


OXP12x325

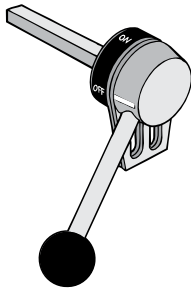
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OHB145J12E00S



OSNF30-S



OETL-ZX74



OHY_J



OXP6X170
OXP12X325



OZXA-24



OZXA-25



OZXA-26

Side operated switches — 3 pole

UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower rating					Weight (Lbs.)	Catalog number
		Three phase						
		200V	208V	240V	480V	600V		
30	32	5	7.5	7.5	15	20	1.90	OSNF30-S ①
60	63	15	15	15	30	50	3.90	OSNF60-S ①
100	125	25	25	30	60	75	4.50	OSNF100-S
400	630	100	100	125	250	350	13.66	OETL-NF400-S
600	800	150	150	200	400	500	13.66	OETL-NF600A-S

Handles

UL/NEMA type	Color	Length inches/mm	Marking	Defeatable	Padlockable	Weight (Lbs.)	Catalog number
--------------	-------	------------------	---------	------------	-------------	---------------	----------------

For use with OSNF30-S

1, 12, 3R	Black Red/Yel	2.65/65	O/I & Off/On	Yes	Yes	Yes	OHB65J6E00S OHY65J6E00S
-----------	------------------	---------	--------------	-----	-----	-----	----------------------------

For use with OSNF60-S — OSNF100-S

1, 12, 3R	Black Red/Yel	3.1/80	O/I & Off/On	Yes	Yes	Yes	OHB80J6E00S OHY80J6E00S
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For use with OETL-NF400-S — OETL-NF600A-S

1, 12, 3R	Black Red/Yel Metal	4.9/145	O/I & Off/On O/I & Off/On Off/On	Yes	Yes	Yes	OHB145J12E00S OHY145J12E00S OETL-ZX74
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Shaft

For use with:	Length (Inches/mm)	Description	Weight (Lbs.)	Catalog number
OSNF30-S	6.7/170	.20 x .20" (5 x 5mm)	0.08	OXP6X170
OSNF60-S — OSNF100-S	8.3/210	.24 x .24" (6 x 6mm)	0.10	OXP6X210
OETL-NF400-S — OETL-NF600A-S	12.8/325	.47 X .47" (12 X 12mm)	0.90	OXP12X325

Terminal lug kits

For use with:	Wire size	Weight	Wire type	Lugs per kit	Catalog number
OSNF30-S	#18 – 8	—	Cu	—	Integral
OSNF60-S	#14 – 4	—	Cu	—	Integral
OSNF100-S	#14 – 2/0	0.43	Cu/Al	6	OZXA-24
OETL-NF400-S	#2 – 600 kcmil	3.520	Cu/Al	6	OZXA-26
OETL-NF600A-S	(2) #2 – 600 kcmil	4.62	Cu/Al	6	OZXA-27

① Fused switches with solid links installed.

Special configurations

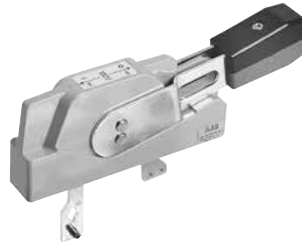
Shaft operated flange

30A - 100A



Switch

+



Handle

+



Shaft

30A -100A Flange operated — non fusible switches (Shaft) - 3 pole



OT100F3

UL general purpose amp rating	Catalog number
30	OT30F3-F
60	OT60F3-F
100	OT100F3-F

Flange handles — for use with OT30_, OT60_, OT100



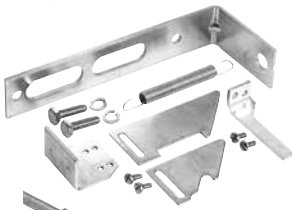
DSFHN-HS12

UL/ NEMA type	Marking	Defeatable	Padlockable	Catalog number
1, 3R, 12	OFF/ON	Yes	Yes	DSFHN-HS12
4, 4X	OFF/ON	Yes	Yes	DSFHN-HS4

Shafts

For use with:	Maximum enclosure depth (inches)		Catalog number
OT30_ - OT100_	16		OTFS-16
OT30_ - OT100_	24		OTFS-24

Door hardware NEMA 12



DSFHS-12

Item	Catalog number
Safety door latch, 2 point, door less than 40" high	KDH2R
Safety door latch, 2 point, door greater than 40" high	KDH3R

Flange operated fusible and non-fusible disconnect switches

ABB's solution for complying with the new NFPA79 requirements is Flange Operated Fusible and Non-fusible Disconnect Switches.

NFPA 79 changes requires main disconnecting means to be operable without the use of accessory tools or devices, independent of door position. This code also includes an interlocking provision to prevent the closing of disconnects while the enclosure door is open, unless an interlock is operated by a deliberate action.

The flange operated disconnect switches are available as ridged shaft or flexible cable operated versions. The cable operated version allows you to install the disconnect switch virtually anywhere in the enclosure depending on the length of the cable. Cables are available in lengths up to 84 inches.

The designs are cost-effective NFPA 79 solutions offering quick and easy installation.

Disconnect
switches
Non-fusible

Special configurations

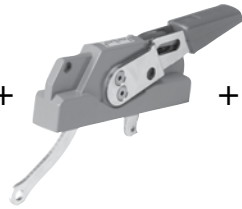
Cable operated flange

30A - 1200A



Switch

+



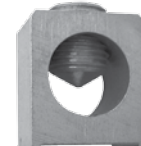
Handle

+



Cable

+



Lug kit (as required)

+



Operating mechanism ①

Non-fusible



OT100F3

UL general purpose amp rating	Catalog number	UL general purpose amp rating	Catalog number
30	OT30F3	400	OETL-NF400-FC
60	OT60F3	600	OETL-NF600A-FC
100	OT100F3	800	OETL-NF800A-FC
200	OT200U30	1200	OETL-NF1200-FC

Flange handles – UL98; UL file #E101914



OHF1C12

For use with:	Environmental rating	Catalog number
OT30 - 100F3, OT160E3, OT200U30	NEMA 1, 3R, 12 NEMA 4, 4X	OHF1C12 OHF1C4
OT400_, OETL-NF600_, OETL-NF1200_	NEMA 1, 3R, 12 NEMA 4, 4X	K7FCH K7FCH4

Flexible cables



OXC1L36-
OXC1L84

For use with:	Cable length (inches)	Catalog number
OT30 - 100F3, OT160E3, OT200U30	36	OXC1L36
	48	OXC1L48
	60	OXC1L60
	72	OXC1L72
OT400_, OETL-NF600_, OETL-NF1200_	84	OXC1L84
	48	K7C048
	60	K7C060
	72	K7C072
	84	K7C084

Operating mechanisms

For use with:	Catalog number
OT30 - 100F3 OT160E3 OT200U30	MKCS1 MKCS3 MKCS4
OETL-NF400-FC - OETL-NF1200-FC	Included

① Operating mechanism required for OT30 - OT200

Special configurations

Cable operated flange

30A - 1200A

Terminal lug kits

For use with	Wire size	Wire type	Description	Lugs per kit	Catalog number
OT200U30	#4 - 300 kcmil	Cu/Al	—	6	OZXA-200
	#4 - 300 kcmil	Cu/Al	—	3	OZXA-200/3
	(6) #4-6 AWG	Cu/Al	Distribution lug	3	OZXA-206S
OETL-NF400-FC	#2 - 600 kcmil	Cu/Al	-	6	OZXA-26
OETL-NF600 -	#2 - 600 kcmil	Cu/Al	-	6	OZXA-27
OETL-NF800	#2 - 600 kcmil	Cu/Al	-	3	OZXA-27/3P
	(6) #4-6 AWG	Cu/Al	Distribution lug	3	OZXA-175/400
OETL-NF1200	(4) #2-600 kcmil	Cu/Al	-	6	OZXA-28
	(8) 2/0 + (2) #2-600 kcmil	Cu/Al	-	3	OZXA-28/3P
	(8) 2/0 + (2) #2-600 kcmil	Cu/Al	Distribution lug	3	OZXA-32

Door hardware — NEMA 12

Item	Catalog number
Safety door latch, 2 point, door less than 40" high	KDH2R
Safety door latch, 3 point, door greater than 40" high	KDH3R

Terminal shrouds

For use on	Description	Weight (lbs.)	Catalog number
OT30 - OT100	3 Pole	0.02	OTS125T3
OT200	3 Pole Long Type Shroud	0.2	OTS250G1L/3
OT200	3 Pole Short Type Shroud	0.13	OTS250G1S/3
OETL-NF400	3 Pole (includes one shroud for line and load side)	0.62	OETL-ZX111
OETL-NF600	3 Pole (includes one shroud for line and load side)	0.66	OETL-ZX94
OETL-NF800	3 Pole (includes one shroud for line and load side)	0.88	OETL-2X800A
OETL-NF1200	3 Pole (includes one shroud for line and load side)	1.2	OETL-2X119

Disconnect
switches
Non-fusible

Special configurations

Double throw switches

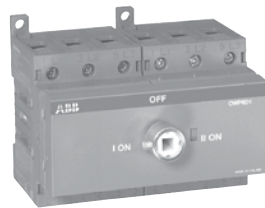
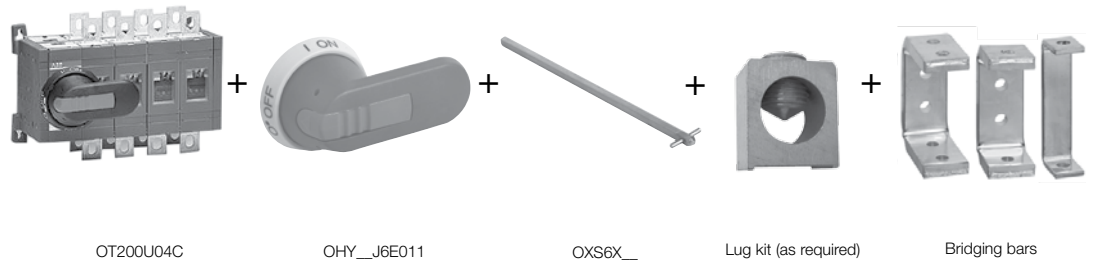
16A - 600A

For a complete assembly, please select one of each:

- 1 switch (page 19.17)
- 1 handle (page 19.30)
- 1 shaft (page 19.32)
- 1 terminal lug kit (page 19.34)
- 1 bridging bar (page 19.17)

NOTE: For additional accessories, see pages 19.29 - 19.42

(Lug kits only necessary on switches 200A and above)



OT63F3C

UL only	UL general purpose amp rating	IEC AC21 amp rating	3 Pole	4 Pole ①
			Catalog number	Catalog number
UL508	20	16	OT16F3C	—
	30	25	OT25F3C	—
	40	40	OT40F3C	—
	60	63	OT63F3C	—
	80	80	OT80F3C	—
UL98	30	40	OT30F3C	—
	60	63	OT60F3C	—
	100	115	OT100F3C	—
	200	250	OT200U03C	OT200U04C
			OT200U30C	OT200U40C
	400	630	OT400U03C	OT400U04C
			OT400U30C	OT400U40C
	600	800	OT600U03C	OT600U04C
			OT600U30C	OT600U40C
	800	1250	OT800U03C	OT800U04C
OT800U30C			OT800U40C	



OTZC13

Bridging busbar kits — required for OT200_C through OT600_C ②

Description	For Use On:	Catalog number
3 Pole Kit	OT200_C	OTZC13
	OT400_C	OTZC23
	OT600_C	OTZC33
	OT800_C	OTZC53
4 Pole kit	OT200_C	OTZC14
	OT400_C	OTZC24
	OT600_C	OTZC34
	OT800_C	OTZC54

Bridging bars are required on 200-600A double throw switches to operate as standard double throw switches. Otherwise, they will operate as two mechanically interlocked switches.

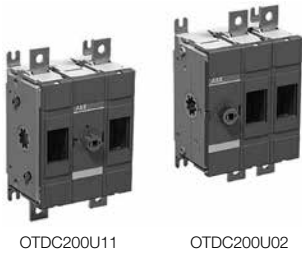
① A snap on power pole may be added to build a 4 pole 16-100A double throw switch.
② For 16-100A double throw switches, jumpers are not provided.

Disconnect
switches
Non-fusible

OTDC Disconnect switches

28A - 55A, 600VDC

100A - 200A, 1000VDC



OTDC200U11

OTDC200U02

UL Category	UL General purpose amp rating	IEC DC21B amp rating	Number of circuits	Number of poles	Catalog number w/jumper installed	Catalog number w/o jumper
28A - 55A, 600VDC						
UL98B	28	28	1	8 + 1	-	OT40FD9N2
	55	55	1	8	-	OT80FD8
100A - 200A, 1000VDC						
UL98B	100	100	1	2	OTDC100US11	OTDC100U11
	100	100	1	2	OTDC100US02	OTDC100U02
	100	100	2	4	OTDC100US22	OTDC100U22
	200	250	1	2	OTDC200US11	OTDC200U11
	200	250	1	2	OTDC200US02	OTDC200U02
	180	250	2	4	OTDC180US22	OTDC180U22

Phase separators

Switch size	Units type (pcs)	Weight/unit (lbs.)	Catalog number
100...200	6	0.04	OTDCB250/6

Grey plastic plate for maintaining 1" clearance between the phases without terminal shrouds. Snap on mounting. Includes as standard in OTDC100...200U_types.

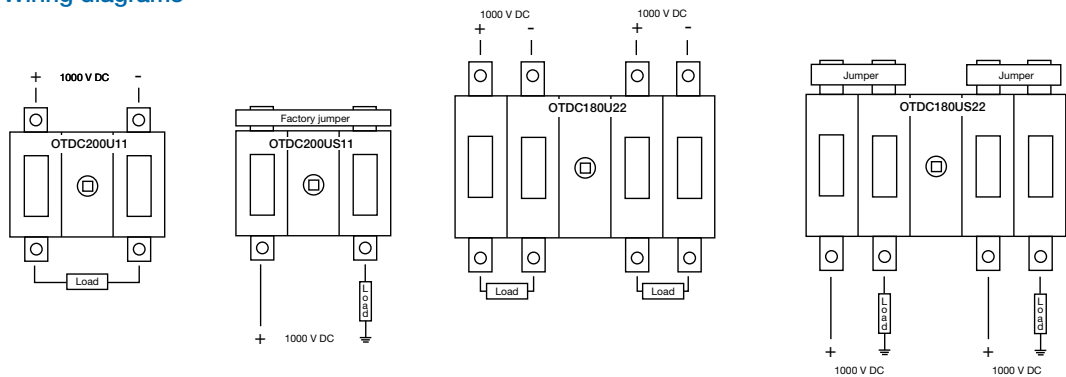
Jumper / heat sink

Switch size	Units type (pcs)	Weight/unit (lbs.)	Catalog number
100...200	1	0.04	OEZY91

Terminal lugs

Switch size	Catalog number
100...200	OZXA-200

Wiring diagrams



Ⓢ "S" indicates jumpers installed. Jumpers are installed on line side, connecting 2 poles in series

Fusible Disconnect switches



Fusible disconnect switches 30A – 1200A, 600VAC

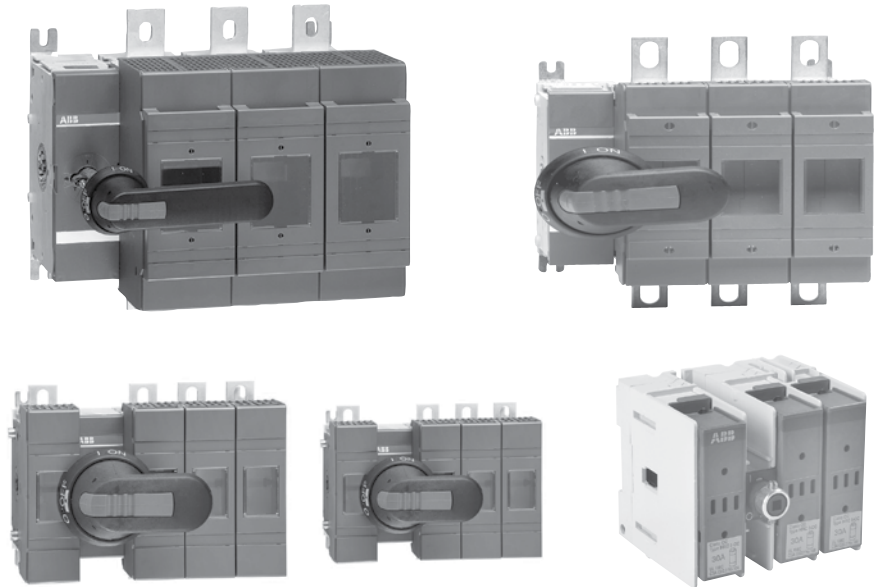


ABB PowerLine includes seven different amperage sizes from 30A to 1200A. All ABB fusible switches are designed to meet customer requirements in terms of high interrupting capacity and long electrical life while occupying little more panel space than the appropriate fuses. The basic construction provides flexibility and high performance in an extremely compact size. ABB PowerLine switches are a perfect choice to withstand the heat and humidity of the tropics, the extreme cold of the arctic and any rugged industrial environment you may have.

International acceptance

ABB fusible switches are available with a wide range of fuse clip options:

UL	USA	CSA	Canada
DIN	Europe	BS	United Kingdom
NFC	France	Ultra-rapid	

As well as the corresponding approvals: UL listed, CSA approved, IEC rated, CE marked, and most other international standards.

UL98 (CSA 22.2 No.4) – UL File # E101914, CSA File #LR58077

For 30A – 1200A switches, OH_ pistol grip handles

Suitable for use as motor disconnects or industrial control panel disconnects on service entrance equipment, panelboards, switchboards, industrial control equipment, motor control centers, etc. and are horsepower rated and ampere rated.

IEC

Tested in accordance to IEC 947-1 and 3, IEC 664, IEC 269, and IEC 204

CE

Compliance with the European Machine Directive IEC 204 (EN 60204)

Selection guide

OS30FACC12 – OS1200L03



OS30FA_12 OS60J12 OS100J03 OS200J03 OS400J03 OS600J03 OS800L3 OS1200L03

Catalog number 3 pole		OS30FACC12	OS30FAJ12	OS60GJ12	OS100GJ03	OS200J03	OS400J03	OS600J03	OS800L3	OS1200L03	
General purpose amp rating		A	30	30	60	100	200	400	600	800	1200
Approvals ①		2 pole 3 pole 4 pole	N/A UL98 & IEC UL98 & IEC	N/A UL98 & IEC UL98 & IEC	N/A UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	
Technical ratings (UL, CSA)											
Max operating voltage		V	600	600	600	600	600	600	600	600	
Max horsepower rating											
Three phase											
	240V	HP	7.5	7.5	15	30	60	125	200	250	
	480V	HP	15	15	30	60	125	250	400	500	
	600V	HP	20	20	50	75	150	350	500	600	
Single phase											
	120V	HP	2	2	—	—	—	—	—	—	
	240V	HP	3	3	—	—	—	—	—	—	
UL fuse class			CC	J	J	J	J	J	J	L	L
Technical ratings (IEC)											
Rated insulation and operational voltage. AC20 and DC20		V	1000	1000	1000	1000	1000	1000	1000	1000	
Rated thermal current, I _n											
	AC 20/DC 20 open	A	32	32	63	160	200	400	630	800	
	AC 20/DC 20 enclosed	A	32	32	63	160	200	400	600	720	
	AC 21A ≤500V	A	32	32	63	160	200	400	630	800	
	≤690V	A	32	32	63	160	200	400	630	800	
Rated operational power AC23											
	400/415V	kW	14/15	14/15	30	80/90	110	220/230	355	350/380	
	690V	kW	25	25	60	132	200	400	560	600	
Physical characteristics											
Weight											
	3 pole switch	lb	1.54	1.54	2.86	3.30	5.9	12.56	28.66	37.44	
	4 pole	lb	1.98	1.98	3.52	3.96	7.5	15.21	37.48	46.26	
Dimension											
	3 pole	H in	3.66	3.60	3.94	5.67	6.5	9.29	12.03	12.03	
		W in	4.15	4.15	5.63	7.07	7.1	10.04	13.86	13.86	
		D in	4.10	4.10	5.04	5.10	5.2	6.93	9.18	9.18	
Accessories											
Double break contacts			S	S	S	S	S	S	S	S	
Fuse cover			S	S	S	S	S	S	S	S	
Terminal lug kit			Integral	Integral	Integral	OZXA-24	OZXA-200	OZXA-400	OZXA-800	OZXA-1200	
Terminal shroud			Not required	Not required	Not required	•	•	•	•	•	
Auxiliary contact			•	•	•	•	•	•	•	•	
Shaft/handle diameter			6mm .24 x .24"	6mm .24 x .24"	6mm .24 x .24"	6mm .24 x .24"	6mm .24 x .24"	12mm .47 x .47"	12mm .47 x .47"	12mm .47 x .47"	
Handle UL/NEMA type											
	Type 1, 3R, 12		•	•	•	•	•	•	•	•	
	Type 1, 3R, 4, 4X, 12		•	•	•	•	•	•	•	•	
Recommended pistol handle length			45 - 65mm	45 - 65mm	45 - 65mm	45 - 65mm	65 - 80mm	125 - 175mm	125 - 175mm	125 - 175mm	
Maximum recommended shaft length			290mm	290mm	290mm	290mm	290mm	595mm	595mm	595mm	
Electrical interlock			—	—	—	—	—	•	•	•	

S = Standard
• = Available
— = Not available

① UL listed switches are also CSA approved.

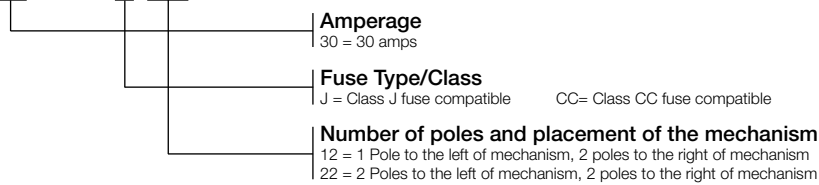
Selection information

Disconnect
switches
Fusible

Standard part number designation ①

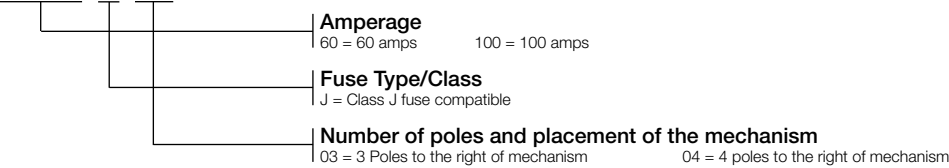
Fusible OS Switches (30A)

OS 30 F A J 22 F



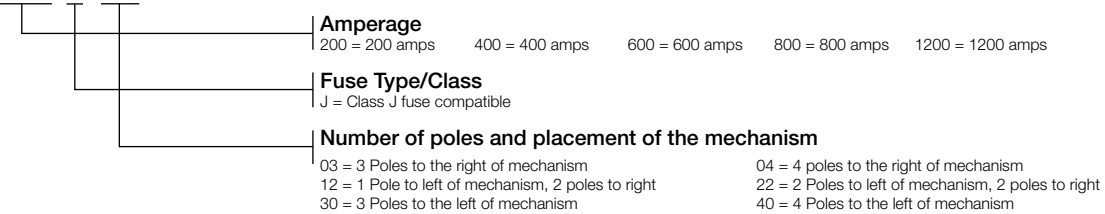
Fusible OS Switches (60 to 100A)

OS 100G J 03



Fusible OS Switches (200A and above)

OS 200 J 04 F



Pistol Handles

O H B 65 J 6 E011



① Part designation keys are provided for reference only. Not all variations or configurations are available.

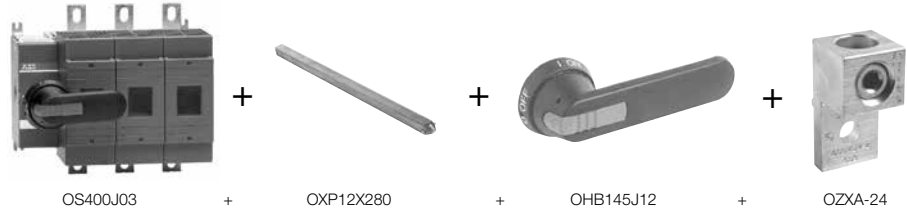
Base & DIN rail mounted 30 – 1200A

For a complete assembly, please select one of each:

- 1 switch (page 19.22)
- 1 handle (page 19.30)
- 1 shaft (page 19.32)
- 1 terminal lug kit (page 19.34)

NOTE: For additional accessories, see pages 19.29 - 19.42.

(Only required for 100A & above.)



	UL general purpose amp rating	UL Fuse Type 600V	2 Pole	3 Pole	4 Pole
			Catalog number	Catalog number	Catalog number
UL 98	30	J CC ①	— —	OS30FAJ12 OS30FACC12	OS30FAJ22F OS30FACC22F
	60	J	—	OS60GJ12 ② OS60GJ03	OS60GJ22F
	100	J	—	OS100GJ12 ② OS100GJ03 ②	OS100GJ04F
	200	J	OS200J02	OS200J03 OS200J30 OS200J12	OS200J04F OS200J13F OS200J22F
	400	J	OS400J02	OS400J03 OS400J30 OS400J12	OS400J04F
	600	J	OS600J02	OS600J03 OS600J30 OS600J12	OS600J04F
	800	L	OS800L02	OS800L03	OS800L04F
	1200	L	OS1200L02	OS1200L03	OS1200L04F

① Rejection style fuses only.

② Din Rail Mountable: 60A & 100A requires Din Rail Adapter OSGZD1

Disconnect
switches
Fusible

Other configurations

Side operated

30A – 400A, UL fuse class J,CC

For a complete assembly,
please select one of each:

- 1 switch
- 1 handle
- 1 shaft
- 1 terminal lug



OS30FAJS30

+



OPX6X170

+



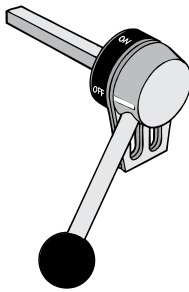
OHY65L6E00S



OS60GJS30



OS100GJS30



OETL-ZX74



OZXA-24

Side operated switches — 3 pole

UL general purpose amp rating	UL fuse type 600V	Maximum horsepower rating					Weight (Lbs.)	Catalog number
		Three phase						
		200V	208V	240V	480V	600V		
30	J	5	7.5	7.5	15	20	1.54	OS30FAJS30
30	CC	5	7.5	7.5	15	20	1.54	OS30FACCS30
60	J	15	15	15	30	50	3.52	OS60GJS30
100	J1	25	25	30	60	75	3.97	OS100GJS30
200	J1	50	50	60	125	150	15.21	OES200J3-S
400	J1	100	100	125	250	350	17.20	OES400J3-S

Handles

UL/NEMA type	IEC type	Color	Length (Inches/mm)	Marking	Defeatable	Padlockable	Weight	Catalog number
For use with OS30A_S30								
1, 3R, 12	IP65	Black Red/Yel	2.6/65	OFF/ON	Yes	Yes	0.29	OHB65J6E00S OHY65L6E00S
For use with OS60GJS30, OS60JS30 & OS100GJS30								
1, 3R, 12	IP65	Black Red/Yel	3.1/80	OFF/ON	Yes	Yes	0.30	OHB80J6E00S OHY80J6E00S
For use with OES200J3-S & OES400J3-S								
1, 3R, 12	IP65	Black Red/Yel	4.9/145	OFF/ON	Yes	Yes	0.39	OHB145J12E00S OHY145J12E00S
		Metal			No	Yes		1.50

Shaft

For use with:	Length (Inches/mm)	Description	Weight (Lbs.)	Catalog number
OS30AJS30 & OS30ACCS30	6.7/170	.20 x .20" (5 x 5mm)	0.08	OPX6X170
OS60GJS30 & OS100GJS30	8.3/210	.24 x .24" (6 x 6mm)	0.10	OPX6X210
OES200J3-S & OES400J3-S	12.8/325	.47 X .47" (12 X 12mm)	0.90	OPX12X325

Terminal lug kits

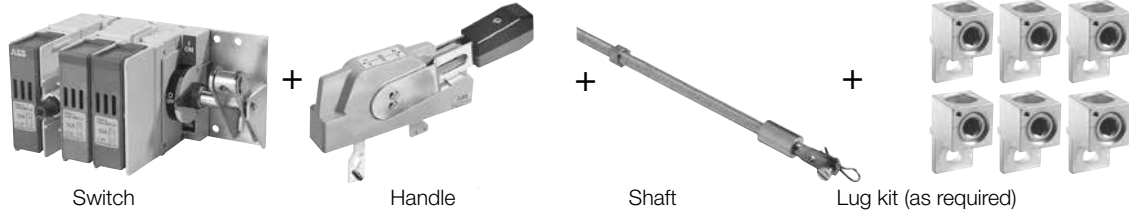
For use with:	Wire size	Weight	Wire type	Lugs per kit	Catalog number
OS30AJS30 & OS30ACCS30	#18 – 8	—	Cu	—	Integral
	OS60GJS30	#14 – 4	—	Cu	—
OS100GJS30	#14 – 2/0	0.43	Cu/Al	6	OZXA-24
OES200J3-S	#6 – 300 kcmil	0.93	Cu/Al	6	OZXA-25
OES400J3-S	#2 – 600 kcmil	3.50	Cu/Al	6	OZXA-26

Special configurations

Shaft operated flange

30A - 100A

For a complete assembly, please select one of each.



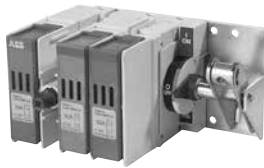
Switch

Handle

Shaft

Lug kit (as required)

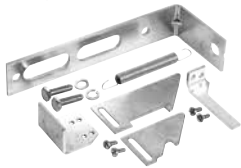
30A -100A Flange operated fusible switches (Shaft) – 3 pole



OS30FAJF30

UL general purpose amp rating A	UL fuse type 600V	Maximum horsepower rating			Catalog number
		Three phase			
		240V	480V	600V	
30	J	7.5	15	20	OS30FAJF30
30	CC	7.5	15	20	OS30FACCF30
60	J	15	30	50	OS60GJF30
100	J	30	60	75	OS100GJF30

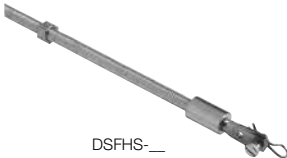
Flange handles



DSFHN-HS_

UL/ NEMA type	Marking	Defeatable	Padlockable	Catalog number
1, 3R, 12	OFF/ON	Yes	Yes	DSFHN-HS12
4, 4X	OFF/ON	Yes	Yes	DSFHN-HS4

Shafts



DSFHS_

For use with:	Maximum enclosure depth (inches)	Catalog number
OS30_ - OS100_	16	DSFHS-12
	21	DSFHS-17
	26.5	DSFHS-22

Terminal lug kits and accessories

For use on:	Description	Wire size	Wire type	Qty.	Catalog number
OS30_	Lug	#18 - #8	Cu	--	Integral
OS60_	Lug	#14 - #4	Cu	--	Integral
OS100_	Lug	#14 - 2/0	Cu/Al	6	OZXA-24
OS30_ - OS100_	Aux. Contact	1 NO		1	OA1G10
	Aux. Contact	1 NC		1	OA3G01
OS30_	Adapter	Needed for mounting aux. Contacts on OS30_		1	OSZ4
OS100_	Shroud	Includes one set of 3 for use on line or load side		1	OSS160T3

Door hardware NEMA 12



OZXA-24

Item	Catalog number
Safety door latch, 2 point, door less than 40" high	KDH2R
Safety door latch, 3 point, door greater than 40" high	KDH3R

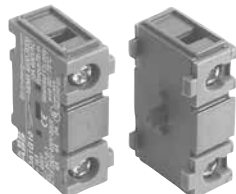
Flange operated fusible and non-fusible disconnect switches

ABB's solution for complying with the NFPA79 requirements is Flange Operated Fusible and Non-fusible Disconnect Switches.

NFPA 79 changes requires main disconnecting means to be operable without the use of accessory tools or devices, independent of door position. This code also includes an interlocking provision to prevent the closing of disconnects while the enclosure door is open, unless an interlock is operated by a deliberate action.

The flange operated disconnect switches are available as ridged shaft or flexible cable operated versions. The cable operated version allows you to install the disconnect switch virtually anywhere in the enclosure depending on the length of the cable. Cables are available in lengths up to 84 inches.

The designs are cost-effective NFPA 79 solutions offering quick and easy installation.



OA1G_

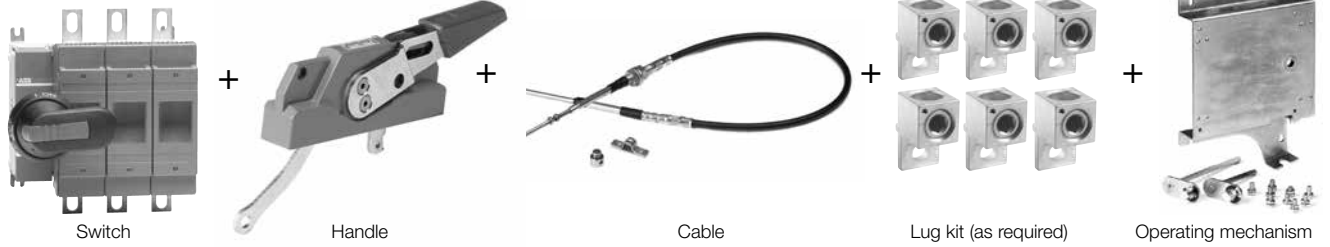
Disconnect
switches
Fusible

Special configurations

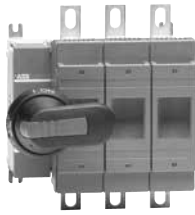
Cable operated flange

30A - 800A

For a complete assembly, please select one each of the following:



Fusible



OS200J03

UL general purpose amp rating	UL fuse type 600V	Catalog number
30	J	OS30FAJ12
30	CC	OS30FACC12
60	J	OS60GJ30
100	J	OS100GJ30
200	J	OS200J30
400	J	OES400J3-FC
600	J	OES600J3-FC
800	L	OES800L3-FC



OHF1C12

Flange handles – UL98; File #E101914

For use with:	Environmental rating	Catalog number
OS30_12, OS60J12, OS100AJ30, OS200J30	NEMA 1, 3R, 12	OHF1C12
	NEMA 4, 4X	OHF1C4
OES400_, OES600_, OES800_	NEMA 4, 4X	K7FCH4



OXC1L36-
OXC1L84

Flexible cables

For use with:	Cable length (inches)	Catalog number
OS30_12, OS60J12, OS100AJ30, OS200J30	36	OXC1L36
	48	OXC1L48
	60	OXC1L60
	72	OXC1L72
	84	OXC1L84
OES400_, OES600_, OES800_	48	K7C048
	60	K7C060
	72	K7C072
	84	K7C084

Operating mechanisms

For use with:	Catalog number
OS30AFJ12, OS30AFCC12	MKCS2
OS60GJ12	MKCS3
OS60GJ30, OS100GJ30, OS200J30	MKCS4

Special configurations

Cable operated flange

30A - 800A



Lug Kit



OZXA-200

Terminal lug kits

For use with	Wire size	Wire type	Description	Lugs per kit	Catalog number
OS100GJ30	#4 - 300 kcmil	Cu/Al	-	6	OZXA-24
OS200J30	#4 - 300 kcmil (6) #4-6 AWG	Cu/Al Cu/Al	- Distribution lug	3 3	OZXA-200/3 OZXA-206S
OES400	#2 - 600 kcmil	Cu/Al	-	6	OZXA-26
	#2 - 600 kcmil	Cu/Al	-	3	OZXA-26/3P
	(2) #2 - 500 kcmil	Cu/Al	Distribution lug	6	OZXA-33
OES600 - OES800	(12) #14 - 6 kcmil	Cu/Al	-	3	OZXA-175/400
	(2) #2 - 600 kcmil	Cu/Al	-	6	OZXA-27
	(2) #2 - 600 kcmil	Cu/Al	Distribution lug	3	OZXA-27/3P

Door hardware NEMA 12

Item	Catalog number
Safety door latch, 2 point, door less than 40" high	KDH2R
Safety door latch, 3 point, door greater than 40" high	KDH3R

Terminal shrouds

For use on	Description	Weight (lbs.)	Catalog number
OS100	1 Pole	0.04	OSS160T1
OS100	3 Pole	0.12	OSS160T3
OS200	3 Pole Long Type Shroud	0.2	OSS200G1L/3
OS200	3 Pole Short Type Shroud	0.13	OSS200G1S/3
OES400	3 Pole (includes one shroud for line and load side)	0.13	OESA-ZX123
OES600	3 Pole (includes one shroud for line and load side)	0.13	OESA-ZX125
OES800	3 Pole (includes one shroud for line and load side)	0.11	OESA-ZX125

Disconnect
switches
Fusible

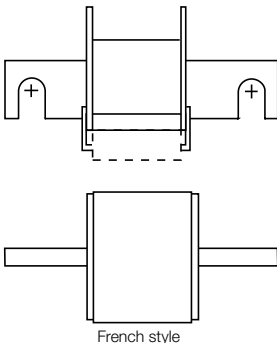
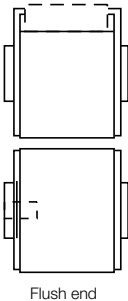
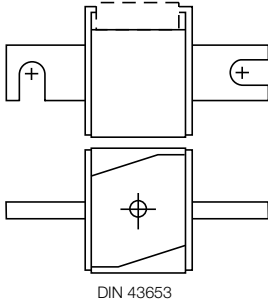
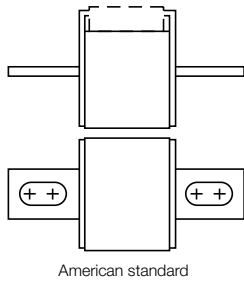
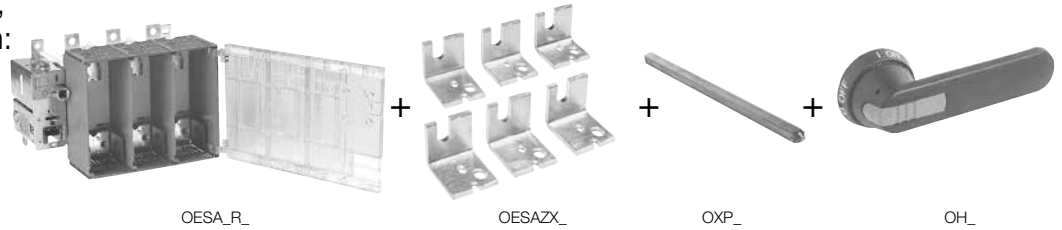
Other configurations

High speed fuse pattern

Special type fuses

For a complete assembly,
please select one of each:

- 1 switch body
- 1 adapter kit
- 1 shaft
- 1 handle



Selecting switch bodies and adapter kits

Please select switch body and adapter kit according to your fuses. Switch body alone can not be used — an adapter kit is always needed.

Switch bodies – 200 A through 800 A

UL general purpose amp rating	Maximum horsepower rating three phase			Max. allowed fuse power dissipation at rated current	Weight	Catalog number
	240 V	480 V	600 V			
200	60	125	150	22W	15.21	OES200R03
400	125	250	350	45W	17.20	OES400R03
600	200	400	500	60W	37.48	OES600R03
800	250	500	600	65W	37.48	OES800R03
200	60	125	150	22W	17.4	OES200R04
400	125	250	350	45W	19.4	OES400R04
600	200	400	500	60W	46.3	OES600R04
800	250	500	600	65W	46.3	OES800R04

Fuse adapter kits — for switches OES200 – OES400

Fuse standard	For 3 pole switch	For 4 pole switch
	Catalog number	Catalog number
American standard	OESAZX1-S4	OESAZX1-S4/4
DIN80 (DIN43653)	OESAZX1-S5	OESAZX1-S5/4
DIN80 sizes 00 and 000 (DIN 43653)	OESAZX1-S7	OESAZX1-S7/4
DIN110 (DIN43653)	OESAZX1-S9	OESAZX1-S9/4
DIN140 (DIN43653)	OESAZX1-S2	OESAZX1-S2/4
Flush-end, 70mm body	OESAZX1-S6	OESAZX1-S6/4
Flush-end, 50mm body	OESAZX1-S8	OESAZX1-S8/4
French	OESAZX1-S3	OESAZX1-S3/4
French with micro switches	OESAZX1-S10	OESAZX1-S10/4
	OESAZX1-S11	OESAZX1-S11/4

Fuse adapter kits — for switches OES600 – OES800

Fuse standard	For 3 pole switch	For 4 pole switch
	Catalog number	Catalog number
American standard	OESAZX2-S4	OESAZX2-S4/4
DIN80, DIN 110, DIN 140 (DIN43653)	OESAZX2-S2	OESAZX2-S2/4
Flush-end, 50mm and 70mm body	OESAZX2-S3	OESAZX2-S3/4
French	OESAZX2-S5	OESAZX2-S5/4
French with micro switches	OESAZX2-S6	OESAZX2-S6/4

Handles and shafts — see pages 19.30 - 19.32.

Selecting the right fusible disconnect for HSF fuses may be difficult. Due to UL restrictions it is not possible to give a general fuse selection table for your use. Therefore we ask you to contact ABB Inc., in application issues. Information needed is nominal current of the application and catalog number of the fuse.

Ⓞ Consult Factory.

Other configurations

High speed fuse pattern

Standard switches

For a complete assembly, please select one switch catalog number which includes:



Switch body



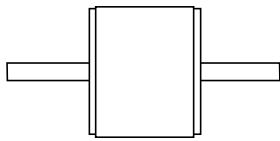
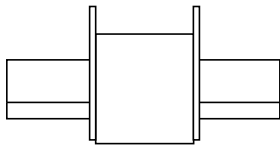
shaft



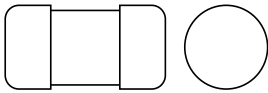
handle

Selecting switch bodies

There are some HSF fuses that fit in standard pattern fusible disconnects, no adapter kits needed.



DIN 43620



NFC Style

DIN-type fusible disconnects – 32-1200A

IEC Amp rating	AC23A operational power in kW		Fuse Type	Weight (kg)	3 Pole Catalog number	4 Pole Catalog number
	400V	500V				
32	15	18.5	DIN 000	1.3	OS32GD03	OS32GD04F
63	30	37	DIN 000	1.3	OS63GD03	OS63GD04F
160	75	90	DIN 000, 00	1.5	OS160GD03	OS160GD04F
250	145	170	DIN 0, 1	4.3	OS200D03	OS200D04F
400	230	280	DIN 0, 1, 2	7.1	OS400D03	OS400D04F
630	355	450	DIN 3	13.6	OS630D03	OS630D04F
800	450	560	DIN 3	13.6	OS800D03	OS800D04F
1200	560	710	DIN 4	46	OS1250D03	OS1250D04F

NFC-style Fusible disconnects – 25-125A

IEC Amp rating	AC23A operational power in kW		Fuse Type	Weight (kg)	3 Pole Catalog number	4 Pole Catalog number
	400V	500V				
25	11	15	NFC 10x38	0.7	OS25FF1210	OS25FF2210F
32	15	18.5	NFC 14x51	0.7	OS32FF1214	OS32FF2214F
50	22	30	NFC 14x51	1.3	OS50GF12	OS50GF22F
125	55	75	NFC 22x58	1.5	OS125GF12	OS125GF22F

BS-types fusible disconnects – 32-1200A

IEC Amp rating	AC23A operational power in kW		Fuse Type	Weight (kg)	3 Pole Catalog number	4 Pole Catalog number
	400V	500V				
32	15	18.5	A2,A3	1.3	OS32GB03	OS32GB04N1
63	30	37	A2,A3	1.3	OS63GB03	OS63GB04N1
100	55	55	A2, A3, A4	1.5	OS100GB03	OS100GB04N1
160	75	90	A2, A3, A4	1.5	OS160GB03	OS160GB04N1
200	145	170	B1-B2	3.3	OS200B03	OS200B04N2
400	230	280	B1-B4	7.1	OS400B03	OS400B04N2
630	355	450	C1-C2	13.6	OS630B03	OS630B04N2
800	450	560	C1-C3	13.6	OS800B03	OS800B04N2
1250	560	710	D1	46	OS1250B03	OS1250B04N2

Standard handles & shafts ①②



OHBS2AJ1



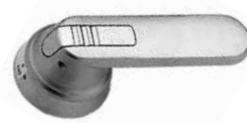
OHB_J6



OHY_J6



YASDA-8



OHM125L12



OHB4

Recommended handles & shafts

Amperes	Shaft diameter	Recommended standard pistol handle length	Maximum recommended shaft length
16 - 100	6x6 mm - .24 x .24"	45 - 65 mm	290 mm
200	6x6 mm - .24 x .24"	65 - 80 mm	290 mm
400 - 1200	12x12 mm - .47 x .47"	125 - 274 mm	595 mm
1600 - 3150	12x12 mm - .47 x .47"	175 - 330 mm	595 mm

Selector handles — for use with .24 x .24" (6mm) OXS6X shafts

UL/NEMA Type	IEC type	Color	Marking	Defeatable	Padlockable	Weight (lbs)	Catalog number
1	IP54	Black	O/I & Off/On	—	—	0.09	OHBS1AH1 ③
				—	Yes	0.12	OHBS3AH1 ③
1, 3R, 12	IP65	Black	O/I & Off/On	—	Yes	0.16	OHBS2AJ1 ③
				Yes	Yes	0.16	OHBS2AJ ③

Pistol handles — for use with .24 x .24" (6mm) OXP6X shafts

UL/NEMA Type	IEC type	Color	Marking	Length in/mm	Defeatable	Padlockable	Weight (lbs)	Catalog number
1, 3R, 12	IP65	Black	O/I & Off/On	2.6/65	Yes	Yes	0.29	OHB65J6
			Off/On/Test	2.6/65	Yes	Yes	0.29	OHB65J6T ④
			O/I & Off/On	3.1/80	Yes	Yes	0.30	OHB80J6
			O/I & Off/On	3.1/80	Yes	Yes	0.30	OHB80L6
1, 3R, 12, 4, 4X	IP66	Black	O/I & Off/On	2.6/65	Yes	Yes	0.29	OHB65L6
1, 3R, 12, 4, 4X	IP66	316L Stainless steel	O/I & Off/On	2.6/65	Yes	Yes	1.60	OHM65L6
1, 3R, 12	IP65	Black w/ 316 stainless hasp	O/I & Off/On	2.6/65	Yes	Yes	0.31	OHB65J6EH
1, 3R, 12, 4, 4X	IP66	Black w/ 316 stainless hasp	O/I & Off/On	2.6/65	Yes	Yes	0.31	OHB65L6EH

Pistol handles — for use with .47 x .47" (12mm) OXP12X shafts

UL/NEMA Type	IEC type	Color	Marking	Length in/mm	Defeatable	Padlockable	Weight (lbs)	Catalog number
1, 3R, 12	IP65	Black	O/I & Off/On	4.9/125	Yes	Yes	0.39	OHB125J12
		Black		5.7/145	Yes	Yes	0.39	OHB145J12
		Black		6.9/175	Yes	Yes	0.41	OHB175J12
		Black T-Handle		7.9/200	Yes	Yes	0.88	OHB200J12P
		Black Steel Reinforced		10.8/274	Yes	Yes	1.19	OHB274J12
		Black Steel Reinforced		13/330	Yes	Yes	1.28	OHB330J12
1, 3R, 12, 4, 4X	IP66	Black	O/I & Off/On	5.7/145	Yes	Yes	0.39	OHB145L12
		Black		6.9/175	Yes	Yes	0.41	OHB175L12
		Black T-Handle		7.9/200	Yes	Yes	0.88	OHB200L12P
		Black Steel Reinforced		10.8/274	Yes	Yes	1.19	OHB274L12
		Black Steel Reinforced		13/330	Yes	Yes	1.28	OHB330L12
1, 3R, 12, 4, 4X	IP65	Metal	Off/On	8.7/220	--	Yes	1.50	YASDA-8
1, 3R, 12, 4, 4X	IP66	316L Stainless Steel	O/I & Off/On	4.9/125	Yes	Yes	1.7	OHM125L12
		316L Stainless Steel		6.9/175	Yes	Yes	1.8	OHM175L12
		316L Stainless Steel		10.8/275	Yes	Yes	2.1	OHM275L12
		T-Handle		7.9/200	Yes	Yes	0.88	OHM200L12P
1, 3R, 12	IP65	Black w/ 316 stainless hasp	O/I & Off/On	4.9/125	Yes	Yes	0.44	OHB125J12EH
		Black w/ 316 stainless hasp		6.9/175	Yes	Yes	0.76	OHB175J12EH
1, 3R, 12, 4, 4X	IP66	Black w/ 316 stainless hasp	O/I & Off/On	4.9/125	Yes	Yes	0.44	OHB125L12EH
		Black w/ 316 stainless hasp		6.9/175	Yes	Yes	0.76	OHB175L12EH

① Red/Yellow handles are available by substituting the OHB prefix with OHY.

② All handles are plastic unless otherwise noted as metal or stainless steel.

③ Not recommended for use on OT30/60/100.

④ The OS30_ switch has a TEST position, accessed by rotating the mechanism 45 degrees counterclockwise from the OFF position. In the TEST position, optional auxiliary contacts, OA4B1C, are actuated but the main switch contacts are not.

Standard handles & shafts ②

Disconnect
switches
Accessories

Direct mount handle for non-fusible switches

Description	For use on	Color	Padlockable	Shaft through handle	Weight	Shaft catalog number	Switch catalog number
Mounts directly on switch. No shaft necessary	OT16-40	Black	Yes	Yes	0.05		OHBS12 ③ CXBY68989
	OT63-80	Black	Yes	No	0.05		OHBS2③ CXBY68998 CXBY68419/6/2M
	OT30/60/100						
Up to 3 padlocks in OFF-position, includes shaft and mechanism	OT200	Black	Yes	No	0.22		OTV250EK
	OT400	Black	Yes	Yes	0.44		OTV400EK
	OT600	Black	Yes	Yes	0.66		OTV800EK
	OT800	Black	Yes	Yes	0.30		OTV1000EK
	OT1200	Black	Yes	Yes	0.30		OTV1000EK
Mounts on shaft	OETL-NF1600-OETL-NF3150	Metal	No	Yes	0.80		YASDA-34

Direct mount handle for fusible switches

For use on	Description	Marking	Color	Padlockable	Weight	Catalog number
OS30	No shaft required	O/I/Test	Black	Yes	0.10	OHBS5
OS60 - OS200	No shaft required	O/I	Black	Yes	0.30	OSV200BK
OS400	No shaft required	O/I	Black	Yes	0.30	OSV400BK
OS600	No shaft required	O/I	Black	Yes	0.30	OSV600BK
OS400-600, OES800	Mounts on 12mm shaft	—	Metal	No	0.78	YASDA-33

3 Position selector handles for double throw switches

UL/NEMA Type	IEC Type	Markings	Color	Defeatable	Padlockable	Weight (Lbs.)	Catalog number
1, 3R, 12	IP65	I/O/II, ON/OFF/ON	Black	Yes	Yes	0.16	OHBS2AJE011

3 Position pistol handles for double throw switches

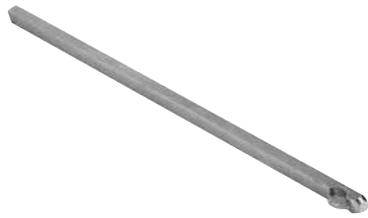
UL/NEMA Type	IEC Type	Markings	Color	Defeatable	Padlockable	Weight (Lbs.)	Catalog number	Catalog number
1, 3R, 12	IP65		Black	Yes	Yes	0.29	OHB65J6E011	OHB145J12E011
1, 3R, 12, 4, 4X	IP66	I/O/II, ON/OFF/ON	Black	Yes	Yes	0.29	OHB65L6E011	OHB145L12E011
1, 3R, 12	IP65		Black	Yes	Yes	0.3	OHB80J6E011	OHB175J12E011
1, 3R, 12, 4, 4X	IP66		Black	Yes	Yes	0.3	OHB80L6E011	OHB175L12E011

Selector handles for door mounted switches ①

UL/NEMA Type	IEC Type	Color	Defeatable	Padlockable	Weight (lbs)	Catalog number
Snap-on mounting - for use on OT16FT3 - OT40FT3						
1	IP54	Black	—	—	0.10	OHBS1PH
1	IP54	Black	—	Yes	0.13	OHBS3PH
1, 3R, 12	IP65	Black	—	Yes	0.17	OHBS2PJ
Screw mounting - for use on OT16FT3 - OT100FT3. For OT30, OT60, and OT100 use OH_2_ only						
1	IP54	Black	—	—	0.11	OHBS1RH
1	IP54	Black	—	Yes	0.14	OHBS3RH
1, 3R, 12	IP65	Black	—	Yes	0.18	OHBS2RJ

① Red/Yellow handles are available by substituting the OHB prefix with OHY.
 ② All handles are plastic unless otherwise noted as metal or stainless steel.
 ③ Suitable for 3 & 4 pole versions only. Not for use with 6 or 8 pole or double throw configurations.

Standard handles & shafts



OXS6X_



OSP6X
OSP12X_

Shafts for use with selector handles – .24 x .24" (6x6 mm)

Shaft length (in/mm)	Maximum Mounting Depth (inches) ①					Weight	Catalog number
	OT16F3, OT25F3, OT40F3		OT63F3, OT80F3		OS30 ②		
	OH_1_ & OH_3_	OH_2_	OH_1_ & OH_3_	OH_2_			
3.3/85	5.0	4.3	5.6	5.0	–	0.07	OXS6X85
4.1/105	5.8	5.1	6.4	5.8	–	0.07	OXS6X105
4.7/120	6.4	5.8	7.0	6.4	–	0.08	OXS6X120
5.1/130	6.7	6.1	7.4	6.8	5.6	0.08	OXS6X130
7.1/180	8.7	8.1	9.4	8.7	6.1	0.11	OXS6X180
9.8/250	11.5	10.8	12.1	11.5	10.3	0.13	OXS6X250
13/330	14.6	14.0	15.3	14.7	13.4	0.17	OXS6X330

Shafts for use with pistol handles – .24 x .24" (6x6 mm)

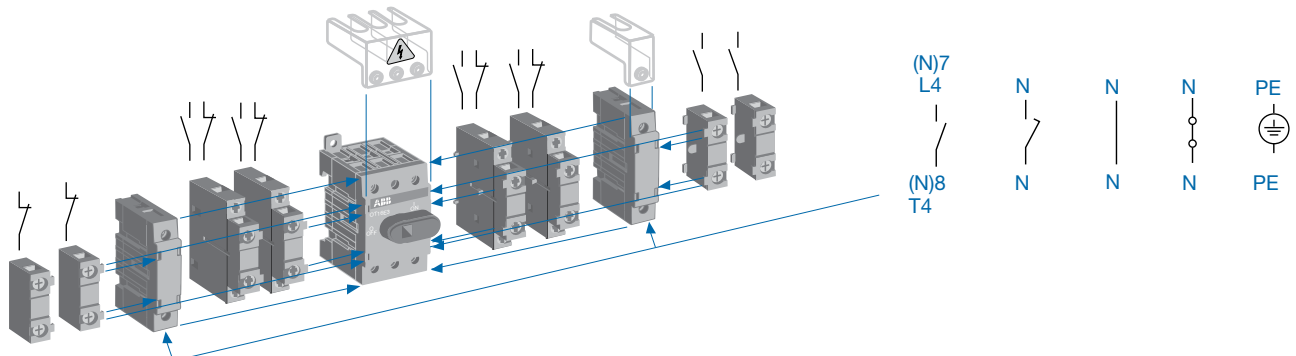
Shaft length (in/mm)	Maximum Mounting Depth (inches)								Weight	Catalog number
	OT16F3 - OT40F3	OT63F3 - OT80F3	OT30F3/60F3/100F3	OT200	OS30	OS60	OS100	OS200		
5.2/130	5.9	6.4	6.7	6.5	–	–	–	–	0.08	OSP6X130
5.9/150	6.7	7.4	7.0	7.2	8.9	9.7	9.8	9.9	0.09	OSP6X150
8.3/210	9.1	9.7	9.8	9.6	9.7	12.1	12.2	13.0	0.13	OSP6X210
11.4/290	12.2	12.8	12.9	12.7	13.4	15.2	15.3	–	0.18	OSP6X290
14.2/360	14.9	13.8	15.6	15.5	18.7	12.9	18.0	–	0.23	OSP6X360
16.9/430	17.6	18.3	18.3	18.2	22.6	20.6	20.7	–	0.27	OSP6X430

Shafts for use with pistol handles – .47 x .47" (12x12 mm)

Shaft length (in/mm)	Maximum Mounting Depth (inches)						Weight	Catalog number
	OT400	OT600	OT800 - OT1200	OETL-NF1600 - OETL-NF3150	OS400	OS600 - OS1200		
11.0/280	13.3	14.6	14.5	–	13.8	14.9	0.77	OSP12X280
12.8/325	15.0	16.4	16.3	20.9	15.6	16.7	0.90	OSP12X325
15.6/395	20.5	19.1	19.1	23.6	18.3	19.4	1.10	OSP12X395
18.3/465	21.9	21.8	21.9	26.3	21.0	22.1	1.32	OSP12X465
21.1/535	22.8	24.6	24.6	29.1	23.8	24.8	1.54	OSP12X535

① Mounting depth is distance from the outside of the door to the disconnect switch mounting plate. Shaft can be cut to desired length.
 ② Selector handles and shafts are not recommended for use with fusible switches over 30A.

Auxiliary contacts

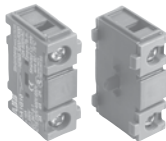


Auxiliary contacts — snap-on mounting ①

Description	For Use On	Weight	AC Thermal amp rating	AC rated voltage	Catalog number
Form C 1 N.O. & 1 N.C.	OS30 ②	0.04	6	250	OA4B1C
1 N.O.	OT16-100, OT200-1200 OS30-OS1200	0.07	10	600	OA1G10
1 N.C.	OT16-100	0.07	10	600	OA1G01
	OT200-1200 OS30-OS1200	0.07	10	600	OA3G01
1 N.O. & 1 N.C.	OT16-100	0.07	10	600	OA2G11
Module for auxiliary contacts	OS30	0.09	–	–	OSZA
	OT200-1200 OS200-OS1200	0.1	–	–	OEA28



OEA28



OA1G_



OA2G11

Auxiliary contacts — front mounting ③

Description	For Use On	Weight	AC Thermal amp rating	AC rated voltage	Catalog number
1 N.O. + 1 N.C.	OETL-NF1600 through OETL-NF3150	0.2	10	600	OZXK-1
2 N.O. + 2 N.C.		0.26	10	600	OZXK-2
4 N.O. + 4 N.C.		0.4	10	600	OZXK-3
2 N.O.		0.18	10	600	OZXK-4
4 N.O.		0.25	10	600	OZXK-5
8 N.O.		0.4	10	600	OZXK-6

Auxiliary contacts — snap-on mounting for double throw

Description	For Use On	Weight (Lbs.)	AC Thermal amp rating	AC rated voltage	Catalog number
1 N.O.	OT16-100_C	0.7	10	600	OA7G10
1 N.C.	OT16-800_C	0.7	10	600	OA3G01
1 N.O.	OT200-800_C	0.7	10	600	OA1G10

Mounting & installation considerations

Non-Fusible

OT16-100	OA1G10 (1 N.O.) mounts on right side of switch only OA1G01 (1 N.C.) mounts on left side of switch only OA2G11 (1 N.O. & 1 N.C.) mounts on left of right side of switch Maximum two contacts on each side of switch
OT200-1200	Maximum 8 auxiliary contact blocks with the OEA28 module Maximum 4 auxiliary contact blocks mounting under the mechanisms

Fusible

OS30	Form C contacts mount directly to switch Maximum two Form C contacts OA1G10 (1 N.O.) + OA3G01 (1 N.C.) require mounting base Maximum 6 OA1G10 + OA3G01 contacts with mounting base OSZ4
OS60-1200	Mounting to left side of switch with OEA28 module: Maximum 8 contact blocks Mounting under mechanism cover: Maximum 4 contact blocks

① UL file #E83510

② Not suitable for use on cable operated flange version of OS100

③ UL File #E5707

Terminal lugs

Terminal lugs ①

For Use On	Wire Size	Wire Type	Lugs/Kit	Weight (lbs)	Catalog number
OS100	#14-2/0	Cu/Al	6	0.50	OZXA-24 ②
OT200/OS200	#4 - 300 kcmil	Cu/Al	6	0.50	OZXA-200
	#4 - 300 kcmil		3	0.25	OZXA-200/3
	(6) 14-6 AWG		3	0.25	OZXA-206T
OT/OS400	#2 - 600 kcmil	Cu/Al	6	0.50	OZXA-400
	#2 - 600 kcmil		3	0.25	OZXA-400/3P
	(2) #4 - 300 kcmil		6	0.50	OZXA-402
	(6) #14 - 6 AWG		3	0.50	OZXA-406
OT600 , OS600 - OS800	(2) #2 - 600 kcmil	Cu/Al	6	0.50	OZXA-800
	(2) #2 - 600 kcmil		3	0.50	OZXA-800/3
OT800, OT1200 & OS1200	(4) #2 - 600 kcmil	Cu/Al	6	6.90	OZXA-1200
	(2) #2 - 600 kcmil		3	3.45	OZXA-1200/3
OETL-NF1600	(4) #2 - 600 kcmil	Cu/Al	6	10.44	OZXA-28
	(4) #2 - 600 kcmil		3	5.22	OZXA-28/3
	(8) 2/0 + (2) #2 - 600 kcmil ③		3	10.44	OZXA-32
OETL-NF2000-3150	(8) #2 - 600 kcmil	Cu/Al	12	20.88	OZXA-28/2

Terminal lug kits for double throw switches

For Use On	Wire Size	Wire Type	Lugs/Kit	Weight (Lbs)	Catalog number
OT200_C	#4 - 300kcmil #4 - 300kcmil	Cu/Al	9	0.5	OZXA-200/9
			12	0.25	OZXA-200/12
OT400_C	#2 - 600kcmil #2 - 600kcmil	Cu/Al	9	0.5	OZXA-400/9
			12	0.25	OZXA-400/12
OT600_C	(2) #2 - 600kcmil (2) #2 - 600kcmil	Cu/Al	9	0.5	OZXA-800/9
			12	0.5	OZXA-800/12
OT800_C	(4) #2 - 600 kcmil (2) #2 - 600 kcmil Cu/Al	Cu/Al	9	0.5	OZXA-1200/9
			12	0.5	OZXA-1200/12



OZXA-400



OZXA-27



OZXA-30



OZXA-32



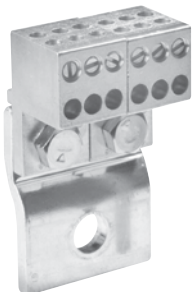
OZXA-175/400



OZXA-24



OZXA-27



OZXA-175/400

① Lugs are integral to the switch for 16-125A. No separate lug kit accessory is required.

② Not suitable for use on cable operated flange version OS100.

③ A load side distribution lug eliminates the need to purchase, install and wire a separate distribution block.

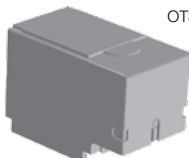
Terminal shrouds

Terminal shrouds for non-fusible

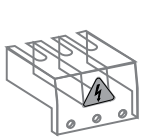
Description	For Use On	Weight	Catalog number
3 pole includes one shroud for line or load side	OT16-OT40 ②	0.02	OTS40T3
	OT63-OT80 ②	0.02	OTS80T3
	OT30-OT100 ②	0.02	OTS125T3
4th pole includes one shroud for line or load side	OTPS40FPN1 ②	0.03	OTS40T1
	OTPS80FP ②	0.03	OTS80T1
	OTPS125FP ②	0.03	OTS125T1
3 pole long type shrouds	OT200	0.12	OTS250G1L/3
3 pole short type shrouds		0.13	OTS250G1S/3
4 pole long type shrouds		0.26	OTS250G1L/4
4 pole short type shrouds		3.18	OTS250G1S/4
3 pole includes one shroud for line or load side ①	OT400	0.33	OTS403
	OT600	0.33	OTS603
3 pole includes one shroud for line or load side ①	OT800	0.88	OTS803
	OT1200	1.2	OTS1203



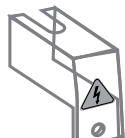
OTS250G1L/3



OTS250G1S/3



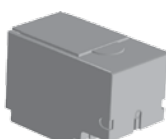
OTS40T3
OTS80T3
OTS125T3



OTS40T1
OTS80T1
OTS125T1



OSS160T3



OSS200G1S/3



OSS200G1L/3

Terminal shrouds for fusible

Description	For Use On	Weight (Lbs.)	Catalog number
Terminal shroud for one pole	OS100	0.04	OSS160T1
Terminal shroud for 3 poles	OS100	0.04	OSS160T3
3 pole long type shrouds	OS200	0.20	OSS200G1L/3
3 pole short type shrouds	OS200	0.13	OSS200G1S/3
4 Pole long type shrouds	OS200	0.26	OSS200G1L/4
4 pole Short type shrouds	OS200	0.18	OSS200G1S/4
3 Pole includes one shroud for line or load side ①	OS400	0.13	OSS403
	OS600	0.11	OSS603
3 pole short type shrouds	OS800	0.47	OSS800G1S/3
3 pole long type shrouds		1.54	OSS800G1L/3
4 pole short type shrouds		0.62	OSS800G1S/4
4 pole long type shrouds		1.54	OSS800G1L/4
3 pole short type shrouds	OS1200	0.88	OSS1200G1S/3
3 pole long type shrouds		2.12	OSS1200G1L/3
4 pole short type shrouds		1.15	OSS1200G1S/4
4 pole long type shrouds		2.2	OSS1200G1L/4

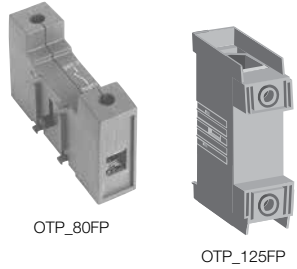
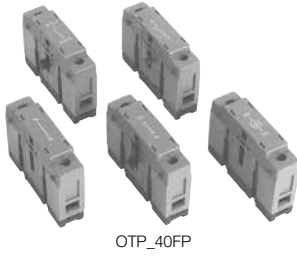
① For 4 pole shrouds, please consult factory.

② ABB OT16 - OT100 switches are IP20 touchsafe as standard. Terminal shrouds provide an extra degree of protection.

Additional poles

Additional poles for non-fusible ①

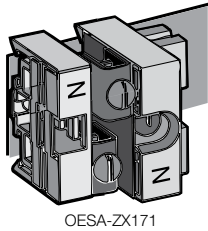
Power poles - Only one power pole per switch: mounts on left or right side of switch. (OTPS40FPN1 mounts to left side only.)



Description	For use on	Weight	AC Thermal amp rating	AC rated voltage	Catalog number
 Fourth Pole	OT16-OT40	0.07	40	600	OTPS40FPN1 OTPS60FP OTPS80FP OTPS125FP
	OT30-OT60	0.13	60		
	OT63-OT80	0.13	80		
	OT100	0.31	100		
 Late-break/ early-make	OT16-OT40	0.07	40	600	OTPL40FP OTPL60FP OTPL80FP OTPL125FP
	OT30-OT60	0.13	60		
	OT63-OT80	0.13	80		
	OT100	0.31	100		

Terminal poles - Switch accepts one terminal pole per side: mounts on left or right side of switch

Description	For use on	Weight	AC Thermal amp rating	AC rated voltage	Catalog number
 Solid neutral	OT16-OT40	0.07	40	600	OTPN40FP OTPN60FD OTPN80FP OTPN125FP
	OT30-OT60	0.13	60		
	OT63-OT80	0.13	80		
	OT30-OT100	0.31	100		
 Detachable Neutral	OT16-OT40	0.07	40	600	OTPD40FP OTPD60FP OTPD80FP OTPD125FP
	OT30-OT60	0.13	60		
	OT63-OT80	0.13	80		
	OT100	0.31	60		
 Ground Terminal	OT16-OT40	0.07	40	600	OTPE40FP OTPE60FP OTPE80FP OTPE125FP
	OT30-OT60	0.13	60		
	OT63-OT80	0.13	80		
	OT100	0.31	100		



Additional poles for fusible

Description	For use on	Weight (Lbs.)	AC Thermal amp rating	AC rated voltage	Catalog number
Detachable neutral mounts on side of switch or DIN rail	OS30	0.45	30	600	OESA-ZX171
	OS60	0.13	63	600	OSZ1
	OS100	0.31	125	600	OSZ2

① Switches accept only one power pole or one terminal pole per side. Only one power pole per switch.

Fuse monitors & carriers



OFM_



OSC60J_



CXBY68362

Fuse monitors

Blown fuse indicators/monitors

For Use With	Rated Voltage	Weight (lbs)	Catalog number
OS30-1200	100-240	0.31	OFM240
	380-600	0.31	OFM600

Suitable for 1 or 3 phase circuits. Includes 1 N.O. and 1 N.C. auxiliary contacts and red & green LED lights for indication.

Fuse Monitor Mounting Accessories

For Use With	Crimp Terminal size (mm)	Catalog number
OS30-200	2.8-0.8	OFMZ2
OS400-1200 Includes 6 crimp terminals	6.3-0.8	OFMZ4

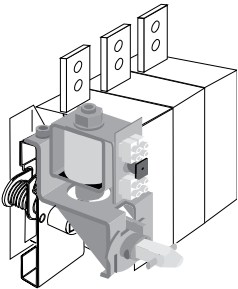
Fuse carriers/covers

Description	For Use on	Catalog number
CC fuse carrier (Qty. 1)	OS30AFCC_	OESAZD48
J fuse carrier (Qty. 1)	OS30AFJ_	OESAZD28
Solid link carrier (Qty. 1)	OS30_	OESAZD55

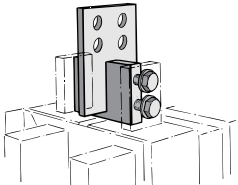
Shorting bars for fusible switches

Description	For Use On	AC thermal amp rating	AC rated voltage	Catalog number
Dummy Fuse	OS60	60	600	OESA-ZD54
Solid links: metal strap	OS100	100	600	OESA-ZS36
	OS200	400	600	OESA-ZK98

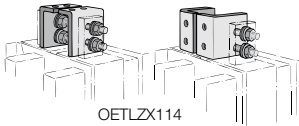
Miscellaneous accessories Replacement parts



OETL-ZT80_



OETL-ZX115



OETLZX114



OTZS2

Miscellaneous accessories

Shaft accessories

Accessory Type	Description	For Use On	Weight	Catalog number
Shaft Adapter	Adapts one end of a 6mm shaft to 12mm (use with shaft extension coupler)	6mm shafts	0.20	OETL-ZK19
Shaft Extension Coupler	Joins two shafts together for applications where extended length is required	6mm shafts 12mm shafts	0.26 0.26	OESA-ZX167 OETL-ZX95
Shaft Guide	Fits all pistol grip handles, mounts on the inside of the enclosure door with provided hardware	pistol handles	-	OHZX10

Busbar connections

Accessory Type	Description	For Use On	Weight	Catalog number
Busbar Connections	Vertical, back or edgewise mounting ①	OETL-NF1600 - 3150	46.2 31.0	OETL-ZX115 OETL-ZX114

Locking accessories

Accessory Type	Description	For Use On	Weight	Catalog number
Cam Attachment	For Kirk Key, Castell, Low & Fletcher and Ronis interlock. For adapting to the interlock system. The interlock is not included.	OS60-OS200	0.25	OETL-ZW16
		OS400-OS1200	0.29	OETL-ZW5
Electrical Interlock	Closed circuit principle for interlocking the switch movement. When the coil circuit is dead, A-types cannot be operated to O-position and L-types cannot be operated to ON- or OFF-position. Coil voltages 110VAC, 220 VAC, 24VDC, 48VDC, 60VDC, 110VDC, 220VDC, P - 15W U = 0.7 - 1.1 Un (U = coil voltage, Un = nominal voltage)	OETL-NF800 - 3150A, OES800	2.42	OETL-ZT80AΔ OETL-ZT80LΔ

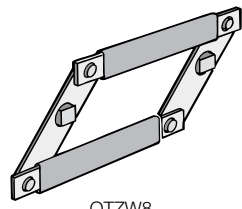
Δ = Coil Voltage

Replacement parts

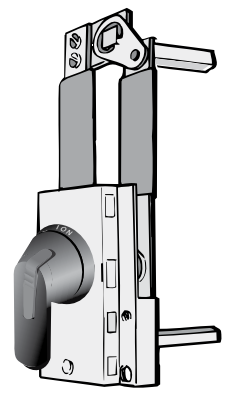
Accessory Type	Description	For Use On	Catalog number
Non-fusible			
Metal collar	Replaces original black knob for locking shaft in place	OT16-200, OS30-200	OTZS2
Set screw	Set screw for use with knob or collar	OT16-200 OS30-200	FLSWM5X8AX
Shaft set screw	Shaft set screw, bag of 10	OT400-1200	OZX1
Fusible			
Terminal cover	Covers terminal below fuse carrier	OS30	CXBY67121
Phase barrier	-	OS200	CXBY68794
Shaft Set Screw	-	OS30_	FLSWM5X8AX
	Bag of 10	OS400-1200	OZX1

① Vertical busbar is provided as standard on OETL-NF1600 through OETL-NF3150 switches.

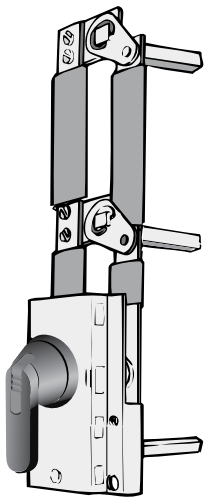
Conversion, transfer & bypass mechanisms Mechanical interlocks



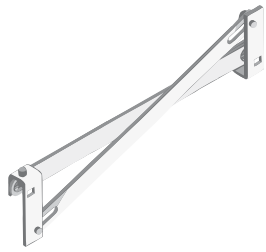
OTZW8



OTZW6



OTZW17



OETL-ZW24

Conversion mechanisms

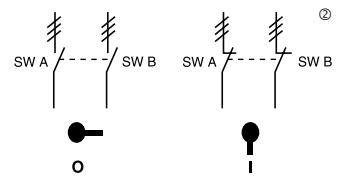
Mechanism Type	For use on	Weight	UL/Nema Type	Catalog number
6 or 8 pole mechanisms	OT16-100	0.33	-	OTZW8
	OT160	1.52	-	OETL-ZK19
	OT200	1.52	-	OESA-ZW2
	OT400 – OETL-NF1200	2.42	-	OETL-ZW9
Double throw mechanisms	OT16 - 160	2.20	1, 3R, 12 1, 3R, 12, 4, 4X	OESA-ZW1 OESA-ZW1X
	OT200	2.20	1, 3R, 12 1, 3R, 12, 4, 4X	OTZW25 OTZW25X
	OT400 – OETL-NF1200	10.10	1, 3R, 12, 4, 4X	OETL-ZW12
Bypass mechanisms	OT16-OT100	1.54	1, 3R, 12 1, 3R, 12, 4, 4X	OTZW17 OTZW17X
	OT200	7.28	1, 3R, 12	OTZW26
	OT400 – OETL-NF1200	8.81	1, 3R, 12, 4, 4X	OETL-ZW13
Mechanical interlock mechanisms	OT16-OT100	0.33	-	OTZW24
	OT160-200	0.55	-	OTZW10
	OT400 – OETL-NF800	1.26	-	OETL-ZW3
	OETL-NF1200 – OETL-NF3150	2.64	-	OETL-ZW15

6 or 8 pole

6 (8) pole mechanism allows two switches controlled by one handle to open or close simultaneously.

Equipment required for a complete installation:

- One conversion mechanism
- Two disconnect switches (see page 19.11)
- One handle[Ⓞ] (see page 19.30)
- Two shafts (see page 19.32)



	POS. O	POS. I
SW. A	O	X
SW. B	O	X

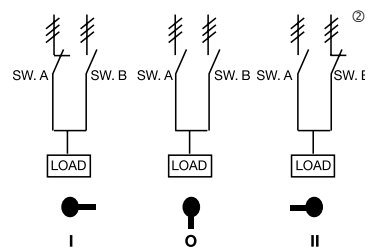
X = Closed
O = Open

Transfer

Transfer mechanism manually transfers between two power sources using two switches and a center OFF position. A 3-position handle is included.

Shafts included. Equipment required for a complete installation:

- One conversion mechanism
- Two disconnect switches (see page 19.11.)



	POS. I	POS. O	POS. II
SW. A	X	O	O
SW. B	O	O	X

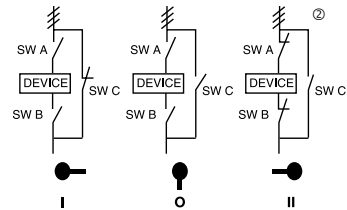
X = Closed
O = Open

Bypass

Bypass mechanism operates three switches: Two switches in series and one changeover switch to allow power bypass. A 3-position handle is included.

Shafts included. Equipment required for a complete installation:

- One conversion mechanism
- Three disconnect switches (see page 19.11.)



	POS. I	POS. O	POS. II
SW. A	O	O	X
SW. B	O	O	X
SW. C	X	O	O

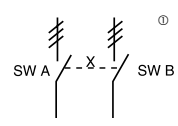
X = Closed
O = Open

Mechanical interlock

Mechanical interlock mechanism prevents both switches from being in the ON position at the same time.

Equipment required for a complete installation:

- One conversion mechanism
- Two disconnect switches (see page 19.11)
- Two handles (see page 19.30)
- Two shafts (see page 19.32)



	SW. A POS. I	SW. B POS. I
SW. A	X	O
SW. B	O	X

X = Closed
O = Open

Ⓞ OT16E3 – OT32E3 can use a selector or pistol handle. All other sizes must use a pistol handle.
Ⓜ = Three poles

Notes



Enclosed disconnect switches

16A – 3150A Non-fusible

30A – 1200A Fusible

Enclosed Disconnect switches



eOT, NF and FJ's meet customer requirements in terms of safety, ease of installation, space savings and operational convenience. They are available in a wide range of amperage ratings, are UL approved and NEMA rated to satisfy rugged industrial environments.

Enclosed

General information

Non-fusible, fusible & lockable

Non-fusible

Snap on accessories include additional poles, auxiliary contacts, etc.

Enclosures available in plastic, metal, or stainless steel in NEMA 1, 3R, 12, 4X, 7 & 9 environmental categories



Modern appearance

Quick make, quick brake mechanism

Heavy duty disconnect, 600VAC

Extremely compact size

Finger-proof construction. No hazardous exposed parts

3/4/6/8 pole constructions; transfer switches and by-pass switches available

Fusible

Snap on accessories include fuse monitors, auxiliary contacts, etc.

Enclosures available in plastic, metal, or stainless steel in NEMA 1, 3R, 12, 4X, 7 & 9 environmental categories



Modern appearance

Quick make, quick brake mechanism

Heavy duty disconnect, 600VAC, 200kA, I_{SC}

Extreme compact size as fuse carriers are decked above contacts

Double contacts enabling feed from any direction and preventing back feed

Finger-proof construction. No hazardous exposed parts

3/4/6/8 pole constructions; transfer switches and by-pass switches available

Lockable

Clear position indications:

- I-ON
- O-OFF

Door interlocked when handle padlocked to OFF position

Handle padlockable with up to three padlocks



Door interlocked when handle is in ON position. Door interlock can be defeated by authorized personnel.

Pilot devices can be added

General information

Non-fusible, 16A - 3150A

Fusible, 30-1200A

Disconnect
switches
Enclosed

Switch ratings, 16 – 3150 Amps, 600V

UL General purpose amp rating	Maximum horsepower rating							Wire size for terminal lugs	For wire type	Approval	
	Single phase			Three phase							
	120V	200V	240V	200V – 208V	240V	480V	600V				
UL 508	16	1	2	2	3	5	10	10	#18 – 8	Cu	UL
	25	1.5	3	3	7.5	7.5	15	20	#18 – 8	Cu	UL
	40	2	5	5	10	10	20	25	#18 – 8	Cu	UL
	60	2	5	5	15	15	30	30	#14 – 1	Cu	UL
	80	2	5	5	20	20	40	40	#14 – 1	Cu	UL
UL 98	30	2	5	5	10	10	20	30	#14 – 4	Cu	UL
	60	3	7.5	7.5	20	20	40	40	#14 – 4	Cu	UL
	100	5	15	15	25	30	50	50	#8 – 1/0	Cu	UL
	125	7.5	20	20	30	30	75	100	#8 – 1/0	Cu	UL
	200	—	—	—	60	75	150	200	#6 – 300 kcmil	Cu	UL
	400	—	—	—	100	125	250	350	#2 – 600 kcmil	Cu	UL
	600	—	—	—	150	200	400	500	(2) #2 – 600 kcmil	Cu	UL
	800	—	—	—	200	250	500	600	(2) #2 – 600 kcmil	Cu/Al	UL
	1200	—	—	—	—	—	—	—	(4) #2 – 600 kcmil	Cu/Al	UL
	1600	—	—	—	—	—	—	—	(4) #2 – 600 kcmil	Cu/Al	UL
	2000	—	—	—	—	—	—	—	(8) #2 – 600 kcmil	Cu/Al	UL
3150 ①	—	—	—	—	—	—	—	(8) #2 – 600 kcmil	Cu/Al	IEC	

Handle ratings

Catalog number suffix	Style type	NEMA	Color	Marking	Defeatable	Padlockable	Catalog number
S	Selector	1,3R,12	Black	O/I & OFF/ON	Yes	Yes	OHBS2AJ
S1	Selector	1,3R,12	Red/Yel	O/I & OFF/ON	Yes	Yes	OHYS2AJ
P	Pistol	1,3R,12	Black	O/I & OFF/ON	Yes	Yes	OHBS65J6
P	Pistol	1,3R,4,4X,12	Black	O/I & OFF/ON	Yes	Yes	OHBS65L6
P1	Pistol	1,3R,12	Red/Yel	O/I & OFF/ON	Yes	Yes	OHYS65J6
P1	Pistol	1,3R,4,4X,12	Red/Yel	O/I & OFF/ON	Yes	Yes	OHYS65L6
BJ	Selector	1,3R,12	Black	O/I & OFF/ON	Yes	Yes	OHBS2AJ
YJ	Selector	1,3R,12	Red/Yel	O/I & OFF/ON	Yes	Yes	OHYS2AJ
B4	Pistol	1,3R,12	Black	O/I & OFF/ON	Yes	Yes	OHB145J12
B4	Pistol	1,3R,12	Black	I/O/II	Yes	Yes	OHB145J12E011
B4	Pistol	1,3R,4,4X,12	Black	I/O/II	Yes	Yes	OHB145L12E011
Y4	Pistol	1,3R,12	Red/Yel	O/I & OFF/ON	Yes	Yes	OHY145J12
B6	Pistol	1,3R,4,4X,12	Black	O/I & OFF/ON	Yes	Yes	OHBS65J6
Y6	Pistol	1,3R,4,4X,12	Red/Yel	O/I & OFF/ON	Yes	Yes	OHYS65L6
B7	Pistol	1,3R,4,4X,12	Black	O/I & OFF/ON	Yes	Yes	OHB175J12
B7	Pistol	1,3R,12	Black	I/O/II	Yes	Yes	OHB175J12E011
B7	Pistol	1,3R,4,4X,12	Black	I/O/II	Yes	Yes	OHB175L12E011
Y7	Pistol	1,3R,4,4X,12	Red/Yel	O/I & OFF/ON	Yes	Yes	OHY175L12
B8	Pistol	1,3R,4,4X,12	Black	O/I & OFF/ON	Yes	Yes	OHB80L6
B8	Pistol	1,3R,12	Black	I/O/II	Yes	Yes	OHB80J6E011
B8	Pistol	1,3R,4,4X,12	Black	I/O/II	Yes	Yes	OHB80L6E011
Y8	Pistol	1,3R,4,4X,12	Red/Yel	O/I & OFF/ON	Yes	Yes	OHY80L6
6	Pistol	1,3R,4,4X,12	Black	I/O/II	No	Yes	OHB174L12E011
8	Pistol	1,3R,4,4X,12	Metal	O/I & OFF/ON	No	Yes	YASDA-8
21	Pistol	1,3R,4,4X,12	Metal	I/O/II	No	Yes	YASDA-21
21	Pistol	1,3R,4,4X,12	Black	I/O/II	No	Yes	OHB274L12E011

① IEC rated only.
② Switches are for double throw.

Disconnect
switches
Enclosed

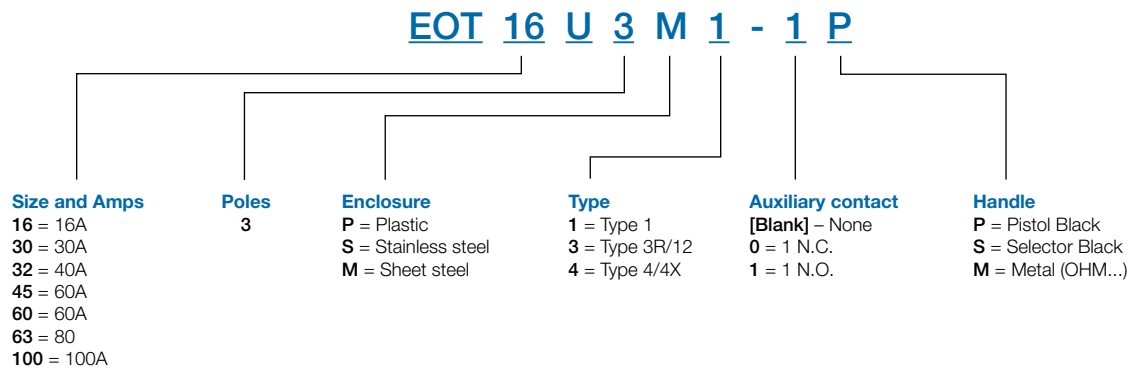
General information

Fusible, 30A – 1200A

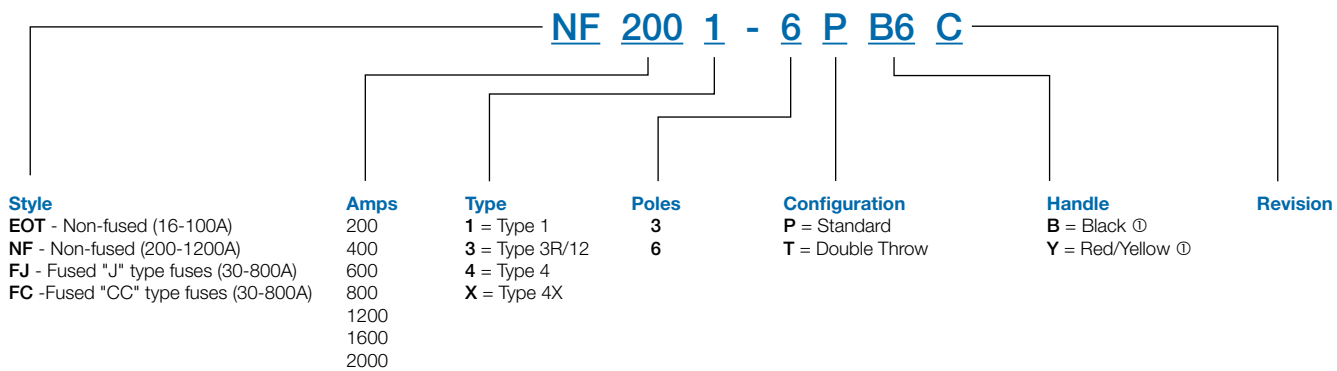
Switch ratings

UL general purpose amp rating	Maximum horsepower rating								Wire size for terminal lugs	For wire type	Approval ①
	Single phase			Three phase							
	120V	200V	240V	200V	208V	240V	480V	600V			
30	2	3	5	5	7.5	7.5	15	20	#18 – 8	Cu	CSA, UL
60	3	7.5	10	15	15	15	30	50	#14 – 4	Cu	CSA, UL
100	5	10	15	25	25	30	60	75	#14 – 2/0	Cu/Al	CSA, UL
200	–	–	–	50	50	60	125	150	#6 – 300 kcmil	Cu/Al	CSA, UL
400	–	–	–	100	125	125	250	350	#2 – 600 kcmil	Cu/Al	CSA, UL
600	–	–	–	150	150	200	400	500	(2) #2 – 600 kcmil	Cu/Al	CSA, UL
800	–	–	–	200	200	250	500	600	(2) #2 – 600 kcmil	Cu/Al	CSA, UL
1200	–	–	–	–	–	–	–	–	(4) #2 – 600 kcmil	Cu/Al	CSA, UL

Enclosed non-fused, 3 poles, 16 to 100 A



Enclosed non-fusible, 200 - 1200 A and specialty configurations



Custom versions or other versions of enclosed products are available upon request... please consult factory.

① Fusible switches are UL listed to the UL98 standard.

3 pole Non-fusible, 16A – 3150A

Disconnect
switches
Enclosed



NF32X-3PB6C



EOT16U3P3-S



EOT63U3M1-P

3 pole, 600V, 16-80A Selector handle

UL general purpose amp rating	UL/NEMA Enclosure Type			
	1	3R/12	4/4X	3R/12 Plastic
	Catalog number	Catalog number	Catalog number	Catalog number
16	EOT16U3M1-S	EOT16U3M3-S	Not available with selector handles	EOT16U3P3-S
40	EOT32U3M1-S	EOT32U3M3-S		EOT32U3P3-S
60	EOT45U3M1-S	EOT45U3M3-S		EOT45U3P3-S
80	EOT63U3M1-S	EOT63U3M3-S		EOT63U3P3-P

3 pole, 600V, 16-100A Pistol handle

UL general purpose amp rating	UL/NEMA Enclosure Type					
	1	3R/12	4	4X Stainless	4X Plastic	7 & 9
	Catalog number	Catalog number	Catalog number	Catalog number	Catalog number	Catalog number
16	EOT16U3M1-P	EOT16U3M3-P	-	EOT16U3S4-P	EOT16U3P4-P	NF167-3P
40	EOT32U3M1-P	EOT32U3M3-P	-	EOT32U3S4-P	EOT32U3P4-P	NF327-3P
60	EOT45U3M1-P	EOT45U3M3-P	-	EOT45U3S4-P	EOT45U3P4-P	NF457-3P
80	EOT63U3M1-P	EOT63U3M3-P	-	EOT63U3S4-P	EOT63U3P4-P	NF637-3P
30	EOT30U3M1-P	EOT30U3M3-P	-	EOT30U3S4-P	NF30P-3PB6C	NF307-3P
60	EOT60U3M1-P	EOT60U3M3-P	-	EOT60U3S4-P	NF60P-3PB6C	NF607-3P
100	EOT100U3M1-P	EOT100U3M3-P	-	EOT100U3S4-P	NF100P-3PB8C	NF1007-3P

3 Pole, 600V, 200A – 3150A Pistol handle

UL general purpose amp rating	UL/NEMA Enclosure Type					
	1	3R/12	4	4X Stainless	4X Plastic	7 & 9
	Catalog number	Catalog number	Catalog number	Catalog number	Catalog number	Catalog number
200	NF2001-3PB8B	NF2003-3PB8B	NF2004-3PB8B	NF200X-3PB8B	NF200P-3PB8B	—
400	NF4001-3PB4B	NF4003-3PB4B	NF4004-3PB4B	NF400X-3PB4B	NF400P-3PB4B	—
600	NF6001-3PB7B	NF6003-3PB7B	NF6004-3PB7B	NF600X-3PB7B	NF600P-3PB7B	—
800	NF8001-3PB4A	NF8003-3PB4A	NF8004-3PB4A	NF800X-3PB4A	NF800P-3PB4A	—
1200	NF12001-3PB4A	NF12003-3PB4A	NF12004-3PB4A	NF1200X-3PB4A	NF1200P-3PB4A	—
1600	NF16001-3P8A	NF16003-3P8A	NF16004-3P8A	NF1600X-3P8A	—	—
2000	NF20001-3P8A	NF20003-3P8A	NF20004-3P8A	NF2000X-3P8A	—	—
3150 ①	NF31501-3P8A	NF31503-3P8A	NF31504-3P8A	NF3150X-3P8A	—	—

NOTE: All enclosed switches are provided with a black handle; however, most handles can be substituted with a red and yellow handle if desired.

EXAMPLE: A red/yellow selector handle for an EOT16U3M1-S can be substituted for the black selector handle by using the "S1" suffix instead of the "S" suffix, new catalog #EOT16U3M1-S1.

① IEC rated only.
② New Washdown.

Disconnect
switches
Enclosed

6 pole Non-fusible, 16A – 1200A

6 pole, 600V, 16-1200A Pistol handle

UL general purpose amp rating	UL/NEMA Enclosure Type					
	1	3R/12	4	4X Stainless	4X Plastic	7
	Catalog number	Catalog number	Catalog number	Catalog number	Catalog number	Catalog number
16	NF161-6PB6C	NF163-6PB6C	NF164-6PB6A	NF16X-6PB6C	NF16P-6PB6A	NF167-6P
25	NF251-6PB6C	NF253-6PB6C	NF254-6PB6A	NF25X-6PB6C	NF25P-6PB6A	NF257-6P
40	NF321-6PB6C	NF323-6PB6C	NF324-6PB6A	NF32X-6PB6C	NF32P-6PB6A	NF327-6P
60	NF451-6PB6B	NF453-6PB6B	NF454-6PB6B	NF45X-6PB6B	NF45P-6PB6B	NF457-6P
80	NF631-6PB6A	NF633-6PB6A	NF634-6PB6A	NF63X-6PB6A	NF63P-6PB6A	NF637-6P
30	NF301-6PB6B	NF303-6PB6B	NF304-6PB6B	NF30X-6PB6B	NF30P-6PB6B	-
60	NF601-6PB6C	NF603-6PB6B	NF604-6PB6B	NF60X-6PB6B	NF60P-6PB6B	-
100	NF1001-6PB6B	NF1003-6PB6B	NF1004-6PB6B	NF100X-6PB6B	NF100P-6PB6B	-
125	NF1251-6PB2A	NF1253-6PB2A	NF1254-6PB4A	NF125X-6PB4A	NF125P-6PB4A	-
200	NF2001-6PB4B	NF2003-6PB4B	NF2004-6PB4B	NF200X-6PB4B	NF200P-6PB4B	-
400	NF4001-6PB8B	NF4003-6PB8B	NF4004-6PB8B	NF400X-6PB8B	NF400P-6PB8B	-
600	NF6001-6PB8B	NF6003-6PB8B	NF6004-6PB8B	NF600X-6PB8B	NF600P-6PB8B	-
800	NF8001-6PB8A	NF8003-6PB4A	NF8004-6PB4A	NF800X-6PB8A	NF800P-6PB8A	-
1200	NF12001-6PB8A	NF12003-6PB4A	NF12004-6PB8A	NF1200X-6PB8A	NF1200P-6PB8A	-

3 Pole double throw 3 pole, 600V, 16-1200A Pistol handle

UL general purpose amp rating	UL/NEMA Enclosure Type				
	1	3R/12	4	4X Stainless	4X Plastic
	Catalog number	Catalog number	Catalog number	Catalog number	Catalog number
16	NF161-3TB8C	NF163-3TB8C	NF164-3TB8C	NF16X-3TB8C	NF16P-3TB8A
25	NF251-3TB8C	NF253-3TB8C	NF254-3TB8C	NF25X-3TB8C	NF25P-3TB8A
40	NF321-3TB8C	NF323-3TB8C	NF324-3TB8C	NF32X-3TB8C	NF32P-3TB8A
60	NF451-3TB8B	NF453-3TB8B	NF454-3TB8B	NF45X-3TB8B	NF45P-3TB8B
80	NF631-3TB8A	NF633-3TB8A	NF634-3TB8A	NF63X-3TB8A	NF63P-3TB8A
30	NF301-3TB8B	NF303-3TB8B	NF304-3TB8B	NF30X-3TB8B	NF30P-3TB8B
60	NF601-3TB8B	NF603-3TB8B	NF604-3TB8B	NF60X-3TB8B	NF60P-3TB8B
100	NF1001-3TB8B	NF1003-3TB8B	NF1004-3TB8B	NF100X-3TB8B	NF100P-3TB8B
125	NF1251-3TB8A	NF1253-3TB8A	NF1254-3TB8A	NF125X-3TB8A	NF125P-3TB8A
200	NF2001-3TB4B	NF2003-3TB4B	NF2004-3TB4B	NF200X-3TB4B	NF200P-3TB4B
400	NF4001-3TB4B	NF4003-3TB4B	NF4004-3TB4B	NF400X-3TB4B	NF400P-3TB4B
600	NF6001-3TB4A	NF6003-3TB4B	NF6004-3TB4A	NF600X-3TB4A	NF600P-3TB4A
800	NF8001-3TB4A	NF8003-3TB4A	NF8004-3TB4A	NF800X-3TB4A	NF800P-3TB4A
1200	NF12001-3TB4A	NF12003-3TB4A	NF12004-3TB4A	NF1200X-3TB4A	NF1200P-3TB4A

3 Pole Fusible, 30A – 800A

Disconnect
switches
Enclosed



FJ30X-3PB6B

3 pole, 600V, 30-800A Pistol handle

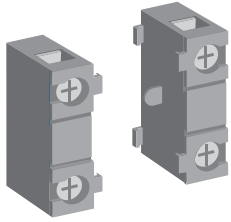
UL general purpose amp rating	Fuse Type	UL/NEMA Enclosure Type				
		1	3R/12	4	4X Stainless	4X Plastic
		Catalog number	Catalog number	Catalog number	Catalog number	Catalog number
30	J	FJ301-3PB6B	FJ303-3PB6B	FJ304-3PB6B	FJ30X-3PB6B	FJ30P-3PB6B
30	CC	FC301-3PB6B	FC303-3PB6B	FC304-3PB6B	FC30X-3PB6B	FC30P-3PB6B
60	J	FJ601-3PB6B	FJ603-3PB6B	FJ604-3PB8B	FJ60X-3PB8B	FJ60P-3PB8B
100	J	FJ1001-3PB8B	FJ1003-3PB8B	FJ1004-3PB8B	FJ100X-3PB8B	FJ100P-3PB8B
200	J	FJ2001-3PB8C	FJ2003-3PB8C	FJ2004-3PB8C	FJ200X-3PB8C	FJ200P-3PB8C
400	J	FJ4001-3PB4C	FJ4003-3PB4C	FJ4004-3PB4C	FJ400X-3PB4C	FJ400P-3PB4C
600	J	FJ6001-3PB7C	FJ6003-3PB7C	FJ6004-3PB7C	FJ600X-3PB7C	FJ600P-3PB7C
800	L	FL8001-3PB4B	FL8003-3PB4B	FL8004-3PB4B	FL800X-3PB4B	FL800P-3PB4

Disconnect
switches
Enclosed

Accessories Fusible

Auxiliary contacts

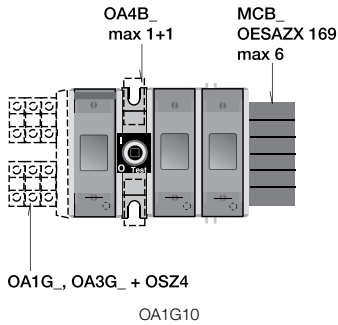
For use on:	Contact configuration	Catalog number
30A	1 N.O. + 1 N.C.	OA4B1C
	2 N.O. + 2 N.C.	
60-1200	1 N.O.	OA1G10
	1 N.C.	OA3G01



OA4B1C

Accessories

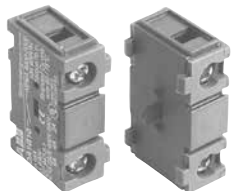
For use on:	Description	Installation suffix code
30A	Neutral block	N
60A – 100A	Neutral block	N
200A – 400A	Neutral block	N
600A – 800A	Neutral block	N
30A – 200A	Service entrance, 3 wire	U
	Service entrance, 4 wire	V
400A – 800A	Service entrance, 3 wire	U
	Service entrance, 4 wire	V



Accessories Non -fusible

Auxiliary contacts

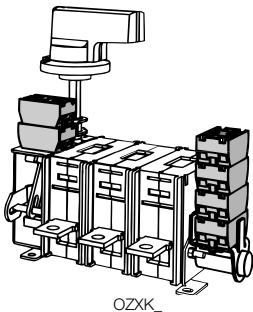
For use on:	Contact configuration	Catalog number
16A – 100A	1 N.O.	OA1G10
	1 N.C.	OA1G01
	1 N.O. & 1 N.C.	OA2G11
200A - 1200A	1 N.O.	OA1G10
	1 N.C.	OA3G01
1600A – 3150A	1 N.O. & 1 N.C.	OZ XK-1
	2 N.O. & 2 N.C.	OZ XK-2



OA1G_

Accessories

For use on:	Description	Installation suffix code
EOT16, 32	Neutral or isolated ground block	N or G
EOT45, 63	Neutral or isolated ground block	N or G
OT30, 60, 100	Neutral or isolated ground block	N or G
NF200 – 1200A	Neutral block	N
NF1600 – 3150A	Neutral block	N
NF200 – 1200A	Service entrance, 3 wire	U
NF200 – 1200A	Service entrance, 4 wire	V



OZ XK_

Selecting switches per NEC

Selecting switches per NEC

Article 430 of the US National Electric Code includes two methods for properly sizing disconnect switches:

1. Single motor application

A properly sized disconnect switch for a single motor will:

- a) have an ampere rating greater than or equal to 115 percent of the rated motor full load current; or,
- b) have a HP rating greater than or equal to the rated motor HP (at applied voltage) if the disconnect switch under consideration is HP rated.

2. Combination load application

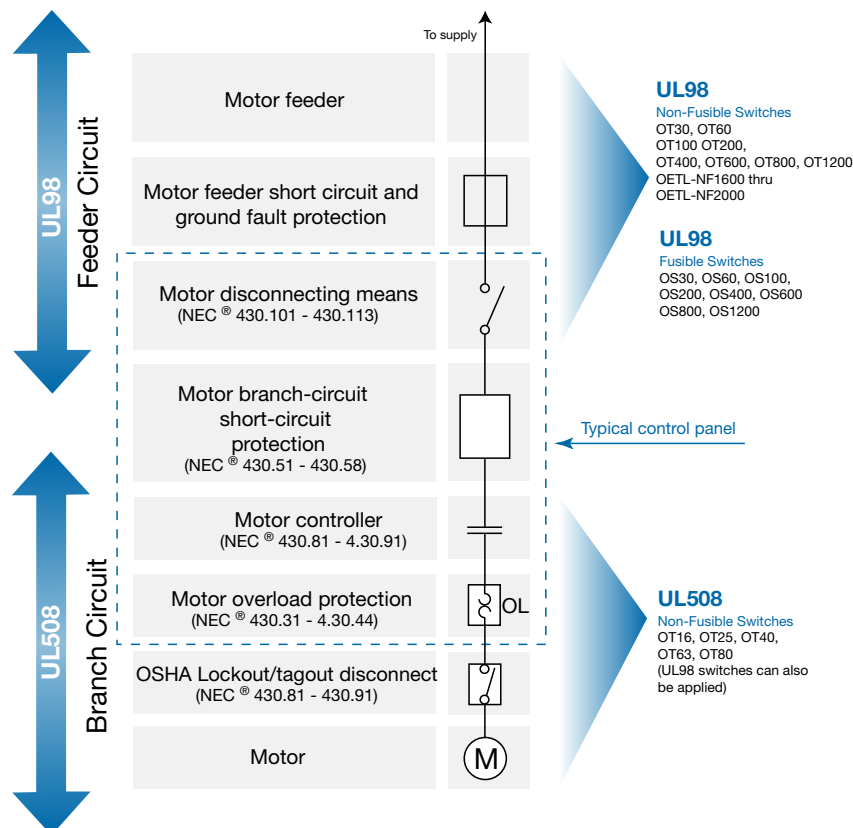
A properly sized disconnect switch for a combination load will be selected by adding all the simultaneous individual loads in the circuit under consideration.

Using motor nameplate information, load information, and tables from section 430 of the NEC, determine one equivalent full load current and one equivalent locked rotor current. The equivalent locked rotor current can be used with table 430-151 to determine an equivalent HP rating. Select a disconnect switch:

- a) greater than or equal to 115 percent of the equivalent full load current; and,
- b) greater than or equal to the equivalent HP rating.

Use of UL98 & UL508 Disconnects

According to *NEC*® Article 430



Technical data

OT16F3 – OT100F3

UL & CSA

UL & CSA

Catalog number	3 pole	OT16F3	OT25F3	OT40F3	OT63F3	OT80F3	OT30F3	OT60F3	OT100F3
Approvals ^①	2 pole 3 pole 4 pole	N/A UL508 & IEC UL508 & IEC	N/A UL508 & IEC UL508 & IEC	N/A UL508 & IEC UL508 & IEC	N/A UL508 & IEC UL508 & IEC	N/A UL508 & IEC UL508 & IEC	N/A UL98 & IEC UL98 & IEC	N/A UL98 & IEC UL98 & IEC	N/A UL98 & IEC UL98 & IEC
General purpose amp rating -40° to 40°C pf = 0.7 – 0.8	A	20	30	40	60	80	30	60	100
Max. operating voltage	V	600	600	600	600	600	600	600	600
Max. horsepower rating/motor FLA current, pf = 0.4 – 0.5 Three phase									
240V	HP/A	5/15.2	7.5/22.0	10/28.0	15/42.0	20/54.0	10/28.0	20/54.0	30/80.0
480V	HP/A	10/14.0	15/21.0	20/27.0	30/40.0	40/52.0	20/27.0	40/52.0	50/65.0
600V	HP/A	10/11.0	20/22.0	25/27.0	30/32.0	40/41.0	30/32.0	40/41.0	50/52.0
Single phase									
120V	HP/A	1/16	1.5/20	3/24	2/24.0	2/24.0	3/34.0	3/34.0	5/56.0
240V	HP/A	2/13.2	3/18.7	5/30.8	7.5/40.0	10/57.5	5/28.0	7.5/40.0	15/68.0
Short circuit rating with fuse									
Fuse type CC	kA	10	10	10	100	100	200	200	200
Fuse type J	kA	10	10	10	100	100	200	200	200
Fuse type T	kA	10	10	10	100	100	200	200	200
Fuse type RK1	kA	10	10	10	10	10	10	10	10
Fuse type RK5	kA	5	5	5	10	10	10	10	10
Fuse type L	kA	—	—	—	—	—	—	—	—
Fuse type H	kA	—	—	—	—	5	5	—	—
Maximum fuse size	A	30	60	30	60	100	150	60	150
3 cycle short circuit current withstand rating ^②	kA	—	—	—	—	—	—	—	—
Endurances									
Min. Electrical endurance, pf = 0.75 – 0.80	operation cycles	6000	6000	6000	6000	6000	6000	6000	6000
Min. Electrical endurance, pf = 0.40 – 0.50	operation cycles	1000	1000	1000	1000	1000	③	③	③
Mechanical endurance	operations	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Physical characteristics									
Weight, switches	3 pole 4 pole	lb	0.24 0.33	0.24 0.33	0.24 0.33	0.59 0.77	0.59 0.77	0.79 1.10	0.79 1.10
Dimension, switches	3 pole	H in W in D in	2.68 1.38 2.20	2.68 1.38 2.20	2.68 1.38 2.20	3.60 2.07 2.85	3.60 2.07 2.85	3.94 2.76 2.95	3.94 2.76 2.95
Shaft set screw tightening torque		lb. in.	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Shaft size — square □		in mm	.24 x .24 6 x 6	.24 x .24 6 x 6	.24 x .24 6 x 6	.24 x .24 6 x 6	.24 x .24 6 x 6	.24 x .24 6 x 6	.24 x .24 6 x 6
Switch operating torque for rotary 3 pole switches		lb. in.	8.8	8.8	8.8	10.5	10.5	17.5	17.5
Terminal lug kits			Not required	Not required	Not required	Not required	Not required	Not required	Not required
Wire range	AWG	#18 – 8	#18 – 8	#18 – 8	#14 – 4	#14 – 4	#14 – 4	#14 – 4	#8 – 1/0
Torque:									
Wire tightening	lb. in.	7	7	7	18	18	55	55	55
Lug mounting	lb. in.	Integral	Integral	Integral	Integral	Integral	Integral	Integral	Integral
Auxiliary contacts		OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _
NEMA ratings, AC		A600	A600	A600	A600	A600	A600	A600	A600
AC rated voltage	VAC	600	600	600	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10	10	10
AC maximum volt-ampere making	VA	7200	7200	7200	7200	7200	7200	7200	7200
AC maximum volt-ampere breaking	VA	720	720	720	720	720	720	720	720
NEMA ratings, DC		R300	R300	R300	R300	R300	R300	R300	R300
DC rated voltage	VDC	300	300	300	300	300	300	300	300
DC thermal rated current	A	1	1	1	1	1	1	1	1
DC maximum make-break	VA	28	28	28	28	28	28	28	28
Torque: Wire tightening	lb. in	7	7	7	7	7	7	7	7
Wire range	AWG	#18 – 14	#18 – 14	#18 – 14	#18 – 14	#18 – 14	#18 – 14	#18 – 14	#18 – 14

① UL Listed switches are also CSA Approved.
 ② UL98 overload test, 50 operations, pf 0.40 – 0.50 at 2x FLA.
 ③ Multi-tap lug available, please see page 19.34.
 ④ Fuse size 70A for RK5
 ⑤ When protected by any Listed fuse or Listed circuit breaker whose current rating does not exceed the maximum thermal current rating of the switch.

Technical data

OT200U03 – OETL-NF3150

UL & CSA

Disconnect
switches
Technical
data

UL & CSA

Catalog number	3 pole	OT200U03	OT400U03	OT600U03	OT800U03	OT1200U03	OETL-NF1600	OETL-NF2000	OETL-NF3150 ⑤
Approvals ^①	2 pole 3 pole 4 pole	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC IEC	UL98 & IEC UL98 & IEC IEC	UL98 & IEC UL98 & IEC IEC	IEC IEC IEC
General purpose amp rating pf = 0.7 – 0.8	-40° to 40°C A	200	400	600	800	1200	1600	2000	3150
Max. operating voltage	V	600	600	600	600	600	600	480	—
Max. horsepower rating/Max. motor FLA current, pf = 0.4 – 0.5 Three phase									
	240V HP/A	75/192.0	125/312.0	200/480.0	200/602	—	—	—	—
	480V HP/A	150/180.0	250/302.0	450/515	500/590	—	—	—	—
	600V HP/A	200/192.0	350/336.0	500/472.0	500/472	—	—	—	—
Single phase	120V HP/A	—	—	—	—	—	—	—	—
	240V HP/A	—	—	—	—	—	—	—	—
Short circuit rating with fuse									
Fuse type CC	kA	—	—	—	—	—	—	—	—
Fuse type J	kA	200	100	—/100	—	—	—	—	—
Fuse type T	kA	—	—	100/—	—	—	—	—	—
Fuse type RK1	kA	—	—	—	—	—	—	—	—
Fuse type RK5	kA	—	—	100	—	—	—	—	—
Fuse type L	kA	—	—	—/100	100	100	100	100	—
Fuse type H	kA	—	—	—/100	—	—	—	—	—
Maximum fuse size	A	200	600	600/800	1200	1200	2000	2000	—
3 cycle short circuit current withstand rating ②	kA	14	30	50	50	50	65	65	—
Endurances									
Min. Electrical endurance, pf = 0.75 – 0.80 operation cycles		6000	1000	1000	500	500	500	500	400
Min. Electrical endurance, pf = 0.40 – 0.50 operation cycles		②	②	②	②	②	②	②	②
Mechanical endurance operations	20,000	20,000	10,000	6,000	6,000	6000	6000	6000	—
Physical characteristics									
Weight, switches	3 pole lb 4 pole lb	2.9 3.5	5.7 6.8	11.4 14.3	33.5 42.9	33.5 42.9	127.7 149.7	127.7 149.7	127.7 149.7
Dimension, switches	3 pole H in W in D in	6.69 6.67 3.27	8.66 8.70 4.15	9.84 10.48 5.47	14.65 13.78 5.20	14.65 13.78 5.20	21.5 18.11 10.67	21.5 18.11 10.67	21.5 18.11 10.67
Shaft set screw tightening torque	lb. in.	14 - 17.7	—	—	—	—	—	—	—
Shaft size — square □in	.24 x .24	.47 x .47	.47 x .47	.47 x .47	.47 x .47	.47 x .47	.47 x .47	.47 x .47	.47 x .47
	mm	6 x 6	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12
Switch operating torque for rotary 3 pole switches	lb. in.	62	142	184	575	575	438	438	438
Terminal lug kits									
Wire range	AWG	OZXA-200 #4-300kcmil ^③	OZXA-400 #2-600kcmil ^③	OZXA-800 (2)#2-600kcmil ^③	OZXA-1200 (4)#2-600kcmil ^③	OZXA-1200 (4)#2-600kcmil	OZXA-28 (4)#2-600kcmil	OZXA-28/2 (8)#2-600kcmil	OZXA-28/2 (8)#2-600kcmil
Torque:									
Wire tightening	lb. in.	200	375	375	500	500	375	375	375
Lug mounting	lb. in.	72	240	240	450-670	450-670	230	230	230
Auxiliary contacts									
NEMA ratings, AC		OA_G_ A600	OA_G_ A600	OA_G_ A600	OA_G_ A600	OA_G_ A600	OZXC-__ A600	OZXC-__ A600	OZXC-__ A600
AC rated voltage	VAC	600	600	600	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10	10	10
AC maximum volt-ampere making	VA	7200	7200	7200	7200	7200	7200	7200	7200
AC maximum volt-ampere breaking	VA	720	720	720	720	720	720	720	720
NEMA ratings, DC		OA_G_ P600	OA_G_ P600	OA_G_ P600	OA_G_ P600	OA_G_ P600	OZXC-__ P600	OZXC-__ P600	OZXC-__ P600
DC rated voltage	VDC	600	600	600	600	600	600	600	600
DC thermal rated current	A	5	5	5	5	5	5	5	5
DC maximum make-break	VA	138	138	138	138	138	138	138	138
Torque: Wire tightening	lb. in	7	7	7	7	7	7	7	7
Wire range	AWG	#22 – #14	#22 – #14	#22 – #14	#22 – #14	#22 – #14	#22 – #14	#22 – #14	#22 – #14

① UL Listed switches are also CSA Approved.

② UL98 overload test, 50 operations, pf 0.40 – 0.50 at 2x FLA.

③ Multi-tap lug available, please see page 19.34.

④ Fuse size 70A for RK5

⑤ IEC rated only.

⑥ When protected by any Listed fuse or Listed circuit breaker whose current rating does not exceed the maximum thermal current rating of the switch.

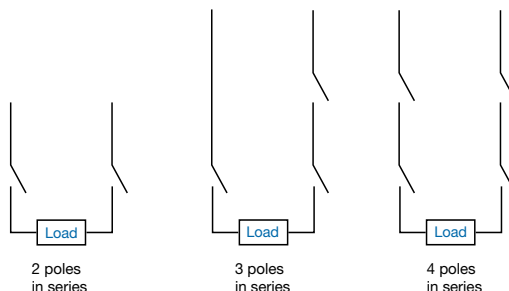
Technical data

OT16F3 – OT100F3

IEC

IEC

Catalog number	3 pole	OT16F3	OT25F3	OT40F3	OT63F3	OT80F3	OT30F3	OT60F3	OT100F3	
Rated insulation and operation voltage, AC20 and DC20	40°C V	750	750	750	750	750	750	750	750	
Rated impulse withstand voltage	kV	8	8	8	8	8	8	8	8	
Rated thermal current, I_m										
AC 20/DC 20	open ①	A	25	32	40	63	80	40	63	115
	40°C enclosed	A	25	32	40	63	80	40	63	115
	60°C enclosed	A	25	32	40	63	80	40	63	115
Rated operational currents										
AC 21A	≤500V	A	16	25	40	63	80	30	60	100
	≤690V	A	16	25	40	63	80	40	63	100
	≤1000V	A	—	—	—	—	—	—	—	—
AC 22A	≤500V	A	16	25	40	63	80	40	63	100
	≤690V	A	16	25	40	63	80	40	63	100
	≤1000V	A	—	—	—	—	—	—	—	—
AC 23A	≤415V	A	16	20	23	45	75	40	63	80
	≤500V	A	16	20	23	45	58	40	60	60
	≤690V	A	10	11	12	20	20	40	40	40
	≤1000V	A	—	—	—	—	—	—	—	—
Rated operational currents/poles in series										
DC21A	48V	A	16/1	25/1	32/1	45/1	63/1	40/1	63/1	100/1
	110V	A	16/2	25/2	32/2	45/2	63/2	40/2	63/2	100/2
	220V	A	16/3	25/3	32/3	45/4	63/4	40/4	63/4	100/4
	440V	A	16/4	25/6	32/6	③	③	③	③	③
	750V	A	16/8	25/8	32/8	③	③	③	③	③
DC22A	48V	A	16/1	25/1	32/1	45/1	63/1	40/1	63/1	100/1
	110V	A	16/2	25/2	32/2	45/2	63/2	40/2	63/2	100/2
	220V	A	16/3	25/3	32/4	45/4	63/4	40/4	63/4	63/4
	440V	A	16/6	25/8	③	③	③	③	③	③
	750V	A	16/8	25/8	③	③	③	③	③	③
DC23A	48V	A	16/1	25/1	32/1	45/1	63/1	40/1	63/1	100/1
	110V	A	16/2	25/2	32/2	45/2	63/2	40/2	63/2	100/2
	220V	A	16/4	25/4	32/4	45/4	63/4	40/4	63/4	63/4
	440V	A	10/4	③	③	③	③	③	③	③
	750V	A	16/8	③	③	③	③	③	③	③
Rated operational power										
AC23A	230V	kW	3	4	5.5	11	22	7.5	11	22
	400/415V	kW	7.5	9	11	22	37	15	18.5	37
	500V	kW	7.5	9	11	22	37	15	18.5	37
	690V	kW	7.5	9	11	15	18.5	15	15	37
Short-circuit current with back-up fuses of size	kA	50	50	50	50	50	50	50	50	
	A	25	32	40	63	80	100	100	100	



① The ambient air temperature does not exceed +40°C and its average over a period of 24 hours does not exceed +35°C according to IEC 947.
 ② IEC 947-3, utilization category B, infrequent operation.
 ③ Not available at time of printing, please consult factory.

Technical data

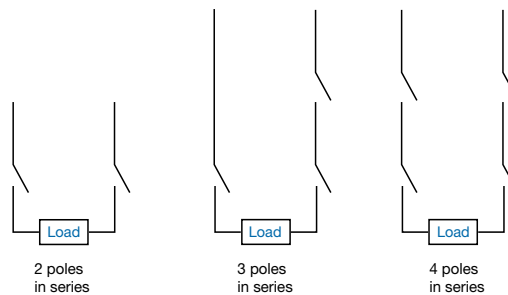
OT200U03 – OETL-NF3150

IEC

Disconnect
switches
Technical
data

IEC

Catalog number	3 pole	OT200U03	OT400U03	OT600U03	OT800U03	OT1200U03	OETL-NF1600	OETL-NF2000	OETL-NF3150
Rated insulation and operational voltage, AC20 and DC20	40°C V	1000	1000	1000	1000	1000	1000	1000	1000
Rated impulse withstand voltage	kV	12	12	12	8	8	8	8	8
Rated thermal current, I_{th}									
AC 20/DC 20	open ^① A	250	400	800	1600	1600	2500	3150	3150
	40°C enclosed A	250	400	800	1600	1600	2300	2300	2600
	60°C enclosed A	—	—	—	—	—	1950	1950	2300
Rated operational currents									
AC 21A	≤500V A	250	400	800	1600	1600	2500^②	2500^②	3150^③
	≤690V A	250	400	800	1600	1600	2500 ^②	2500 ^②	3150 ^③
	≤1000V A	—	—	800	1600	1600	—	—	—
AC 22A	≤500V A	250	400	800	1600	1600	1600 ^②	1600 ^②	1600 ^②
	≤690V A	250	400	800	1600	1600	—	—	—
	≤1000V A	—	—	800	—	—	—	—	—
AC 23A	≤415V A	250	400	800	1250	1250	800 ^④	800 ^④	800 ^④
	≤500V A	250	400	800	1250	1250	800 ^④	800 ^④	800 ^④
	≤690V A	250	400	800	1250	1250	—	—	—
	≤1000V A	—	—	800	—	—	—	—	—
Rated operational currents/poles in series									
DC21A	48V A	250/1	630/2	800/2	—	—	2500/2	2500/2	3150/2
	110V A	250/2	630/2	800/2	—	—	2500/2	2500/2	3150/2
	220V A	250/2	630/2	800/2	—	—	2500/2	2500/2	3150/2
	440V A	250/3	630/3	800/3	—	—	2500/3	2500/3	3150/2
	750V A	250/4	—	—	—	—	—	—	—
DC22A	48V A	250/1	630/2	800/2	—	—	2500/2	2500/2	3150/2
	110V A	250/2	630/2	800/2	—	—	2500/2	2500/2	3150/2
	220V A	250/2	630/2	800/2	—	—	2500/2	2500/2	3150/2
	440V A	250/3	630/3	800/3	—	—	—	—	—
	750V A	250/4	—	—	—	—	—	—	—
DC23A	48V A	250/1	630/2	—	—	—	—	—	—
	110V A	250/2	630/2	—	—	—	—	—	—
	220V A	250/2	630/2	—	—	—	—	—	—
	440V A	250/3	—	—	—	—	—	—	—
	750V A	250/4	—	—	—	—	—	—	—
Rated operational power									
AC23A	230V kW	75	110	—	—	—	250	250	250
	400/415V kW	132/140	220/230	450	710	710	400	400	400
	500V kW	170	280	560	900	900	450	450	450
	690V kW	240	355	800	1200	1200	—	—	—
Short-circuit current	kA	100	100	100	50/50 ^⑤	50/50 ^⑤	50/63 ^⑥	50/63 ^⑥	50/63 ^⑥
with back-up fuses of size	A	400	800	800	—	—	—	—	—



① The ambient air temperature does not exceed +40°C and its average over a period of 24 hours does not exceed +35°C according to IEC 947.

② IEC 947-3, utilization category B, infrequent operation.

③ Not available at time of printing, please consult factory.

④ 690V / 500V

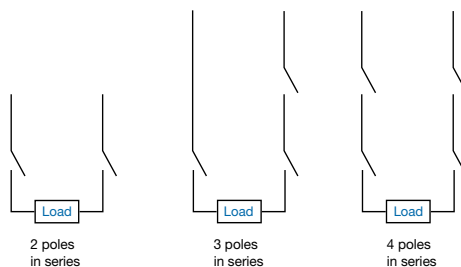
Technical data

OT16F3 – OT100F3

IEC

IEC

Catalog number	3 pole	OT16F3	OT25F3	OT40F3	OT63F3	OT80F3	OT30F3	OT60F3	OT100F3
Rated short-circuit making capacity, prospective peak value, I _{cm}	kA	0.7	0.7	0.7	1.4	1.4	3.6	3.6	3.6
Rated short time withstand current, RMS I ^{CW} 0.2s	kA	—	—	—	—	—	—	—	—
RMS I ^{CW} 1.0s	kA	0.5	0.5	0.5	1	1	2.5	2.5	2.5
AC breaking capacity									
pf = 0.35									
≤415V	A	128	160	184	240	304	320	504	640
≤500V	A	128	160	184	240	256	320	480	480
≤690V	A	80	88	96	160	160	320	320	320
DC breaking capacity/poles in series									
L/R = 15ms									
≤48V	A	64/1	100/1	128/1	180/1	252/1	160/1	252/1	400/1
≤110V	A	64/2	100/2	128/2	180/2	252/2	160/2	252/2	400/2
≤220V	A	64/3	100/4	128/4	180/4	180/4	160/4	252/4	252/4
≤440V	A	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
≤750V	A	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Physical characteristics									
Electrical endurance at rated operational current, pf = 0.65									
operation cycles		3000	3000	3000	3000	3000	3000	3000	3000
Mechanical endurance									
operations		20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Weight									
3 pole	kg	0.11	0.11	0.11	0.27	0.27	0.36	0.36	0.36
4 pole	kg	0.15	0.15	0.15	0.35	0.35	0.5	0.5	0.5
Dimension 3 pole									
H mm		68	68	91.5	91.5	100	100	100	100
W mm		35	35	35	52.5	52.5	70	70	70
D mm		56	56	56	72.5	72.5	75	75	75
Power loss per pole									
W		0.3	0.6	1	1.4	2.8	1	1.6	4
Shaft size — square □									
mm		6 × 6	6 × 6	6 × 6	6 × 6	6 × 6	6 × 6	6 × 6	6 × 6
Switch operating torque for rotary 3 pole switches									
Nm		1	1	1	1.2	1.2	2	2	2
Suitable conductor cross section Cu									
mm ²		0.75 – 10	0.75 – 10	0.75 – 10	1.5 – 25	1.5 – 25	1.5 – 25	1.5 – 25	10 – 70
Bolt size									
		—	—	—	—	—	—	—	—
Auxiliary contacts									
		OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _
Ratings according to IEC 947-5-1									
Rated voltage, U_i									
VAC		690	690	690	690	690	690	690	690
Thermal current, Ith									
A		16	16	16	16	16	16	16	16
AC12/DC12 I^e, A U^e = 120V									
A		—	—	—	—	—	—	—	—
125V	A	—	—	—	—	—	—	—	—
240V	A	6 ⊙	6 ⊙	6 ⊙	6 ⊙	6 ⊙	6 ⊙	6 ⊙	6 ⊙
250V	A	—	—	—	—	—	—	—	—
400V	A	4 ⊙	4 ⊙	4 ⊙	4 ⊙	4 ⊙	4 ⊙	4 ⊙	4 ⊙
415V	A	—	—	—	—	—	—	—	—
440V	A	—	—	—	—	—	—	—	—
480V	A	—	—	—	—	—	—	—	—
500V	A	—	—	—	—	—	—	—	—
600V	A	—	—	—	—	—	—	—	—
690V	A	2 ⊙	2 ⊙	2 ⊙	2 ⊙	2 ⊙	2 ⊙	2 ⊙	2 ⊙



⊙ Not available at time of printing, please consult factory.
 ⊙ AC15, according to IEC947-5-1.

Technical data

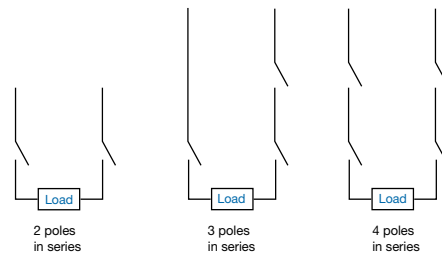
OT200U03 – OETL-NF3150

IEC

Disconnect
switches
Technical
data

IEC

Catalog number	3 pole	OT200U03	OT400U03	OT600U03	OT800U03	OT1200U03	OETL-NF1600	OETL-NF2000	OETL-NF3150
Rated short-circuit making capacity, prospective peak value, $I_{cm}500/690V$	kA	30	65	80	110	110	140/105	140/105	140/105
Rated short time withstand current,									
RMS I_{low} 0.25s, 690V	kA	15	28	36	50	50	—	—	—
RMS I_{low} 1.0s, 690V	kA	8	15	20	50 ②	50 ②	80 ②	80 ②	80 ②
AC breaking capacity									
pf = 0.35	≤415V A	2000	3200	5760	10,000	10,000	6400	6400	6400
	≤500V A	2000	3200	5600	10,000	10,000	6400	6400	6400
	≤690V A	2000	3200	5600	10,000 ③	10,000 ③	4800 ④	4800 ④	4800 ④
DC breaking capacity/poles in series									
L/R = 15ms, 3 pole in series									
	48V A	1000/2	①	①	①	①	①	①	①
	110V A	1000/2	①	①	①	①	①	①	①
	220V A	1000/2	1600/2	2000/2	—	—	2600/2	2600/2	2600/2
	440V A	1000/3	1600	2000/3	①	①	①	①	①
	750V A	1000/4	①	①	①	①	①	①	①
Physical characteristics									
Electrical endurance at rated operational current, pf = 0.65	operation cycles	1000	1000	1000	500	500	100 ⑤	100 ⑤	100 ⑤
Mechanical endurance	operations	20,000	16,000	10,000	6000	6000	6000	6000	6000
Weight	3 pole kg	1.2	2.2	5.2	15.2	15.2	37	37	37
	4 pole kg	1.6	2.6	6.5	19.5	19.5	47	47	47
Dimension 3 pole	H mm	162	216	250	372	372	546	546	546
	W mm	219	260	266	350	350	468	468	468
	D mm	92.5	130	139	132	132	271	271	271
Power loss per one pole	W	6.5	10	40	29	48	90	90	140
Shaft size — square □	mm	6 x 6	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12
Switch operating torque for rotary 3 pole switches	Nm	7	16	21	21	21	50	50	50
Suitable conductor cross section Cu	mm ²	—	—	—	—	—	—	—	—
Bolt size		8 x 25	10 x 30	12 x 40	12 x 60	12 x 60	12 x 60	12 x 60	12 x 60
Auxiliary contacts		OA_G_	OA_G_	OA_G_	OA_G_	OA_G_	OZ XK_ _	OZ XK_ _	OZ XK_ _
Ratings according to IEC 947-5-1									
Rated voltage, U	VAC	690	690	690	690	690	690	690	690
Thermal rated current, I_{th}	A	16	16	10	10	10	10	10	10
AC12/DC12 I_n , A U_n =									
120V	A	—	—	8/—	8/—	8/—	8/—	8/—	8/—
125V	A	—	—	—/1.1	—/1.1	—/1.1	—/1.1	—/1.1	—/1.1
240V	A	6/—	6/—	6/—	6/—	6/—	6/—	6/—	6/—
250V	A	—	—	—/0.55	—/0.55	—/0.55	—/0.55	—/0.55	—/0.55
400V	A	4/—	4/—	4/—	4/—	4/—	4/—	4/—	4/—
415V	A	—	—	4/—	4/—	4/—	4/—	4/—	4/—
440V	A	—	—	—/0.31	—/0.31	—/0.31	—/0.31	—/0.31	—/0.31
480V	A	—	—	3/—	3/—	3/—	3/—	3/—	3/—
500V	A	—	—	3/0.27	3/0.27	3/0.27	3/0.27	3/0.27	3/0.27
600V	A	—	—	—/0.2	—/0.2	—/0.2	—/0.2	—/0.2	2—/0.2
690V	A	2/—	2/—	2/—	2/—	2/—	2/—	2/—	2/—



- ① Not available at time of printing, please consult factory.
- ② Maximum distance between busbar support and switch terminal 70mm.
- ③ pf 0.95.
- ④ pf 0.65.
- ⑤ IEC 947-3, utilization category B, infrequent operation.

Technical data

OTDC Disconnect switches

100A - 200A, 1000VDC

Technical data in accordance to UL98B for disconnect switches OTDC100 and OTDC200
Suitable for use in photovoltaic systems in accordance with Article 690 of NEC

Catalog number		OTDC100	OTDC180	OTDC200
Approvals		UL98B & IEC	UL98B & IEC	UL98B & IEC
General purpose amp rating (-20° – +50° C)	A	100	180	200
Maximum operating voltage	V	1000	1000	1000
Short circuit current rating at 1000 VDC	kA	5	5	5
	SCCR with:	Circuit breaker	Circuit breaker	Circuit breaker
Endurances	Oper	4000	4000	4000
Wiring range	MCM	#4-300	#4-300	#4-300

Technical data

OS30FA_12 – OS1200L03

UL & CSA

UL & CSA

Catalog number	3 pole	OS30FA_12	OS60GJ12	OS100GJ03	OS200J03	OS400J03	OS600J03	OS800L03	OS1200U03
Approvals ①	2 pole 3 pole 4 pole	N/A UL98 & IEC UL98 & IEC	N/A UL98 & IEC UL98 & IEC	IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC
Technical ratings	-40° to 40°C								
General purpose amp rating pf = 0.7 – 0.8	A	30	60	100	200	400	600	800	1200
Max operating voltage	V	600	600	600	600	600	600	600	600
Max horsepower rating/ Max motor FLA current pf = 0.4 – 0.5 Three phase									
240V	HP/A	7.5/22.0	15/42.0	30/80.0	60/145.0	125/312.0	200/480.0	250/602.0	—
480V	HP/A	15/21.0	30/40.0	60/77.0	125/156.0	250/302.0	400/477.0	500/590.0	—
600V	HP/A	20/22.0	50/52.0	75/77.0	150/144.0	350/336.0	500/472.0	500/472.0	—
Single phase									
120V	HP/A	2/24.0	—	—	—	—	—	—	—
240V	HP/A	3/17.0	—	—	—	—	—	—	—
Short circuit rating with fuse	kA	200	200	200	200	200	200	200	200
UL Fuse size	A	30	60	100	200	400	600	800	1200
UL Fuse type	J/CC	J	J	J/T	J/T	J	J	L	L
Endurances									
Min. Electrical endurance, pf = 0.75 – 0.80	operation cycles	6000	6000	6000	6000	1000	1000	500	500
Mechanical endurance	operation	20,000	20,000	20,000	16,000	12,000	4,000	3000	2000
Physical characteristics									
Weight	3 pole lb 4 pole lb	1.54 1.98	2.86 3.52	3.30 3.96	5.9 7.5	12.56 15.21	28.66 37.48	28.66 37.48	63.93 —
Dimension	3 pole H in W in D in	3.66 4.15 4.10	3.94 5.63 5.04	5.67 7.07 5.10	6.5 7.1 5.2	9.29 10.04 6.93	12.04 13.50 9.17	12.04 13.50 9.17	16.7 16.42 11.62
Shaft size square □	in mm	.24 x .24 6 x 6	.24 x .24 6 x 6	.24 x .24 6 x 6	.24 x .24 6 x 6	.47 x .47 12 x 12	.47 x .47 12 x 12	.47 x .47 12 x 12	.47 x .47 12 x 12
Switch operating torque for rotary 3 pole switches	lb. in.	26.6	35.5	70.9	195	195	336	336	575
Terminal lug kits									
Wire range	AWG	Integral #18 – 8	Integral #14 – 4	OZXA-24 #14 – 2/0	OZXA-200 #4 – 300kcmil	OZXA-400 #2 – 600kcmil	OZXA-800 (2) #2 – 600 kcmil	OZXA-800 (2) #2 – 600 kcmil	OZXA-1200 (4)#2-600kcmil
Torque:									
Wire tightening	lb. in.	17	30	120	200	500	500	500	500
Lug mounting	lb. in.	N/A	N/A	50	72	480	480	480	480
Auxiliary contacts		OA4G_	OA1/3G_	OA_G_	OA_G_	OA_G_	OA_G_	OA_G_	OA_G_
NEMA ratings, AC		—	A600	A600	A600	A600	A600	A600	A600
AC rated voltage	VAC	250	600	600	600	600	600	600	600
AC thermal rated current	A	6	10	10	10	10	10	10	10
AC maximum volt ampere making	VA	—	7200	7200	7200	7200	7200	7200	7200
AC maximum volt ampere breaking	VA	—	720	720	720	720	720	720	720
NEMA ratings, DC		—	P300	R300	R300	P600	P600	P600	P600
DC rated voltage	VDC	—	300	300	300	600	600	600	600
DC thermal rated current	A	—	1	1	1	1	1	1	1
DC maximum make break current	A	—	28	28	28	28	28	28	28
Torque:									
Wire tightening	lb. in.	7	7	7	7	7	7	7	7
Wire range	AWG	#22 – 14/#18 – 14	#18 – 14	#18 – 14	#18 – 14	#18 – 14	#18 – 14	#20 – 12	#20 – 12

① The following UL Listed switches are also CSA approved.

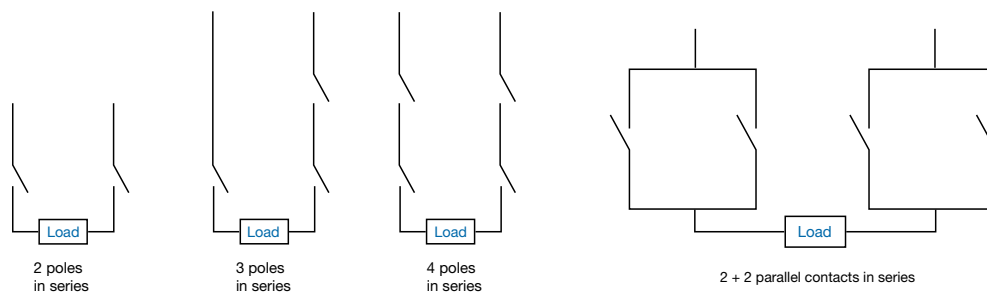
Technical data

OS30FA_12 – OS1200L03

IEC

IEC

Catalog number	3 pole	OS30FA_12	OS60GJ12	OS100GJ03	OS200J03	OS400J03	OS600J03	OS800L03	OS1200L03	
Technical ratings	-40° to 40°C									
Rated insulation voltage										
Pollution degree 3 ⑥	V	1000	1000	1000	1000	1000	1000	1000	1000	
Dielectric strength 50Hz/60Hz, 1 min	kV	10	10	10	10	10	10	10	10	
Rated impulse withstand voltage	kV	12	12	12	12	12	12	12	12	
Rated thermal current, I _{th} /max. fuse power dissipation ①										
AC 20/DC 20 open ②	A/W	32/3.5	63/7.5	160/12	200/17	400/45	630/60	800/65	1250/110	
40°C enclosed	A/W	32/3.5	63/7.5	160/12	200/15	400/30	570/50	720/55	1000/85	
Enclosed with solid links	A/W	32	–	–	–	–	–	–	–	
with minimum cable cross section Cu	mm ²	6	16	70	95	240	2 x 185	2 x 240	1250/2 x 400	
Rated operational voltage AC 20 and DC 20V		1000	1000	1000	1000	1000	1000	1000	1000	
AC Rated operational currents										
AC 21A	≤500V	A	32	63	160	200	400	630	800	1250 Cat. B
	≤690V	A	32	63	160	200	400	630	800	1250 Cat. B
AC 22A	≤500V	A	32	63	160	200	400	630	800	1250 Cat. B
	≤690V	A	32	63	160	200	400	630	800	1250 Cat. B
AC 23A	≤500V	A	32	63 ③	160 ③	200	400	630	800	1000 Cat. B
	≤690V	A	32	63 ③	160 ③	200	400	630	800	1000 Cat. B
DC Rated operational currents/poles in series										
DC21A	48V	A	32/2 ③	63/2	160/2	200/1	400/2	630/1 CAT. B	800/1 CAT. B	–
	110V	A	32/2	63/2	125/2	200/1	400/2	630/1 CAT. B	800/1 CAT. B	–
	220V	A	32/2	63/2	125/2	200/1	400/2	630/1 CAT. B	800/1 CAT. B	–
	440V	A	32/4	50/4	125/4	200/2	400/3 CAT. B	630/2 CAT. B	800/2 CAT. B	–
	750V	A	–	④	④	180/4	400/4 CAT. B	630/4 CAT. B	720/4 CAT. B	–
	880V	A	–	④	④	180/4	–	630/4 CAT. B	720/4 CAT. B	–
DC22A	48V	A	32/2 ③	63/2	160/2	200/1	400/2	–	800/1 CAT. B	–
	110V	A	32/2	63/2	125/2	200/1	400/2	–	800/1 CAT. B	–
	220V	A	32/2	63/2	125/2	200/1	400/2	–	800/1 CAT. B	–
	440V	A	32/4	–	–	200/2	400/3 CAT. B	–	800/2 CAT. B	–
	750V	A	–	④	④	180/4	400/4 CAT. B	–	800/4 CAT. B	–
	880V	A	–	④	④	180/4	–	–	800/4 CAT. B	–
DC23A	48V	A	32/2 ③	63/2	160/2	200/1	400/2	–	800/1 CAT. B	–
	110V	A	32/2	63/2	125/2	200/1	400/2	–	800/1 CAT. B	–
	220V	A	32/2	63/2	125/2	200/1	400/2	–	800/1 CAT. B	–
	440V	A	32/4	–	–	200/2	400/3 CAT. B	–	800/2 CAT. B	–
	750V	A	–	–	–	180/4	400/4 CAT. B	–	720/4 CAT. B	–
	880V	A	–	–	–	180/4	–	–	720/4 CAT. B	–
Rated operational power	AC23A									
230V	kW	7.5	18.5	45	60	132	200	250	315	
400V	kW	15	30	75	110	220	355	450	560	
415V	kW	15	30	75	110	230	355	450	560	
500V	kW	18.5	37	90	132	280	450	560	710	
690V	kW	22	55	132	200	400	630	710	1000	



① Ambient temperature 60°C: derating 20 percent. Mounting on ceiling: derating 10 percent. Mounting on wall, horizontal fuses: derating 8 percent.
 ② The ambient air temperature does not exceed +40°C and its average over a period of 24h does not exceed +35°C according to IEC 947.
 ③ For 30A switches, use 2 + 2 parallel contacts in series.
 ④ Available on request.
 ⑤ IEC 947-3, utilization category B, infrequent operation.
 ⑥ Pollution degree 3: Conductive pollution occurs, or dry, non-conductive pollution occurs, which becomes conductive due to condensation.

Technical data

OS30FA_12 – OS1200L03

IEC

Disconnect
switches
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data

IEC

Catalog number	3 pole	OS30FA_12	OS60GJ12	OS100GJ03	OS200J03	OS400J03	OS600J03	OS800L03	OS1200L03
Rated breaking capacity									
in category AC-23A	500V A	256	504	1280	1600	3200	5760	5760	8000
	690V A	256	504	1280	1600	3200	5760	5760	8000
Rated breaking capacity/poles in series									
in category DC-23	<220V A	128/2	252/2	640/2	—	—	—	—	—
	440V A	128/4	—	—	—	—	—	—	—
	500 – 750V A	—	—	—	—	—	—	—	—
	1000V A	—	—	—	—	—	—	—	—
Rated conditional short-circuit current r.m.s. ③									
	80 kA, 415V kA	9	13.5	22	35	40	75	75	89
	100 kA, 500 V kA	8	12.5	22	37.5	40	75	75	105
	50 kA, 690 V kA	7	9.5	15	—	—	—	—	—
	Rated short time withstand current, 1s. kA	1	2.5	5	8	14	18	18	40
Rated capacitor power									
The capacitor rating of the fusible disconnect switch is limited by the fuse link									
	400 V kVar	15	30	60	90	180	250	310	440
	415V kVar	15	32	65	100	200	270	340	460
	690V kVar	25	50	100	160	325	450	550	750
Power loss/pole									
with rated current, without fuse	W	2	4	9	8	30	46	75	75
Mechanical endurance	operations	20,000	20,000	20,000	20,000	16,000	10,000	10,000	6000
Physical characteristics									
Weight	3 pole kg	0.7	1.1	1.5	2.6	5.7	11.5	11.5	29.00
	4 pole kg	0.9	1.3	1.8	—	—	—	—	—
Dimension	3 pole H mm	93	100	144	198.5	236	306	282	424.18
	W mm	106	143	179	181.5	255	343	376	417.07
	D mm	104	120	129	132	176	233	233	295.14
Shaft size square	mm	6 x 6	6 x 6	6 x 6	6 x 6	12 x 12	12 x 12	12 x 12	12 x 12
Terminals									
Built-in terminal size	mm ²	0.5 – 10	2.5 – 25	—	—	—	—	—	—
Terminal bolt size, metric thread	diameter x length mm	—	—	M8 x 25	M8 x 25	M10 x 30	M12 x 40	M12 x 40	M12 x 40
Terminal bolt tightening torque	Nm	2	3.5	15-22	15 – 22	30 – 44	50 – 75	50 – 75	50 – 75
Fuse-links bolts tightening torque	Nm	2	3.5	M5:3.5 M8:5	4	20	M10:30 M12:40	M10:30 M12:40	M12:40
Operating torque	Nm	3	5	7	7	19	38	38	65
Auxiliary contacts									
		OA4G_ ①	OA1/3G ②	OA_G_ ②	OA_G_ ②	OA_G_ ②	OA_G_ ②	OA_G_ ②	OA_G ②
Ratings according to IEC 947-5-1									
Rated voltage, U _i	VAC	690	690	690	690	690	690	690	690
Thermal current, I _{th}	A	10	16	16	16	16	16	16	16
AC12 / DC12, I _e	U _e =24V A	— / 6	—	—	—	—	—	—	—
	120V A	— / 6	—	—	—	—	—	—	—
	125V A	—	—	—	—	—	—	—	—
	230V A	—	6 / —	6 / —	6 / —	—	—	6 / —	6 / —
	250V A	—	—	—	—	—	—	—	—
	400V A	—	4 / —	4 / —	4 / —	—	—	4 / —	4 / —
	415V A	—	—	—	—	—	—	—	—
	440V A	2 / —	—	—	—	—	—	—	—
	480V A	—	—	—	—	—	—	—	—
	500V A	—	—	—	—	—	—	—	—
	600V A	—	—	—	—	—	—	—	—
	690V A	—	2 / —	2 / —	2 / —	2 / —	2 / —	2 / —	2 / —

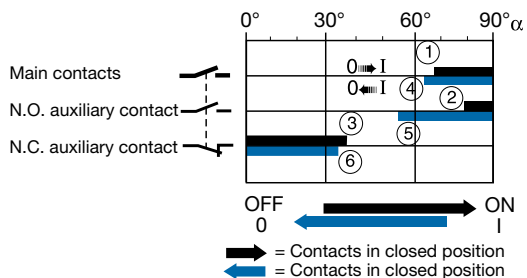
① AC15 / DC12, according to IEC 947-5-1

② AC15, according to IEC 947-5-1

③ Values shown are corresponding max. allowed cut-off current, peak-values per single phase fuse tests.

Auxiliary contact timing diagrams OT16 – OT100

Legend



Contacts closing

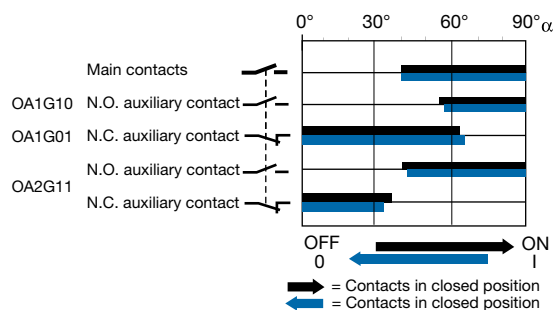
- ① Main contacts close
- ② N.O. auxiliary contacts close
- ③ N.C. auxiliary contacts open

Contacts opening

- ④ Main contacts open
- ⑤ N.O. auxiliary contacts open
- ⑥ N.C. auxiliary contacts close

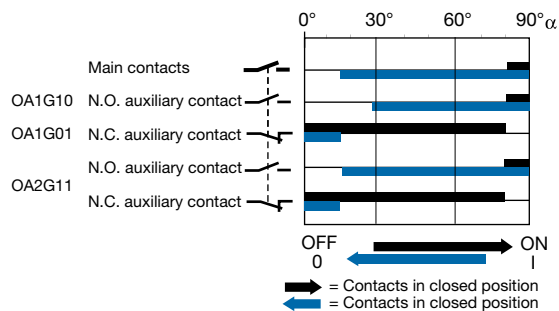
OT16, OT25, OT40

Catalog number	Auxiliary contact	Contact configuration
OT16, OT25, OT40	OA1G10 OA1G01 OA2G11	1 N.O. 1 N.C. 1 N.O. & 1 N.C.



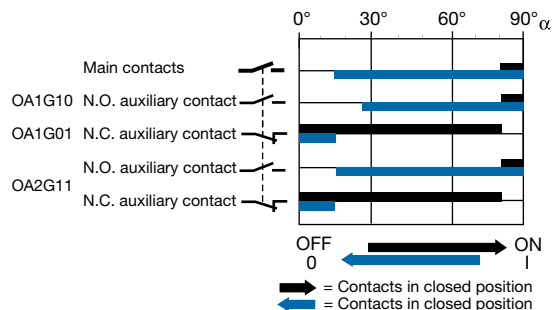
OT63, OT80

Catalog number	Auxiliary contact	Contact configuration
OT63, OT80	OA1G10 OA1G01 OA2G11	1 N.O. 1 N.C. 1 N.O. & 1 N.C.



OT30, OT60, OT100

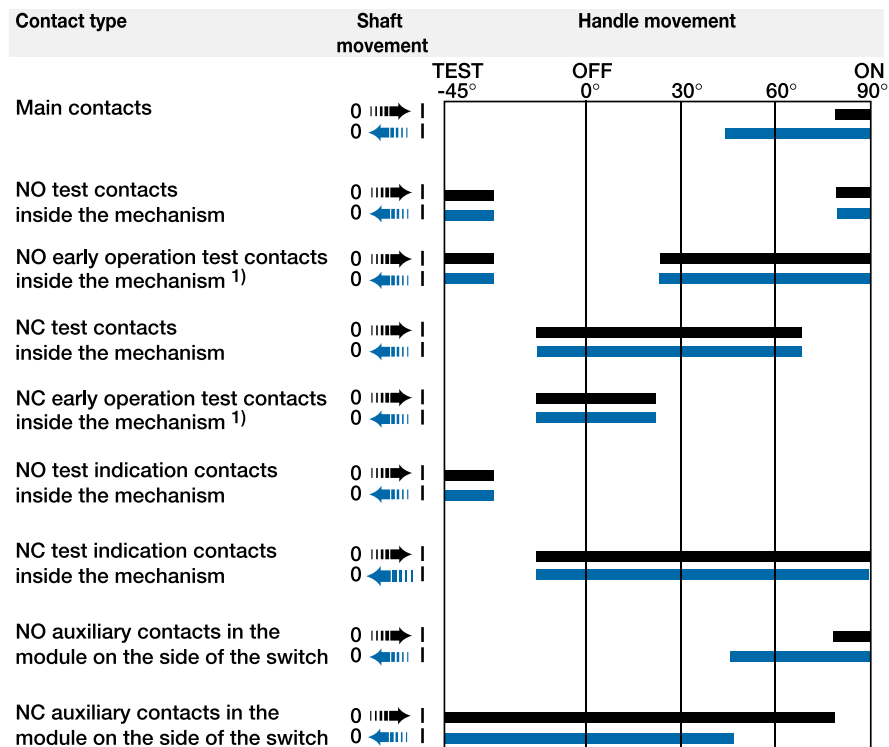
Catalog number	Auxiliary contact	Contact configuration
OT30, OT60, OT100	OA1G10 OA1G01 OA2G11	1 N.O. 1 N.C. 1 N.O. & 1 N.C.



Auxiliary contact timing diagrams OT200U – OETL-NF3150

OT200U03 – OT1200U03

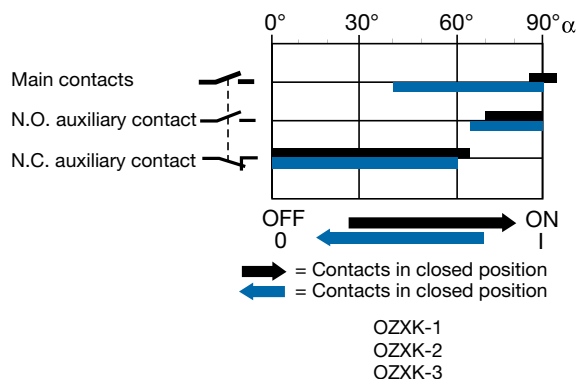
Catalog number	Auxiliary contact	Contact configuration
OT200U03 – OT1200U03	OA1G10 OA3G01	1 N.O. 1 N.C.



1) OT800 - 1200 only

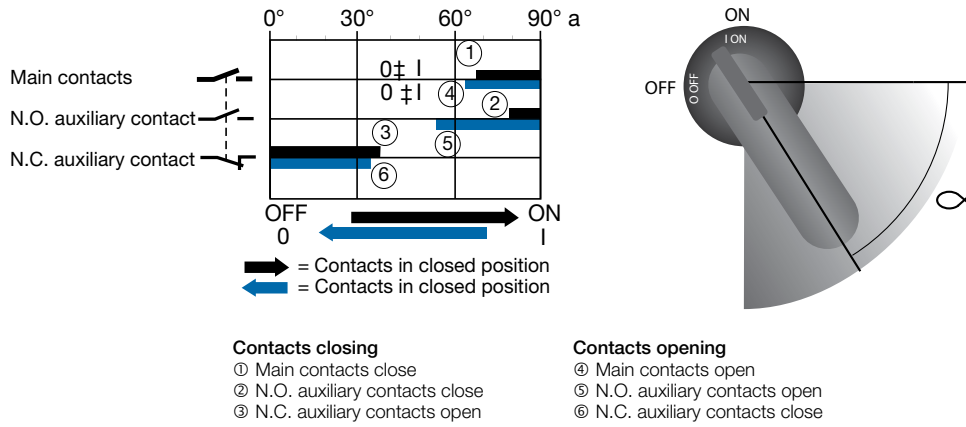
OETL-NF1600 – OETL-NF3150

Catalog number	Auxiliary contact	Contact configuration
OETL-NF1600A – OETL-NF3150	OZXK-1 OZXK-2 OZXK-3	1 N.O. & 1 N.C. 2 N.O. & 2 N.C. 4 N.O. & 4 N.C.



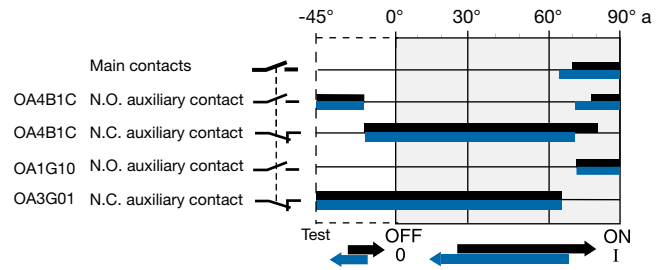
Auxiliary contact timing diagrams OS30_

Legend



OS30_

Catalog number	Auxiliary contact	Contact configuration
OS30_	OA4B1C	1 N.O. & 1 N.C.
	OA1G10	1 N.O.
	OA3G01	1 N.C.

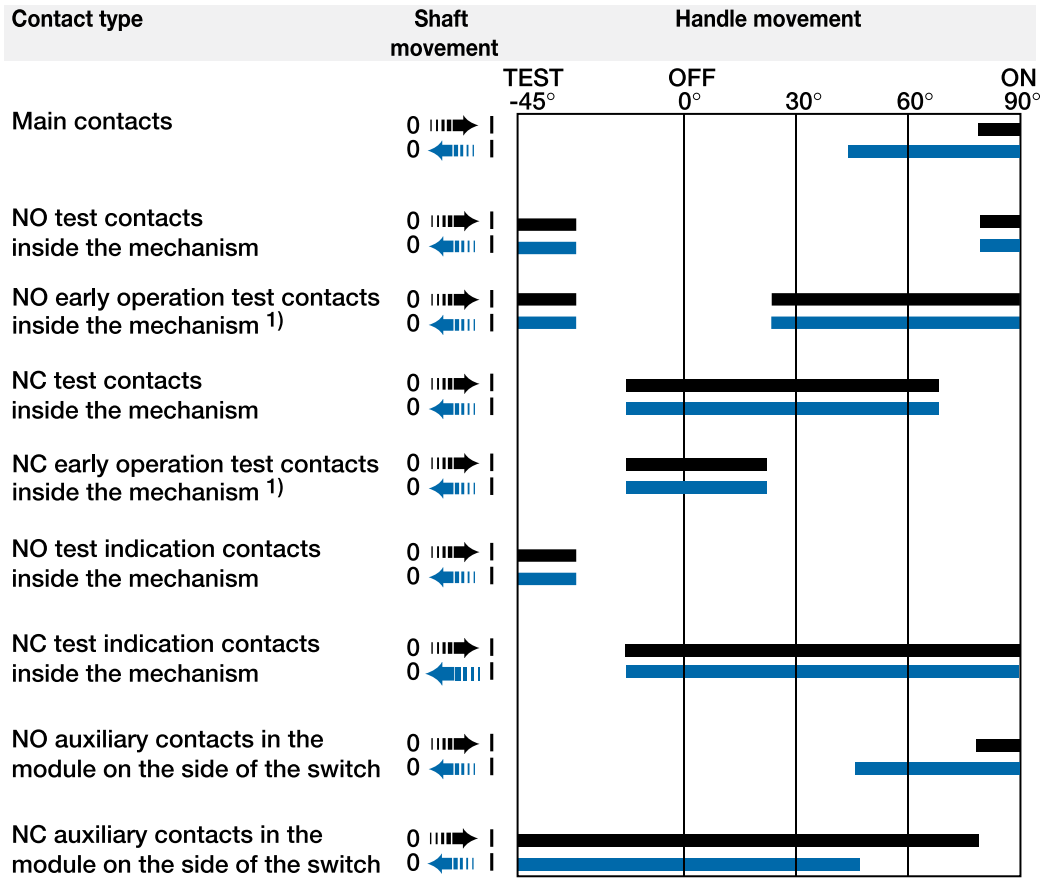


Auxiliary contact timing diagrams

OS60 - OS1200

Disconnect
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OS60-OS1200



1) OS1200 only

NEMA Environmental ratings

Introduction

An enclosure is a surrounding case constructed to provide a degree of protection to personnel against accidental contact with the enclosed equipment and to provide a degree of protection to the enclosed equipment against specified environmental conditions.

A brief description of the more common types of enclosures used by the electrical industry relating to their environmental capabilities

follows. Refer to NEMA Standards Publication for more information regarding applications, features and design tests.

Individual NEMA product Standards Publications or third party certification standards may contain additional requirements for product testing and performance.

Definitions pertaining to nonhazardous locations



Type 1

Enclosures are intended for indoor use primarily to provide a degree of protection against limited amounts of falling dirt. (NEMA Standard 7-15-1991.)



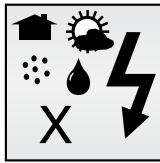
Type 3R

Enclosures are intended for outdoor use primarily to provide a degree of protection against rain, sleet and damage from external ice formation. (NEMA Standard 7-15-1991.)



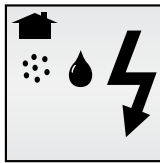
Type 4

19 Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water and damage from external ice formation. (NEMA Standard 1-10-1979.)



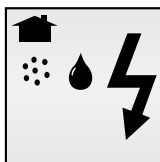
Type 4X

Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water and damage from external ice formation. (NEMA Standard 1-10-1979)



Type 12

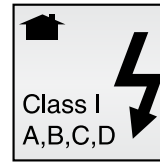
Enclosures are intended for indoor use primarily to provide a degree of protection against circulating dust, falling dirt, and dripping noncorrosive liquids. (NEMA Standard 7-15-1991.)



Type 13

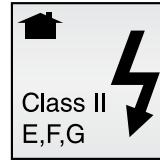
Enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil and noncorrosive coolant. (NEMA Standard 1-10-1979.)

Definitions pertaining to hazardous locations



Type 7






Enclosures are intended for indoor use in locations classified as Class I, Groups A, B, C, or D, as defined in the National Electrical Code. (NEMA Standard 7-15-1991.)



Type 9

Enclosures are intended for indoor use in locations classified as Class II, Groups E, F, or G, as defined in the National Electrical Code. (NEMA Standard 7-15-1991.)

Legend






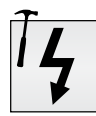

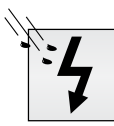

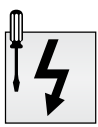
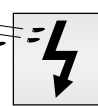








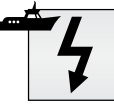

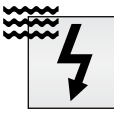
-  – Indoors
-  – Outdoors
-  – Water
-  – Dirt/dust
-  – Corrosion

IEC Environmental ratings

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IP ratings

indicate the degree of protection against dust, liquids and impacts. The IP degrees of protection are defined by the French standard NFC 20-010. To rate a device's degrees of protection, the letters IP are followed by up to three numbers. These numbers are defined as follows:

first number protection against solid objects	second number protection against liquids	third number protection against mechanical impacts
<p>IP 0  no protection</p>	<p>IP 0  no protection</p>	<p>IP 0  no protection</p>
<p>1  protected against solid objects over 50mm (e.g. accidental touch by hands.)</p>	<p>1  protected against vertically falling rain or condensation</p>	<p>1  impact 0,225 joule 150g falling from 15 cm</p>
<p>2  protected against solid objects over 12 mm (e.g. fingers)</p>	<p>2  protected against direct sprays of water up to 15° from vertical</p>	<p>2  impact 0,375 joule 250g falling from 15 cm</p>
<p>3  protected against solid objects over 2.5 mm (tools & wires)</p>	<p>3  protected against sprays to 60° from vertical</p>	<p>3  impact 0,50 joule 250g falling from 20cm</p>
<p>4  protected against solid objects over 1mm (small tools & small wires)</p>	<p>4  protected against water sprayed from all directions</p>	<p>5  impact 2,00 joule 500g falling from 40 cm</p>
<p>5  protected against dust (no harmful deposit)</p>	<p>5  protected against low pressure jets of water from all directions</p>	<p>7  impact 6,00 joule 1.5kg falling from 40 cm</p>
<p>6  totally protected against dust</p>	<p>6  protected from strong jets of water (e.g. for use on ship decks)</p>	<p>9  impact 20,00 joule 5 kg falling from 40 cm</p>
	<p>7  protected against the effects of immersion between 15cm and 1m</p>	

Definitions

AC – Alternating current — Current that reverses its direction of flow twice per cycle.

Ambient temperature — Temperature of the air surrounding the unit.

Amp rating — The basic unit of measurement for electric current (columbs / seconds).

Conventional thermal current I_{th} — Value of the current the disconnect switch can withstand with poles in closed position, in free air for an eight hour duty, without the temperature rise of its various parts exceeding the limits specified by the standards.

Cycle duration — Total time of the on-load + off-load period.

DC – Direct current — Current that flows in only one direction.

Electrical endurance — Number of on-load operating cycles.

IEC environmental protection type — see page 19.48.

Full load amp current FLA — The current required by a motor to produce full-load torque at the motor's rated speed.

Inductive load — An electrical load characterized by having significant inrush (5 to 6 times FLA for typical design-B AC induction motors).

kW — Kilowatts (1000 watts)

Lockout/Tagout — Means of removing power from electrical equipment during inspection, service or repair.

Make / Break — ON / OFF

Mechanical endurance — Number of off-load operating cycles.

Poles in series — Means of connection poles using wires or bus bars to increase breaking capacity of load.

Power factor — The relationship between working power and total power consumed. Power factor measures how effectively electrical power is being used.

Rated insulation U_i — Voltage value which designates the unit and to which dielectric tests, clearance and creepage distances are referred.

Rated operating current I_e — Current value stated by the

manufacturer and taking into account the rated operating voltage U_e, the rated frequency, the rated duty, the utilization category, the electrical contact life and the type of protective enclosure.

Rated operating voltage U_e — Voltage value to which utilization characteristics of the disconnect switch are referred, i.e. phase-to-phase voltage in 3 phase circuits.

Rated short circuit making capacity I_{cm} — The rated short-circuit making capacity of a disconnect switch, a disconnect or a switch-disconnector is the value assigned to equipment at the rated operational voltage, frequency (if any) and specified power-factor for AC or time constant for DC. It is expressed as the maximum prospective peak current under prescribed conditions.

Rated short time withstand current I_{cw} — The rated short-time withstand current of a disconnect switch, a disconnect or a switch-disconnector is the value that the equipment can carry without damage, under the test conditions specified in the relevant product standard. The value of the rated short-time withstand current shall be not less than twelve times the maximum rated operational current unless otherwise stated by manufacturer and the duration of the current shall be 1 s.

Resistive load — An electrical load characterized by not having any significant inrush current.

Short circuit protection coordination — Co-ordination types "1" and "2" are defined in IEC 947-4-1.

Type 1 coordination — There has to be no discharge of parts beyond the enclosure. Damage to the contactor and the overload is acceptable.

Type 2 coordination — No damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts is permitted, if they are easily separated.

Time constant — Ratio of inductance to the resistance:
 $L/R = \text{mH}/\text{Ohm} = \text{ms}$.

Torque — The force that produces rotation. It is commonly measured in pound-feet (lb-ft). Torque applies to such things as motor operations, handle rotations, wire tightening.

NEMA environmental protection type — see page 19.47.

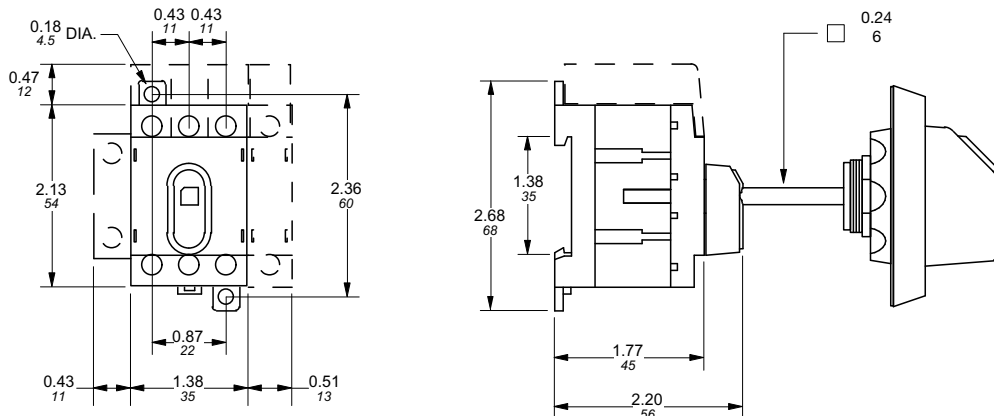
Volt — The unit of electrical potential difference and electromotive force.

Disconnect
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Dimensions

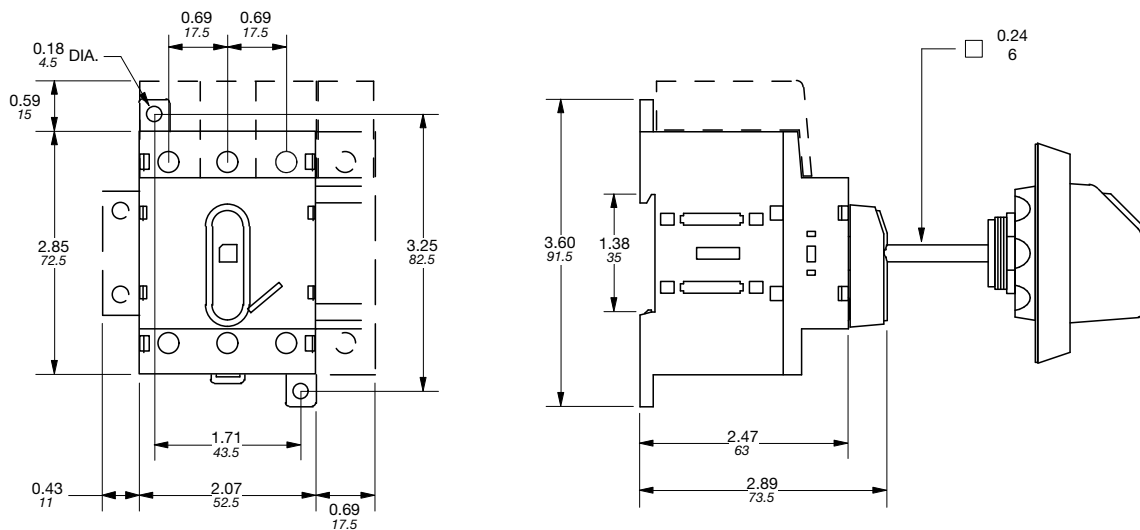
Approximate dimensions OT16F3 – OT100F3 Base & DIN rail mounted switches

← 00.00 Inches
00.00 → [Millimeters]

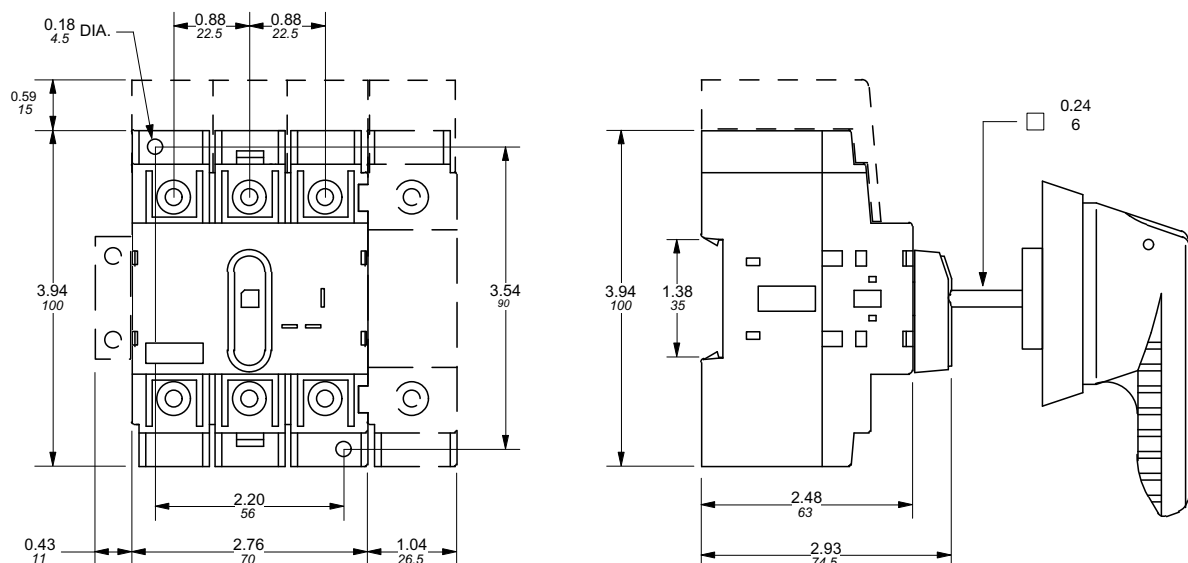
OT16F3, OT25F3, OT40F3 – base & DIN rail mounted switch



OT63F3, OT80F3 – base & DIN rail mounted switch



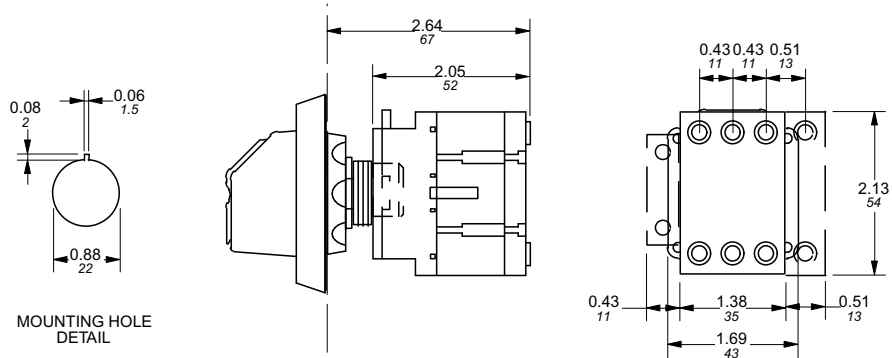
OT30F3, OT60F3, OT100F3 – base & DIN rail mounted switch



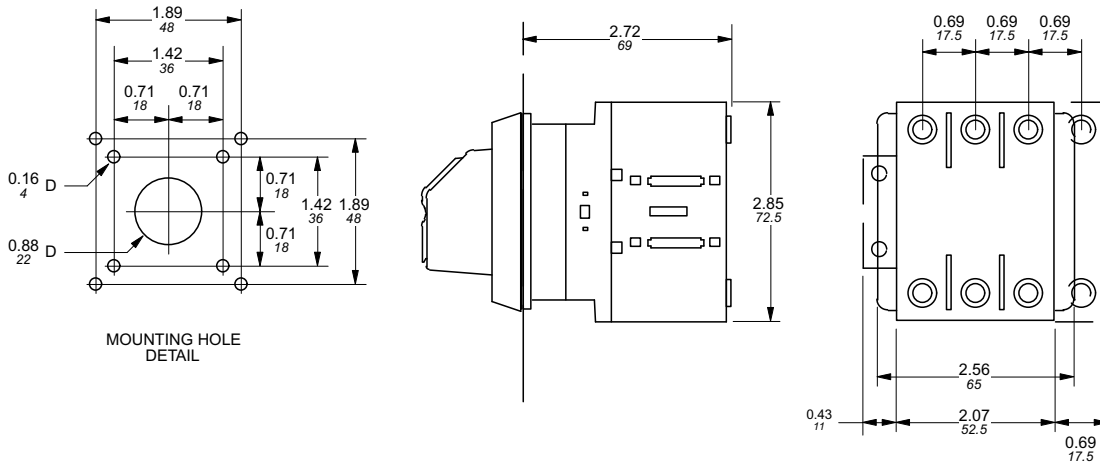
Approximate dimensions OT16FT3 – OT100FT3 Door mounted switches

00.00 Inches
00.00 [Millimeters]

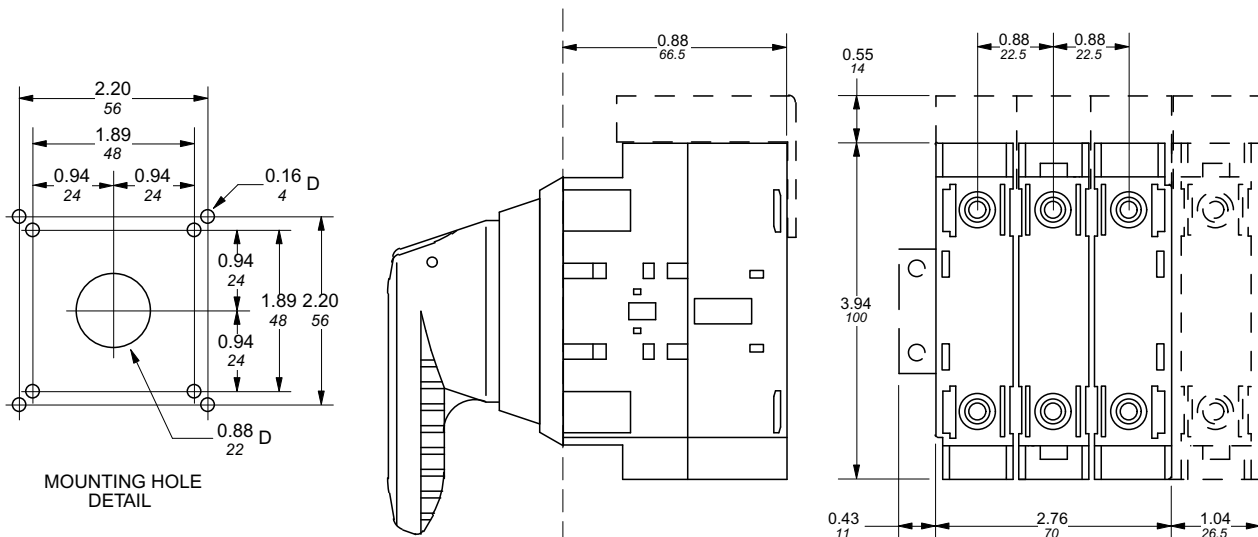
OT16FT3, OT25FT3, OT40FT3 – door mounted switch



OT63FT3, OT80FT3 – door mounted switch



OT30FT3, OT60FT3, OT100FT3 – door mounted switch

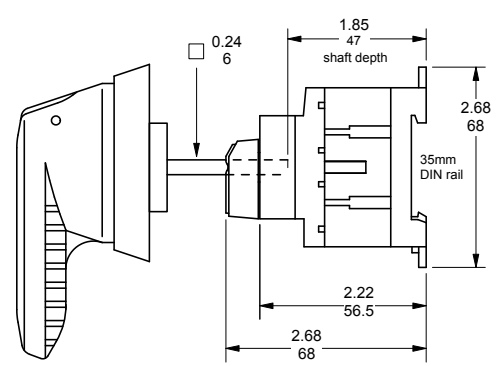
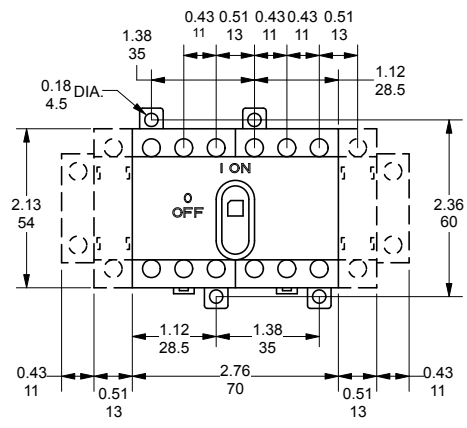


19

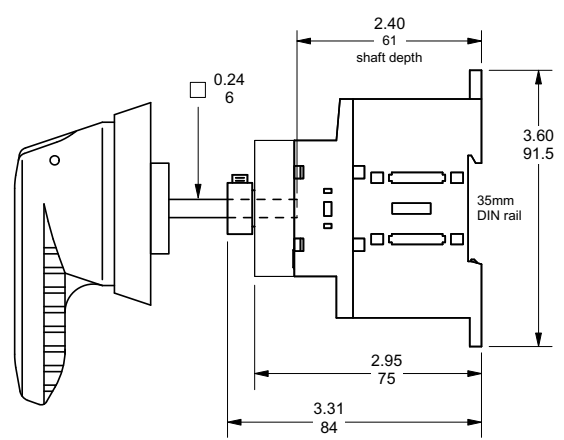
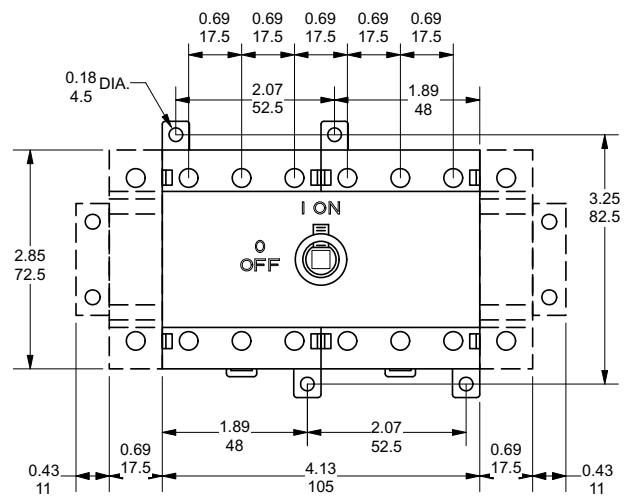
Approximate dimensions OT16F6 – OT100F6 6-pole switches

00.00 Inches
00.00 [Millimeters]

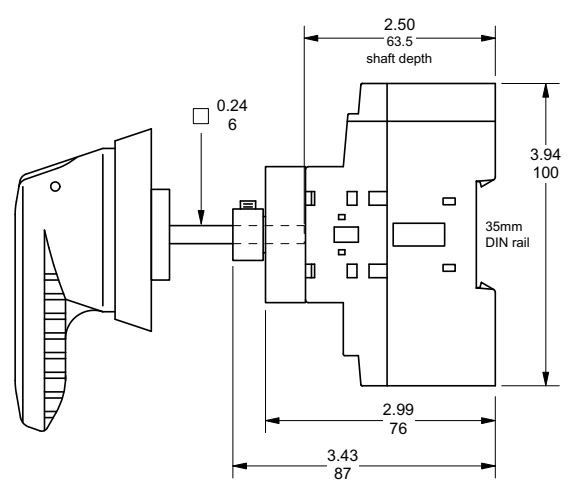
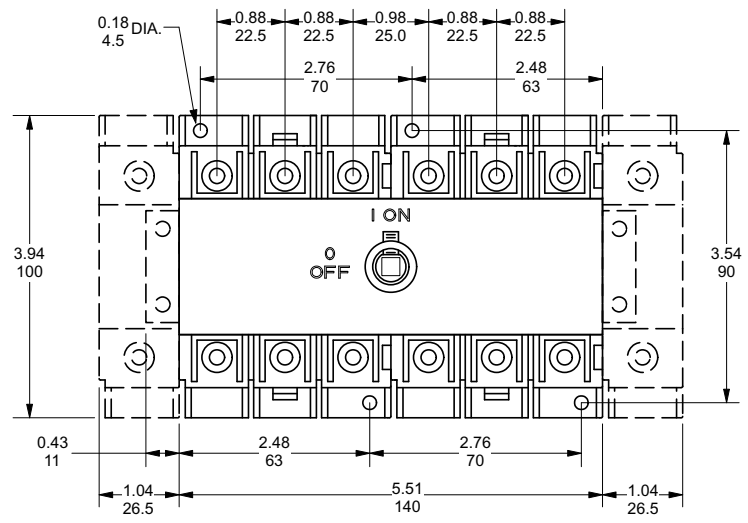
OT16, 25, 40F6 – 6 Pole switches



OT63, OT80F6 – 6 Pole switches



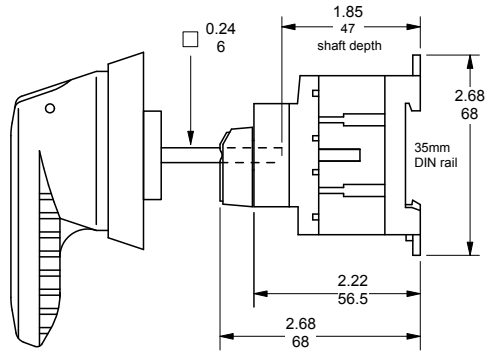
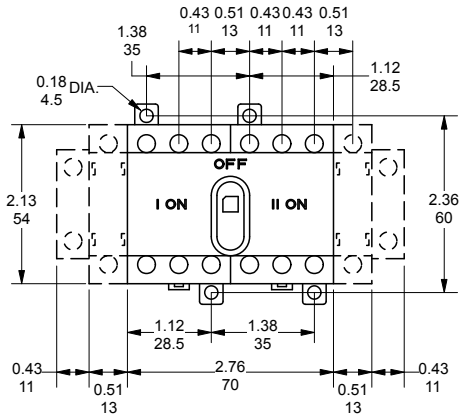
OT30, OT60, OT100F6 – 6 Pole switches



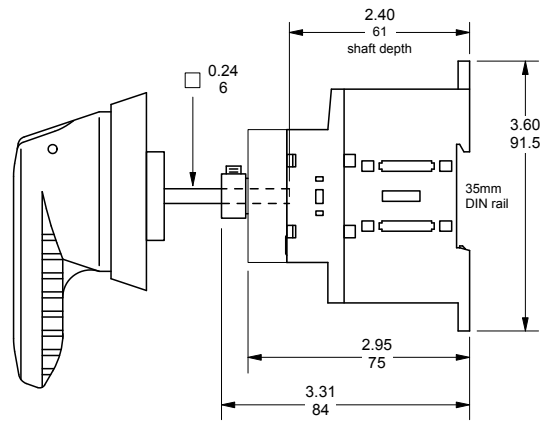
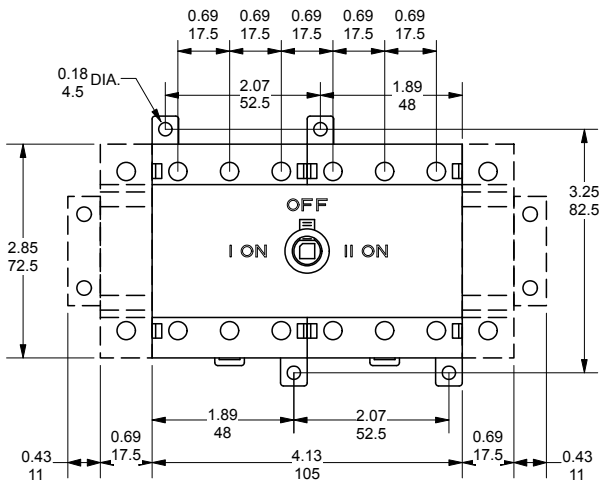
Approximate dimensions OT16 – OT100F3C Double throw switches

00.00 Inches
00.00 [Millimeters]

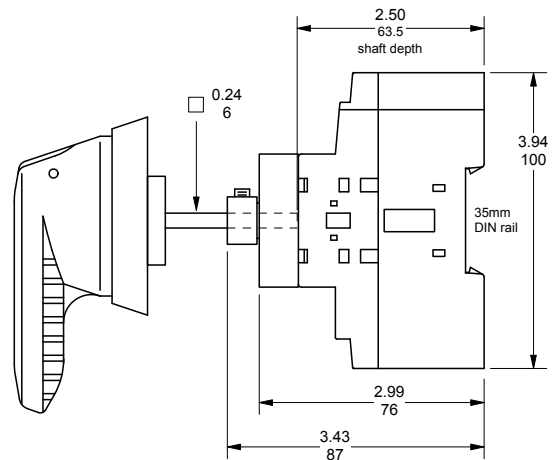
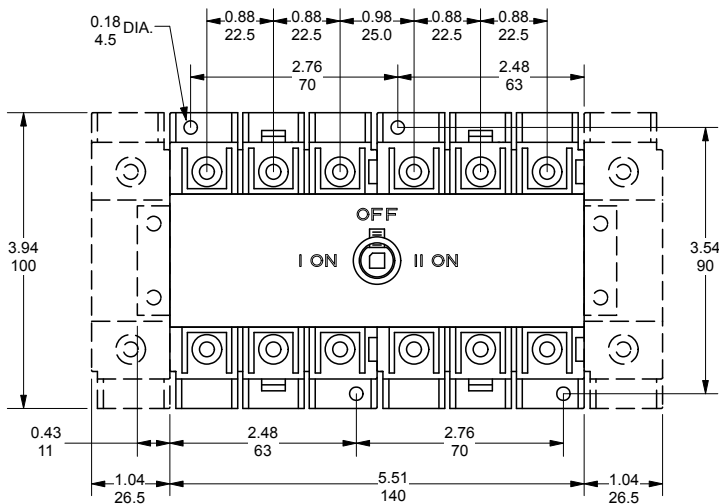
OT16, OT25, OT40F3C – Double throw switches



OT45, OT63, OT80F3C – Double throw switches



OT30, OT60, OT100F3C – Double throw switches



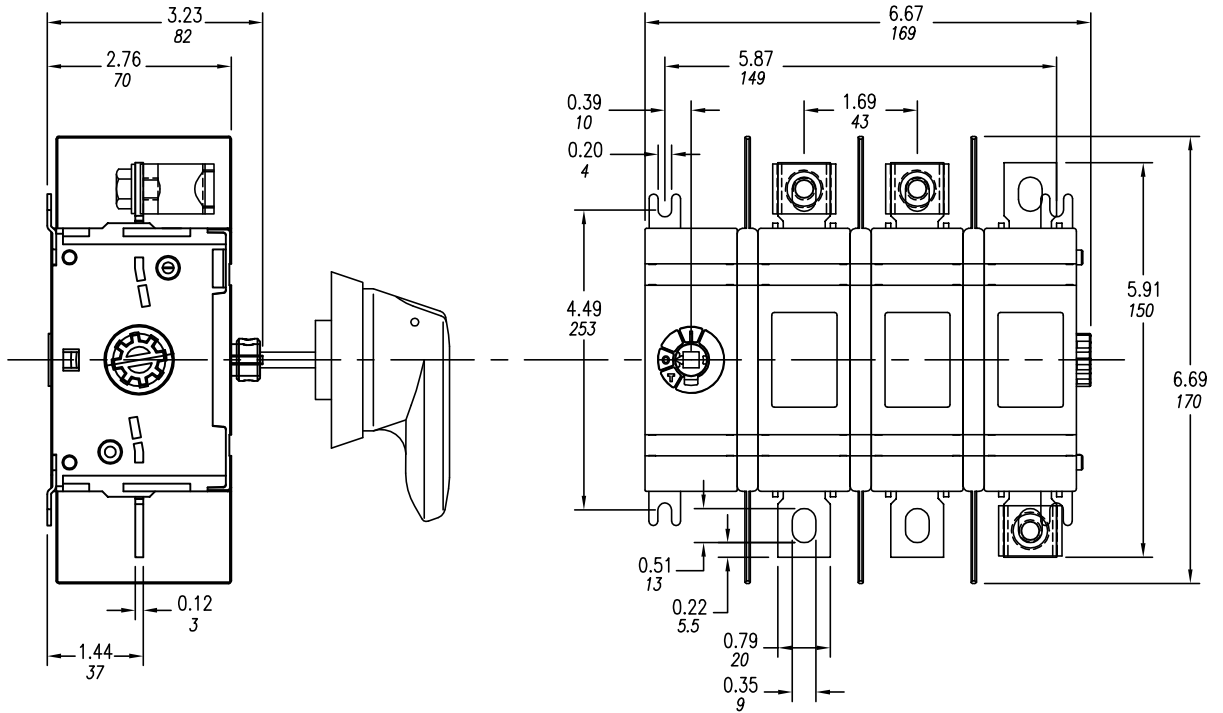
19

Approximate dimensions OT200_ – OT400_

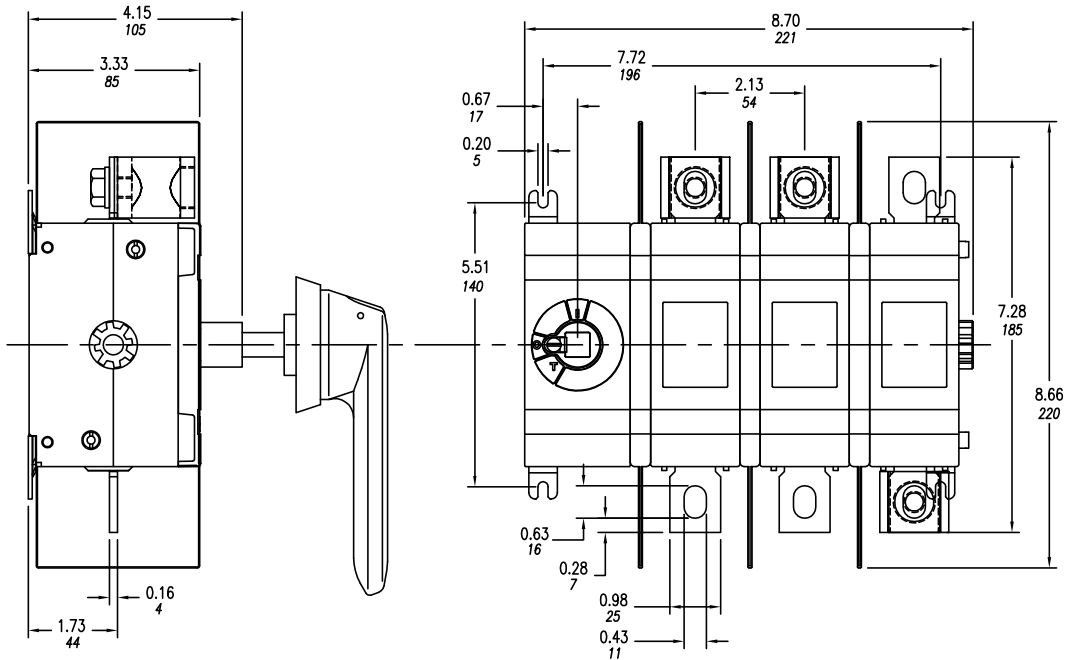
Disconnect
switches
Dimensions

00.00 Inches
00.00 [Millimeters]

OT200U03



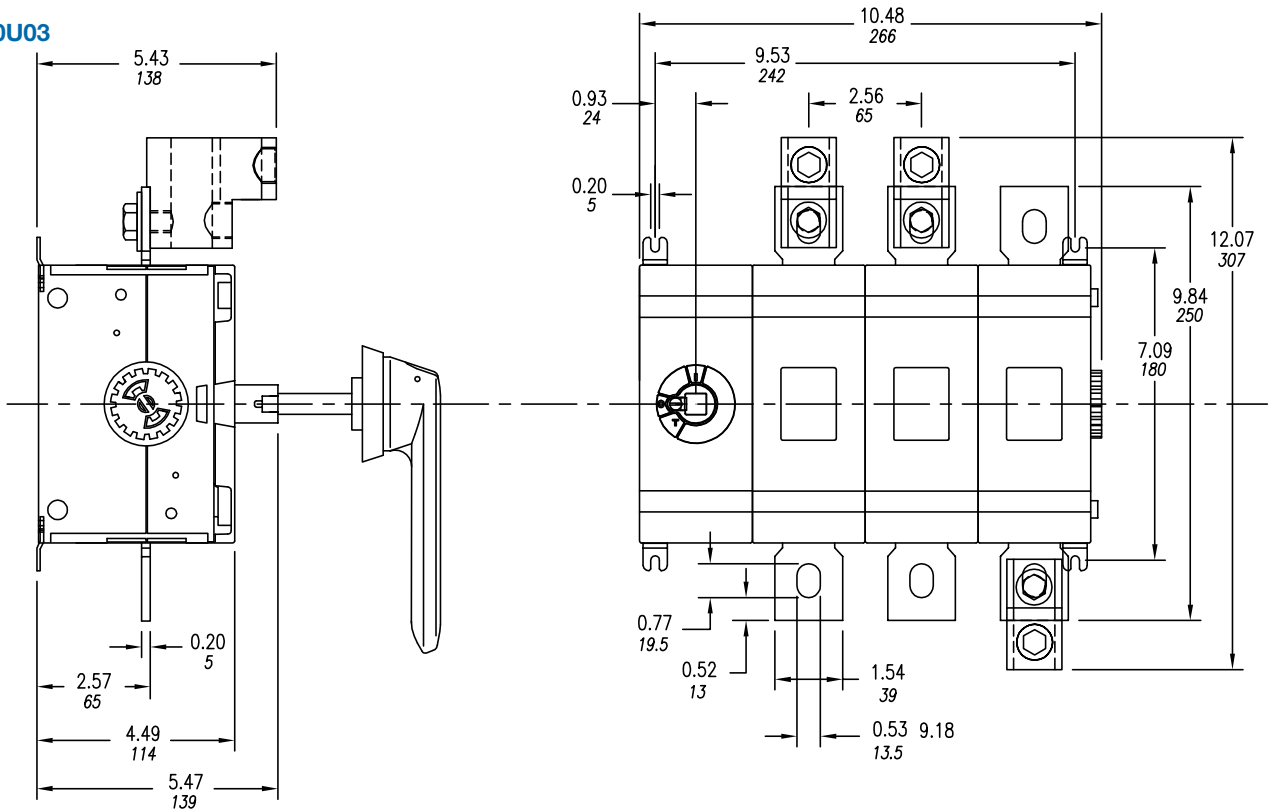
OT400U03



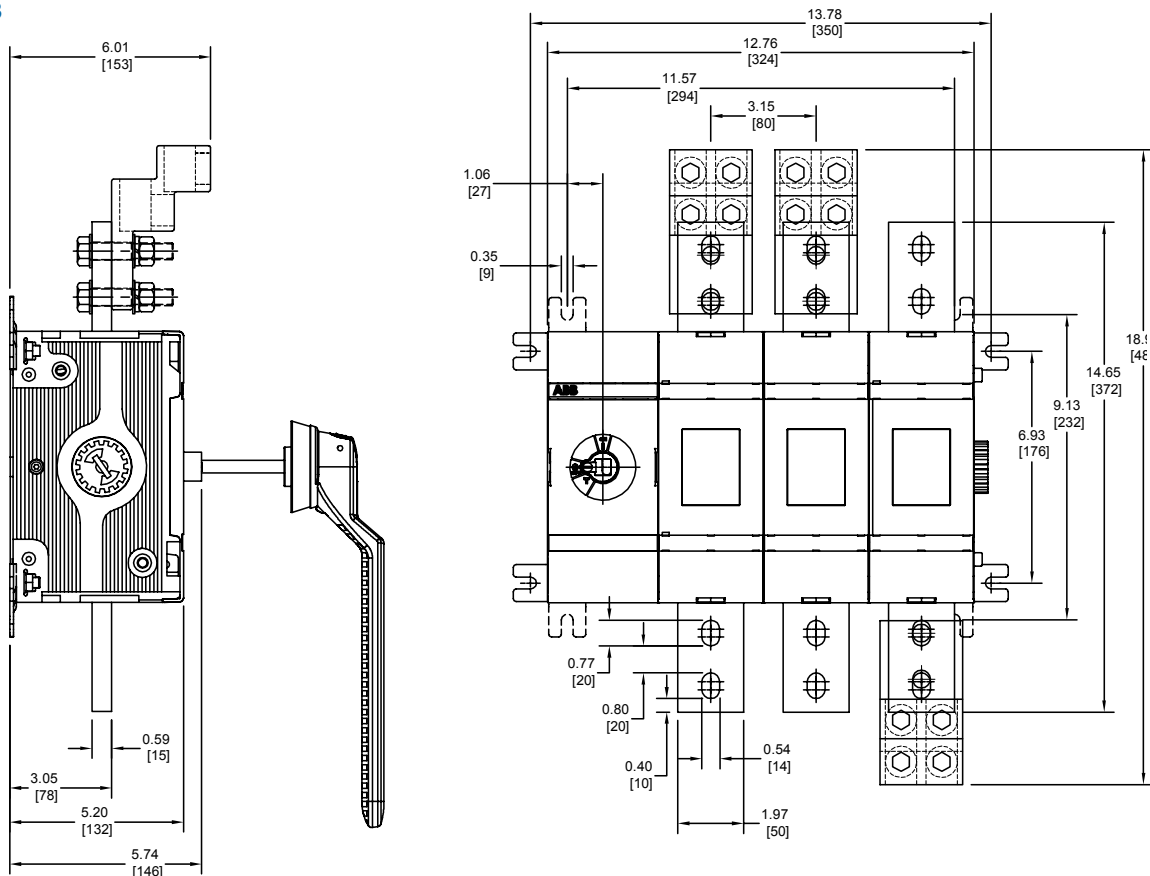
Approximate dimensions OT600U03 – OT800U03

00.00 Inches
00.00 [Millimeters]

OT600U03



OT800U03

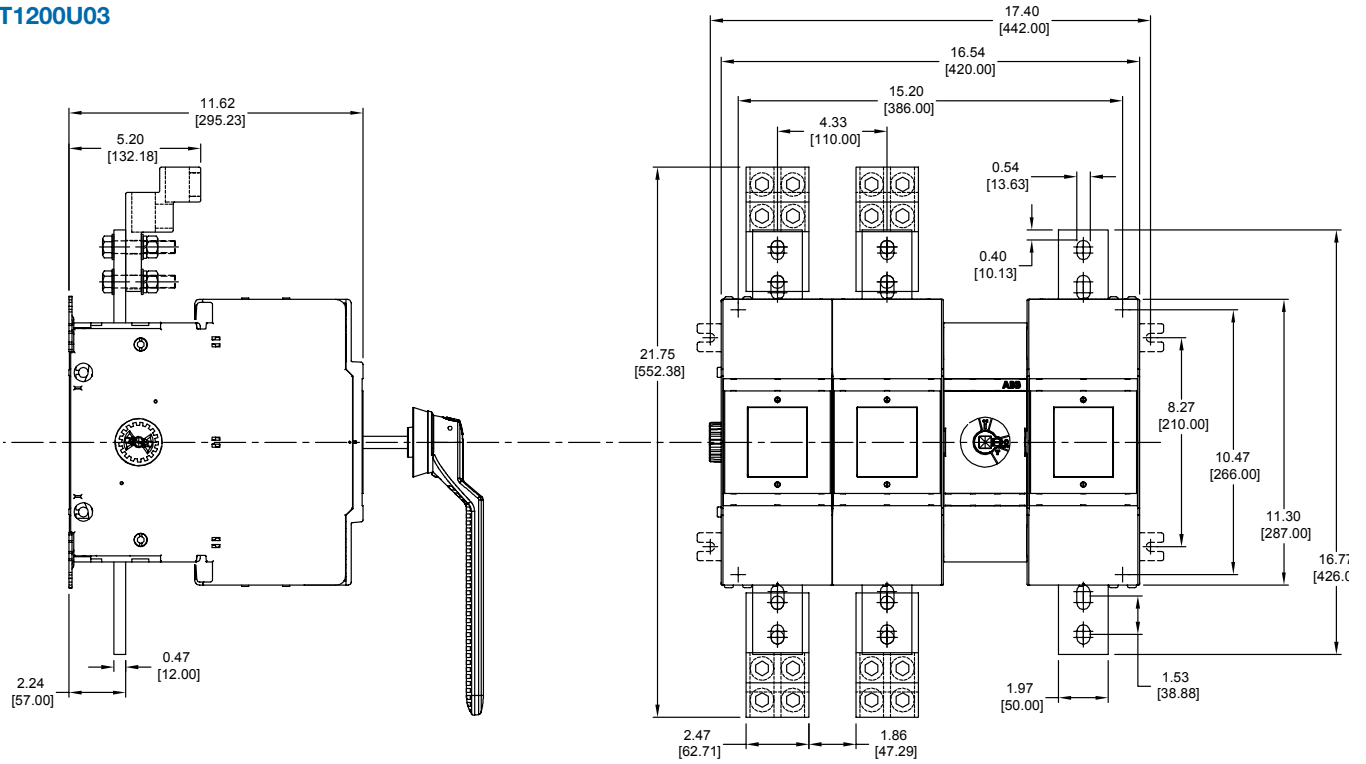


Approximate dimensions OT1200U03 – OETL-NF1600

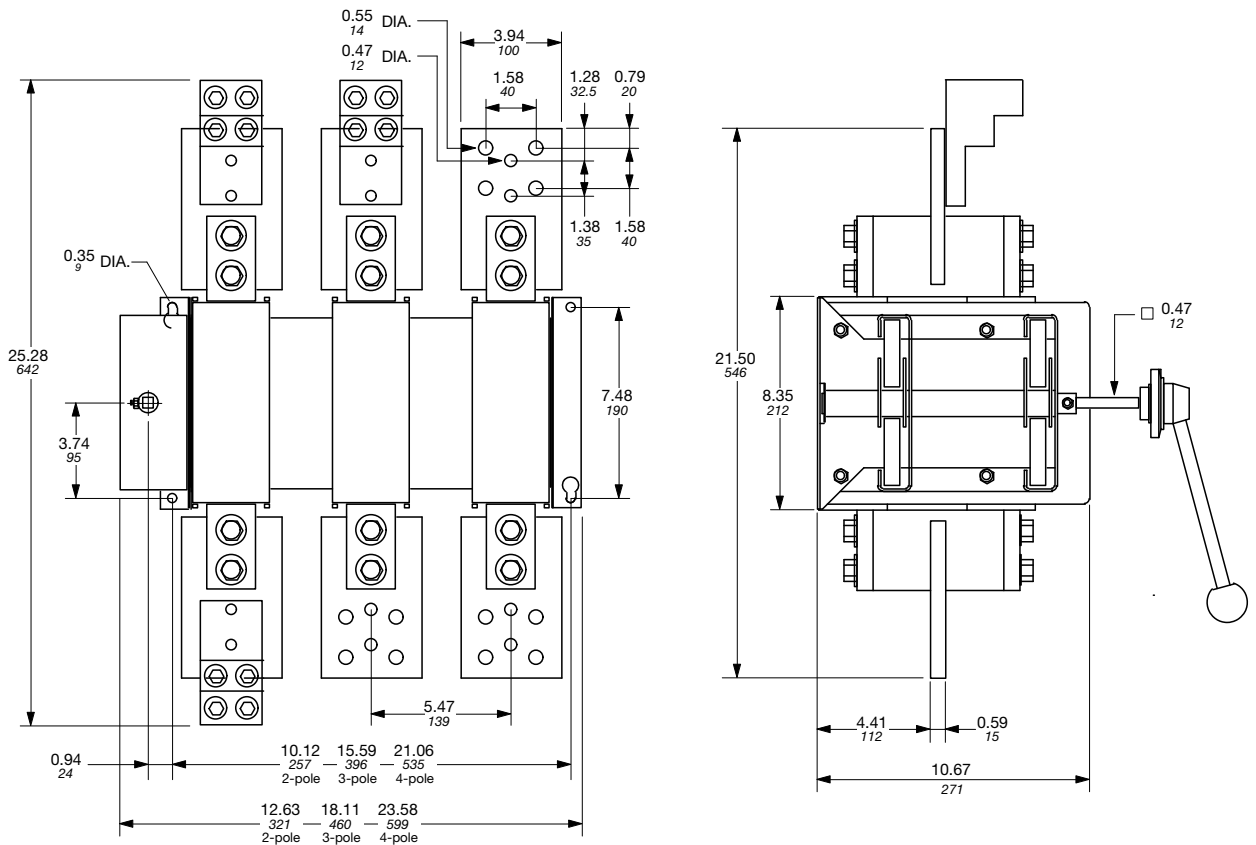
Disconnect
switches
Dimensions

00.00 Inches
00.00 [Millimeters]

OT1200U03



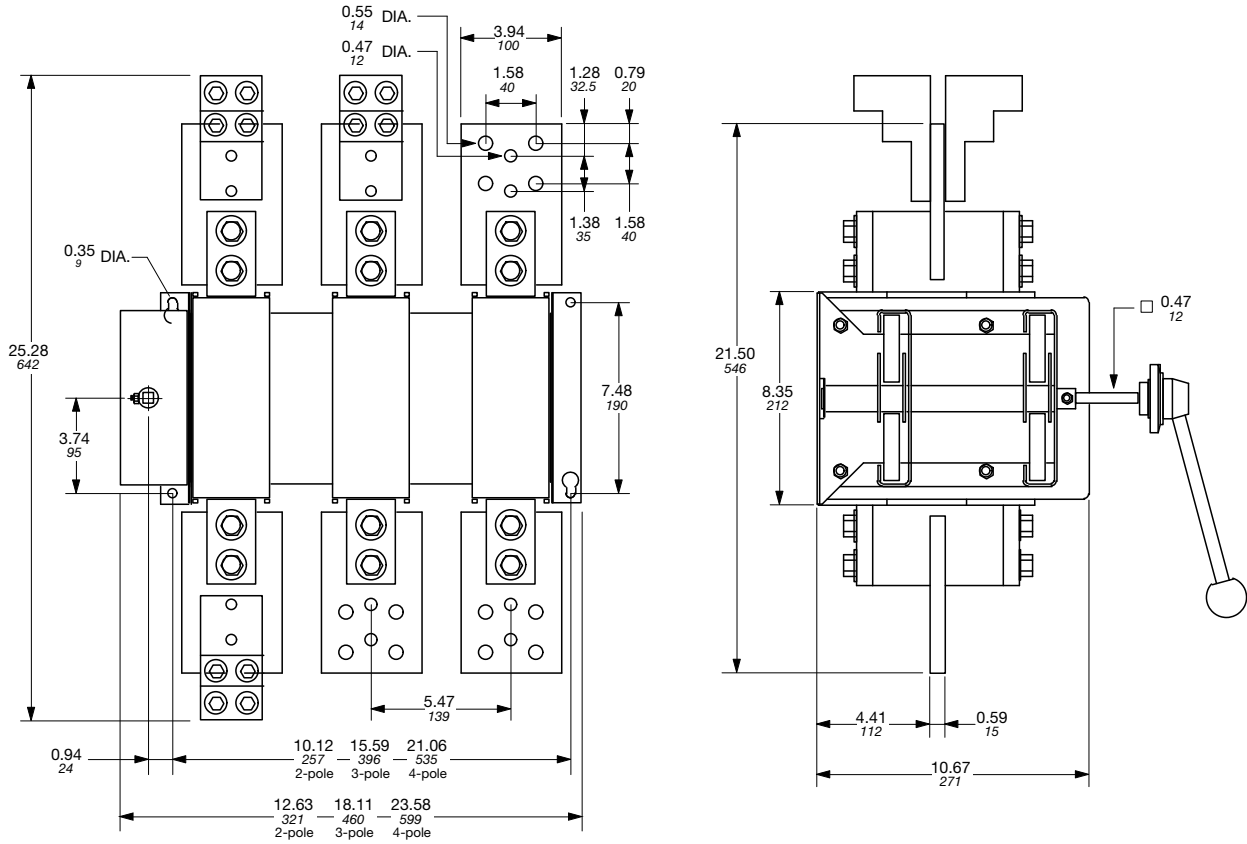
OETL-NF1600



Approximate dimensions OETL-NF2000 – OETL-NF3150

00.00 Inches
00.00 [Millimeters]

OETL-NF2000 – OETL-NF3150

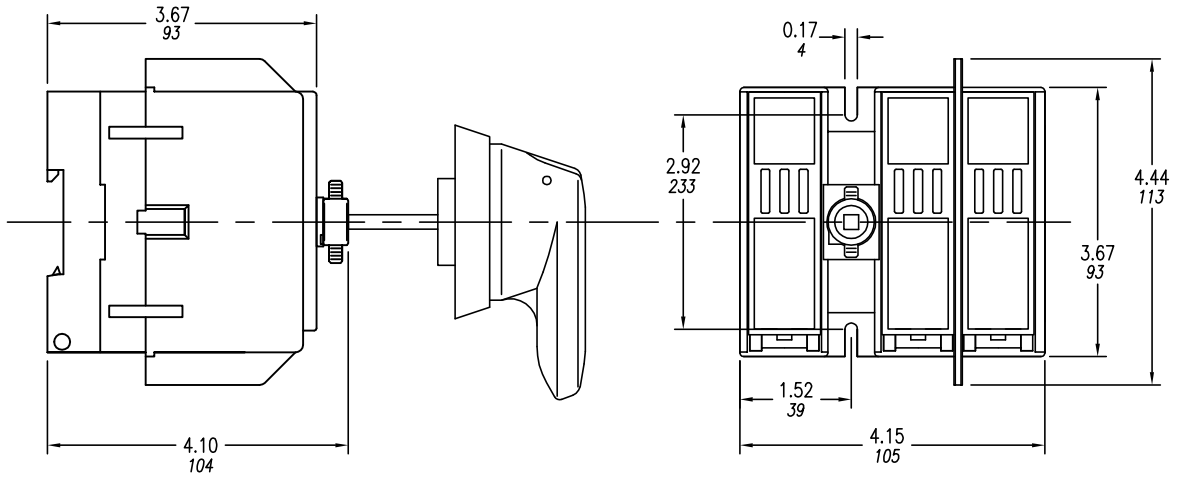


Approximate dimensions OS30FA_12 – OS60GJ12

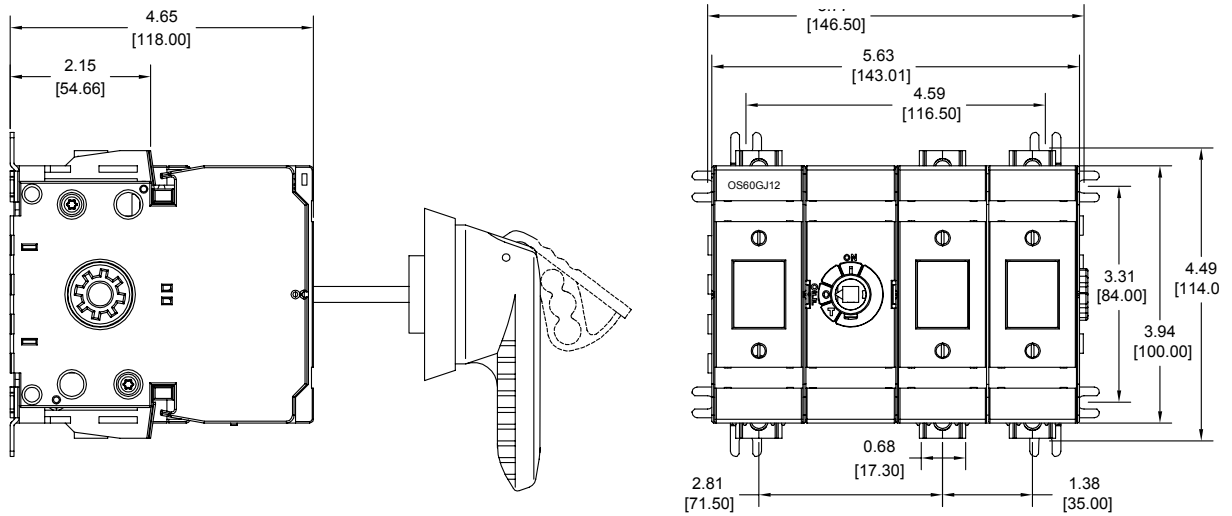
Disconnect
switches
Dimensions

00.00 Inches
00.00 [Millimeters]

OS30FA_12



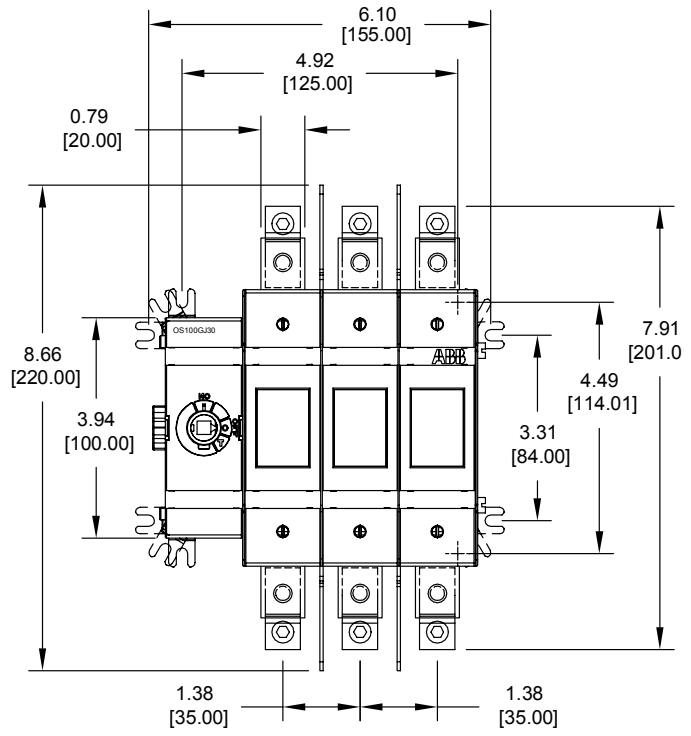
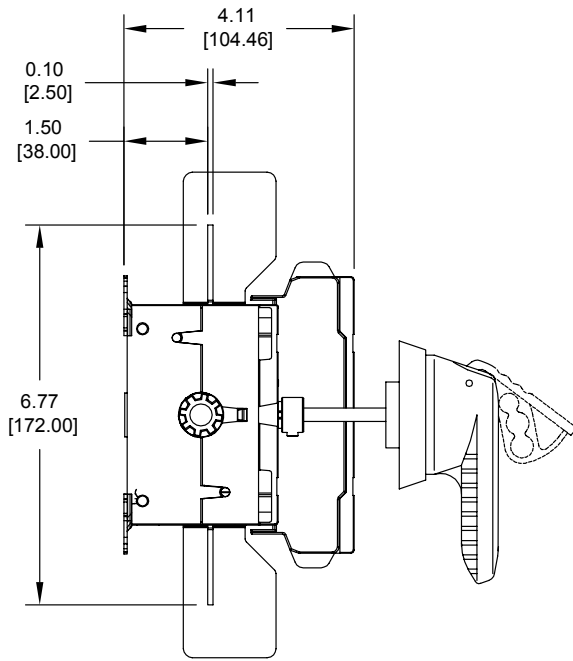
OS60GJ12



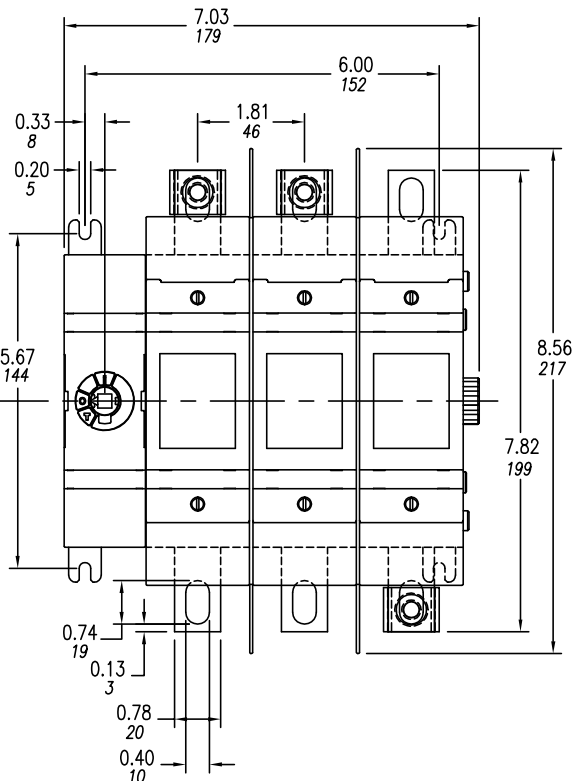
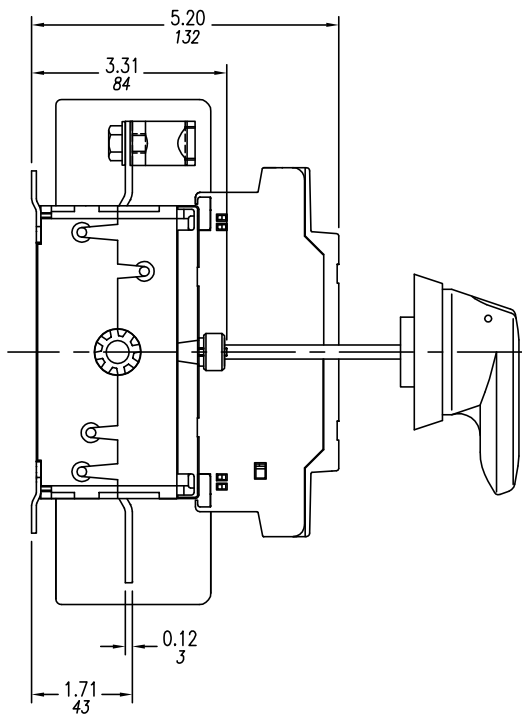
Approximate dimensions OS100GJ03 – OS200J03

00.00 Inches
00.00 [Millimeters]

OS100GJ03



OS200J03

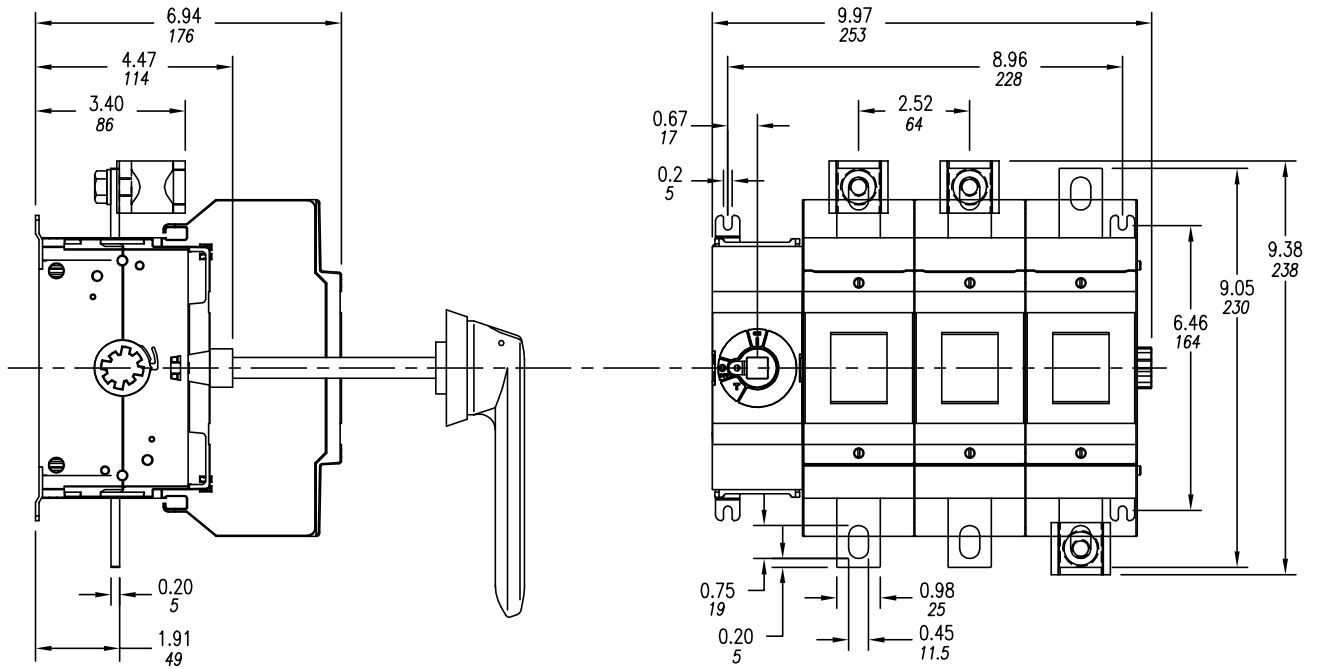


Approximate dimensions OS400J03 – OS600J03

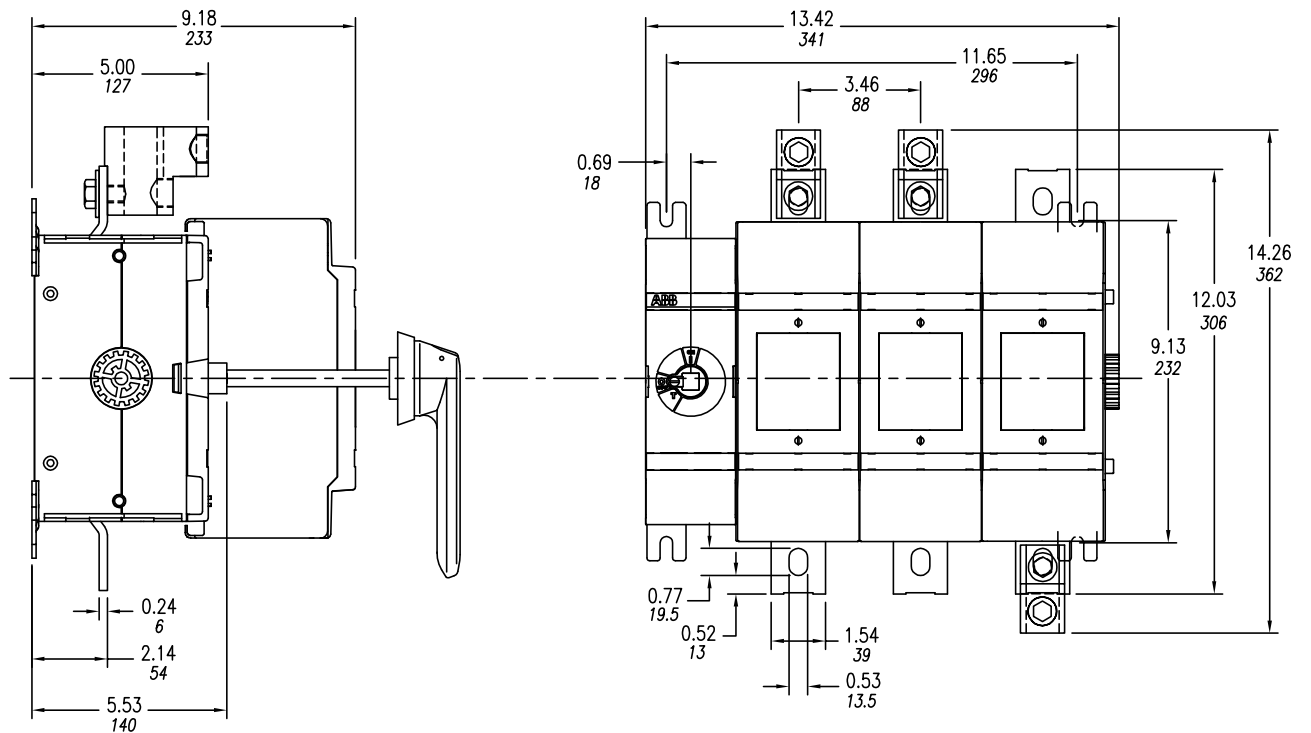
Disconnect
switches
Dimensions

00.00 Inches
00.00 [Millimeters]

OS400J03



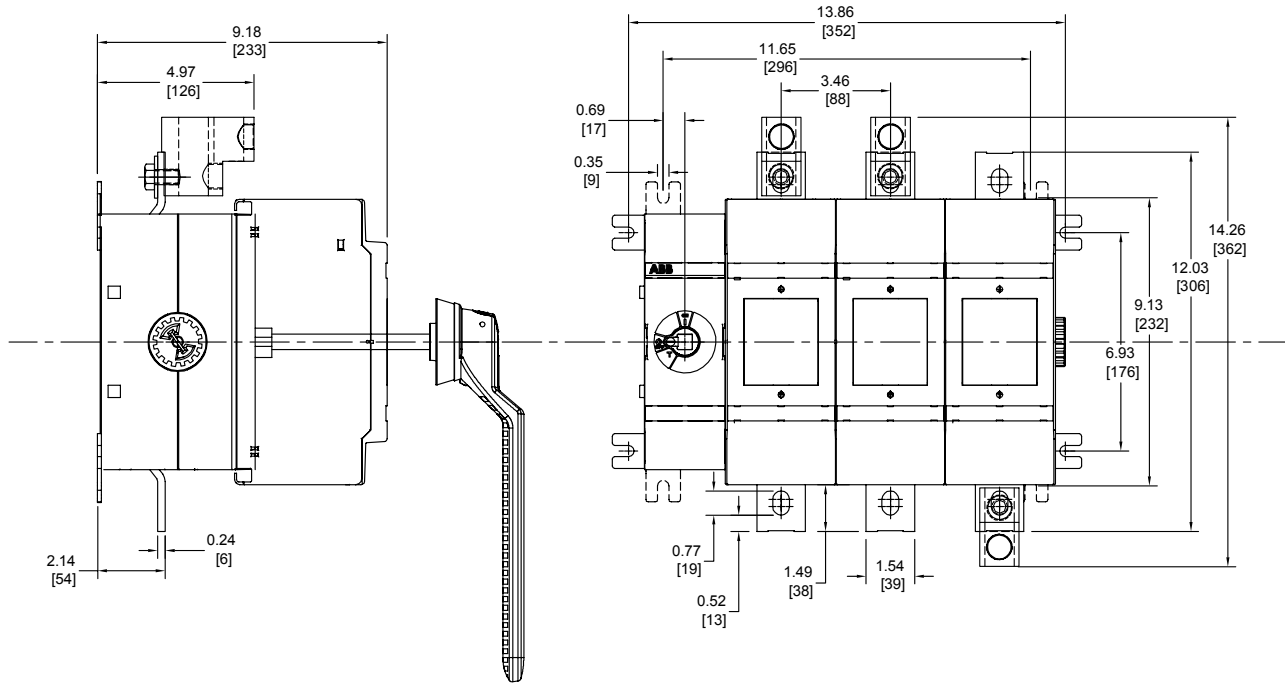
OS600J03



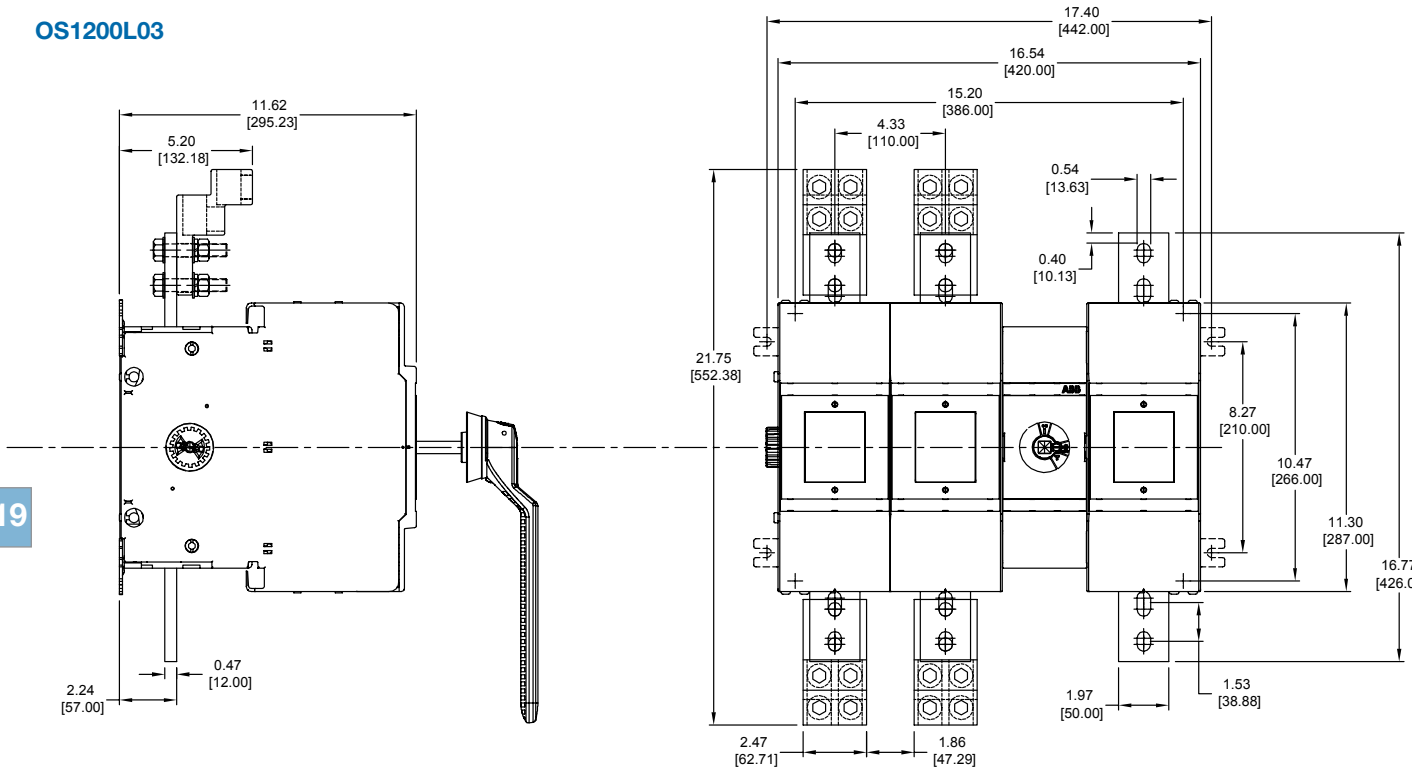
Approximate dimensions OS800L03 – OS1200L03

00.00 Inches
00.00 [Millimeters]

OS800L03



OS1200L03

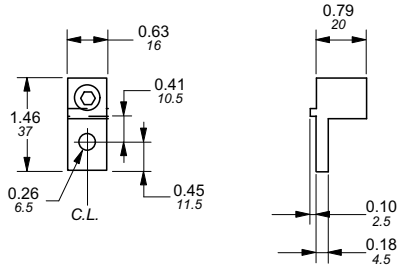


Approximate dimensions for Terminal lugs

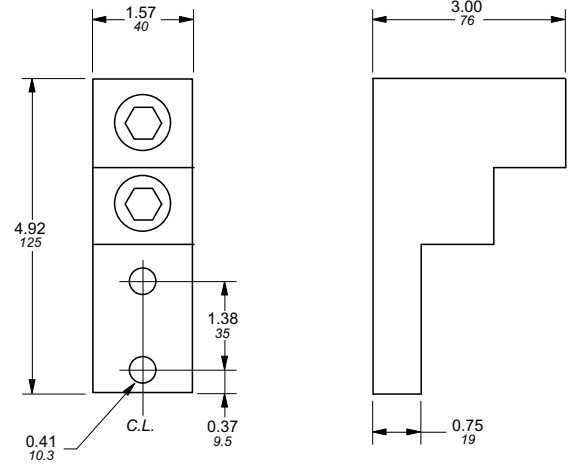
Disconnect
switches
Dimensions

00.00 Inches
00.00 [Millimeters]

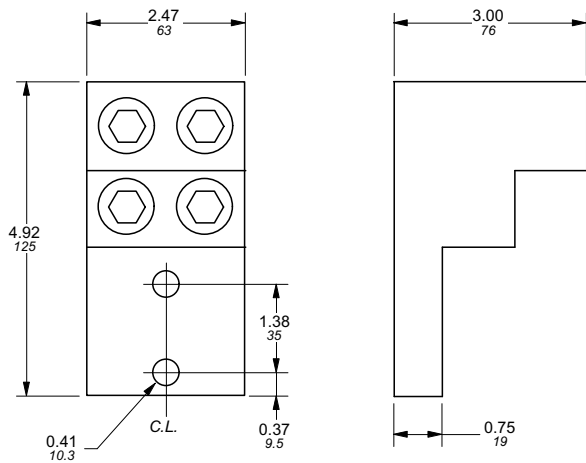
OZXA-24



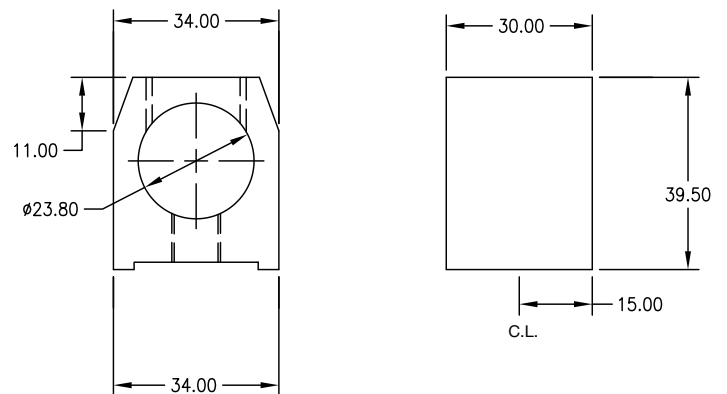
OZXA-30



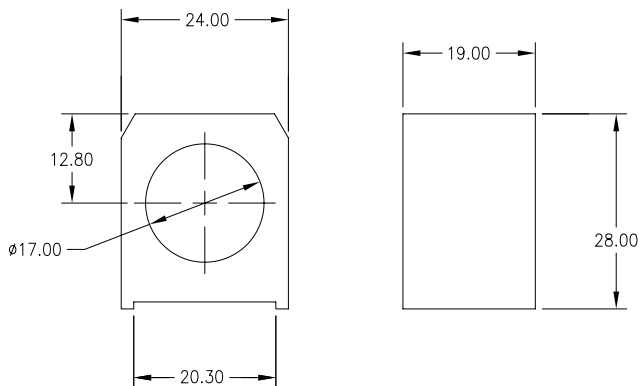
OZXA-28 & OZXA-28/2



OZXA-400



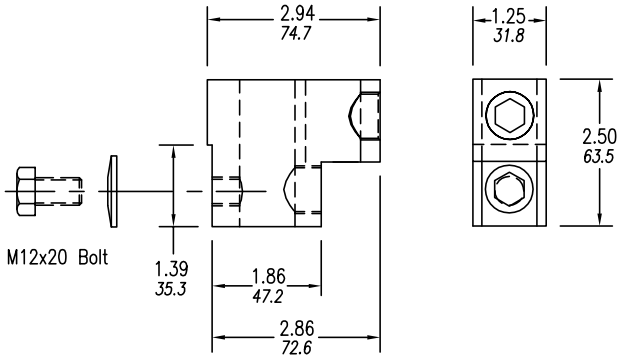
OZXA-200



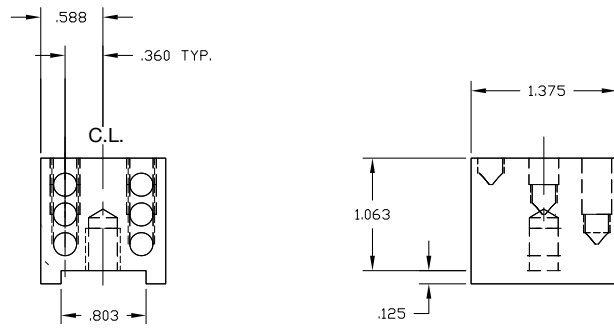
Approximate dimensions for Terminal lugs

00.00 Inches
00.00 [Millimeters]

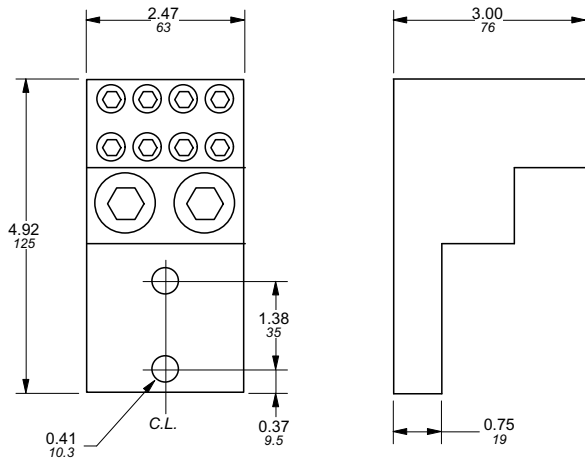
OZXA-800



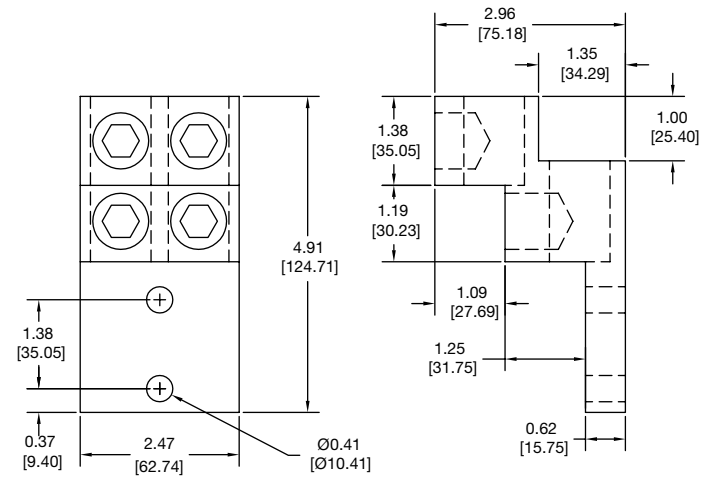
OZXA-406



OZXA-32



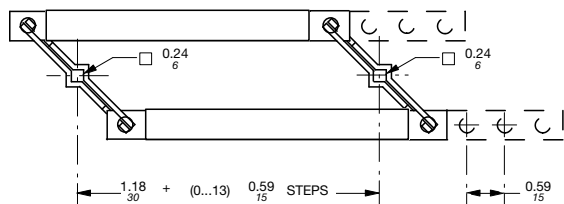
OZXA-1200



Approximate dimensions for 16A – 100A conversion mechanisms

← 00.00 Inches
00.00 [Millimeters] →

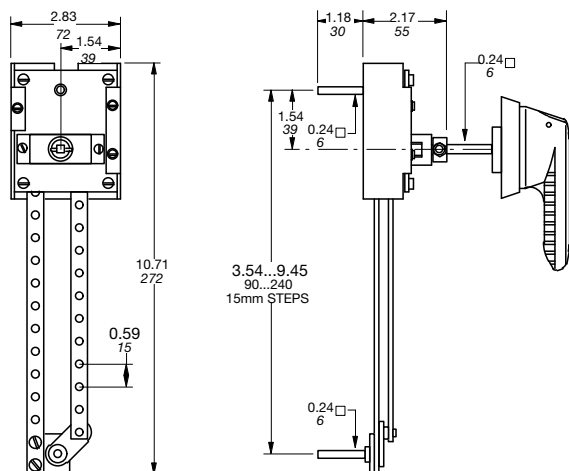
6 or 8 pole – OTZW8



For installation of 6 or 8 pole, transfer and bypass mechanisms, the following minimum and maximum mounting dimensions are given below.

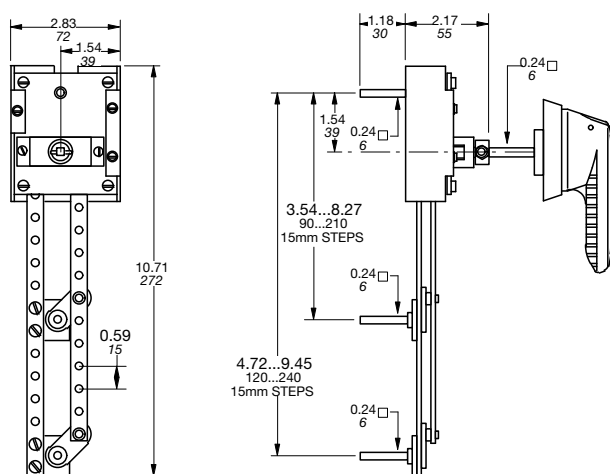
OTZW8 in combination with:	Minimum inches/mm	Maximum inches/mm
OT16F3, OT25F3, OT40F3	3.07/78	N/A
OT63F3, OT80F3	3.74/95	N/A
OT30F3, OT60F3, OT100F3	3.82/97	N/A

Double throw switch – OTZW6, OTZW6X



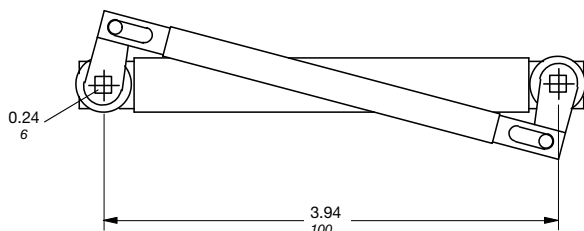
OESA-ZW1, OESA-ZW1X in combination with:	Minimum inches/mm	Maximum ^① inches/mm
OT16F3, OT25F3, OT40F3	4.61/117	6.57/167
OT63F3, OT80F3	5.31/135	7.28/185
OT30F3, OT60F3, OT100F3	4.84/123	6.81/173

Bypass switch – OTZW17, OTZW17X



OTZW17, OTZW17X in combination with:	Minimum inches/mm	Maximum ^① inches/mm
OT16F3, OT25F3, OT40F3	4.61/117	6.57/167
OT63F3, OT80F3	5.31/135	7.28/185
OT30F3, OT60F3, OT100F3	4.84/123	6.81/173

Mechanical interlock – OETL-ZW24



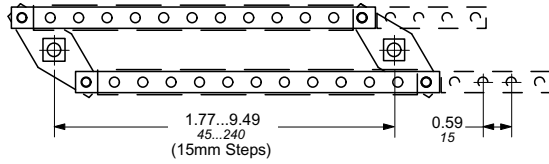
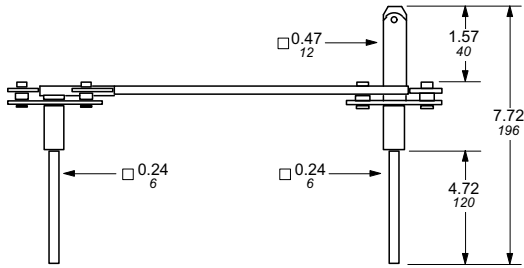
OETL-ZW24 in combination with:	Minimum inches/mm	Maximum ^① inches/mm
OT16F3, OT25F3, OT40F3	3.39 / 86	—
OT63F3, OT80F3	4.09 / 104	—
OT30F3, OT60F3, OT100F3	4.13 / 105	—

① Deeper enclosures will require a longer shaft. Please select a 6mm shaft from page 19.5.

Approximate dimensions for 125 – 200A conversion mechanisms

← 00.00 → Inches
00.00 [Millimeters]

6 or 8 pole – OESA-ZW2

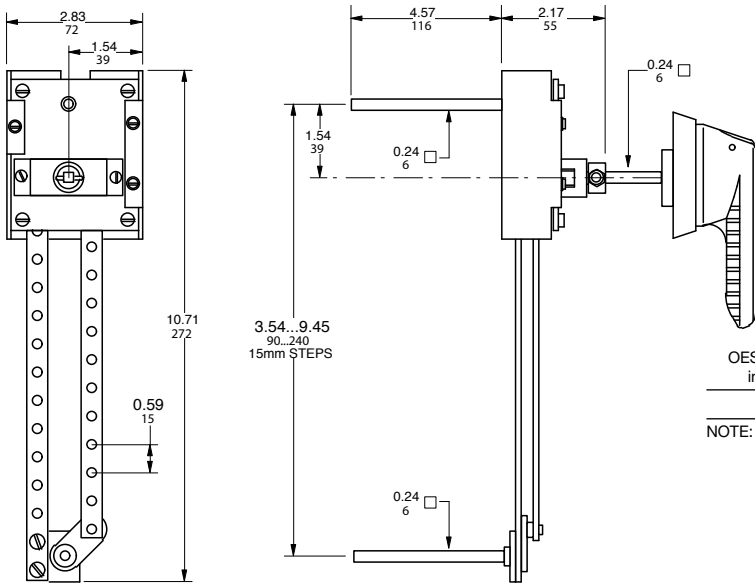


For installation of 6 or 8 pole, transfer and bypass mechanisms, the following minimum and maximum mounting dimensions are given below.

OESA-ZW2 in combination with:	Minimum inches/mm	Maximum inches/mm
OT160 - OT200	5.35/136	9.49/241

NOTE: Deeper enclosures will require a longer shaft. Please select a 12mm shaft from page 19.7 and an OETL-ZX95 shaft extension coupler from page 19.10.

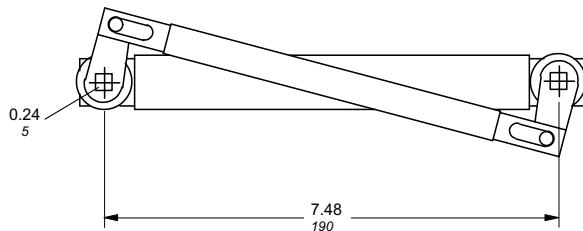
Double throw switch – OESA-ZW1, OESA-ZW1X



OESA-ZW1, OESA-ZW1X in combination with:	Minimum inches/mm	Maximum inches/mm
OT160 - OT200	4.61/117	6.57/167

NOTE: Deeper enclosures will require a longer shaft. Please select a 6mm shaft from page 19.7

Mechanical interlock – OTZW10



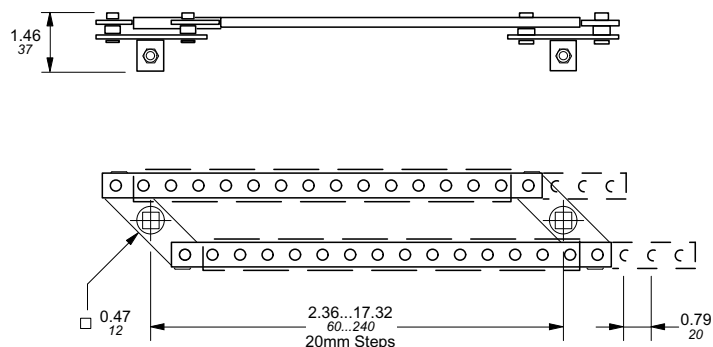
OTZW10 in combination with:	Minimum inches/mm	Maximum inches/mm
OT160 - OT200	4.13 / 105	—

NOTE: Deeper enclosures will require a longer shaft. Please select a 6mm shaft from page 19.7

Approximate dimensions for 400A – 1200A conversion mechanisms

← 00.00 Inches
00.00 → [Millimeters]

6 or 8 pole – OETL-ZW9

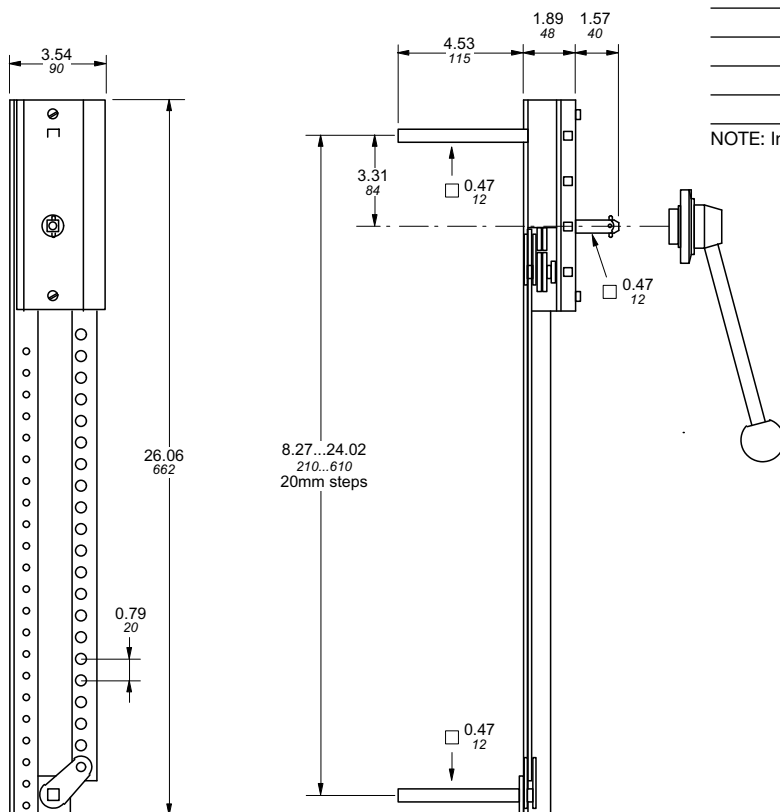


For installation of 6 or 8 pole, transfer and bypass mechanisms, the following minimum and maximum mounting dimensions are given below.

OETL-ZW9 in combination with:	Minimum inches/mm	Maximum inches/mm
OT400	7.52/191	N/A
OT600	7.52/191	N/A
OETL-NF800A	7.52/191	N/A
OETL-NF1200	7.52/191	N/A

NOTE: Handle not included

Double throw – OETL-ZW12



OETL-ZW12 in combination with:	Minimum inches/mm	Maximum [Ⓞ] inches/mm
OT400	8.19/208	11.73/298
OT600	8.19/208	11.73/298
OETL-NF800A	8.19/208	11.73/298
OETL-NF1200	8.19/208	11.73/298

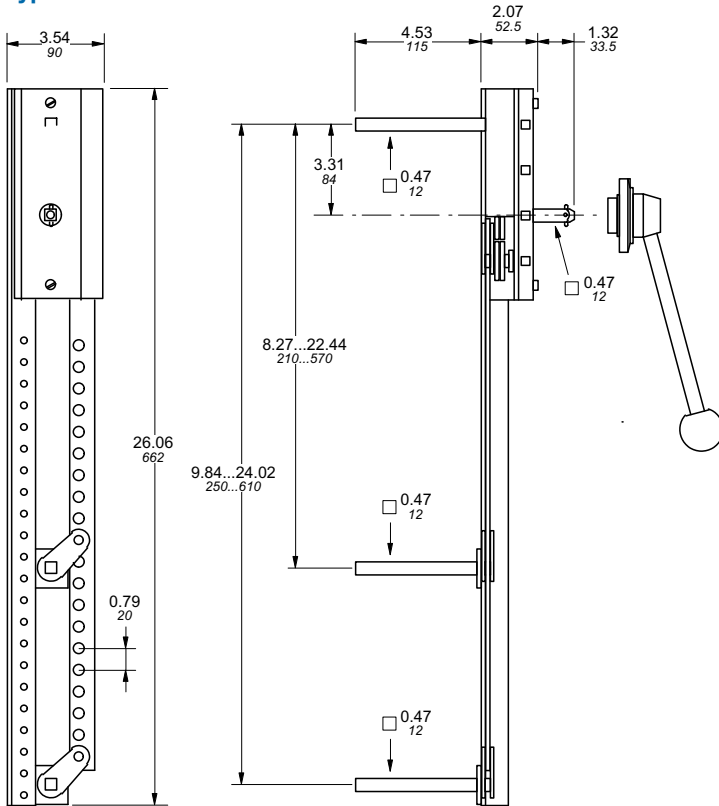
NOTE: Includes YASDA-21 handle

Ⓞ Deeper enclosures will require a longer shaft. Please select a 12mm shaft from page 19.7 and an OETL-ZX95 shaft extension coupler from pg. 18.10.

Approximate dimensions for 400A – 3150A conversion mechanisms

← 00.00 ——— Inches
00.00 ——— [Millimeters]

Bypass switch – OETL-ZW13

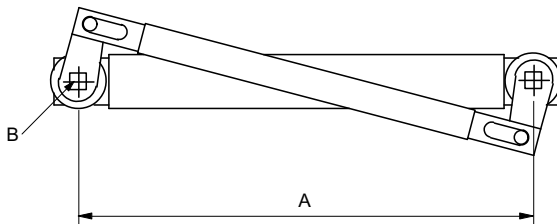


For installation of 6 or 8 pole, transfer and bypass mechanisms, the following minimum and maximum mounting dimensions are given below.

OETL-ZW12 in combination with:	Minimum inches/mm	Maximum ^① inches/mm
OT400	8.19/208	11.73/298
OT600	8.19/208	11.73/298
OETL-NF800A	8.19/208	11.73/298
OETL-NF1200	8.19/208	11.73/298

NOTE: Includes YASDA-21 handle

Mechanical interlock – OETL-ZW3, OETL-ZW14, OETL-ZW15



Dimensions in Inches
& mm

	A	B
OETL-ZW3	11.81 300.0	0.47 12.0
OETL-ZW14	9.84 250.0	0.47 12.0
OETL-ZW15	19.69 500.0	0.47 12.0

OETL-ZW3, 14 & 15 in combination with:	Minimum inches/mm	Maximum ^① inches/mm
OT400 & OT600	6.50/165	—
OETL-NF800 – OETL-NF1200	6.30/160	—
OETL-NF1600 – OETL-NF3150	12.00/305	—

NOTE: Handle(s) not included.

NOTE: OETL-ZW15 is the only mechanical interlock
OETL-NF1200 – OETL-NF3150 can use.

① Deeper enclosures will require a longer shaft. Please select a 12mm shaft from page 19.7 and an OETL-ZX95 shaft extension coupler from page 19.10.

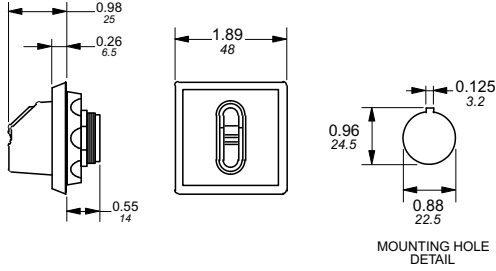
Approximate dimensions for Handles

Disconnect
switches
Dimensions

00.00 Inches
00.00 [Millimeters]

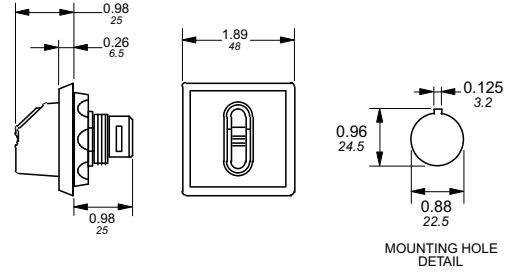
Selector handles for base and DIN rail mounted switches

OH_S1AH1 & OH_S3AH1

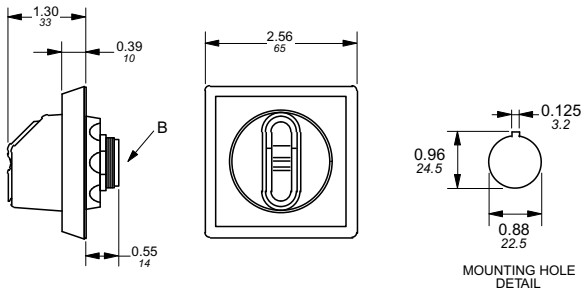


Selector handles for door mounted switches

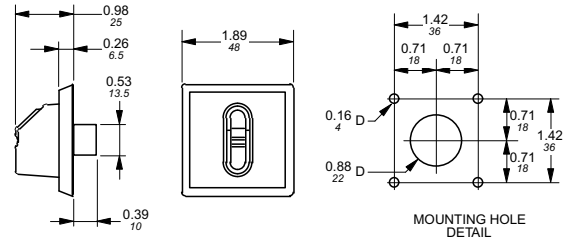
OH_S1P_ & OH_S3P_



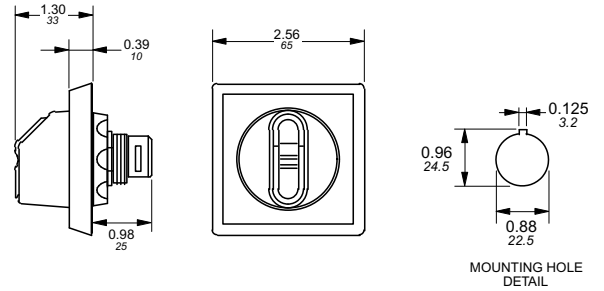
OH_S2A_



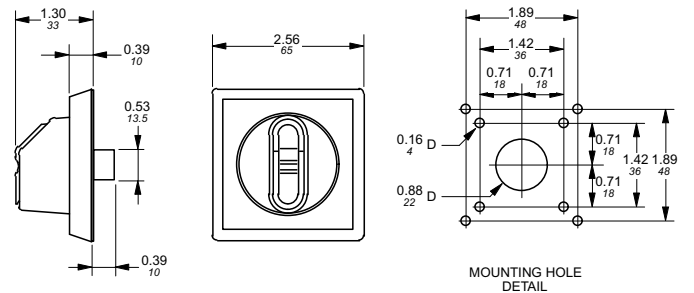
OH_S1R_ & OH_S3R_



OH_S2P_



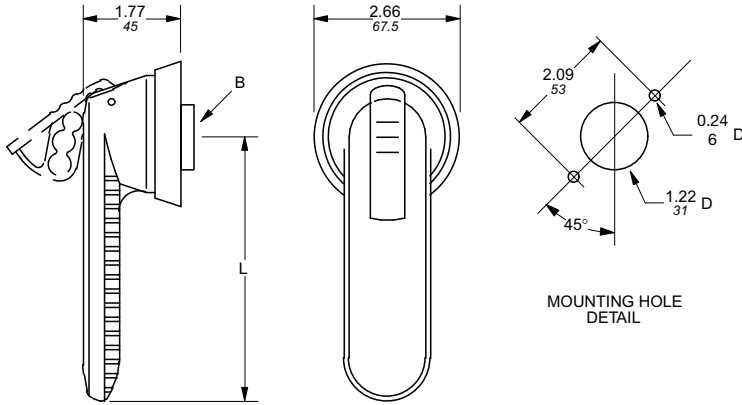
OH_S2R_



Approximate dimensions for Handles

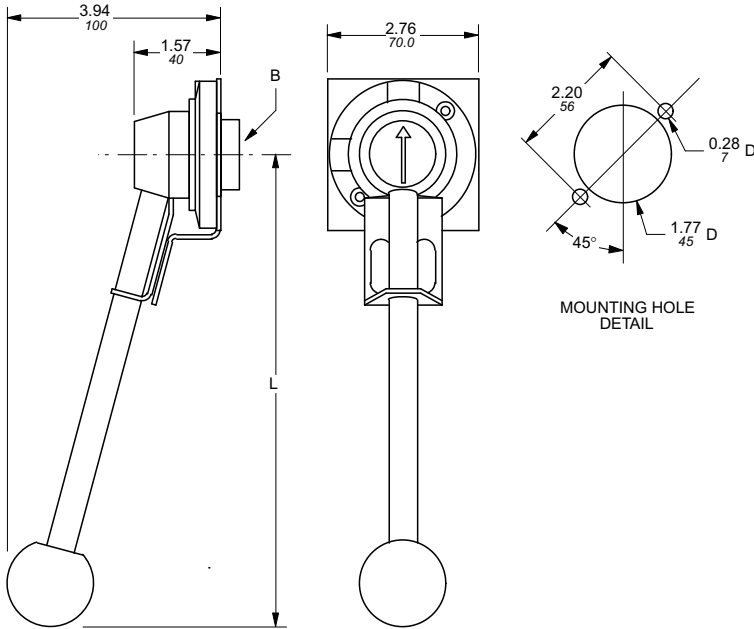
← 00.00 Inches
00.00 → [Millimeters]

Pistol handles



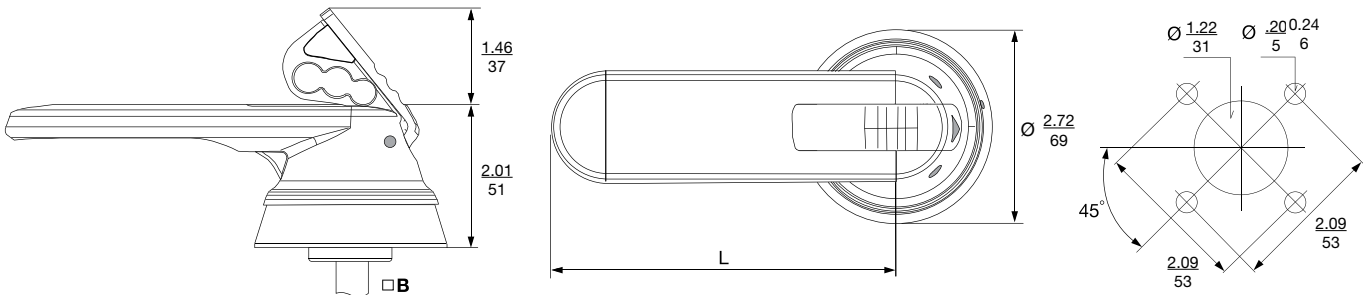
A Catalog number	L Inches/ mm	□ B Shaft size Inches/ mm	NEMA / UL Type
OH_45J6	1.8/45	0.24/6	1, 3R, 12
OH_65J6	2.6/65	0.24/6	1, 3R, 12
OH_80J6	3.1/80	0.24/6	1, 3R, 12
OH_125J12	4.9/125	0.47/12	1, 3R, 12
OH_145J12	5.7/145	0.47/12	1, 3R, 12
OH_175J12	6.9/175	0.47/12	1, 3R, 12
OH_80L6	3.1/80	0.24/6	1, 3R, 4, 4X, 12
OH_145L12	5.7/145	0.47/12	1, 3R, 4, 4X, 12
OH_175L12	6.9/175	0.47/12	1, 3R, 4, 4X, 12

— = Handle color, B (Black) or Y (Red/Yellow)



A catalog number	L inches/mm	□ B Shaft size inches/mm	NEMA Type
YASDA-7	8.66/220	0.47/12	1, 3R, 4, 4X, 12
YASDA-8	8.66/220	0.47/12	1, 3R, 4, 4X, 12
YASDA-21	8.66/220	0.47/12	1, 3R, 4, 4X, 12
YASDA-6	12.60/320	0.47/12	1, 3R, 4, 4X, 12

MOUNTING HOLE
DETAIL

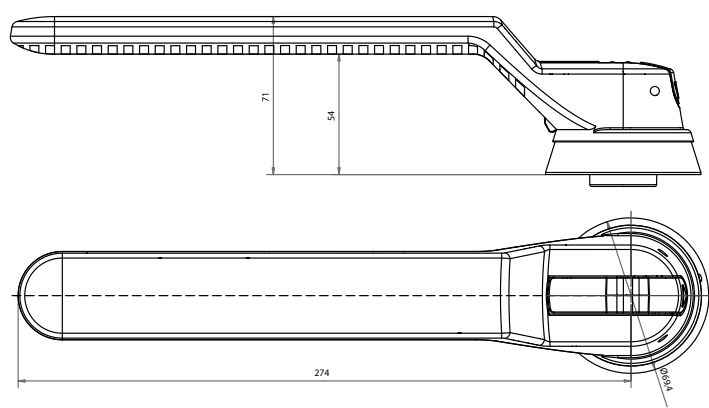


Handle type	OHM65L6	OHM125L12	OHM175L12	OHM275L12
L	2.6/65	4.9/125	6.9/175	10.8/225
□ B	.24/6	.47/12	.47/12	.47/12

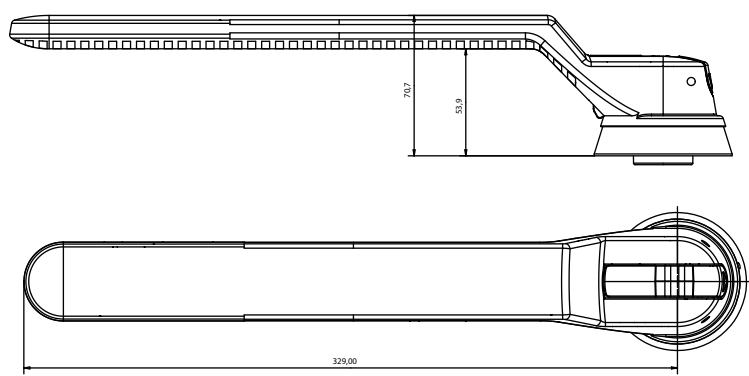
Approximate dimensions for Handles

← 00.00 → Inches
00.00 [Millimeters]

OH_274_12



OH_330_12



A Catalog number	L inches/mm	B shaft size inches/mm	NEMA Type
OHB274-330	10.75/274	0.47/12	1, 3R, 4, 4X, 12

Approximate dimensions

2, 3 & 4 Pole ②

30A – 1200A Fusible

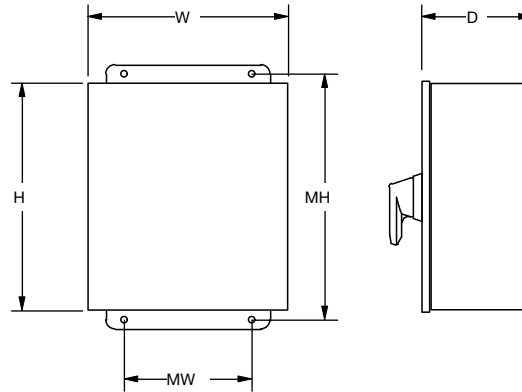
← 00.00 → Inches
00.00 → [Millimeters]

Fusible

Frame size	Enclosure type	H height	W width	D depth	MH mtg. height	MW mtg. width	Weight
OS30_	1	10.0	8.0	6.0	7.0	7.0	12
	3R	10.0	8.0	6.0	10.75	6.0	12
	4	10.0	8.0	6.0	10.75	6.0	12
	4X SS	10.0	8.0	6.0	10.75	6.0	12
	4X Plastic	10.0	8.0	8.0	10.75	6.0	8.0
	12	10.0	8.0	6.0	10.75	6.0	12
OS60_	1	14.0	12.0	8.0	7.0	7.0	13
	3R	14.0	12.0	8.0	10.75	6.0	13
	4	14.0	12.0	8.0	10.75	6.0	13
	4X SS	14.0	12.0	8.0	10.75	6.0	13
	4X Plastic	10.0	8.0	8.0	10.75	6.0	9.0
	12	14.0	12.0	8.0	10.75	6.0	13
OS100_	1	14.0	12.0	8.0	11.0	9.0	22
	3R	14.0	12.0	8.0	14.75	10.0	22
	4	14.0	12.0	8.0	14.75	10.0	22
	4X SS	14.0	12.0	8.0	14.75	10.0	22
	4X Plastic	14.0	12.0	8.0	14.75	10.0	16
	12	14.0	12.0	8.0	14.75	10.0	22
OS200_	1	24.0	16.0	8.0	25.5	14.5	75
	3R	24.0	16.0	8.0	25.5	14.5	75
	4	24.0	16.0	8.0	25.5	14.5	75
	4X SS	24.0	16.0	8.0	25.5	14.5	75
	4X Plastic	①	①	①	①	①	①
	12	24.0	16.0	8.0	25.5	14.5	75

Frame size	Enclosure type	H height	W width	D depth	mtg. height	MW mtg. width	Weight
OS400_	1	44.0	22.0	11.0	37.5	22.5	150
	3R	44.0	22.0	11.0	37.5	22.5	150
	4	44.0	22.0	11.0	37.5	22.5	150
	4X SS	44.0	22.0	11.0	37.5	22.5	150
	4X Plastic	①	①	①	①	①	①
	12	44.0	22.0	11.0	37.5	22.5	150
OS600_	1	42.0	36.0	12.0	43.5	34.5	150
	3R	42.0	36.0	12.0	43.5	34.5	150
	4	42.0	36.0	12.0	43.5	34.5	150
	4X SS	42.0	36.0	12.0	43.5	34.5	150
	4X Plastic	①	①	①	①	①	①
	12	42.0	36.0	12.0	43.5	34.5	150
OS800_	1	48.0	24.0	12.0	49.5	22.5	170
	3R	48.0	24.0	12.0	49.5	22.5	170
	4	48.0	24.0	12.0	49.5	22.5	170
	4X SS	48.0	24.0	12.0	49.5	22.5	170
	4X Plastic	①	①	①	①	①	①
	12	48.0	24.0	12.0	49.5	22.5	170
OS1200_	1	60.0	36.0	12.8	62	38	200
	3R	60.0	36.0	12.8	62	38	200
	4	60.0	36.0	12.8	62	38	200
	4X SS	60.0	36.0	12.8	62	38	200
	4X Plastic	①	①	①	①	①	①
	12	60.0	36.0	12.8	62	38	200

① Please consult factory, enclosures are sized to suit specific customer needs.
② Some 4-pole switches require larger enclosures. Please consult factory.



Approximate dimensions

2, 3 & 4 Pole ③

16A – 3150A, Non-fusible

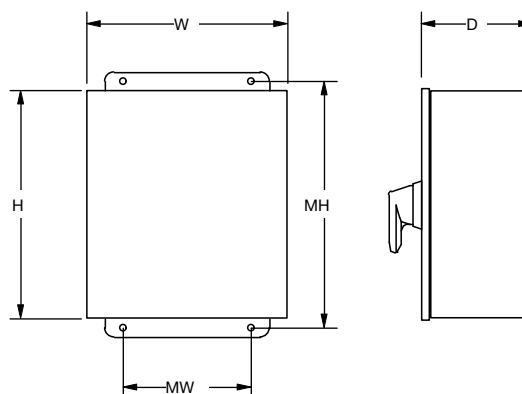
← 00.00 Inches
00.00 [Millimeters] →

Non-Fusible

Frame size	Enclosure type	H height	W width	D depth	MH mtg. height	MW mtg. width	Weight
OT16_ OT25_ OT40_	1	6.0	6.0	4.0	4.0	4.0	4.0
	3R	6.0	6.0	4.0	7.75	3.0	4.0
	4	6.0	6.0	4.0	6.75	4.0	4.0
	4X SS	6.0	6.0	4.0	7.75	3.0	4.0
	4X Plastic	6.0	6.0	5.9	6.75	4.0	4.0
12	6.0	6.0	4.0	7.75	3.0	4.0	
OT63_ OT80_	1	8.0	6.0	4.0	7.0	5.0	6.0
	3R	8.0	6.0	4.0	8.75	4.0	6.0
	4	8.0	6.0	4.0	8.75	4.0	6.0
	4X SS	8.0	6.0	4.0	8.75	4.0	6.0
	4X Plastic	8.0	6.0	5.9	8.75	4.0	6.0
12	8.0	6.0	4.0	8.75	4.0	6.0	
OT30 OT60 OT100	1	10.0	8.0	5.0	7.0	7.0	9.0
	3R	10.0	8.0	5.0	10.75	6.0	9.0
	4	10.0	8.0	5.0	10.75	6.0	9.0
	4X SS	10.0	8.0	5.0	10.75	6.0	9.0
	4X Plastic	10.0	8.0	5.9	10.75	6.0	9.0
12	10.0	8.0	5.0	10.75	6.0	9.0	

Frame size	Enclosure type	H height	W width	D depth	mtg. height	MW mtg. width	Weight
OT200	1	24.0	16.0	8.0	25.5	14.5	50
	3R	24.0	16.0	8.0	25.5	14.5	50
	4	24.0	16.0	8.0	25.5	14.5	50
	4X SS	24.0	16.0	8.0	25.5	14.5	50
	4X Plastic	25.0	17.0	10.0	25.5	14.5	40
	12	24.0	16.0	8.0	25.5	14.5	50
OT400	1	44.0	22.0	11.0	37.5	22.5	120
	3R	44.0	22.0	11.0	37.5	22.5	120
	4	①	①	①	①	①	①
	4X SS	36.0	24.0	12.0	37.5	22.5	130
	4X Plastic	①	①	①	①	①	①
	12	36.0	24.0	8.0	37.5	22.5	120
OT600	1	44.0	22.0	11.0	37.5	22.5	120
	3R	36.0	24.0	12.0	37.5	22.5	120
	4	36.0	24.0	12.0	37.5	22.5	120
	4X SS	36.0	24.0	12.0	37.5	22.5	120
	4X Plastic	40.0	32.0	13.0	41.2	30.2	120
	12	36.0	24.0	12.0	37.5	22.5	120
OT800 - OT1200	1	60.0	36.0	12.0	61.5	34.5	200
	3R	60.0	36.0	12.0	61.5	34.5	200
	4	60.0	36.0	12.0	61.5	34.5	200
	4X SS	60.0	36.0	12.0	61.5	34.5	200
	4X Plastic	①	①	①	①	①	①
	12	60.0	36.0	12.0	61.5	34.5	200
OETL-NF1600 OETL-NF2000 OETL-NF3150	1	90.0	36.0	24.0	②	②	600
	3R	90.0	36.0	24.0	②	②	600
	4	①	①	①	①	①	①
	4X SS	①	①	①	①	①	①
	4X Plastic	①	①	①	①	①	①
	12	90.0	36.0	24.0	②	②	600

- ① Please consult factory, enclosures are sized to suit specific customer needs.
- ② Enclosure is free standing.
- ③ Some 4-pole switches require larger enclosures. Please consult factory.



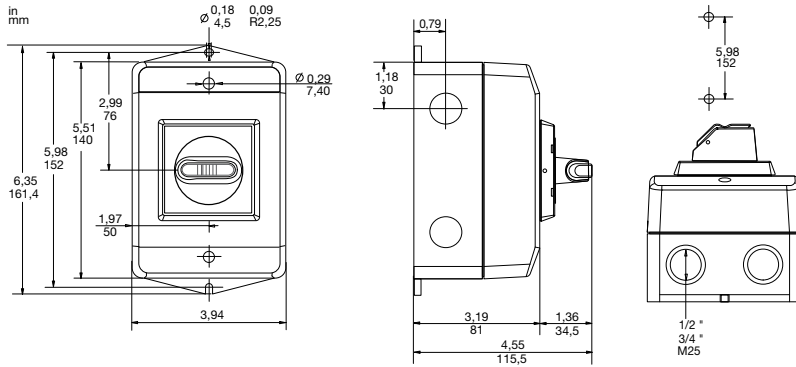
600V, 16A - 3150A
2, 3 and 4-pole switches
Enclosure dimensions

eOT Enclosed switches

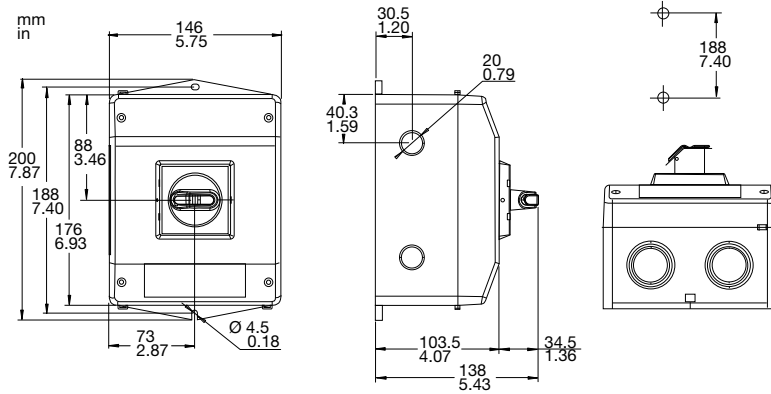
Approximate dimensions
eOT16_ - eOT45U

← 00.00 Inches
00.00 [Millimeters] →

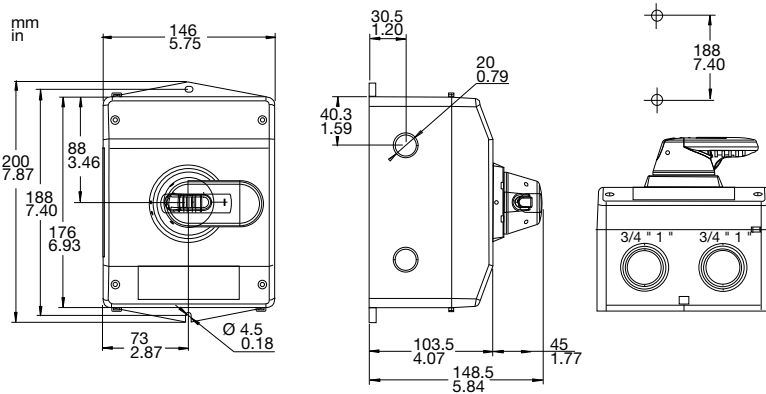
eOT16_, eOT32_ (enclosure size 1)



eOT45U_ (enclosure size 2 with selector handle)



eOT45U_ (enclosure size 2 with pistol grip handle)



Disconnect
switches
Dimensions

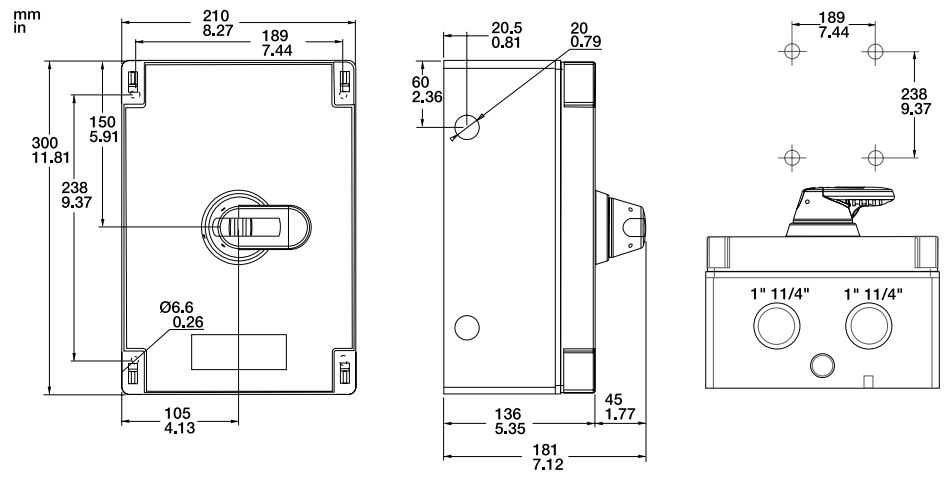
eOT Enclosed manual motor controllers

Approximate dimensions

eOT63_

00.00 Inches
00.00 [Millimeters]

eOT63_ (enclosure size 3 with pistol grip handle)



Notes

← 00.00 → Inches
00.00 [Millimeters]



20 - Arc Guard Systems

Arc Guard Systems20.1 - 20.16

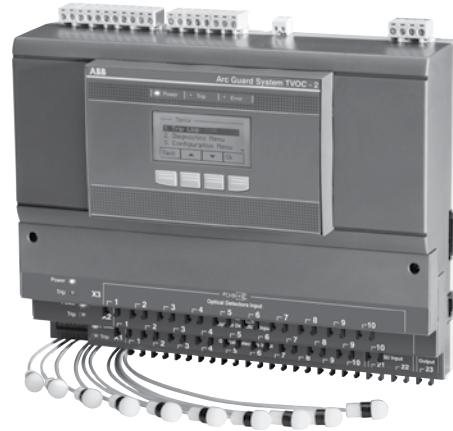
General information	
Description.....	20.1
System description.....	20.2
Overview.....	20.3
Ordering details	
Arc monitor with detectors.....	20.4
Current sensing unit.....	20.5
Technical data.....	20.6 - 20.8
Basic information	
Basic installation tips.....	20.9
Diagrams.....	20.10
Configurations.....	20.11 - 20.12
Approximate dimensions.....	20.13
Circuit diagrams.....	20.14 - 20.15



Notes

Arc monitor • Current sensing unit Arc Guard Systems™

ABB Arc Guard Systems™
Arc monitor
Current sensing unit
Accessories



An even better Arc Guard System™

TVOC-2, ABB's latest Arc Monitor, builds on the well known TVOC design. Its new functions and features improve an already great product, putting even more focus on reliability, flexibility and simplicity.

Arc Guard System™ protects people and equipment, and eliminates unnecessary production stops.

Arc monitor type TVOC-2 is ABB's state-of-the-art solution for arc fault protection in all applications, providing functional safety.

With over 35 years of experience, Arc Guard System™ has become an industry standard in several key markets, helping to protect personnel and businesses around the world.

Typical applications include all low- and medium-voltage switchgears.

Reliability

- Certified according to functional safety (SIL-2) standard
- Over 35 years experience in Arc Guard Systems™
- Pre-calibrated optical sensors

Flexibility

- HMI (Human Machine Interface) can be mounted on the panel door
- Expandable with up to 30 optical sensors
- Configure the system according to various needs

Simplicity

- User-friendly start-up menu
- DIN-rail or wall-mounted
- Easy to expand as the switchgear functions are added

General information

System description

Arc Guard System™

Arc Guard System™ quickly detects an arc fault and trips the incoming circuit-breaker. Using light as the main trip criteria, Arc Guard System™ trips instantaneously. Thanks to this key functional advantage, it overrides all other protections and delays, which is crucial when reaction times need to be measured in milliseconds.

How it works

The system acts in three phases:

①

- Light passes through an optical sensor (Detection)



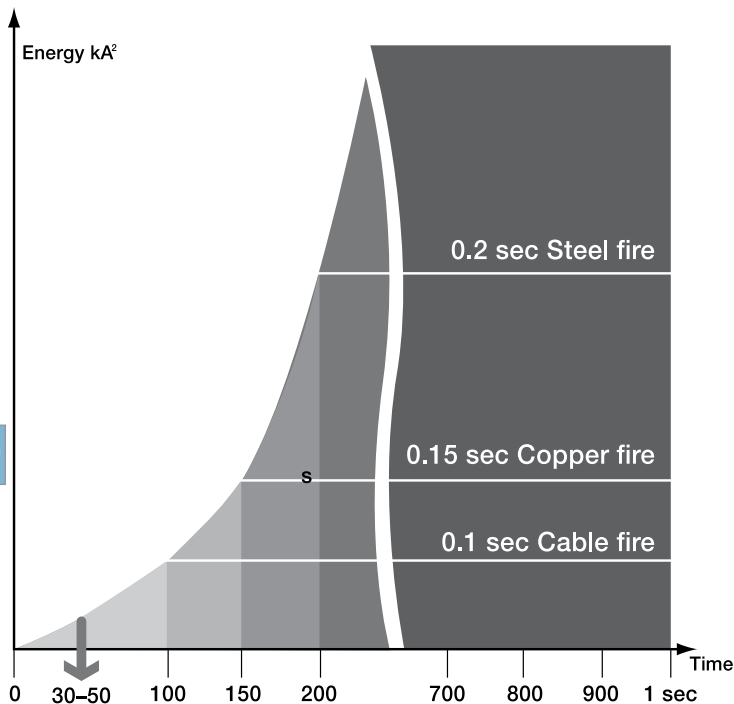
②

- The Arc monitor determines the intensity of light (Recognition)



③

- The Arc monitor sends signal to trip breaker(s) (Action)



Total breaking time = ABB Arc Guard System™ + Breaker

Arc Faults

Short-circuit faults in LV and MV switchgears are often accompanied by an electric arc. An arc fault always leads to considerable damage to equipment and injury to personnel unless it is detected very quickly. To avoid serious damage and give the person involved a good chance of surviving the accident without severe injury, the fault should be disconnected as fast as possible, typically in less than 30-50 ms.

General information Overview

Arc Monitor

With its modular concept, the Arc Monitor is designed to fit all types and sizes of low- and medium-voltage switchgears.

It is designed according to Functional Safety, and is SIL 2-certified according to IEC 61508 and IEC 62061 which puts full focus on reliability. This corresponds to performance level d according to EN ISO 13849-1. Safety functions are exclusively handled by hardware. In addition, the system, trip logs and user-interface are all microprocessor-monitored.

The system can be configured to trip selected breakers, depending on which sensor that detects the light. The DIP-switches that take care of this function also handle settings like auto-reset and Current Sensing Units (see pages 20.10 - 20.11 for more details).

Energy is stored in the unit for operation up to 0.2 s if the supply voltage fails. This is sufficient to close the tripping circuit even if voltage disappears at a short-circuit fault.

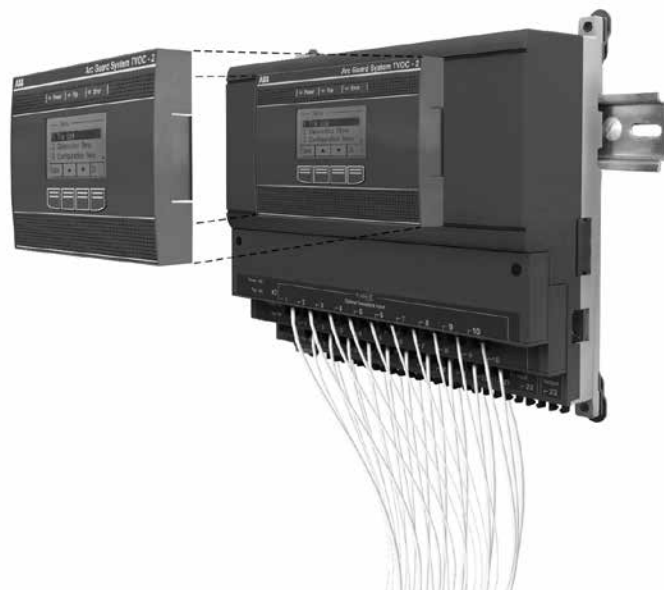
Note: The circuit breaker still needs a back-up energy source for its tripping circuit.

Connections

All connections can be accessed from the front of the arc monitor. Pluggable terminal blocks allow electrical wiring before mounting TVOC-2 into the cabinet.

The solid state tripping contacts are type IGBT, which guarantees fast and reliable tripping.

More details can be found on page 20.6, technical data.



HMI (Human Machine Interface)

- Handles settings with key-pad and full text display
- Holds error log and trip information after power loss
- Error log and trip log include time/date stamp from a real-time clock
- TVOC-2 can handle two separate HMIs (cabinet door and on product)
- Three-meter cable included

Sensor & Sensor modules

- Fiber-optic sensors not affected by electrical noise
- Pre-calibrated sensors remove need for manual configuration
- Up to 30 detectors can be connected

Current Sensing Unit (optional)

The Current Sensing Unit (CSU) is an accessory needed only in those few specific applications where strong light is expected on a regular basis.

CSUs are connected with a fiber optic cable using light as signal for normal current. If this was removed by accident, the system would treat it as an over-current and trip if an arc flash is seen of reliability reasons.

Adding a CSU will result in an additional operating time depending on the size of the over-current and the number of phases measured. Under normal conditions the time from over-current occurring to actuating optical output is in the region between 2 and 8 milliseconds.

Arc Monitor connections

- 3 IGBT solid state tripping contacts
- 2 change-over trip signal relays
- 1 change-over self supervision alarm relay (IRF)
- 2 current sensing unit inputs
- 1 current sensing unit output

Mounting alternatives

- DIN-rail
- Wall mounting

Optical detector inputs

- 1-10 Main unit X1
- 1-10 Extension module X2
- 1-10 Extension module X3

HMI

- Can be mounted on door
- IP 54
- Additional HMI possible
- User-friendly start up meny

Arc monitor with detectors



TVOC-2-240



TVOC-2-E1



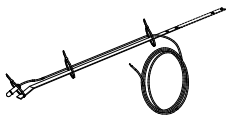
TVOC-2-H1



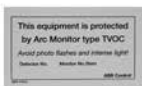
TVOC-2-DP1



TVOC-2-MK1



AGS-MK600



AGS-LABEL



TVOC-MB

Supply voltage 100-240 V DC or AC 50-60 Hz

Description	Catalog number	Weight lbs.
Arc Monitor Supply voltage 100-240V DC or AC 50-60 Hz including one HMI and door mounting accessories	TVOC-2-240	2.09
Extension (1-30m) 10 optical inputs	TVOC-2-E1	0.33
Extension (60m) 10 optical inputs for 60 meter	TVOC-2-E3	0.33
HMI (Human machine interface) additional	TVOC-2-H1	0.33

Detectors

Cable length	1 m, 39.37 in	TVOC-2-DP1	0.04
Cable length	2 m, 78.74 in	TVOC-2-DP2	0.04
Cable length	4 m, 157.48 in	TVOC-2-DP4	0.09
Cable length	6 m, 236.22 in	TVOC-2-DP6	1.32
Cable length	8 m, 314.96 in	TVOC-2-DP8	1.76
Cable length	10 m, 393.70 in	TVOC-2-DP10	0.22
Cable length	15 m, 590.55 in	TVOC-2-DP15	0.33
Cable length	20 m, 787.40 in	TVOC-2-DP20	0.44
Cable length	25 m, 984.25 in	TVOC-2-DP25	0.55
Cable length	30 m, 1181.10 in	TVOC-2-DP30	0.66
Cable length ③	60 m, 2362.20 in	TVOC-2-DP60	1.32
Cable straps	1 set incl. 50 pcs	TVOC-2-MK1	0.22
	600 mm, 23.62 in	AGS-MK600	0.77
Mounting kit	800/1000 mm 31.49/ 39.37 in	AGS-MK1000	1.32
Label	1 set incl. 10 pcs	AGS-LABEL	0.04
Mounting bracket	1 set incl. 5 bracket pcs and 10 cable strap pcs	TVOC-MB	0.55

③ Only to be used with TVOC-2-E3

Current sensing unit



AGS-CS240



TVOC-1TO2-OP1



TVOC-2-OP1

Description	Catalog number	Weight lbs.
Current Sensing Unit (CSU)	AGS-CS240	3.31

Optical cable between CSU and TVOC-2 Arc monitor and

Cable length	1 m, 39.37 in	TVOC-1TO2-OP1	0.02
Cable length	2 m, 78.74 in	TVOC-1TO2-OP2	0.04
Cable length	4 m, 157.48 in	TVOC-1TO2-OP4	0.08
Cable length	6 m, 236.22 in	TVOC-1TO2-OP6	0.13
Cable length	8 m, 314.96 in	TVOC-1TO2-OP8	0.18
Cable length	10 m, 393.70 in	TVOC-1TO2-OP10	0.22
Cable length	15 m, 590.55 in	TVOC-1TO2-OP15	0.33
Cable length	20 m, 787.40 in	TVOC-1TO2-OP20	0.44
Cable length	25 m, 984.25 in	TVOC-1TO2-OP25	0.55
Cable length	30 m, 1181.10 in	TVOC-1TO2-OP30	0.66

Optical cable between TVOC-2 and TVOC-2 Arc monitors (transferring CSU signal)

Cable length	1 m, 39.37 in	TVOC-2-OP1	0.02
Cable length	2 m, 78.74 in	TVOC-2-OP2	0.04
Cable length	4 m, 157.48 in	TVOC-2-OP4	0.08
Cable length	6 m, 236.22 in	TVOC-2-OP6	0.13
Cable length	8 m, 314.96 in	TVOC-2-OP8	0.18
Cable length	10 m, 393.70 in	TVOC-2-OP10	0.22
Cable length	15 m, 590.55 in	TVOC-2-OP15	0.33
Cable length	20 m, 787.40 in	TVOC-2-OP20	0.44
Cable length	25 m, 984.25 in	TVOC-2-OP25	0.55
Cable length	30 m, 1181.10 in	TVOC-2-OP30	0.66

Optical inputs and output

Optical detectors	10 inputs on Arc Monitor		
	10 inputs on Extension unit X2 (optional)		
	10 inputs on Extension unit X3 (optional)		
Current signal from CSU	2 inputs: X1.21, X1.22	(optical)	
Forward current signal to another Arc Monitor	1 output: X1.23	(optical)	

Breaker trip contacts (K4, K5, K6)

Solid state tripping contacts	3 NO solid state type IGBT		
Rated voltage	250 V AC/DC		
Make and carry for 0.2 s	30 A		
Make and carry for 1 s 0.15% duty ration	10 A		
Breaking capacity	250 V	1.5 A	AC-15
	250 V	1 A	DC-13
	110 V	3 A	DC-13
	48 V	3 A	DC13
	Reinforced insulation between separate contacts		
	Voltage drop 5 V 30 A, 3 V 3 A, 2 V 10 mA Off state current < 1 mA at 250 V 60 Hz Min. recommended load current 10 mA		

Signal relay outputs (K2, K3)

Manual or auto resettable	2 CO gold-plated contacts		
Rated voltage	250 V AC/DC		
Continuous carry I_{th}	5 A		
Make and carry for 0.2 s	30 A		
Make and carry for 3 s 10% duty ratio	15 A		
Breaking capacity	250 V	3 A	AC-15
	250 V	0.3 A	DC-13
	110 V	0.6 A	DC-13
	48 V	2 A	DC-13
	Reinforced insulation between separate contacts		
	$I_{th} = 5 A$ Min switching load: 1 mA at 5 V DC with contacts not used for switching current > 0.5 A if inductive/capacitive load before.		

Internal Relay Fault (IRF) signal (K1)

Self supervision alarm relay	1 CO gold-plated contact		
Rated voltage	250 V AC/DC		
Continuous carry, I_{th}	5 A		
Make and carry for 3 s	8 A		
Breaking capacity	250 V	1.5 A	AC-15
	250 V	0.15 A	DC-13
	110 V	0.3 A	DC-13
	48 V	0.5 A	DC-13
	Reinforced insulation between separate contacts		
	$I_{th} = 5 A$ Min switching load: 1 mA at 5 V DC with contacts not used for switching current > 0.5 A if inductive/capacitive load before		

Settings and indications

Connections for HMI on base module	1 output RJ45 male at front side 1 output RJ14 female at right side
Display on HMI	52 x 26 mm graphic LCD with LED backlight
Keyboard on HMI	Membrane buttons, 4 soft keys
LED signal on HMI	Power, Trip, Error
LED signal on Arc Monitor and extension units	Power, Trip
Configuration switches	8-pole DIP-switch on Arc Monitor front
Settings (HMI)	Time and display language
Configuration (DIP switches)	Manual or auto reset of K2 and K3 Use of CSU or not Trip configuration
Display information	Trip log, connected modules, actual configuration self diagnostic test result and error log

Power supply

Rated supply voltage, U_s	100-240 V AC, 50-60 Hz 100-250 V DC
U_s variation	AC -20% – +10% DC -25% – +30%
Rated insulation voltage, U_i	250 V with reinforced insulation
Rated impulse withstand Voltage U_{imp}	4 kV
Main MCB/fuse	Max. 10 A char. C/fuse 10 A gG
Power consumption	5 W

Reaction time

From light detection to trip (contacts K4, K5, K6)	Approx. 1 ms (depends on light intensity)
From light detection to indication signal (relay K2, K3)	< 10 ms
Current condition from input to output	< 0.4 ms

Start-up time

Trip possible	< 15 ms from power on
---------------	-----------------------

Environmental conditions

Permissible ambient temperature in operation	- 25 to + 55 °C
Permissible ambient temperature in transportation and storage	- 25 to + 70°C
Humidity	Maximum 95%
Altitude	2000 meter above sea level
Degree of protection	IP20 Arc Monitor IP54 HMI front side

Safety parameters for application according to IEC61508

Life time	10 years
PFD	3.49×10^{-03}

Detector cable

Maximum length	30 m with Arc Monitor and extension – E1 60 m with extension – E3
Service temperature range	-25 to +70°C continuous -25 to +85°C short-time
Smallest permissible bending radius	45 mm after installation 10 mm on handling
Acceptable backlight intensity light without tripping	3000 Lux

Optical cable

Maximum length	30 m
----------------	------

Safety integrity level

	SIL 2 when not used with CSU
--	------------------------------

Current sensing unit

Rated current	
Selectable, for connection of external current transformers with secondary rated current	1, 2 or 5 A
Load on the external current transformers	0.2 VA connected for 1 A 0.7 VA connected for 5 A
The Current Sensing Unit withstands a maximum of:	
Continuously	1 x rated current
For 1 s	15 x rated current
Optical outputs:	
To Arc Monitor/Current Sensing Unit	Quantity: 2
Optical inputs:	
From other Current Sensing Unit	Quantity: 1
Indications:	
Signal to Arc Monitor/Current Sensing Unit	Green LED lit up at load current < set overcurrent level
Pre-warning	Yellow LED lit up at load current < approx. 70% of set overcurrent level
Test position	Red LED

Control devices/settings: (on the p.c.b.)	
Change-over switch	On/Off
Test position	On/Off
Optical input is used or not	On/Off
Trimming potentiometers	
Setting of overcurrent level	0.5 – 3.5 x rated current
Simulation of overcurrent level in test position	–
Supply voltage	See ordering table
Permitted variation	+/- 20 % at DC +/- 10 % at 110-127 V AC +10 % -15 % at 230 V AC
Power consumption	1 W at 24 V 11 W at 220 V
Permissible ambient temperature	- 25...+ 55 °C
Operating times	
From overcurrent occurring to actuating optical outputs:	
At currents ≥ 2 x set overcurrent level	
3-phase supply.	< 2 ms
1-phase supply.	< 8 ms
Current conditions from optical input to optical outputs	< 0.3 ms
Degree of protection	IP 54

Standards



UL508	Industrial control equipment
CSA C22.2 No.14	Industrial control equipment
IEC 61508	Functional safety of electrical/electronic/programmable electronic safety-related systems
IEC / EN60947-1	Low voltage switchgear and controlgear – Part 1: General rules
IEC / EN60947-5-1	Low voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements - Electromechanical control
IEC61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use

General information

Basic installation tips

Arc Monitor (TVOC-2)

The Arc Monitor can be mounted anywhere in the switchgear, e.g. in the breaker cubicle or in a separate control cabinet. Tripping is handled by a separate tripping circuit. The task of the Arc Monitor is to close the circuit very quickly. You can connect up to 3 breakers in this way and, if required, trip different breakers depending on where the arc occurs.

CSU (Current Sensing Unit)

The CSU is an accessory used if you cannot prevent direct sunlight or other highly intensive light reaching the sensors frequently. CSUs can be mounted in series if more than two are needed.

Connection of current transformers (for CSU)

The CSU measures either 1, 2 or 3-phase. Three-phase is, however, preferable for reasons of safety and reliability. Current transformers with a secondary current of 1, 2 or 5 A are used for this purpose.

Note: Current transformers for relay protection are preferable since they do not saturate as quickly as standard current transformers. The transformers should not saturate before at least twice the set over-current level.

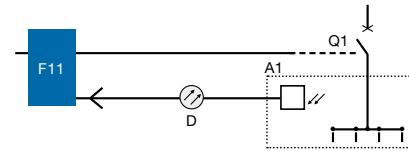
Detectors

Detector cables are available in standard lengths (see ordering details). They cannot be cut or joined. Avoid sharp bends or pinching when installing the cables.

The plastic fiber is made of polymethylene acrylate (PMMA) with a polyethylene jacket. Each detector consists of an optical cable and a lens that are calibrated together to give the same sensitivity independent of cable length. The detector has a plug-in connector that fits the arc monitor. The lens collects light from all directions, with the exception of a small shaded area behind the detector (see the polar diagram). Practical experiments have shown that arc light reflected between metallic surfaces is normally sufficient to cause tripping.

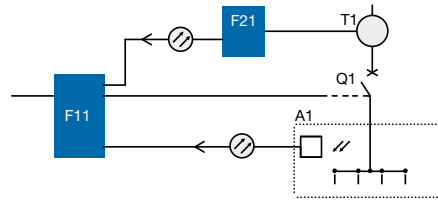
Detector positioning

The basic strategy for positioning the sensors is to make sure to cover all parts that may suffer from an arc. Typically this involves the horizontal and vertical bus bar system and the breaker cubicle. If possible, it's also normally preferable to supervise each cubicle. Avoid placing the detector so that it sees the normal light from a breaker. The sensor can detect arcs within a 3-meter distance (see illustration). To raise the safety level even higher, you can separate them at a 1.5-meter distance, thereby creating redundancy between them.

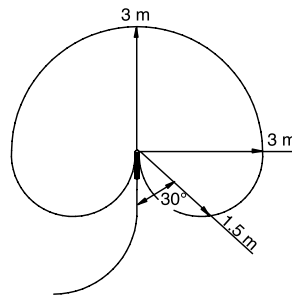


Arc Guard System with Arc Monitor

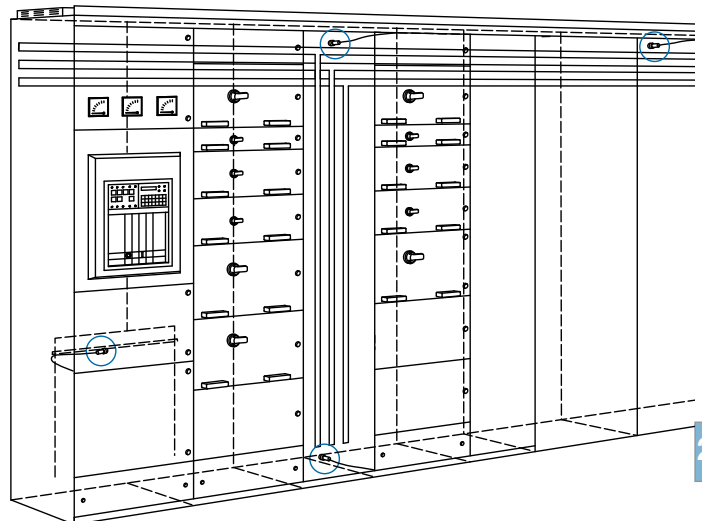
A1 Switchgear
F11 Arc Monitor
F21 Current Sensing Unit
T1 Current transformer
Q1 Circuit-breaker



Arc Guard System with Arc Monitor and Current Sensing Unit



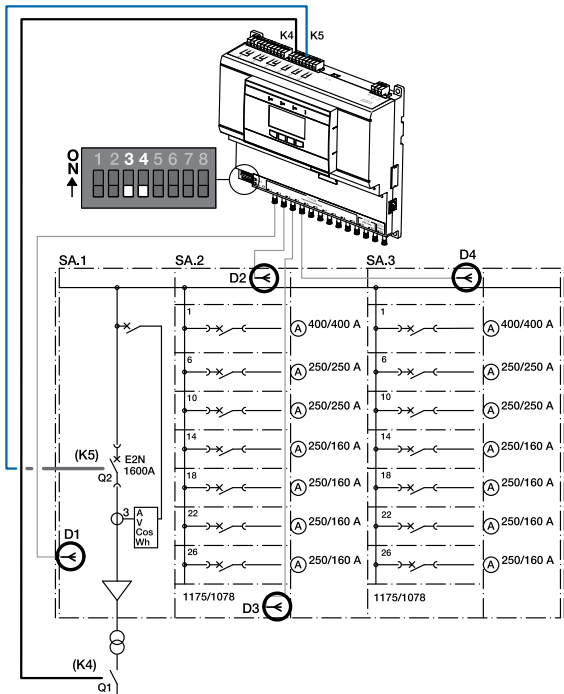
Polar diagram of detector



Example showing the position of detectors in:
1. Horizontal and vertical bus bar system
2. Circuit-breaker cubicle

Example 1:

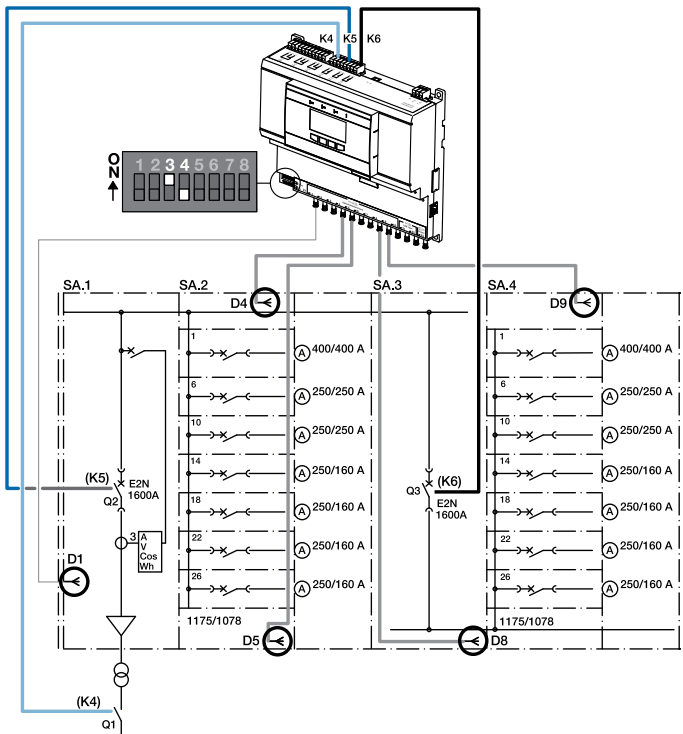
Arc Guard System™ installed to trip all breakers in case of an arc.



SA1... SA3	Switchgear
K4, K5	Solid state tripping contacts
Q1, Q2	Circuit-breaker
D1...D4	Detectors

Example 2:

Arc Guard System™ installed to trip different breakers depending on where the arc occurs.



SA1... SA4	Switchgear
K4, K5, K6	Solid state tripping contacts
Q1, Q2	Circuit breaker
Q3	Bus coupler
D1...D9	Detectors

Configurations

Trip condition configuration

Manual/auto reset configuration

System configuration using DIP switch

DIP switches are used to configure the system regarding use of current condition (activated CSU inputs) and assigning detectors to breaker trip outputs (so-called selectivity). They are located on the front (low, left) of the arc monitor.

DIP switches

Sw1	Current condition inputs Terminals X1:21-22	Sw5	Not used
Sw2	Current condition output Terminal X1:23	Sw6	Autoreset K2, K3 (signal relays)
Sw3	Trip output assign	Sw7	Not used
Sw4	Trip output assign	Sw8	Not used

Breaker trip output	Detector inputs
Output relay K4	Terminals X1:1-10
Output relay K5	Terminals X2:1-10
Output relay K6	Terminals X3:1-10

Trip condition configuration

TVOC-2 can be configured to trip selected breakers depending on which detector is signalling for an arc. This can be used to trip sections of a switchgear or use one monitor for several small switchgears. It also has an option to add a current condition.

Symbol description

= Arc detected

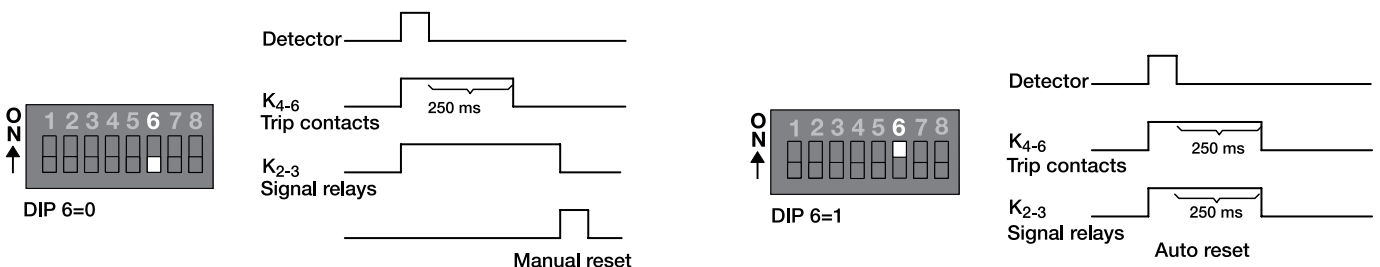
= Arc not detected

Configurable tripping relays

Configuration	Standard configuration, trip all breakers	Sw3	Sw4	Function detectors
<p>Configuration 1</p>	<p>Standard configuration, trip all breakers</p>	0	0	Any detection trips all breakers K4, K5, K6
<p>Configuration 2</p>	<p>Trip different breaker depending on extension module</p>	0	1	Detectors X1 operate K4 Detectors X2 operate K5 Detectors X3 operate K6
<p>Configuration 3</p>	<p>Trip different breaker depending on detector (1-3, 4-6, 7-)</p>	1	0	Detectors X1:1-3 operate K4 Detectors X1:4-6 operate K5 Detectors X1:7-10, X2 and X3 operate K6

Manual/auto reset configuration

The signal relays K2, K3 can be configured to react as the trip contacts (auto reset) or to be de-energized by manual reset on the HMI. See below for explanation.




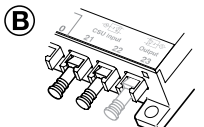
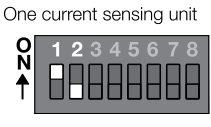
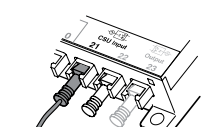
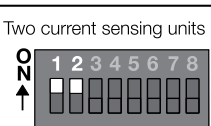
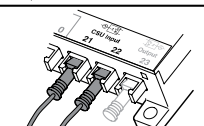
Configuration

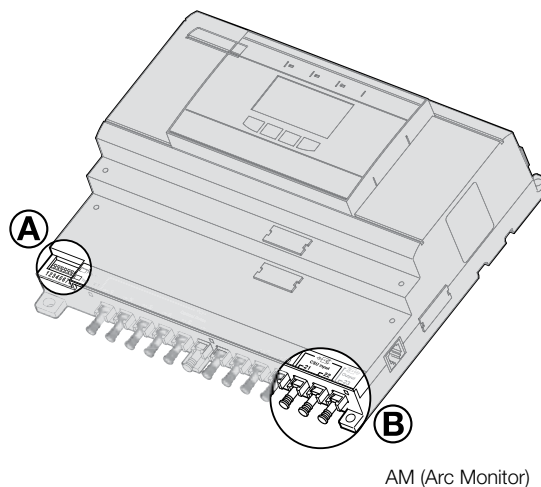
Current condition configuration

Normal trip configuration with additional current condition

A current condition is an option that could be used to avoid the risk of nuisance tripping due to strong light from other sources than arcs. The main risks are light from arc chutes and direct sunlight, which in normal cases can be avoided. Therefore the standard configuration is without CSUs (Current Sensing Units).

All trip configurations on page 20.12 can be combined with an additional current condition. It is possible to connect up to two CSUs directly to the Arc Monitor (AM) (input 21 and 22). Connecting additional current sensing units in series is also possible if required. Sharing the current condition between different Arc Monitors can be done by connecting output 23 on the first Arc Monitor to the standard CSU input on the other. The Arc Monitor will then block the trip condition until it sees an over current.

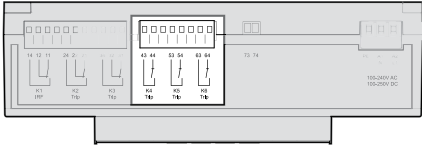
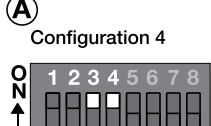
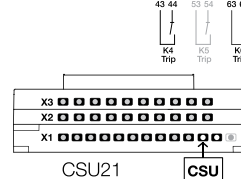
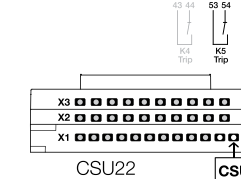
		Sw1	Sw2	Function current condition
No current sensing unit 		0	0	Not used
One current sensing unit 		1	0	Input CSU21 used
Two current sensing units 		1	1	Both inputs used



AM (Arc Monitor)

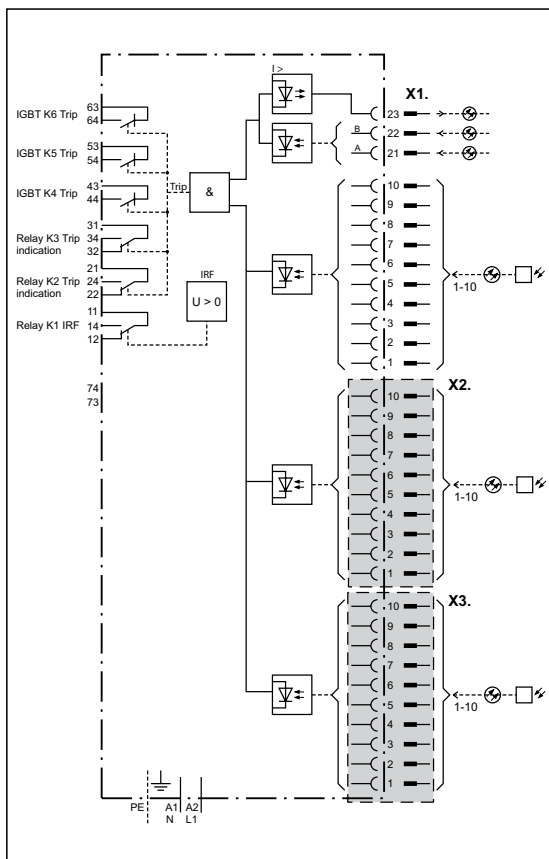
Special trip configuration depending on over current

The arc monitor has a special trip configuration that determines trips depending on where it sees the over current. This configuration will then trip different breakers depending on which supply is showing an over current.

Symbol description	Configurable tripping relays		Sw3	Sw4	
= Arc detected = Arc not detected					
Configuration 4 			1	1	Any detector + current condition CSU21 operate K4 + K6 Any detector + current condition CSU22 operate K5+ K6

See manual for more details

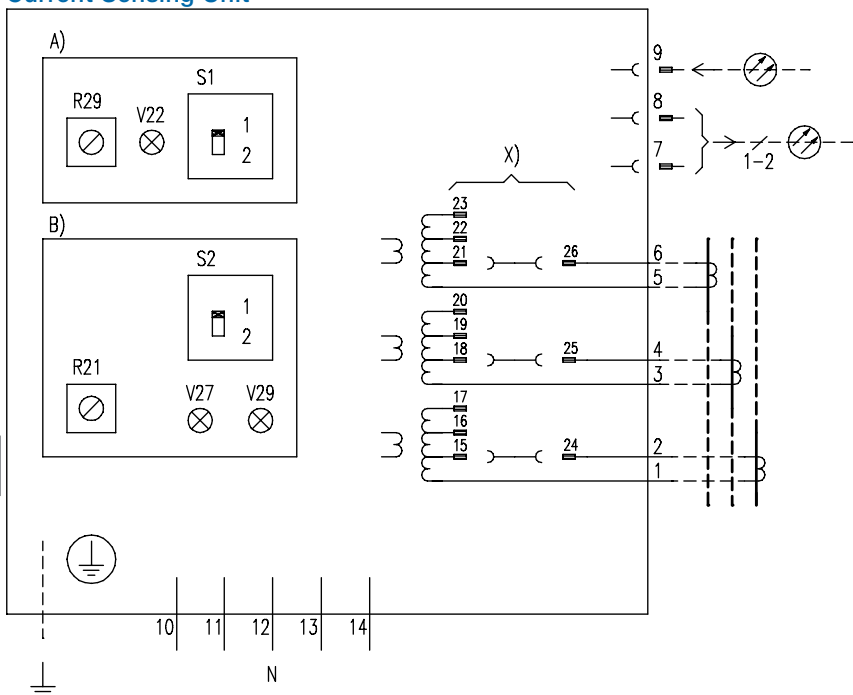
Arc Monitor



Terminals

X1 1-10	Detector input
X2 1-10	Extra detector unit detector input (option)
X3 1-10	Extra detector unit detector input (option)
A1, A2	Power supply
PE	Power supply
43, 44	Solid-state contacts
53, 54	Solid-state contacts
63, 64	Solid-state contacts
11, 12, 14	Indication contacts
21, 22, 24	Indication contacts
31, 32, 34	Indication contacts

Current Sensing Unit



Terminals

1 ... 6	Current transformer terminals
7 and 8	Output current signal to another Current Sensing Unit or Arc Monitor
9	Input current signal from another Current Sensing Unit

Power supply terminals

10 and 12	24 V DC
11 and 12	60 V DC
11 and 12	48 V DC Interconnection 11-13
13 and 12	110 V - 125 V AC/DC
14 and 12	220 V DC, 230 V AC

A) Testing facilities:

R29	Simulating a test current
S1	1 = Test position 2 = Operation position
V22	Red ON = S1 in test position OFF = S1 in operation position

B) Setting facilities:

R21	Overcurrent setting
S2	1 = Input 9 not used 2 = Input 9 used
V27	Yellow ON = Load current less than 70% of set overcurrent level OFF = Load current more than 70% of overcurrent level
V29	Green ON = Load current less than set overcurrent level OFF = Load current more than set overcurrent level

X) Current range bridge connections

Range	Adjustable between	Connections
1A:	0.5 - 3.5	24-17, 25-20, 26-23
2A:	1.0 - 7.0	24-16, 25-19, 26-22
5A:	2.5 - 17.5	24-15, 25-18, 26-21

Circuit diagrams

Arc Guard System with two separated circuit-breakers

Several Current Sensing Units

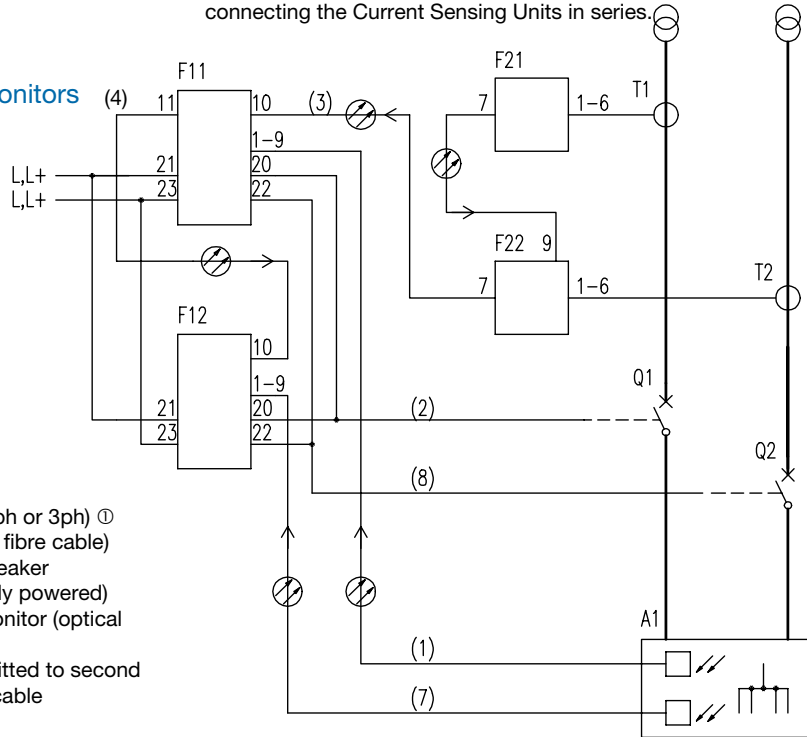
The Arc Monitor can be linked with several Current Sensing Units by connecting the Current Sensing Units in series.

Parallel connection of Arc Monitors

In installations with more than one Arc Monitor.

Current sensing function is transmitted to next Arc Monitor via fibre cable (4).

- A1 Switchgear or similar
- F11, F12 Arc Monitor
- F21, F22 Current Sensing Unit
- Q1, Q2 Circuit-breaker
- T1, T2 Current transformers (1ph or 3ph) ①
- (1), (7) Detector cables (optical fibre cable)
- (2), (8) Trip circuit for circuit-breaker (electric cable, separately powered)
- (3) Current signal to Arc Monitor (optical fibre cable)
- (4) Current signal is transmitted to second Arc Monitor via optical cable



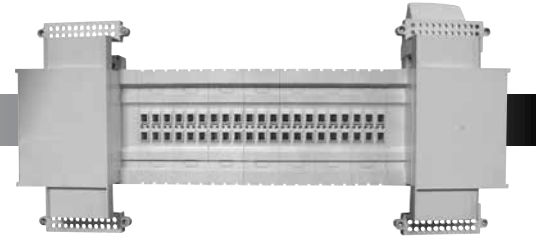
① Reference page 20.14

Notes



21 - Proline panelboard

Proline panelboard	21.1 - 21.16
Description	21.1
Features	21.2 - 21.4
Breaker placement	21.5
Ordering information	
PL700, K-Curve.....	21.6
PL700, Z-Curve.....	21.7
Accessories.....	21.8 - 21.9
Approximate dimensions	21.10 - 21.12
Technical data	21.13
Series UL ratings	21.14
Coordination (discrimination) IEC ratings.....	21.15
Breaker features	21.16



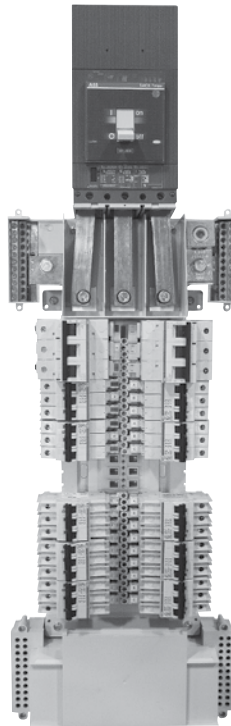
Notes

ProLine Panelboard & breakers



ProLine panelboard & breakers

The ProLine panelboard is the electrical industry's first current limiting, touch safe, fully coordinated UL 67 panelboard.



Electrical:

- UL File #E319800
- UL67
- 225A and 400A
- 12, 24, 42 circuit
- Up to 240V & 277/480Y VAC
- 35 kAIC series rating (240V)
- 14 kAIC series rating (277/480V)
- Single or double ended Incoming
- Fully rated feed through lugs
- 1A to 100A branch breakers
- Fully rated sub fed lugs or breaker
- K or Z trip curve breakers
- N1 enclosure

Features

- Breakers UL current limiting
- Fully coordinated
- Touch safe
- Pluggable breaker with non-energized, bolt-on screw

The ProLine circuit breaker is the industry's first UL approved current limiting breaker to be used in a panelboard application.



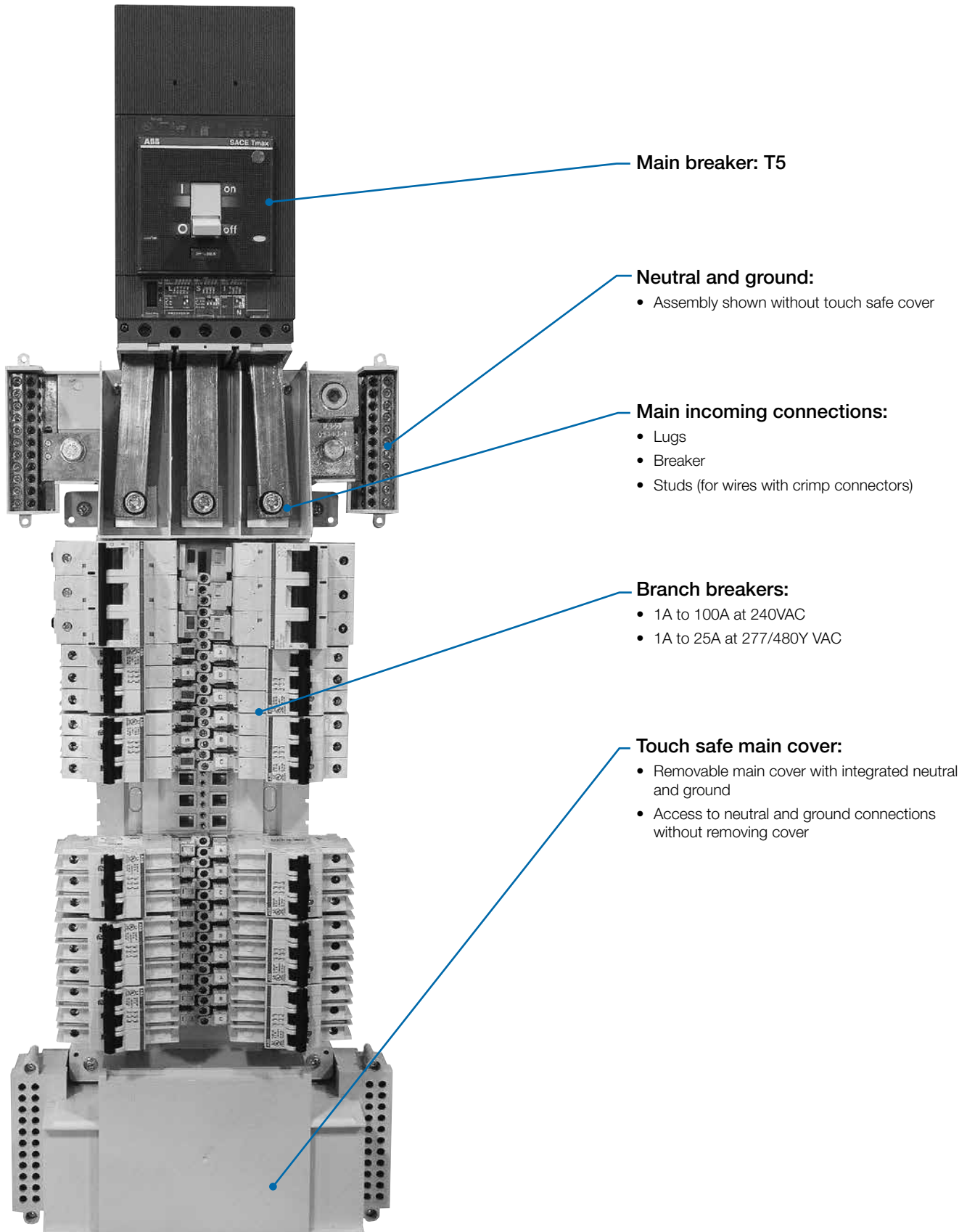
Electrical:

- Current limiting according to UL489
- Up to 240V & 277/480Y VAC
- 10KAIC with main lug
- 35KAIC series rating with T5 main
- K or Z curve
- 1A to 100A

Features:

- Contact position window
- Independent thermal magnetic trip units
- Pluggable breaker with non-energized bolt-on screw

ProLine features

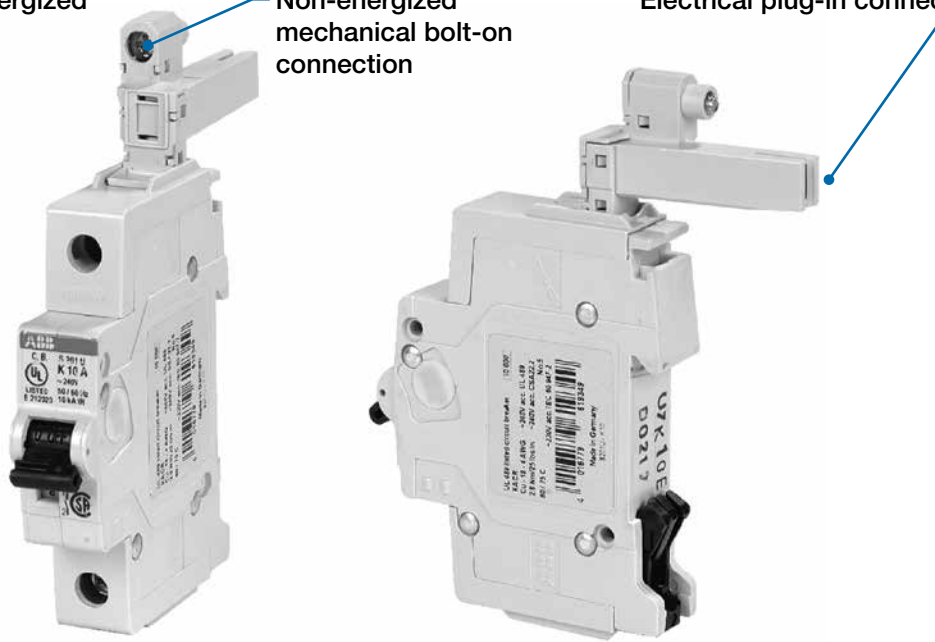


ProLine features

Pluggable with non-energized bolt-on connection

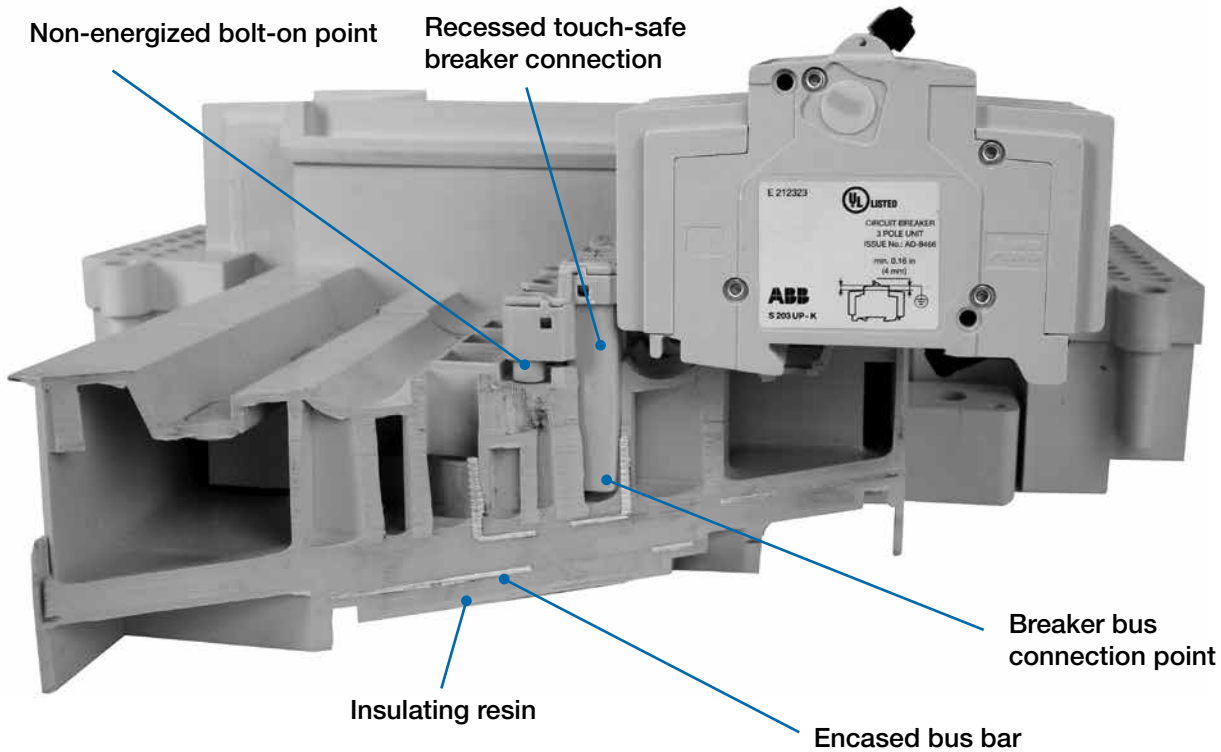
Non-energized mechanical bolt-on connection

Electrical plug-in connection



Non-energized bolt-on point

Recessed touch-safe breaker connection

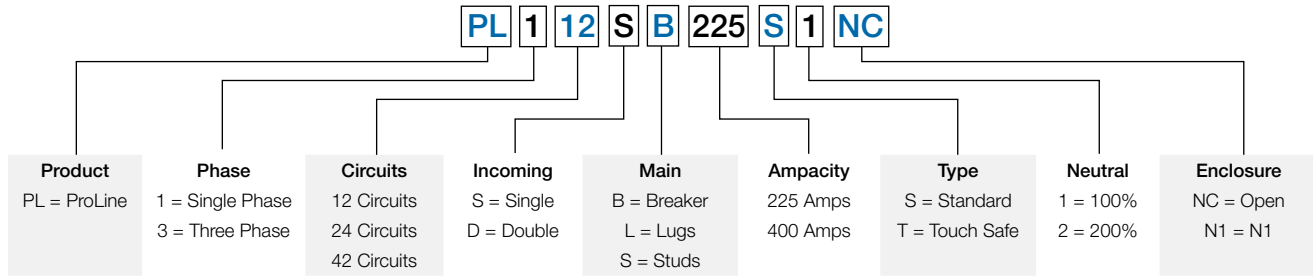


Stable bus bar design for high withstand ratings

- Busbar designed with more surface area than typical panelboard bus bar
- Busbar encased in resin to aid stabilization in the case of a fault

ProLine features

Catalog number explanation

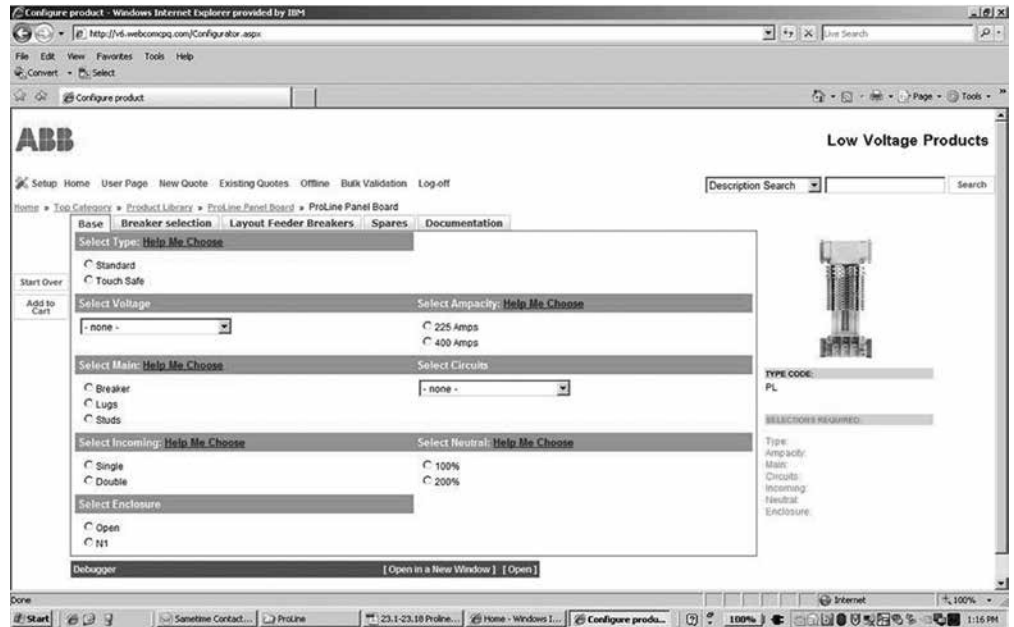
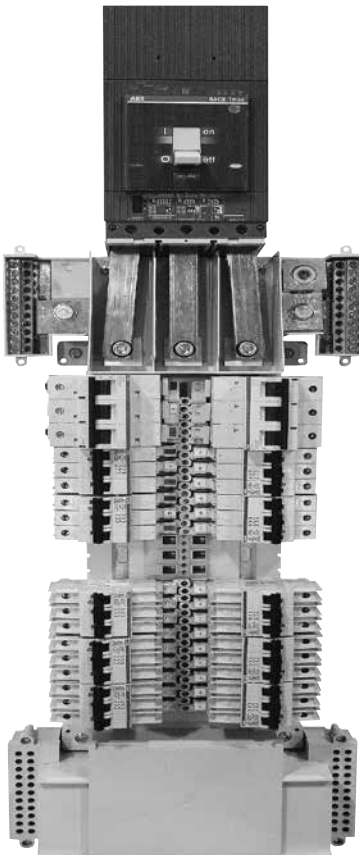


ProLine panelboards can be configured with the above options using the ProLine panelboard configurator.

The ProLine Panelboard Configurator

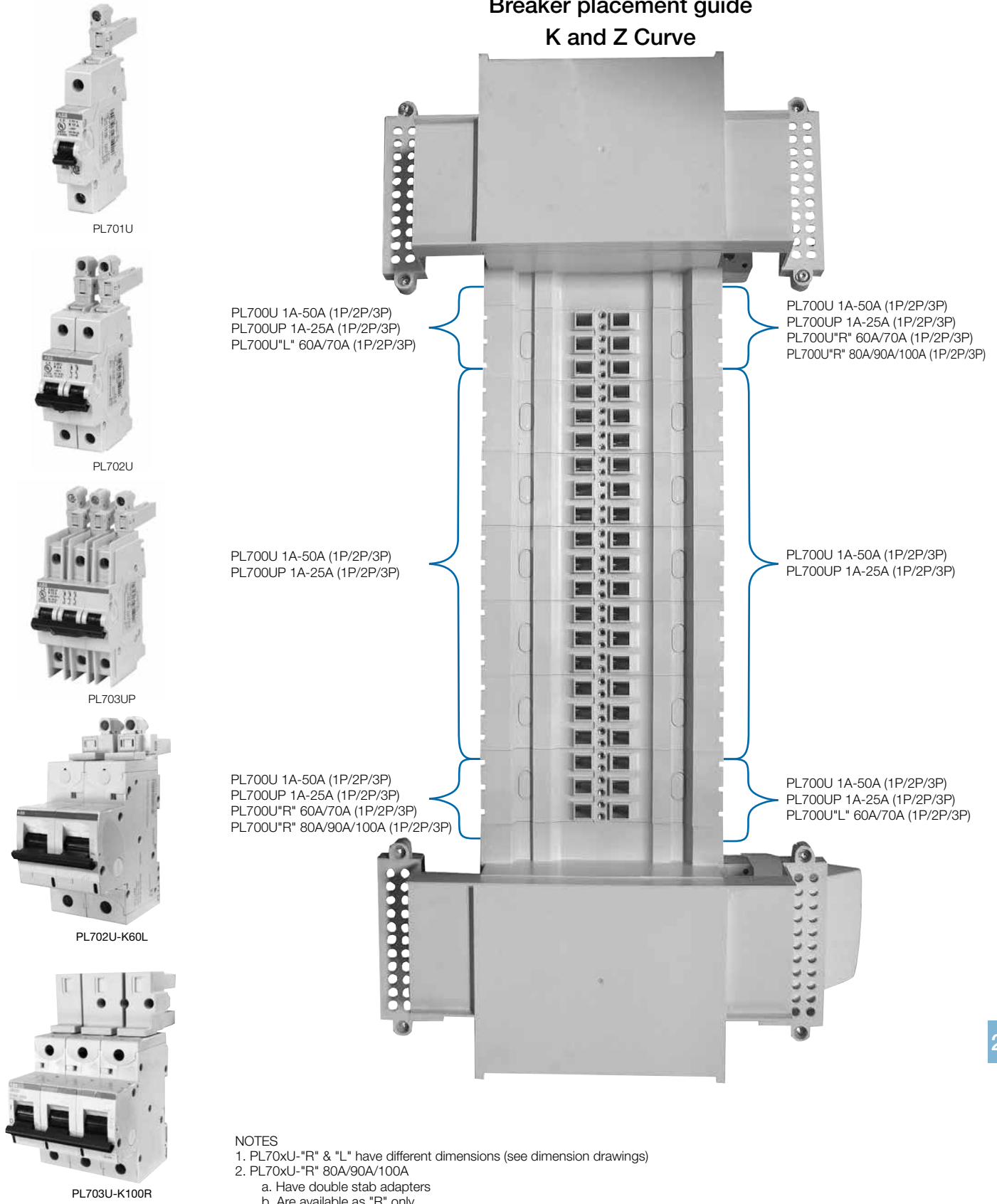
Allows users 24 hour access to:

- Quotations
- Specifications
- Dimensional drawings
- Literature
- URL: <http://v6.webcomcpq.com/AbbLogin.aspx?cfdomain=abblp>



Breaker placement

Breaker placement guide K and Z Curve



PL700, K-Curve

ProLine breakers, 120, 208, 240 & 277/480Y VAC
UL489

K



PL701U



PL702U



PL703UP



PL702U-K60L



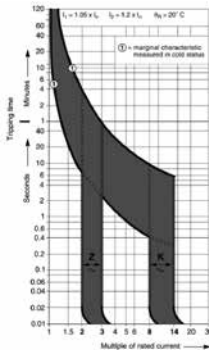
PL703U-K100R

120/208/240 VAC

K Curve 1 Pole		K Curve 2 Pole		K Curve 3 Pole	
Catalog number	Rated current	Catalog number	Rated current	Catalog number	Rated current
PL701U-K1	1	PL702U-K1	1	PL703U-K1	1
PL701U-K2	2	PL702U-K2	2	PL703U-K2	2
PL701U-K3	3	PL702U-K3	3	PL703U-K3	3
PL701U-K4	4	PL702U-K4	4	PL703U-K4	4
PL701U-K5	5	PL702U-K5	5	PL703U-K5	5
PL701U-K6	6	PL702U-K6	6	PL703U-K6	6
PL701U-K8	8	PL702U-K8	8	PL703U-K8	8
PL701U-K10	10	PL702U-K10	10	PL703U-K10	10
PL701U-K15	15	PL702U-K15	15	PL703U-K15	15
PL701U-K20	20	PL702U-K20	20	PL703U-K20	20
PL701U-K25	25	PL702U-K25	25	PL703U-K25	25
PL701U-K30	30	PL702U-K30	30	PL703U-K30	30
PL701U-K40	40	PL702U-K40	40	PL703U-K40	40
PL701U-K50	50	PL702U-K50	50	PL703U-K50	50
PL701U-K60L	60	PL702U-K60L	60	PL703U-K60L	60
PL701U-K70L	70	PL702U-K70L	70	PL703U-K70L	70
PL701U-K60R	60	PL702U-K60R	60	PL703U-K60R	60
PL701U-K70R	70	PL702U-K70R	70	PL703U-K70R	70
PL701U-K80R	80	PL702U-K80R	80	PL703U-K80R	80
PL701U-K90R	90	PL702U-K90R	90	PL703U-K90R	90
PL701U-K100R	100	PL702U-K100R	100	PL703U-K100R	100

277/480Y VAC

K Curve 1 Pole		K Curve 2 Pole		K Curve 3 Pole	
Catalog number	Rated current	Catalog number	Rated current	Catalog number	Rated current
PL701UP-K1	1	PL702UP-K1	1	PL703UP-K1	1
PL701UP-K2	2	PL702UP-K2	2	PL703UP-K2	2
PL701UP-K3	3	PL702UP-K3	3	PL703UP-K3	3
PL701UP-K4	4	PL702UP-K4	4	PL703UP-K4	4
PL701UP-K5	5	PL702UP-K5	5	PL703UP-K5	5
PL701UP-K6	6	PL702UP-K6	6	PL703UP-K6	6
PL701UP-K8	8	PL702UP-K8	8	PL703UP-K8	8
PL701UP-K10	10	PL702UP-K10	10	PL703UP-K10	10
PL701UP-K15	15	PL702UP-K15	15	PL703UP-K15	15
PL701UP-K20	20	PL702UP-K20	20	PL703UP-K20	20
PL701UP-K25	25	PL702UP-K25	25	PL703UP-K25	25



Tripping Characteristic K

UL 489
10 kA
K Curve
Inductive Loads
Curve allows for loads with higher
inrush during system start-up.

NOTES

1. PL70XU-"R" & "L" have different dimensions (see dimension drawings)
2. PL70xU-"R" 80A/90A/100A
 - a. Have double stab adapters
 - b. Are available as "R" only

PL700, Z-Curve

ProLine breakers, 120, 208, 240 & 277/480Y VAC
UL489

Z



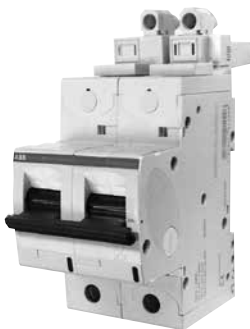
PL701U



PL702U



PL703UP



PL702U-K60L



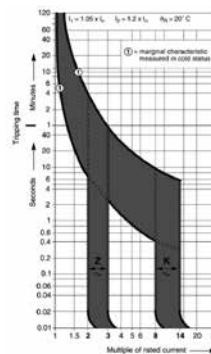
PL703U-K100R

120 / 208 / 240 VAC

Z Curve 1 Pole		Z Curve 2 Pole		Z Curve 3 Pole	
Catalog number	Rated current	Catalog number	Rated current	Catalog number	Rated current
PL701U-Z1	1	PL702U-Z1	1	PL703U-Z1	1
PL701U-Z2	2	PL702U-Z2	2	PL703U-Z2	2
PL701U-Z3	3	PL702U-Z3	3	PL703U-Z3	3
PL701U-Z4	4	PL702U-Z4	4	PL703U-Z4	4
PL701U-Z5	5	PL702U-Z5	5	PL703U-Z5	5
PL701U-Z6	6	PL702U-Z6	6	PL703U-Z6	6
PL701U-Z8	8	PL702U-Z8	8	PL703U-Z8	8
PL701U-Z10	10	PL702U-Z10	10	PL703U-Z10	10
PL701U-Z15	15	PL702U-Z15	15	PL703U-Z15	15
PL701U-Z20	20	PL702U-Z20	20	PL703U-Z20	20
PL701U-Z25	25	PL702U-Z25	25	PL703U-Z25	25
PL701U-Z30	30	PL702U-Z30	30	PL703U-Z30	30
PL701U-Z40	40	PL702U-Z40	40	PL703U-Z40	40
PL701U-Z50	50	PL702U-Z50	50	PL703U-Z50	50
PL701U-Z60L	60	PL702U-Z60L	60	PL703U-Z60L	60
PL701U-Z70L	70	PL702U-Z70L	70	PL703U-Z70L	70
PL701U-Z60R	60	PL702U-Z60R	60	PL703U-Z60R	60
PL701U-Z70R	70	PL702U-Z70R	70	PL703U-Z70R	70
PL701U-Z80R	80	PL702U-Z80R	80	PL703U-Z80R	80
PL701U-Z90R	90	PL702U-Z90R	90	PL703U-Z90R	90
PL701U-Z100R	100	PL702U-Z100R	100	PL703U-Z100R	100

277/480Y VAC

Z Curve 1 Pole		Z Curve 2 Pole		Z Curve 3 Pole	
Catalog number	Rated current	Catalog number	Rated current	Catalog number	Rated current
PL701UP-Z1	1	PL702UP-Z1	1	PL703UP-Z1	1
PL701UP-Z2	2	PL702UP-Z2	2	PL703UP-Z2	2
PL701UP-Z3	3	PL702UP-Z3	3	PL703UP-Z3	3
PL701UP-Z4	4	PL702UP-Z4	4	PL703UP-Z4	4
PL701UP-Z5	5	PL702UP-Z5	5	PL703UP-Z5	5
PL701UP-Z6	6	PL702UP-Z6	6	PL703UP-Z6	6
PL701UP-Z8	8	PL702UP-Z8	8	PL703UP-Z8	8
PL701UP-Z10	10	PL702UP-Z10	10	PL703UP-Z10	10
PL701UP-Z15	15	PL702UP-Z15	15	PL703UP-Z15	15
PL701UP-Z20	20	PL702UP-Z20	20	PL703UP-Z20	20
PL701UP-Z25	25	PL702UP-Z25	25	PL703UP-Z25	25



Tripping Characteristic Z

UL 489

10 kA

Z Curve

Resistive Loads

Curve allows for protection of application with low inrush and sensitive loads.

NOTES

1. PL70xU-"R" & "L" have different dimensions (see dimension drawings)
2. PL70xU-"R" 80A/90A/100A
 - a. Have double stab adapters
 - b. Are available as "R" only

Panelboard accessories

Panelboard chassis hole bus cover

Catalog number	Description
PLBUSCVR	Bus cover (Binky) to cover stab adapter circuit holes on panelboard

Switchboard circuit ID labels

Catalog number	Description
PLIDLBL12	12 Circuit Switchboard circuit ID label
PLIDLBL24	24 Circuit Switchboard circuit ID label
PLIDLBL42	42 Circuit Switchboard circuit ID label
PLIDLBL43-84	42 Circuit Switchboard circuit ID label, for ccts 43-84



PL24LBL

Panelboard directory card and holder

Directory card for marking circuit designation (card and holder package of 5)

Catalog number	Description
PL12LBL	12 Circuit description card, label holder
PL24LBL	24 Circuit description card, label holder
PL42LBL	42 Circuit description card, label holder

Neutral / Ground assembly

Catalog number	Description
PLN42400S	Neutral bar assembly (100%), 42CKT, 400A
PLN42400S2	Neutral bar assembly (200%), 42CKT, 400A
PLG42400S	Ground bar assembly, 42CKT, 400A
PLN42225S	Neutral bar assembly (100%), 42CKT, 225A
PLN42225S2	Neutral bar assembly, (200%), 42CKT, 225A
PLG42225S	Ground bar assembly, 42CKT, 225A
PLN24400S	Neutral bar assembly (100%), 24CKT, 400A
PLN24400S2	Neutral bar assembly (200%), 24CKT, 400A
PLG24400S	Ground bar assembly, 24CKT, 400A
PLN24225S	Neutral bar assembly (100%), 24CKT, 225A
PLN24225S2	Neutral bar assembly (200%), 24CKT, 225A
PLG24225S	Ground bar assembly, 24CKT, 225A
PLN12400S	Neutral bar assembly (100%), 12CKT, 400A
PLN12400S2	Neutral bar assembly (200%), 12CKT, 400A
PLG12400S	Ground bar assembly, 12CKT, 400A
PLN12225S	Neutral bar assembly (100%), 12CKT, 225A
PLN12225S2	Neutral bar assembly (200%), 12CKT, 225A
PLG12225S	Ground bar assembly, 12CKT, 225A



PL350MECLUG

Neutral / Ground lugs

Catalog number	Description
PLNG12250	Proline, 12 CKT, 250A, N/G Lug
PLNG24250	Proline, 24 CKT, 250A, N/G Lug
PLNG42250	Proline, 42 CKT, 250A, N/G Lug
PLNG12400	Proline, 12 CKT, 400A, N/G Lug
PLNG24400	Proline, 24 CKT, 400A, N/G Lug
PLNG42400	Proline, 42 CKT, 400A, N/G Lug

Main and sub-feed lugs

Lugs for incoming and outgoing connections

Catalog number	Description
PL350MECLUG	225 A Single 4/0 to 350 MCM
PL600MECLUG	400 A Single 4/0 to 600 MCM

Panelboard accessories

Enclosure blank circuit covers

Covers for filling enclosure spaces not used by breakers

Catalog number	Description
PLBLNKCVR200	Proline PB filler plate for S200 MCBs
PLBLNKCVR200H	Proline PB filler plate, hinged for S200 MCBs
PLBLNKCVR800	Proline PB filler plate for S800 MCBs
PLBLNKCVR800H	Proline PB filler plate, hinged for S800 MCBs

Panelboard spare parts

Catalog number	Description
PLGNDLUG	Ground lug 14-1/0, 1/4" Stud



Main cover

Catalog number	Description
PLMCVR	Main cover

Main breaker conversion kit

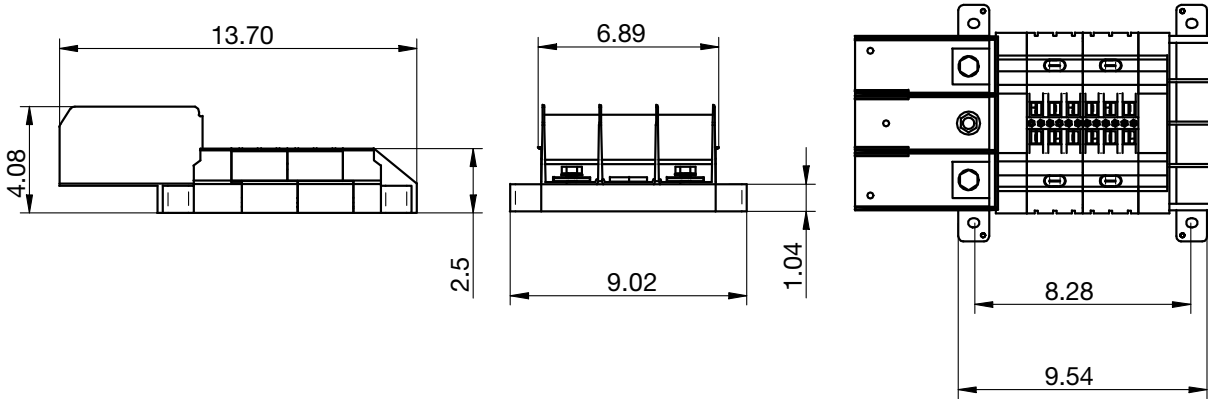
Kit for converting panelboard from main lugs to main breaker

(Kit includes: Enclosure extension, breaker, adaptor, plates, and bus connections)

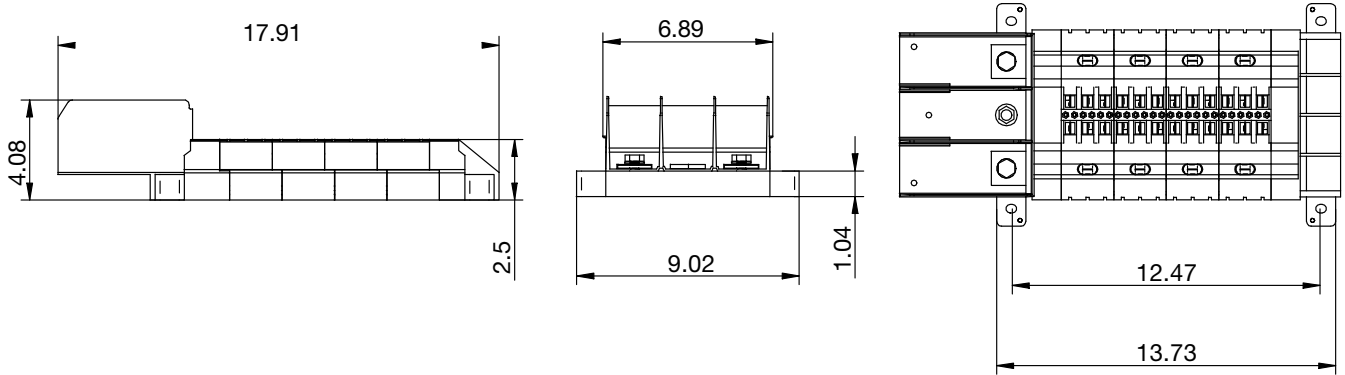
Catalog number	Description
PLT5225CONV3P	225A T5 main breaker, 3 Phase
PLT5225CONV1P	225A T5 main breaker, 1 Phase
PLT5CONV3P	400A T5 main breaker, 3 Phase
PLT5CONV1P	400A T5 main breaker, 1 Phase

Approximate dimensions (inches)
Panelboards
Single-ended

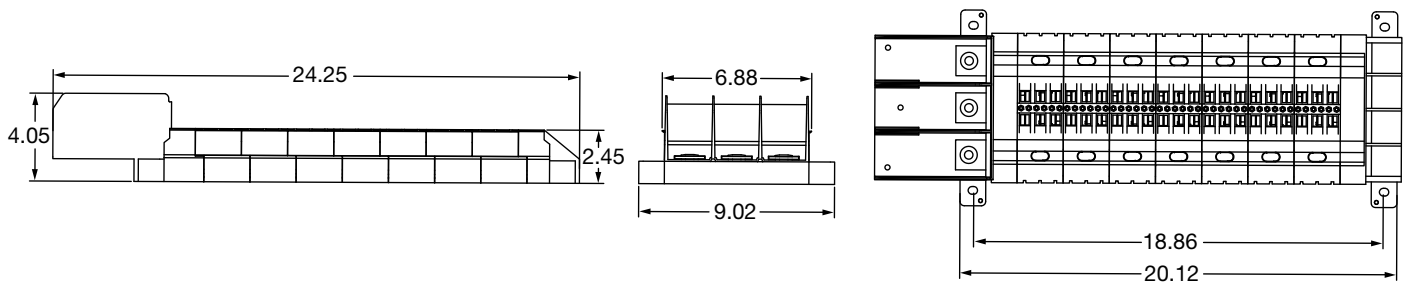
12 circuit, single-ended



24 circuit, single-ended



42 circuit, single-ended

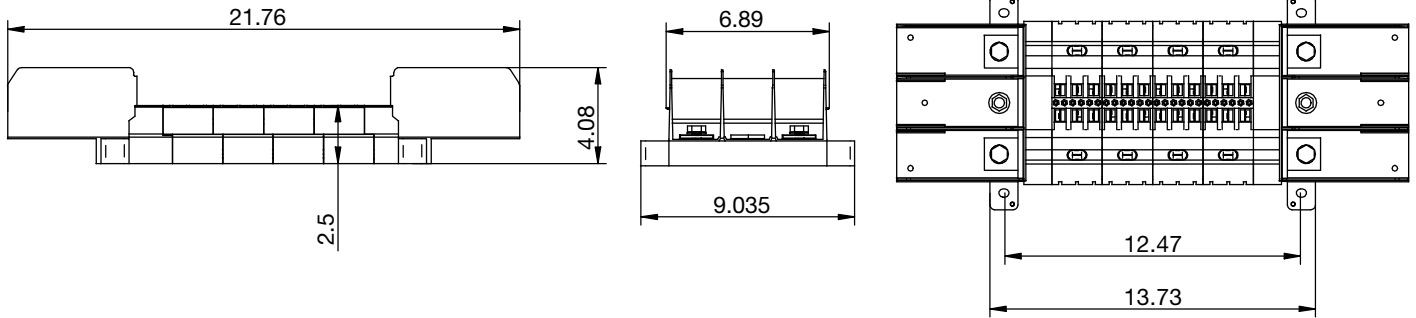


Approximate dimensions (inches)

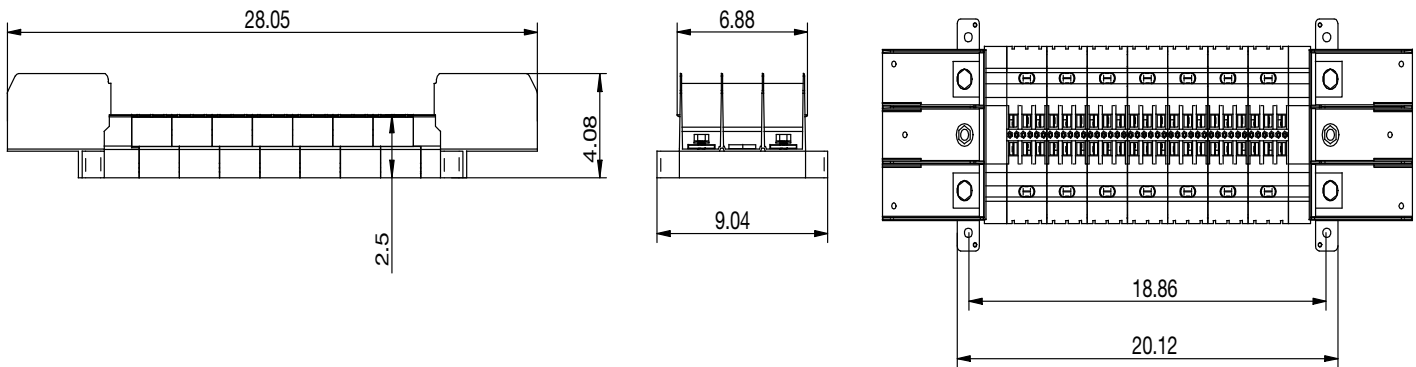
Panelboards

Double-ended

24 circuit, double-ended



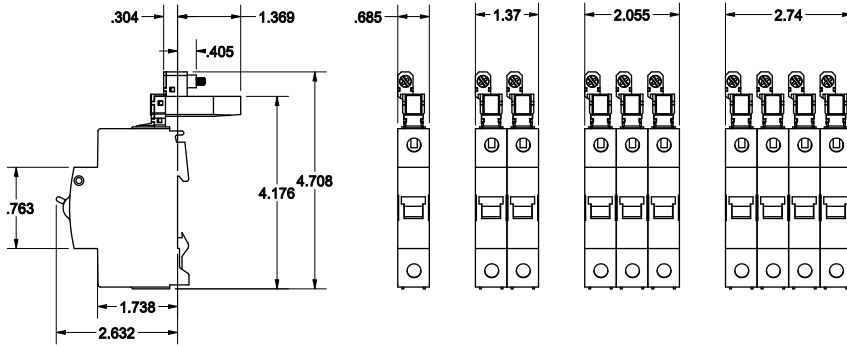
42 circuit, double-ended



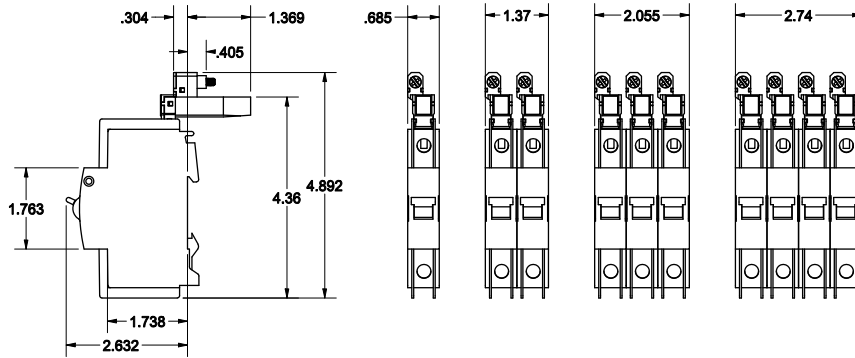
Approximate dimensions (mm)

PL700 breakers

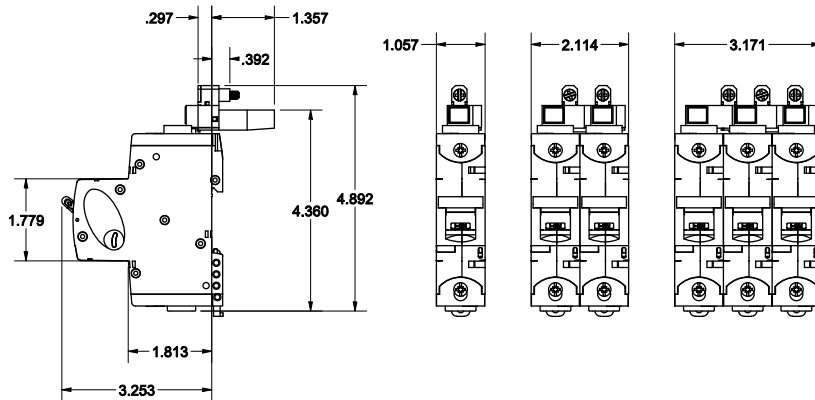
PL700U
1A-50A



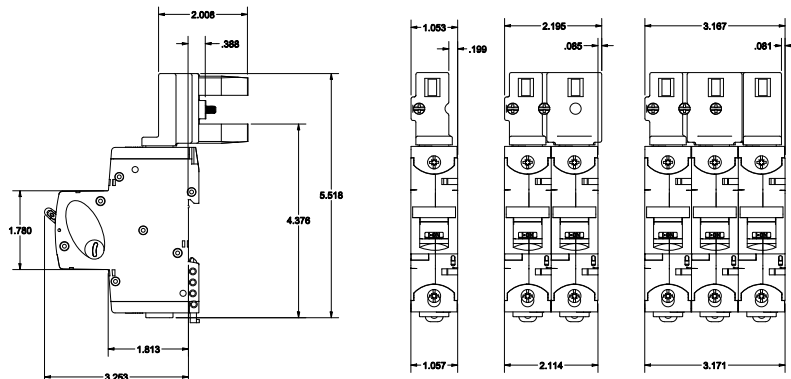
PL700UP
1A-25A



PL700U60-70A
60A-70A



PL700U80-100A
80A-100A



Technical data

PL700 breakers

ProLine
panelboard

Item	PL700U-K,Z	PL700UP-K,Z	PL700U-K"L", PL700U-K"R"	PL700U-Z"R", PL700U-Z"L"
Approvals: UL	489	489	489	489
Number of Poles:	1,2,3	1,2,3	1,2,3	1,2,3
Tripping Characteristic:	K,Z	K,Z	K	Z
Rated Currents:	1 to 50A	1 to 25A	60 to 70A ①; 80 to 100A ②	60 to 70A ①; 80 to 100A ②
Minimum Operating Voltage:	12V	12V	—	—
UL Rated Voltage & Interrupting Capacity: Series rating	240VAC; 35kA w/main breaker	480VAC; 35kA w/main breaker	240VAC; 35kA w/main breaker	240VAC; 35kA w/main breaker
Frequency:	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
120VAC	10kA	10kA	50kA: multi pole	50kA: multi pole
240 VAC	10kA	10kA	30kA: single pole	30kA: single pole
277 VAC	—	10kA	—	—
277/480Y VAC	—	10kA	—	—
Frequency:	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Rated Voltage:	240VAC	277/480Y VAC	240VAC	240VAC
Production Category:	IP20	IP20	IP20	IP20
Main Terminals: Wire Size	18-4 AWG/0.75-25mm	18-4 AWG/0.75-25mm	25-1 AWG	25-1 AWG
Torque	25 in-lbs/2.8 nm	25 in-lbs/2.8 nm	35 in-lbs./4nm	36 in-lbs./4nm
Tool	#2 Posidrive	#2 Posidrive		
Service Life at Rated Load:	20,000 operations (below 32A) 10,000 operations (32A & higher)	20,000 operations 10,000 operations	6,000 operations —	6,000 operations —
Ambient Temperatures: Minimum	-25°C -13°F	-25°C -13°F	-25°C -13°F	-25°C -13°F
Maximum	+55°C 131°F	+55°C 131°F	60°C 140°F	60°C 140°F
Storage Temperatures: Minimum	-40°C -40°F	-40°C -40°F	-40°C -40°F	-40°C -40°F
Maximum	70°C 158°F	70°C 158°F	70°C 158°F	70°C 158°F
Shock Resistance:	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms	—	—
Vibration Resistance:	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 in	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 in	—	—

- ① 60A/70A have different for factor (see dimension drawings)
 ② 80A/90A/100A available as "R" only and have different form factor (see dimension drawings)
 80A to 100A have double stab adapters

Series UL ratings

Tmax T3 – PL700 @ 240VAC

	PL700 Amps	Series Rating	
T3S 225A Main Breaker	1	35kA	
	2	35kA	
	3	35kA	
	4	35kA	
	5	35kA	
	6	35kA	
	8	35kA	
	10	35kA	
	15	35kA	
	20	35kA	
	PL700 Branch K and Z Curve	25	35kA
		30	35kA
		40	35kA
		50	35kA
		60	35kA
		70	35kA
		80	35kA
		90	35kA
100		35kA	

Tmax T5 – PL700 @ 240VAC

	PL700 Amps	Series Rating	
T5N 400A Main Breaker	1	35kA	
	2	35kA	
	3	35kA	
	4	35kA	
	5	35kA	
	6	35kA	
	8	35kA	
	10	35kA	
	15	35kA	
	20	35kA	
	PL700 Branch K and Z Curve	25	35kA
		30	35kA
		40	35kA
		50	35kA
		60	35kA
		70	35kA
		80	35kA
		90	35kA
100		35kA	

Tmax T3 – PL700 @ 480VAC

	PL700 Amps	Series Rating
T3S 225A Main Breaker	1	14kA
	2	14kA
	3	14kA
	4	14kA
	5	14kA
	6	14kA
	8	14kA
	10	14kA
	15	14kA
	20	14kA
PL700 Branch K and Z Curve	25	14kA

Tmax T5 – PL700 @ 480VAC

	PL700 Amps	Series Rating
T5N 400A Main Breaker	1	14kA
	2	14kA
	3	14kA
	4	14kA
	5	14kA
	6	14kA
	8	14kA
	10	14kA
	15	14kA
	20	14kA
PL700 Branch K and Z Curve	25	14kA

Main Lug – PL700 @ 240VAC

	PL700 Amps	Series Rating	
Main Lug	1	10kA	
	2	10kA	
	3	10kA	
	4	10kA	
	5	10kA	
	6	10kA	
	8	10kA	
	10	10kA	
	15	10kA	
	20	10kA	
	PL700 Branch K and Z Curve	25	10kA
		30	10kA
		40	10kA
		50	10kA
		60	10kA
		70	10kA
		80	10kA
		90	10kA
		100	10kA

Main Lug – PL700 @ 480VAC

	PL700 Amps	Series Rating	
Main Lug	1	10kA	
	2	10kA	
	3	10kA	
	4	10kA	
	5	10kA	
	6	10kA	
	8	10kA	
	10	10kA	
	15	10kA	
	20	10kA	
	PL700 Branch K and Z Curve	25	10kA

Coordination (discrimination) IEC ratings

Tmax T3 – PL700 @ 240VAC

	PL700 Amps	Coordination rating	
T3S 225A Main Breaker	1	28.6kA	
	2	28.6kA	
	3	28.6kA	
	4	28.6kA	
	5	28.6kA	
	6	28.6kA	
	8	28.6kA	
	10	28.6kA	
	15	28.6kA	
	20	28.6kA	
	PL700 Branch K and Z Curve	25	28.6kA
		30	28.6kA
		40	28.6kA
		50	28.6kA
		60	28.6kA
		70	28.6kA
		80	28.6kA
90		28.6kA	
100		28.6kA	

Tmax T5 – PL700 @ 240VAC

	PL700 Amps	Coordination rating	
T5N 400A Main Breaker	1	28.6kA	
	2	28.6kA	
	3	28.6kA	
	4	28.6kA	
	5	28.6kA	
	6	28.6kA	
	8	28.6kA	
	10	28.6kA	
	15	28.6kA	
	20	28.6kA	
	PL700 Branch K and Z Curve	25	28.6kA
		30	28.6kA
		40	28.6kA
		50	28.6kA
		60	28.6kA
		70	28.6kA
		80	28.6kA
90		28.6kA	
100		28.6kA	

Tmax T3 – PL700 @ 480VAC

	PL700 Amps	Coordination rating	
T3S 225A Main Breaker	1	14kA	
	2	14kA	
	3	14kA	
	4	14kA	
	5	14kA	
	6	14kA	
	8	14kA	
	10	14kA	
	15	14kA	
	20	14kA	
	25	14kA	
	PL700 Branch K and Z Curve	30	14kA
		40	14kA
		50	14kA
		60	14kA
		70	14kA

Main Lug – PL700 @ 240VAC

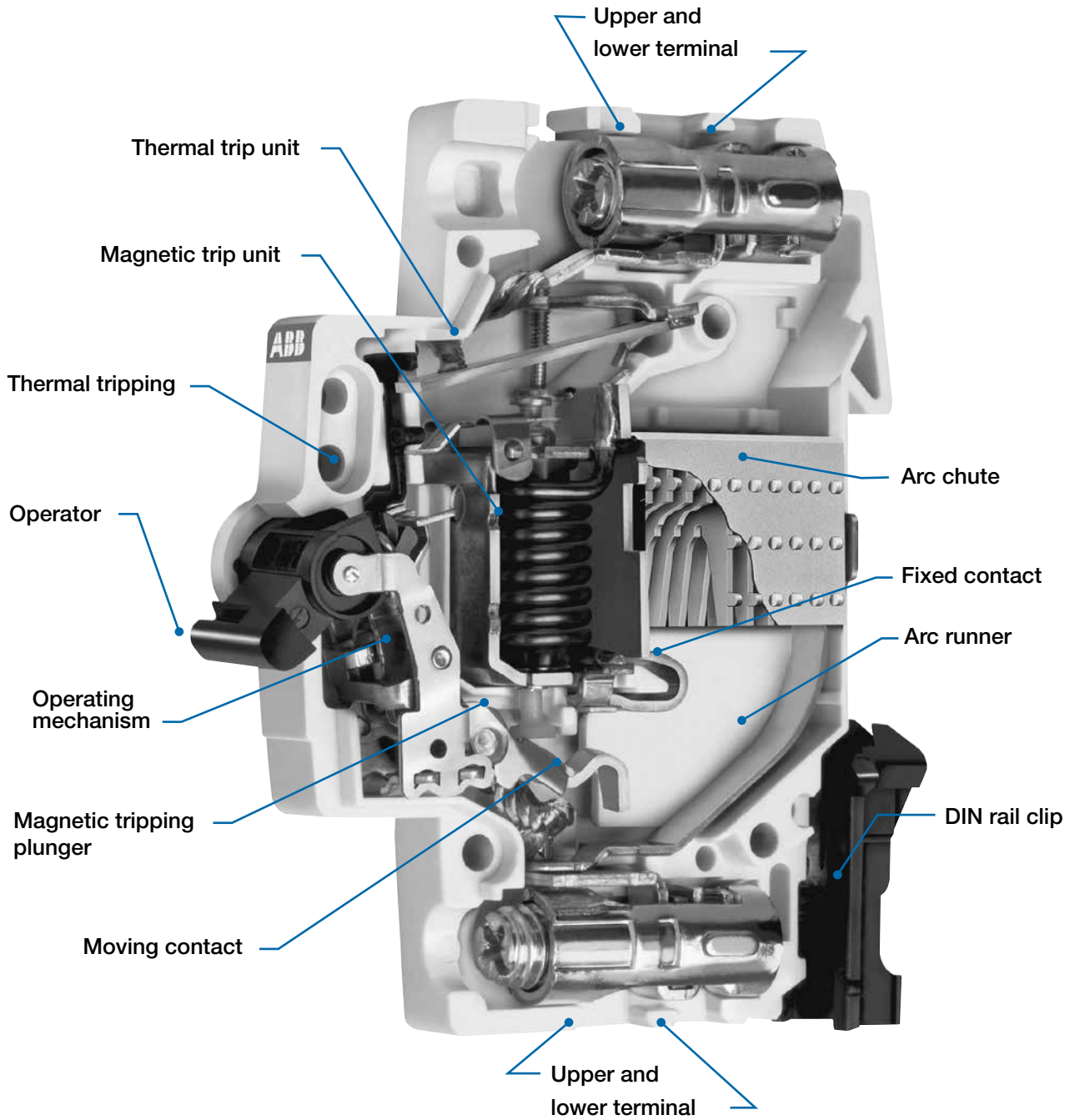
	PL700 Amps	Coordination rating	
Main Lug	1	10kA	
	2	10kA	
	3	10kA	
	4	10kA	
	5	10kA	
	6	10kA	
	8	10kA	
	10	10kA	
	15	10kA	
	20	10kA	
	25	10kA	
	30	10kA	
	40	10kA	
	50	10kA	
	60	10kA	
	70	10kA	
	80	10kA	
	90	10kA	
	100	10kA	
	PL700 Branch K and Z Curve	15	10kA
		20	10kA
		25	10kA
		30	10kA
		40	10kA

Main Lug – PL700 @ 480VAC

	PL700 Amps	Coordination rating	
Main Lug	1	10kA	
	2	10kA	
	3	10kA	
	4	10kA	
	5	10kA	
	6	10kA	
	8	10kA	
	10	10kA	
	15	10kA	
	20	10kA	
	25	10kA	
	PL700 Branch K and Z Curve	30	10kA
		40	10kA
		50	10kA
		60	10kA
70		10kA	

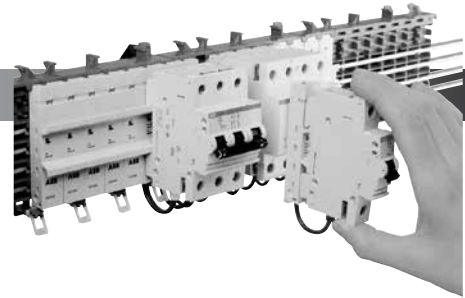
Breaker features

ABB current limiting breaker components





22 - SMISLINE



SMISLINE modular bus system.....22.1 - 22.24

Features	22.1
Building a SMISLINE assembly for UL508 & UL489 based solutions	22.2 - 22.5
Building a SMISLINE assembly for UL489 based solutions	22.6 - 22.7
Building a SMISLINE assembly for UL508 based solutions	22.8 - 22.10
Technical data	22.11 - 22.16
Approximate dimensions	22.18 - 22.23
Approvals and standards	22.24

Notes

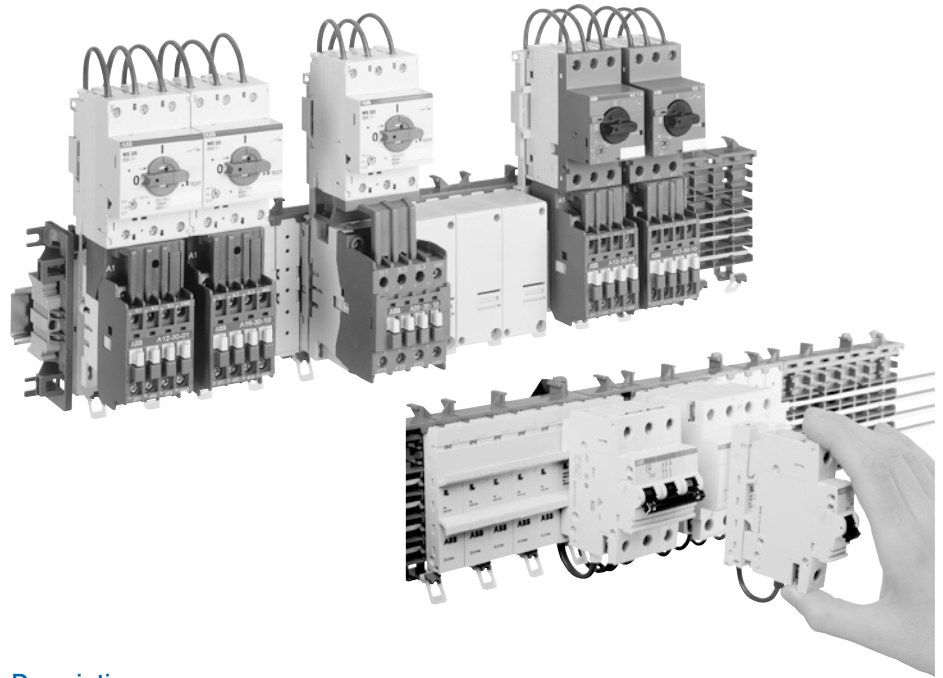
Modular power distribution bus system

SMISLINE



SMISLINE

Modular power distribution bus system



Description

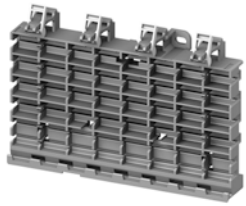
- The SMISLINE power distribution bus system provides a versatile and flexible means of distributing power to a wide variety of electrical devices. Ideal for group motor installations and ABB modular DIN rail products.
- Hot swappable socket mounted components.
- Individual devices may be turned off and safely removed without turning off power to the whole bus.
- Bus system “Starter kits” available in various lengths, can also be easily cut down for custom installations.
- Busbar rated 100 A when end fed and up to 200 A when center fed. Main power feed terminals may be installed anywhere along the bus system.
- Individual bus stab adapters are available in L1, L2, L3 and N phase connections; they can be connected together to form multi-pole units. Unwired modules are available where bus connection is not required. 18 mm width.
- Snap-on installation. No tools required to install or remove bus mounted components.
- System can be DIN rail or base mounted.
- Bus covers protect unused portions of the bus from accidental contact providing total bus isolation and IP20 finger safe protection.
- Reputable history of performance and reliability.
- UL489 UL File #312425 Ⓢ
- UL508 Recognized, UL File #E222110
- UL508 UL File #257901

Ⓢ These marked MCBs are no longer available. Please use S200U with appropriate universal adapters ZLS1XYU with appropriate number of poles and bus connector L1, L2, L3, for these current ratings and number of poles. For UL files on S200U MCBs please refer to the respective S200U MCB chapter.

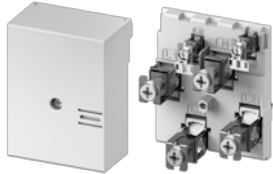
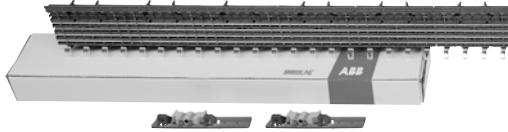
Building a SMISLINE assembly for UL508 and UL489 based solutions

Step 1: Select base module starter pack

Preassembled bases with bus bar components



ZLS808



ZLS224

Step 2: Select main incoming

Main Lugs



Step 3: Select components

Breakers
Miscellaneous DIN rail devices

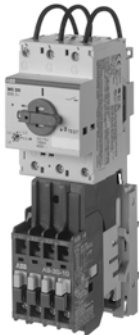
UL489



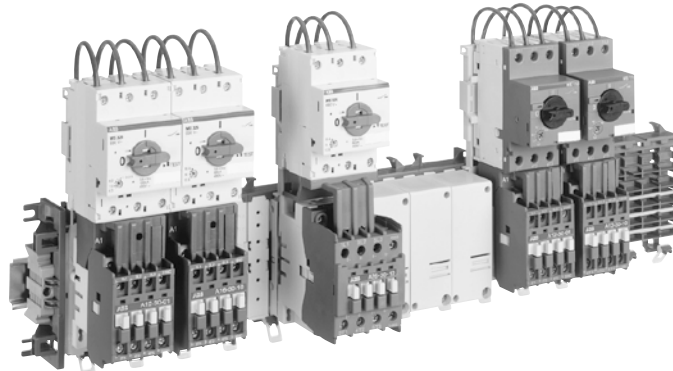
S401U-K10 ①

Contactors
Combo starters
Miscellaneous DIN rail devices

UL508



ZLS325



① These marked MCBs are no longer available. Please use S200U with appropriate universal adapters ZLS1XYU with appropriate number of poles and bus connector L1, L2, L3, for these current ratings and number of poles.

Building a SMISLINE assembly for UL508 and UL489 based solutions

Starter packs, sockets and busbars

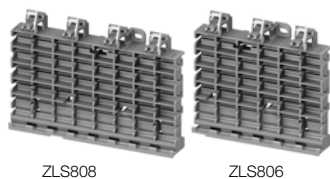
Step 1: Select base modules according to UL508 and UL489



Base module starter packs

Starter packs are available with socket bases, bus bar and end pieces installed.

Number of poles	Number of 8 pole modules	Number of 6 pole modules	Phase	Former catalog number	New catalog number
20	1	2	3L	ZLS782	ZLS204E20-3L
20	1	2	3LN	ZLS783	ZLS204E20-3LN
22	2	1	3L	ZLS760	ZLS204E22-3L
22	2	1	3LN	ZLS761	ZLS204E22-3LN
24	3	—	3L	ZLS750	ZLS204E24-3L
24	3	—	3LN	ZLS751	ZLS204E24-3LN
26	1	3	3L	ZLS785	ZLS204E26-3L
26	1	3	3LN	ZLS786	ZLS204E26-3LN
30	3	1	3L	ZLS762	ZLS204E30-3L
30	3	1	3LN	ZLS763	ZLS204E30-3LN
32	4	—	3L	ZLS752	ZLS204E32-3L
32	4	—	3LN	ZLS753	ZLS204E32-3LN
34	2	3	3L	ZLS776	ZLS204E34-3L
34	2	3	3LN	ZLS777	ZLS204E34-3LN
38	4	1	3L	ZLS764	ZLS204E38-3L
38	4	1	3LN	ZLS765	ZLS204E38-3LN
40	5	—	3L	ZLS754	ZLS204E40-3L
40	5	—	3LN	ZLS755	ZLS204E40-3LN
44	4	2	3L	ZLS778	ZLS204E44-3L
44	4	2	3LN	ZLS779	ZLS204E44-3LN
48	6	—	3L	ZLS756	ZLS204E48-3L
48	6	—	3LN	ZLS757	ZLS204E48-3LN
62	7	1	3L	ZLS780	ZLS204E62-3L
62	7	1	3LN	ZLS781	ZLS204E62-3LN
64	8	—	3L	ZLS766	ZLS204E64-3L
64	8	—	3LN	ZLS767	ZLS204E64-3LN
80	10	—	3L	ZLS758	ZLS204E80-3L
80	10	—	3LN	ZLS759	ZLS204E80-3LN



Socket bases

Description	Number of poles	Catalog number
8-module socket, Length 144 mm	8	ZLS808
6-module socket, Length 108 mm	6	ZLS806

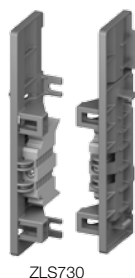
The 6 or 8 pole socket bases are installed either by screwing them to any flat surface or by snapping them into a 35 mm DIN rail.



Busbars – for insertion into one or more socket bases

Description	Number of poles	Catalog number
100 A busbar plated, 10 x 3 mm, for L1, L2, L3, N and PE - Delivery length 1979 mm	110	ZLS200

Busbars are sized as 10 mm x 3 mm and rated for 100 A. They are electroplated for contact with stab adaptors. Maximum length is 2 meters (6'-5"). Busbar snaps easily into socket bases from front.



Socket end piece

To prevent movement of socket bases or busbars, end pieces are used on both sides of the assembly.

Description	Number of poles	Catalog number
Socket end piece (2 pieces, left and right)	—	ZLS730

Busbars

100 A

100 A busbars and sockets

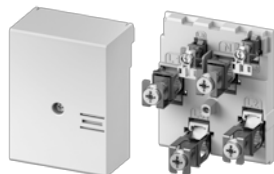
Catalog number busbar 100 A	ABB IT number	Number of sockets 8 module	Number of sockets 6 module	Modules	Busbar length in mm
ZLS201E6	2CCF800158R0001	-	1	6	104
ZLS201E8	2CCF800159R0001	1	-	8	140
ZLS201E12	2CCF800160R0001	-	2	12	212
ZLS201E14	2CCF800161R0001	1	1	14	248
ZLS201E16	2CCF800162R0001	2	-	16	284
ZLS201E18	2CCF800163R0001	-	3	18	320
ZLS201E20	2CCF800164R0001	1	2	20	357
ZLS201E22	2CCF800165R0001	2	1	22	393
ZLS201E24	2CCF800166R0001	3	-	24	429
ZLS201E26	2CCF800167R0001	1	3	26	465
ZLS201E28	2CCF800168R0001	2	2	28	501
ZLS201E30	2CCF800169R0001	3	1	30	537
ZLS201E32	2CCF800170R0001	4	-	32	573
ZLS201E34	2CCF800171R0001	2	3	34	609
ZLS201E36	2CCF800172R0001	3	2	36	645
ZLS201E38	2CCF800173R0001	4	1	38	681
ZLS201E40	2CCF800174R0001	5	-	40	717
ZLS201E42	2CCF800175R0001	3	3	42	753
ZLS201E44	2CCF800176R0001	4	2	44	789
ZLS201E46	2CCF800177R0001	5	1	46	825
ZLS201E48	2CCF800178R0001	6	-	48	861
ZLS201E50	2CCF800179R0001	4	3	50	897
ZLS201E52	2CCF800180R0001	5	2	52	933
ZLS201E54	2CCF800181R0001	6	1	54	969
ZLS201E56	2CCF800182R0001	7	-	56	1005
ZLS201E58	2CCF800183R0001	5	3	58	1041
ZLS201E60	2CCF800184R0001	6	2	60	1077
ZLS201E62	2CCF800185R0001	7	1	62	1113
ZLS201E64	2CCF800186R0001	8	-	64	1150
ZLS201E66	2CCF800187R0001	6	3	66	1186
ZLS201E68	2CCF800188R0001	7	2	68	1222
ZLS201E70	2CCF800189R0001	8	1	70	1258
ZLS201E72	2CCF800190R0001	9	-	72	1294
ZLS201E74	2CCF800191R0001	7	3	74	1330
ZLS201E76	2CCF800192R0001	8	2	76	1366
ZLS201E78	2CCF800193R0001	9	1	78	1402
ZLS201E80	2CCF800194R0001	10	-	80	1438
ZLS201E82	2CCF800195R0001	8	3	82	1474
ZLS201E84	2CCF800196R0001	9	2	84	1510
ZLS201E86	2CCF800197R0001	10	1	86	1546
ZLS201E88	2CCF800198R0001	11	-	88	1582
ZLS201E90	2CCF800199R0001	9	3	90	1618
ZLS201E92	2CCF800200R0001	10	2	92	1654
ZLS201E94	2CCF800201R0001	11	1	94	1690
ZLS201E96	2CCF800202R0001	12	-	96	1726
ZLS201E98	2CCF800203R0001	10	3	98	1762
ZLS201E100	2CCF800204R0001	11	2	100	1798
ZLS201E102	2CCF800205R0001	12	1	102	1834
ZLS201E104	2CCF800206R0001	13	-	104	1870
ZLS201E106	2CCF800207R0001	11	3	106	1906
ZLS201E108	2CCF800208R0001	12	2	108	1942

Planning for the incorporation of feeder block and spare places should be taken into account. The total lengths given above were calculated by taking socket spacings and tolerances into account. For this reason, the indicated busbar length is not necessarily a multiple of 18 mm (1 Module).

Building a SMISLINE assembly for UL508 and UL489 based solutions

Step 2: Select main incoming

Standard incoming terminal blocks according to UL508 and UL489



ZLS224

Description	Number of poles	Phase	Catalog number
100 A	4	3LN left	ZLS224
		3LN right	ZLS224R
		3L left	ZLS225
		3L right	ZLS225R

Incoming terminal blocks are used to connect cables directly to the busbar. Terminal block can accept up to 4 main terminals L1, L2, L3 and N. Each lug will accommodate 10 - 1/0 AWG wire.



ZLS251

Incoming terminal component according to UL508 and UL489 (200A)

Description	Number of poles	Phase	Catalog number
200 A	2	L1 terminal	ZLS251
		L2 terminal	ZLS252
		L3 Terminal	ZLS253

Incoming terminal component used to connect feeder cable to busbars. These are single pole components for line terminals L1, L2 and L3. Each lug will accommodate 10 - 1/0 AWG wire.

Socket accessories

Busbar Insulator



ZLS239

Description	Module	Catalog number
Dark grey, for isolation and spacing of separate busbar sections, 18mm	1	ZLS239

This dark gray insulator electrically isolates the interrupted busbar ends from each other.

Busbar cover



ZLS100

Description	Module	Catalog number
Electrically protected covering of main and auxiliary busbars. Covers come in 4 module pieces and can be divided. Suitable to accept extension adapter ZLS 101, 4x18mm	4	ZLS100

Busbar cover ensures protection by covering main busbars. Covers come in 4 module pieces and can be divided. The openings are marked and allow voltage measurements on the busbars without removing.

Building a SMISLINE assembly for UL489 based solutions ①

Step 3: Select MCB components according to UL489

S400U Series

Rated current I_N A	Number of poles	Catalog number
2	1	S401U-K2 ①
5	1	S401U-K5 ①
8	1	S401U-K8 ①
10	1	S401U-K10 ①
15	1	S401U-K15 ①
20	1	S401U-K20 ①
25	1	S401U-K25 ①
30	1	S401U-K30 ①
40	1	S401U-K40 ①
50	1	S401U-K50 ①
60	1	S401U-K60 ①
2	2	S402U-K2 ①
5	2	S402U-K5 ①
8	2	S402U-K8 ①
10	2	S402U-K10 ①
15	2	S402U-K15 ①
20	2	S402U-K20 ①
25	2	S402U-K25 ①
30	2	S402U-K30 ①
40	2	S402U-K40 ①
50	2	S402U-K50 ①
60	2	S402U-K60 ①
2	3	S403U-K2 ①
5	3	S403U-K5 ①
8	3	S403U-K8 ①
10	3	S403U-K10 ①
20	3	S403U-K20 ①
25	3	S403U-K25 ①
30	3	S403U-K30 ①
40	3	S403U-K40 ①
50	3	S403U-K50 ①
60	3	S403U-K60 ①



S401U-K5



S401U-K10



S403U-K20



S2C-H6RU



ZLS502



ZLS501

Made exclusively for use on the SMISLINE distribution bus system, the S400U series is a UL489 branch rated device. The S400U offers movable tabs on the bottom of the unit for fast, easy selection of L1, L2 or L3. The indication window on the top of the unit clearly identifies breaker phasing.

Auxiliary contact, locking device, "Blank" housing

Description	Catalog number
Auxiliary contact	S2C-H6RU
Blank housing	ZLS502
Locking device	ZLS501

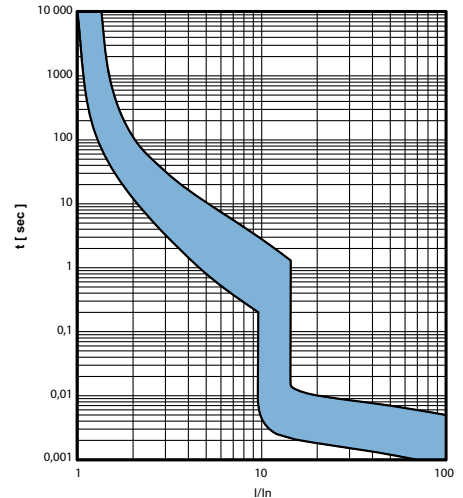
These accessories are simply snapped in place for easy field mounting. The auxiliary unit takes only 1/2 pole space on SMISLINE. To complete the full pole spacing, add a ZLS502 blank unit.

Tripping characteristics K

UL489
240 V AC
10 kA

Inductive loads

- K Curve
- Designed for allowing higher in-rush currents during system start up
- Example: motors, transformers



NOTE

① These marked MCBs are no longer available. Please use S200U with appropriate universal adapters ZLS1XYU with appropriate number of poles and bus connector L1, L2, L3, for these current ratings and number of poles.

25 A and 45 A bus stab adapters UL489 based solutions

25 A and 45 A bus stab adapters

These UL489 bus stab adapters are designed for using with the S200U 240V ABB minibreakers. Please refer to dimension pages for additional details.



ZLS161U

ZLS177U

Description	Module	Catalog number
25 A Solutions		
Single adaptor 25 A <u>bottom feed</u> , <u>Clip on bottom side</u> of ZLS808, ZLS806 SOCKET BASE		
L1	1	ZLS161U
L2	1	ZLS162U
L3	1	ZLS163U
Single adaptor 25 A <u>top feed</u> , <u>Clip on bottom side</u> of ZLS808, ZLS806 SOCKET BASE		
L1	1	ZLS177U
L2	1	ZLS178U
L3	1	ZLS179U
45 A Solutions		
Single adaptor 45 A <u>top feed</u> , <u>Clip on bottom side</u> of ZLS808, ZLS806 SOCKET BASE		
L1	1	ZLS167U
L2	1	ZLS168U
L3	1	ZLS169U
Single adaptor 45 A <u>bottom feed</u> , <u>Clip on bottom side</u> of ZLS808, ZLS806 SOCKET BASE		
L1	1	ZLS171U
L2	1	ZLS172U
L3	1	ZLS173U



ZLS171U

ZLS167U

Dummy element adapter

Description	Module	Catalog number
Dummy element adapter	1	ZLS164U



ZLS164U

Building a SMISSLINE assembly for UL508 based solutions

Step 3: Select components according to UL508

Combination motor starters

All modules include: Combi module, contactor, MS325 manual motor protector, MS325 coupler, and brass pin connector.



ZLS325-480-0.5

480V – AC Coils, Combo starters

Description	Number of poles	Catalog number
1/2HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-480-0.5
3/4HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-480-.75
1HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-480-1
2HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-480-2
3HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-480-3
5HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-480-5
7.5HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-480-7.5
10HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-480-10
15HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-480-15

240V – AC Coils, Combo starters

Description	Number of poles	Catalog number
1/2HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-240-0.5
1HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-240-1
1.5HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-240-1.5
2.5HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-240-2.5
3HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-240-3
5HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-240-5
7.5HP Motor Starter – Disc. w/ Overload and Bus Adaptor	3	ZLS325-240-7.5



ZLS325-240-0.5

480V – Reversing combo starters

Description	Number of poles	Catalog number
1/2HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-480-0.5
3/4HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-480-.75
1HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-480-1
2HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-480-2
3HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-480-3
5HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-480-5
7.5HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-480-7.5

240V – Reversing combo starters

Description	Number of poles	Catalog number
1/2HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-240-0.5
1HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-240-1
1.5HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-240-1.5
2.5HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-240-2.5
3HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-240-3
5HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-240-5
7.5HP Motor Starter – Disc. w/ Overload and Bus Adaptor	6	ZLS325R-240-7.5

30 A and 60 A universal adapters UL508 based solutions

30 A and 60 A universal adapters

Bus stab adapters are designed for top or bottom feed for complete flexibility. No matter how the socket bases are mounted. Clip side of the ZLS808 or Z1S806 on top or bottom. Please refer to dimension pages for additional details.



ZLS177 ZLS167



ZLS184



ZLS171

Description	Module	Catalog number
Single adaptor 30 A <u>bottom feed</u> with <u>clip on bottom side</u> of ZLS806, ZLS808 socket base		
N	1	ZLS160
L1	1	ZLS161
L2	1	ZLS162
L3	1	ZLS163
Single adaptor 60 A <u>bottom feed</u> with <u>clip on bottom side</u> of ZLS806, ZLS808 socket base		
N	1	ZLS170
L1	1	ZLS171
L2	1	ZLS172
L3	1	ZLS173
Combination adaptor 30 A <u>clip on top side</u> of ZLS806, ZLS808 with <u>top feed</u>		
L1, L2	2	ZLS185TT12
L2, L3	2	ZLS185TT23
L1, L3	2	ZLS185TT13
L1, L2, L3	3	ZLS183TT
Combination adaptor 60 A <u>clip on top side</u> of ZLS806, ZLS808 with <u>top feed</u>		
L1, L2	2	ZLS186TT12
L2, L3	2	ZLS186TT23
L1, L3	2	ZLS186TT13
L1, L2, L3	3	ZLS189TT
Single adaptor 30 A <u>top feed</u> with <u>clip on bottom side</u> of ZLS806, ZLS808 socket base		
N	1	ZLS176
L1	1	ZLS177
L2	1	ZLS178
L3	1	ZLS179
Single adaptor 60 A <u>top feed</u> with <u>clip on bottom side</u> of ZLS806, ZLS808 socket base		
N	1	ZLS166
L1	1	ZLS167
L2	1	ZLS168
L3	1	ZLS169
Combination adaptor 30 A <u>clip on top side</u> of ZLS806, ZLS808 <u>socket base and bottom feed</u>		
L1, L2	2	ZLS187TB12
L2, L3	2	ZLS187TB23
L1, L3	2	ZLS187TB13
L1, L2, L3	3	ZLS183TB
Combination adaptor 60 A <u>clip on top side</u> of ZLS806, ZLS808 <u>socket base and bottom feed</u>		
L1, L2	2	ZLS188TB12
L2, L3	2	ZLS188TB23
L1, L3	2	ZLS188TB13
L1, L2, L3	3	ZLS188TB
Single adaptor, wire length, 300 mm, 30 A <u>top feed</u> . <u>Wire opposite clip side</u> of ZLS806, ZLS808		
N	1	ZLS176L300
L1	1	ZLS177L300
L2	1	ZLS178L300
L3	1	ZLS179L300
Single adaptor, wire length, 300 mm, 60 A <u>top feed</u> . <u>Wire opposite clip side</u> of ZLS806, ZLS808		
N	1	ZLS166L300
L1	1	ZLS167L300
L2	1	ZLS168L300
L3	1	ZLS169L300
Single adaptor, wire length, 300 mm, 30 A <u>bottom feed</u> . <u>Wire on clip side</u> of ZLS806, ZLS808		
N	1	ZLS160L300
L1	1	ZLS161L300
L2	1	ZLS162L300
L3	1	ZLS163L300
Single adaptor, wire length, 300 mm, 60 A <u>bottom feed</u> . <u>Wire on clip side</u> of ZLS806, ZLS808		
N	1	ZLS170L300
L1	1	ZLS171L300
L2	1	ZLS172L300
L3	1	ZLS173L300

Combi module

UL508 based solutions

Combi module without plug-in contacts

Description	Module	Catalog number
Combi module	—	ZLS840

Used for motor controls in same panel but not plugged into SMISLINE bus network.

Combi module accessories

Description	Module	Catalog number
Connection element for combi module (3 connectors per module) Bag containing 12 items	—	ZLS519
Fixing pins for contactor Bag containing 10 items	—	ZLS522

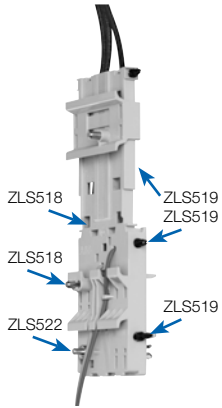
These accessories are designed exclusively for the A-Line contactor and MS325 manual motor protector to give stability from vibrations and sliding while mounted on the combi-module.



ZLS8403LABWT-S
Wire at top



ZLS840
No wire



Technical data

S400U circuit breaker UL489 ①

Auxiliary contact UL489, Power losses, internal resistances

S400U ①	UL489 listed Circuit Breaker (File E 312425)
Certifications:	240 V AC
Rated voltage:	2...60 A
Rated current:	K
Trip characteristics:	1...3
Number of poles:	50/60 Hz
Rated frequency:	10 kA
Rated interrupting:	Yes
UL Current limiting:	Opposing action stroke clamp on cylinder, finger-safe (front), suitable to clamp
Terminal at load side S400U:	Single conductor-copper only
Conductor Type:	14-4AWG, solid or stranded (mm ²)
Wire Range:	25 lbs in (2.8 Nm)
Tightening torque:	IP40 front (6000 electrical, 4000 mechanical)
Degree of protection:	any
Mounting position:	-40 °F...158 °F (-40 °C...70 °C)
Storage temperature:	-13 °F...131 °F (-25 °C...55 °C)
Ambient temperature:	5 g, 20 Cycles 5...150...5 Hz at 0.8 In, IEC 60068-2-6
Vibration resistance acc. to DIN EN 60 068-2-6: Resistance to vibrations	halogen-free
Plastic material:	cadmium-free
Contacts:	
Auxiliary contact, S2C-H6RU	
Rated current In/A:	1A, 480 V AC; 2A, 277 V AC
Contact:	1 Alteration
Wire Range:	18...14AWG (0.75...2.5mm ²)
Tightening torque:	10,6 lbs (1,2 Nm)
Contact security by vibration resistance according to DIN IEC 68-2-6:	5g, 20 frequency cycles 5...150...5 Hz by 24 V AC, 5 mA short break < 10 ms
Mechanical device endurance:	10.000 cycles
Dimension in mm:	68 x 74 x 99

Internal resistances at rated voltage and power losses ①

Internal resistances and power loss per pole (20° C - valve) (68° F)

Rated current A	mΩ	P _v
		W
2	0.415	1.7
5	0.150	2.4
8	0.043	2.7
10	0.0165	1.7
15	0.0095	2.4
20	0.0073	2.9
25	0.0053	3.3
39	0.0034	3.4
40	0.0028	4.5
50	0.0021	5.3
60	0.0015	5.9

NOTE

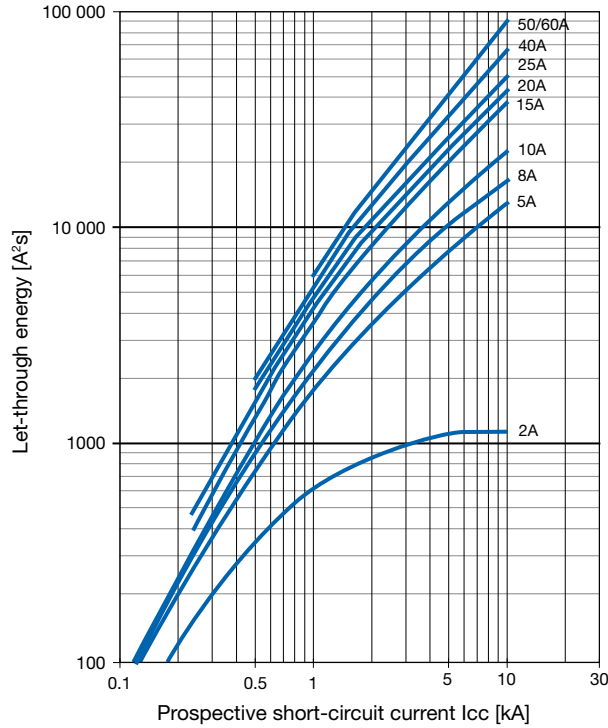
① These marked MCBs are no longer available. Please use S200U with appropriate universal adapters ZLS1XYU with appropriate number of poles and bus connector L1, L2, L3, for these current ratings and number of poles.

Technical data

S400U circuit breaker UL489 ①

Let through energies I^2t

S400U characteristics at 240 V AC ①



S400U-K Maximum I_{peak} and I^2t Values ①

Type	Ampere Ratings (A)	Voltage (V)	Frequency (Hz)	Phase	Current (A)	Maximum Values	
						I_{peak} (kA)	I^2t (kA²s)
S401U-K	0.2-15	240	60	1	4095	2.5	8
S401U-K	0.2-15	240	60	1	7500	3.5	20
S401U-K	0.2-15	240	60	1	10000	6	40
S401U-K	16-30	240	60	1	4095	4	35
S401U-K	16-30	240	60	1	7500	5	45
S401U-K	16-30	240	60	1	10000	6.8	80
S401U-K	40-60	240	60	1	4095	4.6	56
S401U-K	40-60	240	60	1	7500	6.8	75
S401U-K	40-60	240	60	1	10000	7.5	90
S403U-K	0.2-15	240	60	3	4095	2.3	6
S403U-K	0.2-15	240	60	3	7500	2.8	10
S403U-K	0.2-15	240	60	3	10000	5.5	30
S403U-K	16-30	240	60	3	4095	3.3	15
S403U-K	16-30	240	60	3	7500	4	22
S403U-K	16-30	240	60	3	10000	6	35
S403U-K	40-60	240	60	3	4095	4.4	35
S403U-K	40-60	240	60	3	7500	6.6	56
S403U-K	40-60	240	60	3	10000	7	60

Threshold Current Rating: 4095 A
 Intermediate Current Rating: 7500 A
 Maximum Interrupting Current Rating: 10000 A

NOTE

① These marked MCBs are no longer available. Please use S200U with appropriate universal adapters ZLS1XYU with appropriate number of poles and bus connector L1, L2, L3, for these current ratings and number of poles.

Technical data

Busbar system

UL489, UL508 (E257901)

Incoming terminal block / incoming terminal block components

	Busbar	Incoming terminal blocks, ZLS224, 2224, 225, 225R	Incoming terminal component, ZLS250, 251, 252, 253
Maximum nominal voltage:	240 V	240 V	240 V
Maximum nominal current:	100 A	100 A	200 A
Nominal current for supply, side feed:	100 A	100 A	100 A
Nominal current for supply, center feed:	100 A	150 A	200 A
Resistance to short circuits:		50 kA when protected by a 150 A fuse 10 kA when protected by a 200 A fuse	
Supply cable size:		14 to 1/0 AWG	8 AWG to 3/0 AWG

UL508 (E222110)

Busbar system accessories

	Busbar	Incoming terminal block	Incoming terminal component	Universal adapter 30 A	Universal adapter 60 A	Combi module	Adaptor MS325 ZLS8403
Maximum nominal voltage:			600 V AC				
Maximum nominal current:	100 A	150 A	200 A	30 A	60 A	32 A	25 A
Nominal current for supply, left or right:	100 A	100 A	100 A	—	—	—	—
Nominal current for supply, center:	100 A	150 A	200 A	—	—	—	—
Resistance to short circuits:			50 kA with 200 A back-up fuse				
Supply cable size:		+0 to 1/0 AWG	8 AWG to 3/0 AWG				

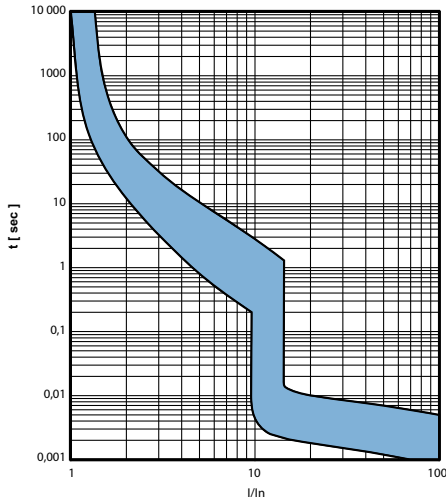
Technical data

S400U circuit breaker UL489 ①

Trip characteristics, Influence of ambient temperature

Trip characteristics: K ①

Calibration temperature 77 °F (25 °C)



Temperature Derating ①

Rated Current Amps	50 °F (10 °C)	59 °F (15 °C)	68 °F (20 °C)	77 °F (25 °C)	86 °F (30 °C)	95 °F (35 °C)	104 °F (40 °C)	113 °F (45 °C)	122 °F (50 °C)	131 °F (55 °C)
2	2.21	2.14	2.07	2	1.93	1.86	1.79	1.72	1.65	1.57
5	5.65	5.43	5.22	5	4.78	4.56	4.34	4.12	3.91	3.69
8	8.8	8.6	8.3	8	7.7	7.4	7.2	6.9	6.6	6.3
10	11.1	10.7	10.4	10	9.7	9.3	9.0	8.6	8.3	7.9
15	16.7	16.1	15.6	15	14.4	13.9	13.3	12.7	12.2	11.6
20	22.1	21.4	20.7	20	19.3	18.6	17.9	17.2	16.5	15.8
25	27.6	26.8	25.9	25	24.1	23.3	22.4	21.5	20.6	19.7
30	33.4	32.3	31.1	30	28.9	27.8	26.6	25.5	24.4	23.2
40	43.8	42.5	41.3	40	38.7	37.4	36.2	34.9	33.6	32.3
50	55.3	53.5	51.8	50	48.2	46.5	44.7	43.0	41.2	39.5
60	66.7	64.4	62.2	60	57.8	55.6	53.3	51.1	48.9	46.7

Max. operating currents depending on ambient temperature for S400U miniature circuit breakers trip characteristic K.
S400U calibrated at 77 °F (25 °C).

NOTE

① These marked MCBs are no longer available. Please use S200U with appropriate universal adapters ZLS1XYU with appropriate number of poles and bus connector L1, L2, L3, for these current ratings and number of poles.

Technical data

S400U circuit breaker UL489 ① Series rating with Tmax T3, T4

Class J Fuse - S400U @ 240V AC ①

		L.	Fuse
I.		I_n [A]	Max. 200 S
S400U	K	2...60	50 I_{cu} [kA]

Sace Tmax - S400U @ 240V AC ①

		Up- stream	T3	T3	T4	T4	T4	T4	T4
Downstream	Version	Version	N	S	N	S	H	L	U
		I_n [A]	I_{cu} [kA]	50	65	65	100	150	200
S400U	K	2...60		25	25	50	50	50	50

I. = Upstream

L. = Downstream

A. = version

Back-up limit values are specified in kA

NOTE

① These marked MCBs are no longer available. Please use S200U with appropriate universal adapters ZLS1XYU with appropriate number of poles and bus connector L1, L2, L3, for these current ratings and number of poles.

Technical data

Miniature circuit breaker S400U ①

Selectivity to Sace Tmax T3, T4

Tmax T3 - S400U @ 240V ①

		I.	T3						
		Version	N, S						
		Release	TM, M						
		Frame size	250						
L.	Char.	I _n [A]	60	80	100	125	150	175	200
S400U	K	2	10	10	10	10	10	10	10
		5	10	10	10	10	10	10	10
		10	10	8,5	10	10	10	10	10
		15	4,5	7,5	10	10	10	10	10
		20	4,5	5,5	6,5	10	10	10	10
		25	3,5	5,5	6	9,5	10	10	10
		30		4,5	6	9,5	10	10	10
		40			5	8	10	10	10
		50			3	6	9,5	10	10
60			3	5,5	9,5	10	10		

Tmax T4 - S400U @ 240V ①

		I.	T4											
		Version	N, S, H, L, V											
		Release	TM, M								EL			
		Frame size	200								200			
L.	Char.	I _n [A]	20	25	30	50	80	100	125	160	200	100	160	200
S400U	K	2	50	50	50	50	50	50	50	50	50	50	50	50
		5	10	10	10	10	10	10	10	10	10	10	10	10
		10		5	5	5	9	10	10	10	10	10	10	10
		15		5		5	8	10	10	10	10	10	10	10
		20				5	6	10	10	10	10	10	10	10
		25				5	6	10	10	10	10	10	10	10
		30				5	6	10	10	10	10	10	10	10
		40					5,5	10	10	10	10	10	10	10
		50					5	10	10	10	10	10	10	10
60						10	10	10	10	10	10	10		

NOTE

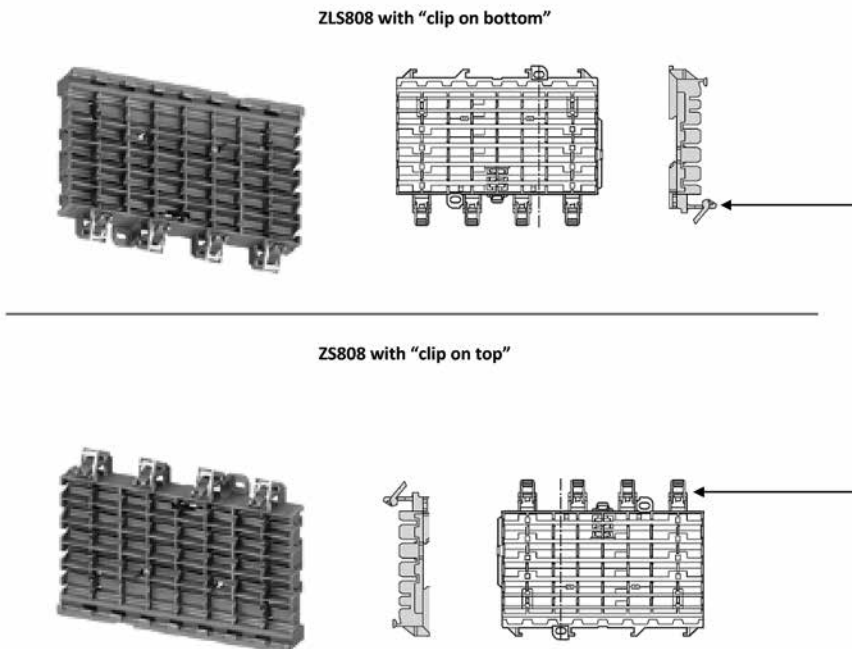
① These marked MCBs are no longer available. Please use S200U with appropriate universal adapters ZLS1XYU with appropriate number of poles and bus connector L1, L2, L3, for these current ratings and number of poles.

Building a SMISLINE assembly

Module socket assembly rail orientation and adapter configuration definitions

Explanation of “clip on top” and “clip on bottom” concept:

1. This is achieved by simply inverting the 8 module or 6 module socket assembly.
2. There is no change in the ZLS808 or ZLS806 catalog number.



Universal adapter configurations

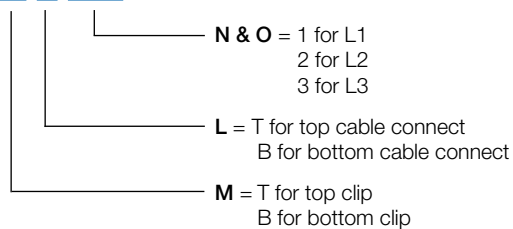
The universal adapters can be combined to generate different combination connections to the respective bus bars as required. This allows load connections to be connected to the bottom or top for maximum flexibility of the module rail.

Example

ZLS188TB13 = Top clip, bottom cable entry with L1 and L3 bus bar connections

Refer to dimensions section for more details and options.

ZLS1 xx M L NO



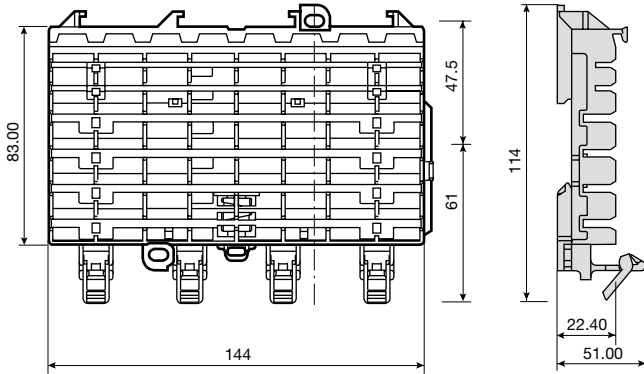
Approximate dimensions

Module base sockets; incoming terminal blocks

Main power module

ZLS808 8 module base socket

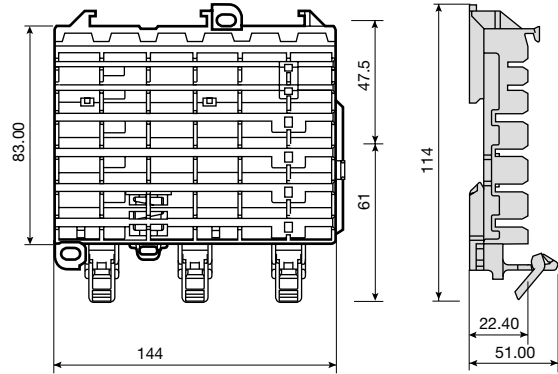
(dimensions in mm)



The base consists of eight (8) 18 mm poles designed to stand alone or to be combined with other bases to accommodate: bus bar, bus adaptors, main lugs, main breakers, main fused and non-fused switches, combination starters, feeder breakers, feeder switches, or contactors. The base may be fixed mounted, DIN rail mounted, or assembled on a panel inner door.

ZLS806 6 module base socket

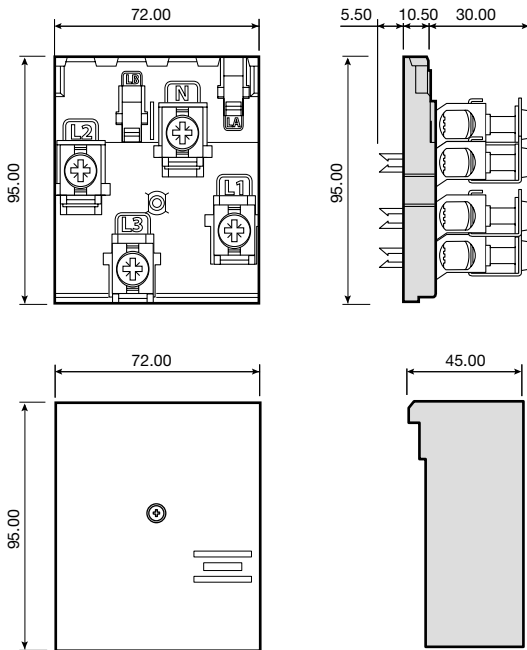
(dimensions in mm)



The base consists of six (6) 18 mm poles designed to stand alone or to be combined with other bases to accommodate: bus bar, bus adaptors, main lugs, main breakers, main fused and non-fused switches, combination starters, feeder breakers, feeder switches, or contactors. The base may be fixed mounted, DIN rail mounted, or assembled on a panel inner door.

ZLS224 Incoming terminal blocks

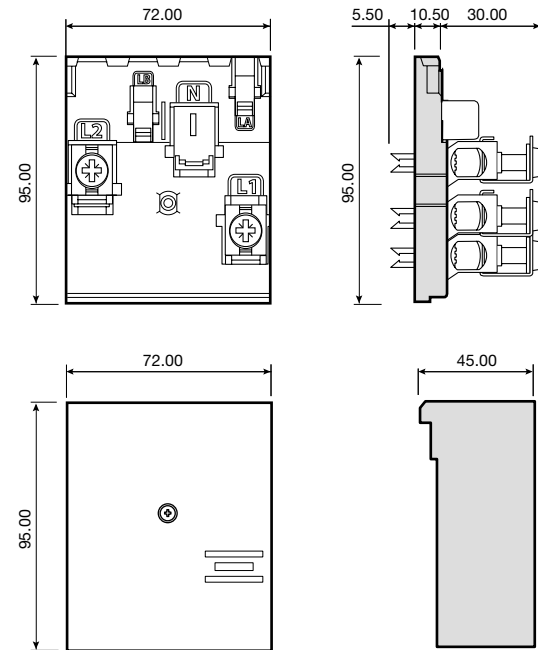
(dimensions in mm)



The ZLS224 is a 100A rated module if feeding the end of a SMISLINE line-up or 150A rated module if feeding the center of a SMISLINE line-up. The module is designed to allow wire to be connected to the system bus. The ZLS224 may be used as an incoming or outgoing device and has four (4) lugs (L1, L2, L3, N) designed to accommodate 10-1/0 AWG wire.

ZLS225 Main power module

(dimensions in mm)

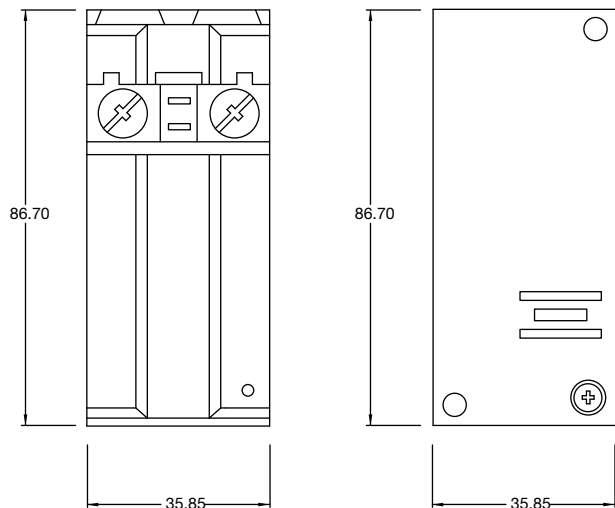


The ZLS225 is a 100A rated module if feeding the end of a SMISLINE line-up or 150A rated module if feeding the center of a SMISLINE line-up. The module is designed to allow wire to be connected to the system bus. The ZLS225 may be used as an incoming or outgoing device and has three (3) lugs (L1, L2, L3) designed to accommodate 10-1/0 AWG wire.

Approximate dimensions Main power modules

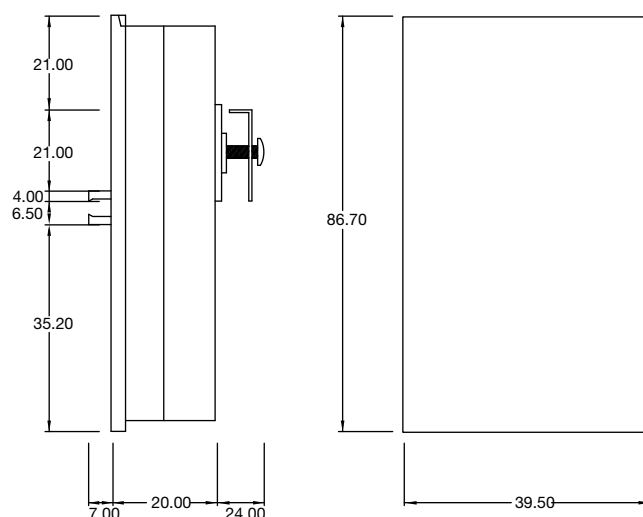
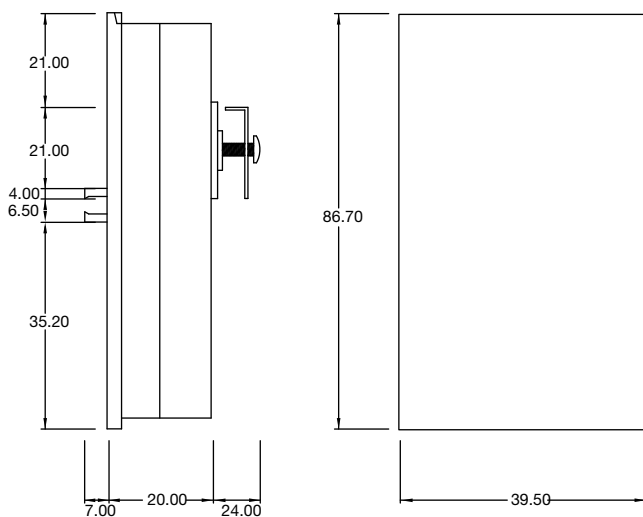
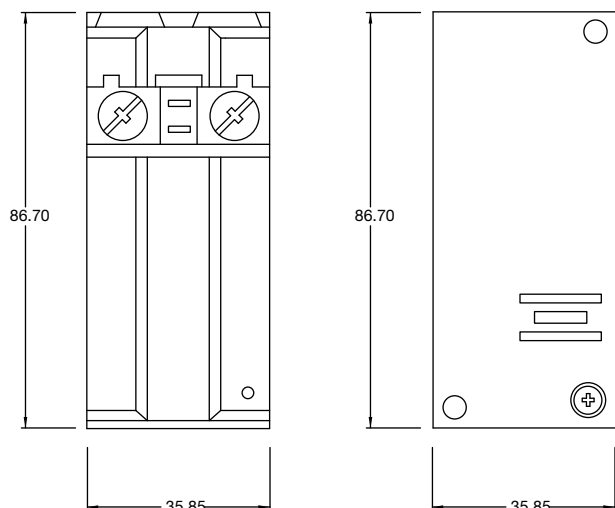
ZLS250 Main power module

(dimensions in mm)



ZLS251 Main power module

(dimensions in mm)



The ZLS250 is a 200 A rated module if feeding the center of a SMISSLINE line-up. The module is designed to allow wire to be connected to the system bus. The ZLS250 may be used as an incoming or outgoing device and has one lug (N) designed to accommodate 8-4/0 AWG wire.

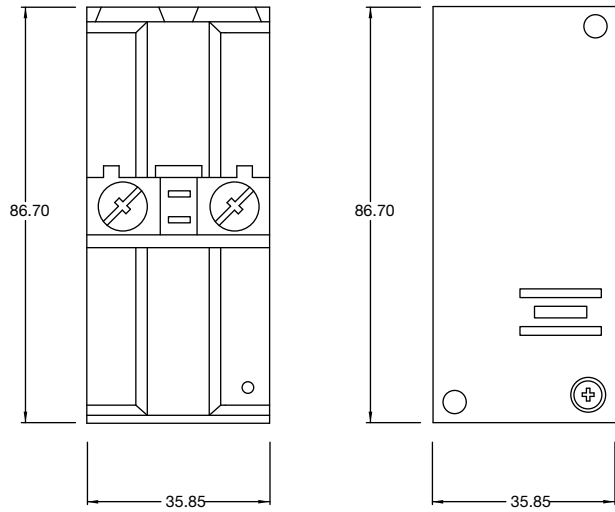
The ZLS251 is a 200 A rated module if feeding the center of a SMISSLINE line-up. The module is designed to allow wire to be connected to the system bus. The ZLS251 may be used as an incoming or outgoing device and has one lug (L1) designed to accommodate 8-4/0 AWG wire.

Approximate dimensions

Main power modules

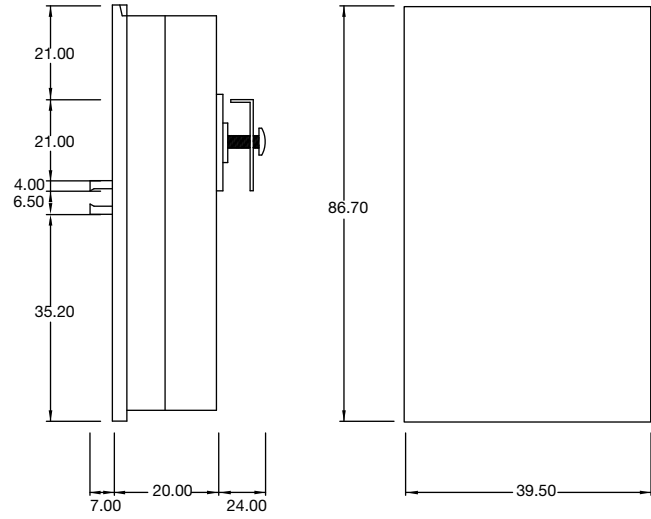
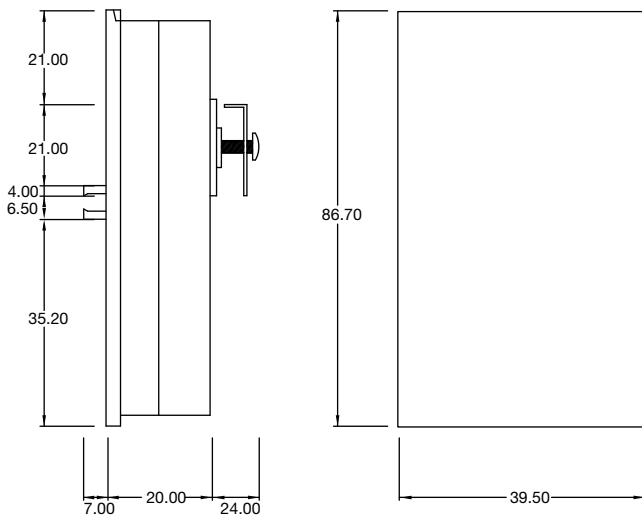
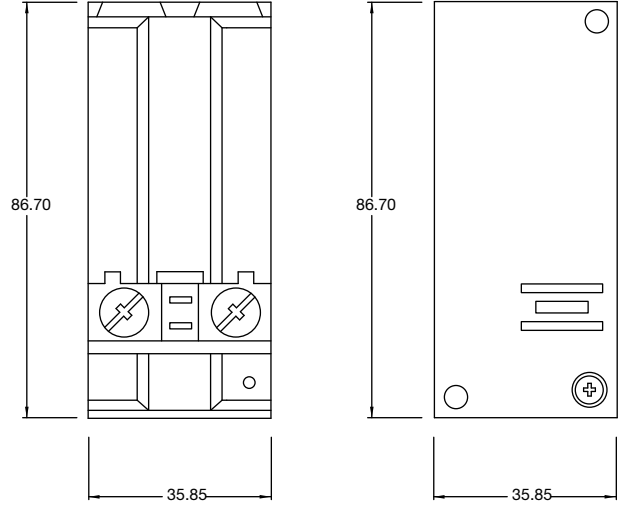
ZLS252 Main power module

(dimensions in mm)



ZLS253 Main power module

(dimensions in mm)



The ZLS252 is a 100 A from either side of incoming module. The module is designed to allow wire to be connected to the system bus. The ZLS252 may be used as an incoming or outgoing device and has one lug (L2) designed to accommodate 8-4/0 AWG wire.

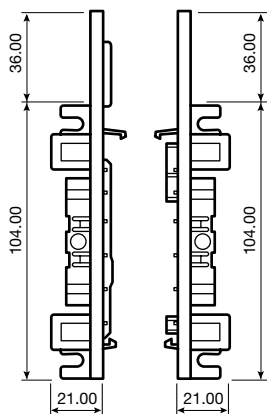
The ZLS253 is a 100 A from either side of incoming module. The module is designed to allow wire to be connected to the system bus. The ZLS253 may be used as an incoming or outgoing device and has one lug (L3) designed to accommodate 8-4/0 AWG wire.

Approximate dimensions

Base end stop Bus stab adaptor

ZLS730 Base end stop

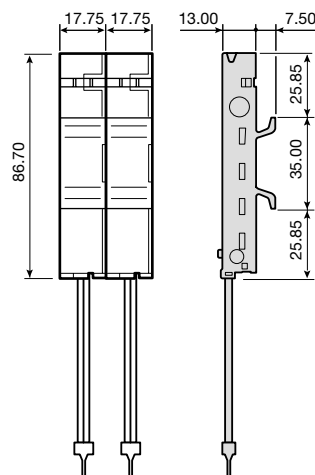
(dimensions in mm)



The ZLS30 end stop is designed to insulate and secure the ends of a SMISSLINE assembly. The module electrically isolates the bus bars of the main socket bases and the sockets of the neutral and ground assemblies.

60A 2P Bus stab adaptor

(dimensions in mm)



The bus stab adaptor is designed to connect the assembly bus bar to DIN rail mounted electrical components. SMISSLINE bus stab can be joined together in any configuration.

2 Pole combination adaptor; 60 A clip on top side of ZLS806

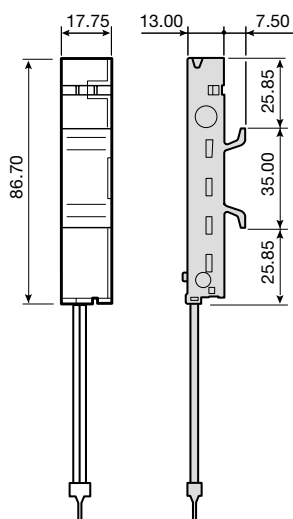
L1, L2 ZLS186TT12
L1, L2 ZLS188TB12
L1, L3 ZLS186TT13

2 Pole combination adaptor; 60 A clip on top side ZLS806, ZLS808 socket base and bottom fed

L1, L3 ZLS186TT23
L1, L3 ZLS188TB23
L1, L3 ZLS188TB13

60A 1P Bus stab adaptor

(dimensions in mm)



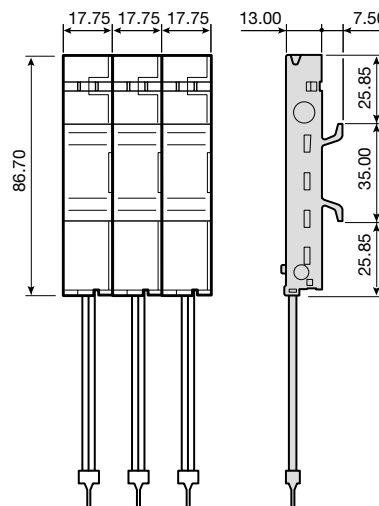
The bus stab adaptor is designed to connect the assembly bus bar to DIN rail mounted electrical components. SMISSLINE bus stab can be joined together in any configuration.

Bus stab adaptors:

ZS170 (N), ZLS171 (L1), ZLS172 (L2), ZLS173 (L3)
ZLS166 (N), ZLS167 (L1), ZLS168 (L2), ZLS169 (L3)

60A 3P Bus stab adaptor

(dimensions in mm)



The bus stab adaptor is designed to connect the assembly bus bar to DIN rail mounted electrical components. SMISSLINE bus stab can be joined together in any configuration.

3 Pole combination adaptor; 60 A clip on top side of ZLS806, ZLS808 socket bottom fed

L1, L2, L3 ZLS183TB

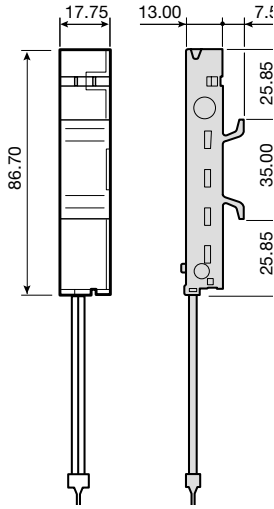
3 Pole combination adaptor; 60 A clip on top side ZLS806, ZLS808 with top and feed

L1, L2, L3 ZLS183TT

Approximate dimensions

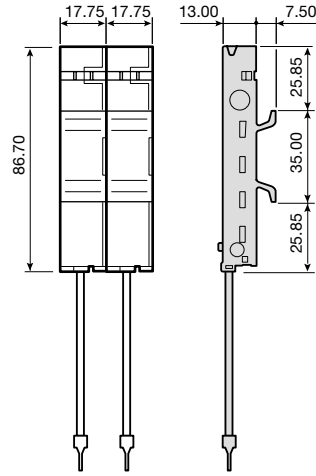
30A 1P Bus stab adaptor

(dimensions in mm)



30A 2P Bus stab adaptor

(dimensions in mm)



Bus stab adaptors:

- ZLS185TT12 [Wire on clip side of ZLS808, ZLS806 socket base]
- ZLS185TT23 [Wire on clip side of ZLS808, ZLS806 socket base]
- ZLS185TT13 [Wire on clip side of ZLS808, ZLS806 socket base]
- ZLS187TB12 [Wire on opposite clip side of ZLS808, ZLS806 socket base]
- ZLS187TB23 [Wire on opposite clip side of ZLS808, ZLS806 socket base]
- ZLS187TB13 [Wire on opposite clip side of ZLS808, ZLS806 socket base]
- ZLS187BT12 [Wire on opposite clip side of ZLS808, ZLS806 socket base]
- ZLS187BT23 [Wire on opposite clip side of ZLS808, ZLS806 socket base]
- ZLS187BT13 [Wire on opposite clip side of ZLS808, ZLS806 socket base]
- ZLS185BB12 [Wire on clip side of ZLS808, ZLS806 socket base]
- ZLS185BB23 [Wire on clip side of ZLS808, ZLS806 socket base]
- ZLS185BB13 [Wire on clip side of ZLS808, ZLS806 socket base]

The bus stab adaptor is designed to connect the assembly bus bar to DIN rail mounted electrical components. SMISSLINE bus stab can be joined together in any configuration.

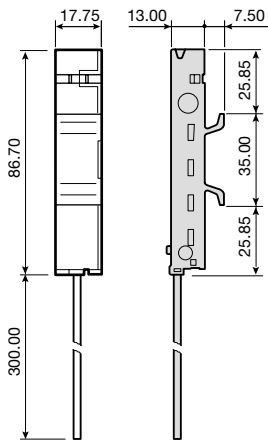
The bus stab adaptor is designed to connect the assembly bus bar to DIN rail mounted electrical components. SMISSLINE bus stab can be joined together in any configuration.

Bus stab adaptors:

- ZS160 (N), ZLS161 (L1), ZLS162 (L2), ZLS163 (L3)
- ZLS176 (N), ZLS177 (L1), ZLS178 (L2), ZLS179 (L3)

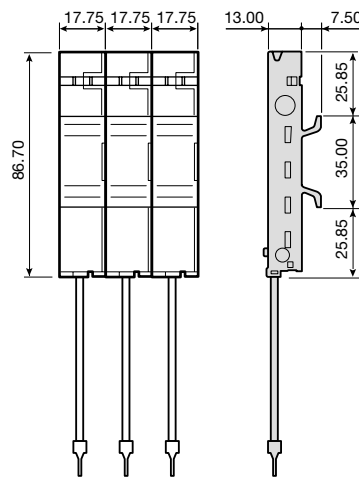
30A 1P 300 mm Bus stab adaptor

(dimensions in mm)



30A 3P Bus stab adaptor

(dimensions in mm)



The bus stab adaptor is designed to connect the assembly bus bar to DIN rail mounted electrical components. SMISSLINE bus stab can be joined together in any configuration.

The bus stab adaptor is designed to connect the assembly bus bar to DIN rail mounted electrical components. SMISSLINE bus stab can be joined together in any configuration.

Bus stab adaptors with 300 mm wire:

- ZS161L300 (L1), ZLS162L300 (L2), ZLS163L300 (L3)
- ZLS177L300 (L1), ZLS178L300 (L2), ZLS179L300 (L3)

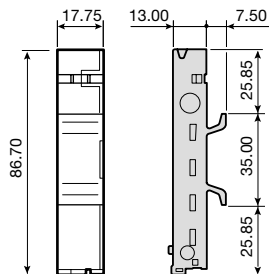
Bus stab adaptors:

- ZLS183TT (Wire on clip side of ZLS808, ZLS806 socket base)
- ZLS183TB (Wire on opposite clip side of ZLS808, ZLS806 socket base)
- ZLS183BT (Wire on opposite clip side of ZLS808, ZLS806 socket base)
- ZLS183BB (Wire on clip side of ZLS808, ZLS806 socket base)

Approximate dimensions

Blank adaptor – ZLS164

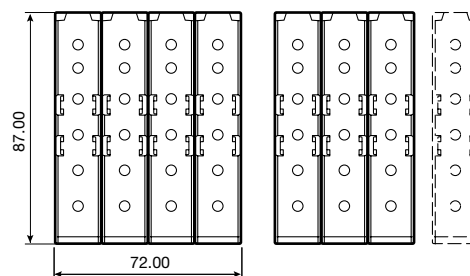
(dimensions in mm)



The ZLS164 blank adaptor is designed to connect DIN Rail mounted components to the SMISSLINE base assembly. The blank adaptor does not have a bus stab or wiring and may be combined with any other bus stab adaptor.

Bus covers – ZLS100

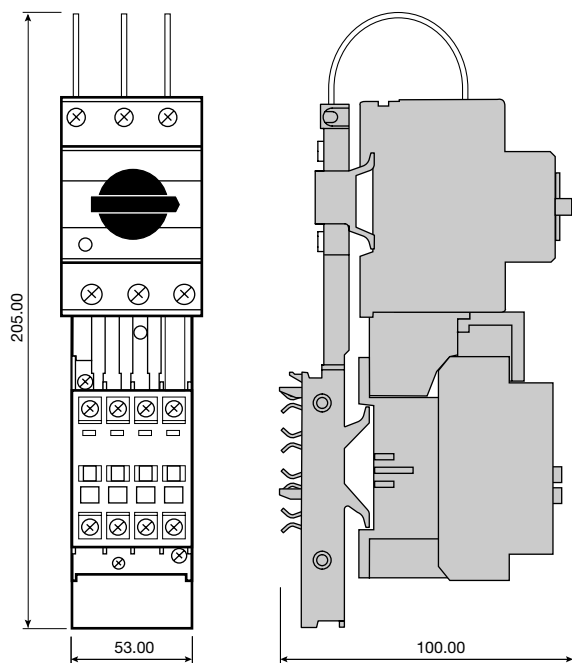
(dimensions in mm)



The ZLS100 bus covers are designed to insulate all energized components by “pluggin” into ZLS808 or ZLS806 socket base. The covers are finger safe and can be customized to create a 1 pole, 2 pole, or 4 pole device. The six (6) holes in the covers allow maintenance personnel to test the assembly bus without exposure to energized parts.

Combination motor starter – ZLS-MS325

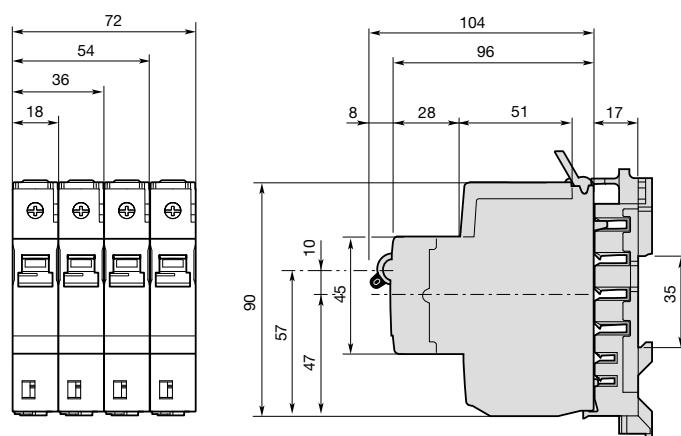
(dimensions in mm)



The ZLS-MS325 is a combination motor starter assembly that is integrated into SMISSLINE. The combo-starter provides a disconnect means, short circuit protection, and overload protection in one compact package. The ZLA-MS325 range is available between 5HP through 15 HP at 480 V AC and .5 HP through 7.5 HP at 240 V AC.

1, 2 and 3 pole miniature circuit breakers – S400

(dim. in mm)



Motor starter assemblies:

480 V AC

ZLS325-480-0.5
ZLS325-480-.75
ZLS325-480-1
ZLS325-480-2
ZLS325-480-3
ZLS325-480-5
ZLS325-480-7.5
ZLS325-480-10
ZLS325-480-15

240 V AC

ZLS325-240-0.5
ZLS325-240-1
ZLS325-240-2
ZLS325-240-3
ZLS325-240-5
ZLS325-240-7.5

IEC

							EN60947-2	EN60898-1	EN61008-1	EN61009-1	EN61643-11	EN60947-3	EN60439-1	EN60439-2	EN60898-2	EN62019
Miniature circuit breaker 10kA B S400 M	■	■				■	■									
Miniature circuit breaker 10kA C S400 M	■	■		■	■	■	■	■								
Miniature circuit breaker 10kA D S400 M	■	■		■	■	■	■	■								
Miniature circuit breaker 10kA K S400 M	■	■		■	■	■	■									
Miniature circuit breaker 10kA S400UC, C, Z	■	■				■	■									
2-pole residual current operated circuit breaker F402	■	■			■	■			■							
2-pole short time delayed residual current operated circuit breaker F402 K	■	■			■	■			■							
2-pole residual current operated circuit breaker with overcurrent protection FS401	■	■			■	■				■						
2-pole short time delayed residual current operated circuit breaker with overcurrent protection FS401 K	■	■			■	■				■						
4-pole residual current operated circuit breaker F404	■	■			□	■			■							
4-pole short time delayed residual current operated circuit breaker F404 K	■	■			□	■			■							
4-pole selective residual current operated circuit breaker F404 S	■	■			□	■			■							
4-pole residual current operated circuit breaker, special design 16 2/3 Hz F404 LF	■	■				■			■							
High performance manual motor starter MS325			■				■									
Switch disconnecter IS404	■										■					
Surge arrester OVR 404																
Auxiliary switch and signal contacts (1NO, 1NC)	■			■	■	■						■				■
Socket bases ZLS806/808	■			■	■							■		■		
Incoming terminal blocks ZLS224/225	■			■	■							■		■		
Incoming terminal component ZLS250-255	■			■	■							■		■		
Universal adapter 30A (UR 30A)	■			■	■							■		■		
Universal adapter 60A (UR 60A)	■			■	■							■		■		
Universal adapter 100A ZLS240, 241				■	■							■		■		
Terminals for additional socket ZLS812, ZLS815				■	■							■		■		
Terminals for additional socket ZLS813, ZLS816				■	■							■		■		
Combi module				■	■							■		■		
2MS 915,923 adapter for MS325																

UL

			UL508 E222110	UL489 E312425
Miniature circuit breaker S400U ①		■		■
Auxiliary Switch S2C-H6RU		■		■
Locking device ZLS501		■		■
Dummy housing ZLS502		■		■
Socket bases ZLS806/808	■		■	■
Bus Bar ZLS200	■		■	■
Bus Bar Cover ZLS100	■		■	■
Extension Adapter ZLS101	■		■	■
Socket End Piece ZLS730	■		■	■
Incoming terminal blocks ZLS224/225	■		■	■
Incoming terminal component ZLS250-253	■		■	■
Bus Bar insulator ZLS239	■		■	■
Universal adapter 25A ZLS177-179U		■		■
Universal adapter 45A167-169U		■		■
Dummy adapter ZLS164		■		■
Connecton ZLS174		■		■
Combi module ZLS840	■		■	

■ Approved
 □ Device is submitted for approval

NOTE

① These marked MCBs are no longer available. Please use S200U with appropriate universal adapters ZLS1XYU with appropriate number of poles and bus connector L1, L2, L3, for these current ratings and number of poles.

AF09-30-10-Δ - 017322627

Catalog number
Alphanumeric

Catalog No.	Page No.	Catalog No.	Page No.	Catalog No.	Page No.	Catalog No.	Page No.	Catalog No.	Page No.
AF09-30-10-Δ	1.14	▼AL12R-30-10-Δ	1.23	010151310	10.114	011483600	10.85	012511601	10.75
▼A16-22-00-Δ	1.33	▼AL16-30-01-Δ	1.22	010151512	10.114	011483600	10.85	012511813	10.77
▼A16-40-00-Δ	1.33	▼AL16-30-10-Δ	1.22	010151714	10.114	011483600	10.87	012512011	10.78
▼A16NO-30-10-Δ	1.30	▼AL16M-30-10-Δ	1.23	010159826	10.51	011483600	10.87	012512401	10.80
▼A16NOM-10-Δ	1.31	▼AL16R-30-10-Δ	1.23	010167300	10.114	011483600	10.90	012512916	10.79
▼A16NOR-10-Δ	1.31	▼AL26-30-01-Δ	1.22	010306221	10.74	011483600	10.114	012546822	10.76
▼A26-22-00-Δ	1.33	▼AL26-30-10-Δ	1.22	010306221	10.74	011511607	10.75	012547925	10.76
▼A26-40-00-Δ	1.33	▼AL26M-30-10-Δ	1.23	010306221	10.75	011511811	10.77	012548605	10.74
▼A26N1-30-10-Δ	1.30	▼AL26R-30-10-Δ	1.23	010306221	10.75	011512017	10.78	012549015	10.83
▼A26N1M-10-Δ	1.31	▼AL9-30-01-Δ	1.22	010306221	10.77	011512407	10.80	012657617	10.76
▼A26N1R-10-Δ	1.31	▼AL9-30-10-Δ	1.22	010306221	10.77	011512914	10.79	012662924	10.76
▼A9-22-00-Δ	1.33	▼AL9M-30-10-Δ	1.23	010306221	10.78	011527122	10.83	012836810	10.74
▼A9-40-00-Δ	1.33	▼AL9R-30-10-Δ	1.23	010306524	10.79	011527720	10.86	012836810	10.75
▼A9N00-30-10-Δ	1.30	000786526	6.235	010312515	10.74	011546820	10.76	012836810	10.77
▼A9N00M-10-Δ	1.31	000786526	6.236	010312515	10.75	011547923	10.76	012836810	10.78
▼A9N00R-10-Δ	1.31	000786526	6.244	010312515	10.77	011548603	10.74	012849925	10.83
▼AE12-30-11-Δ	1.20	000786526	6.250	010312515	10.78	011549013	10.83	012861803	10.79
▼AE12M-30-11-Δ	1.21	000786526	6.257	010312616	10.74	011550112	10.83	016304321	10.89
▼AE12R-30-11-Δ	1.21	000786526	6.266	010312616	10.75	011552915	10.86	016304321	10.114
▼AE16-30-11-Δ	1.20	000786526	6.266	010312616	10.77	011553705	10.85	016307000	10.114
▼AE16M-30-11-Δ	1.21	000786526	10.89	010312616	10.78	011553816	10.85	016326100	10.89
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▼AE16NOM-11-Δ	1.31	000828815	10.89	010331220	10.75	011556115	10.87	016326201	10.114
▼AE16NOR-11-Δ	1.31	000828916	10.89	010331220	10.77	011560421	10.87	016451924	10.114
▼AE16R-30-11-Δ	1.21	000829013	10.89	010331220	10.78	011565725	10.88	016511114	10.80
▼AE26-30-11-Δ	1.20	000829100	10.89	010386220	10.76	011565907	10.88	016511316	10.75
▼AE26M-30-11-Δ	1.21	000829201	10.89	010386321	10.76	011566121	10.88	016511417	10.77
▼AE26N1-30-11-Δ	1.30	003180021	6.257	010392315	10.88	011566222	10.88	016511510	10.78
▼AE26N1M-11-Δ	1.31	003180021	6.266	010500127	10.75	011566323	10.88	016513023	10.79
▼AE26N1R-11-Δ	1.31	003180217	6.266	010500220	10.75	011568825	10.86	016548827	10.74
▼AE26R-30-11-Δ	1.21	003180411	6.266	010500422	10.77	011657615	10.76	016580901	10.75
▼AE9-30-11-Δ	1.20	003181301	6.269	010502821	6.257	011659105	10.87	016583021	10.77
▼AE9M-30-11-Δ	1.21	003181402	6.269	010502821	6.266	011662922	10.76	016590905	10.74
▼AE9N00-30-11-Δ	1.30	003181503	6.269	010502821	6.266	011665625	10.83	016754622	10.89
▼AE9N00M-11-Δ	1.31	003182101	6.266	010502821	6.272	011665726	10.83	016754723	10.89
▼AE9N00R-11-Δ	1.31	003182101	6.266	010503114	10.75	011677120	10.85	016754804	10.89
▼AE9R-30-11-Δ	1.21	003182101	6.266	010503215	10.75	011677120	10.85	016754905	10.89
▼AL16-22-00-Δ	1.33	003182101	6.270	010504421	10.83	011679713	10.81	016755002	10.89
▼AL16-40-00-Δ	1.33	003182202	6.266	010504522	10.83	011690027	6.235	016786001	10.89
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▼AL16NOR-10-Δ	1.31	003182202	6.270	010504805	10.83	011690027	6.250	016850012	6.271
▼AL26-22-00-Δ	1.33	003182303	6.266	010504906	10.83	011690027	6.257	016850012	10.52
▼AL26-40-00-Δ	1.33	003182303	6.266	010505120	10.75	011690027	6.271	016850012	10.114
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▼AL26N1R-10-Δ	1.31	003182505	6.266	010507722	10.74	011690027	10.87	016852122	10.87
▼AL9-22-00-Δ	1.33	003182505	6.266	010511616	10.75	011690027	10.87	016852122	10.89
▼AL9-40-00-Δ	1.33	003182505	6.266	010511820	10.77	011690027	10.90	016852223	10.87
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▼A16-30-10-Δ	1.18	003182911	6.270	010700525	10.77	011836816	10.77	016870022	6.271
▼A16M-30-10-Δ	1.19	003183016	6.266	010700525	10.78	011836816	10.78	016870022	10.51
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▼A26-30-01-Δ	1.18	003183016	6.270	011337326	10.86	011849923	10.83	016897400	10.87
▼A26-30-10-Δ	1.18	003183103	6.257	011355024	6.272	011861801	10.79	016897400	10.89
▼A26M-30-10-Δ	1.19	003183103	6.266	011385116	10.81	011870703	10.74	017321726	10.84
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▼A9-30-01-Δ	1.18	003183812	6.266	011420520	10.89	011870703	10.75	017321900	10.84
▼A9-30-10-Δ	1.18	003183812	6.266	011482505	10.79	011870703	10.75	017322005	6.266
▼A9M-30-10-Δ	1.19	003183812	6.270	011482505	10.86	011870703	10.77	017322005	6.271
▼A9R-30-10-Δ	1.19	003183913	6.266	011483600	6.244	011870703	10.77	017322005	10.50
▼AL12-30-01-Δ	1.22	003183913	6.266	011483600	6.257	011870703	10.78	017322005	10.114
▼AL12-30-10-Δ	1.22	003183913	6.269	011483600	6.271	011870703	10.78	017322122	10.84
▼AL12M-30-10-Δ	1.23	010150804	10.114	011483600	10.83	011870703	10.79	017322627	10.84

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1SVR750005R0100	6.206	A145C3P1-84	1.196	A1A040TW-2	17.4	A26LC12P1-84	1.196	A45L-22-00-84	1.197
1SVR750487R8300	6.120	A145M-30-11-Δ	1.19	A1A050TW	17.4	A26LC22P1-84	1.197	A45L-40-00-84	1.196
1SVR750488R8300	6.120	A145N4-30-11-Δ	1.30	A1A050TW	17.4	A26LC4P1-84	1.196	A45LC22CP1-84	1.197
1SVR750489R8300	6.120	A145N4M-11-Δ	1.31	A1A050TW-1	17.4	A26LC8P1-84	1.196	A45LC4P1-84	1.196
1SVR750660R0200	6.145	A145N4R-11-Δ	1.31	A1A050TW-2	17.4	A26N11SNX-2Δ	3.9	A50-30-00-84	1.196
1SVR750660R0300	6.145	A145R-30-11-Δ	1.19	A1A060TW	17.4	A2A125TW	17.5	A503011RT-Δ	1.203
1SVR750660R0400	6.145	A16-012-00-84	1.196	A1A060TW	17.4	A2A125TW-1	17.5	A50-30-11-Δ	1.18
1SVR760487R8300	6.120	A16-04-00-84	1.196	A1A060TW-1	17.4	A2A125TW-2	17.5	A50-40-00-84	1.196
1SVR760488R8300	6.120	A16-04-00-Δ	1.33	A1A060TW-2	17.4	A2A150TW	17.5	A50-40-00-Δ	1.33
1SVR760489R8300	6.120	A16-08-00-84	1.196	A1A070TW	17.4	A2A150TW-1	17.5	A50C3P1-84	1.196
1SVR760660R0200	6.145	A16-120-00-84	1.196	A1A070TW	17.4	A2A150TW-2	17.5	A50C4P1-84	1.196
1SVR760660R0300	6.145	A16-120-00-84	1.196	A1A070TW-1	17.4	A2A175TW	17.5	A50L-30-00-84	1.196
1SVR760660R0400	6.145	A16-22-00-84	1.197	A1A070TW-2	17.4	A2A175TW-1	17.5	A50L-40-00-84	1.196
1SVR760660R0500	6.145	A163001RT-Δ	1.203	A1A080TW	17.4	A2A175TW-2	17.5	A50LC3P1-84	1.196
1SVR760660R0500	6.145	A163010RT-Δ	1.203	A1A080TW	17.4	A2A200TW	17.5	A50LC4P1-84	1.196
2154 373-1	7.52	A16-40-00-84	1.196	A1A080TW-1	17.4	A2A200TW-1	17.5	A50M-30-11-Δ	1.19
29491468-2	7.34	A16-40L-00-84	1.196	A1A080TW-2	17.4	A2A200TW-2	17.5	A50N21SNX-2Δ	3.9
29491468-2	7.63	A16-80-00-84	1.196	A1A090TW	17.4	A2A225TW	17.5	A50N2-30-11-Δ	1.30
29491469-2	7.34	A16-80L-00-84	1.196	A1A090TW	17.4	A2A225TW-1	17.5	A50N2M-11-Δ	1.31
29491469-2	7.63	A16C12NCP1-84	1.196	A1A090TW-1	17.4	A2A225TW-2	17.5	A50N2R-11-Δ	1.31
2CDE601101R2001	11.52	A16C12P1-84	1.196	A1A090TW-2	17.4	A2A250TW	17.5	A50R-30-11-Δ	1.19
2CDE601101R2002	11.52	A16C12PL1-84	1.196	A1A100TW	17.4	A2A250TW-1	17.5	A63-30-00-84	1.196
2CDE601101R2003	11.52	A16C4NCP1-84	1.196	A1A100TW	17.4	A2A250TW-2	17.5	A633011RT-Δ	1.203
2CDE601101R2004	11.52	A16C4P1-84	1.196	A1A100TW-1	17.4	A2N125TW	17.5	A63-30-11-Δ	1.18
2CDE601101R2006	11.52	A16C4PL1-84	1.196	A1A100TW-2	17.4	A2N125TW-1	17.5	A63C3P1-84	1.196
2CDE601101R2008	11.52	A16C8NCP1-84	1.196	A1N015TW-1	17.4	A2N125TW-2	17.5	A63L-30-00-84	1.196
2CDE601101R2010	11.52	A16C8P1-84	1.196	A1N015TW-2	17.4	A2N150TW	17.5	A63LC3P1-84	1.196
2CDE601101R2012	11.52	A16C8PL1-84	1.196	A1N020TW-1	17.4	A2N150TW-1	17.5	A63M-30-11-Δ	1.19
2CDE601101R2905	11.52	A16L-012-00-84	1.196	A1N020TW-2	17.4	A2N150TW-2	17.5	A63R-30-11-Δ	1.19
2CDE605100R0500	11.52	A16L-04-00-84	1.196	A1N025TW-1	17.4	A2N175TW	17.5	A75-22-00-84	1.197
2CDE605200R0021	11.52	A16L-08-00-84	1.196	A1N025TW-2	17.4	A2N175TW-1	17.5	A75-22-00-Δ	1.33
4950 512-1	7.28	A16L-120-00-84	1.196	A1N030TW-1	17.4	A2N175TW-2	17.5	A75-30-00-84	1.196
4950 512-1	7.57	A16L-120L-00-84	1.196	A1N030TW-2	17.4	A2N200TW	17.5	A753011RT-Δ	1.203
4950 512-2	7.28	A16L-22-00-84	1.197	A1N040TW-1	17.4	A2N200TW-1	17.5	A75-30-11-Δ	1.18
4950 512-2	7.57	A16L-40-00-84	1.196	A1N040TW-2	17.4	A2N200TW-2	17.5	A75-40-00-84	1.196
4950 512-3	7.28	A16L-40L-00-84	1.196	A1N050TW-1	17.4	A2N225TW	17.5	A75-40-00-Δ	1.33
4950 512-3	7.57	A16L-80-00-84	1.196	A1N050TW-2	17.4	A2N225TW-1	17.5	A75C3P1-84	1.196
5396 0543-1	7.115	A16L-80L-00-84	1.196	A1N060TW-1	17.4	A2N225TW-2	17.5	A75C4P1-84	1.196
5911 086-11	7.28	A16LC12NCP1-84	1.196	A1N060TW-2	17.4	A2N250TW	17.5	A75L-22-00-84	1.197
5911 086-11	7.57	A16LC12P1-84	1.196	A1N070TW-1	17.4	A2N250TW-1	17.5	A75L-30-00-84	1.196
5911 086-11	7.99	A16LC12PL1-84	1.196	A1N070TW-2	17.4	A2N250TW-2	17.5	A75L-40-00-84	1.196
5911 086-12	7.28	A16LC22P1-84	1.197	A1N080TW-1	17.4	A300-30-00-84	1.196	A75LC22CP1-84	1.197
5911 086-12	7.57	A16LC4NCP1-84	1.196	A1N080TW-2	17.4	A300-30-11-Δ	1.18	A75LC3P1-84	1.196
5911 086-12	7.99	A16LC4P1-84	1.196	A1N090TW-1	17.4	A300C3P1-84	1.196	A75LC4P1-84	1.196
5911 086-13	7.28	A16LC4PL1-84	1.196	A1N090TW-2	17.4	A300M-30-11-Δ	1.19	A75M-30-11-Δ	1.19
5911 086-13	7.57	A16LC8NCP1-84	1.196	A1N100TW-1	17.4	A300R-30-11-Δ	1.19	A75N3-30-11-Δ	1.30
5911 086-13	7.99	A16LC8P1-84	1.196	A1N100TW-2	17.4	A303001RT-Δ	1.203	A75N3M-11-Δ	1.31
5911 086-14	7.28	A16LC8PL1-84	1.196	A210-30-00-84	1.196	A30-30-01-Δ	1.18	A75N3R-11-Δ	1.31
5911 086-14	7.57	A16N01SNX-2Δ	3.9	A210-30-11-Δ	1.18	A30-30-10-84	1.196	A75R-30-11-Δ	1.19
5911 086-14	7.99	A185-30-11-Δ	1.18	A210C3P1-84	1.196	A303010RT-Δ	1.203	A9-120-00-84	1.196
5911 086-15	7.28	A185M-30-11-Δ	1.19	A210M-30-11-Δ	1.19	A30-30-10-Δ	1.18	A9-22-00-84	1.197
5911 086-15	7.57	A185R-30-11-Δ	1.19	A210R-30-11-Δ	1.19	A30C3P1-84	1.196	A93001RT-Δ	1.203
5911 086-15	7.99	A1A015TW	17.4	A260-30-11-Δ	1.18	A30L-30-10-84	1.196	A93010RT-Δ	1.203
5911 086-4	7.28	A1A015TW	17.4	A260M-30-11-Δ	1.19	A30LC3P1-84	1.196	A9-40-00-84	1.196
5911 086-4	7.57	A1A015TW-1	17.4	A260N5-30-11-Δ	1.30	A30M-30-10-Δ	1.19	A95-30-00-84	1.196
5911 086-4	7.99	A1A015TW-2	17.4	A260N5M-11-Δ	1.31	A30R-30-10-Δ	1.19	A95-30-11-Δ	1.18
5911 086-5	7.28	A1A020TW	17.4	A260N5R-11-Δ	1.31	A403001RT-Δ	1.203	A95C3P1-84	1.196
5911 086-5	7.57	A1A020TW	17.4	A260R-30-11-Δ	1.19	A40-30-01-Δ	1.18	A95M-30-11-Δ	1.19
5911 086-5	7.99	A1A020TW-1	17.4	A26-120-00-84	1.196	A40-30-10-84	1.196	A95R-30-11-Δ	1.19
5911 086-7	7.28	A1A020TW-2	17.4	A26-22-00-84	1.197	A403010RT-Δ	1.203	A9-80-00-84	1.196
5911 086-7	7.57	A1A025TW	17.4	A263001RT-Δ	1.203	A40-30-10-Δ	1.18	A9C12P1-84	1.196
5911 086-7	7.99	A1A025TW	17.4	A263010RT-Δ	1.203	A40C3P1-84	1.196	A9C4P1-84	1.196
700LF1-60H	5.59	A1A025TW-1	17.4	A26-40-00-84	1.196	A40LC30-10-84	1.196	A9C8P1-84	1.196
A1101FX-2Δ4	3.10	A1A025TW-2	17.4	A26-80-00-84	1.196	A40LC3P1-84	1.196	A9L-120-00-84	1.196
A110-30-11-Δ	1.18	A1A030TW	17.4	A26C12P1-84	1.196	A40M-30-10-Δ	1.19	A9L-22-00-84	1.197
A110M-30-11-Δ	1.19	A1A030TW	17.4	A26C4P1-84	1.196	A40R-30-10-Δ	1.19	A9L-40-00-84	1.196
A110R-30-11-Δ	1.19	A1A030TW-1	17.4	A26C8P1-84	1.196	A45-22-00-84	1.197	A9L-80-00-84	1.196
A123001RT-Δ	1.203	A1A030TW-2	17.4	A26L-120-00-84	1.196	A45-22-00-Δ	1.33	A9LC12P1-84	1.196
A123010RT-Δ	1.203	A1A040TW	17.4	A26L-22-00-84	1.197	A45-40-00-84	1.196	A9LC22P1-84	1.197
A145-30-00-84	1.196	A1A040TW	17.4	A26L-40-00-84	1.196	A45-40-00-Δ	1.33	A9LC4P1-84	1.196

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A9N001SNX-2Δ	3.9	AF1101S2-2Δ	3.7	AF1452NX-2Δ	3.16	AF2102B2-2ΔD	3.18	AF261SBX-2Δ3	3.14
AA1-110	4.10	AF1101SB2-2ΔB	3.14	AF1452X-2Δ	3.15	AF2102B2-2ΔE	3.18	AF261SBX-2Δ4	3.14
AA1206	16.10	AF1101SB2-2ΔC	3.14	AF145-30-11-Δ	1.14	AF2102BX-2ΔD	3.18	AF261SBX-2Δ6	3.14
AA1-230	4.10	AF1101SBX-2ΔB	3.14	AF145-30-11-Δ	1.209	AF2102BX-2ΔE	3.18	AF261SF2-2Δ1	3.11
AA1-24	4.10	AF1101SBX-2ΔC	3.14	AF145B-30-11RT-Δ	1.204	AF2102F2-2Δ5	3.17	AF261SF2-2Δ2	3.11
AA1-400	4.10	AF1101SF2-2Δ4	3.11	AF145B-30-11-Δ	1.204	AF2102FX-2Δ5	3.17	AF261SFX-2Δ1	3.11
AA4-110	4.10	AF1101SFX-2Δ4	3.11	AF145M-30-11-Δ	1.15	AF2102N2-2Δ	3.16	AF261SFX-2Δ2	3.11
AA4-24	4.10	AF1101SN2-2Δ	3.9	AF145N4-3011-Δ	1.28	AF2102NX-2Δ	3.16	AF261SN2-2Δ	3.9
AA4-240	4.10	AF1101SNX-2Δ	3.9	AF145N4M-11-Δ	1.29	AF2102X-2Δ	3.15	AF261SNX-2Δ	3.9
AA4-400	4.10	AF1101SX-2Δ	3.7	AF145N4R-11-Δ	1.29	AF210-30-11-Δ	1.14	AF261SX-2Δ	3.7
AE30-30-11-Δ	1.20	AF1101X-2Δ	3.6	AF145R-30-11-Δ	1.15	AF210-30-11-Δ	1.209	AF261X-2Δ	3.6
AE30M-30-11-Δ	1.21	AF11022-2Δ	3.15	AF161F2-2Δ1	3.10	AF210B-30-11RT-Δ	1.204	AF26-22-00-Δ	1.32
AE30R-30-11-Δ	1.21	AF1102B2-2ΔB	3.18	AF161FX-2Δ1	3.10	AF210B-30-11-Δ	1.204	AF2622-2Δ	3.15
AE40-30-11-Δ	1.20	AF1102B2-2ΔC	3.18	AF161SF2-2Δ1	3.11	AF210M-30-11-Δ	1.15	AF262B2-2Δ1	3.18
AE40M-30-11-Δ	1.21	AF1102BX-2ΔB	3.18	AF161SFX-2Δ1	3.11	AF210R-30-11-Δ	1.15	AF262B2-2Δ2	3.18
AE40R-30-11-Δ	1.21	AF1102BX-2ΔC	3.18	AF16-22-00-Δ	1.32	AF26012-2Δ	3.6	AF262B2-2Δ3	3.18
AE45-22-00-Δ	1.33	AF1102F2-2Δ4	3.17	AF162F2-2Δ1	3.17	AF2601B2-2ΔF	3.12	AF262B2-2Δ4	3.18
AE45-40-00-Δ	1.33	AF1102FX-2Δ4	3.17	AF162FX-2Δ1	3.17	AF2601B2-2ΔG	3.12	AF262B2-2Δ5	3.18
AE50-30-11-Δ	1.20	AF1102NX-2Δ	3.16	AF16-30-01-Δ	1.14	AF2601BX-2ΔF	3.12	AF262B2-2Δ6	3.18
AE50-40-00-Δ	1.33	AF1102X-2Δ	3.15	AF16-30-10-Δ	1.14	AF2601BX-2ΔG	3.12	AF262BX-2Δ1	3.18
AE50M-30-11-Δ	1.21	AF110-30-11-Δ	1.14	AF163F2-2ΔΔ1	3.22	AF2601F2-2Δ5	3.10	AF262BX-2Δ2	3.18
AE50N2-30-11-Δ	1.30	AF110B-30-11RT-Δ	1.204	AF163FX-2ΔΔ1	3.22	AF2601F2-2Δ6	3.10	AF262BX-2Δ3	3.18
AE50N2M-11-Δ	1.31	AF110B-30-11-Δ	1.204	AF16-40-00-Δ	1.32	AF2601FX-2Δ5	3.10	AF262BX-2Δ4	3.18
AE50N2R-11-Δ	1.31	AF110M-30-11-Δ	1.15	AF164F2-2ΔΔ1	3.26	AF2601FX-2Δ6	3.10	AF262BX-2Δ5	3.18
AE50R-30-11-Δ	1.21	AF110N2-2Δ	3.8	AF164FX-2ΔΔ1	3.26	AF2601N2-2Δ	3.8	AF262F2-2Δ2	3.17
AE63-30-11-Δ	1.20	AF110N2-2Δ	3.16	AF1650-30-11-Δ	1.14	AF2601NX-2Δ	3.8	AF262FX-2Δ2	3.17
AE63M-30-11-Δ	1.21	AF110R-30-11-Δ	1.15	AF1650-30-11-Δ	1.209	AF2601X-2Δ	3.6	AF262N2-2Δ	3.16
AE63R-30-11-Δ	1.21	AF121F2-2Δ1	3.10	AF1650N83011-Δ	1.28	AF26022-2Δ	3.15	AF262NX-2Δ	3.16
AE75-22-00-Δ	1.33	AF121FX-2Δ1	3.10	AF16M-30-22-Δ	1.15	AF2602B2-2ΔF	3.18	AF262X-2Δ	3.15
AE75-30-11-Δ	1.20	AF121SF2-2Δ1	3.11	AF16M2-30-22-Δ	1.17	AF2602B2-2ΔG	3.18	AF26-30-00-Δ	1.14
AE75-40-00-Δ	1.33	AF121SFX-2Δ1	3.11	AF16R-30-22-Δ	1.15	AF2602BX-2ΔG	3.18	AF2632-2ΔΔ	3.20
AE75M-30-11-Δ	1.21	AF122F2-2Δ1	3.17	AF16R2-30-22-Δ	1.17	AF2602BX-2ΔF	3.18	AF263B2-2ΔΔ1	3.23
AE75N3-30-11-Δ	1.30	AF122FX-2Δ1	3.17	AF16Z-22-00-Δ	1.32	AF2602BX-2ΔG	3.18	AF263B2-2ΔΔ2	3.23
AE75N3M-11-Δ	1.31	AF12-30-01-Δ	1.14	AF16Z-30-01-Δ	1.16	AF2602F2-2Δ5	3.17	AF263B2-2ΔΔ3	3.23
AE75N3R-11-Δ	1.31	AF12-30-10-Δ	1.14	AF16Z-30-10-Δ	1.16	AF2602F2-2Δ6	3.17	AF263B2-2ΔΔ4	3.23
AE75R-30-11-Δ	1.21	AF123F2-2ΔΔ1	3.22	AF16Z-40-00-Δ	1.32	AF2602FX-2Δ5	3.17	AF263B2-2ΔΔ5	3.23
AF091F2-2Δ1	3.10	AF123FX-2ΔΔ1	3.22	AF18512-2Δ	3.6	AF2602FX-2Δ6	3.17	AF263BX-2ΔΔ1	3.23
AF091FX-2Δ1	3.10	AF124F2-2ΔΔ1	3.26	AF1851B2-2ΔD	3.12	AF2602N2-2Δ	3.16	AF263BX-2ΔΔ2	3.23
AF091SF2-2Δ1	3.11	AF124FX-2ΔΔ1	3.26	AF1851B2-2ΔD	3.12	AF2602NX-2Δ	3.16	AF263BX-2ΔΔ3	3.23
AF09-22-00-Δ	1.32	AF1250-30-11-Δ	1.14	AF1851BX-2ΔD	3.12	AF2602X-2Δ	3.15	AF263BX-2ΔΔ4	3.23
AF092F2-2Δ1	3.17	AF1250-30-11-Δ	1.209	AF1851F2-2Δ5	3.10	AF260-30-11-Δ	1.14	AF263BX-2ΔΔ5	3.23
AF092FX-2Δ1	3.17	AF12M-30-22-Δ	1.15	AF1851N2-2ΔD	3.8	AF260-30-11-Δ	1.209	AF263F2-2ΔΔ2	3.22
AF09-30-01-Δ	1.14	AF12MZ-30-22-Δ	1.17	AF1851NX-2Δ	3.8	AF260B-30-11RT-Δ	1.204	AF263FX-2ΔΔ2	3.22
AF093F2-2ΔΔ1	3.22	AF12N0-30-10-Δ	1.28	AF1851X-2Δ	3.6	AF260B-30-11-Δ	1.204	AF263N2-2ΔΔ	3.21
AF093FX-2ΔΔ1	3.22	AF12N0-30-10-Δ	1.28	AF18522-2Δ	3.15	AF260M-30-11-Δ	1.15	AF263NX-2ΔΔ	3.21
AF09-40-00-Δ	1.32	AF12N0M-3022-Δ	1.29	AF18522-2Δ	3.15	AF260N5-3011-Δ	1.28	AF263X-2ΔΔ	3.20
AF094F2-2ΔΔ1	3.26	AF12NOMZ-3022-Δ	1.29	AF1852B2-2ΔD	3.18	AF260N5M-11-Δ	1.29	AF26-40-00-Δ	1.32
AF094FX-2ΔΔ1	3.26	AF12NOR-3022-Δ	1.29	AF1852B2-2ΔD	3.18	AF260N5R-11-Δ	1.29	AF2642-2ΔΔ	3.24
AF09M-30-22-Δ	1.15	AF12NORZ-3022-Δ	1.29	AF1852F2-2Δ5	3.17	AF260R-30-11-Δ	1.15	AF264B2-2ΔΔ1	3.27
AF09MZ-30-22-Δ	1.17	AF12NOZ-30-01-Δ	1.28	AF1852FX-2Δ5	3.17	AF2612-2Δ	3.6	AF264B2-2ΔΔ2	3.27
AF09N00-30-10-Δ	1.28	AF12NOZ-30-10-Δ	1.28	AF1852N2-2Δ	3.16	AF261B2-2Δ1	3.12	AF264B2-2ΔΔ3	3.27
AF09N00-30-10-Δ	1.28	AF12R-30-22-Δ	1.15	AF1852NX-2Δ	3.16	AF261B2-2Δ2	3.12	AF264B2-2ΔΔ4	3.27
AF09N00M-3022-Δ	1.29	AF12RZ-30-22-Δ	1.17	AF1852X-2Δ	3.15	AF261B2-2Δ3	3.12	AF264B2-2ΔΔ5	3.27
AF09N00MZ-3022-Δ	1.29	AF12Z-30-01-Δ	1.16	AF185-30-11-Δ	1.14	AF261B2-2Δ4	3.12	AF264BX-2ΔΔ1	3.27
AF09N00R-3022-Δ	1.29	AF12Z-30-10-Δ	1.16	AF185-30-11-Δ	1.209	AF261B2-2Δ5	3.12	AF264BX-2ΔΔ2	3.27
AF09N00RZ-3022-Δ	1.29	AF1350-30-11-Δ	1.14	AF185B-30-11RT-Δ	1.204	AF261BX-2Δ1	3.12	AF264BX-2ΔΔ3	3.27
AF09N00Z-30-01-Δ	1.28	AF1350-30-11-Δ	1.209	AF185B-30-11-Δ	1.204	AF261BX-2Δ2	3.12	AF264BX-2ΔΔ4	3.27
AF09N00Z-30-10-Δ	1.28	AF14512-2Δ	3.6	AF185M-30-11-Δ	1.15	AF261BX-2Δ3	3.12	AF264BX-2ΔΔ5	3.27
AF09R-30-22-Δ	1.15	AF14512-2Δ	3.6	AF185R-30-11-Δ	1.15	AF261BX-2Δ4	3.12	AF264F2-2ΔΔ2	3.26
AF09RZ-30-22-Δ	1.17	AF1451B2-2ΔC	3.12	AF2050-30-11-Δ	1.14	AF261BX-2Δ5	3.12	AF264FX-2ΔΔ2	3.26
AF09Z-22-00-Δ	1.32	AF1451BX-2ΔC	3.12	AF2050-30-11-Δ	1.209	AF261F2-2Δ2	3.10	AF264N2-2ΔΔ	3.25
AF09Z-30-01-Δ	1.16	AF1451F2-2Δ5	3.10	AF21012-2Δ	3.6	AF261FX-2Δ2	3.10	AF264NX-2ΔΔ	3.25
AF09Z-30-10-Δ	1.16	AF1451FX-2Δ5	3.10	AF2101B2-2ΔD	3.12	AF261N2-2Δ	3.8	AF264X-2ΔΔ	3.24
AF09Z-40-00-Δ	1.32	AF1451N2-2Δ	3.8	AF2101B2-2ΔE	3.12	AF261NX-2Δ	3.8	AF2650-30-11-Δ	1.14
AF11012-2Δ	3.6	AF1451NX-2Δ	3.6	AF2101BX-2ΔD	3.12	AF261S2-2Δ	3.7	AF26M-30-02-Δ	1.15
AF1101B2-2ΔB	3.12	AF14522-2Δ	3.15	AF2101BX-2ΔE	3.12	AF261SB2-2Δ1	3.14	AF26MZ-30-02-Δ	1.17
AF1101B2-2ΔC	3.12	AF1452B2-2ΔC	3.18	AF2101F2-2Δ5	3.10	AF261SB2-2Δ2	3.14	AF26N1-30-00-Δ	1.28
AF1101BX-2ΔB	3.12	AF1452BX-2ΔC	3.18	AF2101FX-2Δ5	3.10	AF261SB2-2Δ3	3.14	AF26N1M-3002-Δ	1.29
AF1101BX-2ΔC	3.12	AF1452F2-2Δ5	3.17	AF2101N2-2Δ	3.8	AF261SB2-2Δ4	3.14	AF26N1MZ-3002-Δ	1.29
AF1101F2-2Δ4	3.10	AF1452FX-2Δ5	3.17	AF2101NX-2Δ	3.8	AF261SB2-2Δ6	3.14	AF26N1R-3002-Δ	1.29
				AF2101X-2Δ	3.6	AF261SBX-2Δ1	3.14	AF26N1RZ-3002-Δ	1.29

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AF26N1Z-30-00-Δ	1.28	AF3042-2ΔΔ	3.24	AF460-30-11-Δ	1.14	AF5801NX-2Δ	3.8	AF7502X-2Δ	3.15
AF26R-30-02-Δ	1.15	AF304B2-2ΔΔ6	3.27	AF460-30-11-Δ	1.209	AF5801X-2Δ	3.6	AF750-30-11-Δ	1.14
AF26RZ-30-02-Δ	1.17	AF304B2-2ΔΔ7	3.27	AF460M-30-11-Δ	1.15	AF58022-2Δ	3.15	AF750-30-11-Δ	1.209
AF26Z-22-00-Δ	1.32	AF304B4X-2ΔΔ6	3.27	AF460N6-3011-Δ	1.28	AF5802B2-2ΔM	3.18	AF750M-30-11-Δ	1.15
AF26Z-30-00-Δ	1.16	AF304B4X-2ΔΔ7	3.27	AF460N6M-11-Δ	1.29	AF5802B2-2ΔN	3.18	AF750N7-3011-Δ	1.28
AF26Z-40-00-Δ	1.32	AF304F2-2ΔΔ2	3.26	AF460N6R-11-Δ	1.29	AF5802BX-2ΔM	3.18	AF750N7M-11-Δ	1.29
AF30012-2Δ	3.6	AF304FX-2ΔΔ2	3.26	AF460R-30-11-Δ	1.15	AF5802BX-2ΔN	3.18	AF750N7R-11-Δ	1.29
AF3001B2-2ΔH	3.12	AF304N2-2ΔΔ	3.25	AF5012-2Δ	3.6	AF5802F2-2Δ8	3.17	AF750R-30-11-Δ	1.15
AF3001B2-2ΔJ	3.12	AF304NX-2ΔΔ	3.25	AF501B2-2Δ7	3.12	AF5802FX-2Δ8	3.17	AF7512-2Δ	3.6
AF3001B2-2ΔH	3.12	AF304X-2ΔΔ	3.24	AF501B2-2Δ8	3.12	AF5802N2-2Δ	3.16	AF751B2-2ΔA	3.12
AF3001BX-2ΔJ	3.12	AF30M-30-02-Δ	1.15	AF501BX-2Δ7	3.12	AF5802NX-2Δ	3.16	AF751BX-2ΔA	3.12
AF3001F2-2Δ6	3.10	AF30MZ-30-02-Δ	1.17	AF501BX-2Δ8	3.12	AF5802X-2Δ	3.15	AF751F2-2Δ4	3.10
AF3001FX-2Δ6	3.10	AF30R-30-02-Δ	1.15	AF501F2-2Δ3	3.10	AF580-30-11-Δ	1.14	AF751FX-2Δ4	3.10
AF3001N2-2Δ	3.8	AF30RZ-30-02-Δ	1.17	AF501FX-2Δ3	3.10	AF580-30-11-Δ	1.209	AF751N2-2Δ	3.8
AF3001NX-2Δ	3.8	AF30Z-30-00-Δ	1.16	AF501N2-2Δ	3.8	AF580M-30-11-Δ	1.15	AF751NX-2Δ	3.8
AF3001X-2Δ	3.6	AF38-22-00-Δ	1.32	AF501NX-2Δ	3.8	AF580R-30-11-Δ	1.15	AF751S2-2Δ	3.7
AF30022-2Δ	3.15	AF38-30-00-Δ	1.14	AF501S2-2Δ	3.7	AF6312-2Δ	3.6	AF751SB2-2ΔA	3.14
AF3002B2-2ΔH	3.18	AF38-40-00-Δ	1.32	AF501SB2-2Δ8	3.14	AF631B2-2Δ9	3.12	AF751SBX-2ΔA	3.14
AF3002B2-2ΔJ	3.18	AF38Z-22-00-Δ	1.32	AF501SBX-2Δ8	3.14	AF631BX-2Δ9	3.12	AF751SF2-2Δ4	3.11
AF3002BX-2ΔH	3.18	AF38Z-30-00-Δ	1.16	AF501SF2-2Δ3	3.11	AF631F2-2Δ4	3.10	AF751SF2-2Δ4	3.11
AF3002BX-2ΔJ	3.18	AF38Z-40-00-Δ	1.32	AF501SFX-2Δ3	3.11	AF631FX-2Δ4	3.10	AF751SN2-2Δ	3.9
AF3002F2-2Δ6	3.17	AF40012-2Δ	3.6	AF501SN2-2Δ	3.9	AF631N2-2Δ	3.8	AF751SNX-2Δ	3.9
AF3002FX-2Δ6	3.17	AF4001B2-2ΔJ	3.12	AF501SNX-2Δ	3.9	AF631NX-2Δ	3.8	AF751SX-2Δ	3.7
AF3002N2-2Δ	3.16	AF4001B2-2ΔK	3.12	AF501SX-2Δ	3.7	AF631X-2Δ	3.6	AF751X-2Δ	3.6
AF3002NX-2Δ	3.16	AF4001B2-2ΔL	3.12	AF501X-2Δ	3.6	AF6322-2Δ	3.15	AF75-22-00-Δ	1.32
AF3002X-2Δ	3.15	AF4001BX-2ΔJ	3.12	AF5022-2Δ	3.15	AF632B2-2Δ9	3.18	AF7522-2Δ	3.15
AF300-30-11-Δ	1.14	AF4001BX-2ΔK	3.12	AF502B2-2Δ7	3.18	AF632BX-2Δ9	3.18	AF752B2-2ΔA	3.18
AF300-30-11-Δ	1.209	AF4001BX-2ΔL	3.12	AF502B2-2Δ8	3.18	AF632F2-2Δ4	3.17	AF752BX-2ΔA	3.18
AF300B-30-11RT-Δ	1.204	AF4001F2-2Δ7	3.10	AF502BX-2Δ7	3.18	AF632FX-2Δ4	3.17	AF752F2-2Δ4	3.17
AF300B-30-11-Δ	1.204	AF4001FX-2Δ7	3.10	AF502BX-2Δ8	3.18	AF632N2-2Δ	3.16	AF752FX-2Δ4	3.17
AF300M-30-11-Δ	1.15	AF4001N2-2Δ	3.8	AF502F2-2Δ3	3.17	AF632NX-2Δ	3.16	AF752N2-2Δ	3.16
AF300R-30-11-Δ	1.15	AF4001NX-2Δ	3.8	AF502FX-2Δ3	3.17	AF632X-2Δ	3.15	AF752NX-2Δ	3.16
AF3012-2Δ	3.6	AF4001X-2Δ	3.6	AF502N2-2Δ	3.16	AF633011RT-Δ	1.203	AF752X-2Δ	3.15
AF301B2-2Δ6	3.12	AF40022-2Δ	3.15	AF502NX-2Δ	3.16	AF63-30-11-Δ	1.14	AF753011RT-Δ	1.203
AF301B2-2Δ7	3.12	AF4002B2-2ΔJ	3.18	AF502X-2Δ	3.15	AF6332-2ΔΔ	3.20	AF75-30-11-Δ	1.14
AF301BX-2Δ6	3.12	AF4002B2-2ΔK	3.18	AF503011RT-Δ	1.203	AF633B2-2ΔΔ9	3.23	AF7532-2ΔΔ	3.20
AF301BX-2Δ7	3.12	AF4002B2-2ΔL	3.18	AF50-30-11-Δ	1.14	AF633BX-2ΔΔ9	3.23	AF753B2-2ΔΔA	3.23
AF301F2-2Δ2	3.10	AF4002B2-2ΔJ	3.18	AF5032-2ΔΔ	3.20	AF633F2-2ΔΔ4	3.22	AF753BX-2ΔΔA	3.23
AF301FX-2Δ2	3.10	AF4002BX-2ΔK	3.18	AF503B2-2ΔΔ7	3.23	AF633FX-2ΔΔ4	3.22	AF753F2-2ΔΔ4	3.22
AF301N2-2Δ	3.8	AF4002BX-2ΔL	3.18	AF503B2-2ΔΔ8	3.23	AF633N2-2ΔΔ	3.21	AF753FX-2ΔΔ4	3.22
AF301NX-2Δ	3.8	AF4002F2-2Δ7	3.17	AF503BX-2ΔΔ7	3.23	AF633NX-2ΔΔ	3.21	AF753N2-2ΔΔ	3.21
AF301S2-2Δ	3.7	AF4002FX-2Δ7	3.17	AF503BX-2ΔΔ8	3.23	AF633X-2ΔΔ	3.20	AF753NX-2ΔΔ	3.21
AF301SB2-2Δ7	3.14	AF4002N2-2Δ	3.16	AF503F2-2ΔΔ3	3.22	AF6342-2ΔΔ	3.24	AF753X-2ΔΔ	3.20
AF301SBX-2Δ7	3.14	AF4002X-2Δ	3.15	AF503N2-2ΔΔ	3.21	AF634B2-2ΔΔ9	3.27	AF75-40-00-Δ	1.32
AF301SF2-2Δ2	3.11	AF400-30-11-Δ	1.14	AF503N2-2ΔΔ	3.21	AF634BX-2ΔΔ9	3.27	AF7542-2ΔΔ	3.24
AF301SFX-2Δ2	3.11	AF400-30-11-Δ	1.209	AF503NX-2ΔΔ	3.21	AF634F2-2ΔΔ4	3.26	AF754B2-2ΔΔA	3.27
AF301SN2-2Δ	3.9	AF400-30-11-Δ	1.15	AF503X-2ΔΔ	3.20	AF634FX-2ΔΔ4	3.26	AF754BX-2ΔΔA	3.27
AF301SNX-2Δ	3.9	AF400M-30-11-Δ	1.15	AF50-40-00-Δ	1.32	AF634N2-2ΔΔ	3.25	AF754F2-2ΔΔ4	3.26
AF301SX-2Δ	3.7	AF400R-30-11-Δ	1.15	AF5042-2ΔΔ	3.24	AF634NX-2ΔΔ	3.25	AF754FX-2ΔΔ4	3.26
AF301X-2Δ	3.6	AF45-22-00-Δ	1.32	AF504B2-2ΔΔ7	3.27	AF634X-2ΔΔ	3.24	AF754N2-2ΔΔ	3.25
AF3022-2Δ	3.15	AF45-40-00-Δ	1.32	AF504B2-2ΔΔ8	3.27	AF63M-30-11-Δ	1.15	AF754NX-2ΔΔ	3.25
AF302B2-2Δ6	3.18	AF46012-2Δ	3.6	AF504BX-2ΔΔ7	3.27	AF63R-30-11-Δ	1.15	AF754X-2ΔΔ	3.24
AF302B2-2Δ7	3.18	AF4601B2-2ΔK	3.12	AF504BX-2ΔΔ8	3.27	AF75012-2Δ	3.6	AF75M-30-11-Δ	1.15
AF302BX-2Δ6	3.18	AF4601B2-2ΔM	3.12	AF504F2-2ΔΔ3	3.26	AF7501B2-2ΔN	3.12	AF75N3-30-11-Δ	1.28
AF302BX-2Δ7	3.18	AF4601BX-2ΔK	3.12	AF504FX-2ΔΔ3	3.26	AF7501B2-2ΔP	3.12	AF75N3M-3011-Δ	1.29
AF302F2-2Δ2	3.17	AF4601BX-2ΔM	3.12	AF504N2-2ΔΔ	3.25	AF7501BX-2ΔN	3.12	AF75N3R-3011-Δ	1.29
AF302FX-2Δ2	3.17	AF4601F2-2Δ7	3.10	AF504NX-2ΔΔ	3.25	AF7501BX-2ΔP	3.12	AF75R-30-11-Δ	1.15
AF302N2-2Δ	3.16	AF4601FX-2Δ7	3.10	AF504X-2ΔΔ	3.24	AF7501F2-2Δ8	3.10	AF91SFX-2Δ1	3.11
AF302NX-2Δ	3.16	AF4601N2-2Δ	3.8	AF50M-30-11-Δ	1.15	AF7501FX-2Δ8	3.10	AF95-30-11-Δ	1.14
AF302X-2Δ	3.15	AF4601NX-2Δ	3.8	AF50N2-30-11-Δ	1.28	AF7501N2-2Δ	3.8	AF95B-30-11RT-Δ	1.204
AF30-30-00-Δ	1.14	AF4601X-2Δ	3.6	AF50N2M-3011-Δ	1.29	AF7501NX-2Δ	3.8	AF95B-30-11-Δ	1.204
AF3032-2ΔΔ	3.20	AF46022-2Δ	3.15	AF50N2R-3011-Δ	1.29	AF7501X-2Δ	3.6	AF95M-30-11-Δ	1.15
AF303B2-2ΔΔ6	3.23	AF4602B2-2ΔK	3.18	AF50R-30-11-Δ	1.15	AF75022-2Δ	3.15	AF95R-30-11-Δ	1.15
AF303B2-2ΔΔ7	3.23	AF4602B2-2ΔM	3.18	AF58012-2Δ	3.6	AF7502B2-2ΔN	3.18	AFN0012-2Δ	3.6
AF303BX-2ΔΔ6	3.23	AF4602BX-2ΔK	3.18	AF5801B2-2ΔM	3.12	AF7502B2-2ΔP	3.18	AFN001B2-2Δ1	3.13
AF303BX-2ΔΔ7	3.23	AF4602BX-2ΔM	3.18	AF5801B2-2ΔN	3.12	AF7502BX-2ΔN	3.18	AFN001BX-2Δ1	3.13
AF303F2-2ΔΔ2	3.22	AF4602F2-2Δ7	3.17	AF5801BX-2ΔM	3.12	AF7502BX-2ΔP	3.18	AFN001F2-2Δ1	3.10
AF303FX-2ΔΔ2	3.22	AF4602FX-2Δ7	3.17	AF5801BX-2ΔN	3.12	AF7502F2-2Δ8	3.17	AFN001FX-2Δ1	3.10
AF303N2-2ΔΔ	3.21	AF4602N2-2Δ	3.16	AF5801F2-2Δ8	3.10	AF7502FX-2Δ8	3.17	AFN001N2-2Δ	3.8
AF303NX-2ΔΔ	3.21	AF4602NX-2Δ	3.16	AF5801FX-2Δ8	3.10	AF7502N2-2Δ	3.16	AFN001NX-2Δ	3.8
AF303X-2ΔΔ	3.20	AF4602X-2Δ	3.15	AF5801N2-2Δ	3.8	AF7502NX-2Δ	3.16	AFN001S2-2Δ	3.7

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AFN001SB2-2Δ1	3.14	AFN11SBX-2Δ6	3.14	AFN31F2-2Δ4	3.10	AS09-30-32S-ΔM	1.25	B7-22-00-FΔ	1.34
AFN001SBX-2Δ1	3.14	AFN11SF2-2Δ1	3.11	AFN31FX-2Δ4	3.10	AS09-30-32-ΔM	1.24	B7-22-00-PA	1.34
AFN001SF2-2Δ1	3.11	AFN11SF2-2Δ2	3.11	AFN31N2-2Δ	3.8	AS12-30-01S-ΔM	1.25	B7-22-00-Δ	1.34
AFN001SFX-2Δ1	3.11	AFN11SFX-2Δ1	3.11	AFN31NX-2Δ	3.8	AS12-30-01-ΔM	1.24	B7-30-01-FΔ	1.26
AFN001SN2-2Δ	3.9	AFN11SFX-2Δ2	3.11	AFN31X-2Δ	3.6	AS12-30-10S-ΔM	1.25	B7-30-01-PA	1.26
AFN001SX-2Δ	3.7	AFN11SN2-2Δ	3.9	AFN322-2Δ	3.15	AS12-30-10-ΔM	1.24	B7-30-01-Δ	1.26
AFN001X-2Δ	3.6	AFN11SX-2Δ	3.7	AFN32B2-2Δ7	3.19	AS12-30-32S-ΔM	1.25	B7-30-10-FΔ	1.26
AFN0022-2Δ	3.15	AFN11X-2Δ	3.6	AFN32B2-2Δ8	3.19	AS12-30-32-ΔM	1.24	B7-30-10-PA	1.26
AFN002B2-2Δ1	3.19	AFN122-2Δ	3.15	AFN32B2-2Δ9	3.19	AS16-30-01S-ΔM	1.25	B7-30-10-Δ	1.26
AFN002BX-2Δ1	3.19	AFN12B2-2Δ1	3.19	AFN32B2-2ΔA	3.19	AS16-30-01-ΔM	1.24	B7-40-00-FΔ	1.34
AFN002F2-2Δ1	3.17	AFN12B2-2Δ2	3.19	AFN32BX-2Δ7	3.19	AS16-30-10S-ΔM	1.25	B7-40-00-PA	1.34
AFN002FX-2Δ1	3.17	AFN12B2-2Δ3	3.19	AFN32BX-2Δ8	3.19	AS16-30-10-ΔM	1.24	B7-40-00-Δ	1.34
AFN002N2-2Δ	3.16	AFN12B2-2Δ4	3.19	AFN32BX-2Δ9	3.19	AS16-30-32S-ΔM	1.25	BA4	1.69
AFN002NX-2Δ	3.16	AFN12B2-2Δ5	3.19	AFN32BX-2ΔA	3.19	AS16-30-32-ΔM	1.24	BA4	6.21
AFN002X-2Δ	3.15	AFN12B2-2Δ6	3.19	AFN32F2-2Δ4	3.17	ASL09-30-01S-ΔM	1.25	BA5-50	1.69
AFN012-2Δ	3.6	AFN12BX-2Δ1	3.19	AFN32FX-2Δ4	3.17	ASL09-30-01-ΔM	1.24	BB3	1.56
AFN01B2-2Δ1	3.13	AFN12BX-2Δ2	3.19	AFN32N2-2Δ	3.16	ASL09-30-10S-ΔM	1.25	BB3	6.18
AFN01B2-2Δ2	3.13	AFN12BX-2Δ3	3.19	AFN32NX-2Δ	3.16	ASL09-30-10-ΔM	1.24	BB4	1.56
AFN01BX-2Δ1	3.13	AFN12BX-2Δ4	3.19	AFN32X-2Δ	3.15	ASL09-30-32S-ΔM	1.25	BB4	6.18
AFN01BX-2Δ2	3.13	AFN12F2-2Δ1	3.17	AFN412-2Δ	3.6	ASL09-30-32-ΔM	1.24	BC6-22-00-FΔ	1.34
AFN01F2-2Δ1	3.10	AFN12F2-2Δ2	3.17	AFN41B2-2ΔA	3.13	ASL12-30-01S-ΔM	1.25	BC6-22-00-PA	1.34
AFN01FX-2Δ1	3.10	AFN12FX-2Δ1	3.17	AFN41B2-2ΔB	3.13	ASL12-30-01-ΔM	1.24	BC6-22-00-Δ	1.34
AFN01N2-2Δ	3.8	AFN12FX-2Δ2	3.17	AFN41B2-2ΔC	3.13	ASL12-30-10S-ΔM	1.25	BC6-30-01-FΔ	1.27
AFN01NX-2Δ	3.8	AFN12N2-2Δ	3.16	AFN41B2-2ΔD	3.13	ASL12-30-10-ΔM	1.24	BC6-30-01-Δ	1.27
AFN01S2-2Δ	3.7	AFN12NX-2Δ	3.16	AFN41BX-2ΔA	3.13	ASL12-30-32S-ΔM	1.25	BC6-30-10-FΔ	1.27
AFN01SB2-2Δ1	3.14	AFN12X-2Δ	3.15	AFN41BX-2ΔC	3.13	ASL12-30-32-ΔM	1.24	BC6-30-10-PA	1.27
AFN01SB2-2Δ2	3.14	AFN212-2Δ	3.6	AFN41F2-2Δ5	3.10	ASL16-30-01S-ΔM	1.25	BC6-30-10-Δ	1.27
AFN01SB2-2Δ3	3.14	AFN21B2-2Δ6	3.13	AFN41FX-2Δ5	3.10	ASL16-30-01-ΔM	1.24	BC6-40-00-FΔ	1.34
AFN01SBX-2Δ1	3.14	AFN21B2-2Δ7	3.13	AFN41N2-2Δ	3.8	ASL16-30-10S-ΔM	1.25	BC6-40-00-PA	1.34
AFN01SBX-2Δ2	3.14	AFN21B2-2Δ8	3.13	AFN41NX-2Δ	3.8	ASL16-30-10-ΔM	1.24	BC6-40-00-Δ	1.34
AFN01SBX-2Δ3	3.14	AFN21B2-2Δ8	3.13	AFN41X-2Δ	3.6	ASL16-30-32S-ΔM	1.25	BC7-22-00-FΔ	1.34
AFN01SF2-2Δ1	3.11	AFN21BX-2Δ6	3.13	AFN422-2Δ	3.15	ASL16-30-32-ΔM	1.24	BC7-22-00-PA	1.34
AFN01SFX-2Δ1	3.11	AFN21BX-2Δ7	3.13	AFN42B2-2ΔA	3.19	AST35/15BP	15.12	BC7-22-00-Δ	1.34
AFN01SN2-2Δ	3.9	AFN21BX-2Δ8	3.13	AFN42B2-2ΔB	3.19	AST35/15SP	15.39	BC7-30-01-FΔ	1.27
AFN01SX-2Δ	3.7	AFN21F2-2Δ2	3.10	AFN42B2-2ΔC	3.19	ATK1350/4	1.67	BC7-30-01-PA	1.27
AFN01X-2Δ	3.6	AFN21F2-2Δ3	3.10	AFN42BX-2ΔA	3.19	ATK1350/4	2.18	BC7-30-01-Δ	1.27
AFN022-2Δ	3.15	AFN21FX-2Δ2	3.10	AFN42BX-2ΔB	3.19	ATK1650/4	1.67	BC7-30-10-FΔ	1.27
AFN02B2-2Δ1	3.19	AFN21FX-2Δ3	3.10	AFN42BX-2ΔC	3.19	ATK1650/6	1.67	BC7-30-10-PA	1.27
AFN02B2-2Δ2	3.19	AFN21N2-2Δ	3.8	AFN42F2-2Δ5	3.17	ATK185	1.67	BC7-30-10-Δ	1.27
AFN02B2-2Δ3	3.19	AFN21NX-2Δ	3.8	AFN42FX-2Δ5	3.17	ATK185	2.18	BC7-40-00-FΔ	1.34
AFN02B2-2Δ4	3.19	AFN21S2-2Δ	3.7	AFN42N2-2Δ	3.16	ATK185	5.22	BC7-40-00-PA	1.34
AFN02F2-2Δ1	3.17	AFN21SB2-2Δ8	3.14	AFN42NX-2Δ	3.16	ATK185HK	1.67	BC7-40-00-Δ	1.34
AFN02F2-2Δ2	3.17	AFN21SBX-2Δ8	3.14	AFN42X-2Δ	3.15	ATK300	1.67	BEA110/495	1.64
AFN02N2-2Δ	3.16	AFN21SF2-2Δ2	3.11	AGS-CS240	20.5	ATK300	2.18	BEA110/495	4.15
AFN02NX-2Δ	3.16	AFN21SFX-2Δ2	3.11	AGS-LABEL	20.4	ATK300	5.22	BEA16-3	1.64
AFN02X-2Δ	3.15	AFN21SN2-2Δ	3.9	AGS-MK1000	20.4	ATK300/2	1.67	BEA16-3	1.64
AFN112-2Δ	3.6	AFN21SX-2Δ	3.7	AGS-MK600	20.4	ATK300/2	2.18	BEA16-3	1.64
AFN11B2-2Δ1	3.13	AFN21X-2Δ	3.6	AL123001RT-Δ	1.203	ATK300/2	5.22	BEA16-3	4.15
AFN11B2-2Δ2	3.13	AFN222-2Δ	3.15	AL123010RT-Δ	1.203	ATK300/2HK	1.67	BEA16-3	4.15
AFN11B2-2Δ3	3.13	AFN22B2-2Δ6	3.19	AL163001RT-Δ	1.203	ATK300/2HK	2.18	BEA16-3	4.15
AFN11B2-2Δ4	3.13	AFN22B2-2Δ7	3.19	AL163010RT-Δ	1.203	ATK300HK	1.67	BEA16-4	1.64
AFN11B2-2Δ5	3.13	AFN22B2-2Δ8	3.19	AL263001RT-Δ	1.203	ATK300HK	2.18	BEA16-4	1.64
AFN11B2-2Δ6	3.13	AFN22BX-2Δ7	3.19	AL263010RT-Δ	1.203	ATK580/2	1.67	BEA16-4	1.64
AFN11B2-2Δ7	3.13	AFN22BX-2Δ8	3.19	AL303001RT-Δ	1.203	ATK580/2HK	1.67	BEA16-4	1.64
AFN11B2-2Δ8	3.13	AFN22BX-2Δ9	3.19	AL30-30-01-Δ	1.22	ATK580/2HK	2.18	BEA16-4	1.64
AFN11B2X-2Δ6	3.19	AFN22F2-2Δ2	3.17	AL303010RT-Δ	1.203	ATK750/3	1.67	BEA16-4	4.15
AFN11BX-2Δ1	3.13	AFN22F2-2Δ3	3.17	AL30R-30-10-Δ	1.23	ATK750/3HK	1.67	BEA16-4	4.15
AFN11BX-2Δ2	3.13	AFN22FX-2Δ2	3.17	AL403001RT-Δ	1.203	ATK750/3HK	2.18	BEA16-4	4.15
AFN11BX-2Δ3	3.13	AFN22N2-2Δ	3.16	AL403010RT-Δ	1.203	B6-22-00-FΔ	1.34	BEA16-4	4.15
AFN11BX-2Δ4	3.13	AFN22NX-2Δ	3.16	AL403010RT-Δ	1.203	B6-22-00-PA	1.34	BEA16-4	4.15
AFN11BX-2Δ5	3.19	AFN22NX-2Δ	3.16	AL40-30-01-Δ	1.22	B6-22-00-Δ	1.34	BEA185/T3	1.65
AFN11F2-2Δ1	3.10	AFN22X-2Δ	3.15	AL403010RT-Δ	1.203	B6-30-01-FΔ	1.26	BEA185/T4	1.65
AFN11F2-2Δ2	3.10	AFN312-2Δ	3.6	AL403010RT-Δ	1.203	B6-30-01-PA	1.26	BEA185D/T3	1.65
AFN11FX-2Δ1	3.10	AFN31B2-2Δ7	3.13	AL40M-30-10-Δ	1.23	B6-30-01-Δ	1.26	BEA185D/T4	1.65
AFN11FX-2Δ2	3.10	AFN31B2-2Δ8	3.13	AL40R-30-10-Δ	1.23	B6-30-10-FΔ	1.26	BEA210/T4	1.65
AFN11N2-2Δ	3.8	AFN31B2-2Δ9	3.13	AL93001RT-Δ	1.203	B6-30-10-PA	1.26	BEA210D/T4	1.65
AFN11NX-2Δ	3.8	AFN31B2-2ΔA	3.13	AL93010RT-Δ	1.203	B6-30-10-Δ	1.26	BEA26-4	1.64
AFN11S2-2Δ	3.7	AFN31BX-2Δ7	3.13	AS09-30-01S-ΔM	1.25	B6-40-00-FΔ	1.34	BEA26-4	1.64
AFN11SB2-2Δ4	3.14	AFN31BX-2Δ8	3.13	AS09-30-01-ΔM	1.24	B6-40-00-PA	1.34	BEA26-4	4.15
AFN11SB2-2Δ6	3.14	AFN31BX-2Δ9	3.13	AS09-30-10S-ΔM	1.25	B6-40-00-Δ	1.34	BEA26-4	4.15
AFN11SBX-2Δ4	3.14	AFN31BX-2ΔA	3.13	AS09-30-10-ΔM	1.24	B6C-30-01-PA	1.27	BEA300/T5	1.65

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BEA300H/T5	1.65	BS4-3	4.12	CA4-31N	6.18	CAT4-11U	1.47	CL-100G	7.96
BEA38-4	1.64	BSK-BP	15.12	CA4-31U	1.47	CB1-600G	7.97	CL-100L	7.96
BEA38-4	1.64	BSK-SP	15.39	CA4-40E	1.47	CB1-601G	7.97	CL-100R	7.96
BEA38-4	1.64	BSM6-30	1.62	CA4-40N	1.47	CB1-602G	7.97	CL-100W	7.96
BEA38-4	1.64	BT030	17.54	CA4-40N	6.18	CB1-603G	7.97	CL-100Y	7.96
BEA38-4	1.64	BT030	17.63	CA4-40U	1.47	CB1-610R	7.97	CL-501G	7.95
BEA38-4	4.15	BT030	17.75	CA5-01	1.48	CB1-610Y	7.97	CL-501L	7.95
BEA38-4	4.15	BX4	1.69	CA5-01	1.198	CB1-611R	7.97	CL-501R	7.95
BEA38-4	4.15	BX4	6.21	CA5-04E	1.48	CB1-611Y	7.97	CL-501W	7.95
BEA38-4	4.15	BX4-CA	1.69	CA5-04M	1.48	CB1-612R	7.97	CL-501Y	7.95
BEA38-4	4.15	BX4-CA	6.21	CA5-04U	1.48	CB1-612Y	7.97	CL-502G	7.95
BEA460H/T4	1.65	C2SS110Δ-01	7.94	CA5-10	1.48	CB1-613R	7.97	CL-502L	7.95
BEA50/450	1.64	C2SS110Δ-02	7.94	CA5-10	1.198	CB1-613Y	7.97	CL-502R	7.95
BEA50/450	4.15	C2SS110Δ-10	7.94	CA5-11/11E	1.48	CB1-620B	7.97	CL-502W	7.95
BEA7/132	1.64	C2SS110Δ-11	7.94	CA5-11/11M	1.48	CB1-621B	7.97	CL-502Y	7.95
BEA7/132	1.64	C2SS110Δ-20	7.94	CA5-13M	1.48	CB1-622B	7.97	CL-504G	7.95
BEA7/132	1.64	C2SS210Δ-01	7.94	CA5-22E	1.48	CB1-623B	7.97	CL-504L	7.95
BEA7/132	4.15	C2SS210Δ-02	7.94	CA5-22M	1.48	CB1-630B	7.97	CL-504R	7.95
BEA7/132	4.15	C2SS210Δ-10	7.94	CA5-22U	1.198	CB1-631B	7.97	CL-504W	7.95
BEA7/132	4.15	C2SS210Δ-11	7.94	CA5-31E	1.48	CB1-632B	7.97	CL-504Y	7.95
BEA75/495	1.64	C2SS210Δ-20	7.94	CA5-31M	1.48	CB1-633B	7.97	CL-505G	7.95
BEA75/495	4.15	C2SS310Δ-01	7.94	CA5-31M	1.198	CC4-01	1.47	CL-505L	7.95
BEA750/T5	1.65	C2SS310Δ-02	7.94	CA5-31U	1.198	CC4-01	6.18	CL-505R	7.95
BEA750/T6	1.65	C2SS310Δ-10	7.94	CA5-40E	1.48	CC4-10	1.47	CL-505W	7.95
BEA750D/T5	1.65	C2SS310Δ-11	7.94	CA5-40U	1.48	CC4-10	6.18	CL-505Y	7.95
BEA750D/T6	1.65	C2SS310Δ-20	7.94	CA5D-01	1.189	CC5-01	1.48	CL-513G	7.95
BED110U	1.63	C3SS110Δ-02	7.94	CA5D-11	1.189	CCL16-11E	1.50	CL-513L	7.95
BED145U	1.63	C3SS110Δ-11	7.94	CA6-1026	7.120	CE3K1-10B-11	7.93	CL-513R	7.95
BED185U	1.63	C3SS210Δ-02	7.94	CA6-11E	1.50	CE3K1-10R-02	7.93	CL-513W	7.95
BED210U	1.63	C3SS210Δ-11	7.94	CA6-11E-P	1.50	CE3P-10B-11	7.93	CL-513Y	7.95
BED300U	1.63	C3SS210Δ-20	7.94	CA6-11K	6.18	CE3P-10R-11	7.93	CL-515G	7.95
BED400U	1.63	C3SS310Δ-02	7.94	CA6-11K-F	6.18	CE3P-10R-02	7.93	CL-515L	7.95
BED460U	1.63	C3SS310Δ-11	7.94	CA6-11K-P	6.18	CE3P-10R-11	7.93	CL-515R	7.95
BED50U	1.63	C3SS310Δ-20	7.94	CA6-11M	1.50	CE3T-10B-11	7.93	CL-515W	7.95
BED50U	1.63	C3SS710Δ-02	7.94	CA6-11M-P	1.50	CE3T-10B-11	7.93	CL-515Y	7.95
BED50U	1.63	C3SS710Δ-11	7.94	CA6-11N	1.50	CE3T-10R-01	7.93	CL-520G	7.95
BED580U	1.63	C3SS710Δ-20	7.94	CA6-11N-P	1.50	CE3T-10R-02	7.93	CL-520L	7.95
BED750U	1.63	CA1-8053	7.107	CAF6-02E	1.50	CE3T-10R-11	7.93	CL-520R	7.95
BED95U	1.63	CA1-8054	7.107	CAF6-02K	6.18	CE3T-10R-20	7.93	CL-520W	7.95
BEF185/OESA250	1.65	CA1-8075	7.100	CAF6-02M	1.50	CE4K1-10B-11	7.93	CL-520Y	7.95
BEF185H/OESA250	1.65	CA1-8077	7.100	CAF6-02N	1.50	CE4K1-10R-02	7.93	CL-523G	7.96
BEF300/OESA400	1.65	CA1-8078	7.100	CAF6-11E	1.50	CE4K1-10R-11	7.93	CL-523L	7.96
BEF300H/OESA400	1.65	CA1-8080	7.100	CAF6-11K	6.18	CE4P-10B-11	7.93	CL-523R	7.96
BEF460/OESA400	1.65	CA3-01	1.50	CAF6-11M	1.50	CE4P-10R-02	7.93	CL-523W	7.96
BEF460H/OESA400	1.65	CA3-01	6.18	CAF6-11N	1.50	CE4P-10R-11	7.93	CL-523Y	7.96
BEF750/OESA800	1.65	CA3-01S	1.50	CAF6-20E	1.50	CE4T-10B-11	7.93	CL-530G	7.96
BEM110-30	1.62	CA3-01S	6.18	CAF6-20K	6.18	CE4T-10R-01	7.93	CL-530L	7.96
BEM185-30	1.62	CA3-10	1.50	CAF6-20M	1.50	CE4T-10R-02	7.93	CL-530R	7.96
BEM460-30	1.62	CA3-10	6.18	CAF6-20N	1.50	CE4T-10R-11	7.93	CL-530W	7.96
BEM750-30	1.62	CA3-10S	1.50	CAL16-11A	1.50	CE4T-10R-20	7.93	CL-530Y	7.96
BEM75-30	1.62	CA3-10S	6.18	CAL16-11A	1.188	CE9-1003	7.93	CL-541G	7.96
BEMA300-30	1.62	CA4-01	1.47	CAL16-11A	1.188	CEL18-01	1.48	CL-541L	7.96
BER16-4	1.62	CA4-01	6.18	CAL16-11B	1.50	CEL18-01	1.209	CL-541R	7.96
BER16C-3	1.62	CA4-04E	1.47	CAL16-11B	1.188	CEL18-10	1.48	CL-541W	7.96
BER16V	1.62	CA4-04M	1.47	CAL16-11C	1.188	CEL18-10	1.209	CL-541Y	7.96
BER38-4	1.62	CA4-04N	1.47	CAL16-11C	1.50	CEP1-0	7.107	CP110A-01	7.90
BER40V	1.62	CA4-10	1.47	CAL16-11D	1.50	CEP1-1001	7.108	CP110A-02	7.90
BES110-30	1.62	CA4-10	6.18	CAL16-11D	1.188	CEP1-1002	7.108	CP110A-10	7.90
BES185-30	1.62	CA4-13M	1.47	CAL16-11E	1.50	CEP1-2001	7.108	CP110A-11	7.90
BES460-30	1.62	CA4-13N	1.47	CAL16-11E	1.188	CEP1-2002	7.108	CP110A-20	7.90
BES750-30	1.62	CA4-13N	6.18	CAL18-11	1.48	CEP1-0	7.107	CP1110W-10	7.90
BES75-30	1.62	CA4-22E	1.47	CAL18-11	1.198	CEPY1-1001	7.108	CP111G-10	7.91
BES75-40	1.62	CA4-22E	1.47	CAL18-11B	1.48	CEPY1-1001LP	7.108	CP111R-01	7.91
BESA300-30	1.62	CA4-22M	1.47	CAL18-11B	1.188	CEPY1-1002	7.108	CP111R-10	7.91
BEY16-4	1.63	CA4-22N	1.47	CAL18-11B	1.198	CEPY1-1002LP	7.108	CP111Y-10	7.91
BEY16C-3	1.63	CA4-22N	1.47	CAL4-11	1.47	CEPY1-2001	7.108	CP112G-10	7.91
BEY16V-2	1.63	CA4-22U	1.47	CAL4-11	6.18	CEPY1-2002	7.108	CP112R-01	7.91
BEY26-2	1.63	CA4-31E	1.47	CAL5-11	1.48	CK1-02	4.10	CP112R-10	7.91
BEY38-4	1.63	CA4-31M	1.47	CAL5-11	1.198	CK1-11	4.10	CP112Y-10	7.91
BEY40-2	1.63	CAT4-11E	1.47	CAT4-11E	1.47	CK1-20	4.10	CP113G-10	7.92

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CP113Y-10	7.92	CXBY68989	19.31	DR25-A-48	2.19	E217-16-01B48	16.57	E930/MCR1P50	16.48
CP1210W-10	7.90	CXBY68998	19.31	DR25-A-500	2.19	E217-16-01C	16.56	E930/MCR3P125	16.48
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CP210Δ-02	7.90	DA75-21-21-Δ	1.186	DS25-A-220/380	2.19	E217-16-01C48	16.57	E931/125	16.48
CP210Δ-10	7.90	DA75-21A-11-Δ	1.186	DS25-A-24	2.19	E217-16-01D	16.56	E931/50	16.48
CP210Δ-11	7.90	DA75M-20-11-Δ	1.187	DS25-A-48	2.19	E217-16-01D220	16.57	E931N/125	16.48
CP210Δ-20	7.90	DA75M-21A-11-Δ	1.187	DS25-A-500	2.19	E217-16-01D48	16.57	E931N/50	16.48
CP211G-10	7.91	DB140E	2.18	DSFHN-HS12	19.14	E217-16-01E	16.56	E932/125	16.48
CP211R-01	7.91	DB16	2.18	DSFHN-HS12	19.24	E217-16-01E220	16.57	E932/50	16.48
CP211R-10	7.91	DB16E	2.18	DSFHN-HS4	19.14	E217-16-01E48	16.57	E933/125	16.48
CP211Y-10	7.91	DB200	2.18	DSFHN-HS4	19.24	E217-16-01G	16.56	E933/50	16.48
CP212G-10	7.91	DB25/25A	2.18	DSFHS-12	19.24	E217-16-01G220	16.57	E933N/125	16.48
CP212R-01	7.91	DB25/32A	2.18	DSFHS-17	19.24	E217-16-01G48	16.57	E933N/50	16.48
CP212R-10	7.91	DB42	2.18	DSFHS-22	19.24	E217-16-10B	16.56	E93hN/32	16.44
CP212Y-10	7.91	DB45E	2.18	DT450/A185	2.18	E217-16-10B220	16.57	E93N/30	16.47
CP213G-10	7.92	DB80	2.18	DT450/A300	2.18	E217-16-10B48	16.57	E93N/32	16.42
CP213R-01	7.92	DB80E	2.18	DT500/AF460L	2.18	E217-16-10C	16.56	E94/30	16.47
CP213R-10	7.92	DE6TBA	17.63	DT500/AF460S	2.18	E217-16-10C220	16.57	E94/32	16.42
CP213Y-10	7.92	DE6TBAR4	17.63	DT800/AF750L	2.18	E217-16-10C48	16.57	EF19-0.32	2.11
CP310Δ-01	7.90	DE6TBAR5	17.63	DT800/AF750S	2.18	E217-16-10D	16.56	EF19-1.0	2.11
CP310Δ-02	7.90	DE6TBAR9	17.63	DX495	4.12	E217-16-10D220	16.57	EF19-18.9	2.11
CP310Δ-10	7.90	DMS132-G	4.14	E1250DU1250	2.15	E217-16-10D48	16.57	EF19-2.7	2.11
CP310Δ-11	7.90	DMS132-Y	4.14	E140DU140	2.13	E217-16-10E	16.56	EF19-6.3	2.11
CP310Δ-20	7.90	DP/DIN1-2	1.177	E16DU0.32	2.10	E217-16-10E220	16.57	EF45-30	2.11
CP311G-10	7.91	DP/DIN1-2	1.177	E16DU0.32	2.12	E217-16-10E48	16.57	EF45-45	2.11
CP311R-01	7.91	DP/DIN1-2	1.177	E16DU1.0	2.10	E217-16-10G	16.56	EHDB220C2P-ΔL	1.186
CP311R-10	7.91	DP/DIN1-2	1.177	E16DU1.0	2.12	E217-16-10G220	16.57	EHDB220C-ΔL	1.186
CP311Y-10	7.91	DP/DIN1-2	1.177	E16DU18.9	2.10	E217-16-10G48	16.57	EHDB220M2P-ΔL	1.187
CP312G-10	7.91	DP/DIN1-2	1.177	E16DU18.9	2.12	E218-16-11	16.54	EHDB220M-ΔL	1.187
CP312R-01	7.91	DP20C1P-Δ	1.176	E16DU2.7	2.10	E218-16-22	16.54	EHDB280C2P-ΔL	1.186
CP312R-10	7.91	DP20C1P-Δ/B	1.176	E16DU2.7	2.12	E218-16-31	16.54	EHDB280C-ΔL	1.186
CP312Y-10	7.91	DP20C2P-Δ	1.176	E16DU6.3	2.10	E218-25-11	16.54	EHDB280M2P-ΔL	1.187
CP313G-10	7.92	DP20C2P-Δ/B	1.176	E16DU6.3	2.12	E219-B	16.58	EHDB280M-ΔL	1.187
CP313R-01	7.92	DP20C3P-Δ	1.176	E200DU200	2.14	E219-B220	16.58	EHDB360C2P-ΔL	1.186
CP313R-10	7.92	DP20C3P-Δ/B	1.176	E210-ASV9	16.59	E219-B48	16.58	EHDB360C-ΔL	1.186
CP313Y-10	7.92	DP20C4P-Δ	1.176	E210-DH	16.59	E219-C	16.58	EHDB360M2P-ΔL	1.187
CP3310B-01	7.90	DP20C4P-Δ/B	1.176	E210-SPV	4.13	E219-C220	16.58	EHDB360M-ΔL	1.187
CP410Δ-01	7.90	DP25C1P-Δ	1.176	E211-16-10	16.52	E219-C48	16.58	EHDB520C2P-ΔL	1.186
CP410Δ-02	7.90	DP25C1P-Δ/B	1.176	E211-16-20	16.52	E219-D	16.58	EHDB520C-ΔL	1.186
CP410Δ-10	7.90	DP25C2P-Δ	1.176	E211-16-30	16.52	E219-D220	16.58	EHDB520M2P-ΔL	1.187
CP410Δ-11	7.90	DP25C2P-Δ/B	1.176	E211-16-40	16.52	E219-D48	16.58	EHDB520M-ΔL	1.187
CP410Δ-20	7.90	DP25C3P-Δ	1.176	E211-25-10	16.52	E219-E	16.58	EHDB650C2P-ΔL	1.186
CP411G-10	7.91	DP25C3P-Δ/B	1.176	E211-25-20	16.52	E219-E220	16.58	EHDB650C-ΔL	1.186
CP411R-01	7.91	DP25C4P-Δ	1.176	E211-25-30	16.52	E219-E48	16.58	EHDB650M2P-ΔL	1.187
CP411R-10	7.91	DP25C4P-Δ/B	1.176	E211-25-40	16.52	E219-G	16.58	EHDB650M-ΔL	1.187
CP411Y-10	7.91	DP-2-AC	1.177	E211-32-10	16.52	E219-G220	16.58	EHDB800C2P-ΔL	1.186
CP412G-10	7.92	DP-2-AC	1.177	E211-32-20	16.52	E219-G48	16.58	EHDB800C-ΔL	1.186
CP412R-01	7.92	DP-2-AC	1.177	E211-32-30	16.52	E320DU320	2.14	EHDB800M2P-ΔL	1.187
CP412R-10	7.92	DP30C1P-Δ	1.176	E211-32-40	16.52	E45DU30	2.12	EHDB800M-ΔL	1.187
CP412Y-10	7.92	DP30C1P-Δ/B	1.176	E211X-16-10	16.53	E45DU45	2.12	EHDB960C2P-ΔL	1.186
CP413G-10	7.92	DP30C2P-Δ	1.176	E211X-16-20	16.53	E500DU500	2.15	EHDB960C-ΔL	1.186
CP413R-01	7.92	DP30C2P-Δ/B	1.176	E211X-16-30	16.53	E800DU800	2.15	EHDB960M2P-ΔL	1.187
CP413R-10	7.92	DP30C3P-Δ	1.176	E211X-25-10	16.53	E800DU80	2.13	EHDB960M-ΔL	1.187
CP413Y-10	7.92	DP30C3P-Δ/B	1.176	E211X-25-20	16.53	E91/30	16.47	EHDBAS220	1.188
CPM310B-11	7.92	DP30C4P-Δ	1.176	E211X-25-30	16.53	E91/30s	16.47	EHDBAS220-2	1.188
CPM310G-11	7.92	DP30C4P-Δ/B	1.176	E213-16-001	16.53	E91/32	16.42	EHDBAS280	1.188
CPM310L-11	7.92	DP40C1P-Δ	1.176	E213-16-002	16.53	E91/32PV	16.45	EHDBAS280-2	1.188
CPM310R-11	7.92	DP40C1P-Δ/B	1.176	E213-25-001	16.53	E91/32PVs	16.45	EHDBAS360	1.188
CPM310Y-11	7.92	DP40C2P-Δ	1.176	E213-25-002	16.53	E91/32s	16.42	EHDBAS360-2	1.188
CUSTOM 1 SEAT	7.130	DP40C2P-Δ/B	1.176	E214-16-101	16.54	E91hN/32	16.44	EHDBAS520	1.188
CUSTOM 2 SEAT	7.130	DP40C3P-Δ	1.176	E214-16-202	16.54	E91hN/32s	16.44	EHDBAS520-2	1.188
CUSTOM 2 SEAT Y	7.130	DP40C3P-Δ/B	1.176	E214-25-101	16.54	E91N/30	16.47	EHDBAS650	1.188
CUSTOM 3 SEAT	7.130	DP40C4P-Δ	1.176	E214-25-202	16.54	E91N/32	16.42	EHDBAS650-2	1.188
CUSTOM 3 SEAT Y	7.130	DP40C4P-Δ/B	1.176	E215-16-11B	16.56	E91N/32s	16.42	EHDBAS800	1.188
CUSTOM 4 SEAT	7.130	DP50C3P-Δ	1.176	E215-16-11C	16.56	E92/30	16.47	EHDBAS800-2	1.188
CUSTOM 4 SEAT Y	7.130	DP60C3P-Δ	1.176	E215-16-11D	16.56	E92/32	16.42	EHDBAS960	1.188
CUSTOM 6 SEAT	7.130	DP75C3P-Δ	1.176	E215-16-11E	16.56	E92/32PV	16.45	EHDBAS960-2	1.188
CUSTOM 6 SEAT Y	7.130	DP90C3P-Δ	1.176	E215-16-11F	16.56	E92/32PVs	16.45	EHDBCK220-2	1.189
CXBY67121	19.38	DR25-A-110	2.19	E215-16-11G	16.56	E93/30	16.47	EHDBCK220-NC	1.189

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EHDBCK280-NC	1.189	F202A-100/0.5	16.32	F204A-125/0.3	16.32	FC30P-3PB6B	19.47	G1M3SSK1-10Δ	7.50
EHDBCK360-2	1.189	F202A-16/0.01	16.32	F204A-125/0.5	16.32	FC30X-3PB6B	19.47	G1M3SSK2-10Δ	7.50
EHDBCK360-NC	1.189	F202A-25/0.03	16.32	F204A-25/0.03	16.32	FJ1001-3PB8B	19.47	G1M3SSK3-10Δ	7.50
EHDBCK520-2	1.189	F202A-25/0.03APR	16.33	F204A-25/0.03APR	16.33	FJ1003-3PB8B	19.47	G1M3SSK4-10Δ	7.50
EHDBCK520-NC	1.189	F202A-25/0.1	16.32	F204A-25/0.1	16.32	FJ1004-3PB8B	19.47	G1M3SSK5-10Δ	7.50
EHDBCK650-2	1.189	F202A-25/0.3	16.32	F204A-25/0.3	16.32	FJ100P-3PB8B	19.47	G1ML1-100Δ	7.53
EHDBCK650-NC	1.189	F202A-25/0.5	16.32	F204A-25/0.5	16.32	FJ100X-3PB8B	19.47	G1MP1-10Δ	7.42
EHDBCK800-2	1.189	F202A-40/0.03	16.32	F204A-40/0.03	16.32	FJ2001-3PB8C	19.47	G1MP1-11‡	7.42
EHDBCK800-NC	1.189	F202A-40/0.03APR	16.33	F204A-40/0.03APR	16.33	FJ2003-3PB8C	19.47	G1MP2-10Δ	7.42
EHDBCK960-2	1.189	F202A-40/0.1	16.32	F204A-40/0.1	16.32	FJ2004-3PB8C	19.47	G1MP2-11‡	7.42
EHDBCK960-NC	1.189	F202A-40/0.3	16.32	F204A-40/0.3	16.32	FJ200P-3PB8C	19.47	G1MP3-10Δ	7.42
EHDRC280-Δ	1.188	F202A-40/0.5	16.32	F204A-40/0.5	16.32	FJ200X-3PB8C	19.47	G1MP3-11‡	7.42
EHDRC360-Δ	1.188	F202A-63/0.03	16.32	F204A-63/0.03	16.32	FJ301-3PB6B	19.47	G1MP4-10Δ	7.42
EHDRC650-Δ	1.188	F202A-63/0.03APR	16.33	F204A-63/0.03APR	16.33	FJ303-3PB6B	19.47	G1MP4-11‡	7.42
EHDRC960-Δ	1.188	F202A-63/0.1	16.32	F204A-63/0.1	16.32	FJ304-3PB6B	19.47	G1MPEK3-11R	7.44
EHDRK280-Δ	1.188	F202A-63/0.3	16.32	F204A-63/0.3	16.32	FJ30P-3PB6B	19.47	G1MPEK3-12R	7.44
EHDRK360-Δ	1.188	F202A-63/0.5	16.32	F204A-63/0.5	16.32	FJ30X-3PB6B	19.47	G1MPEK3-13R	7.44
EHTK210	1.189	F202A-80/0.03	16.32	F204A-80/0.03	16.32	FJ4001-3PB4C	19.47	G1MPEK4-11R	7.44
EHTK210	2.18	F202A-80/0.03APR	16.33	F204A-80/0.03APR	16.33	FJ4003-3PB4C	19.47	G1MPEK4-12R	7.44
EHTK550N	1.189	F202A-80/0.1	16.32	F204A-80/0.1	16.32	FJ4004-3PB4C	19.47	G1MPEK4-13R	7.44
EHTK700	1.189	F202A-80/0.3	16.32	F204A-80/0.3	16.32	FJ400P-3PB4C	19.47	G1MPEP3-10R	7.45
EHTK800	1.189	F202A-80/0.5	16.32	F204A-80/0.5	16.32	FJ400X-3PB4C	19.47	G1MPEP4-10R	7.45
EK1000C4P-ΔL	1.32	F202AC-100/0.03	16.30	F204AC-100/0.03	16.30	FJ6001-3PB7C	19.47	G1MPET3-10R	7.44
EK110C4P-ΔL	1.32	F202AC-100/0.1	16.30	F204AC-100/0.1	16.30	FJ6003-3PB7C	19.47	G1MPET4-10R	7.44
EK150C4P-ΔL	1.32	F202AC-100/0.3	16.30	F204AC-100/0.3	16.30	FJ6004-3PB7C	19.47	G1MPM1-10Δ	7.43
EK175C4P-ΔL	1.32	F202AC-100/0.5	16.30	F204AC-100/0.5	16.30	FJ600P-3PB7C	19.47	G1MPM1-11‡	7.43
EK210C4P-ΔL	1.32	F202AC-16/0.01	16.30	F204AC-125/0.03 1	16.30	FJ600X-3PB7C	19.47	G1MPM2-10Δ	7.43
EK370C4P-ΔL	1.32	F202AC-25/0.03	16.30	F204AC-125/0.1 1	16.30	FJ601-3PB6B	19.47	G1MPM2-11‡	7.43
EK550C4P-ΔL	1.32	F202AC-25/0.1	16.30	F204AC-125/0.3 1	16.30	FJ603-3PB6B	19.47	G1MPM3-11R	7.45
ELP22-1101	7.120	F202AC-25/0.3	16.30	F204AC-125/0.5 1	16.30	FJ604-3PB8B	19.47	G1MPM4-11R	7.45
EOT100U3M1-P	19.45	F202AC-25/0.5	16.30	F204AC-25/0.03	16.30	FJ60P-3PB8B	19.47	G1MPMT3-11R	7.44
EOT100U3M3-P	19.45	F202AC-40/0.03	16.30	F204AC-25/0.1	16.30	FJ60X-3PB8B	19.47	G1MPMT4-11R	7.44
EOT100U3S4-P	19.45	F202AC-40/0.1	16.30	F204AC-25/0.3	16.30	FKTP-1001	13.9	G1MP-NPE28-01	7.140
EOT16U3M1-P	19.45	F202AC-40/0.3	16.30	F204AC-25/0.5	16.30	FL8001-3PB4B	19.47	G1MP-NPE28-02	7.140
EOT16U3M1-S	19.45	F202AC-40/0.5	16.30	F204AC-40/0.03	16.30	FL8003-3PB4B	19.47	G1MP-NPE28-03	7.140
EOT16U3M3-P	19.45	F202AC-63/0.03	16.30	F204AC-40/0.1	16.30	FL8004-3PB4B	19.47	G1MP-NPE28-04	7.140
EOT16U3M3-S	19.45	F202AC-63/0.1	16.30	F204AC-40/0.3	16.30	FL800P-3PB4	19.47	G1MP-NPE28-05	7.140
EOT16U3P3-S	19.45	F202AC-63/0.3	16.30	F204AC-40/0.5	16.30	FL800X-3PB4B	19.47	G1MP-NPE28-06	7.140
EOT16U3P4-P	19.45	F202AC-63/0.5	16.30	F204AC-63/0.03	16.30	FLSWM5X8AX	19.38	G1MP-NPE28-07	7.140
EOT16U3S4-P	19.45	F202AC-80/0.03	16.30	F204AC-63/0.1	16.30	FLSWM5X8AX	19.38	G1MP-NPE29-01	7.140
EOT30U3M1-P	19.45	F202AC-80/0.1	16.30	F204AC-63/0.3	16.30	G1M2SS1-10Δ	7.46	G1MP-NPE29-02	7.140
EOT30U3M3-P	19.45	F202AC-80/0.3	16.30	F204AC-63/0.5	16.30	G1M2SS1-11Δ	7.47	G1MP-NPE29-03	7.140
EOT30U3S4-P	19.45	F202AC-80/0.5	16.30	F204AC-80/0.03	16.30	G1M2SS2-10Δ	7.46	G1MP-NPE29-04	7.140
EOT32U3M1-P	19.45	F202ACS-40/0.1	16.31	F204AC-80/0.1	16.30	G1M2SS2-11Δ	7.47	G1MP-NPE29-05	7.140
EOT32U3M1-S	19.45	F202ACS-40/0.3	16.31	F204AC-80/0.3	16.30	G1M2SS3-10Δ	7.46	G1MP-NPE29-06	7.140
EOT32U3M3-P	19.45	F202ACS-40/0.5	16.31	F204AC-80/0.5	16.30	G1M2SS3-11Δ	7.47	G1MP-NPE29-07	7.140
EOT32U3M3-S	19.45	F202ACS-40/1.0	16.31	F204ACS-40/0.1	16.31	G1M2SS4-10Δ	7.46	G1MTS1-10B	7.51
EOT32U3P3-S	19.45	F202ACS-63/0.1	16.31	F204ACS-40/0.3	16.31	G1M2SS4-11Δ	7.47	G1MTS2-10B	7.51
EOT32U3P4-P	19.45	F202ACS-63/0.3	16.31	F204ACS-40/0.5	16.31	G1M2SS5-10Δ	7.46	G1MTS3-10B	7.51
EOT32U3S4-P	19.45	F202ACS-63/0.5	16.31	F204ACS-40/1.0	16.31	G1M2SS5-11Δ	7.47	G2M2SS1-30Δ	7.46
EOT45U3M1-P	19.45	F202ACS-63/1.0	16.31	F204ACS-63/0.1	16.31	G1M2SS6-10Δ	7.46	G2M2SS1-31Δ	7.47
EOT45U3M1-S	19.45	F202AS-100/0.1	16.34	F204ACS-63/0.3	16.31	G1M2SS6-11Δ	7.47	G2M2SS2-30Δ	7.46
EOT45U3M3-P	19.45	F202AS-100/0.3	16.34	F204ACS-63/0.5	16.31	G1M2SSK1-10Δ	7.50	G2M2SS2-31Δ	7.47
EOT45U3M3-S	19.45	F202AS-100/0.5	16.34	F204ACS-63/1.0	16.31	G1M2SSK2-10Δ	7.50	G2M2SS3-30Δ	7.46
EOT45U3P3-S	19.45	F202AS-100/1.0	16.34	F204AS-100/0.1	16.34	G1M2SSK3-10Δ	7.50	G2M2SS3-31Δ	7.47
EOT45U3P4-P	19.45	F202AS-40/0.1	16.34	F204AS-100/0.3	16.34	G1M3SS1-10Δ	7.48	G2M2SS4-30Δ	7.46
EOT45U3S4-P	19.45	F202AS-40/0.3	16.34	F204AS-100/0.5	16.34	G1M3SS1-11Δ	7.49	G2M2SS4-31Δ	7.47
EOT60U3M1-P	19.45	F202AS-40/0.5	16.34	F204AS-100/1.0	16.34	G1M3SS2-10Δ	7.48	G2M2SS5-30Δ	7.46
EOT60U3M3-P	19.45	F202AS-40/1.0	16.34	F204AS-125/0.3 1	16.34	G1M3SS2-11Δ	7.49	G2M2SS5-31Δ	7.47
EOT60U3S4-P	19.45	F202AS-63/0.1	16.34	F204AS-125/0.5 1	16.34	G1M3SS3-10Δ	7.48	G2M2SS6-30Δ	7.46
EOT63U3M1-P	19.45	F202AS-63/0.3	16.34	F204AS-40/0.1	16.34	G1M3SS3-11Δ	7.49	G2M2SS6-31Δ	7.47
EOT63U3M1-S	19.45	F202AS-63/0.5	16.34	F204AS-40/0.3	16.34	G1M3SS4-10Δ	7.48	G2M2SSK1-30Δ	7.50
EOT63U3M3-P	19.45	F202AS-63/1.0	16.34	F204AS-40/0.5	16.34	G1M3SS4-11Δ	7.49	G2M2SSK2-30Δ	7.50
EOT63U3M3-S	19.45	F204A-100/0.03	16.32	F204AS-40/1.0	16.34	G1M3SS5-10Δ	7.48	G2M2SSK3-30Δ	7.50
EOT63U3P3-P	19.45	F204A-100/0.03APR	16.33	F204AS-63/0.1	16.34	G1M3SS5-11Δ	7.49	G2M3SS1-30Δ	7.48
EOT63U3P4-P	19.45	F204A-100/0.1	16.32	F204AS-63/0.3	16.34	G1M3SS6-10Δ	7.48	G2M3SS1-31Δ	7.49
EOT63U3S4-P	19.45	F204A-100/0.3	16.32	F204AS-63/0.5	16.34	G1M3SS6-11Δ	7.49	G2M3SS2-30Δ	7.48
F202A-100/0.03	16.32	F204A-100/0.5	16.32	F204AS-63/1.0	16.34	G1M3SS7-10Δ	7.48	G2M3SS2-31Δ	7.49
F202A-100/0.03APR	16.33	F204A-125/0.03	16.32	FC301-3PB6B	19.47	G1M3SS7-11Δ	7.49	G2M3SS3-30Δ	7.48
F202A-100/0.1	16.32	F204A-125/0.03APR 1	16.33	FC303-3PB6B	19.47	G1M3SS8-10Δ	7.48	G2M3SS3-31Δ	7.49

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G2M3SS4-31Δ	7.49	HK1-20L	4.10	K6-22Z-F85	6.12	K7C060	19.15	KA1-8072	7.28
G2M3SS5-30Δ	7.48	HK4-11	4.10	K6-22Z-P01	6.12	K7C060	19.25	KA1-8072	7.31
G2M3SS5-31Δ	7.49	HK4-W	4.10	K6-22Z-P02	6.12	K7C072	19.15	KA1-8072	7.57
G2M3SS6-30Δ	7.48	HKF1-11	4.10	K6-22Z-P03	6.12	K7C072	19.25	KA1-8072	7.60
G2M3SS6-31Δ	7.49	HKF1-20	4.10	K6-22Z-P80	6.12	K7C084	19.15	KA1-8072	7.99
G2M3SS7-30Δ	7.48	HKS4-02	4.10	K6-22Z-P84	6.12	K7C084	19.25	KA1-8072	7.100
G2M3SS7-31Δ	7.49	HKS4-11	4.10	K6-22Z-P85	6.12	K7FCH	19.15	KA1-8073	7.31
G2M3SS8-30Δ	7.48	HKS4-20	4.10	K6-31Z-01	6.12	K7FCH4	19.15	KA1-8073	7.60
G2M3SS8-31Δ	7.49	IB132-G	4.14	K6-31Z-02	6.12	K7FCH4	19.25	KA1-8073	7.100
G2M3SSK1-30Δ	7.50	IB132-Y	4.14	K6-31Z-03	6.12	K7TUT	17.54	KA1-8077	7.32
G2M3SSK2-30Δ	7.50	IPM1B	8.65	K6-31Z-80	6.12	K7TUT	17.75	KA1-8077	7.61
G2M3SSK3-30Δ	7.50	IPM1G	8.65	K6-31Z-84	6.12	K8TL	17.65	KA1-8079	7.32
G2M3SSK4-30Δ	7.50	IPM1R	8.65	K6-31Z-85	6.12	K8TM	17.65	KA1-8079	7.61
G2M3SSK5-30Δ	7.50	IPM1Y	8.65	K6-31Z-F01	6.12	KA1080-1	17.7	KA1-8080	7.32
G2MEP3-10R	7.45	IPM2B	8.65	K6-31Z-F02	6.12	KA1080-2	17.7	KA1-8080	7.61
G2ML1-100Δ	7.53	IPM2G	8.65	K6-31Z-F03	6.12	KA1080-3	17.7	KA1-8081	7.33
G2MP1-30Δ	7.42	IPM2R	8.65	K6-31Z-F80	6.12	KA1080-4	17.7	KA1-8081	7.62
G2MP1-31‡	7.42	IPM2Y	8.65	K6-31Z-F84	6.12	KA1080-6	17.7	KA1-8082	7.33
G2MP2-30Δ	7.42	IPSA1A11	8.66	K6-31Z-F85	6.12	KA1100-1	17.7	KA1-8082	7.62
G2MP2-31‡	7.42	IPSA1A22	8.66	K6-31Z-P01	6.12	KA1100-2	17.7	KA1-8083	7.33
G2MP3-30Δ	7.42	IPSA1D11	8.66	K6-31Z-P02	6.12	KA1100-3	17.7	KA1-8083	7.62
G2MP3-31‡	7.42	IPSA1D22	8.66	K6-31Z-P03	6.12	KA1100-4	17.7	KA1-8084	7.33
G2MP4-30Δ	7.42	IPSA2A11	8.66	K6-31Z-P80	6.12	KA1100-6	17.7	KA1-8084	7.62
G2MP4-31‡	7.42	IPSA2A22	8.66	K6-31Z-P84	6.12	KA1-8002	7.32	KA1-8085	7.33
G2MP4-31‡	7.42	IPSA2D11	8.66	K6-31Z-P85	6.12	KA1-8002	7.61	KA1-8085	7.62
G2MP4-31‡	7.42	IPSA2D22	8.66	K6-40E-01	6.12	KA1-8002	7.100	KA1-8086	7.33
G2MP4-31‡	7.42	IPSA2A11	8.66	K6-40E-02	6.12	KA1-8005	7.22	KA1-8086	7.62
G2MP4-31‡	7.42	IPSA2A22	8.66	K6-40E-03	6.12	KA1-8005	7.33	KA1-8087	7.33
G2MP4-31‡	7.42	IPSA2D11	8.66	K6-40E-80	6.12	KA1-8005	7.53	KA1-8087	7.62
G2MP4-31‡	7.42	IPSA2D22	8.66	K6-40E-84	6.12	KA1-8005	7.62	KA1-8087	7.100
G2MP4-31‡	7.42	IPSA3A11	8.66	K6-40E-85	6.12	KA1-8005	7.100	KA1-8088	7.33
G2MP4-31‡	7.42	IPSA3A22	8.66	K6-40E-F01	6.12	KA1-8010	7.32	KA1-8088	7.62
G2MP4-31‡	7.42	IPSA3D11	8.66	K6-40E-F02	6.12	KA1-8010	7.61	KA1-8091	7.33
G2MP4-31‡	7.42	IPSA3D22	8.66	K6-40E-F03	6.12	KA1-8010	7.100	KA1-8091	7.62
G2MP4-31‡	7.42	IPSA3A11	8.66	K6-40E-F03	6.12	KA1-8021	7.32	KA1-8092	7.33
G2MP4-31‡	7.42	IPSA3A22	8.66	K6-40E-F80	6.12	KA1-8021	7.61	KA1-8092	7.62
G2MP4-31‡	7.42	IPSA3D11	8.66	K6-40E-F84	6.12	KA1-8021	7.100	KA1-8093	7.33
G2MP4-31‡	7.42	IPSA3D22	8.66	K6-40E-F85	6.12	KA1-8021	7.32	KA1-8093	7.62
G2MP4-31‡	7.42	IPSA3A11	8.66	K6-40E-P01	6.12	KA1-8022	7.61	KA1-8094	7.33
G2MP4-31‡	7.42	IPSA3A22	8.66	K6-40E-P02	6.12	KA1-8022	7.100	KA1-8094	7.62
G2MP4-31‡	7.42	IPSA3D11	8.66	K6-40E-P03	6.12	KA1-8022	7.32	KA1-8095	7.33
G2MP4-31‡	7.42	IPSA3D22	8.66	K6-40E-P80	6.12	KA1-8024	7.32	KA1-8095	7.62
G2MP4-31‡	7.42	IPSA3A11	8.66	K6-40E-P84	6.12	KA1-8024	7.61	KA1-8095	7.33
G2MP4-31‡	7.42	IPSA3A22	8.66	K6-40E-P85	6.12	KA1-8027	7.31	KA1-8096	7.62
G2MP4-31‡	7.42	IPSA3D11	8.66	K6S-22Z-1.7	6.14	KA1-8027	7.60	KA1-8096	7.33
G2MP4-31‡	7.42	IPSA3D22	8.66	K6S-22Z-2.8	6.14	KA1-8028	7.31	KA1-8097	7.62
G2MP4-31‡	7.42	K3TA	17.78	K6S-22Z-F1.7	6.14	KA1-8028	7.60	KA1-8097	7.100
G2MP4-31‡	7.42	K3TA-4	17.78	K6S-22Z-F2.8	6.14	KA1-8029	7.31	KA1-8098	7.33
G2MP4-31‡	7.42	K4TB	17.78	K6S-22Z-P1.7	6.14	KA1-8029	7.60	KA1-8098	7.62
G2MP4-31‡	7.42	K4TB-4	17.78	K6S-22Z-P2.8	6.14	KA1-8029	7.100	KA1-8101	7.33
G2MP4-31‡	7.42	K4TBC	17.78	K6S-31Z-1.7	6.14	KA1-8030	7.31	KA1-8101	7.62
G2MP4-31‡	7.42	K4TBC-4	17.78	K6S-31Z-2.8	6.14	KA1-8030	7.60	KA1-8102	7.33
G2MP4-31‡	7.42	K4TC	17.78	K6S-31Z-F1.7	6.14	KA1-8030	7.100	KA1-8102	7.62
G2MP4-31‡	7.42	K4TC-4	17.78	K6S-31Z-F2.8	6.14	KA1-8031	7.33	KA1-8102	7.33
G2MP4-31‡	7.42	K4TCC	17.78	K6S-31Z-P1.7	6.14	KA1-8031	7.62	KA1-8103	7.33
G2MP4-31‡	7.42	K4TCC-4	17.78	K6S-31Z-P2.8	6.14	KA1-8032	7.33	KA1-8103	7.62
G2MP4-31‡	7.42	K4TD	17.78	K6S-40E-1.7	6.14	KA1-8032	7.62	KA1-8104	7.33
G2MP4-31‡	7.42	K4TD-4	17.78	K6S-40E-2.8	6.14	KA1-8033	7.33	KA1-8104	7.62
G2MP4-31‡	7.42	K4TDC	17.78	K6S-40E-F1.7	6.14	KA1-8033	7.62	KA1-8105	7.33
G2MP4-31‡	7.42	K4TDC-4	17.78	K6S-40E-F2.8	6.14	KA1-8034	7.33	KA1-8105	7.62
G2MP4-31‡	7.42	K4TES	17.79	K6S-40E-P1.7	6.14	KA1-8034	7.62	KA1-8108	7.33
G2MP4-31‡	7.42	K4TES-4	17.79	K6S-40E-P2.8	6.14	KA1-8035	7.33	KA1-8108	7.62
G2MP4-31‡	7.42	K6-22Z-01	6.12	K6TH	17.78	KA1-8035	7.62	KA1-8111	7.33
G2MP4-31‡	7.42	K6-22Z-02	6.12	K6TH-4	17.78	KA1-8038	7.33	KA1-8111	7.62
G2MP4-31‡	7.42	K6-22Z-03	6.12	K6THC	17.78	KA1-8038	7.62	KA1-8112	7.33
G2MP4-31‡	7.42	K6-22Z-80	6.12	K6THC-4	17.78	KA1-8045	7.115	KA1-8112	7.62
G2MP4-31‡	7.42	K6-22Z-84	6.12	K6TJ	17.78	KA1-8046	7.21	KA1-8113	7.33
G2MP4-31‡	7.42	K6-22Z-85	6.12	K6TJ-4	17.78	KA1-8046MR	7.21	KA1-8113	7.62
G2MP4-31‡	7.42	K6-22Z-F01	6.12	K6TJC	17.78	KA1-8047	7.21	KA1-8114	7.33
G2MP4-31‡	7.42	K6-22Z-F02	6.12	K6TJC-4	17.78	KA1-8052	7.32	KA1-8114	7.62
G2MP4-31‡	7.42	K6-22Z-F03	6.12	K7C048	19.15	KA1-8052	7.61	KA1-8115	7.33
G2MP4-31‡	7.42	K6-22Z-F80	6.12						

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KA1-8118	7.62	KA2-2043	7.56	KA2-2232	7.28	KA2S2	17.6	KC6-31Z-1.4	6.14
KA1EF-1	17.7	KA2-2043	7.98	KA2-2232	7.57	KA2S4	17.6	KC6-31Z-13	6.13
KA1EF-2	17.7	KA2-2044	7.27	KA2-2232	7.99	KA2S7	17.6	KC6-31Z-16	6.13
KA1EF-3	17.7	KA2-2044	7.56	KA2-2233	7.28	KA2S8	17.6	KC6-31Z-2.4	6.14
KA1EF-4	17.7	KA2-2044	7.98	KA2-2233	7.57	KA2S9	17.6	KC6-31Z-F01	6.13
KA1EF-6	17.7	KA2-2045	7.27	KA2-2233	7.99	KA2SSW-F	17.8	KC6-31Z-F04	6.13
KA1ES-2	17.8	KA2-2045	7.56	KA2-2234	7.28	KA2SSW-T	17.8	KC6-31Z-F05	6.13
KA1ES-3	17.8	KA2-2045	7.98	KA2-2234	7.57	KA2U2	17.6	KC6-31Z-F07	6.13
KA1ES-4	17.8	KA2-2051	7.27	KA2-2234	7.99	KA2U4	17.6	KC6-31Z-F1.4	6.14
KA1ES-6	17.8	KA2-2051	7.56	KA2-2235	7.28	KA2U5	17.6	KC6-31Z-F13	6.13
KA1F-1	17.7	KA2-2051	7.98	KA2-2235	7.57	KA2U7	17.6	KC6-31Z-F16	6.13
KA1F-2	17.7	KA2-2052	7.27	KA2-2235	7.99	KA2U8	17.6	KC6-31Z-F2.4	6.14
KA1F-3	17.7	KA2-2052	7.56	KA2225-1	17.7	KA3-1018	7.147	KC6-31Z-P01	6.13
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KA2-2011	7.98	KA2-2055	7.56	KA2250-6	17.7	KA4-1025	7.146	KC6-40E-04	6.13
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KT6FLD	17.80	KT7PA1000-L	17.70	KT7XS6	17.71	KTR1-1005	7.54	KTS3U3	17.72
KT6FLDW	17.80	KT7PB1000-L	17.70	KT7XS7	17.52	KTR1-1011	7.25	KTS3U4	17.72
KT6HTC-3	17.78	KT7PBH-3	17.53	KT7XS7	17.71	KTR1-1011	7.54	KTS3U5	17.72
KT6HTC-4	17.78	KT7PBH-3	17.79	KT7XS8	17.52	KTR1-1012	7.25	KTS3U6	17.72
KT6KLFD	17.80	KT7PBH-4	17.79	KT7XS8	17.71	KTR1-1012	7.54	KTS3U7	17.72
KT6LTC-3	17.78	KT7PBH-4	17.53	KT7XS9	17.52	KTR1-1013	7.25	KTS3U8	17.72
KT6LTC-4	17.78	KT7PBL-3	17.53	KT7XS9	17.71	KTR1-1013	7.54	KTS3VD-H	17.80
KT6M2	17.74	KT7PBL-3	17.79	KT7XSCFP-C	17.54	KTR1-1014	7.25	KTS3VD-M	17.80
KT6M3	17.74	KT7PBL-4	17.53	KT7XSCFP-C	17.82	KTR1-1014	7.54	KTS3VD-S	17.80
KT6M4	17.74	KT7R-3	17.79	KT7XSCFP-L	17.54	KTR1-2001	7.25	KTS3WFF	17.82
KT6M7	17.74	KT7R-3	17.79	KT7XSCFP-R	17.54	KTR1-2001	7.54	KTS3WFR	17.82
KT6M8	17.74	KT7R-4	17.79	KT7XSCFP-R	17.82	KTR1-2002	7.25	KTS3WMK	17.82
KT6MI-H	17.83	KT7RH	17.80	KT7XSCMP-C	17.54	KTR1-2002	7.54	KZK1000	1.72
KT6MI-V	17.83	KT7SCFP-L	17.82	KT7XSCMP-C	17.82	KTR1-2003	7.25	KZK110	1.72
KT6NCT-600	17.75	KT7VD-H	17.80	KT7XSCMP-L	17.54	KTR1-2003	7.54	KZK150	1.72
KT6NCT-800	17.75	KT7VD-M	17.80	KT7XSCMP-L	17.82	KTR1-2004	7.25	KZK175	1.72
KT6PA600-L	17.70	KT7VD-S	17.80	KT7XSCMP-R	17.54	KTR1-2004	7.54	KZK210	1.72
KT6PA800-W	17.70	KT7WFHR	17.54	KT7XSCMP-R	17.82	KTR1-2005	7.25	KZK370	1.72
KT6PB600-L	17.70	KT7WFHR	17.82	KT7XU0	17.52	KTR1-2005	7.54	KZK550	1.72
KT6PB800-W	17.70	KT7X0400RP	17.54	KT7XU0	17.72	KTR1-2011	7.25	L100A3000Δ	1.197
KT6PBL-3	17.79	KT7X0400RP	17.75	KT7XU1	17.52	KTR1-2011	7.54	L200A3000Δ	1.197
KT6R-3	17.79	KT7X0600RP	17.54	KT7XU1	17.72	KTR1-2012	7.25	L30A3010Δ	1.197
KT6R-3	17.79	KT7X0600RP	17.75	KT7XU2	17.52	KTR1-2012	7.54	L60A3010Δ	1.197
KT6R-4	17.79	KT7X0800RP	17.54	KT7XU2	17.72	KTR1-2013	7.25	LD-110	1.67
KT6RH	17.80	KT7X0800RP	17.75	KT7XU3	17.52	KTR1-2013	7.54	LD-75	1.67
KT6RHW	17.80	KT7X1000RP	17.54	KT7XU3	17.72	KTR1-2014	7.25	LDC4	1.69
KT6VD-H	17.80	KT7X1000RP	17.75	KT7XU4	17.52	KTR1-2014	7.54	LDC4	6.21
KT6VD-M	17.80	KT7X1200-3	17.53	KT7XU4	17.72	KTS3AS	17.73	LE185	1.67
KT6WFEF	17.82	KT7X1200-3	17.78	KT7XU5	17.52	KTS3BA	17.73	LE185	5.22
KT6WFHR	17.82	KT7X1200-4	17.53	KT7XU5	17.72	KTS3C-AB	17.73	LE185	5.34
KT6WFVR	17.82	KT7X1200-4	17.78	KT7XU6	17.52	KTS3C-ABP	17.73	LE300	1.67
KT6WMK	17.82	KT7X1200RP	17.54	KT7XU6	17.72	KTS3C-M	17.74	LE300	5.22
KT70-1001	7.146	KT7X1200RP	17.75	KT7XU7	17.52	KTS3C-MP	17.74	LE300	5.34
KT70-1002	7.146	KT7XAC	17.54	KT7XU7	17.72	KTS3C-SU	17.71	LE460	1.67
KT7AS	17.73	KT7XAS2	17.52	KT7XU8	17.52	KTS3C-SU	17.71	LE460	5.34
KT7AS3	17.73	KT7XAS2	17.73	KT7XU8	17.72	KTS3C-SU	17.72	LE750	1.67
KT7AS3-AU	17.73	KT7XAS2-AU	17.52	KT7XU9	17.52	KTS3C-SUP	17.71	LE750	5.34
KT7AS-AU	17.73	KT7XAS2-AU	17.73	KT7XU9	17.72	KTS3C-SUP	17.71	LF40	1.66
KT7KLF	17.80	KT7XHTC-3	17.53	KT7XWMK	17.54	KTS3C-SUP	17.72	LF75	1.66
KT7LDO	17.80	KT7XHTC-3	17.78	KT7XWMK	17.82	KTS3DIN	17.83	LH75	1.66
KT7MKL1	17.53	KT7XHTC-4	17.78	KT81000RP	17.63	KTS3EF-3	17.79	LK110	1.67
KT7MKL2	17.53	KT7XHTC-4	17.53	KT81200RP	17.63	KTS3EF-4	17.79	LK75-F	1.67
KT7MTS	17.52	KT7XLTC-3	17.53	KT81600RP	17.63	KTS3FLD	17.80	LK75-L	1.67

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LP185	1.209	LS35P13B02	8.7	LS35P71L20	8.9	LS45M32L02	8.37	LS45M71D11	8.40
LP2050	1.209	LS35P13B11	8.7	LS35P72B02	8.9	LS45M32L20	8.37	LS45M71L02	8.40
LP22-2000	7.121	LS35P13C11	8.7	LS35P72B11	8.9	LS45M33B02	8.38	LS45M71L20	8.40
LP300	1.66	LS35P13D11	8.7	LS35P72C11	8.9	LS45M33B11	8.38	LS45M72B02	8.41
LP300	1.209	LS35P13L02	8.7	LS35P72D11	8.9	LS45M33C11	8.38	LS45M72B11	8.41
LP460	1.66	LS35P13L20	8.7	LS35P72L02	8.9	LS45M33D11	8.38	LS45M72C11	8.41
LP460	1.209	LS35P30B02	8.7	LS35P72L20	8.9	LS45M33L02	8.38	LS45M72D11	8.41
LP750	1.66	LS35P30B11	8.7	LS35P91B02	8.9	LS45M33L20	8.38	LS45M72L02	8.41
LP750	1.209	LS35P30C11	8.7	LS35P91B11	8.9	LS45M41B02	8.38	LS45M72L20	8.41
LS2ΔΔ 51B11- U 01	8.58	LS35P30D11	8.7	LS35P91C11	8.9	LS45M41B11	8.38	LS45M91B02	8.41
LS2ΔΔ 91B11- U 01	8.58	LS35P30L02	8.7	LS35P91D11	8.9	LS45M41C11	8.38	LS45M91B11	8.41
LS2ΔΔ11B11-U01	8.57	LS35P30L20	8.7	LS35P91L02	8.9	LS45M41D11	8.38	LS45M91C11	8.41
LS2ΔΔ11B11-U01	8.59	LS35P31B02	8.7	LS35P91L20	8.9	LS45M41L02	8.38	LS45M91D11	8.41
LS2ΔΔ11D11-U 01	8.57	LS35P31B11	8.7	LS35P92B02	8.9	LS45M41L20	8.38	LS45M91L02	8.41
LS2ΔΔ11D11-U01	8.59	LS35P31C11	8.7	LS35P92B11	8.9	LS45M42B02	8.38	LS45M91L20	8.41
LS2ΔΔ12B11-U01	8.57	LS35P31D11	8.7	LS35P92C11	8.9	LS45M42B11	8.38	LS45M92B02	8.41
LS2ΔΔ12B11-U01	8.59	LS35P31L02	8.7	LS35P92D11	8.9	LS45M42C11	8.38	LS45M92B11	8.41
LS2ΔΔ12D11-U01	8.57	LS35P31L20	8.7	LS35P92L02	8.9	LS45M42D11	8.38	LS45M92C11	8.41
LS2ΔΔ12D11-U01	8.59	LS35P32B02	8.7	LS35P92L20	8.9	LS45M42L02	8.38	LS45M92D11	8.41
LS2ΔΔ16B11-U01	8.57	LS35P32B11	8.7	LS45M00B02	8.49	LS45M42L20	8.38	LS45M92L02	8.41
LS2ΔΔ16B11-U01	8.59	LS35P32C11	8.7	LS45M00B11	8.49	LS45M43B02	8.38	LS45M92L20	8.41
LS2ΔΔ16D11-U01	8.57	LS35P32D11	8.7	LS45M00C11	8.49	LS45M43B11	8.38	LS45M93B02	8.41
LS2ΔΔ16D11-U01	8.59	LS35P32L02	8.7	LS45M00D11	8.49	LS45M43C11	8.38	LS45M93B11	8.41
LS2ΔΔ21B11-U01	8.57	LS35P32L20	8.7	LS45M00L02	8.49	LS45M43D11	8.38	LS45M93C11	8.41
LS2ΔΔ21B11-U01	8.59	LS35P34B02	8.7	LS45M00L20	8.49	LS45M43L02	8.38	LS45M93D11	8.41
LS2ΔΔ21D11-U01	8.57	LS35P34B11	8.7	LS45M11B02	8.36	LS45M43L20	8.38	LS45M93L02	8.41
LS2ΔΔ21D11-U01	8.59	LS35P34C11	8.7	LS45M11B11	8.36	LS45M44B02	8.39	LS45M93L20	8.41
LS2ΔΔ22B11-U01	8.58	LS35P34D11	8.7	LS45M11C11	8.36	LS45M44B11	8.39	LS45P00B02	8.26
LS2ΔΔ22B11-U01	8.60	LS35P34L02	8.7	LS45M11D11	8.36	LS45M44C11	8.39	LS45P00B11	8.26
LS2ΔΔ22D11-U01	8.58	LS35P34L20	8.7	LS45M11L02	8.36	LS45M44D11	8.39	LS45P00C11	8.26
LS2ΔΔ22D11-U01	8.60	LS35P40B02	8.22	LS45M11L20	8.36	LS45M44L02	8.39	LS45P00D11	8.26
LS2ΔΔ41B11-U01	8.58	LS35P40B11	8.22	LS45M12B02	8.36	LS45M44L20	8.39	LS45P00L02	8.26
LS2ΔΔ41B11-U01	8.60	LS35P40C11	8.22	LS45M12B11	8.36	LS45M51B02	8.39	LS45P00L20	8.26
LS2ΔΔ41D11-U01	8.58	LS35P40D11	8.22	LS45M12C11	8.36	LS45M51B11	8.39	LS45P11B02	8.10
LS2ΔΔ41D11-U01	8.60	LS35P40L02	8.22	LS45M12D11	8.36	LS45M51C11	8.39	LS45P11B11	8.10
LS2ΔΔ51B11-U01	8.60	LS35P40L20	8.22	LS45M12L02	8.36	LS45M51D11	8.39	LS45P11C11	8.10
LS2ΔΔ51D11-U 01	8.58	LS35P41B02	8.8	LS45M12L20	8.36	LS45M51L02	8.39	LS45P11D11	8.10
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LS2ΔΔ91B11-U01	8.60	LS35P41C11	8.8	LS45M13B11	8.36	LS45M52B02	8.39	LS45P11L20	8.10
LS35M11B11	8.34	LS35P41D11	8.8	LS45M13C11	8.36	LS45M52B11	8.39	LS45P12B02	8.10
LS35M11D11	8.34	LS35P41L02	8.8	LS45M13D11	8.36	LS45M52C11	8.39	LS45P12B11	8.10
LS35M12B11	8.34	LS35P41L20	8.8	LS45M13L02	8.36	LS45M52D11	8.39	LS45P12C11	8.10
LS35M12D11	8.34	LS35P42B02	8.8	LS45M13L20	8.36	LS45M52L02	8.39	LS45P12D11	8.10
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LS35M38B11	8.35	LS35P42L20	8.8	LS45M21L02	8.36	LS45M53D11	8.39	LS45P13C11	8.10
LS35M38D11	8.35	LS35P50B02	8.22	LS45M21L20	8.36	LS45M53L02	8.39	LS45P13D11	8.10
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LS35M41D11	8.35	LS35P50C11	8.22	LS45M22B11	8.37	LS45M54B02	8.40	LS45P13L20	8.10
LS35M42B11	8.35	LS35P50D11	8.22	LS45M22C11	8.37	LS45M54B11	8.40	LS45P31B02	8.10
LS35M42D11	8.35	LS35P50L02	8.22	LS45M22D11	8.37	LS45M54C11	8.40	LS45P31B11	8.10
LS35M51B11	8.35	LS35P50L20	8.22	LS45M22L02	8.37	LS45M54D11	8.40	LS45P31C11	8.10
LS35M51D11	8.35	LS35P51B02	8.8	LS45M22L20	8.37	LS45M54L02	8.40	LS45P31D11	8.10
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LS35M91D11	8.35	LS35P51L02	8.8	LS45M23D11	8.37	LS45M61C11	8.40	LS45P32B11	8.11
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LS35P10B11	8.6	LS35P52B02	8.8	LS45M23L20	8.37	LS45M61L02	8.40	LS45P32D11	8.11
LS35P10C11	8.6	LS35P52B11	8.8	LS45M31B02	8.37	LS45M61L20	8.40	LS45P32L02	8.11
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LS35P10L02	8.6	LS35P52D11	8.8	LS45M31C11	8.37	LS45M62B11	8.40	LS45P33B02	8.11
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LS35P11B02	8.6	LS35P52L20	8.8	LS45M31L02	8.37	LS45M62D11	8.40	LS45P33C11	8.11
LS35P11B11	8.6	LS35P71B02	8.9	LS45M31L20	8.37	LS45M62L02	8.40	LS45P33D11	8.11
LS35P11C11	8.6	LS35P71B11	8.9	LS45M32B02	8.37	LS45M62L20	8.40	LS45P33L02	8.11
LS35P11D11	8.6	LS35P71C11	8.9	LS45M32B11	8.37	LS45M71B02	8.40	LS45P33L20	8.11

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LS45P41C11	8.11	LS45P91B11	8.14	LSA40X51	8.28	LSTH13	8.26	LX185	5.34
LS45P41D11	8.11	LS45P91C11	8.14	LSA40X51	8.51	LSTH14	8.26	LX300	1.66
LS45P41L02	8.11	LS45P91D11	8.14	LSA40X52	8.28	LSTH19	8.26	LX300	5.34
LS45P41L20	8.11	LS45P91L02	8.14	LSA40X52	8.51	LSTH31	8.26	LX460	1.66
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LS45P42B11	8.11	LS45P92B02	8.14	LSA40X53	8.51	LSTH33	8.26	LX750	1.66
LS45P42C11	8.11	LS45P92B11	8.14	LSA40X54	8.28	LSTH35	8.26	LX750	5.34
LS45P42D11	8.11	LS45P92C11	8.14	LSA40X54	8.51	LSTH36	8.26	LY110	1.66
LS45P42L02	8.11	LS45P92D11	8.14	LSA40X61	8.28	LSTH37	8.26	LY16-4	1.66
LS45P42L20	8.11	LS45P92L02	8.14	LSA40X61	8.51	LSTH40	8.27	LY185	1.66
LS45P43B02	8.11	LS45P92L20	8.14	LSA40X62	8.28	LSTH41	8.27	LY300	1.66
LS45P43B11	8.11	LS45P93B02	8.14	LSA40X62	8.51	LSTH42	8.27	LY38-4	1.66
LS45P43C11	8.11	LS45P93B11	8.14	LSA40X71	8.28	LSTH43	8.27	LY460	1.66
LS45P43D11	8.11	LS45P93C11	8.14	LSA40X71	8.51	LSTH44	8.27	LY750	1.66
LS45P43L02	8.11	LS45P93D11	8.14	LSA40X72	8.28	LSTH50	8.28	M2SS1-10B	7.13
LS45P43L20	8.11	LS45P93L02	8.14	LSA40X72	8.51	LSTH51	8.27	M2SS1-10R	7.13
LS45P44B02	8.11	LS45P93L20	8.14	LSA40X73	8.28	LSTH52	8.27	M2SS1-10U	7.13
LS45P44B11	8.11	LS75M11B11	8.42	LSA40X73	8.51	LSTH53	8.27	M2SS1-11C	7.16
LS45P44C11	8.11	LS75M11D11	8.42	LSC30XB02	8.22	LSTH54	8.27	M2SS1-11G	7.16
LS45P44D11	8.11	LS75M12B11	8.42	LSC30XB11	8.22	LSTH61	8.27	M2SS1-11L	7.16
LS45P44L02	8.11	LS75M12D11	8.42	LSC30XC11	8.22	LSTH62	8.27	M2SS1-11R	7.16
LS45P44L20	8.11	LS75M31B11	8.42	LSC30XD11	8.22	LSTH71	8.27	M2SS1-11Y	7.16
LS45P51B02	8.12	LS75M31D11	8.42	LSC30XL02	8.22	LSTH72	8.27	M2SS2-10B	7.13
LS45P51B11	8.12	LS75M38B11	8.42	LSC30XL20	8.22	LSTH73	8.27	M2SS2-10R	7.13
LS45P51C11	8.12	LS75M38D11	8.42	LSC40XB02	8.28	LSTH91	8.27	M2SS2-10U	7.13
LS45P51D11	8.12	LS75M45B11	8.43	LSC40XB02	8.28	LSTH92	8.27	M2SS2-11C	7.16
LS45P51L02	8.12	LS75M45D11	8.43	LSC40XB02	8.51	LSTH93	8.27	M2SS2-11G	7.16
LS45P51L20	8.12	LS75M71B11	8.43	LSC40XB11	8.28	LT1000-EK	1.68	M2SS2-11L	7.16
LS45P52B02	8.12	LS75M71D11	8.43	LSC40XB11	8.28	LT150-EK	1.68	M2SS2-11R	7.16
LS45P52B11	8.12	LS75M91B11	8.43	LSC40XB11	8.51	LT185-AC	1.68	M2SS2-11Y	7.16
LS45P52C11	8.12	LS75M91D11	8.43	LSC40XC11	8.28	LT185-AL	1.68	M2SS3-10B	7.13
LS45P52D11	8.12	LS75M98B11-A	8.43	LSC40XC11	8.28	LT185-AL	5.22	M2SS3-10R	7.13
LS45P52L02	8.12	LS75M98D11-A	8.43	LSC40XC11	8.51	LT185-AL	5.34	M2SS3-10U	7.13
LS45P52L20	8.12	LS75P11B11	8.16	LSC40XD11	8.28	LT185-AY	1.68	M2SS3-11C	7.16
LS45P53B02	8.12	LS75P11D11	8.16	LSC40XD11	8.28	LT200A185	2.18	M2SS3-11G	7.16
LS45P53B11	8.12	LS75P13B11	8.16	LSC40XD11	8.51	LT200E	2.18	M2SS3-11L	7.16
LS45P53C11	8.12	LS75P13D11	8.16	LSC40XL02	8.28	LT210-EK	1.68	M2SS3-11R	7.16
LS45P53D11	8.12	LS75P31B11	8.16	LSC40XL02	8.28	LT300-AC	1.68	M2SS3-11Y	7.16
LS45P53L02	8.12	LS75P31D11	8.16	LSC40XL02	8.51	LT300-AL	1.68	M2SS4-10B	7.13
LS45P53L20	8.12	LS75P41B11	8.16	LSC40XL20	8.28	LT300-AL	5.22	M2SS4-10R	7.13
LS45P54B02	8.12	LS75P41D11	8.16	LSC40XL20	8.28	LT300-AL	5.34	M2SS4-10U	7.13
LS45P54B11	8.12	LS75P42B11	8.17	LSC40XL20	8.51	LT300-AY	1.68	M2SS4-11C	7.16
LS45P54C11	8.12	LS75P42D11	8.17	LSR1305	8.22	LT300E	2.18	M2SS4-11G	7.16
LS45P54D11	8.12	LS75P51B11	8.17	LSTE11	8.49	LT460-AC	1.68	M2SS4-11L	7.16
LS45P54L02	8.12	LS75P51D11	8.17	LSTE12	8.49	LT460-AL	1.68	M2SS4-11R	7.16
LS45P54L20	8.12	LS75P52B11	8.17	LSTE21	8.49	LT460-AL	5.34	M2SS4-11Y	7.16
LS45P61B02	8.13	LS75P52D11	8.17	LSTE22	8.49	LT460-AL	5.34	M2SS5-10B	7.13
LS45P61B11	8.13	LS75P72B11	8.17	LSTE23	8.49	LT500E	2.15	M2SS5-10R	7.13
LS45P61C11	8.13	LS75P72D11	8.17	LSTE31	8.49	LT500E	2.18	M2SS5-10U	7.13
LS45P61D11	8.13	LS75P91B11	8.17	LSTE32	8.49	LT550-EK	1.68	M2SS5-11C	7.16
LS45P61L02	8.13	LS75P91D11	8.17	LSTE33	8.49	LT6-B	1.69	M2SS5-11G	7.16
LS45P61L20	8.13	LS75P98B11-A	8.17	LSTE40	8.50	LT6-B	6.21	M2SS5-11L	7.16
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LS45P62B11	8.13	LSA30P05	8.22	LSTE42	8.50	LT750-AL	1.68	M2SS5-11Y	7.16
LS45P62C11	8.13	LSA30P06	8.22	LSTE43	8.50	LT750-AL	5.34	M2SS6-10B	7.13
LS45P62D11	8.13	LSA30X41	8.22	LSTE44	8.50	LT800E	2.15	M2SS6-10R	7.13
LS45P62L02	8.13	LSA30X42	8.22	LSTE50	8.51	LT800E	2.18	M2SS6-10U	7.13
LS45P62L20	8.13	LSA30X51	8.22	LSTE51	8.50	LW110	1.66	M2SS6-11C	7.16
LS45P71B02	8.13	LSA30X52	8.22	LSTE52	8.50	LW110	5.34	M2SS6-11G	7.16
LS45P71B11	8.13	LSA30X71	8.22	LSTE53	8.50	LW1250	1.66	M2SS6-11L	7.16
LS45P71C11	8.13	LSA30X72	8.22	LSTE54	8.50	LW185	1.66	M2SS6-11R	7.16
LS45P71D11	8.13	LSA30X73	8.22	LSTE61	8.50	LW185	5.22	M2SS6-11Y	7.16
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LS45P72B11	8.13	LSA40X42	8.27	LSTE73	8.50	LW300	5.34	M2SSK2-101	7.19
LS45P72C11	8.13	LSA40X42	8.50	LSTE91	8.50	LW460	1.66	M2SSK2-102	7.19
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MLBL-05BW	7.113	MLBL-09Y	7.59	MPD14-11R	7.9	MPEP3-10R	7.12	MS132-32	4.7
MLBL-05BY	7.113	MP1-10B	7.5	MPD14-11Y	7.9	MPEP4-10B	7.12	MS132-4.0	4.7
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MLBL-05L	7.58	MP1-10R	7.5	MPD15-11R	7.9	MPET4-10B	7.12	MS450-40x	4.8
MLBL-05R	7.29	MP1-10W	7.5	MPD15-11Y	7.9	MPET4-10R	7.11	MS450-45	4.8
MLBL-05R	7.58	MP1-10Y	7.5	MPD16-11B	7.7	MPM1-10B	7.10	MS450-45E	4.8
MLBL-05W	7.29	MP1-11C	7.6	MPD16-11C	7.9	MPM1-10G	7.10	MS450-45x	4.8
MLBL-05W	7.58	MP1-11G	7.6	MPD16-11G	7.9	MPM1-10R	7.10	MS450-50	4.8
MLBL-05Y	7.29	MP1-11L	7.6	MPD16-11R	7.9	MPM1-10Y	7.10	MS450-50E	4.8
MLBL-05Y	7.58	MP1-11R	7.6	MPD16-11Y	7.9	MPM1-11G	7.10	MS450-50x	4.8
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MLBL-06BL	7.113	MP1-11Y	7.6	MPD17-11C	7.9	MPM1-11Y	7.10	MS451-16E	4.8
MLBL-06BR	7.113	MP2-10B	7.5	MPD17-11G	7.9	MPM2-10B	7.10	MS451-16x	4.8
MLBL-06BW	7.113	MP2-10C	7.5	MPD17-11R	7.9	MPM2-10R	7.10	MS451-20	4.8
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MLBL-06G	7.29	MP2-10L	7.5	MPD18-11B	7.7	MPM2-11R	7.10	MS451-20x	4.8
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NS22ES-28M	6.11	NSL31ES-86M	6.11	OES200R04	19.27	OETL-NF800A-FC	19.15	OHB80L6	19.30
NS31E-16M	6.10	NSL31ES-88M	6.11	OES400J3-FC	19.25	OETL-ZK19	19.38	OHB80L6	19.43
NS31E-20M	6.10	NSL40E-81M	6.10	OES400J3-S	19.23	OETL-ZK19	19.39	OHB80L6E011	19.43
NS31E-26M	6.10	NSL40E-83M	6.10	OES400R03	19.27	OETL-ZT80AΔ	19.38	OHB95J10	17.80
NS31E-28M	6.10	NSL40E-86M	6.10	OES400R04	19.27	OETL-ZT80LΔ	19.38	OHB95J10	17.80
NS31ES-16M	6.11	NSL40E-88M	6.10	OES600J3-FC	19.25	OETL-ZW12	19.39	OHB95L10	17.80
NS31ES-20M	6.11	NSL40ES-81M	6.11	OES600R03	19.27	OETL-ZW13	19.39	OHB95L10	17.80
NS31ES-26M	6.11	NSL40ES-83M	6.11	OES600R04	19.27	OETL-ZW15	19.39	OHBS12	19.31
NS31ES-28M	6.11	NSL40ES-86M	6.11	OES800L3-FC	19.25	OETL-ZW16	19.38	OHBS1AH1	19.30
NS40E-16M	6.10	NSL40ES-88M	6.11	OES800R03	19.27	OETL-ZW3	19.39	OHBS1PH	19.31
NS40E-20M	6.10	NSL44E-81M	6.10	OES800R04	19.27	OETL-ZW5	19.38	OHBS1RH	19.31
NS40E-26M	6.10	NSL44E-83M	6.10	OESAZD28	19.37	OETL-ZW9	19.39	OHBS2	19.31
NS40E-28M	6.10	NSL44E-86M	6.10	OESAZD48	19.37	OETL-ZX111	19.16	OHBS2AJ	19.30
NS40ES-16M	6.11	NSL44E-88M	6.10	OESA-ZD54	19.37	OETL-ZX114	19.38	OHBS2AJ	19.43
NS40ES-20M	6.11	NSL44ES-81M	6.11	OESAZD55	19.37	OETL-ZX115	19.38	OHBS2AJ	19.43
NS40ES-26M	6.11	NSL44ES-83M	6.11	OESA-ZK98	19.37	OETL-ZX74	19.13	OHBS2AJ1	19.30
NS40ES-28M	6.11	NSL44ES-86M	6.11	OESA-ZS36	19.37	OETL-ZX74	19.23	OHBS2AJE011	19.31
NS44E-16M	6.10	NSL44ES-88M	6.11	OESA-ZW1	19.39	OETL-ZX94	19.16	OHBS2PJ	19.31
NS44E-20M	6.10	NSL53E-81M	6.10	OESA-ZW1X	19.39	OETL-ZX95	19.38	OHBS2RJ	19.31
NS44E-26M	6.10	NSL53E-83M	6.10	OESA-ZW2	19.39	OEZY91	19.18	OHBS3AH1	19.30
NS44E-28M	6.10	NSL53E-86M	6.10	OESA-ZX123	19.26	OFM240	19.37	OHBS3PH	19.31
NS44ES-16M	6.11	NSL53E-88M	6.10	OESA-ZX125	19.26	OFM600	19.37	OHBS3RH	19.31
NS44ES-20M	6.11	NSL53ES-81M	6.11	OESA-ZX125	19.26	OFMZ2	19.37	OHBS5	19.31
NS44ES-26M	6.11	NSL53ES-83M	6.11	OESA-ZX167	19.38	OFMZ4	19.37	OHBS65J6	19.43
NS44ES-28M	6.11	NSL53ES-86M	6.11	OESA-ZX171	19.36	OHB125J10	17.80	OHBS65J6	19.43
NS53E-16M	6.10	NSL53ES-88M	6.11	OESAZX1-S10	19.27	OHB125J12	19.30	OHBS65L6	19.43
NS53E-20M	6.10	NSL62E-81M	6.10	OESAZX1-S10/4	19.27	OHB125J12EH	19.30	OHF1C12	17.83
NS53E-26M	6.10	NSL62E-83M	6.10	OESAZX1-S11	19.27	OHB125L10	17.80	OHF1C12	19.15
NS53E-28M	6.10	NSL62E-86M	6.10	OESAZX1-S11/4	19.27	OHB125L12EH	19.30	OHF1C12	19.25
NS53ES-16M	6.11	NSL62E-88M	6.10	OESAZX1-S2	19.27	OHB145J12	19.43	OHF1C12T	17.83
NS53ES-20M	6.11	NSL62ES-81M	6.11	OESAZX1-S2/4	19.27	OHB145J12	19.30	OHF1C4	17.83
NS53ES-26M	6.11	NSL62ES-83M	6.11	OESAZX1-S3	19.27	OHB145J12E00S	19.13	OHF1C4	19.15
NS53ES-28M	6.11	NSL62ES-86M	6.11	OESAZX1-S3/4	19.27	OHB145J12E00S	19.23	OHF1C4	19.25
NS62E-16M	6.10	NSL62ES-88M	6.11	OESAZX1-S4	19.27	OHB145J12E011	19.31	OHF1C4T	17.83
NS62E-20M	6.10	NSL71E-81M	6.10	OESAZX1-S4/4	19.27	OHB145J12E011	19.43	OHM125L12	19.30

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OHY145J12E00S	19.13	OMA1PB	9.3	ONA05PB	9.4	ONST51PB	9.7	OS160GB04N1	19.28
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OHY175J10	17.80	OMA3KB	9.3	ONA06PB	9.4	ONST61PB	9.7	OS160GD04F	19.28
OHY175L12	19.43	OMA3PB	9.3	ONA1KB	9.3	ONST62PB	9.7	OS200B03	19.28
OHY65J6	17.80	OMA4PB	9.3	ONA1M	9.3	ONST63PB	9.7	OS200B04N2	19.28
OHY65J6E00S	19.13	OMA5PB	9.3	ONA1PB	9.3	ONST71PB	9.8	OS200D03	19.28
OHY65L6E00S	19.23	OMA6PB	9.3	ONA2M	9.3	ONST81PB	9.8	OS200D04F	19.28
OHY80J6E00S	19.13	OMAU31PB	9.12	ONA2PB	9.3	ONST91PB	9.8	OS200J02	19.22
OHY80J6E00S	19.23	OMF101	9.13	ONA3KB	9.3	ONU1KB	9.5	OS200J03	19.22
OHY80L6	17.80	OMFB72	9.13	ONA3M	9.3	ONU1M	9.4	OS200J04F	19.22
OHY80L6	19.43	OMFG72	9.13	ONA3PB	9.3	ONU1PB	9.4	OS200J12	19.22
OHY95J10	17.80	OMK95	9.13	ONA4PB	9.3	ONU2M	9.4	OS200J13F	19.22
OHY95J10	17.80	OMNX80	9.13	ONA5PB	9.3	ONU2PB	9.4	OS200J22F	19.22
OHY95L10	17.80	OMP1	9.13	ONA6M	9.3	ONU3KB	9.5	OS200J30	19.22
OHY95L10	17.80	OMPG1	9.13	ONA6PB	9.3	ONU3M	9.4	OS200J30	19.25
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OHYS2AJ	19.43	OMSE158PB	9.10	ONAU31PB	9.12	ONU4M	9.4	OS25FF2210F	19.28
OHYS65J6	19.43	OMSE2PB	9.12	ONAU32PB	9.12	ONU4PB	9.4	OS30FACC12	19.22
OHYS65L6	19.43	OMSEA10PB	9.12	ONF 101	9.13	ONUR139M	9.12	OS30FACC12	19.25
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OL40SO101PB	9.9	OMSO43PB	9.6	ONSE158M	9.10	ONVN30M	9.11	OS32GB03	19.28
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OL40SO31PB	9.6	OMSO52PB	9.7	ONSE2PB	9.12	ONVN3M	9.11	OS32GD03	19.28
OL40SO61PB	9.7	OMST301PB	9.10	ONSEA10M	9.12	ONVN3PB	9.11	OS32GD04F	19.28
OL40SO62PB	9.7	OMST31PB	9.6	ONSEA10PB	9.12	ONW3PB	9.10	OS400B03	19.28
OL40SO63PB	9.7	OMST32PB	9.6	ONSEA1PB	9.12	ONWS1M	9.5	OS400B04N2	19.28
OL40SO71PB	9.8	OMST33PB	9.6	ONSO101PB	9.9	ONWS1PB	9.5	OS400D03	19.28
OL40SO81PB	9.8	OMST34PB	9.6	ONSO111PB	9.9	ONWS2M	9.5	OS400D04F	19.28
OL40SO91PB	9.8	OMST41PB	9.6	ONSO21M	9.6	ONWS2PB	9.5	OS400J02	19.22
OL40ST101PB	9.9	OMST42PB	9.6	ONSO21PB	9.6	ONWS3M	9.5	OS400J03	19.22
OL40ST111PB	9.9	OMST43PB	9.6	ONSO22PB	9.6	ONWS3PB	9.5	OS400J04F	19.22
OL40ST121PB	9.9	OMST51PB	9.7	ONSO23PB	9.6	ONWS4M	9.5	OS400J12	19.22
OL40ST301PB	9.10	OMST52PB	9.7	ONSO24PB	9.6	ONWS4PB	9.5	OS400J30	19.22
OL40ST61PB	9.7	OMU1KB	9.5	ONSO31M	9.6	ONX30	9.13	OS50GF12	19.28
OL40ST62PB	9.7	OMU1PB	9.4	ONSO31PB	9.6	ONX99	9.13	OS50GF22F	19.28
OL40ST63PB	9.7	OMU2PB	9.4	ONSO32PB	9.6	ONXB1	9.13	OS600J02	19.22
OL40ST71PB	9.8	OMU3KB	9.5	ONSO33PB	9.6	ONZ10L2	9.13	OS600J03	19.22
OL40ST81PB	9.8	OMU3PB	9.4	ONSO34PB	9.6	ONZ10L4	9.13	OS600J04F	19.22
OL40ST91PB	9.8	OMU4PB	9.4	ONSO41PB	9.6	ONZ10L6	9.13	OS600J12	19.22
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OL40U2PB	9.4	OMURR3PB	9.5	ONSO43PB	9.6	ONZ20RY	9.13	OS60GJ03	19.22
OL40U3PB	9.4	OMV30PB	9.11	ONSO51PB	9.7	ONZ74	9.14	OS60GJ12	19.22
OL40U4PB	9.4	OMV32PB	9.11	ONSO52PB	9.7	OS100GB03	19.28	OS60GJ22F	19.22
OL40URR1PB	9.5	OMV3PB	9.11	ONSO61PB	9.7	OS100GB04N1	19.28	OS60GJ30	19.25
OL40URR2PB	9.5	OMVN30PB	9.11	ONSO62PB	9.7	OS100GJ03	16.10	OS60GJF30	19.24
OL40URR3PB	9.5	OMVN3PB	9.11	ONSO63PB	9.7	OS100GJ03	19.22	OS60GJS30	19.23
OL40W3PB	9.10	OMWS1PB	9.5	ONSO71PB	9.8	OS100GJ04F	19.22	OS630B03	19.28
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OL40WS2PB	9.5	OMWS3PB	9.5	ONSO91PB	9.8	OS100GJ12	19.22	OS630D03	19.28
OL40WS3PB	9.5	OMWS4PB	9.5	ONST101PB	9.9	OS100GJ30	19.25	OS630D04F	19.28
OL40WS4PB	9.5	OMX99	9.13	ONST111PB	9.9	OS100GJF30	19.24	OS63GB03	19.28
OLZ21	9.14	OMXB1	9.13	ONST121PB	9.9	OS100GJS30	19.23	OS63GB04N1	19.28
OLZ31	9.14	OMXNB1	9.13	ONST301M	9.10	OS1200L02	19.22	OS63GD03	19.28
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OMA01PB	9.4	ONA01M	9.4	ONST31M	9.6	OS1200L04F	19.22	OS800B03	19.28
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OS800L02	19.22	OT30F6	19.11	OTPD40FP	19.36	OVRNE12320120SPX	16.10	OVRT270NPU	16.19
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OSNF60-S	19.13	OT400U04	19.11	OTPE60FP	19.36	OVRPV151000CU	16.26	OVRTC24V	16.27
OSS1200G1L/3	19.35	OT400U04C	19.17	OTPE80FP	19.36	OVRPV151000PTSU	16.26	OVRTC48V	16.27
OSS1200G1L/4	19.35	OT400U12	19.11	OTPL125FP	19.36	OVRPV151000PU	16.26	OXC1L108	17.83
OSS1200G1S/3	19.35	OT400U22	19.11	OTPL40FP	19.36	OVRPV15600CU	16.26	OXC1L36	17.83
OSS1200G1S/4	19.35	OT400U30	19.11	OTPL60FP	19.36	OVRPV15600PTSU	16.26	OXC1L36	19.15
OSS160T1	19.26	OT400U30C	19.17	OTPL80FP	19.36	OVRPV15600PU	16.26	OXC1L36	19.25
OSS160T1	19.35	OT400U40	19.11	OTPN125FP	19.36	OVRPV15800CU	16.26	OXC1L48	17.83
OSS160T3	19.24	OT400U40C	19.17	OTPN40FP	19.36	OVRPV15800PTSU	16.26	OXC1L48	19.15
OSS160T3	19.26	OT40F3	19.11	OTPN60FD	19.36	OVRPV15800PU	16.26	OXC1L48	19.25
OSS160T3	19.35	OT40F3/B50	19.11	OTPN80FP	19.36	OVRPV401000CU	16.26	OXC1L60	17.83
OSS200G1L/3	19.26	OT40F3C	19.17	OTPS125FP	19.36	OVRPV401000PTSU	16.26	OXC1L60	19.15
OSS200G1L/3	19.35	OT40F6	19.11	OTPS40FPN1	19.36	OVRPV401000PU	16.26	OXC1L60	19.25
OSS200G1L/4	19.35	OT40FD9N2	19.18	OTPS60FP	19.36	OVRPV40600CU	16.26	OXC1L72	17.83
OSS200G1S/3	19.26	OT40FT3/B50	19.12	OTPS80FP	19.36	OVRPV40600PTSU	16.26	OXC1L72	19.15
OSS200G1S/3	19.35	OT600U02	19.11	OTS1203	19.35	OVRPV40600PU	16.26	OXC1L72	19.25
OSS200G1S/4	19.35	OT600U03	19.11	OTS125T1	19.35	OVRPV40800CU	16.26	OXC1L84	17.83
OSS403	19.35	OT600U03C	19.17	OTS125T3	19.16	OVRPV40800PTSU	16.26	OXC1L84	19.15
OSS603	19.35	OT600U04	19.11	OTS125T3	19.35	OVRPV40800PU	16.26	OXC1L84	19.25
OSS800G1L/3	19.35	OT600U04C	19.17	OTS250G1L/3	19.16	OVRT215150CU	16.19	OXC1L96	17.83
OSS800G1L/4	19.35	OT600U12	19.11	OTS250G1L/3	19.35	OVRT215150PU	16.17	OXC1L96	17.83
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OSS800G1S/4	19.35	OT600U30	19.11	OTS250G1S/3	19.16	OVRT215320PU	16.17	EXP10X148	17.80
OSV200BK	19.31	OT600U30C	19.17	OTS250G1S/4	19.35	OVRT21N15150PU	16.18	EXP10X148	17.80
OSV400BK	19.31	OT600U40	19.11	OTS250G1S/4	19.35	OVRT21N15320PU	16.18	EXP10X225	17.80
OSV800BK	19.31	OT600U40C	19.17	OTS403	19.35	OVRT21N40150PTSU	16.18	EXP10X225	17.80
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OT100F6	19.11	OT63F3C	19.17	OTV400EK	19.31	OVRT22N15320PU	16.18	EXP12X325	19.32
OT100FT3/B25	19.12	OT63F6	19.11	OTV800EK	19.31	OVRT22N40150PTSU	16.18	EXP12X395	19.32
OT1200U02	19.11	OT63FT3/B50	19.12	OTZC13	19.17	OVRT22N40320PTSU	16.18	EXP12X465	19.32
OT1200U03	19.11	OT800U02	19.11	OTZC14	19.17	OVRT22N40440PTSU	16.18	EXP12X535	19.32
OT1200U04	19.11	OT800U03	19.11	OTZC23	19.17	OVRT22N40550PTSU	16.18	EXP6X130	19.32
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OT16F3/B50	19.11	OT800U04	19.11	OTZC33	19.17	OVRT23L15150PU	16.17	EXP6X150	19.32
OT16F3C	19.17	OT800U04C	19.17	OTZC34	19.17	OVRT23L15320PU	16.17	EXP6X170	19.13
OT16F6	19.11	OT800U30C	19.17	OTZC53	19.17	OVRT23L40150PTSU	16.17	EXP6X170	19.23
OT16FT3/B50	19.12	OT800U40C	19.17	OTZC54	19.17	OVRT23L40320PTSU	16.17	EXP6X210	19.13
OT200U02	19.11	OT80F3	19.11	OTZS2	19.38	OVRT23L40440PTSU	16.17	EXP6X210	19.23
OT200U03	19.11	OT80F3/B50	19.11	OTZW10	19.39	OVRT23L40550PTSU	16.17	EXP6X210	19.32
OT200U03C	19.17	OT80F3C	19.17	OTZW17	19.39	OVRT23N15150PU	16.19	EXP6X290	19.32
OT200U04	19.11	OT80F6	19.11	OTZW17X	19.39	OVRT23N15320PU	16.19	EXP6X360	19.32
OT200U04C	19.17	OT80FD8	19.18	OTZW24	19.39	OVRT23N40150PTSU	16.19	EXP6X430	17.80
OT200U12	19.11	OT80FT3/B50	19.12	OTZW25	19.39	OVRT23N40320PTSU	16.19	EXP6X430	19.32
OT200U22	19.11	OTDC100U02	19.18	OTZW25X	19.39	OVRT23N40440PTSU	16.19	OXS6X105	4.14
OT200U30	19.11	OTDC100U11	19.18	OTZW26	19.39	OVRT23N40550PTSU	16.19	OXS6X105	19.32
OT200U30	19.15	OTDC100U22	19.18	OTZW8	19.39	OVRT23N40660PTSU	16.19	OXS6X120	19.32
OT200U30C	19.17	OTDC100US02	19.18	OVR1N160120	16.10	OVRT240150CU	16.19	OXS6X130	4.14
OT200U40	19.11	OTDC100US11	19.18	OVR1N160120PS	16.10	OVRT240150PTSU	16.17	OXS6X130	19.32
OT200U40C	19.17	OTDC100US22	19.18	OVR1N160277	16.10	OVRT240150PU	16.17	OXS6X180	4.14
OT25F3	19.11	OTDC180U22	19.18	OVR1N160277PS	16.10	OVRT240320CU	16.19	OXS6X180	19.32
OT25F3/B50	19.11	OTDC180US22	19.18	OVR1N160480	16.10	OVRT240320PTSU	16.17	OXS6X250	19.32
OT25F3C	19.17	OTDC200U02	19.18	OVR1N160480PS	16.10	OVRT240320PU	16.17	OXS6X330	19.32
OT25F6	19.11	OTDC200U11	19.18	OVRNE12160120SP	16.10	OVRT240440CU	16.19	OXS6X85	4.14
OT25FT3/B50	19.12	OTDC200US02	19.18	OVRNE12160120SPX	16.10	OVRT240440PTSU	16.17	OXS6X85	19.32
OT30F3	19.11	OTDC200US11	19.18	OVRNE12160277Y	16.10	OVRT240550CU	16.19	OZX1	19.38
OT30F3	19.15	OTDCB250/6	19.18	OVRNE12160277YX	16.10	OVRT240550PTSU	16.17	OZX1	19.38
OT30F3/B25	19.11	OTFS-16	19.14	OVRNE12160480D	16.10	OVRT240660CU	16.19	OZXA-1200	19.34

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OZXA-1200/3	19.34	P4-1ESSSRL	7.106	PL701U-Z70R	21.7	PL703U-K15	21.6	PLG42400S	21.8
OZXA-1200/9	19.34	P4-1HOARLYLGL	7.106	PL701U-Z8	21.7	PL703U-K2	21.6	PLGNDLUG	21.9
OZXA-175/400	19.16	P4-1HOASRLGL	7.106	PL701U-Z80R	21.7	PL703U-K20	21.6	PLIDLBL12	21.8
OZXA-175/400	19.26	P4-1OORLYLGL	7.106	PL701U-Z90R	21.7	PL703U-K25	21.6	PLIDLBL24	21.8
OZXA-200	19.16	P4-1SSRGL	7.106	PL702U-K1	21.6	PL703U-K3	21.6	PLIDLBL42	21.8
OZXA-200	19.18	PG16-1/2NPT	4.14	PL702U-K10	21.6	PL703U-K30	21.6	PLIDLBL43-84	21.8
OZXA-200	19.34	PL12LBL	21.8	PL702U-K100R	21.6	PL703U-K4	21.6	PLMCCR	21.9
OZXA-200/12	19.34	PL24LBL	21.8	PL702U-K15	21.6	PL703U-K40	21.6	PLN12225S	21.8
OZXA-200/3	19.16	PL350MECLUG	21.8	PL702U-K2	21.6	PL703U-K5	21.6	PLN12225S2	21.8
OZXA-200/3	19.26	PL42LBL	21.8	PL702U-K20	21.6	PL703U-K50	21.6	PLN12400S	21.8
OZXA-200/3	19.34	PL600MECLUG	21.8	PL702U-K25	21.6	PL703U-K6	21.6	PLN12400S2	21.8
OZXA-200/9	19.34	PL701U-K1	21.6	PL702U-K3	21.6	PL703U-K60L	21.6	PLN24225S	21.8
OZXA-206S	19.16	PL701U-K10	21.6	PL702U-K30	21.6	PL703U-K60R	21.6	PLN24225S2	21.8
OZXA-206S	19.26	PL701U-K100R	21.6	PL702U-K4	21.6	PL703U-K70L	21.6	PLN24400S	21.8
OZXA-206T	19.34	PL701U-K15	21.6	PL702U-K40	21.6	PL703U-K70R	21.6	PLN24400S2	21.8
OZXA-24	16.10	PL701U-K2	21.6	PL702U-K5	21.6	PL703U-K8	21.6	PLN42225S	21.8
OZXA-24	19.13	PL701U-K20	21.6	PL702U-K50	21.6	PL703U-K80R	21.6	PLN42225S2	21.8
OZXA-24	19.23	PL701U-K25	21.6	PL702U-K6	21.6	PL703U-K90R	21.6	PLN42400S	21.8
OZXA-24	19.24	PL701U-K3	21.6	PL702U-K60L	21.6	PL703UP-K1	21.6	PLN42400S2	21.8
OZXA-24	19.26	PL701U-K30	21.6	PL702U-K60R	21.6	PL703UP-K10	21.6	PLNG12250	21.8
OZXA-24	19.34	PL701U-K4	21.6	PL702U-K70L	21.6	PL703UP-K15	21.6	PLNG12400	21.8
OZXA-25	19.23	PL701U-K40	21.6	PL702U-K70R	21.6	PL703UP-K2	21.6	PLNG24250	21.8
OZXA-26	19.13	PL701U-K5	21.6	PL702U-K8	21.6	PL703UP-K20	21.6	PLNG24400	21.8
OZXA-26	19.16	PL701U-K50	21.6	PL702U-K80R	21.6	PL703UP-K25	21.6	PLNG42250	21.8
OZXA-26	19.23	PL701U-K6	21.6	PL702U-K90R	21.6	PL703UP-K3	21.6	PLNG42400	21.8
OZXA-26	19.26	PL701U-K60L	21.6	PL702UP-K1	21.6	PL703UP-K4	21.6	PLT5225CONVP	21.9
OZXA-26/3P	19.26	PL701U-K60R	21.6	PL702UP-K10	21.6	PL703UP-K5	21.6	PLT5225CONVP3P	21.9
OZXA-27	19.13	PL701U-K70L	21.6	PL702UP-K15	21.6	PL703UP-K6	21.6	PLT5CONVP	21.9
OZXA-27	19.16	PL701U-K70R	21.6	PL702UP-K2	21.6	PL703UP-K8	21.6	PLT5CONVP3P	21.9
OZXA-27	19.26	PL701U-K8	21.6	PL702UP-K20	21.6	PL703UP-Z1	21.7	PN110-21	1.70
OZXA-27/3P	19.16	PL701U-K80R	21.6	PL702UP-K25	21.6	PL703UP-Z10	21.7	PN185-11	1.70
OZXA-27/3P	19.26	PL701U-K90R	21.6	PL702UP-K3	21.6	PL703UP-Z15	21.7	PN185-21	1.70
OZXA-28	19.16	PL701UP-K1	21.6	PL702UP-K4	21.6	PL703UP-Z2	21.7	PN210-22	1.70
OZXA-28	19.34	PL701UP-K10	21.6	PL702UP-K5	21.6	PL703UP-Z20	21.7	PN300-21	1.70
OZXA-28/2	19.34	PL701UP-K15	21.6	PL702UP-K6	21.6	PL703UP-Z25	21.7	PN300-22	1.70
OZXA-28/3	19.34	PL701UP-K2	21.6	PL702UP-K8	21.6	PL703UP-Z3	21.7	PN300A-11	1.70
OZXA-28/3P	19.16	PL701UP-K20	21.6	PL702UP-Z1	21.7	PL703UP-Z4	21.7	PN460-11	1.70
OZXA-32	19.16	PL701UP-K25	21.6	PL702UP-Z10	21.7	PL703UP-Z5	21.7	PN460-21	1.70
OZXA-32	19.34	PL701UP-K3	21.6	PL702UP-Z15	21.7	PL703UP-Z6	21.7	PN750-11	1.70
OZXA-33	19.26	PL701UP-K4	21.6	PL702UP-Z2	21.7	PL703UP-Z8	21.7	PN750-21	1.70
OZXA-400	19.34	PL701UP-K5	21.6	PL702UP-Z20	21.7	PL703U-Z1	21.7	PR010/T	17.54
OZXA-400/12	19.34	PL701UP-K6	21.6	PL702UP-Z25	21.7	PL703U-Z10	21.7	PR010/T	17.75
OZXA-400/3P	19.34	PL701UP-K8	21.6	PL702UP-Z3	21.7	PL703U-Z100R	21.7	PR030/B	17.54
OZXA-400/9	19.34	PL701UP-Z1	21.7	PL702UP-Z4	21.7	PL703U-Z15	21.7	PR030/B	17.63
OZXA-402	19.34	PL701UP-Z10	21.7	PL702UP-Z5	21.7	PL703U-Z2	21.7	PR030/B	17.75
OZXA-406	19.34	PL701UP-Z15	21.7	PL702UP-Z6	21.7	PL703U-Z20	21.7	PR110-1	1.71
OZXA-800	19.34	PL701UP-Z2	21.7	PL702UP-Z8	21.7	PL703U-Z25	21.7	PR145-1	1.71
OZXA-800/12	19.34	PL701UP-Z20	21.7	PL702U-Z1	21.7	PL703U-Z3	21.7	PR185-2	1.71
OZXA-800/3	19.34	PL701UP-Z25	21.7	PL702U-Z10	21.7	PL703U-Z30	21.7	PR210-1	1.71
OZXA-800/9	19.34	PL701UP-Z3	21.7	PL702U-Z100R	21.7	PL703U-Z4	21.7	PR300-1	1.71
OZXA-800	19.33	PL701UP-Z4	21.7	PL702U-Z15	21.7	PL703U-Z40	21.7	PR300-2	1.71
OZXA-800	19.48	PL701UP-Z5	21.7	PL702U-Z2	21.7	PL703U-Z5	21.7	PR330/D-M	17.54
OZXA-800	19.33	PL701UP-Z6	21.7	PL702U-Z20	21.7	PL703U-Z50	21.7	PR330/D-M	17.75
OZXA-800	19.48	PL701UP-Z8	21.7	PL702U-Z25	21.7	PL703U-Z6	21.7	PR330/D-M 2	17.63
OZXA-800	19.33	PL701U-Z1	21.7	PL702U-Z3	21.7	PL703U-Z60L	21.7	PR330/R-T7	17.75
OZXA-800	19.33	PL701U-Z10	21.7	PL702U-Z30	21.7	PL703U-Z60R	21.7	PR330/V77	17.75
OZXA-800	19.33	PL701U-Z100R	21.7	PL702U-Z4	21.7	PL703U-Z70L	21.7	PR330/V77MX1	17.54
OZXA-800	19.33	PL701U-Z15	21.7	PL702U-Z40	21.7	PL703U-Z70R	21.7	PR330/V-T83	17.63
P1-1ES	7.105	PL701U-Z2	21.7	PL702U-Z5	21.7	PL703U-Z8	21.7	PR330/V-T84	17.63
P1-ES	7.105	PL701U-Z20	21.7	PL702U-Z50	21.7	PL703U-Z80R	21.7	PR400-2	1.71
P1-HOA	7.105	PL701U-Z25	21.7	PL702U-Z6	21.7	PL703U-Z90R	21.7	PR460-1	1.71
P2-100RL	7.105	PL701U-Z3	21.7	PL702U-Z60L	21.7	PLBLNKCVR200	21.9	PR460-2	1.71
P2-1HOARL	7.105	PL701U-Z30	21.7	PL702U-Z60R	21.7	PLBLNKCVR200H	21.9	PR580-2	1.71
P2-SS	7.105	PL701U-Z4	21.7	PL702U-Z70L	21.7	PLBLNKCVR800	21.9	PR750-1	1.71
P3-1ESHOARL	7.105	PL701U-Z40	21.7	PL702U-Z70R	21.7	PLBLNKCVR800H	21.9	PR750-2	1.71
P3-1HOARLGL	7.105	PL701U-Z5	21.7	PL702U-Z8	21.7	PLBUSCVR	21.8	PS 1/12/16BP	15.12
P3-1HOASRL	7.105	PL701U-Z50	21.7	PL702U-Z80R	21.7	PLG12225S	21.8	PS 1/18/16BP	15.12
P3-1OORLGL	7.105	PL701U-Z6	21.7	PL702U-Z90R	21.7	PLG12400S	21.8	PS 1/6/16BP	15.12
P3-1SSRL	7.105	PL701U-Z60L	21.7	PL703U-K1	21.6	PLG24225S	21.8	PS 2/12/16BP	15.12
P4-1ESHOARLGL	7.106	PL701U-Z60R	21.7	PL703U-K10	21.6	PLG24400S	21.8	PS 2/18/16BP	15.12

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PS 3/12/16BP	15.12	PS-FBPA	5.11	PST175-690-70	5.31	PST72-690-70	5.30	QD050X050HG	14.7
PS 3/18/16BP	15.12	PS-FBPA	5.22	PST175-690-70	5.33	PST72-690-70	5.31	QD050X050HG	14.8
PS 3/6/16BP	15.12	PSLK-185	5.34	PST210-600-70	5.30	PST72-690-70	5.33	QD050X050HG	14.13
PS1/38/16H	15.38	PSLK-185-B	5.34	PST210-600-70	5.31	PST85-600-70	5.30	QD050X050HW	14.3
PS1/38H	15.38	PSLK-300	5.34	PST210-600-70	5.32	PST85-600-70	5.31	QD050X050HW	14.7
PS1/60/16SP	15.37	PSLK-300/2	5.34	PST210-600-70	5.32	PST85-600-70	5.32	QD050X050HW	14.7
PS1/60SP	15.37	PSLK-300/2-B	5.34	PST210-600-70	5.33	PST85-600-70	5.32	QD050X050HW	14.8
PS1-2-0-65	4.12	PSLK-300-B	5.34	PST210-690-70	5.30	PST85-600-70	5.33	QD050X050HW	14.13
PS1-2-1-65	4.12	PSLK-580/2	5.34	PST210-690-70	5.31	PST85-690-70	5.30	QD050X050SG	14.2
PS1-2-2-65	4.12	PSLK-750/3	5.34	PST210-690-70	5.33	PST85-690-70	5.31	QD050X050SG	14.7
PS1-3-0-100	4.12	PSLW-72	5.11	PST250-600-70	5.30	PST85-690-70	5.33	QD050X050SG	14.7
PS1-3-0-65	4.12	PSR105-600-70	5.10	PST250-600-70	5.31	PSTB1050-600-70	5.30	QD050X050SG	14.8
PS1-3-1-100	4.12	PSR105-600-81	5.10	PST250-600-70	5.32	PSTB1050-600-70	5.31	QD050X050SG	14.12
PS1-3-1-65	4.12	PSR105-MS495	4.15	PST250-600-70	5.32	PSTB1050-600-70	5.32	QD050X050SW	14.2
PS1-3-2-100	4.12	PSR105-MS495	5.11	PST250-600-70	5.33	PSTB1050-600-70	5.32	QD050X050SW	14.7
PS1-3-2-65	4.12	PSR12-600-70	5.10	PST250-690-70	5.30	PSTB1050-600-70	5.33	QD050X050SW	14.7
PS1-4-0-100	4.12	PSR12-600-81	5.10	PST250-690-70	5.31	PSTB1050-690-70	5.30	QD050X050SW	14.8
PS1-4-0-65	4.12	PSR16-600-70	5.10	PST250-690-70	5.33	PSTB1050-690-70	5.31	QD050X050SW	14.12
PS1-4-1-100	4.12	PSR16-600-81	5.10	PST300-600-70	5.30	PSTB1050-690-70	5.33	QD100X125HG	14.3
PS1-4-1-65	4.12	PSR16-MS116	4.15	PST300-600-70	5.31	PSTB370-600-70	5.30	QD100X125HG	14.7
PS1-4-2-65	4.12	PSR16-MS116	4.15	PST300-600-70	5.32	PSTB370-600-70	5.31	QD100X125HG	14.7
PS1-5-0-100	4.12	PSR16-MS116	5.11	PST300-600-70	5.32	PSTB370-600-70	5.32	QD100X125HG	14.8
PS1-5-0-65	4.12	PSR25-600-70	5.10	PST300-600-70	5.33	PSTB370-600-70	5.32	QD100X125HG	14.13
PS1-5-1-100	4.12	PSR25-600-81	5.10	PST300-690-70	5.30	PSTB370-600-70	5.33	QD100X125HW	14.3
PS1-5-1-65	4.12	PSR30-600-70	5.10	PST300-690-70	5.31	PSTB370-690-70	5.30	QD100X125HW	14.7
PS1-5-2-65	4.12	PSR30-600-81	5.10	PST300-690-70	5.33	PSTB370-690-70	5.31	QD100X125HW	14.7
PS2/48/16SP	15.38	PSR30-MS132	4.15	PST30-600-70	5.30	PSTB370-690-70	5.33	QD100X125HW	14.8
PS2/58/16SP	15.37	PSR30-MS132	4.15	PST30-600-70	5.31	PSTB470-600-70	5.30	QD100X125HW	14.13
PS2/58SP	15.37	PSR30-MS132	5.11	PST30-600-70	5.32	PSTB470-600-70	5.31	QD100X125SG	14.2
PS3/39/16SP	15.38	PSR3-600-70	5.10	PST30-600-70	5.32	PSTB470-600-70	5.32	QD100X125SG	14.7
PS3/60/16SP	15.37	PSR3-600-81	5.10	PST30-600-70	5.33	PSTB470-600-70	5.32	QD100X125SG	14.7
PS3/60SP	15.37	PSR37-600-70	5.10	PST30-690-70	5.30	PSTB470-600-70	5.33	QD100X125SG	14.8
PS4/58/16NSP	15.38	PSR37-600-81	5.10	PST30-690-70	5.31	PSTB470-690-70	5.30	QD100X125SG	14.12
PS4/60/16SP	15.37	PSR45-600-70	5.10	PST30-690-70	5.33	PSTB470-690-70	5.31	QD100X125SW	14.2
PS4-2-0	4.12	PSR45-600-81	5.10	PST37-600-70	5.30	PSTB470-690-70	5.33	QD100X125SW	14.7
PS4-2-2	4.12	PSR45-MS450	4.15	PST37-600-70	5.31	PSTB570-600-70	5.30	QD100X125SW	14.7
PS4-3-0	4.12	PSR45-MS450	5.11	PST37-600-70	5.32	PSTB570-600-70	5.31	QD100X125SW	14.8
PS4-3-2	4.12	PSR60-600-70	5.10	PST37-600-70	5.32	PSTB570-600-70	5.32	QD100X125SW	14.12
PS4-4-0	4.12	PSR60-600-81	5.10	PST37-600-70	5.33	PSTB570-600-70	5.32	QD100X150HG	14.3
PS4-4-2	4.12	PSR6-600-70	5.10	PST37-690-70	5.30	PSTB570-600-70	5.33	QD100X150HG	14.7
PSE105-600-70	5.20	PSR6-600-81	5.10	PST37-690-70	5.31	PSTB570-690-70	5.30	QD100X150HG	14.7
PSE105-600-70	5.21	PSR72-600-70	5.10	PST37-690-70	5.33	PSTB570-690-70	5.31	QD100X150HG	14.8
PSE142-600-70	5.20	PSR72-600-81	5.10	PST44-600-70	5.30	PSTB570-690-70	5.33	QD100X150HG	14.13
PSE142-600-70	5.21	PSR85-600-70	5.10	PST44-600-70	5.31	PSTB720-600-70	5.30	QD100X150HW	14.3
PSE170-600-70	5.20	PSR85-600-81	5.10	PST44-600-70	5.32	PSTB720-600-70	5.31	QD100X150HW	14.7
PSE170-600-70	5.21	PSR9-600-70	5.10	PST44-600-70	5.32	PSTB720-600-70	5.32	QD100X150HW	14.7
PSE18-600-70	5.20	PSR9-600-81	5.10	PST44-600-70	5.33	PSTB720-600-70	5.32	QD100X150HW	14.8
PSE18-600-70	5.21	PSR-FAN	5.11	PST44-690-70	5.30	PSTB720-600-70	5.33	QD100X150HW	14.13
PSE210-600-70	5.20	PSR-FAN 60-105 A	5.11	PST44-690-70	5.31	PSTB720-690-70	5.30	QD100X150SG	14.2
PSE210-600-70	5.21	PST105-600-70	5.30	PST44-690-70	5.33	PSTB720-690-70	5.31	QD100X150SG	14.7
PSE250-600-70	5.20	PST105-600-70	5.31	PST50-600-70	5.30	PSTB720-690-70	5.33	QD100X150SG	14.7
PSE250-600-70	5.21	PST105-600-70	5.32	PST50-600-70	5.31	PSTB840-600-70	5.30	QD100X150SG	14.8
PSE25-600-70	5.20	PST105-600-70	5.32	PST50-600-70	5.32	PSTB840-600-70	5.31	QD100X150SG	14.12
PSE25-600-70	5.21	PST105-600-70	5.33	PST50-600-70	5.32	PSTB840-600-70	5.32	QD100X150SW	14.2
PSE300-600-70	5.20	PST105-690-70	5.30	PST50-600-70	5.33	PSTB840-600-70	5.32	QD100X150SW	14.7
PSE300-600-70	5.21	PST105-690-70	5.31	PST50-690-70	5.30	PSTB840-600-70	5.33	QD100X150SW	14.7
PSE30-600-70	5.20	PST105-690-70	5.33	PST50-690-70	5.31	PSTB840-690-70	5.30	QD100X150SW	14.8
PSE30-600-70	5.21	PST142-600-70	5.30	PST50-690-70	5.33	PSTB840-690-70	5.31	QD100X150SW	14.12
PSE370-600-70	5.20	PST142-600-70	5.31	PST60-600-70	5.30	PSTB840-690-70	5.33	QD100X200HW	14.13
PSE370-600-70	5.21	PST142-600-70	5.32	PST60-600-70	5.31	PSTEK	5.34	QD100X225HG	14.3
PSE37-600-70	5.20	PST142-600-70	5.32	PST60-600-70	5.32	PSTM-2	5.34	QD100X225HG	14.7
PSE37-600-70	5.21	PST142-600-70	5.33	PST60-600-70	5.32	Q12P164C	14.17	QD100X225HG	14.7
PSE45-600-70	5.20	PST142-690-70	5.30	PST60-600-70	5.33	Q12SEP164	14.17	QD100X225HG	14.8
PSE45-600-70	5.21	PST142-690-70	5.31	PST60-690-70	5.30	Q24SEP82	14.17	QD100X225HG	14.13
PSE60-600-70	5.20	PST142-690-70	5.33	PST60-690-70	5.31	Q25P82C	14.17	QD100X225HW	14.3
PSE60-600-70	5.21	PST175-600-70	5.30	PST60-690-70	5.33	Q39P82C	14.17	QD100X225HW	14.7
PSE72-600-70	5.20	PST175-600-70	5.31	PST72-600-70	5.30	Q39SEP82	14.17	QD100X225HW	14.7
PSE72-600-70	5.21	PST175-600-70	5.32	PST72-600-70	5.31	Q47P82C	14.17	QD100X225HW	14.8
PSE85-600-70	5.20	PST175-600-70	5.32	PST72-600-70	5.32	Q47SEP82	14.17	QD100X225SG	14.2
PSE85-600-70	5.21	PST175-600-70	5.33	PST72-600-70	5.32	QD050X050HG	14.3	QD100X225SG	14.7

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QD100X225SG	14.8	QD150X150HG	14.13	QD150X400SW	14.2	QD225X300HW	14.7	QD300X225SW	14.7
QD100X225SG	14.12	QD150X150HW	14.3	QD150X400SW	14.7	QD225X300HW	14.7	QD300X225SW	14.8
QD100X225SW	14.2	QD150X150HW	14.7	QD150X400SW	14.7	QD225X300HW	14.8	QD300X225SW	14.12
QD100X225SW	14.7	QD150X150HW	14.7	QD150X400SW	14.8	QD225X300HW	14.13	QD300X300HG	14.3
QD100X225SW	14.7	QD150X150HW	14.8	QD150X400SW	14.12	QD225X300SG	14.2	QD300X300HG	14.7
QD100X225SW	14.8	QD150X150HW	14.13	QD225X125HG	14.3	QD225X300SG	14.7	QD300X300HG	14.7
QD100X225SW	14.12	QD150X150SG	14.2	QD225X125HG	14.7	QD225X300SG	14.7	QD300X300HG	14.8
QD100X300HG	14.3	QD150X150SG	14.7	QD225X125HG	14.7	QD225X300SG	14.8	QD300X300HG	14.13
QD100X300HG	14.7	QD150X150SG	14.7	QD225X125HG	14.8	QD225X300SG	14.12	QD300X300HW	14.3
QD100X300HG	14.7	QD150X150SG	14.8	QD225X125HG	14.13	QD225X300SW	14.2	QD300X300HW	14.7
QD100X300HG	14.8	QD150X150SG	14.12	QD225X125HW	14.3	QD225X300SW	14.7	QD300X300HW	14.7
QD100X300HG	14.13	QD150X150SW	14.2	QD225X125HW	14.7	QD225X300SW	14.7	QD300X300HW	14.8
QD100X300HW	14.3	QD150X150SW	14.7	QD225X125HW	14.7	QD225X300SW	14.8	QD300X300HW	14.13
QD100X300HW	14.7	QD150X150SW	14.7	QD225X125HW	14.8	QD225X300SW	14.12	QD300X300SG	14.2
QD100X300HW	14.7	QD150X150SW	14.8	QD225X125HW	14.13	QD225X400HG	14.3	QD300X300SG	14.7
QD100X300HW	14.8	QD150X150SW	14.12	QD225X125SG	14.2	QD225X400HG	14.7	QD300X300SG	14.7
QD100X300HW	14.13	QD150X225HG	14.3	QD225X125SG	14.7	QD225X400HG	14.7	QD300X300SG	14.8
QD100X300SG	14.2	QD150X225HG	14.7	QD225X125SG	14.7	QD225X400HG	14.8	QD300X300SG	14.12
QD100X300SG	14.7	QD150X225HG	14.7	QD225X125SG	14.8	QD225X400HG	14.13	QD300X300SW	14.2
QD100X300SG	14.7	QD150X225HG	14.8	QD225X125SG	14.12	QD225X400HW	14.3	QD300X300SW	14.7
QD100X300SG	14.8	QD150X225HG	14.13	QD225X125SW	14.2	QD225X400HW	14.7	QD300X300SW	14.7
QD100X300SG	14.12	QD150X225HW	14.3	QD225X125SW	14.7	QD225X400HW	14.7	QD300X300SW	14.8
QD100X300SW	14.2	QD150X225HW	14.7	QD225X125SW	14.7	QD225X400HW	14.8	QD300X300SW	14.12
QD100X300SW	14.7	QD150X225HW	14.7	QD225X125SW	14.8	QD225X400HW	14.13	QD300X400HG	14.3
QD100X300SW	14.7	QD150X225HW	14.8	QD225X125SW	14.12	QD225X400SW	14.2	QD300X400HG	14.7
QD100X300SW	14.8	QD150X225HW	14.13	QD225X150HG	14.3	QD225X400SW	14.7	QD300X400HG	14.7
QD100X300SW	14.12	QD150X225SG	14.2	QD225X150HG	14.7	QD225X400SG	14.7	QD300X400HG	14.8
QD100X400HG	14.3	QD150X225SG	14.7	QD225X150HG	14.7	QD225X400SG	14.8	QD300X400HG	14.13
QD100X400HG	14.7	QD150X225SG	14.7	QD225X150HG	14.8	QD225X400SG	14.12	QD300X400HG	14.3
QD100X400HG	14.7	QD150X225SG	14.8	QD225X150HG	14.13	QD225X400SW	14.2	QD300X400HW	14.7
QD100X400HG	14.8	QD150X225SG	14.12	QD225X150HW	14.3	QD225X400SW	14.7	QD300X400HW	14.7
QD100X400HG	14.13	QD150X225SW	14.2	QD225X150HW	14.7	QD225X400SW	14.7	QD300X400HW	14.8
QD100X400HW	14.3	QD150X225SW	14.7	QD225X150HW	14.7	QD225X400SW	14.8	QD300X400HW	14.13
QD100X400HW	14.7	QD150X225SW	14.7	QD225X150HW	14.8	QD225X400SW	14.12	QD300X400SG	14.2
QD100X400HW	14.7	QD150X225SW	14.8	QD225X150HW	14.13	QD300X150HG	14.3	QD300X400SG	14.7
QD100X400HW	14.8	QD150X225SW	14.12	QD225X150SG	14.2	QD300X150HG	14.7	QD300X400SG	14.7
QD100X400HW	14.13	QD150X300HG	14.3	QD225X150SG	14.7	QD300X150HG	14.7	QD300X400SG	14.8
QD100X400SG	14.2	QD150X300HG	14.7	QD225X150SG	14.7	QD300X150HG	14.8	QD300X400SG	14.12
QD100X400SG	14.7	QD150X300HG	14.7	QD225X150SG	14.8	QD300X150HG	14.13	QD300X400SW	14.2
QD100X400SG	14.7	QD150X300HG	14.8	QD225X150SG	14.12	QD300X150HW	14.3	QD300X400SW	14.7
QD100X400SG	14.8	QD150X300HG	14.13	QD225X150SW	14.2	QD300X150HW	14.7	QD300X400SW	14.8
QD100X400SG	14.12	QD150X300HW	14.3	QD225X150SW	14.7	QD300X150HW	14.7	QD300X400SW	14.8
QD100X400SW	14.2	QD150X300HW	14.7	QD225X150SW	14.7	QD300X150HW	14.8	QD300X400SW	14.12
QD100X400SW	14.7	QD150X300HW	14.7	QD225X150SW	14.8	QD300X150HW	14.13	QD400X150HG	14.3
QD100X400SW	14.7	QD150X300HW	14.8	QD225X150SW	14.12	QD300X150SG	14.2	QD400X150HG	14.7
QD100X400SW	14.8	QD150X300HW	14.13	QD225X225HG	14.3	QD300X150SG	14.7	QD400X150HG	14.7
QD100X400SW	14.12	QD150X300SG	14.2	QD225X225HG	14.7	QD300X150SG	14.7	QD400X150HG	14.8
QD150X125HG	14.3	QD150X300SG	14.7	QD225X225HG	14.7	QD300X150SG	14.8	QD400X150HG	14.13
QD150X125HG	14.7	QD150X300SG	14.7	QD225X225HG	14.8	QD300X150SG	14.12	QD400X150HW	14.3
QD150X125HG	14.7	QD150X300SG	14.8	QD225X225HG	14.13	QD300X150SG	14.2	QD400X150HW	14.7
QD150X125HG	14.8	QD150X300SG	14.12	QD225X225HW	14.3	QD300X150SW	14.7	QD400X150HW	14.7
QD150X125HG	14.13	QD150X300SW	14.2	QD225X225HW	14.7	QD300X150SW	14.7	QD400X150HW	14.8
QD150X125HW	14.3	QD150X300SW	14.7	QD225X225HW	14.7	QD300X150SW	14.8	QD400X150HW	14.13
QD150X125HW	14.7	QD150X300SW	14.7	QD225X225HW	14.8	QD300X150SW	14.12	QD400X150SG	14.2
QD150X125HW	14.7	QD150X300SW	14.8	QD225X225HW	14.13	QD300X225HG	14.3	QD400X150SG	14.7
QD150X125HW	14.8	QD150X300SW	14.12	QD225X225HW	14.2	QD300X225HG	14.7	QD400X150SG	14.7
QD150X125HW	14.13	QD150X400HG	14.3	QD225X225SG	14.7	QD300X225HG	14.7	QD400X150SG	14.8
QD150X125SG	14.2	QD150X400HG	14.7	QD225X225SG	14.7	QD300X225HG	14.8	QD400X150SG	14.12
QD150X125SG	14.7	QD150X400HG	14.7	QD225X225SG	14.8	QD300X225HG	14.13	QD400X150SG	14.2
QD150X125SG	14.7	QD150X400HG	14.8	QD225X225SG	14.12	QD300X225HW	14.3	QD400X150SW	14.7
QD150X125SG	14.8	QD150X400HG	14.13	QD225X225SW	14.2	QD300X225HW	14.7	QD400X150SW	14.7
QD150X125SG	14.12	QD150X400HW	14.3	QD225X225SW	14.7	QD300X225HW	14.7	QD400X150SW	14.8
QD150X125SW	14.2	QD150X400HW	14.7	QD225X225SW	14.7	QD300X225HW	14.8	QD400X150SW	14.12
QD150X125SW	14.7	QD150X400HW	14.7	QD225X225SW	14.8	QD300X225HW	14.13	QD400X225HG	14.3
QD150X125SW	14.7	QD150X400HW	14.8	QD225X225SW	14.12	QD300X225SG	14.2	QD400X225HG	14.7
QD150X125SW	14.8	QD150X400HW	14.13	QD225X300HG	14.3	QD300X225SG	14.7	QD400X225HG	14.7
QD150X125SW	14.12	QD150X400SG	14.2	QD225X300HG	14.7	QD300X225SG	14.7	QD400X225HG	14.8
QD150X150HG	14.3	QD150X400SG	14.7	QD225X300HG	14.7	QD300X225SG	14.8	QD400X225HG	14.13
QD150X150HG	14.7	QD150X400SG	14.7	QD225X300HG	14.8	QD300X225SG	14.12	QD400X225HW	14.3
QD150X150HG	14.7	QD150X400SG	14.8	QD225X300HG	14.13	QD300X225SW	14.2	QD400X225HW	14.7

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QD400X225HW	14.13	QD475X225HG	14.3	QDC300W	14.4	QT30	14.15	RC5-1/50	6.19
QD400X225SG	14.2	QD475X225HG	14.7	QDC400G	14.4	QT3075-35B	14.20	RC5-2/133	1.52
QD400X225SG	14.7	QD475X225HG	14.7	QDC400W	14.4	QT3075-35B	14.22	RC5-2/250	1.52
QD400X225SG	14.7	QD475X225HG	14.8	QDC475G	14.4	QT3075-35W	14.20	RC5-2/440	1.52
QD400X225SG	14.8	QD475X225HG	14.13	QDC475W	14.4	QT3075-35W	14.22	RC5-2/50	1.52
QD400X225SG	14.12	QD475X225HW	14.3	QDC600G	14.4	QT40	14.15	RC5-3/440	1.52
QD400X225SW	14.2	QD475X225HW	14.7	QDC600W	14.4	QT400-10B	14.20	RC-EH300/415	1.52
QD400X225SW	14.7	QD475X225HW	14.7	QDCUTR	14.4	QT400-10B	14.22	RC-EH300/48	1.52
QD400X225SW	14.7	QD475X225HW	14.8	QDF050X050G	14.15	QT400-10BB	14.20	RC-EH800/110	1.52
QD400X225SW	14.8	QD475X225HW	14.13	QDF058X058G	14.15	QT400-10W	14.20	RC-EH800/110	1.52
QD400X225SW	14.12	QD475X225SG	14.2	QDF075X075G	14.15	QT400-10W	14.22	RC-EH800/600	1.52
QD400X300HG	14.3	QD475X225SG	14.7	QDF100X100G	14.15	QT400-10WB	14.20	RT5/150	1.52
QD400X300HG	14.7	QD475X225SG	14.7	QDF125X125G	14.15	QT400-24B	14.20	RT5/150	6.19
QD400X300HG	14.7	QD475X225SG	14.8	QDF150X150G	14.15	QT400-24B	14.23	RT5/264	1.52
QD400X300HG	14.8	QD475X225SG	14.12	QDF200X200G	14.15	QT450-35B	14.20	RT5/264	6.19
QD400X300HG	14.13	QD475X225SW	14.2	QDPDB	14.4	QT450-35B	14.23	RT5/32	1.52
QD400X300HW	14.3	QD475X225SW	14.7	QDPL8-12-S	14.4	QT525-10B	14.20	RT5/32	6.19
QD400X300HW	14.7	QD475X225SW	14.7	QDPR4MM	14.4	QT525-10B	14.22	RT5/65	1.52
QD400X300HW	14.7	QD475X225SW	14.8	QDPR6MM	14.4	QT525-10BB	14.20	RT5/65	6.19
QD400X300HW	14.8	QD475X225SW	14.12	QDRCD100B	14.4	QT525-10W	14.20	RT5/90	1.52
QD400X300HW	14.13	QD475X300HG	14.3	QDRCD150B	14.4	QT525-10W	14.22	RT5/90	6.19
QD400X300SG	14.2	QD475X300HG	14.7	QDRCD225B	14.4	QT525-10WB	14.20	RV5/133	1.52
QD400X300SG	14.7	QD475X300HG	14.7	QDRCD300B	14.4	QT550-10B	14.20	RV5/133	1.198
QD400X300SG	14.7	QD475X300HG	14.8	QDRCD400B	14.4	QT550-10BB	14.20	RV5/133	6.19
QD400X300SG	14.8	QD475X300HG	14.13	QDRCD500B	14.4	QT550-10WB	14.20	RV5/250	1.52
QD400X300SG	14.12	QD475X300HW	14.3	QDRCD600B	14.4	QT550-14B	14.22	RV5/250	1.198
QD400X300SW	14.2	QD475X300HW	14.7	QDRVGTUN	14.4	QT550-14W	14.20	RV5/250	6.19
QD400X300SW	14.7	QD475X300HW	14.7	QD-SAMPL-HIDENSG	14.14	QT550-14W	14.22	RV5/440	1.52
QD400X300SW	14.7	QD475X300HW	14.8	QD-SAMPL-RND	14.14	QT625-10B	14.20	RV5/440	1.198
QD400X300SW	14.8	QD475X300HW	14.13	QD-SAMPL-SPIRAL	14.14	QT625-10B	14.22	RV5/440	6.19
QD400X300SW	14.12	QD475X300SG	14.2	QD-SAMPL-SQR	14.14	QT625-10BB	14.20	RV5/50	1.52
QD400X400HG	14.3	QD475X300SG	14.7	QD-SAMPL-STDG	14.14	QT625-10W	14.20	RV5/50	1.198
QD400X400HG	14.7	QD475X300SG	14.7	QD-SAMPL-STDW	14.14	QT625-10W	14.22	RV5/50	6.19
QD400X400HG	14.7	QD475X300SG	14.8	QDWS8-12-150B	14.4	QT625-10WB	14.20	RV-BC6/250	1.53
QD400X400HG	14.8	QD475X300SG	14.12	QDWS8-12-225B	14.4	QT700-14B	14.22	RV-BC6/250	6.19
QD400X400HG	14.13	QD475X300SW	14.2	QDWS8-12-300	14.4	QT700-14W	14.20	RV-BC6/380	1.53
QD400X400HW	14.3	QD475X300SW	14.7	QDWS8-12-400	14.4	QT700-14W	14.22	RV-BC6/380	6.19
QD400X400HW	14.7	QD475X300SW	14.7	QT-10	14.15	QT700-17B	14.20	RV-BC6/60	1.53
QD400X400HW	14.7	QD475X300SW	14.8	QT1050-35B	14.20	QT700-24B	14.20	RV-BC6/60	6.19
QD400X400HW	14.8	QD475X300SW	14.12	QT1050-35B	14.23	QT700-24B	14.23	RV-BC6-F/250	1.53
QD400X400HW	14.13	QD600X400HG	14.3	QT1100-14B	14.20	QT700-35B	14.20	RV-BC6-F/250	6.19
QD400X400SG	14.2	QD600X400HG	14.7	QT1100-14B	14.22	QT700-35B	14.23	RV-BC6-F/380	1.53
QD400X400SG	14.7	QD600X400HG	14.7	QT1100-14W	14.20	QT800-14B	14.20	RV-BC6-F/380	6.19
QD400X400SG	14.7	QD600X400HG	14.8	QT1100-14W	14.22	QT800-14B	14.22	RV-BC6-F/60	1.53
QD400X400SG	14.8	QD600X400HG	14.13	QT1100-17B	14.20	QT800-14BB	14.20	RV-BC6-F/60	6.19
QD400X400SG	14.12	QD600X400HW	14.3	QT1100-17B	14.22	QT800-14W	14.20	S1-M1-25	4.12
QD400X400SW	14.2	QD600X400HW	14.7	QT1100-17W	14.20	QT800-14W	14.22	S1-M2-25	4.12
QD400X400SW	14.7	QD600X400HW	14.7	QT1100-17W	14.22	QT800-14WB	14.20	S1-M3-25	4.12
QD400X400SW	14.7	QD600X400HW	14.8	QT1100-30B	14.20	QT800-30B	14.20	S1-M3-35	4.12
QD400X400SW	14.8	QD600X400HW	14.13	QT1100-30B	14.22	QT800-30B	14.22	S201-B10	15.18
QD400X400SW	14.12	QD600X400SG	14.2	QT1100-30W	14.20	QT800-30W	14.20	S201-B10NA	15.18
QD475X150HG	14.3	QD600X400SG	14.7	QT1100-30W	14.22	QT800-30W	14.22	S201-B13	15.18
QD475X150HG	14.7	QD600X400SG	14.7	QT1400-17B	14.20	QTAB-B	14.21	S201-B13NA	15.18
QD475X150HG	14.7	QD600X400SG	14.8	QT1400-17B	14.22	QTAB-C	14.21	S201-B16	15.18
QD475X150HG	14.8	QD600X400SG	14.12	QT1400-17W	14.20	QTCR	14.21	S201-B16NA	15.18
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QD475X150HW	14.7	QD600X400SW	14.8	QT1400-30W	14.20	QT-SAMPL-MBA	14.14	S201-B25NA	15.18
QD475X150HW	14.8	QD600X400SW	14.12	QT1400-30W	14.22	QT-SAMPL-STDIES	14.14	S201-B32	15.18
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QD475X150SG	14.2	QDAT9MMX50M	14.4	QT1400-35B	14.23	QTSMB-B	14.21	S201-B40	15.18
QD475X150SG	14.7	QDC050G	14.4	QT1700-35B	14.20	QTSMB-C	14.21	S201-B40NA	15.18
QD475X150SG	14.7	QDC050W	14.4	QT1700-35B	14.22	RA5-1	1.54	S201-B50	15.18
QD475X150SG	14.8	QDC100G	14.4	QT1700-35W	14.20	RC5-1/133	1.52	S201-B50NA	15.18
QD475X150SG	14.12	QDC100W	14.4	QT1700-35W	14.22	RC5-1/133	6.19	S201-B6	15.18
QD475X150SW	14.2	QDC150G	14.4	QT20	14.15	RC5-1/250	1.52	S201-B63	15.18
QD475X150SW	14.7	QDC150W	14.4	QT2150-35B	14.20	RC5-1/250	6.19	S201-B63NA	15.18
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S201-D25NA	15.20	S201P-C16	15.24	S201PR-K63	15.28	S201U-K30	15.2	S201-Z32	15.22
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S202-C40	15.19	S202P-D1.6	15.25	S202P-Z40	15.27	S202UP-K0.75	15.4	S203-B20NA	15.18
S202-C50	15.19	S202P-D10	15.25	S202P-Z50	15.27	S202UP-K1	15.4	S203-B25	15.18
S202-C6	15.19	S202P-D10	15.25	S202P-Z6	15.27	S202UP-K1.6	15.4	S203-B25NA	15.18
S202-C63	15.19	S202P-D13	15.25	S202P-Z63	15.27	S202UP-K10	15.4	S203-B32	15.18
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S202P-B13	15.23	S202PR-K15	15.28	S202UDC-Z63	15.8	S202U-Z50	15.3	S203-C63NA	15.19
S202P-B16	15.23	S202PR-K16	15.28	S202UDC-Z8	15.8	S202U-Z6	15.3	S203-C6NA	15.19
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S203-K6NA	15.21	S203PR-K1	15.28	S203UP-K25	15.4	S204-C16	15.19	S204PR-K25	15.28
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S203-K8NA	15.21	S203PR-K10	15.28	S203UP-K4	15.4	S204-C20	15.19	S204PR-K30	15.28
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S204U-K32	15.2	S204-Z4	15.22	S282UC-Z50	15.30	S2-UA220	15.33	S501UC-B40	15.83
S204U-K4	15.2	S204-Z40	15.22	S282UC-Z6	15.30	S2-UA24	15.33	S501UC-B50	15.83
S204U-K40	15.2	S204-Z50	15.22	S282UC-Z63	15.30	S2-UA380	15.33	S501UC-B6	15.83
S204U-K5	15.2	S204-Z6	15.22	S282UC-Z8	15.30	S2-UA48	15.33	S501UC-B63	15.83
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S204U-K63	15.2	S281UC-K0.5	15.29	S283UC-K0.75	15.29	S401U-K20	22.6	S501UC-K0.42	15.84
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S204UP-K3	15.4	S281UC-K6	15.29	S283UC-K63	15.29	S402U-K40	22.6	S501UC-K41	15.84
S204UP-K4	15.4	S281UC-K63	15.29	S283UC-K8	15.29	S402U-K5	22.6	S501UC-K45	15.84
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S204UP-Z25	15.5	S281UC-Z4	15.30	S283UC-Z40	15.30	S403U-K60	22.6	S502-K15	15.82
S204UP-Z3	15.5	S281UC-Z40	15.30	S283UC-Z50	15.30	S403U-K8	22.6	S502-K2.1	15.82
S204UP-Z4	15.5	S281UC-Z50	15.30	S283UC-Z6	15.30	S4-M1	4.12	S502-K20	15.82
S204UP-Z5	15.5	S281UC-Z6	15.30	S283UC-Z63	15.30	S500-H11	15.85	S502-K26	15.82
S204UP-Z6	15.5	S281UC-Z63	15.30	S283UC-Z8	15.30	S500-H20	15.85	S502-K3	15.82
S204UP-Z8	15.5	S281UC-Z8	15.30	S2-A1	15.33	S500-K1	15.85	S502-K32	15.82
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S204U-Z16	15.3	S282UC-K1.6	15.29	S2C-DH	15.9	S501-K0.21	15.82	S502-K8	15.82
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S204U-Z25	15.3	S282UC-K2	15.29	S2C-S/H6R	15.31	S501-K0.58	15.82	S502UC-B16	15.83
S204U-Z3	15.3	S282UC-K20	15.29	S2C-S6RU	15.9	S501-K0.8	15.82	S502UC-B20	15.83
S204U-Z30	15.3	S282UC-K25	15.29	S2C-UA 110	15.31	S501-K1.1	15.82	S502UC-B25	15.83
S204U-Z32	15.3	S282UC-K3	15.29	S2C-UA 12	15.31	S501-K1.5	15.82	S502UC-B32	15.83
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S204U-Z40	15.3	S282UC-K4	15.29	S2C-UA 24	15.31	S501-K15	15.82	S502UC-B50	15.83
S204U-Z5	15.3	S282UC-K40	15.29	S2C-UA 400	15.31	S501-K2.1	15.82	S502UC-B6	15.83
S204U-Z50	15.3	S282UC-K50	15.29	S2C-UA 48	15.31	S501-K20	15.82	S502UC-B63	15.83
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S503UC-B50	15.83	S800W-RSU	15.58	S801U-Z80	15.55	S802U-Z70	15.55	S803U-Z60	15.55
S503UC-B6	15.83	S801S-B10	15.60	S801U-Z90	15.55	S802U-Z80	15.55	S803U-Z70	15.55
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S503UC-K0.3	15.84	S801S-B16	15.60	S802S-B13	15.60	S803S-B125	15.60	S803W-SCL100-SR	15.56
S503UC-K0.42	15.84	S801S-B20	15.60	S802S-B16	15.60	S803S-B13	15.60	S803W-SCL32-SR	4.16
S503UC-K0.58	15.84	S801S-B25	15.60	S802S-B20	15.60	S803S-B16	15.60	S803W-SCL32-SR	15.56
S503UC-K0.8	15.84	S801S-B32	15.60	S802S-B25	15.60	S803S-B20	15.60	S803W-SCL63-SR	4.16
S503UC-K1.1	15.84	S801S-B40	15.60	S802S-B32	15.60	S803S-B25	15.60	S803W-SCL63-SR	15.56
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S503UC-K11	15.84	S801S-B63	15.60	S802S-B50	15.60	S803S-B40	15.60	S804S-B100	15.60
S503UC-K15	15.84	S801S-B80	15.60	S802S-B63	15.60	S803S-B50	15.60	S804S-B125	15.60
S503UC-K2.1	15.84	S801S-C10	15.61	S802S-B80	15.60	S803S-B63	15.60	S804S-B13	15.60
S503UC-K20	15.84	S801S-C100	15.61	S802S-C10	15.61	S803S-B80	15.60	S804S-B16	15.60
S503UC-K26	15.84	S801S-C125	15.61	S802S-C100	15.61	S803S-C10	15.61	S804S-B20	15.60
S503UC-K3	15.84	S801S-C13	15.61	S802S-C125	15.61	S803S-C100	15.61	S804S-B25	15.60
S503UC-K32	15.84	S801S-C16	15.61	S802S-C13	15.61	S803S-C125	15.61	S804S-B32	15.60
S503UC-K37	15.84	S801S-C20	15.61	S802S-C16	15.61	S803S-C13	15.61	S804S-B40	15.60
S503UC-K4.2	15.84	S801S-C25	15.61	S802S-C20	15.61	S803S-C16	15.61	S804S-B50	15.60
S503UC-K41	15.84	S801S-C32	15.61	S802S-C25	15.61	S803S-C20	15.61	S804S-B63	15.60
S503UC-K45	15.84	S801S-C40	15.61	S802S-C32	15.61	S803S-C25	15.61	S804S-B80	15.60
S503UC-K5.8	15.84	S801S-C50	15.61	S802S-C40	15.61	S803S-C32	15.61	S804S-C10	15.61
S503UC-K8	15.84	S801S-C63	15.61	S802S-C50	15.61	S803S-C40	15.61	S804S-C100	15.61
S504UC-B10	15.83	S801S-C80	15.61	S802S-C63	15.61	S803S-C50	15.61	S804S-C125	15.61
S504UC-B13	15.83	S801S-D10	15.62	S802S-C80	15.61	S803S-C63	15.61	S804S-C13	15.61
S504UC-B16	15.83	S801S-D100	15.62	S802S-D10	15.62	S803S-C80	15.61	S804S-C16	15.61
S504UC-B20	15.83	S801S-D125	15.62	S802S-D100	15.62	S803S-D10	15.62	S804S-C20	15.61
S504UC-B25	15.83	S801S-D13	15.62	S802S-D125	15.62	S803S-D100	15.62	S804S-C25	15.61
S504UC-B32	15.83	S801S-D16	15.62	S802S-D13	15.62	S803S-D125	15.62	S804S-C32	15.61

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S804S-C63	15.61	SK 615 550-75	7.123	SK4-11	4.10	SU203PR-K2	15.6	T030LF1-60BM	5.59
S804S-C80	15.61	SK 615 550-76	7.123	SK615512-1	7.32	SU203PR-K20	15.6	T040L1-48M	5.58
S804S-D10	15.62	SK 615 550-80	7.124	SK615512-1	7.61	SU203PR-K25	15.6	T040L1-60M	5.58
S804S-D100	15.62	SK 615 550-81	7.124	SK616016-2	7.31	SU203PR-K3	15.6	T040L2-48M	5.58
S804S-D125	15.62	SK 615 552-13	7.121	SK616016-2	7.60	SU203PR-K30	15.6	T040L2-60M	5.58
S804S-D13	15.62	SK 615 552-14	7.121	SK616021-71	7.31	SU203PR-K32	15.6	T040LB1-48NM	5.59
S804S-D16	15.62	SK 615 552-15	7.121	SK616021-71	7.60	SU203PR-K35	15.6	T040LB1-60LM	5.59
S804S-D20	15.62	SK 615 552-16	7.121	SK616021-72	7.31	SU203PR-K4	15.6	T040LB4-24/XD	5.64
S804S-D25	15.62	SK 615 552-17	7.121	SK616021-72	7.60	SU203PR-K40	15.6	T040LF1-48CM	5.59
S804S-D32	15.62	SK 615 552-18	7.121	SK616021-73	7.31	SU203PR-K5	15.6	T040LF1-60CM	5.59
S804S-D40	15.62	SK 615 552-20	7.121	SK616021-73	7.60	SU203PR-K50	15.6	T050L1-48M	5.58
S804S-D50	15.62	SK 615 552-21	7.121	SU201PR-K0.2	15.6	SU203PR-K6	15.6	T050L1-60M	5.58
S804S-D63	15.62	SK 615 552-22	7.121	SU201PR-K0.3	15.6	SU203PR-K60	15.6	T050L2-48M	5.58
S804S-D80	15.62	SK 615 552-23	7.121	SU201PR-K0.5	15.6	SU203PR-K63	15.6	T050L2-60M	5.58
S804S-K10	15.63	SK 615 552-24	7.121	SU201PR-K0.75	15.6	SU203PR-K8	15.6	T050LB1-48RM	5.59
S804S-K100	15.63	SK 615 552-25	7.121	SU201PR-K1	15.6	SU204PR-K0.2	15.6	T050LB1-60NM	5.59
S804S-K125	15.63	SK 615 552-27	7.121	SU201PR-K1.6	15.6	SU204PR-K0.3	15.6	T050LB4-24/XD	5.64
S804S-K13	15.63	SK 615 552-28	7.121	SU201PR-K10	15.6	SU204PR-K0.5	15.6	T050LB4-48/XD	5.64
S804S-K16	15.63	SK 615 552-29	7.121	SU201PR-K13	15.6	SU204PR-K0.75	15.6	T050LF1-48CM	5.59
S804S-K20	15.63	SK 615 552-30	7.121	SU201PR-K15	15.6	SU204PR-K1	15.6	T050LF1-60CM	5.59
S804S-K25	15.63	SK 615 552-31	7.121	SU201PR-K16	15.6	SU204PR-K1.6	15.6	T060L1-48M	5.58
S804S-K32	15.63	SK 615 552-32	7.121	SU201PR-K2	15.6	SU204PR-K10	15.6	T060L1-60M	5.58
S804S-K40	15.63	SK 615 552-39	7.121	SU201PR-K20	15.6	SU204PR-K13	15.6	T060L2-48M	5.58
S804S-K50	15.63	SK 615 552-40	7.121	SU201PR-K25	15.6	SU204PR-K15	15.6	T060L2-60M	5.58
S804S-K63	15.63	SK 615 552-52	7.123	SU201PR-K3	15.6	SU204PR-K16	15.6	T060LB1-48SM	5.59
S804S-K80	15.63	SK 615 552-53	7.123	SU201PR-K30	15.6	SU204PR-K2	15.6	T060LB1-60RM	5.59
S804U-K10	15.54	SK 615 552-55	7.123	SU201PR-K32	15.6	SU204PR-K20	15.6	T060LB4-24/XD	5.64
S804U-K100	15.54	SK 615 552-60	7.124	SU201PR-K35	15.6	SU204PR-K25	15.6	T060LF1-48DM	5.59
S804U-K15	15.54	SK 615 552-JO	7.121	SU201PR-K4	15.6	SU204PR-K3	15.6	T060LF1-60CM	5.59
S804U-K20	15.54	SK 615 562-72	7.123	SU201PR-K40	15.6	SU204PR-K30	15.6	T075L1-48M	5.58
S804U-K25	15.54	SK 615 562-82	7.124	SU201PR-K5	15.6	SU204PR-K32	15.6	T075L1-60M	5.58
S804U-K30	15.54	SK 615 562-83	7.124	SU201PR-K50	15.6	SU204PR-K35	15.6	T075L2-48M	5.58
S804U-K40	15.54	SK 615 562-87	7.20	SU201PR-K6	15.6	SU204PR-K4	15.6	T075L2-60M	5.58
S804U-K50	15.54	SK 615 562-88	7.20	SU201PR-K60	15.6	SU204PR-K40	15.6	T075LB1-48TM	5.59
S804U-K60	15.54	SK 615 640-1	7.138	SU201PR-K63	15.6	SU204PR-K5	15.6	T075LB1-60SM	5.59
S804U-K70	15.54	SK 615 641-1	7.138	SU201PR-K8	15.6	SU204PR-K50	15.6	T075LB4-24/XD	5.64
S804U-K80	15.54	SK 615 650-29	7.138	SU202PR-K0.2	15.6	SU204PR-K6	15.6	T075LB4-48/XD	5.64
S804U-K90	15.54	SK 615 652-13	7.138	SU202PR-K0.3	15.6	SU204PR-K60	15.6	T075LF1-48DM	5.59
S804U-Z10	15.55	SK 615 652-14	7.138	SU202PR-K0.5	15.6	SU204PR-K63	15.6	T075LF1-60DM	5.59
S804U-Z100	15.55	SK 615 652-15	7.138	SU202PR-K0.75	15.6	SU204PR-K8	15.6	T1000L1-60M	5.58
S804U-Z15	15.55	SK 615 652-16	7.138	SU202PR-K1	15.6	SZ-ESK BP	15.12	T1000L2-60M	5.58
S804U-Z20	15.55	SK 615 652-17	7.138	SU202PR-K1.6	15.6	SZ-ESKSP	15.39	T1000LB1-60KM	5.59
S804U-Z25	15.55	SK 615 652-18	7.138	SU202PR-K10	15.6	T010L1-48M	5.58	T1000LF1-60K	5.59
S804U-Z30	15.55	SK 615 652-20	7.138	SU202PR-K13	15.6	T010L2-48M	5.58	T100L1-48M	5.58
S804U-Z40	15.55	SK 615 652-21	7.138	SU202PR-K15	15.6	T010LB1-48EM	5.59	T100L1-60M	5.58
S804U-Z50	15.55	SK 615 652-22	7.138	SU202PR-K16	15.6	T010LF1-48AM	5.59	T100L2-48M	5.58
S804U-Z60	15.55	SK 615 652-23	7.138	SU202PR-K2	15.6	T015L1-60M	5.58	T100L2-60M	5.58
S804U-Z70	15.55	SK 615 652-24	7.138	SU202PR-K20	15.6	T015L2-60M	5.58	T100LB1-48VM	5.59
S804U-Z80	15.55	SK 615 652-25	7.138	SU202PR-K25	15.6	T015LB1-60EM	5.59	T100LB1-60TM	5.59
S804U-Z90	15.55	SK 615 652-27	7.138	SU202PR-K3	15.6	T015LF1-60AM	5.59	T100LB4-24/XD	5.64
SA1	4.14	SK 615 652-28	7.138	SU202PR-K30	15.6	T020L1-48M	5.58	T100LB4-48/XD	5.64
SA1	15.31	SK 615 652-29	7.138	SU202PR-K32	15.6	T020L2-48M	5.58	T100LF1-48DM	5.59
SA2	4.14	SK 615 652-30	7.138	SU202PR-K35	15.6	T020LB1-48JM	5.59	T100LF1-60DM	5.59
SA2	15.31	SK 615 652-31	7.138	SU202PR-K4	15.6	T020LF1-48BM	5.59	T125L1-48M	5.58
SA3	4.14	SK 615 652-32	7.138	SU202PR-K40	15.6	T025L1-48M	5.58	T125L1-60M	5.58
SK 615 512-1	7.100	SK 615 652-39	7.138	SU202PR-K5	15.6	T025L1-60M	5.58	T125L2-48M	5.58
SK 615 516-1	7.115	SK 615 652-40	7.138	SU202PR-K50	15.6	T025L2-48M	5.58	T125L2-60M	5.58
SK 615 540-1	7.121	SK 615 652-44	7.138	SU202PR-K6	15.6	T025L2-60M	5.58	T125LB1-48XM	5.59
SK 615 540-1	7.124	SK 615 652-52	7.139	SU202PR-K60	15.6	T025LB1-48KM	5.59	T125LB1-60VM	5.59
SK 615 541-1	7.121	SK 615 652-53	7.139	SU202PR-K63	15.6	T025LB1-60JM	5.59	T125LB4-48/XD	5.64
SK 615 541-1	7.124	SK 615 652-55	7.139	SU202PR-K8	15.6	T025LB4-24/XD	5.64	T125LF1-48EM	5.59
SK 615 545-1	7.121	SK 615 652-60	7.139	SU203PR-K0.2	15.6	T025LF1-48EM	5.59	T125LF1-60DM	5.59
SK 615 545-2	7.121	SK 615 652-71	7.139	SU203PR-K0.3	15.6	T025LF1-60BM	5.59	T150L1-48M	5.58
SK 615 545-3	7.121	SK 615 652-80	7.139	SU203PR-K0.5	15.6	T030L1-48M	5.58	T150L1-60M	5.58
SK 615 545-4	7.121	SK 615 652-FR	7.139	SU203PR-K0.75	15.6	T030L1-60M	5.58	T150L2-48M	5.58
SK 615 545-5	7.121	SK 615 652-JO	7.138	SU203PR-K1	15.6	T030L2-48M	5.58	T150L2-60M	5.58
SK 615 546-2	7.120	SK 616 016-2	7.100	SU203PR-K1.6	15.6	T030L2-60M	5.58	T150LB1-48YM	5.59
SK 615 546-8	7.120	SK 616 021-71	7.100	SU203PR-K10	15.6	T030LB1-48LM	5.59	T150LB1-60XM	5.59
SK 615 550-29	7.121	SK1-02	4.10	SU203PR-K13	15.6	T030LB1-60KM	5.59	T150LB4-24/XD	5.64

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T150LF1-48EM	5.59	T250LB1-60ZM	5.59	T2SQ100BW	17.19	T400LB1-60DM	5.59	T4N125TW	17.28
T150LF1-60EM	5.59	T250LB4-24/XD	5.64	T2SQ100TW	17.18	T400LB4-48/XD	5.64	T4N125TW-2	17.28
T16-0.13	2.10	T250LB4-48/XD	5.64	T300L1-48M	5.58	T400LF1-48GM	5.59	T4N150BW	17.30
T16-0.17	2.10	T250LF1-48FM	5.59	T300L1-60M	5.58	T400LF1-60FM	5.59	T4N150BW-2	17.30
T16-0.23	2.10	T250LF1-60EM	5.59	T300L2-48M	5.58	T4H100BW	17.30	T4N150CW	17.30
T16-0.31	2.10	T2H015TW	17.18	T300L2-60M	5.58	T4H100CW	17.30	T4N150CW-2	17.30
T16-0.41	2.10	T2H020MW	17.19	T300LB1-48DM	5.59	T4H100E5W	17.32	T4N150E5W	17.32
T16-0.55	2.10	T2H020TW	17.18	T300LB1-60BM	5.59	T4H100EW	17.30	T4N150EW	17.30
T16-0.74	2.10	T2H025BW	17.19	T300LB4-24/XD	5.64	T4H125TW	17.28	T4N150EW-2	17.30
T16-1.0	2.10	T2H025E5W	17.19	T300LB4-48/XD	5.64	T4H150BW	17.30	T4N150TW	17.28
T16-1.3	2.10	T2H025TW	17.18	T300LF1-48FM	5.59	T4H150CW	17.30	T4N150TW-2	17.28
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T16-13	2.10	T2H050MW	17.19	T350L1-60M	5.58	T4H150TW	17.28	T4N250BW	17.30
T16-16	2.10	T2H050TW	17.18	T350L2-48M	5.58	T4H200TW	17.28	T4N250BW-2	17.30
T16-2.3	2.10	T2H060BW	17.19	T350L2-60M	5.58	T4H250BW	17.30	T4N250CW	17.30
T16-3.1	2.10	T2H060E5W	17.19	T350LB1-48EM	5.59	T4H250CW	17.30	T4N250CW-2	17.30
T16-4.2	2.10	T2H060TW	17.18	T350LB1-60CM	5.59	T4H250DW	17.32	T4N250DW	17.32
T16-5.7	2.10	T2H070TW	17.18	T350LF1-48FM	5.59	T4H250E5W	17.32	T4N250E5W	17.32
T16-7.6	2.10	T2H080TW	17.18	T350LF1-60FM	5.59	T4H250EW	17.30	T4N250EW	17.30
T1B015TL-1	17.16	T2H090TW	17.18	T3N060TW	17.21	T4H250TW	17.28	T4N250EW-2	17.30
T1B020TL-1	17.16	T2H100BW	17.19	T3N070TW	17.21	T4HQ100BW	17.31	T4N250TW	17.28
T1B025TL-1	17.16	T2H100E5W	17.19	T3N080TW	17.21	T4HQ100CW	17.31	T4N250TW-2	17.28
T1B030TL-1	17.16	T2H100MW	17.19	T3N090TW	17.21	T4HQ100EW	17.31	T4NQ100BW	17.31
T1B040TL-1	17.16	T2H100TW	17.18	T3N100TW	17.21	T4HQ125TW	17.29	T4NQ100CW	17.31
T1B050TL-1	17.16	T2HQ015TW	17.18	T3N125TW	17.21	T4HQ150BW	17.31	T4NQ100EW	17.31
T1B060TL-1	17.16	T2HQ020TW	17.18	T3N150TW	17.21	T4HQ150CW	17.31	T4NQ125TW	17.29
T1B070TL-1	17.16	T2HQ025BW	17.19	T3N175TW	17.21	T4HQ150EW	17.31	T4NQ150BW	17.31
T1B080TL-1	17.16	T2HQ025TW	17.18	T3N200TW	17.21	T4HQ150TW	17.29	T4NQ150CW	17.31
T1B090TL-1	17.16	T2HQ030TW	17.18	T3N225TW	17.21	T4HQ200TW	17.29	T4NQ150EW	17.31
T1B100TL-1	17.16	T2HQ040TW	17.18	T3NQ060TW	17.21	T4HQ250BW	17.31	T4NQ150TW	17.29
T1N015TL	17.16	T2HQ050TW	17.18	T3NQ070TW	17.21	T4HQ250CW	17.31	T4NQ200TW	17.29
T1N020TL	17.16	T2HQ060BW	17.19	T3NQ080TW	17.21	T4HQ250EW	17.31	T4NQ250BW	17.31
T1N025TL	17.16	T2HQ060TW	17.18	T3NQ090TW	17.21	T4HQ250TW	17.29	T4NQ250CW	17.31
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T1N040TL	17.16	T2HQ080TW	17.18	T3NQ125TW	17.21	T4L100CW	17.30	T4NQ250TW	17.29
T1N050TL	17.16	T2HQ090TW	17.18	T3NQ150TW	17.21	T4L100E5W	17.32	T4PA040TL	17.69
T1N060TL	17.16	T2HQ100BW	17.19	T3NQ175TW	17.21	T4L100EW	17.30	T4PA050TL	17.69
T1N070TL	17.16	T2HQ100TW	17.18	T3NQ200TW	17.21	T4L125TW	17.28	T4PA080TL	17.69
T1N080TL	17.16	T2S015TW	17.18	T3NQ225TW	17.21	T4L150BW	17.30	T4PA100TL	17.69
T1N090TL	17.16	T2S020MW	17.19	T3S060TW	17.21	T4L150CW	17.30	T4PA125TL	17.69
T1N100DL	17.16	T2S020TW	17.18	T3S070TW	17.21	T4L150E5W	17.32	T4PA150TL	17.69
T1N100TL	17.16	T2S025BW	17.19	T3S080TW	17.21	T4L150EW	17.30	T4PA200DL	17.69
T1N015TL	17.16	T2S025E5W	17.19	T3S090TW	17.21	T4L150TW	17.28	T4PA200TL	17.69
T1NQ020TL	17.16	T2S025TW	17.18	T3S100MW	17.22	T4L200TW	17.28	T4PB040TL	17.69
T1NQ025TL	17.16	T2S030TW	17.18	T3S100TW	17.21	T4L250BW	17.30	T4PB050TL	17.69
T1NQ030TL	17.16	T2S040TW	17.18	T3S125MW	17.22	T4L250CW	17.30	T4PB080TL	17.69
T1NQ040TL	17.16	T2S050MW	17.19	T3S125TW	17.21	T4L250DW	17.32	T4PB100TL	17.69
T1NQ050TL	17.16	T2S050TW	17.18	T3S150DW	17.22	T4L250E5W	17.32	T4PB125TL	17.69
T1NQ060TL	17.16	T2S060BW	17.19	T3S150MW	17.22	T4L250EW	17.30	T4PB150TL	17.69
T1NQ070TL	17.16	T2S060E5W	17.19	T3S150TW	17.21	T4L250TW	17.28	T4PB200DL	17.69
T1NQ080TL	17.16	T2S060TW	17.18	T3S175TW	17.21	T4LQ100BW	17.31	T4PB200TL	17.69
T1NQ090TL	17.16	T2S070TW	17.18	T3S200MW	17.22	T4LQ100CW	17.31	T4S100BW	17.30
T1N100TL	17.16	T2S080TW	17.18	T3S200TW	17.21	T4LQ100EW	17.31	T4S100CW	17.30
T1PA100DL-4	17.69	T2S090TW	17.18	T3S225DW	17.22	T4LQ125TW	17.29	T4S100E5W	17.32
T1PB100DL-4	17.69	T2S100BW	17.19	T3S225TW	17.21	T4LQ150BW	17.31	T4S100EW	17.30
T200L1-48M	5.58	T2S100E5W	17.19	T3SQ060TW	17.21	T4LQ150CW	17.31	T4S125TW	17.28
T200L1-60M	5.58	T2S100MW	17.19	T3SQ070TW	17.21	T4LQ150EW	17.31	T4S150BW	17.30
T200L2-48M	5.58	T2S100TW	17.18	T3SQ080TW	17.21	T4LQ150TW	17.29	T4S150CW	17.30
T200L2-60M	5.58	T2SQ015TW	17.18	T3SQ090TW	17.21	T4LQ200TW	17.29	T4S150E5W	17.32
T200LB1-48AM	5.59	T2SQ020TW	17.18	T3SQ100TW	17.21	T4LQ250BW	17.31	T4S150EW	17.30
T200LB1-60YM	5.59	T2SQ025BW	17.19	T3SQ125TW	17.21	T4LQ250CW	17.31	T4S150TW	17.28
T200LB4-24/XD	5.64	T2SQ025TW	17.18	T3SQ150TW	17.21	T4LQ250EW	17.31	T4S200TW	17.28
T200LB4-48/XD	5.64	T2SQ030TW	17.18	T3SQ175TW	17.21	T4LQ250TW	17.29	T4S250BW	17.30
T200LF1-48EM	5.59	T2SQ040TW	17.18	T3SQ200TW	17.21	T4N100BW	17.30	T4S250CW	17.30
T200LF1-60EM	5.59	T2SQ050TW	17.18	T3SQ225TW	17.21	T4N100BW-2	17.30	T4S250DW	17.32
T250L1-48M	5.58	T2SQ060BW	17.19	T400L1-48M	5.58	T4N100CW	17.30	T4S250E5W	17.32
T250L1-60M	5.58	T2SQ060TW	17.18	T400L1-60M	5.58	T4N100CW-2	17.30	T4S250EW	17.30
T250L2-48M	5.58	T2SQ070TW	17.18	T400L2-48M	5.58	T4N100E5W	17.32	T4S250TW	17.28
T250L2-60M	5.58	T2SQ080TW	17.18	T400L2-60M	5.58	T4N100EW	17.30	T4SQ100BW	17.31

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T4SQ100EW	17.31	T5L300BW	17.35	T5S400DW	17.37	T6H800E5W	17.40	T6SQ800EW	17.40
T4SQ125TW	17.29	T5L300CW	17.35	T5S400E5W	17.37	T6H800EW	17.39	T6SQ800TW	17.39
T4SQ150BW	17.31	T5L300E5W	17.37	T5S400EW	17.35	T6H800TW	17.39	T700L1-48M	5.58
T4SQ150CW	17.31	T5L300EW	17.35	T5S400TW	17.34	T6HQ600BW	17.40	T700L1-60M	5.58
T4SQ150EW	17.31	T5L300TW	17.34	T5S600BW	17.35	T6HQ600CW	17.40	T700L2-48M	5.58
T4SQ250CW	17.29	T5L400BW	17.35	T5S600CW	17.35	T6HQ600EW	17.40	T700L2-60M	5.58
T4SQ200TW	17.29	T5L400CW	17.35	T5S600DW	17.37	T6HQ600TW	17.39	T700LB1-48KM	5.59
T4SQ250BW	17.31	T5L400DW	17.37	T5S600E5W	17.37	T6HQ800BW	17.40	T700LB1-60JM	5.59
T4SQ250EW	17.31	T5L400E5W	17.37	T5S600EW	17.35	T6HQ800CW	17.40	T700LF1-48JM	5.59
T4SQ250TW	17.29	T5L400EW	17.35	T5SQ300BW	17.36	T6HQ800EW	17.40	T7H1000BW	17.42
T4V100BW	17.30	T5L400TW	17.34	T5SQ300CW	17.36	T6HQ800TW	17.39	T7H1000CW	17.42
T4V100CW	17.30	T5L600BW	17.35	T5SQ300EW	17.36	T6L600BW	17.39	T7H1000E5W	17.44
T4V100EW	17.30	T5L600CW	17.35	T5SQ300TW	17.34	T6L600CW	17.39	T7H1000EW	17.42
T4V125TW	17.28	T5L600DW	17.37	T5SQ400BW	17.36	T6L600E5W	17.40	T7H1000PW	17.42
T4V150BW	17.30	T5L600E5W	17.37	T5SQ400CW	17.36	T6L600EW	17.39	T7H1000RW	17.42
T4V150CW	17.30	T5L600EW	17.35	T5SQ400EW	17.36	T6L600TW	17.39	T7H1200BW	17.42
T4V150EW	17.30	T5LQ300BW	17.36	T5SQ400TW	17.34	T6L800BW	17.39	T7H1200CW	17.42
T4V150TW	17.28	T5LQ300CW	17.36	T5V300BW	17.35	T6L800CW	17.39	T7H1200DW	17.44
T4V200TW	17.28	T5LQ300EW	17.36	T5V300CW	17.35	T6L800E5W	17.40	T7H1200EW	17.44
T4V250BW	17.30	T5LQ300TW	17.34	T5V300EW	17.35	T6L800EW	17.39	T7H1200PW	17.42
T4V250CW	17.30	T5LQ400BW	17.36	T5V300TW	17.34	T6L800TW	17.39	T7H1200RW	17.42
T4V250EW	17.30	T5LQ400CW	17.36	T5V400BW	17.35	T6LQ600BW	17.40	T7H1200SW	17.42
T4V250TW	17.29	T5LQ400EW	17.36	T5V400CW	17.35	T6LQ600CW	17.40	T7H1200TW	17.42
T4V250EW	17.30	T5LQ400TW	17.34	T5V400DW	17.37	T6LQ600EW	17.40	T7H1200SW	17.42
T4V250TW	17.28	T5N300BW	17.35	T5V400EW	17.35	T6LQ600TW	17.39	T7HQ1000BW	17.43
T4VQ100BW	17.31	T5N300BW-2	17.35	T5V400TW	17.34	T6LQ800BW	17.40	T7HQ1000CW	17.43
T4VQ100CW	17.31	T5N300CW	17.35	T5V600BW	17.35	T6LQ800CW	17.40	T7HQ1000EW	17.43
T4VQ100EW	17.31	T5N300CW-2	17.35	T5V600CW	17.35	T6LQ800EW	17.40	T7HQ1000PW	17.43
T4VQ125TW	17.29	T5N300E5W	17.37	T5V600DW	17.37	T6LQ800TW	17.39	T7HQ1000RW	17.43
T4VQ150BW	17.31	T5N300EW	17.35	T5V600EW	17.35	T6N600BW	17.39	T7HQ1000SW	17.43
T4VQ150CW	17.31	T5N300EW-2	17.35	T5VQ300BW	17.36	T6N600CW	17.39	T7HQ1200BW	17.43
T4VQ150EW	17.31	T5N300TW	17.34	T5VQ300CW	17.36	T6N600E5W	17.40	T7HQ1200CW	17.43
T4VQ150TW	17.29	T5N300TW-2	17.34	T5VQ300EW	17.36	T6N600EW	17.39	T7HQ1200EW	17.43
T4VQ200TW	17.29	T5N400BW	17.35	T5VQ300TW	17.34	T6N600TW	17.39	T7HQ1200PW	17.43
T4VQ250BW	17.31	T5N400BW-2	17.35	T5VQ400BW	17.36	T6N800BW	17.39	T7HQ1200RW	17.43
T4VQ250CW	17.31	T5N400CW	17.35	T5VQ400CW	17.36	T6N800CW	17.39	T7HQ1200SW	17.43
T4VQ250EW	17.31	T5N400CW-2	17.35	T5VQ400EW	17.36	T6N800E5W	17.40	T7L1000BW	17.42
T4VQ250TW	17.29	T5N400DW	17.37	T5VQ400TW	17.34	T6N800EW	17.39	T7L1000CW	17.42
T500L1-48M	5.58	T5N400E5W	17.37	T600L1-48M	5.58	T6N800TW	17.39	T7L1000E5W	17.44
T500L1-60M	5.58	T5N400EW	17.35	T600L1-60M	5.58	T6NQ600BW	17.40	T7L1000EW	17.42
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T500LB1-60EM	5.59	T5N600BW	17.35	T600LB1-60GM	5.59	T6NQ800BW	17.40	T7L1200BW	17.42
T500LB4-48/XD	5.64	T5N600CW	17.35	T600LB4-48/XD	5.64	T6NQ800CW	17.40	T7L1200CW	17.42
T500LF1-48HM	5.59	T5N600DW	17.37	T600LF1-48HM	5.59	T6NQ800EW	17.40	T7L1200E5W	17.44
T500LF1-60GM	5.59	T5N600E5W	17.37	T600LF1-60H	5.59	T6NQ800TW	17.39	T7L1200EW	17.42
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T5H300EW	17.35	T5NQ300EW	17.36	T61.5K1	13.8	T6PA800TW-4	17.69	T7LQ1000BW	17.43
T5H300TW	17.34	T5NQ300TW	17.34	T6100PS1	13.7	T6PB600DL-4	17.69	T7LQ1000CW	17.43
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T5H400CW	17.35	T5NQ400CW	17.36	T61K1	13.8	T6PB800DW-4	17.69	T7LQ1000PW	17.43
T5H400DW	17.37	T5NQ400EW	17.36	T6200PS1	13.7	T6PB800TW-4	17.69	T7LQ1000RW	17.43
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T5H600DW	17.37	T5PB400DL	17.69	T6500PS1	13.7	T6S800BW	17.39	T7LQ1200RW	17.43
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TF42-0.23	2.11	Ts3HQ040TW	17.25	Ts3N040TW	17.24	UA110-30-11-RAΔ	1.169	VEM4	6.18
TF42-0.31	2.11	Ts3HQ050TW	17.25	Ts3N040TW-2	17.24	UA110-30-11-Δ	1.169	VH145	1.57
TF42-0.41	2.11	Ts3HQ060TW	17.25	Ts3N050TW	17.24	UA1-120	4.10	VH300	1.57
TF42-0.55	2.11	Ts3HQ070TW	17.25	Ts3N050TW-2	17.24	UA1-208	4.10	VH800	1.57
TF42-0.74	2.11	Ts3HQ080TW	17.25	Ts3N060TW	17.24	UA1-230	4.10	VM1650H	1.57
TF42-1.0	2.11	Ts3HQ090TW	17.25	Ts3N060TW-2	17.24	UA1-24	4.10	VM3	1.56
TF42-1.3	2.11	Ts3HQ100TW	17.25	Ts3N070TW	17.24	UA1-415	4.10	VM3	6.18
TF42-1.7	2.11	Ts3HQ125TW	17.25	Ts3N070TW-2	17.24	UA1-575	4.10	VM300/460H	1.57
TF42-10	2.11	Ts3HQ150TW	17.25	Ts3N080TW	17.24	UA16-30-10-RAΔ	1.169	VM300/460V	1.57
TF42-13	2.11	Ts3L003MW	17.26	Ts3N080TW-2	17.24	UA16-30-10-Δ	1.169	VM300H	1.57
TF42-16	2.11	Ts3L005MW	17.26	Ts3N090TW	17.24	UA26-30-10-RAΔ	1.169	VM300H	1.57
TF42-2.3	2.11	Ts3L010MW	17.26	Ts3N090TW-2	17.24	UA26-30-10-Δ	1.169	VM300V	1.57
TF42-20	2.11	Ts3L015TW	17.24	Ts3N100TW	17.24	UA30-30-10-RAΔ	1.169	VM300V	1.57
TF42-24	2.11	Ts3L015TW-2	17.24	Ts3N100TW-2	17.24	UA30-30-10-Δ	1.169	VM4	1.56
TF42-29	2.11	Ts3L020TW	17.24	Ts3N125TW	17.24	UA4-120	4.10	VM4	6.18
TF42-3.1	2.11	Ts3L020TW-2	17.24	Ts3N125TW-2	17.24	UA4-24	4.10	VM5-1	1.57
TF42-35	2.11	Ts3L025MW	17.26	Ts3N150TW	17.24	UA4-240	4.10	VM750H	1.57
TF42-38	2.11	Ts3L025TW	17.24	Ts3N150TW-2	17.24	UA4-400	4.10	VM750V	1.57
TF42-4.2	2.11	Ts3L025TW-2	17.24	Ts3NQ015TW	17.25	UA50-30-00-RAΔ	1.169	VMDP-1	1.177
TF42-5.7	2.11	Ts3L030TW	17.24	Ts3NQ020TW	17.25	UA50-30-00-Δ	1.169	VMDP-1	1.177
TF42-7.6	2.11	Ts3L030TW-2	17.24	Ts3NQ025TW	17.25	UA50-30-11-RAΔ	1.169	WB75A-01	1.58
TNL22ERT-Δ	1.205	Ts3L035TW	17.24	Ts3NQ030TW	17.25	UA50-30-11-Δ	1.169	WB75A-01	1.198
TNL22E-Δ	1.205	Ts3L035TW-2	17.24	Ts3NQ035TW	17.25	UA63-30-00-RAΔ	1.169	WB75A-02	1.58
TNL31ERT-Δ	1.205	Ts3L040TW	17.24	Ts3NQ040TW	17.25	UA63-30-00-Δ	1.169	WB75A-03	1.58
TNL31E-Δ	1.205	Ts3L040TW-2	17.24	Ts3NQ050TW	17.25	UA63-30-11-RAΔ	1.169	WB75A-03	1.198
TNL40ERT-Δ	1.205	Ts3L050MW	17.26	Ts3NQ060TW	17.25	UA63-30-11-Δ	1.169	WB75A-04	1.58
TNL40E-Δ	1.205	Ts3L050TW	17.24	Ts3NQ070TW	17.25	UA75-30-00-RAΔ	1.169	WB75A-04	1.198
TNL44ERT-Δ	1.205	Ts3L050TW-2	17.24	Ts3NQ080TW	17.25	UA75-30-00-Δ	1.169	WB75A-05	1.58
TNL44E-Δ	1.205	Ts3L060TW	17.24	Ts3NQ090TW	17.25	UA75-30-11-RAΔ	1.169	WB75A-05	1.198
TNL62ERT-Δ	1.205	Ts3L060TW-2	17.24	Ts3NQ100TW	17.25	UA75-30-11-Δ	1.169	WB75A-06	1.58
TNL62E-Δ	1.205	Ts3L070TW	17.24	Ts3NQ125TW	17.25	UA95-30-00-RAΔ	1.169	WB75A-07	1.58
TNL80ERT-Δ	1.205	Ts3L070TW-2	17.24	Ts3NQ150TW	17.25	UA95-30-00-Δ	1.169	WB75A-07	1.198
TNL80E-Δ	1.205	Ts3L080TW	17.24	TVOC-1TO2-OP1	20.5	UA95-30-11-RAΔ	1.169	WB75A-08	1.58
TPTC-1001	13.9	Ts3L080TW-2	17.24	TVOC-1TO2-OP10	20.5	UA95-30-11-Δ	1.169	WB75A-08	1.198
TPTC-1002	13.9	Ts3L090TW	17.24	TVOC-1TO2-OP15	20.5	VAS09EM-ΔM	1.24	X4045SF1	13.5
TPTC-1006	13.9	Ts3L090TW-2	17.24	TVOC-1TO2-OP2	20.5	VAS12EM-ΔM	1.24	X4050PSF1	13.5
Ts3H015TW	17.24	Ts3L100MW	17.26	TVOC-1TO2-OP20	20.5	VAS16EM-ΔM	1.24	X4075PSF1	13.5
Ts3H015TW-2	17.24	Ts3L100TW	17.24	TVOC-1TO2-OP25	20.5	VASL09EM-ΔM	1.24	X41.5K1	13.6
Ts3H020TW	17.24	Ts3L100TW-2	17.24	TVOC-1TO2-OP30	20.5	VASL12EM-ΔM	1.24	X4100PSF1	13.5
Ts3H020TW-2	17.24	Ts3L125MW	17.26	TVOC-1TO2-OP4	20.5	VASL16EM-ΔM	1.24	X4150PSF1	13.5
Ts3H025TW	17.24	Ts3L125TW	17.24	TVOC-1TO2-OP6	20.5	VB6-30-01-FΔ	1.26	X41K1	13.6
Ts3H025TW-2	17.24	Ts3L125TW-2	17.24	TVOC-1TO2-OP8	20.5	VB6-30-01-PΔ	1.26	X4200PSF1	13.5
Ts3H030TW	17.24	Ts3L150MW	17.26	TVOC-2-240	20.4	VB6-30-01-Δ	1.26	X4250PSF1	13.5
Ts3H030TW-2	17.24	Ts3L150TW	17.24	TVOC-2-DP1	20.4	VB6-30-10-FΔ	1.26	X42K1	13.6
Ts3H035TW	17.24	Ts3L150TW-2	17.24	TVOC-2-DP10	20.4	VB6-30-10-PΔ	1.26	X4300PSF1	13.5
Ts3H035TW-2	17.24	Ts3L175MW	17.26	TVOC-2-DP15	20.4	VB6-30-10-Δ	1.26	X4350PSF1	13.5
Ts3H040TW	17.24	Ts3L200MW	17.26	TVOC-2-DP2	20.4	VB7-30-01-FΔ	1.26	X43K1	13.6
Ts3H040TW-2	17.24	Ts3LQ015TW	17.25	TVOC-2-DP20	20.4	VB7-30-01-PΔ	1.26	X4500PSF1	13.5

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XUS002518	14.5	XUSP03343	10.122	ZLS162	22.9	ZLS201E30	22.4	ZLS252	22.5
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XUS002837	10.115	XUSP03344	10.122	ZLS162U	22.7	ZLS201E34	22.4	ZLS325-240-0.5	22.8
XUS002885	10.112	XUSP03345	10.53	ZLS163	22.9	ZLS201E36	22.4	ZLS325-240-1	22.8
XUS002886	10.112	XUSP03345	10.122	ZLS163L300	22.9	ZLS201E38	22.4	ZLS325-240-1.5	22.8
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XUS003157	10.111	XUSP03347	10.53	ZLS166	22.9	ZLS201E44	22.4	ZLS325-240-5	22.8
XUS003158	10.110	XUSP03347	10.122	ZLS166L300	22.9	ZLS201E46	22.4	ZLS325-240-7.5	22.8
XUSP01132	10.53	XUSP03348	10.53	ZLS167	22.9	ZLS201E48	22.4	ZLS325-480-.75	22.8
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XUSP01133	10.53	XUSP03457	10.53	ZLS168L300	22.9	ZLS201E56	22.4	ZLS325-480-15	22.8
XUSP01133	10.122	XUSP03511	10.53	ZLS168U	22.7	ZLS201E58	22.4	ZLS325-480-2	22.8
XUSP01134	10.53	XUSP03511	10.122	ZLS169	22.9	ZLS201E6	22.4	ZLS325-480-3	22.8
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XUSP01134	10.122	XUSP03512	10.122	ZLS169U	22.7	ZLS201E62	22.4	ZLS325-480-7.5	22.8
XUSP01135	10.53	XUSP03513	10.53	ZLS170	22.9	ZLS201E64	22.4	ZLS325R-240-0.5	22.8
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XUSP01135	10.122	XUSP03514	10.53	ZLS171	22.9	ZLS201E68	22.4	ZLS325R-240-1.5	22.8
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XUSP01138	10.122	XUST03371	10.91	ZLS172	22.9	ZLS201E74	22.4	ZLS325R-240-5	22.8
XUSP01139	10.53	YASDA-21	19.43	ZLS172L300	22.9	ZLS201E76	22.4	ZLS325R-240-7.5	22.8
XUSP01139	10.53	YASDA-33	19.31	ZLS172U	22.7	ZLS201E78	22.4	ZLS325R-480-.75	22.8
XUSP01139	10.122	YASDA-34	19.31	ZLS173	22.9	ZLS201E8	22.4	ZLS325R-480-0.5	22.8
XUSP01548	10.53	YASDA-8	19.43	ZLS173L300	22.9	ZLS201E80	22.4	ZLS325R-480-1	22.8
XUSP01548	10.122	YASDA-8	19.30	ZLS173U	22.7	ZLS201E82	22.4	ZLS325R-480-2	22.8
XUSP01549	10.53	ZA110-Δ	1.73	ZLS176	22.9	ZLS201E84	22.4	ZLS325R-480-3	22.8
XUSP01549	10.122	ZA16-Δ	1.73	ZLS176L300	22.9	ZLS201E86	22.4	ZLS325R-480-5	22.8
XUSP01550	10.53	ZA185-Δ	1.73	ZLS177	22.9	ZLS201E88	22.4	ZLS325R-480-7.5	22.8
XUSP01550	10.53	ZA300-Δ	1.73	ZLS177L300	22.9	ZLS201E90	22.4	ZLS519	22.10
XUSP01550	10.122	ZA40-Δ	1.73	ZLS177U	22.7	ZLS201E92	22.4	ZLS522	22.10
XUSP01551	10.53	ZA75-Δ	1.188	ZLS178	22.9	ZLS201E94	22.4	ZLS730	22.3
XUSP01551	10.122	ZA75-Δ	1.73	ZLS178L300	22.9	ZLS201E96	22.4	ZLS806	22.3
XUSP01552	10.53	ZAE16-Δ	1.73	ZLS178U	22.7	ZLS201E98	22.4	ZLS808	22.3
XUSP01552	10.122	ZAE40-Δ	1.73	ZLS179	22.9	ZLS204E20-3L	22.3	ZLS840	22.10
XUSP02530	10.53	ZAE75-Δ	1.73	ZLS179L300	22.9	ZLS204E20-3LN	22.3	ZLT45	1.72
XUSP02530	10.122	ZAF110-Δ	1.73	ZLS179U	22.7	ZLS204E22-3L	22.3	ZLT50	1.72
XUSP02531	10.53	ZAF1650-Δ	1.73	ZLS183TB	22.9	ZLS204E22-3LN	22.3	ZLT75	1.72
XUSP02531	10.122	ZAF185-Δ	1.73	ZLS183TT	22.9	ZLS204E24-3L	22.3	ZLU110	1.72
XUSP02629	10.53	ZAF300-Δ	1.73	ZLS185TT12	22.9	ZLS204E24-3LN	22.3	ZLU50	1.72
XUSP02629	10.122	ZAF460-Δ	1.73	ZLS185TT13	22.9	ZLS204E26-3L	22.3	ZLU63	1.72
XUSP02630	10.53	ZAF750-Δ	1.73	ZLS185TT23	22.9	ZLS204E26-3LN	22.3	ZLU75	1.72
XUSP02630	10.122	ZAF75-Δ	1.73	ZLS186TT12	22.9	ZLS204E30-3L	22.3	ZLU95	1.72
XUSP02633	1.69	ZL110	1.72	ZLS186TT13	22.9	ZLS204E30-3LN	22.3	ZMS137	4.13
XUSP02633	6.21	ZL1250	1.72	ZLS186TT23	22.9	ZLS204E32-3L	22.3	ZMS139	4.13
XUSP02633	10.53	ZL1350	1.72	ZLS187TB12	22.9	ZLS204E32-3LN	22.3	ZMS930	4.13
XUSP02633	10.53	ZL145	1.72	ZLS187TB13	22.9	ZLS204E34-3L	22.3	ZMS930	4.13
XUSP02633	10.53	ZL1650	1.72	ZLS187TB23	22.9	ZLS204E34-3LN	22.3	ZMS932	4.13
XUSP02633	10.122	ZL185	1.72	ZLS188TB	22.9	ZLS204E38-3L	22.3	ZMS935	4.13
XUSP02636	10.53	ZL2050	1.72	ZLS188TB12	22.9	ZLS204E38-3LN	22.3	ZP1650	1.73
XUSP02636	10.55	ZL210	1.72	ZLS188TB13	22.9	ZLS204E40-3L	22.3		
XUSP02636	10.55	ZL260	1.72	ZLS188TB23	22.9	ZLS204E40-3LN	22.3		
XUSP02636	10.60	ZL300	1.72	ZLS189TT	22.9	ZLS204E44-3L	22.3		
XUSP02636	10.60	ZL400	1.72	ZLS200	22.3	ZLS204E44-3LN	22.3		
XUSP02636	10.65	ZL460	1.72	ZLS201E100	22.4	ZLS204E48-3L	22.3		
XUSP02636	10.65	ZL50	1.72	ZLS201E102	22.4	ZLS204E48-3LN	22.3		
XUSP02636	10.71	ZL580	1.72	ZLS201E104	22.4	ZLS204E62-3L	22.3		
XUSP02636	10.122	ZL63	1.72	ZLS201E106	22.4	ZLS204E62-3LN	22.3		
XUSP02639	10.53	ZL75	1.72	ZLS201E108	22.4	ZLS204E64-3L	22.3		

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Contact us

ABB Inc.

Low Voltage Control Products

16250 W. Glendale Drive

New Berlin, WI 53151

Phone: 888-385-1221

Fax: 800-726-1441

USA Technical Support & Customer

Service:

888-385-1221, Option 4

7:30AM to 5:30PM, CST,

Monday - Friday

lvps.support@us.abb.com

Web: www.abb.us/lowvoltage