

Technical catalog

FORMULA UL

New low voltage molded case
circuit breakers up to 250A

Power and productivity
for a better world™



[FORMULA]



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FORMULA.

Simplicity and Quality in a Single Product.



[FORMULA

FORMULA is the cumulation of ABB SACE's long history of developing effective circuit breakers. It was developed to be simple, but amazes with its extreme quality and versatility.

The highlights of the new line of molded case circuit breakers include:

- Quick and easy selection and ordering with few, but essential, versions of circuit breakers
- Multiple polarities, dedicated to various applications
- Accompanying accessory line
- Reduced circuit breaker depths

FORMULA



The new FORMULA family consists of two frames, A1 and A2, which reach up to 100A and 250A respectively. Both frames are available in the fixed version, with front terminals.

The protection trip unit has fixed thermal and magnetic threshold values for putting the circuit breaker into service more rapidly. This way selection becomes precise. A reduced number of sales codes simplifies selection and makes ordering easier. Installation is easy and the circuit breaker is ready for use immediately.

FORMULA.

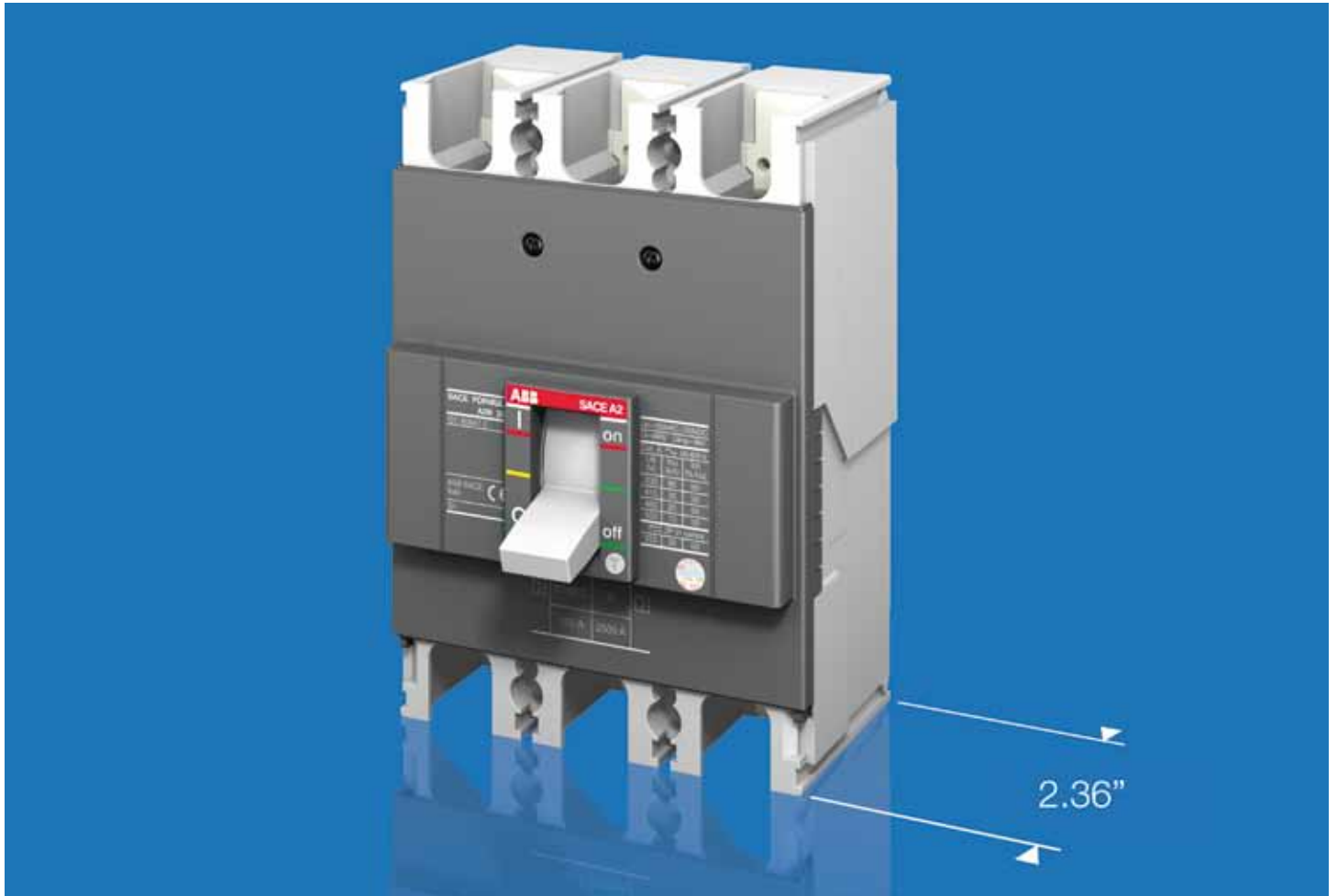
The Easy and Precise Choice.



How simple and functional can a range of molded case circuit breakers be? By asking this elementary question, ABB conceived the idea for a new family of circuit breakers. The result is FORMULA, the perfect synthesis between ABB SACE's recognized quality, reliability and simplicity. Simple, with regard to installation, sizing and fitting of accessories.

Reducing dimensions without compromising on performance and reliability is an ABB SACE trademark that helps with installation and increases the work space inside switchboards and panels. FORMULA's compact design is a great advantage, especially for OEMs, panel builders and installers.

FORMULA. Quality in All Applications.



Quality is great versatility. In addition to the availability of both frames in the three-pole version, for the first time ABB SACE now possesses single-pole and two-pole versions up to 250A, opening the door to the most varied application fields.

Quality is compact overall dimensions. The FORMULA A1 and A2 depth of under 2.5" is the lowest on the market up to 250A.



Main characteristics

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Construction characteristics

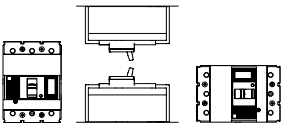
General information



Double insulation



Positive operation



Installation positions



Test pushbutton

All the molded case circuit breakers in the FORMULA family are constructed in accordance with the following construction characteristics:

- Double insulation
- Positive operation
- Isolation behavior
- Electromagnetic compatibility
- Topicalization
- Reverse feedable power supply
- Versatility of the installation. It is possible to mount the circuit breaker either in the horizontal, vertical, or lying down position without undergoing any derating of the rated characteristics;
- No nominal performance derating for use up to an altitude of 6562 ft. Above 6562 ft, the properties of the atmosphere (composition of the air, dielectric strength, cooling power and pressure) change, having an impact on the main parameters which define the circuit breaker. The table below gives the changes to the main performance parameters.

Altitude	6600 ft		8500 ft		13000 ft	
	A1	A2	A1	A2	A1	A2
Rated service voltage, Ue	[V] 240	240	228	228	192	192
Rated uninterrupted current	% 100	100	99	99	96	96

- Circuit breaker weights

Weights	A1 [Lbs]	A2 [Lbs]
Circuit breaker 1 pole	0.54	0.82
Circuit breaker 2 poles	1.04	1.61
Circuit breaker 3 poles	1.54	2.43

- FORMULA circuit breakers can be used in ambient with a temperature between -25°C to 70°C (-13°F to 158°F) and stored in a room with atmospheric temperature between -40°C to 70°C (-40°F to 158°F).
- All FORMULA circuit breakers are fitted with a Test pushbutton which allows the release test to be done. This test must be carried out with the circuit breaker closed.

Construction characteristics

Regulations and reference standards



Hologram

Conformity with Standards

FORMULA circuit breakers and their accessories are constructed in conformity with:

- Standards
 - IEC 60947-2
 - UL 489 (Underwriters Laboratories Incorporated)
- Directives
 - EC directive: “Low Voltage Directives” (LVD) no. 2006/95/CE (in replacement of 73/23/CEE and subsequent amendments);
 - EC directive: “Electromagnetic Compatibility Directive” (EMC) no. 89/336 EEC.

Certification of conformity with the product standards is carried out in the ABB SACE test room (accredited by SINAL - certificate No. 062/1997-) in respect of the EN 45011 European Standard, by the Italian certification body ACAE (Association for Certification of Electrical Apparatus), member of the European LOVAG organization (Low Voltage Agreement Group) and by the Swedish certification body SEMKO belonging to the international IECEE organization.

The FORMULA series has a hologram on the front, obtained using special anti-forgery techniques, as a guarantee of the quality and genuineness of the circuit breaker as an ABB SACE product.

Company Quality System

The ABB SACE Quality System conforms with the following Standards:

- ISO 9001 International Standard;
- EN ISO 9001 (equivalent) European Standards;
- UNI EN ISO 9001 (equivalent) Italian Standards.

The ABB SACE Quality System attained its first certification with the RINA certification body in 1990.

Environmental Management System, Social Responsibility and Ethics

Attention to protection of the environment is a priority commitment for ABB SACE. Confirmation of this is the realization of an Environmental Management System certified by RINA in conformity with the International ISO14001 Standard. ABB SACE was the first industry in the electromechanical sector in Italy to obtain this recognition. In 1999, the Environmental Management System was integrated with the Occupational Health and Safety Management System according to the OHSAS 18001 Standard and later, in 2005, with the SA 8000 (Social Accountability 8000) Standard, committing itself to respect of business ethics and working conditions.

The commitment to environmental protection becomes concrete through:

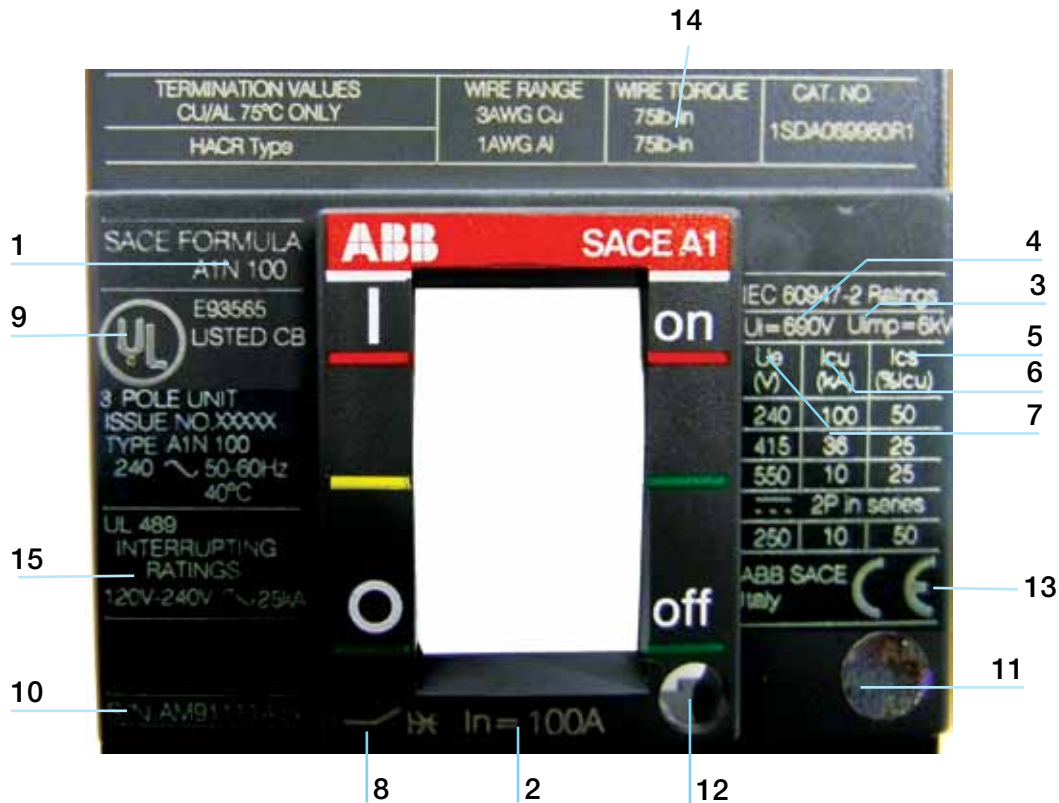
- Selection of materials, processes and packaging which optimize the true environmental impact of the product;
- Use of recyclable materials;
- Voluntary respect of the RoHS directive

Construction characteristics

Identification of the FORMULA circuit breakers

The characteristics of the circuit breakers are given on the label on the front of the circuit breaker.

Front label



1. Name of the circuit breaker and performance level
 2. In: rated uninterrupted current*
 3. Uimp: rated impulse withstand voltage*
 4. Ui: insulation voltage*
 5. Ics: rated short circuit service breaking capacity*
 6. Icu: rated ultimate short circuit breaking capacity*
 7. Ue: rated service voltage*
 8. Symbol of isolation behavior*
 9. Reference standard and file number
 10. Serial number
 11. Anti-forgery
 12. Test pushbutton
 13. CE Marking
 14. Lug information
 15. UL interrupting ratings
- * in compliance with the IEC 60947-2 Standard



Circuit breakers for power distribution

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Circuit breakers for power distribution

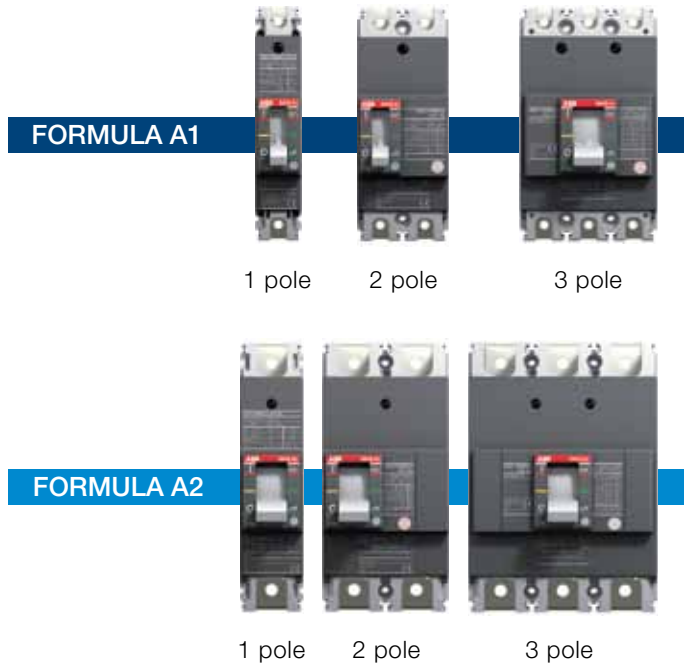
General characteristics

The FORMULA circuit breakers from 15A to 250A consist of the interruption part together with the trip unit and can be installed:

- Directly on the back plate of cubicles
- On a DIN rail

They are characterized by:

- Fixed version
- Polarity: 1 pole, 2 poles, 3 poles
- Maximum breaking capacity of 25kA at 240V AC
- Fixed thermomagnetic trip unit (TMF) for protection of networks in alternating current
- A single depth of 2.36"
- Standard front terminals

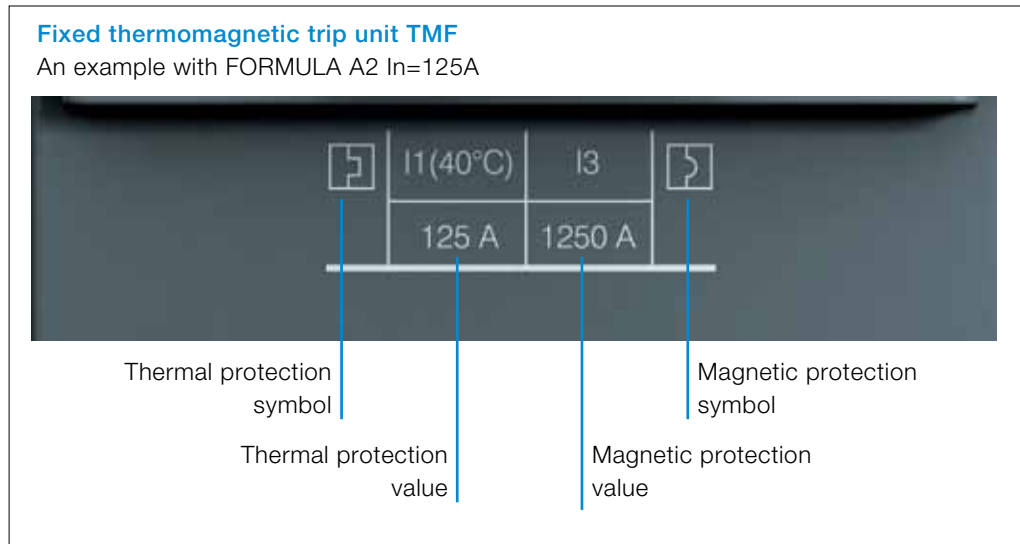


Circuit breakers for power distribution

Thermomagnetic trip unit

The thermomagnetic trip units TMF, with fixed thermal and magnetic threshold, are generally used in power distribution plants. They allow protection against overloads thanks to the thermal device and protection against short circuit thanks to the magnetic device:

- Thermal protection (L): fixed threshold $I_1 = 1 \times I_n$, with long inverse time trip curve
- Magnetic protection (I): fixed threshold $I_3 = 10 \times I_n$, with instantaneous trip curve



FORMULA A1 with trip unit TMF

TMF

L	I_n [A]	15	20	25	30	40	50	60	70	80	90	100
	$I_1 = 1 \times I_n$ Neutral [A] - 100%	15	20	25	30	40	50	60	70	80	90	100
I	I_3 [A]	300	300	300	300	400	500	600	700	800	900	1000
	$I_3 = 10 \times I_n$ Neutral [A] - 100%	300	300	300	300	400	500	600	700	800	900	1000

FORMULA A2 with trip unit TMF

TMF

L	I_n [A]	125	150	175	200	225	250
	$I_1 = 1 \times I_n$ Neutral [A] - 100%	125	150	175	200	225	250
I	I_3 [A]	1250	1500	1750	2000	2250	2500
	$I_3 = 10 \times I_n$ Neutral [A] - 100%	1250	1500	1750	2000	2250	2500

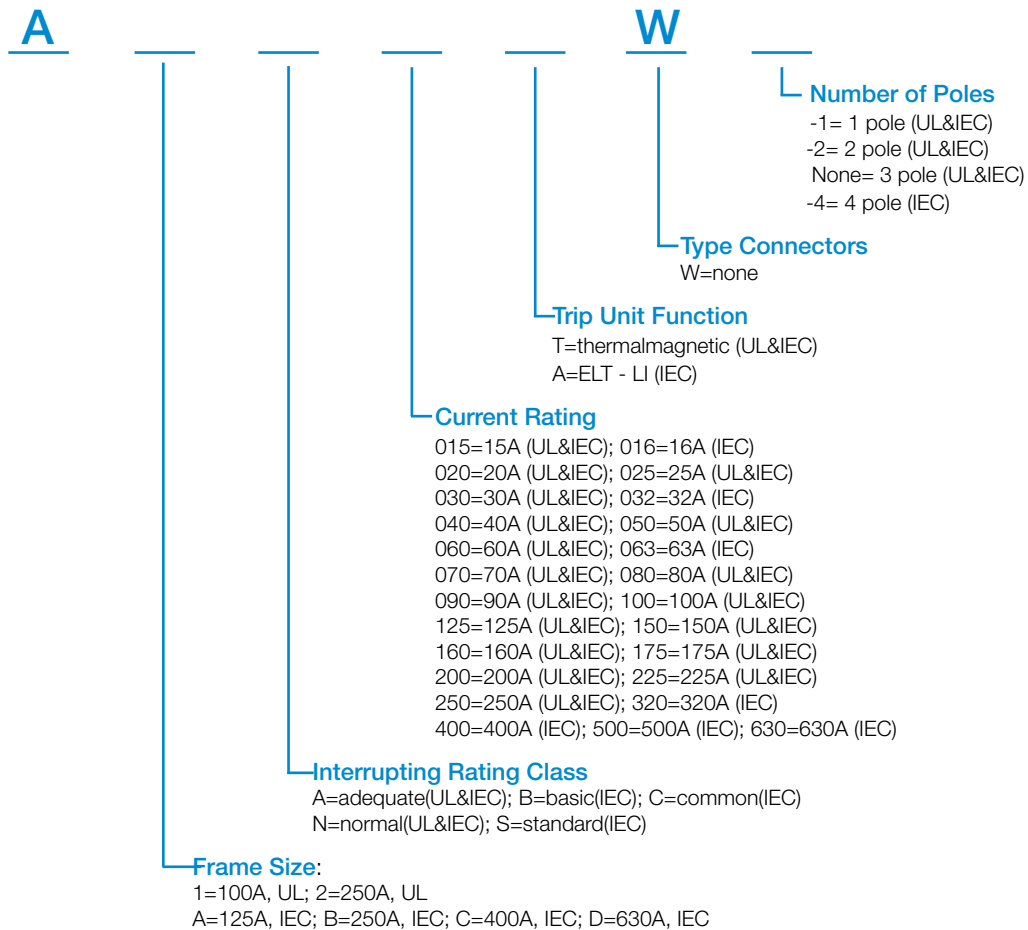
Circuit breakers for power distribution

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 (DC)	V	240 (1p, 2p, 3p)				240 (1p, 2p, 3p)			
	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}									
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

Part number scheme



Circuit breakers for power distribution

A1 Ordering information



A1 100A - Fixed (F) 1 pole - Front terminals (F)
Thermomagnetic trip unit - TMF Icu (240 V)

In	I ₃	A (10kA)	N (18kA)
15	400	A1A015TW-1	A1N015TW-1
20	400	A1A020TW-1	A1N020TW-1
25	400	A1A025TW-1	A1N025TW-1
30	400	A1A030TW-1	A1N030TW-1
40	400	A1A040TW-1	A1N040TW-1
50	500	A1A050TW-1	A1N050TW-1
60	600	A1A060TW-1	A1N060TW-1
70	700	A1A070TW-1	A1N070TW-1
80	800	A1A080TW-1	A1N080TW-1
90	900	A1A090TW-1	A1N090TW-1
100	1000	A1A100TW-1	A1N100TW-1



A1 100A - Fixed (F) 2 pole - Front terminals (F)
Thermomagnetic trip unit - TMF Icu (240 V)

In	I ₃	A (10kA)	N (25kA)
15	400	A1A015TW-2	A1N015TW-2
20	400	A1A020TW-2	A1N020TW-2
25	400	A1A025TW-2	A1N025TW-2
30	400	A1A030TW-2	A1N030TW-2
40	400	A1A040TW-2	A1N040TW-2
50	500	A1A050TW-2	A1N050TW-2
60	600	A1A060TW-2	A1N060TW-2
70	700	A1A070TW-2	A1N070TW-2
80	800	A1A080TW-2	A1N080TW-2
90	900	A1A090TW-2	A1N090TW-2
100	1000	A1A100TW-2	A1N100TW-2



A1 100A - Fixed (F) 3 pole - Front terminals (F)
Thermomagnetic trip unit - TMF Icu (240 V)

In	I ₃	A (10kA)	N (25kA)
15	300	A1A015TW	A1N015TW
20	300	A1A020TW	A1N020TW
25	300	A1A025TW	A1N025TW
30	300	A1A030TW	A1N030TW
40	400	A1A040TW	A1N040TW
50	500	A1A050TW	A1N050TW
60	600	A1A060TW	A1N060TW
70	700	A1A070TW	A1N070TW
80	800	A1A080TW	A1N080TW
90	900	A1A090TW	A1N090TW
100	1000	A1A100TW	A1N100TW

Circuit breakers for power distribution

A2 Ordering information



A2 250A - Fixed (F) 1 pole - Front terminals (F)
Thermomagnetic trip unit - TMF Icu (240 V)

In	I ₃	A (10kA)	N (14kA)
125	1250	A2A125TW-1	A2N125TW-1
150	1500	A2A150TW-1	A2N150TW-1
175	1750	A2A175TW-1	A2N175TW-1
200	2000	A2A200TW-1	A2N200TW-1
225	2250	A2A225TW-1	A2N225TW-1
250	2500	A2A250TW-1	A2N250TW-1



A2 250A - Fixed (F) 2 pole - Front terminals (F)
Thermomagnetic trip unit - TMF Icu (240 V)

In	I ₃	A (10kA)	N (25kA)
125	1250	A2A125TW-2	A2N125TW-2
150	1500	A2A150TW-2	A2N150TW-2
175	1750	A2A175TW-2	A2N175TW-2
200	2000	A2A200TW-2	A2N200TW-2
225	2250	A2A225TW-2	A2N225TW-2
250	2500	A2A250TW-2	A2N250TW-2



A2 250A - Fixed (F) 3 pole - Front terminals (F)
Thermomagnetic trip unit - TMF Icu (240 V)

In	I ₃	A (10kA)	N (25kA)
125	1250	A2A125TW	A2N125TW
150	1500	A2A150TW	A2N150TW
175	1750	A2A175TW	A2N175TW
200	2000	A2A200TW	A2N200TW
225	2250	A2A225TW	A2N225TW
250	2500	A2A250TW	A2N250TW

Notes



Content

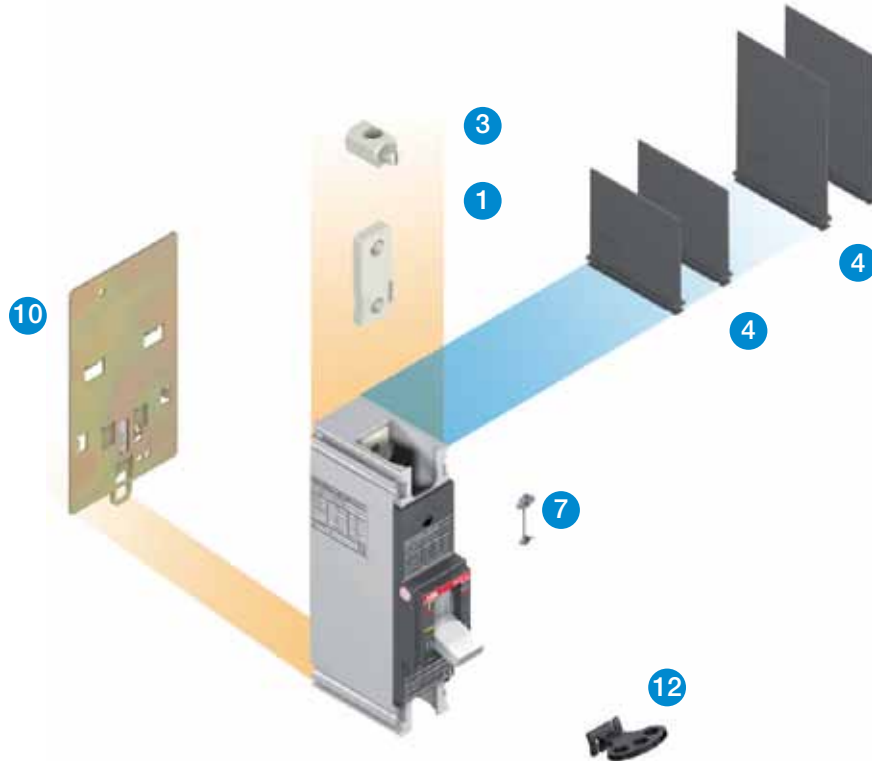
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Accessories

Panorama of the accessories

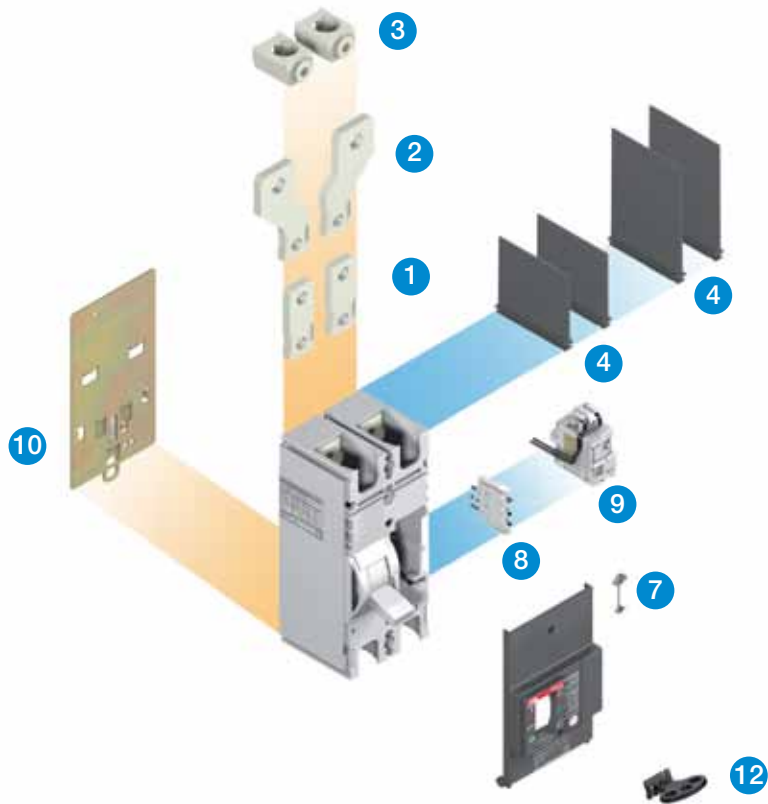
FORMULA A1 - A2

1 pole accessories



FORMULA A1 - A2

2 pole accessories



Caption

- 1 EF: extended front terminals ¹⁾
- 2 ES: extended spread terminals ¹⁾
- 3 FCCuAl: front terminals for copper and aluminium cables
- 4 PS: phase separators
- 5 HTC: high terminal cover
- 6 LTC: low terminal cover
- 7 Sealable screw ¹⁾
- 8 AUX-C/AUE-C: auxiliary contact
- 9 SOR-C/UVR-C: service releases
- 10 DIN: Din rail ¹⁾
- 12 PLL: padlocks
- 14 RHD: rotary handle direct
- 15 RHE: extended rotary handle
- 16 Key lock ¹⁾

¹⁾ IEC rated only.

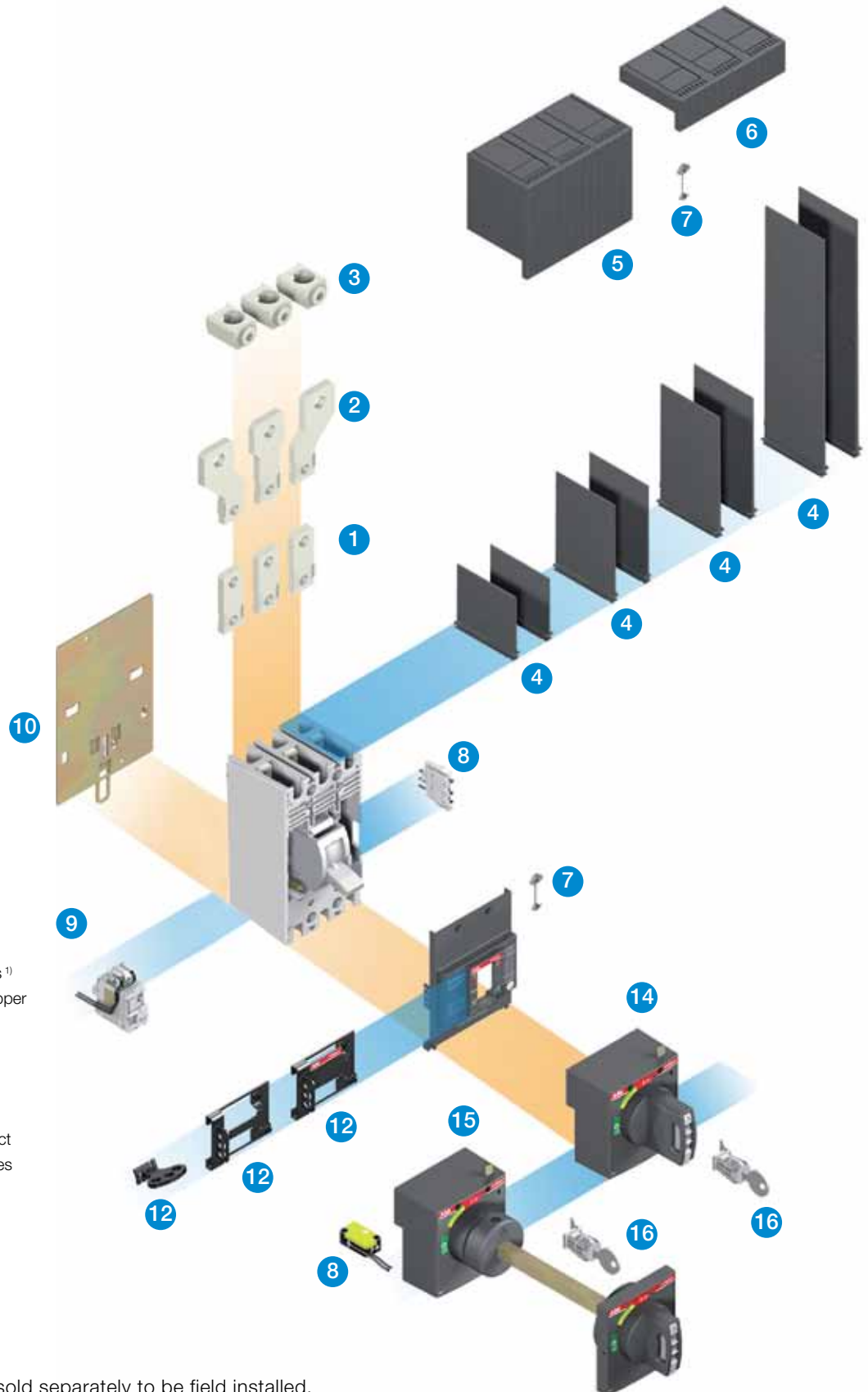
All FORMULA accessories are sold separately to be field installed.

Accessories

Panorama of the accessories

FORMULA A1 - A2

3 pole accessories



Caption

- 1 EF: extended front terminals ¹⁾
- 2 ES: extended spread terminals ¹⁾
- 3 FCCuAl: front terminals for copper and aluminium cables
- 4 PS: phase separators
- 5 HTC: high terminal cover
- 6 LTC: low terminal cover
- 7 Sealable screw ¹⁾
- 8 AUX-C/AUE-C: auxiliary contact
- 9 SOR-C/UVR-C: service releases
- 10 DIN: Din rail ¹⁾
- 12 PLL: padlocks
- 14 RHD: rotary handle direct
- 15 RHE: extended rotary handle
- 16 Key lock ¹⁾

¹⁾ IEC only.

All FORMULA accessories are sold separately to be field installed.

Accessories

Mechanical accessories

Connection terminals

The connection terminals allow the circuit breaker to be connected in the most suitable way for the desired application. Various termination options are available in both UL and IEC rated formats. The front terminals allow cables or busbars to be connected directly from the front of the circuit breaker (cable lugs are not included). Different types of terminals can be combined (for example, one type for the line and a different type for the load side).

The standard version of the circuit breaker is supplied with front terminals (F). Alternative terminal options are sold separately.

Front terminals - F

Type	Poles	Busbar dimensions [mm/in]				Cable lug [mm/in]		Tightening torques				Terminal covers [mm/in]				Separators [mm/in]			
		W	H	D	ø	W	ø	Terminal	Cable or busbar	2/07	7.5/29	50/1.96	60/2.36	50/1.96	80/3.14	100/3.93	200/7.87		
A1	1 2 3	15/.59	6/.23	5/.19	6.5/.25	15/.59	6.5/.25	-	-	M6	4	-	-	R	-	S ^[1]	-	R	-
A2	1 2 3	25/.98	8/.31	6/.23	8.5/.33	24/.94	8.5/.33	-	-	M8	8	-	-	-	R	-	S ^[1]	R	-

[1] Separators are supplied on line side



Terminal F



Terminal F with cable lug



Terminal F with busbar

Front Extended Terminals - EF (IEC only)

Type	Poles	Busbar dimensions [mm/in]			Cable lug [mm/in]		Tightening torques				Terminal covers [mm/in]				Separators [mm/in]			
		W	D	ø	W	ø	Terminal	Cable or busbar	2/07	7.5/29	50/1.96	60/2.36	50/1.96	80/3.14	100/3.93	200/7.87		
A1	1 2 3	15/.59	5/.19	8.5/.33	15/.59	8.5/.33	M6	3	M8	9	-	-	R	-	S	-	R	-
A2	1 2 3	25/.98	6/.23	9/.35	NA	NA	M8	8	M8	9	-	-	-	R	-	[1]	R	-

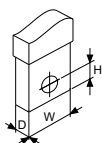
[1] In EF terminal kit the phase separators are not provided, but for a correct installation it is necessary to use the phase separators already provided with the circuit breakers base.



Terminal EF



Terminal EF with busbar



NA = Not available
W = Width
H = Hole height
D = Depth
ø = Diameter
S = Standard
R = On request

Accessories

Mechanical accessories

Front Extended Spread Terminal - ES (IEC only)

Type	Poles	Busbar dimensions [mm/in]			Cable lug [mm/in]		Tightening torques				Terminal covers [mm/in]				Separators [mm/in]			
		W	D	ø	W	ø	Terminal	Cable or busbar	2/.07	7.5/.29	50/1.96	60/2.36	50/1.96	80/3.14	100/3.93	200/7.87		
A1	2 3	20/.78	6/.23	8.5/.33	20/.78	8.5/.33	M6	3	M8	9	-	-	-	-	-	-	S	-
A2	2 3	30/1.18	4/.15	10.5/.41	10.5/.41	NA	M8	8	M10	18	-	-	-	-	-	-	S	-



Terminal ES



Terminal ES with cable lug



Terminal ES with busbar

Front Terminals for copper aluminium cables - FCCuAl

Type	Assembly	Poles	Cable [mm/in]			Tightening torques				Length of Cable stripping [mm/in]				Terminal covers [mm/in]				Separators [mm/in]			
			Rigid	Terminal	Cable or busbar	Terminal	Cable or busbar	Terminal	Cable or busbar	2/.07	7.5/.29	50/1.96	60/2.36	50/1.96	80/3.14	100/3.93	200/7.87				
A1	Internal	1 ⁽¹⁾ 2 ⁽¹⁾ 3	14-2 AWG	M6	35lb-in	14 - 10 AWG; 20lb-in 8 AWG; 35lb-in 6 - 2 AWG; 75lb-in	M6	35lb-in	16/.62	-	S ⁽¹⁾	R	-	-	-	-	-	-			
A1	Internal	1 ⁽¹⁾ 2 ⁽¹⁾ 3	4-1 AWG	M6	35lb-in	75lb-in	M6	35lb-in	16/.62	-	S ⁽¹⁾	R	-	-	-	-	-	-			
A2	Internal	1 2 3	1 AWG - 300 kcmil	M8	135lb-in	135lb-in	M8	135lb-in	20/.78	-	S ⁽¹⁾	-	R	-	-	-	-	-			
A2	Internal	1 2 3	300 - 350 kcmil	M8	135lb-in	177lb-in	M8	135lb-in	22/.86	-	S ⁽¹⁾	-	R	-	-	-	-	-			

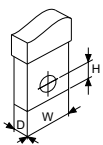
(1) The Terminal covers are not supplied for 1p and 2p, the use of phase separators, supplied with the standard circuit breaker, and the insulating of switchboard door are mandatory.



Terminal FCCuAl



Terminal FCCuAl with cable



NA = Not available
W = Width
H = Hole height
D = Depth
ø = Diameter
S = Standard
R = On request

Accessories

Mechanical accessories

Front Terminals

	1 piece	2 pieces	3 pieces	4 pieces	6 pieces
KIT F A1	KA1F-1	KA1F-2	KA1F-3	KA1F-4	KA1F-6
KIT F A2	KA2F-1	KA2F-2	KA2F-3	KA2F-4	KA2F-6

Front Extended Terminals (IEC only)

KIT EF A1	KA1EF-1	KA1EF-2	KA1EF-3	KA1EF-4	KA1EF-6
KIT EF A2	KA2EF-1	KA2EF-2	KA2EF-3	KA2EF-4	KA2EF-6

Front Extended Spread Terminals (IEC only)

KIT ES A1	KA1ES-1	KA1ES-2	KA1ES-3	KA1ES-4	KA1ES-6
KIT ES A2	KA2ES-1	KA2ES-2	KA2ES-3	KA2ES-4	KA2ES-6

Front Terminals for copper aluminium cables - FCCuAl

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
KIT FC CuAL A2; 250A Cu cables and 225A Al cables	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

Accessories

Mechanical accessories



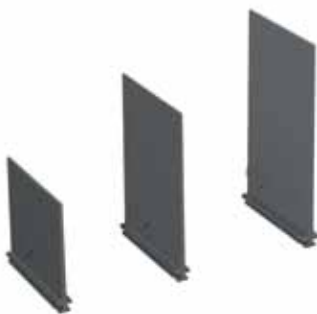
High terminal cover (HTC)



Low terminal cover (LTC)



Sealable screw



Phase separators (PS)

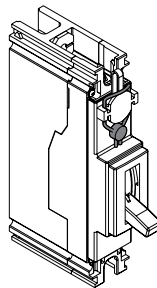
Terminal covers, phase separators and sealable screws

The terminal both high (HTC) and low (LTC) covers are applied to the circuit breaker to avoid accidental contact with live parts and, in this way, to guarantee protection against direct contact. The terminal covers are pre-punched for knock-out on the front to facilitate installation of busbars and/or cables, guaranteeing correct insulation.

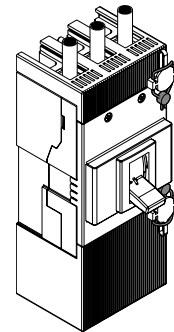
The phase separator partitions (PS) allow the insulation characteristics between phases to be increased near the connections. They are mounted on the front by inserting them into the corresponding slots and can be applied either prior to or when the circuit breaker is already installed. The phase separators are incompatible with both the high and the low terminal covers.

The lead sealing kit consists of screws which, when applied onto the terminal covers or onto the circuit breaker front, prevent their removal, acting as a protection against direct contacts and tampering. The screws can be locked with a wire and sealed with lead.

The compulsory and optional phase separators and terminal covers needed for correct installation and insulation of the circuit breaker are indicated in the "Connection terminals" section of the Accessories chapter and in the "Overall dimension" chapter, in correspondence with each usable terminal.



Sealable screw onto the circuit breaker front



Sealable screw onto the terminal covers

Terminal Covers

	A1	A2
HTC 3p 2pcs	KA1HTC-3	KA2HTC-3
LTC 3p 2pcs	KA1LTC-3	KA2LTC-3
Sealable screws for terminal covers	KA2SSW-T	--
Sealable screws for front	KA2SSW-F	--

Phase Separators

	A1		A2	
	2 pieces	4 pieces	2 pieces	4 pieces
PB 50mm	KA1PBL-2	KA1PBL-3	--	--
PB 80mm	--	--	KA2PBL-2	KA2PBL-3
PB 100mm	KA2PBH-2	KA2PBH-3	KA2PBH-2	KA2PBH-3
Sealable screws for front (IEC only)	KA2SSW-F	--	--	--

Accessories

Mechanical accessories

Rotary handle operating mechanism

A rotary handle operating mechanism is a control device that allows the circuit breaker to be comfortably operated by means of a rotary handle.



Direct handle (RHD)

There are two types of handles:

- Direct (RHD): installed directly on the front of the circuit breaker
- Extended (RHE): installed through the switchboard door, it interacts with the circuit breaker that is behind the door by means of a transmission rod

The rotary handles, in the direct and extended version, are available for the three-pole A1 and A2 circuit breakers both in the standard version (grey) and in the emergency version (red on a yellow background).

Information/settings visible and accessible to the user:

- Circuit breaker nameplate
- Indication of the 3 positions: open (OFF), closed (ON), tripped (TRIP)
- Access to the test pushbutton of rotary handle release (only RHD)



Extended handle (RHE)

The rotary handle operating mechanisms can be ordered:

- By using the pre configured “kit” code (RHD and RHE)
- By ordering the following three devices (only RHE)
 - Rotary handle on door of the compartment: standard (RHE_H) or emergency (RHE_H_EM);
 - Transmission rod of 500mm (RHE_S). The minimum and maximum distances between the fixing surface and the door are 62.5mm/2.46in and 479.5mm/18.88in
 - Base for circuit breaker (RHE_B)

It is possible to accessorize the handles with a vast range of key locks and padlocks. Each rotary handle takes up to 3 padlocks (7mm/.28in Ø stem). [See the “Locks” paragraph in the Accessories chapter].

The direct and extended rotary handle allows use of the early auxiliary contacts on closing in order to supply the undervoltage release with power early in relation to closing of the main circuit breaker contacts [see the “Early auxiliary contacts” paragraph in the Accessories chapter].

Rotary Handle Component

	A1-A2
RHD A1-A2 STAND. DIRECT	KA2RHD
RHD_EM A1-A2 EMER. DIRECT	KA2RHDEM
RHE A1-A2 STAND. RETURNED	KA2RHE
RHE_EM A1-A2 EMER. RETURNED	KA2RHEEM
RHE_B A1-A2 SIDEB.R.DIST.ADJ.ROT.HAND	KA2RHE-B
RHE_S A1-A2 ROD R.D.ADJ.ROT.HAN	KA2RHE-S
RHE_H A1-A2 HANDLE R.D.ADJ.ROT.HAN	KA2RHE-H
RHE_H A1-A2 HAND.EME.R.D.ADJ.ROT.HAN	KA2RHE-HEM

Accessories

Mechanical accessories

Locks

Locks are devices (with padlocks or keys) that prevent the circuit breaker from closing or opening. They can be applied:

- Directly onto the front of the circuit breaker
- Onto the direct/extended rotary handle operating mechanism;
- Onto the front for lever operating mechanisms

Circuit breaker locks in the open position ensure isolation of the circuit according to the IEC 60947-2 Standard. The locks in closed position do not prevent release of the mechanism following a fault.



Fixed padlock in open position (PLL)



Fixed padlock in open and closed position (PLL)



Removable padlock in open position (PLL)

	Type of lock	Circuit breaker	Polarity	Optional/Standard Supply	CB lock position	Type of Lock	Withdrawability of Key
Circuit breaker	PLL- Fixed padlock	A1-A2	3	Optional	OPEN-CLOSED	padlocks-max 3 padlocks Ø stem 7mm/0.28in (not supplied)	-
	PLL- Fixed padlock	A1-A2	3	Optional	OPEN	padlocks-max 3 padlocks Ø stem 7mm/0.28in (not supplied)	-
	PLL- Removable padlock	A1-A2	1,2,3	Optional	OPEN	padlocks-max 3 padlocks Ø stem 7mm/0.28in (not supplied)	-
Rotary Handle Direct and Extended	Padlock in open position	A1-A2	3	Standard	OPEN	padlocks-max 3 padlocks Ø stem 7mm/0.28in (not supplied)	-
	Compartment door lock	A1-A2	3	Standard	CLOSED	Door lock ⁽¹⁾	-
	RHL-S Lock with key in open pos.	A1-A2	3	Optional	OPEN	Same Ronis keys	OPEN
	RHL-D Lock with key in open pos.	A1-A2	3	Optional	OPEN	Different Ronis keys	OPEN
	RHL-D Lock with key in open and closed position	A1-A2	3	Optional	OPEN-CLOSED	Different Ronis keys	OPEN/CLOSED

(1) Function can be completely excluded by the Customer during assembly of the handle [A1 and A2].

Accessories

Mechanical accessories



Circuit breaker with fixed padlock in open position



Circuit breaker with fixed padlock in open and closed position



Key lock for direct handle



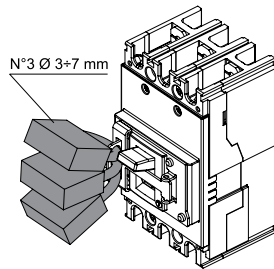
Key lock for extended handle

Padlocks for lever operating mechanism of the circuit breaker

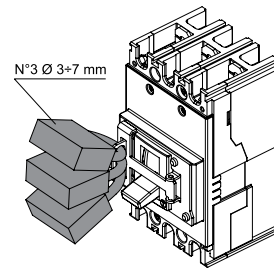
	A1-A2
PLL - Padlocks removable in open position	KA2LDOR
PLL - Padlocks fixed in open position	KA2LDO
PLL - Padlocks fixed in open and closed position	KA2LD

Key lock on Handle and front for lever operating mechanism (IEC only)

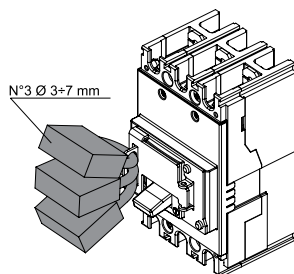
	A1-A2
RHL-D Lock in open position, different keys	KA2RHLO
RHL-S Lock in open position, same keys type A	KA2RHLO-A
RHL-S Lock in open position, same keys type B	KA2RHLO-B
RHL-S Lock in open position, same keys type C	KA2RHLO-C
RHL-S Lock in open position, same keys type D	KA2RHLO-D
RHL-D Lock in open/closed position different keys	KA2RHL



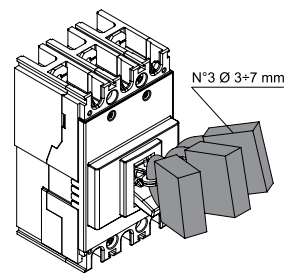
Fixed padlock in open/closed position



Fixed padlock in open/closed position



Fixed padlock in open position



Removable padlock in open position

Accessories

Mechanical accessories



Bracket for DIN rail

Bracket for fixing on DIN rail (IEC only)

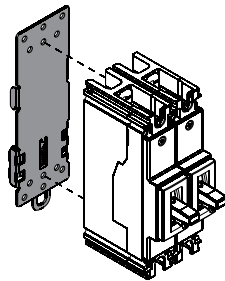
The bracket, applied on the back of the circuit breakers, allows installation on a standard DIN EN 50022 rail to simplify mounting in standard switchboards.

The bracket for fixing on DIN rail can be used with all the circuit breakers in the FORMULA family, with the exception of A3:

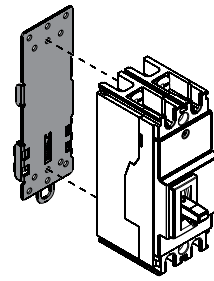
- A1 in 1p, 2p, 3p, version;
- A2 in 1p, 2p, 3p, version.

Bracket for fixing on DIN rail (IEC only)

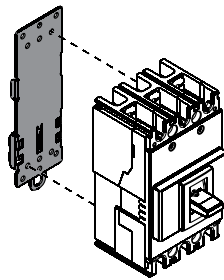
	A1-A2
Bracket for 1p, 2p, 3p	KA2DIN



Bracket for DIN rail for 1p circuit breaker



Bracket for DIN rail for 2p circuit breaker



Bracket for DIN rail for 3p circuit breaker

Accessories

Electrical accessories



Cabled service release
SOR-C and UVR-C

Service releases

The cabled shunt opening release SOR-C 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 U_n , in both alternating and direct current. It is fitted with an integrated limit contact for cutting off the power supply.

The cabled undervoltage release UVR-C ensures opening of the circuit breaker for lack/lowering of the release power supply voltage. Opening is guaranteed when the voltage is between 70% and 35% of U_n . After tripping, the circuit breaker can be closed again starting from a voltage higher than 85% of U_n . With the undervoltage release de-energized, it is impossible to close the circuit breaker and/or the main contacts.

The service releases SOR-C and UVR-C for Formula can be mounted as alternatives to each other and are only available in the cabled version (20AWB cable section/0.5mm²), with 1m long cables. For A1 and A2, screw less, snap on assembly is carried out in the special internal compartment of the circuit breaker. In the following circuit breakers:

- Two-pole (A1, A2), the SOR-C or UVR-C can be mounted as an alternative in the right-hand slot;
- Three-pole (A1, A2), the SOR-C or UVR-C can be mounted as an alternative in the left-hand slot;

SOR-C – Electrical characteristics

Versions	Absorbed power on inrush	
	AC [VA]	DC [W]
12 VDC		50
24...30 VAC/DC	50...65	50...65
48...60 VAC/DC	60	60
110...127 VAC - 110...125 VDC	50	50
220...240 VAC - 220...250 VDC	50...60	50...60

UVR-C – Electrical characteristics

Versions	Absorbed power during normal operation	
	AC [VA]	DC [W]
24...30 VAC/DC	1.5	1.5
48 VAC/DC	1	1
60 VAC/DC	1	1
110...127 VAC - 110...125 VDC	2	2
220...240 VAC - 220...250 VDC	2.5	2.5

Accessories

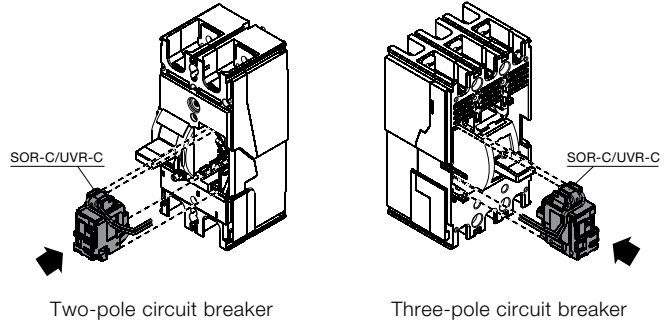
Electrical accessories

Shunt Opening Release - SOR-C

	A1-A2
SOR-C 12 Vdc	KA2S9
SOR-C 24-30 Vac/dc	KA2S8
SOR-C 48-60 Vac/dc	KA2S7
SOR-C 110-127Vac-110-125Vdc	KA2S4
SOR-C 220-240Vac-220-250Vdc	KA2S2

Undervoltage Release - UVR-C

	A1-A2
UVR-C 12 Vdc	KA2U9
UVR-C 24-30 Vac/dc	KA2U8
UVR-C 48 Vac/dc	KA2U7
UVR-C 60 Vac/dc	KA2U5
UVR-C 110-127Vac-110-125Vdc	KA2U4
UVR-C 220-240Vac-220-250Vdc	KA2U2



Accessories

Electrical accessories



Cabled auxiliary contact

Auxiliary contacts for the electrical signals

The auxiliary contacts allow information about the state of the circuit breaker to be available through an electronic signal to another apparatus.

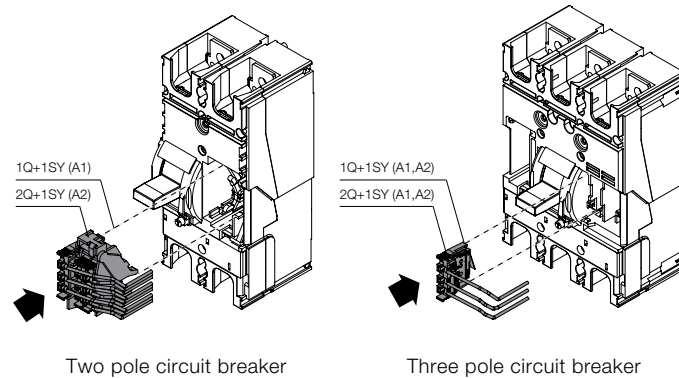
The signals available are as follows:

- Form C (open/closed): signalling the position of the circuit breaker power contacts (Q);
- Bell alarm (release trip): signalling circuit breaker opening due to tripping of the thermomagnetic or electronic trip unit (due to overload or short circuit), of the opening of the shunt opening release or undervoltage release (SOR-C or UVR-C), or by activation of the test pushbutton (SY).

Auxiliary contacts AUX-C Q, AUX-C SY

Installation of the auxiliary contacts for A1 and A2 snap-on in the special slot of the circuit breaker without the use of any screws. All the auxiliary contacts are supplied in the cabled version (20 AWG cable section/0.5mm²), with loose cables 1 m long.

An AUX-C contact is also available as spare part and it can be used as Q or SY according to the slot of the circuit breaker in which it is inserted.



AUX-C – Electrical characteristics

Category of use [IEC 60947-5-1]	Voltage [V]	Current [A]
AC-12/AC-13/AC-14	125	6
AC-15	125	5
AC-12/AC-13/AC-14	250	6
AC-15	250	4
DC-12	110	0.5
DC-14	110	0.05
DC-12	250	0.3
DC-14	250	0.03

Accessories

Electrical accessories

Auxiliary Contacts - AUX-C

	A1		A2	
	2 poles	3 poles	2 poles	3 poles
Cabled version (numbered cables)				
AUX-C 1Q+1SY 250 Vac/dc	KA2AS-2	KA2AS		KA2AS
AUX-C 2Q+1SY 250 V A2 2p		KA2AS2	KA2AS2-2	KA2AS2
AUX-C 1Q+1SY 24 Vdc	KA2ASAU-2	KA2ASAU		KA2ASAU
AUX-C 2Q+1SY 24 Vdc		KA2AS2AU	KA2AS2AU-2	KA2AS2AU
Cabled version (spare parts) (IEC only)				
AUX-C 250 V 1 CONT. A1-A2	KA2ASSP			



Early auxiliary contact

Early auxiliary contacts AUE-C (IEC only)

The cabled early auxiliary contacts (AUE-C) are normally open contacts, early in relation to closing, which allow the undervoltage release to be supplied in advance prior to the closing of the main contacts in conformity with the IEC 60204-1, VDE 0113 Standards.

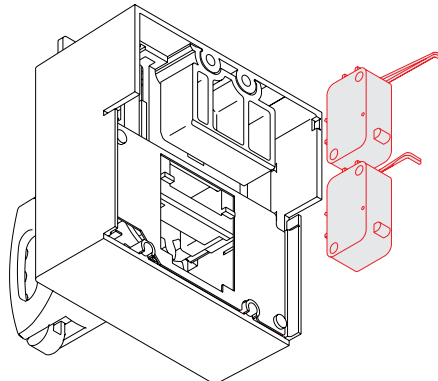
It is possible to insert up to two early auxiliary contacts on closing inside the direct and extended rotary handle operating mechanism for three pole circuit breakers. The contacts, supplied in the cabled version with cables 1 m long (20 AWG cable section/0.5mm²), must be ordered in combination with an undervoltage release.

AUE -C – Electrical characteristics

Voltage [V]	Current [A]	
	AC	DC
125 DC	-	0.5
250 AC/DC	12	0.3

Early auxiliary contacts – AUE-C (IEC Only)

	A1-A2
AUE-C	KA2RH-EM



Notes



Content

Temperature performance	4.2
Technical Information	
Dissipated powers	4.3

Temperature performances

All FORMULA circuit breakers can be used under the following environmental conditions:

- -25°C to 70°C (-13°F to 158°F): range of temperature where the circuit breaker is installed
- -40°C to 70°C (-40°F to 158°F): range of temperature where the circuit breaker is stored

To determinate tripping time using time/current curves, use $I t^{\circ}\text{C}$ values indicated in the tables below.

FORMULA A1 circuit breaker with thermomagnetic trip unit TMF

In [A]	10°C	20°C	30°C	40°C	50°C	60°C	70°C
5	6.5	6.1	5.8	5.4	5	4.8	4.5
10	12.9	12.2	11.5	10.8	10	9.6	9.0
15	19.4	18.4	17.3	16.2	15	14.4	13.5
20	24.6	23.5	22.4	21.2	20	19.2	18.0
25	29.2	28.2	27.2	25.9	25	24.0	22.5
30	36.8	35.3	33.6	31.8	30	28.8	27.0
40	46.7	45.2	43.5	41.5	40	38.3	36.0
50	58.3	56.5	54.3	51.9	50	47.9	45.0
60	70.0	67.8	65.2	62.2	60	57.5	54.0
70	81.7	79.1	76.1	72.6	70	67.1	63.0
80	91.0	88.5	85.6	82.1	80	76.7	72.0
90	102.4	99.6	96.3	92.4	90	86.3	81.0
100	116.7	113.0	108.7	103.7	100	95.9	90.0

FORMULA A2 circuit breaker with thermomagnetic trip unit TMF

In [A]	10°C	20°C	30°C	40°C	50°C	60°C	70°C
125	161	153	144	135	125	114	102
150	184	176	168	159	150	138	126
160	196	188	179	169	160	148	135
175	215	206	196	185	175	160	144
200	246	235	224	212	200	183	165
225	290	276	260	243	225	205	184
250	323	306	289	270	250	228	204

NOTE: Temperature ratings and performances above are per IEC standard test results.

Technical information

Dissipated powers

For each circuit breaker, the table gives the dissipated power values for a single pole circuit breaker. The maximum total dissipated power of a two-pole or three-pole circuit breaker used at 50/60Hz is equal to the dissipated power for the single pole multiplied by the number of poles.

Power [w/pole] TMF

In [A]	A1	A2
15	2.5	-
20	3	-
25	3	-
30	4	-
40	4.5	-
50	5.5	-
60	6	-
70	8	-
80	9	-
90	7	-
100	8	-
125	-	7
150	-	8
175	-	10
200	-	12
225	-	14
250	-	16

NOTE: Dissipated powers above are per IEC standard test results.

Notes



Content

Information for reading and graphic symbols	5.2
Wiring diagrams of the circuit breakers	5.3
Electrical accessories	5.4 - 5.5

Information for reading and graphic symbols

State of operation represented

The diagram is shown under the following conditions:

- Circuit breaker open
- Circuits without voltage
- Trip unit not tripped

Incompatibility

A1 A2

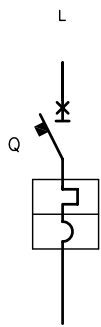
Accessory circuits cannot be supplied with single-pole circuit breakers. The applications indicated in figures 1-2-6, which are supplied as an alternative, can be supplied with two-pole circuit breakers. All the applications indicated in the figures can be supplied with three-pole circuit breakers. Figures 1-2-3-4 are provided as an alternative. Figures 5-6 are provided as an alternative. See pages 5.4 and 5.5.

Graphic Symbols (IEC 60617 and CEI 3-14...3-26 Standards)

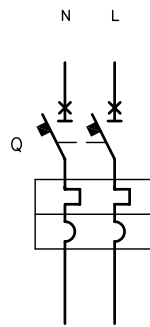
	Thermal effect	•	Terminal		Change-over break before make contact
	Electromagnetic effect		Plug and socket (male and female)		Circuit breaker with automatic release
----	Mechanical connection (link)		Resistor (general symbol)		Operating device (general symbol)
E---	Operated by pushing		Current transformer		Instantaneous overcurrent or rate-of-rise relay
F---	Operated by turning		Make contact		Overcurrent relay with inverse long time-lag characteristic
•	Connection of conductors		Break contact		

Wiring diagrams of the circuit breakers

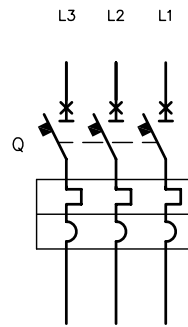
Operating status A1 A2



Single pole circuit breaker with thermomagnetic trip unit



Two pole circuit breaker with thermomagnetic trip unit



Three pole circuit breaker with thermomagnetic trip unit

Caption

Q = Main circuit breaker

Electrical accessories

Shunt opening and undervoltage releases A1 A2

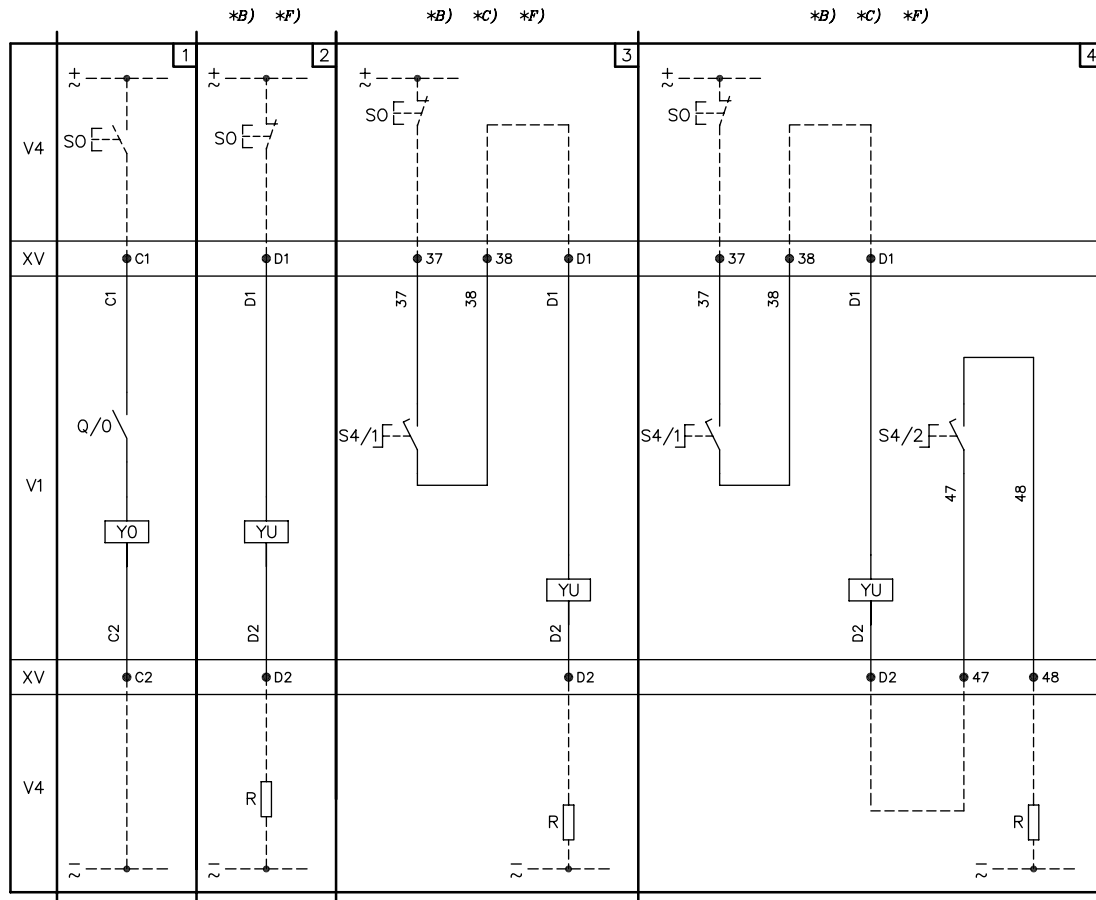


Figure:

- 1) Shunt opening release (SOR-C o YO)
- 2) Undervoltage release (UVR-C o YU)
- 3) Instantaneous undervoltage release with an early contact in series (AUE-C+UVR-C)
- 4) Instantaneous undervoltage release with two early contacts in series (AUE-C+UVR-C)

Notes

- B) The undervoltage release is supplied for power supply branched on the supply side of the circuit breaker or from an independent source: circuit breaker closing is only allowed with the release energised (the lock on closing is made mechanically).
- C) The S4/1 and S4/2 contacts shown in figures 3-4 open the circuit with circuit breaker open and close it when a manual closing command is given by means of the rotary handle in accordance with the Standards regarding machine tools (closing does not take place if the undervoltage release is not supplied).
- F) Additional external undervoltage resistor supplied at 250V DC.

Caption

- Q/0 = Circuit breaker auxiliary contacts
 R = Resistor (see note F)
 S4/1-2 = Early auxiliary contacts activated by the rotary handle of the circuit breaker (see note C)
 SO = Pushbutton or contact for opening the circuit breaker
 V1 = Circuit breaker applications
 V4 = Indicative apparatus and connections for control and signalling, outside the circuit breaker
 XV = Terminal boards of the applications
 YO = Shunt opening release (SOR-C)
 YU = Undervoltage release (UVR-C) (see notes B and C)

Electrical accessories

Auxiliary contacts A1 A2

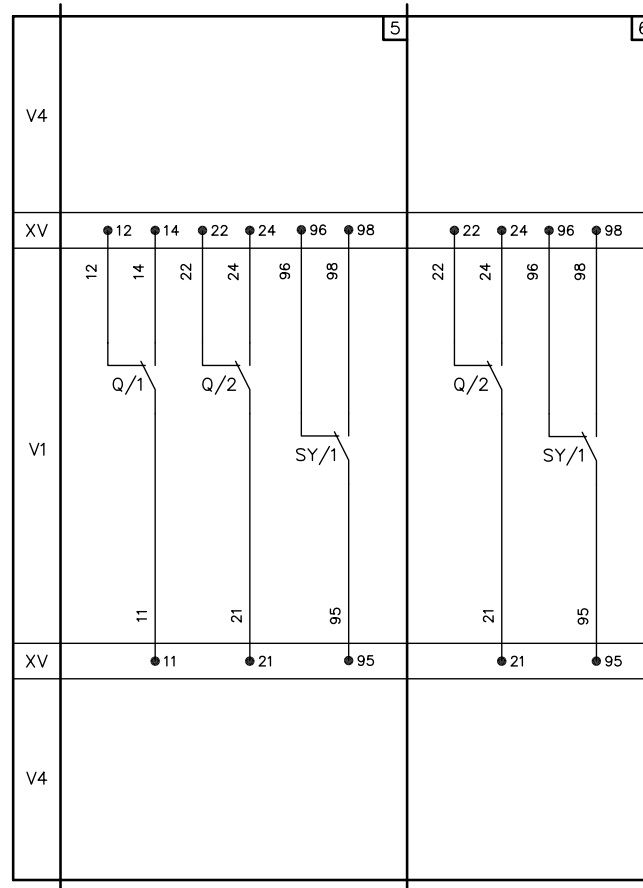


Figure:

- 5) Two changeover contacts for electrical signalling of circuit breaker open/closed and one changeover contact for signalling circuit breaker in tripped position due to thermomagnetic trip unit or SOR-C or UVR-C intervention (2Q+1SY)
- 6) One changeover contact for electrical signalling of circuit breaker open/closed and one changeover contact for signalling circuit breaker in tripped position due to thermomagnetic trip unit or SOR-C or UVR-C intervention (1Q+1SY)

Caption

- Q/1, 2 = Circuit breaker auxiliary contacts
- SY = Contact for electrical signalling circuit breaker open due to trip of the thermomagnetic trip unit YO (SOR-C), YU (UVR-C) (tripped position)
- V1 = Circuit breaker applications
- V4 = Indicative apparatus and connections for control and signalling, outside the circuit breaker
- XV = Terminal boards of the applications

Notes



Approximate dimensions

Content

FORMULA A1

Circuit breaker and terminals	6.2 - 6.7
Accessories	6.8

FORMULA A2

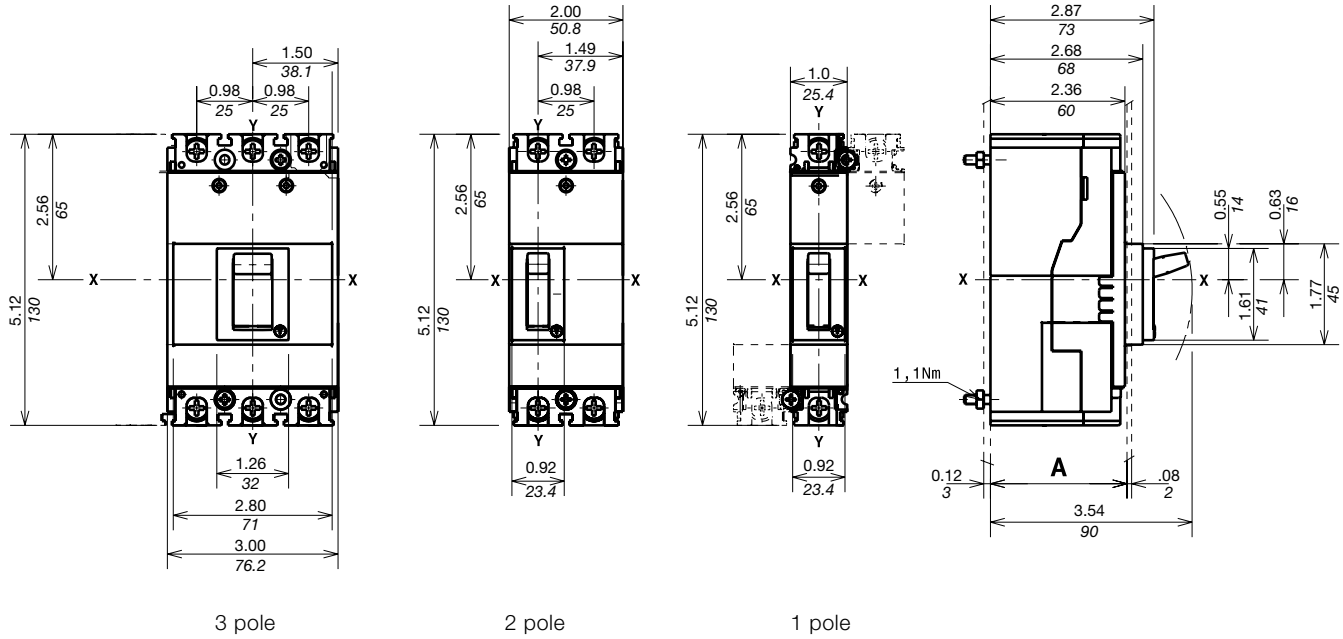
Circuit breaker and terminals	6.9 - 6.14
Accessories	6.15

Distances to be respected	6.16
--	------

Approximate dimensions

A1 - Circuit breaker and terminals

Fixing onto the back plate

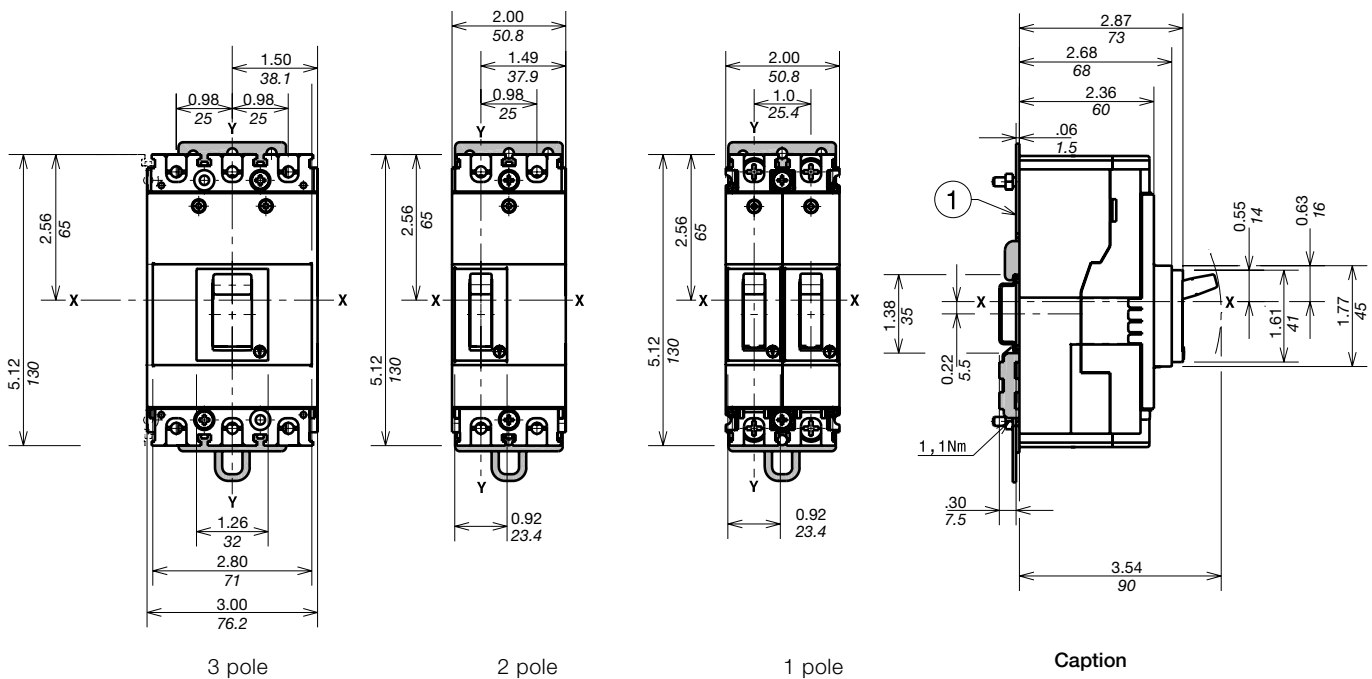


Distance between compartment door and back of switchboard		A [mm/in]
Without flange	1, 2, & 3 pole	69/2.72
	1, 2, & 3 pole	61/2.40

The circuit breaker installed at:

- A = 69mm/2.72in has the face around the operating lever extending from the compartment door;
- A = 61mm/2.40in has the face around the operating lever and steel with construction characteristics extending from the compartment door.

Fixing onto DIN 50022 rail



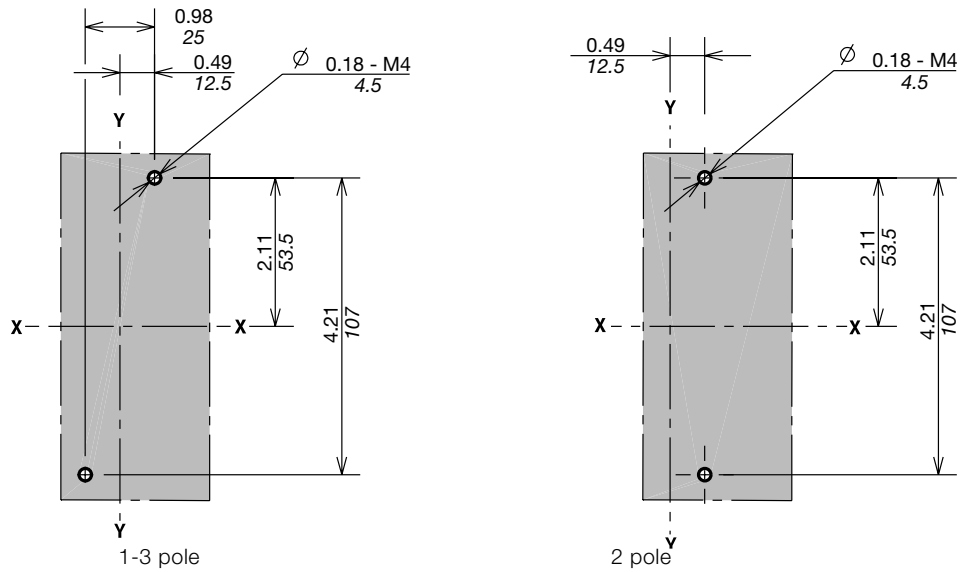
Caption

① Fixing bracket

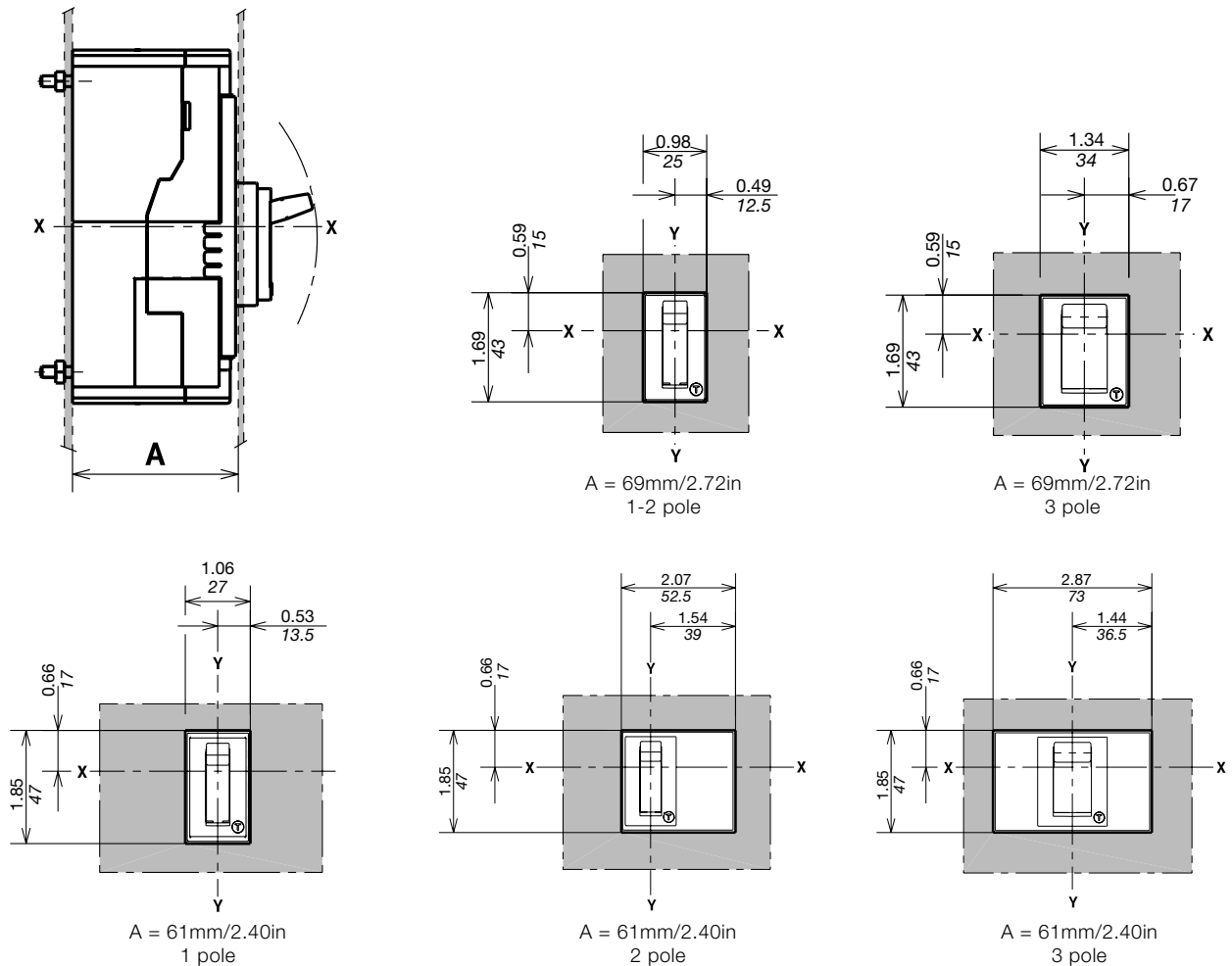
Approximate dimensions

A1 - Circuit breaker and terminals

Drilling templates for support sheet



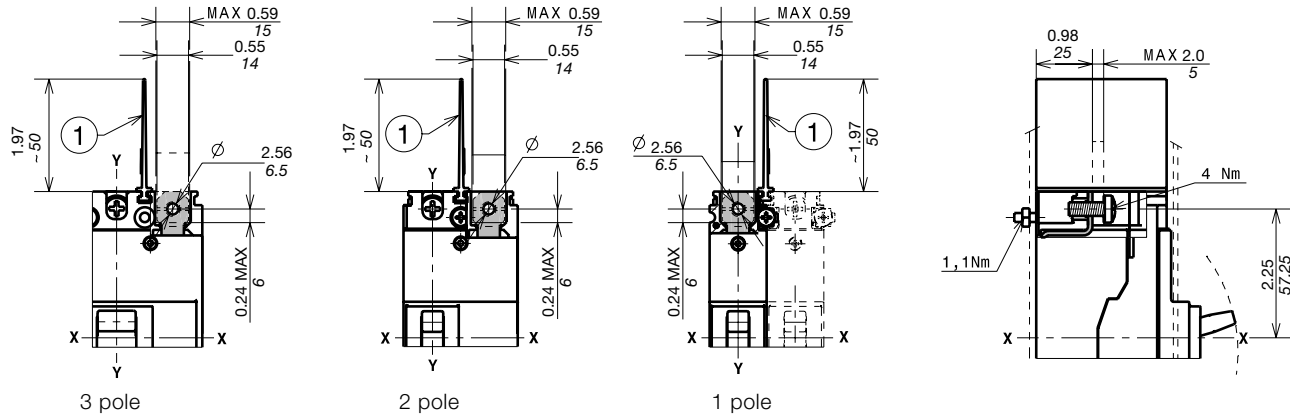
Drilling templates for compartment door



Approximate dimensions

A1 - Circuit breaker and terminals

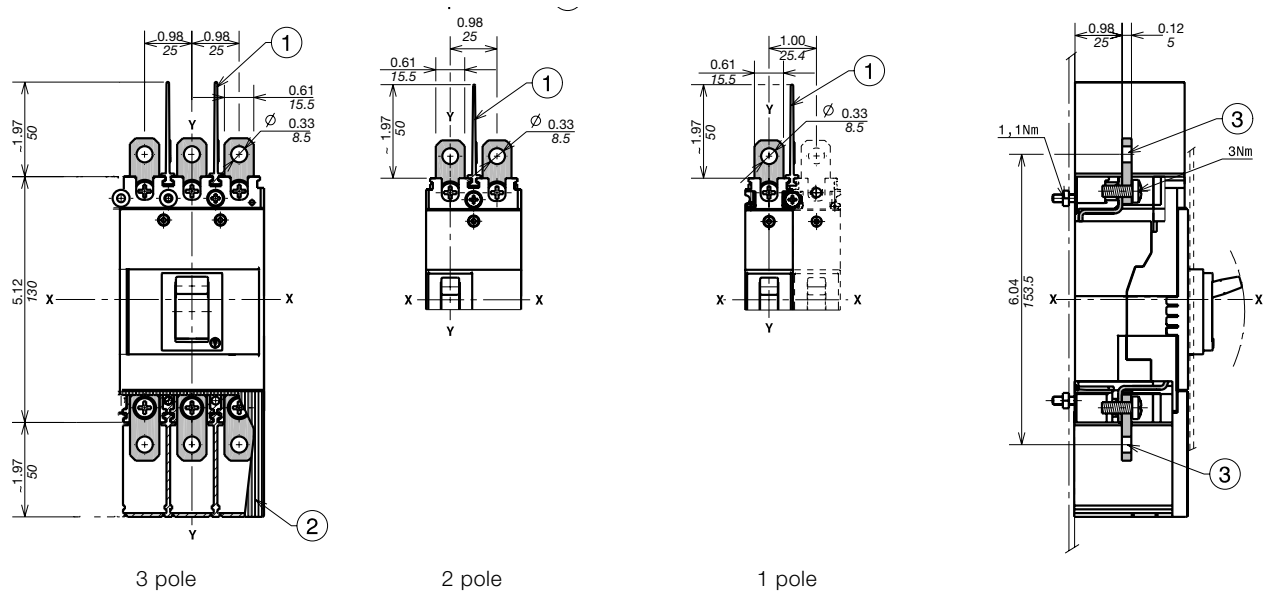
F Terminals



Caption

- ① 50mm insulating barriers between the terminals (compulsory) supplied

EF Terminals



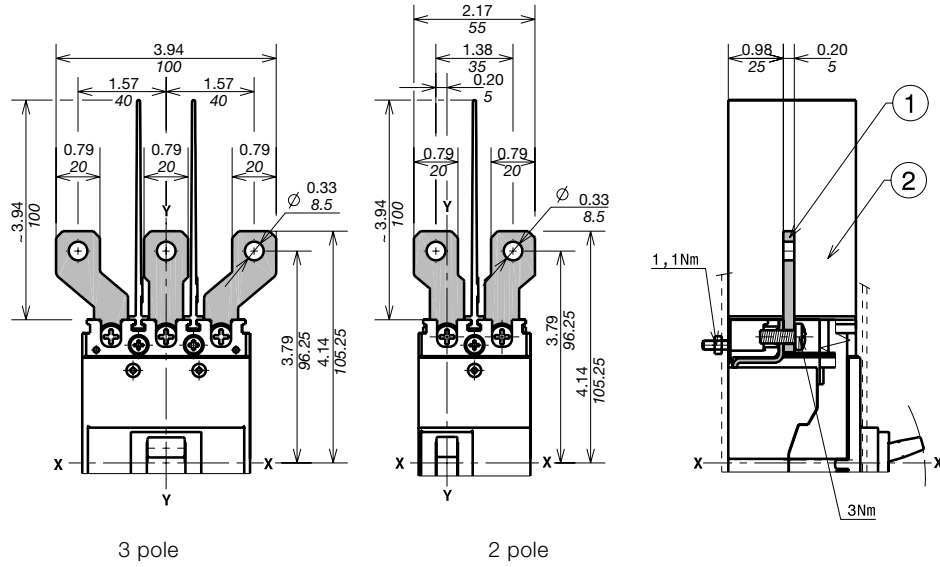
Caption

- ① 50mm insulating barriers between the terminals (compulsory) not supplied with EF terminals kit, but with the circuit breaker in base version
- ② Top terminal covers with IP40 degree of protection (on request)
- ③ Front extended terminals

Approximate dimensions

A1 - Circuit breaker and terminals

ES Terminals



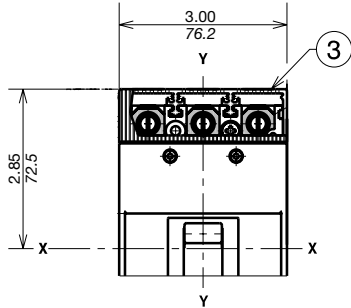
Caption

- ① Front extended spread terminals
- ② 100mm insulating barriers between the terminals (compulsory) supplied

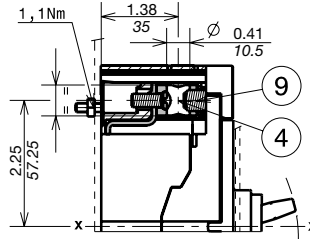
Approximate dimensions

A1 - Circuit breaker and terminals

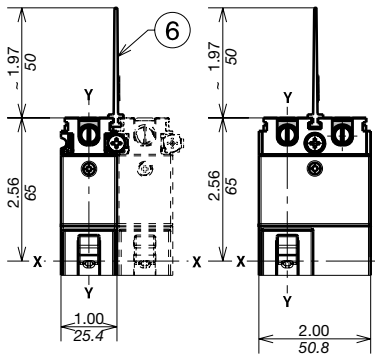
FCCuAI 4-1 AWG Terminals



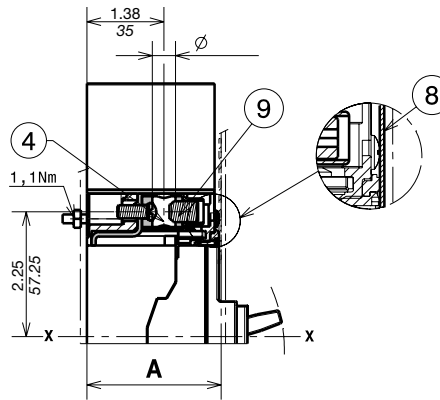
3 pole



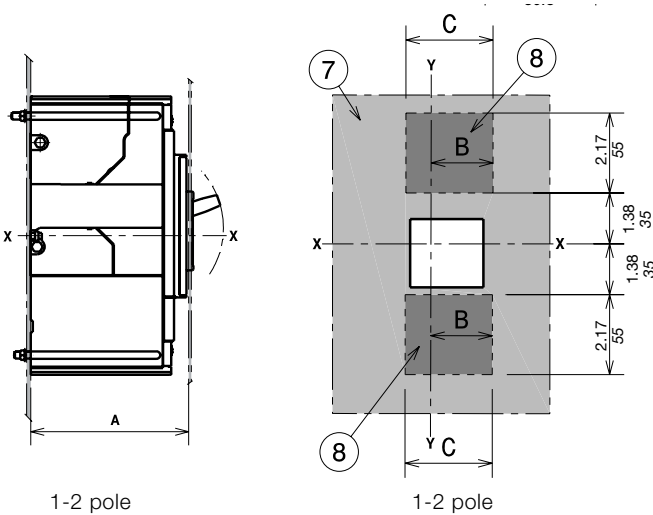
3 pole



1-2 pole



1-2 pole



1-2 pole

1-2 pole

	A [mm/in]	B [mm/in]	C [mm/in]	
Without flange	69/2.72	33/1.30	66/2.60	1 POLE
	69/2.72	58/2.28	91/3.58	2 POLE
	61*/2.40*	33/1.30	66/2.60	1 POLE
	61*/2.40*	58/2.28	91/3.58	2 POLE

* Distance only possible with insulation plate max 1mm / 0.04in thick

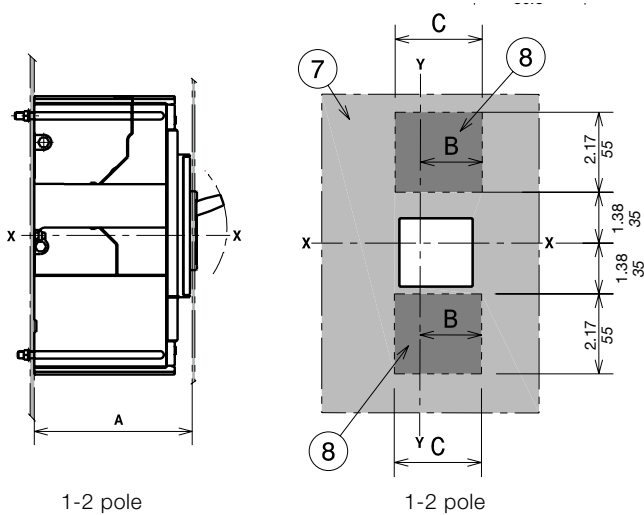
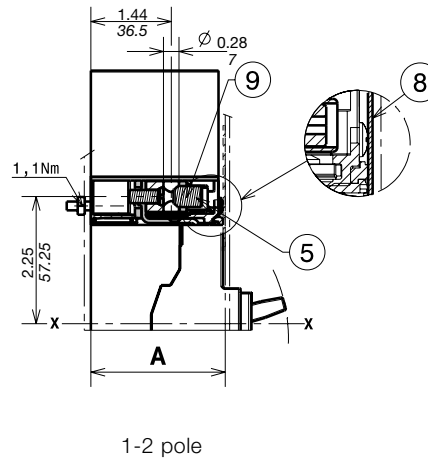
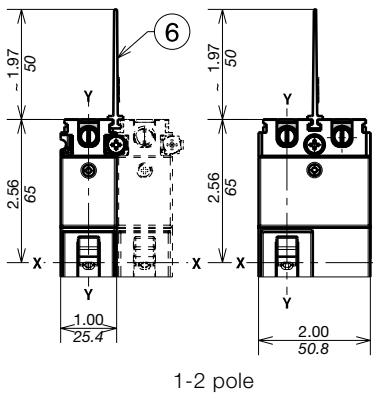
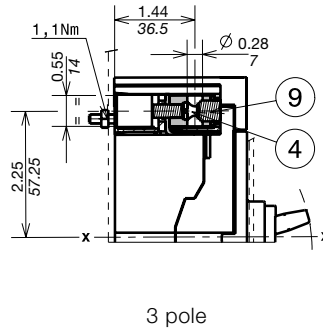
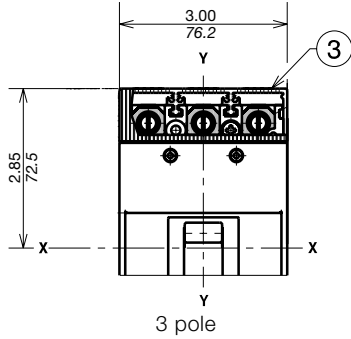
Caption

- ③ Bottom terminal covers with IP40 degree of protection (compulsory)
- ④ FCCuAI 4-1 AWG terminals
- ⑥ 50mm insulating barriers between the terminals (compulsory) not supplied with FCCuAI terminals kit, but with the circuit breaker in base version
- ⑦ Compartment door drilling template and fixing insulation (provided by customer)
- ⑧ Compulsory internal 1 pole - 2 pole insulation plates (provided by customer)

Approximate dimensions

A1 - Circuit breaker and terminals

FCCuAI 14 - 2 AWG Terminals



	A [mm/in]	B [mm/in]	C [mm/in]	
Without flange	69/2.72	33/1.30	66/2.60	1 POLE
	69/2.72	58/2.28	91/3.58	2 POLE
	61*/2.40*	33/1.30	66/2.60	1 POLE
	61*/2.40*	58/2.28	91/3.58	2 POLE

* Distance only possible with insulation plate max 1mm/0.039in thick

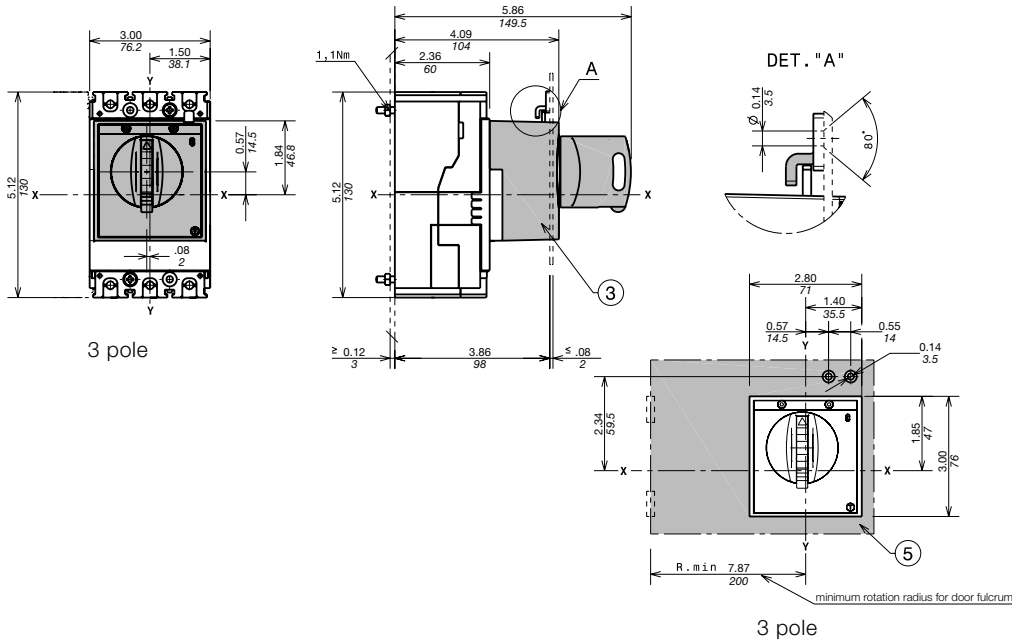
Caption

- ③ Bottom terminal covers with IP40 degree of protection (compulsory)
- ⑤ FCCuAI 14-2 AWG terminals
- ⑥ 50mm insulating barriers between the terminals (compulsory) not supplied with FCCuAI terminals kit, but with the circuit breaker in base version
- ⑦ Compartment door drilling template and fixing insulation (provided by customer)
- ⑧ Compulsory internal 1 pole - 2 pole insulation plates (provided by customer)

Approximate dimensions

A1 - Accessories

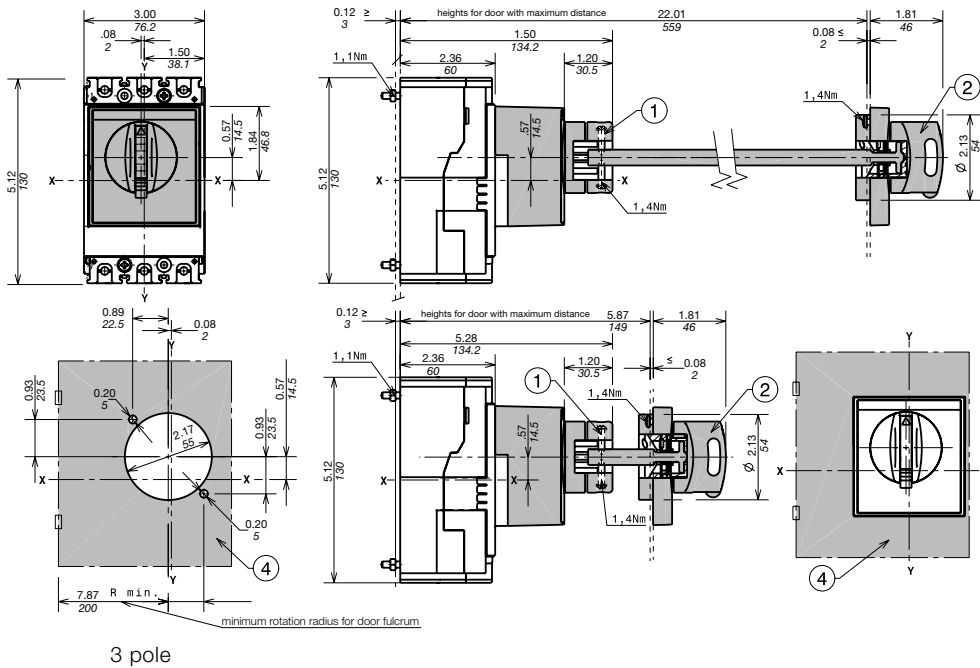
Rotary handle operating mechanism on circuit breaker and compartment door drilling template (RHD)



Caption

- ③ Rotary handle operating mechanism on circuit breaker
- ⑤ Template for drilling compartment with direct handle

Rotary handle operating mechanism on compartment door and compartment door drilling template (RHE)

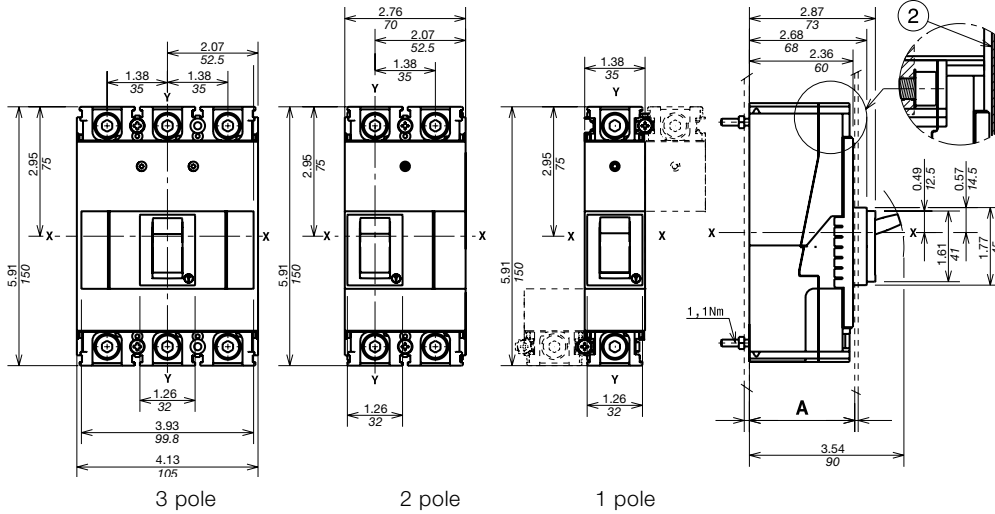


Caption

- ① Transmission group
- ② Extended rotary handle operating mechanism
- ④ Template for drilling compartment with extended rotary handle

Approximate dimensions A2 - Circuit breaker and terminals

Fixing on the back plate

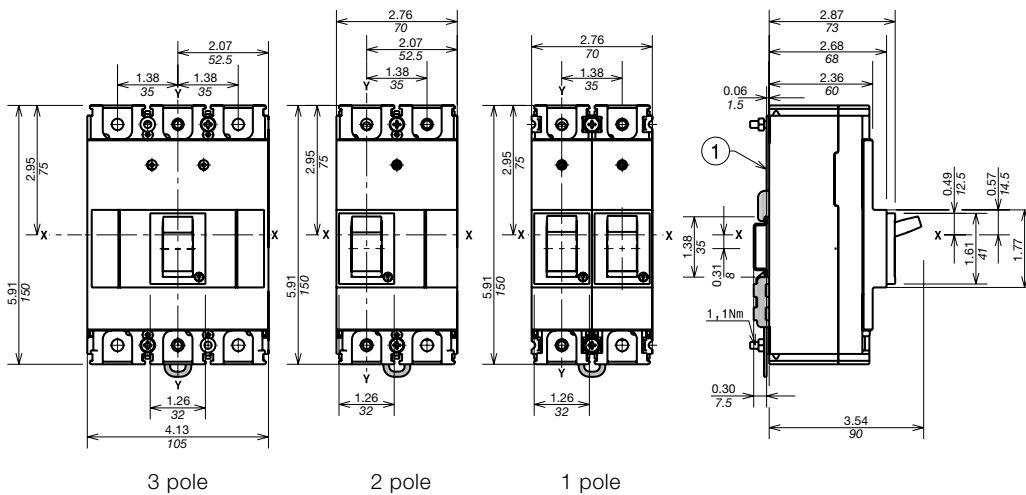


Distance between compartment door and back of switchboard		A [mm/in]
Without flange	1, 2, & 3 pole	69/2.72
	1, 2, & 3 pole	61/2.40

The circuit breaker installed at:

- A = 69mm/2.72in has the face around the operating lever extending from the compartment door;
- A = 61mm/2.40in has the face around the operating lever and steel with construction characteristics extending from the compartment door.

Fixing onto DIN 50022 rail



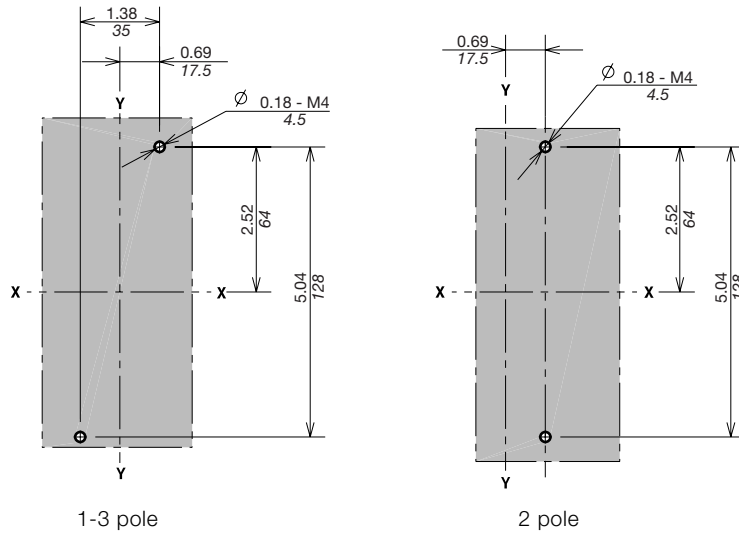
Caption

- ① Fixing bracket

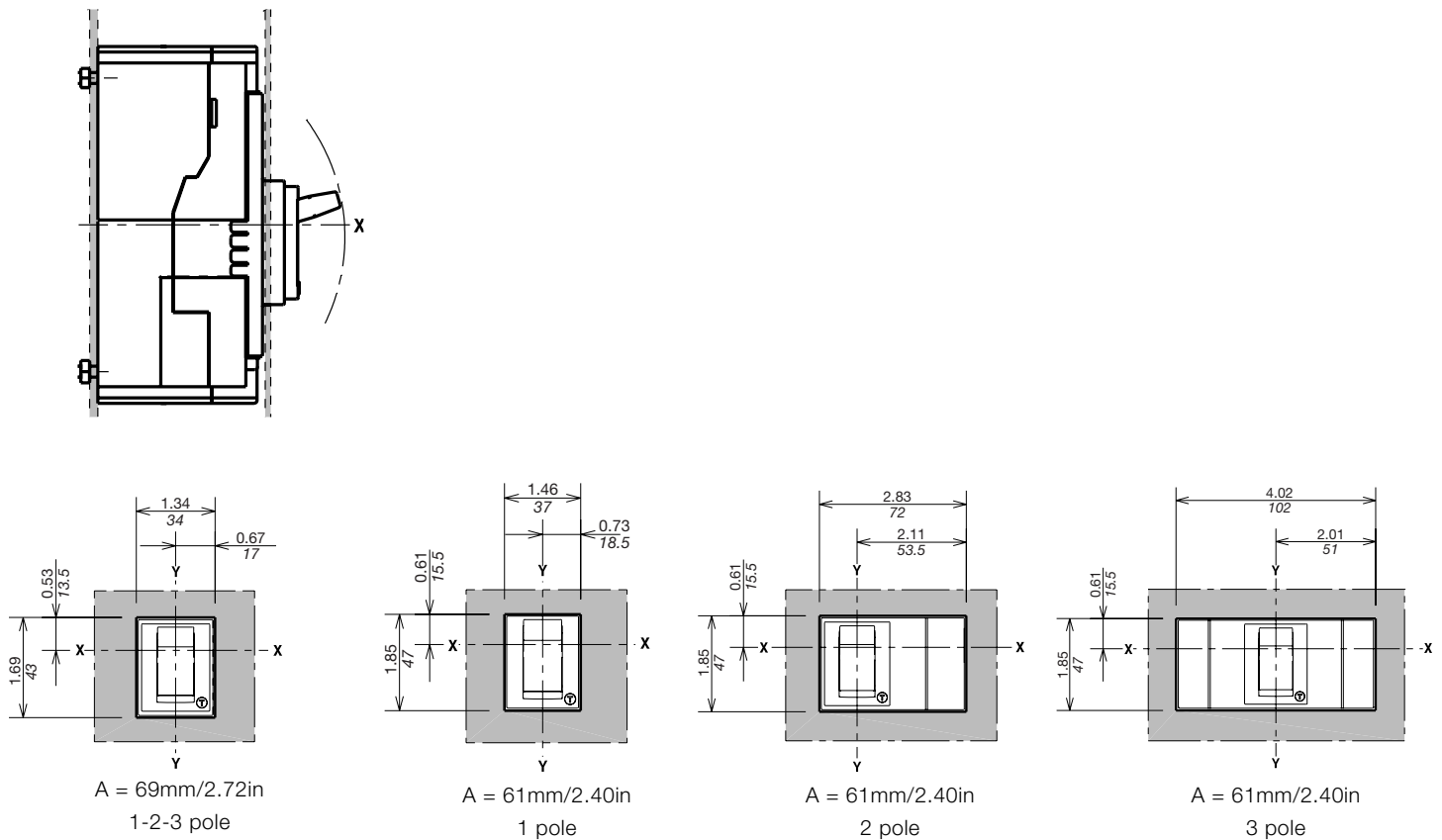
Approximate dimensions

A2 - Circuit breaker and terminals

Drilling templates for support sheet



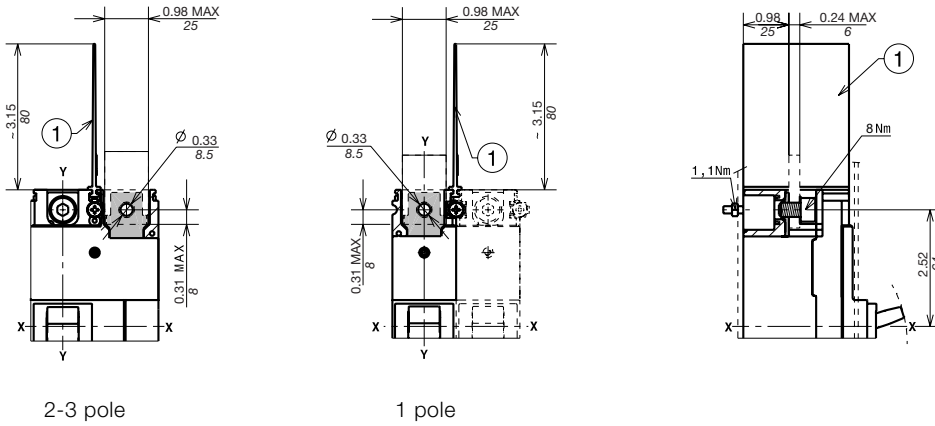
Compartment door drilling templates



Approximate dimensions

A2 - Circuit breaker and terminals

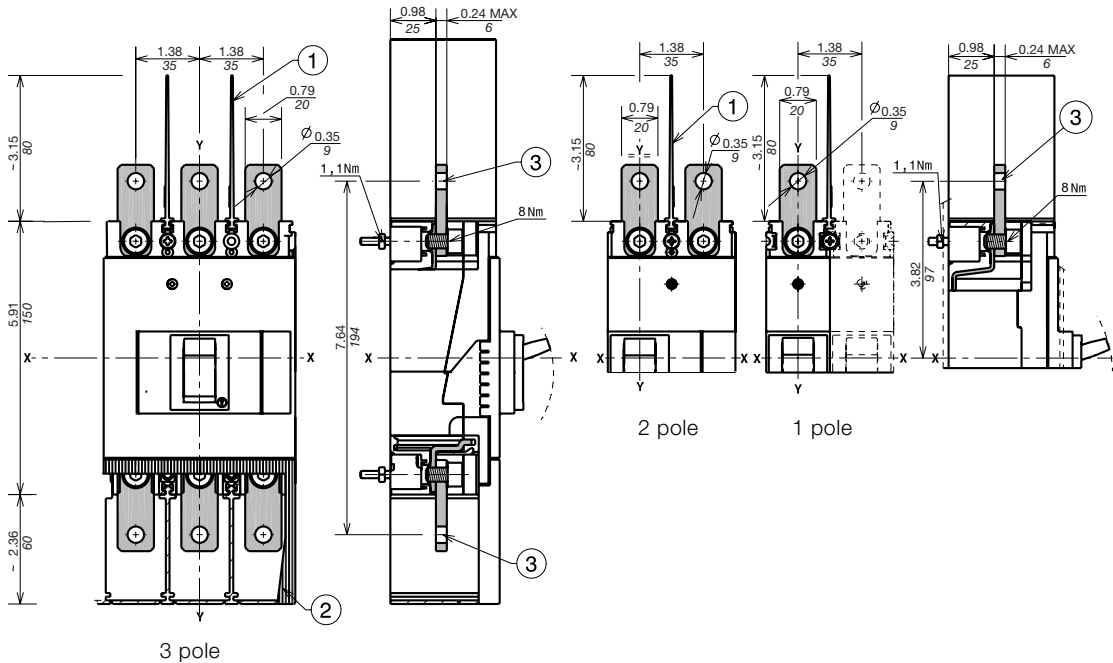
F Terminals



Caption

- ① 80mm insulating barriers between the terminals (compulsory) supplied

EF Terminals



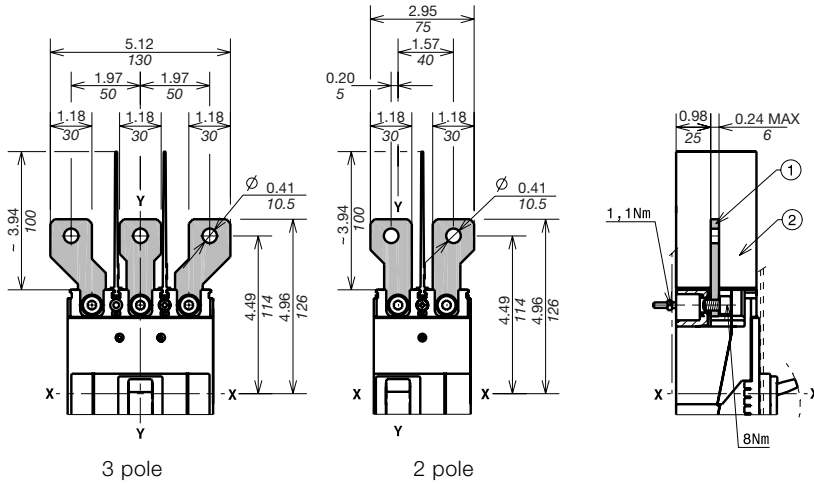
Caption

- ① 80mm insulating barriers between the terminals (compulsory) not supplied with EF terminals kit, but with the circuit breaker in base version
- ② Top terminal covers with IP40 degree of protection (on request)
- ③ Front extended terminals

Approximate dimensions

A2 - Circuit breaker and terminals

ES Terminals



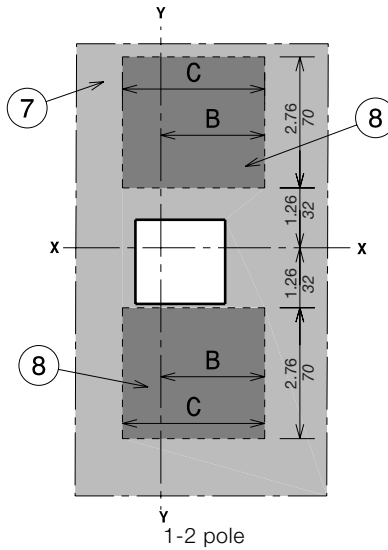
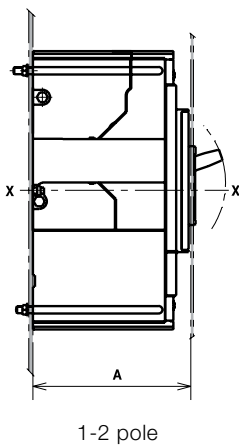
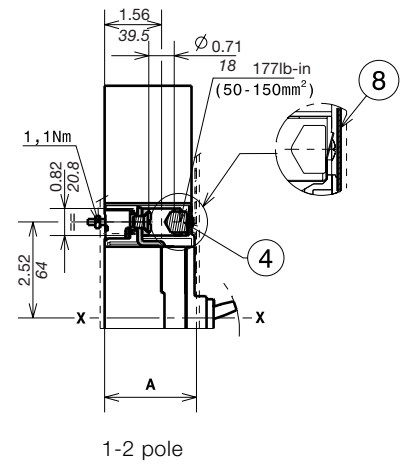
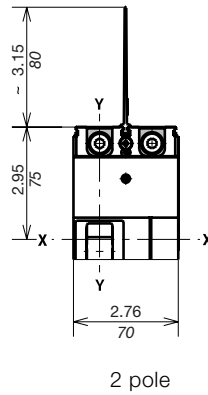
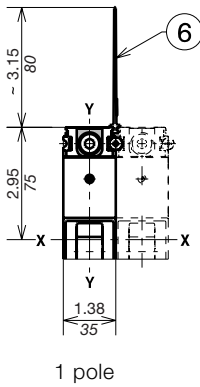
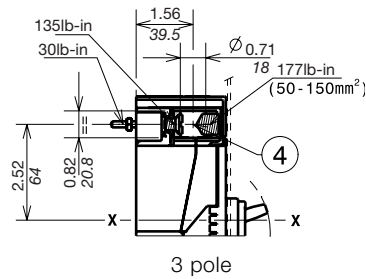
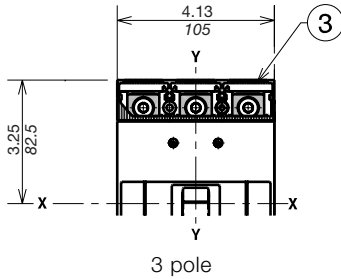
Caption

- ① Front extended spread terminals
- ② 100mm insulating barriers between the terminals (compulsory) supplied

Approximate dimensions

A2 - Circuit breaker and terminals

FCCuAl 300kcmil - 350kcmil Terminals



Caption

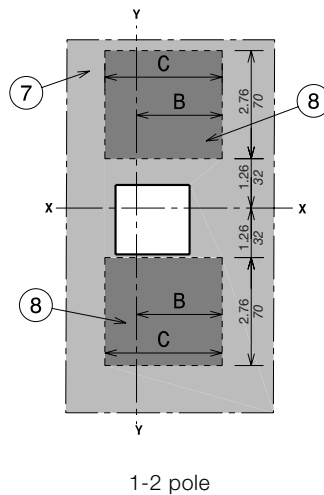
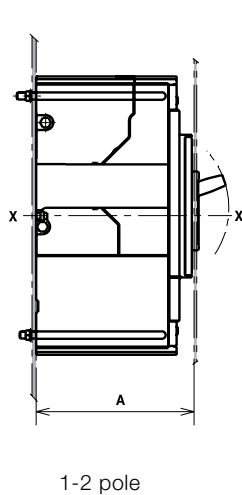
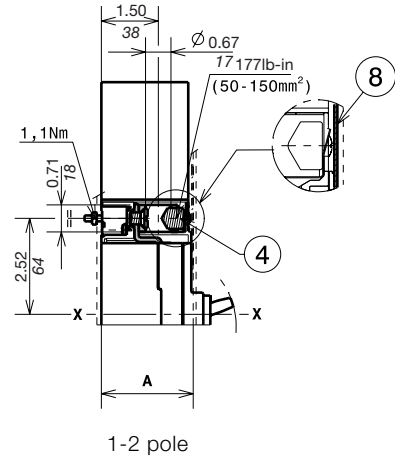
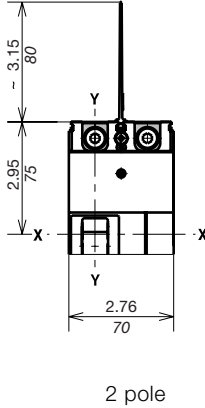
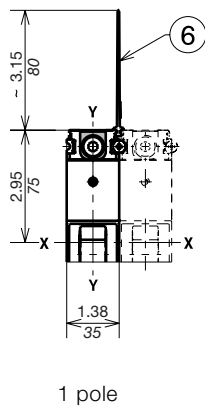
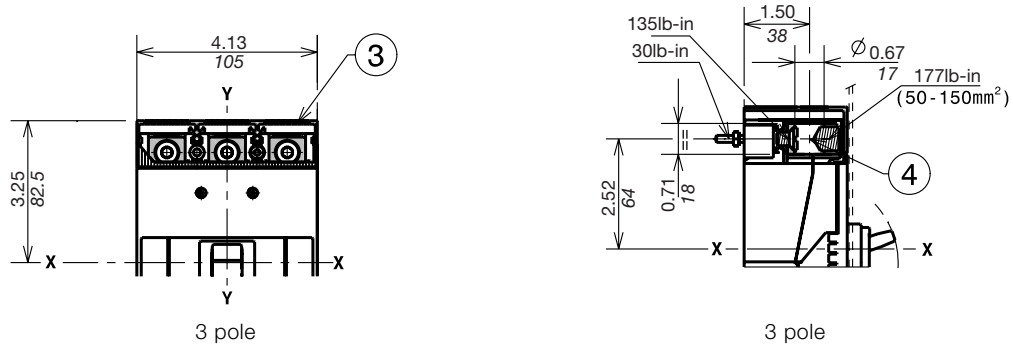
- ③ Terminal covers (compulsory)
- ⑤ Terminals FCCuAl 300kcmil - 350kcmil
- ⑥ 80mm insulating barriers between the terminals (compulsory) not supplied with FCCuAl terminals kit, but with the circuit breaker in base version
- ⑦ Compartment door drilling template and fixing insulation (provided by customer) 1 pole
- ⑧ Compulsory internal insulation plates (provided by customer) max 1mm/0.039in thick

	A [mm/in]	B [mm/in]	C [mm/in]	
	69/2.72	37.5/1.48	75/2.95	1 POLE
Without flange	69/2.72	-	-	2 POLE
	61/2.40	37.5/1.48	75/2.95	1 POLE
	61/2.40	-	-	2 POLE

Approximate dimensions

A2 - Circuit breaker and terminals

FCCuAI 1 AWG - 300kcmil Terminals



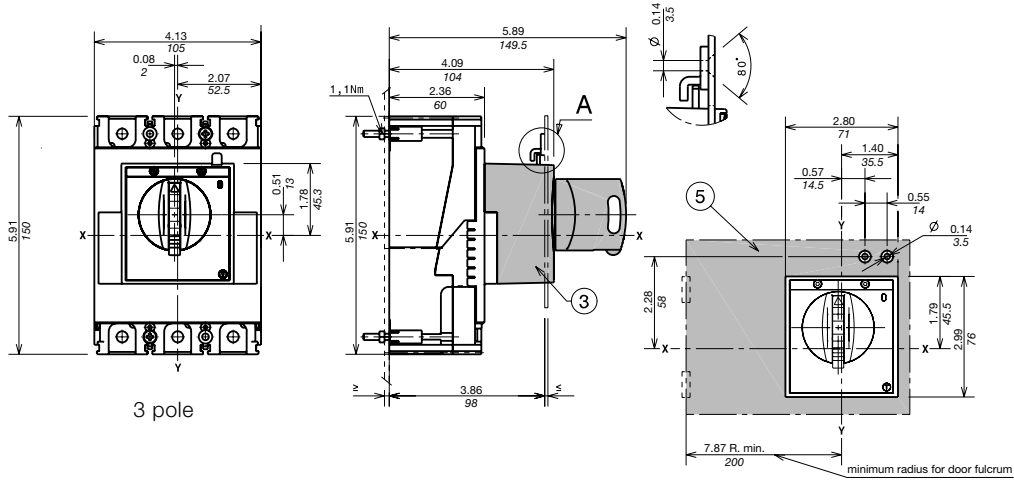
Caption

- ③ Terminal covers (compulsory)
- ④ Terminals FCCuAI 1 AWG - 300kcmil
- ⑥ 80mm insulating barriers between the terminals (compulsory) not supplied with FCCuAI terminals kit, but with the circuit breaker in base version
- ⑦ Compartment door drilling template and fixing insulation (provided by customer) 1 pole
- ⑧ Compulsory internal insulation plates (provided by customer) max 1mm/0.039in thick

	A [mm/in]	B [mm/in]	C [mm/in]	
Without flange	69/2.72	42.5/1.67	85/3.35	1 POLE
	69/2.72	-	-	2 POLE
	61/2.40	42.5/1.67	85/3.35	1 POLE
	61/2.40	-	-	2 POLE

Approximate dimensions A2 - Accessories

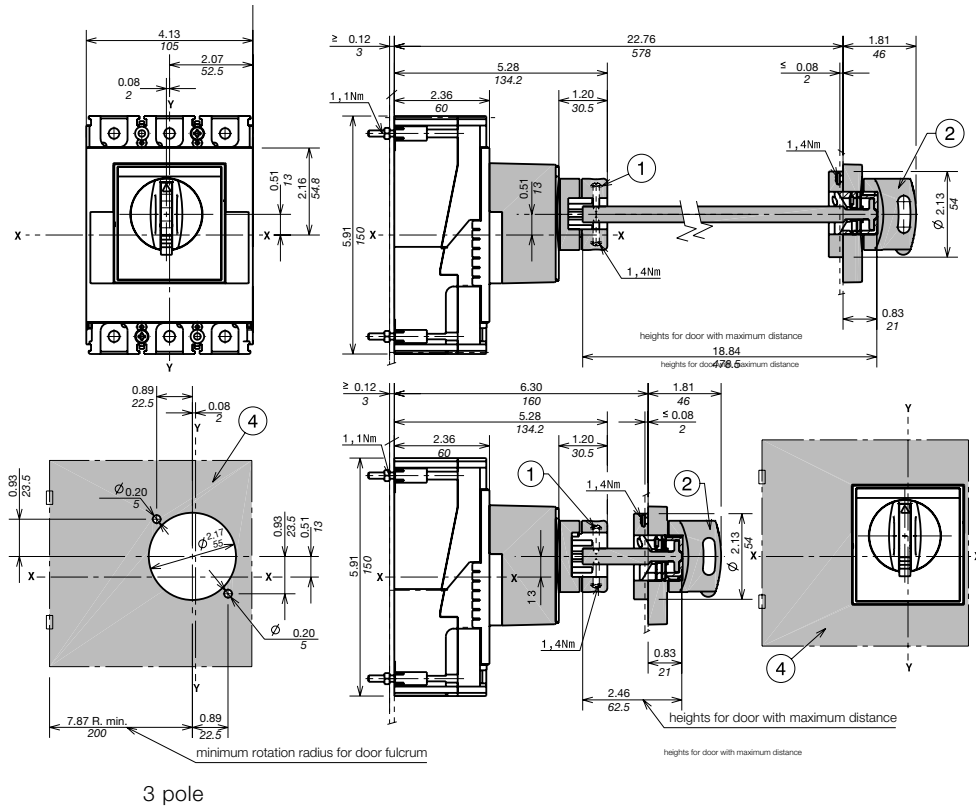
Rotary handle operating mechanism on compartment door and compartment door drilling template (RHD)



Caption

- ③ Rotary handle operating mechanism on circuit breaker
- ⑤ Template for compartment drilling with direct handle

Rotary handle operating mechanism on circuit breaker and compartment door drilling template (RHE)



Caption

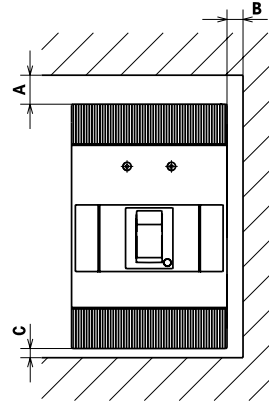
- ① Transmission group
- ② Extended rotary handle operating mechanism
- ④ Template for drilling compartment with extended rotary handle

Approximate dimensions

Distances to be respected

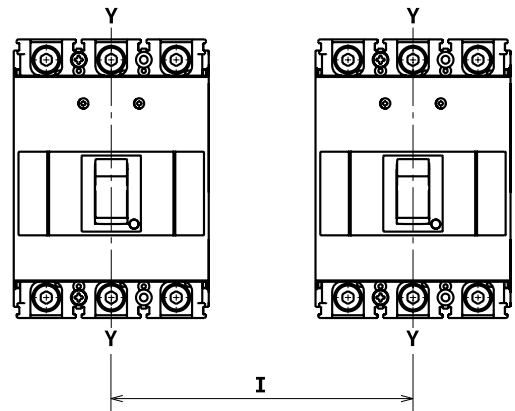
Insulation distances to be respected for installation in cubicles

	A [mm/in]	B [mm/in]	C [mm/in]
A1 - 1p, 2p, 3p	50/1.97	50/1.97	50/1.97
A2 - 1p, 2p, 3p	50/1.97	50/1.97	50/1.97



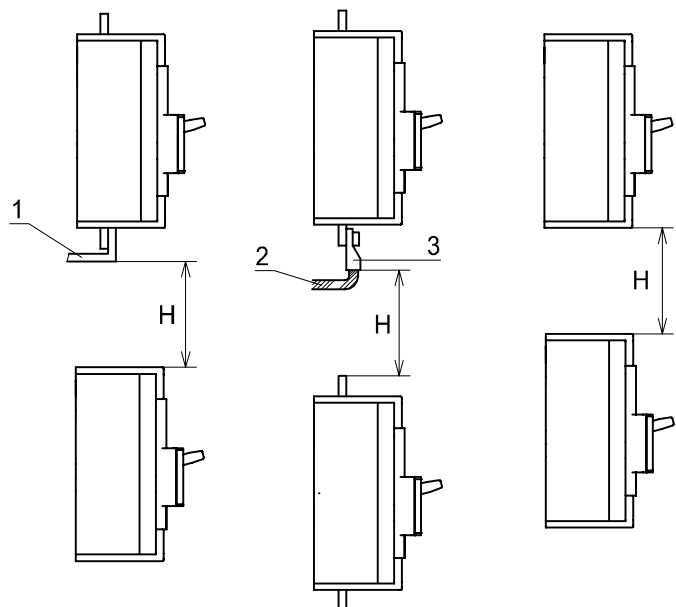
Minimum center distance between two side by side circuit breakers

	Circuit breaker width [mm/in]			Center distance I [mm/in]		
	1 pole	2 pole	3 pole	1 pole	2 pole	3 pole
A1	25.4/1.00	50.8/2.00	76.2/3.00	25.4/1.00	50.8/2.00	76.2/3.00
A2	36/1.42	70/2.76	105/4.13	36/1.42	70/2.76	105/4.13



Minimum center distance between two stacked circuit breakers

	H [mm/in]
A1	80/3.15
A2	400/15.75



Caption

- ① Connection not insulated
- ② Insulated cable
- ③ Cable terminal

Notes

Notes

Notes

Notes

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