Measuring and monitoring relays
Single- and three-phase

Power and productivity
for a better world™

Current and voltage monitoring relays
Monitoring the parameters of single-phase mains

Applications of current and voltage monitoring relays in single-phase mains

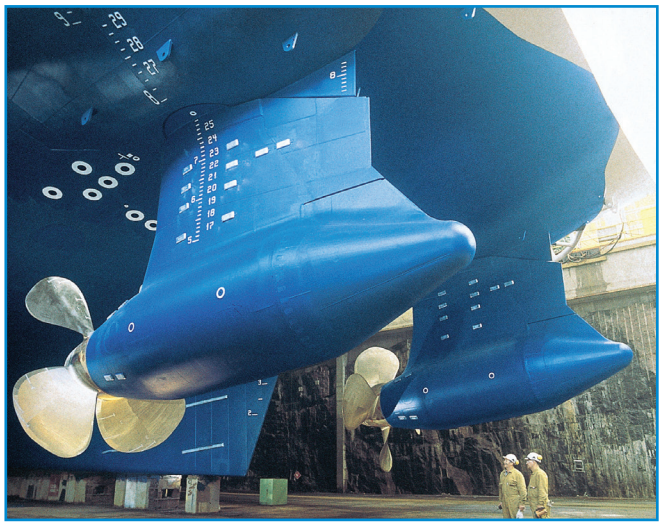
For the monitoring of currents and voltages in single-phase AC/DC systems, ABB's CM range contains a wide selection of powerful and compact devices all in only 22.5 mm wide. This meauring range includes current and voltage monitoring relays for over- and undercurrent protection, over- and undervoltage protection and phase loss monitoring – from 3 mA to 15 A and from 3 V to 600 V. Incorporating ABB's long-term experience the CM range provides highest safety and reliability for your electric installation.

Current monitoring
The ABB current monitoring relays CM-SRS.xx reliably monitor currents which exceed or fall below the selected threshold value. The functions overcurrent or undercurrent monitoring can be preselected. Single- and multifunction devices for 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 the right solution if the application requires the simultaneous monitoring of over- and undercurrents.

Voltage monitoring
The ABB voltage monitoring relays CM-ESS.xx are used to monitor direct and alternating voltages within a range of 3 to 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.



Three-phase monitoring relays
Monitoring the parameters in three-phase mains

Applications for three-phase monitoring relays in three-phase mains

Only reliable and continuous monitoring of three-phase networks guarantees trouble-free and economic operation of machines and installations. Thus, the three-phase monitoring relays of the CM range monitor the phase voltages, phase sequence, phase unbalance and phase loss.

Monitoring for over- and undervoltage

All electric devices can be damaged when operated continuously at voltages over or under their rated values. An overvoltage could potentially cause heating within the device. If the temperature is unduly high, component parts and thus whole devices or installations may fail or may be destroyed. Undervoltages involve the risk that the switching elements reach an undefined state. In this case, parts of the installation still function, but not others. This misoperation can result in damage of the product or installation. In the worst case, wrong voltages may even cause harm to the operating personnel.

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 monitoring relays with phase unbalance monitoring can reliably detect this critical situation.

Phase failure detection

In case of a phase loss, undefined states of the installation are likely to occur. E.g. the startup process of motors is disturbed. All three-phase monitoring relays of the ABB CM range detect a phase loss as soon as the voltage of one phase drops below 60 % of its nominal value.

Phase sequence monitoring

A change of the phase sequence during operation or an incorrect phase sequence that is applied at start-up will cause a three-phase motor to run with reverse rotation. Certain motors when operated in the reverse direction will cause severe damage to connected loads such as pumps, screw compressors and fans. Especially for non-fixed or portable equipment, such as construction machinery, phase sequence detection prior to the start-up process is highly recommended. ABB offers three-phase monitoring relays with selectable phase sequence monitoring. This provides the capability of ignoring phase sequence conditions for applications, such as motors with forward and reverse rotation, where the phase sequence is

Interrupted neutral

Under normal conditions, individual phase voltages are equal and the load causes the individual phase currents to vary. Systems that have neutral conductors accommodate this variation by a compensating current flow through the neutral conductor. If the neutral conductor breaks, the compensating current can no longer flow. As a result, the voltage is divided asymmetrically on the individual phases. This means that over- and undervoltages are produced in the individual phases and these can damage or even destroy the connected consumers. ABB offers three-phase monitoring relays that monitor the neutral conductor for interrupted neutral. The interruption of the neutral is detected by means of phase balance monitoring.

Automatic phase sequence correction

The new generation of ABB three-phase monitoring relays offers devices with automatic phase sequence correction. If phase sequence monitoring and phase sequence correction are activated, and in conjunction with a reversing contactor combination, it is ensured that for any non-fixed or portable equipment, e.g. construction machinery, the correct phase sequence is applied to the input terminals of the load.

Current and voltage monitoring relays for single-phase AC/DC currents

Current monitoring relays

Voltage monitoring relays

Single-phase voltage and current monitoring relays protect sensitive equipment and control systems against undervoltage (brownout) or undercurrent events or overvoltage or overcurrent events. Different units with adjustable or fixed threshold values (trip points) are available.
All devices are available with two different terminal versions. You can choose between the proven screw connection technology (double-chamber cage connection terminals) and the completely tool-free Easy Connect Technology (push-in terminals).

Characteristics of current monitoring relays

- Monitoring of DC and AC currents (3 mA to 15 A)
- TRMS measuring principle
- One device includes 3 measuring ranges
- Over- and/or undercurrent monitoring configurable [1)]
- CM-SFS.2 and CM-SRS.M: Latching function configurable
- Hysteresis adjustable (3-30 %) or fixed hysteresis (5 %) [1)]
- Precise adjustment by front-face operating controls
- Screw connection technology or Easy Connect Technology available
- Housing material for highest fire protection classification UL 94 V-0
- Tool-free mounting on DIN rail as well as demounting
- 22.5 mm (0.89 in) width
- 3 LEDs for status indication

[1)] depending on device

Characteristics of voltage monitoring relays

- Monitoring of DC and AC voltages (3-600 V)
- TRMS measuring principle
- One device includes 4 measuring ranges
- Over- and/or undervoltage monitoring configurable [1)]
- CM-ESS.M and CM-EFS.2: Latching function configurable
- Hysteresis adjustable (3-30 %) or fixed hysteresis (5 %) [1)]
- Precise adjustment by front-face operating controls
- Screw connection technology or Easy Connect Technology available
- Housing material for highest fire protection classification UL 94 V-0
- Tool-free mounting on DIN rail as well as demounting
- 22.5 mm (0.89 in) width
- 3 LEDs for status indication

[1)] depending on device

Approvals for current and voltage monitoring relays

- UL 508, CAN/CSA C22.2 No.14
- GL (pending)
- GOST
- CB Scheme
- CCC
- RMRS

Marks for current and voltage monitoring relays

- CE
- C-Tick

Single- / multifunctional monitoring relays for monitoring of three-phase mains

Singlefunctional

Multifunctional

The reliable and continuous monitoring of three-phase networks guarantees trouble-free and economic operation of machines and installations.
The most multifunctional devices in the EPR assortment are the CM-MPS/N monitoring relays for rated voltage levels up to 820 V AC and 400 Hz. Additionally a variety of economic and cost-efficient three-phase monitoring relays are offered in this range with specialized functionality.
Most devices are available with two different terminal versions. You can choose between the proven screw connection technology (double-chamber cage connection terminals) and the completely tool-free Easy Connect Technology (push-in terminals).

Characteristics

- Monitoring of three-phase mains for phase sequence (can be switched off), phase failure, phase unbalance over- and undervoltage [1)]
- TRMS measuring principle
- Threshold values are adjustable as absolute values [1)]
- Powered by the measuring circuit
- Precise adjustment by front-face operating controls
- Screw connection technology or Easy Connect Technology available
- Housing material for highest fire protection classification UL 94 V-0
- Tool-free mounting on DIN rail as well as demounting
- S-range: 22.5 mm (0.89 in) width
- N-range : 45 mm (1.78 in) width
- 3 LEDs for status indication

[1)] depending on device

Approvals

	UL 508, CAN/CSA C22.2 No.14	(CM-PVS.81 pending, not for CM-MPN.72)
	GL	(pending)
	GOST	
	CB Scheme	(pending)
	CCC	(CM-PVS.81 pending)

Marks

	CE	
	C-Tick	(CM-PVS.81 pending)

Current and voltage monitoring relays
Ordering data

Type	Rated control supply voltage	Connection technology	Measuring ranges	Order code
CM-SRS.11P	24-240 V AC/DC	Push-in terminals	3-30 mA, 10-100 mA, 0.1-1 A	1SVR 740 840 R0200
	110-130 V AC			1SVR 740 841 R0200
	220-240 V AC			1SVR 740 841 R1200
CM-SRS.11S	24-240 V AC/DC	Screw terminals	3-30 mA, 10-100 mA, 0.1-1 A	1SVR 730 840 R0200
	110-130 V AC			1SVR 730 841 R0200
	220-240 V AC			1SVR 730 841 R1200
CM-SRS.12S	24-240 V AC/DC	Screw terminals	0.3-1.5 A, 1-5 A, 3-15 A	1SVR 730 840 R0300
	110-130 V AC			1SVR 730 841 R0300
	220-240 V AC			1SVR 730 841 R1300
CM-SRS.21S	24-240 V AC/DC	Screw terminals	3-30 mA, 10-100 mA, 0.1-1 A	1SVR 730 840 R0400
	110-130 V AC			1SVR 730 841 R0400
	220-240 V AC			1SVR 730 841 R1400
CM-SRS.21P	24-240 V AC/DC	Push-in terminals		1SVR 740 840 R0400
	110-130 V AC			1SVR 740 841 R0400
	220-240 V AC			1SVR 740 841 R1400
CM-SRS.22S	24-240 V AC/DC	Screw terminals	0.3-1.5 A, 1-5 A, 3-15 A	1SVR 730 840 R0500
	110-130 V AC			1SVR 730 841 R0500
	220-240 V AC			1SVR 730 841 R1500
CM-SRS.M1P	24-240 V AC/DC	Push-in terminals	3-30 mA, 10-100 mA, 0.1-1 A	1SVR 740 840 R0600
CM-SRS.M1S		Screw terminals		1SVR 730 840 R0600
CM-SRS.M2S			0.3-1.5 A, 1-5 A, 3-15 A	1SVR 730 840 R0700
CM-SFS.21P	24-240 V AC/DC	Push-in terminals	3-30 mA, 10-100 mA, 0.1-1 A	1SVR 740 760 R0400
CM-SFS.21S		Screw terminals		1SVR 730 760 R0400
CM-SFS.22S			0.3-1.5 A, 1-5 A, 3-15A	1SVR 730 760 R0500
CM-ESS.1P	24-240 V AC/DC	Push-in terminals	3-30 V, 6-60 V, 30-300 V, 60-600 V	1SVR 740 830 R0300
	110-130 V AC			1SVR 740 831 R0300
	220-240 V AC			1SVR 740 831 R1300
CM-ESS.1S	24-240 V AC/DC	Screw terminals	3-30 V, 6-60 V, 30-300 V, 60-600 V	1SVR 730 830 R0300
	110-130 V AC			1SVR 730 831 R0300
	220-240 V AC			1SVR 730 831 R1300
CM-ESS.1P	24-240 V AC/DC	Push-in terminals	3-30 V, 6-60 V, 30-300 V, 60-600 V	1SVR 740 830 R0300
	110-130 V AC			1SVR 740 831 R0300
	220-240 V AC			1SVR 740 831 R1300
CM-ESS.1S	24-240 V AC/DC	Screw type terminals	3-30 V, 6-60 V, 30-300 V, 60-600 V	1SVR 730 830 R0300
	110-130 V AC			1SVR 730 831 R0300
	220-240 V AC			1SVR 730 831 R1300
CM-ESS.1P	24-240 V AC/DC	Push-in terminals	3-30 V, 6-60 V, 30-300 V, 60-600 V	1SVR 740 830 R0300
	110-130 V AC			1SVR 740 831 R0300
	220-240 V AC			1SVR 740 831 R1300
CM-ESS.1S	24-240 V AC/DC	Screw type terminals	3-30 V, 6-60 V, 30-300 V, 60-600 V	1SVR 730 830 R0300
	110-130 V AC			1SVR 730 831 R0300
	220-240 V AC			1SVR 730 831 R1300
CM-ESS.MP	24-240 V AC/DC	Push-in terminals	3-30 V, 6-60 V, 30-300 V, 60-600 V	1SVR 740 830 R0500
CM-ESS.MS		Screw type terminals		1SVR 730 830 R0500
CM-ESS.MP	24-240 V AC/DC	Push-in terminals	3-30 V, 6-60 V, 30-300 V, 60-600 V	1SVR 740 830 R0500
CM-ESS.MS		Screw type terminals		1SVR 730 830 R0500
CM-EFS.2P	24-240 V AC/DC	Push-in terminals	3-30 V, 6-60 V, 30-300 V, 60-600 V	1SVR 740 750 R0400
CM-EFS.2S	24-240 V AC/DC	Screw type terminals	3-30 V, 6-60 V, 30-300 V, 60-600 V	1SVR 730 750 R0400

Three-phase monitoring relays
Ordering data

Type	Rated control supply voltage = measuring voltage	Interrupted neutral monitoring	Connection technology	Order code
CM-MPS.11P	3 x 90-170 V AC	yes	Push-in terminals	1SVR 740 885 R1300
CM-MPS.11S		yes	Screw terminals	1SVR 730 885 R1300
CM-MPS.21P	3 x 180-280 V AC	yes	Push-in terminals	1SVR 740 885 R3300
CM-MPS.21S		yes	Screw terminals	1SVR 730 885 R3300
CM-MPS.31P	3 x 160-300 V AC	no	Push-in terminals	1SVR 740 884 R1300
CM-MPS.31S		no	Screw terminals	1SVR 730 884 R1300
CM-MPS.41P	3 x 300-500 V AC	no	Push-in terminals	1SVR 740 884 R3300
CM-MPS.41S		no	Screw terminals	1SVR 730 884 R3300
CM-MPS.23P	3 x 180-280 V AC	yes	Push-in terminals	1SVR 740 885 R4300
CM-MPS.23S		yes	Screw terminals	1SVR 730 885 R4300
CM-MPS.43P	3 x 300-500 V AC	no	Push-in terminals	1SVR 740 884 R4300
CM-MPS.43S		no	Screw terminals	1SVR 730 884 R4300
CM-MPS.52P	3 x 350-580 V AC	no	Push-in terminals	1SVR 760 487 R8300
CM-MPS.52S		no	Screw terminals	1SVR 750 487 R8300
CM-MPS.62P	3 x 450-720 V AC	no	Push-in terminals	1SVR 760 488 R8300
CM-MPS.62S		no	Screw terminals	1SVR 750 488 R8300
CM-MPS.72P	3 x 530-820 V AC	no	Push-in terminals	1SVR 760 489 R8300
CM-MPS.72S		no	Screw terminals	1SVR 750 489 R8300
CM-PSS.31P	3 x 380 V AC	no	Push-in terminals	1SVR 740 784 R2300
CM-PSS.31S		no	Screw terminals	1SVR 730 784 R2300
CM-PSS.41P	3 x 400 V AC	no	Push-in terminals	1SVR 740 784 R3300
CM-PSS.41S		no	Screw terminals	1SVR 730 784 R3300
CM-PVS.31P	3 x 160-300 V AC	no	Push-in terminals	1SVR 740 794 R1300
CM-PVS.31S		no	Screw terminals	1SVR 730 794 R1300
CM-PVS.41P	3 x 300-500 V AC	no	Push-in terminals	1SVR 740 794 R3300
CM-PVS.41S		no	Screw terminals	1SVR 730 794 R3300
CM-PVS.81P	3 x 200-400 V AC	no	Push-in terminals	1SVR 740 794 R2300
CM-PVS.81S		no	Screw terminals	1SVR 730 794 R2300
CM-PAS.31P	3 x 160-300 V AC	no	Push-in terminals	1SVR 740 774 R1300
CM-PAS.31S		no	Screw terminals	1SVR 730 774 R1300
CM-PAS.41P	3 x 300-500 V AC	no	Push-in terminals	1SVR 740 774 R3300
CM-PAS.41S		no	Screw terminals	1SVR 730 774 R3300
CM-PBE	3 x 380-440 V AC, 220-240 V AC	yes	Screw terminals	1SVR 550 881 R9400
CM-PBE	3 x 380-440 V AC	no	Screw terminals	1SVR 550 882 R9500
CM-PVE	3 x 320-460 V AC, 185-265 V AC	yes	Screw terminals	1SVR 550 870 R9400
CM-PVE	3 x 320-460 V AC	no	Screw terminals	1SVR 550 871 R9500
CM-PFS	3 x 200-500 V AC	no	Screw terminals	1SVR 430 824 R9300

Contact us

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