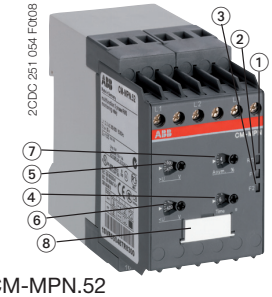
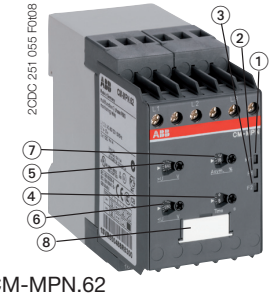
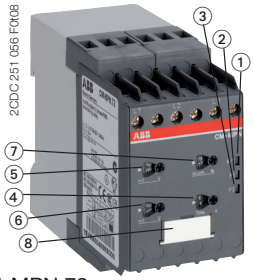
Multifunctional three-phase monitoring relays
CM-MPN.52, CM-MPN.62 and CM-MPN.72
Data sheet



CM-MPN.52



CM-MPN.62



CM-MPN.72

① R/T: yellow LED - relay status, timing
② F1: red LED - fault message
③ F2: red LED - fault message
④ Adjustment of the tripping delay t_V
⑤ Adjustment of the threshold value for overvoltage
⑥ Adjustment of the threshold value for undervoltage
⑦ Adjustment of the threshold value for phase unbalance
⑧ Function selection (see DIP switch functions) / Marker label

Features

- Monitoring of three-phase mains for phase sequence (can be switched off), phase failure, over- and undervoltage as well as phase unbalance
- Automatic phase sequence correction configurable
- Threshold values for phase unbalance, over- and undervoltage are adjustable as absolute values
- Tripping delay can be adjusted or switched off by means of a logarithmic scale
- ON-delayed or OFF-delayed tripping delay selectable
- Powered by the measuring circuit
- True RMS measuring principle
- 1x2 or 2x1 c/o (SPDT) contact configurable
- 3 LEDs for status indication

Approvals

	UL 508, CAN/CSA C22.2 No.14	(only CM-MPN.52 und CM-MPN.62)
	GL	
	GOST	
	CB scheme	
	CCC	

Marks

CE	CE
	C-Tick

Order data

Type	Rated control supply voltage = measuring voltage	Order code
CM-MPN.52	3 x 350-580 V AC	**1SVR 650 487 R8300**
CM-MPN.62	3 x 450-720 V AC	**1SVR 650 488 R8300**
CM-MPN.72	3 x 530-820 V AC	**1SVR 650 489 R8300**

Order data - Accessories

Type	Description	Order code
ADP.02	Adapter for screw mounting	**1SVR 440 029 R0100**
MAR.02	Marker label for devices with DIP switch	**1SVR 430 043 R0000**
COV.02	Sealable transparent cover	**1SVR 440 005 R0100**

Application

The CM-MPN.x2 are multifunctional monitoring relays for three-phase mains. They monitor the phase parameters phase sequence, phase failure, over- and undervoltage and phase unbalance.The threshold values for over- and undervoltage and phase unbalance are adjustable.

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Operating mode

Configuration of the devices is made by means of setting elements accessible on the front of the unit and signalling is made by means of front-face LEDs.

Adjustment potentiometer

Threshold values

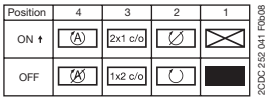
By means of three separate potentiometers with direct reading scales, the threshold values for over- and undervoltage as well as for phase unbalance can be adjusted within the measuring range.

	Measuring range for overvoltage	Measuring range for undervoltage	Measuring range for phase unbalance
CM-MPN.52	3 x 480-580 V AC	3 x 350-460 V AC	2-25 % of average of phase voltages
CM-MPN.62	3 x 600-720 V AC	3 x 450-570 V AC	
CM-MPN.72	3 x 690-820 V AC	3 x 530-660 V AC	

Tripping delay t_V

The tripping delay t_V can be adjusted within a range of 0.1-30 s by means of a potentiometer with logaritmic scale. By turning to the left stop, the tripping delay can be switched off.

DIP switches



DIP switch 1 = Timing function	
ON = ON-delayed ⊠	**OFF = OFF-delayed** ■
In case of a fault, the de-energizing of the output relays and the respective fault message are suppressed for the adjusted tripping delay t_V.	In case of a fault, the output relays de-energize instantaneously and a fault message is displayed and stored for the length of the adjusted tripping delay t_V. Thereby, also momentary undervoltage conditions are recognized.

DIP switch 2 = Phase sequence monitoring	
ON = Phase sequence monitoring deactivated	**OFF = Phase sequence monitoring activated**
Phase sequence errors will not be recognized.	The output relays de-energize as soon as a phase sequence error occurs. The output relays re-energize automatically as soon as the phase sequence is correct again.

DIP switch 3 = Operating principle of the output relays	
ON = 2x1 c/o (SPDT) contact 2x1 c/o	**OFF = 1x2 c/o (SPDT) contacts** 1x2 c/o
Depending on the configuration of automatic phase sequence correction and on the fault type, the output relays R1 (15-16/18) and R2 (25-26/28) react differently, if operating principle 2x1 c/o (SPDT) contact is selected. Auto. phase sequence correction deactivated: ■ Overvoltage: only 1st c/o (SPDT) contact R1 (15-16/18) switches ■ Undervoltage: only 2nd c/o (SPDT) contact R2 (25-26/28) switches ■ Phase unbalance, phase sequence, phase failure, interrupted neutral: both output relays R1 (15-16/18) and R2 (25-26/28) react synchronously Auto. phase sequence correction activated: ■ Overvoltage, undervoltage, phase unbalance, phase failure, interrupted neutral: only 1st c/o (SPDT) contact R1 (15-16/18) switches ■ Phase sequence: only 2nd c/o (SPDT) contact R2 (25-26/28) switches Operating principle 2x1 c/o (SPDT) contact is mandatory if automatic phase sequence correction is activated.	If operating principle 1x2 c/o (SPDT) contacts is selected, both output relays R1 (15-16/18) and R2 (25-26/28) react synchronously, independent of the fault type.

DIP switch 4 = Automatic phase sequence correction	
ON = Phase sequence correction activated	**OFF = Phase sequence correction deactivated**
In conjunction with a reversing contactor combination, it is ensured that the correct phase sequence is applied to the input terminals of the load.	No automatic phase sequence correction in case of phase sequence error.

LEDs

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	-	⎍⎍ alternating	
Overvoltage	-	⎍	-
Undervoltage	-	-	⎍
Phase unbalance	-	⎍	⎍
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 (SPDT) contacts
DIP switch 2 and 4 = ON: Phase sequence detection is deactivated and the automatic phase sequence correction is actived

Function descriptions/diagrams

Function diagram legend

Control supply voltage not applied / Output contact open / LED off
Control supply voltage applied / Output contact closed / LED glowing

Phase sequence and phase failure monitoring

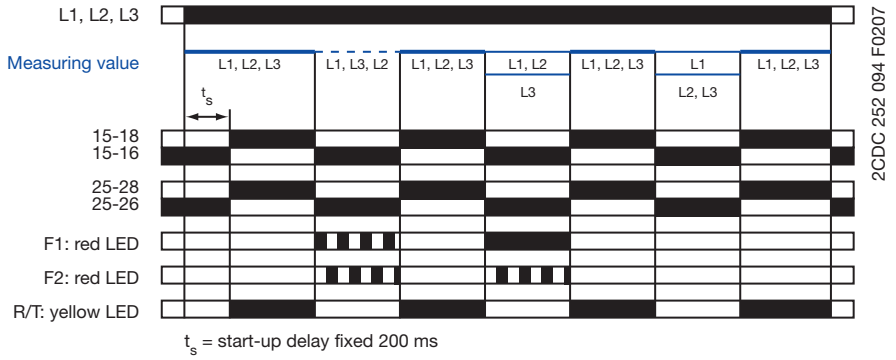
Applying control supply voltage begins the fixed start-up delay t_S. When t_S is complete and all phases are present with correct voltage, the output relays energize and the yellow LED R/T glows.

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.



t_s = start-up delay fixed 200 ms

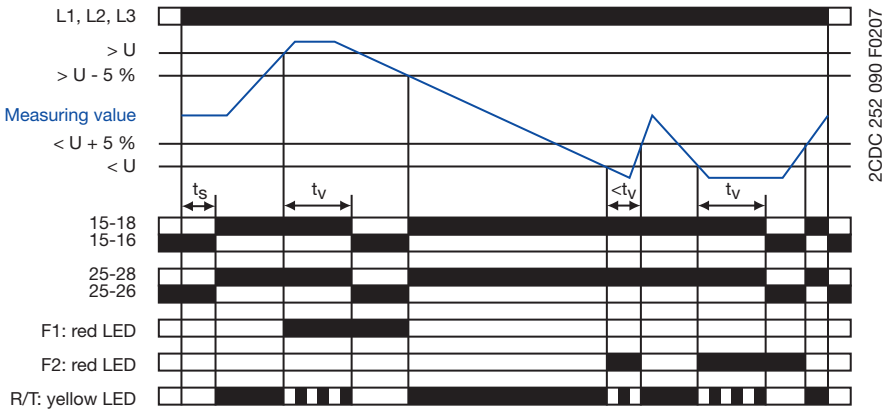
Over- and undervoltage monitoring 1x2 c/o (SPDT) contacts 1x2 c/o

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 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 %. The LED R/T glows.

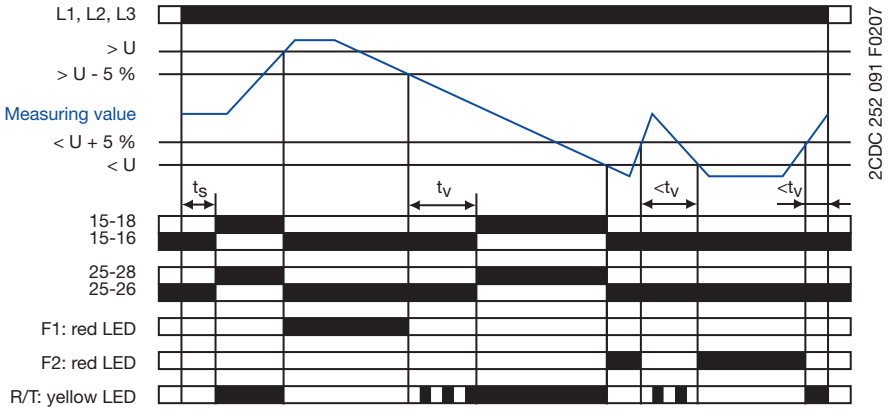


t_s = start-up delay fixed 200 ms
t_v = adjustable tripping delay

Type of tripping delay = OFF-delay ■

If the voltage to be monitored exceeds or falls below the set 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.



t_s = start-up delay fixed 200 ms
t_v = adjustable tripping delay

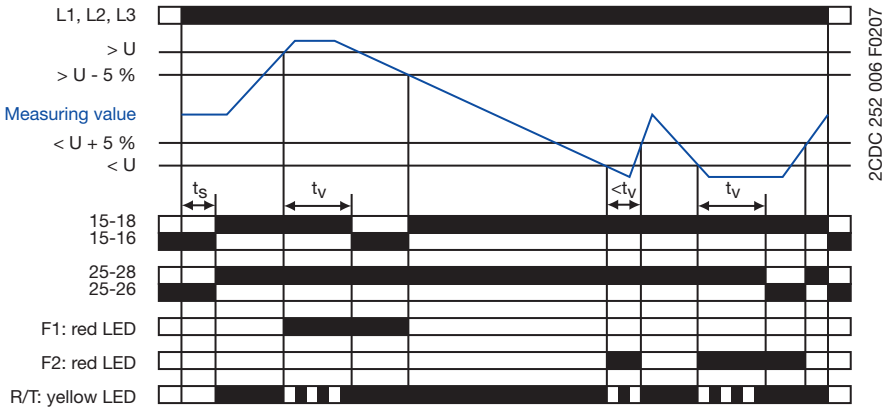
Over- and undervoltage monitoring 2x1 c/o (SPDT) contact 2x1 c/o

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 %.

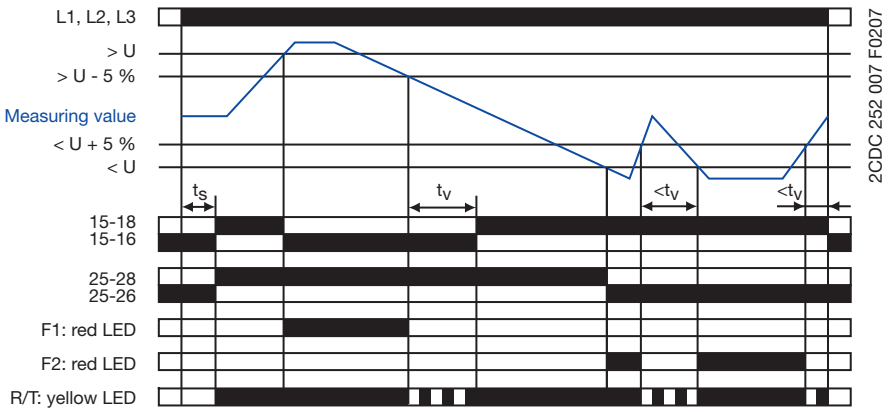


t_s = start-up delay fixed 200 ms
t_V = adjustable tripping delay

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.



t_s = start-up delay fixed 200 ms
t_V = adjustable tripping delay

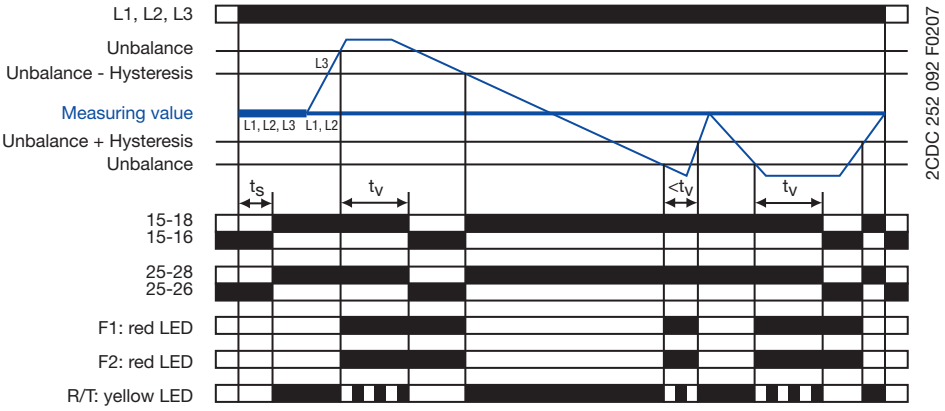
Phase unbalance monitoring

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.

The output relays re-energize automatically as soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 20 %. The LED R/T glows.

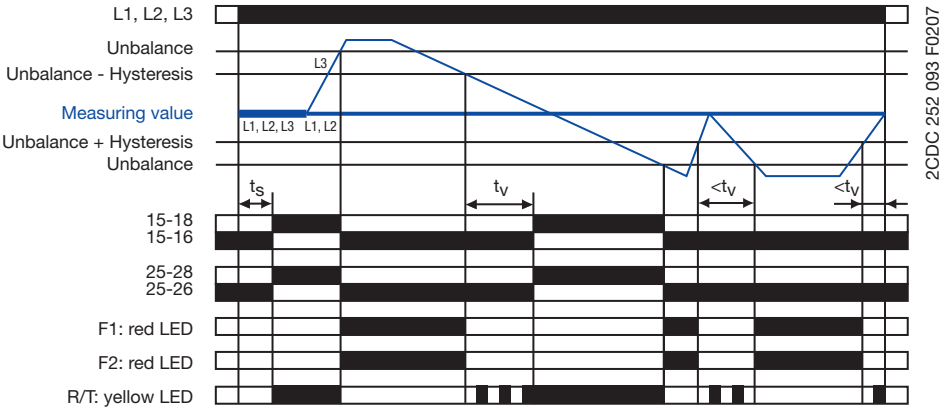


t_S = start-up delay fixed 200 ms
t_V = adjustable tripping delay

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.



t_S = start-up delay fixed 200 ms
t_V = adjustable tripping delay

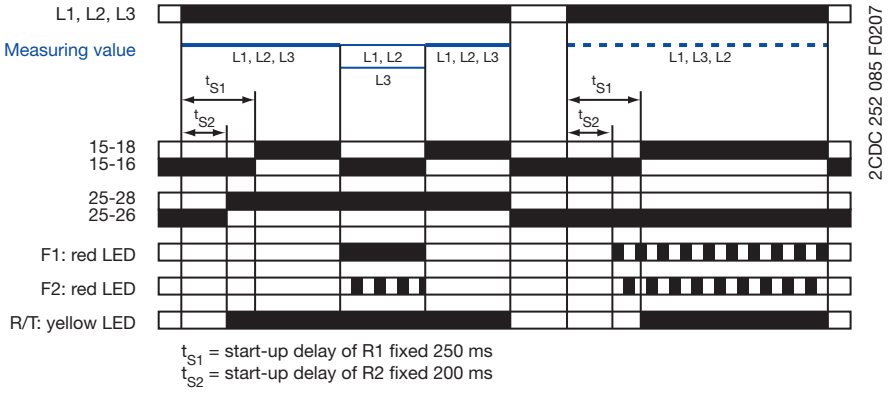
Automatic phase sequence correction

This function can be selected only if phase sequence monitoring is activated (DIP switch 3 = ON) and operating mode 2x1 c/o (SPDT) contact is selected (DIP switch 2 = OFF).

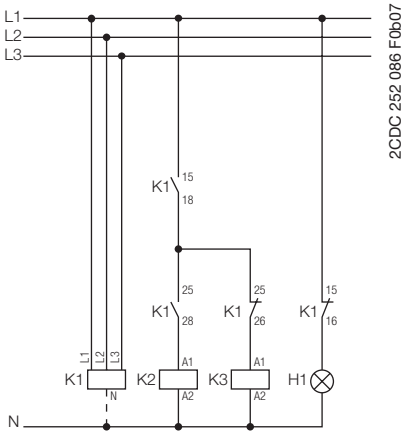
Applying control supply voltage begins the fixed start-up delay t_{S1}. When t_{S1} is complete and all phases are present with correct voltage, output relay R1 energizes. Output relay R2 energizes when the fixed start-up delay t_{S2} is complete and all phases are present with correct phase sequence. 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.

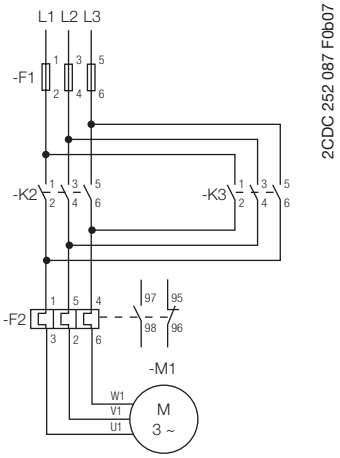
Output relay R2 is responsive only to a false phase sequence. In conjunction with a reversing contactor combination, this enables an automatic correction of the rotation direction. See circuit diagrams.



t_{S1} = start-up delay of R1 fixed 250 ms
t_{S2} = start-up delay of R2 fixed 200 ms

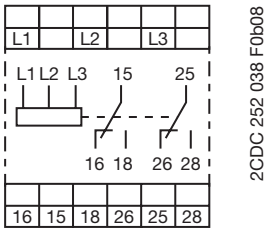


Control circuit diagram (K1 = CM-MPN.x2)



Power circuit diagram

Connection diagram



2CDC 252 038 F0b08

L1, L2, L3	Control supply voltage = measuring voltage
15-16/18	Output contacts -
25-26/28	closed-circuit principle

CM-MPN.52, CM-MPN.62, CM-MPN.72

Data at T_a = 25 °C and rated values, unless otherwise indicated

Type			CM-MPN.52	CM-MPN.62	CM-MPN.72
Input circuit = Measuring circuit				**L1, L2, L3**	
Rated control supply voltage U_S = measuring voltage			3 x 350-580 V AC	3 x 450-720 V AC	3 x 530-820 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			29 mA / 41 VA (480 V AC)	29 mA / 52 VA (600 V AC)	29 mA / 59 VA (690 V AC)
Measuring circuit				**L1, L2, L3**	
Monitoring functions		Phase failure	■	■	■
		Phase sequence		can be switched off	
		Automatic phase sequence correction		configurable	
		Over-/undervoltage	■	■	■
		Phase unbalance	■	■	■
		Interrupted neutral	-	-	-
Measuring range		Overvoltage	3 x 480-580 V AC	3 x 600-720 V AC	3 x 690-820 V AC
		Undervoltage	3 x 350-460 V AC	3 x 450-570 V AC	3 x 530-660 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				$\Delta U \leq 0.06$ % / °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	
Repeat accuracy (constant parameters)				< ±0.2 %	
Accuracy within the rated control supply voltage tolerance				$\Delta t \leq 0.5$ %	
Accuracy within the temperature range				$\Delta t \leq 0.06$ % / °C	
Indication of operational states				1 yellow LED, 2 red LEDs Details see operating mode and function description/diagrams	
Output circuits				**15-16/18, 25-26/28**	
Kind of output				2 x 1 or 1 x 2 c/o (SPDT) contacts configurable (Relays)	
Operating principle [1]				closed-circuit principle	
Contact material				AgNi alloy, Cd free	
Rated operational voltage U_e (IEC/EN 60947-1)				250 V	
Minimum switching power				24 V / 10 mA	
Maximum switching voltage				see load limit curve	
Rated operational current I_e (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	

Data at T_a = 25 °C and rated values, unless otherwise indicated

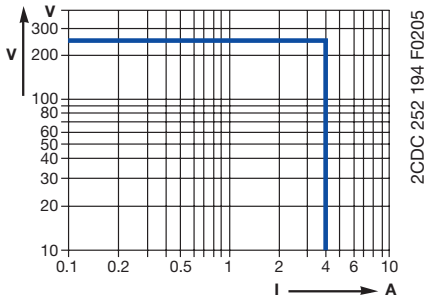
Type			CM-MPN.52	CM-MPN.62	CM-MPN.72
Mechanical lifetime			30 x 10^6 switching cycles		
Electrical lifetime (AC12, 230 V, 4 A)			0,1 x 10^6 switching cycles		
Maximum fuse rating to achieve short-circuit protection		n/c contact	10 A fast-acting		
		n/o contact	10 A fast-acting		
General data					
Duty time			100 %		
Dimensions (W x H x D)			45 x 78 x 100 mm (1.78 x 3.07 x 3.94 in)		
Weight			0.22 kg (0.49 lb)		
Mounting			DIN rail (IEC/EN 60715), snap-on mounting without any tool		
Mounting position			any		
Minimum distance to other units			not necessary		
Degree of protection		enclosure / terminals	IP50 / IP20		
Electrical connection					
Wire size	fine-strand with(out) wire end ferrule		2 x 0.75-2.5 mm² (2 x 18-14 AWG)		
	rigid		2 x 0.5-4 mm² (2 x 20-12 AWG)		
Stripping length			7 mm (0.28 inch)		
Tightening torque			0.6-0.8 Nm		
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					
Rated insulation voltage U_i	input circuit / output circuit		1000 V		
	output circuit 1 / output circuit 2		300 V		
Rated impulse withstand voltage U_{imp} (VDE 0110, IEC/EN 60664)		input circuit	8 kV; 1.2/50 µs		
		output circuit	4 kV; 1.2/50 µs		
Test voltage (type test) between	isolated output circuits		2.5 kV, 50 Hz, 1 s		
	input circuit and isolated output circuits		4 kV, 50 Hz, 1 s		
Basis isolation	input circuit / output circuit		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					
Product standard			IEC/EN 60255-6, 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		
electrostatic discharge		IEC/EN 61000-4-2	Level 3 (6 kV / 8 kV)		
radiated, radio-frequency, electro-magnetic 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			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

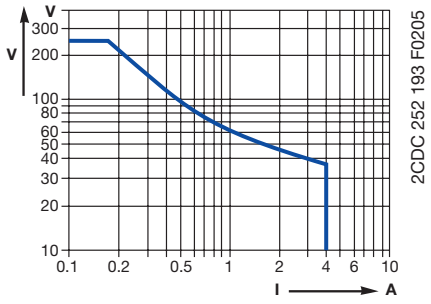
Technical diagrams

Load limit curves

AC load (resistive)

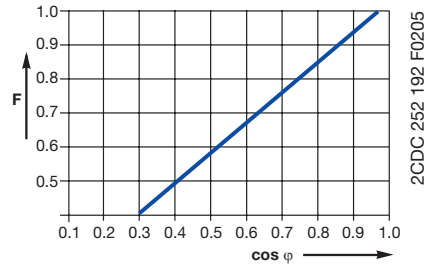


DC load (resistive)

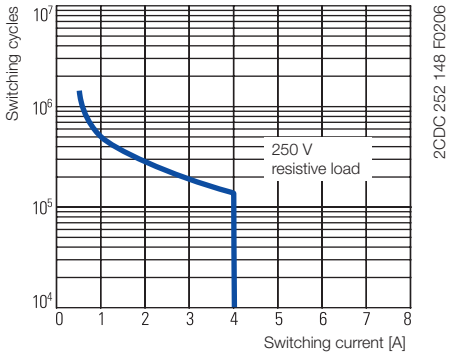


Derating factor F

at inductive AC load

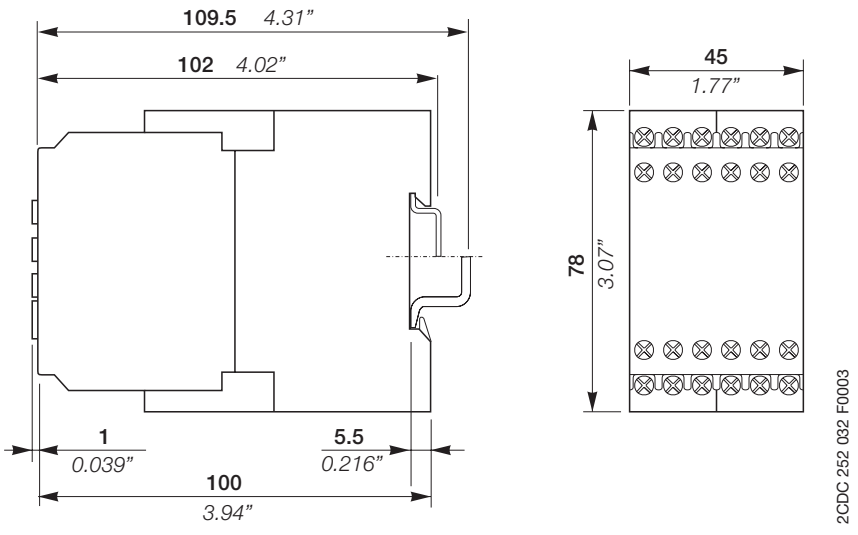


Contact lifetime

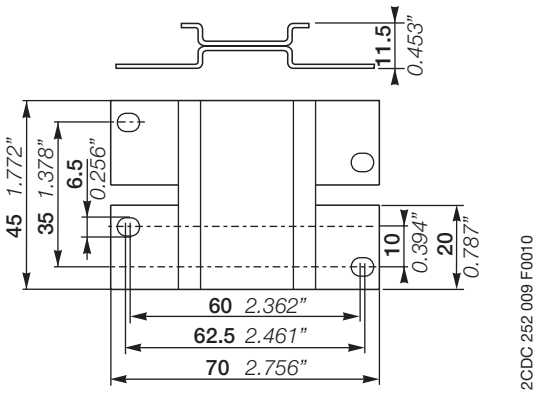


Dimensions

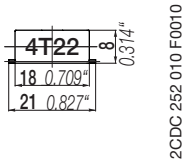
in mm



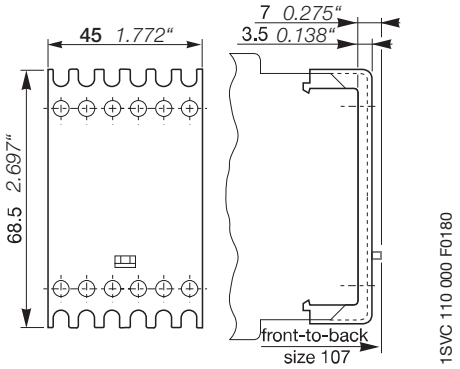
Dimensions - Accessories
in mm



ADP.02 - Adapter for screw mounting



MAR.02 - Marker label



COV.02 - Sealable transparent cover

Further documentation

Document title	Document type	Document number
Electronic Products and Relays	Technical catalogue	2CDC 110 004 C020x
CM-MPS.23, CM-MPS.43, CM-MPN.52, CM-MPN.62, CM-MPN.72	Instruction manual	1SVC 630 530 M0000

You can find the documentation online at www.abb.com/lowvoltage → Control Products → Electronic Relays and Controls

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Document number. 2CDC 112 128 D0201 (11/10)

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