Three-phase monitoring relays Product group picture



Three-phase monitoring relays Table of content

Three phase monitoring relays	
Product group picture	2/27
Table of contents	2/28
Benefits and advantages, Applications	2/29
Notes	2/30
Selection and conversion	2/31
Ordering details	2/33
Function diagrams	2/35
Connection diagrams, DIP switches	2/40
Connection diagrams, DIP switches, Rotary switches	2/41
Notes	2/42
Technical data	2/43

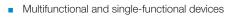
Three-phase monitoring relays Benefits and advantages, Applications

Characteristics of the CM range three-phase monitors

- Adjustable phase unbalance threshold value 1)
- Adjustable ON-delay/OFF-delay time 1)
- Dual frequency measuring 50/60 Hz
- Powered by the measuring circuit
- 1 n/o contact, 1 or 2 contacts
- LED status indication
- Approvals: (I) us (I) (CB scherus







- Phase loss monitoring
- Phase sequence monitoring 1)
- Over- and undervoltage monitoring (fixed or adjustable)1)
- Wide-range operating voltage guarantees world-wide operation

Phase unbalance monitoring

If the supply by the three-phase system is unbalanced due to uneven distribution of the load, the motor will convert a part of the energy into reactive power. This energy gets lost unexploited; also the motor is exposed to higher thermal strain. Other thermal protection devices fail to detect continuing unbalances which can lead to damage or destruction of the motor. The CM range three-phase monitors with phase unbalance monitoring can reliably detect this critical situation.

Phase sequence

Changing the phase sequence during operation or a wrong phase sequence prior to startup causes a change of the rotational direction of the connected device. Generators, pumps or fans rotate in the wrong direction and the installation is no longer working properly. Especially for moveable equipment, such as construction machinery, phase sequence detection prior to the startup process is highly reasonable.

Phase loss

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

Expanded functionality

ABB's new generation of three-phase monitoring relays feature additional functions making the application field for the devices considerably larger.

Selectable phase sequence monitoring

The phase sequence monitoring can be switched off by means of a rotary switch or a DIP switch. This enables monitoring of three-phase mains where phase sequence is not relevant for the application, for example in case of motors with forward and reverse rotation, heating applications, etc.

Voltage monitoring

All electric devices can be damaged when operated continuously in a network with out-of-range voltages. For example, safe starting is not ensured in case of undervoltage. Also, the switching state of a contactor is not clearly defined when operated in a "forbidden" voltage range. This can lead to undefined stats of the installtion and cause damage or destruction of valuable parts.

Structure of the type designation

 $CM-_ _x.yz$

x: width of enclosure

y: Control supply voltage / measuring range

1	110, 115, 120, 127 V supply systems (phase-neutral)
2	220, 230, 240 V supply systems (phase-neutral)
3	200, 208, 220, 230, 240, 257, 260 V supply systems (phase-phase)
4	440, 460 V supply systems (phase-phase)
5	480, 500 V supply systems (phase-phase)
6	575, 600 V supply systems (phase-phase)
7	660, 690 V supply systems (phase-phase)
8	200, 400 V supply systems (phase-phase)

z: Rated frequency / output circuit

1	50/60 Hz - 1x2 c/o
2	50/60 Hz – 1x2 or 2x1 c/o
3	50/60/400 Hz - 1x2 oder 2x1 c/o



- 1 Threshold value V_{min}/V_{max}
- 2 R/T: yellow LED Relay status, timing

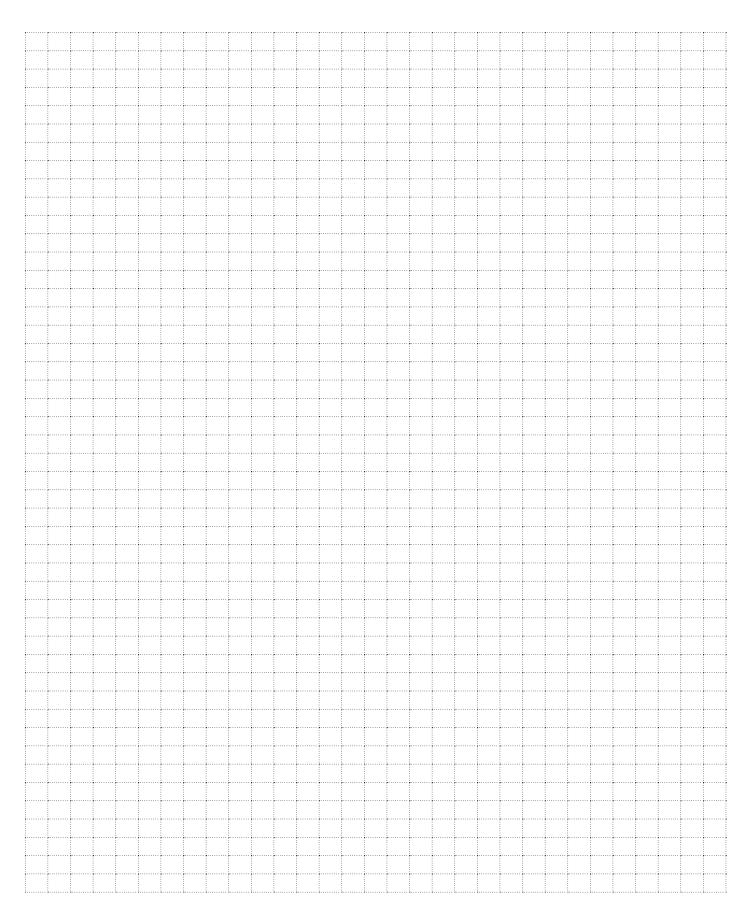
F1: red LED fault message

F2: red LED failure:

- overvoltage: F1
- undervoltage: F2
- phase unbalance: F1 and F2 constant
- phase loss: F1 on F2 flashing
- phase sequence: F1 and F2 alternately flashing
- 3 Adjustment of the tripping delay
- 4 Time setting 0.1-10 s Phase sequence and phase loss are indicated without any time delay

¹⁾ depending on device type

Three-phase monitoring relays Notes



Three-phase monitoring relays Selection and conversion

Three-phase monitoring relays	nber	8	00	00	00	00	00	00	000	003	000	000	000	00	00	00	000	000	003	000	00	003	00	000	00	
	order numbe	1SVR 550 881 R9400	882 R9500	870 R9400	871 R9500	1SVR 550 824 R9100	1SVR 430 824 R9300	1SVR 730 784 R2300	1SVR 740 784 R2300	1SVR 730 784 R3300	1SVR 740 784 R3300	1SVR 730 794 R1300	1SVR 740 794 R1300	1SVR 730 794 R3300	1SVR 740 794 R3300	1SVR 730 794 R2300	1SVR 740 794 R2300	1SVR 730 774 R1300	1SVR 740 774 R1300	1SVR 730 774 R3300	1SVR 740 774 R3300	1SVR 730 885 R1300	1SVR 740 885 R1300	1SVR 730 885 R3300	R3300	
	ord	881	882	870	871	824	824	784	784	784	784	794	794	794	794	794	794	774	774	774	774	885	885	885	885	
		550	550	550	550	550	430	730	740	730	740	730	740	730	740	730	740	730	740	730	740	730	740	730	740	
		N.	1SVR	1SVR	1SVR	N.	, W.	K	Ä.	K	M	W	WB	W	M	WB	WB	WB	MS	K	K	WR	K	W	1SVR 740 885	
	0	5	8	85	8	8	8	φ.	φ	5	8	5	\$	8	8	5	5	\$	φ.	φ.	8					
	Type							318	31P	41S	41P	318	31P	118	41 P	318	31P	318	31P	113	1	CM-MPS.11S	CM-MPS.11P	CM-MPS.21S	CM-MPS.21P	
		핆	H	Ã	Š	밅	FS	SS.	SS.	SS.	SS.	VS.	VS.	VS.	VS.	VS.8	VS.8	AS.	AS.	AS.	AS.	IPS.	IPS.	IPS.	IPS.	
Rated control supply voltage U _s		CM-PBE	CM-PBE	CM-PVE	CM-PVE	CM-PFE	CM-PFS	CM-PSS.31S	CM-PSS.31P	CM-PSS.41S	CM-PSS.41P	CM-PVS.31S	CM-PVS.31P	CM-PVS.41S	CM-PVS.41P	CM-PVS.81S	CM-PVS.81P	CM-PAS.31S	CM-PAS.31P	CM-PAS.41S	CM-PAS.41P	Σ	₹	M-N	Σ	
Phase to Phase		0	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	ပ	O	
160-300 V AC	I											-	•					•	•							
200-400 V AC	\perp	_														•	•									
200-500 V AC 208-440 V AC	+	\vdash				-	•																\vdash			
300-500 V AC	\dagger					-									•						•					
320-460 V AC				•																						
350-580 V AC	_																									
380 V AC 380-440 V AC	+							•	•																	
400 V AC		-	-								•															
450-720 V AC																										
530-820 V AC	丄												\Box													
Phase to Neutral 90-170 V AC	Т	Ι																	Г							Г
180-280 V AC																						-	-	•	•	
185-265 V AC				•																						
220-240 V AC 230 V AC	\bot	•																								
Rated frequency	_	_																								
50 Hz	Т																									
50/60 Hz	\perp	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	
50/60/400 Hz Suitable for monitoring		<u> </u>																								
Single-phase mains	Т	•																	П				•	•		
Three-phase mains		•	•	•	•	•	•	•	•	•		•		•	•	•		•	•	•	•	•	•	•	•	
Monitoring function Phase failure		_	Ι_	_	Γ_	Γ_	Γ_		_			_	_				_				Ι_	Ι_	_	_	_	
Phase sequence	+	-	-	-	-	-	-	ad	ad	ad	ad	■ ad	ad	■ ad	ad	■ ad	ad	-				■ ad	ad	ad	■ ad	
Automatic phase sequence correction																										
Overvoltage	╄	_		•				•	•	•	•	•	•	•	•	•	•							•		
Undervoltage Unbalance	+	<u> </u>		•	-			•	•	•	•	•	•	•	•	•	•	_	<u> </u>	_	_	-	-	-	-	
Neutral	+	-																-	-	-	-	-	-	-	-	
Overfrequency				_																					_	
Underfrequency	\perp			-	-							_					L.				L.					
Thresholds Timing functions for tripping delay		fix	fix	fix	fix	fix	fix	fix	fix	fix	fix	fix	fix	ad	ad	ad	ad	ad								
ON delay	Т	Π					fix											ad	ad	ad	ad	Π				
On and OFF delay		fix	fix	fix	fix	fix																				
ON or OFF delay	\perp							ad				_	ad	ad	ad	ad										
								R2300		R3300		R1300		R3300		0		R1300		R3300		R1300		R3300		
								R23		R33		R13		R33		230		R13		R3		R		R33		
								784		784		794		794		34R		774		774		885		885		
	1							630 7		630 7		630 7		630 794		075		30 7		630 7		630 8		630 8		
) B) N		B G) B		R63		H W) N		B B		B B		
								1SVR		1SVR		1SVR		1SVR		1SVR630794R2300		1SVR 630		1SVR		1SVR		1SVR		
	-	\vdash																								
									l	<u> -</u>	'	مم				مم					1	I I		C/I		
	sion							38.31		3S.41		/S.3		/S.4		/S.8		\S.3-		\S.4		PS.1		PS.2		
	Conversion							CM-PSS.31		CM-PSS.41		CM-PVS.31		CM-PVS.41		CM-PVS.81		CM-PAS.31		CM-PAS.41		CM-MPS.11		CM-MPS.21		

Three-phase monitoring relays Selection and conversion

CM-MPS.31	1SVR 630 884 R1300	ad	ad	•	•	■ ad		•						-	CM-MPS.31S	1SVR 730 884 R1300	_
		ad	ad	•	•	■ ad	-	•						-	CM-MPS.31P	1SVR 740 884 R1300	_
CM-MPS.41	1SVR 630 884 R4300	ad	ad	•		■ ad	-	•					•		CM-MPS.41S	1SVR 730 884 R4300	_
		ad	ad	-	•	■ ad		•					•		CM-MPS.41P	1SVR 740 884 R4300	_
CM-MPS.23	1SVR 630 885 R4300	ad	ad	-	-	ad ad	•	-		_					CM-MPS.23S	1SVR 730 885 R4300	_
		ad	ad	•	•	ad ad	:			-					CM-MPS.23P	1SVR 740 885 R4300	_
CM-MPS.43	1SVR 630 884 R4300	ad	ad	•	•	ad ad	-	-					•		CM-MPS.43S	1SVR 730 884 R4300	_
		ad	ad	-	-	ad ad	-	-					•		CM-MPS.43P	1SVR 740 884 R4300	_
CM-MPN.52	CM-MPN.52 1SVR 650 487 R8300	ad	ad	•	-	ad ad	•	•				-			CM-MPN.52S	1SVR 750 487 R8300	_
		ad	ad	•	•	ad ad	•	•				•			CM-MPN.52P	1SVR 760 487 R8300	_
CM-MPN.62	CM-MPN.62 1SVR 650 488 R8300	ad	ad	•	-	ad ad	-	•			•				CM-MPN.62S	1SVR 750 488 R8300	_
		ad	ad	•	•	ad ad	-	•			•				CM-MPN.62P	1SVR 760 488 R8300	_
CM-MPN.72	CM-MPN.72 1SVR 650 489 R8300	ad	ad	•	•	ad ad	-	•			_				CM-MPN.72S	1SVR 750 489 R8300	_
		ad	ad	•	•	ad ad	•	•			_				CM-MPN.72P	1SVR 760 489 R8300	_
CM-UFS.2	1SVR 630 736 R1300		fix fix	IIX	fix fix	fix	:		-		-				CM-UFS.2S	1SVR 730 736 R1300	_
			fix fix	IIX	fix fix	fix	•				-				CM-UFS.2P	1SVR 740 736 R1300	_

Three-phase monitoring relays Ordering details



CM-PBE



CM-PSS.41P



Description

Only reliable and continuous monitoring of a three-phase network guarantees the trouble-free and economic operation of machines and installations.t

Ordering details

Rated control supply voltage = measuring voltage	Monitoring function	Neutral moni- toring	Туре	Order code	Price 1 pce	Weight (1 pce) kg (lb)
3x380-440 V AC, 220-240 V AC	Phase failure detection	yes	CM-PBE ¹⁾	1SVR550881R9400		0.08 (0.17)
3x380-440 V AC	(Single- and three-phase)	no	CM-PBE	1SVR550882R9500		0.08 (0.17)
3x320-460 V AC, 185-265 V AC	Over- / under- voltage and phase failure	yes	CM-PVE 1)	1SVR550870R9400		0.08 (0.17)
3x320-460 V AC	detection (Single- and three-phase)	no	CM-PVE	1SVR550871R9500		0.08 (0.17)
3x208-440 V AC	Phase sequence monitoring and		CM-PFE ²⁾	1SVR550824R9100		0.08 (0.17)
3x200-500 V AC	phase failure detection (Three-phase)		CM-PFS ²⁾	1SVR430824R9300		0.15 (0.33)
0000.\/ AO			CM-PSS.31S	1SVR730784R2300		0.132 (0.291)
3x380 V AC	Over- / under-		CM-PSS.31P	1SVR740784R2300		0.123 (0.271)
2:400 \ \ A C	voltage with fixed threshold values ± 10 %		CM-PSS.41S	1SVR740784R3300		0.132 (0.291)
3x400 V AC			CM-PSS.41P	1SVR730784R3300		0.123 (0.271)
3x160-300 V AC			CM-PVS.31S	1SVR730794R1300		0.141 (0.311)
3X100-300 V AC	Over- and		CM-PVS.31P	1SVR740794R1300		0.132 (0.291)
3x300-500 V AC	under- voltage with adiustable		CM-PVS.41S	1SVR730794R3300		0.139 (0.306)
3X300-300 V AC	threshold values (Three-		CM-PVS.41P	1SVR740794R3300		0.131 (0.289)
3x200-400 V AC	phase) `		CM-PVS.81S	1SVR730794R2300		0.136 (0.300)
3A2UU-4UU V AU			CM-PVS.81P	1SVR740794R2300		0.128 (0.282)
3x160-300 V AC			CM-PAS.31S	1SVR730774R1300		0.133 (0.293)
3X100-300 V AC	Phase unba-		CM-PAS.31P	1SVR740774R1300		0.124 (0.273)
3x300-500 V AC	lance (Three- phase)		CM-PAS.41S	1SVR730774R3300		0.132 (0.291)
3X3UU-3UU V AC			CM-PAS.41P	1SVR740774R3300		0.123 (0.271)



¹⁾ The version with neutral monitoring is also suitable for monitoring single-phase mains. For this, all three external conductors (L1,L2,L3) have to be

²⁾ For applications where a reverse fed voltage >60% is expected, we recommend to use our three-phase monitoring relays for unbalance CM-PAS.xx

Three-phase monitoring relays Ordering details



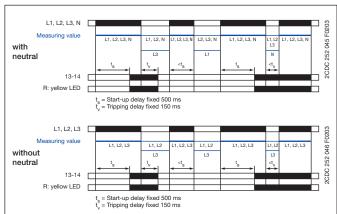
CM-MPS.23P



CM-MPN.52P

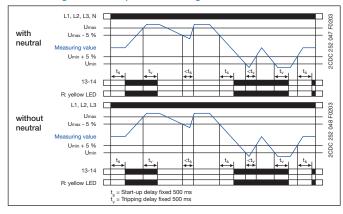
Rated control supply voltage = measuring voltage	Monitoring function	Neutral moni- toring	Туре	Order code	Price 1 pce	Weight (1 pce) kg (lb)
00 170 \/ AC			CM-MPS.11S	1SVR730885R1300		0.148 (0.326)
90-170 V AC	Multifunctional		CM-MPS.11P	1SVR740885R1300		0.137 (0.302)
100 000 V AC	(Three-phase phase failure	yes	CM-MPS.21S	1SVR730885R3300		0.146 (0.322)
180-280 V AC	detection, Phase		CM-MPS.21P	1SVR740885R3300		0.135 (0.298)
	sequence monitoring, overvoltage,		CM-MPS.31S	1SVR730884R1300		0.142 (0.313)
0.000.500.4.40	undervoltage, Phase unba-		CM-MPS.31P	1SVR740884R1300		0.133 (0.293)
3x300-500 V AC	lance)	no	CM-MPS.41S	1SVR730884R3300		0.140 (0.309)
			CM-MPS.41P	1SVR740884R3300		0.132 (0.291)
180-280 V AC			CM-MPS.23S	1SVR730885R4300		0.149 (0.328)
100-200 V AC		yes	CM-MPS.23P	1SVR740885R4300		0.138 (0.304)
3x300-500 V AC	Multifunctional	no	CM-MPS.43S	1SVR730884R4300		0.148 (0.327)
3X300-300 V AC	(Three-phase phase failure detection.	TIO	CM-MPS.43P	1SVR740884R4300		0.137 (0.302)
0.050 500 1/ 40	Phase sequence		CM-MPN.52S	1SVR750487R8300		0.230 (0.507)
3x350-580 V AC	monitoring, overvoltage, undervoltage,		CM-MPN.52P	1SVR760487R8300		0.226 (0.498)
0.450.700.V.40	Phase unba- lance)		CM-MPN.62S	1SVR750488R8300		0.229 (0.505)
3x450-720 V AC	ŕ	no	CM-MPN.62P	1SVR760488R8300		0.225 (0.496)
0500 000 \/ AC	•		CM-MPN.72S	1SVR750489R8300		0.224 (0.494)
3x530-820 V AC			CM-MPN.72P	1SVR760489R8300		0.220 (0.485)
3 x 400 V AC (L-L) /	see Three-		CM-UFS.2S	1SVR730736R1300		0.146 (0.322)
230 V AC (L-N)	Phase overview page	yes	CM-UFS.2P	1SVR740736R1300		0.134 (0.295)

Function diagrams - Three-phase monitoring CM-PBE



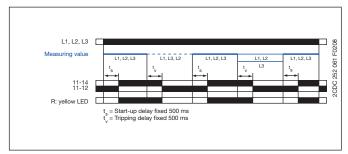
If all phases (and the neutral) are present, the output relay energizes after the start-up delay to is complete. If a phase failure occurs, the tripping delay t starts. When timing is complete, the output relay de-energizes. As soon as the voltage returns to the tolerance range, timing of to starts. When timing is complete, the output relay reenergizes automatically. The yellow LED glows when the output relay

Function diagrams - Three-phase monitoring CM-PVE



If all phases (and the neutral) are present with correct voltage, the output relay energizes after the start-up delay to is complete. If the voltage exceeds or falls below the fixed threshold value or if a phase failure occurs, the tripping delay t, starts. When timing is complete, the output relay de-energizes. As soon as the voltage returns to the tolerance range, timing of t_s starts. When timing is complete, the output relay re-energizes automatically. The yellow LED glows when the output relay is energized.

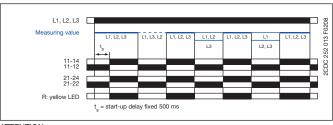
Function diagram - CM-PFE



If all phases are present with the correct phase sequence, the output relay energizes after the start-up delay $\boldsymbol{t}_{_{\!S}}$ is complete. If a phase failure or a phase sequence error occurs, the tripping delay to starts. When timing is complete, the output relay de-energizes. The yellow LED glows when the output relay is energized.

In case of motors which continue running with only two phases, the CM-PFE detects phase failure if the reverse fed voltage is less than 60 % of the originally applied voltage.

Function diagram - CM-PFS



ATTENTION

If several CM-PFS units are placed side by side and the control supply voltage is higher than 415 V, spacing of at least 10 mm has to be kept between the individual units

If all phases are present with the correct phase sequence, the output relay energizes after the start-up delay to is complete. If a phase failure or a phase sequence error occurs, the output relay de-energizes instantaneous. The yellow LED glows when the output relay is ener-

In case of motors which continue running with only two phases, the CM-PFS detects phase failure if the reverse fed voltage is less than 60 % of the originally applied voltage.

Phase sequence and phase failure monitoring CM-PSS.xx, CM-PVS.xx, CM.PAS.xx, CM-MPS.xx, CM-MPN.xx

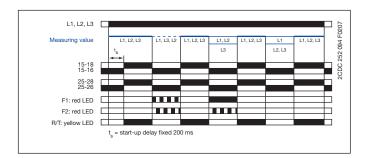
Applying control supply voltage begins the fixed start-up delay t_s. When ts is complete and all phases are present with correct voltage, the output relays energize and the yellow LED R/T glows.

Phase sequence monitoring

If phase sequence monitoring is activated, the output relays deenergize as soon as a phase sequence error occurs. The fault is displayed by alternated flashing of the LEDs F1 and F2. The output relays reenergize automatically as soon as the phase sequence is correct again.

Phase failure monitoring

The output relays de-energize instantaneous if a phase failure occurs. The fault is indicated by lightning of LED F1 and flashing of LED F2. The output relays re-energize automatically as soon as the voltage returns to the tolerance range.



Interrupted neutral monitoring CM-MPS.11, CM-MPS.21, CM-MPS.23

The interruption of the neutral in the main to be monitored is detected by means of phase unbalance evaluation.

Determined by the system, in case of unloaded neutral, i.e. symmetrical load between all three phases, it may happen that an interruption of the neutral will not be detected.

If the star point is displaced by asymmetrical load in the three-phase main, an interrupted neutral will be detected.

Displacement of the star point



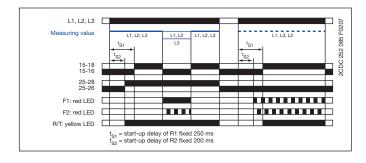
Automatic phase sequence correction CM-MPS.x3, CM-MPN.x2

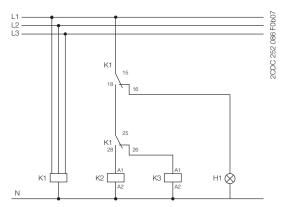
This function can be selected only if phase sequence monitoring is activated and operating mode 2x1 c/o (SPDT) contact is selected.

Applying control supply voltage begins the fixed start-up delay t_{s_1} . 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 \mathbf{t}_{S2} is complete and all phases are present with correct phase sequence. Output relay R2 remains de-energized if the phase sequence is incorrect.

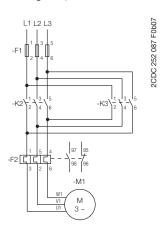
If the voltage to be monitored exceeds or falls below the set threshold values for phase unbalance, over- or undervoltage or if a phase failure occurs, output relay R1 de-energizes and the LEDs F1 and F2 indicate the fault.

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





Control circuit diagram (K1 = CM-MPS.xx or CM-MPN.xx)



Power circuit diagram

Over- and undervoltage monitoring 1x2 c/o

CM-PSS.xx1, CM-PVS.xx2, CM-MPS.xx2, CM-MPN.xx2

Applying control supply voltage begins the fixed start-up delay $t_{\rm s}.$ When $t_{\rm s}$ is complete and all phases are present with correct voltage and with correct phase sequence, the output relays energize and the yellow LED R/T glows.

Type of tripping delay = ON-delay

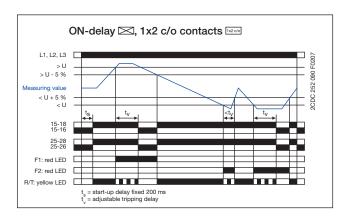
If the voltage to be monitored exceeds or falls below the fixed¹⁾ or set²⁾ threshold value, the output relays de-energize after the set tripping delay $\mathbf{t}_{_{\mathrm{V}}}$ is complete. The LED R/T flashes during timing and turns off as soon as the output relays de-

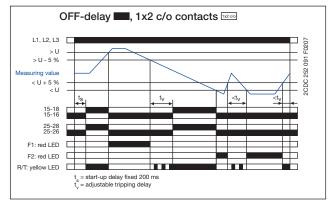
The output relays re-energize automatically as soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 % and the LED R/T glows.

Type of tripping delay = OFF-delay

If the voltage to be monitored exceeds or falls below the fixed¹⁾ or set²⁾ threshold value, the output relays de-energize instantaneously and the LED R/T turns off.

As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %, the output relays re-energize automatically after the set tripping delay $t_{\mbox{\tiny N}}$ is complete. The LED R/T flashes during timing and turns steady when timing is complete.





Over- and undervoltage monitoring 2x1 c/o

CM-MPS.x3, CM-MPN.x2

Applying control supply voltage begins the fixed start-up delay t_s. When ts 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

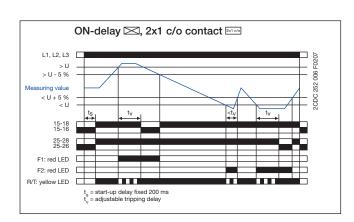
If the voltage to be monitored exceeds or falls below the set threshold value, output relay R1 (overvoltage) or output relay R2 (undervoltage) de-energizes after the set tripping delay t, is complete. The LED R/T flashes during timing.

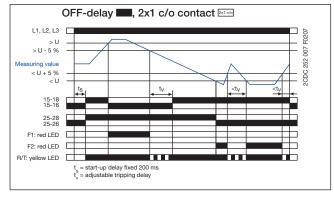
The corresponding output relay re-energizes automatically as soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %.

Type of tripping delay = OFF-delay

If the voltage to be monitored exceeds or falls below the set threshold value, output relay R1 (overvoltage) or output relay R2 (undervoltage) de-energizes instantaneously.

As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %, the corresponding output relay reenergizes automatically after the set tripping delay t, is complete. The LED R/T flashes during timing.





Phase unbalance monitoring CM-PAS.xx, CM-MPS.xx, CM-MPN.xx

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

Type of tripping delay = ON-delay

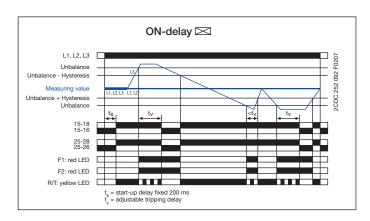
If the voltage to be monitored exceeds or falls below the set phase unbalance threshold value, the output relays de-energize after the set tripping delay $\boldsymbol{t}_{\boldsymbol{v}}$ is complete. The LED R/T flashes during timing and turns off as soon as the output relavs de-energize.

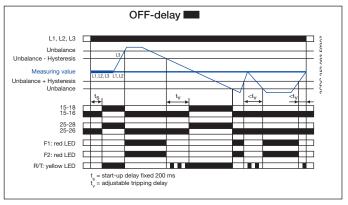
The output relays re-energize automatically as soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 20 % and the LED R/T glows.

Type of tripping delay = OFF-delay

If the voltage to be monitored exceeds or falls below the set phase unbalance threshold value, the output relays de-energize instantaneously and the LED R/T turns

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





LED functions CM-PSS.xx, CM-PSV.xx, CM-PAS.xx, CM-MPS.xx, CM-MPN.xx

Function	R/T:	F1:	F2:
	yellow LED	red LED	red LED
Control supply voltage applied, output relay energized		-	-
Tripping delay t _v active	ПП	-	-
Phase failure	-		
Phase sequence	-	□□□ alte	ernating
Overvoltage	-		-
Undervoltage	-	-	
Phase unbalance	-		
Interruption of the neutral	-		ПП
Adjustment error 1)	пп	пп	

¹⁾ Possible misadjustments of the front-face operating controls:

Overlapping of the threshold values: An overlapping of the threshold values is given, if the threshold value for overvoltage is set to a smaller value than the threshold value for undervoltage.

DIP switch 3 = OFF and DIP switch 4 = ON: Automatic phase sequence correction is activated and selected operating mode is 1x2 c/o contacts

DIP switch 2 and 4 = ON: Phase sequence detection is deactivated and the automatic phase sequence correction is actived

Type of tripping delay CM-PSS.xx, CM-PSV.xx, CM-PAS.xx, CM-MPS.xx, CM-MPN.xx

The type of tripping delay / can be adjusted via a rotary (CM-PxS.xx) or a DIP switch (CM-MPx.xx).

Switch position ON-delay ::

In case of a fault, the de-energizing of the output relays and the respective fault message are suppressed for the adjusted tripping delay t_v.

Switch position OFF-delay

In case of a fault, the output relays de-energize instantaneously and a fault message is displayed and stored for the length of the adjusted tripping delay $t_{_{\! V}}$. Thereby, also momentary undervoltage conditions are recognized.

Grid feeding monitoring CM-UFS.2

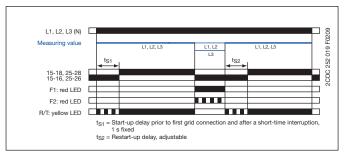
Function of the yellow LED

The yellow LED is flashing during timing and turns steady as soon as the output relays are energized.

Phase failure monitoring

Applying control supply voltage begins the fixed start-up delay $t_{\rm s1}$. When $t_{\rm s1}$ is complete and all phases are present with correct voltage and frequency, the output relays energize. They de-energize instantaneously if a phase failure occurs. The fault is indicated by LEDs.

As soon as all 3 phases are present again, the output relays re-energize automatically after the set restart delay $t_{\rm sp}$ is complete.

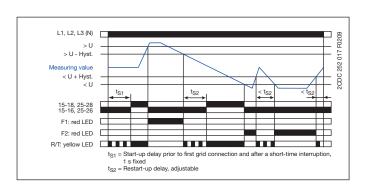


Over- and undervoltage monitoring

Applying control supply voltage begins the fixed start-up delay $t_{\rm s_1}$. When $t_{\rm s_1}$ is complete and all phases are present with correct voltage and frequency, the output relays energize.

If the voltage to be monitored exceeds or falls below the fixed threshold value, the output relays de-energize instantaneously. The fault type is indicated by LEDs. As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %, the

output relays re-energize after the set restart delay $t_{\rm so}$ is complete.



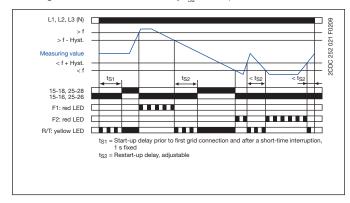
LED Funktionen

Function	R/T:	F1:	F2:
Output relay energized		-	-
Delay active	лл	-	-
Overvoltage	-		-
Undervoltage	-	-	
Overfrequency	-	ПП	-
Underfrequency	-	-	
Phase failure	-		пп

Over- and underfrequency monitoring

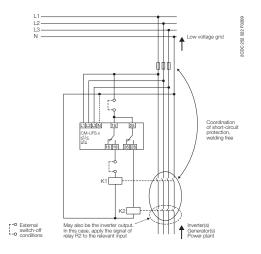
Applying control supply voltage begins the fixed start-up delay $t_{\rm S1}$. When $t_{\rm S1}$ is complete and all phases are present with correct voltage and frequency, the output relays energize.

If the frequency to be monitored exceeds or falls below the fixed threshold value, the output relays deenergize instantaneously. The fault type is indicated by LEDs. As soon as the frequency returns to the tolerance range, taking into account a fixed hysteresis, the output relays re-energize after the set restart delay $t_{\mbox{\tiny ES}}$ is complete.



Function diagram legend

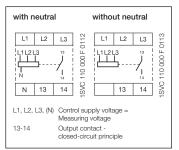
- Control supply voltage not applied / Output contact open / LED off
- Control supply voltage applied / Output contact closed / LED glowing



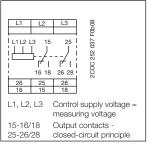
Automatized grid connection instead of a permanently accessible switching point with a disconnection function

Three-phase monitoring relays Connection diagrams, DIP switches

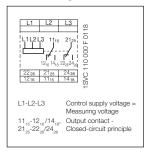
Connection diagrams CM-PBE



Connection diagram CM-PVS.x1



Connection diagram CM-PFS



Rotary switch "Function"CM-PVS



ON-delay

with phase sequence monitoring



OFF-delay

with phase sequence monitoring



ON-delay

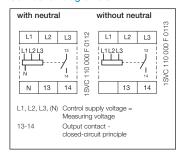
without phase sequence monitoring



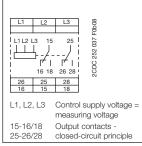
OFF-delay

without phase sequence monitoring

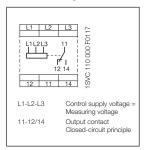
Connection diagrams CM-PVE



Connection diagram CM-PSS.x1



Connection diagram CM-PFE



Rotary switch "Function" CM-PSS



ON-delay

with phase sequence monitoring



OFF-delay

with phase sequence monitoring



ON-delay

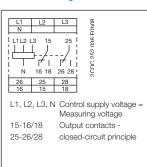
without phase sequence monitoring



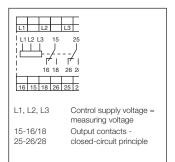
OFF-delay

without phase sequence monitoring

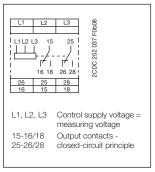
Connection diagram CM-UFS.2



Connection diagram CM-MPN.x2

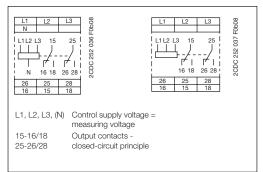


Connection diagram CM-PAS.x1

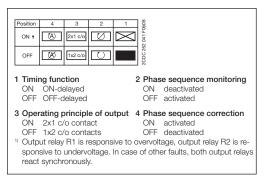


Three-phase monitoring relays Connection diagrams, DIP switches, Rotary switches

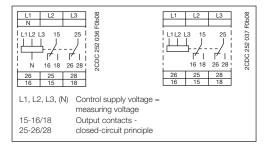
Connection diagram CM-MPS.x3



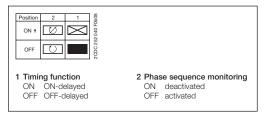
DIP switch functions CM-MPS.x3 and CM-MPN.x2



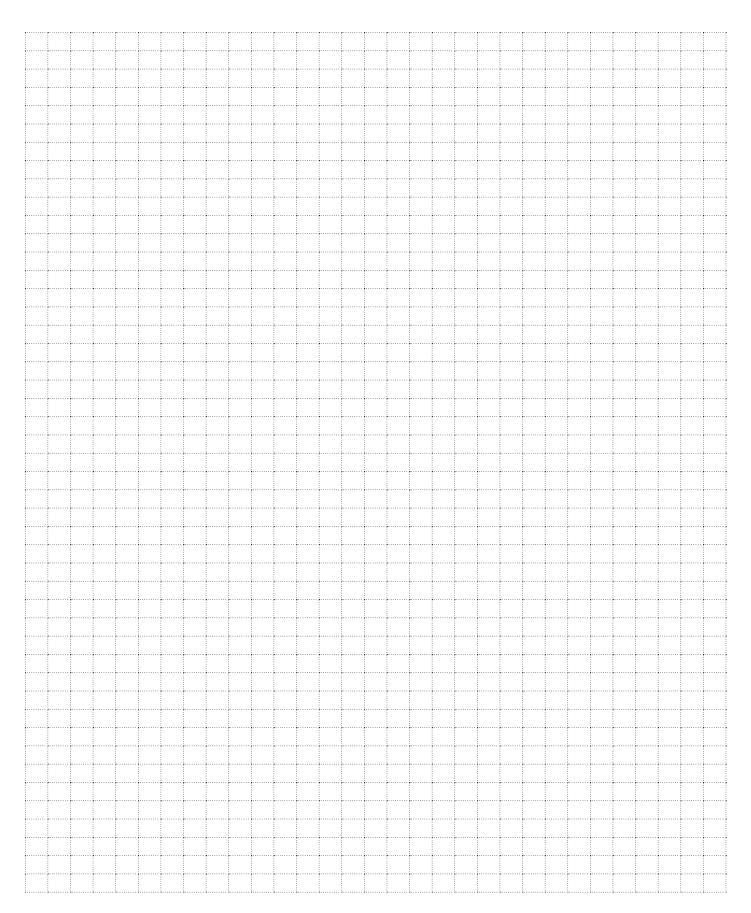
Connection diagram CM-MPS.x1



DIP switch functions CM-MPS.x1



Three-phase monitoring relays Notes



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

Туре	CM-PBE 1)	CM-PBE	CM-PVE 1)	CM-PVE	CM-PFE	CM-PFS
Supply circuit = measuring circuit	L1-L2-L3-N	L1-L2-L3	L1-L2-L3-N	L1-L2-L3	L1-L	_2-L3
Rated control supply voltage $U_{\rm S}$ = measuring voltage	3x380- 440 V AC, 220-240 V AC	3x380- 440 V AC	3x320- 460 V AC, 185-265 V AC	3x320- 460 V AC	3x208- 440 V AC	3x200- 500 V AC
Power consumption					approx	κ. 15 VA
Rated control supply voltage U _s tolerance	-15	+15 %	-15	-10 %	-10+10 %	-15+10 %
Rated frequency	50/6	i0 Hz	50/	60 Hz (-10+1	0 %)	50/60 Hz
Duty time			100			
Measuring circuit	L1-L2-L3-N	L1-L2-L3	L1-L2-L3-N	L1-L2-L3	L1-L	_2-L3
Monitoring functions phase failur phase sequence	e =		•			
over- / undervoltac	ie -	-	•		-	-
neutr	al =	-	•	- -	-	-
Measuring ranges	3x380- 440 V AC, 220-240 V AC	3x380- 440 V AC	3x320- 460 V AC, 185-265 V AC	3x320- 460 V AC	3x208- 440 V AC	3x200- 500 V AC
Thresholds U _r	nin	x UN	fixed 185 V / 320 V	fixed 320 V	0.6	x UN
U _n	0.6)	x UN	fixed 265 V / 460 V	fixed 460 V	0.6	X UN
Hysteresis related to the threshold value Measuring voltage frequency		15 % e = 0.65 x UN)	fixed	5 %	50/6	60 Hz
Response time	40	ms 50/60 HZ (-	10 %+10 %)	ms) ms
Accuracy within the rated control supply voltage tolerance Accuracy within the temperature range						0.5 %
Timing circuit			•			
Start-up delay t _s		fixed 500	ms (±20 %)		fixed (500 ms
Tripping t _v	fixed 1 (±2)	150 ms 0 %)	at over-/ ur fixed 500 r	dervoltage ns (±20 %)	fixed 500 ms	-
Indication of operational states						•
Relay status R: yellow LE	D		∫ Output	relay energize	d	
Output circuits			3-14		11-12/14	11(15)- 12(16)/14(18), 21(25)- 22(26)/24(28)
Kind of output Operating principle 2)		1 n/o	contact	ilt principle	1 c/o contact	2 c/o contacts
Contact material		• • • • • • • • • • • • • • • • • • • •	closed-circ	ait principie	•••••	AgNi
Rated operational voltage U _a IEC/EN 60947-	1	***************************************	250) V	.*	
Minimum switching voltage / Minimum switching current Maximum switching voltage		• • • • • • • • • • • • • • • • • • • •	- / 250 V AC,	′ -	•••••	•
Rated operational current I _g AC12 (resistive) 230		• • • • • • • • • • • • • • • • • • • •	4	A		
(IEC/EN 60947-5-1) AC15 (inductive) 230 DC12 (resistive) 24		.	3			
DC12 (resistive) 24 DC13 (inductive) 24		•	4 2			
Mechanical lifetime			30 x 106 swi			
Electrical lifetime (AC12, 230 V, 4 A)		•	0.1 x 106 swi			
Max. fuse rating to achieve n/c contact short-circuit protection			10 A fast-acting			4 A fast- acting
n/o conta			10 A fast-acting			6 A fast- acting
AC rating Utilization category (Control Circuit Rating Code (UL 508) max. rated operational voltage	<u>}</u>		B 3			
(UL 508) max. rated operational voltage max. continuous thermal current at B 300			300 <u>'</u> 5			
max. making/breaking apparent power at B 300		***************************************	3600/3		.*	

Device with neutral monitoring: The external conductor voltage towards the neutral conductor is measured.

Closed-circuit principle: Output relay is de-energized if the measured value exceeds/drops below the adjusted threshold.

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

Туре		CM-PBE 1)	CM-PBE	CM-PVE 1)	CM-PVE	CM-PFE	CM-PFS
General data				•			•
Dimensions (W x H x D)						,	22.5 x 78
				2.5 x 78 x 78.5 n			x 100 mm
			(0.	89 x 3.07 x 3.09	in)		(0.89 x 3.07
					•	<u>.</u>	x 3.94 in)
Weight				see dat			····
Mounting				DIN rail (IEC	•	•	···•
Mounting position	havaina / tarminala			ar		•	···•
Degree of protection	housing / terminals			IP50 /	IP20		
Electrical connection Wire size fine							
vvire size	e-strand with wire end ferrule						
			2 x 0.75-	1.5 mm² (2 x 18-	-16 AWG)		2 x 0.75-
							2.5 mm ²
fine-st	rand without wire end ferrule		0 v 1 1 1	5 mm² (2 x 18-1	6 AMC)	•••••	(2 x 8-14 AWG)
			∠ X 1-1.3	J IIIII- (2 X 10-1	o Avva)		
	rigid						2 x 0.5-
			2 x 0.75-	1.5 mm ² (2 x 18-	16 AWG)		4 mm ² (2 x 20-12 AWG)
							(2 × 20 12 / WO)
Stripping length				40 (0.00 ;)	•••••	•	7 mm
				10 mm (0.39 in)			(0.28 in)
Tightening torque				0.6-0.	8 Nm		
Environmental data							
Ambient temperature range	operation / storage				-40+85 °C		
Environmental testing (IEC 68-2-30)			24	h cycle time, 55	°C, 93 % rel., 9	96 h	
Operational reliability (IEC 68-2-6)				6 g	• • • • • • • • • • • • • • • • • • • •	•	4 g
Mechanical resistance (IEC 68-2-6)				10 g		-	6 g
Isolation data							
Rated insulation volt. between supply, measuring (VDE 0110, IEC 60947-1)	g and output circuits		40	00 V		5	00 V
Rated impulse withstand voltage U _{imp} between a	II (II - (•	İ	·
(VDE 0110, IEC 664)	II ISOIATED CIRCUITS			4 kV / 1.	2 - 50 µs		
Test voltage between all isolated circuits		······		2.5 kV, 50	Hz 1 min	•	···•
Pollution category (VDE 0110, IEC/EN 60664, IE	-C 255-5)				3	•	
Overvoltage category (VDE 0110, IEC/EN 60664					<u>,</u> 	•	···•
Standards	.,						
Product standard				IEC 255-6,	EN 60255-6		
Low Voltage Directive		·······		2006/		•	···•
EMC Directive				2004/1	• · · · · · · · · · · · · · · · · · · ·	•	····•
Electromagnetic compatibility				200 17	00,20		
Interference immunity to				EN 610	00-6-2		
electrostatic discharge	IEC/EN 61000-4-2	······			6 kV/ 8 kV	•	···•
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	•		Level 3	•••••	•	·····
electrical fast transient / burst	IEC/EN 61000-4-4	ļ			•••••	•	···•
	IEC/EN 61000-4-4 IEC/EN 61000-4-5	ļ			kV / 5 kHz	•	
surge conducted disturbances, induced by	IEC/EN 61000-4-5	<u> </u>		Level 4 -	∠ KVL-L	•	······
radio-frequency fields	ILO/LIN 01000-4-0			Level 3	•	•	
Interference emission				EN 610	00-6-4		

Device with neutral monitoring: The external conductor voltage towards the neutral conductor is measured.

²⁾ Closed-circuit principle: Output relay is de-energized if the measured value exceeds/drops below the adjusted threshold.

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

Туре		CM-PSS.31	CM-PSS.41	CM-PVS.31	CM-PVS.41	CM-PVS.81	CM-PAS.31	CM-PAS.41
Input circuit = Measur	ring circuit			•	L1, L2, L3		•	•
Rated control supply voltage	e U _s = measuring voltage	3x380 V AC	3x400 V AC	3x160- 300 V AC	3x300- 500 V AC	3x200- 400 V AC	3x160- 300 V AC	3x300- 500 V AC
Rated control supply voltage	e U _s tolerance		•••••	•	-15+10 %	•	•••••	-
Rated frequency			•••••	•••••	50/60 Hz	•	•••••	•
Frequency range		•••••	•••••	•••••	45-65 Hz	•	•••••	•
Typical current / power cons	sumption	25 mA / 18 VA (380 V AC)	25 mA / 18 VA (400 V AC)	25 mA / 10 VA (230 V AC)	25 mA / 18 VA (400 V AC)	19 mA / 10 VA (300 V AC)	25 mA / 10 VA (230 V AC)	25 mA / 18 VA (400 V AC)
Measuring circuit				•	L1, L2, L3		•	•
Monitoring functions	Phase failure		•		•	•		
	Phase sequence	········ ·	ca	n be switched	•	<u></u>	•	•
-	Automatic phase sequence correction	-	-	-	-	-	-	-
	Over- / undervoltage		•	•		•	-	-
••	Phase unbalance		-	-	-			
	Neutral	-	-	-	-	-	-	-
Measuring range	Overvoltage	3x418 V AC	3x440 V AC	3x220- 300 V AC	3x420- 500 V AC	3x300- 400 V AC	-	-
	Undervoltage	3x342 V AC	3x360 V AC	3x160- 230 V AC	3x300- 380 V AC	3x210- 300 V AC	-	-
	Phase unbalance	-	-	-	-	-	2-25 % of phase	average voltages
Thresholds	Overvoltage	fix	ed	adjustabl	e within measu	ring range	-	-
	Undervoltage	fix	ed	adjustabl	e within measu	ring range	-	-
	Phase unbalance (switch-off value)	-	-	-	-	-	adjust. within	meas. rang
Hysteresis related to the	Over- / undervoltage			fixed 5 %	•	•	-	
threshold value "	Phase unbalance	-	-	-	-	-	fixed	20 %
Rated frequency of the mea Frequency range of the mea Maximum measuring cycle the Accuracy within the rated con Accuracy within the temperative Measuring method	asuring signal time control supply voltage tolerance			Δί	50/60 Hz 45-65 Hz 100 ms ΔU ≤ 0.5 % J ≤ 0.06 % / °0 True RMS	<u> </u>		
Fiming circuit					TIGOTIMO			
					f' 1000			
Start-up delay t _s					fixed 200 ms	•		····
Tripping delay t _v				DN- or OFF-del 0.1-30 s adjusta			ON- 0 0; 0.1-30 s	
Repeat accuracy (constant)	naramatara)		υ, ι	J.1-30 S aujusti	abie	I w 0.2 %	0, 0.1-30 8	aujustable
	control supply voltage tolerance		.	i	$\Delta t \leq 0.5 \%$	1 W U.Z 70	.i	i
Accuracy within the tempera			•••••	Λ	t ≤ 0.06 % / °C	······	•••••	•
ndication of operational stat					ow LED, 2 red		:	***************************************
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		Details se description	e function / -diagrams	Details see c	perating mode cription / -diag	and function	Details se	
Output circuits		•		•	16/18, 25-26/		•	
Kind of output					o contacts (Re			
Operating principle 1)	·····				ed-circuit princ			***************************************
Contact material	······		• • • • • • • • • • • • • • • • • • • •		Ni alloy, Cd fre			***************************************
Rated operational voltage U	IEC/EN 60947-1		•••••	S	250 V	•	•••••	• • • • • • • • • • • • • • • • • • • •
Minimum switching power			••••••		24 V / 10 mA	•		•
Maximum switching voltage				Se	e load limit cur	/A		

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

Туре		CM-PSS.31 CM-PSS.41 CM-PVS.31 CM-P	VS.41 CM-PVS.81 CM-PAS.31 CM-PAS.41			
Rated operational current I (IEC/EN 60947-5-1)	AC12 (resistive) 230 V	4.				
(IEC/EIN 00947-0-1)	AC15 (inductive) 230 V	3.	A			
	DC12 (resistive) 24 V DC13 (inductive) 24 V	4 A 2 A				
AC rating (UL 508)	Utilization category					
	(Control Circuit Rating Code)	B 300				
	max. rated operational voltage	300 V AC				
	max. continuous thermal current at B 300	5 A				
	max. making/breaking apparent					
	power at B 300	3600/3	60 VA			
Mechanical lifetime	· · · · · · · · · · · · · · · · · · ·	30 x 10 ⁶ swite	ching cycles			
Electrical lifetime (AC12, 23		0.1 x 10° swit	ching cycles			
Max. fuse rating to achieve short-circuit protection		6 A fast				
General data	n/o contact	10 A fas:	t-acting			
MTBF			w.cot			
Duty time		on rec 100				
Dimensions (W x H x D)	product dimensions	22.5 x 85.6 x 103.7 mm				
` ' '	packaging dimensions	97 x 109 x 30 mm (3				
Weight		depending on device,				
Mounting		DIN rail (IEC/				
Mounting position		snap-on mounting				
Minimum distance to other	units vertical / horizontal	an not necessary /	not necessary			
Material of housing		UL 94	V-0			
Degree of protection	housing / terminals	IP50 /	IP20			
Electrical connection						
Wire size		Screw connection technology	Easy Connect Technology (Push-in)			
	fine atronal with/out) wire and formula		2 x 0.5-1.5 mm² (2 x 20-16 AWG)			
	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm² (1 x 20-14 AWG) 2 x 0.5-1.5 mm² (2 x 20-16 AWG)	2 X U.5-1.5 mm² (2 X 2U-16 AWG)			
	rigid	1 x 0.5-4 mm² (1 x 20-12 AWG)	2 x 0.5-1.5 mm² (2 x 20-16 AWG)			
	5 -	2 x 0.5-2.5 mm ² (2 x 20-14 AWG)	,			
Stripping length		8 mm (C).32 in)			
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)	-			
Environmental data						
Ambient temperature range	es operation / storage	-25+60 °C /	-40+85 °C			
Damp heat (IEC 60068-2-3	30)	55 °C, 6	cycles			
Climatic category		3K				
Vibration (sinusoidal) (IEC/E Shock (IEC/EN 60255-21-2		Clas				
	<u> </u>	Clas	8.2			
Rated insulation	input circuit / output circuit	600) V			
voltage U	output circuit 1 / output circuit 2	300				
Rated impulse withstand vo		6 kV; 1.2				
Rated impulse withstand vo U _{imp} (VDE 0110, IEC/EN 60		4 kV; 1.2	2/50 μs			
Test voltage between all isc		2.5 kV, 50				
Basis isolation Protective separation (VDE 0	input circuit / output circuit 0106 input circuit /	600) V			
part 101 and 101/A, IEC/EI	N 1140) input circuit / output circuit /	-				
Pollution degree (VDE 0110), IEC/EN 60664)	3				
Overvoltage category (VDE	0110, IEC 60664)	l				
Standards						
Product standard		IEC/EN 60255				
Low Voltage Directive EMC directive		2006/9				
RoHS directive		2004/1 2002/9				
Electromagnetic com	l patibility	2002/8	, o, La			
Interference immunity to		EN 61000-6-1,	FN 61000-6-2			
electrostatic discharge	IEC/EN 61000-4-2	Level 3 (6				
radiated, radio-frequenc		Level 3 (•••••••••••••••••••••••••••••••••••••••			
electromagnetic field			,			
electrical fast transient /		Level 3 (2 k	• • • • • • • • • • • • • • • • • • • •			
surge	IEC/EN 61000-4-5 IEC/EN 61000-4-6	Level 4 (2	2 KV L-L)			
conducted disturbances, induced by radio-frequen		Level 3	(10 V)			
Interference emission		Clas	s 3			
		EN 61000-6-3, EN 61000-6-4				
high-frequency radiated	I IEC/CISPR 22, EN 50022 ted IEC/CISPR 22, EN 50022	EN 61000-6-3,	EN 61000-6-4			

Data at $T_{\rm a}$ = 25 °C and rated values, unless otherwise indicated

Туре	CM-MPS.11	CM-MPS.21	CM-MPS.31	CM-MPS.41		
Input circuit = Measuring circuit	L1, L2	2, L3, N	L1, L2, L3			
Rated control supply voltage U _s = measuring voltage	3x90-170 V AC	3x180-280 V AC	3x160-300 V AC	3x300-500 V AC		
Rated control supply voltage U _s tolerance		-15	+10 %	•		
Rated frequency			0 Hz	•••••		
Frequency range			5 Hz			
Typical current / power consumption	25 mA / 10 VA (115 V AC)	25 mA / 18 VA (230 V AC)	25 mA / 10 VA (230 V AC)	25 mA / 18 VA (400 V AC)		
Measuring circuit	L1, L2	2, L3, N	L1, L2, L3			
Monitoring functions Phase failure						
Phase sequence		can be sv	ritched off			
Automatic phase sequence correction	-	-	-	-		
Over- / undervoltage	•	•	•	•		
Phase unbalance		•	•			
Interrupted neutral		•	-	=		
Measuring range Overvoltage	3x120-170 V AC	3x240-280 V AC	3x220-300 V AC	3x420-500 V AC		
Undervoltage	3x90-130 V AC	3x180-220 V AC	3x160-230 V AC	3x300-380 V AC		
Phase unbalance			of phase voltages			
Thresholds Overvoltage			measuring range	• • • • • • • • • • • • • • • • • • • •		
Undervoltage			measuring range			
Phase unbalance (switch-off value)			measuring range			
Hysteresis related to the Over- / undervoltage threshold value	fixed 5 %					
i riase uribalance	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 ΔU ≤ 0.5 %					
Accuracy within the rated control supply voltage tolerance						
Accuracy within the temperature range	ΔU ≤ 0.06 % / °C True RMS					
Measuring method		Irue	RMS			
Timing circuit			200			
Start-up delay t _s	fixed 200 ms					
Tripping delay t _v	ON- or OFF-delay 0; 0.1-30 s adjustable					
Accuracy within the rated control supply voltage tolerance	Δt ≤ 0.5 %					
Accuracy within the temperature range	Δt ≤ 0.06 % / °C					
Indication of operational states	Details see function description / -diagrams					
Output circuits	15-16/18, 25-26/28					
Kind of output	1x2 c/o contacts (Relays)					
Operating principle 1)	closed-circuit principle					
Contact material	AgNi alloy, Cd free					
Rated operational voltage U _a (IEC/EN 60947-1)	250 V					
Minimum switching power	24 V / 10 mA					
Maximum switching voltage	see load limit curve					
Rated operational current I AC12 (resistive) 230 V	4 A					
(IEC/EN 60947-5-1) AC15 (inductive) 230 V		· • · · · · · · · · · · · · · · · · · ·	A	• • • • • • • • • • • • • • • • • • • •		
DC12 (resistive) 24 V	4 A					
DC13 (inductive) 24 V		2	A			
AC rating (UL 508) Utilization category (Control Circuit Rating Code)						
max. rated operational voltage						
max. continuous thermal current at B 300						
max. making/breaking apparent power at B 300						
Mechanical lifetime	30 x 10 ⁶ switching cycles					
Electrical lifetime (AC12, 230 V, 4 A)			tching cycles	•••••		
Max. fuse rating to achieve n/c contact	6 A fast-acting					
Wax. rusc rating to acritical	10 A fast-acting					

Data at $\rm T_a = 25~^{\circ}C$ and rated values, unless otherwise indicated

Туре	CM-MPS.11	CM-MPS.21	CM-MPS.31	CM-MPS.41	
General data			•		
MTBF		on re	equest		
Duty time		1(00%		
Dimensions product dimensions	2	2.5 x 85.6 x 103.7 m	m (0.89 x 3.37 x 4.08 ii	<u>1)</u>	
(W x H x D) packaging dimensions		97 x 109 x 30 mm	(3.82 x 4.29 x 1.18 in)		
Weight	Screw connection technology Easy Connect Tech		hnology (Push-in)		
net weight			e, see ordering details		
gross weight		depending on devic	e, see ordering details	•	
Mounting	DIN rail (IEC/EN 60715),				
Mounting position		•	ng without any tool		
Minimum distance to other units vertical / horizontal	any not necessary / not necessary				
Material of housing			94 V-0		
Degree of protection housing / terminals		IP50	/ IP20	•	
Electrical connection					
Vire size	Screw connect	ion technology	Easy Connect Ted	hnology (Push-in	
fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm2 2 x 0.5-1.5 mm2	(1 x 20-14 AWG) (2 x 20-16 AWG)	2 x 0.5-1.5 mm2	(2 x 20-16 AWG)	
rigid	1 x 0.5-4 mm2 (1 x 20-12 AWG)	2 x 0.5-1.5 mm2	(2 x 20-16 AWG)	
Stripping length	2 x 0.5-2.5 mm2		(0.32 in)		
Fightening torque	0.6-0.8 Nm (5	•	(0.02 11)		
Environmental data	0.0 0.0 1 (0		:		
Ambient temperature ranges operation / storage		-25+60 °C	/ -40+85 °C		
Damp heat (IEC 60068-2-30)		-20+00 07 40+00 0			
Climatic category	3K3				
Vibration (sinusoidal) (IEC/EN 60255-21-1)	Class 2				
Shock (IEC/EN 60255-21-2)	Class 2				
Isolation data		Oit	200 Z		
Rated insulation voltage U, input circuit / output circuit		60	00 V		
output circuit 1 / output circuit 2		• · · · · · · · · · · · · · · · · · · ·	00 V		
	6 kV; 1.2/50 μs				
Rated impulse withstand voltage U _{imp} input circuit (VDE 0110, IEC/EN 60664) output circuit					
Test voltage between all isolated circuits (type test)	4 kV; 1.2/50 µs				
	2.5 kV, 50 Hz, 1 s 600 V				
			JO V	•	
(VDE 0106 part 101 and 101/A, IEC/EN 61140)	yes -			-	
Pollution degree (VDE 0110, IEC/EN 60664)	3 				
Overvoltage category (VDE 0110, IEC 60664)			111		
Standards		150/5N 0005			
Product standard	IEC/EN 60255-6, EN 50178				
Low Voltage Directive	2006/95/EG				
EMC directive	2004/108/EG				
RoHS directive		2002	/95/EG		
Electromagnetic compatibility					
Interference immunity to	EN 61000-6-1, EN 61000-6-2				
electrostatic discharge IEC/EN 61000-4-2	Level 3 (6 kV / 8 kV)				
radiated, radio-frequency, IEC/EN 61000-4-3 electromagnetic field	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, IEC/EN 61000-4-6 induced by radio-frequency fields		Level 3 (10 V)			
harmonics and interharmonics IEC/EN 61000-4-13		Cla	ass 3		
Interference emission		EN 61000-6-3	3, EN 61000-6-4		
high-frequency radiated IEC/CISPR 22, EN 50022	Class B				
high-frequency conducted IEC/CISPR 22, EN 50022	Class B			***************************************	

¹⁾ Closed-circuit principle: Output relay(s) de-energize(s) if measured value exceeds or falls below the adjusted threshold value

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

Туре	CM-MPS.23	CM-MPS.43	CM-MPN.52	CM-MPN.62	CM-MPN.72	
Input circuit = Measuring circuit	L1, L2, L3, N		L1, L	.2, L3		
Rated control supply voltage U_S = measuring voltage	3x180-280 V AC	3x300-500 V AC	3x350-580 V AC	3x450-720 V AC	3x530-820 V AC	
Rated control supply voltage U _s tolerance		•	-15+10 %	•	•	
Rated frequency		400 Hz		50/60 Hz	• • • • • • • • • • • • • • • • • • • •	
Frequency range	45-4	40 Hz	00 4 / 44 \/4	45-65 Hz		
Typical current / power consumption	(230 V AC)	5 mA / 4 VA (400 V AC)	29 mA / 41 VA (480 V AC)	(600 V AC)	29 mA / 59 VA (690 V AC)	
Measuring circuit	L1, L2, L3, N		L1, L	.2, L3		
Monitoring functions Phase sequer Automatic phase sequence correct Over- / undervolta	on ge •		can be switched c configurable	ff •		
Phase unbalar Interrupted neu				•		
Measuring range Overvolta		- 2×420 500 V AC	- 3x480-580 V AC	- 2×600 720 V AC	2v600 820 V AC	
Undervolta	0	3x300-380	·· · ·····	3x450-570 V AC	3x530-660	
Phase unbalar Thresholds Overvolta Undervolta Phase unbalance (switch-off val	ice ge ge	adjusta adjusta	if average of phas ble within measuri ble within measuri ble within measuri	: e voltages ng range ng range	V AC	
Hysteresis related to the Over- / undervolte threshold value Phase unbalar	igė (fixed 5 % fixed 20 %		•	
Rated frequency of the measuring signal Frequency range of the measuring signal	50/60/	50/60/400 Hz 50/60 Hz 45-440 Hz 45-65 Hz				
Maximum measuring cycle time Accuracy within the rated control supply voltage tolerance Accuracy within the temperature range Measuring method		ΔU ≤ 0.5 % ΔU ≤ 0.6 % / °C True RMS				
Timing circuit	1					
Start-up delay t _s and t _s		fixed 200 ms				
Start-up delay t _{s1}		•	fixed 250 ms			
Tripping delay t _v		ON- or OFF-delay ON-delay 0; 0.1-30 s adjustable 0; 0.1-30 s adjus				
Accuracy within the rated control supply voltage tolerance Accuracy within the temperature range	9,	Δt ≤ 0.5 % Δt ≤ 0.06 % / °C				
Indication of operational states		Details see function description / -diagrams				
Output circuits		15-16/18, 25-26/28				
Kind of output Operating principle 1)		2x1 or 1x2 c/o contacts configurable (Relays) closed-circuit principle				
Contact material Rated operational voltage U _e IEC/EN 60947	7-1	AgNi alloy, Cd free 250 V				
Minimum switching power Maximum switching voltage		24 V / 10 mA see load limit curve				
Rated operational current I ₀ AC12 (resistive) 230 (IEC/EN 60947-5-1) AC15 (inductive) 230 (IEC/EN 60947-5-1) DC12 (resistive) 240 (IEC/EN 60947-5-1) DC12 (resistive) 240 (IEC/EN 60947-5-1)	0V 3 A 4 A					
DC13 (inductive) 2- AC rating Utilization category (Control Circuit Rating Control	4 V 2. A de) B 300					
(UL 508) max. rated operational volta max. continuous thermal current at B 3	at B 300 5 A					
max. making/breaking apparent power at B.3 Mechanical lifetime Electrical lifetime (AC12, 230 V, 4 A)		30 0.1	x 10 ⁶ switching cy x 10 ⁶ switching cy	rcles rcles		
Max. fuse rating to achieve n/c control short-circuit protection n/o control		t-acting	10 A fast-acting	10 A fast-acting		

Data at $\rm T_a = 25~^{\circ}C$ and rated values, unless otherwise indicated

Туре		CM-MPS.23	CM-MPS.43	CM-MPN.52	CM-MPN.62	CM-MPN.72
General data						
MTBF			••••	on request	••••	•
Duty time	product dimensions			100%		•
Dimensions (W x H x D)			103.7 mm (0.89 x 30 mm (3.82 x 4.		•	
Weight	packaging dimensions			on device, see or		•
Mounting		DIN			nting without any	tool
Mounting position			•••••	any		•
Minimum distance to other units Material of housing	vertical / horizontal		not ne	cessary / not ned UL 94 V-0	cessary	•
Degree of protection	housing / terminals		• • • • • • • • • • • • • • • • • • • •	IP50 / IP20		•
Electrical connection	riodollig / torrillialo			11 00 / 11 20		
Wire size					Fasy Connec	t Technology
77.10 0.120		Screw	connection tech	nology		0,
	fine strand with/out) wire and forrule	1 ∨ 0 5	2.5 mm2 (1 x 20-	14 AMC	(Pus	h-in) (2 x 20-16 AWG)
	fine-strand with(out) wire end ferrule	2 x 0.5-	1.5 mm2 (2 x 20-	14 AWG) 16 AWG)	2 X 0.5-1.5 IIIII2	(2 X 20-10 AVVG)
***************************************	rigid	1 x 0.5	-4 mm2 (1 x 20-1	2 AWG)	2 x 0.5-1.5 mm2	(2 x 20-16 AWG)
0		2 x 0.5-	2.5 mm2`(2 x 20-	14 AWG)	<u> </u>	
Stripping length Tightening torque	······	0.6-0	0.8 Nm (5.31-7.08	8 mm (0.32 in)		
Environmental data		0.0-0	2.0 14111 (3.31-7.00	10.111)		
Ambient temperature ranges	operation / storage		-25	+60 °C / -40+8	35 °C	
Damp heat (IEC 60068-2-30)	operation / storage		20.	55 °C, 6 cycles	50.0	•
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	60	0 V	300 V	1000 V	•
Rated impulse withstand voltage U _{imp}	output circuit 1 / 2 input circuit	6 kV; 1.	2/50 118	300 V	8 kV: 1.2/50 us	•
(VDE 0110, IEC/EN 60664)	output circuit		2/00 μο	4 kV; 1.2/50 μs	0 KV, 1.2700 µ3	•
Test voltage (type test)	isolated output circuits		• • • • • • • • • • • • • • • • • • • •	2.5 kV, 50 Hz, 1	s	• • • • • • • • • • • • • • • • • • • •
between	input circuit and isolated output circuits	2.5 kV, 5	0 Hz, 1 s		4 kV, 50 Hz, 1 s	•••••
Basis isolation	input circuit / output circuit	60	0 V		1000 V	•
Protective separation (VDE 0106 part 101 and 101/A, IEC/EN 6	input circuit /			-		
· · · · · · · · · · · · · · · · · · ·	· Output Grount		•			•
Pollution degree (VDE 0110, IEC/EN 6066 Overvoltage category (VDE 0110, IEC 606		3				
Standards	50-1)					
Product standard			IFC/	EN 60255-6, EN	50178	
Low Voltage Directive		2006/95/EG				
EMC directive		2004/108/EG				
RoHS directive				2002/95/EG		
Electromagnetic compatibility						
Interference immunity to	IFO/FNI 04000 4 0			000-6-1, EN 610		• • • • • • • • • • • • • • • • • • • •
electrostatic discharge radiated, radio-frequency,	IEC/EN 61000-4-2 IEC/EN 61000-4-3		L	_evel 3 (6 kV / 8 k	<u>v)</u>	•
electromagnetic field	ILO/EN 01000-4-3			Level 3 (10 V/m)		
electrical fast transient / burst	IEC/EN 61000-4-4		L	evel 3 (2 kV / 2 kF		•
surge	IEC/EN 61000-4-5	Level 4 (2 kV L-N)		Level 4	(2 kV L-L)	•
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6			Level 3 (10 V)		
harmonics and interharmonics	IEC/EN 61000-4-13		•••••	Class 3	•••••	•••••
Interference emission			EN 61	000-6-3, EN 610	00-6-4	
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

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

Туре		CM-UFS.2			
Input circuit - Measuring circuit		L1, L2, L3 L-N			
Rated control supply voltage U _s = measuring voltage		3 x 400 V AC	3 x 230 V AC		
Rated control supply voltage tolerance U _s		-20	+20 %		
Control supply voltage range		3 x 300-500 V AC	3 x 180-280 V AC		
Rated frequency		50 Hz			
Frequency range Typical current / power consumption		45-55 Hz 23 mA / 16 VA			
Power failure buffering time		min. 20 ms			
Input circuit - measuring circuit		L1, L2, L3	L-N		
Monitoring functions	Phase failure		-		
	Over-/ undervoltage		-		
	Over-/ underfrequency 10 minutes average value				
Measuring range	Voltage range	3 x 320-480 V AC	3 x 184-276 V AC		
0 0	Frequency range		-55 Hz		
Thresholds	Overvoltage		20 % of U		
	Undervoltage Overfrequency		0 % of U Hz, configurable		
	Underfrequency		Hz, configurable		
	10 minutes average value	_			
Hysteresis related to the threshold value	Over-/ undervoltage Over-/ underfrequency	fix 5 % fix 20 mHz			
Rated frequency of the measuring signal	Over-7 underfrequency	11X 20 111112 50 Hz			
Frequency range of the measuring signal		45-55 Hz			
Maximum measuring cycle time		50 ms			
Maximum reaction time (time between fault detection and change of switching status	Over-/ undervoltage Over-/ underfrequency	< 120 ms < 100 ms			
of the relay)	10 minutes average value		-		
Accuracy within the rated control supply voltage tolerance			≤ 0,5 %		
Accuracy within the temperature range Measuring method),06 % / °C le RMS		
Timing circuit		III	ie nivio		
Start-up delay t_{s_1} prior to grid connection after a short in	nterruntion	fi	x. 1 s		
Restart delay t _{so}	iorapion				
Accuracy within the rated control supply voltage tolera	ance	adjustable, 0 s; 0,1 − 30 s Δt ≤ 0,5 %			
Accuracy within the tated control supply voltage tolera	1100	$\Delta t \le 0.06 \% / ^{\circ}C$			
Indication of operational states		1 yellow LED, 2 red LEDs			
		Details see operation mode and function description/diagrams			
Output circuits		15-16/18, 25-26/28			
Kind of output		Relais, 1 x 2 changeover			
Operation principle 1)		closed-circuit principle			
Contact material Rated operational voltage U _a (IEC/EN 60947-1)		AgNi alloy, Cd free 250 V			
Minimum switching voltage / switching current		230 V 24 V / 10 mA			
Maximum switching voltage / switching current		see load limit curve			
Rated operational current I	AC12 (resistive) 230 V	4 A			
(IEC/EN 60947-5-1)	AC15 (inductive) 230 V	3 A			
<u></u>	DC12 (resistive) 24 V DC13 (inductive) 24 V	-	4 A 2 A		
Mechanical lifetime	2010 (III.0000170) Z 1 V	30 x 10 ⁶ switching cycles			
Electrical lifetime (AC12, 230 V, 4 A)		0,1 x 106 switching cycles			
Max. fuse rating to achieve short-circuit protection	n/c contact n/o contact	6 A fast-acting			
SHORE-CIRCUIT PROTECTION	11/0 COHIaCL	10 A fast-acting			

Data at $\rm T_a = 25~^{\circ}C$ and rated values, unless otherwise indicated

Туре		CM-UFS.2			
General data					
MTBF		C	on request		
Duty time	•		100%		
Dimensions (W x H x D)	product dimensions	22.5 x 85.6 x 103.	7 mm (0.89 x 3.37 x 4.08 in)		
, ,	packaging dimensions	97 x 109 x 30 n	nm (3.82 x 4.29 x 1.18 in)		
Weight	gross weight	depending on de	evice, see ordering details		
Mounting			snap-on mounting without any tool		
Mounting position			any		
Minimum distance to other units	vertical / horizontal		sary / not necessary		
Material of housing			JL 94 V-0		
Degree of protection	housing / terminals	I	P50 / IP20		
Electrical connection					
Wire size		Screw connection technology	Easy Connect Technology (Push-in)		
	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm ² (1 x 20-14 AWG)	2 x 0.5-1.5 mm ² (2 x 20-16 AWG)		
	` '	2 x 0.5-1.5 mm² (2 x 20-16 AWG)	,		
	rigid	1 x 0.5-4 mm ² (1 x 20-12 AWG) 2 x 0.5-2.5 mm ² (2 x 20-14 AWG)	2 x 0.5-1.5 mm ² (2 x 20-16 AWG)		
Stripping length		8 r	nm (0.32 in)		
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)	-		
Environmental data					
Ambient temperature range	operation / storage	-25 ±60	°C / -40+85 °C		
Damp heat, cyclic (IEC/EN 60068-2-30)	operation / storage		cle, 55 °C, 95 % RH		
Climatic category (IEC/EN 60721-3-1)	•	2 x 12 11 0)	3K3		
Vibration (sinusoidal) (IEC/EN 60255-21-1)	Class 2			
Shock (IEC/EN 60255-21-2)	·	Class 2			
Isolation data			01000 2		
Rated impulse withstand voltage U.	input circuit / output circuit		600 V		
nated impulse withstand voltage o	output circuit 1 / 2		300 V		
Dated impulse withstand voltage II		6 1/	V; 1,2/50 µs		
Rated impulse withstand voltage U _{imp} input circuit (VDE 0110, IEC/EN 60664) output circuit			V; 1,2/50 µs		
Test voltage between all isolated circuits (v, 1,2/30 µs «V, 50 Hz, 1 s		
Basis isolation	input circuit / output circuit	2,01	600 V		
Protective separation	input circuit / output circuit				
(VDE 0160 Part 101 and 101/A, IEC/EN 6	S1140)	yes			
Pollution degree (VDE 0110, IEC/EN 6066	54)		3		
Overvoltage category (VDE 0110, IEC/EN 00004)					
Standards	,				
Standards		Type tested in accordance with the "	Guideline for Connections to ENEL distribution		
Product standard			d.2.1., January 2011		
Further standards)178, EN 61727		
Low Voltage Directive		2006/95/EG			
EMV-Directive		2004/108/EG			
RoHS-Directive		2	002/95/EG		
Electromagnetic compatibility					
Interference immunity to		IEC/EN 61000	-6-1, IEC/EN 61000-6-2		
electrostatic discharge	IEC/EN 61000-4-2	Level	3 (6 kV / 8 kV)		
radiated, radio-frequency,	IEC/EN 61000-4-3	······································	rel 3 (10 V/m)		
electromagnetic field			,		
electrical fast transient / burst	IEC/EN 61000-4-4		3 (2 kV / 2 kHz)		
surge	IEC/EN 61000-4-5	Level 4	4 (2 kV L-L, L-N)		
conducted disturbances,	IEC/EN 61000-4-6	ا د	evel 3 (10 V)		
induced by radio-frequency fields	TEO/EN 04055	Le			
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