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: (1) (1) (CF (1) CB

- Marks: CE C
- Multifunctional and single-functional devices
- Phase loss monitoring
- Phase sequence monitoring ¹⁾
- Over- and undervoltage monitoring (fixed or adjustable)¹⁾
- Wide-range operating voltage guarantees world-wide operation

¹⁾ depending on device type

Phase unbalance monitoring

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

Phase sequence

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

Phase loss

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

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

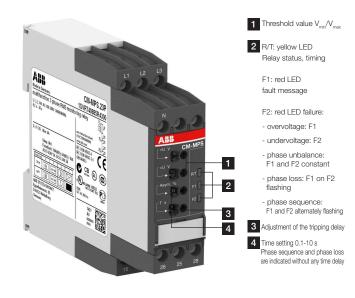
CM-__x.yz

x: width of enclosurey: 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



Three-phase monitoring relays Notes

Three-phase monitoring relays Selection and conversion

Three-phase monitoring relays	oer	8	0	8	8	8	Q	0	0	8	8	Q	Q	8	Q	0	Q	Q	Q	0	8	8	0	8	g	
	order numbei	R9400	R9500	1SVR 550 870 R9400	R9500	R9100	R9300	R2300	R2300	R3300	R3300	R1300	R1300	R3300	1SVR 740 794 R3300	1SVR 730 794 R2300	1SVR 740 794 R2300	1SVR 730 774 R1300	R1300	1SVR 730 774 R3300	1SVR 740 774 R3300	R1300	R1300	1SVR 730 885 R3300	R3300	
	orde	881 1	382 F	370 F	371 F	324 F	324 F	84 F	84 F	84 F	84 1	'94 F	'94 F	94 F	94 F	'94 F	94 F	74	74 F	74	74 F	885	885	385 1	385 F	
		550 8	1SVR 550 882	00	00	1SVR 550 824	1SVR 430 824	30 7	40 7	30 7	40 7	730 794	40 7	1SVR 730 794	40 7	30 7	40 7	30 7	40 7	30 7	40 7	30 8	40	30 8	40	
		Ъ	Ъ	Ъ Н	Ъ Н	ы Б	Н 4	В 7	R 7.	H H	B Z	R 7:	R 7	Ц Н	R 7.	Н 7	В И	В 7	R 7.	Ц Ц	R 7	1SVR 730	ЧЧ	Ц Н	Ъ Ч	
		1SVR	1SV	1SV	1SVR 550 871	1SV	1SV	1SVR 730 784	1SVR 740 784	1SVR 730 784	1SVR 740 784	1SVR	1SVR 740 794	1SV	1SV	1SV	1SV	1SV	1SVR 740 774	1SV	1SV	1SV	1SVR 740	1SV	1SVR 740 885	
	Type							s	٩	S	٩.		4	S	4	s	4	s	4	s	٩.	S	۵.	S	٩	
	Γ						~	5.31	5.31	5.41	5.41	3.31	3.31	3.41	3.41	3.81	3.81	5.31	3.31	5.41	3.41	S.11	S.11	S.21	S.21	
		BB	PBI	P R	P	E	PF	PS	PS	PSS	PSS	PVS	P S	PS S	PVS	Ъ	۲ ۲	PAS	PAS	PAS	PAS	MP	Δb	MP	μ	
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	CM-MPS.11S	CM-MPS.11P	CM-MPS.21S	CM-MPS.21P	
Phase to Phase																				-						
160-300 V AC 200-400 V AC	_												•						•							<u> </u>
200-500 V AC	┢															-	•									
208-440 V AC																										
300-500 V AC																										
320-460 V AC	_			•																						
350-580 V AC 380 V AC	+			-				_	_								<u> </u>	<u> </u>							$\left - \right $	-
380-440 V AC	╀																					<u> </u>				
400 V AC	\uparrow		-																							
450-720 V AC																										
530-820 V AC																										
Phase to Neutral 90-170 V AC	Т	1																				-	-			
180-280 V AC	+																					•	•			
185-265 V AC																								-	-	
220-240 V AC																										
230 V AC																										
Rated frequency 50 Hz	-	1	1																			-		-		
50/60 Hz	-							-	-							-										
50/60/400 Hz		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Suitable for monitoring																										
Single-phase mains	_	•		•																		•	•	•	•	
Three-phase mains Monitoring function	_			•			-									-							-			L
Phase failure	Т																									
Phase sequence								ad	ad	ad	ad	ad		ad	ad	ad	ad					ad	ad		ad	
Automatic phase sequence correction																										
Overvoltage				•					•	-					•		•					•	•	-	•	
Undervoltage Unbalance	+	<u> </u>		•					•	•	-		•			-	•		_		_				-	
Neutral																		-	•	-						
Overfrequency																						_			_	
Underfrequency	T																									
Thresholds Timing functions for tripping delay		fix	fix	fix	fix	fix	fix	fix	fix	fix	fix	fix	fix	ad	ad	ad	ad	ad	ad	ad	ad	ad	ad	ad	ad	
ON delay	Т	<u> </u>		[fix											ad	ad	ad	ad	-				
On and OFF delay	ϯ	fix	fix	fix	fix	fix													uu	uu						
ON or OFF delay								ad	ad	ad	ad		ad	ad	ad	ad	ad					ad	ad	ad	ad	
								8		8		00		8		~		8		8		8		8]	
								R2300		R3300		R1300		R3300		SVR630794R2300		R1300		R3300		R1300		R3300		
								34 F		34 F		794 F		34 F		4R2		74 F		774 F		885 F		35 F		
								37 C		630 784		32 C		32 C		1794		12 C		17 C		80		80		
								1 SVR 630 784		63(630		1 SVR 630 794		630		1 SVR 630 774		630		630		1SVR 630 885		
								Зľ		SVR		SVR		NR N		NR.		N.		SVR		SVR		NR		
								10		10		1S		1 S		1 0		1 ²		10 10						
								33		41		31		41		8		31		41		Ξ		.21		
			1	1	1			ci.		S S		0 0		S.		S.		S.		S		လူ	1	S		
	rsior							ő		S S		i Si I		>		>		<		<		≞		≝		l I
	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		

2/5 ABB | EPR Catalog 2012 | 2CDC 110 077 C0201

Three-phase monitoring relays Selection and conversion

884 R1300	884 R1300	884 R4300	884 R4300	885 R4300	885 R4300	884 R4300	884 R4300	487 R8300	487 R8300	488 R8300	488 R8300	489 R8300	489 R8300	1SVR 730 736 R1300	1SVR 740 736 R1300
1SVR 730 884 R1300	1SVR 740	1SVR 730 884 R4300	1SVR 740	1SVR 730	1SVR 740 885 R4300	1SVR 730 884 R4300	1SVR 740 884 R4300	1SVR 750 487 R8300	1SVR 760 487 R8300	1SVR 750 488 R8300	1SVR 760	1SVR 750 489 R8300	1SVR 760 489 R8300	1SVR 730	1SVR 740
CM-MPS.31S	CM-MPS.31P 1SVR 740 884 R1300	CM-MPS.41S	CM-MPS.41P 1SVR 740 884 R4300	CM-MPS.23S 15VR 730 885 R4300	CM-MPS.23P	CM-MPS.43S	CM-MPS.43P	CM-MPN.52S	CM-MPN.52P	CM-MPN.62S	CM-MPN.62P 1SVR 760 488 R8300	CM-MPN.72S	CM-MPN.72P	CM-UFS.2S	CM-UFS.2P
		•													
									•						
															•
															•
															•
						•									
		-			•										•
	•	•	•			•	•	•	•	•	•	•	•		
ad	ad	• ad	∎ ad	• ad	• ad	∎ ad	∎ ad	∎ ad	∎ ad	∎ ad	∎ ad	∎ ad	∎ ad		1
					•								•	fix fix	fix fix
ad	∎ ad	ad	∎ ad	ad ad	ad ad	∎ ad ad	∎ ad ad	∎ ad ad	∎ ad ad	∎ ad ad	∎ ad ad	∎ ad ad	∎ ad ad	fix	fix
ad ad	ad	ad ad	ad	ad ad	ad ad	ad ad	ad ad	ad ad	ad ad	ad ad	ad ad	ad ad	ad ad	fix fix fix fix	fix fix fix fix
ad ad	ad	ad ad	ad	ad ad	ad ad	ad ad	ad ad	ad ad	ad ad	ad ad	ad ad	ad ad	ad ad	fix fix fix	fix fix fix
ad 	ad 	ad 	ad 	ad ad 	ad ad 	ad ad	ad ad •	ad ad	ad ad •	ad ad	ad ad •	ad ad •	ad ad •	fix fix fix fix	fix fix fix fix
ad a a a a ad	ad ad ad	ad ad ad	ad ad ad	ad ad ad ad	ad ad ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	fix fix fix fix	fix fix fix fix
ad ad ad ad ad	ad 	ad ad ad ad	ad 	ad ad ad a ad ad	ad ad 	ad ad a ad ad	ad ad •	ad ad a ad ad ad	ad ad •	ad ad a ad ad ad	ad ad •	ad ad ad ad ad ad	ad ad •	fix fix fix fix	fix fix fix fix
ad ad ad ad ad	ad ad ad	ad ad ad ad	ad ad ad	ad ad ad a ad ad	ad ad ad ad ad ad ad	ad ad a ad ad	ad ad ad ad ad	ad ad a ad ad ad	ad ad ad ad ad	ad ad a ad ad ad	ad ad ad ad ad	ad ad ad ad ad ad	ad ad ad ad ad	fix fix fix fix	fix fix fix fix
ad ad ad ad ad	ad ad ad	ad ad ad ad	ad ad ad	ad ad ad a ad ad	ad ad ad ad ad ad ad	ad ad a ad ad	ad ad ad ad ad	ad ad a ad ad ad	ad ad ad ad ad	ad ad a ad ad ad	ad ad ad ad ad	ad ad ad ad ad ad	ad ad ad ad ad	fix fix fix fix	fix fix fix fix
ad ad ad ad ad	ad ad ad	ad ad ad ad	ad ad ad	ad ad ad a ad ad	ad ad ad ad ad ad ad	ad ad a ad ad	ad ad ad ad ad	ad ad a ad ad ad	ad ad ad ad ad	ad ad a ad ad ad	ad ad ad ad ad	ad ad ad ad ad ad	ad ad ad ad ad	fix fix fix fix	fix fix fix fix
ad a a a a ad	ad ad ad	ad ad ad	ad ad ad	ad ad ad ad	ad ad ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	ad ad ad ad ad	fix fix fix fix	fix fix fix fix

Three-phase monitoring relays Ordering details





CM-PSS.41P



CM-PAS.31P

Description

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

oring dotails

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 failŭre detection (Three-phase)		CM-PFS ²⁾	1SVR430824R9300		0.15 (0.33)
3x380 V AC			CM-PSS.31S	1SVR730784R2300		0.132 (0.291)
3x380 V AC	Over- / under- voltage with		CM-PSS.31P	1SVR740784R2300		0.123 (0.271)
	fixed threshold values ± 10 %		CM-PSS.41S	1SVR740784R3300		0.132 (0.291)
3x400 V AC			CM-PSS.41P	1SVR730784R3300		0.123 (0.271)
0 400 000 1/40			CM-PVS.31S	1SVR730794R1300		0.141 (0.311)
3x160-300 V AC	Over- and		CM-PVS.31P	1SVR740794R1300		0.132 (0.291)
0.000 500 1/ 40	under- voltage with		CM-PVS.41S	1SVR730794R3300		0.139 (0.306)
3x300-500 V AC	adjustable threshold values (Three-		CM-PVS.41P	1SVR740794R3300		0.131 (0.289)
0.000.400.14.40	phase)		CM-PVS.81S	1SVR730794R2300		0.136 (0.300)
3x200-400 V AC			CM-PVS.81P	1SVR740794R2300		0.128 (0.282)
			CM-PAS.31S	1SVR730774R1300		0.133 (0.293)
3x160-300 V AC	Phase unba-		CM-PAS.31P	1SVR740774R1300		0.124 (0.273)
0-200 E00 V AO	lance (Three- phase)		CM-PAS.41S	1SVR730774R3300		0.132 (0.291)
3x300-500 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 jumpered and connected as one single conductor.

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

NEW

Three-phase monitoring relays Ordering details

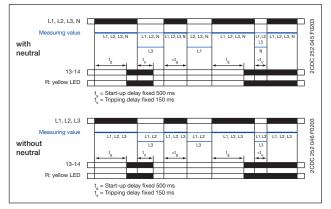


CM-MPS.23P



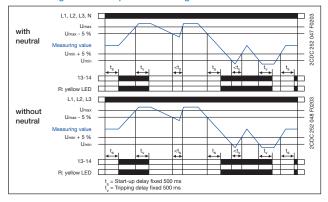
CM-MPN.52P

Rated control supply voltage = measuring voltage	Monitoring function	Neutral moni- toring	Туре	Order code	Price 1 pce	Weight (1 pce) kg (lb)
00 170 \/ 40			CM-MPS.11S	1SVR730885R1300		0.148 (0.326)
90-170 V AC	Multifunctional		CM-MPS.11P	1SVR740885R1300		0.137 (0.302)
180-280 V AC	(Three-phase phase failure	yes	CM-MPS.21S	1SVR730885R3300		0.146 (0.322)
160-260 V AC	detection, Phase		CM-MPS.21P	1SVR740885R3300		0.135 (0.298)
	sequence monitoring, overvoltage,		CM-MPS.31S	1SVR730884R1300		0.142 (0.313)
3x300-500 V AC	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)
			CM-MPS.23S	1SVR730885R4300		0.149 (0.328)
180-280 V AC		yes	CM-MPS.23P	1SVR740885R4300		0.138 (0.304)
3x300-500 V AC	Multifunctional		CM-MPS.43S	1SVR730884R4300		0.148 (0.327)
3x300-300 V AG	(Three-phase phase failure detection.	no	CM-MPS.43P	1SVR740884R4300		0.137 (0.302)
	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 AO	Phase unba- lance)		CM-MPN.62S	1SVR750488R8300		0.229 (0.505)
3x450-720 V AC		no	CM-MPN.62P	1SVR760488R8300		0.225 (0.496)
3x530-820 V AC			CM-MPN.72S	1SVR750489R8300		0.224 (0.494)
5XU5U-62U V AU			CM-MPN.72P	1SVR760489R8300		0.220 (0.485)
3 x 400 V AC (L-L) /	see Three- Phase	VOC	CM-UFS.2S	1SVR730736R1300		0.146 (0.322)
230 V AC (L-N)	overview page	yes	CM-UFS.2P	1SVR740736R1300		0.134 (0.295)



Function diagrams - Three-phase monitoring CM-PBE

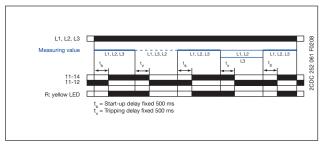




If all phases (and the neutral) are present, the output relay energizes after the start-up delay t_s is complete. If a phase failure occurs, the tripping delay t_s starts. When timing is complete, the output relay de-energizes. As soon as the voltage returns to the tolerance range, timing of t_s starts.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

If all phases (and the neutral) are present with correct voltage, the output relay energizes after the start-up delay t_s is complete. If the voltage exceeds or falls below the fixed threshold value or if a phase failure occurs, the tripping delay t_s 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



put relay energizes after the start-up delay t_s is complete. If a phase failure or a phase sequence error occurs, the tripping delay t_s 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

If all phases are present with the correct phase sequence, the out-

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 $t_{\rm s}$ 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 energized.

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

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

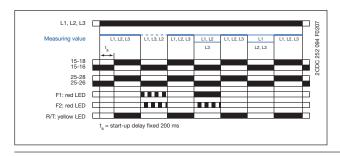
Applying control supply voltage begins the fixed start-up delay $t_{\rm s}.$ When $t_{\rm s}$ is complete and all phases are present with correct voltage, the output relays energize and the yellow LED R/T glows.

Phase sequence monitoring

If phase sequence monitoring is activated, the output relays 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.

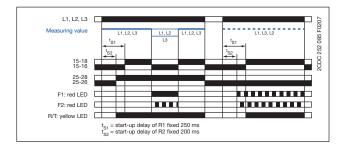


Automatic phase sequence correction CM-MPS.x3, CM-MPN.x2

This function can be selected only if phase sequence monitoring is activated \square and operating mode 2x1 c/o (SPDT) contact \square is selected. 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, output relay R1 energizes. Output relay R2 energizes when the fixed start-up delay $t_{\rm S2}$ 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.



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

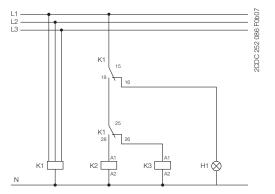
The interruption of the neutral in the main to be monitored is detected by means of phase unbalance evaluation.

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.

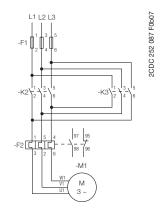
If the star point is displaced by asymmetrical load in the three-phase main, an interrupted neutral will be detected.

Displacement of the star point





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 $t_{\rm g}$. When $t_{\rm g}$ is complete and all phases are present with correct voltage and with correct phase sequence, the output relays energize and the yellow LED R/T glows.

Type of tripping delay = ON-delay

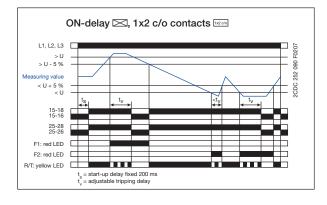
If the voltage to be monitored exceeds or falls below the fixed¹) or set² threshold value, the output relays de-energize after the set tripping delay $t_{\rm v}$ is complete. The LED R/T flashes during timing and turns off as soon as the output relays de-energize.

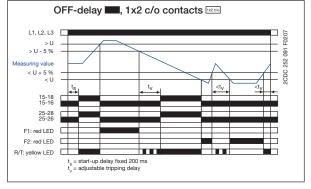
The output relays re-energize automatically as soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 % and the LED R/T glows.

Type of tripping delay = OFF-delay

If the voltage to be monitored exceeds or falls below the fixed $^{\rm 1)}$ or set $^{\rm 2)}$ 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 $t_{\rm v}$ is complete. The LED R/T flashes during timing and turns steady when timing is complete.





Over- and undervoltage monitoring 2x1 c/o

CM-MPS.x3, CM-MPN.x2

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

Type of tripping delay = ON-delay

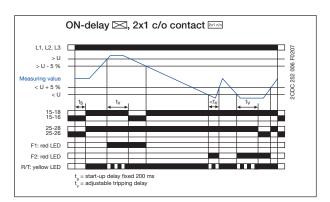
If the voltage to be monitored exceeds or falls below the set threshold value, output relay R1 (overvoltage) or output relay R2 (undervoltage) de-energizes after the set tripping delay $t_{\rm v}$ is complete. The LED R/T flashes during timing.

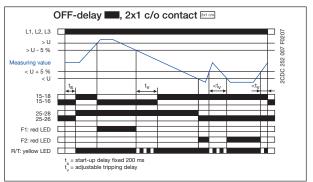
The corresponding output relay re-energizes automatically as soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %.

Type of tripping delay = OFF-delay

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

As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %, the corresponding output relay reenergizes automatically after the set tripping delay $t_{\rm v}$ 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

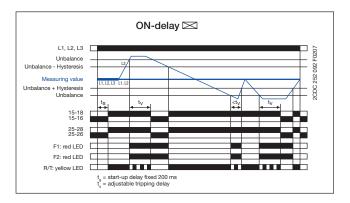
If the voltage to be monitored exceeds or falls below the set phase unbalance threshold value, the output relays de-energize after the set tripping delay $t_{\rm v}$ is complete. The LED R/T flashes during timing and turns off as soon as the output relays de-energize.

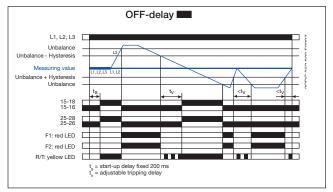
The output relays re-energize automatically as soon as the voltage returns to the tole-rance range, taking into account a fixed hysteresis of 20 % and the LED R/T glows.

Type of tripping delay = OFF-delay

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

As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 20 %, the output relays re-energize automatically after the set tripping delay t_v is complete. The LED R/T flashes during timing and turns steady when timing is complete.





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

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

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 $t_{\rm v}.$

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 $t_{\rm v}.$ Thereby, also momentary undervoltage conditions are recognized.

Grid feeding monitoring CM-UFS.2

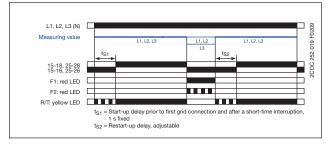
Function of the yellow LED

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 $t_{\rm S2}$ is complete.

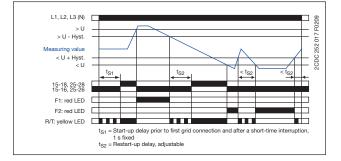


Over- and undervoltage monitoring

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 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_{s_2} is complete.



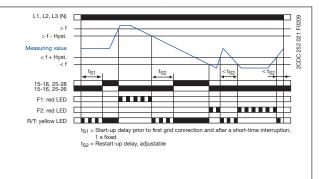
LED Funktionen

Function	R/T: yellow LED	F1: red LED	F2: red LED
Output relay energized		-	-
Delay active	лл	-	-
Overvoltage	-		-
Undervoltage	-	-	<u>ا</u>
Overfrequency	-	лл	-
Underfrequency	-	-	лл
Phase failure	-		лл

Over- and underfrequency monitoring

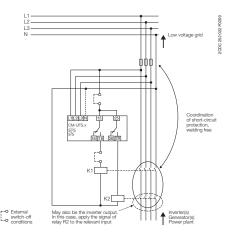
Applying control supply voltage begins the fixed start-up delay t_{s_1} . When t_{s_1} is complete and all phases are present with correct voltage and frequency, the output relays energize.

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_{sp} is complete.



Function diagram legend

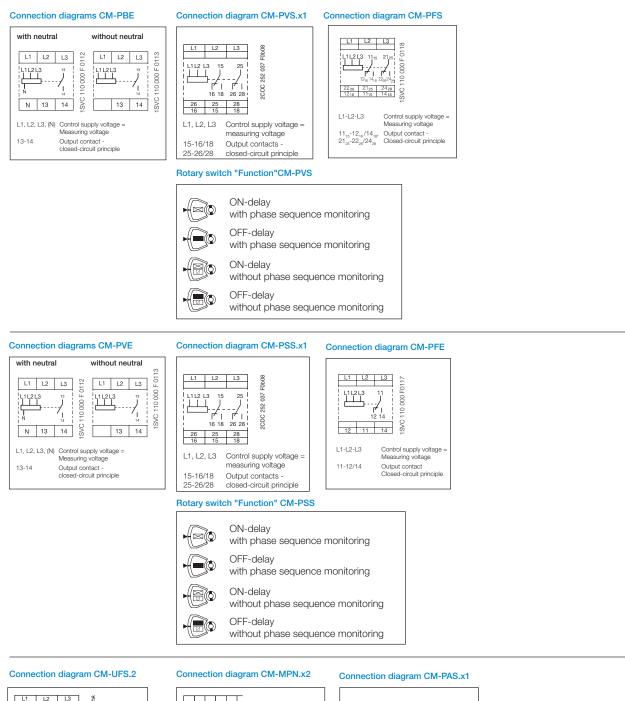
Control supply voltage not applied / Output contact open / LED off
 Control supply voltage applied / Output contact closed / LED glowing

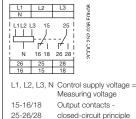


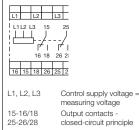
Automatized grid connection instead of a permanently accessible switching point with a disconnection function

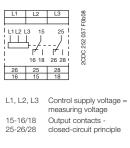
2/13 ABB | EPR Catalog 2012 | 2CDC 110 077 C0201

Three-phase monitoring relays Connection diagrams, DIP switches



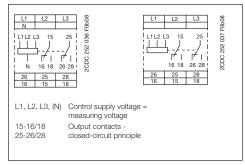






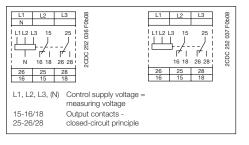
Three-phase monitoring relays Connection diagrams, DIP switches, Rotary switches

Connection diagram CM-MPS.x3

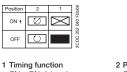


DIP switch functions CM-MPS.x3 and CM-MPN.x2 4 3 2 1 Position (A) 2x1 c/0 ON t OFF Ø 1x2 c/o 🔘 💻 1 Timing function 2 Phase sequence monitoring ON deactivated OFF activated ON ON-delayed OFF OFF-delayed 3 Operating principle of output 4 Phase sequence correction ON 2x1 c/o contact OFF 1x2 c/o contacts ON activated OFF deactivated ¹⁾ Output relay R1 is responsive to overvoltage, output relay R2 is responsive to undervoltage. In case of other faults, both output relays react synchronously.

Connection diagram CM-MPS.x1



DIP switch functions CM-MPS.x1



ON ON-delayed OFF OFF-delayed 2 Phase sequence monitoring ON deactivated OFF activated

2/15 ABB | EPR Catalog 2012 | 2CDC 110 077 C0201

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	t	L1-L2-L3-N	L1-L2-L3	L1-L2-L3-N	L1-L2-L3	L1-L	2-L3
Rated control supply voltage U _s = measur	ing voltage	3x380- 440 V AC, 220-240 V AC	3x380- 440 V AC	3x320- 460 V AC, 185-265 V AC	3x320- 460 V AC	3x208- 440 V AC	3x200- 500 V AC
Power consumption	•					approx	. 15 VA
Rated control supply voltage Us tolerance		-15	⊦15 %	-15+	-10 %	-10+10 %	-15+10 %
Rated frequency	••••••		0 Hz		60 Hz (-10+1		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 failure			•			
	phase sequence over- / undervoltage			-	-	-	-
	neutral		-		-	-	-
Measuring ranges		3x380- 440 V AC, 220-240 V AC	3x380- 440 V AC	3x320- 460 V AC, 185-265 V AC	3x320- 460 V AC	3x208- 440 V AC	3x200- 500 V AC
Thresholds	U _{min}		•	fixed 185 V / 320 V	fixed 320 V		
	U _{max}	0.6 >	< UN	fixed 265 V / 460 V	fixed 460 V	0.6	x UN
Hysteresis related to the threshold value	•	fixed (release value	5 % = 0.65 x UN)	fixed	5 %		
Measuring voltage frequency		50/60 Hz (-10		10 %+10 %)		50/60 Hz	
Response time	·····	40 ms		80 ms		500 ms	
Accuracy within the rated control supply v Accuracy within the temperature range	oltage tolerance	$\Delta U \le 0.5 \%$ $\Delta U \le 0.06 \% / °C$					0.5 %
Timing circuit							
Start-up delay t			fixed 500	ms (±20 %)		fixed §	500 ms
Tripping t _v		fixed 1 (±20	50 ms	at over-/ un fixed 500 n	dervoltage ns (±20 %)	fixed 500 ms	-
Indication of operational states		· · ·				•	
Relay status	R: yellow LED			Contraction Contraction	relay energize	d	<i>,</i>
Output circuits			13	3-14		11-12/14	11(15)- 12(16)/14(18) 21(25)- 22(26)/24(28
Kind of output			1 n/o	contact		1 c/o contact	2 c/o contac
Operating principle 2)				closed-circu	uit principle		
Contact material Rated operational voltage U	IEC/EN 60047.1			AgCdO		•••••••••••••••••••••••••••••••••••••••	AgNi
Vinimum switching voltage / Minimum sw	IEC/EN 60947-1 itching current	250 V - / -					
Maximum switching voltage Rated operational current I	AC12 (resistive) 230 V			250 V AC, 4		•••••••••••••••••••••••••••••••••••••••	
IEC/EN 60947-5-1)	AC12 (resistive) 230 V AC15 (inductive) 230 V						
	DC12 (resistive) 24 V			4		•	
	DC13 (inductive) 24 V			2	A		•••••••••••••••••••••••••••••••••••••••
Aechanical lifetime				30 x 106 swit			
Electrical lifetime (AC12, 230 V, 4 A)				0.1 x 106 swi	tching cycles	. .	
Max. fuse rating to achieve short-circuit protection	n/c contact			10 A fast-acting			4 A fast- acting
	n/o contact	10 A fast-acting					6 A fast- acting
	egory (Control Circuit Rating Code)			B 3		<u>.</u>	
UL 508)	max. rated operational voltage						
	ontinuous thermal current at B 300 preaking apparent power at B 300						
max. making/i	reaking apparent power at D 300	1		3000/3	OU VA		

¹⁾ Device with neutral monitoring: The external conductor voltage towards the neutral conductor is measured.

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

Data at $T_{\rm a}$ = 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 x 78.5 mm (0.89 x 3.07 x 3.09 in)			22.5 x 78 x 100 mm (0.89 x 3.07 x 3.94 in)			
Weight	•••••••••••••••••••••••••••••••••••••••			see data	a sheet	•••••••••••••••••••••••••••••••••••••••	, x 010 1 11)
Mounting	•			DIN rail (IEC	/EN 60715)		
Mounting position	······			an			<u>.</u>
Degree of protection	housing / terminals			IP50 /	IP20		
Electrical connection		1					;
	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 (2 x 8-14 AWG)
fine-s	trand without wire end ferrule		2 x 1-1.5	5 mm² (2 x 18-1	6 AWG)		(2 × 0 + 1 / 4 / 6 /
	rigid		2 x 0.75-1.5 mm² (2 x 18-16 AWG)				2 x 0.5- 4 mm ² (2 x 20-12 AWG)
Stripping length				10 mm (0.39 in)			7 mm (0.28 in)
Tightening torque	•••••••••••••••••••••••••••••••••••••••	0.6-0.8 Nm					••••
Environmental data							
Ambient temperature range			-20+60 °C / -40+85 °C				
Environmental testing (IEC 68-2-30)		24 h cycle time, 55 °C, 93 % rel., 96 h					
Operational reliability (IEC 68-2-6) Mechanical resistance (IEC 68-2-6)				6 g 10 g			4 g 6 q
Isolation data				10 g			: 69
	a and output circuits					-	
Rated insulation volt. between supply, measurin (VDE 0110, IEC 60947-1)	ig and output circuits		400 V 50			00 V	
Rated impulse withstand voltage U _{imp} between a (VDE 0110, IEC 664)	all isolated 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, I	EC 255-5)			3	}		
Overvoltage category (VDE 0110, IEC/EN 6066	4, IEC 255-5)						
Standards							
Product standard				IEC 255-6, E			
Low Voltage Directive EMC Directive	•			2006/9 2004/1			····
Electromagnetic compatibility				2004/1	00/20		
Interference immunity to		1		EN 610	00-6-2		
electrostatic discharge	IEC/EN 61000-4-2			Level 3 - 6			
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3			Level 3 -			
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3 - 2 kV / 5 kHz					•
surge	IEC/EN 61000-4-5						
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 - 10 V					
Interference emission		Ι		EN 610	00-6-4		
Interference emission		EN 61000-6-4					

¹⁾ Device with neutral monitoring: The external conductor voltage towards the neutral conductor is measured.

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

Data at $\rm T_a$ = 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		:	÷	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 / 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)		
Measuring circuit					L1, L2, L3				
Monitoring functions	Phase failure								
	Phase sequence		Ca	an be switched	off	-			
	Automatic phase sequence correction	-	-	-	-	-	-	-	
	Over- / undervoltage	-					-	-	
	Phase unbalance	-	-	-	-	-			
Maraa	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 % o of phase		
Thresholds	Overvoltage	fixed			adjustable within measuring range		-		
	Undervoltage	fix	ed	adjustabl	e within measu	ring range	-	-	
I h stavesia velatad ta tha	Phase unbalance (switch-off value)	-	-	-	-	-	adjust. within	meas. range	
Hysteresis related to the threshold value	Over- / undervoltage Phase unbalance	_	-	fixed 5 %	-	_	fixed	20 %	
Rated frequency of the mea	· · · · · · · · · · · · · · · · · · ·	50/60 Hz							
Frequency range of the mea	asuring signal		•••••••••••••••••••••••••••••••••••••••	•••••••	45-65 Hz	••••••		••••••••••••••••••••••••••••••••••••••	
Maximum measuring cycle t	time control supply voltage tolerance	100 ms							
Accuracy within the tempera		$\Delta U \leq 0.5\%$							
Measuring method	atore range	ΔU ≤ 0.06 % / °C True RMS							
Timing circuit				-	indo inivio				
Start-up delay t			-		fixed 200 mg				
		fixed 200 ms							
Tripping delay $t_{\rm v}$		ON- or OFF-delay ON- delay 0; 0.1-30 s adjustable 0; 0.1-30 s adjustable							
Repeat accuracy (constant)	parameters)	-	-	-	-	lw 0.2 %	-	-	
	ontrol supply voltage tolerance				$\Delta t \leq 0.5 \%$				
Accuracy within the tempera			•••••••••••••••••••••••••••••••••••••••	Δ	t ≤ 0.06 % / °C	5			
Indication of operational stat	tes				ow LED, 2 red				
		Details see function Details see operating mode and function Details see fun description / -diagrams description / -diagrams description / -diagrams							
Output circuits				15-	16/18, 25-26/	28			
Kind of output				2x1 c	/o contacts (Re	elays)			
Operating principle 1)			•••••••		ed-circuit princ				
Contact material					Ni alloy, Cd fre				
Rated operational voltage U	IEC/EN 60947-1	250 V							
Minimum switching power	·····		. .		24 V / 10 mA	.		. .	
Maximum switching voltage	L	see load limit curve							

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

		CM-PSS.31 CM	M-PSS.41 CM-PVS.3	1 CM-PVS.4	1 CM-PVS.81	CM-PAS.31	CM-PAS.4
Rated operational current				4 A			
(IEC/EN [°] 60947-5-1)	AC15 (inductive) 230 V			3 A			
	DC12 (resistive) 24 V			4 A			
	DC13 (inductive) 24 V			2 A			
AC rating (UL 508)	Utilization category			B 300			
	(Control Circuit Rating Code)						
	max. rated operational voltage			300 V AC			
	max. continuous thermal			5 A			
	current at B 300			ЪА			
	max. making/breaking apparent		-	3600/360 VA		•	••••••
	power at B 300			3600/360 VA	4		
Mechanical lifetime			30	x 10 ⁶ switching	cycles	•••••••••••••••••••••••••••••••••••••••	
Electrical lifetime (AC12, 2	30 V, 4 A)	•	0.1	x 10 ⁶ switching	cycles	•	
Max. fuse rating to achieve	e n/c contact			6 A fast-actin	g		
short-circuit protection	n/o contact			10 A fast-actir	ng	-	
General data							
MTBF		1		on request			
Duty time				100%	•••••	••••••	••••••
Dimensions (W x H x D)	product dimensions	••••••	22.5 x 85.6 y	: 103.7 mm (0.89	x 3 37 x 4 08 in)	••••••	••••••
	packaging dimensions	l		x 30 mm (3.82 x 4		•••••••••••••••••••••••••••••••••••••••	••••••
Weight	packaging annonoion			on device, see c			••••••
Mounting	•••••••••••••••••••••••••••••••••••••••			IN rail (IEC/EN 60		•••••••	•••••••••••••••••••••••••••••••••••••••
				n mounting with			
Mounting position			onap o	any		•••••••••••••••••••••••••••••••••••••••	•••••••
Minimum distance to othe	r units vertical / horizontal	••••••	n∩t r	necessary / not n	ecessarv		••••••
Material of housing		•••••	1001	UL 94 V-0		••••••	•••••••••••••••••••••••••••••••••••••••
Degree of protection	housing / terminals	•••••	•	IP50 / IP20			••••••
Electrical connection	× *	1					
Wire size		1					
wire size		Screw co	onnection technolog	iy E	asy Connect	Technology (Push-in)
	fine-strand with(out) wire end ferrule	1,0,5,0	$E mm^2/1 \times 0.014 \text{ AVA/C}$	\	0,0,0,5,1,5,~~	1m² (2 x 20-16 /	
	line-strand with(out) wire end terrule		2.5 mm ² (1 x 20-14 AWG		2 X U.S-1.5 II	IM- (2 x 20-16 A	400G)
	riaid		.5 mm ² (2 x 20-16 AWG)	0 2 0 5 1 5 ~	im² (2 x 20-16 A	
	rigid		4 mm ² (1 x 20-12 AWG)	\ \	2 X 0.3-1.5 H	IIII- (2 X 20-10 A	4WG)
Otvianina lanath		2 X U.S-2	2.5 mm² (2 x 20-14 AWG			•••••••••••••••••••••••••••••••••••••••	•••••••••••••••••••••••••••••••••••••••
Stripping length	•••••••••••••••••••••••••••••••••••••••		0 N (5 04 7 00 lb 1-)	8 mm (0.32 ir	<u>1)</u>	•••••••••••••••••••••••••••••••••••••••	.
Tightening torque	•••••••	0.0-0.	8 Nm (5.31-7.08 lb.in)	<u>i</u>	•••••	-	•••••••••••••••••••••••••••••••••••••••
Environmental data			•••••	•••••	••••	••••••	•••••••
Ambient temperature rang	operation / storage		0E	+60 °C / -40	.05 00	••••••	•••••••
Damp heat (IEC 60068-2-		•••••••	-23	55 °C, 6 cycle		•••••••	•••••••
Climatic category	50)	•		3K3	75	•••••••••••••••••••••••••••••••••••••••	•••••••••••••••••••••••••••••••••••••••
Vibration (sinusoidal) (IEC/	EN 60255-21-1)	•••••••	······	Class 2	•••••	•••••••••••••••••••••••••••••••••••••••	
Shock (IEC/EN 60255-21-		•••••••	••••••	Class 2	•••••	•••••••	•••••••••••••••••••••••••••••••••••••••
				Class 2			-
Isolation data							
		· · · · · · · · · · · · · · · · · · ·					
	input circuit / output circuit			600 V			••••••
voltage U	output circuit 1 / output circuit 2		·····	300 V			•
voltage U	output circuit 1 / output circuit 2			300 V 6 kV; 1.2/50 μ			
voltage U _i Rated impulse withstand v U _{mp} (VDE 0110, IEC/EN 60	output circuit 1 / output circuit 2 /oltage input circuit 0664) output circuit			300 V 6 kV; 1.2/50 μ 4 kV; 1.2/50 μ	IS		
voltage U _i Rated impulse withstand v U _{imp} (VDE 0110, IEC/EN 6i Test voltage between all is	output circuit 1 / output circuit 2 /oltage input circuit 0664) output circuit /olated circuits (type test)			300 V 6 kV; 1.2/50 µ 4 kV; 1.2/50 µ 2.5 kV, 50 Hz,	IS		
voltage U _i Rated impulse withstand v U _{mp} (VDE 0110, IEC/EN 6/ Test voltage between all is Basis isolation	output circuit 1 / output circuit 2 voltage input circuit 0664) output circuit olated circuits (type test) input circuit / output circuit			300 V 6 kV; 1.2/50 μ 4 kV; 1.2/50 μ	IS		
voltage U _i Rated impulse withstand v U _{mp} (VDE 0110, IEC/EN 6/ Test voltage between all is Basis isolation Protective separation (VDE	output circuit 1 / output circuit 2 voltage input circuit 0664) output circuit olated circuits (type test) input circuit / output circuit 0106 input circuit /			300 V 6 kV; 1.2/50 µ 4 kV; 1.2/50 µ 2.5 kV, 50 Hz,	IS		
voltage U, Rated impulse withstand \ Ump (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/E	output circuit 1 / output circuit 2 voltage input circuit 0664) output circuit olated circuits (type test) input circuit / output circuit 0106 input circuit / eN 1140) output circuit			300 V 6 kV; 1.2/50 µ 4 kV; 1.2/50 µ 2.5 kV, 50 Hz, 600 V	IS		
voltage U, Rated impulse withstand V Ump (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/E Pollution degree (VDE 011	output circuit 1 / output circuit 2 voltage input circuit olated circuits (type test) input circuit / output circuit 0106 input circuit / output circuit N1140 output circuit 0, IEC/EN 60664)			300 V 6 kV; 1.2/50 µ 4 kV; 1.2/50 µ 2.5 kV, 50 Hz, 600 V - 3	IS		
voltage U, Rated impulse withstand V Ump (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE politic and 101/A, IEC/E Pollution degree (VDE 011 Overvoltage category (VDE	output circuit 1 / output circuit 2 voltage input circuit olated circuits (type test) input circuit / output circuit 0106 input circuit / output circuit N1140 output circuit 0, IEC/EN 60664)			300 V 6 kV; 1.2/50 µ 4 kV; 1.2/50 µ 2.5 kV, 50 Hz, 600 V	IS		
voltage U, Rated impulse withstand \ Ump (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/F Pollution degree (VDE 011 Overvoltage category (VDE Standards	output circuit 1 / output circuit 2 voltage input circuit olated circuits (type test) input circuit / output circuit 0106 input circuit / output circuit N1140 output circuit 0, IEC/EN 60664)			300 V 6 kV: 1.2/50 J 4 kV: 1.2/50 J 2.5 kV: 50 Hz, 600 V - 3 III	15 1 5		
voltage U, Rated impulse withstand \ J _{mp} (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/K Pollution degree (VDE 011 Overvoltage category (VDE Standards Product standard	output circuit 1 / output circuit 2 voltage input circuit olated circuits (type test) input circuit / output circuit 0106 input circuit / output circuit N1140 output circuit 0, IEC/EN 60664)			300 V 6 kV; 1.2/50 J 4 kV; 1.2/50 J 2.5 kV, 50 Hz, 600 V - 3 III EN 60255-6, EI	IS 1 S V 50178		
voltage U, Rated impulse withstand \ Ump (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/E Pollution degree (VDE 011 Overvoltage category (VDE Standards Product standard Low Voltage Directive	output circuit 1 / output circuit 2 voltage input circuit olated circuits (type test) input circuit / output circuit 0106 input circuit / output circuit N1140 output circuit 0, IEC/EN 60664)		IEC/	300 V 6 kV; 1.2/50 j 4 kV; 1.2/50 j 2.5 kV, 50 Hz, 600 V - 3 III EN 60255-6, El 2006/95/EG	IS 1 s N 50178		
voltage U, Rated impulse withstand (J _{mp} (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/F Pollution degree (VDE 011 Overvoltage category (VDI Standards Product standard Low Voltage Directive EMC directive	output circuit 1 / output circuit 2 voltage input circuit olated circuits (type test) input circuit / output circuit 0106 input circuit / output circuit N1140 output circuit 0, IEC/EN 60664)			300 V 6 kV; 1.2/50 J 4 kV; 1.2/50 J 2.5 kV, 50 Hz, 600 V - 3 III EN 60255-6, EI 2006/95/EG 2004/108/EC	IS 1 s N 50178		
voltage U, Rated impulse withstand (J _{mp} (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/F Pollution degree (VDE 011 Overvoltage category (VDI Standards Product standard Low Voltage Directive EMC directive RoHS directive	output circuit 1 / output circuit 2 voltage input circuit 0664) output circuit olated circuits (type test) 0106 input circuit / output circuit 0106 input circuit / output circuit 0106 output circuit 0106 00064) E 0110, IEC 60664)		IEC/	300 V 6 kV; 1.2/50 j 4 kV; 1.2/50 j 2.5 kV, 50 Hz, 600 V - 3 III EN 60255-6, El 2006/95/EG	IS 1 s N 50178		
voltage U, Rated impulse withstand (J _{mp} (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/F Pollution degree (VDE 011 Overvoltage category (VDI Standards Product standard Low Voltage Directive EMC directive RoHS directive	output circuit 1 / output circuit 2 voltage input circuit 0664) output circuit olated circuits (type test) 0106 input circuit / output circuit 0106 input circuit / output circuit 0106 output circuit 0106 00064) E 0110, IEC 60664)			300 V 6 kV; 1.2/50 J 4 kV; 1.2/50 J 2.5 kV, 50 Hz, 600 V - 3 III EN 60255-6, EI 2006/95/EG 2004/108/EC	IS 1 s N 50178		
voltage U, Rated impulse withstand \ J _{mp} (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/F Pollution degree (VDE 011 Overvoltage category (VDI Standards Product standard Low Voltage Directive EMC directive RoHS directive Electromagnetic con	output circuit 1 / output circuit 2 voltage input circuit 0664) output circuit olated circuits (type test) 0106 input circuit / output circuit 0106 input circuit / output circuit 0106 output circuit 0106 00064) E 0110, IEC 60664)			300 V 6 kV; 1.2/50 j 4 kV; 1.2/50 J 2.5 kV; 50 H2, 600 V - 3 III EN 60255-6, EI 2006/95/EG 2002/95/EG	IS 1 S V 50178		
voltage U, Rated impulse withstand \ Ump. (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/F Pollution degree (VDE 011 Overvoltage category (VDI Standards Product standard Low Voltage Directive EWC directive RoHS directive Electromagnetic con	output circuit 1 / output circuit 2 voltage input circuit 0664) output circuit 001ated circuits (type test) 0106 input circuit / output circuit 0106 input circuit / output circuit 0106 0, IEC/EN 60664) E 0110, IEC 60664) mpatibility		EN 6	300 V 6 kV; 1.2/50 J 4 kV; 1.2/50 J 2.5 kV, 50 H2, 600 V - 3 III EN 60255-6, EI 2006/95/EG 2002/95/EG 2002/95/EG	IS 1 S N 50178		
voltage U, Rated impulse withstand \ J _{mp} (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/K Pollution degree (VDE 011 Overvoltage category (VDI Standards Product standard Low Voltage Directive EMC directive RoHS directive Electromagnetic con Interference immunity to electrostatic discharge	output circuit 1 / output circuit 2 voltage input circuit 0664) output circuit 0106 input circuit 0106 input circuit 0106 input circuit 0, IEC/EN 60664) npatibility IEC/EN 61000-4-2		EN 6	300 V 6 kV; 1.2/50 j 4 kV; 1.2/50 J 2.5 kV; 50 Hz, 600 V - 3 III 2006/95/EG 2004/108/EC 2002/95/EG 2002/95/EG 2002/95/EG	IS 1 S N 50178 A 1000-6-2 kV)		
voltage U, Rated impulse withstand \ J _{mp} (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/F Pollution degree (VDE 011 Overvoltage category (VDI Standards Product standard Low Voltage Directive EMC directive ROHS directive Electromagnetic con Interference immunity to	output circuit 1 / output circuit 2 voltage input circuit 0664) output circuit 0106 input circuit 0106 input circuit 0106 input circuit 0, IEC/EN 60664) npatibility IEC/EN 61000-4-2		EN 6	300 V 6 kV; 1.2/50 J 4 kV; 1.2/50 J 2.5 kV, 50 H2, 600 V - 3 III EN 60255-6, EI 2006/95/EG 2002/95/EG 2002/95/EG	IS 1 S N 50178 A 1000-6-2 kV)		
voltage U, Rated impulse withstand \ J _{PP} (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/E Pollution degree (VDE 011 Dvervoltage category (VDE Standards Product standard ow Voltage Directive ENC directive ROHS directive Electromagnetic con nterference immunity to electrostatic discharge radiated, radio-frequer electromagnetic field	output circuit 1 / output circuit 2 voltage input circuit olotade output circuit olated circuits (type test) input circuit / output circuit 0106 input circuit / output circuit 0106 input circuit 0.1EC/EN 60664) E 0110, IEC 60664) npatibility IEC/EN 61000-4-2 ICy, IEC/EN 61000-4-3		EN 6	300 V 6 kV; 1.2/50 µ 4 kV; 1.2/50 µ 2.5 kV, 50 Hz, 600 V - 3 III EN 60255-6, EI 2006/95/EG 2004/108/EG 2002/95/EG 1000-6-1, EN 6 evel 3 (6 kV / 8 Level 3 (10 V/1	IS 1 s N 50178 A 1000-6-2 KV) n)		
voltage U, Rated impulse withstand \ J _{mp} (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/F Pollution degree (VDE 011 Overvoltage category (VDI Standards Product standard Low Voltage Directive EMC directive RoHS directive Electromagnetic con Interference immunity to electromagnetic field electrical fast transient	output circuit 1 / output circuit 2 voltage input circuit 00664) output circuit 010664) output circuit 0106 input circuit / output circuit 0106 input circuit / output circuit 0106 input circuit 0106 input circuit 0106 input circuit 0106 00664) E 0110, IEC 60664) npatibility IEC/EN 61000-4-2 cy, IEC/EN 61000-4-3 / burst IEC/EN 61000-4-4		EN 6	300 V 6 kV; 1.2/50 j 4 kV; 1.2/50 j 2.5 kV, 50 Hz, 600 V - 3 III EN 60255-6, EI 2006/95/EG 2002/95/EG 2002/95/EG 2002/95/EG 1000-6-1, EN 6 evel 3 (6 kV / 8 Level 3 (10 V/1 evel 3 (2 kV / 2	IS 1 s N 50178 A 1000-6-2 kV) n) kHz)		
voltage U, Rated impulse withstand \ J _{mp} (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/K Pollution degree (VDE 011 Overvoltage category (VDI Standards Product standard Low Voltage Directive EMC directive EMC directive Electromagnetic con Interference immunity to electrostatic discharge radiated, radio-frequer electromagnetic field electrical fast transient surge	output circuit 1 / output circuit 2 /oltage input circuit 0664) output circuit 001200 circuits (type test) 0106 input circuit / output circuit 0106 input circuit / output circuit / 0107 input circuit / output circuit / 0108 input cir		EN 6	300 V 6 kV; 1.2/50 j 4 kV; 1.2/50 J 2.5 kV; 50 H2, 600 V - 3 111 EN 60255-6, EI 2006/95/EG 2004/108/EC 2002/95/EG 2002/95	IS 1 s N 50178 A 1000-6-2 KV) n) kHz) -L)		
voltage U, Rated impulse withstand (J _{PP} (VDE 0110, IEC/EN 6) Rasis isolation Protective separation (VDE part 101 and 101/A, IEC/E Pollution degree (VDE 011 Pollution degree (VDE 011 Pollution degree (VDE 011 Standards Product standard Low Voltage Directive EMC directive EMC directive Electromagnetic con Interference immunity to electrostatic discharge radiated, radio-frequer electromagnetic field electrical fast transient surge conducted disturbances	output circuit 1 / output circuit 2 /oltage input circuit /oltage input circuit /olated circuits (type test) input circuit / output circuit 0106 input circuit / output circuit 0, IEC/EN 60664) E 0110, IEC 60664) npatibility IEC/EN 61000-4-2 rcy, IEC/EN 61000-4-3 / burst IEC/EN 61000-4-3 S, IEC/EN 61000-4-6		EN 6	300 V 6 kV; 1.2/50 j 4 kV; 1.2/50 j 2.5 kV, 50 Hz, 600 V - 3 III EN 60255-6, EI 2006/95/EG 2002/95/EG 2002/95/EG 2002/95/EG 1000-6-1, EN 6 evel 3 (6 kV / 8 Level 3 (10 V/1 evel 3 (2 kV / 2	IS 1 s N 50178 A 1000-6-2 KV) n) kHz) -L)		
voltage U, Rated impulse withstand \ Imp. (VDE 0110, IEC/EN 6) Rest voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/E Pollution degree (VDE 011 Overvoltage category (VDE Standards Product standard Low Voltage Directive EMC directive ROHS directive Electromagnetic con Interference immunity to electrostatic discharge radiated, radio-frequer electromagnetic field electrical fast transient surge conducted disturbances induced by radio-frequer	output circuit 1 / output circuit 2 /oltage input circuit /oltage input circuit /olated circuits (type test) input circuit / output circuit 0106 input circuit / output circuit 0, IEC/EN 60664) E 0110, IEC 60664) npatibility IEC/EN 61000-4-2 rcy, IEC/EN 61000-4-3 / burst IEC/EN 61000-4-3 S, IEC/EN 61000-4-6		EN 6	300 V 6 kV; 1.2/50 µ 4 kV; 1.2/50 µ 2.5 kV, 50 Hz, 600 V - 3 III EN 60255-6, EI 2006/95/EG 2004/108/EC 2002/95/EG 1000-6-1, EN 6 _evel 3 (6 kV / 8 Level 3 (10 V/ Level 4 (2 kV L	IS 1 s N 50178 A 1000-6-2 KV) n) kHz) -L)		
voltage U, Rated impulse withstand \ J _{mp} (VDE 0110, IEC/EN 6) Test voltage between all is Basis isolation Protective separation (VDE part 101 and 101/A, IEC/F Pollution degree (VDE 011 Overvoltage category (VDI Standards Product standard Low Voltage Directive EMC directive RoHS directive Electromagnetic Con Interference immunity to electromagnetic field electromagnetic field electromagnetic field electromagnetic field electroal fast transient surge conducted disturbances induced by radio-freque Interference emission	output circuit 1 / output circuit 2 voltage input circuit 2 ob64) output circuit olated circuits (type test) input circuit / output circuit 0106 input circuit / output circuit 0106 input circuit / output circuit 0106 input circuit 0100 -4-2 IEC/EN 61000-4-3 IEC/EN 61000-4-5 s, IEC/EN 61000-4-6 input fields		EN 6	300 V 6 kV; 1.2/50 j 4 kV; 1.2/50 j 2.5 kV, 50 Hz, 600 V - 3 III EN 60255-6, EI 2006/95/EG 2002/95/	IS 1 s N 50178 A 1000-6-2 kV) n) kHz) -L))		
Pollution degree (VDE 011 Overvoltage category (VDI Standards Product standard Low Voltage Directive EMC directive EMC directive Electromagnetic con Interference immunity to electrostatic discharge radiated, radio-frequer electromagnetic field electrical fast transient surge conducted disturbances	output circuit 1 / output circuit 2 /oltage input circuit 00664) output circuit 0018ted circuits (type test) 0106 input circuit / output circuit 0106 input circuit 0100 -4-2 02 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2		EN 6	300 V 6 kV; 1.2/50 µ 4 kV; 1.2/50 µ 2.5 kV, 50 Hz, 600 V - 3 III EN 60255-6, EI 2006/95/EG 2004/108/EC 2002/95/EG 1000-6-1, EN 6 _evel 3 (6 kV / 8 Level 3 (10 V/ Level 4 (2 kV L	IS 1 s N 50178 A 1000-6-2 kV) n) kHz) -L))		

Data at $T_a = 25$ °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		50/6	50 Hz	•		
Frequency range			65 Hz	•		
Typical current / power consumption	25 mA / 10 VA (115 V AC)	25 mA / 18 VA (230 V AC)	25 mA / 10 VA (230 V AC)	25 mA / 18 VA (400 V AC)		
Measuring circuit	. ,	2, L3, N	111	2, L3		
Monitoring functions Phase failure						
Phase sequence		can be sv	vitched 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			15%	••••••		
threshold value Phase unbalance			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		fixed 2	200 ms			
Tripping delay t _v		ON- or OFF-delay C	; 0.1-30 s adjustable			
Accuracy within the rated control supply voltage tolerance	$\Delta t \leq 0.5$ %					
Accuracy within the temperature range	$\Delta t \le 0.06 \% / °C$					
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 _e (IEC/EN 60947-1)		25	0 V			
Minimum switching power		24 V /	10 mA			
Maximum switching voltage			limit curve			
Rated operational current I _e AC12 (resistive) 230 V		· · • • · · · · · · · · · · · · · · · ·	A			
(IEC/EN 60947-5-1) AC15 (inductive) 230 V			A			
DC12 (resistive) 24 V			A			
DC13 (inductive) 24 V			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			A	•		
max. making/breaking apparent power at B 300			360 VA	•		
Mechanical lifetime			tching cycles	•••••••••••••••••••••••••••••••••••••••		
Electrical lifetime (AC12, 230 V, 4 A)			tching cycles	•		
Max. fuse rating to achieve n/c contact				•		
short-circuit protection n/o contact						

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

Туре		CM-MPS.11	CM-MPS.21	CM-MPS.31	CM-MPS.41
General data	I				
MTBF			on red	quest	
Duty time			100)%	
Dimensions	product dimensions		22.5 x 85.6 x 103.7 mm	(0.89 x 3.37 x 4.08 i	<u>1)</u>
$(W \times H \times D)$	packaging dimensions		97 x 109 x 30 mm (3	.82 x 4.29 x 1.18 in)	
Weight		Screw connec	tion technology	Easy Connect Tee	hnology (Push-in
	net weight		depending on device.		
	gross weight		depending on device.	see ordering details	•••••••
Mounting			DIN rail (IEC	/EN 60715),	•
Mounting position			snap-on mounting ar		
Minimum distance to other units	vertical / horizontal		not necessary /		•
Material of housing			UL 94		•
Degree of protection	housing / terminals		IP50 /	IP20	
Electrical connection					
Wire size		Screw connec	tion technology	Easy Connect Teo	chnology (Push-in
	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm2 2 x 0.5-1.5 mm2	2 (1 x 20-14 AWG) 2 (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 (2 x 20-14 AWG)		(2 x 20-16 AWG)
Stripping length		00000	8 mm (().32 in)	
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)		-
Environmental data				10 05 00	
Ambient temperature ranges	operation / storage		-25+60 °C /		
Damp heat (IEC 60068-2-30)			55 °C, 6		•
Climatic category		3K3			
Vibration (sinusoidal) (IEC/EN 60255-21-1)		Class 2			
Shock (IEC/EN 60255-21-2)			Clas	is 2	
Isolation data					
Rated insulation voltage U _i	input circuit / output circuit		600		•
	output circuit 1 / output circuit 2		300		
Rated impulse withstand voltage U _{imp} (VDE 0110, IEC/EN 60664)	input circuit		6 kV; 1.		
· · · · ·	output circuit	4 kV; 1.2/50 µs			
Test voltage between all isolated circuits (typ			2.5 kV, 5		•
Basis isolation	input circuit / output circuit		600) V	••••••
Protective separation (VDE 0106 part 101 and 101/A, IEC/EN 611	input circuit / output circuit 40)	yes -			-
Pollution degree (VDE 0110, IEC/EN 60664)		3			
Overvoltage category (VDE 0110, IEC 60664	e)		I		
Standards					
Product standard			IEC/EN 60255		•
Low Voltage Directive			2006/9		
EMC directive		2004/108/EG			
RoHS directive			2002/9	95/EG	
Electromagnetic compatibility					
Interference immunity to			EN 61000-6-1,		
electrostatic discharge	IEC/EN 61000-4-2		Level 3 (6	kV / 8 kV)	
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3		Level 3 (10 V/m)	
electrical fast transient / burst	IEC/EN 61000-4-4		Level 3 (2 k	(V / 2 kHz)	
surge	IEC/EN 61000-4-5		Level 4 (2	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		Clas	is 3	
Interference emission			EN 61000-6-3,	EN 61000-6-4	
high-frequency radiated	IEC/CISPR 22, EN 50022		Clas	s B	-
high-frequency conducted	IEC/CISPR 22, EN 50022		Clas	s B	•••••••••••••••••••••••••••••••••••••••

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

Data at $\rm T_a$ = 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 = Measurin	L1, L2, L3, N	L3, N L1, L2, L3					
Rated control supply voltage L	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 L	I _s tolerance			-15+10 %	. <u>.</u>	. <u>.</u>	
Rated frequency		50/60/4			50/60 Hz		
Frequency range			10 Hz	00 0 / 11 //0	45-65 Hz	00	
Typical current / power consur	nption	5 mA / 4 VA (230 V AC)	5 mA / 4 VA (400 V AC)	29 mA / 41 VA (480 V AC)	29 mA / 52 VA (600 V AC)	29 mA / 59 VA (690 V AC)	
Measuring circuit		L1, L2, L3, N	()		-2, L3	. (
Monitoring functions	Phase failure						
	Phase sequence		(can be switched c	ff		
	Automatic phase sequence correction			configurable			
	Over- / undervoltage Phase unbalance		-			-	
	Interrupted neutral		-	-	-	-	
Measuring range	Overvoltage		3x420-500 V AC	3x480-580 V AC	3x600-720 V AC	3x690-820 V AC	
	Undervoltage		3x300-380 V AC		3x450-570 V AC	0.500.000	
	Phase unbalance			f average of phas			
Thresholds	Overvoltage			le within measuri			
	Undervoltage Phase unbalance (switch-off value)			le within measuri	ng range ng range		
Hysteresis related to the	Over- / undervoltage		aujustai	fixed 5 %	ng range	•••••••••••••••••••••••••••••••••••••••	
threshold value	Phase unbalance		•••••••••••••••••••••••••••••••••••••••	fixed 20 %			
Rated frequency of the measu		50/60/400 Hz 50/60 Hz					
Frequency range of the measu		45-440 Hz 45-65 Hz 100 ms					
Maximum measuring cycle tim Accuracy within the rated con				$\Delta U \le 0.5 \%$	•••••••••••••••••••••••••••••••••••••••	•••••••••••••••••••••••••••••••••••••••	
Accuracy within the temperatu		ΔU ≤ 0.06 % / °C					
Measuring method		True RMS					
Timing circuit							
Start-up delay t_s and t_{s_2}				fixed 200 ms			
Start-up delay t _{s1}				fixed 250 ms	•		
Tripping delay t _v		ON- or OFF-delay ON-delay					
Accuracy within the rated con	tral supply voltage telerapee	0; 0.1-30 s adjustable0; 0.1-30 s adjustable					
Accuracy within the temperatu		$\Delta t \leq 0.5\%$ $\Delta t \leq 0.06\% / °C$					
Indication of operational states		Details see function description / -diagrams					
Output circuits			1	5-16/18, 25-26/	28		
Kind of output				o contacts config			
Operating principle 1)				sed-circuit princi			
Contact material Rated operational voltage U	IEC/EN 60947-1	AgNi alloy, Cd free 250 V					
Minimum switching power	120/211 00347 1			250 V 24 V / 10 mA			
Maximum switching voltage				see load limit curv	íe.		
Rated operational current I	AC12 (resistive) 230 V						
(IEC/EN 60947-5-1)	AC15 (inductive) 230 V			3 A			
	DC12 (resistive) 24 V DC13 (inductive) 24 V			4 A 2 A	•••••••••••••••••••••••••••••••••••••••	•••••••••••••••••••••••••••••••••••••••	
AC rating	Utilization category (Control Circuit Rating Code)			2 A B 300			
(UL 508)	max. rated operational voltage		••••••	300 V AC	•••••••••••••••••••••••••••••••••••••••	•••••••••••••••••••••••••••••••••••••••	
. /	max. continuous thermal current at B 300	5 A					
Mashaniaal life/inter-	max. making/breaking apparent power at B 300			3600/360 VA			
Mechanical lifetime Electrical lifetime (AC12, 230 V	(ΛΔ)			x 10 ⁶ switching cy x 10 ⁶ switching cy			
Max. fuse rating to achieve	n/c contact	6 A fast		x to switching c)	10 A fast-acting		
short-circuit protection	n/o contact						

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
General data						
MTBF				on request	_	
Duty time		100%				
Dimensions (W x H x D)	product dimensions			103.7 mm (0.89 x		
10/-1-1-1	packaging dimensions				.	
Weight Mounting	····•	depending on device, see ordering details DIN rail (IEC/EN 60715), snap-on mounting without any tool				taal
Mounting position		יווט	n Tall (IEC/EIN OUT	any	nung without any	1001
Minimum distance to other units	vertical / horizontal		not ne	cessary / not neo	ressarv	•••••••••••••••••••••••••••••••••••••••
Material of housing	Vortical / Horizontal			UL 94 V-0	joodary	•••••••••••••••••••••••••••••••••••••••
Degree of protection	housing / terminals		•••••••••••••••••••••••••••••••••••••••	IP50 / IP20		••••••
Electrical connection						
Wire size					Easy Connec	t Technology
		Screw	connection tech	nology		0,
	a share all with (s. 4) wine and formula	10.5	2.5 mm2 (1 x 20-		(Pus	h-in) (2 x 20-16 AWG)
IIrie	e-strand with(out) wire end ferrule		-2.5 mm2 (1 x 20- 1.5 mm2 (2 x 20-		2 X U.S-1.S MM2	(2 X 20-16 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)
		2 x 0.5-	-4 mm2 (1 x 20-1 2.5 mm2 (2 x 20-	14 AWG)	2 X 010 110 11112	(2 / 20 10 / 110)
Stripping length				8 mm (0.32 in)		
Tightening torque		0.6-0	0.8 Nm (5.31-7.08	lb.in)		-
Environmental data						
Ambient temperature ranges	operation / storage		-25.	+60 °C / -40+8	35 °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			A. 1. (:		
Rated insulation voltage U	input circuit / output circuit	60	0 V	300 V	1000 V	
Dated includes with stand with sail 1	output circuit 1 / 2	0104.1	0/50	300 V	8 kV; 1.2/50 µs	
Rated impulse withstand voltage U _{imp} (VDE 0110, IEC/EN 60664)	input circuit output circuit	<u></u> Ο ΚΫ, Ι.	2/50 µs	4 kV; 1.2/50 μs	ο κν, 1.2/30 μs	
Test voltage (type test)					-	·····
	isolated output circuits circuit and isolated output circuits	25 kV 5	i0 Hz, 1 s	2.5 kV, 50 Hz, 1	s 4 kV, 50 Hz, 1 s	•••••••••••••••••••••••••••••••••••••••
Basis isolation	input circuit / output circuit		0 V		1000 V	•••••••
Protective separation	input circuit /		<u> </u>	<u>.</u>	1000 1	
(VDE 0106 part 101 and 101/A, IEC/EN 61140)	output circuit			-		
Pollution degree (VDE 0110, IEC/EN 60664)	output on our			3		
Overvoltage category (VDE 0110, IEC 60664)						
Standards						
Product standard			IEC/	EN 60255-6, EN	50178	
Low Voltage Directive				2006/95/EG		
EMC directive		2004/108/EG				
RoHS directive				2002/95/EG		
Electromagnetic compatibility						
Interference immunity to				000-6-1, EN 610		•
electrostatic discharge	IEC/EN 61000-4-2		Ļ	evel 3 (6 kV / 8 k	V)	•••••••••••••••••••••••••••••••••••••••
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3			Level 3 (10 V/m)		
electrical fast transient / burst	IEC/EN 61000-4-4			evel 3 (2 kV / 2 kl		•••••••••••••••••••••••••••••••••••••••
surge	IEC/EN 61000-4-5	Level 4 (2 kV L-N)			12) (2 kV L-L)	
conducted disturbances.	IEC/EN 61000-4-6		<u>.</u>			•••••••
induced by radio-frequency fields		[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 $T_a = 25 \text{ °C}$ 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 volta	ge	3 x 400 V AC	3 x 230 V AC			
Rated control supply voltage tolerance U	-	-20+20 %				
Control supply voltage range		3 x 300-500 V AC	3 x 180-280 V AC			
Rated frequency	-) Hz			
Frequency range			55 Hz			
Typical current / power consumption		23 mA / 16 VA				
Power failure buffering time			20 ms			
Input circuit - measuring circuit		L1, L2, L3	L-N			
Monitoring functions	Phase failure Over-/ undervoltage		•			
	Over-/ underfrequency					
	10 minutes average value	0	-			
Veasuring range	Voltage range Frequency range	3 x 320-480 V AC	3 x 184-276 V AC 55 Hz			
Thresholds	Overvoltage		0 % of U_			
	Undervoltage		% of U_			
	Overfrequency		z, configurable			
	Underfrequency	49,7 or 49 H	z, configurable			
	10 minutes average value		- 5 %			
Hysteresis related to the	Over-/ undervoltage Over-/ underfrequency		5 % 0 mHz			
Rated frequency of the measuring signal	Over-7 undernequency) Hz			
Frequency range of the measuring signal			55 Hz			
Vaximum measuring cycle time		50 ms < 120 ms				
Maximum reaction time (time between fault	Over-/ undervoltage					
detection and change of switching status of the relay)	Over-/ underfrequency	< 100 ms				
Accuracy within the rated control supply voltage	10 minutes average value	٨	- 			
Accuracy within the temperature range		$\Delta U \le 0.5 \%$ $\Delta U \le 0.06 \% / °C$				
Measuring method			RMS			
Timing circuit						
Start-up delay t_{s_1} prior to grid connection after a s	nort interruption	fix	, 1 s			
Restart delay t _{s2}		adjustable,	0 s; 0,1 – 30 s			
Accuracy within the rated control supply voltage	tolerance	$\Delta t \leq 0.5 \%$				
Accuracy within the temperature range		$\Delta t \le 0.06 \% / °C$				
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			2 changeover			
Operation principle ¹⁾			cuit principle			
Contact material			by, Cd free			
Rated operational voltage U _e (IEC/EN 60947-1)			50 V			
Minimum switching voltage / switching current Maximum switching voltage / switching current			/ 10 mA limit curve			
Viaximum switching voltage / switching current Rated operational current I	AC12 (resistive) 230 V		IIMIT CUIVE 4 A			
IEC/EN 60947-5-1)	AC15 (inductive) 230 V		3 A			
- /	DC12 (resistive) 24 V	2	1 A			
	DC13 (inductive) 24 V	2	2 A			
Mechanical lifetime		30 x 10 ⁶ sw	itching cycles			
Electrical lifetime (AC12, 230 V, 4 A)	n/o contect		itching cycles			
Max. fuse rating to achieve short-circuit protection	n/c contact n/o contact		st-acting st-acting			
	n/o contact	IU A ta	stading			

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

Туре		(CM-UFS.2		
General data					
MTBE			on request		
Duty time		•	100%		
Dimensions (W x H x D)	product dimensions	22.5 x 85.6 x 103.	7 mm (0.89 x 3.37 x 4.08 in)		
packaging dimensions		97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in)			
Weight	gross weight	depending on d	evice, see ordering details		
Mounting		DIN rail (IEC/EN 60715),	snap-on mounting without any tool		
Mounting position			any		
Minimum distance to other units	vertical / horizontal		sary / not necessary		
Material of housing			UL 94 V-0		
Degree of protection	housing / terminals		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 mm² (1 x 20-12 AWG) 2 x 0.5-2.5 mm² (2 x 20-14 AWG)	2 x 0.5-1.5 mm² (2 x 20-16 AWG)		
Stripping length		· · · · · · · · · · · · · · · · · · ·	mm (0.32 in)		
Stripping length Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)	-		
		0.0-0.0 NIII (0.01-7.00 ID.III)	-		
Environmental data	and the second sec	05 00	2 2 2 4 2 2 5 2 2		
Ambient temperature range	operation / storage		0 °C / -40+85 °C		
Damp heat, cyclic (IEC/EN 60068-2-30)		2 X 12 N C	/cle, 55 °C, 95 % RH		
Climatic category (IEC/EN 60721-3-1) Vibration (sinusoidal) (IEC/EN 60255-21-1)		3K3 Class 2			
Shock (IEC/EN 60255-21-1)			Class 2 Class 2		
		· · · · · · · · · · · · · · · · · · ·	Class 2		
Isolation data			0001/		
Rated impulse withstand voltage U_{i}	input circuit / output circuit output circuit 1 / 2		600 V		
Rated impulse withstand voltage Uimp	input circuit	300 V			
(VDE 0110, IEC/EN 60664)	output circuit	6 kV; 1,2/50 µs 4 kV; 1,2/50 µs			
Test voltage between all isolated circuits (typ			kV, 50 Hz, 1 s		
Basis isolation	input circuit / output circuit	2,0	600 V		
Protective separation	input circuit / output circuit	•••••••			
(VDE 0160 Part 101 and 101/A, IEC/EN 611	40)	yes			
Pollution degree (VDE 0110, IEC/EN 60664)		3			
Overvoltage category (VDE 0110, IEC 60664	4)				
Standards					
Product standard		Type-tested in accordance with the " network" E	Guideline for Connections to ENEL distribution Ed.2.1., January 2011		
Further standards		FN 50	0178, EN 61727		
Low Voltage Directive			006/95/EG		
EMV-Directive		2004/108/EG			
RoHS-Directive			002/95/EG		
Electromagnetic compatibility					
Interference immunity to		IEC/EN 61000	I-6-1, IEC/EN 61000-6-2		
electrostatic discharge	IEC/EN 61000-4-2	Leve	I 3 (6 kV / 8 kV)		
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Lev	vel 3 (10 V/m)		
electrical fast transient / burst	IEC/EN 61000-4-4	Level	3 (2 kV / 2 kHz)		
surge	IEC/EN 61000-4-5	Level	4 (2 kV L-L, L-N)		
conducted disturbances,	IEC/EN 61000-4-6	1	evel 3 (10 V)		
induced by radio-frequency fields					
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