

# Three-phase monitoring relays

## CM-PFD.C1

The CM-PFD.C1 is a three-phase monitoring relay that monitors the phase parameters phase sequence and phase failure in three-phase mains. With their MDRC profile and a width of only 17.5 mm, the CM-D range relays are ideally suited for installation in distribution panels as well as for industrial applications where compact dimensions are required.



### Characteristics

- Monitoring of three-phase mains for phase sequence and phase failure
- Powered by the measuring circuit
- 1 c/o (SPDT) contact
- Width of only 17.5 mm (0.689 in)

### Order data

Three-phase monitoring relay

Type	Rated control supply voltage = measuring voltage	Order code
CM-PFD.C1	3 x 380-440 V AC	1SVR590982R0100

## Functions

### Application / Operating mode

The CM-PFD.C1 is designed for use in three-phase mains for monitoring the phase parameters phase sequence and phase failure.

It works according to the closed-circuit principle.

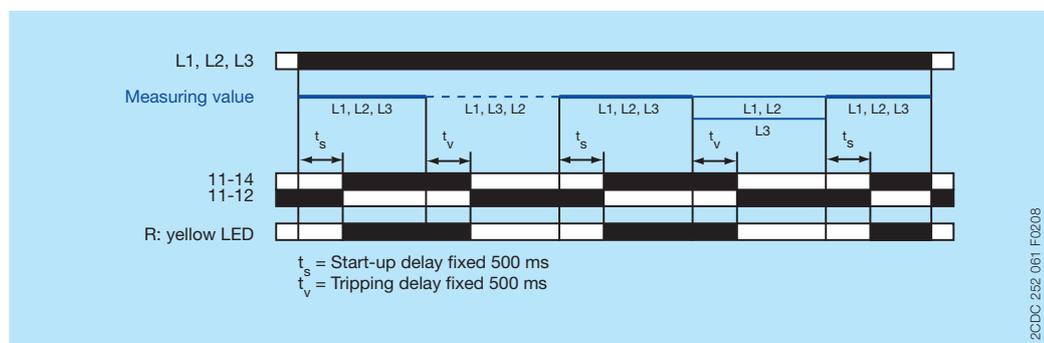
### Function descriptions / diagrams

#### Phase sequence and phase failure monitoring

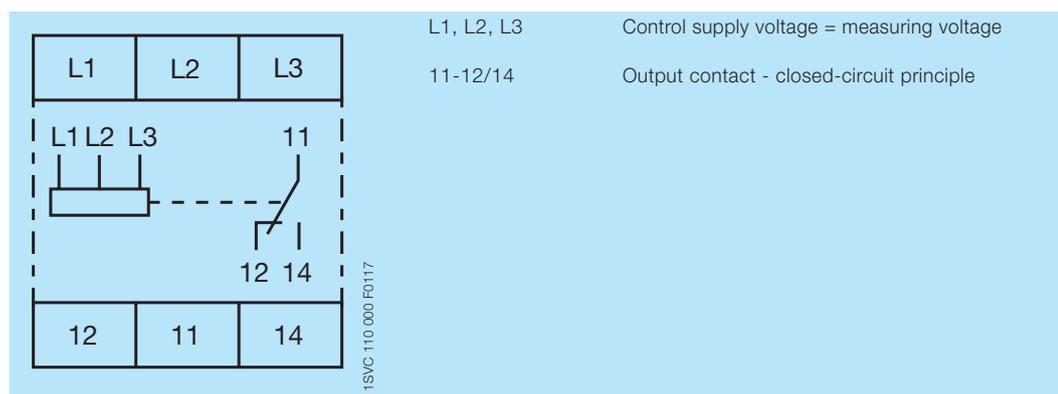
If all phases are present with the correct phase sequence, the output relay energizes after the fixed start-up delay  $t_s$  is complete.

If a phase failure or a phase sequence error occurs, the fixed tripping delay  $t_v$  starts. When timing is complete, the output relay de-energizes. The LED R 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.



### Electrical connection



Connection diagram CM-PFD

## Technical data

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

### Input circuits

Type		CM-PFD
<b>Supply circuit = measuring circuit</b>		<b>L1, L2, L3</b>
Rated control supply voltage $U_s =$ measuring voltage		3 x 380-440 V AC
Rated control supply voltage $U_s$ tolerance		-15...+10 %
Rated frequency		50/60 Hz
Frequency range		45-65 Hz
Typical current / power consumption	400 V AC / 50 Hz	8 mA / 5 VA
<b>Measuring circuit</b>		<b>L1, L2, L3</b>
Monitoring functions		phase failure detection, phase sequence monitoring
Measuring ranges		3 x 380-440 V AC
Threshold value for phase failure	$U_{min}$	$0.6 \times U_N$
Hysteresis related to the threshold value		-
Response time		500 ms
Measuring principle		true RMS
<b>Timing circuit</b>		
Start-up delay $t_s$		fixed 500 ms
Tripping delay $t_v$		-

### Output circuits

Kind of output	11-12/14	relay, 1 c/o (SPDT) contact
Operating principle		closed-circuit principle <sup>1)</sup>
Contact material		AgNi alloy, Cd free
Rated voltage (IEC/EN 60947-1)		250 V AC
Minimum switching voltage / Minimum switching current		24 V / 10 mA
Maximum switching voltage / Maximum switching current		440 V / 1.0 A
Mechanical lifetime		$30 \times 10^6$ switching cycles
Electrical lifetime	AC-12, 230 V, 4 A	$0.1 \times 10^6$ switching cycles
Maximum fuse rating to achieve short-circuit protection	n/c contact n/o contact	6 A fast-acting 10 A fast-acting

<sup>1)</sup> Closed-circuit principle: Output relay is de-energized if the measured value exceeds/drops below the adjusted threshold.

### General data

MTBF		on request
Duty cycle		100 %
Dimensions		see 'Dimensional drawings'
Weight	net	0.054 kg (0.119 lb)
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool
Mounting position		any
Minimum distance to other units	vertical / horizontal	not necessary
Degree of protection	housing terminals	IP50 IP20

### Electrical connection

Connecting capacity	fine-strand with wire end ferrule	$1 \times 0.5\text{-}2.5\text{ mm}^2 / 2 \times 0.5\text{-}1.5\text{ mm}^2$ (1 x 20-14 AWG / 2 x 20-16 AWG)
	fine-strand without wire end ferrule	$1 \times 0.5\text{-}2.5\text{ mm}^2 / 2 \times 0.5\text{-}1.5\text{ mm}^2$ (1 x 20-14 AWG / 2 x 20-16 AWG)
	rigid	$1 \times 0.5\text{-}4\text{ mm}^2 / 2 \times 0.5\text{-}1.5\text{ mm}^2$ (1 x 20-12 AWG / 2 x 20-16 AWG)
Stripping length		7 mm (0.28 in)
Tightening torque		0.5-0.8 Nm (4.43-7.08 lb.in)
Recommended screw driver		PZ1 / $\varnothing$ 4.5 mm (0.177)

## Environmental data

Ambient temperature ranges	operation	-20...+60 °C
	storage	-40...+85 °C
	transport	-40...+85 °C
Climatic class	IEC/EN 60721-3-3	3K3
Damp heat, cyclic	IEC/EN 60068-2-30	6 x 24 h cycle, 55 °C, 95 % RH
Vibration, sinusoidal	IEC/EN 60255-21-1	class 2
Shock	IEC/EN 60255-21-2	class 2

## Isolation data

Rated insulation voltage $U_i$ (IEC/EN 60255-27, IEC/EN 60664-1)	input circuit / output circuit	600 V
Rated impulse withstand voltage $U_{imp}$ (IEC/EN 60255-27, IEC/EN 60664-1)	input circuit / output circuit	6 kV
Pollution degree (IEC/EN 60255-27, IEC/EN 60664-1)		2
Overvoltage category (IEC/EN 60255-27, IEC/EN 60664-1)		III

## Standards / Directives

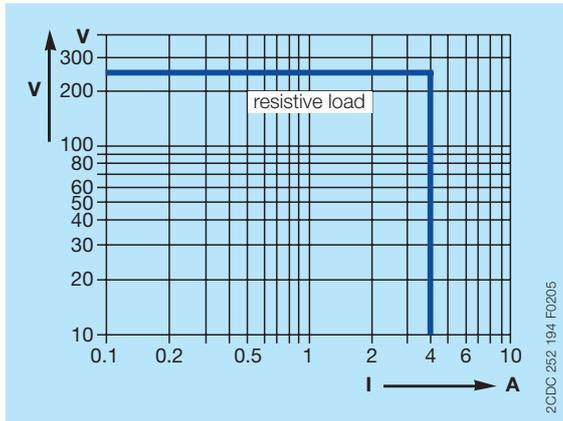
Standards	IEC/EN 60255-1, IEC/EN 60255-27
Low Voltage Directive	2014/35/EU
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

## Electromagnetic compatibility

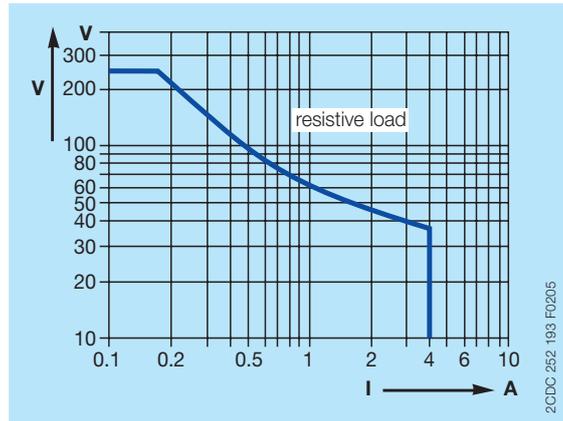
Interference immunity to		IEC/EN 60255-26
electrostatic discharge	IEC/EN 61000-4-2	Level 3 (6 kV / 8 kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3 (2 kV / 5 kHz)
surge	IEC/EN 61000-4-5	Level 4 (2 kV L-L)
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)
Interference emission		IEC/EN 60255-26, EN 61000-6-3
high-frequency radiated	IEC/CISPR 11, EN 55011	Class B
high-frequency conducted	IEC/CISPR 11, EN 55011	Class B

## Technical diagrams

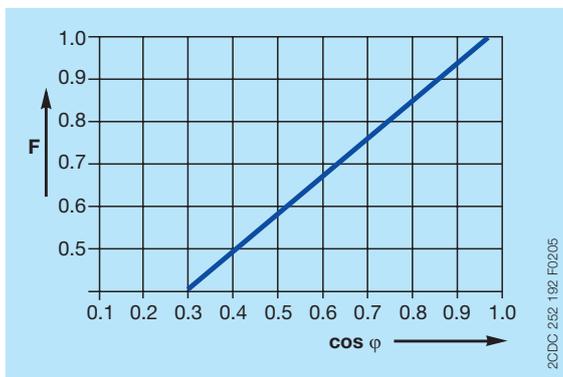
### Load limit curves



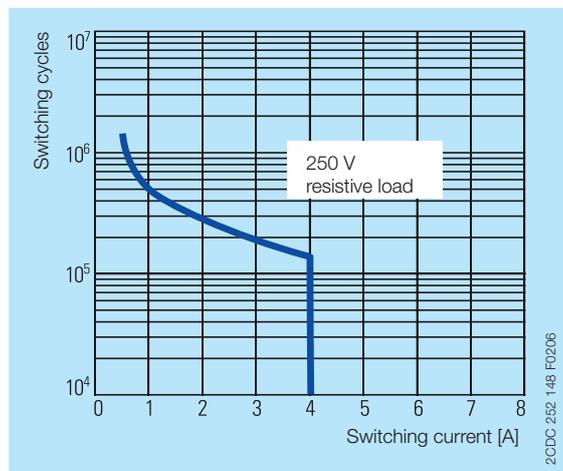
AC load (resistive)



DC load (resistive)



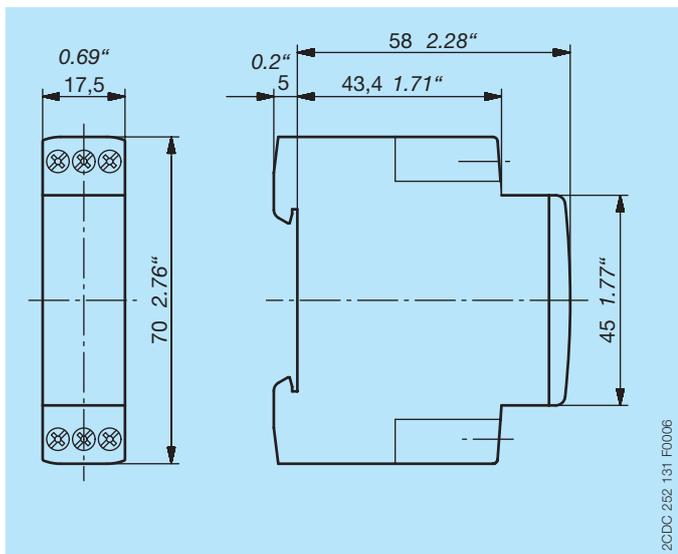
Derating factor F for inductive AC load



Contact lifetime

## Dimensions

in mm and inches



# Contact us

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