Three-phase monitoring relay
CM-PVE

The three-phase monitoring relay CM-PVE monitors the phase parameter phase failure as well as over- and undervoltage in three-phase mains.

Characteristics

- Monitoring of three-phase mains for phase failure, over- and undervoltage
- With or without neutral monitoring
- Device with neutral monitoring can also be used to monitor single-phase mains
- Powered by the measuring circuit
- 1 n/o contact
- 25 mm (0.89 in) width
- 1 LED for the indication of operational states

Order data

Three-phase monitoring relays

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated control supply voltage = measuring voltage</th>
<th>Neutral monitoring</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM-PVE</td>
<td>3 x 320-460 V AC, 185-265 V AC</td>
<td>yes</td>
<td>1SVR550870R9400</td>
</tr>
<tr>
<td>CM-PVE</td>
<td>3 x 320-460 V AC</td>
<td>no</td>
<td>1SVR550871R9500</td>
</tr>
</tbody>
</table>
Functions

Operating controls

1. Indication of operational states
   R: yellow LED – Relay status

Application / operating mode

The CM-PVE is designed for use in three-phase mains for monitoring the phase parameter phase failure as well as over- and undervoltage. The CM-PVE 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.

The CM-PVE works according to the closed-circuit principle.
**Function descriptions / diagrams**

**Phase failure monitoring**

Applying control supply voltage begins the fixed start-up delay $t_S$. When $t_S$ is complete and all phases are present with correct voltage, the output relay energizes and the yellow LED R glows. If a phase failure occurs, the output relay de-energizes instantaneously and the LED R turns off.

As soon as the voltage returns to the tolerance range $t_S$ starts again. After $t_S$ is complete, the output relay re-energizes automatically and the LED R glows.

**Over- and undervoltage monitoring**

Applying control supply voltage begins the fixed start-up delay $t_S$. When $t_S$ is complete and all phases are present with correct voltage, the output relay energizes and the LED R glows. If the voltage to be monitored exceeds or falls below the fixed threshold value, the output relay de-energizes after the fixed tripping delay $t_V$ is complete and the LED R turns off.

As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %, $t_S$ starts again. After $t_S$ is complete, the output relay re-energizes automatically and the LED R glows.

CM-PVE with neutral monitoring

![CM-PVE with neutral monitoring diagram](image)

CM-PVE without neutral monitoring

![CM-PVE without neutral monitoring diagram](image)
Electrical connection

Connection diagram CM-PVE with neutral monitoring

Connection diagram CM-PVE without neutral monitoring

L1, L2, L3, (N)  Control supply voltage = measuring voltage
13-14  Output contact - closed-circuit principle

Connection diagram CM-PVE with neutral monitoring

Connection diagram CM-PVE without neutral monitoring
Technical data
Data at \( T_a = 25 \, ^\circ \text{C} \) and rated values, unless otherwise indicated

### Input circuits

<table>
<thead>
<tr>
<th>Type</th>
<th>CM-PVE (^1)</th>
<th>CM-PVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply circuit = measuring circuit</td>
<td>L1, L2, L3, N</td>
<td>L1, L2, L3</td>
</tr>
<tr>
<td>Rated control supply voltage ( U_s ) = measuring voltage</td>
<td>3 x 320-460 V AC, 185-265 V AC</td>
<td>3 x 320-460 V AC</td>
</tr>
<tr>
<td>Rated control supply voltage ( U_s ) tolerance</td>
<td>-15...+10 %</td>
<td>-15...+10 %</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>50/60 Hz (-10...+10 %)</td>
<td></td>
</tr>
</tbody>
</table>

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

### Measuring circuit

<table>
<thead>
<tr>
<th>Monitoring functions</th>
<th>L1, L2, L3, N</th>
<th>L1, L2, L3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over-/ undervoltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interrupted neutral</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Measuring ranges     | 3 x 320-460 V AC, 185-265 V AC | 3 x 320-460 V AC |

<table>
<thead>
<tr>
<th>Thresholds</th>
<th>fixed 185 V / 320 V</th>
<th>fixed 320 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>( U_{\text{min}} )</td>
<td>fixed 265 V / 460 V</td>
<td>fixed 460 V</td>
</tr>
</tbody>
</table>

| Hysteresis related to the threshold value | fixed 5 % |
| Response time | 80 ms |
| Accuracy within the temperature range | \( \Delta U \leq 0.06 \% / ^\circ \text{C} \) |

### Timing circuit

| Start-up delay \( T_s \) | fixed 500 ms (±20 %) |
| Tripping delay \( T_v \) at over-/undervoltage | fixed 500 ms (±20 %) |

### User interface

#### Indication of operational states

- **Relay status**: R: yellow LED
- **Output relay energized**

### Output circuits

| Kind of output | 13-14 relay, 1 n/o contact |
| Operating principle | closed-circuit principle \(^2\) |
| Rated operational voltage \( U_e \) | 250 V |
| Minimum switching voltage / Minimum switching current | 24 V / 10 mA |
| Maximum switching voltage / Maximum switching current | see ‘Load limit curves’ |
| Rated operational current \( I_e \) | AC-12 (resistive) at 230 V: 4 A, AC-15 (inductive) at 230 V: 3 A, DC-12 (resistive) at 24 V: 4 A, DC-13 (inductive) at 24 V: 2 A |
| AC rating (UL 508) | B 300 pilot duty: general purpose 250 V, 4 A, cos phi 0.75 |
| max. rated operational voltage | 300 V AC |
| max. continuous thermal current at B 300 | 5 A |
| max. making/breaking apparent power at B 300 | 3600/360 VA |
| Mechanical lifetime | 30 x 10⁶ switching cycles |
| Electrical lifetime | AC-12, 230 V, 4 A: 0.1 x 10⁶ switching cycles |
| Maximum fuse rating to achieve | n/c contact: 10 A fast-acting, n/o contact: 10 A fast-acting |

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

MTBF | on request
Duty time | 100 %
Dimensions | see ‘Dimensional drawings’

| Weight | net weight | 1SVR 550 870 R9400 | 0.069 kg (0.152 lb)
|        | gross weight | 1SVR 550 871 R9500 | 0.066 kg (0.146 lb)
|        | net weight | 1SVR 550 870 R9400 | 0.080 kg (0.176 lb)
|        | gross weight | 1SVR 550 871 R9500 | 0.078 kg (0.172 lb)
Mounting | DIN rail (IEC/EN 60715), snap-on mounting without any tool
Mounting position | any
Degree of protection | housing IP50
| terminals | IP20

Electrical connection

| Connecting capacity | fine-strand with wire end ferrule | 2 x 0.75-1.5 mm² (2 x 18-16 AWG)
| fine-strand without wire end ferrule | 2 x 1-1.5 mm² (2 x 18-16 AWG)
| rigid | 2 x 0.75-1.5 mm² (2 x 18-16 AWG)
| Stripping length | 10 mm (0.39 in)
| Tightening torque | 0.6 - 0.8 Nm (5.31 - 7.08 lb.in)

Environmental data

| Ambient temperature ranges | operation | -20...+60 °C
| storage | -40...+85 °C
| Damp heat | IEC/EN 60068-2-30 | 40 °C, 93 % RH, 4 days
| Vibration withstand | IEC/EN 60068-2-6 | 10-57 Hz: 0.075 mm
| 57-150 Hz: 1 g

Isolation data

| Rated insulation voltage $U_i$ between all isolated circuits | 400 V
| Rated impulse withstand voltage $U_{imp}$ between all isolated circuits | 4 kV, 1.2/50 µs
| Pollution degree | 3
| Overvoltage category | III

Standards / Directives

| Standards | IEC/EN 60947-5-1, EN 50178
| Low Voltage Directive | 2014/35/EU
| EMC Directive | 2014/30/EU
| RoHS Directive | 2011/65/EU

Electromagnetic compatibility

| Interference immunity to | IEC/EN 61000-6-2
| 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 61000-6-3
| high-frequency radiated | IEC/CISPR 22, EN 55022 | Class B
| high-frequency conducted | IEC/CISPR 22, EN 55022 | Class B
Load limit curves

**AC load (resistive)**

- Voltage (V) vs. Current (A)
- Load limit curves for resistive load

**DC load (resistive)**

- Voltage (V) vs. Current (A)
- Load limit curves for resistive load

**Derating factor F for inductive AC load**

- Derating factor F vs. Cosine of Phase Angle (cos ϕ)

**Contact lifetime**

- Number of switching cycles vs. Switching current [A]
- Contact lifetime for 250 V resistive load
Dimensions

in mm and inches

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Dimensions in inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>88.5</td>
<td>3.48&quot;</td>
</tr>
<tr>
<td>81</td>
<td>3.19&quot;</td>
</tr>
<tr>
<td>78.5</td>
<td>3.09&quot;</td>
</tr>
<tr>
<td>22.5</td>
<td>0.886&quot;</td>
</tr>
<tr>
<td>30.7</td>
<td></td>
</tr>
</tbody>
</table>

Further documentation

<table>
<thead>
<tr>
<th>Document title</th>
<th>Document type</th>
<th>Document number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic relays and controls</td>
<td>Catalog</td>
<td>2CDC 110 004 C02xx</td>
</tr>
</tbody>
</table>

You can find the documentation on the internet at www.abb.com/lowvoltage

CAD system files

You can find the CAD files for CAD systems at http://abb-control-products.partcommunity.com
-> Low Voltage Products & Systems -> Control Products -> Electronic Relays and Controls.
Contact us

ABB STOTZ-KONTAKT GmbH
P. O. Box 10 16 80
69006 Heidelberg, Germany
Phone: +49 (0) 6221 7 01-0
Fax: +49 (0) 6221 7 01-13 25
E-mail: info.desto@de.abb.com

You can find the address of your local sales organisation on the ABB home page http://www.abb.com/contacts
-> Low Voltage Products and Systems

Note:
We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB AG does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB AG.

Copyright© 2019 ABB
All rights reserved