

# Three-phase monitoring relay CM-PBE

The three-phase monitoring relay CM-PBE monitors the phase parameter phase failure in three-phase mains.



2CDC 251 007 S0012

## Characteristics

- Monitoring of three-phase mains for phase failure
- 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

## Approvals

- UL LISTED UL 508, CAN/CSA C22.2 No.14
- EAC EAC
- CB CB scheme
- CCC CCC
- RMRS RMRS

## Marks

- CE CE
- C-Tick C-Tick

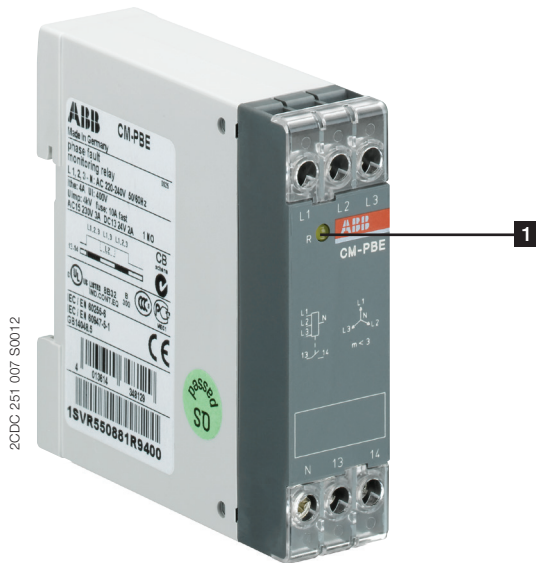
## Order data

### Three-phase monitoring relays

| Type   | Rated control supply voltage = measuring voltage | Neutral monitoring | Order code      |
|--------|--|--------------------|-----------------|
| CM-PBE | 3 x 380-440 V AC, 220-240 V AC                   | yes                | 1SVR550881R9400 |
| CM-PBE | 3 x 380-440 V AC                                 | no                 | 1SVR550882R9500 |

## Functions

### Operating controls



#### 1 Indication of operational states

R: yellow LED – Relay status


### Application / operating mode

The CM-PBE is designed for use in three-phase mains for monitoring the phase parameter phase failure ( $U_{\text{meas}} < 60 \% \times U_n$ ). The CM-PBE 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-PBE works according to the closed-circuit principle.

### Indication of operational states

#### LEDs, status information and fault messages

| Operational state      | R: LED yellow   |
|------------------------|---|
| Output relay energized |  |

## Function descriptions / diagrams

### Phase failure monitoring

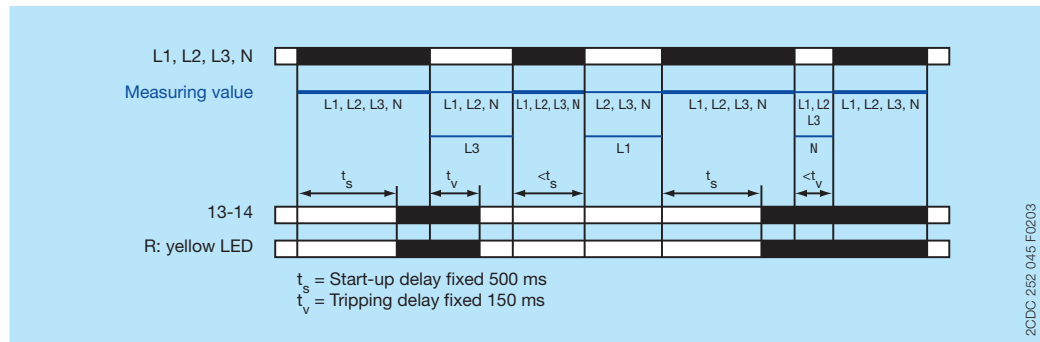
If all phases (and the neutral) are present, the output relay energizes after the fixed start-up delay  $t_s$  is complete.

If a phase failure occurs, the fixed tripping delay  $t_v$  starts. When timing is complete, the output relay de-energizes.

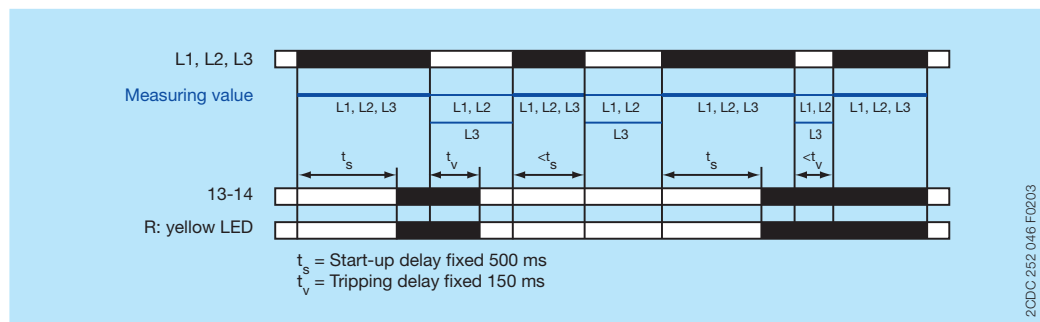
As soon as the voltage returns to the tolerance range, timing of  $t_s$  starts. When timing is complete, the output relay re-energizes automatically.

The LED R glows when the output relay is energized.

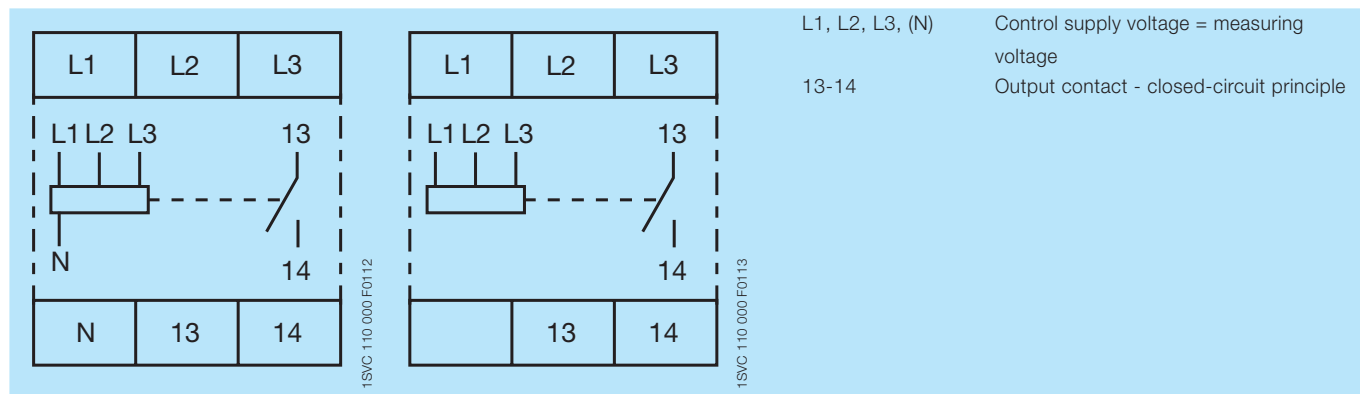
### CM-PBE with neutral monitoring



### CM-PBE without neutral monitoring



## Electrical connection



Connection diagram CM-PBE with neutral monitoring

Connection diagram CM-PBE without neutral monitoring

## Technical data

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

### Input circuits

| Type   | CM-PBE <sup>1)</sup>           | CM-PBE            |
|--|--------------------------------|-------------------|
| <b>Supply circuit = measuring circuit</b>              | <b>L1, L2, L3, N</b>           | <b>L1, L2, L3</b> |
| Rated control supply voltage $U_s =$ measuring voltage | 3 x 380-440 V AC, 220-240 V AC | 3 x 380-440 V AC  |
| Rated control supply voltage $U_s$ tolerance           | -15...+15 %                    |                   |
| Rated frequency  | 50/60 Hz                       |                   |

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

| Measuring circuit                         | L1, L2, L3, N                             | L1, L2, L3       |
|---|---|------------------|
| Monitoring functions                      |   |                  |
| Phase failure                             | ■   | ■                |
| Interrupted neutral                       | ■   | -                |
| Measuring ranges                          | 3 x 380-440 V AC, 220-240 V AC            | 3 x 380-440 V AC |
| Thresholds                                |   |                  |
| $U_{min}$                                 | 0.6 x $U_n$                               |                  |
| $U_{max}$                                 |   |                  |
| Hysteresis related to the threshold value | fixed 5 % (release value = 0.65 x $U_n$ ) |                  |
| Rated frequency of the measuring signal   | 50/60 Hz (-10...+10 %)                    |                  |
| Response time                             | 40 ms                                     |                  |
| <b>Timing circuit</b>                     |   |                  |
| Start-up delay $T_s$                      | fixed 500 ms ( $\pm 20\%$ )               |                  |
| Tripping delay $T_v$                      | fixed 150 ms ( $\pm 20\%$ )               |                  |

### User interface

| Indication of operational states |              |
|----------------------------------|--------------|
| Relay status                     | R yellow LED |

Details see table ‚LEDs, status information and fault messages‘ on page 2 and ‚Function descriptions / diagrams‘ on page 3.

### Output circuits

|   |  |  |
|---|--|--|
| Kind of output  | 13-14  | relay, 1 n/o contact                   |
| Operating principle                                     |  | closed-circuit principle <sup>2)</sup> |
| Contact material  |  | AgCdO                                  |
| Rated operational voltage $U_o$ (IEC/EN 60947-1)        |  | 250 V                                  |
| Minimum switching voltage / Minimum switching current   |  | 250 V DC, 250 V AC                     |
| Rated operational current $I_e$ (IEC/EN 60947-5-1)      | AC12 (resistive) at 230 V                          | 4 A                                    |
|   | AC15 (inductive) at 230 V                          | 3 A                                    |
|   | DC12 (resistive) at 24 V                           | 4 A                                    |
|   | DC13 (inductive) at 24 V                           | 2 A                                    |
| AC rating (UL 508)                                      | Utilization category (Control Circuit Rating Code) | B 300                                  |
|   | max. rated operational voltage                     | 300 V AC                               |
|   | max. continuous thermal current at B 300           | 5 A                                    |
|   | max. making/breaking apparent power at B 300       | 3600/360 VA                            |
| Mechanical lifetime                                     |  | 30 x 10 <sup>6</sup> switching cycles  |
| Electrical lifetime                                     | AC12, 230 V, 4 A                                   | 0.1 x 10 <sup>6</sup> switching cycles |
| Maximum fuse rating to achieve short-circuit protection | n/c contact  | 10 A fast-acting                       |
|   | n/o contact  | 10 A fast-acting                       |

<sup>2)</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 time              |                      | 100 %                                       |
| Dimensions (W x H x D) | product dimensions   | 22.5 x 78 x 78.5 mm (0.89 x 3.07 x 3.09 in) |
|                        | packaging dimensions | 24 x 83 x 25 mm (0.94 x 3.27 x 0.98 in)     |
| Weight                 | net weight           | 0.066 kg (0.146 lb)                         |
|                        | gross weight         | 0.078 kg (0.172 lb)                         |
| Mounting               |                      | DIN rail (IEC/EN 60715)                     |
| Mounting position      |                      | any   |
| Degree of protection   | housing              | IP50  |
|                        | terminals            | IP20  |

## Electrical connection

|                   |                                      |  |
|-------------------|--------------------------------------|--|
| Wire size         | fine-strand with wire end ferrule    | 2 x 0.75-1.5 mm <sup>2</sup> (2 x 18-16 AWG) |
|                   | fine-strand without wire end ferrule | 2 x 1-1.5 mm <sup>2</sup> (2 x 18-16 AWG)    |
|                   | rigid                                | 2 x 0.75-1.5 mm <sup>2</sup> (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, cyclic (IEC 60068-2-30)   |           | 24 h cycle time, 55 °C, 93 % rel., 96 h |
| Operational reliability (IEC 68-2-6) |           | 6 g                                     |
| Mechanical resistance (IEC 68-2-6)   |           | 10 g                                    |

## Isolation data

|   |   |                       |
|---|---|-----------------------|
| Rated insulation voltage U <sub>i</sub> (VDE 0110, IEC/EN 60947-1)        | supply circuit / measuring circuit / output circuit | 400 V                 |
| Rated impulse withstand voltage U <sub>imp</sub> (VDE 0110, IEC/EN 60664) | all isolated circuits                               | 4 kV, 1.2/50 µs       |
| Test voltage between all isolated circuits (routine test)                 |   | 2.5 kV, 50 Hz, 1 min. |
| Pollution degree (VDE 0110, IEC/EN 60664, IEC/EN 60255-5)                 |   | 3                     |
| Overvoltage category (VDE 0110, IEC/EN 60664, IEC/EN 60255-5)             |   | III                   |

## Standards

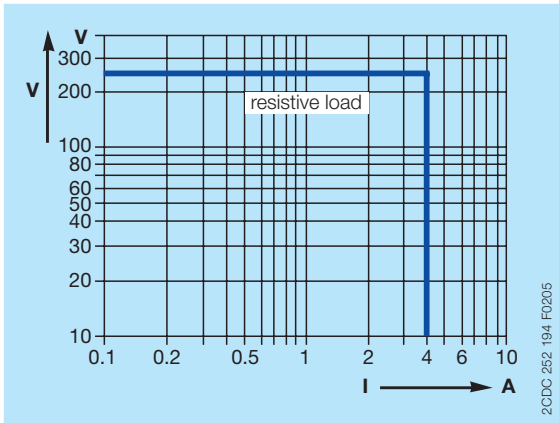
|                       |                |
|-----------------------|----------------|
| Product standard      | IEC/EN 60255-6 |
| Low Voltage Directive | 2006/95/EC     |
| EMC directive         | 2004/108/EC    |

## Electromagnetic compatibility

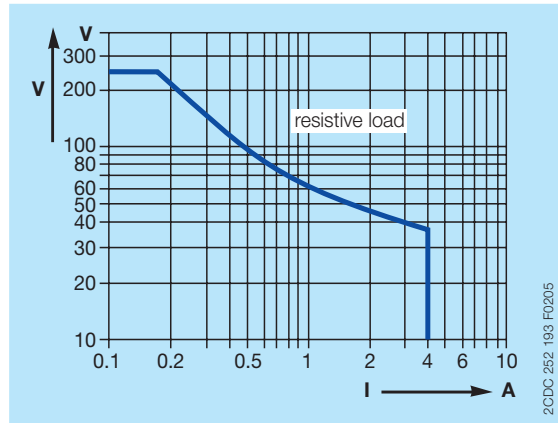
|   |                  |                        |
|---|------------------|------------------------|
| Interference immunity to                                  |                  | IEC/EN 61000-6-2       |
| electrostatic discharge                                   | IEC/EN 61000-4-2 | Level 3 (6 kV / 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 61000-6-4       |

## Technical diagrams

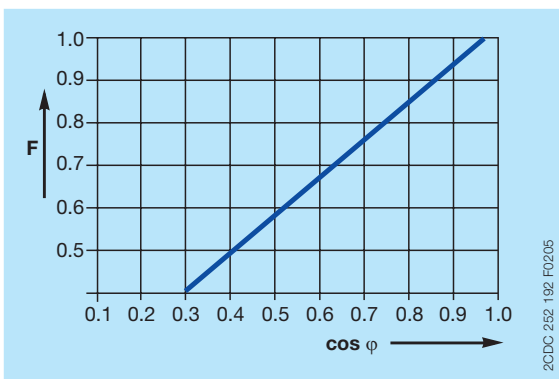
### Load limit curves



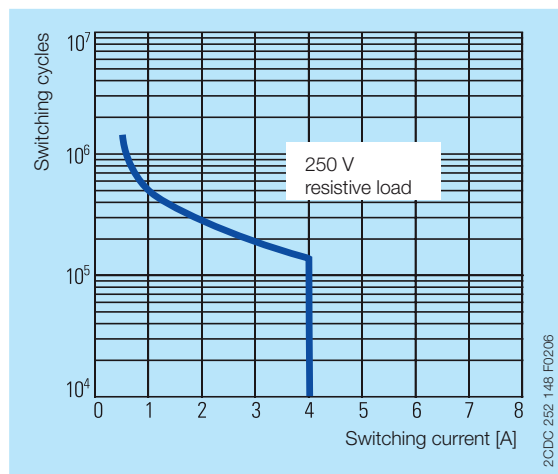
AC load (resistive)



DC load (resistive)



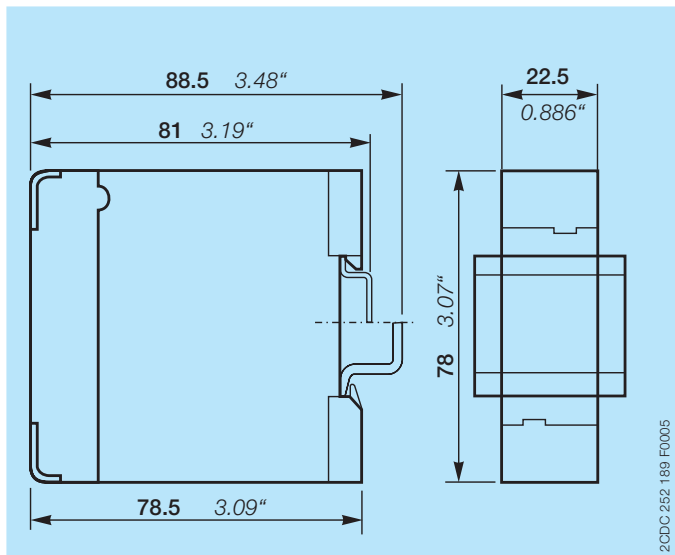
Derating factor F for inductive AC load



Contact lifetime

## Dimensions

in **mm** and inches



## Further documentation

| Document title                 | Document type       | Document number    |
|--------------------------------|---------------------|--------------------|
| Electronic products and relays | Technical catalogue | 2CDC 110 004 C020x |

You can find the documentation on the internet at [www.abb.com/lowvoltage](http://www.abb.com/lowvoltage) -> Control Products -> Electronic Relays and Controls -> Three Phase Monitors.

## CAD system files

You can find the CAD files for CAD systems at <http://abb-control-products.partcommunity.com/PARTcommunity/Portal/abb-control-products> -> Low Voltage Products & Systems -> Control Products -> Electronic Relays and Controls -> Three Phase Monitors -> CM-PBx - Three Phase Monitors.

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