

# Monitoring Relays

## True RMS 3-Phase, 3-Phase+N, Multi-function

### Types DPB01, PPB01

CARLO GAVAZZI



DPB01



PPB01

- TRMS 3-phase over and under voltage, phase sequence and phase loss monitoring relays
- Detect when all 3 phases are present and have the correct phase sequence (except for N versions)
- Available versions (W4) supplied between phase and neutral
- Detect if all the 3-phase-phase or phase-neutral voltages are within the set limits
- Upper and lower limits separately adjustable
- Measure their own power supply
- Selection of measuring range by DIP-switches
- Adjustable voltage on relative scale
- Adjustable delay function (0.1 to 30 s)
- Output: 8 A SPDT relay N.E.
- For mounting on DIN-rail in accordance with DIN/EN 50 022 (DPB01) or plug-in module (PPB01)
- 22.5 mm Euronorm housing (DPB01) or 36 mm plug-in module (PPB01)
- LED indication for relay, alarm and power supply ON

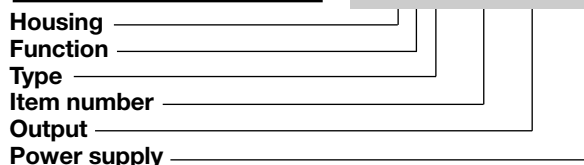
## Product Description

3-phase or 3-phase+neutral line voltage monitoring relay for phase sequence, phase loss, over and under voltage (separately adjustable set

points) with built-in time delay function. Supply ranges from 208 to 480 VAC covered by two multivoltage relays.

## Ordering Key

**DPB 01 C M23**



## Type Selection

| Mounting | Phase sequence detection | Output | Supply: 208 to 240 VAC | Supply: 380 to 415 VAC   | Supply: 380 to 480 VAC |
|----------|--------------------------|--------|------------------------|--------------------------|------------------------|
| DIN-rail | yes                      | SPDT   | <b>DPB 01 C M23</b>    | <b>DPB 01 C M48 W4</b>   | <b>DPB 01 C M48</b>    |
| Plug-in  | yes                      | SPDT   | <b>PPB 01 C M23</b>    | <b>PPB 01 C M48 W4</b>   |                        |
| Plug-in  | yes                      | SPDT   |                        | <b>PPB 01 C M48</b>      |                        |
| DIN-rail | no                       | SPDT   | <b>DPB 01 C M23 N</b>  | <b>DPB 01 C M48 N W4</b> | <b>DPB 01 C M48 N</b>  |
| Plug-in  | no                       | SPDT   | <b>PPB 01 C M23 N</b>  | <b>PPB 01 C M48 N W4</b> |                        |
| Plug-in  | no                       | SPDT   |                        | <b>PPB 01 C M48 N</b>    |                        |

## Input Specifications

| Input  | Input  | Ranges                         | Hysteresis  |
|--|--|--------------------------------|---|
| L1, L2, L3, N  | DPB01: Terminals L1, L2, L3, N<br>PPB01: Terminals 5, 6, 7, 11<br>Measure their own supply     | Upper level<br><br>Lower level | Set points from 2 to 5%<br>Set points from 5 to 22% |
| Note: Connect the neutral only if it is intrinsically at the star centre |  |                                |   |
| Measuring ranges   |  |                                |   |
| 208 to 240 VAC   | 177 to 275 V <sub>L-L</sub> AC<br>M23 versions   |                                |   |
| 380 to 415 VAC   | 323 to 475 V <sub>L-L</sub> AC<br>PPB01CM48<br>PPB01CM48N<br>D/P PB01CM48W4<br>D/P PB01CM48NW4 |                                |   |
| 380 to 480 VAC   | 323 to 550 V <sub>L-L</sub> AC<br>DPB01CM48<br>DPB01CM48N                                      |                                |   |
|  |  |                                | 1%<br>2%  |

## Output Specifications

|   |   |
|---|---|
| <b>Output</b><br>Rated insulation voltage   | SPDT relay<br>250 VAC   |
| <b>Contact ratings</b> (AgSnO <sub>2</sub> )<br>Resistive loads AC 1<br>DC 12<br>Small inductive loads AC 15<br>DC 13 | μ<br>8 A @ 250 VAC<br>5 A @ 24 VDC<br>2.5 A @ 250 VAC<br>2.5 A @ 24 VDC |
| <b>Mechanical life</b>  | ≥ 30 x 10 <sup>6</sup> operations                                       |
| <b>Electrical life</b>  | ≥ 10 <sup>5</sup> operations<br>(at 8 A, 250 V, cos φ = 1)              |
| <b>Operating frequency</b>  | ≤ 7200 operations/h   |
| <b>Dielectric strength</b><br>Dielectric voltage<br>Rated impulse withstand volt.                                     | 2 kVAC (rms)<br>4 kV (1.2/50 μs)  |

## Supply Specifications

|  |  |
|--|--|
| <b>Power supply</b><br>Rated operational voltage through terminals:<br>L1, L2, L3, N (DPB01)<br>5, 6, 7, 11 (PPB01)<br><br>D/P PB01CM23,<br>D/P PB01CM23N<br><br>D/P PB01CM48W4,<br>D/P PB01CM48NW4,<br>PPB01CM48, PPB01CM48N<br><br>DPB01CM48, DPB01CM48N | Overvoltage cat. III<br>(IEC 60664, IEC 60038)<br><br>208 to 240 V <sub>L-L</sub> AC ±15%<br>45 to 65 Hz<br><br>380 to 415 V <sub>L-L</sub> AC ±15%<br>(220 to 240 V <sub>L-N</sub> AC ±15%)<br>45 to 65 Hz<br><br>380 to 480 V <sub>L-L</sub> AC ±15%<br>(220 to 277 V <sub>L-N</sub> AC ±15%)<br>45 to 65 Hz |
| <b>Rated operational power</b><br>DPB01CM23x, PPB01CM23x<br>DPB01CM48x, PPB01CM48x<br><br>DPB01CM48xW4<br>DPB01CM48xW4   | 13 VA @ 230 ΔVAC, 50 Hz<br>13 VA @ 400 ΔVAC, 50 Hz<br>Supplied by L1 and L2<br><br>13 VA @ 400 ΔVAC, 50 Hz<br>Supplied by L1 and N   |

## Mode of Operation

Connected to the 3 phases (and neutral) DPB01 and PPB01 operate when all 3 phases are present at the same time, the phase sequence is correct (not N versions) and the phase-phase (or phase-neutral) voltage levels are within set limits.

If one or more phase-phase or phase-neutral voltages exceeds the upper set level or drops below the lower set level, the red LED starts

flashing 2 Hz and the output relay releases after the set time period. In any case if phase-neutral measurement is selected both phase-phase and phase-neutral voltages are monitored. If the phase sequence is wrong or one phase is lost, the output relay releases immediately.

Only 200 ms delay occurs. The failure is indicated by the red LED flashing 5 Hz during the alarm condition.

## General Specifications

|  |  |
|--|--|
| <b>Power ON delay</b>  | 1 s ± 0.5 s or 6 s ± 0.5 s   |
| <b>Reaction time</b><br>Incorrect phase sequence or total phase loss<br>Voltage level<br><br>Alarm ON delay<br>Alarm OFF delay                                   | < 200 ms<br>(input signal variation from -20% to +20% or from +20% to -20% of set value)<br>< 200 ms (delay < 0.1 s)<br>< 200 ms (delay < 0.1 s) |
| <b>Accuracy</b><br>Temperature drift<br>Delay ON alarm<br>Repeatability  | (15 min warm-up time)<br>± 1000 ppm/°C<br>± 10% on set value ± 50 ms<br>± 0.5% on full-scale   |
| <b>Indication for</b><br>Power supply ON<br>Alarm ON<br><br>Output relay ON  | LED, green<br>LED, red (flashing 2 Hz during delay time)<br>LED, yellow  |
| <b>Environment</b><br>Degree of protection<br>Pollution degree<br>Operating temperature<br>@ Max. voltage, 50 Hz<br>@ Max. voltage, 60 Hz<br>Storage temperature | IP 20<br>3 (DPB01), 2 (PPB01)<br>-20 to 60°C, R.H. < 95%<br>-20 to 50°C, R.H. < 95%<br>-30 to 80°C, R.H. < 95%                                   |
| <b>Housing</b><br>Dimensions<br>Material   | DPB01<br>PPB01<br>22.5 x 80 x 99.5 mm<br>36 x 80 x 94 mm<br>PA66 or Noryl  |
| <b>Weight</b>  | Approx. 120 g  |
| <b>Screw terminals</b><br>Tightening torque  | Max. 0.5 Nm<br>according to IEC 60947  |
| <b>Product standard</b>  | EN 60947-5-1   |
| <b>Approvals</b>   | UL, CSA<br>(except for W4 versions)<br>CCC (GB14048.5) only DPB  |
| <b>CE Marking</b><br><br>EMC<br>Immunity<br>Emissions  | L.V. Directive 2006/95/EC<br>EMC Directive 2004/108/EC<br><br>According to EN 61000-6-2<br>According to EN 61000-6-3                             |

### Example 1 (mains network monitoring)

The relay monitors over and under voltage, phase loss and correct phase sequence.

In case of N versions, the relay monitors over and under voltage.

### Example 2 (load monitoring)

The relay releases in case of interruption of one or more phases, when one or more voltages drop below the lower set level or exceed the upper set level.

## Function/Range/Level and Time Delay Setting

Adjust the input range setting the DIP switches 3 and 4 as shown below.

To access the DIP switches open the grey plastic cover as shown below

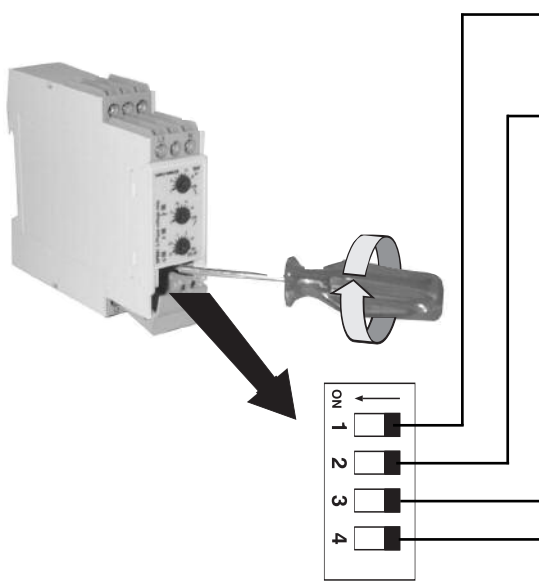
**Selection of level and time delay:**

**Centre knob:**  
Setting of upper level on relative scale.

Select the desired function setting the DIP switches 1 and 2 as shown below.

**Upper knob:**  
Setting of lower level on relative scale.

**Lower knob:**  
Setting of delay on alarm time on absolute scale (0.1 to 30 s).

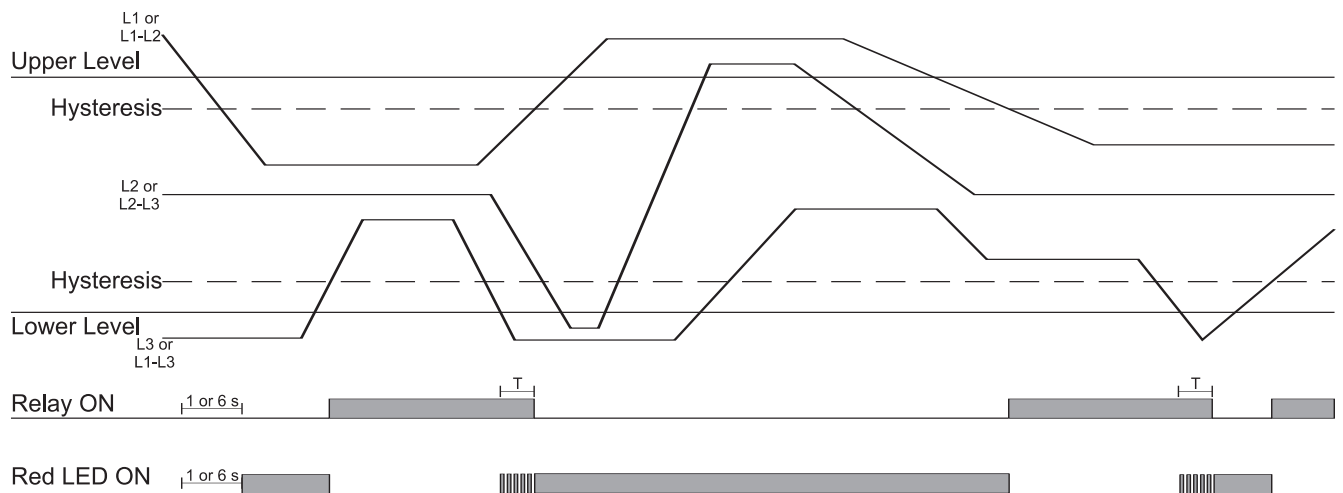


**Power ON delay**  
ON: 6 s ± 0.5 s  
OFF: 1 s ± 0.5 s

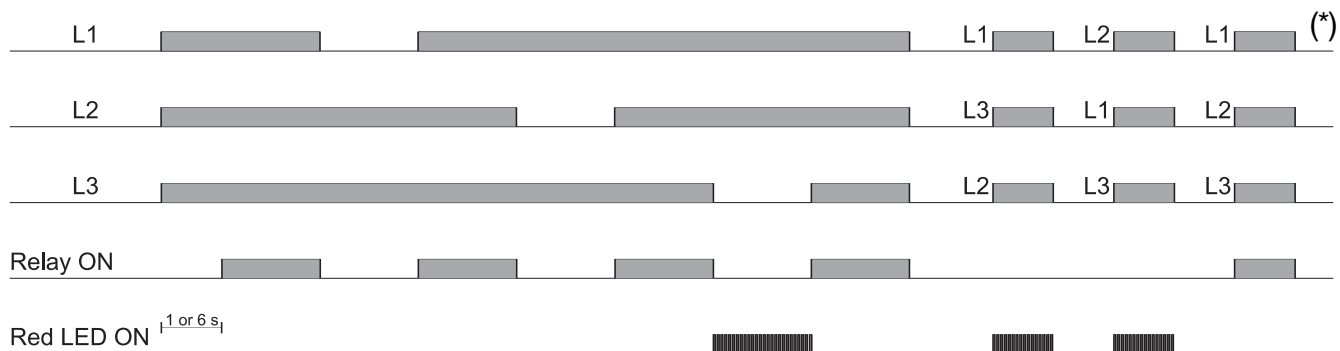
**Monitored voltage**  
ON: Phase-Neutral  
OFF: Phase-Phase

| Measuring range   |         |         |         |   |
|-------------------|---------|---------|---------|---|
| SW3               | ON      | ON      | OFF     | OFF   |
| SW4               | ON      | OFF     | ON      | OFF   |
| M23 Ph-Ph Voltage | 208 VAC | 220 VAC | 230 VAC | 240 VAC                                     |
| M48 Ph-Ph Voltage | 380 VAC | 400 VAC | 415 VAC | 480 VAC<br>DPB01CM48,<br>DPB01CM48N<br>only |
| M48 Ph-N Voltage  | 220 VAC | 230 VAC | 240 VAC | 277 VAC<br>DPB01CM48,<br>DPB01CM48N<br>only |

## Operation Diagrams



## Operation Diagrams (cont.)



(\*) N versions don't detect incorrect phase sequence.

## Wiring Diagrams

