Monitoring Relays
True RMS 3-Phase, Phase Sequence/Loss - Asymmetry
Types DPB02, PPB02

CARLO GAVAZZI


DPB02


PPB02

- **TRMS 3-phase phase sequence, phase loss and asymmetry monitoring relays**
- **Detect when all 3 phases are present and have the correct sequence**
- **Detect if asymmetry level is below the set value**
- **Measure on own power supply**
- **Selection of measuring range by DIP-switches**
- **Adjustable asymmetry on relative scale**
- **Adjustable delay function (0.1 to 30 s)**
- **Output: 8 A relay SPDT N.E.**
- **For mounting on DIN-rail in accordance with DIN/EN 50 022 (DPB02) or plug-in module (PPB02)**
- **22.5 mm Euronorm housing (DPB02) or 36 mm plug-in module (PPB02)**
- **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 and asymmetry with built-in time delay function.

Supply ranges from 208 to 480 VAC covered by two multi voltage relays.

Ordering Key

DPB 02 C M23

- **Housing**
- **Function**
- **Type**
- **Item number**
- **Output**
- **Power supply**

Type Selection

Mounting	Output	Supply: 208 to 240 VAC	Supply: 380 to 415 VAC	Supply: 380 to 480 VAC
DIN-rail	SPDT	**DPB 02 C M23**		**DPB 02 C M48**
Plug-in	SPDT	**PPB 02 C M23**	**PPB 02 C M48**	

Input Specifications

Input	
L1, L2, L3, N	DPB02: Terminals L1, L2, L3, N PPB02: Terminals 5, 6, 7, 11 Measure on own supply
Note: Connect the neutral only if it is intrinsically at the star centre	
Measuring ranges	
208 to 240 VAC	177 to 275 ΔVAC
380 to 480 VAC (DPB02CM48)	323 to 550 ΔVAC
380 to 415 VAC (PPB02CM48)	323 to 475 ΔVAC
Ranges	
Asymmetry	2 to 22% of the nominal voltage

Note: The input voltage must not exceed the maximum rated voltage or drop below the minumum rated voltage reported above.

Output Specifications

Output	SPDT relay
Rated insulation voltage	250 VAC
Contact ratings ($AgSnO_2$)	μ
Resistive loads AC 1	8 A @ 250 VAC
DC 12	5 A @ 24 VDC
Small inductive loads AC 15	2.5 A @ 250 VAC
DC 13	2.5 A @ 24 VDC
Mechanical life	≥ 30 x 10^6 operations
Electrical life	≥ 10^5 operations (at 8 A, 250 V, cos φ = 1)
Operating frequency	≤ 7200 operations/h
Dielectric strength	
Dielectric voltage	2 kVAC (rms)
Rated impulse withstand volt.	4 kV (1.2/50 μs)

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Supply Specifications

Power supply	Overvoltage cat. III
Rated operational voltage through terminals:	(IEC 60664, IEC 60038)
L1, L2, L3, N (DPB02)	
5, 6, 7, 11 (PPB02)	
M23 - Delta Voltage:	208 to 240 VAC ± 15% 45 to 65 Hz
M48 (DIN-rail) - Delta Voltage:	380 to 480 VAC ± 15% 45 to 65 Hz
M48 (DIN-rail) - Star Voltage:	220 to 277 VAC ± 15% 45 to 65 Hz
M48 (Plug-in) - Delta Voltage:	380 to 415 VAC ± 15% 45 to 65 Hz
M48 (Plug-in) - Star Voltage:	220 to 240 VAC ± 15% 45 to 65 Hz
Rated operational power	
DPB02CM23, PPB02CM23	13 VA @ Δ230 VAC, 50 Hz
DPB02CM48, PPB02CM48	13 VA @ Δ400 VAC, 50 Hz Supplied by L1 and L2

General Specifications

Power ON delay	1 s ± 0.5 s or 6 s ± 0.5 s
Reaction time	
Incorrect phase sequence or total phase loss	< 200 ms
Asymmetry	
Alarm ON delay	< 200 ms (delay < 0.1 s)
Alarm OFF delay	< 200 ms (delay < 0.1 s)
Accuracy	(15 min warm-up time)
Temperature drift	± 1000 ppm/°C
Delay ON alarm	± 10% on set value ± 50 ms
Repeatability	± 0.5% on full-scale
Indication for	
Power supply ON	LED, green
Alarm ON	LED, red (flashing 2 Hz during delay time)
Output relay ON	LED, yellow
Environment	
Degree of protection	IP 20
Pollution degree	3 (DPB02), 2 (PPB02)
Operating temperature	
@ Max. voltage, 50 Hz	-20 to 60°C, R.H. < 95%
@ Max. voltage, 60 Hz	-20 to 50°C, R.H. < 95%
Storage temperature	-30 to 80°C, R.H. < 95%
Housing	
Dimensions DPB02	22.5 x 80 x 99.5 mm
PPB02	36 x 80 x 94 mm
Weight	Approx. 120 g
Screw terminals	
Tightening torque	Max. 0.5 Nm acc. to IEC 60947
Approvals	UL, CSA
CE marking	Yes
EMC	Electromagnetic Compatibility
Immunity	According to EN 61000-6-2
Emissions	According to EN 61000-6-3

Mode of Operation

Connected with the 3 phases (and neutral) DPB02 and PPB02 operate when all 3 phases are present at the same time, the phase sequence is correct and the asymmetry is under the set level.
Asymmetry is defined as follows:

$$\frac{\max\{|\Delta V_{ph\text{-}ph}|\}}{\text{nom. voltage}}$$

when measuring phase-phase voltages and also as follows:

$$\frac{\max\{|\Delta V_{ph\text{-}n}|\}}{\text{nom. voltage}}$$

when measuring phase-neutral voltages.

If the asymmetry exceeds the set level the red LED starts flashing 2 Hz and the output relay releases after the set time period. If the phase sequence is incorrect 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 after the alarm condition occurs.

Example 1
(mains network monitoring)

The relay monitors asymmetry, phase loss and correct phase sequence.

Example 2
(load monitoring)

The relay releases in case of interruption of one or more phases or when the asymmetry exceeds the set level.

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Function/Range/Level and Time Delay Setting

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

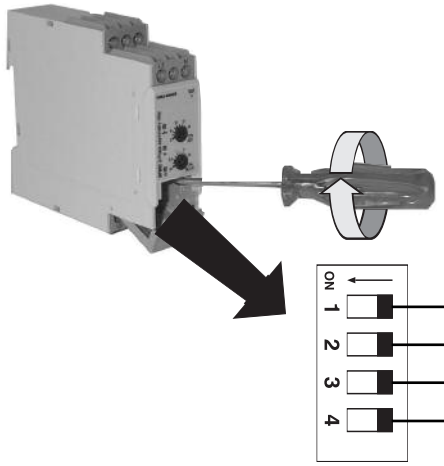
Select the desired function setting the DIP switches 1 and 2 as shown below.

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

Selection of asymmetry and time delay:

Centre knob:
Setting of asymmetry on relative scale.

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



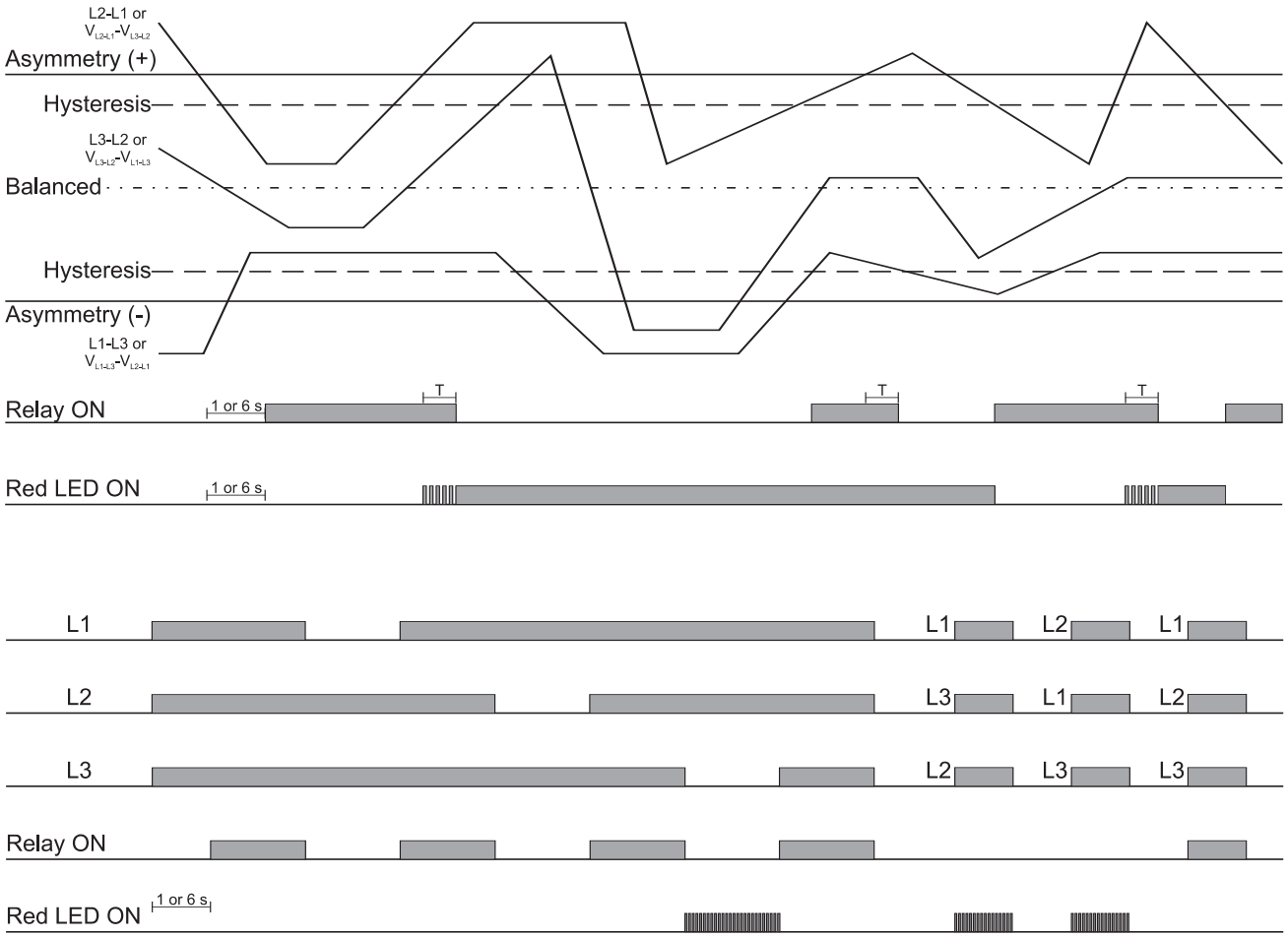
Power ON delay
ON: 6 s ± 0.5 s
OFF: 1 s ± 0.5 s

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

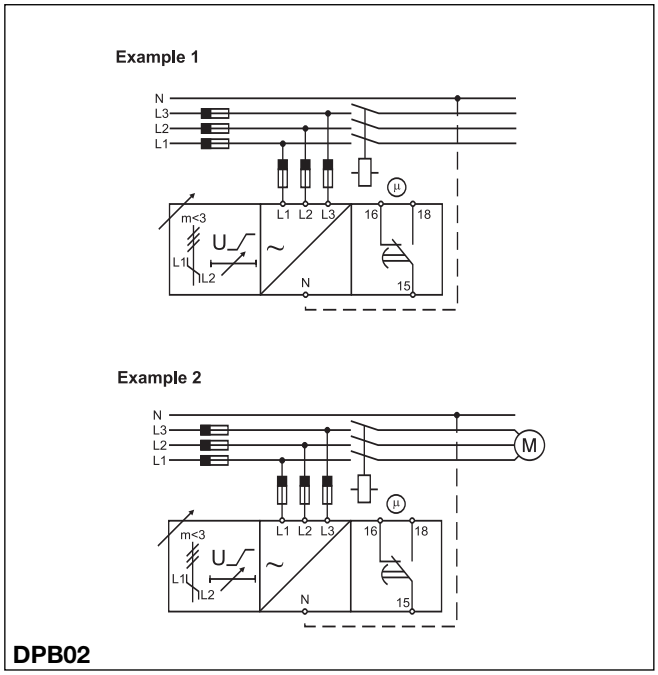
Measuring range

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 DPB02 only
M48 Ph-N Voltage	220 VAC	230 VAC	240 VAC	277 VAC DPB02 only

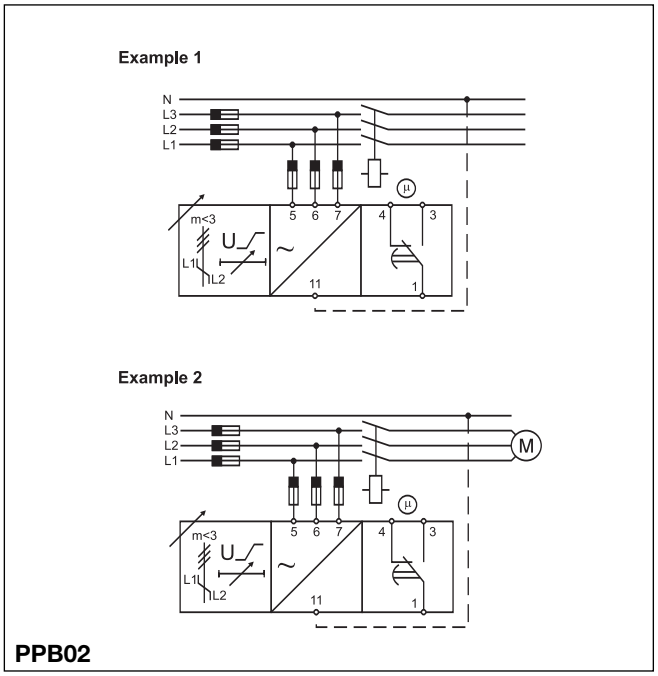
Operation Diagrams



Wiring Diagrams



DPB02



PPB02

Dimensions