Monitoring Relays
True RMS 3-Phase, 3-Phase+N, Multi-function
Types DPB01, PPB01


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 on 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

Housing
Function
Type
Item number
Output
Power supply

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	**DPB 01 C M23**	**DPB 01 C M48 W4**	**DPB 01 C M48**
Plug-in	yes	SPDT	**PPB 01 C M23**	**PPB 01 C M48 W4**	
Plug-in	yes	SPDT		**PPB 01 C M48**	
DIN-rail	no	SPDT	**DPB 01 C M23 N**	**DPB 01 C M48 N W4**	**DPB 01 C M48 N**
Plug-in	no	SPDT	**PPB 01 C M23 N**	**PPB 01 C M48 N W4**	
Plug-in	no	SPDT		**PPB 01 C M48 N**	

Input Specifications

Input
L1, L2, L3, N — DPB01: Terminals L1, L2, L3, N; PPB01: 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 V_{L-L} AC M23 versions
380 to 415 VAC	323 to 475 V_{L-L} AC PPB01CM48 PPB01CM48N D/P PB01CM48W4 D/P PB01CM48NW4
380 to 480 VAC	323 to 550 V_{L-L} AC DPB01CM48 DPB01CM48N

Ranges

Upper level	+2 to +22% of the nominal voltage
Lower level	-22 to -2% of the nominal voltage

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

Hysteresis

Set points from 2 to 4%	1%
Set points from 4 to 22%	2%

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)

Supply Specifications

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

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
Voltage level	(input signal variation from -20% to +20% or from +20% to -20% of set value)
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 (DPB01), 2 (PPB01)
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	
DIN-rail version	22.5 x 80 x 99.5 mm
Plug-in version	36 x 80 x 94 mm
Weight	Approx. 120 g
Screw terminals	
Tightening torque	Max. 0.5 Nm according 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 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.

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.

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

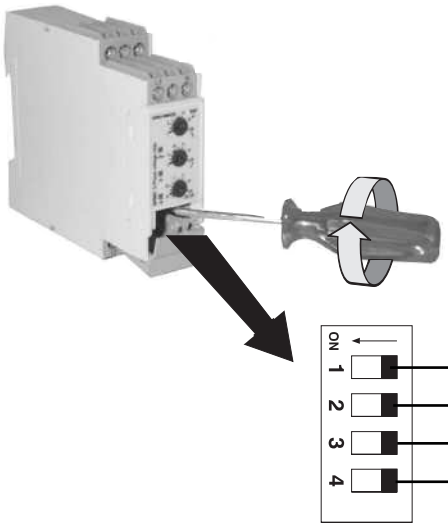
To access the DIP swiches open the grey plastic cover as shown below

Selection of level and time delay:

Upper knob:
Setting of lower level on relative scale.

Centre knob:
Setting of upper 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

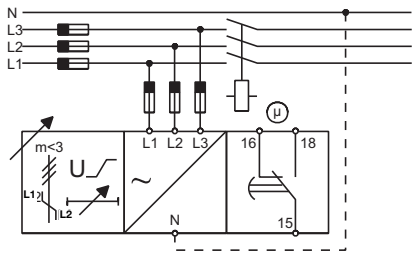
Monitored voltage
ON: Phase-Neutral
OFF: Phase-Phase

Measuring range

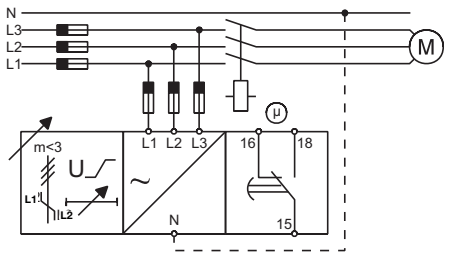
SW3	ON	ON	OFF	OFF
SW4	ON	OFF	ON	OFF
M23 Ph-Ph Voltage	208 VAC	220 VAC	230 VAC	240 VAC
M48 Ph-Ph Voltage	380 VAC	400 VAC	415 VAC	480 VAC DPB01CM48, DPB01CM48N only
M48 Ph-N Voltage	220 VAC	230 VAC	240 VAC	277 VAC DPB01CM48, DPB01CM48N only

Wiring Diagrams

Example 1

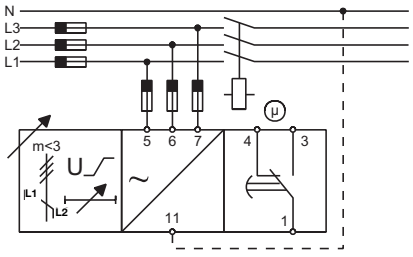


Example 2

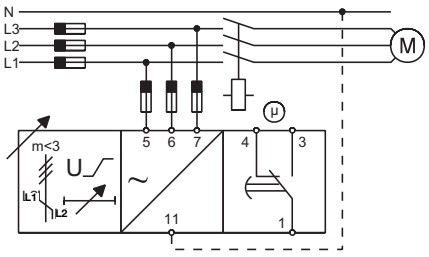


DPB01

Example 1



Example 2



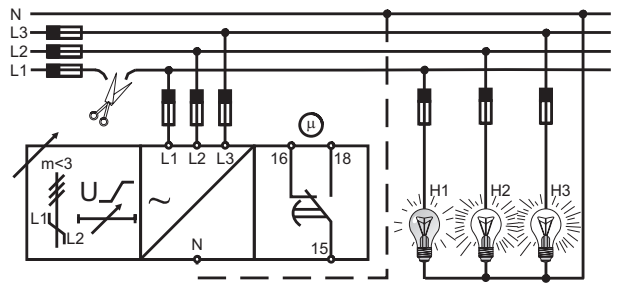
PPB01

Note

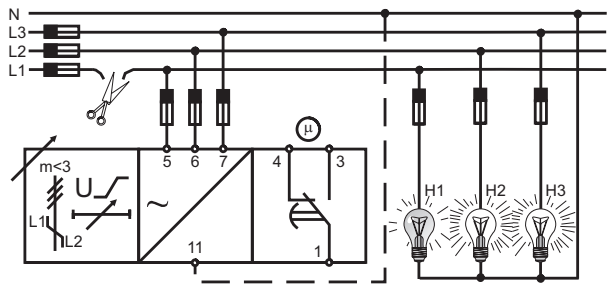
When DPB01 or PPB01 is used with phase indicator lamps (see examples in the following diagrams), the lamp H1 or H2 might be dimly lit when there is a phase loss in L1 or L2. This might happen if the lamps used are the typical low power indicator lamps, and there are no other loads present.

This fact can be avoided by using W4 models. Note that the neutral must be always connected to the device.

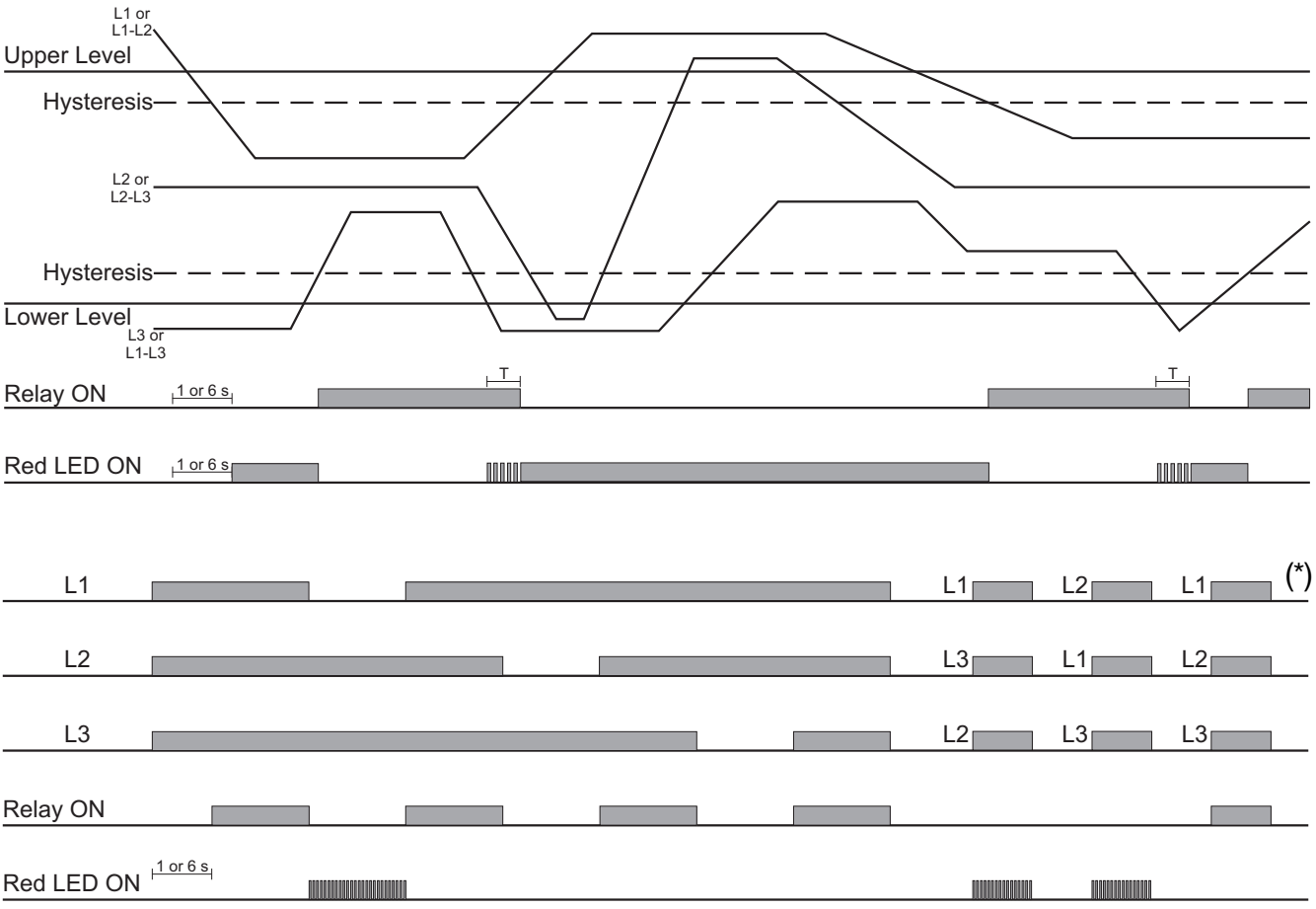
DPB01



PPB01



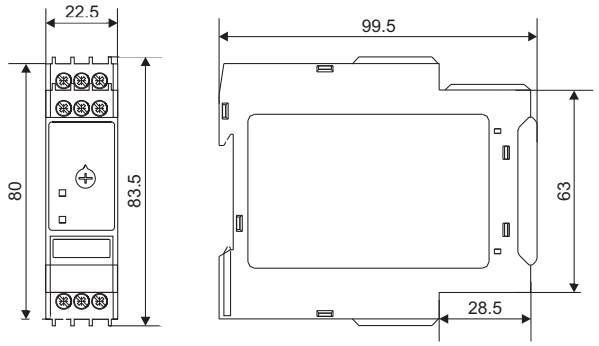
Operation Diagrams



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

Dimensions

DIN-rail



Plug-in