

Monitoring Relays

3-Phase, 3-Phase+N, Multi-function

Types DPC01, PPC01

CARLO GAVAZZI



DPC01



PPC01

- 3-phase over and under voltage, phase sequence, phase loss and asymmetry monitoring relay
- Detect when all 3 phases are present and have the correct sequence
- Detect if all the 3-phase-phase or phase-neutral voltages are within the set limits
- Detect if asymmetry is below set value
- Separately adjustable setpoints
- Separately adjustable delay functions (0.1 to 30 s)
- Output: 2 x 8 A relay SPDT NE or ND (selectable)
- For mounting on DIN-rail in accordance with DIN/EN 50 022 (DPC01) or plug-in module (PPC01)
- 45 mm Euronorm housing (DPC01) or 36 mm plug-in module (PPC01)
- 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, asymmetry, 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

DPC 01 D M48

Housing _____
 Function _____
 Type _____
 Item number _____
 Output _____
 Power supply _____

Type Selection

Mounting	Output	Supply: 208 to 240 VAC	Supply: 380 to 480 VAC
DIN-rail	2 x SPDT	DPC 01 D M23	DPC 01 D M48
Plug-in	2 x SPDT	PPC 01 D M23	PPC 01 D M48

Input Specifications

Input L1, L2, L3, N	DPC01: Terminals L1, L2, L3, N PPC01: Terminals 5, 6, 7, 11 Measure on own supply
Measuring ranges 208 to 240 VAC 380 to 480 VAC (DPC01DM48) 380 to 415 VAC (PPC01DM48)	177 to 275 VAC 323 to 550 VAC 323 to 475 VAC
Ranges Upper level Lower level Asymmetry Tolerance	+2 to +22% of the nominal voltage -22 to -2% of the nominal voltage 2 to 22% of the nominal voltage 2 to 22% of the nominal voltage

Output Specifications

Output Rated insulation voltage	2 x SPDT relays 250 VAC
Contact ratings (AgSnO ₂) Resistive loads AC 1 DC 12 Small inductive loads AC 15 DC 13	μ 8 A @ 250 VAC 5 A @ 24 VDC 2.5 A @ 250 VAC 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 Rated impulse withstand volt.	2 kVAC (rms) 4 kV (1.2/50 μs)

Supply Specifications

Power supply Rated operational voltage through terminals: L1, L2, L3, N (DPC01) 5, 6, 7, 11 (PPC01) M23: M48:	Overvoltage cat. III (IEC 60664, IEC 60038) 208 to 240 VAC ± 15% 45 to 65 Hz 380 to 480 VAC ± 15% 45 to 65 Hz
Rated operational power M48 M23	13 VA @ 400 VAC, 50 Hz 13 VA @ 230 VAC, 50 Hz Supplied by L2 and L3

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 Voltage level Asymmetry level Alarm ON delay Alarm OFF delay	< 200 ms (input signal variation from -20% to +20% or from +20% to -20% of set value) < 200 ms (delay < 0.1 s) < 200 ms (delay < 0.1 s)
Accuracy Temperature drift Delay ON alarm Repeatability	(15 min warm-up time) ± 1000 ppm/°C ± 10% on set value ± 50 ms ± 0.5% on full-scale

General Specifications (cont.)

Indication for Power supply ON Alarm ON Output relay ON	LED, green LED, red (flashing 2 Hz during delay time) 2 x LED, yellow
Environment Degree of protection Pollution degree Operating temperature Storage temperature	(EN 60529) IP 20 3 (DPC01), 2 (PPC01) -20 to 60°C, R.H. < 95% @ 475 VAC, 65 Hz -20 to 50°C, R.H. < 95% @ 550 VAC, 65 Hz -30 to 80°C, R.H. < 95%
Housing dimensions DIN-rail version Plug-in version	45 x 80 x 99.5 mm 36 x 80 x 87 mm
Weight	Approx. 220 g
Screw terminals Tightening torque	Max. 0.5 Nm acc. to IEC 60947
CE-Marking	Yes

Mode of Operation

Connected to the 3 phases (and neutral) DPC01 and PPC01 operate when all 3 phases are present at the same time and the phase sequence is correct. It can be decided whether to monitor upper and lower voltage level of each phase or their asymmetry and tolerance. In any case if phase-neutral measurement is selected both phase-phase and phase-neutral voltages are monitored.

Asymmetry is defined as follows:

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

when measuring phase-phase voltages and also as follows:

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

when measuring phase-neutral voltages. Tolerance is defined as

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

and also as

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

when measuring phase-neutral voltages.

Voltage level monitoring: if one or more phase-phase or phase-neutral voltage exceeds the upper set level or drops below the lower set level, the red LED starts flashing 2 Hz and the respective output relay releases after the set time period.

Asymmetry and tolerance

monitoring: if one of them exceeds the set level the red LED starts flashing 2 Hz and the respective output relay releases after the set time period. If the phase sequence is wrong or one phase is lost, both output relays release immediately. Only 200 ms delay occurs. The failure is indicated by the red LED flashing 5 Hz during the alarm condition.

Example 1

(mains - over and under phase-phase voltage - monitoring)

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

Example 2

(starting and operating load - asymmetry and tolerance phase-neutral - monitoring)

DPC01 and PPC01 ensure correct starting and operating conditions. They monitor the voltage level, phase sequence (correct direction of the motor rotation) and asymmetry.

Frequent failures are fuse blowing and incorrect voltage level. In case of fuse blowing the motor regenerates a voltage in the interrupted phase. These relays detect the failure and react due to excessive imbalance among the phases.

Function/Range/Level and Time Delay Setting

Selection of function:

DIP-switch selector (1 to 6)

- 1
ON ☐ Power ON delay 6 ± 0.5 s
☐ Power ON delay 1 ± 0.5 s

- 2
☐ Phase-neutral voltage
☐ Phase-phase voltage

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☐ 3 x 208 Δ VAC (M23)
☐ 3 x 380 Δ VAC (M48)

☐ 3 x 220 Δ VAC (M23)
☐ 3 x 400 Δ VAC (M48)

☐ 3 x 230 Δ VAC (M23)
☐ 3 x 415 Δ VAC (M48)

☐ 3 x 240 Δ VAC (M23)
☐ 3 x 480 Δ VAC (M48)
(DPC01DM48)

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☐ 2 x SPDT relays
☐ 1 x DPDT relay

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☐ Asymmetry + tolerance
☐ Overvoltage + undervoltage

Selection of level and time delay:

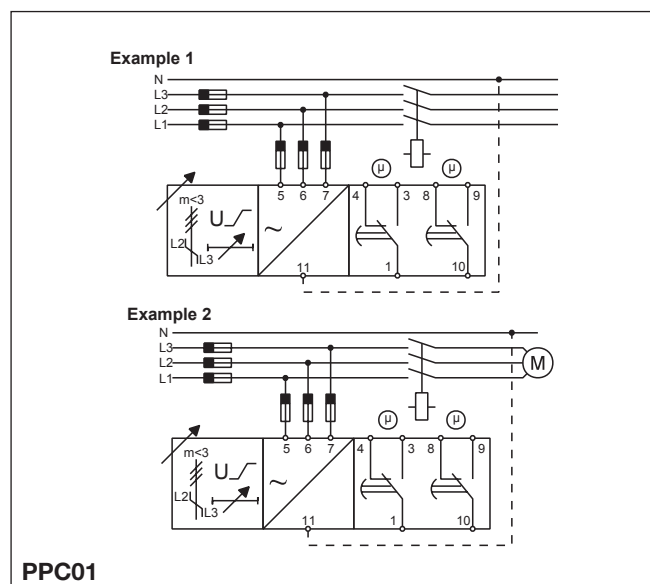
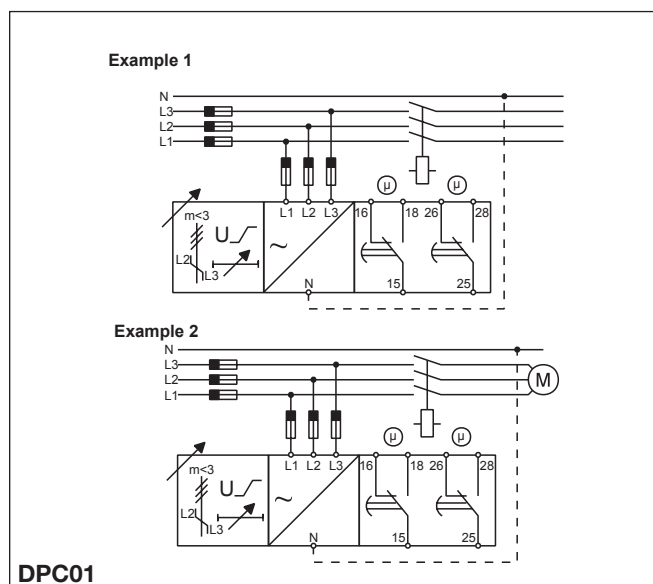
Centre knobs:

Setting of upper and lower level or setting of asymmetry and absolute tolerance of set value on relative scale.

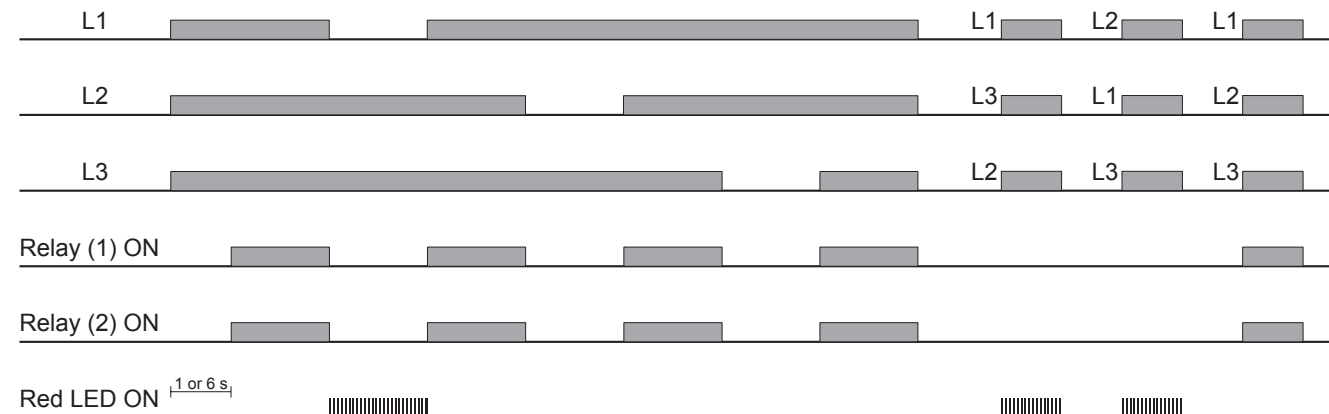
Lower knobs:

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

Wiring Diagrams



Operation Diagrams





Operation Diagrams (cont.)

