

# Monitoring Relays

## True RMS 3-Phase, 3-Phase+N, Multifunction

### Type DPC02

CARLO GAVAZZI



- TRMS 3-phase over and under voltage, over and under frequency, phase sequence and phase loss 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 the system frequency is between the set limits
- Separately adjustable setpoints
- Separately adjustable delay functions (0.1 to 30 s)
- Output: 2 x 8 A relay SPDT
- For mounting on DIN-rail in accordance with DIN/EN 50 022
- 45 mm Euronorm housing
- LED indication for relays, alarm and power supply ON

## Product Description

3-phase or 3-phase+neutral line voltage monitoring relays for phase sequence, phase loss, over and under voltage (separately adjustable set points), over and under frequency with built-in time delay function.

Supply ranges from 208 to 690 VAC covered by four multivoltage relays. The main application is for generator sets.

## Ordering key

**DPC 02 D M48**

Housing \_\_\_\_\_  
 Function \_\_\_\_\_  
 Type \_\_\_\_\_  
 Item number \_\_\_\_\_  
 Output \_\_\_\_\_  
 Power Supply \_\_\_\_\_

## Type Selection

Mounting	Output	Supply: 208 to 240 VAC	Supply: 380 to 415 VAC	Supply: 440 to 480 VAC	Supply: 600 to 690 VAC
DIN-rail	2 x SPDT	DPC 02 D M23	DPC 02 D M48	DPC 02 D M49	DPC 02 D M69

## Input Specifications

<b>Input</b> L1, L2, L3, N      DPC02:		Terminals L1, L2, L3, N Measures its own supply	<b>Ranges</b> Upper voltage level Lower voltage level Frequency window		+2 to +22% of the nominal voltage -22 to -2% of the nominal voltage 10 to 110% of the selected range
Note: Connect the neutral only if it is intrinsically at the star centre			<b>Hysteresis (frequency)</b> 2 Hz range 15 Hz range		~ 0.05 Hz ~ 0.25 Hz
<b>Measuring ranges (voltage)</b> M23 M48 M49 M69		177 to 275 ΔVAC 323 to 475 ΔVAC 374 to 552 ΔVAC 510 to 793 ΔVAC			
<b>Measuring ranges (frequency)</b> Selectable by DIP-switches 2 Hz range 15 Hz range		<b>Upper level</b> +0.2 to +2.2 Hz 50.2 to 52.2 Hz 60.2 to 62.2 Hz +1.5 to +16.5 Hz 51.5 to 66.5 Hz 61.5 to 76.5 Hz	<b>Lower level</b> -2.2 to -0.2 Hz 47.8 to 49.8 Hz 57.8 to 59.8 Hz -16.5 to -1.5 Hz 33.5 to 48.5 Hz 43.5 to 58.5 Hz	<b>Note:</b> The input voltage must not exceed the maximum rated voltage or drop below the minimum rated voltage reported above.	

## Output Specifications

<b>Output</b>	2 x SPDT relays N.E.
Rated insulation voltage	250 VAC
<b>Contact ratings</b> (AgSnO <sub>2</sub> )	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
<b>Mechanical life</b>	≥ 30 x 10 <sup>6</sup> operations
<b>Electrical life</b>	≥ 10 <sup>5</sup> operations (at 8 A, 250 V, cos φ = 1)
<b>Operating frequency</b>	≤ 7200 operations/h
<b>Dielectric strength</b>	
Dielectric voltage	≥ 2 kVAC (rms)
Rated impulse withstand volt.	4 kV (1.2/50 μs)

## Supply Specifications

<b>Power supply</b>	Overvoltage cat. III
Rated operational voltage through terminals:	(IEC 60664, IEC 60038)
M23 - Delta Voltage:	L1, L2, L3, N
	208 to 240 VAC ± 15%
	45 to 65 Hz
M48 - Delta Voltage:	380 to 415 VAC ± 15%
	45 to 65 Hz
M48 - Star Voltage:	220 to 240 VAC ± 15%
	45 to 65 Hz
M49 - Delta Voltage:	440 to 480 VAC ± 15%
	45 to 65 Hz
M49 - Star Voltage	254 to 277 VAC ± 15%
	45 to 65 Hz
M69 - Delta Voltage:	600 to 690 VAC ± 15%
	45 to 65 Hz
M69 - Star Voltage:	347 to 400 VAC ± 15%
	45 to 65 Hz
<b>Rated operational power</b>	8 VA, 50/60 Hz
	Supplied by L2 and L3

## General Specifications

<b>Power ON delay</b>	1 s ± 0.5 s
<b>Accuracy</b>	(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
<b>Reaction time</b>	
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)
Frequency level	
Alarm ON delay:	< 200 ms (delay < 0.1 s)
Alarm OFF delay:	< 200 ms (delay < 0.1 s)
<b>Indication for</b>	
Power supply ON	LED, green
Alarm ON	LED, red (flashing 2 Hz during delay time)
Output relays ON	2 x LED, yellow
<b>Environment</b>	(EN 60529)
Degree of protection	IP 20
Pollution degree	3
Operating temperature	
8A output	-20 to +50°C, R.H. < 95%
5A output	-20 to +60°C, R.H. < 95%
Storage temperature	-30 to 80°C, R.H. < 95%
<b>Housing</b>	
Dimensions	45 x 80 x 99.5 mm
Material	PA66 or Noryl
<b>Weight</b>	Approx. 220 g
<b>Screw terminals</b>	
Tightening torque	Max. 0.5 Nm acc. to IEC 60947
<b>Product standard</b>	EN 60255-6
<b>Approvals</b>	UL, CSA
<b>CE Marking</b>	L.V. Directive 2006/95/EC EMC Directive 2004/108/EC
EMC	
Immunity	According to EN 60255-26 According to EN 61000-6-2
Emissions	According to EN 60255-26 According to EN 61000-6-3

## Mode of Operation

Connected to the 3 phases (and neutral) DPC02 operates when all 3 phases are present at the same time and the phase sequence is correct.

### Voltage and frequency level monitoring:

if one or more phase-phase or phase-neutral voltage exceed the upper set level or drop below the lower set level, the red LED starts flashing 2 Hz and the respective output relay

releases after the set time period. If the mains frequency gets out of the symmetrical window across the nominal frequency the red LED starts flashing 2 Hz and the respective output relay releases after the set time period.

### Example 1

(Generator monitoring - 2xSPDT relays - phase-phase voltage)  
The relay monitors phase loss and correct phase sequence, over and under voltage and the frequency of the system. A voltage failure is detected through relay 1 and a frequency failure is detected through relay 2.

### Example 2

(Mains monitoring - DPDT relay)  
DPC02 monitors phase loss and correct phase sequence, over and under voltage and the frequency. Every failure is detected through relays 1 and 2 at the same time to allow independent operations.

## Function/Range/Level/Time Setting

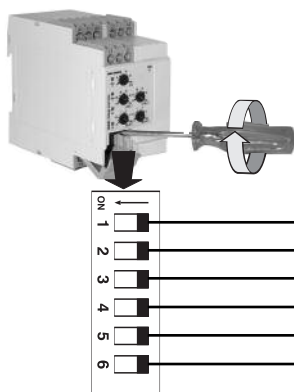
Adjust the input range setting the DIP-switches 3 and 4. Select the desired function setting the DIP-switches 5 and 6 as shown on the left. To access the DIP-switches open the plastic cover using a screwdriver as shown below.

**Upper left knob:**  
Setting of upper voltage level on relative scale.

**Centre left knob:**  
Setting of lower voltage level on relative scale.

**Centre right knob:**  
Setting of frequency window width on relative scale.

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



### Output

ON: 2 x SPDT relays  
OFF: 1 x DPDT relay

### Monitoring

ON: Phase-Neutral voltages  
OFF: Phase-Phase voltages

### Measuring range

	ON	ON	OFF	OFF
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	415VAC	415VAC
M48 Ph-N Voltage	220 VAC	230 VAC	240 VAC	240 VAC
M49 Ph-Ph Voltage	440 VAC	440 VAC	480 VAC	480 VAC
M49 Ph-N Voltage	254 VAC	254 VAC	277 VAC	277 VAC
M69 Ph-Ph Voltage	600 VAC	600 VAC	690 VAC	690 VAC
M69 Ph-N Voltage	347 VAC	347 VAC	400 VAC	400 VAC

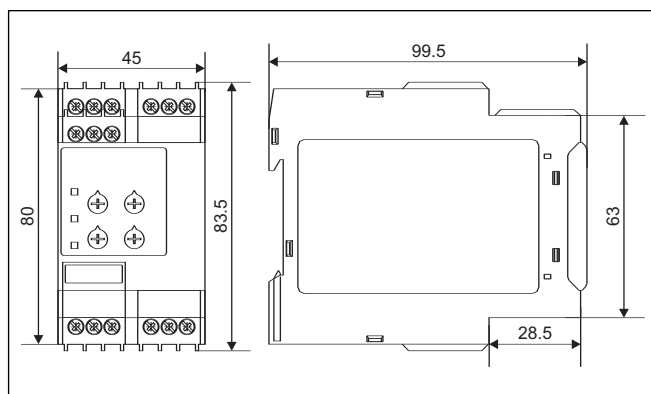
### System frequency

ON: 60 Hz  
OFF: 50 Hz

### Frequency setpoint range

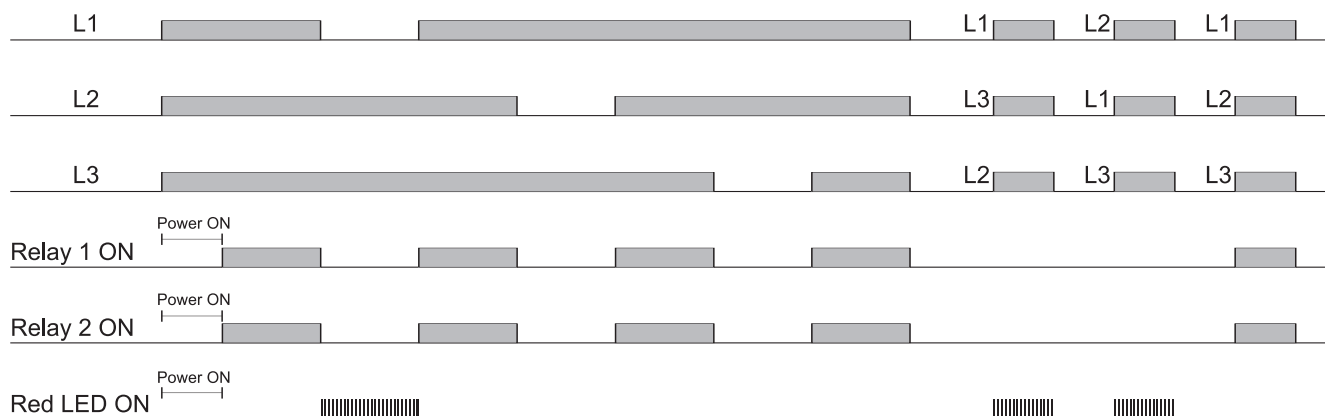
ON: 2 Hz  
OFF: 15 Hz

## Dimensions



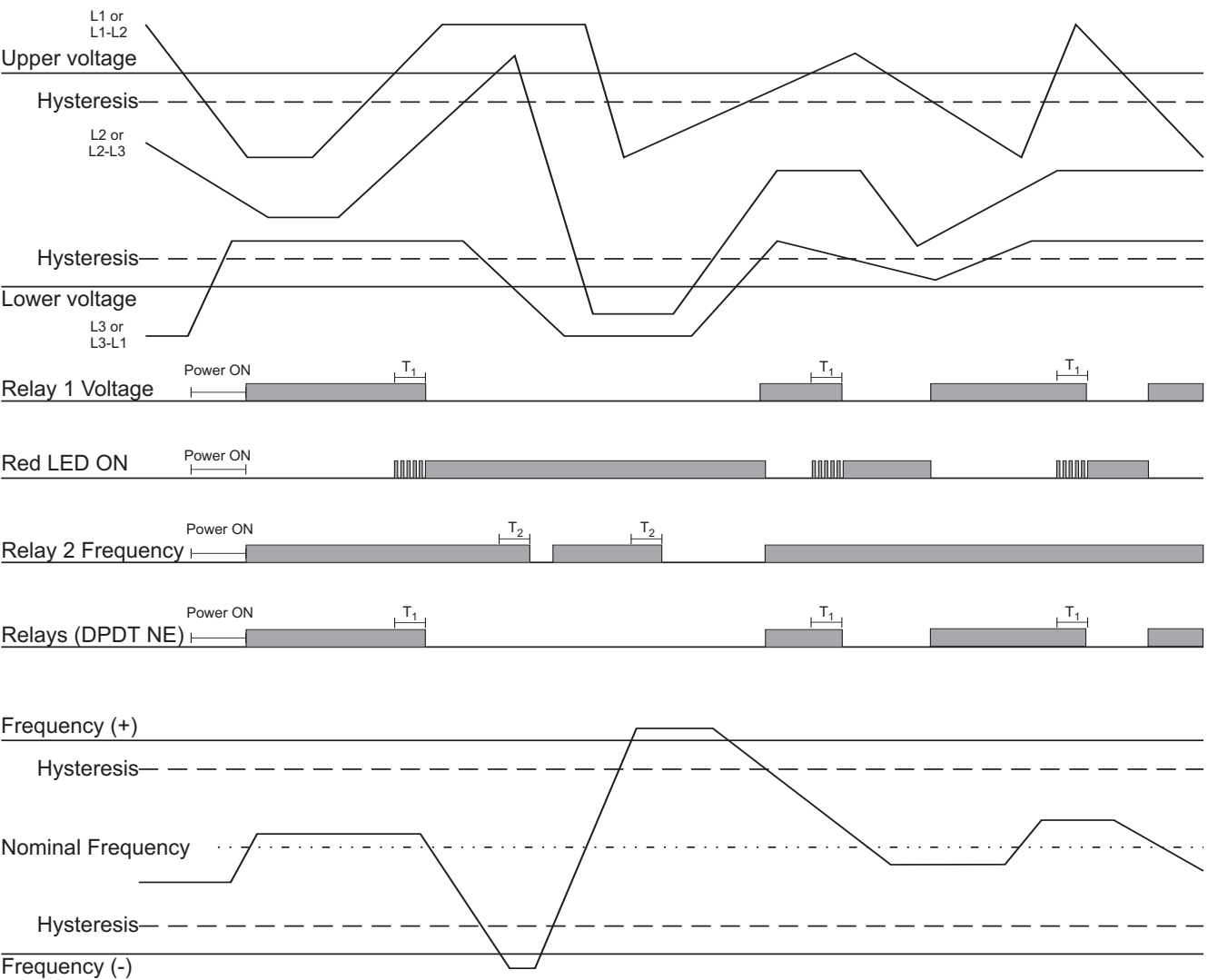
## Operation Diagrams

### Phase sequence, total phase loss

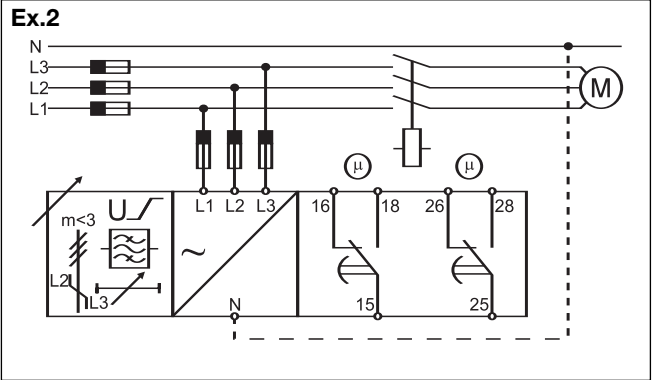
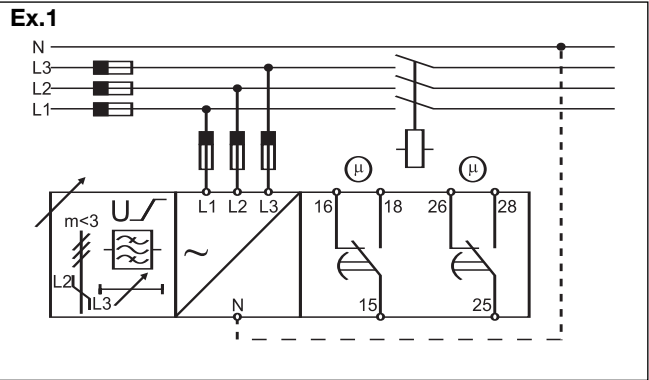




Operation Diagrams (cont.)



Wiring Diagrams



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