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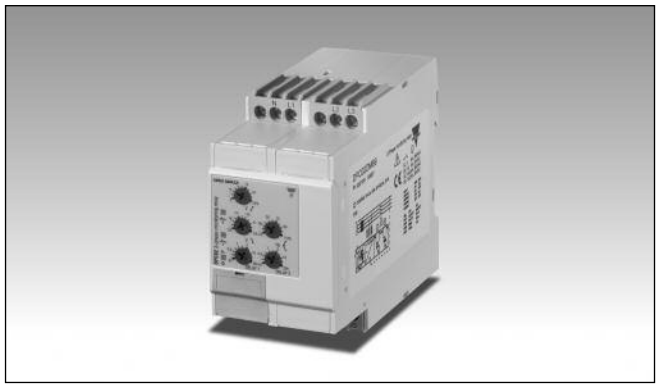
Monitoring Relays
True RMS 3-Phase, 3-Phase+N, Multifunction
Type DPC02



- **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

Input		
L1, L2, L3, N	DPC02:	Terminals L1, L2, L3, N Measures its own supply
Note: Connect the neutral only if it is intrinsically at the star centre		
Measuring ranges (voltage)		
M23		177 to 275 ΔVAC
M48		323 to 475 ΔVAC
M49		374 to 552 ΔVAC
M69		510 to 793 ΔVAC
Measuring ranges (frequency)	**Upper level**	**Lower level**
Selectable by DIP-switches		
2 Hz range	+0.2 to +2.2 Hz	-2.2 to -0.2 Hz
50 Hz	50.2 to 52.2 Hz	47.8 to 49.8 Hz
60 Hz	60.2 to 62.2 Hz	57.8 to 59.8 Hz
15 Hz range	+1.5 to +16.5 Hz	-16.5 to -1.5 Hz
50 Hz	51.5 to 66.5 Hz	33.5 to 48.5 Hz
60 Hz	61.5 to 76.5 Hz	43.5 to 58.5 Hz

Ranges	
Upper voltage level	+2 to +22% of the nominal voltage
Lower voltage level	-22 to -2% of the nominal voltage
Frequency window	10 to 110% of the selected range
Hysteresis (frequency)	
2 Hz range	~ 0.05 Hz
15 Hz range	~ 0.25 Hz

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

Output Specifications

Output	2 x SPDT relays N.E.
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
Rated operational voltage	(IEC 60664, IEC 60038)
through terminals:	L1, L2, L3, N
M23 - Delta Voltage:	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
Rated operational power	8 VA, 50/60 Hz Supplied by L2 and L3

General Specifications

Power ON delay	1 s ± 0.5 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
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)
Frequency level	
Alarm ON delay:	< 200 ms (delay < 0.1 s)
Alarm OFF delay:	< 200 ms (delay < 0.1 s)
Indication for	
Power supply ON	LED, green
Alarm ON	LED, red (flashing 2 Hz during delay time)
Output relays ON	2 x LED, yellow
Environment	(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%
Housing	
Dimensions	45 x 80 x 99.5 mm
Materila	PA66 or Noryl
Weight	Approx. 220 g
Screw terminals	
Tightening torque	Max. 0.5 Nm acc. to IEC 60947
Product standard	EN 60255-6
Approvals	UL, CSA
CE Marking	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.

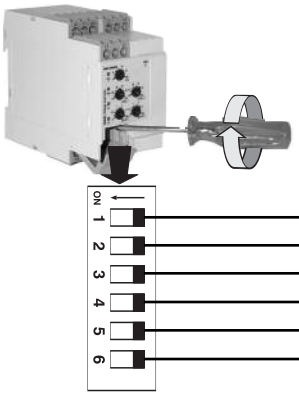
CARLO GAVAZZI

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

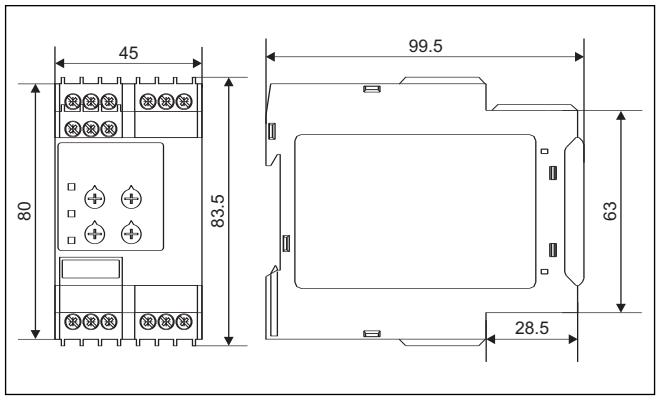
Measuring range

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

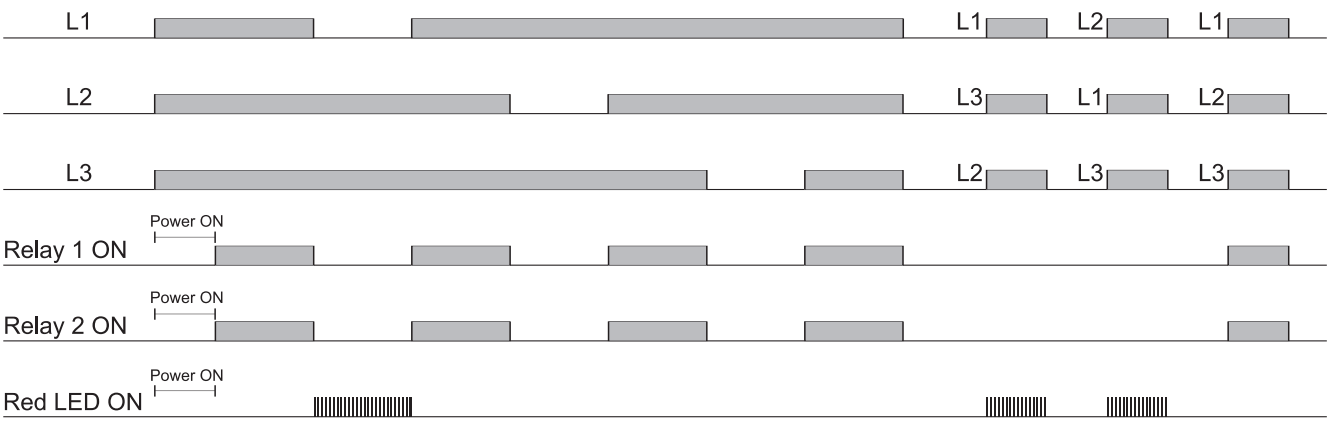
Frequency setpoint range
ON: 2 Hz
OFF: 15 Hz

Dimensions

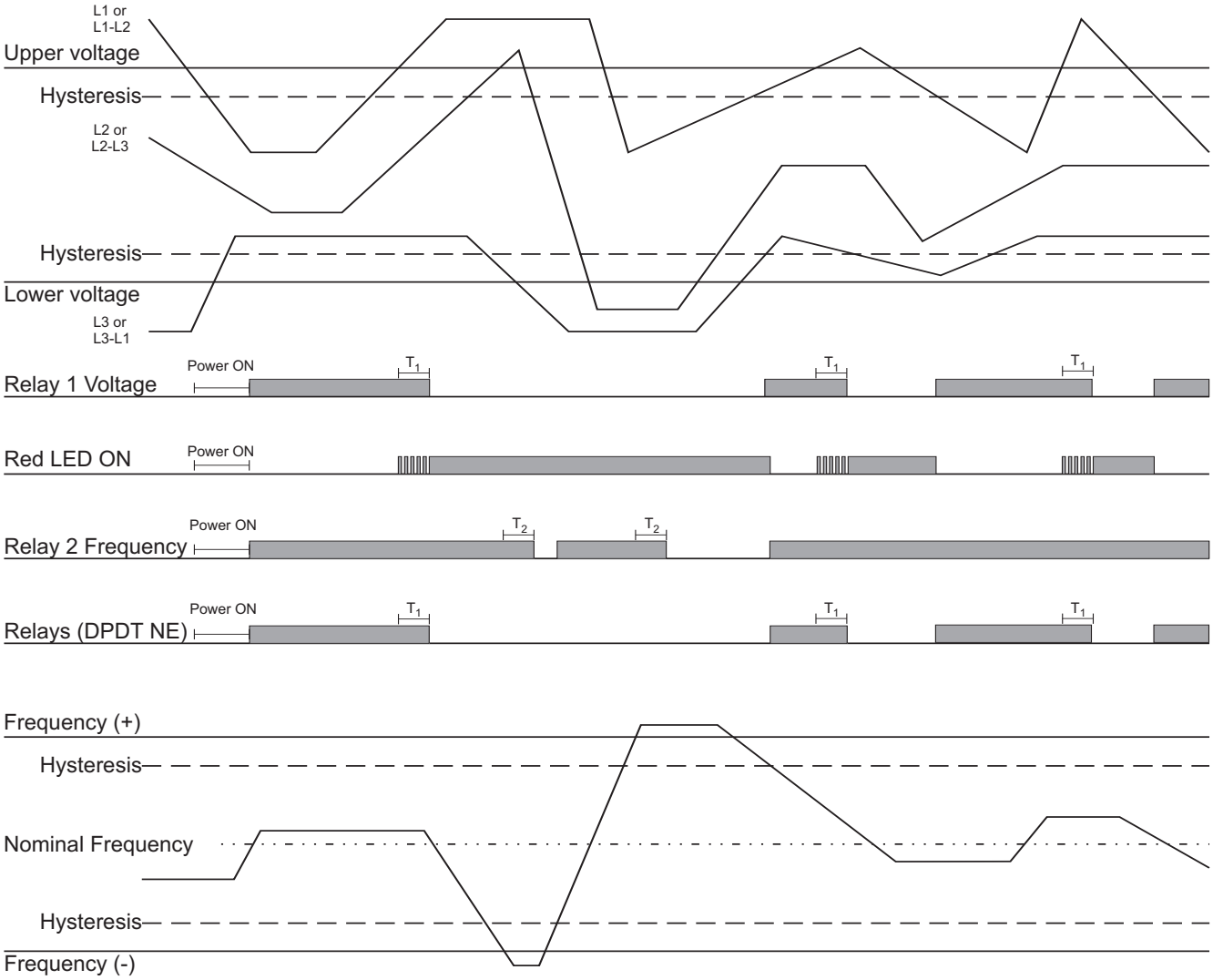


Operation Diagrams

Phase sequence, total phase loss

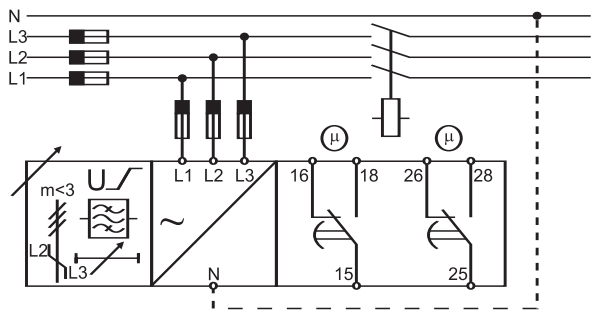
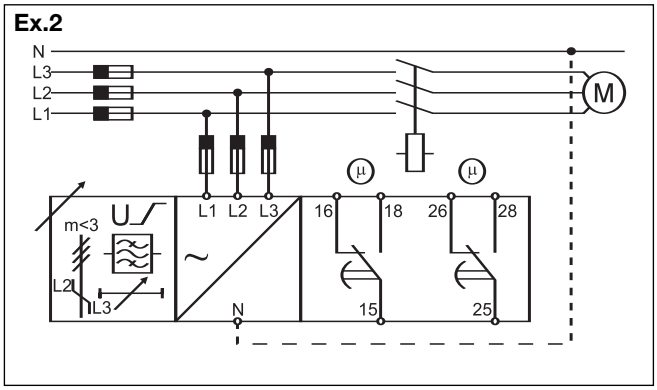


Operation Diagrams (cont.)



Wiring Diagrams

Ex.1



Ex.2