

# DPB51CM44



## True RMS 3-Phase voltage monitoring relay



### Benefits

- **Wide voltages ranges.** Working in systems from 208 to 480 VAC.
- **Adjustable voltage levels and time delay.** To allow a correct response to real alarm conditions.
- **Output and status LED indication.** For quick troubleshooting.
- **Ultra-high harmonic immunity.** For very noisy environments.
- **High Compactness.** 17.5 mm DIN rail housing.

### Description

DPB51 is a multifunction 3-phase mains monitoring relay.

It operates on 3P and 3P+N systems, monitoring phase loss and phase sequence, overvoltage and undervoltage.

Power supply provided by the monitored mains.

Delay on alarm, up to 30s, for over/under voltage alarms.

For mounting on DIN-rail or back panel.

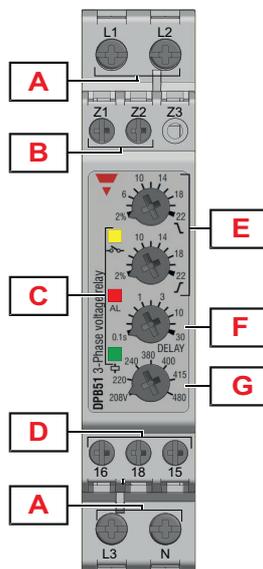
### Applications

DPB51 offers solutions for a wide range of applications: lifts, escalators, HVAC, material handling, pumps, compressors and mobile machinery installations.

### Main features

- Monitoring 3-phase mains with 3 wires (3P) or 4 wires (3P+N).
- Detection of the correct phase sequence and phase loss.
- Front dial adjustable overvoltage and undervoltage setpoints.
- Time delay.
- Changeover relay output.

Structure

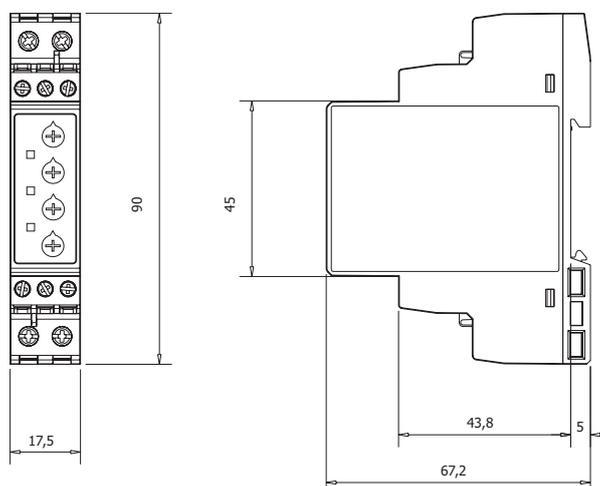


Element	Component	Function
A	Input terminals	Connection of the line voltages (neutral when present)
B	Mains type terminals	No connection: delta voltage Connected: star voltage
C	Information LED	Yellow for relay output status Red to signal alarm status Green for device ON
D	Output terminals	SPDT relay output
E	Voltage setpoints dials	Overvoltage and undervoltage setpoints adjustment
F	Delay time dial	Setting the alarm ON delay time
G	Mains nominal voltage dial	Mains nominal voltage adjustment

## Features

### General

<b>Material</b>	Polyamide (Nylon) or Phenylene ether + Polystyrene
<b>Colour</b>	RAL7035 (light grey)
<b>Dimensions d x h x w</b>	67.2mm x 90mm x 17.5mm
<b>Protection degree</b>	IP20
<b>Weight</b>	100 g
<b>Terminals</b>	Cable size from 0.05mm <sup>2</sup> to 2.5mm <sup>2</sup> (AWG30 to AWG13), stranded or solid
<b>Tightening torque</b>	Max. 0.8Nm (7.08lb.in)
<b>Terminal type</b>	Screw terminals



### Power supply

<b>Power supply</b>	Supplied by measured phases
<b>Overvoltage category</b>	III (IEC 60038)
<b>Voltage range</b>	208 to 480 V <sub>L-L</sub> AC ±15% (177V to 552V)
<b>Frequency range</b>	50Hz to 60Hz ±10% sinusoidal waveform
<b>Consumption</b>	< 13 VA
<b>Power ON delay</b>	1 s ± 0.5 s

### Environmental

<b>Operating temperature</b>	-20° C to 60° C (-4° F to 140° F)
<b>Storage temperature</b>	-30° C to 80° C (-22° F to 176° F)
<b>Relative humidity</b>	< 95%
<b>Pollution degree</b>	3
<b>Operating max altitude</b>	2000 m amsl (6560ft)
<b>Salinity</b>	Non saline environment
<b>UV resistance</b>	No



Vibration/Shock resistance

Test condition	Test	Level
Tests with unpacked device	Vibration response (IEC60255-21-1)	Class 1
	Vibration endurance (IEC 60255-21-1)	Class 1
	Shock (IEC 60255-21-2)	Class 1
	Bump (IEC 60255-21-2)	Class 1
Tests with packed device	Vibration random (IEC60068-2-64)	Class 1
	Shock (IEC 60255-21-2)	Class 1
	Bump (IEC 60255-21-2)	Class 1

Class 1: monitoring devices for normal use in power plants, substations and industrial plants and for normal transportation conditions.

The packaging type is designed and implemented in such manner that the severity class parameters will not be exceeded during transportation.

Compatibility and conformity

CE-marking	 According to EN 60947-5-1. Complies to European LV directive 2014/35/EU and EMC directive 2014/30/EU: Immunity according to EN61000-6-2; Emissions according to EN61000-6-3
Approvals	 (UL508)  (GB/T14048.5)

Inputs

Measuring ranges	
Measured variables	Phase sequence Phase loss 3P: voltages $V_{L12}, V_{L23}, V_{L31}$ 3P+N: voltages $V_{L1N}, V_{L2N}, V_{L3N}$
Nominal line range	208 VAC to 480 VAC $\pm 15\%$ (177 VAC to 552 VAC)
Nominal voltages (*)	3P: 208V, 220V, 240V, 380V, 400V, 415V, 480V (delta voltage) 3P+N: 120V, 127V, 140V, 220V, 230V, 240V, 277V (star voltage)

(\*) **Note:** connect the neutral only if it is intrinsically at the star centre.

Outputs

Number of outputs	1
Type	SPDT electromechanical relay with change-over contacts
Logic	Output de-energized on alarm
Contact rating	<b>AC1:</b> 5 A @ 250 VAC <b>AC15:</b> 2.5 A @ 250 VAC <b>DC12:</b> 5 A @ 24 VDC <b>DC13:</b> 2.5 A @ 24 VDC
Electrical lifetime	$\geq 50 \times 10^3$ operations (at 8 A, 250 V, $\cos \varphi = 1$ )
Mechanical lifetime	$> 30 \times 10^6$ operations
Assignment	Associated to all alarm types

**Insulation**

Terminals	Basic insulation
Inputs: L1, L2, L3, N to Output: 15, 16, 18	2.5kVrms, 4kV impulse 1.2/50µs (basic)

**Operating description**

► **Device configuration**

The relay is energized when all the phases are present, the phase sequence is correct and the phase-phase (or phase-neutral) voltage levels are within set limits.

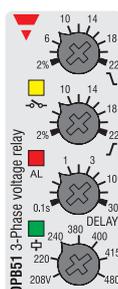
The relay is de-energized when one or more phase-phase (or phase-neutral) voltages exceeds the upper set level or drops below the lower set level.

Undervoltage adjustment dial	
Typology	Linear selection from 2% to 22%
Resolution	2% setpoint increase per notch
Function	Relative undervoltage setpoint

Overvoltage adjustment dial	
Typology	Linear selection from 2% to 22%
Resolution	2% setpoint increase per notch
Function	Relative overvoltage setpoint

Delay setting dial	
Typology	Logarithmic adjustment from 0.1s to 30s
Resolution	From 100ms/notch at 0.1s to 10s/notch at 30s
Function	Alarm ON delay setting for undervoltage and overvoltage

Mains nominal voltage setting dial	
Function	Selection of mains nominal voltage value



### ► Alarms

DPB51 operates in 2 different modes depending upon the alarm type:

- Phase loss and incorrect phase sequence cause immediate output relay de-energisation.
- Under or over voltage cause output relay de-energisation at the end of set delay.

Over / under voltage alarms	
Input variables	3P: voltages $V_{L12}$ , $V_{L23}$ , $V_{L31}$ 3P+N: voltages $V_{L1N}$ , $V_{L2N}$ , $V_{L3N}$
Reaction time	$\leq 200\text{ms} + \text{set delay ON alarm}$
Undervoltage setting range	From -2% to -22%
Overvoltage setting range	From 2% to 22%
Repeatability	0.5% on full-scale
Hysteresis	Setpoint from 2% to 4% $\rightarrow$ Hys 1% Setpoint from 4% to 22% $\rightarrow$ Hys 2%
Delay ON	Adjustable from 0.1s to 30s $\pm 10\%$ of set value $\pm 50$ ms
Delay OFF	None

Phase loss alarm	
Input variables	Voltage measurements L1-L2, L2-L3 and L3-L1
Alarm setpoint	One phase $\leq 85\%$ of the rated value (regeneration voltage detection)
Restore setpoint	All phases $> 85\%$ of the rated value + Hysteresis
Reaction time	$\leq 200$ ms
Delay ON	$< 200$ ms
Delay OFF	$< 200$ ms

Phase sequence alarm	
Input variables	Connection L1, L2, L3
Reaction time	$\leq 200$ ms
Delay ON	$< 200$ ms
Delay OFF	$< 200$ ms

### ► Visual information

DPB51 features 3 front LEDs which provide operation status information.

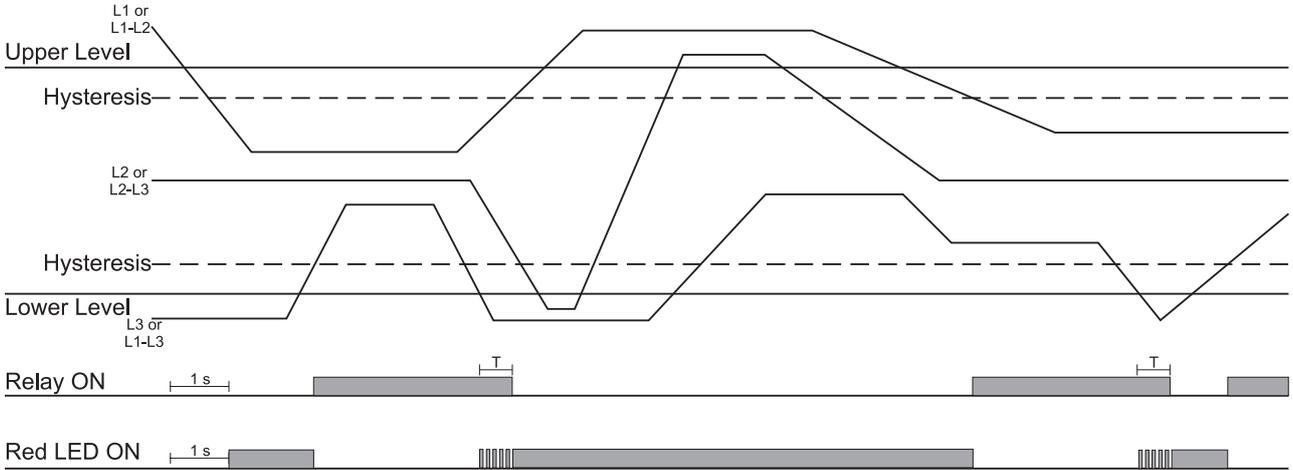
- Green LED is ON when the power supply is present.
- Red "AL" LED provides alarm status information: when an over or under voltage alarm is triggered, and there is a delay on alarm elapsing, the LED blinks at 2Hz during the delay. If the alarm situation is still present at the end of delay, the LED turns steady ON.

If a phase is lost or the phase sequence is incorrect, the LED flashes fast at 5Hz.

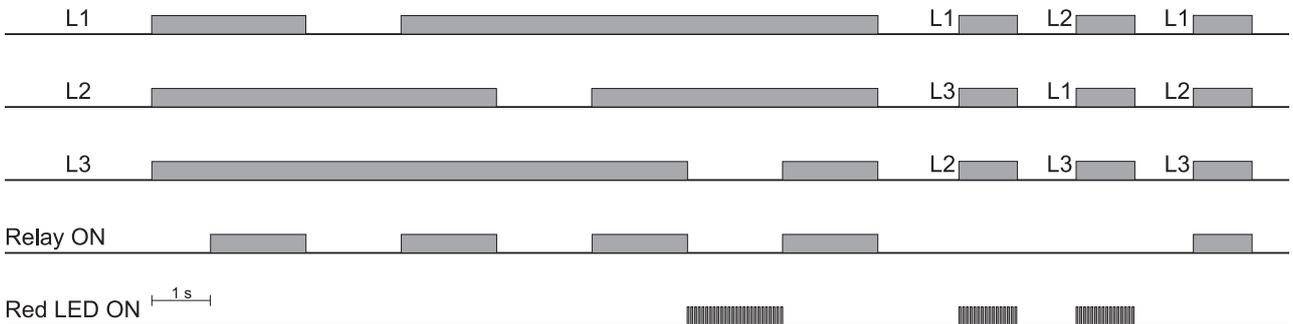
- Yellow LED is ON when the output relay is energised.



**Operating diagrams**



**Fig. 1** Over and undervoltage monitoring (1 x SPDT relay)



**Fig. 2** Phase sequence, total phase loss



# Connection Diagram

