

# DPB01CM44 - PPB01CM44



## True RMS 3-Phase voltage monitoring relay



### Benefits

- **Wide input voltage range and frequency.** Very wide input voltage range: from 208Vac to 480Vac  $\pm 15\%$  (177Vac to 552Vac), up to 400Hz mains.
- **Adjustable voltage ranges and over / under.** 8 voltage ranges can be selected by front DIP Switches. Over and under voltages are adjustable from + or - 2 to 22% of the selected range.
- **Switch mode power supply.** Very low consumption, heat and dissipation. Control circuit power supply is filtered and therefore immune to mains disturbances, noise and harmonics.
- **Output LED indication.** A yellow LED provides visual indication of the output status.
- **Relay contact output.** A relay contact provides electrical (remote) indication of the alarms/output status.
- **Enclosure versatility.** DPB01 features 22.5mm standard DIN enclosure. PPB01 is the Plug-In version, suitable for Undecal socket.

### Description

xPB01CM44 relays are threephase mains monitoring devices.

They can operate on both 3Ph and 3Ph+N mains detecting, besides the phase loss and the correct phase sequence, possible overvoltages and undervoltages.

Power supply is provided by the monitored mains, is wide input range and switch mode.

Consumption, dissipation and consequently heat are very limited.

A delay on alarm, up to 30s, for the over/under voltage alarms, filters unwanted trippings for temporary conditions.

Operating frequency is up to 400Hz.

### Applications

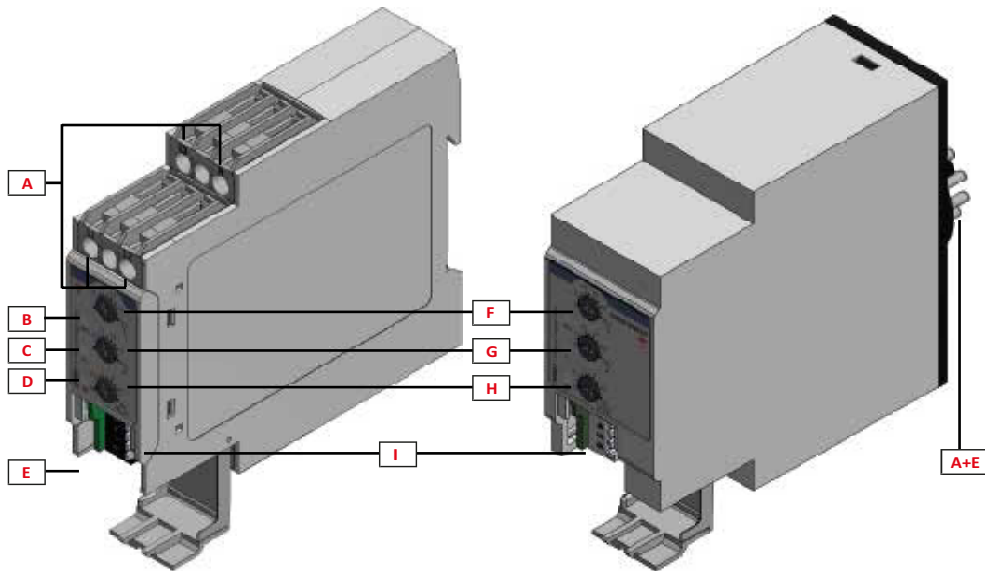
DPB/PPB01CM44 are suitable for applications where it is necessary to monitor, besides the phase presence and correct phase sequence of threephase mains, also the correct supply voltage value: lifts, escalators, HVAC, material handling, pumps and compressors, mobile machinery, for places with unstable mains or for export markets, airport and aircraft applications due to 400Hz max. operating frequency.

### Main functions

- 3Ph or 3Ph+N monitoring
- From 208V to 480V @50 to 400Hz, nominal voltage and frequency
- Adjustable over / under voltage and delay on alarm

- Phase sequence and phase loss alarm
- 8A SPDT relay output

**Structure**



Element	Component	Function
A	Input/supply terminals	DIN rail mounting: L1, L2, L3 and N (when necessary), double cage clamp terminals Plug-in mounting: 5, 6, 7, 11
B	Output status LED	Yellow, ON when output active (No Alarm)
C	Alarm LED "AL"	5Hz RED flashes during phase loss, wrong phase sequence. Blinking slow (2Hz) when over / under voltage is triggered but delay is elapsing, RED steady ON when delay elapsed.
D	Power ON LED	GREEN, lit when device supplied on at least two input lines
E	Output terminals	Output relay contacts terminals DPB01: 15 COM, 16 NC*, 18 NO* PPB01: 1COM, 4 NC*, 3 NO* * when power supply not applied.
F	Undervoltage setting	Undervoltage setting dial, range from -2% to -22% of rated mains voltage
G	Overvoltage setting	Overvoltage setting dial, range from +2% to +22% of rated mains voltage
H	Delay on alarm	Delay on alarm setting dial. Delay from 0.1s to 30s
I	DIP switches	See fig. 1 (DIP switch settings table)

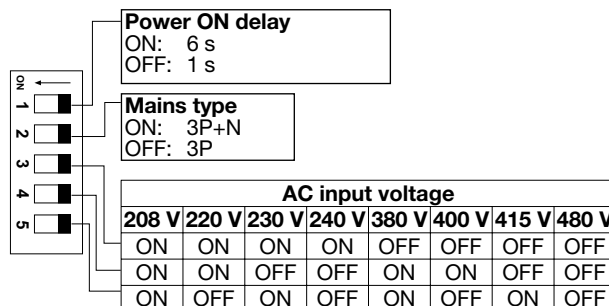
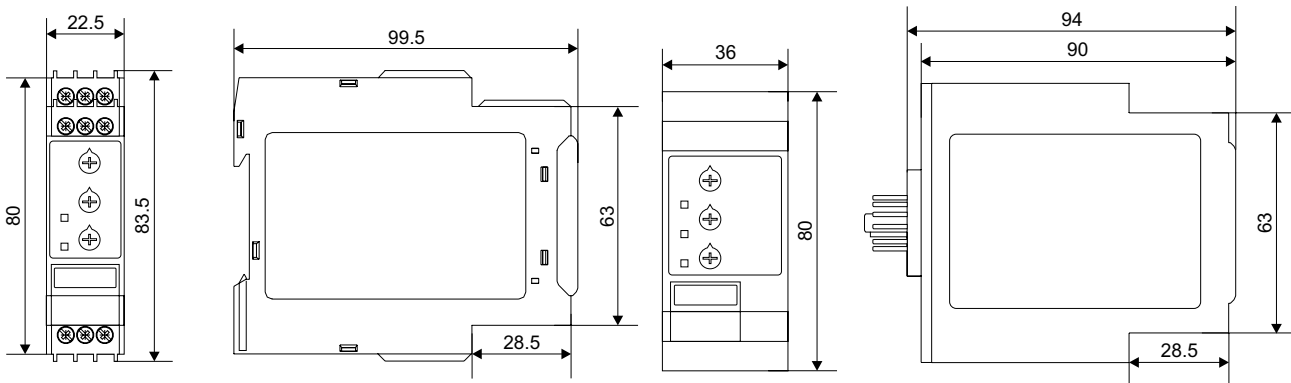


Fig. 1 DIP switch settings table

# Features

## General

<b>Material</b>	PA66 or Noryl
<b>Colour</b>	RAL7035 (light grey)
<b>Dimensions d x h x w</b>	DPB01: 99.5mm x 80mm x 22.5mm (3.92" x 3.15" x 0.886") PPB01: 94mm x 80mm x 36mm (3.7" x 3.15" x 1.42")
<b>Protection degree</b>	IP20
<b>Weight</b>	150 g (5.29oz)
<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. 0.5Nm (4.425lb.in)
<b>Terminal type</b>	Double cage screw terminals (DPB01), Undecal Plug-in terminals (PPB01)



## Power supply

<b>Power supply</b>	Voltage range: 208Vac to 480Vac $\pm$ 15% (177V to 552V) Supplied from measured phases Frequency range: 50Hz to 400Hz $\pm$ 10% sinusoidal waveform
<b>Consumption</b>	< 2.5 VA
<b>Supply technology</b>	Switch mode supply from all 3 phases

## Environmental

<b>Working 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>	5-95% non condensing
<b>Pollution degree</b>	2
<b>Operating max altitude</b>	2000 m amsl ( 6560ft )
<b>Salinity</b>	No 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**

<b>CE-marking</b>	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
<b>Approvals</b>	 UL508, CSA Standard C22.2 

**Inputs**

Measuring ranges	
<b>Measured variables</b>	Voltage PH-PH measurement on L1, L2 and L3 lines Phase sequence Phase loss

Voltage measurement	
<b>Typology</b>	PH-PH voltage measurement on L1, L2 and L3 lines
<b>Nominal line range</b>	From 208Vac to 480Vac ±15%
<b>Setting ranges (Un)</b>	208V, 220V, 230V, 240V, 380V, 400, 415, 480V

Over / under voltage alarms	
<b>Input variables</b>	Voltage measurements L1-L2, L2-L3, L1-L3
<b>Reaction time</b>	≤ 200ms + set delay ON alarm
<b>Undervoltage setting range (U&lt;)</b>	From -2% to -22%
<b>Overvoltage setting range (U&gt;)</b>	From 2% to 22%
<b>Resolution</b>	1V + 2% notch
<b>Accuracy</b>	1V + 2%
<b>Repeatability</b>	0.5% reading
<b>Hysteresis</b>	Setpoint between 2% and 5% = Hys 1% Setpoint between 5% and 22% = Hys 2%
<b>Delay ON</b>	Adjustable from 0.1s to 30s Accuracy: absolute form ±50ms at 0.1s to ±5s at 30s Repeatability: absolute form ±10ms at 0.1s to ±1 at 30s
<b>Delay OFF</b>	None



Phase loss alarm	
Input variables	Voltage measurements L1-L2, L2-L3 and L1-L3
Alarm Threshold	≤70% of the least one compared to rated value
Restore threshold	>70% of least phase compared to rated value + Hysteresis
Reaction time	≤ 200 ms
Hysteresis	2% fixed
Delay ON	None
Delay OFF	None

Phase sequence alarm	
Input variables	Connection L1, L2, L3
Reaction time	≤ 200 ms
Adjustable range	Not applicable, always active
Delay ON	None
Delay OFF	None

**Outputs**

Number of outputs	1
Type	SPDT electromechanical relay with change-over contacts
Logic	Output de-energized on alarm
Contact rating	<b>AC1:</b> 8 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	10 <sup>5</sup> operations
Mechanical lifetime	>30 x 10 <sup>6</sup> operations
Assignment	Associated to all alarm types

**Insulation**

Terminals	Basic insulation
Inputs: L1,L2,L3,N to Output : 11,12,14	2.5KVrms, 4KV impulse 1.2/50us (basic)



**Operating Description**

**Suitability**

DPB/PPB01CM44 can be used for power supply and mains quality monitoring of all three-phase loads, with or without neutral, supply voltage from 208VAC to 480VAC and frequencies from 50 to 400Hz.

**Device configuration**

The relay operates when all the phases are present, the phase sequence is correct and the phase-phase voltage levels are within set limits.

The relay releases when one or more phase-phase voltages exceeds the upper set level or drops below the lower set level.

The DPB/PPB01CM44 is configurable by trimmers, in order to set Over / Under Voltage, Delay ON.

Undervoltage adjustment dial	
Typology	Linear selection from -2% to -22%
Resolution	2% / notch
Function	Relative voltage threshold setting of UNDERVOLTAGE alarm

Overvoltage adjustment dial	
Typology	Linear selection from +2% to +22%
Resolution	2% / notch
Function	Relative voltage threshold setting of OVERVOLTAGE alarm

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

DIP switches	
Typology	6 switches DIP Switch (switch number 6 is unused)
Function	- Power ON delay - Grid type - Grid voltage (8 ranges)

**Alarms**

The DPB/PPB01CM44 operates in 2 different modes depending upon the alarm type:

- Phase loss and wrong phase sequence cause immediate (only <200ms delay occur due to device reaction time) output relay de-energisation, yellow LED turns OFF at the same time. Red "AL" flashes fast to display this type of alarm.

- Under or over voltage triggering cause output relay and yellow LED to turn OFF at the end of set delay. During the delay elapsing the red "AL" LED blinks slowly and turn steady ON at the end of delay.

**Visual information**

DPB/PPB01CM44 feature 3 front LEDs which provide operation status information.

- LED 1, green, is ON when the power supply is applied.

- LED 2 "AL" provides Alarm Status information: When an over or under voltage alarm is triggered, but there is a delay on alarm elapsing, the LED blinks Red at 2Hz during the delay then, if alarm situation still present at the end of delay, it turns steady ON.

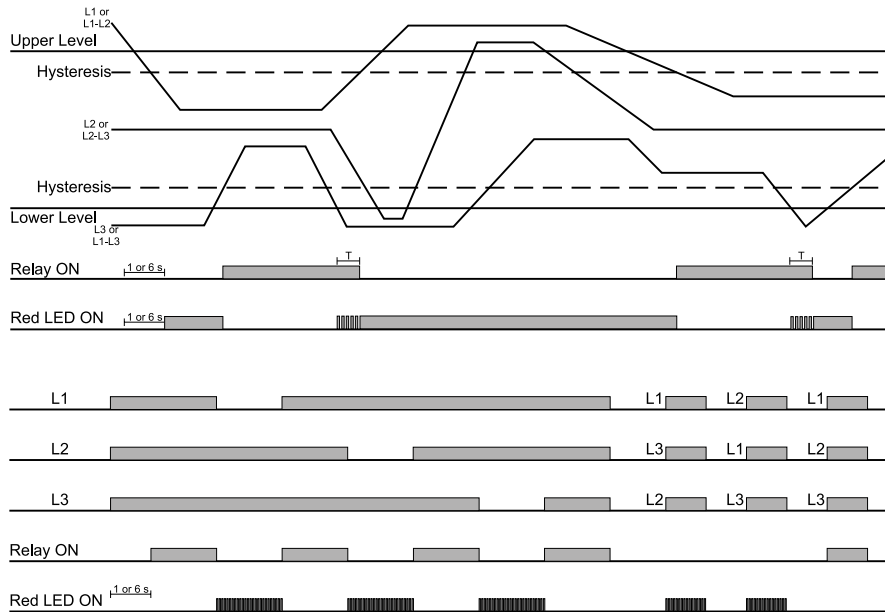
If a phase is lost, the phase sequence is wrong and the LED flashes fast at 5Hz.

- LED 3, yellow, is ON when the output relay is energised.

• **Phase loss**

Phase loss measurement is performed by comparing the 3 phases voltages (L1-L2, L2-L3, L3-L1) or phase to neutral (L1-N, L2-N, L3-N) on star grid type. If the voltage of one phase falls below 70% compared to the other 2 phases, the alarm goes off. DPB/PPB01CM44 detects loads regenerated voltage, for instance on motor or transformer loads.

**Operating diagram**



**Connection Diagrams**

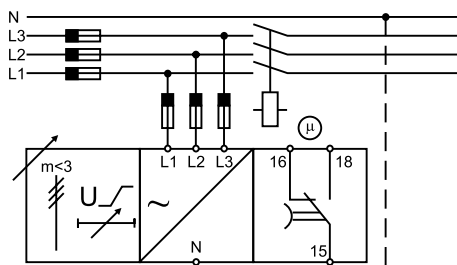


Fig. 2 DPB01 - Example 1

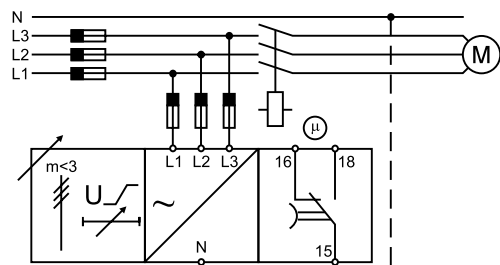


Fig. 3 DPB01 - Example 2

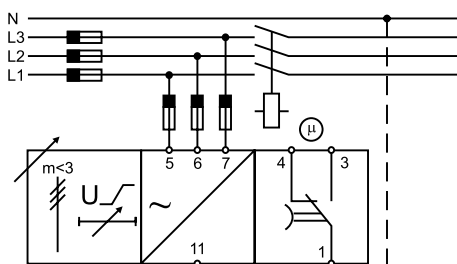


Fig. 4 PPB01 - Example 1

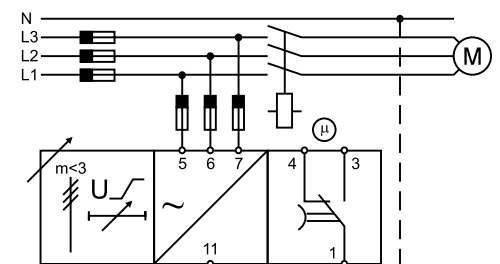


Fig. 5 PPB01 - Example 2

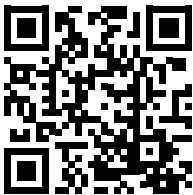
## References

 Order code

  PB01CM44

Complete the code entering the corresponding option instead of

Code	Option	Description
<input type="checkbox"/>	D	DIN rail mounting housing
	P	Plug-in housing
P	-	Function
B	-	Type
01	-	Item number
C	-	Output
M44	-	Power supply



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