

3PHMR1

3 Phase voltage monitoring relay



Benefits

- **Measuring Voltage Range. 440V Ac**, Very wide input working voltage range: from 183 V to 528V
- **LED indication.** Its use to indicate Phase sequence/Phase loss/Unbalance and under voltage and over voltage conditions
- **Outputs LED indication.** A yellow LED provides visual indication of the output status.
- **High Compactness.** The 3PHMR1 is a 3-Phase monitoring relay with **17,5mm width**.

Description

3PHMR1 is a monitoring relay suitable 3-phase without neutral mains. It protects loads from wrong phase sequence, phase loss, Phase Unbalance and under voltage, over voltage. User can adjust the ranges as per the based on the set values in potentiometer and as soon as wired it is ready for operation. Power supply is provided by the measured mains, and it is switch mode, making it wide range and immune to mains disturbances, transients and harmonics problems. Additional protection, against dust and humidity, is provided by the PCB conformal coating. The output signal is a 5A changeover electromechanical relay.

4 front LED's provide visual indication of output state and fault discrimination.

Thanks to the low profile DIN construction it is possible to install it either in industrial cabinets as well as NORM distribution panels.

Applications

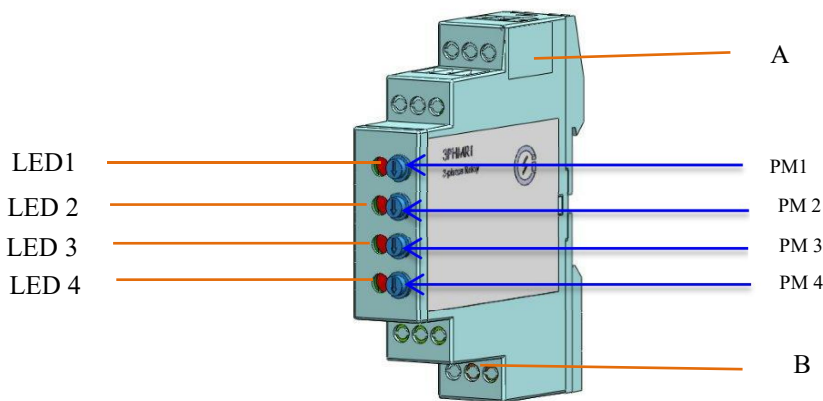
3PHMR1 is suitable for all applications where it is necessary to monitor phase presence, correct phase sequence and Under voltage, Over Voltage of three phase load mains: lifts, escalators, HVAC, material handling, conveyors, pumps and compressors.



Main function

- 3Ph monitoring
- 440 V rated input
- Phase sequence, Phase loss , Phase unbalance , Under voltage, Over voltage
- 5A SPDT relay output
- DIN Enclosure

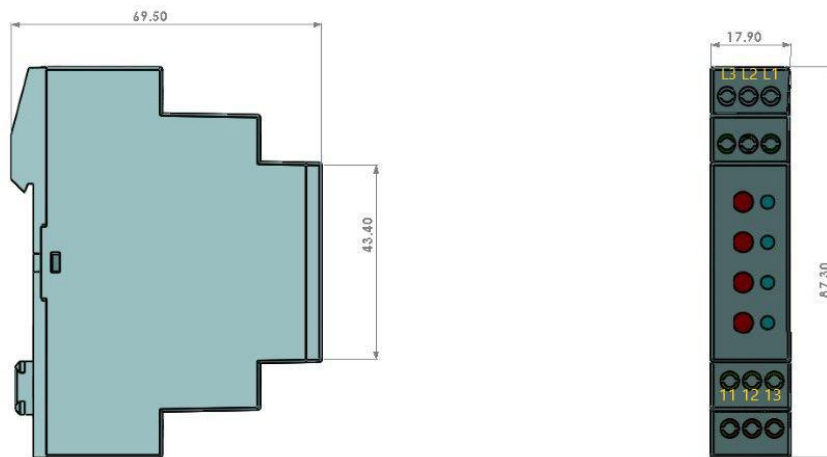
Structure



| | Component | Function |
|--------------------------|------------------|----------------------------------------------------------------------------|
| A | Power supply | L1, L2 and L3 supply and measuring terminals |
| B | Output terminals | Output Relay contacts terminals: COM, NO and NC |
| LED 1 | Output Led Amber | Blinks for ON delay period and Cont.ON state when relay is Energized |
| LED 2 | Alarm LED | Cont.ON state for Over voltage Blinks for Phase Unbalance |
| LED 3 | Alarm LED | Cont.ON state for Under Voltage Blinks for phase fail |
| LED 2 & LED 3 | Alarm LED | Both LED 2 & 3 Blinks for Phase sequence error. |
| LED 4 | Alarm LED | Cont.ON Supply Power |
| PM 1 | Potentiometer | Under Voltage Setting Range (330V -390 V) |
| PM 2 | Potentiometer | Phase Asymmetry Range (20 V -60 V) |
| PM 3 | Potentiometer | Over Voltage Range (460 V - 480 V) |
| PM 4 | Potentiometer | On delay Range (0.2 Sec - 10 Sec) |



Features



General data

| | |
|-----------------------------|-----------------------------------|
| Material | |
| Protection grade | IP20 |
| Housing colour | |
| Weight | approx. 100g |
| Dimensions | 87.3H x 69.5D x 17.9W |
| Terminals wire size | AWG18 to AWG14, stranded or solid |
| Terminals tightening torque | max. 0.5Nm |



Power supply

| | |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Power supply | Voltage working range: (183V to 528V) Supplied from L2, L3 measured phases Frequency range: 50Hz to 60 sinusoidal waveform |
| Consumption | < 2 VA |

Environmental

| | |
|-------------------------------|--------------------------------------------------------------------------------------|
| Working temperature | -20° C to 60° C (-4° F to 140° F) |
| Storage temperature | -30° C to 80° C (-22° F to 176° F) |
| Relative humidity | 5%-95% |
| Pollution degree | 2 |
| Operating max altitude | 2000m a.m.s.l. (6562ft) |
| Salinity | No saline environment |
| UV resistance | None |
| Other | Possible UV exposure if installed in an outdoor electric panel with transparent door |

Vibration/Shock resistance

| | |
|-----------------------------------------------|--------|
| Tests with the device outside the box: | |
| Vibration response (IEC60255-21-1) | Class1 |
| Vibration endurance (IEC 60255-21-1) | Class1 |
| Shock (IEC 60255-21-2) | Class1 |
| Bump (IEC 60255-21-2) | Class1 |
| Tests with the device inside the box: | |
| Vibration, random (IEC60068-2-64) | Class1 |
| Shock (IEC 60255-21-2) | Class1 |
| Bump (IEC 60255-21-2) | Class1 |

Note:

Class 1: Monitoring devices for normal use in power plants, substations and industrial plants and for normal transportation conditions(*)

(*) Packaging type is designed and implemented in such manner that the severity class parameters will not be exceeded during transportation.



▶ Compatibility and conformity

| | |
|---------------|-------|
| Approvals | |
| CE Marking | |
| CULUS Marking | |

▶ Input

| Measuring Ranges | |
|--------------------|---------------------------------------------------------------------------------------------------------------------------|
| Variable measuring | Voltage PH-PH measurement on L1, L2 and L3 lines: Phase sequence, Phase loss, Phase Unbalance Under Voltage, Over Voltage |

| Voltage measurement | |
|---------------------|--------------------------------------------------|
| Typology | PH-PH voltage measurement on L1, L2 and L3 lines |
| Nominal Line Range | 440Vac |
| Overload range | 183V to 528V (208Vac to 480Vac) |

| Phase Loss alarm | |
|-------------------|-----------------------------------------------------------------------------------------------------------|
| Input variables | L1-L2, L2-L3 and L3-L1 Voltage measurements |
| Alarm Threshold | $\leq 85\% \text{ of } (1 - (L1,2,3 \text{ Max} - L1,2,3\text{Min}) / L1,2,3\text{Avg})$ |
| Restore threshold | $> 85\% \text{ of } (1 - (L1,2,3 \text{ Max} - L1,2,3\text{Min}) / L1,2,3\text{Avg}) + \text{Hysteresis}$ |
| Adjustable range | Fixed |
| Reaction time | $\leq 200\text{ms}$ |
| Resolution | 1V |
| Accuracy | 1% reading +1V |
| Repeatability | 0.5% reading +1V |
| Hysteresis | 2% fixed |
| Delay ON | None. |
| Delay OFF | None |



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| Phase Sequence alarm | |
|--------------------------|--------------------------------|
| Input variables | Connections L1, L2, L3 |
| Restore threshold | ≤ 200ms |
| Adjustable range | Not applicable, always active. |
| Delay ON | None |
| Delay OFF | None |

| Phase unbalance alarm | |
|-------------------------|---------------------------------------------|
| Input variables | L1-L2, L2-L3 and L3-L1 Voltage measurements |
| Reaction time | ≤ 200ms |
| Resolution | 1V |
| Accuracy | 1% reading +1V |
| Repeatability | 0.5% reading +1V |
| Hysteresis | 2% |
| Delay ON | None |
| Delay OFF | None |
| Adjustable range | 20V - 60V |

| Phase undervoltage | |
|-------------------------|---------------------------------------------|
| Input variables | L1-L2, L2-L3 and L3-L1 Voltage measurements |
| Reaction time | ≤ 200ms |
| Resolution | 1V |
| Accuracy | 1% reading +1V |
| Repeatability | 0.5% reading +1V |
| Hysteresis | 2% |
| Delay ON | None |
| Delay OFF | None |
| Adjustable range | 330 to 390V |

| Phase Overvoltage | |
|-------------------------|---------------------------------------------|
| Input variables | L1-L2, L2-L3 and L3-L1 Voltage measurements |
| Reaction time | ≤ 200ms |
| Resolution | 1V |
| Accuracy | 1% reading +1V |
| Repeatability | 0.5% reading +1V |
| Hysteresis | 2% |
| Delay ON | None |
| Delay OFF | None |
| Adjustable range | 460V to 480V |

Output

| | |
|--------------------------|--------------------------------------------------------|
| Number of outputs | 1 |
| Type | SPDT electromechanical relay with change-over contacts |
| Logic | Output De-Energized on Alarm |
| Contact rating | AC: 5A @ 250Vac DC: 5A @ 24Vdc |
| Assignment | Associated to all alarm types |



3PHMR1

Insulation

| Output 1 | |
|-----------------------------------------|------------------|
| Terminals | Basic Insulation |
| Inputs: L1,L2,L3 to Output: 11,12,13 | |

Operating description

- **Suitability**

3PHMR1 can be used for power supply and mains quality monitoring of all types of three phase loads with rated supply voltage from 440 VAC. Monitoring function is performed between Line to Line.

- **Device configuration**

3PHMR1 requires setting value as mentioned range. It automatically adapts to the grid to which is connected.

- **Alarm**

The relay operates when all the phases are present and the phase sequence is correct. Alarm goes off when one phase-phase voltage drops below 85% of the other phase-phase voltages, the phase sequence is wrong or the mains voltage is out of range. The alarm state de-energises the output relay.

As soon as the alarm cause is no longer present the normal operation is automatically restored.

- **Visual information**

The 3PHMR1 is equipped with 4 LEDs which provide the status information

LED1 (Output Led- Amber)Blinks O/P ON delay and steady On when the output is energized

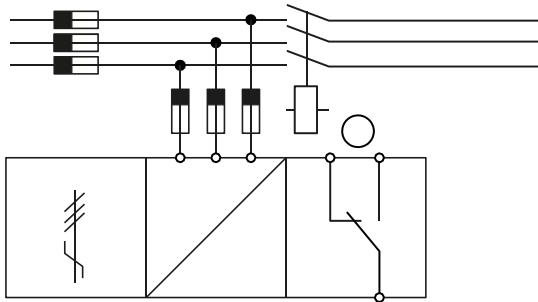
LED2 (Alarm Led) is Steady ON state for Over voltage and can be blinking for Phase unbalance

LED3 (Alarm Led) Steady ON state for Under **voltage** ,Blinks for **Phase fail**

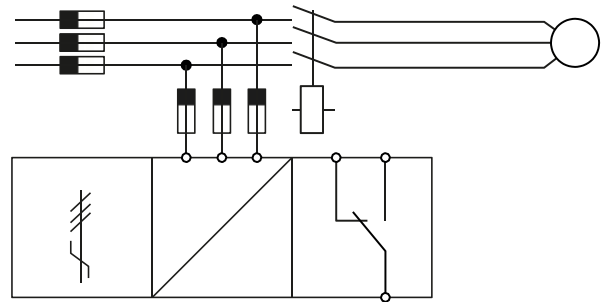
LED2 & 3 Both blinks for Phase sequence error

LED4 (Alarm Led) for Power ON

CONNECTION DIAGRAM:



Example 1



Example 2

Example 1

The relay monitors that the power supply has the correct phase sequence and that all phases are present.

Example 2

The relay releases in case of interruption of one or more phases, provided that the regenerated voltage does not exceed 85% of the phase-phase voltage