D4-VM31 / P49-VM31
D4-VM31N / P49-VM31N
Voltage monitor

Operating instructions and Guarantee Certificate

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Description:

In addition to providing OVER and / or UNDER voltage protection, this device will monitor phase failure, phase reversal and phase imbalance (neutral failure on “N” devices). It incorporates upper and lower voltage set-points, a programmable start-up delay, trigger delay, recovery delay, hysteresis, phase imbalance limit and phase imbalance hysteresis. By changing the calibration setting, the readings may be adjusted from 90 to 110%. The individual phase-to-phase voltages are monitored and can be viewed by pressing the “+” button. Every key-press cycles the display in the following order: the voltage between phase 1 and 2, then 1 and 3, then 2 and 3, line frequency and the average of all three phases. Under normal conditions the average of all 3 phases is displayed. Under fault conditions, the display indicates the offending phases using the left hand character, and the message “Hi” or “Lo”. A phase imbalance or reversal is indicated by “PH.ib” or “Ph.Er”. If the start-up or trigger delay holds the relay energised during a fault condition, the display indicates “-r1-“ as a warning. The same message is displayed when the relay is held in the de-energised state by the recovery delay. A latch facility is also incorporated.

Operation:

Even though the average of the 3 phases is being displayed, the individual phase to phase voltages are monitored. If all phases are in the correct order, and no phase imbalance exists, AND all 3 phase to phase voltages are ABOVE the “LO” parameter AND below the “HI” parameter, the relay is energised. If the voltage goes out of limits (eg above the “HI” parameter), the relay is de-energised until the voltage drops below the “HI” parameter by the “HYST” amount of volts. Eg: “HI”=410V & “HYST”=5V. The relay is energised while the voltage is BELOW 410V. Once this setpoint is reached, the relay de-energises until the voltage drops to below 405V (410V-5V).
If the latch is used, the relay remains de-energised until the latch is removed.
START-UP delay: The relay is energised at startup for the pre-set time. Monitoring starts after the delay has lapsed.

TRIGGER delay: Fault conditions (NOT phase fail or reversal) are tolerated for this period of time before the relay is de-energised. If a fault condition is detected for longer, the relay is de-energised.

RECOVERY delay: When the relay is de-energised, it will not re-energise before this amount of time, even if all fault conditions are removed. This delay is active at start-up if the START UP delay parameter is set to ZERO.

Menu functionality:

All adjustments are made via the three front mounted buttons. Press the “MENU” button repeatedly until the desired setting is reached, press “SELECT” to display the current value of the selected setting. Use the “+” and “-“ buttons to change the value. “ENTER” will return the device to the menu. The “BACK” button will exit the menu.

Menu options:

- **Upper limit (“Hi”) (default: Disabled)**
  If the input voltage on any phase exceeds this value, the relay de-energises. To disable this feature, set is to maximum (501V). “diSA” is displayed.

- **Lower limit (“Lo”) (default: Disabled)**
  If the input voltage on any phase drops below this value, the relay de-energises. To disable this feature, set is to minimum (249V). “diSA” is displayed.

- **Hysteresis (“HySt”)**
  If the input voltage exceeded the “Hi” setting, or dropped below the “Lo” setting, the voltage must drop, or rise above the applicable limit by this amount before the relay re-energises. This setting is limited to the difference between the “Hi” and “Lo” settings.

- **Phase imbalance (“Ph.ib”) (default: 20V)**
  If the difference between any 2 phases exceeds this amount, the relay is de-energised.

- **Phase imbalance hysteresis (“Ph. H”)**
  If a phase imbalance is detected, the voltage difference between the 2 phases that caused the imbalance must reduce by this amount before the relay will re-energise.

- **Startup delay (“St d”) (default: 0 Second)**
  If all 3 phases are present, and NOT reversed, the relay is energised upon start-up. The device does NOT monitor voltage errors until the start-up delay has lapsed. This feature is used to allow for over/under-voltage conditions following a power-up. During this time, the display alternates between the actual voltage, and whether it is Hi or Low.

- **Trigger delay (“tr d”) (Default: 0 seconds)**
  This function is similar to the start-up delay. The device will tolerate voltage errors for this period of time once monitoring has commenced.

- **Recovery delay (“rEC. d”) (Default: 0 seconds)**
  Once the relay is de-energised, it will NOT re-energise for this period of time, even if all fault conditions are removed. To implement this timer at start-up, set the START UP delay parameter to 0.

- **Calibration (“CAL”) (Default: 100%)**
  This function may be used re-calibrate the device. The readings may be adjusted from 90% to 110%.

- **Reset (“rESt)**
  By selecting this option, all values are reset to default.

Latch facility:

If the latch pins are shorted, the relay will not re-energise (after a fault) until the short is removed, even if the input voltage is within the pre-set limits.

Lock adjustment & full / reduced menu:

When not in a menu or sub-menu, press and hold "+" and "-". After 3 seconds the display will show "----". If the keys are released at this point, the lock settings feature will be activated (settings may be viewed, but not changed). If the keys are held for an additional 2 seconds, the display will show "____". The full menu will be activated. To toggle the lock feature, or full / reduced menu, repeat the above procedure.

Notes:

- The latch pins MUST BE ISOLATED FROM THE INPUT.
- As a power saving feature, the display dims if settings are not being made.
- We recommend that all relay connections be disconnected while making adjustments and the unit be reset by disconnecting the power after settings have been changed.
- Certain settings are reset to default when the device is re-configured. Before commissioning, re-check all settings to ensure they are correct.
- Even though the device seems to operate correctly, the relay will not energise if the input voltage is below the operating voltage.
- If one phase should fail while an inductive load is connected, the device may detect the fault as a low phase (not phase failure). The load may be generating a voltage on the 3rd phase.
- If the input voltage is below the minimum operating voltage, the relay may not energize. Even though the device's display is on.

Specifications:

Accuracy:	±1% (typically 0.5% at 25 °C)	
Display Resolution:	1 Volt	
Input voltage:	±15% of rated voltage	
Led indication:	Relay status	
Response time:	Phase failure /reversal:	<1 Sec
	Over / Under voltage	<2 Sec
	Phase imbalance	<2 sec
Start-up delay:	0 to 125 sec	
Trigger delay:	0 to 125 sec	
Recovery delay:	0 to 250 sec	

Menu operation example:

Set the device to energise the relay if the input voltage is between 350V and 400V.
Press "MENU" to display "Hi". Press "SELECT". Use the "+" and "-" buttons to change the value to "400". Press "ENTER" to return to the menu. "Lo" is displayed. Press "SELECT". Use "+" and "-" to change the value to "350". Press "ENTER". Press "BACK".

12 Month guarantee:
Our product is guaranteed for a 12 (twelve) month period from date of purchase. This guarantee is valid for defects arising from failure during specified conditions. This guarantee does not cover damage due to abuse, tampering or improper installation. Our company does not accept liability for any consequential damage or loss arising from product malfunction. Should this product prove to be defective, kindly return for inspection or repair. For further information contact your nearest distributor.

Relay specifications:

Contact rating:	10A 250 VAC 2500VA (Resistive)
Mechanical life:	30 million operations
Electrical life:	250 000 operations (at maximum load)