



# VPR-A

## Voltage – Frequency Monitoring & Protection



Voltage and Frequency Protection for Feeders and AC Machines

## DESCRIPTION

The voltage protection relay VPR-A has been designed to measure the line or phase RMS voltage, frequency and unbalance under normal condition or under disturbances. This information is internally processed by the microprocessor, to take the voltage protection actions defined under ANSI or IEC standards. The different functions provided by the VPR-A may be classified into the following groups:

## APPLICATIONS

- Protection of generators, motors and transformer against adverse system voltage conditions.
- Ground fault detection 59N.
- Supervision of automatic transfer switching schemes.

## DIGITAL MEASUREMENT

- RMS line and phase voltages.
- Homopolar voltage.
- Voltage unbalance.
- Average voltage.
- System frequency.
- Phase sequence.

## PROTECTION AND FUNCTIONALITY

- **(27t/27i)** Timed and instantaneous undervoltage.
- **(27r)** Residual undervoltage.
- **(46)** Voltage unbalance.
- **(47)** Phase reversal
- **(59t/59i)** Timed and instantaneous overvoltage.
- **(59N)** Homopolar voltage.
- **(81)** Underfrequency and Overfrequency.
- Five output relay programmable.
- Control power drop or internal fault relay.

## SIGNALLING AND PROGRAMMING

- LED and LCD display indication.
- Touchpad programming.
- Indication and storage of fault condition and their values.
- Undervoltage, overvoltage, unbalance, frequency pickup indications.
- System status.
- Output relays status.

## APPLICABILITY

**Systems:** Mono phase and 3 or 4-wire three phase systems  
**Frequency:** 50 and 60 Hz  
**Voltage:** 69 kV maximum

## COMMUNICATION

- Remote communication using a PC or PLC by 1 RS232 or 2 RS485.
- Remote programming of the setpoints.
- Remote breaker opening or closing.



## SPECIFICATIONS

<b>SUPPLY VOLTAGE</b> 24±310 Vdc, -15%,+10% 24±240 Vac, -15%, +10%	<b>MAX POWER CONSUMPTION</b> 12 VA (7W)
<b>TEMPERATURE RANGE</b> Operational: 0 °C ÷ 50 °C Storage: -20 °C ÷ 70 °C	<b>RELATIVE HUMIDITY</b> Max. 90% (non condensing)
<b>DIELECTRIC WITHSTAND VOLTAGE</b> 2 kVac, 60 s	<b>BURN IN</b> 48 hours at 50°C
<b>CONSTRUCTION</b> According to VDE, UL, CEI standards	<b>OUTPUT CONTACT</b> <i>Rated load:</i> 8 A DC 150W resistive or 90W inductive (L/R=40 ms) AC 2000VA resistive or 800VA inductive (PF=0.4) <i>Max. operating voltage:</i> 250 Vac, 125 Vdc
<b>COMMUNICATIONS</b> <i>Type:</i> 1 RS232 port + 2 2-wire RS485 port , half duplex, 1200 → 19200 baud <i>Protocol:</i> Modbus RTU <i>Functions:</i> Reading/Writing of setpoints Reading of actual values Executing of commands	<b>LED INDICATORS</b> <i>Relay status:</i> AUX 1, AUX 2, AUX 3, AUX4, AUX 5, OUT OF SERVICE <i>System status:</i> memory, pickup ANSI 27, pickup ANSI 27R, pickup ANSI 59/59N, pickup ANSI 46, pickup ANSI 81. <i>Display (LCD):</i> 16 x 2 digits
<b>DIGITAL INPUT</b> <i>Type:</i> Dry contact only, 500 Ohm max ON resistance <i>Output:</i> 12 Vdc @ 10 mA provided by relay	<b>TERMINAL BLOCK</b> Fixed, back connection terminals with 4-mm <sup>2</sup> section cable (12 AWG)
<b>FRAME</b> In ABS, auto-extinguish, with frontal panel in polycarbonate (IP54)	<b>ASSEMBLY</b> The relay has to be jointed to the structure fixing it by means of two stirrup with screws.
<b>DIMENSION</b> 144 x 144 x 138 mm  <b>WEIGHT</b> 1.5 kg	<b>FRONT PANEL CUTOUT</b> 137 x 137 mm
<b>(27t, 27i, 27r) UNDERVOLTAGE PROTECTION</b>  <i>Pickup level :</i> 15% to 100% VT; Steps: 1% <i>Reset pickup level:</i> 15% to 100% VT; Steps: 1% <i>Curve:</i> Inverse, Definite <i>Delay:</i> 0.0 to 600.0 s; Steps: 0.01/0.1/1 s <i>Pickup accuracy:</i> ±1% of full scale (15 ≤ V ≤ 60) ±0,5% of full scale (60 < V ≤ 254) <i>Reset accuracy:</i> ±1% of full scale (15 ≤ V ≤ 254) <i>Time accuracy:</i> ±3% of trip time or ±20ms (whichever is greater) at 0ms time delay (no intentional delay) 60ms max <i>Operation Phases:</i> Any one / Any two / All three <i>Minimum oper. level:</i> 0% to 100% VT; Steps: 1%	<b>(59t, 59i) OVERVOLTAGE PROTECTION (59N only with VT in wye-wye)</b>  <i>Pickup level :</i> 1% to 150% VT; Steps: 1% <i>Reset pickup level:</i> 1% to 150% VT; Steps: 1% <i>Delay:</i> 0.0 to 600.0 s; Steps: 0.01/0.1/1 s <i>Pickup accuracy:</i> ±0,5% of full scale <i>Reset accuracy:</i> ±1% of full scale <i>Time accuracy:</i> ±3% of trip time or ±20ms (whichever is greater) at 0 ms time delay (no intentional delay) 50 ms max  <i>Operation Phases:</i> Any one / Any two / All three / Homopolar
<b>(46) VOLTAGE UNBALANCE PROTECTION</b>  <i>Pickup level :</i> 1% to 100% VT; Steps: 1% <i>Reset pickup level:</i> 1% to 100% VT; Steps: 1% <i>Delay:</i> 0.0 to 600.0 s; Steps: 0.01/0.1/1 s <i>Pickup accuracy:</i> 3 x voltage input error <i>Reset accuracy:</i> 3 x voltage input error <i>Time accuracy:</i> ±3% of trip time or ±20ms (whichever is greater) at 0ms (no intentional delay) 40ms max	<b>(81) UNDER- AND OVERFREQUENCY PROTECTION</b>  <i>U/F – O/F ΔF pickup:</i> 0.05 to 9.99 Hz; Steps: 0.01 Hz <i>Reset pickup level U/F:</i> 0.01 to 5.00 Hz; Steps: 0.01 Hz <i>Delay:</i> 0.1 to 600 s; Steps: 0.1/1 s <i>Pickup accuracy:</i> ±0.1Hz <i>Reset accuracy:</i> ±0.1Hz <i>Time accuracy:</i> ±3% of trip time or ±20ms (whichever is greater) <i>Measured:</i> by means of Phase A-N or A-B voltage

<p><b>(47) PHASE SEQUENCE PROTECTION</b></p> <p><i>Correct sequence:</i> A - B - C  <i>Delay:</i> 0.05 to 600 s; Steps: 0.01/0.1/1 s</p>	<p><b>MEASURED PARAMETERS</b>  (Accuracies based on 100% Un input)</p> <p><b>Voltage:</b> A-N(A-B)/B-N(B-C)/C-N(C-A) voltages  <b>Accuracy:</b> ±0.5% F.S. (15 ≤ V ≤ 254)  <b>Frequency:</b> Across Phase A-N(A-B) voltage  <b>Range:</b> 40.0 to 70.0 Hz  <b>Accuracy:</b> ±0.05 Hz</p>
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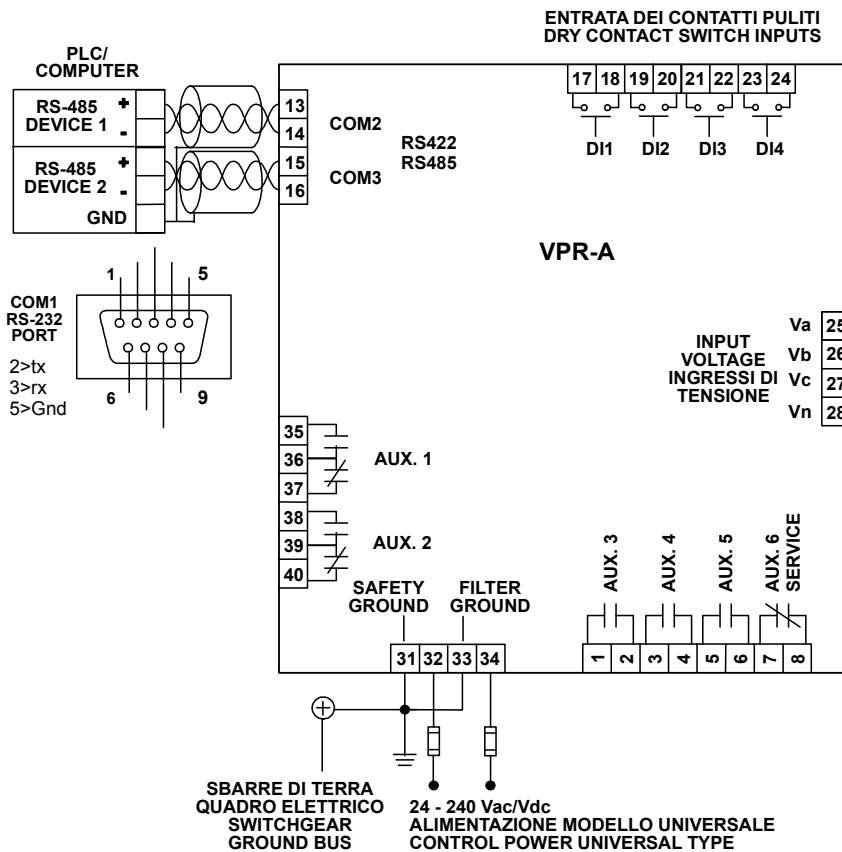
**ORDER CODE:**

**VPR – A X**

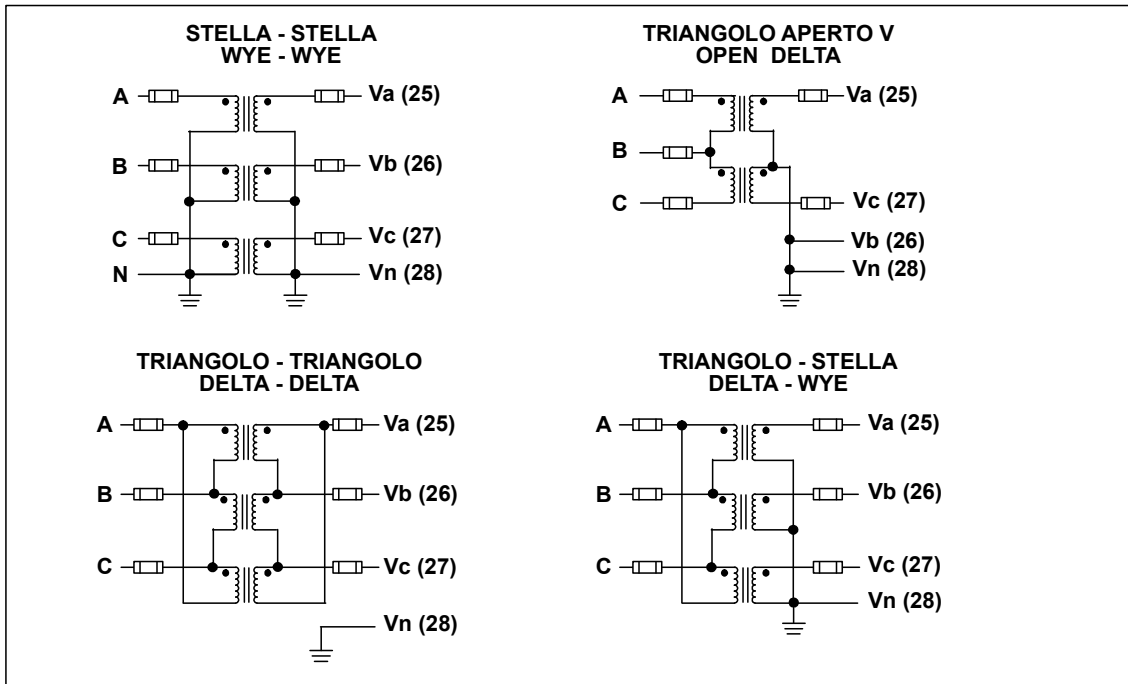
<p><b>MODEL:</b>  1: Standard  X: Special version</p>
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## WIRING DIAGRAM



## COLLEGAMENTO DEI TV VT WIRING DIAGRAM



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