



ORION ITALIA

Protection relays & Metering division

VPR-A

Voltage - Frequency
Monitoring & Protection



Voltage and Frequency Protection for Feeders and AC Machines

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

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

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

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

SPECIFICATIONS

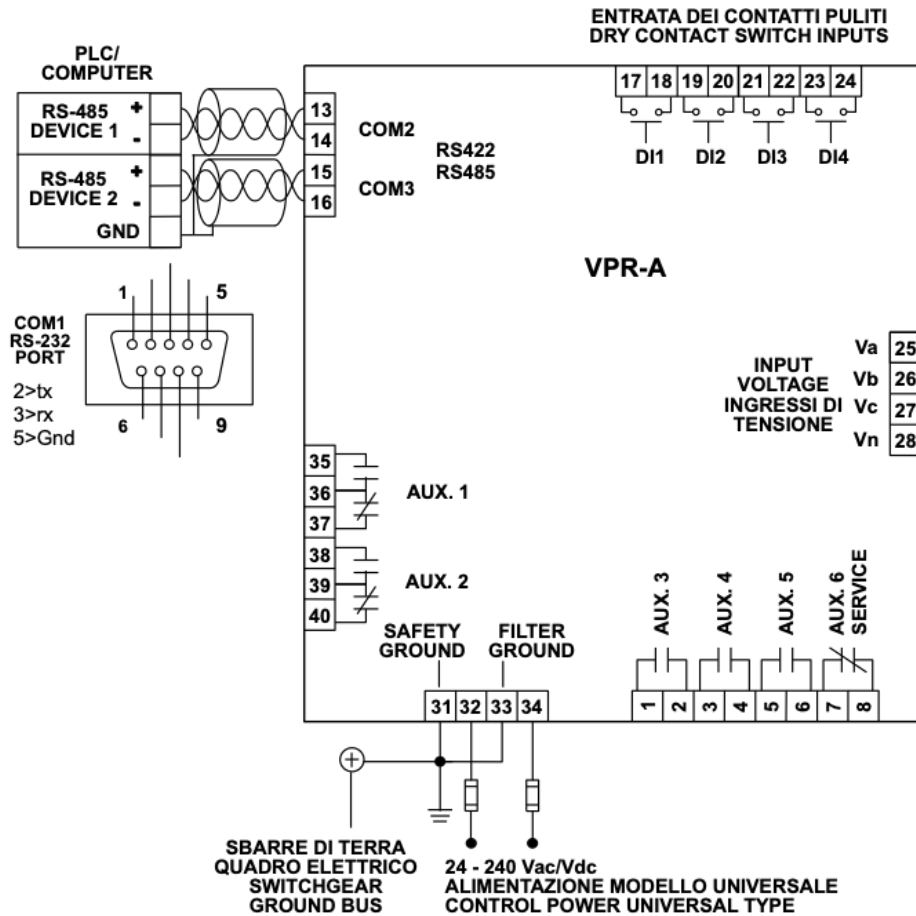
SUPPLY VOLTAGE 24÷310 Vdc, -15%,+10% 24÷240 Vac, -15%, +10%	MAX. POWER CONSUMPTION 12 VA (7W)
TEMPERATURE Operational: 0 °C ÷ 50 °C Storage: -20 °C ÷ 70 °C	RELATIVE HUMIDITY Max. 90% (non condensing)
DIELECTRIC WITHSTAND VOLTAGE 2 kVac, 60 s	BURN IN 48 hours at 50°C
CONSTRUCTION According to VDE, UL,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

<p>(46) VOLTAGE UNBALANCE PROTECTION <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</p>	<p>(81) UNDER- AND OVERFREQUENCY PROTECTION <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>
<p>(47) PHASE SEQUENCE PROTECTION <i>Correct sequence:</i> A - B - C <i>Delay:</i> 0.05 to 600 s; Steps: 0.01/0.1/1 s</p>	<p>MEASURED PARAMETERS (Accuracies based on 100% Un input) <i>Voltage:</i> A-N(A-B)/B-N(B-C)/C-N(C-A) voltages <i>Accuracy:</i> ±0.5% F.S. (15 ≤ V ≤ 254) <i>Frequency:</i> Across Phase A-N(A-B) voltage <i>Range:</i> 40.0 to 70.0 Hz <i>Accuracy:</i> ±0.05 Hz</p>
<p>MEASURED PARAMETERS (Accuracies based on 100% Un input) <i>Voltage:</i> A-N(A-B)/B-N(B-C)/C-N(C-A) voltages <i>Accuracy:</i> ±0.5% F.S. (15 ≤ V ≤ 254) <i>Frequency:</i> Across Phase A-N(A-B) voltage <i>Range:</i> 40.0 to 70.0 Hz <i>Accuracy:</i> ±0.05 Hz</p>	<p>IMMUNITY TEST</p> <ul style="list-style-type: none"> • <u>Conducted disturbances induced by RF field</u> References: EN 61000-4-6; Port: AC mains and signal lines • <u>Radiated electromagnetic field</u> References: EN 61000-4-3; Port: enclosure • <u>Electrostatic discharge</u> References: EN 61000-4-2; Port: enclosure • <u>Fast transients (burst)</u> References: EN 61000-4-4 ; Port: AC mains and signal lines • <u>Surge</u> References: EN 61000-4-5 ; Port: AC mains • <u>Voltage dips and short interruptions</u> References: EN 61000-4-11 ; Port: AC mains <p>EMISSION TEST</p> <ul style="list-style-type: none"> • <u>Radiated emissions</u> References: EN 55011; Port : enclosure; Class A, at 10m • <u>Conducted emissions</u> References: EN 55011; Port: AC mains; Class A

ORDER CODE

VPR – A X  **MODEL: 1: Standard X: Special version**

WIRING DIAGRAM



COLLEGAMENTO DEI TV VT WIRING DIAGRAM

