VPR-A

Voltage – Frequency Monitoring & Protection

CE

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

SUPPLY VOLTAGE 24÷310 Vdc, -15%,+10% 24÷240 Vac, -15%, +10%	**MAX POWER CONSUMPTION** 12 VA (7W)

TEMPERATURE RANGE 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** *Rated load:* 8 A DC 150W resistive or 90W inductive (L/R=40 ms) AC 2000VA resistive or 800VA inductive (PF=0.4) *Max. operating voltage:* 250 Vac, 125 Vdc

COMMUNICATIONS *Type*: 1 RS232 port + 2 2-wire RS485 port , half duplex, 1200 → 19200 baud *Protocol:* Modbus RTU *Functions:* Reading/Writing of setpoints Reading of actual values Executing of commands	**LED INDICATORS** *Relay status:* AUX 1, AUX 2, AUX 3, AUX4, AUX 5, OUT OF SERVICE *System status:* memory, pickup ANSI 27, pickup ANSI 27R, pickup ANSI 59/59N, pickup ANSI 46, pickup ANSI 81. *Display (LCD):* 16 x 2 digits

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 jointed to the structure fixing it by means of two stirrup with screws.

DIMENSION 144 x 144 x 138 mm **WEIGHT** 1.5 kg	**FRONT PANEL CUTOUT** 137 x 137 mm

UNDERVOLTAGE PROTECTION (27t, 27i, 27r) *Pickup level* : 15% to 100% VT; Steps: 1% *Reset pickup level:* 15% to 100% VT; Steps: 1% *Curve:* *Inverse, Definite* *Delay:* 0.0 to 600.0 s; Steps: 0.01/0.1/1 s *Pickup accuracy:* ±1% of full scale (15 ≤ V ≤ 60) ±0,5% of full scale (60 < V ≤ 254) *Reset accuracy:* ±1% of full scale (15 ≤ V ≤ 254) *Time accuracy:* ±3% of trip time or ±20ms (whichever is greater) *at 0ms time delay (no intentional delay) 60ms max* *Operation Phases:* Any one / Any two / All three *Minimum oper. level:* 0% to 100% VT; Steps: 1%	**OVERVOLTAGE PROTECTION (59t, 59i) (59N only with VT in wye-wye)** *Pickup level* : 1% to 150% VT; Steps: 1% *Reset pickup level:* 1% to 150% VT; Steps: 1% *Delay:* 0.0 to 600.0 s; Steps: 0.01/0.1/1 s *Pickup accuracy:* ±0,5% of full scale *Reset accuracy:* ±1% of full scale *Time accuracy:* ±3% of trip time or ±20ms (whichever is greater) *at 0 ms time delay (no intentional delay) 50 ms max* *Operation Phases:* Any one / Any two / All three / Homopolar

VOLTAGE UNBALANCE PROTECTION (46) *Pickup level* : 1% to 100% VT; Steps: 1% *Reset pickup level:* 1% to 100% VT; Steps: 1% *Delay:* 0.0 to 600.0 s; Steps: 0.01/0.1/1 s *Pickup accuracy:* 3 x voltage input error *Reset accuracy:* 3 x voltage input error *Time accuracy:* ±3% of trip time or ±20ms (whichever is greater) *at 0ms (no intentional delay) 40ms max*	**UNDER- AND OVERFREQUENCY PROTECTION (81)** *U/F – O/F ΔF pickup*: 0.05 to 9.99 Hz; Steps: 0.01 Hz *Reset pickup level U/F:* 0.01 to 5.00 Hz; Steps: 0.01 Hz *Delay:* 0.1 to 600 s; Steps: 0.1/1 s *Pickup accuracy:* ±0.1Hz *Reset accuracy:* ±0.1Hz *Time accuracy:* ±3% of trip time or ±20ms (whichever is greater) *Measured*: by means of Phase A-N or A-B voltage

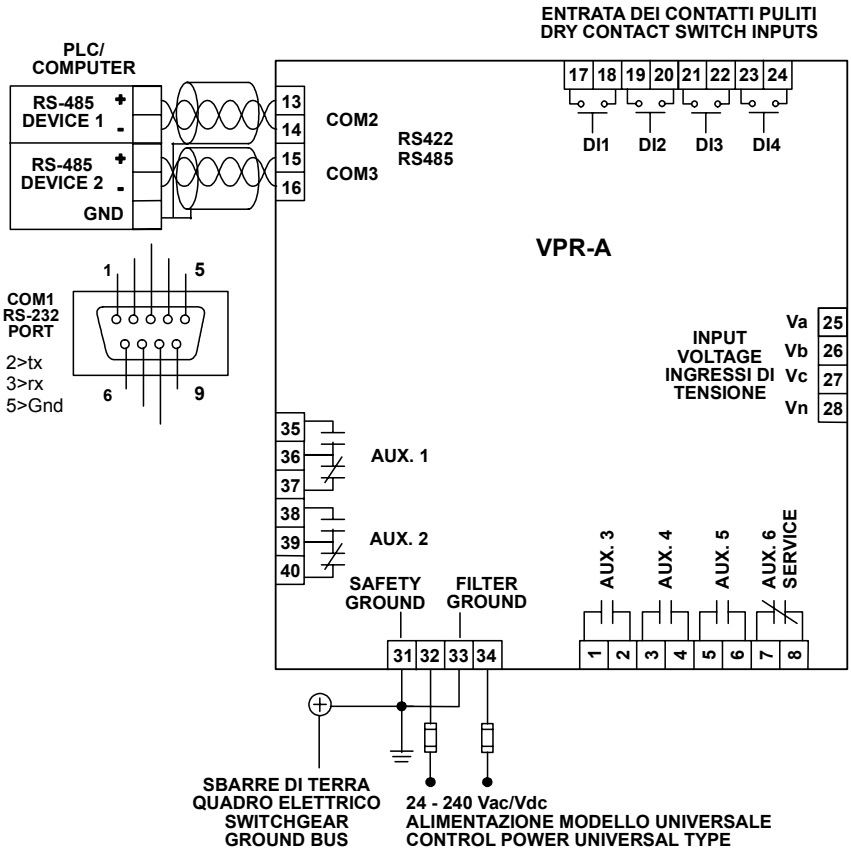
PHASE SEQUENCE PROTECTION (47)		MEASURED PARAMETERS (Accuracies based on 100% Un input)	
Correct sequence:	A - B - C	**Voltage**:	A-N(A-B)/B-N(B-C)/C-N(C-A) voltages
Delay:	0.05 to 600 s; Steps: 0.01/0.1/1 s	*Accuracy:*	±0.5% F.S. (15 ≤ V ≤ 254)
		Frequency:	Across Phase A-N(A-B) voltage
		Range:	40.0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

MEASURED PARAMETERS (Accuracies based on 100% Un input)		IMMUNITY TEST
Voltage:	A-N(A-B)/B-N(B-C)/C-N(C-A) voltages	• Conducted disturbances induced by RF field References: EN 61000-4-6; Port: AC mains and signal lines
Accuracy:	±0.5% F.S. (15 ≤ V ≤ 254)	• Radiated electromagnetic field References: EN 61000-4-3; Port: enclosure
Frequency:	Across Phase A-N(A-B) voltage	• Electrostatic discharge References: EN 61000-4-2; Port: enclosure
Range:	40.0 to 70.0 Hz	• Fast transients (burst) References: EN 61000-4-4 ; Port: AC mains and signal lines
Accuracy:	±0.05 Hz	• Surge References: EN 61000-4-5 ; Port: AC mains
		• Voltage dips and short interruptions References : EN 61000-4-11 ; Port: AC mains
		EMISSION TEST
		• Radiated emissions References: EN 55011; Port : enclosure; Class A, at 10m
		• Conducted emissions 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