EVAR

Line Analizer & Protection

CE

Metering & Protection for Feeders, Generators & Industry

DESCRIPTION

The EVAR relay has been designed for the continuous monitoring of electrical parameters in medium or low-voltage 1-phase or 3-phase systems. It allows direct or remote monitoring of the system's general conditions as it immediately signals any fault. EVAR can also be used to control the production process thanks to the programmable contacts suitable for various applications.

APPLICATIONS

- Metering of distribution feeders, transformers, generators, capacitor banks and motors.
- Commercial & industrial utility.
- Flexible control for demand load shedding, power factor, etc.
- Power quality analysis.

PROTECTION AND FUNCTIONALITY

Configurable setpoints of:

- Phase Under & Over Current
- Ground overcurrent
- Phase Under & Over Voltage
- Phase sequence
- Current & Voltage Total harmonic distortion (THD)
- Under & Over frequency
- Positive & Negative Active power
- Positive & Negative Reactive power
- Voltage & current Unbalance
- Power factor (leading or lagging)
- Demand readings for:
  - phase current ..... (A)
  - active power ..... (kW)
  - reactive power..... (kvar)
  - apparent power ... (kVA)

COMMUNICATION

- Remote communication using a PC or a PLC by 1 RS232 & 2 RS485 ports.
- Remote programming of the setpoints.
- Protocol used: Modbus RTU.

DIGITAL MEASUREMENT

1. True RMS Phase & Ground Current
2. True RMS Phase & Line voltage
3. Energy
4. Positive & negative Active power (kW) & Reactive power (kvar)
5. Last & Maximum Demand readings for:
   - phase current (A)
   - active power (kW)
   - reactive power (kvar)
   - apparent power (kVA)
6. Frequency (Hz)
7. Voltage & Current Unbalance.
8. Voltage & current harmonic analysis up to the 13th
9. K value measurement.
9. Event recorder.

SIGNALLING AND PROGRAMMING

- LCD & LED display indication.
- Indication and storage of fault conditions and their values.
- Indication on the system status:
  - NORMAL
  - CURRENT FAULT
  - VOLTAGE FAULT
  - UNBALANCE FAULT
  - POWER FAULT
  - POWER FACTOR FAULT
  - DEMAND FAULT
  - THD FAULT
  - FREQUENCY FAULT

SPECIFICATIONS

SUPPLY VOLTAGE
24÷310 Vdc, –15%, +10%
24÷240 Vac, -15%, +20% 50/60Hz

MAX. POWER CONSUPTION
12VA (7W)

TEMPERATURE RANGE
Operational: 0 °C a +50 °C
Storage: –20 °C a + 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: 8A
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

SWITCH INPUT
Type: Dry contacts only, 500 Ohm Max ON resistance
(12 Vdc @ 10 mA provided by relay)

LED INDICATORS
Relay status: Alarm
AUX.1
AUX.2

System status: Normal.
Fault: Current, Voltage, Unbalance, Frequency, Power, Power Factor Demand, THD.

Display (LCD): 16 x 2 digits

COMMUNICATIONS
Type: 1 RS232 port + 2 RS485 ports, Half duplex, 1200 → 57600 baud
Protocol: Modbus RTU
Functions: Reading/Writing setpoints
Reading actual values
Executing command

TERMINAL BLOCK
Fixed, back connection terminals with 4-mm^2-section cable (12 AWG).

FRAME
In ABS auto-extinguish with frontal in polycarbonate (IP54).

ASSEMBLY
The relay has to be fixed to the structure with the help of the stirrup with screws.

DIMENSION
144 x 144 x 141 mm

FRONT PANEL CUTOUT
137 x 137 mm

WEIGHT
1.5 Kg

APPLICABILITY
System: one and three and four-wire;
Frequency: 50 and 60 Hz;
Current: max. 5000 A;
Voltage: max. 69 KV

PHASE AND GROUND CT INPUTS
Source CT (In): CT (In) 5 A to 5000 A, Steps: 5 A.
CT secondary: CT 1 A or 5 A (specify with order).
Sampling: True RMS, 32 sample/s.
CT burden: 0.25 VA per phase at rated secondary current.
Continuous: 2xIn Amps.
Current withstand capac.: 20 times In curr. value per 1 sec.
Range: 1 to 600% of In.
Frequency: up to 13th harmonic.
Accuracy: ± 0.5% of full scale, true RMS.

VOLTAGE INPUT
Sampling: True RMS, 32 samples/cycle.
VT input: Secondary: 55 to 254 Vac, Steps: 1V;
Primary (Un): 0.10 to 69 kV, Steps 0.01kV.
Input range: 10 to 400 Vac (direct)
VT burden: 1 VA max.
Max. Continuous: 320 Vac phase-neutral.
Range: 20 to 125% of Un.
Frequency: up to 13th harmonic.
Accuracy: ± 0.5% of full scale, true RMS.

PHASE UNDERCURRENT MONITORING
Pickup level : 2% → 100% of In, Steps: 1%
Dropout level: 1% → 100% of In, Steps: 1%
Delay time: 0.5 s → 600.0 s, Steps: 0.5 s
Accuracy: see: current input
Timing accuracy: ± 0.5 s

PHASE & GROUND OVERCURRENT MONITORING
Pickup level: 2% → 500% di In, Steps: 1%
Dropout level: 1% → 100% di In, Steps: 1%
Delay time: 0.5 s → 600.0 s, Steps: 0.5 s
Accuracy: see: current input
Timing accuracy: ± 0.5 s

UNDERVOLTAGE MONITORING

Required voltage:	>20% Un, applied in all phases
Pickup level:	30% → 100% of Un, Steps: 1%
Dropout level:	1% → 100% of Un, Steps 1%
Delay time:	0.5 s → 600.0 s, Steps: 0.5 s
Phases:	Any one, any two, all three (programmable)
Accuracy:	see: voltage input
Timing accuracy:	± 0.5 s

OVERVOLTAGE MONITORING

Pickup level:	101% → 125% of Un, Steps: 1%
Dropout level:	1% → 25% of Un, Steps 1%
Delay time:	0.5 s → 600.0 s, Steps: 0.5 s
Phases:	Any one, any two, all three (programmable)
Accuracy:	see: voltage input
Timing accuracy:	± 0.5 s

CURRENT / VOLTAGE UNBALANCE MONITORING

Pickup level:	1% → 100% of In / Un, Steps: 1%
Dropout level:	1% → 100% of In / Un, Steps 1%
Delay time:	0.5 s → 600.0 s, Steps: 0.5 s
Accuracy:	±1% of full scale
Timing accuracy:	± 0.5 s

POWER MONITORING

Positive Pickup level:	10kW/kvar → 650000 kW/kvar, Steps: 10,100,1000 kW/kvar
Negative Pickup level:	-10kW/kvar → -650000 kW/kvar, Steps: 10,100,1000kW/kvar
Delay time:	0.5 s → 600.0 s, Steps: 0.5 s
Accuracy:	±1% of full scale
Timing accuracy:	± 0.5 s

CURRENT TOT. HARMONIC DISTORTION (THD) MONITORING

Pickup level:	0.5% → 100,0%, Steps: 0.5%
Delay time:	0.5 s → 600.0 s, Steps: 0.5 s
Accuracy:	±2% of full scale
Timing accuracy:	± 0.5 s

VOLTAGE TOT. HARMONIC DISTORTION (THD) MONITORING

Pickup level:	0.5% → 100.0%, Steps: 0.5%
Delay time:	0.5 s → 600.0 s, Steps: 0.5 s
Accuracy:	±2% of full scale
Timing accuracy:	± 0.5 s

OVER / UNDERFREQUENCY MONITORING

Required voltage:	>20% of Un, applied in phase A
Pickup level:	40.00Hz → 70.00 Hz, Steps:0.01Hz
Dropout level:	0.01 Hz → 5.00 Hz, Steps: 0.01 Hz
Delay time:	0.5 s → 600.0 s, Steps: 0.5 s
Accuracy:	±0.02 Hz

PULSE COUNTER PROTECTION

Pickup level:	1 → 65000 pulse, Step: 1 pulse
Delay time:	0.5 s → 600.0 s, Steps: 0.5 s
Timing accuracy:	± 0.5 s

PHASE REVERSAL MONITORING

Delay time:	0.5 s → 600.0 s, Steps: 0.5 s
Timing accuracy:	± 0.5 s

POWER FACTOR MONITORING

Required voltage:	>20% di Un, applied in phase A
Pickup level:	0.05 Lag → 0.05 Lead, Steps: 0.01
Dropout level:	0.01 → 1.00, Steps: 0.01

DEMAND MONITORING (Accuracies based on less than 6xIn and 125% Un inputs)

Measured values:	Phase A, B, C Current	[A]
	3ϕ Real power	[kW or MW]
	3ϕ Reactive power	[kvar or Mvar]
	3ϕ Apparent power	[kVA or MVA]
Measurement type:	Block interval	
	Time interval (programmable): 5 to 60 min.	
Pickup level:	*Phase A, B, C, Gnd Current demand*	
	2% → 500% of In, Steps: 1%	
	KW demand	
	10kW → 650MW, Steps: 10,100,1000kW	
	kvar demand	
	10kvar→650Mvar, Steps: 10,100,1000kvar	
	KVA demand	
	10kVA→650MVA, Steps: 10,100,1000kVA	

EMISSION TEST

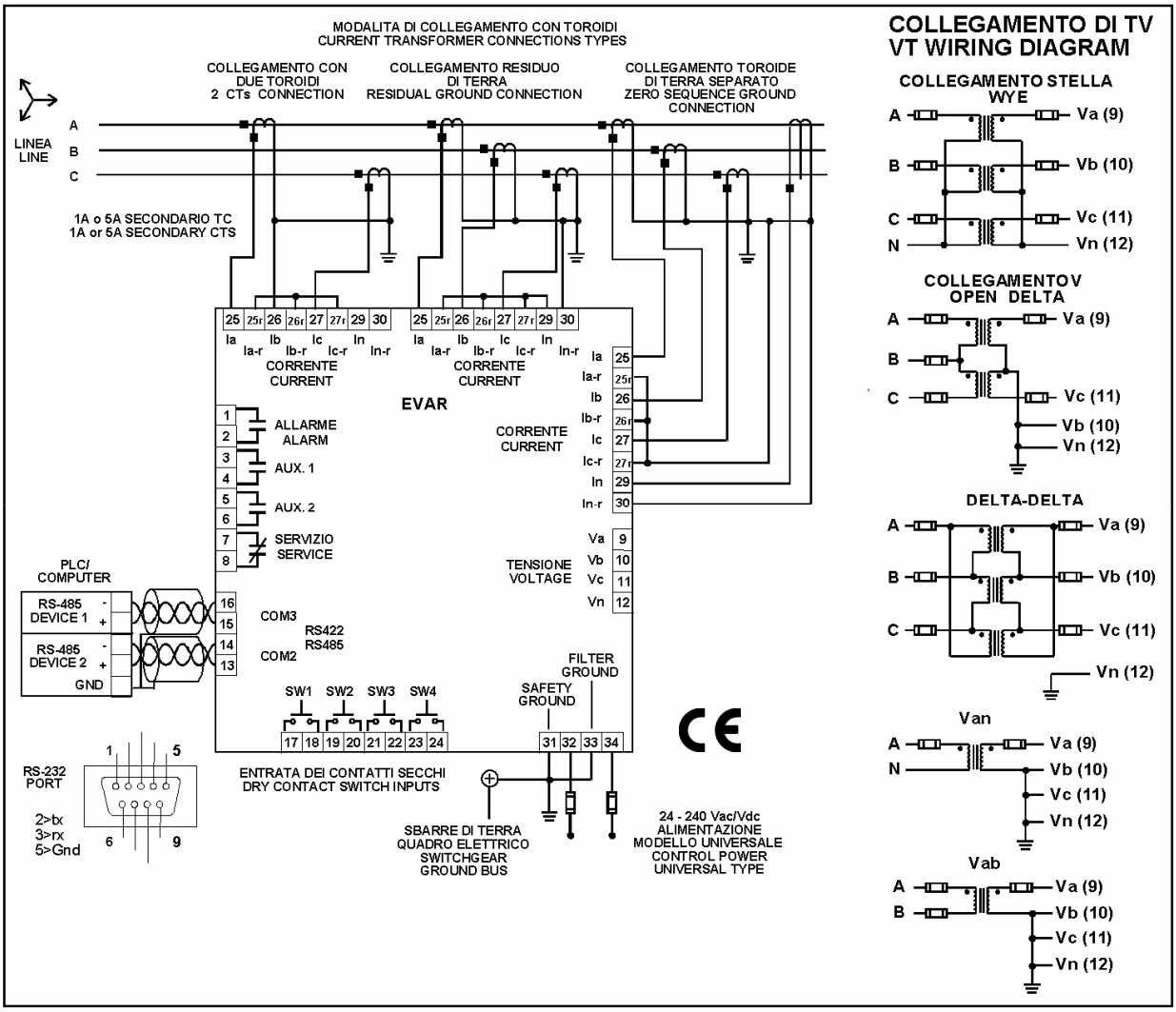
- Radiated emissions
  References: EN 55011; Port : enclosure; Class A, at 10m
- Conducted emissions
  References: EN 55011; Port: AC mains; Class A

MEASURED PARAMETERS (Accuracies based on 100% In and 100% Un inputs)

Current:	Phase A, B, C Currents Accuracy: ± 0.5%
Voltage:	A-N (A-B), B-N (B-C), C-N (C-A), Accuracy: ± 0.5%
Voltage unbalance:	Range: 0 → 100% Accuracy: ± 1%
Current unbalance:	Range: 0 → 100% Accuracy: ± 1%
Frequency:	Across phase A-N (A-B) voltage. Range: 40.00 Hz → 70.00 Hz Accuracy: ± 0.02 Hz
3ϕ Real power:	-1000 MW → +1000 MW Accuracy: ±1%
3ϕ Reactive power:	-1000 Mvar → +1000 Mvar Accuracy: ±1%
3ϕ Apparent power:	0 MVA → +1000 MVA Accuracy: ±1%
Power factor:	Lag: 0,00 → 1.00 Lead: 0,00 → 1.00 Accuracy: ± 0.01
Watthours:	Total, 1 hour 0 GWh → 4200 GWh Accuracy: ±2%
Varhours:	Total, 1 hour 0 Gvahr → 4200 Gvarh Accuracy: ±2%
Demand Range:	see: Demand Monitoring 0 MW → 1000 MW 0 MVA →1500 MVA

IMMUNITY TEST

- Conducted disturbances induced by RF field
  References: EN 61000-4-6; Port: AC mains and signal lines
- Radiated electromagnetic field
  References: EN 61000-4-3; Port: enclosure
- Electrostatic discharge
  References: EN 61000-4-2; Port: enclosure
- Fast transients (burst)
  References: EN 61000-4-4 ; Port: AC mains and signal lines
- Surge
  References: EN 61000-4-5 ; Port: AC mains
- Voltage dips and short interruptions
  References : EN 61000-4-11 ; Port: AC mains



ORDER CODE

EVAR – X → PHASE AND GROUND CT SECONDARY

1: 1 A CTs **5:** 5 A CTs

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