



PhaseLOG *plus*

VOLTAGE MONITOR WITH PROTECTION
FOR THREE-PHASE LOADS AND
INTERNAL DATALOGGER

Ver.03



PHASELOG03-01T-12435

1 - DESCRIPTION

The **PhaseLOG *plus*** is a device for monitoring and protecting electrical installations, designed for use in both residential and commercial applications. The **PhaseLOG *plus*** has an internal real time clock and non-volatile memory, which permits the device to store the voltage values of each phase of the electrical network periodically, with a time interval defined by the user. The **PhaseLOG *plus*** is able to monitor the energy quality by using the True RMS voltage measuring method, and it can protect mono and multiphase loads against: Under and over voltage, angular asymmetry, modular asymmetry, missing phase, and wrong phase sequence.

The **PhaseLOG *plus*** can be configured easily and quickly through the software SITRAD®, which is also used to access the information stored in the **PhaseLOG *plus*** internal memory.

*True RMS: Root Square Mean voltage is the true voltage applied on the load. This voltage measuring method also takes into consideration the high frequency noise present in the electrical network (harmonic distortion); in other words, this is the actual voltage applied on the load (e.g. electric motor, compressor), because it is able to measure correctly the voltage on the load, independently of its waveform. Other measurement methods give correct voltage values only if its waveform is a perfect sine wave.

2 - APPLICATION

- Monitoring quality of energy
- Protection of motors
- Electrical panels
- Other multiphase equipments

3 - TECHNICAL SPECIFICATIONS

- **Power Supply:** 90 ~ 264 Vac (50/60 Hz)
- **Control Voltage:** 90 to 600Vac
- **Resolution:** 1 Vac
- **Maximum Current:** 5(3)A / 250 Vac 1/8HP
- **Dimensions:** 71 x 28 x 71mm
- **Operational Temperature:** 0 to 50°C
- **Operational Humidity:** 10 to 90% RH (without condensation)

4 - CONFIGURATIONS

4.1 - To enter the function menu

Press **CODE** and **FUNC** at the same time for 2 seconds until **SETE** appears.

When **CODE** appears, press **SET** (short touch), then enter the code (123) through the keys **CODE** and **CODE**. To confirm press the key **SET**. Use the keys **CODE** and **CODE** to access the other functions to adjust them. To leave the menu and return to normal operation, press **SET** (Long touch) until **----** appears.

4.2 - Functions

- CODE** - Access code input
- FUNC** - Advanced configuration functions
- CODE** - Adjustment of time and date

4.3 - Chart of parameters

Configuration parameters protected by access code.

Fun	Description	Min	Max	Unit	Standard
F01	Number of phases in operation	1	3	-	3
F02	Activation of phase inversion detection	0-no	1-yes	-	1-yes
F03	Angular asymmetry sensibility	0	100	-	80.0
F04	Time to validate angular asymmetry	0	30	sec.	5
F05	Modular asymmetry sensibility	0	100	-	80.0
F06	Time to validate modular asymmetry	0	30	sec.	5
F07	Minimum operational voltage	90	600	Vac	90
F08	Maximum operational voltage	90	600	Vac	500
F09	Time to validate out of range voltage	0	30	sec.	5
F10	R voltage indication offset	-20	20	Vac	0
F11	S voltage indication offset	-20	20	Vac	0
F12	T voltage indication offset	-20	20	Vac	0
F13	Controller start delay	0	999	sec.	0
F14	Relay delay after turned off	0	999	sec.	5
F15	Instrument powered by an auxililar power supply	0-no	1-yes	-	1-yes
F16	Datalogger management	0	2	-	2
F17	Time between each sample in memory	5	999	sec.	5
F18	Variation of the voltage to force data recording	3	FFF	Volts	FFF
F19	Variation of the output to force data recording	0-off	1-on	-	0-off
F20	Overwrite the old data in the datalogger	0-no	1-yes	-	1-yes
F21	Preferential indication on display	P--	RL	-	RL
F22	RS-485 net address	1	247	-	1

5. PARAMETERS DESCRIPTION

F01 - Number of phases in operation:

In this parameter the user configures which phases are connected to the instrument and will be monitored:

- 1** - Only Phase R (used with single-phase connections)
- 2** - Phases R and S (used with two-phase connections)
- 3** - Phases R, S and T (used with three-phase connections)

F02 - Activation of phase inversion detection:

This parameter can adjust the multiphase monitor to supervise the sequence of phases, in this way protecting the load from a possible phase inversion. **Obs:** A protection against phase inversion is only available if F01 is configured with the value 3.

F03 - Angular asymmetry sensibility:

In this parameter the user can adjust the sensibility with which the **PhaseLOG *plus*** will detect the angle asymmetry of phases configured in F01. If the user increases this parameter, there will be a reduction in the tolerance to errors. In the case where the function needs to be deactivated, just configure the function with the value 00.0.

Example: Initial condition: tree-phase balanced system (the phase difference between phases is $\pm 120^\circ$). If this function is configured with a value of 80, the asymmetric angular phase alarm will be activated when the angular phase difference between any two phases becomes higher than 144° or lower than 96° .

F04 - Time to validate angular asymmetry:

Time in seconds that the three-phase monitor waits to validate the angular asymmetry error.

F05 - Modular asymmetry sensibility:

In this parameter the user can adjust the sensibility with which the **PhaseLOG *plus*** will detect the modular asymmetry of phases configured in F01. The higher the value of this parameter, there will be a reduction in the tolerance to errors. In case this monitoring needs to be deactivated just configure the function with the value 00.0.

Example: Initial condition: tree-phase balanced system (initial phase voltages: 220 VRMS). If this function is configured with a value of 80, VR=220 VRMS and VS = 220 VRMS, the asymmetric modular voltage alarm will be activated when the voltage VT becomes higher than 293 VRMS or lower than 159 VRMS.

F06 - Time to validate modular asymmetry:

Time in seconds that the three-phase monitor waits to validate the modular asymmetry error.

F07 - Minimum operational voltage:

Minimum voltage threshold to drive load protection

F08 - Maximum operational voltage:

Maximum voltage threshold to drive load protection.

F09 - Time to validate out of range voltage:

Time in seconds that the three-phase monitor waits to validate the out of range voltage error.

Note: If any error is detected while reading the voltages (i.e. **E--**, **E--r** ou **E--S**) is active), this function is ignored; in other words, the load is turned off immediately.

F10 - R voltage indication offset:

This parameter lets the user adjust the R phase voltage indication offset.

F11 - S voltage indication offset:

This parameter lets the user adjust the S phase voltage indication offset.

F12 - T voltage indication offset:

This parameter lets the user adjust the T phase voltage indication offset.

F13 - Controller start delay:

Time in seconds that the **PhaseLOG *plus*** waits before the protection control start (during controller initialization).

F14 - Relay delay after turned off:

Minimum time that the output will remain turned off, this means, the amount of time between the last turn off and the next activation.

F15 - Instrument powered by an auxililar power supply

Manages if the instrument is powered by an auxililar energy power supply. (e.g.: no-break)

- ☐ - No - Powered directly from mains power line
- ☐ - Yes - Powered by an auxililar power supply

F16 - Datalogger management:

Manages how the voltage register device will be used:

- ☐ - Always OFF
- ☐ - Always ON
- ☐ - Manual Operation

F17 - Time between each sample in memory:

Time period in which the controller will store a voltage sample.

F18 - Variation of voltage to force data recording:

Voltage difference in any of the phases monitored so that the **PhaseLOG *plus*** forces the recording of data in the memory, independently of the sampling period configured at F17.

This function can be configured from 3 to 50 volts. To deactivate it just adjust the the function value until the message **FFF** appears in the display.

F19 - Variation of the output to force data recording

Indicates if a change in the output state (turned on/turned off) will force the recording of data in memory regardless of the sampling period set in F17.

F20 - Overwrite the old data in the datalogger

This allows you to start overwriting data from datalogger memory beginning when the memory is full. This prevents the latest data recorded from equipment being erased first.

F21 - Preferential indication on the display:

In this parameter the user configures the phase voltage which should be shown on the display:

- P - r - Phase R
- P - S - Phase S
- P - T - Phase T
- ALL - Alternate indication of all phases

F22 - RS-485 network address:

Address of the instrument on the network to communicate with the SITRAD® software. Obs: Care must be taken with this function if there are several instruments connected in a RS485 network, because each instrument must have a unique network address in order to communicate with the SITRAD® software.

6 - FUNCTIONS WITH FACILITATED ACCESS

6.1 - Visualization of current time

Press rapidly the **SET** key the date and adjusted time on the controller can be visualized. It will show sequentially: current day, month, year, hour and minutes on the display .

E.g.: 17/03/2006 12h43min

- 11d - Day
- 03m - Month
- 06y - Year
- 12h - Hour
- 43 - Minutes

6.2 - Visualizing maximum and minimum voltages

Press the **▲** key quickly to visualize the minimum and maximum voltages sampled by the device. When the **▲** key is pressed (short touch), the message **P - r** will be displayed, (followed by the minimum and maximum voltages of phase R). After these messages, the device will display **P - S** (followed by the minimum and maximum voltages of phase S) and then finally it will show **P - T** (followed by the minimum and maximum voltages of phase T). To clean the registers of minimum and maximum voltages sampled, release and press the **▲** key until the message **r S E** is showed on the display.

6.3 - Visualization of other voltages

To alternate the visualization of the voltages on phases R, S, and T, Press the **▼** key until the desired voltage is shown on the display:

- P - r - Voltage on phase R
- P - S - Voltage on phase S
- P - T - Voltage on phase T

The selected voltage will be shown on the display for 15 seconds. After this time the preferential indication returns to the display (in accordance with the value stored on function F21 adjustments on parameter F21).

6.4 - Cleaning datalogger memory

Press the **▲** and **SET** for 4 seconds keys and wait for the message **FE n CLR** be showed on the display. After this message the display will show **no**, and if the memory should not be cleared press the **SET** Key. To clear the memory, then press the **▲** key until the message **UE S** shows on the display, press **SET** to clear the memory and leave the function.

6.5 - Manual Operation of the datalogger

To active or deactivate the internal data-logger (storage of the measured voltages on non-volatile memory), the user must press the **SET** key for 2 seconds. The message **Lo g** will be displayed followed by the message **on** if the data-logger has been activated, or **off** if the data-logger has been deactivated. If the values **on** or **off** the messages **on** and **off** will be respectively displayed.

7 - SIGNALLING

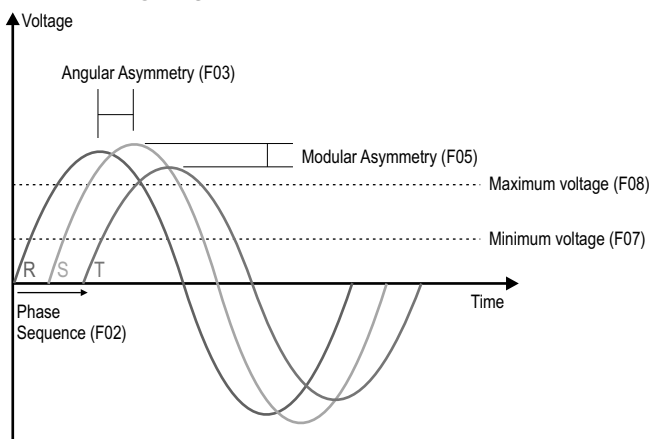
- E - r - Phase T voltage reading error
- E - r - Phase R voltage reading error
- E - S - Phase S voltage reading error
- R - 1 - Voltage out of range alarm (Note 2).
- R - 2 - Phase sequence inversion alarm
- R - 3 - Angular asymmetry alarm
- R - 4 - Modular asymmetry alarm
- d F L - Datalogger memory full alarm
- d E r - Memory of the datalogger corrupted
- CL o - Invalid date or time / Date and time adjust
- PPP - Configuration parameters deprogrammed or out of range
- FE n - Reading the datalogger memory (showed when the controller start) (Note 3).

Note 1: These errors are detected if the respective measured voltage is out of the equipment's voltage control range.

Note 2: This alarm is activated when at least one measured voltage is higher than the voltage specified in F08 or lower than the voltage specified in F07.

Note 3: This feature can take some time if there is too much data stored in the datalogger memory

8 - EXPLANATORY CHART



9 - ASYMMETRIC ALARM ACTIVATION CONDITION (ANGULAR OR MODULAR ASYMMETRIES)

S = Sensibility (0 to 100%)

Modular asymmetry:

$$\text{Tolerance} = \frac{(100 - S) \times (\text{Average Measured voltages})}{100}$$

Angular asymmetry:

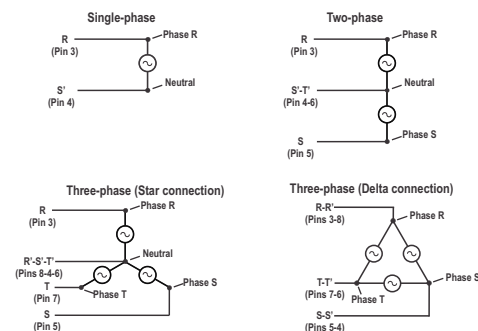
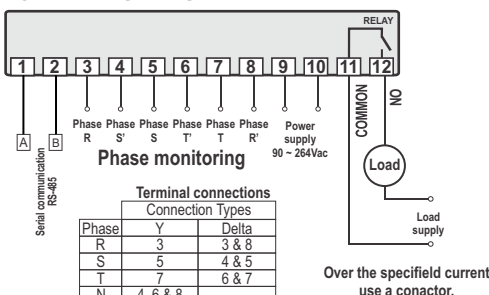
$$\text{Tolerance} = \frac{(100 - S) \times (\text{Average Measured phase difference})}{100}$$

Alarm activation condition: (both cases)

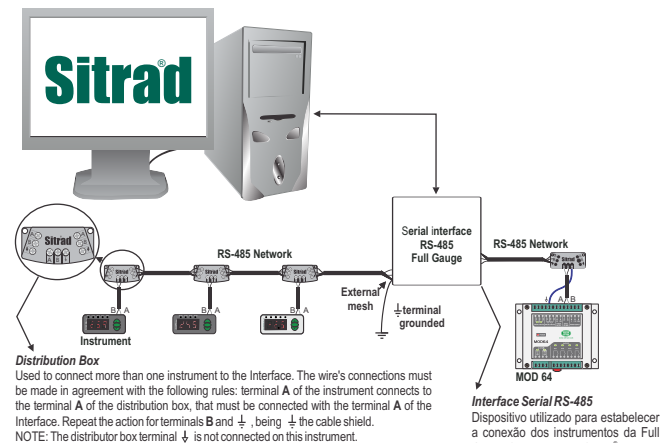
Measured value higher than average value + tolerance
or

Measured value lower than average value - tolerance

10 - WIRING DIAGRAM



11 - INTEGRATING CONTROLLERS, RS-485 SERIAL INTERFACE AND COMPUTER

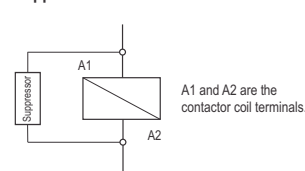


IMPORTANT

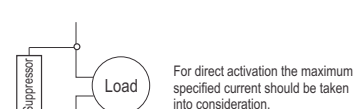
According to the chapters of norm IEC 60364:

- 1: Install protector against overvoltage on the power supply
- 2: Sensor cables and signal cables of the computer may be joined, but not in the same electric conduit through which the electric input and the activation of the loads run
- 3: Install transient suppressors (RC filters) parallel to the loads as to increase the product life of the relays.

Schematic for the connection of suppressors to contactors



Schematic for the connection of suppressors to direct activation loads



For direct activation the maximum specified current should be taken into consideration.



ENVIRONMENTAL INFORMATION

Package:

The packages material are 100% recyclable. Just dispose it through specialized recyclers.

Products:

The electro components of Full Gauge controllers can be recycled or reused if it is disassembled for specialized companies.

Disposal:

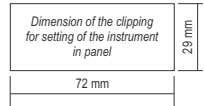
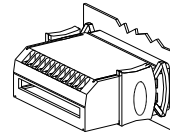
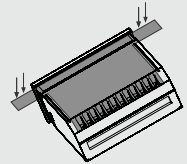
Do not burn or throw in domestic garbage the controllers which have reached the end-of-life. Observe the respectively law in your region concerning the environmental responsible manner of dispose its devices. In case of any doubts, contact Full Gauge controls for assistance.



PROTECTIVE VINYL:

This adhesive vinyl (included inside the packing) protects the instruments against water drippings, as in commercial refrigerators, for example. Do the application after finishing the electrical connections.

Remove the protective paper and apply the vinyl on the entire superior part of the device, folding the flaps as indicated by the arrows.



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