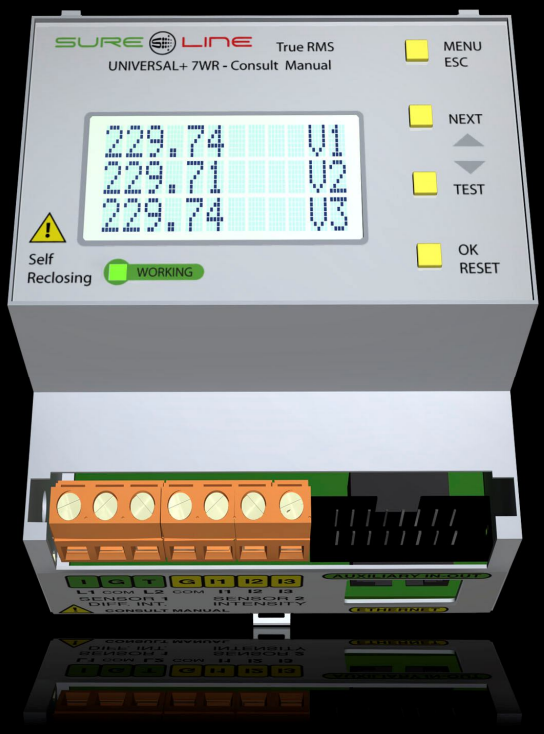
Universal tele-programmable, tele-controllable mains analysis unit with WebServer and Modbus TCP/IP
Graphic and numerical display in real time. RMS, Peak, AC and DC measurements
Oscilloscope event-logger in waveform with pre-trigger (built-in 600-event memory)
Graphic log of meanTHD–HD–VAr at 5-minute intervals for analysis for
harmonics compensation and reactive power with built-in 14-month memory
64-harmonic spectrum with distortion range in % and V-A value, plus THD
THD measurement and alarm as from 2-63, programmable by harmonic and harmonics bracket
Proactive measurements of 1600 electrical parameters + temperature and humidity
Relays with alarms, timers, time programmer, input control and manual control
Graphical history (months, days, hours and minutes) of energy, costs and emissions with built-in 1.5-year memory
Tele-management, sizing, surveillance, energy maintenance and I/O control. Precisions: (V, I): ± 0.5% and ±1%



UNIVERSA+ 7WR Rogowski M4, 3 and 4-pole
Configurable measurement scales to the unit
Scales: 250A, 500A, 1000A and 2000A
With one single model of flexible Current Transformers
multi-range Rogowski coil calibrated for its unit

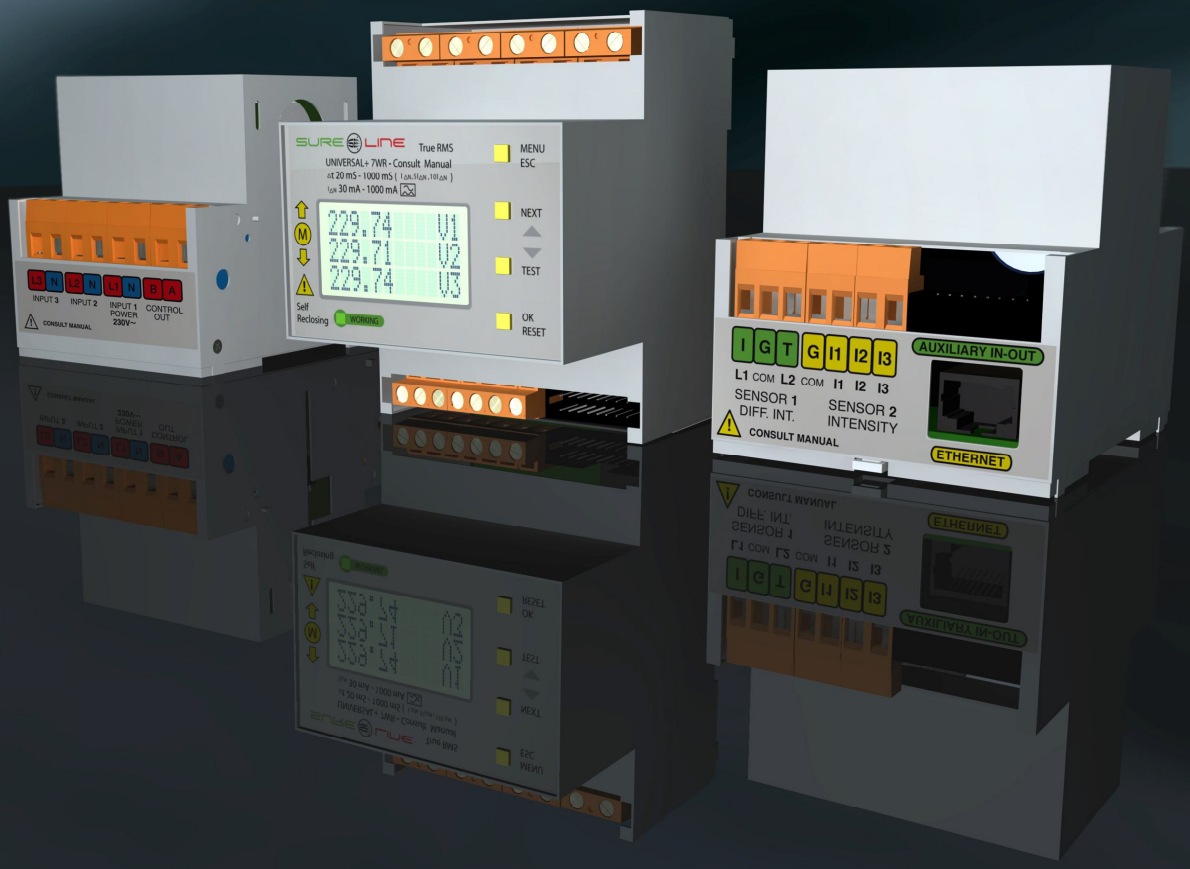
Annexe to UNIVERSAL+ 7WR Rogowski M4 manual

Software: version V3.12

Annexe to UNIVERSAL+ 7WR Rogowski M4 user/installer manual

It is essential that the user/installer fully understand the present manual prior to using the unit. Should any doubt arise, please refer to the Authorised Distributor or the Manufacturer (Please, refer to UNIVERSAL+ 7WR M4, Rogowski M4 and MINI M4 Generic manual)

Published in Spain by Safeline, S.L. 6th Edition (June 2020)



Consult appended manuals for specific models:

Generic UNIVERSAL+ 7WR M4, Rogowski M4 and MINI M4manual

Manual Safeline Web Service

Instruction manual - DatawatchPro software

Instruction manual - UNIVERSAL+ 7WR IN OUT

Instruction manual - UNIVERSAL+ 7WR accessories

INDEX

Important: Depending on the versions of the software and of the UNIVERSAL+ 7WR rogowski M4 model and (consult these on the identifying label on the side of the unit and on its display and/or WebServer), different protections/alarms, measurements, connections and characteristics are included. These are to be found in the corresponding manuals and synoptic tables.

Chapter 1 – Introduction

1.1 Nomenclature

Model: UNIVERSAL+ 7WR Rogowski M4 (three-phase, 3 and 4-pole)
Version:line intensity transformer. Rogowski coil (flexible current transformer), multi-range
Consolidates measurements up to 250A, 500A, 1000A and 2000A
Configurable measurement scales: 250A, 500A, 1000A and 2000A
In one single multi-range Rogowski coil (flexible current transformer) calibrated for its own corresponding unit
Version: auxiliary power supply

7WR Rogowski [M4] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

1 2 3 4 5 6 7 8 9 10 11 12

1- Command configuration

[**M4**] = Command 4
[**M4 SR**] = M4 + Automatic data dispatch to a remote server via Internet: Specially designed to work with "Safeline Web Service" administration software.

1 – Version: Voltage measuring scale (Line Neutral / Power + -) AC and DC

[**250E**] = full measuring scale line neutral 250V Pk
[**500E**] = full measuring scale line neutral 500V Pk
[**1000E**] = full measuring scale line neutral 1000V Pk

2 – Version: Line intensity measurement transformer AC

[**LEM**] = Rogowski multi-range coil (flexible current transformer)),LEM model (high-precision), measurements up to 250A, 500A, 1000A and 2000A
[**KIR**] = Rogowski multi-range coil (flexible current transformer), KIR model (standard-precision), measurements up to 250A, 500A, 1000A and 2000A

3 – Version: output cable terminal of the Rogowski coil (flexible current transformer)

[ ] = No suffix = Rogowski flexible coil with terminal cable output direct to core end sleeve (mass and signal)
[**BNC**] = Rogowski flexible coil with cable output: BNC connector direct to BNC-TERMINALS accessory (incluyded)

4 – Version: power supply (terminals)

[**A**] = Auxiliary power

5 – Power-measurement frequency

[**50Hz**] = 50Hz (standard)
[**60Hz**] = 60Hz

6 – Auxiliary power voltage (Line Neutral / Power + -)

[**12V**] = 12V DC (9V – 18V DC)
[**24V**] = 24V DC (18V – 36V DC)
[**48V**] = 48V DC (36V – 72V DC)
[**230VU**] = Universal AC and DC supply: (85V – 265V AC 47-440HZ) and (130V – 370V DC)

7 – Version: Energy log with memory

[ ] No suffix = no energy log and no built-in memory
[**G3**] = with energy log (L1, L2, L3 and ∑L1, 2 and 3) and and built-in 1.5-year memory

8 – Version: oscilloscope event-logger in waveform with pre-trigger (built-in 600-event memory)

[ ] No suffix = without oscilloscope event-logger in waveform with pre-trigger (built-in 600-event memory)
[**W**] = with oscilloscope event-logger in waveform with pre-trigger (built-in 600-event memory)

9 – Version: Graphic history of mean THD–HD–VAr at 5-minute intervals and with built-in 14-month memory
(Analysis for compensation of harmonics and reactive power)

[ ] No suffix = without graphic history of mean THD–HD–VAr at 5-minute intervals and with built-in 14-month memory
[**H**] = with graphic history of mean THD–HD–VAr at 5-minute intervals and with built-in 14-month memory (only three-phase models)

10 – Version: basic precision - voltage and intensity

[**HP0.5**] = 0,5% precision in voltage and intensity
[**HP1**] = 1% precision in voltage and intensity

11 – Display and front panel

[ ] No suffix = Display with backlighting, full front panel and Working LED and beep
[**NZ**] = Display without backlighting, full front panel and Working LED and beep
[**ND**] = No display and no beep, only RESET and Working LED buttons

Example: UNIVERSAL+ 7WR Rogowski M4 500E KIR BNC A 50Hz 230VU G3 W H HP1

Attention: Please, refer to the identifying label on the side of the unit.

Chapter 2 – User's guide (front panel and display)

2.1 Functions of the keys

The contextual keys permit the user to surf the menu and follow on-screen, cursor and flashing figure indications. These intuitive, user-friendly keys have different logical value depending on the context.

MENU / ESC:
- Outside the menu:
  - enters menu mode
- Within the menu:
  - returns to previous level or quits menu mode
  - in process of modification of values (flashing), quits without modifying data

NEXT / (up):
- Outside the menu:
  - following measurement screen
- Within the menu:
  - goes to next level
  - increases a flashing value
  - goes to next screen

TEST / (down):
- Outside the menu:
  - returns to previous measurement screen
  - held down for more than one second, runs differential intensity test
- Within the menu:
  - Goes down one level
  - decreases a flashing value
  - goes to previous screen

RESET / OK:
- Outside the menu:
  - unit is reinitiated in the event of locking or during a counting process
  - general reset (see section below)
- Within the menu:
  - enters submenus and confirms changes
  -

GENERAL RESET

Outside the menu and held down for more than 10 seconds, the unit undergoes a GENERAL RESET.

Very important:

The general reset restores the TCP/IP parameters to factory values and enables TCP/IP programming via Internet/Intranet.

It deletes recorded data, alarms detected and recorded and status of the unit, with the exception of:

- Total accrued cut-off counter
- Alarm configurations
- User PIN

2.2 User PIN

The user PIN represents a high degree of security for the owner since this is the sole means whereby the programmed parameters can be validated. Any changes in programmed values only come into effect once said PIN has been entered.

Made up of 4 digits, each one from 0 to 9

- Default PIN enabled at factory: **1,2,3,4**
- The user PIN can be changed if one is in possession of the current one
- The PIN is one and the same for surfing Internet

WARNING: For security reasons, no master code exists. In case of loss, the user must contact the manufacturer to have the unit re-programmed and thoroughly verified. It is recommended that this PIN be noted down and kept in a safe place.

2.3 Start-up sequence

1. Upon energy being supplied to the unit, the manufacturer's name is displayed on-screen.

2.4 Main display screens (please, refer to synoptical tables of characteristics)

There are **45** main screens. To change screen, press "NEXT" to scroll up or "TEST" to scroll down.

The order of the screens is as follows:	**Nomenclature**
1. RMS voltage measurements	V1, V2 and V3
2. Pk voltage measurements	VPk1, VPk2 and VPk3
3. V crest factor measurements	CFV1, CFV2 and CFV3
4. Composite voltage measurements	V12, V23, V31
5. Voltage unbalance measurements	%DesV1, %DesV2 and %DesV3
6. RMS intensity measurements	A1, A2 and A3
7. Pk intensity measurements	APk1, APk2 and APk3
8. I crest factor measurements	CFI1, CFI2 and CFI3
9. Line impedance measurements	Z1, Z2 and Z3
10. Differential intensity and neutral intensity measurements	RMS, Pk mA, mAPk An
11. I unbalance measurements	%DesI1, %DesI2 and %DesI3
12. RMS line 1 measurements	V1, A1, and ID
13. RMS line 2 measurements	V2, A2, and ID
14. RMS line 3 measurements	V3, A3, and ID
15. Voltage frequency measurements	Hz1, Hz2 and Hz3
16. Voltage THD measurements	%ThdV1, %ThdV2 and %ThdV3
17. Intensity THD measurements	%ThdI1, %ThdI2 and %ThdI3
18. Active power measurements	W1, W2 and W3
19. Requested power measurements	W1+, W2+ and W3+
20. Returned power measurements	W1-, W2- and W3-
21. Power factor measurements	PF1, PF2 and PF3
22. Volt-Amper measurements	VA1, VA2 and VA3
23. Reactive inductive power measurements	rL1, rL2 and rL3
24. Reactive capacitive power measurements	rC1, rC2 and rC3
25. Summation of active powers	∑W
summations of requested powers	∑W+
summations of returned powers	∑W-
26. Summations of Volt-Amper,	∑VA
summations of reactive inductive powers	∑rL
summations of reactive capacitive powers	∑rC
27. Active energy counter line 1	KWh L1
28. Active energy counter line 2	KWh L2
29. Active energy counter line 3	KWh L3
30. Reactive energy counter line 1	KQh L1
31. Reactive energy counter line 2	KQh L2
32. Reactive energy counter line 3	KQh L3
33. Summations of active energy counters	KWh L123 Active
34. Summations of reactive energy counters	KQh L123 Reactive
35. Status of relays A and B	
36. Status of relays 1, 2, 3 and 4 of module 1	
37. Status of relays 1, 2, 3 and 4 of module 2	
38. Status of inputs 1, 2, 3 and 4 of module 1	
39. Status of inputs 1, 2, 3 and 4 of module 2	
40. Status of timers 1 and 2 of module 1	
41. Status of timers 3 and 4 of module 1	
42. Status of timers 1 and 2 of module 2	
43. Status of timers 3 and 4 of module 2	
44. Temperature and relative humidity measurements	ºC and %RH
45. Day of the week, date and time	Day, dd/mm/yy, HH:MM:SS
46.	

NOTE: The parameters displayed in inverted commas "-.-", indicate that the parameter and, therefore, its corresponding alarm are not implemented in this specific and, consequently, no operation is contemplated
NOTE: The temperature and humidity in inverted commas "-.-" indicate that the temperature/humidity probe is either not enabled in the menu or that it has not been installed.
NOTE: The logical status of the input/output modules displayed in inverted commas "-", indicates that the I/O modules are either not enabled in the menu or that they have not been installed.

2.5 Display menu

To enter the menu, click “menu” in any main screen. Once inside the menu, the user can select a submenu by moving the main cursor up or down. To enter this menu, press "OK". The "ESC" (escape) key permits the user to quit the submenu or menu. In order to confirm the modification of a flashing value, press "OK".

NOTE: To save all changes in memory, press "ESC" until all submenus and the menu have been quitted. When "ESC" is pressed this last time, the unit asks whether one wishes to save the changes and requests the PIN. If the current PIN is not entered, the changes will not be saved. By defect, certain menus, such as deletion of registers or ex-factory configurations, request the PIN immediately.

NOTE: If more than 3 minutes elapse without any key having been pressed, the auto-quit from menu is activated. This means that the unit automatically quits the menu mode and returns to the last screen displayed.

NOTE: Should an alarm occur whilst surfing the menu, the auto-quit from menu is activated and the alarm is displayed.

All the unit’s option configurations are to be found in the menu’s submenus

The order of the submenus is as follows:

→ Tests
Alarms. Configuration
Most recent alarm
RMS visualisation mean
Alarm counters
Maximum measurements
Minimum measurements
Delete counters/measurements
I measurement transformer ratio
I/O external module 1
I/O external module 2
Manual control relays
Remote input 1
Remote input 2
Temperature and humidity probe
TCP/IP configuration
Language
Change user PIN
Clock
Time programmer
Default ex-factory configuration
Screen light
Beep (acoustic warning)
Version
Invert intensity channels
Calibration

2.5.1 Tests **(please, refer to synoptical tables of characteristics)**

Real incremental alarm test. This test verifies the programmed alarms and provides the real alarm value,

The following test can be run:

Differential intensity ID measurement test (Not active. Only active in M1, M2 and M3)

The real incremental test injects a voltage or a r*eal, incremental value* sinusoidal intensity which is added onto the existent line measurement. This produces an alarm/cut-off due to the alarm threshold having been exceeded.

2.5.2 Alarm configuration (please, refer to synoptical tables of characteristics)

When "OK" is pressed in "Alarms", a submenu group is displayed from which the alarm to be programmed can be selected.
The configurable parameters for each alarm, both RMS and Pk, are the alarm value and the time delay. An alarm occurs when the measurement value is equal or superior to the programmed value and remaining so during a time delay equal or superior to that programmed.

Submenus indicating the name of the alarm. Permit the user to configure the alarm value and delay

RMS overvoltage
Pk overvoltage
RMS low voltage
RMS differential intensity
Pk differential intensity (See NOTE 1 below)
RMS intensity
Pk intensity
Voltage unbalance
Intensity unbalance
Neutral intensity
Over-temperature (OFF value must be > ON value)

Low temperature (OFF value must be < ON value)
Over-humidity
Low humidity
Voltage THD
Intensity THD
Over-frequency
Low frequency
Phase sequence
Power factor

Value: The value can be V, A, mA, %, ºC, RH, Hz, etc.
Delay: The delay can be RMS delay, Pk delay or delay in seconds.

The delays for the RMS alarms are **RMS delays** and, for the Pk alarms, **Pk delays.**

RMS delay = the frequency period. 1 cycle = 20mS (50Hz)

Pk delay = wave sampling speed. 1 sample = 156.25us (50Hz)

NOTE 1: The Pk differential intensity alarm value is calculated automatically (sole case for safety reasons) as:

Pk alarm value = $\sqrt{2} \times$ RMS alarm value

Common to the following submenus is that their time delay is programmed in RMS or Pk delays:

→ RMS overvoltage
Pk overvoltage
RMS low voltage
RMS differential intensity
Pk differential intensity
RMS intensity
Pk intensity

Common to the following submenus is that their time delay is programmed in seconds:

→ Voltage unbalance
Intensity unbalance
Neutral intensity
Over-temperature
Low temperature
Over-humidity
Low humidity
Voltage THD
Intensity THD
Over-frequency
Low frequency
Phase sequence
Power factor

2.5.3 Most recent alarm

Displays the most recent known alarm. When "OK" is pressed, a second screen comes up indicating the date and time of said alarm.

2.5.4 RMS measurement and display mean

Number of measurement means for on-screen display

When "OK" is pressed in this submenu, the following configurable option is displayed:

→	☐	100ms	(Mean RMS - 5 cycles)	
	☐	200ms	(Mean RMS - 10 cycles)	
	☐	300ms	(Mean RMS - 15 cycles)	
	☐	400ms	(Mean RMS - 20 cycles)	
	☒	500ms	(Mean RMS - 25 cycles)	default, ex-factory

NOTE: The mean measurements are: RMS voltage, RMS intensity, composite voltages V12, V23 and V31, neutral intensity, W, W+, W-, VA, VARC, VARL powers and power factor.

2.5.5 Alarm counters (please, refer to synoptical tables of characteristics)

This submenu permits the user to consult which and how many alarms have occurred.

When "OK" is pressed in this submenu, all the alarm counters are displayed in diverse screens.
When “NEXT” or “TEST” (up or down) is pressed, either the following screen or the previous one is displayed. To quit the menu, press "ESC". Should one wish to delete the counters, press "OK" in any of the screens. They can also be deleted from the menu "delete counters and events".

These counters are:	**Nomenclature**
overvoltage counters.	ST L1 =, ST L2 = y ST L3 = 65535
low voltage counters	IT L1 =, IT L2 = and IT L3 = 65535
intensity counters	I L1 =, I L2 = and I L3 = 65535
differential intensity counter	ID = 65535
neutral intensity counter	In = 65535
voltage unbalance counters	DesV1 =, DesV2 = and DesV3 = 65535
intensity unbalance counters	DesI1 =, DesI2 = and DesI3 = 65535
voltage THD counters	THDV1 =, THDV2 = and THDV3 = 65535
intensity THD counters	THDI1 =, THDI2 = and THDI3 = 65535
over-temperature counter	STemp. = 65535
low temperature counter	ITemp. = 65535
over-humidity counter	SRH. = 65535
low humidity counter	IRH. = 65535
over-frequency counters	SHzV1 =, SHzV2 = and SHzV3 = 65535
low frequency counters	IHzV1 =, IHzV2 = and IHzV3 = 65535
power factor counters	PF L1 =, PF L2 = and PF L3 = 65535
phase sequence counter	SPhase = 65535
MCB counter	MCB = 65535
time programmer counter	PROG.H. = 65535
remote input 1 counter	ReIn1 = 65535
remote input 2 counter	ReIn2 = 65535
lock counter	Lock = 65535
power OFF counter	Power = 65535
total counter	Total = 65535
accrued total counter (undeletable)	T.acum = 65535

2.5.6 Maximum measurements (please, refer to synoptical tables of characteristics)

This submenu permits the user to consult the maximum measurements. Only the measurement of highest value is memorised.
When "OK" is pressed in this submenu, all the registers of maximum measurements are displayed in diverse screens
When “NEXT” or “TEST” (up or down) is pressed, either the following screen or the previous one is displayed. To quit the menu, press "ESC". Should one wish to initialise the registers, press "OK" in any of the screens. They can also be initialised from the menu "delete counters and events".

Maximum measurement: voltage L1, L2 and L3
- Maximum measurement: voltage unbalance L1, L2 and L3
- Maximum measurement: intensity L1, L2 and L3
- Maximum measurement: differential intensity
- Maximum measurement: neutral intensity
- Maximum measurement: intensity unbalance L1, L2 and L3
- Maximum measurement: frequency V1, V2 and V3
- Maximum measurement: voltage THD L1, L2 and L3
- Maximum measurement: intensity THD L1, L2 and L3
- Maximum measurement: active power L1, L2 and L3 (Maximeter programmable from 10 secs. to 15 mins.)
- Maximum measurement: apparent power L1, L2 and L3
- Maximum measurement: reactive inductive power L1, L2 and L3
- Maximum measurement: reactive capacitive power L1, L2 and L3
- Maximum measurement: temperature
- Maximum measurement: humidity

2.5.7 Minimum measurements (please, refer to synoptical tables of characteristics)

This submenu permits the user to consult the minimum measurements. Only the measurement of lowest value is memorised.
When "OK" is pressed in this submenu, all the registers of minimum measurements are displayed in diverse screens.
When “NEXT” or “TEST” (up or down) is pressed, either the following screen or the previous one is displayed. To quit the menu, press "ESC". Should one wish to initialise the registers, press "OK" in any of the screens. They can also be initialised from the menu "delete counters and events".

- Minimum measurement: voltage L1, L2 and L3
- Minimum measurement: frequency V1, V2 and V3
- Minimum measurement: temperature
- Minimum measurement: humidity

2.5.8 Deletion of counters and registers

This submenu permits the user to reset all the counters to zero and to initialise all the unit’s registers of maximum and minimum measurements.

When “OK” is pressed in this submenu, four further submenus are displayed:

Energy:	Resets the energy counters of all the main screens to zero.
Alarms :	Resets the cut-alarm counters to zero
Maximum measurements:	Initialises the maximum measurement registers
Minimum measurements:	Initialises the minimum measurement registers

Using “NEXT” or “TEST” (up or down), situate the cursor on the submenu which one wishes to reset to zero or initialise. Then, press "OK"..

2.5.9 I measurement transformer ratio

This submenu permits the user to program the desired intensity measurement scales for lines L1, L2 and L3.
The scale is programmable in four ranges:

250A scale
500A scale
1000A scale
2000A scale

The intensity measurements are carried out by the Rogowski multi-range coil (flexible current transformer), compatible with the UNIVERSAL+ 7WR Rogowski M4

- IMPORTANT: For the intensity measurement, install only those models of Rogowski flexible coils/probes which are compatible with the UNIVERSAL+ 7WR Rogowski M4.

2.5.10 and 2.5.11 I/O external module 1 and I/O external module 2

These two submenus permit the I/O modules to be enabled
Example of module 1 (module 2 is the same)

When "OK" is pressed in Yes/No, the following configurable option is displayed:

→ ☐ Yes
☒ No default, ex-factory

2.5.12 Relay manual control

This submenu permits relays A and B and relays R1,R2, R3 and R4 of the external modules 1 and 2 to be enabled manually. When “OK” is pressed, display indicates:

→ ☐ Relay A
☐ Relay B
☐ Relay 1 M1
☐ Relay 2 M1
☐ Relay 3 M1
☐ Relay 4 M1
☐ Relay 1 M2
☐ Relay 2 M2
☐ Relay 3 M2
☐ Relay 4 M2

2.5.13 and 2.5.14 Remote input 1 and Remote input 2 (I/O external modules)

This submenu indicates to the unit the type of input signal which is to be connected to the remote control inputs. The unit is able to detect both normal and rocking input signals.

NORMAL:

A normal signal is one which has only two states. OFF(0) and ON(1). It is similar to a switch.

When OFF(0), remote control is disabled
When ON(1), remote control is enabled (Alarm)

ROCKING:

A rocking signal is one which goes from OFF(0) to ON(1) and then back to OFF(0). It is similar to a pushbutton.

At each to-and-fro signal, the unit goes from one state to the other. This means that if the remote control is disabled, on detecting a to-and-fro change in the signal, it becomes enabled. It remains in this state (alarm) until it detects another to-and-fro change in the input signal.

2.5.15 Temperature and humidity probe

This submenu indicates to the unit that a temperature and relative humidity measuring probe is connected.

When "OK" is pressed, the following configurable option is displayed:

→ ☐ Yes
☒ No default, ex-factory

NOTE The temperature and humidity measurements in inverted commas “-.-“ indicate that the temperature/humidity probe is either not enabled in the menu or that it has not been installed. Consult the accessories, I/O relay modules, temperature and humidity probe manual

2.5.16 TCP/IP configuration

This submenu permits the user to see the unit's TCP/IP configuration, see the Lan LED, configure the default ex-factory parameters and **enable/disable the security protection which prevents the possibility of the unit's parameters being modified via Internet (WebServer in display and read-only mode).**

When "OK" is pressed, the following submenus are displayed:

→ Information TCP/IP
LED Lan
Default configuration ex-factory
Disable Tcp/Ip programming?

When "OK" is pressed in "TCP/IP information ", the following information is displayed (the parameters indicate are those ex-factory by default):

→	Port = 80	(clicking OK in this parameter, its value can be changed)
	IP = 192.168.2.10	(clicking OK in this parameter, its value can be changed)
	Gateway = 192.168.2.1	(clicking OK in this parameter, its value can be changed)
	Mask = 255.255.255.000	
	MAC = xx.xx.xx.xx.xx.xx	

When "OK" is pressed in "LED Lan", "LED = Lan" is displayed on-screen. The green LED on the front panel acts as LED Lan. Press "ESC" to quit.

Press "OK" in "Default configuration" if you wish to restore the TCP/IP parameters to ex-factory values.

Press "OK" en "Disable TCP/IP programming?" if you wish to prevent the possibility of the unit's parameters being modified via Internet (WebServer in read-only mode).

NOTE: For security reasons, if the TCP/IP programming is disabled via Internet, it can only be enabled from the unit itself.

2.5.17 Language

This submenu permits the user to change from Spanish to English or vice versa.

When "OK" is pressed in "Language", the following configurable option is displayed:

→	☒ Spanish	default, ex-factory
	☐ English	

2.5.18 Changing user PIN

The user PIN represents a high degree of security for the owner since this is the sole means whereby the programmed parameters can be validated. Any changes in programmed values only come into effect once said PIN has been entered.

Made up of 4 digits, each one from 0 to 9

- Default PIN enabled at factory: **1,2,3,4**
- The user PIN can be changed if one is in possession of the current one
- The PIN is one and the same for surfing Internet

NOTE: The 0,0,0,0 PIN is a special PIN which totally cancels request for same. The unit will not request it in any change in programming. The user can change any value either via the front panel or Internet (on condition that the latter is not in read-only mode). This PIN can be useful as a temporary measure during a training process or an overhaul or revision of the unit. However, its use is not recommended on a permanent basis in an installation due to problems which could be caused by unauthorised personnel.

WARNING: **For security reasons, no master PIN exists. In case of loss, the user must contact the manufacturer to have the unit re-programmed and thoroughly verified. It is recommended that this PIN be noted down and kept in a safe place.**

2.5.19 Clock

This submenu permits the user to configure the day of the week, date and time.
When "OK" is pressed in "Clock", the current day of the week, date (dd/mm/yy) and time (HH:MM:SS) are displayed. Pressing "OK" and entering programming mode, one can modify the day of the week, date or time
Using "NEXT" or "TEST" (up or down), select the day of the week, date and/or time and press "OK". The value to be modified flashes indicating that this value can be changed. Press "OK" to validate.
The chronological register of the most recent alarm and most recent cut-off sets the date in these registers.

2.5.20 Time programmer

These submenus permit the user to enable the time programmer and configure it.

With the time programmer one can program the enablement/disablement of the relays of the external I/O modules and/or the ancillary MCB (circuit-breaker).

Each day of the week has 6 programs, allowing 6 different time frames to be established wherein any relay of the external I/O modules or the ancillary MCB can be enabled.
.

Programming is in HH:MM (hours:minutes) enablement and HH:MM disablement, plus an independent box per program in order to indicate which of these 6 possible daily programmes are enabled. All programmes whose box is not enabled/selected will be ignored.

IMPORTANT: If the time programmer is not associated to any relay or MCB, when a program runs out, nothing will happen. In order to associate the relays to the time programmer, please refer “Relay alarms” on the Web page.

When "OK" is pressed ", the following submenus are displayed:

→ Yes/No

Monday	Every day
Tuesday	Saturdays and Sundays
Wednesday	Monday to Friday
Thursday	
Friday	
Saturday	
Sunday	

When "OK" is pressed in Yes/No, the following configurable option is displayed:

→ ☒ Yes Time programmer enabled (default, ex-factory)
☐ No Time programmer disabled. All programmes are ignored.

When “OK” is pressed in a day of the week, the enabled/disabled state of the 6 daily programmes which have been selected (disabled ex-factory, by default):

→ ☐ P1 (disabled ex-factory, by default)
☐ P2 (disabled ex-factory, by default)
☐ P3 (disabled ex-factory, by default)
☐ P4 (disabled ex-factory, by default)
☐ P5 (disabled ex-factory, by default)
☐ P6 (disabled ex-factory, by default)

Using “NEXT” or “TEST” (up or down), one situates oneself in the program one wishes to configure.

When “OK” is pressed in one of the 6 programmes, one enters a configuration submenu where 3 configurable options are displayed:

→ ☐ Px Enabled/disabled, individually for each programme
00:00h ON Enable/ON - for example, a relay
00:00h OFF Disable/OFF - for example, a relay

The 1st option indicates whether that specific program is active or not
The 2nd option permits the hour and minutes of ON to be configured
The 3rd option permits the hour and minutes of OFF to be configured

2.5.21 Default configuration ex-factory

This submenu restores the configuration of the alarms to the original ex-factory values.

2.5.22 Screen light

This submenu permits the screen illumination mode to be selected. The default ex-factory mode is the timed one. When 30 seconds has elapsed after any key having been pressed, the screen light goes off. As long as keys are being pressed, the light remains on. The permanent mode keeps the light on all the time except for when a reclosure is imminent. When this is the case, the light goes off and, once the internal load values of the capacitors have been restored, it comes back on

→ ☒ Timed default, ex-factory
☐ Permanent

2.5.23 Acoustic warnings (beep)

This submenu permits the acoustic warnings to be enabled/disabled.

→ ☒ Enabled default, ex-factory
☐ Disabled

2.5.24 Version

This submenu permits the user to see the unit's software model and version..

Warning: A change of the software version means a variation in the unit's characteristics. These should be consulted in the manual for the specific version

2.5.25 Calibration

Solely at factory

2.6 Informative messages

The unit informs at all times what is happening both on the front screen panel and by accessing Internet.

1. In the event of an alarm, the corresponding descriptive message and value are displayed on-screen during a short time. Moreover, this message can be consulted in the "most recent alarm" menu where the date and time are also included.

The following **error messages** can also be displayed:

2. Power supply below limits:

"Failure, Vac energy OFF"
"Low VAC"

3. Upon a test being run and alarm not being detected;
Message: "Test error" along with a long, intermittent beep.
Technical service must be contacted.

4. Indication of a *non-existent* module, due to disconnection of a communication cable, power failure, etc.

"Communication error, external module 1 not found"
" Communication error, external module 2 not found "
" Communication error, Temp/RH module not found"
" Communication error, I2C clock not found"

5. Anomaly in verification of RAM memory RAM:

"Error RAM"

2.7 Impedance measurement

Impedance measurement (Z) on the unit's screen and WebServer,
When consumption is zero (I = 0) . impedance is infinite (Z = ∞).
Since the character screen does not have the infinity symbol (∞), this is shown as "0.00". Therefore, when consumption is zero, impedance is infinite and is expressed as Z = 0.00. The same applies for measurements displayed via WebServer.
La impedance is calculated using the formula Vrms / Irms. Therefore,the value of Z is in ohmios (resistance)

2.8 Measurement with three-phase 3-pole no neutral (measurement through false neutral)

A standard false neutral is generated in the interior of the unit by means of resistances (resistances to lines L1, L2 and L3, star construction and the common one linked which generates this false neutral). This latter is used as a reference for line/neutral measurements.

2.9 Alarm delays

NOTE: The RMS alarm delays can additionally vary between 0 and 15ms depending on the moment of calculation of RMS.
The peak alarm delays can additionally vary between 0 and 312uS depending on conversion and calculation.
The programming alarm delays in seconds can vary +/-1 second.

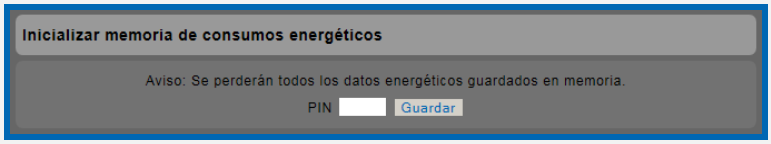
2.10 Power measurements and power factor in the harmonics module

Soleley in precision versions HP0.5 and HP1

When making calculations in the harmonics module, one must bear in mind that the power and power factor measurements are merely a guidance. This is due to the fact that, in order to achieve a high resolutionand precision in the RMS measurements, the analogue-digital converter has to work with oversampling, thus generating a filtering of the native wave. This factor, therefore, has a negative effect on the accuracy of said power and power factor measurements in the harmonics module. The higher the chosen harmonics index, the more significant this will be.
This effect does not occur in the lower precision versions (those without the "HP" suffix).

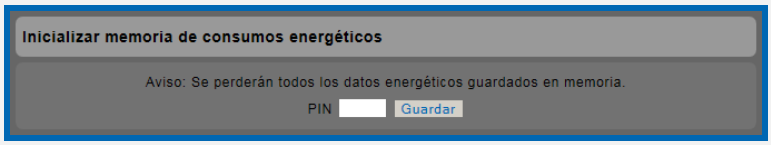
2.11 Energy log with built-in 3-year memory (G version)

Memory: The unit has sufficient memory to store three years' monthly, daily, hourly and 5-minute frame consumptions. Once the 3-year memory is used up, no more data can be stored.
In order to store another 3-year cycle, the memory must be deleted after having entered the user pin.



2.12 Energy log with built-in 1.5-year memory (G3 version)

Memory: The unit has sufficient memory to store three years' monthly, daily, hourly and 5-minute frame consumptions. Once the 1.5-year memory is used up, no more data can be stored.
In order to store another 1.5-year cycle, the memory must be deleted after having entered the user pin.

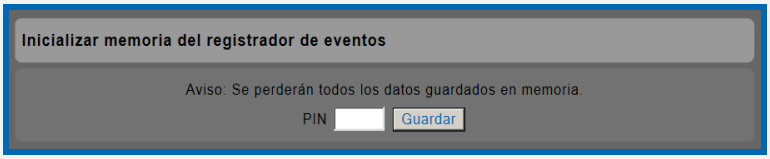


Attention: Update the time and date in the unit's clock in order to obtain correct data in the energy log manually or automatically with the DatawatchPro software.

2.13 Oscilloscope event-logger in waveform with pre-trigger

NOTE: When an event occurs, the waveforms are recorded in a non-volatile memory..
Recording time for an event (three-phase 6-channel) ranges from 620ms and 720ms (access time non-volatile memory).
While the recording in memory takes place, the oscilloscope event-logger does not log events.
Streamed events of a different type of trigger will all be recorded only if there is an interval of ≥ 720ms between each and the next.
Repetitive events (of the same type of trigger) will be recorded every 10 secs (time alarm indicated)

Memory: The unit has sufficient memory to store 600 three-phase, 6-channel events. Once the 600-event memory is used up, no more data can be stored. Should one so wish, the events can be stored and displayed in a PC using the DataWatchPro software.
Should one wish to store another 600-event cycle, the memory must be deleted after having entered the user PIN.



Attention: Update the time and date in the unit's clock in order to obtain correct data in the event logger manually or automatically with the DatawatchPro software.

2.14 Clarification LOG

In the event of simultaneous alarms, only the first detected is logged.
In the event of various alarms going off in less than 1 second, only the first detected is logged.

Chapter 3 – Technical characteristics (please, refer to synoptical tables of characteristics 3.2)

3.1- Technical characteristics - UNIVERSAL+ 7WR Rogowski M4 (version HP with 0.5% and 1% precision)

Technical characteristics - UNIVERSAL+ 7WR Rogowski M4 (version HP with 0.5% and 1% precision) (power : L-N 230V AC ± 15% 50Hz alternating sinusoidal)		
Measurement: True RMS voltage L1, L2, L3 (line neutral)	from 50,00V to 350,00V (version: 500E = full scale 500V Pk) from 100,00V to 700,00V (version: 1000E = full scale 1000V Pk)	
Measurement: Peak voltage L1, L2, L3 (line neutral)	from 70,00V to 500,00Vpk (version: 500E = full scale 500V Pk) from 140,00V to 1000,00Vpk (version: 1000E = full scale 1000V Pk)	
Measurement: True RMS voltage between phases L1 L2, L2 L3, L3 L1	from 100,00V to 500,00V (version: 500E = full scale 500V Pk) from 200,00V to 1000,00V (version: 1000E = full scale 1000V Pk)	
Measurement: AC voltage L1, L2, L3 (line neutral)	from 50,00V to 350,00V (version: 500E = full scale 500V Pk) from 100,00V to 700,00V (version: 1000E = full scale 1000V Pk)	
Measurement: DC voltage L1, L2, L3 (line neutral)	from 0,00V to 450,00V (version: 500E = full scale 500V Pk) from 0,00V to 900,00V (version: 1000E = full scale 1000V Pk)	
Measurement: True RMS intensity and AC intensity **Example for a programming Scale 250A RMS** **Example for a programming Scale de 500A RMS** **Example for a programming Scale de 1000A RMS** **Example for a programming Scale de 2000A RMS**	Programmable scales: 250A, 500A, 1000A and 2000A, from 10A to 250,000A from 15A to 500,000A from 20A to 1000,000A from 25A to 2000,000A	
Measurement: Peak intensity	RMS intensity by 1,4142	
Measurement: Neutral intensity	Range similar to RMS intensity	
Measurement: Active power (W) L1, L2, L3, ∑L123	Resolution: 0,1W	
Measurement: Apparent power (VA) L1, L2, L3, ∑L123	Resolution: 0,1VA	
Measurement: Reactive inductive power L1, L2, L3, ∑L123	Resolution: 0,1VarL (from an FP of 0,997)	
Measurement: Reactive capacitive power L1, L2, L3, ∑L123	Resolution: 0,1VarC (from an FP of 0,997)	
Measurement: Requested power L1, L2, L3, ∑L123	Resolution: 0,1 +W	
Measurement: Returned power L1, L2, L3, ∑L123	Resolution: 0,1 -W	
Measurement: Power factor L1, L2, L3	from 0,000 to 1,000	
Measurement: Active power W L1, L2, L3.	Maximeter (power integration) programmable from 10 secs to 15 mins	
Counter: Active imported energy L1, L2, L3, ∑L123	from 0000000,0001 kWh to 9999999,9999 kWh	
Counter: Active exported energy L1, L2, L3, ∑L123	from 0000000,0001 kWh to 9999999,9999 kWh	
Counter: Reactive energy L1, L2, L3, ∑L123	from 0000000,0001 kQh to 9999999,9999 kQh (from an FP of 0,997)	
Measurement: Voltage unbalance L1, L2, L3 (line neutral)	%	
Measurement: Intensity unbalance L1, L2, L3	%	
Measurement: Voltage crest factor L1, L2, L3 (line neutral)		
Measurement: Intensity crest factor L1, L2, L3		
Measurement: Line impedance L1, L2, L3 (line neutral)	Z	
Measurement: line frequency L1, L2, L3 (line neutral)	45,0Hz to 55,0Hz	
Measurement: Temperature from -40,0 ºC to +100,0 ºC	**Measurement: Humidity** from 0,0% to 100,0% RH	
Measurement: Total Harmonic Distortion (THD 63 harmonics) In voltage L1, L2 and L3 in 50Hz (line neutral) In intensity L1, L2 and L3 in 50Hz	from 0,1 to 999,9% % Measurement precision 1% 1 year ± (% measurement precision + 2 digits + 0.05% of F.E.) 22°C ± 5 °C, 30 a 75% HR from 0,1 to 999,9% % Measurement precision 1% 1 year ± (% measurement precision + 2 digits + 0.15% of F.E.) 22°C ± 5 °C, 30 a 75% HR	
% Measurement precision in: RMS voltage L1, L2, L3 (line neutral)	0.5 % Version HP 0.5	1 % Version HP 1
% Measurement precision in: DC (Vdc) voltage L1, L2, L3 (line neutral)	0.5 % Version HP 0.5	1 % Version HP 1
% Measurement precision in: AC (Vac) voltage L1, L2, L3 (line neutral)	0.5 % Version HP 0.5	1 % Version HP 1
% Measurement precision in: RMS intensity L1, L2, L3	0.5 % Version HP 0.5	1 % Version HP 1
% Measurement precision in: DC (Idc) intensity L1, L2, L3	(Not possible with Rogowski coil)	(Not possible with Rogowski coil)
% Measurement precision in: AC (Iac) intensity L1, L2, L3	0.5 % Version HP 0.5	1 % Version HP 1
% Measurement precision in: Active power (W)	% Precision: V+I (RMS)+0.2	
% Measurement precision in: Apparent power (VA)	% Precision: V+I (RMS)+0.2	
% Measurement precision in: Reactive power	% Precision: V+I (RMS)+1	
% Measurement precision in: DC (Wdc) power	(Not possible with Rogowski coil)	(Not possible with Rogowski coil)
% Measurement precision in: AC (Wac) power	% Precision: V+I (RMS)+0.2	
Voltage: Specifications of typical precision and conditions at:	1 year ± (% **m**easurement precision **+** 2 digits + 0.25% of F.E.) with 22°C ± 5 °C, humidity 30 to 75% HR, range: 10-90%, 50Hz sinusoidal	
Intensity: Specifications of typical precision and conditions at:	1 year ± (% **m**easurement precision **+** 2 digits + 0.55% of F.E.) with 22°C ± 5 °C, humidity 30 to 75% HR, range: 10-90%, 50Hz sinusoidal	
Alarms programmable in value and delay		
ΔV Pk (voltage difference) L1, L2, L3 (line neutral)	from 20V to 200V	Delay: 156,25 µs
ΔV RMS (voltage difference) L1, L2, L3 (line neutral)	from 1V to 300V	Delay: 20ms
RMS overvoltage L1, L2, L3 (line neutral)	from 50V to 320V	Delay: 20ms to 10000ms (version F.E. 500V Pk.)
RMS overvoltage L1, L2, L3 (line neutral)	from 100V to 600V	Delay: 20ms to 10000ms (version F.E. 1000V Pk.)
Pk overvoltage L1, L2, L3 (line neutral)	from 70VPk to 450VPk	Delay: 0,156ms to 9,06ms (version F.E. 500V Pk.)
Pk overvoltage L1, L2, L3 (line neutral)	from 141VPk to 850VPk	Delay: 0,156ms to 9,06ms (version F.E. 1000V Pk.)
RMS low voltage L1, L2, L3 (line neutral)	from 50V to 320V	Delay: 20ms to 10000ms (version F.E. 500V Pk.)
RMS low voltage L1, L2, L3 (line neutral)	from 100V to 600V	Delay: 20ms to 10000ms (version F.E. 1000V Pk.)
RMS intensity L1, L2, L3 (Scale 250A)	from 5.0A to 225.0A	Delay: 20ms to 10000ms
RMS intensity L1, L2, L3 (Scale 500A)	from 10.0A to 450.0A	Delay: 20ms to 10000ms
RMS intensity L1, L2, L3 (Scale 1000A)	from 20.0A to 900.0A	Delay: 20ms to 10000ms
RMS intensity L1, L2, L3 (Scale 2000A)	from 40.0A to 1800.0A	Delay: 20ms to 10000ms
Pk intensity L1, L2, L3 (Scale 250A)	from 7.0APk to 318.1Pk	Delay: 0,156ms to 9,06ms
Pk intensity L1, L2, L3 (Scale 500A)	from 14.1APk to 636.3Pk	Delay: 0,156ms to 9,06ms
Pk intensity L1, L2, L3 (Scale 1000A)	from 28.2APk to 1272.7Pk	Delay: 0,156ms to 9,06ms
Pk intensity L1, L2, L3 (Scale 2000A)	from 56.5APk to 2545.5Pk	Delay: 0,156ms to 9,06ms
Neutral intensity. Range similar to RMS intensity	from xA to xxxxA	Delay: 2S to 180S
Power 1 W L1, L2, L3	from 1 to 9999999 W	Delay: 1S to 999S
Power 2 W (Maximeter-integration programmable from 10 secs to 15 mins.)	from 1 to 9999999 W	L1, L2, L3
Power factor L1, L2, L3	from 0,99 to 0,01	Delay: 1S to 180S
Voltage THD L1, L2, L3. From harmonic 2-63, programmable by harmonic and harmonics bracket	from 1% to 90%	Delay: 2S to 180S
Intensity THD L1, L2, L3. From harmonic 2-63, programmable by harmonic and harmonics bracket	from 1% to 90%	Delay: 2S to 180S
Over-frequency L1, L2, L3 (line neutral)	from 51Hz to 55Hz	Delay: 1S to 180S
Low frequency L1, L2, L3 (line neutral)	from 45Hz to 49Hz	Delay: 1S to 180S
Phase sequence	-	Delay: 1S to 180S
Phase failure		
Voltage unbalance L1, L2, L3 (line neutral)	from 5% to 100%	Delay: 1S to 180S
Intensity unbalance L1, L2, L3	from 5% to 100%	Delay: 1S to 180S
Over-temperature	from -40,0 ºC to +100,0 ºC	Delay: 1S to 180S
Low temperature	from -40,0 ºC to +100,0 ºC	Delay: 1S to 180S
Over- humidity	from 10% to 90%	Delay: 1S to 180S
Low humidity	from 10% to 90%	Delay: 1S to 180S

AC/DC measurements	
DC voltage (Vdc) L1, L2, L3 (line neutral)	Range from 0,00V to 450,00V (version 500E = full scale 500V Pk.)
DC voltage (Vdc) L1, L2, L3 (line neutral)	Range from 0,00V to 9000,00V (version 500E = full scale 1000V Pk.)
AC voltage (Vac) L1, L2, L3 (line neutral)	Range from 50,00V to 350,00V (version 500E = full scale 500V Pk.)
AC voltage (Vac) L1, L2, L3 (line neutral))	Range from 100,00V to 700,00V (version 1000E = full scale 1000V Pk.)
DC intensity (Idc) L1, L2, L3	Depending on external intensity transformer (Not possible with Rogowski coil)
AC intensity (Iac) L1, L2, L3	Depending on external intensity transformer
DC power (Wdc) and AC power (Wac) L1, L2, L3 Resolution: 0,1VA	Depending on external intensity transformer (Not possible with Rogowski coil)
64-harmónic spectrum with distortion, range in % and V–A value, + THD THD alarm and measurement as from harmonic 2–63, programmable by harmonic and harmonics bracket	
%HDF (harmonic distortion) voltage L1, L2, L3 from harmonic k0 to 63 (64 harmonics)	64 harmonics, range from 0,1 to 999,9%
%HDF (harmonic distortion) intensity L1, L2, L3 from harmonic k0 to 63 (64 harmonics)	64 harmonics, range from 0,1 a 999,9%
Voltage L1, L2, L3, from harmonic k0 to 63 (64 harmonics)	64 harmonics
Intensity L1, L2, L3, from harmonic k0 to 63 (64 harmonics)	64 harmonics
300-register graphic logger, 12 channels (46 measurements) with autoscale and variable refreshment (1-600 secs) with temporary max., min. and avg. measurements	
Current value of 46 measurements and Difference in value between maximum and minimum (Max value – Min value) of 46 measurements	
Temporary maximum value (300 registers, 1-600 Secs.) of 46 measurements	
Temporary minimum value (300 registers, 1-600 Secs.) of 46 measurements	
Temporary average value (300 registers, 1-600 Secs.) of 46 measurements	
Graphic energy log, costs and emissions with built-in 3-year memory (optional). Active and reactive energy consumption log. Includes measurement cursor.	
Graphic bar and line display in WebServer for months, days, hours and 5-minute frames.	

Oscilloscope event-logger in waveform with pre-trigger and autoscale, 6 channels V1, V2, V3, I1, I2, I3, with captures for each event (optional) Six modes of log length in 6 channels 160ms, 320ms and 640ms (pre-trigger 40ms, 80ms and 160ms) and 20s, 40s and 80s (pre-trigger 5s, 10s and 20s) 600-event storage in built-in memory. Display via WebServer and DataWatchPro. Trigger for alarms which can be enabled and are programmable in value and delay. Chronological record for each type of alarm. Display via WebServer with horizontal zoom functions. Multi-channel measurement, value and time cursor, 3 mathematical V*I channels, etc. Display via DataWatchPro with offset functions, amplitude, time base, horizontal shift zoom, value and time cursor,	
Alarm: ΔV Pk (voltage difference) L1, L2, L3	
Alarm: ΔV RMS (voltage difference) L1, L2, L3	
Alarm: RMS overvoltage L1, L2, L3	
Alarm: Pk overvoltage L1, L2, L3	
Alarm: RMS intensity L1, L2, L3	
Alarm: Pk intensity L1, L2, L3	
Alarm: Voltage THD L1, L2, L3	
Alarm: Intensity THD L1, L2, L3	
Alarm: Over-frequency L1, L2, L3	
Alarm: Low frequency L1, L2, L3	
Remote input 1 and Remote input 2 (digital inputs). **External trigger**	
Sampling 6 channels, log length 160ms pre-trigger 40ms	6,4KHz per channel. Native resolution (1024 points in 160ms)
Sampling 6 channels, log length 320ms pre-trigger 80ms	6,4KHz per channel. Resolution /2 (1024 points in 320ms)
Sampling 6 channels, log length 640ms pre-trigger 160ms	6,4KHz per channel. Resolution /4 (1024 points in 640ms)
Sampling 6 channels, log length 20,48s pre-trigger 5,12s	Native resolution (1024 RMS samples, 20ms in 20s)
Sampling 6 channels, log length 40,96s pre-trigger 10,24s	Resolution /2 (1024 RMS samples, 20ms in 40s)
Sampling 6 channels, log length 81,92s pre-trigger 20,48s	Resolución /4 (1024 RMS samples, 20ms in 80s)
Other	
Working temperature: L-N 230V AC ± 15%	0° to +45° C. Standard version -10° to +55° C. Industrial version :models with "TI" suffix -25° to +70° C. Extended industrial version :models with "TE" suffix
Dimensions - UNIVERSAL+ 7WR Rogowski M4	72mm (4 modules) height: 81mm, 35mm DIN rail
Weight module UNIVERSAL+ 7WR Rogowski M4	375 gr.
Weight toroids	TRIT14 (70 gr.), TRIT18 o TRDF18 (185 gr.), TRIT26 o TRDF26 (300 gr.), TRDF60 (250 gr.)
Guarantee	3 years
Configurable languages	Spanish and English
Precision in accordance with standards	UNE-EN 62053-23:2003 (IEC 62053-23:2003) CLASE 2
In accordance with standards	UNE-EN 6101-1:2011 (IEC 61010-1:2011), UNE 20-600-77(CEI-278)
Full scale (F.E.) Voltage L1, L2, L3:	500V (version 500E = full scale 500V Pk.)
Full scale (F.E.) between phases L1 L2, L2 L3, L3 L1	900V (version 500E = full scale 500V Pk.)
Full scale (F.E.) Voltage L1, L2, L3:	1000V (version 1000E = full scale 1000V Pk.)
Full scale (F.E.) between phases L1 L2, L2 L3, L3 L1	1800V (version 1000E = full scale 1000V Pk.)
Full scale (F.E.) Intensity L1, L2, L3:	354A en Escala 250A
Full scale (F.E.) Intensity L1, L2, L3:	707A en Escala 500A
Full scale (F.E.) Intensity L1, L2, L3:	1414A en Escala 1000A
Full scale (F.E.) Intensity L1, L2, L3:	2828A en Escala 2000A
Full scale (F.E.) Active power L1, L2, L3:	Intensity full scale, by voltage full scale (Max. 9999999,9 W)
Full scale (F.E.) Apparent power L1, L2, L3:	Intensity full scale, by voltage full scale (Max. 9999999,9 W)
Full scale (F.E.) Reactive power L1, L2, L3:	Intensity full scale, by voltage full scale (Max. 9999999,9 W)
Full scale (F.E.) DC and AC power L1, L2, L3:	Intensity full scale, by voltage full scale (Max. 9999999,9 W)
Full scale (F.E.) harmonic distortion	999,9%
Programmable acoustic warnings	Enables or disabled
Chronological logger most recent alarm	With value and year, month, day, hour and minute
Screen with programmable illumination	Timed or permanent
Remote inputs 1 and 2, programmable	Programmable input signal, normal or rocking. Delay Remote Input 1 y 2 (5 ms)
Individual alarm counters	cf synoptic tables of characteristics
Registers maximum and minimum measurements	cf synoptic tables of characteristics
Alarm central, telecontrol and automation	10 logical outputs (relays) and 10 logical inputs.
Time programmer with high-precision clock:	6 programs per day, programming in hours and minutes, enablement of 10 logical outputs (relays)
WebServer (Version: HTML 4.01 Transitional, IPV4, connection RJ45 8 pin 10 BASE-T) Modbus TCP/IP, Port 502, and TCP/IP. HTTP communication protocol . WebServer.	
7-channel oscilloscope with autoscale and 3 mathematical V*I channels. Includes instantaneous value measurement cursor in all channels (display in WebServer)	
7-channel oscilloscope with autoscale and offset control functions, amplitude, time base, delay/advance in degrees, multi-channel measurement cursor, Measurement of RMS, Pk, THD, etc. Sampling 7 channels 6,4KHz per channel (display in DataWatchPro)	
Análysis of harmonics spectrum with autoscale (V1, V2, V3, I1, I2 y I3 with 64 harmonics). Measurements of 64 harmonics (range in % and V–A value). Display with continuous refreshment (every 1,5 secs.). Includes measurement cursor (display via WebServer)	
Analysis of 7-channel harmonics spectrum with autoscale (up to harmonic 63, range in % and RMS value). Multi-channel measurement cursor and simultaneous analysis of 1, 2, 3, 4, 5, 6 and 7 channels (display via DataWatchPro).	
DWP (DataWatchPro): Professional software for PC with database and graphic analysis.	

Auxiliary power supply Universal L-N 230VU, AC y DC: (85V – 265V AC 50-440HZ) and (130V – 370V DC). Version: 1000E = full-scale measurement line neutral 1000V Pk.	
Consumption (POWER L-N)	2,2W (supply: 85V to 265V AC RMS 50Hz alternating sinusoidal)
Input voltage (POWER L-N)	Universal AC and DC power supply (85V – 265V AC 47-440HZ) and (130V – 370V DC)
Input voltage RMS, Pk y DC phase neutral (INPUT 1 L1-N)	up to 500V RMS AC 50Hz, up to 700V Pk, Up to 650V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 2 L2-N)	up to 500V RMS AC 50Hz, up to 700V Pk, Up to 650V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 3 L3-N)	up to 500V RMS AC 50Hz, up to 700V Pk, Up to 650V DC
Input voltage RMS y Pk between phases L1 and L2, L1 and L3,L2 and L3	up to 870V RMS AC 50Hz, up to 1200V Pk
Auxiliary power supply Universal L-N 230VU, AC y DC: (85V – 265V AC 50-440HZ) and (130V – 370V DC). Version: 500E = full-scale measurement line neutral 500V Pk.	
Consumption (POWER L-N)	2,2W (supply: 85V to 265V AC RMS 50Hz alternating sinusoidal)
Input voltage (POWER L-N)	Universal AC and DC power supply (85V – 265V AC 47-440HZ) and (130V – 370V DC)
Input voltage RMS, Pk y DC phase neutral (INPUT 1 L1-N)	up to 350V RMS AC 50Hz, up to 500V Pk, Up to 450V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 2 L2-N)	up to 350V RMS AC 50Hz, up to 500V Pk, Up to 450V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 3 L3-N)	up to 350V RMS AC 50Hz, up to 500V Pk, Up to 450V DC
Input voltage RMS y Pk between phases L1 and L2, L1 and L3,L2 and L3	up to 600V RMS AC 50Hz, up to 845V Pk
Auxiliary power supply Universal L-N 230VU, AC y DC: (85V – 265V AC 50-440HZ) and (130V – 370V DC). Versión 250E = full-scale measurement line neutral 250V Pk.	
Consumption (POWER L-N)	2,2W (supply: 85V to 265V AC RMS 50Hz alternating sinusoidal)
Input voltage (POWER L-N)	Universal AC and DC power supply (85V – 265V AC 47-440HZ) and (130V – 370V DC)
Input voltage RMS, Pk y DC phase neutral (INPUT 1 L1-N)	up to 175V RMS AC 50Hz, up to 250V Pk, Up to 250V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 2 L2-N)	up to 175V RMS AC 50Hz, up to 250V Pk, Up to 250V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 3 L3-N)	up to 175V RMS AC 50Hz, up to 250V Pk, Up to 250V DC
Input voltage RMS y Pk between phases L1 and L2, L1 and L3,L2 and L3	up to 300V RMS AC 50Hz, up to 420V Pk
Auxiliary power supply 12, 24, 48V DC. Version: 1000E = full-scale measurement line neutral 1000V Pk.	
Consumption (POWER + -) auxiliary power supply 12V DC Consumption (POWER + -) auxiliary power supply 24V DC Consumption (POWER + -) auxiliary power supply 48V DC	**2,1W att** 12V DC **2,1W att** 24V DC **2,1W att** 48V DC
Input voltage (POWER + -) auxiliary power supply 12V DC Input voltage (POWER + -) auxiliary power supply 24V DC Input voltage (POWER + -) auxiliary power supply 48V DC	from 9V up to 18V DC from 18V up to 36V DC from 36V up to 72V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 1 L1-N)	up to 500V RMS AC 50Hz, up to 700V Pk, Up to 650V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 2 L2-N)	up to 500V RMS AC 50Hz, up to 700V Pk, Up to 650V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 3 L3-N)	up to 500V RMS AC 50Hz, up to 700V Pk, Up to 650V DC
Input voltage RMS y Pk between phases L1 and L2, L1 and L3,L2 and L3	up to 870V RMS AC 50Hz, up to 1200V Pk
Auxiliary power supply 12, 24, 48V DC. Version: 500E = full-scale measurement line neutral 500V Pk.	
Consumption (POWER + -) auxiliary power supply 12V DC Consumption (POWER + -) auxiliary power supply 24V DC Consumption (POWER + -) auxiliary power supply 48V DC	**2,1W att** 12V DC **2,1W att** 24V DC **2,1W att** 48V DC
Input voltage (POWER + -) auxiliary power supply 12V DC Input voltage (POWER + -) auxiliary power supply 24V DC Input voltage (POWER + -) auxiliary power supply 48V DC	from 9V up to 18V DC from 18V up to 36V DC from 36V up to 72V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 1 L1-N)	up to 350V RMS AC 50Hz, up to 500V Pk, Up to 450V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 2 L2-N)	up to 350V RMS AC 50Hz, up to 500V Pk, Up to 450V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 3 L3-N)	up to 350V RMS AC 50Hz, up to 500V Pk, Up to 450V DC
Input voltage RMS y Pk between phases L1 and L2, L1 and L3,L2 and L3	up to 600V RMS AC 50Hz, up to 845V Pk
Auxiliary power supply 12, 24, 48V DC. Versión 250E = full-scale measurement line neutral 250V Pk.	
Consumption (POWER + -) auxiliary power supply 12V DC Consumption (POWER + -) auxiliary power supply 24V DC Consumption (POWER + -) auxiliary power supply 48V DC	**2,1W att** 12V DC **2,1W att** 24V DC **2,1W att** 48V DC
Input voltage (POWER + -) auxiliary power supply 12V DC Input voltage (POWER + -) auxiliary power supply 24V DC Input voltage (POWER + -) auxiliary power supply 48V DC	from 9V up to 18V DC from 18V up to 36V DC from 36V up to 72V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 1 L1-N)	up to 175V RMS AC 50Hz, up to 250V Pk, Up to 250V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 2 L2-N)	up to 175V RMS AC 50Hz, up to 250V Pk, Up to 250V DC
Input voltage RMS, Pk y DC phase neutral (INPUT 3 L3-N)	up to 175V RMS AC 50Hz, up to 250V Pk, Up to 250V DC
Input voltage RMS y Pk between phases L1 and L2, L1 and L3,L2 and L3	up to 300V RMS AC 50Hz, up to 420V Pk

3.2 – Synoptic tables of characteristics, UNIVERSAL+ 7WR M4, Rogowski M4 and MINI M4

UNIVERSAL+ 7WR (3-year guarantee)	UNIVERSAL+ 7WR				
Version	**M4**		**Rogowski M4**	**MINI M4**	
Single-phase (M) only L1 / Three-phase (T) L1, L2, L3	**M**	**T**	**T**	**T**	**M**
Oscilloscope event-logger in waveform with pre-trigger and autoscale. 6 channels V1, V2, V3, I1, I2, I3, with captures for each event (optional) **Three modes of record length in 6 channels 160ms, 320ms and 640ms (pre-trigger: 40ms, 80ms and 160ms)** **+ three modes of record length in 6 channels 20s, 40s y 80s (pre-trigger 5s, 10s y 20s). Only HP versions** **600-event storage in built-in memory. Display via WebServer and DataWatchPro** **Trigger for alarms which can be enabled and are programmable in value and delay. Chronological record for each type of alarm.** **Display via WebServer with horizontal zoom functions. Multi-channel measurement, value and time cursor, 3 mathematical V*I channels, etc.** **Display via DataWatchPro with offset control functions, amplitude, time base, horizontal shift zoom, multi-channel measurement, value and time cursor, etc.**					
Alarm: ΔV Pk (voltage difference) L1, L2, L3, set delay (transients and fast micro-cuts)	●	●	●	●	●
Alarm: ΔV RMS (voltage difference) L1, L2, L3, set delay (transients and dips)	●	●	●	●	●
Alarm: RMS overvoltage L1, L2, L3	●	●	●	●	●
Alarm: Pk overvoltage L1, L2, L3	●	●	●	●	●
Alarm: RMS intensity L1, L2, L3	●	●	●	●	●
Alarm: Pk intensity L1, L2, L3	●	●	●	●	●
Alarm: Voltage THD (total harmonic distortion) L1, L2, L3	●	●	●	●	●
Alarm: Intensity THD (total harmonic distortion) L1, L2, L3	●	●	●	●	●
Alarm: Over-frequency L1, L2, L3 and Alarm: Low frequency L1, L2, L3	●	●	●	●	●
Remote input 1 and Remote input 2 (digital inputs). **External trigger**	●	●	●	●	●
Historical logger LOG. Alarm chronological logger. With measurement value and year, month, day, hour and minute.					
RMS overvoltage L1, L2, L3 and Pk overvoltage L1, L2, L3L1, L2, L3	●	●	●	●	●
RMS low voltage L1, L2, L3	●	●	●	●	●
RMS intensity L1, L2, L3 and Pk intensity L1, L2, L3	●	●		●	●
RMS differential intensity (IDn RMS) and Pk differential intensity (ID Pk)	●	●	●		
Neutral intensity		●	●		●
Power1 W L1, L2, L3	●	●	●	●	●
Power2 W L1, L2, L3 (MDI, programmable from 10 secs. to 15 mins.)	●	●	●	●	●
Power factor L1, L2, L3	●	●	●	●	●
Voltage THD (total harmonic distortion) L1, L2, L3 and Intensity THD (total harmonic distortion) L1, L2, L3	●	●	●	●	●
Voltage unbalance L1, L2, L3 and Intensity unbalance L1, L2, L3		●	●		●
Phase sequence		●	●		●
Over-temperature and Low temperature	●	●	●	●	●
Over-humidity and Low humidity	●	●	●	●	●
Over-frequency L1, L2, L3 and Low frequency L1, L2, L3	●	●	●	●	●
Remote input 1 and Remote input 2 (digital inputs)	●	●	●	●	●
Time programmer	●	●	●	●	●
AC power failure (Power OFF) and Connection AC supply (Power ON)	●	●	●	●	●
7-channel oscilloscope with autoscale and offset control functions, amplitude, time base, delay/advance in degrees, multi-channel measurement cursor, Measurement of RMS, Pk, THD, etc. (display in DataWatchPro) **7-channel oscilloscope with autoscale** and automatic or manual Y axis scale and 3 mathematical V*I. channels. Includes instantaeous value measurement cursor in all channels. Continuously refreshed display (every 1.5 secs.). (Display via Webserver)					
Voltage V1, Intensity I1	●	●	●	●	●
Voltage V2, Intensity I2		●	●		●
Voltage V3, Intensity I3		●	●		●
Differential intensity ID	●	●			
Analysis of 7-channel harmonics spectrum with autoscale (63 harmonics, range en % and value V - A). **Multi-channel measurement cursor and simultaneous analysis of 1, 2, 3, 4, 5, 6 and 7 channels.** (display in DataWatchPro) **Analysis: harmonics spectrum with autoscale (V1, V2, V3, I1, I2 and I3 with 64 harmonics, range in % and value V - A).** **Display with continuous refreshment (every 1.5 secs.). Includes measurement cursor** (display on WebServer)					
Voltage V1, Intensity I1 (Display on WebServer and DataWatchPro)	●	●	●	●	●
Voltage V2, Intensity I2 (Display on WebServer and DataWatchPro)		●	●		●
Voltage V3, Intensity I3 (Display on WebServer and DataWatchPro)		●	●		●
Differential intensity ID (Display only on DataWatchPro)	●	●			
Graphic log of meanTHD–HD–VAr at 5-minute intervals with built-in 14-month memory (optional) **Analysis for harmonics compensation and reactive power of L1, L2, L3, ∑L1,2,3 y (∑L1,2,3)/3** Fromharmonic 2 – 63, programmable by harmonic and harmonics bracket (HP version). Harmonics range: 2 – 63 (non HP version).					
Logs **ThdV (%)**		●	●		
Logs **ThdI (%)**		●	●		
Logs **hdV (V)**		●	●		
Logs **hdI (A)**		●	●		
Logs **VAr**		●	●		
Graphic energy log, costs and emissions with (optional) built-in memory. Graphicactive and reactive energy bar and line display in WebServer. Includes measurement cursor. **Option "G": Energy log (L1 single-phase or ∑L1,2 and 3 three-phase) with built-in 3-year memory**					
5-minute interval active and reactive energy consumption log (3-year memory storage)	●	●		●	●
Hourly active and reactive energy consumption log (3-year memory storage)	●	●		●	●
Daily interval active and reactive energy consumption log (3-year memory storage)	●	●		●	●
Monthly interval active and reactive energy consumption log (3-year memory storage)	●	●		●	●
Graphic energy log, costs and emissions with (optional) built-in memory. Graphicactive and reactive energy bar and line display in WebServer. Includes measurement cursor. **Opción "G3": Energy log (L1, L2, L3 and ∑L1,2 and 3) with built-in 1.5-year memory (only 3-phase model)**					
5-minute interval active and reactive energy consumption log (1.5-year memory storage)		●	●		●
Hourly active and reactive energy consumption log (1.5-year memory storage)		●	●		●
Daily interval active and reactive energy consumption log (1.5-year memory storage)		●	●		●
Monthly interval active and reactive energy consumption log (1.5-year memory storage)		●	●		●
Multi-interaction between remote units via Internet/Intranet for UNIVERSAL+ 7WR range, M1, M2, M3, M4, Rogowski M4, MINI M4, 4LOG, 4REM, 6LIR, 6PHAR and 6PHR. They are totally autonomous and, once configured, can communicate remotely with each other via Internet/Intranet to enable or disable their relays A, B, C and D when a programed event occurs.					
WebServer in real time, display with continuous refreshment (every 1.5 secs.) of measurements, max/min measurements, energy counters, alarm counters, input/output status, event log (LOG), unit information and clock – for UNIVERSAL+ 7WR M1, M2, M3, M4, Rogowski M4 and MINI M4 units					
Alarm central, Tele-control and automation via 10 logical outputs (relays) and 10 logical inputs. For the whole UNIVERSAL+ 7WR M1 range, M2, M3, M4, Rogowski M4 and MINI M4 units, by means of a range of external modules.					

UNIVERSAL+ 7WR (3-year guarantee)	UNIVERSAL+ 7WR				
Version	**M4**		**Rogowski M4**	**MINI M4**	
Single-phase (M) only L1 / Three-phase (T) L1, L2, L3	**M**	**T**	**T**	**T**	**M**
WebServer in real time, display refreshed every 1.5 seconds for variable parameters					
Start-up WEB page, PIN	•	•	•	•	•
WEB page: Box "Measures and events", section "Measurements"	•	•	•	•	•
WEB page: Box "Measures and events", section "Energy counters"	•	•	•	•	•
WEB page: Box "Measures and events", section "Maximum and minimum values"	•	•	•	•	•
WEB page: Box "Measures and events", section "Alarm counters"	•	•	•	•	•
WEB page: Box "Measures and events", section " Event-logger counters in waveform"	•	•	•	•	•
WEB page: Box "Measures and events", section "Historical logger - LOG"	•	•	•	•	•
WEB page: Box "Event-logger" 600-event storage in built-in memory (optional)	•	•	•	•	•
WEB page: Box "Energy log" with 3-year built-in memory (optional)	•	•	•	•	•
WEB page: Box "Real time" 300-event graphic logger, 12 channels with autoscale	•	•	•	•	•
WEB page: Box "Oscilloscope" 7-channel oscilloscope with autoscale	•	•	•	•	•
WEB page: Box "Harmonics" Harmonics spectrum with autoscale (64 harmonics)	•	•	•	•	•
WEB page: Box "Input/output status"	•	•	•	•	•
WEB page: Box "Manual relay control"	•	•	•	•	•
WEB page: Box "Relay alarms"	•	•	•	•	•
WEB page: Box "Relay timers"	•	•	•	•	•
WEB page: Box "Time programmer"	•	•	•	•	•
WEB page: Box "Unit configuration"	•	•	•	•	•
WEB page: Box "Access configuration" and WEB page: Box "Close session"	•	•	•	•	•
WEB page: Box "Thd/Hd/VAr log" **Graphic log of meanTHD–HD–VAr at 5-minute intervals with built-in 14-month memory Analysis for harmonics compensation and reactive power**		•	•		
300-event graphic logger, 12 channels (46 measurements) with autoscale and variable refreshment (1-600 secs.) with temporary max. min. avg. measurements					
Current value for 46 measurements	•	•	•	•	•
Temporary maximum value (300 events, 1-60 secs.) for 46 measurements	•	•	•	•	•
Temporary minimum value (300 events, 1-60 secs.) for 46 measurements	•	•	•	•	•
Temporary average value (300 events, 1-60 secs.) for 46 measurements	•	•	•	•	•
Difference in value between maximum and minimum (Max value – Min value) of 46 measurements	•	•	•	•	•
Automatic data dispatch to a remote server via Internet (optional)					
By enabling "Remote server TCP/IP configuration", the unit automatically dispatches the data file (Slist.json) to a remote server. This file is dispatched every 5 minutes (in sync with the internal clock)	•	•	•	•	•
Measurements					
True RMS and Pk voltage L1, L2, L3	•	•	•	•	•
True RMS voltage between phases L1-2, L2-3, L3-1		•	•		•
True RMS and Pk intensity L1, L2, L3	•	•	•	•	•
Neutral intensity		•	•		•
True RMS and Pk differential intensity	•	•			
Voltage THD (total harmonic distortion) L1, L2, L3 and Intensity THD (total harmonic distortion) L1, L2, L3	•	•	•	•	•
Voltage THD L1, L2, L3 of intensity L1, L2, L3 as from harmonic 2 – 63, programmable by harmonic and harmonic range (HP versions)	•	•	•		
Voltage unbalance L1, L2, L3 and Intensity unbalance L1, L2, L3		•	•		•
Voltage crest factor L1, L2, L3 and Intensity crest factor L1, L2, L3	•	•	•	•	•
Temperature, relative humidity	•	•	•	•	•
Relative temperature and humidity of 6 remote UNIVERSAL+ 7WR TH sensors via Internet/Intranet (Only in HP versions)	•	•	•		
Line frequency L1, L2, L3	•	•	•	•	•
Line impedance L1, L2, L3	•	•	•	•	•
Apparent power L1, L2, L3, ∑L123	•	•	•	•	•
Active power L1, L2, L3, ∑L123	•	•	•	•	•
Requested power L1, L2, L3, L123 and Returned power L1, L2, L3, ∑L123	•	•	•	•	•
Reactive inductive power L1, L2, L3, ∑L123 and Reactive capacitive power L1, L2, L3, ∑L123	•	•	•	•	•
Power factor L1, L2, L3	•	•	•	•	•
Active power W L1, L2, L3, (Maximeter-integration programmable from 10 secs. to 15 mins.)	•	•	•	•	•
Active imported energy counters L1, L2, L3, ∑L123 from 0000000,00001 to 9999999,99999 kWh	•	•	•	•	•
Active exported energy counters L1, L2, L3, ∑L123 from 0000000,00001 to 9999999,99999 kWh	•	•	•	•	•
Reactive energy counters L1, L2, L3, ∑L123 from 0000000,00001 to 9999999,99999 kQh	•	•	•	•	•
DC voltage (Vdc) L1, L2, L3	•	•	•	•	•
AC voltage (Vac) L1, L2, L3	•	•	•	•	•
DC intensity (Idc) L1, L2, L3	•	•		•	•
AC intensity (Iac) L1, L2, L3	•	•	•	•	•
DC power(Wdc) L1, L2, L3	•	•		•	•
AC power (Wac) L1, L2, L3	•	•	•	•	•
Differential intensity DC (IDdc) (HP versions)	•	•			
Differential intensity AC (IDac) (HP versions)	•	•			
Voltage %HD (harmonic distortion) L1, L2, L3 of harmonic k 0 to 63 (64 harmonics)	•	•	•	•	•
Intensity %HD (harmonic distortion) L1, L2, L3, of harmonic k 0 to 63 (64 harmonics)	•	•	•	•	•
Power W L1, L2, L3, ∑L123, of harmonic k 0 to 63 (64 harmonics) Only NON HP versions	•	•		•	•
Power factor L1, L2, L3, of harmonic k 0 to 63 (64 harmonics) Only NON HP versions	•	•		•	•
Voltage L1, L2, L3, of harmonic k 0 to 63 (64 harmonics)	•	•	•	•	•
Intensity L1, L2, L3, of harmonic k 0 to 63 (64 harmonics)	•	•	•	•	•

UNIVERSAL+ 7WR (3-year guarantee)	UNIVERSAL+ 7WR				
Version	M4		Rogowski M4	MINI M4	
Single-phase (M) only L1 / Three-phase (T) L1, L2, L3	M	T	T	M	T
Alarms: programmable in value and delay					
RMS overvoltage L1, L2, L3	●	●	●	●	●
Pk overvoltage L1, L2, L3	●	●	●	●	●
RMS low voltage L1, L2, L3	●	●	●	●	●
RMS intensity L1, L2, L3	●	●	●	●	●
Pk intensity L1, L2, L3	●	●	●	●	●
RMS differential intensity (IDn RMS)	●	●			
Pk differential intensity (ID Pk)	●	●			
Neutral intensity		●	●		●
Power1 W L1, L2, L3	●	●	●	●	●
Power2 W L1, L2, L3 (Maximeter-integration programmable from 10 secs to 15 mins.)	●	●	●	●	●
Power factor L1, L2, L3	●	●	●	●	●
Voltage and Intensity THD (total harmonic distortion) L1, L2, L3. Only NON HP versions	●	●		●	●
Voltage and Intensity L1, L2, L3 From 2-63, programmable by harmonic and harmonics bracket. Only HP versions	●	●	●		
Voltage unbalance L1, L2, L3		●	●		●
Intensity unbalance L1, L2, L3		●	●		●
Over-temperature	●	●	●	●	●
Low temperature	●	●	●	●	●
Over-humidity	●	●	●	●	●
Low humidity	●	●	●	●	●
Over-frequency L1, L2, L3	●	●	●	●	●
Low frequency L1, L2, L3	●	●	●	●	●
Phase sequence		●	●		●
Remote input 1 (digital input)	●	●	●	●	●
Remote input 2 (digital input)	●	●	●	●	●
Time programmer	●	●	●	●	●
Individual alarm counters					
Event-counter for waveform logger L1, L2, L3.	●	●	●	●	●
Overvoltages V1, V2, V3.	●	●	●	●	●
Low voltages V1, V2, V3.	●	●	●	●	●
Intensity I1, I2, I3.	●	●	●	●	●
Differential intensity	●	●			
Neutral intensity.		●	●		●
Power1 L1, L2, L3	●	●	●	●	●
Power2 W L1, L2, L3 (Maximeter-integration programmable from 10 secs to 15 mins.)	●	●	●	●	●
Voltage unbalance V1, V2, V3.		●	●		●
Intensity unbalance I1, I2, I3.		●	●		●
Voltage THD (total harmonic distortion) V1, V2, V3.	●	●	●	●	●
Intensity THD (total harmonic distortion) I1, I2, I3.	●	●	●	●	●
Over-temperature.	●	●	●	●	●
Low temperature.	●	●	●	●	●
Over-humidity.	●	●	●	●	●
Low humidity.	●	●	●	●	●
Over-frequency V1, V2, V3.	●	●	●	●	●
Low frequency V1, V2, V3.	●	●	●	●	●
Power factor L1, L2, L3.	●	●	●	●	●
Time programmer.	●	●	●	●	●
Phase sequence.		●	●		●
Remote input 1 (digital input)	●	●	●	●	●
Remote input 2 (digital input)	●	●	●	●	●
Power OFF (AC power failure)	●	●	●	●	●
Total counter	●	●	●	●	●
Total accumulated counter (undeletable)	●	●	●	●	●
Precisions available in ± 0.1%, ±0.2%, ±0.4%, ±0.5% and ±1% in intensity and voltage					
Basic precision: ± 0.1% Only HP versions	●	●			
Basic precision: ± 0.2% Only HP versions	●	●			
Basic precision: ± 0.4% Only HP versions	●	●			
Basic precision: ± 0.5% Only NON HP versions	●	●		●	●
Basic precision: ± 0.5% Only HP versions			●		
Basic precision: ± 1% Only HP versions			●		
Measurements for 64 harmonics, distortion factor, harmonic distortion (rango in % and valor V – A) +THD					
Graphic and numerical display in WebServer.	●	●	●	●	●

UNIVERSAL+ 7WR (3-year guarantee)	UNIVERSAL+ 7WR				
Version	M4		Rogowski M4	MINI M4	
Single-phase (M) only L1 / Three-phase (T) L1, L2, L3	M	T	T	M	T
Modbus TCP/IP, Port 502, and TCP/IP. HTTP communication protocol . WebServer.					
Measurements (Reading)	●	●	●	●	●
Oscilloscope event-logger counters (Reading)	●	●	●	●	●
Alarm counters (Reading) and Energy counters (Reading)	●	●	●	●	●
Maximum and minimum measurements (Reading)	●	●	●	●	●
Digital outputs (relays) (Reading / Writing of 10outputs) and Digital inputs (Reading of 10 inputs)	●	●	●	●	●
Maximum and minimum measurement logs					
Maximum: voltage L1, L2 and L3	●	●	●	●	●
Maximum: voltage unbalance L1, L2 and L3		●	●		●
Maximum: intensity L1, L2 and L3	●	●	●	●	●
Maximum: differential intensity	●	●			
Maximum: neutral intensity		●	●		●
Maximum: intensity unbalance L1, L2 and L3		●	●		●
Maximum: frequency V1, V2 and V3	●	●	●	●	●
Maximum: voltage THD (total harmonic distortion) L1, L2 and L3	●	●	●	●	●
Maximum: intensity THD (total harmonic distortion) L1, L2 and L3	●	●	●	●	●
Maximum: active power L1, L2 and L3 (Maximeter programmable from 10 secs to 15 mins.)	●	●	●	●	●
Maximum: apparent power L1, L2 and L3	●	●	●	●	●
Maximum: reactive inductive power L1, L2 and L3	●	●	●	●	●
Maximum: reactive capacitive power L1, L2 and L3	●	●	●	●	●
Maximum: temperature	●	●	●	●	●
Maximum: humidity	●	●	●	●	●
Minimum: voltage L1, L2 and L3	●	●	●	●	●
Minimum: frequency V1, V2 and V3	●	●	●	●	●
Minimum: temperature	●	●	●	●	●
Minimum: humidity	●	●	●	●	●
Alarms. Programmable enablement/disablement of 10 relays + 4 relays A, B, C and D of a remote UNIVERSAL+ 7WR unit via Internet/Intranet by one or more alarms					
Overvoltage	●	●	●	●	●
Low voltage	●	●	●	●	●
Intensity	●	●	●	●	●
Differential intensity	●	●			
Neutral intensity		●	●		●
Power factor	●	●	●	●	●
Voltage THD (total harmonic distortion)	●	●	●	●	●
Intensity THD (total harmonic distortion)	●	●	●	●	●
Voltage unbalance		●	●		●
Intensity unbalance		●	●		●
Over-temperature and Low temperature	●	●	●	●	●
Over-humidity and Low humidity	●	●	●	●	●
Over-frequency and Low frequency	●	●	●	●	●
Phase sequence		●	●		●
Remote input 1 (digital input)	●	●	●	●	●
Remote input 2 (digital input)	●	●	●	●	●
Time programmer	●	●	●	●	●
Timer 1, 2, 3 and 4 of module 1 (digital input IN1, IN2, IN3 and IN4 of module 1)	●	●	●	●	●
Timer 1, 2, 3 and 4 of module 2 (digital input IN1, IN2, IN3 and IN4 of module 2)	●	●	●	●	●
Power1 W	●	●	●	●	●
Power2 W (Maximeter-integration programmable from 10 secs to 15 mins.)	●	●	●	●	●
Reception of TCP/IP commands from other remote UNIVERSAL+ 7WR units via Internet/Intranet.					
For the enablement/disablement of relays A and B	●	●		●	●
Outstanding characteristics					
True RMS, Peak (Pk), AC and DC measurement (DC in intensity with DC line transformer)	●	●	●	●	●
Averaged RMS display, programmable 100, 200, 300, 400 and 500ms	●	●	●	500ms	500ms
Backlit,12x3-character screen. Intuitive menus. Long texts: easy to read scroll-down	●	●	●		
4-digit protection PIN	●	●	●	●	
Programmable acoustic warnings (enabled or disabled)	●	●	●		
Ex-factory default configuration	●	●	●	●	
WebServer display, programming and remote control via Internet/Intranet	●	●	●	●	●
Chronological log of last alarm. With value and year, month, day, hour and minute	●	●	●	●	●
Control external I/O modules: up to14 logical outputs (relays) and 10 logical inputs, temperature and humidity probe, controls for logical inputs (Remotes In) programmable signal-action.	●	●	●	●	●
High-precision time programmer in hours and minutes	●	●	●	●	
Language: configurable in Spanish or English	●	●	●	●	
DataWatchPro: Professional software for PC with database ,graphic data analysis , etc.	●	●	●	●	●
Multi-range Rogowski Coil Flexible Current Transformers, Consolidates 250A, 500A, 1000A and 2000A			●		
Standard AC transformer, from 5A/5A up to 10.000A/5A (in 5A slots) HP version	●	●			
Standard AC transformer, from 50A/5A up to 10.000A/5A (in 5A slots) non HP version	●	●		●	●
AC transformers: TRIT7, TRIT14, TRIT18 and TRIT26 (5A, 70A, 140A and 280A)	●	●		●	●

3.3 Description of connection terminals- UNIVERSAL+ 7WR Rogowski M4

Description of connection terminals- UNIVERSAL+ 7WR Rogowski M4, Version: auxiliary power
Version:line intensity transformer. Rogowski coil (flexible current transformer), multi-range
Consolidates measurements up to 250A, 500A, 1000A and 2000A
Configurable measurement scales: 250A, 500A, 1000A and 2000A

L POWER 230V	POWER PHASE (LINE) 230V L-N AC
N POWER 230V	POWER NEUTRAL
N INPUT 1	INPUT SENSOR INPUT 1 MEASUREMENT N (NEUTRAL)
L1 INPUT 1	INPUT SENSOR INPUT 1 MEASUREMENT L1 (LINE 1) L1-N 230V AC
N INPUT 2	INPUT SENSOR INPUT 2 MEASUREMENT N (NEUTRAL)
L2 INPUT 2	INPUT SENSOR INPUT 2 MEASUREMENT L2 (LINE 2) L2-N 230V AC
N INPUT 3	INPUT SENSOR INPUT 3 MEASUREMENT N (NEUTRAL)
L3 INPUT 3	INPUT SENSOR INPUT 3 MEASUREMENT L3 (LINE 3) L3-N 230V AC
5	DO NOT CONNECT
k1 SENSOR 2	COMMON INTENSITY L1 (MASS L1 Rogowski flexible coils)
k2 SENSOR 2	COMMON INTENSITY L2 (MASS L2 Rogowski flexible coils)
k3 SENSOR 2	COMMON INTENSITY L3 (MASS L3 Rogowski flexible coils)
I1 SENSOR 2	INPUT INTENSITY L1 (SIGNAL L1 Rogowski flexible coils)
I2 SENSOR 2	INPUT INTENSITY L2 (SIGNAL L2 Rogowski flexible coils)
I3 SENSOR 2	INPUT INTENSITY L3 (SIGNAL L2 Rogowski flexible coils)
AUXILIARY IN-OUT	CONNECTION TO INPUT/OUTPUT RELAY MODULES TEMPERATURE/HUMIDITY PROBE, REMOTE IN1, IN2 USE ONLY SUPPLIED CABLE AND CONNECTORS
ETHERNET	ETHERNET RJ45 CONNECTION

(Consult the UNIVERSAL+ 7WR IN OUT and accessories, I/O relay modules, temperature and humidity probe manuals)

3.4 Description of display panel

Version with display:

1 – Display: 12 characters in three alpha-numeric lines, 5x7 dot-matrix
2 – Green indicator LED (WORKING), slow flashing (1 Hz), indicates measurement in progress
3 – Green indicator LED (WORKING), fast flashing (1/2 Hz), indicates an alarm has been detected
4 – Square yellow push-buttons: function depends on context:
MENU - ESC
NEXT (up)
TEST (down)
OK – RESET – (General Reset when held down more than 10 secs.)

Version without display:

1 – Green indicator LED (WORKING), slow flashing (1 Hz), indicates measurement in progress
2 – Green indicator LED (WORKING), fast flashing (1/2 Hz), indicates an alarm has been detected
3 – Square yellow push-buttons: function depends on context:

OK – RESET – (General Reset when held down more than 10 secs.)

3.5 Default alarm values ex-factory - UNIVERSAL+ 7WR Rogowski M4
Version: Voltage measurement scale 500E.

For configurations:

115V 50Hz AC between phase and neutral, 200V AC 50Hz between phases
230V 50Hz AC between phase and neutral, 400V AC 50Hz between phases

Version: voltage measurement scale (Line Neutral): 500E = full scale measurement line neutral 500V Pk				
Alarm	**Range Value**	**Value**	**Range Nbr Delay**	**Delay**
ΔV Pk L1, L2, L3 (Pk voltage difference)	from 20 V to 200 V	40 V	Set	156,25 µs
ΔV RMS L1, L2, L3 (RMS voltage difference)	from 1 V to 300 V	25 V	Set	20 ms
RMS overvoltage L1, L2, L3	50 – 320 V	265 V	(1 - 500) x 20 ms = (20 – 10000) ms	49 = 980 ms
Pk overvoltage L1, L2, L3	70 – 450 V Pk	400 V Pk	(1 - 58) x 0,15625 ms = (0,156 – 9,06) ms	12 = 1,875 ms
RMS low voltage L1, L2, L3	50 – 320 V	185 V	(1 - 500) x 20 ms = (20 – 10000) ms	250 = 5000 ms
RMS intensity L1, L2, L3	xxxx A	xxxx A	(1 - 500) x 20 ms = (20 – 10000) ms	250 = 5000 ms
Pk intensity L1, L2, L3	xxxx A Pk	xxxx A Pk	(1 - 58) x 0,15625 ms = (0,156 – 9,06) ms	55 = 8,593 ms
Neutral intensity	xxxx A	xxxx A	1 – 180 seconds	10 s
Power1 W L1, L2, L3	1 – 9999999 W	1000 W	1 – 180 seconds	10 s
Power2 W L1, L2, L3	1 – 9999999 W	1000 W	Maximeter programmable from 10 s to 15 min	15 min.
Power factor L1, L2, L3	0,99 – 0,01	0.4	1 – 180 seconds	10 s
Unbalance V L1, L2, L3	5 – 100%	50%	1 – 180 seconds	10 s
Unbalance I L1, L2, L3	5 – 100%	90%	1 – 180 seconds	10 s
Voltage THD L1, L2, L3	1 – 90%	10%	2 – 180 seconds	10 s
Intensity THD L1, L2, L3	1 – 90%	80%	2 – 180 seconds	10 s
Over-temperature	-40 to +100 ºC	Alarm OFF >= +50 ºC NO alarm ON < +45 ºC Value of OFF must be > value of ON	1 – 180 seconds	10 s
Low temperature	-40 to +100 ºC	Alarm OFF < -10 ºC NO alarm ON >= -5 ºC Value of OFF must be < value of ON	1 – 180 seconds	10 s
Over- humidity	10 – 90%	Alarm OFF >= 90 % NO alarm ON < 80 %	1 – 180 seconds	10 s
Low humidity	10 – 90%	Alarm OFF < 10 % NO alarm ON >= 20 %	1 – 180 seconds	10 s
Over-frequency L1, L2, L3	51 – 55 Hz	Alarm OFF >= 55 Hz NO alarm ON < 54 Hz	1 – 180 seconds	10 s
Low frequency L1, L2, L3	45 – 49 Hz	Alarm OFF < 45 Hz NO alarm ON >= 46 Hz	1 – 180 seconds	10 s
Phase sequence	-	-	1 – 180 seconds	10 s
Remote input 1	Normal or rocking	Normal	-	5 ms
Remote input 2	Normal or rocking	Normal	-	5 ms
Functions				
Time programmer	ON / OFF	ON		
External module 1	YES / NO	NO		
External module 2	YES / NO	NO		
Temp./Humidity probe	YES / NO	NO		

3.6 Default alarm values ex-factory - UNIVERSAL+ 7WR Rogowski M4 Version voltage measurement scale 1000E.

For configurations:

230V 50Hz AC between phase and neutral, 400V AC 50Hz between phases. 400V 50Hz AC between phase and neutral, 690V AC 50Hz between phases.

Version: voltage measurement scale (Line Neutral): 1000E = full scale measurement line neutral 1000V Pk				
Alarm	**Range Value**	**Value**	**Range Nbr Delay**	**Delay**
ΔV Pk L1, L2, L3 (voltage difference Pk)	from 20 V to 200 V	40 V	Set	156,25 µs
ΔV RMS L1, L2, L3 (RMS voltage difference)	from 1 V to 300 V	25 V	Set	20 ms
RMS overvoltage L1, L2, L3	100 – 600 V	460 V	(1 - 500) x 20 ms = (20 – 10000) ms	49 = 980 ms
Pk overvoltage L1, L2, L3	141 – 850 V Pk	695 V Pk	(1 - 58) x 0,15625 ms = (0,156 – 9,06) ms	12 = 1,875 ms
RMS low voltage L1, L2, L3	100 – 600 V	321 V	(1 - 500) x 20 ms = (20 – 10000) ms	250 = 5000 ms
RMS intensity L1, L2, L3	xxxx A	xxxx A	(1 - 500) x 20 ms = (20 – 10000) ms	250 = 5000 ms
Pk intensity L1, L2, L3	xxxx A Pk	xxxx A Pk	(1 - 58) x 0,15625 ms = (0,156 – 9,06) ms	55 = 8,593 ms
Neutral intensity	xxxx A	xxxx A	1 – 180 seconds	10 s
Power1 W L1, L2, L3	1 – 9999999 W	1000 W	1 – 180 seconds	10 s
Power2 W L1, L2, L3	1 – 9999999 W	1000 W	Maximeter programmable from 10 secs to 15 mins	15 min.
Power factor L1, L2, L3	0,99 – 0,01	0.4	1 – 180 seconds	10 s
Unbalance V L1, L2, L3	5 – 100%	50%	1 – 180 seconds	10 s
Unbalance I L1, L2, L3	5 – 100%	90%	1 – 180 seconds	10 s
Voltage THD L1, L2, L3	1 – 90%	10%	2 – 180 seconds	10 s
Intensity THD L1, L2, L3	1 – 90%	80%	2 – 180 seconds	10 s
Over-temperature	-40 to +100 ºC	Alarm OFF >= +50 ºC NO alarm ON < +45 ºC Value of OFF must be > value of ON	1 – 180 seconds	10 s
Low temperature	-40 to +100 ºC	Alarm OFF < -10 ºC NO alarm ON >= -5 ºC Value of OFF must be < value of ON	1 – 180 seconds	10 s
Over- humidity	10 – 90%	Alarm OFF >= 90 % NO alarm ON < 80 %	1 – 180 seconds	10 s
Low humidity	10 – 90%	Alarm OFF < 10 % NO alarm ON >= 20 %	1 – 180 seconds	10 s
Over-frequency L1, L2, L3	51 – 55 Hz	Alarm OFF >= 55 Hz NO alarm ON < 54 Hz	1 – 180 seconds	10 s
Low frequency L1, L2, L3	45 – 49 Hz	Alarm OFF < 45 Hz NO alarm ON >= 46 Hz	1 – 180 seconds	10 s
Phase sequence	-	-	1 – 180 seconds	10 s
Remote input 1	Normal or rocking	Normal	-	5 ms
Remote input 2	Normal or rocking	Normal	-	5 ms
Functions				
Time programmer	ON / OFF	ON		
External module 1	YES / NO	NO		
External module 2	YES / NO	NO		
Temp./Humidity probe	YES / NO	NO		

3.7 Default alarm status (enabled/disabled) ex-factory - UNIVERSAL+ 7WR Rogowski M4

Alarm	Enabled ex-factory by default	Can be enabled/disabled in configuration menu
RMS overvoltage L1, L2, L3	NO	YES
Pk overvoltage L1, L2, L3	NO	YES
RMS low voltage L1, L2, L3	NO	YES
RMS intensity L1, L2, L3	NO	YES
Pk intensity L1, L2, L3	NO	YES
RMS differential intensity (IDn RMS)	NO	YES
Pk differential intensity (ID Pk)	NO	YES
Neutral intensity	NO	YES
Power 1 W	NO	YES
Power 2 W (Maximeter programmable from 10 secs to 15 mins.)	NO	YES
Power factor L1, L2, L3	NO	YES
Voltage THD L1, L2, L3	NO	YES
Intensity THD L1, L2, L3	NO	YES
Voltage unbalance L1, L2, L3	NO	YES
Intensity unbalance L1, L2, L3	NO	YES
Over-temperature	NO	YES
Low temperature	NO	YES
Over- humidity	NO	YES
Low humidity	NO	YES
Over-frequency L1, L2, L3	NO	YES
Low frequency L1, L2, L3	NO	YES
Phase sequence	NO	YES
Phase failure L1, L2, L3	NO (enabled / disabled upon low voltage)	NO
Remote input 1	NO	YES
Remote input 2	NO	YES
Time programmer	NO	YES

3.8 Programmable enablement/disablement of output relays in the event of one or various alarms

Alarm	Enablement/disablement of output relays (10 relays) and relays A, B, C and B of a remote unit via Internet/Intranet
Overvoltage	Yes, programmable
Low voltage	Yes, programmable
Intensity	Yes, programmable
Differential intensity	Yes, programmable
Neutral intensity	Yes, programmable
Power factor	Yes, programmable
Voltage THD	Yes, programmable
Intensity THD	Yes, programmable
Voltage unbalance	Yes, programmable
Intensity unbalance	Yes, programmable
Over-temperature	Yes, programmable
Low temperature	Yes, programmable
Over-humidity	Yes, programmable
Low humidity	Yes, programmable
Over-frequency	Yes, programmable
Low frequency	Yes, programmable
Phase sequence	Yes, programmable
Remote input 1	Yes, programmable
Remote input 2	Yes, programmable
Time programmer	Yes, programmable
Timer 1 module 1 (digital input IN1 module 1)	Yes, programmable
Timer 2 module 1 (digital input IN2 module 1)	Yes, programmable
Timer 3 module 1 (digital input IN3 module 1)	Yes, programmable
Timer 4 module 1 (digital input IN4 module 1)	Yes, programmable
Timer 1 module 2 (digital input IN1 module 2)	Yes, programmable
Timer 2 module 2 (digital input IN2 module 2)	Yes, programmable
Timer 3 module 2 (digital input IN3 module 2)	Yes, programmable
Timer 4 module 2 (digital input IN4 module 2)	Yes, programmable
Power 1 W	Yes, programmable
Power 2 W (Maximeter programmable from 10 secs to 15 mins.)	Yes, programmable

Chapter 4 – User's/installation guide

4.1 Precautions / warnings for the user / installer

- Despite this unit's being of maximum safety, both from a design and features standpoint, the utmost care must always be taken when using it. It must not be used until its characteristics and mode of operation have been fully understood.
- The installation should be equipped with elements of protection against over-intensity (suitable fuses) The maximum intensity of the intensity measurement transformers must not be exceeded.
- The wiring of the installation and the installation itself must be foreseen so as to support the maximum intensity of the protection elements.
- Do not apply current nor use the unit until all its connections have been connected up and it has been correctly installed in a standard enclosure. Once current has been supplied to the unit, its connections must not be disconnected/connected.
- Do not connect the unit to any voltages/frequencies other than those indicated. (please, refer to technical characteristics).
- Caution: The unit's connecting terminals and the AUX. IN-OUT connector are not insulated from the mains. The Ethernet connector, however, does have insulation from the mains.
- Do not exceed the maximum intensity in the inputs of the intensity sensors L1, L2 and L3.
- The intensity measurements are carried out by the Rogowski multi-range coil (flexible current transformer), compatible with the UNIVERSAL+ 7WR Rogowski M4
- For the protection of electrical installations, use UNIVERSAL+ 7WR, versions command 1, command 2 and command 3.
- In the event of electrostatic discharges or electromagnetic emissions, the LCD screen might go blank (with no monitoring). This does not affect the unit's functioning. In order to reset the screen, press MENU. Nevertheless, the unit resets cyclically every 15 minutes.
- Do not expose to liquids or humidity.
- Do not drop, knock or expose to vibrations.
- Do not expose to sources of heat
- Do not expose to environmental temperatures, depending on version, below 0^{o}, -25^{o} C. or over 40^{o}, 50^{o}, 70^{o} C.
- Do not expose to magnetic sources or emissions (electric motors and transformers, electro-magnets, radio frequency emitters, etc.).
- Under no circumstance whatsoever must the unit be opened and the interior manipulated. The safety seals must
- remain intact. Should they be broken, the correct functioning of the unit could be jeopardised.
- In the event of any of the above occurring, the authorised technical service must be contacted immediately in order for the unit to be checked.
- The unit must be completely disconnected from the mains before cleaning with a soft, dry cloth or brush.
- For security reasons, change the ex-factory PIN for a personalised one and *note it down in a safe place.*

ATTENTION - IMPORTANT!
This unit (UNIVERSAL+ 7WR Rogowski M4 module, the Rogowski flexible intensity coils and accessories) must be enclosed in a closed standard housing and only the command panel of the module must be accessible to the user.

The parameters displayed in inverted commas "-.-", indicate that the parameter and, therefore, its corresponding alarm are not implemented in this specific and, consequently, no operation is contemplated
The temperature and humidity in inverted commas "-.-" indicate that the temperature/humidity probe is either not enabled in the menu or that it has not been installed.
The logical status of the input/output modules displayed in inverted commas "-", indicates that the I/O modules are either not enabled in the menu or that they have not been installed.

Important **- Positioning of the toroidal Rogowski flexible coils and individualised adjustment to their module**

The Rogowski flexible coils are individually matched and adjusted to L1, L2 and L3 of their corresponding Sureline UNIVERSAL+ 7WR Rogowski M4 module. They cannot, therefore, under any circumstance whatsoever be interchanged with any others having the same reference and pertaining to different Sureline modules. Should these Rogowski flexible coils be interchanged, this would result in errors in the measurement and an abnormal functioning of the unit. The only coils which are to be installed are those supplied for their corresponding specific Sureline module. Each Rogowski coil indicates the model, line and serial number of the Sureline module to which it has been specifically adjusted and matched. The Rogowski coils have a complusory placement as is indicated in the wiring diagrams. They, likewise, bear an arrow whose direction indicates its positioning with respect to the wiring

- Positioning of the intensity Rogowski flexible coils (L1, L2 and L3)

The Rogowski flexible coils must of necessity be positioned as shown in the "Wiring diagrams". Should the positioning be incorrect, then W+ would measure W- and vice versa and the rL measurement would become rC and vice versa. Should one so wish, one can program the unit with a reversal in direction of each Rogowski flexible coils. To do so, please refer to the section regarding the reversal of intensity channels in the unit's configuration menu.

- Wiring. Precautions/warnings for the user/installer

By way of a protective cover and to avoid contact and dust, the male connector, AUXILIARY IN/OUT, is fitted ex-factory covered with another female connector. This female connector is a protective cover and is not to be removed if not in use.

To remove this connector and connect in its turn the wired connector to the I/O modules, cut off the AC supply, remove this connector and replace it with the new wired female connector (only that supplied by the manufacturer). This connector cannot be manipulated with the unit live. Consult the UNIVERSAL+ 7WR IN OUT and accessories, I/O relay modules, temperature and humidity probe manuals.

All the connection terminals must be handled and connected with the unit totally disconnected from the AC supply and no interconnection can be effected with the unit live.

It is of the utmost importance that **the correct polarity is ensured upon connection of the Sureline terminals.** If this polarity is not respected, the high accuracy is lost originating errors in measurement and abnormal functioning

One risk of the unit not functioning correctly could be originated principally by an incorrect wiring up of the connection terminals. It is, therefore, of the **utmost importance that this wiring be carried out correctly** in accordance with the following protocol:

- An homologated "male pin" is to be incorporated in the naked core of the stripped pliable conductor. These terminals are placed in the corresponding grooves as far in as they will go.

- Ensure that the conductor lead is correctly fixed with the pertinent tightening torque, i.e. there must be no displacement of the terminal nor any damage to the screws on head, thread, fillet or washer, any of which would be to the subsequent detriment of the assemblies and screw connections.

4.2 Transport and handling

This being a highly sophisticated electronic unit, it must be transported and handled with care as per the precautions stipulated in the foregoing section "Precautions / warnings".

4.3 Installation

The installation must be carried out by responsible, competent and qualified technical personnel once the present manual has been fully understood.

The location of the unit must meet the requirements and respect the precautions stipulated in the chapter "Precautions/warnings".

The unit must be installed in a standard single-phase installation, active phase and neutral having a difference of potential of 230V AC or a three-phase installation (3 phases + neutral) having a difference of potential from phases to neutral of 230V AC or 400V AC, depending on the version, and also a protection conductor of operative earth. Moreover, the installation must have, at its main switch panel, appropriate protections against over-intensities and leakage to earth.

4.4 Wiring

The unit is fitted with top quality connection terminals. Each terminal has notches to enable easier fixing of the wires and prevent accidental removal. Likewise, the clamping screws have a self-fixing system which avoids their falling out should they work loose.

Moreover, the serigraphy identifies the corresponding counter-positioned terminals on the fanning strip. The graphic indications are backed up by intuitive identifying colours.

Connect the terminals as indicated for the typical or chosen configuration. Please, refer to "Wiring diagrams"

It is imperative that the wiring of the terminals and the tightening of the screws in the fanning strip be effected correctly.

"Wiring diagrams" should be consulted. Should any doubt arise, the manufacturer or authorised distributor should be consulted.

Chapter 5 – Diagnoses and trouble-shooting

5.1 Diagnosis and solution

1. Test error

"Test error" is displayed on-screen accompanied by a long intermittent beep. Consult the technical service.

2. Communication error real time clock

The unit indicates on-screen "Communication error, I2C clock not found,
There is an anomaly in the real-time clock module and must be checked immediately.
Do NOT use. Consult the technical service.

3. Communication error temperature and humidity probe

Verify the wiring of the temperature and humidity probe, cut off the supply to the unit and then switch on again. Go to the submenu "temperature and humidity probe", disable the probe and then enable it again.
There is an anomaly in the temperature and humidity probe. Do NOT use it. Consult the technical service.

4. Communication error external module

Verify the wiring of the external modules, cut off the supply to the unit and to the modules and then switch the unit on again. Go to the submenu "External module I/O x" and disable the communications of the modules and then enable again.
There is an anomaly in one or both the external modules. Do NOT use them. Disable them and consult the technical service.

5. "Incorrect user pin"

The user has entered the PIN incorrectly prior to pressing "Save" or "Send".

6. "Remote unit not found. Check configuration."

Some parameter in "Remote unit TCP/IP configuration" is not correct.

7. "Warning, command sent with pin error. Check configuration."

Some parameter in "Remote unit TCP/IP configuration" is not correct.

8. "Remote server not found. Check configuration."

Some parameter in "Remote unit TCP/IP configuration" is not correct.

9. "SST error"

Failure upon detection of physical memory for data storage.

10. "Warning, incoming command received with PIN error."

A command/order received from another unit or automated system with incorrect user PIN.

Chapter 6 – Verification and start-up

6.1 Start-up

Connect all up-stream conductors by means of switches, sectionalisers or others.
The reinitiation sequence will automatically be carried out and the unit will be operative.

6.2 Diagnosis of alarm

The causes of the alarm are stored in memory and are indicated on the LCD screen.

Chapter 7 – Technical service

7.1 Technical service

Authorised technical service: solely by the manufacturer

Chapter 8 – Maintenance

8.1 Maintenance

On a minimal yearly basis, the user must check that the measurements of the electrical parameters of the unit coincide with those stipulated in the technical characteristics, To this end, competent technical personnel at the factory will revise the unit and proceed to calibrate it if need be.

Chapter 9 – Description basic components

9.1 Rogowski coil (flexible current transformer) for AC intensity measurement, LEM version

LEM model: ART-B22-D125 Precision 0,5%, (diameter:125mm, length: 1.5 metres)

Warning: individually matched and adjusted for its own model and line (L1, L2 and L3). Do NOT interchange.

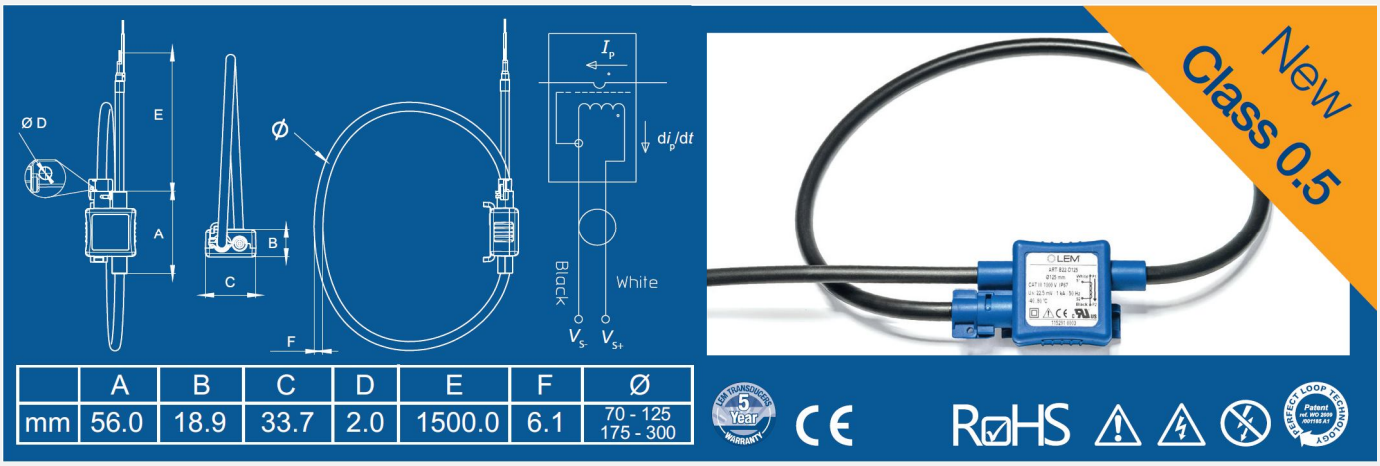
Technical characteristics as per LEM manufacturer

ART Serie

Ref: ART-B22-D70, ART-B22-D125, ART-B22-D175, ART-B22-D300

Flexible clip-around Rogowski coil for the electronic measurement of AC current with galvanic separation between the primary circuit (power) and the secondary circuit (measurement). The patented Perfect Loop Technology dramatically reduces both the error due to the position of the measured conductor within the aperture, and the error due to the proximity of external conductors.

Accuracy Class 0.5



	A	B	C	D	E	F	Ø
mm	56.0	18.9	33.7	2.0	1500.0	6.1	70 - 125 175 - 300

Features

●● Rated insulation voltage 1000 V Cat III PD2 ●● Accuracy Class 0.5 (IEC 61869-2) ●● Protection degree IP67

●● Ø 70, Ø 125, Ø 175, Ø 300 mm sensing aperture

●● 1.5 m output cable (other lengths available see page 8) ●● Ambient temperature −40 °C … +80 °C ●● Very flexible and thin coil: 6.1 mm

●● Slot for attaching the loop on the primary with a cable tie ●● Ø 2 mm hole to pass a security seal tampering

●● An innovative patented clasp drastically reduces the positioning error near the closing

●● Internal shield for enhanced measurement accuracy at low primary currents.

Advantages

●● Thin, flexible, and light weight solution ●● Very low positioning error

●● Quick, non-intrusive and easy setup

●● A single sensor for a large current range without overload ●● Less influenced by external fields

●● Adaptable for a large range of cable diameters.

Applications

●● MV/LV substations on LV side: Transformer Condition Monitoring

●● Power metering: current measurement for active power calculation

●● Building sub-metering: energy efficiency monitoring, consumption analysis and cost allocation

●● Power quality monitoring: electrical loads and distribution system equipment

●● Fault Detection, Isolation and Repair (FDIR): isolate the site of the fault

●● Remote Terminal Units (RTU)

●● Phasor Measurement Units (PMU).

Standards

●● IEC 61010-1: 2010; IEC 61010-2-32 ed.3: 2012

●● 1) IEC 61869-1 ed1.0: 2007; IEC 61869-2: ed1.0: 2012 ●● 1) IEC 61869-6: draft 2016; IEC 61869-10: draft 2016 ●● UL (pending).

Note: 1) Performance standards: ART-B22 only partially fulfills these standards as a Rogowski coil has fundamental differences compared to current transformers.

LEM City answers the demand for an accurate, reliable and easy to install energy sensor for future Smart Cities.

LEM SPLIT CORE ROGOWSKI COIL

ART Series

Absolute maximum ratings

Parameter	Symbol	Unit	Value
Maximum secondary voltage	$U_{S\,max}$	V	30
Maximum primary conductor temperature	$T_{B\,max}$	°C	105

Stresses above these ratings may cause permanent damage.

Exposure to absolute maximum ratings for extended periods may degrade reliability.

Insulation coordination

Parameter	Symbol	Unit	Value	Comment
RMS voltage for AC insulation test, 50 Hz, 1 min	U_d	kV	7.4	
Impulse withstand voltage 1.2/50 µs	$\hat{U}_W$	kV	12.8	
Partial discharge RMS test voltage (q_m < 10 pC)	U_t	kV	1.65	According to IEC 60664-1
Clearance (pri. - sec.)	d_{Cl}	mm	> 16	Shortest distance through air
Creepage distance (pri. - sec.)	d_{Cp}	mm	> 16	Shortest path along device body
Case material	-	-	V0	According to UL 94
CTI			600	
Application example	-		1000 V CAT III PD2	Reinforced insulation according to EN 61010-1
Application example	-		1000 V CAT IV PD2	Basic insulation according to EN 61010-1

Environmental and mechanical characteristics

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Ambient operating temperature	T_A	°C	−40		80	
Ambient storage temperature	T_S	°C	−40		80	
Relative humidity (non-condensing)	RH	%	0		90	
Altitude above sea level		m			2000	
Mass ⌀ 70	m	g		124		Cable length: 1.5 m
Mass ⌀ 125	m	g		130		Cable length: 1.5 m
Mass ⌀ 175	m	g		138		Cable length: 1.5 m
Mass ⌀ 300	m	g		155		Cable length: 1.5 m

LEM SPLIT CORE ROGOWSKI COIL

ART Series

Electrical data ART-B22-D70

At T_A = 25 °C, R_L = 10 kΩ, unless otherwise noted.

Parameter	Symbol	Unit	Min	Value	Max	Comment
Rated primary current	I_{Pr}	A				Not applicable 1)
Rated short-time thermal current	I_{th}	kA		300		@ 50 Hz 2)
Rated transformation ratio	k_{ra}	kA/V		44.44		@ 50 Hz
Rated frequency	f_r	Hz		50/60		

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Secondary voltage	U_S	mV		22.5		@ 50 Hz, I_P = 1 kA
Mutual inductance	M	nH		71.98		
Temperature coefficient of M	TCM	ppm/K		±30		
Frequency bandwidth (−3 dB)	BW	kHz		420		• Cable length: 1.5 m
Phase displacement 4) @ 50/60 Hz	φ	°		0.004		3)
Coil inductance	L_S	µH		180		
Coil resistance	R_S	Ω		56		
Ratio error (centered)	ε	%	−0.5		0.5	Class 0.5 accuracy according to IEC 61869-2
Ratio error (all positions)	ε	%	−0.75		0.75	6. Including positioning error
Linearity error	ε_L	%		None		6)
Influence of external current	$\varepsilon_{I\,ext}$	%	0	±0.2	±0.4	

Notes: 1) The Rogowski coil can measure any primary current as there is no saturation effect.
2 Not tested given that in the worst case (load = 0 Ohm i.e. short circuit on the output) the peak dissipated power remains low (< 2 Watts)
3 Frequency bandwidth and phase shift modeling schematic can be provided on request.
4 Referring to the main phase offset of 90 ° (a Rogowski coil is a derivative current transducer)
5 Considering a primary conductor of at least Ø 15 mm, perpendicular and in contact with the Rogowski coil.
6 Considering an external conductor of at least Ø 15 mm the same current level than internal conductor, perpendicular and in contact with the Rogowski coil.

LEM SPLIT CORE ROGOWSKI COIL

ART Series

Electrical data ART-B22-D125

At T_A = 25 °C, R_L = 10 kΩ, unless otherwise noted.

Parameter	Symbol	Unit	Min	Value	Max	Comment
Rated primary current	I_{Pr}	A				Not applicable 1)
Rated short-time thermal current	I_{th}	kA		300		@ 50 Hz 2)
Rated transformation ratio	k_{ra}	kA/V		44.44		@ 50 Hz
Rated frequency	f_r	Hz		50/60		

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Secondary voltage	U_S	mV		22.5		@ 50 Hz, I_P = 1 kA
Mutual inductance	M	nH		72.14		
Temperature coefficient of M	TCM	ppm/K		±30		
Frequency bandwidth (−3 dB)	BW	kHz		373		- Cable length: 1.5 m
Phase displacement 4) @ 50/60 Hz	φ	°		0.004		3)
Coil inductance	L_S	µH		258		
Coil resistance	R_S	Ω		81		
Ratio error (centered)	ε	%	−0.5		0.5	Class 0.5 accuracy according to IEC 61869-2
Ratio error (all positions)	ε	%	−0.75		0.75	• Including positioning error
Linearity error	ε_L	%		None		
Influence of external current	$\varepsilon_{I\,ext}$	%	0	±0.2	±0.4	6)

Notes: 1) The Rogowski coil can measure any primary current as there is no saturation effect.
- Not tested given that in the worst case (load = 0 Ohm i.e. short circuit on the output) the peak dissipated power remains low (< 2 Watts)
- Frequency bandwidth and phase shift modeling schematic can be provided on request.
- Referring to the main phase offset of 90 ° (a Rogowski coil is a derivative current transducer)
- Considering a primary conductor of at least Ø 15 mm, perpendicular and in contact with the Rogowski coil.
- Considering an external conductor of at least Ø 15 mm the same current level than internal conductor, perpendicular and in contact with the Rogowski coil.

LEM SPLIT CORE ROGOWSKI COIL

ART Series

Electrical data ART-B22-D175

At T_A = 25 °C, R_L = 10 kΩ, unless otherwise noted.

Parameter	Symbol	Unit	Min	Value	Max	Comment
Rated primary current	I_{Pr}	A				Not applicable 1)
Rated short-time thermal current	I_{th}	kA		300		@ 50 Hz 2)
Rated transformation ratio	k_{ra}	kA/V		44.44		@ 50 Hz
Rated frequency	f_r	Hz		50/60		

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Secondary voltage	U_S	mV		22.5		@ 50 Hz, I_P = 1 kA
Mutual inductance	M	nH		72.31		
Temperature coefficient of M	TCM	ppm/K		±30		
Frequency bandwidth (−3 dB)	BW	kHz		350		♦ Cable length: 1.5 m
Phase displacement 4) @ 50/60 Hz	φ	°		0.004		3)
Coil inductance	L_S	µH		343		
Coil resistance	R_S	Ω		105		
Ratio error (centered)	ε	%	−0.5		0.5	Class 0.5 accuracy according to IEC 61869-2
Ratio error (all positions)	ε	%	−0.75		0.75	▲ Including positioning error
Linearity error	ε_L	%		None		
Influence of external current	$\varepsilon_{I\,ext}$	%	0	±0.2	±0.4	6)

Notes: 1) The Rogowski coil can measure any primary current as there is no saturation effect.
2 Not tested given that in the worst case (load = 0 Ohm i.e. short circuit on the output) the peak dissipated power remains low (< 2 Watts)
3 Frequency bandwidth and phase shift modeling schematic can be provided on request.
4 Referring to the main phase offset of 90 ° (a Rogowski coil is a derivative current transducer)
5 Considering a primary conductor of at least Ø 15 mm, perpendicular and in contact with the Rogowski coil.
6 Considering an external conductor of at least Ø 15 mm the same current level than internal conductor, perpendicular and in contact with the Rogowski coil.

LEM SPLIT CORE ROGOWSKI COIL

ART Series

Electrical data ART-B22-D300

At T_A = 25 °C, R_L = 10 kΩ, unless otherwise noted.

Parameter	Symbol	Unit	Min	Value	Max	Comment
Rated primary current	I_{Pr}	A				Not applicable 1)
Rated short-time thermal current	I_{th}	kA		300		@ 50 Hz 2)
Rated transformation ratio	k_{ra}	kA/V		44.44		@ 50 Hz
Rated frequency	f_r	Hz		50/60		

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Secondary voltage	U_s	mV		22.5		@ 50 Hz, I_P = 1 kA
Mutual inductance	M	nH		72.84		
Temperature coefficient of M	TCM	ppm/K		±30		
Frequency bandwidth (−3 dB)	BW	kHz		300		▲ Cable length: 1.5 m
Phase displacement 4) @ 50/60 Hz	φ	°		0.004		3)
Coil inductance	L_s	µH		566		
Coil resistance	R_s	Ω		170		
Ratio error (centered)	ε	%	−0.5		0.5	Class 0.5 accuracy according to IEC 61869-2
Ratio error (all positions)	ε	%	−0.75		0.75	• Including positioning error
Linearity error	ε_L	%		None		6)
Influence of external current	$\varepsilon_{I\,ext}$	%	0	±0.2	±0.4	

Notes: 1) The Rogowski coil can measure any primary current as there is no saturation effect.
- ▲ Not tested given that in the worst case (load = 0 Ohm i.e. short circuit on the output) the peak dissipated power remains low (< 2 Watts)
- ▲ Frequency bandwidth and phase shift modeling schematic can be provided on request.
- ▲ Referring to the main phase offset of 90 ° (a Rogowski coil is a derivative current transducer)
- ▲ Considering a primary conductor of at least Ø 15 mm, perpendicular and in contact with the Rogowski coil.
- ▲ Considering an external conductor of at least Ø 15 mm the same current level than internal conductor, perpendicular and in contact with the Rogowski coil.

Definition of typical, minimum and maximum values

Minimum and maximum values for specified limiting and safety conditions have to be understood as such as well as values shown in “typical” graphs.

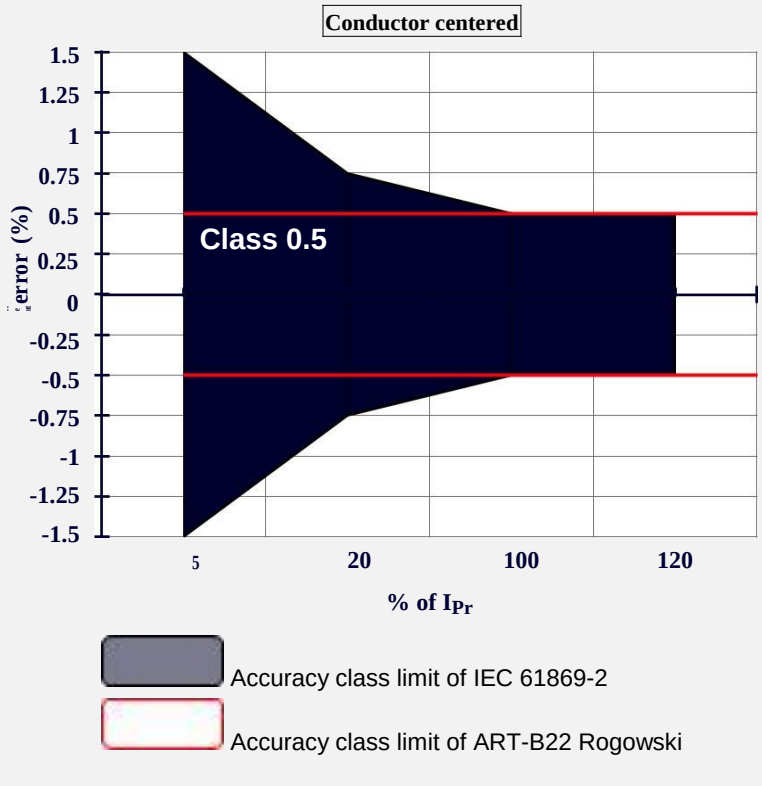
On the other hand, measured values are part of a statistical distribution that can be specified by an interval with upper and lower limits and a probability for measured values to lie within this interval.

Unless otherwise stated (e.g. “100 % tested”), the LEM definition for such intervals designated with “min” and “max” is that the probability for values of samples to lie in this interval is 99.73 %.

For a normal (Gaussian) distribution, this corresponds to an interval between −3 sigma and +3 sigma. If “typical” values are not obviously mean or average values, those values are defined to delimit intervals with a probability of 68.27 %, corresponding to an interval between −sigma and +sigma for a normal distribution.

Typical, minimum and maximum values are determined during the initial characterization of the product.

Accuracy class according to IEC 61869-2



Performance parameters definition

Rated transformation ratio k_{ra}

Ratio of k_{ra} to the actual secondary voltage.

Ratio error ε

The current ratio error, expressed as a percentage, is defined by the formula:

$$\varepsilon = \frac{k_{ra} U_S - I_P}{I_P} \times 100\ \%$$

Where:

k_{ra}: is the rated transformation ratio
I_P: is the actual primary current
U_S: is the actual secondary voltage when I_P is flowing

Phase displacement φ

The φ is the difference in phase between the primary current and the ideal secondary voltage phasors. The direction of the phasors being that the angle is 90 ° (leading) for an ideal Rogowski coil.

The phase displacement is said to be positive when the secondary voltage phasor leads the primary current phasor.

Linearity error ε_L

The linearity error ε_L is the maximum positive or negative difference between the measured points and the linear regression line, expressed as a percentage of I_{Pr}.

Rated short-time thermal current I_{th}

Maximum value of the primary current which the Rogowski will withstand for a specified short time without suffering harmful effects.

SPLIT CORE ROGOWSKI COIL

ART Series

Safety and warning notes

In order to guarantee safe operation of the transducer and to be able to make proper use of all features and functions, please read these instructions thoroughly!
Safe operation can only be guaranteed if the transducer is used for the purpose it has been designed for and within the limits of the technical specifications.
Ensure you get up-to-date technical information that can be found in the latest associated datasheet under www.lem.com.


Caution! Risk of danger

Ignoring the warnings can lead to serious injury and/or cause damage! The electric measuring transducer may only be installed and put into operation by qualified personnel that have received an appropriate training.
The corresponding national regulations shall be observed during installation and operation of the transducer and any electrical conductor.
The transducer shall be used in electric/electronic equipment with respect to applicable standards and safety requirements and in accordance with all the related systems and components manufacturers' operating instructions.


Caution! Risk of electrical shock

When operating the transducer, certain parts of the module may carry hazardous live voltage (e.g. primary conductor). The user shall ensure to take all measures necessary to protect against electrical shock. The transducer is a build-in device containing conducting parts that shall not be accessible after installation. A protective enclosure or additional insulation barrier may be necessary. Installation and maintenance shall be done with the main power supply disconnected except if there are no hazardous live parts in or in close proximity to the system and if the applicable national regulations are fully observed.

Safe and trouble-free operation of this transducer can only be guaranteed if transport, storage and installation are carried out correctly and operation and maintenance are carried out with care.

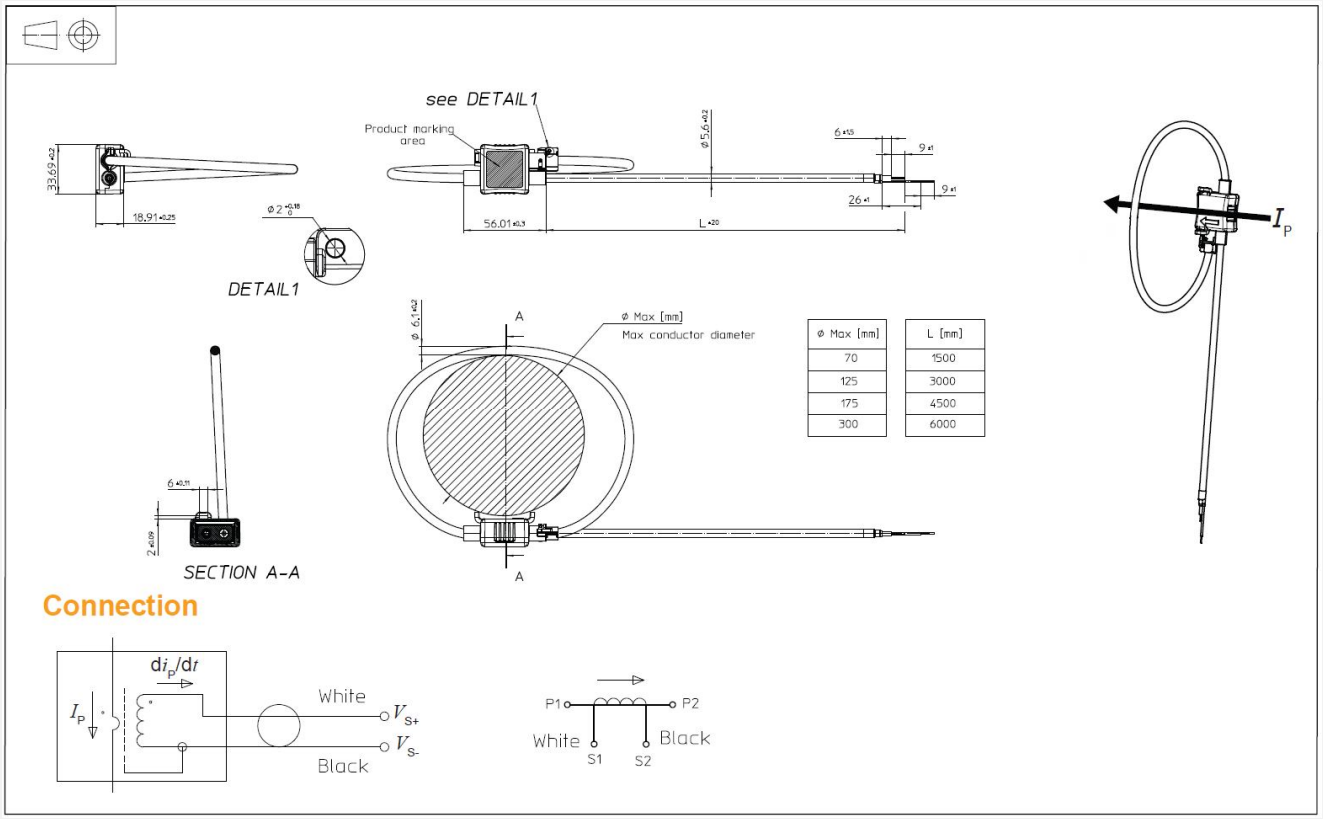

Caution! Risk of electrical shock

Do not apply around or remove from uninsulated hazardous live conductors which may result in electric shock, electric burn or arc flash.

LEM SPLIT CORE ROGOWSKI COIL

ART Series

Dimensions (in mm)



Connection

Mechanical characteristics

•• General tolerance	±1 mm
•• Output cable length	See table page 8 or drawing above
•• Termination	2 stripped wires
•• Cable tie maximum effort	50 N

Remarks

●● $U_S = V_{S+} - V_{S-}$ is positive when an increasing primary current di/dt flows in the direction of the arrow (see fig. 1).

●● Due to low positioning error (ε_P), the device does not need to be physically fastened around the primary conductor. Should the device be secured, make sure no mechanical stress is applied to the coil itself.

●● This product is not intended for outdoor use.

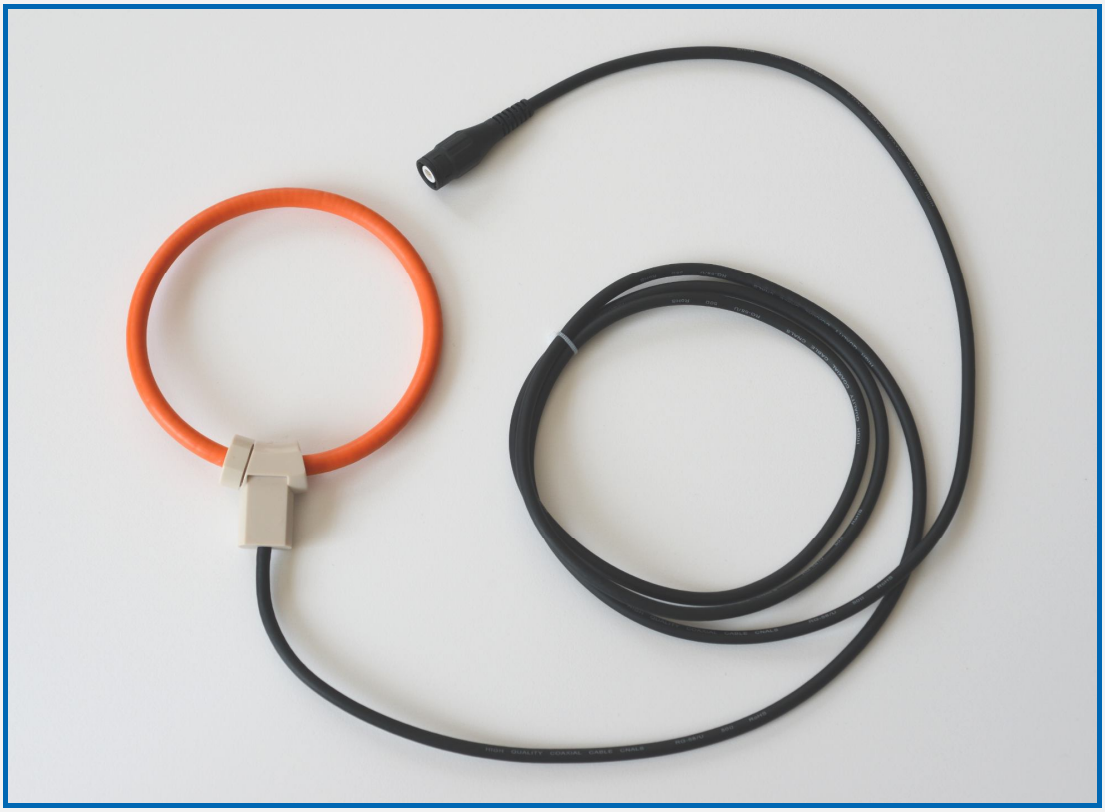
●● Installation of the transducer must be done unless otherwise specified on the datasheet, according to LEM Transducer Generic Mounting Rules. Please refer to LEM document N°ANE120504 available on our Web site: **Products/Product Documentation.**

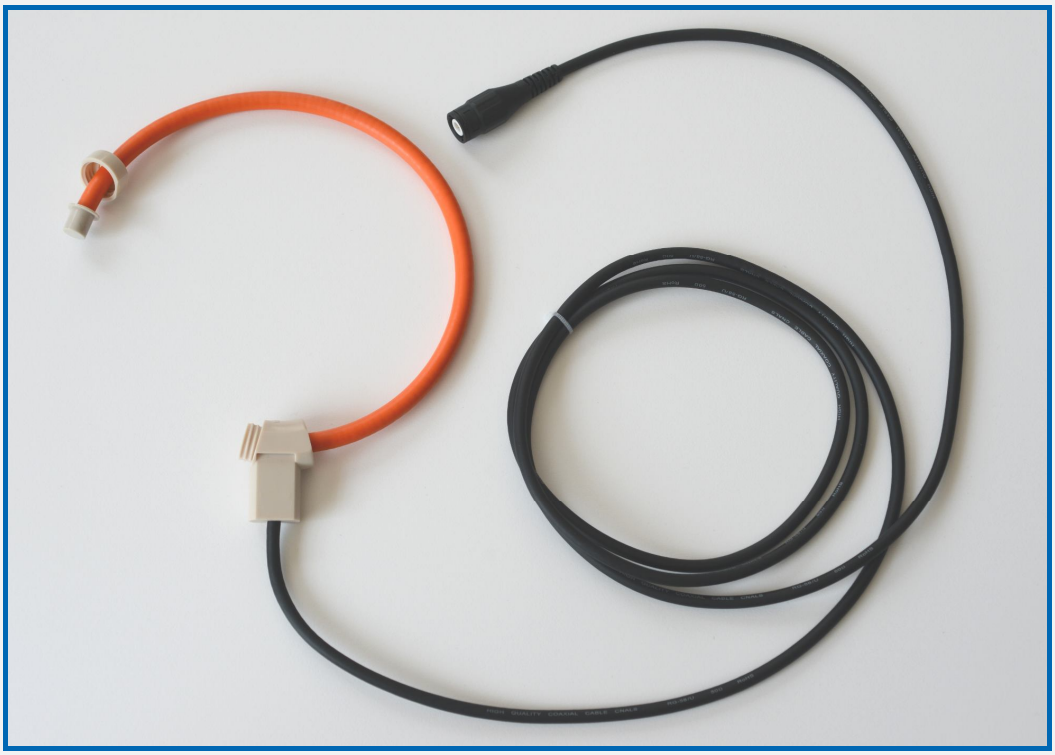
9.2 Rogowski coil (flexible current transformer) for AC intensity measurement. KIR version (model: KIR350)

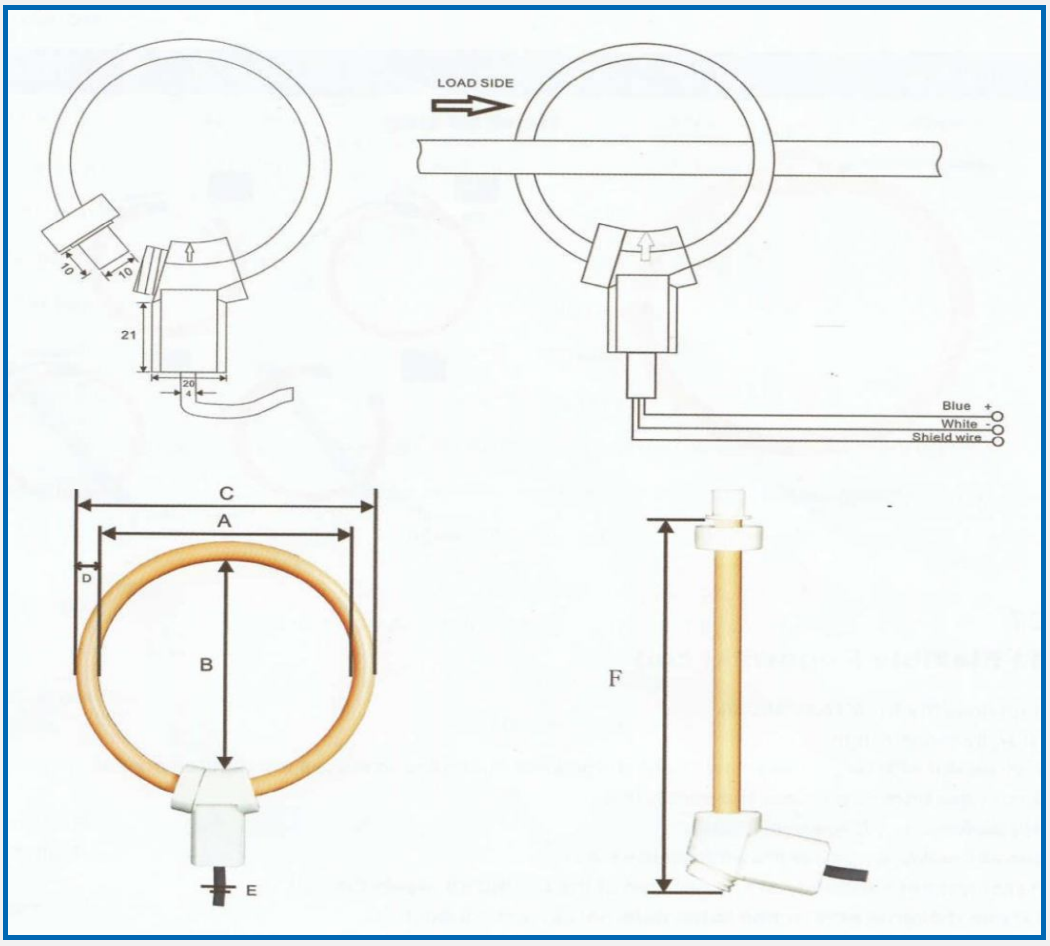
Model: KIR350 Precision 1% (diameter: 100mm, length: 2 metres)

Warning: **individually matched and adjusted for its own model and line (L1, L2 and L3). Do NOT interchange.**

Technical characteristics of the Rogowski coil (flexible current transformer) for AC intensity measurement Model: KIR350	
Current range AC	1A - 5000A
Sensitivity	100 mV/1000A @ 50 Hz
Accuracy	±1% Typical
Linearity (10% to 100% of range)	±0.2%
Phase error	≤1%
Operating temperature	-20℃to 70℃
Material	thermoplastic UL94-V0
Length	2000 mm (±10%)
Color coil	Orange
Coil length	300 - 350 mm
Inner diameter	90 - 100 mm
Frequency range/Bandwidth:	20Hz to 10KHz
Conductor position sensitivity	±2% Typical error
Inuence of external field	±2% Typical error
Ortogonal position sensitivity	±2% Typical error
Working voltage (max)	600Vrms CATIV



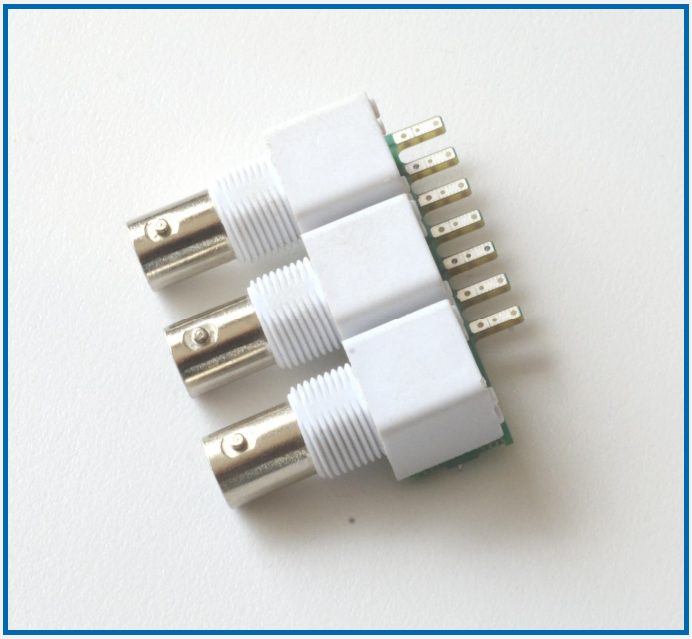




Model KIR350	
A	100 mm
B	95 mm
C	120 mm
D	8 mm
F	350 mm

9.3 BNC-TERMINALS accessory (BNC version)

Connect the 7 comb-type pins of this BNC-TERMIBALS to the unit's terminal (5, k1, k2, k3, I1, I2, I3) as indicated in the diagrams.
Tighten the 7 screws of the unit's terminals.



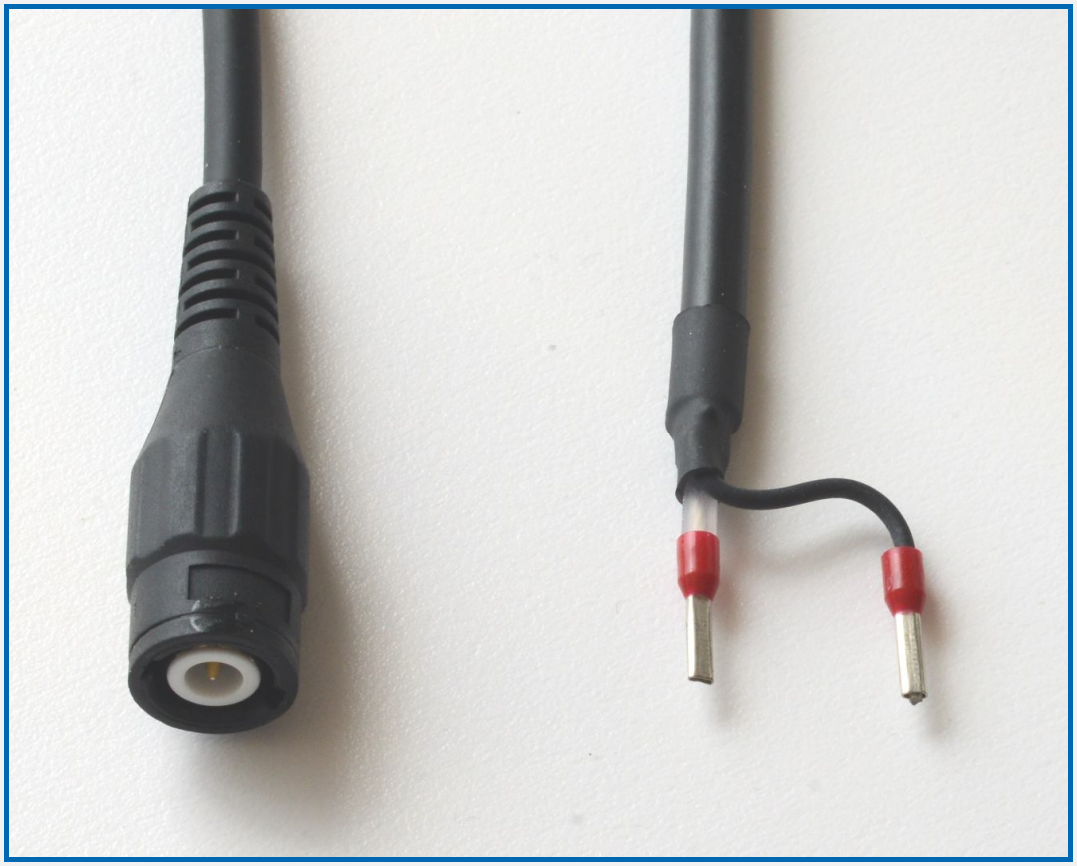
BNC L1 **BNC L2** **BNC L3**

9.4 Version: output cable terminal of the Rogowski coil (flexible current transformer)

Version: output cable terminal of the Rogowski coil (flexible current transformer)

[ ] = No suffix = Rogowski flexible coil with terminal cable output direct to core end sleeve (mass and signal)

[**BNC**] = Rogowski flexible coil with cable output: BNC connector direct to BNC-TERMINALS accessory (incluyded)



Cable with core end sleeves. Signal: transparent white. Mass: black

Chapter 10 – Guarantee

10.1 Guarantee card

GUARANTEE CARD (photocopy or print and send to Safeline)

Sureline model .....
Serial nbr .....
Date of purchase .....

Stamp of establishment where unit purchased (with complete address)

……

……

……

Complete name and address of purchaser

……

……

……

e-mail ……

Main use to which the Sureline unit is to be put .....

Notes .....

.....

I hereby authorise Safeline to keep me periodically informed ☐ Yes ☐ No

GUARANTEE

SAFELINE, S.L., as a leader in the field of electrical and electronic safety equipment endeavours to maintain an extensive service along with up-dated information to the users of its products. To this end, it is indispensable that the user fills out and returns the present guarantee further to purchase of his SURELINE unit.

Period of guarantee: three years as from date of purchase.
Conditions and application of the SURELINE guarantee: Your SURELINE unit is guaranteed against any defect of manufacture or original components as determined by our Technical Service. Any repair or substitution does not extend the guarantee period.

The guarantee covers::

- Reception of the unit for its repair or servicing.
- Cost of all components, replacements and labour on original components

The guarantee does not cover:

- Transport.
- Breakdown caused by non-original components or devices
- Defects caused by incorrect installation.
- Damage caused by incorrect usage, or errors arising from repairs and internal manipulation by unauthorised persons.
.- Consumables: fuses, thermal fuses, varistors and labour involved in replacement of same

The guarantee is automatically forfeited in the event of:

- Breakage or deterioration of the seals of any of the original SURELINE elements
- Incorrect usage due to non-observance of the recommendations given in the SURELINE manual.

Repair service: All repair service, both within and outside of the guarantee period, is by SAFELINE, S.L. and its Authorised Technical Assistance Services

Chapter 11 – Wiring diagrams

11.1 Wiring diagrams

UNIDAD UNIVERSAL+ 7WR Rogowski M4

Modelo UNIVERSAL+ 7WR Rogowski M4 500E A

CONFIGURACION TRIFASICA 4 POLOS HASTA 2.000A.

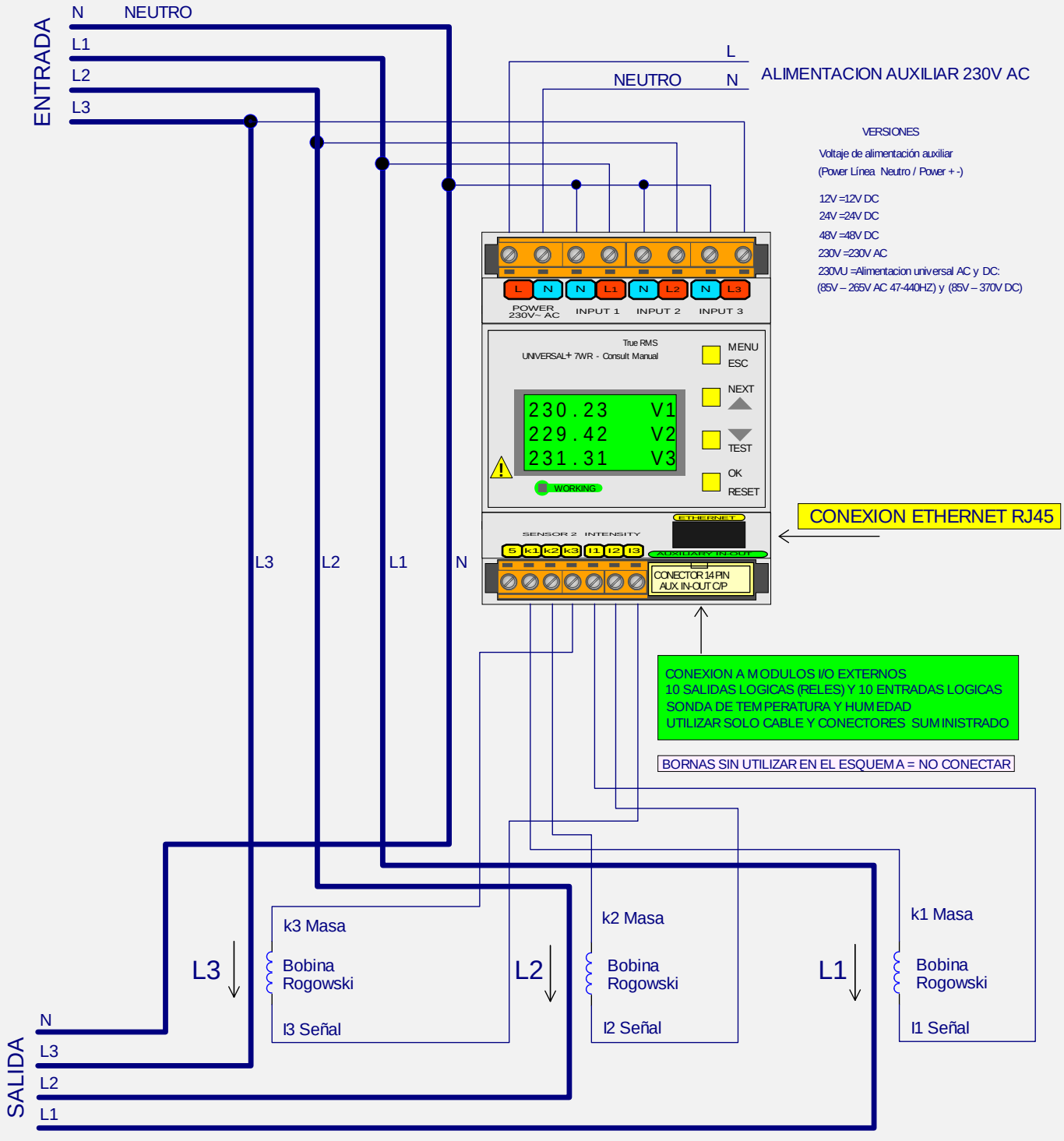
Versión transformador de intensidad de línea. Sonda bobina Rogowski (Transformador de corriente flexible) multirango

Escalas de Medidas configurables en la unida, escalas 250A, 500A, 1000A y 2000A

Versión alimentación auxiliar

ENTRADA 230 V AC ENTRE NEUTRO Y LINEAS (L1, L2, L3)

ENTRADA 400 V AC ENTRE LINEAS (L1 Y L2, L1 Y L3, L2 Y L3)



CONSULTAR MANUAL DE INSTRUCCIONES

UNIDAD UNIVERSAL+ 7WR Rogowski M4

Modelo UNIVERSAL+ 7WR Rogowski M4 500E A

CONFIGURACION TRIFASICA 3 POLOS HASTA 2.000A.

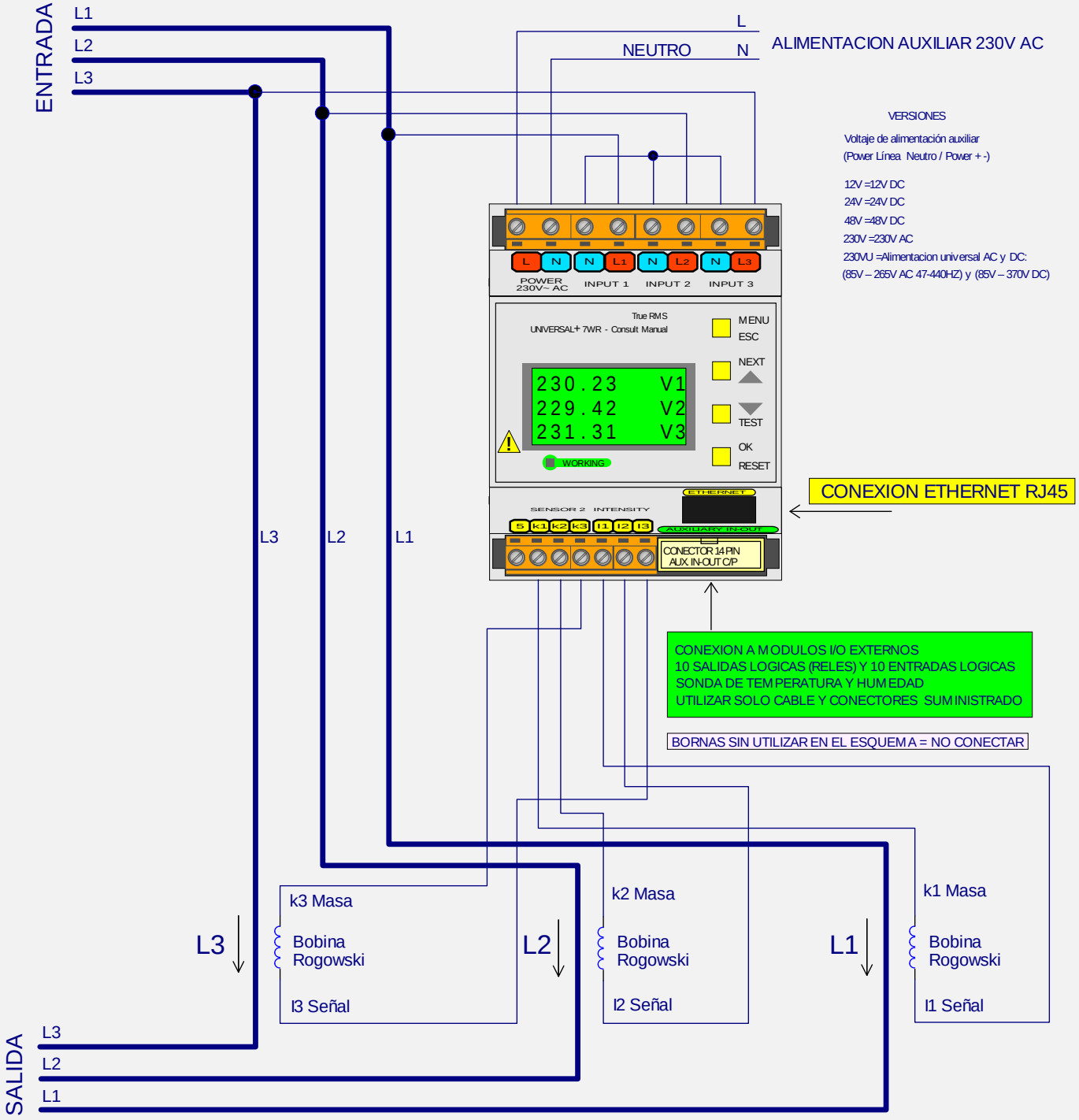
Versión transformador de intensidad de línea. Sonda bobina Rogowski (Transformador de corriente flexible) multirango

Escalas de Medidas configurables en la unida, escalas 250A, 500A, 1000A y 2000A

Versión alimentación auxiliar

Medida mediante Neutro ficticio

ENTRADA 400 V AC ENTRE LINEAS (L1 Y L2, L1 Y L3, L2 Y L3)



CONSULTAR MANUAL DE INSTRUCCIONES

UNIDAD UNIVERSAL+ 7WR Rogowski M4

Modelo UNIVERSAL+ 7WR Rogowski M4 1000E A

CONFIGURACION TRIFASICA 4 POLOS HASTA 2.000A.

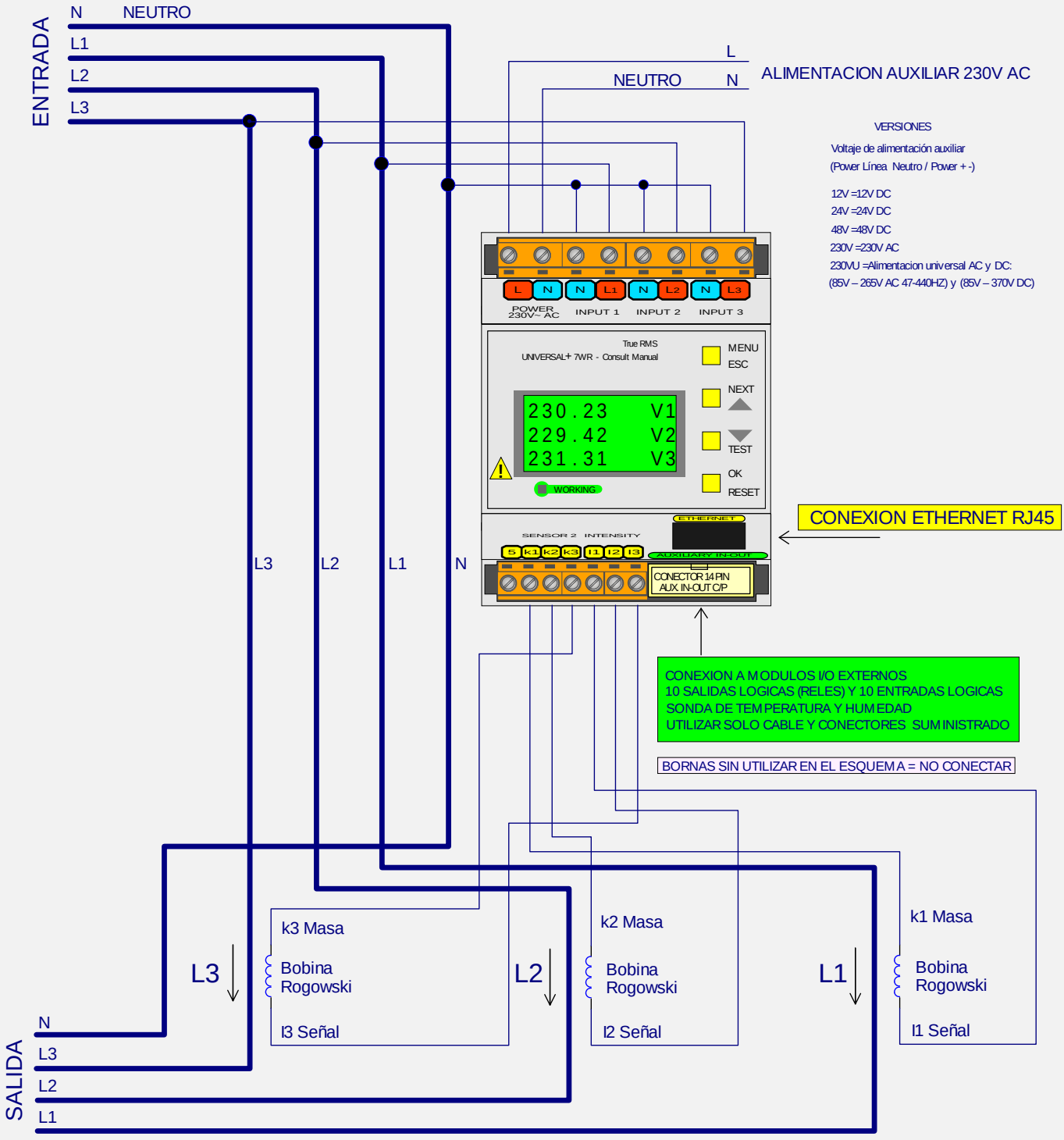
Versión transformador de intensidad de línea. Sonda bobina Rogowski (Transformador de corriente flexible) multirango

Escalas de Medidas configurables en la unida, escalas 250A, 500A, 1000A y 2000A

Versión alimentación auxiliar

ENTRADA 400 V AC ENTRE NEUTRO Y LINEAS (L1, L2, L3)

ENTRADA 690 V AC ENTRE LINEAS (L1 Y L2, L1 Y L3, L2 Y L3)



CONSULTAR MANUAL DE INSTRUCCIONES

UNIDAD UNIVERSAL+ 7WR Rogowski M4

Modelo UNIVERSAL+ 7WR Rogowski M4 1000E A

CONFIGURACION TRIFASICA 3 POLOS HASTA 2.000A.

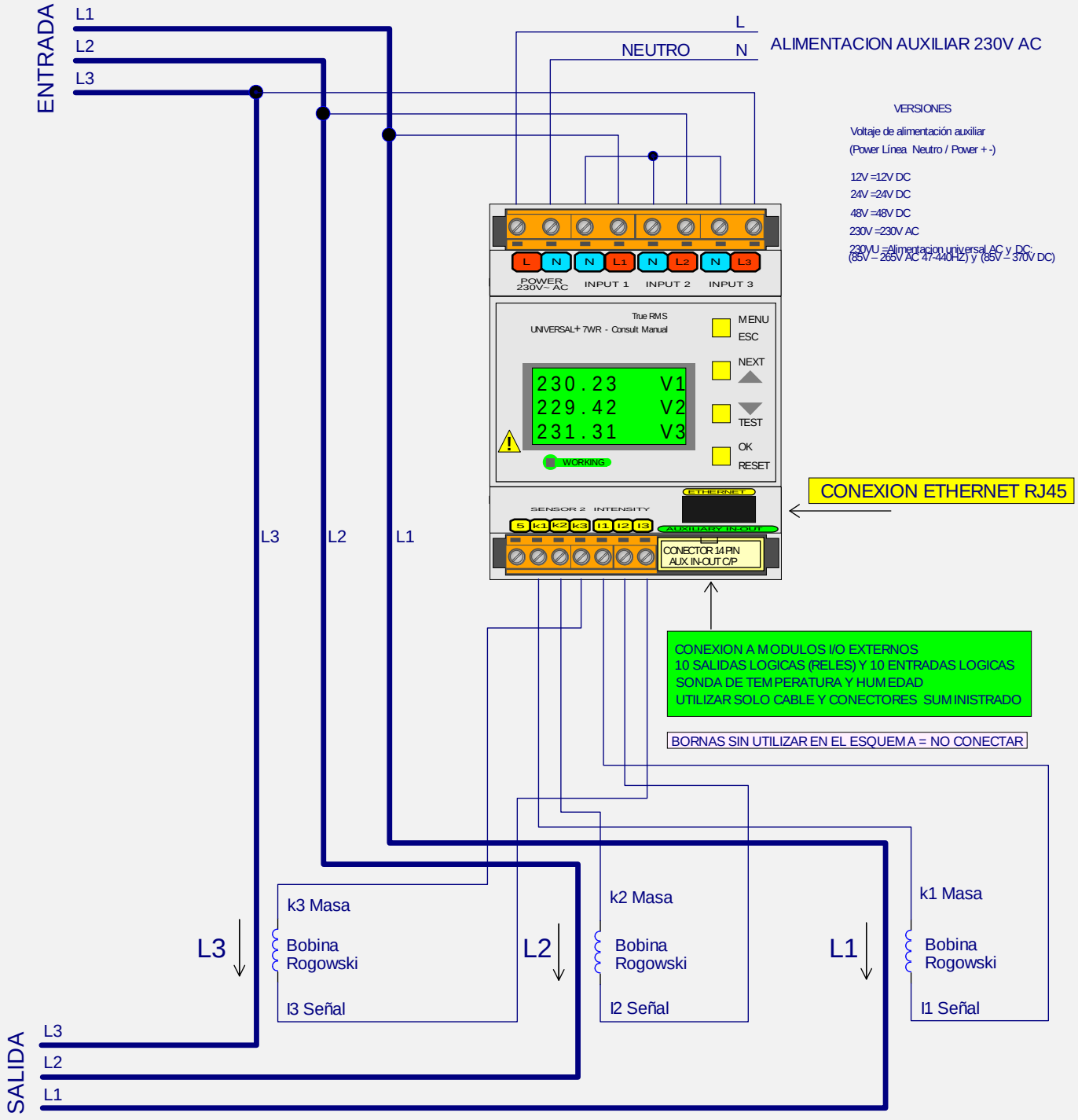
Versión transformador de intensidad de línea. Sonda bobina Rogowski (Transformador de corriente flexible) multirango

Escalas de Medidas configurables en la unida, escalas 250A, 500A, 1000A y 2000A

Versión alimentación auxiliar

Medida mediante Neutro ficticio

ENTRADA 690 V AC ENTRE LINEAS (L1 Y L2, L1 Y L3, L2 Y L3)



CONSULTAR MANUAL DE INSTRUCCIONES

UNIDAD UNIVERSAL+ 7WR Rogowski M4 (Sin Display)

Modelo UNIVERSAL+ 7WR Rogowski M4 500E A

CONFIGURACION TRIFASICA 4 POLOS HASTA 2.000A.

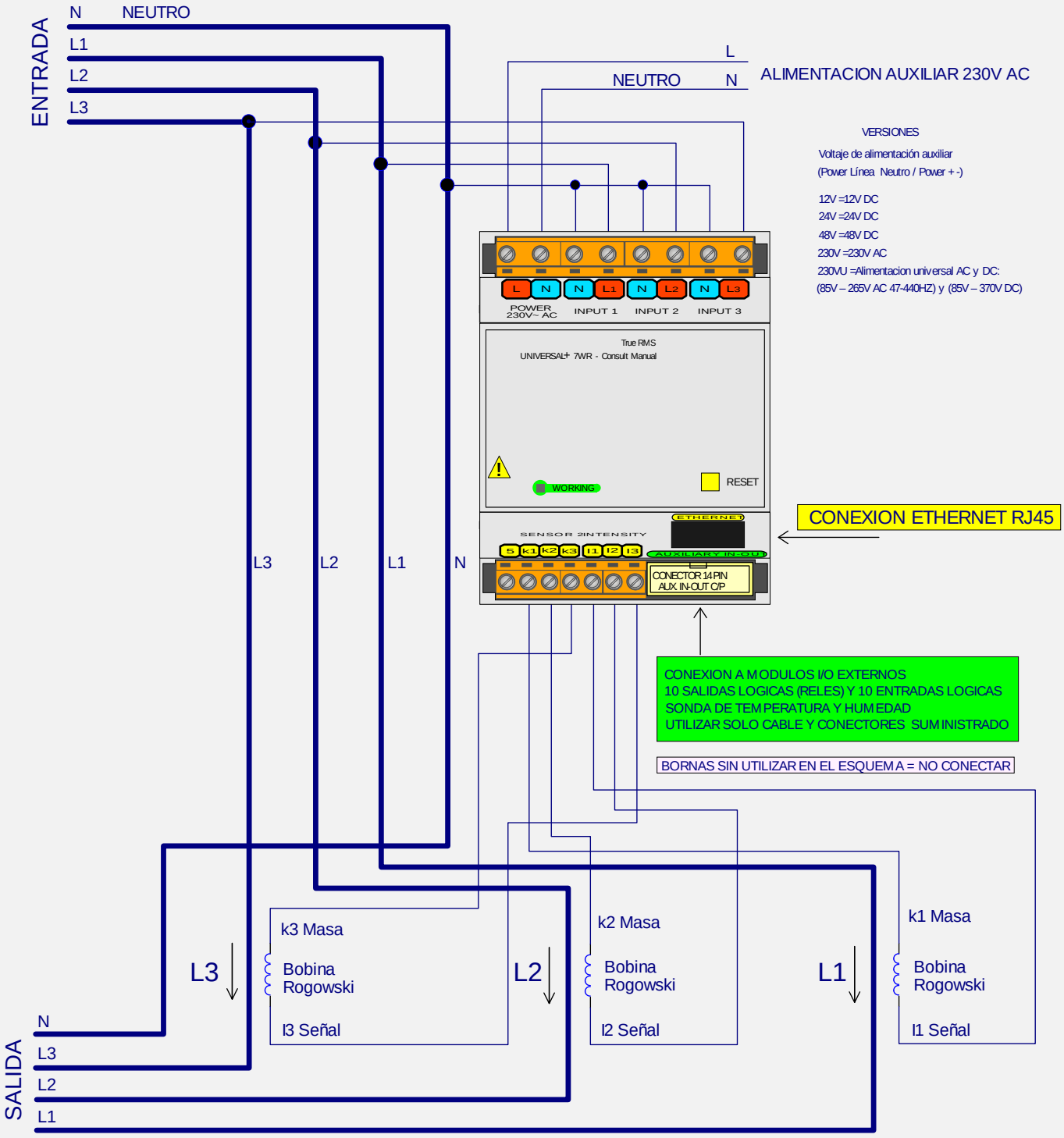
Versión transformador de intensidad de línea. Sonda bobina Rogowski (Transformador de corriente flexible) multirango

Escalas de Medidas configurables en la unida, escalas 250A, 500A, 1000A y 2000A

Versión alimentación auxiliar

ENTRADA 230 V AC ENTRE NEUTRO Y LINEAS (L1, L2, L3)

ENTRADA 400 V AC ENTRE LINEAS (L1 Y L2, L1 Y L3, L2 Y L3)



CONSULTAR MANUAL DE INSTRUCCIONES

Chapter 12 – Modbus TCP/IP communication protocol, Port 502 (please, refer to synoptical tables of characteristics)

Modbus TCP/IP:

Modbus is a communication protocol located at layer 7 of the OSI Model, based on the master/slave o client/server architecture designed in 1979 by Modicon for its range of programmable logic controllers (PLC's). It has become a "de facto" standard within the industrial manufacturing environment and is the most widely used for the connection of industrial electronic devices.

The Modbus TCP/IP protocol transmits via Ethernet port 502.

For further information, consult the specifications and guidelines at "The Modbus Organization" website: http://www.modbus.org/.

1. Modbus messaging on TCP/IP implementation guide V1.0b
2. Modbus application protocol specification V1.1b3

Attention!
The commands, tables, data, measurements, etc in light grey herebelow are not enabled in this version.

Modbus supported commands

01 (0x01h)	**Read Coils** / Reading of digital outputs status
02 (0x02h)	**Read Discrete Inputs** / Reading of digital inputs status
04 (0x04h)	**Read Input Registers** / Reading of a register
05 (0x05h)	**Write Single Coil** / Writing of the status of a digital output
06 (0x06h)	**Write Single Register** / Writing of a register

Modbus tables

0:0001	Digital outputs (relays)	Commands: 01 and 05	Read / write
1:0001	Digital inputs	Command: 02	Read
3:0001	General measurements and values	Command: 04	Read
4:0001	Command	Command: 06	Write only

Types of data

Bit	Refers to binary
UWord16	Hexadecimal number, 16-bit unsigned integer, uses 1 memory address. Register with 2 bytes of memory in **big-endian** format. Example: 1234h will be sent as 12, 34. The most significant byte first.
Word16	Hexadecimal number, 16-bit signed integer, uses 1 memory address. Register with 2 bytes of memory in **big-endian** format. Example: 1234h will be sent as 12, 34. The most significant byte first.
UWord32	Hexadecimal number, 32-bit unsigned integer, uses 2 memory addresses. Register with 4 bytes of memory (2-word) in **little-endian** format. Example: 12345678h will be sent as 56, 78, 12, 34. The least significant word first.
UWord48	Hexadecimal number, 48-bit unsigned integer, uses 3 memory addresses. Register with 6 bytes of memory (3-word) in **little-endian** format. Example: 112233445566h will be sent as 55, 66, 33, 44, 11, 22. The least significant word first.
BCD16	Decimal number, 16-bit binary-coded, uses 1 memory address. Register with 2 bytes of memory in **big-endian** format. Used solely for writing user PIN. Varies from 0000 to 9999 decimal. Example: User PIN = 1234d, 1234h in BCD. Will be sent as 12, 34. The most significant byte first.

Table 3:0001, *accessible with function code 0x04h (Read input registers).*

Modbus registers (Dec)	Modbus addresses (Hex)	Nbr. of registers	Type of data	Description	Scaling	Units
Temperature and relative humidity						
1	0000	1	Word16	TEMP, Temperature	1/100	ºC
2	0001	1	UWord16	HUME, Relative humidity	1/100	%Hr
Measurements						
3	0002	2	UWord32	VRMS1, RMS voltage L1	1/100	V
5	0004	2	UWord32	VRMS2, RMS voltage L2	1/100	V
7	0006	2	UWord32	VRMS3, RMS voltage L3	1/100	V
9	0008	2	UWord32	VPk1, Pk voltage L1	1/100	V
11	000A	2	UWord32	VPk2, Pk voltage L2	1/100	V
13	000C	2	UWord32	VPk3, Pk voltage L3	1/100	V
15	000E	1	UWord16	ID, RMS differential intensity	1/10	mA
16	000F	1	UWord16	IDPk, Pk differential intensity	1/10	mA
17	0010	2	UWord32	V12, RMS voltage phases L1 and L2	1/100	V
19	0012	2	UWord32	V23, RMS voltage phases L2 and L3	1/100	V
21	0014	2	UWord32	V31, RMS voltage phases L3 and L1	1/100	V
23	0016	2	UWord32	I1, RMS intensity L1	1/1000	A
25	0018	2	UWord32	I2, RMS intensity L2	1/1000	A
27	001A	2	UWord32	I3, RMS intensity L3	1/1000	A
29	001C	2	UWord32	IPk1, Pk intensity L1	1/1000	A
31	001E	2	UWord32	IPk2, Pk intensity L2	1/1000	A
33	0020	2	UWord32	IPk3, Pk intensity L3	1/1000	A
35	0022	1	UWord16	HZ1, Frequency L1	1/10	Hz
36	0023	1	UWord16	HZ2, Frequency L2	1/10	Hz
37	0024	1	UWord16	HZ3, Frequency L3	1/10	Hz
38	0025	2	UWord32	W1, Active power L1	1/10	W
40	0027	2	UWord32	W2, Active power L2	1/10	W
42	0029	2	UWord32	W3, Active power L3	1/10	W
44	002B	2	UWord32	W123, Sum L1+L2+L3	1/10	W
46	002D	2	UWord32	WP1, Requested power L1	1/10	W
48	002F	2	UWord32	WP2, Requested power L2	1/10	W
50	0031	2	UWord32	WP3, Requested power L3	1/10	W
52	0033	2	UWord32	WP123, Sum L1+L2+L3	1/10	W
54	0035	2	UWord32	WN1, Returned power L1	1/10	W
56	0037	2	UWord32	WN2, Returned power L2	1/10	W
58	0039	2	UWord32	WN3, Returned power L3	1/10	W
60	003B	2	UWord32	WN123, Sum L1+L2+L3	1/10	W
62	003D	2	UWord32	VA1, Apparent power L1	1/10	VA
64	003F	2	UWord32	VA2, Apparent power L2	1/10	VA
66	0041	2	UWord32	VA3, Apparent power L3	1/10	VA
68	0043	2	UWord32	VA123, Sum L1+L2+L3	1/10	VA
70	0045	2	UWord32	VARL1, Reactive inductive power L1	1/10	Var
72	0047	2	UWord32	VARL2, Reactive inductive power L2	1/10	VAr
74	0049	2	UWord32	VARL3, Reactive inductive power L3	1/10	VAr
76	004B	2	UWord32	VARL123, Sum L1+L2+L3	1/10	VAr
78	004D	2	UWord32	VARC1, Reactive capacitive power L1	1/10	VAr

80	004F	2	UWord32	VARC2, Reactive capacitive power L2	1/10	VAr
82	0051	2	UWord32	VARC3, Reactive capacitive power L3	1/10	VAr
84	0053	2	UWord32	VARC123, Sum L1+L2+L3	1/10	VAr
86	0055	1	UWord16	PF1, Power factor L1	1/1000	%
87	0056	1	UWord16	PF2, Power factor L2	1/1000	%
88	0057	1	UWord16	PF3, Power factor L3	1/1000	%
89	0058	1	UWord16	DESV1, Voltage unbalance L1	1/10	%
90	0059	1	UWord16	DESV2, Voltage unbalance L2	1/10	%
91	005A	1	UWord16	DESV3, Voltage unbalance L3	1/10	%
92	005B	1	UWord16	DESI1, Intensity unbalance L1	1/10	%
93	005C	1	UWord16	DESI2, Intensity unbalance L2	1/10	%
94	005D	1	UWord16	DESI3, Intensity unbalance L3	1/10	%
95	005E	2	UWord32	IN, neutral intensity	1/1000	A
97	0060	1	UWord16	CFV1, Crest factor V1	1/1000	
98	0061	1	UWord16	CFV2, Crest factor V2	1/1000	
99	0062	1	UWord16	CFV3, Crest factor V3	1/1000	
100	0063	1	UWord16	CFI1, Crest factor I1	1/1000	
101	0064	1	UWord16	CFI2, Crest factor I2	1/1000	
102	0065	1	UWord16	CFI3, Crest factor I3	1/1000	
103	0066	2	UWord32	Z1, Impedance L1	1/100	
105	0068	2	UWord32	Z2, Impedance L2	1/100	
107	006A	2	UWord32	Z3, Impedance L3	1/100	
109	006C	2	UWord32	Maximeter W1	1/10	W
111	006E	2	UWord32	Maximeter W2	1/10	W
113	0070	2	UWord32	Maximeter W3	1/10	W
Measurements with harmonics *(cf. Table 4:0001 to select channel and harmonic k)*						
115	0072	1	UWord16	THDV1, Harmonic distortion V1	1/10	%
116	0073	1	UWord16	THDV2, Harmonic distortion V2	1/10	%
117	0074	1	UWord16	THDV3, Harmonic distortion V3	1/10	%
118	0075	1	UWord16	THDI1, Harmonic distortion I1	1/10	%
119	0076	1	UWord16	THDI2, Harmonic distortion I2	1/10	%
120	0077	1	UWord16	THDI3, Harmonic distortion I3	1/10	%
121	0078	1	UWord16	FP1(k), Power factor harmonic k L1. CosΦ1 if k=1.	1/1000	%
122	0079	1	UWord16	FP2(k), Power factor harmonic k L1. CosΦ2 if k=1.	1/1000	%
123	007A	1	UWord16	FP3(k), Power factor harmonic k L1. CosΦ3 if k=1.	1/1000	%
124	007B	2	UWord32	W1(k), Power harmonic k L1	1/10	W
126	007D	2	UWord32	W2(k), Power harmonic k L2	1/10	W
128	007F	2	UWord32	W3(k), Power harmonic k L3	1/10	W
130	0081	2	UWord32	W123(k), Sum L1+L2+L3	1/10	W
132	0083	2	UWord32	V1(k), Voltage harmonic k L1	1/100	V
134	0085	2	UWord32	V2(k), Voltage harmonic k L2	1/100	V
136	0087	2	UWord32	V3(k), Voltage harmonic k L3	1/100	V
138	0089	2	UWord32	I1(k), Intensity harmonic k L1	1/1000	A
140	008B	2	UWord32	I2(k), Intensity harmonic k L2	1/1000	A
142	008D	2	UWord32	I3(k), Intensity harmonic k L3	1/1000	A
144	008F	2	UWord32	S1(k), Apparent power harmonic k L1	1/10	Var o S
146	0091	2	UWord32	S2(k), Apparent power harmonic k L2	1/10	Var o S
148	0093	2	UWord32	S3(k), Apparent power harmonic k L3	1/10	Var o S
150	0095	64	UWord16 * 64	HDF, Factor de harmonic distortion. k = (0...63). *(depending on channel selected)*	1/10	%

AC-DC measurements – voltage, intensity and power (Please, go to end of table for differential intensit)						
214	00D5	2	UWord32	V1dc, DC voltage L1	1/100	V
216	00D7	2	UWord32	V2dc, DC voltage L2	1/100	V
218	00D9	2	UWord32	V3dc, DC voltage L3	1/100	V
220	00DB	2	UWord32	I1dc, DC intensity L1	1/1000	A
222	00DD	2	UWord32	I2dc, DC intensity L2	1/1000	A
224	00DF	2	UWord32	I3dc, DC intensity L3	1/1000	A
226	00E1	2	UWord32	V1ac, AC voltage L1	1/100	V
228	00E3	2	UWord32	V2ac, AC voltage L2	1/100	V
230	00E5	2	UWord32	V3ac, AC voltage L3	1/100	V
232	00E7	2	UWord32	I1ac, AC intensity L1	1/1000	A
234	00E9	2	UWord32	I2ac, AC intensity L2	1/1000	A
236	00EB	2	UWord32	I3ac, AC intensity L3	1/1000	A
238	00ED	2	UWord32	P1dc, DC power L1	1/10	W
240	00EF	2	UWord32	P2dc, DC power L2	1/10	W
242	00F1	2	UWord32	P3dc, DC power L3	1/10	W
244	00F3	2	UWord32	P1ac, AC power L1	1/10	W
246	00F5	2	UWord32	P2ac, AC power L2	1/10	W
248	00F7	2	UWord32	P3ac, AC power L3	1/10	W
Maximum temperature and relative humidity						
250	00F9	1	Word16	MAX_TEMP, Maximum TEMP	1/100	ºC
251	00FA	1	UWord16	MAX_HUME, Maximum HUME	1/100	%Hr
Maximum measurements						
252	00FB	2	UWord32	MAX_V1, Maximum V1	1/100	V
254	00FD	2	UWord32	MAX_V2, Maximum V2	1/100	V
256	00FF	2	UWord32	MAX_V3, Maximum V3	1/100	V
258	0101	1	UWord16	MAX_ID, Maximum ID	1/10	mA
259	0102	2	UWord32	MAX_I1, Maximum I1	1/1000	A
261	0104	2	UWord32	MAX_I2, Maximum I2	1/1000	A
263	0106	2	UWord32	MAX_I3, Maximum I3	1/1000	A
265	0108	2	UWord32	MAX_IN, Maximum IN	1/1000	A
267	010A	1	UWord16	MAX_HZ1, Maximum HZ1	1/10	Hz
268	010B	1	UWord16	MAX_HZ2, Maximum HZ2	1/10	Hz
269	010C	1	UWord16	MAX_HZ3, Maximum HZ3	1/10	Hz
270	010D	2	UWord32	MAX_MAXW1, Maximum Maximeter W1	1/10	W
272	010F	2	UWord32	MAX_MAXW2, Maximum Maximeter W2	1/10	W
274	0111	2	UWord32	MAX_MAXW3, Maximum Maximeter W3	1/10	W
276	0113	2	UWord32	MAX_VA1, Maximum VA1	1/10	VA
278	0115	2	UWord32	MAX_VA2, Maximum VA2	1/10	VA
280	0117	2	UWord32	MAX_VA3, Maximum VA3	1/10	VA
282	0119	2	UWord32	MAX_VARC1, Maximum VARC1	1/10	VAr
284	011B	2	UWord32	MAX_VARC2, Maximum VARC2	1/10	VAr
286	011D	2	UWord32	MAX_VARC3, Maximum VARC3	1/10	VAr
288	011F	2	UWord32	MAX_VARL1, Maximum VARL1	1/10	VAr
290	0121	2	UWord32	MAX_VARL2, Maximum VARL2	1/10	VAr
292	0123	2	UWord32	MAX_VARL3, Maximum VARL3	1/10	VAr
294	0125	1	UWord16	MAX_DESV1, Maximum DESV1	1/10	%
295	0126	1	UWord16	MAX_DESV2, Maximum DESV2	1/10	%
296	0127	1	UWord16	MAX_DESV3, Maximum DESV3	1/10	%

297	0128	1	UWord16	MAX_DESI1, Maximum DESI1	1/10	%
298	0129	1	UWord16	MAX_DESI2, Maximum DESI2	1/10	%
299	012A	1	UWord16	MAX_DESI3, Maximum DESI3	1/10	%
300	012B	1	UWord16	MAX_THDV1, Maximum THDV1	1/10	%
301	012C	1	UWord16	MAX_THDV2, Maximum THDV2	1/10	%
302	012D	1	UWord16	MAX_THDV3, Maximum THDV3	1/10	%
303	012E	1	UWord16	MAX_THDI1, Maximum THDI1	1/10	%
304	012F	1	UWord16	MAX_THDI2, Maximum THDI2	1/10	%
305	0130	1	UWord16	MAX_THDI3, Maximum THDI3	1/10	%
Minimum temperature and relative humidity						
306	0131	1	Word16	MIN_TEMP, Minimum TEMP	1/100	ºC
307	0132	1	UWord16	MIN_HUME, Minimum HUME	1/100	%Hr
Minimum measurements						
308	0133	2	UWord32	MIN_V1, Minimum V1	1/100	V
310	0135	2	UWord32	MIN_V2, Minimum V2	1/100	V
312	0137	2	UWord32	MIN_V3, Minimum V3	1/100	V
314	0139	1	UWord16	MIN_HZ1, Minimum HZ1	1/10	Hz
315	013A	1	UWord16	MIN_HZ2, Minimum HZ2	1/10	Hz
316	013B	1	UWord16	MIN_HZ3, Minimum HZ3	1/10	Hz
Energy counters						
317	013C	3	UWord48	KWH1+, Active imported energy counter L1	1/10000	kWh1+
320	013F	3	UWord48	KWH2+, Active imported energy counter L2	1/10000	kWh2+
323	0142	3	UWord48	KWH3+, Active imported energy counter L3	1/10000	kWh3+
326	0145	3	UWord48	KWH123+, Sum L1+L2+L3	1/10000	kWh+
329	0148	3	UWord48	KWH1-, Active exported energy counter L1	1/10000	kWh1-
332	014B	3	UWord48	KWH2-, Active exported energy counter L2	1/10000	kWh2-
335	014E	3	UWord48	KWH3-, Active exported energy counter L3	1/10000	kWh3-
338	0151	3	UWord48	KWH123+, Sum L1+L2+L3	1/10000	kWh-
341	0154	3	UWord48	KQH1, Reactive energy counter L1	1/10000	kQh1
344	0157	3	UWord48	KQH2, Reactive energy counter L2	1/10000	kQh2
347	015A	3	UWord48	KQH3, Reactive energy counter L3	1/10000	kQh3
350	015D	3	UWord48	KQH123, Sum L1+L2+L3	1/10000	kQh
Cut-off counters by type *(Alarm counters)*						
353	0160	1	UWord16	CN_STEMP, Over-temperature cut-off counter		
354	0161	1	UWord16	CN_ITEMP, Low temperature cut-off counter		
355	0162	1	UWord16	CN_SHUME, Over-humidity cut-off counter		
356	0163	1	UWord16	CN_IHUME, Low humidity cut-off counter		
357	0164	1	UWord16	CN_ST1, Cut-off counter over V1		
358	0165	1	UWord16	CN_ST2, Cut-off counter over V2		
359	0166	1	UWord16	CN_ST3, Cut-off counter over V3		
360	0167	1	UWord16	CN_IT1, Cut-off counter low V1		
361	0168	1	UWord16	CN_IT2, Cut-off counter low V2		
362	0169	1	UWord16	CN_IT3, Cut-off counter low V3		
363	016A	1	UWord16	CN_I1, Cut-off counter I1		
364	016B	1	UWord16	CN_I2, Cut-off counter I2		
365	016C	1	UWord16	CN_I3, Cut-off counter I3		
366	016D	1	UWord16	CN_ID, Cut-off counter ID		
367	016E	1	UWord16	CN_DESV1, Cut-off counter DESV1		

368	016F	1	UWord16	CN_DESV2, Cut-off counter DESV2		
369	0170	1	UWord16	CN_DESV3, Cut-off counter DESV3		
370	0171	1	UWord16	CN_DESI1, Cut-off counter DESI1		
371	0172	1	UWord16	CN_DESI2, Cut-off counter DESI2		
372	0173	1	UWord16	CN_DESI3, Cut-off counter DESI3		
373	0174	1	UWord16	CN_INEUTRO, Cut-off counter INEUTRO		
374	0175	1	UWord16	CN_VA1, Cut-off counter POTENCIA VA1		
375	0176	1	UWord16	CN_VA2, Cut-off counter POTENCIA VA2		
376	0177	1	UWord16	CN_VA3, Cut-off counter POTENCIA VA3		
377	0178	1	UWord16	CN_W1, Cut-off counter POTENCIA W1		
378	0179	1	UWord16	CN_W2, Cut-off counter POTENCIA W2		
379	017A	1	UWord16	CN_W3, Cut-off counter POTENCIA W3		
380	017B	1	UWord16	CN_THDV1, Cut-off counter THDV1		
381	017C	1	UWord16	CN_THDV2, Cut-off counter THDV2		
382	017D	1	UWord16	CN_THDV3, Cut-off counter THDV3		
383	017E	1	UWord16	CN_THDI1, Cut-off counter THDI1		
384	017F	1	UWord16	CN_THDI2, Cut-off counter THDI2		
385	0180	1	UWord16	CN_THDI3, Cut-off counter THDI3		
386	0181	1	UWord16	CN_SHZ1, Cut-off counter over HZ1		
387	0182	1	UWord16	CN_SHZ2, Cut-off counter over HZ2		
388	0183	1	UWord16	CN_SHZ3, Cut-off counter over HZ3		
389	0184	1	UWord16	CN_IHZ1, Cut-off counter low HZ1		
390	0185	1	UWord16	CN_IHZ2, Cut-off counter low HZ2		
391	0186	1	UWord16	CN_IHZ3, Cut-off counter low HZ3		
392	0187	1	UWord16	CN_PF1, Cut-off counter PF1		
393	0188	1	UWord16	CN_PF2, Cut-off counter PF2		
394	0189	1	UWord16	CN_PF3, Cut-off counter PF3		
395	018A	1	UWord16	CN_SF, Cut-off counter: phase sequence		
396	018B	1	UWord16	CN_MCB, Cut-off counter: MCB		
397	018C	1	UWord16	CN_PH, Cut-off counter: time programmer		
398	018D	1	UWord16	CN_RIN1, Cut-off counter: Remote input 1		
399	018E	1	UWord16	CN_RIN2, Cut-off counter: Remote input 2		
400	018F	1	UWord16	CN_BLOCK, Block counter		
401	0190	1	UWord16	CN_POFF, Cut-off counter: power failure 230Vac		
402	0191	1	UWord16	CN_TOTAL, Sum of all the counters		
403	0192	1	UWord16	CN_ACCUM, Cut-off counter (undeletable)		
Counters: transients/dips per line						
404	0193	1	UWord16	CN_TH_L1, Counter; transients/dips in L1		
405	0194	1	UWord16	CN_TH_L2, Counter; transients/dips in L2		
406	0195	1	UWord16	CN_TH_L3, Counter; transients/dips in L3		
Status digital outputs, internal relays A and B *(Also accessible from table 0:0001, read/write)*						
407	0196	1	UWord16	Bit 0, Status of relay A Bit 1, Status of relay B		
Status digital outputs, external modules 1 and 2 *(Also accessible from table 0:0001, read/write)*						

408	0197	1	UWord16	Bit 0, Status of relay 1 external module 1 Bit 1, Status of relay 2 external module 1 Bit 2, Status of relay 3 external module 1 Bit 3, Status of relay 4 external module 1 Bit 4, Status of relay 1 external module 2 Bit 5, Status of relay 2 external module 2 Bit 6, Status of relay 3 external module 2 Bit 7, Status of relay 4 external module 2		
Status digital inputs, external modules 1 and 2 *(Also accessible from table 1:0001, read)*						
409	0198	1	UWord16	Bit 0, Status of input 1 external module 1 Bit 1, Status of input 2 external module 1 Bit 2, Status of input 3 external module 1 Bit 3, Status of input 4 external module 1 Bit 4, Status of input 1 external module 2 Bit 5, Status of input 2 external module 2 Bit 6, Status of input 3 external module 2 Bit 7, Status of input 4 external module 2		
Status digital inputs, remote inputs 1 and 2 *(Also accessible from table 1:0001, read)*						
410	0199	1	UWord16	Bit 0, Status remote input 1 Bit 1, Status remote input 2		
AC-DC measurements – differential intensity (Version HP)						
411	019A	1	UWord16	ID, differential intensity - AC	1/10	mA
412	019B	1	UWord16	ID, differential intensity - DC	1/10	mA

Table 4:0001, *accessible with function code 0x06h (**Write** single register).*

Writing in logs 2 to 10 will only be effective if the user PIN has been previously written in log 1 otherwise the function will show error with exception code 0x01h. In order to delete the user PIN, re-write log 1 as a value of 0x0000h.

Modbus registers (Dec)	Modbus addresses (Hex)	Nbr Registers	Type data	Description
User PIN				
1	0000	1	BCD16	User PIN / Password
Commands				
2	0001	1	UWord16	= 0x0000h, Reset maximum measurements and maximeters W1 W2 W3
3	0002	1	UWord16	= 0x0000h, Reset minimum measurements
4	0003	1	UWord16	= 0x0000h, Reset to zero of energy counters
5	0004	1	UWord16	= 0x0000h, Reset to zero of cut-off counters
6	0005	1	UWord16	= 0x0000h, Unblocking and reset of reclosures
7	0006	1	UWord16	Selector harmonic k. 0x0000h ≤ k ≤ 0x003Fh Measurement V, I, W and FP/Cosfi(k=1) of harmonic k.
8	0007	1	UWord16	Selector channel measurement harmonic distortion factor V1=00h, V2=02h, V3=04h, I1=06h, I2=08h, I3=0Ah. Measurement of all harmonics from 0 to 63
9	0008	1	UWord16	Bit 0 = 1, Disable internal relay A Bit 1 = 1, Disable internal relay B Bit 2 Bit 3 Bit 4 Bit 5 Bit 6 Bit 7 Bit 8 = 1, Enable internal relay A Bit 9 = 1, Enable internal relay B Bit A Bit B Bit C Bit D Bit E Bit F

10	0009	1	UWord16	Bit 0 = 1, Disable relay 1 of external module 1 Bit 1 = 1, Disable relay 2 of external module 1 Bit 2 = 1, Disable relay 3 of external module 1 Bit 3 = 1, Disable relay 4 of external module 1 Bit 4 = 1, Disable relay 1 of external module 2 Bit 5 = 1, Disable relay 2 of external module 2 Bit 6 = 1, Disable relay 3 of external module 2 Bit 7 = 1, Disable relay 4 of external module 2 Bit 8 = 1, Enable relay 1 of external module 1 Bit 9 = 1, Enable relay 2 of external module 1 Bit A = 1, Enable relay 3 of external module 1 Bit B = 1, Enable relay 4 of external module 1 Bit C = 1, Enable relay 1 of external module 2 Bit D = 1, Enable relay 2 of external module 2 Bit E = 1, Enable relay 3 of external module 2 Bit F = 1, Enable relay 4 of external module 2

Table 0:0001, *accessible with function code 0x01h (**Read** Coils) and 0x05h (**Write** Single Coil).*

Writing in registers from 1 to 16 will only be effective if the user PIN has previously been written in register 1 of table 4:0001. If this is not done, then the function returns error with exception code 0x01h.
In order to delete the user PIN, re-write log 1 as a value of 0x0000h.

Modbus registers (Dec)	Modbus addresses (Hex)	Nbr registers	Type data	Description
Digital outputs, internal relays A and B				
1	0000	1	Bit	Internal relay A
2	0001	1	Bit	Internal relay B
3	0002	1	Bit	Reserved (Bit at 0)
4	0003	1	Bit	Reserved (Bit at 0)
5	0004	1	Bit	Reserved (Bit at 0)
6	0005	1	Bit	Reserved (Bit at 0)
7	0006	1	Bit	Reserved (Bit at 0)
8	0007	1	Bit	Reserved (Bit at 0)
Digital outputs, external modules 1 and 2				
9	0008	1	Bit	Relay 1 external module 1
10	0009	1	Bit	Relay 2 external module 1
11	000A	1	Bit	Relay 3 external module 1
12	000B	1	Bit	Relay 4 external module 1
13	000C	1	Bit	Relay 1 external module 2
14	000D	1	Bit	Relay 2 external module 2
15	000E	1	Bit	Relay 3 external module 2
16	000F	1	Bit	Relay 4 external module 2

Table 1:0001, *accessible with function code 0x02h (**Read** Discrete Input).*

Modbus registers (Dec)	Modbus addresses (Hex)	Nbr registers	Type data	Description
Status digital inputs, remote inputs 1 and 2				
1	0000	1	Bit	Remote input 1
2	0001	1	Bit	Remote input 2
3	0002	1	Bit	Reserved (Bit at 0)
4	0003	1	Bit	Reserved (Bit at 0)
5	0004	1	Bit	Reserved (Bit at 0)
6	0005	1	Bit	Reserved (Bit at 0)
7	0006	1	Bit	Reserved (Bit at 0)
8	0007	1	Bit	Reserved (Bit at 0)

Status digital inputs, external modules 1 and 2				
9	0008	1	Bit	Input 1 external module 1
10	0009	1	Bit	Input 2 external module 1
11	000A	1	Bit	Input 3 external module 1
12	000B	1	Bit	Input 4 external module 1
13	000C	1	Bit	Input 1 external module 2
14	000D	1	Bit	Input 2 external module 2
15	000E	1	Bit	Input 3 external module 2
16	000F	1	Bit	Input 4 external module 2

Chapter 13 – TCP/IP. HTTP communication protocol. WebServer.

There are numerous TCP/IP commands which can be sent to a remote unit from the address bar of any browser or via a software program customised to the owner's requirements. These commands must be sent to the address and IP port of the remote unit and, in order to be effective, must include the user PIN configured for the remote unit to which these commands are destined

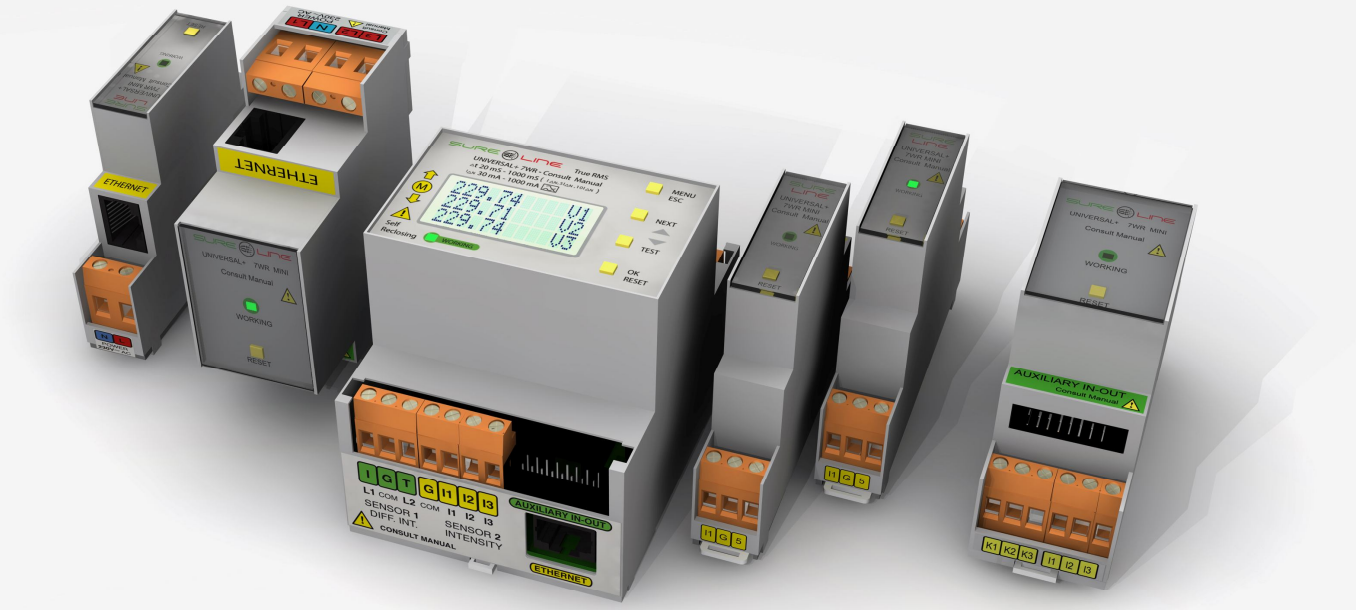
1. Receive complete list of measurements , LOG and I/O status in .txt format

2. Enable / disable internal relays A and B

3. Enable / disable relays 1,2,3,4 of external module 1

4. Enable / disable relays 1,2,3,4 of external module 2

Please refer to appendix "TCP/IP. HTTP communication protocol. WebServer".



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