

LCD THREE-PHASE MULTIFUNCTION METERS



GENERAL DESCRIPTION

- Advanced technology of display with blue lcd and white leds, has visibility and luminosity comparable with the conventional red led display of previous generation.
- All the electrical measurements are represented in their natural form without the use of any multiplier factor or other artifices for scale change or measuring units.
- Easy and immediate reading without possible incomprehensions or further elaborations.
- The use of one button only permits to change the measurements pages in natural way. The button is lighted to permit the use in darkness ambient also.
- During the program phase, the instrument shows the different possibilities present in the device, so it is not necessary to have in hands the user's manual all the time.
- The first powered page can be selected in the program phase.
- The "power supply" page can be used in all the cases on which is important the information of "power supply loss" (e.g. in refrigerating machines and/or cold storage).
- The 6 modules dimension is the right compromise between the necessity to reduce the space and a good readability of measurements that it is one off the main scope in an electrical net.
- The possibility to reset the energy and contemporary the hour/minutes value permits, in easy way, to see the relative consumption in a fixed time.
- The possibility to communicate by the rs485 modbus protocol permits to enter, as peripheric bus, into an automation net. **This is one of the "faster" instrument present in the market due the 115200 BAUDE RATE.**
- The software to install on the PC, showed free of charge on the web site, is simple and extremely potent. It permits to visualize, in RS485 MODBUS connection, by a double wire or by BLUETOOTH technology, all the measurements showed by the instrument to diagnose with simplicity the status of an electrical net.

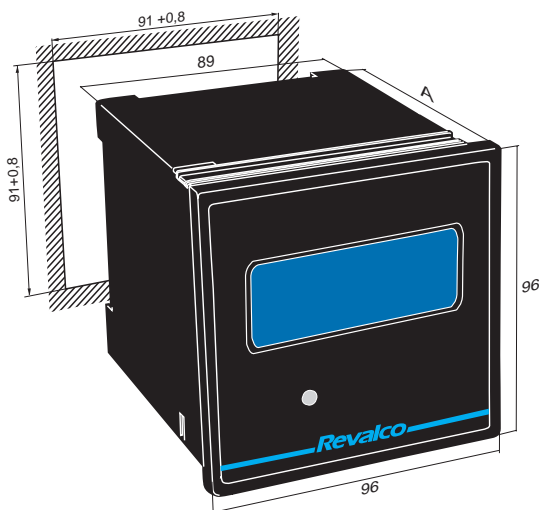
By the double possibilities: visualizer and 3-Phase Voltage and Current Oscilloscope

It permits a complete diagnosis of the electrical system showing the wave form without interferences against the normal functions of the instrument (measurement and memorization mode).

In presence of critical situations or not easy diagnoseable phenomena with available numerical data, exist the possibility to send to the instrument a command of normal activity suspension and enter in the "quick voltage/current oscilloscope" mode.

In this mode the instrument is able to show graphically, in real time, the needed wave form (voltage/current syncronized wave of phase L1 or in combination with phases L2 and L3; therefore 6 sinusoidal waves visualized) and see **what actually is happening** on the net.

DIMENSIONS in mm

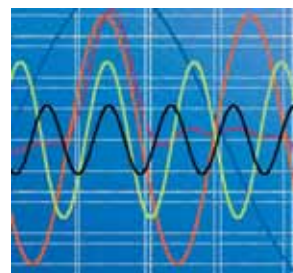


- Weight: 0,55 Kg**
- A = 97,3** without terminal cover; **A = 116,5** with terminal cover

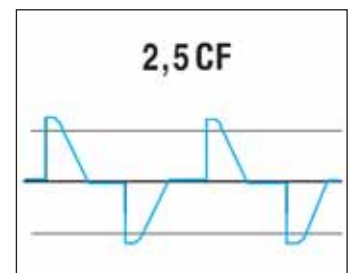
COMMUNICATION DATA

- MODBUS RTU Protocol
- Address from 1 to 255
- Selectable speed on "485" (bps) version: 9600, 19200, 38400, 57600, 115200
- Selectable speed on "BT" (bps) version: standard 115200; on request 9600, 19200, 38400, 57600
- Parity: N; Bits: 8; Stop Bit: 1
- The MODBUS registers table of instrument is available on request or on the web site.

MEASUREMENT'S TYPOLOGY



- True RMS up to the 20th harmonic wave



- Crest factor up to 2,5 (Voltage and Current)

SERIAL INTERFACE

- Two types are forecasted:
 - "485" version: Serial interface RS 485 galvanically insulated (3 kV), suitable for conventional net.
 - "BL" (BLUETOOTH) version: BLUETOOTH interface class 2E. RS 485 interface, galvanically insulated (3 kV). This version permits to execute an access point on net RS485 also, with a fixed speed on demand. **The standard type has 115.200 bps.** A115200bps BLUETOOTH interface only permits to have the oscilloscope function, and eventually RS485 also if connected with the same speed (115200bps). Version "BL" in any case can be connected and used as "485", independently by the bluetooth option present.

TECHNICAL CHARACTERISTICS

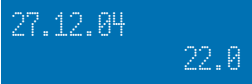






	REFERENCES	2RAE96	2RAE96C	2RAE96CS	2RAE96C485	2RAE96CS485	2RAE96BL485
- Ph-N voltage	L1-N,L2-N,L3-N	•	•	•	•	•	•
- Ph-Ph voltage	L1,L2,L3	•	•	•	•	•	•
- Medium voltage of phases	L medium	•	•	•	•	•	•
- Current	I1,I2,I3	•	•	•	•	•	•
- Power factor	ind/cap L1,L2,L3	•	•	•	•	•	•
- Total equivalent power factor	ind/cap Total	•	•	•	•	•	•
- Apparent power	L1,L2,L3	•	•	•	•	•	•
- Total Apparent power	Pva	•	•	•	•	•	•
- Active power (+/-)	L1,L2,L3	•	•	•	•	•	•
- Total Active power (+/-)	Pw	•	•	•	•	•	•
- Reactive power	L1,L2,L3	•	•	•	•	•	•
- Total Reactive power	Pva	•	•	•	•	•	•
- Frequency	Hz	•	•	•	•	•	•
- Total Active Energy (import) resettable capacity	+kW/h	•	•	•	•	•	•
- Total Active Energy (export) resettable capacity	-kW/h	•	•	•	•	•	•
- Total Reactive Energy resettable capacity	kvar/h	•	•	•	•	•	•
- Total working time resettable capacity	hh:mm	•	•	•	•	•	•
- Partial working time resettable capacity	hh:mm	•	•	•	•	•	•
- Sequence of phases	L1>L2>L3 (Symbol)	•	•	•	•	•	•
- Voltage asymmetry (Ph-N)	(>L1L2L3-N)-(<L1L2L3-N)	•	•	•	•	•	•
■ TWO ALARM OUTPUT RELAYS (contact NO 1000V-0,5A-20VA)				•		•	•
■ PROTOCOL MODBUS SLAVE RTU							
Baude rate 9600 - 19200 - 38400 - 56800 - 115200					•	•	
Baude rate 115200							•
■ ACCESS BLUETOOTH POINT (max 10 meters - Class 2)							•
■ The software is available, free of charge, on our internet address www.revalco.it					•	•	•
■ PERMANENT MEMORY FOR SET POINT AND ENERGIES (EEPROM)							
■ 400V insertion, 3 or 4 wires line, 2 or 3 systems			2RAE96CH1			2RAE96CS485H1	
■ VT.../100V insertion, 3 or 4 wires line, 2 or 3 systems			2RAE96CH2			2RAE96CS485H2	
⚠ Primary voltage up to 9,9 kV							
■ VT.../100V insertion, 3 or 4 wires line, 2 or 3 systems			2RAE96CH3			2RAE96CS485H3	
⚠ Primary voltage from 10 to 100 kV							

TECHNICAL CHARACTERISTICS



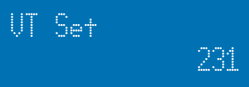


Auxiliary power supply				Power Factor	
- nominal value U AUX	110V, 230V, 400V 50/60Hz			- range $\cos\phi$	-1...0...+1
- range	0.9...1.1 UAUX			- accuracy class with current 0.1...1.0 In and voltage 0.8...1.2 Un	2% fs ± 2 digit
- max absorbed power	2 VA			Working time	
Input voltmeter circuit	Phase-phase voltage:			- Total working time	hh:mm (in presence of aux power supply)
- direct insertion	max 500 V			- Partial working time	hh:mm (from previous reset)
- permanent overload / thermic overload (1 s)	120% / 150%			Digital filter	
- nominal voltage, secondary by VT	100 V (VT type only)			- Average	1...15
- range adjustment, VT ratio	1...80 (8 kV) (VT type only)			Compatible current transformers	
- input impedance of voltmeter circuit	2 MΩ Ph-N/Phase-Phase			- Nominal current	5 A
Input ammeter circuit				Compatible current transformers	
- nominal current	5 A			- Nominal voltage	100 V
- permanent overload	120%			- Ratio	1...80
- thermic overload (1 s)	200%			Visualization	
- range adjustment, CT ratio	5...6000			- display	LCD with white leds
Voltage measurement range				- number of characters	16 on two lines
- max measurement range 3x230V (500V)				- colour	BLUE
- measurement range insertion on VT secondary	100 V (Phase-Phase)			Mechanical characteristics	
- accuracy class	0.5% f.s ± 2 digit			- mounting	on DIN rail DIN50022/ encased DIN43700
Current Measurement range:				- protection	IP20/ frontal IP30
- measurement range insertion on CT secondary	0.05...5.00 A			Electrical characteristics, options	
- accuracy class on range 0,05...5A	0.5% f.s ± 2 digit			- alarm relay coil-contact	Galvanic insulation
Frequency Measurement range:				- RS 485	4.25kV
- nominal value 50/60Hz	400Hz version 2RAE96 only			Relay characteristics	3kV
- range	45...80 Hz			- N.O. contacts maxV...maxI...maxP	1000V 0.5A 20VA
- accuracy class	0.3% vm ± 1 digit			Environment conditions	
- response time	< 300mS			Ambient temperature:	
Active Power (P1, P2, P3) class	1% f.s ± 2 digit			- nominal temperature	0...+45 °C
Reactive Power (Q1, Q2, Q3) class	1% f.s ± 2 digit			- range	-5...+55 °C
Apparent Power (S1, S2, S3) class	1% f.s ± 2 digit			- storage temperature	-10...+70 °C
Active Energy (Wh)				- humidity	10...95 %
- import / export counters resettable	Two separate			- atmospheric pressure	70...110 kPa
- calculating period	15 minutes			Standards CEI	
- accuracy class with current 0.05...1.0 In	2% fs ± 2 digit			- Safety CEI EN 61010-1 300V CLASS III - Accuracy class CEI EN 60688	
Reactive Energy (varh)				- Electromagnetic compatibility (immunity) CEI EN 61000-6-2 (ex EN 50082-2)	
- calculating period	15 minutes			- Electromagnetic compatibility (emission) CEI EN 61000-6-4 (ex EN 50081-2)	
- accuracy class with current 0.05...1.0 In	2% fs ± 2 digit			- Protection IP CEI EN 60529	

2RAE96

OPERATION

- Powering the instrument you can see the following page  Software date revision and version. Update
-  First powering page. A different page can be selected within the available pages present on this type. At first powering the display shows automatically this page
- Introduction page. 
-  Program page. Entering in this page and maintaining pressed the button, it is possible to program the parameters of instruments. "Prog" flashes until to enter in program phase. (*)
- Maintaining pressure on the front button you will see the parameters displayed on this page  Medium phase voltage (L1+L2+L3)/3 Frequency
Releasing the button the measurements will be shown Current I1, I2, I3
- Maintaining pressure on the front button you will see the parameters displayed on this page  Phase-phase voltage L1, L2, L3
Releasing the button the measurements will be shown Current I1, I2, I3
- Maintaining pressure on the front button you will see the parameters displayed on this page  Phase-neutral voltage L1, L2, L3
Releasing the button the measurements will be shown Current I1, I2, I3

CONFIGURATION SELECTION MENU

- To enter in program phase, see "OPERATION" (red rectangle)
- The sliding of "programming parameters" pages is automatic. To intervene on one or more of these pages it is enough to press the button and start with a series of short pressure and releases to increase the numbers one by one; to fast forward maintain pressure on the front button. Once selected the needed number, release the button and the actual page will advance to the next. At the end of the forecasted pages the instrument will go itself to "measurement visualization" mode and, in case of any modification made, will save the new values in the permanent memory.
- (*)  Program mode page.
- Selection of current transformer ratio. 
-  End scale, nominal measurement ph-n. Calibrated in factory. Used for the V.T100V only.
- Mathematical medium n° of samples, practically it is the stability filter of the measurements. Calibrated in factory. In case of not stabilized measurement, increase the number. 
-  Choose of first page at first powering. "Power On Ready" page selected in factory is useful when it is important to know if an electric interruption occurred.


CONNECTION DIAGRAM

- See page 227



2RAE96C / 2RAE96C485

OPERATION

Powering the instrument you can see the following page  Software date revision and version.

 First powering page. A different page can be selected within the available pages present on this type. At first powering the display shows automatically this page


Introduction page.  or  Correct sequence of phases indication. Light OFF = Correct sequence

 or  Program page. Entering in this page and maintaining pressed the button, it is possible to program the parameters of instruments. "Prog" flashes until to enter in program phase. (*)

Maintaining pressure on the front button you will see the parameters displayed on this page  Medium phase voltage (L1+L2+L3)/3 Frequency
Releasing the button the measurements will be shown Current I1, I2, I3

Maintaining pressure on the front button you will see the parameters displayed on this page.  Phase-phase voltage L1, L2, L3
Releasing the button the measurements will be shown Current I1, I2, I3


Maintaining pressure on the front button you will see the parameters displayed on this page.  Phase-neutral voltage L1, L2, L3
Releasing the button the measurements will be shown Current I1, I2, I3




Maintaining pressure on the front button you will see the parameters displayed on this page.  Phase Cosφ Ind/Cap Ind/Cap Ind/Cap
Releasing the button the measurements will be shown L1 L2 L3


Maintaining pressure on the front button you will see the parameters displayed on these pages.   
Releasing the button the measurements will be shown Active power L1 Active power L2 Active power L3


Maintaining pressure on the front button you will see the parameters displayed on this page.  Total Active power I/C Total Cosφ
Releasing the button the measurements will be shown (L1+L2+L3) (I=Ind, C=Cap)

Maintaining pressure on the front button you will see the parameters displayed on these pages.   
Releasing the button the measurements will be shown Reactive power L1 Reactive power L2 Reactive power L3


Maintaining pressure on the front button you will see the parameters displayed on this page.  Total Reactive power
Releasing the button the measurements will be shown

Maintaining pressure on the front button you will see the parameters displayed on these pages.   
Releasing the button the measurements will be shown Apparent power L1 Apparent power L2 Apparent power L3

Maintaining pressure on the front button you will see the parameters displayed on this page.  Total Apparent power
Releasing the button the measurements will be shown

Maintaining pressure on the front button you will see the parameters displayed on this page.  Total Active Energy (Import)
Releasing the button the measurements will be shown

Maintaining pressure on the front button you will see the parameters displayed on this page.  Energy counter reset. Maintaining pressure on button, word "Res" flashes until the end of the reset.
Releasing the button the measurements will be shown

Maintaining pressure on the front button you will see the parameters displayed on this page.  Total Active Energy (Export)
Releasing the button the measurements will be shown

Maintaining pressure on the front button you will see the parameters displayed on this page.  Energy counter reset. Maintaining pressure on button, word "Res" flashes until the end of the reset.
Releasing the button the measurements will be shown

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown

T.Rea Ene Kvarh
0

Reattiva Total Reactive Energy

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown

Tot Rea Ene Res
0

Energy counter reset. Maintaining pressure on button, word "Res" flashes until the end of the reset.

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown

Tot Time
0h 21m

Working hours and minutes with powered instrument.

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown

Rel Time
1h 52m

Working hours and minutes with powered instrument and from the last reset.Counting time between two resets.

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown

Rel Time Res
0 0

Energy counter reset. Maintaining pressure on button, word "Res" flashes until the end of the reset.

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown

Asym U
0

Phase asymmetry. Max L1 Phase-neutral voltage value or L2 or L3 less the minimum value of L1 or L2 or L3. The difference determine the voltage lack between the phases.

CONFIGURATION SELECTION MENU

To enter in program phase, see "OPERATION" (red rectangle)

The sliding of "programmation parameters" pages is automatic.

To intervene on one or more of these pages it is enough to press the button and start with a serie of short pressure and releases to increase the numbers one by one; to fast forward maintain pressure on the front button.

Once selected the needed number, release the button and the actual page will advance to the next. At the end of the forecasted pages the instrument will go itself to "measurement visualization" mode and, in case of any modification made, will save the new values in the permanent memory.

(*) Program mode
Program mode page.

Program mode

Selection of current transformer ratio.

CT Set
1000

VT Set

231

End scale, nominal measurement ph-n. Calibrated in factory. Used for the V.T....100V only.

On models 2RAE96CH1, 2RAE96CH2 and 2RAE96CH3 it is possible to set the VT ratio referred to 100V (L-L voltage)

Mathematical medium n° of samples, practically it is the stability filter of the measurements. Calibrated in factory. In case of not stabilized measurement, increase the number.

Average
3

Default Page

Choose of first page at first powering. "Power On Ready" page selected in factory is useful when it is important to know if an electric interruption occurred.

Serial speed 0=9600, 1=19200, 2=38400, 3=57600, 4=115200
Baude rate = selected speed: N.8.1

485 Speed
1

485 Address

58

MODBUS RTU address (from 1 to 255)

CONNECTION DIAGRAMS


See page 227 for models 2RAE96C and 2RAE96C485

See page 228 for models 2RAE96CH1, 2RAE96CH2 and 2RAE96CH3




2RAE96CS / 2RAE96CS485 / 2RAE96BL485

OPERATION

Powering the instrument you can see the following page  Software date revision and version.

 First powering page. A different page can be selected within the available pages present on this type. At first powering the display shows automatically this page


Introduction page.  or  or  Correct sequence of phases indication. Light OFF = Correct sequence

 or  or  Program page. Entering in this page and maintaining pressed the button, it is possible to program the parameters of instruments. "Prog" flashes until to enter in program phase. (*)

Maintaining pressure on the front button you will see the parameters displayed on this page  Medium phase voltage (L1+L2+L3)/3 Frequency
Releasing the button the measurements will be shown
Current I1, I2, I3




Maintaining pressure on the front button you will see the parameters displayed on this page.  Phase-phase voltage L1, L2, L3
Releasing the button the measurements will be shown
Current I1, I2, I3


Maintaining pressure on the front button you will see the parameters displayed on this page.  Phase-neutral voltage L1, L2, L3
Releasing the button the measurements will be shown
Current I1, I2, I3




Maintaining pressure on the front button you will see the parameters displayed on this page.  Phase Cosφ Ind/Cap Ind/Cap Ind/Cap
Releasing the button the measurements will be shown
L1 L2 L3


Maintaining pressure on the front button you will see the parameters displayed on these pages.   
Releasing the button the measurements will be shown
Active power L1 Active power L2 Active power L3


Maintaining pressure on the front button you will see the parameters displayed on this page.  Total Active power I/C Total Cosφ
Releasing the button the measurements will be shown
(L1+L2+L3) (I=Ind, C=Cap)

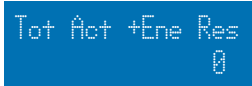
Maintaining pressure on the front button you will see the parameters displayed on these pages.   
Releasing the button the measurements will be shown
Reactive power L1 Reactive power L2 Reactive power L3


Maintaining pressure on the front button you will see the parameters displayed on this page.  Total Reactive power
Releasing the button the measurements will be shown

Maintaining pressure on the front button you will see the parameters displayed on these pages.   
Releasing the button the measurements will be shown
Apparent power L1 Apparent power L2 Apparent power L3

Maintaining pressure on the front button you will see the parameters displayed on this page.  Total Apparent power
Releasing the button the measurements will be shown

Maintaining pressure on the front button you will see the parameters displayed on this page.  Total Active Energy (Import)
Releasing the button the measurements will be shown

Maintaining pressure on the front button you will see the parameters displayed on this page.  Energy counter reset. Maintaining pressure on button, word "Res" flashes until the end of the reset.
Releasing the button the measurements will be shown

Maintaining pressure on the front button you will see the parameters displayed on this page.  Total Active Energy (Export)
Releasing the button the measurements will be shown

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown



Energy counter reset. Maintaining pressure on button, word "Res" flashes until the end of the reset.

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown



Reattiva Total Reactive Energy

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown



Energy counter reset. Maintaining pressure on button, word "Res" flashes until the end of the reset.

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown



Working hours and minutes with powered instrument.

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown



Working hours and minutes with powered instrument and from the last reset.Counting time between two resets.

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown



Energy counter reset. Maintaining pressure on button, word "Res" flashes until the end of the reset.

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown



Phase asymmetry. Max L1 Phase-neutral voltage value or L2 or L3 less the minimum value of L1 or L2 or L3. The difference determine the voltage lack between the phases.

Maintaining pressure on the front button you will see the parameters displayed on this page.
Releasing the button the measurements will be shown



Thresholds status with output relays. "On" means that the alarm is active and the contact is closed (the relay is normally open)

CONFIGURATION SELECTION MENU

To enter in program phase, see "**OPERATION**" (red rectangle)

The sliding of "programmation parameters" pages is automatic.

To intervene on one or more of these pages it is enough to press the button and start with a serie of short pressure and releases to increase the numbers one by one; to fast forward maintain pressure on the front button.

Once selected the needed number, release the button and the actual page will advance to the next. At the end of the forecasted pages the instrument will go itself to "measurement visualization" mode and, in case of any modification made, will save the new values in the permanent memory.

(*) Program mode page.

Selection of current transformer ratio.



End scale, nominal measurement ph-n. Calibrated in factory. Used for the V.T100V only.

On models 2RAE96CH1, 2RAE96CH2 and 2RAE96CH3 it is possible to set the VT ratio referred to 100V (L-L voltage)

Mathematical medium n° of samples, practically it is the stability filter of the measurements. Calibrated in factory. In case of not stabilized measurement, increase the number.



Choose of first page at first powering. "Power On Ready" page selected in factory is useful when it is important to know if an electric interruption occurred.

Serial speed 0=9600, 1=19200, 2=38400, 3=57600, 4=115200
 Baude rate = selected speed: N.8.1



MODBUS RTU address (from 1 to 255)

QUALIFICATION OF RELAY 1 as threshold. If "Off" is selected, this relay can be used by serial way as a peripheric to command another net.



Threshold 1 qualified.
 Function selection: "Hi" intervention for higher values.
Threshold higher. Lower or equal value is the stand-by condition.

Threshold 1 qualified.
 Function selection: "Lo" intervention for lower values.
Threshold lower. Higher or equal value is the stand-by condition.



Delay type of threshold 1.
 "Off-On" delay to the excitation = delay from hold to work.

Delay type of threshold 1.
 "On-Off" delay to the disexcitation = delay from work to hold.



- Th1 DIy
0.2
Delay time of threshold 1.
 From 0.0 sec, to 25.0 sec- steps 0.1 sec

Parameters to which the threshold 1 is related.

3Vff = min or max value of 3 phase-phase voltages.
3I = min or max value of currents.
Pim+ = min or max value of bought power (+, import).
Vas = min or max value of voltage asymmetry.
V23 = min or max value of phase-phase voltage L2.
V1 = min or max value of phase-neutral voltage L1.
V3 = min or max value of phase-neutral voltage L3.
I2 = min or max value of current L2.

3Vn = min or max value of 3 phase-neutral voltages.
Fre = min or max value of frequency.
Pex- = min or max value of solded power (-, export).
V12 = min or max value of phase-phase voltage L1.
V31 = min or max value of phase-phase voltage L3.
V2 = min or max value of phase-neutral voltage L2.
I1 = min or max value of current L1.
I3 = min or max value of current L3.

- Threshold 1 selected as alarm on bought power. Selected on the 50% of the nominal value.
 Nominal value= (CT value) x (ph-n voltage value) x 3.

Th1 Val 346500.0
 PIm+ 50%

- QUALIFICATION OF RELAY 2** as threshold. If "Off" is selected, this relay can be used by serial way as a peripheric to command another net.

Th2 Sel
Off

- Th2 Sel
Hi
 Threshold 2 qualified.
 Function selection: "Hi" intervention for higher values.
Threshold higher. Lower or equal value is the stand-by condition.

- Threshold 2 qualified.
 Function selection: "Lo" intervention for lower values.
Threshold lower. Higher or equal value is the stand-by condition.

Th2 Sel
Lo

- Th2 DD
Off-On
Delay type of threshold 2.
 "Off-On" delay to the excitation = delay from hold to work.

- Delay type of threshold 2.**
 "On-Off" delay to the disexcitation = delay from work to hold.

Th2 DD
On-Off

- Th2 DIy
0.2
Delay time of threshold 2.
 From 0.0 sec, to 25.0 sec- steps 0.1 sec

Parameters to which the threshold 2 is related.

3Vff = min or max value of 3 phase-phase voltages.
3I = min or max value of currents.
Pim+ = min or max value of bought power (+, import).
Vas = min or max value of voltage asymmetry.
V23 = min or max value of phase-phase voltage L2.
V1 = min or max value of phase-neutral voltage L1.
V3 = min or max value of phase-neutral voltage L3.
I2 = min or max value of current L2.

3Vn = min or max value of 3 phase-neutral voltages.
Fre = min or max value of frequency.
Pex- = min or max value of solded power (-, export).
V12 = min or max value of phase-phase voltage L1.
V31 = min or max value of phase-phase voltage L3.
V2 = min or max value of phase-neutral voltage L2.
I1 = min or max value of current L1.
I3 = min or max value of current L3.

- Threshold 2 selected as alarm on frequency. Selected 50 Hz. Value of selected parameter as reference for the correspondent selected alarm value. Being it an absolute value, the selection correspond to the real value.

Th2 Val 50.0
 Fre 50.0

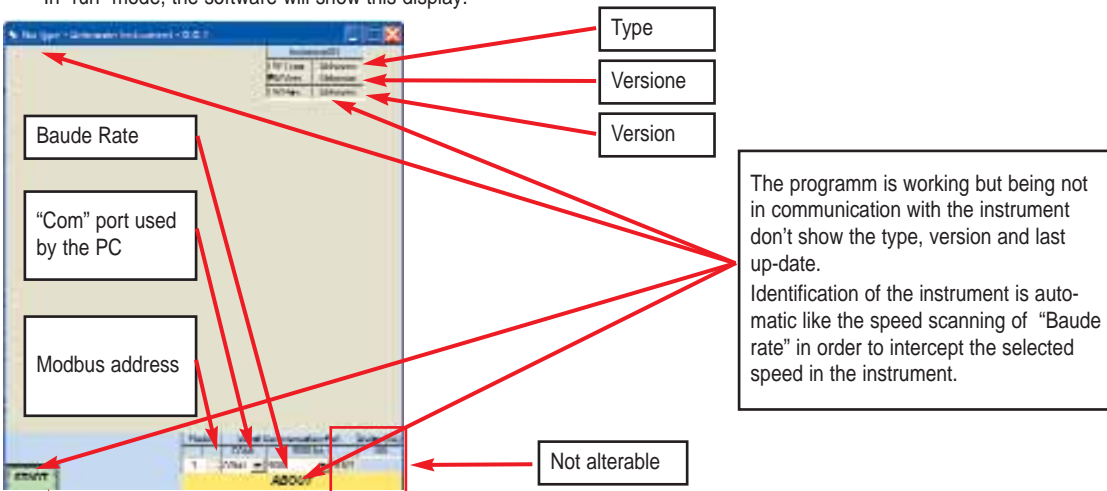
CONNECTION DIAGRAMS

- See page 227 for models 2RAE96CS, 2RAE96CS485 and 2RAE96BL485
- See page 228 for models 2RAE96CS485H1, 2RAE96CS485H2 and 2RAE96CS485H3

SOFTWARE USE

INSTRUCTIONS: Use of software equipped to the types provided by communication interface RS485, BL or RS485 and BL.

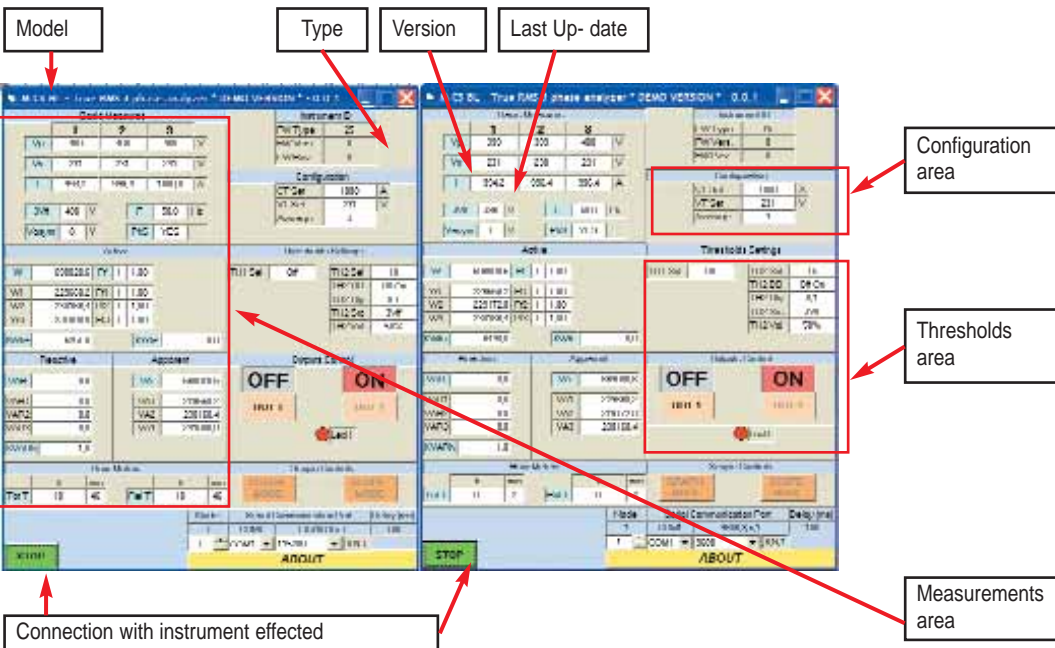
- After the download from CD or from the INTERNET WEB SITE the free software(it permits to see the main measurements available on the instrument) proceed to its installation.
- Once installed the software, execute the application.
- In "run" mode, the software will show this display:



Light green colour means that the software is not in communication with the instrument.

By the mouse press start.....

The instrument in this example is the BL type (the "Top" in our range). The software starts the scanning (self-identification) and it connect itself to the instrument.



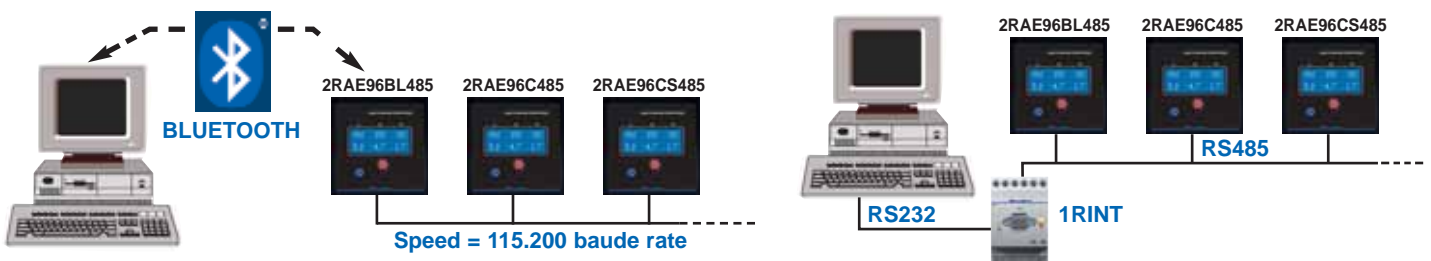
Founded the connection by cableat 115200 bps or at 9600. Configured the display, it visualize the data.....OR

Possibility to use the "access point" in Bluetooth standard (peripheric inserted on USB port or on PC).

In this way it is possible to have a wireless connection with this type of instrument with the advantage to access to the instrument by everybody know the PIN CODE (printed on the back of the instrument).

More, being present the RS485 interface it is possible the conversion from BLUETOOTH to RS485.

It is possible to realize a WIRELESS connection with the first instrument in a chain of instruments having the RS485 interface only and by this access to the others. Alternatively it is possible connect in RS485 this instrument also and proceed to the others, if present, by a classic connection with two standard wires.





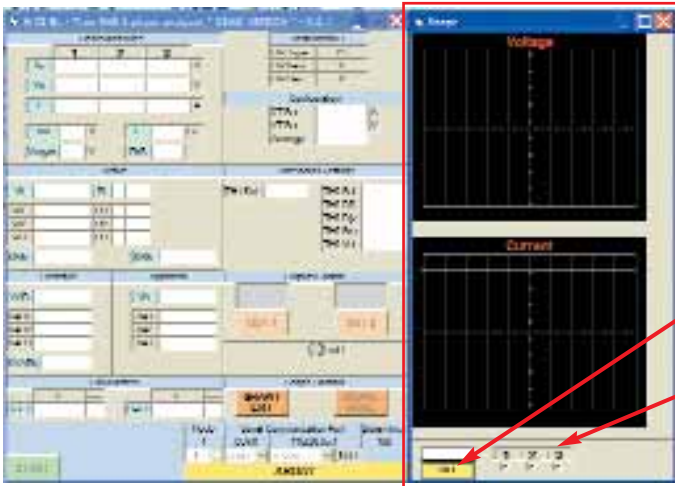
Connection to bluetooth port (example COM5); parameters become "AUTO"

By pressing STOP button the word changes to START; the colour change (light green = stop). From the display the data disappear being the connection with the instrument suspended. In this condition it is possible to push one of the two graphic buttons. Press GRAPH MODE.

Bluetooth connection



"Oscilloscope" visualization mode



The software visualizes contemporary the measurements in numerical form and their wave form like the oscilloscope. It is capable to manage the synchronism of phase L1 and to visualize by six different traces, the relative three voltages and currents.

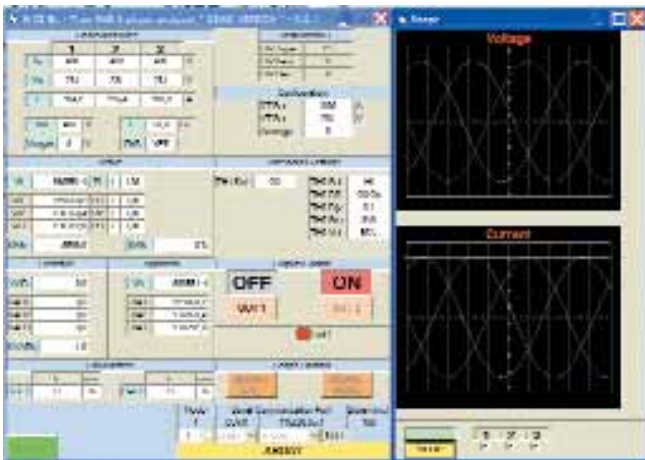
"Oscilloscope" visualization mode

"Start of communication" button

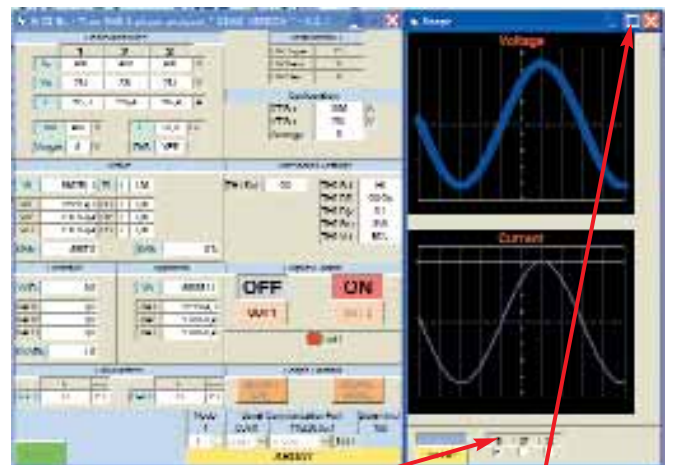
Insertion of phases to visualize (voltage and current)

Independently by the previous "Com" speed, it is forced and blocked on 115200 bps. The connection with the instrument continues in "MODBUS RTU" as before.

By pressing the "GO" button, the connection with instrument starts.



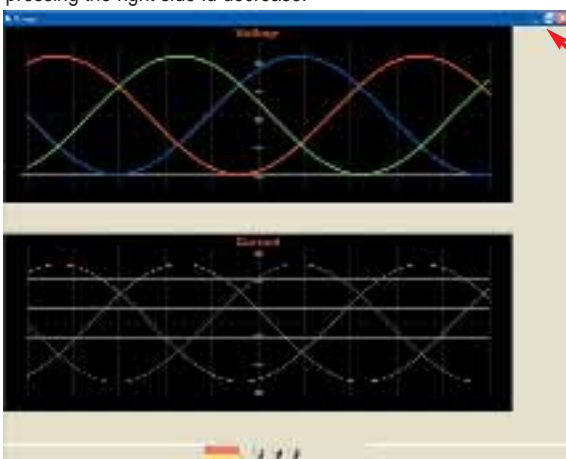
Measurements and curves are simultaneous. Colours are equal for the voltage phase and relative current. The n. 1 (relative to phase L1) is blue-light blue, the n. 2 (relative to phase L2) is red-light red, the n. 3 (relative to phase L3) is green-light green. By pressing the left side of the mouse on a graphic, the thickness of the line increase, by pressing the right side it decrease.



Line 1 only is selected

"Enlarge" the window.

By pressing the left side of the mouse on the graphic, thickness of line increase; by pressing the right side of the mouse it decrease.



Close

Reduce

It is possible to visualize the curves on the big display using the "enlarge" button. By "Reduce" the display come back small, while the button "Close" the application is NOT CLOSED but it shows the original display with measurements and graphic (the graphic is set up again as "Default").

To stop, press "STOP"; to exit press "GRAPH EXIT" in meantime activated.



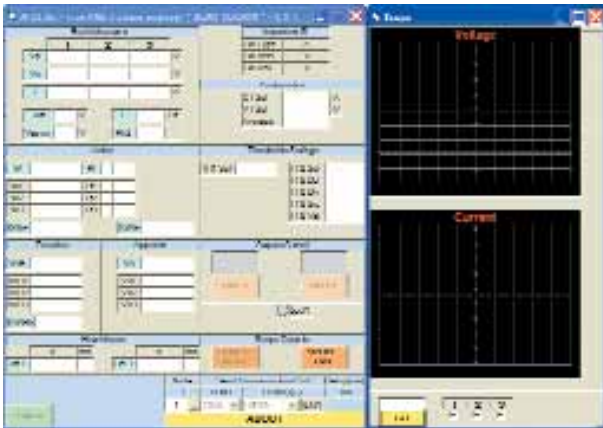
Coming back in measurement mode, when the button START/STOP is green, it is possible to use the output relay 1 (this is permitted when the output is not used as alarm).

Th1 Set Off

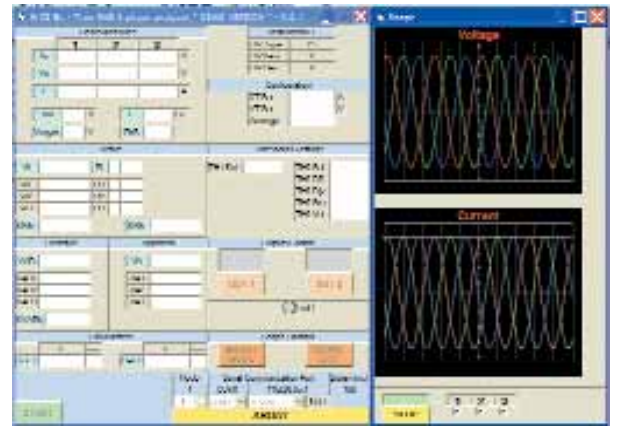
It means that during the programm phase threshold 1 remains in "off" so it is possible to control it from remote as an available resource for generic use (switch-on or switch-off lamps or machines etc.)

Push STOP to restore the graphic access keys .

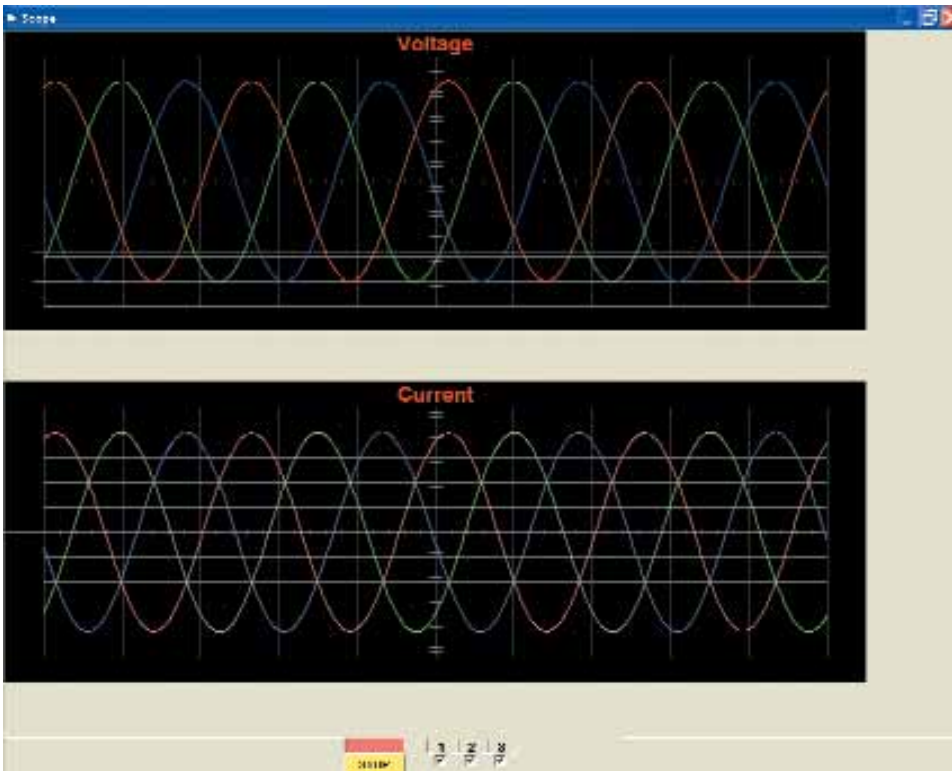
Press "SCOPE MODE"



- After "SCOPE MODE" is pressed the graphic display works as before but:
- 1) The numerical measurements are not displayed
 - 2) The connection with the instrument is not MODBUS RTU but proprietary
 - 3) The display shows frequently a lot of graphic informations



The scope of this software resource, is to obtain the visualization of temporary phenomena in real time having an "oscilloscope with six quick traces" .



This software version is FREEWARE.

- In a next future, on the web site, you'll find a PRO (professional) software to obtain a more complete electrical analysis of the data furnished by the instrument. It will be enriched by measurements as result of mathematical and geometrical the wave form analysis of the electrical signal. The PRO version will be under use's licence and not Freeware

Ethernet connection

By the use of a TRP transducer, it is possible to connect the electrical measurement station in a more wide net of ethernet resources.

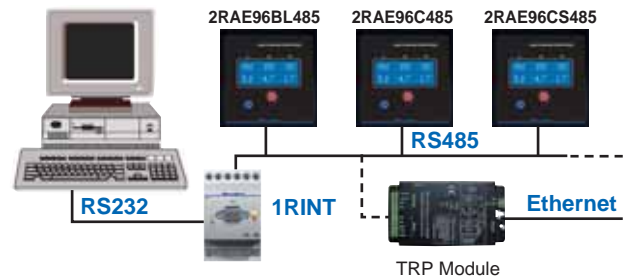
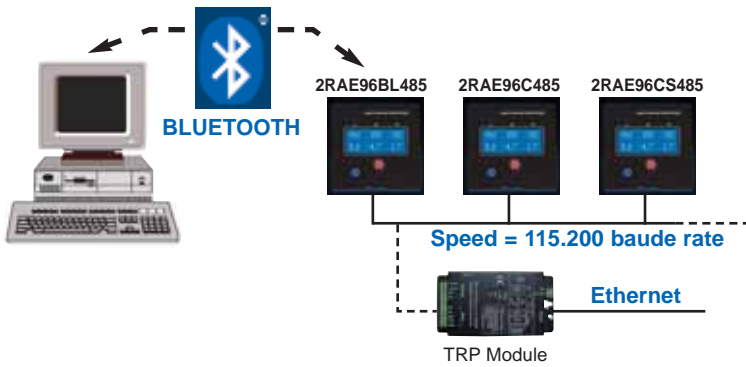
From one side TRP will communicate in MODBUS RTU RS485 with the station or with the ring of stations present in the net

From the other it will be inserted by a RJ45 connector in an ethernet ring. IP address is settable on the TRP transducer.

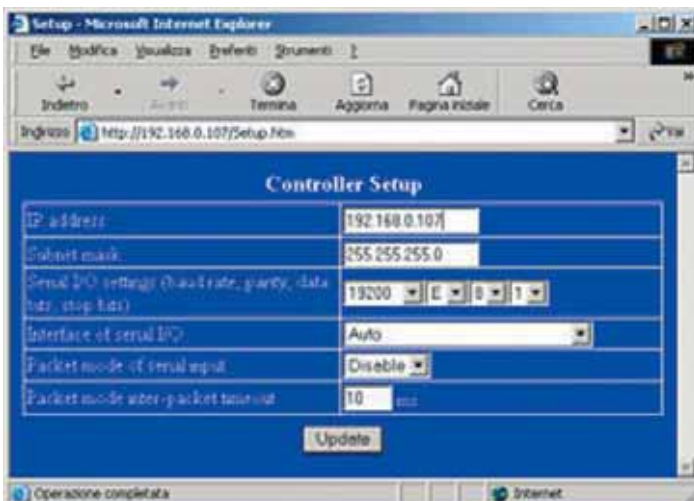


- The transducer is galvanically insulated up to 3kV DC between two interfaces and it is protected by the surge of interface RS422/485. It is therefore recommended in case of long wires connection and/or in case on which it is possible to have differences of potential between the devices.

This TRP transducer has the I/F ethernet on the connector RJ45 and terminals for connection of I/F RS232/422/485 and power supply. It incorporates an "http" server; it permits to enter on all functions (communication parameters set also), directly through the ethernet way from a normal browser (example: Internet Explorer).



SCREEN SETUP

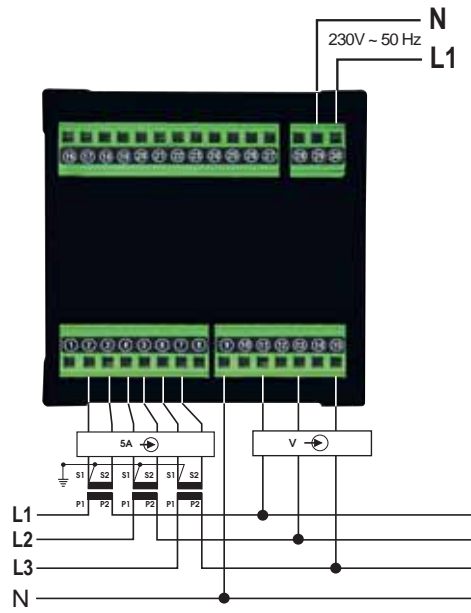


TECHNICAL CHARACTERISTICS

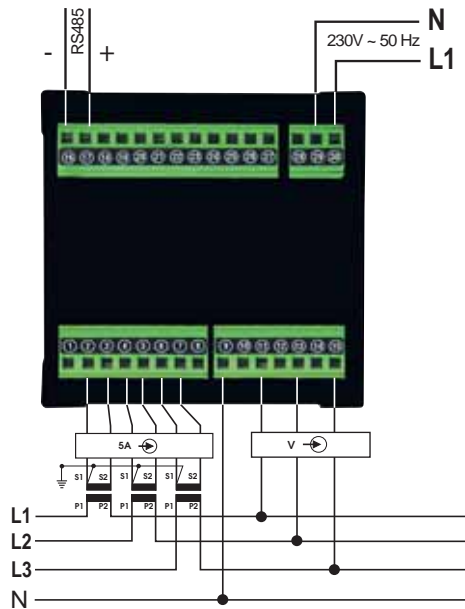
- Auxiliary power supply: 10-30Vdc 1.2W
- Interface data: Ethernet RJ45 10Mbps, RS232, RS422/485
- Baud rate: from 1200bps to 115Kbps
- Protocols: ARP, UDP, TCP, ICMP, HTTP, DHCP, IP
- Status indicators: Power ON, Link, RX/TX Activity
- Galvanic insulation: 3000Vdc
- Working temperature: from -20 to +75°C, Humidity: 10-95%
- Dimensions: 75x150x25mm
- Weight: 240g
- Standards: EN 55022, EN 55024, EN 61000-3-2, EN 61000-3-3

CONNECTION DIAGRAMS

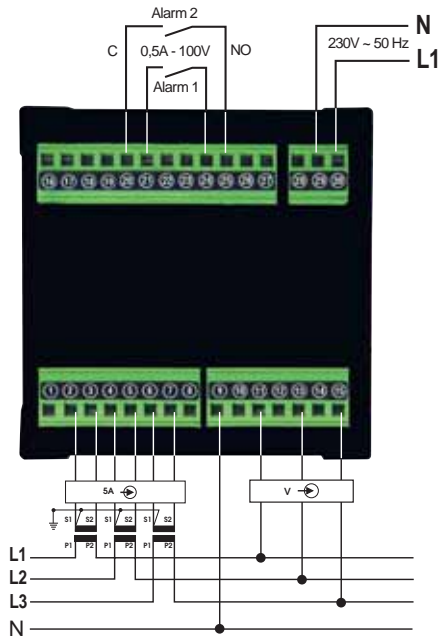
2RAE96 / 2RAE96C



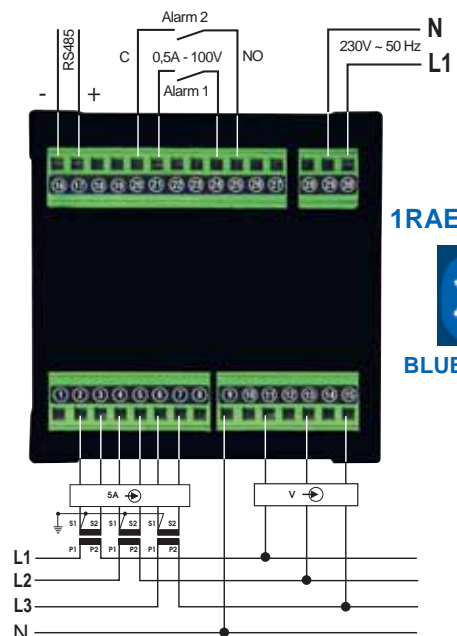
2RAE96C485



2RAE96CS



2RAE96CS485 - 1RAEMBL485

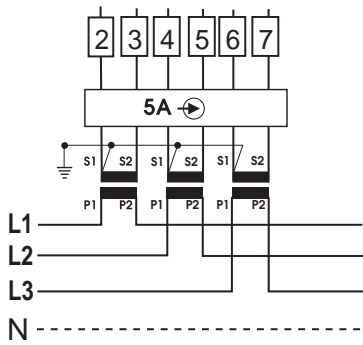


1RAEMBL485

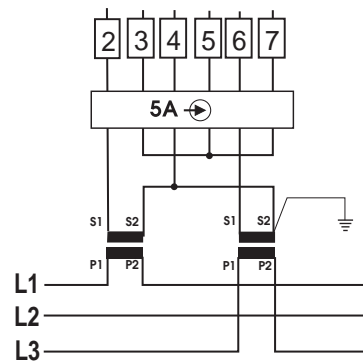


BLUETOOTH

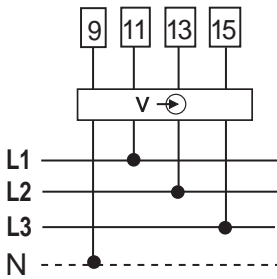
- Ammeter insertion, 4 wires, 3 systems
- Available intertion for models...H1-H2-H3



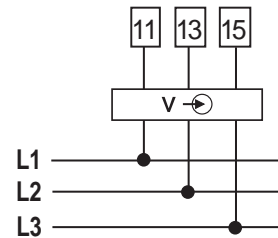
- Ammeter insertion, 3 wires, 2 systems
- Available intertion for models...H1-H2-H3
- ⚠ It is necessary to use CTs with minimum 4VA and class 0,5



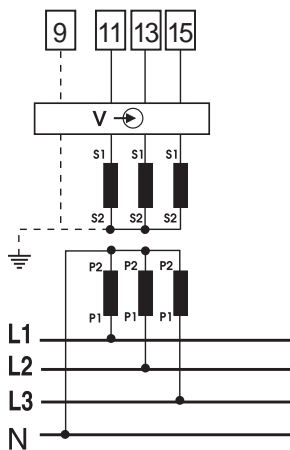
- Ammeter insertion, 4 wires, 3 systems
- Available intertion for model ...H1
- ⚠ Terminal n. 9 is linked to the measure on 4 wires (with neutral) line. Not use with 3 wires line.



- Ammeter insertion, 3 wires, 2 systems
- Available intertion for model ...H1



- Ammeter insertion, 4 wires, 3 systems
- Available intertion for models ...H2-H3



- Ammeter insertion, 3 wires, 2 systems
- Available intertion for models ...H2-H3

