

# LCD 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 multiplicator 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. On model 1RAEM63CS there are two push-button.
- 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.

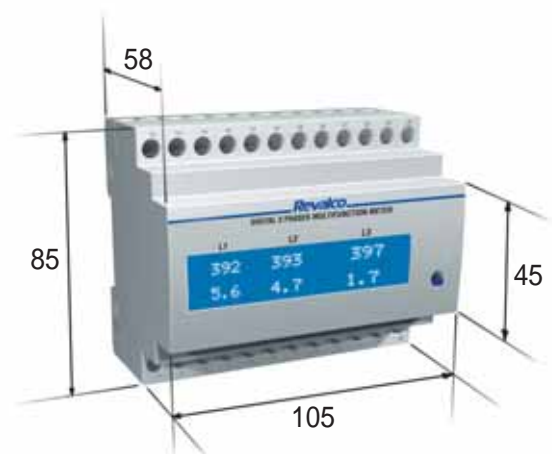
In this mode the instrument is able to show graphically, in real time, the needed wave form (voltage/current syncronized wave of phase L1 or in combination with phases L2 and L3; therefore 6 sinusoidal waves visualized) and see **what actually is happening** on the net.

- TYPE 1RAEM96CS WORKS AS PRIORITY RELAY ALSO**

## DIMENSIONS in mm



- The 70 mm dimensions correspond to 4 DIN modules (17.5 mm each)



- The 105 mm dimensions correspond to 6 DIN modules (17.5 mm each)

	REFERENCES	1RAEM	1RAEMC	1RAEMCS	1RAEMC485	1RAEMCS485	1RAEMBL485	1RAEM63CS
<b>MEASUREMENTS</b>								
- 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	Pvar		•	•	•	•	•	•
- Frequency	Hz	•	•	•	•	•	•	•
- Total Active Energy (import) *	+kW/h		•	•	•	•	•	•
- Total Active Energy (export) *	-kW/h		•	•	•	•	•	•
- Reactive Total energy *	kvar/h		•	•	•	•	•	•
- Total working time *	hh:mm		•	•	•	•	•	•
- Partial working time *	hh:mm		•	•	•	•	•	•
- Sequence of phases	L1>L2>L3 (Symbol)		•	•	•	•	•	•
- Voltage asymmetry (Ph-N)	(>L1L2L3-N)-(<L1L2L3-N)		•	•	•	•	•	•
* resettable capacities								
<b>TWO ALARM OUTPUT RELAYS</b> (contact N.O. 1000V-0,5A-20VA)				•		•	•	
<b>ONE OUTPUT REED RELE</b> (contact N.O. 1000V-0,5A-20VA)								•
<b>PROTOCOL MODBUS SLAVE RTU</b>								
Baude rate 9600 - 19200 - 38400 - 56800 - 115200					•	•		
Baude rate 115200							•	
<b>ACCESS BLUETOOTH POINT</b> (max 10 meters - Class 2)							•	
<b>The software is available, free of charge, on our internet address <a href="http://www.revalco.it">www.revalco.it</a></b>								
<b>PERMANENT MEMORY FOR SET POINT AND ENERGIES</b> (EEPROM)					•	•	•	
<b>WEIGHT</b> kg					0,50			0,70

## COMMON TECHNICAL CHARACTERISTICS

### Auxiliary power supply

- nominal value U AUX	110V, 230V, 400V 50/60Hz
- range	0.9...1.1 UAUX
- max absorbed power	2 VA

### Frequency Measurement range:

- nominal value	50/60Hz
	400Hz version RAEM only
- range	45...80 Hz
- accuracy class	0.3% vm ± 1 digit
- response time	< 300mS

### Power Factor

- range $\cos\varphi$	-1...0...+1
- accuracy class with current 0.1...1.0 In and voltage 0.8...1.2 Un	2% fs ± 2 digit

### Working time

- Total working time	hh:mm (in presence of aux power supply)
- Partial working time	hh:mm (from previous reset)

### Digital filter

- Average	1...15
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### Mechanical characteristics

- mounting	on DIN rail DIN50022/ encased DIN43700
- protection	IP20/ frontal IP30

### Relay characteristics

- N.O. contacts maxV....maxI....maxP	1000V 0.5A 20VA
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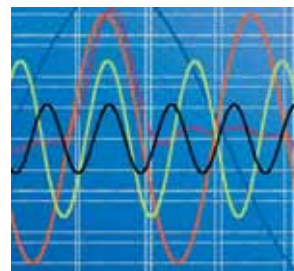
### Environment conditions

Ambient temperature:	
- nominal temperature	0...+45 °C
- range	-5...+55 °C
- storage temperature	-10...+70 °C
- humidity	10...95 %
- atmospheric pressure	70...110 kPa

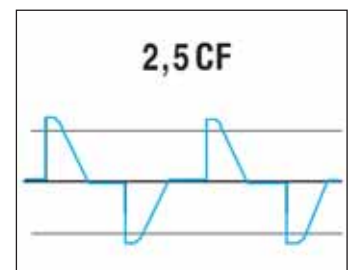
### Standards CEI

- Safety CEI EN 61010-1	300V CLASS III
- Accuracy class CEI EN 60688	
- Electromagnetic compatibility (immunity) CEI EN 61000-6-2	(ex EN 50082-2)
- Electromagnetic compatibility (emission) CEI EN 61000-6-4	(ex EN 50081-2)
- Protection IP CEI EN 60529	

### MEASUREMENT'S TYPOLOGY:



True RMS up to the 20<sup>th</sup> harmonic wave



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

## TECHNICAL CHARACTERISTICS EXCEPT 1RAEM63CS

### Input voltmeter circuit

- direct insertion	Phase-phase voltage:
- permanent overload	max 500 V
- thermic overload (1 s)	120%
- nominal voltage, secondary by VT	150%
- range adjustment, VT ratio	100 V (VT type only)
- input impedance of voltmeter circuit	1...80 (8 kV) (VT type only)
	≈ 2 MΩ Ph-N/Phase-Phase

### Input ammeter circuit

- nominal current	5 A
- permanent overload	120%
- thermic overload (1 s)	200%
- range adjustment, CT ratio	5...6000

### Voltage measurement range

- VLN measurement range (voltage phase, direct insertion)	0...290 V
- measurement range insertion on VT secondary	100 V...8.0 kV (Phase-Phase)
- accuracy class	0.5% f.s ± 2 digit

### Current Measurement range:

- measurement range insertion on CT secondary	0.05...5.00 A
- accuracy class on range 0,05....5A	0.5% f.s ± 2 digit

### Active Power (P1, P2, P3)

- range	85 MW
- accuracy class	1% f.s ± 2 digit

### Reactive Power (Q1, Q2, Q3)

- range	85 Mvar
- accuracy class	1% f.s ± 2 digit

### Apparent Power (S1, S2, S3)

- range 85 MVA
- accuracy class 1% f.s ± 2 digit

### Active Energy (Wh)

- import / export counters resettable Two separate
- calculating period 15 minutes
- energy counting 4.294.967.295 kWh
- accuracy class with current 0.05...1.0 In 2% fs ± 2 digit

### Reactive Energy (varh)

- energy counting resettable 4.294.967.295 kvarh
- calculating period 15 minutes
- accuracy class with current 0.05...1.0 In 2% fs ± 2 digit

### Threephase medium voltages and currents

- medium value of voltage  $V=(V12+V23+V31)/3$

### Compatible current transformers

- Nominal current 5 A
- Ratio 1...1200

### Compatible voltage transformers

- Nominal voltage 100 V
- Ratio 1...80

### Visualization

- display LCD with white leds
- number of characters 18 on two lines
- colour BLUE

### Electrical characteristics, options

- alarm relay coil-contact
- RS 485

Galvanic insulation

4.25kV

3kV

### SERIAL INTERFACE

Two types are forecasted:

- 1) "485" version: Serial interface RS 485 galvanically insulated (3 kV), suitable for conventional net.
- 2) "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.

### 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.

## 1RAEM63CS TECHNICAL CHARACTERISTICS

### Input voltmeter circuit

- direct insertion Phase-phase voltage: max 500 V
- permanent overload 120%
- thermic overload (1 s) 150%
- input impedance of voltmeter circuit 2 MΩ Ph-N/Phase-Phase

### Input ammeter circuit

- nominal current 60 A
- permanent overload 120%
- thermic overload (1 s) 200%

### Voltage measurement range

- VLN measurement range (voltage phase, direct insertion) 0...290 V
- accuracy class 0.5% f.s ± 2 digit

### Current Measurement range:

- measurement range insertion on CT secondary 0.6 ... 60.0 A
- accuracy class on range 0.6 ... 60.0 A 0.5% f.s ± 2 digit

### Active Power (P1, P2, P3)

- range 50 kW
- accuracy class 1% f.s ± 2 digit

### Reactive Power (Q1, Q2, Q3)

- range 50 kVar
- accuracy class 1% f.s ± 2 digit

### Apparent Power (S1, S2, S3)

- range 50 kVa
- accuracy class 1% f.s ± 2 digit

### Active Energy (Wh)

- import / export counters resettable Two separate
- calculating period 15 minutes
- energy counting 99.999.999 kWh
- accuracy class with current 0.05...1.0 In 2% fs ± 2 digit

### Reactive Energy (varh)

- energy counting resettable 99.999.999 kVarh
- calculating period 15 minutes
- accuracy class with current 0.05...1.0 In 2% fs ± 2 digit

### Visualization

- display LCD with white leds
- number of characters 16 on two lines
- colour BLUE

### Electrical characteristics, options

- RS 485 Galvanic insulation
- 3kV

## ALARM RELAY

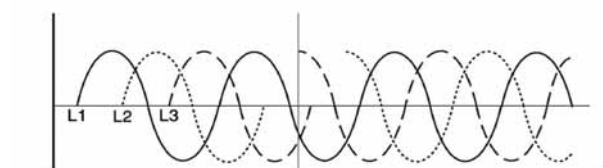
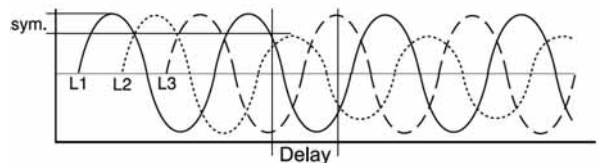
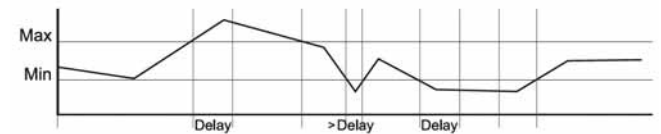
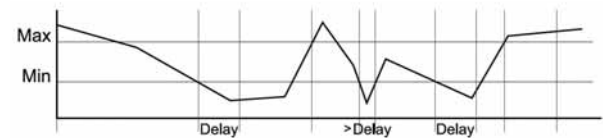
Normal Open contact relay.

Possibility to set the intervention threshold:

- "Hi" modality as higher than .... (>) and "Lo" as lower than ... (<)
- delayed to the excitation "Off-On" or to the disexcitation "On-Off"

### MEASURE'S CHANNEL TO WHICH THE THRESHOLD IS REFERRED:

- min or max of three voltages phase-neutral
- min or max of three voltages phase
- min or max of three currents phase
- min or max of three voltages phase 1-neutral
- min or max of three voltages phase 2-neutral
- min or max of three voltages phase 3-neutral
- min or max of three voltages phase 1
- min or max of three voltages phase 2
- min or max of three voltages phase 3
- min or max of three currents phase 1
- min or max of three currents phase 2
- min or max of three currents phase 3
- min or max of Total active power (import or export)
- min or max of Frequency










### USABLE AS:

- motor protection
- overload
- low consumption
- not presence of phase
- inversion of energy






- priority relay
- anomaly of frequency
- high consumption
- min voltage

# 1 RAEM

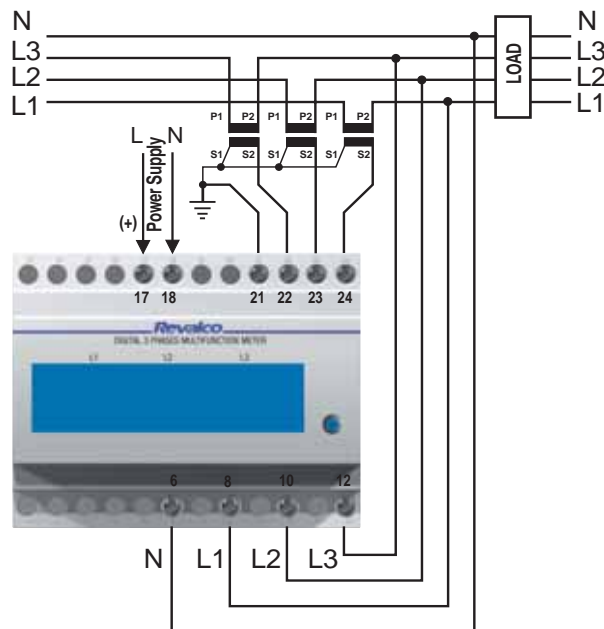
## OPERATION

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

## 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.  CT Set 1000
- UT Set  231 End scale, nominal measurement ph-n. Calibrated in factory. This page is used on models with voltage transformer 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.  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.

## CONNECTION DIAGRAM



# 1RAEMC / 1RAEMC485

## 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.  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 Current I1, I2, I3  
**Releasing the button the measurements will be shown**
- Maintaining pressure on the front button you will see the parameters displayed on this page.  Phase-phase voltage L1-L2, L2-L3, L3-L1 Current I1, I2, I3  
**Releasing the button the measurements will be shown**
- Maintaining pressure on the front button you will see the parameters displayed on this page.  Phase-neutral voltage L1-N, L2-N, L3-N Current I1, I2, I3  
**Releasing the button the measurements will be shown**
- Maintaining pressure on the front button you will see the parameters displayed on this page.  Phase Cosφ Ind/Cap Ind/Cap Ind/Cap L1 L2 L3  
**Releasing the button the measurements will be shown**
- Maintaining pressure on the front button you will see the parameters displayed on these pages.    Active power L1 Active power L2 Active power L3  
**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 power I/C Total Cosφ (L1+L2+L3) (I=Ind, C=Cap)  
**Releasing the button the measurements will be shown**
- Maintaining pressure on the front button you will see the parameters displayed on these pages.    Reactive power L1 Reactive power L2 Reactive power L3  
**Releasing the button the measurements will be shown**
- 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.    Apparent power L1 Apparent power L2 Apparent power L3  
**Releasing the button the measurements will be shown**
- 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**



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.

### 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.



Selection of current transformer ratio.



End scale, nominal measurement ph-n. Calibrated in factory. This page is used on models with voltage transformer 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.



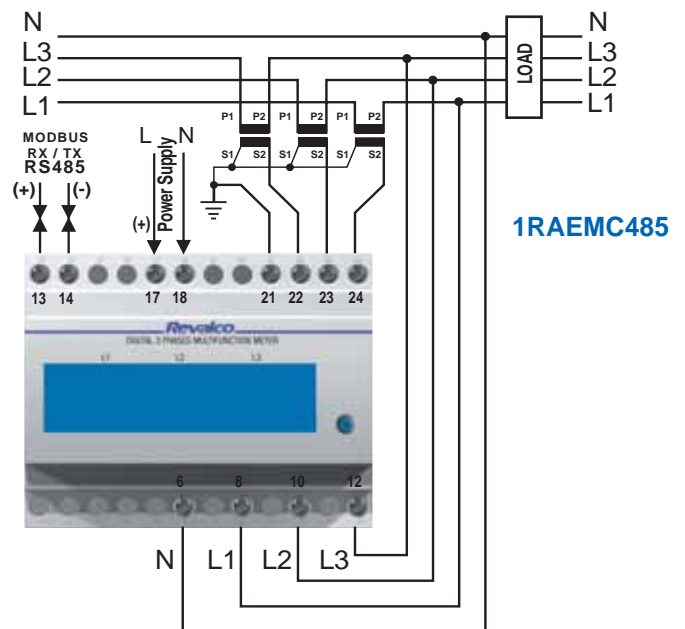
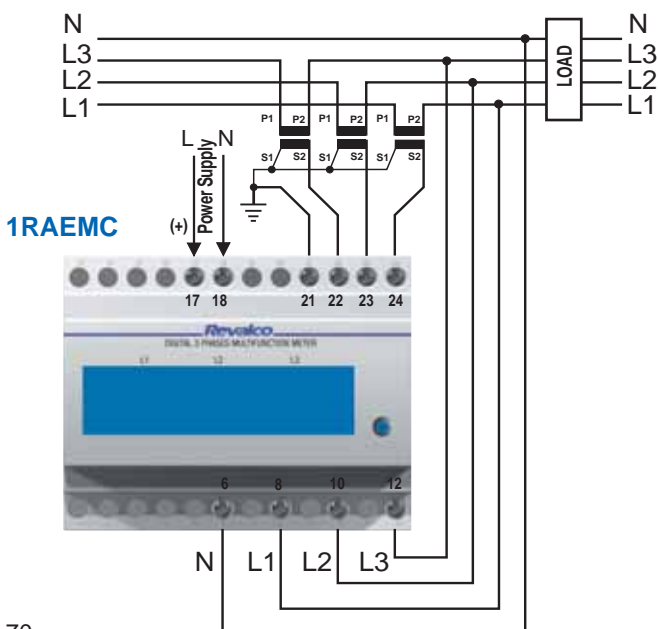
Choose of first page at first powering. "Power On Ready" page selected in factory is useful when it is important to know if an electric interruption occurred.

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)

### CONNECTION DIAGRAMS



# 1RAEMCS / 1RAEMCS485 / 1RAEMBL485

## OPERATION

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

 Update

 Power-On Ready

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.



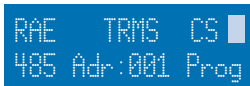
or 

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  
Releasing the button the measurements will be shown



Medium phase voltage (L1+L2+L3)/3 Frequency  
Current I1, I2, I3

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



Phase-phase voltage L1-L2, L2-L3, L3-L1  
Current I1, I2, I3

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



Phase-neutral voltage L1-N, L2-N, L3-N  
Current I1, I2, I3

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



Phase Cosφ Ind/Cap Ind/Cap Ind/Cap  
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.  
Releasing the button the measurements will be shown



Total Active power I/C Total Cosφ  
(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.  
Releasing the button the measurements will be shown



Total Reactive power

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.  
Releasing the button the measurements will be shown



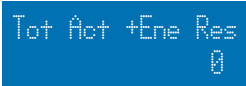
Total Apparent power

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



Total Active Energy (Import)

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



Total Active Energy (Export)

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.



VT Set

231

End scale, nominal measurement ph-n. Calibrated in factory. This page is used on models with voltage transformer 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.



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 Address

58

MODBUS RTU address (froom 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.



Th1 Sel

Hi

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.



Th1 DD

Off-On

**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 Dly 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.



**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 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 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 Dly 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.**

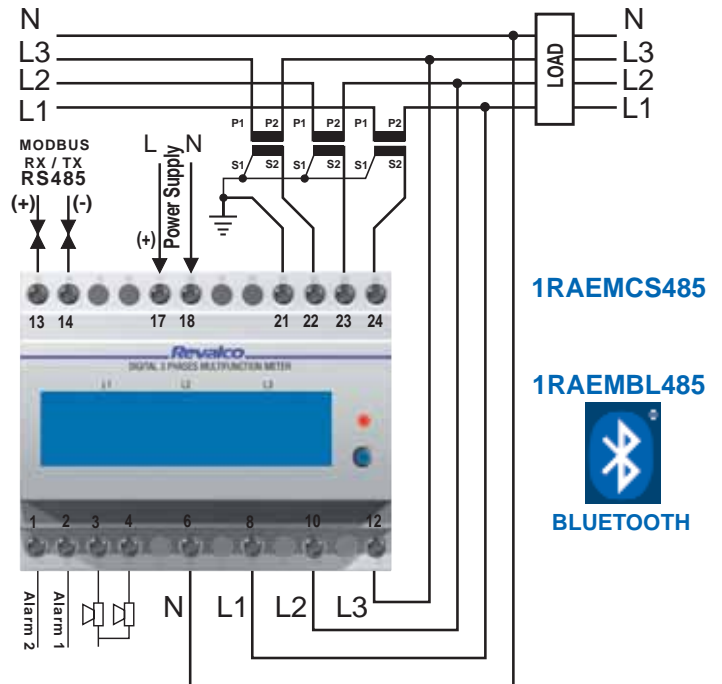
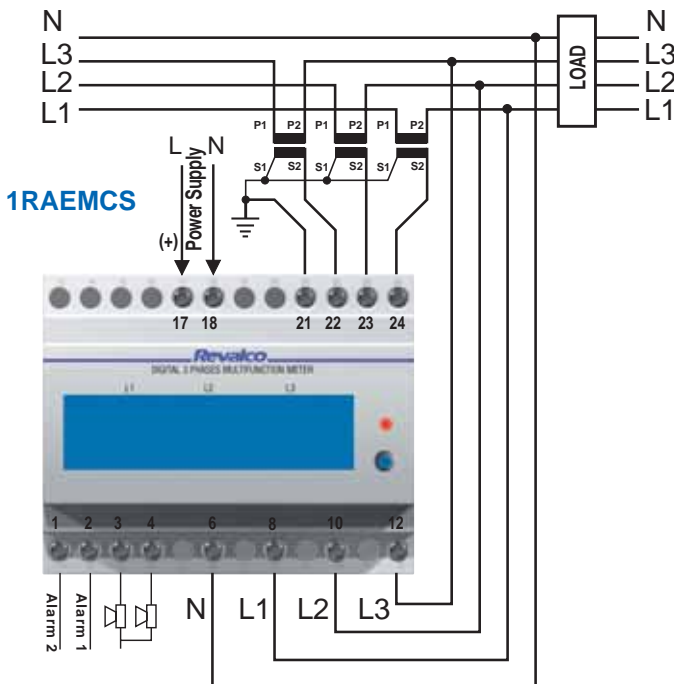
- 3Vff = min or max value of 3 phase-phase voltages.
- 3I = min or max value of currents.
- Pim+= min or max value of bought power (+, import).
- Vas = min or max value of voltage asymmetry.
- V23 = min or max value of phase-phase voltage L2.
- V1 = min or max value of phase-neutral voltage L1.
- V3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



**CONNECTION DIAGRAMS**



# 1RAEM63CS

## OPERATION

Powering the instrument you can see the following page:

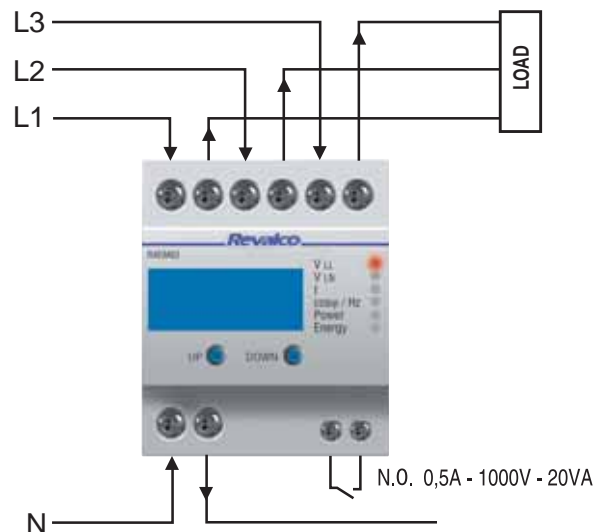


- By pressing the front button, **FIRST LED** lights-on showing the values of Phase-phase voltage.
- By pressing again the front button, **SECOND LED** lights-on showing the values of Phase-neutral voltage.
- By pressing again the front button, **THIRD LED** lights-on showing the values of L1 and L2 currents.
- By pressing again the front button, display shows the value of L3 current.
- By pressing again the front button, **FOURTH LED** lights-on showing the values of Capacitive or Inductive Cosφ.
- By pressing again the front button, display shows the value of Frequency.
- By pressing again the front button, **FIFTH LED** lights-on showing the values of Apparent Power.
- By pressing again the front button, display shows the value of Active Power.
- By pressing again the front button, display shows the value of Reactive Power.
- By pressing again the front button, **SIXTH LED** lights-on showing the values of Active Energy (import).
- By pressing again the front button, display shows the value of Active Energy (export).
- By pressing again the front button, display shows the value of Reactive Energy.
- By pressing again the front button, all the displays light-off showing the function Hourmeter, with aux supply present on the instrument.
- Time spent ( hh and mm),with aux supply present on the instrument, starting from the last annulment. Counting of time interval between two annulments.
- Hourmeter annulment page. Maintaining pressure on the button, the word "Res Time" flashes and the number become zero.

## CONFIGURATION SELECTION MENU

- The sliding of the pages is automatic. To select one or more of them it is enough to press the button of needed page and by a series of pressures and releases, increase the numberings; To fast forward maintain pressure on the front button. Once the needed number is selected, release the button and the further page will be showed. At the end of the pages the instruments will come back himself to the "measurement visualisation" and in case of effected modifications, new values will be saved in the permanent memory.
- In case of min or max threshold setting, the LED correspondent to the chosen parameter lights-on.
- Selection of threshold type: "Lo", relay intervene with values lower than the selected.
- Minimum threshold.** An equal or higher value to the selected one is the not working relay condition.
- Selection of threshold type: "Hi", relay intervene with values higher than the selected.
- Maximum threshold.** An equal or lower value to the selected one is the not working relay condition.
- Delay type**  
"Off" excitation delay (from rest to work).
- Delay type**  
"On" non excitation delay (from work to rest).
- Delay type**  
from 0 sec to 25 sec by steps of 0,1 sec each.

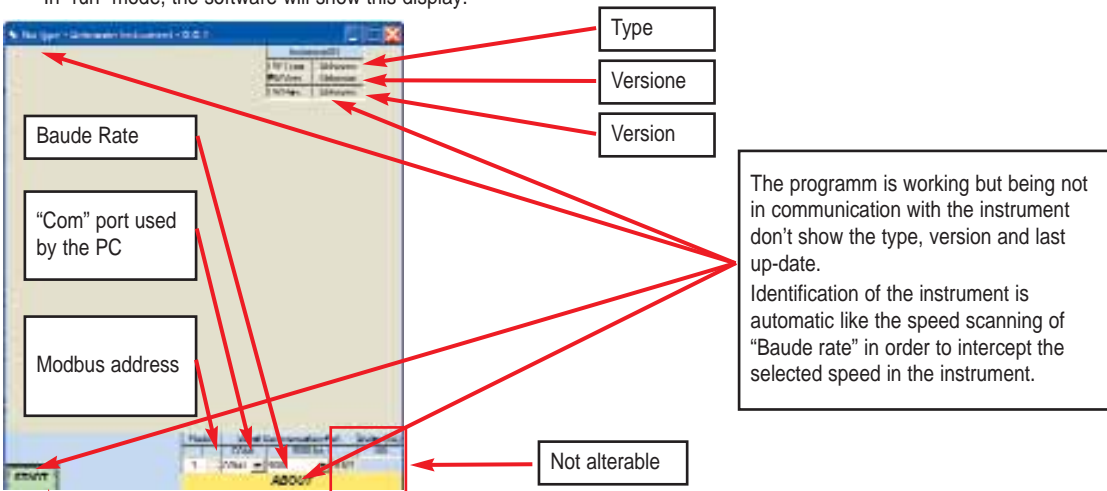
## CONNECTION DIAGRAM



## SOFTWARE USE

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

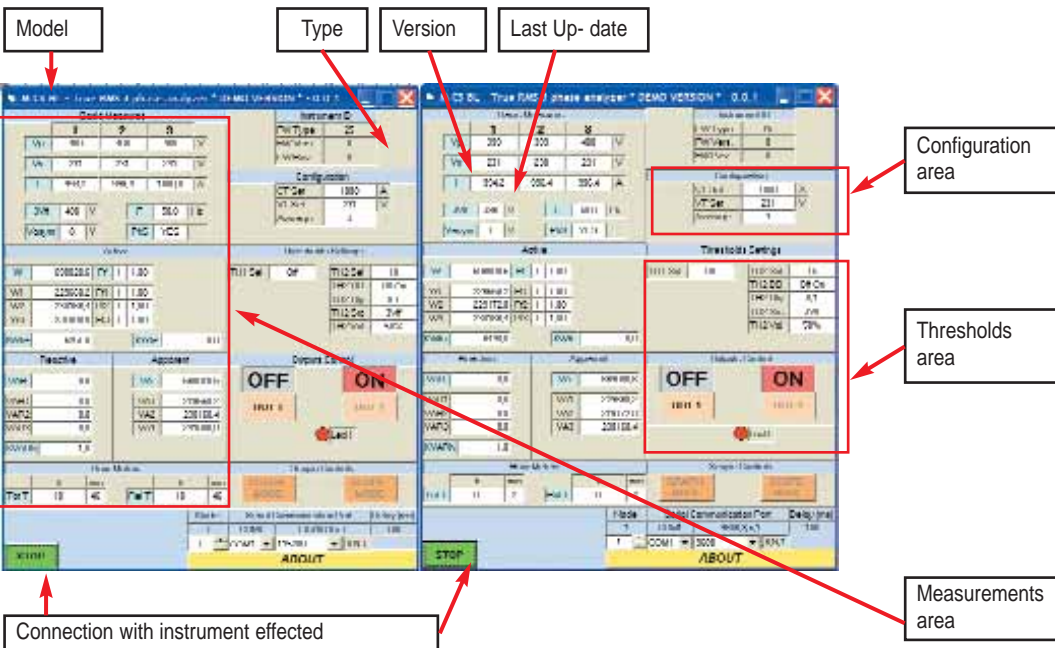
- After the download from CD or from the INTERNET WEB SITE the free software( it permits to see the main measurements available on the instrument) proceed to its installation.
- Once installed the software, execute the application.
- In "run" mode, the software will show this display:



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.



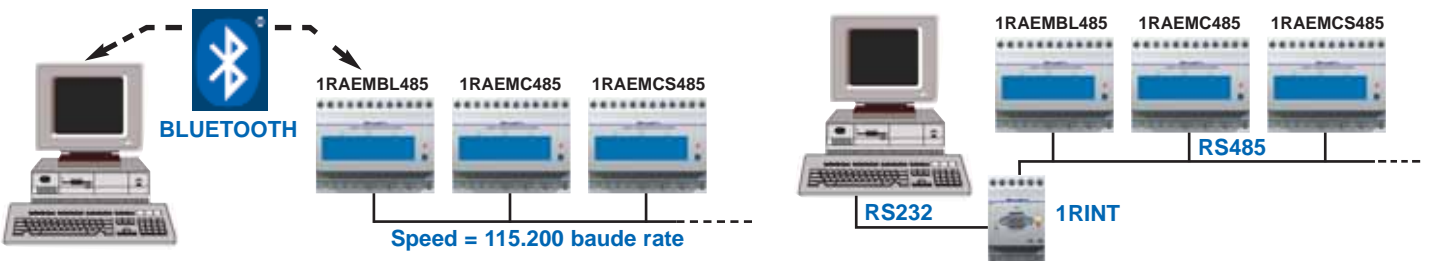
Founded the connection by cableat 115200 bps or at 9600. Configured the display, it visualize the data.....OR

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.





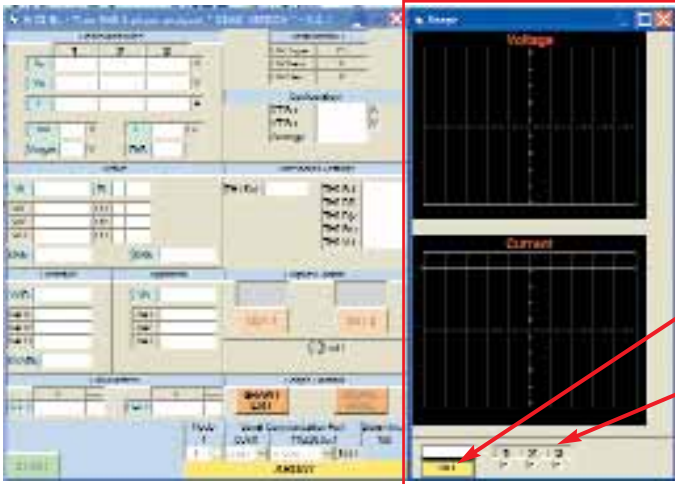
Connection to bluetooth port (example COM5);  
parametres become "AUTO"

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.

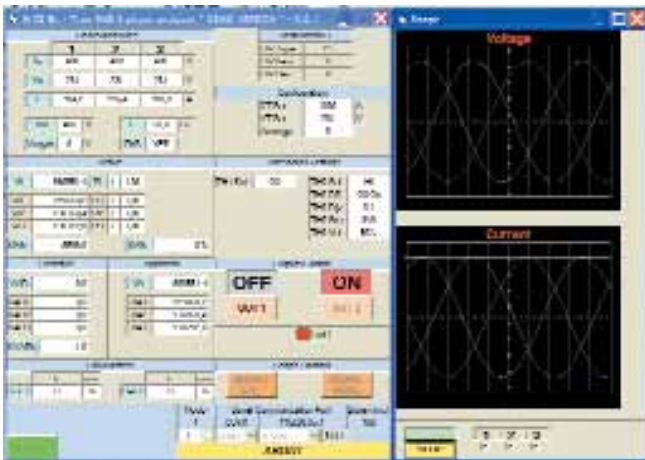
"Oscilloscope" visualization mode

"Start of communication" button

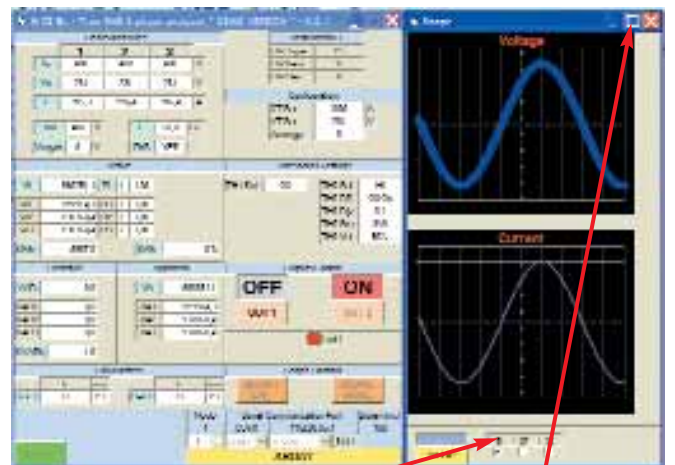
Insertion of phases to visualize(voltage and current)

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.



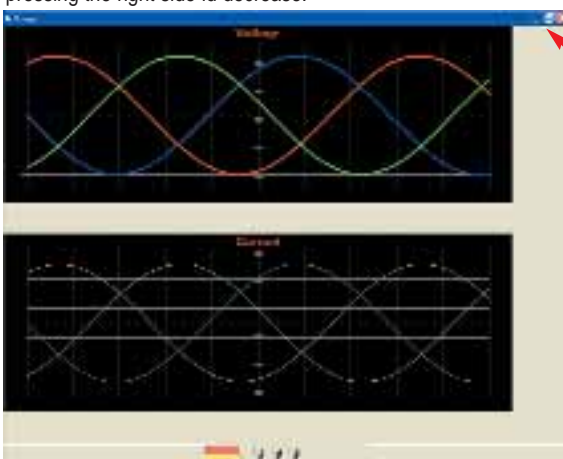
Measurements and curves are simultaneous. Colours are equal for the voltage phase and relative current. The n. 1 (relative to phase L1) is blue-light blue, the n. 2 (relative to phase L2) is red-light red, the n. 3 (relative to phase L3) is green-light green. By pressing the left side of the mouse on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



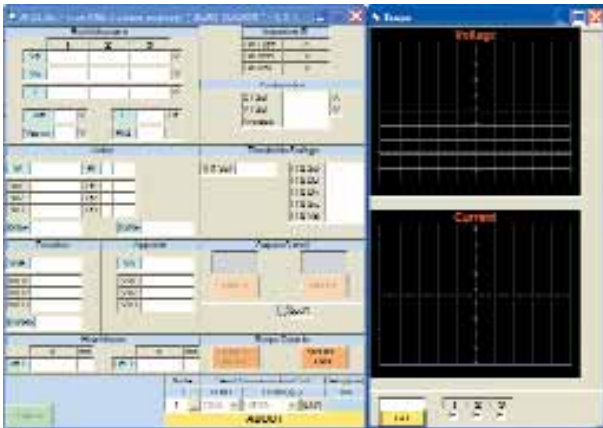
Coming back in measurement mode, when the button START/STOP is green, it is possible to use the output relay 1 (this is permitted when the output is not used as alarm).

Th1 Sel  
Off

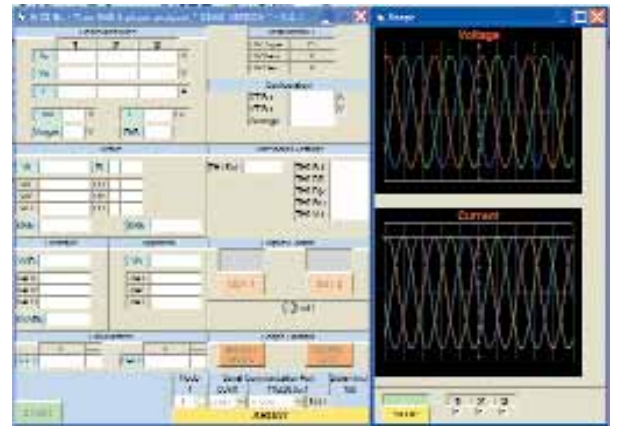
It means that during the programm phase threshold 1 remains in "off" so it is possible to control it from remote as an available resource for generic use ( switch-on or switch-off lamps or machines etc.)

Push STOP to restore the graphic access keys .

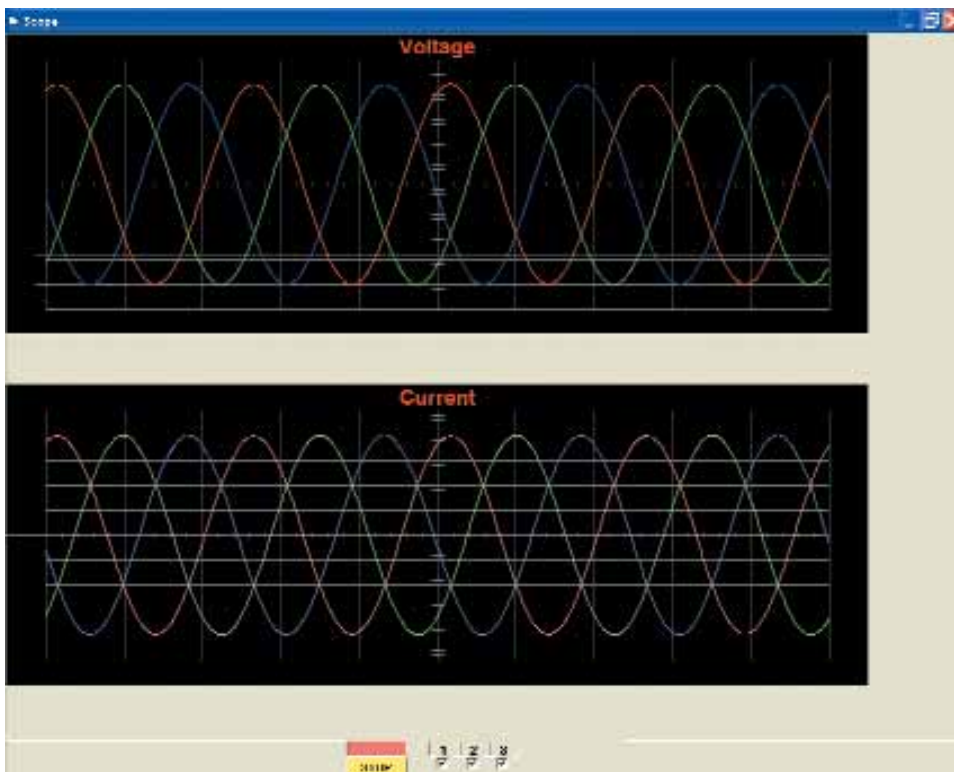
Press "SCOPE MODE"



- 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.

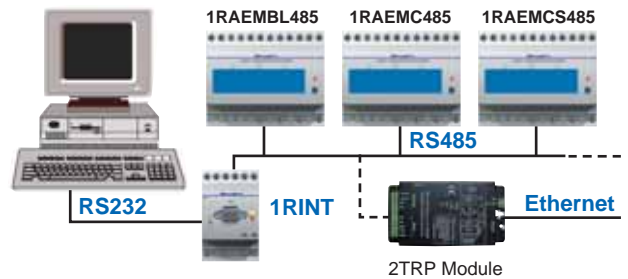
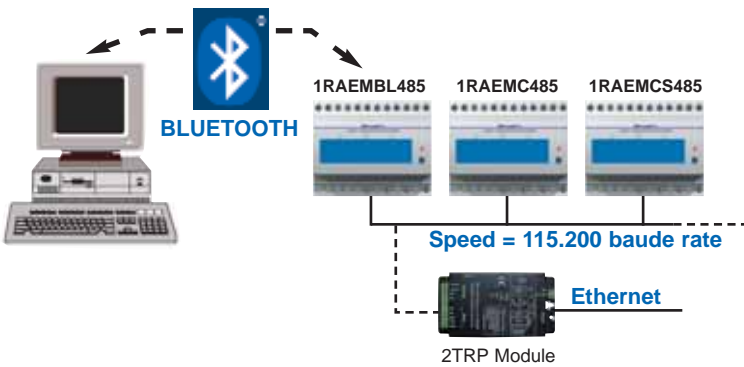
From one side TRP will communicate in MODBUS RTU RS485 with the station or with the ring of stations present in the net

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

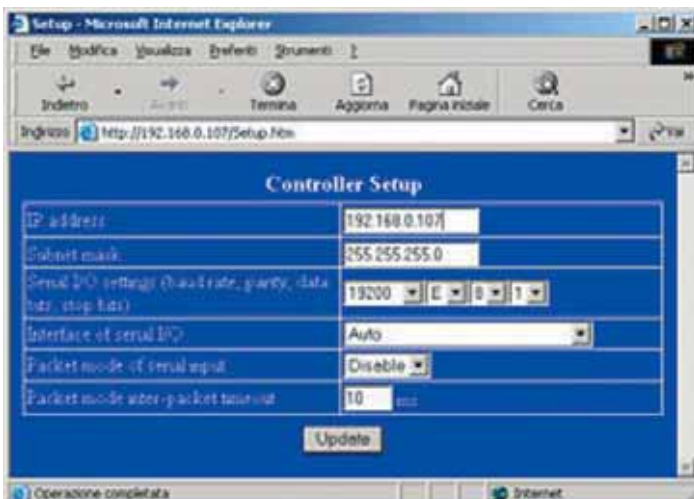


- The transducer is galvanically insulated up to 3kV DC between two interfaces and it is protected by the surge of interface RS422/485. It is therefore recommended in case of long wires connection and/or in case on which it is possible to have differences of potential between the devices.

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