LED THREE PHASE MULTIFUNCTION METER - 2 DIN MODULES
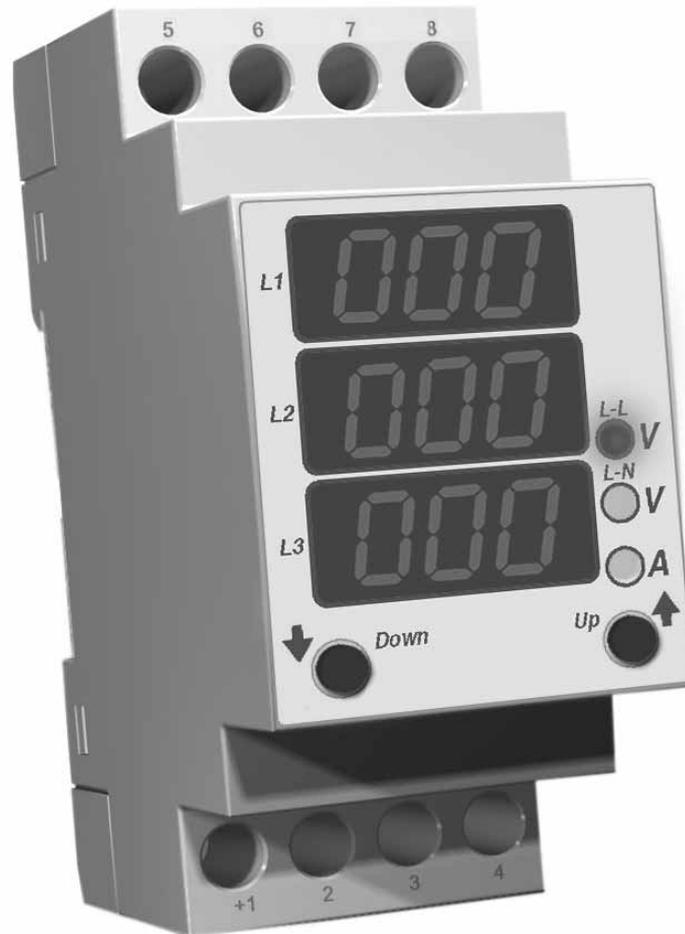
55DERANM23NEUTRO - Ed. 07.01 I/GB

LED THREE PHASE MULTIFUNCTION METER

GENERAL DESCRIPTION

- 2 modules DIN (the smaller present on the market) is the best solution in order to save space on cabinets and in meantime to have a good readability of measures; main scope of multifunction meters in an electrical net.
- Nine red leds with high intensity on three lines, permit to show 3 measurements at the same time.
- Two buttons on front permit to change the measurement pages easily and in natural way.
- During the setting phase, the instrument shows the different possibilities present in the device; so it is not necessary to have in the hands the user's manual all the time.
- "Power supply" page can be used in all the cases on which is important the information of **"lost power supply"** (example in refrigerating machines and/or cold storage)
- The possibility to reset the energy consumption and time, permits to show in easy way the relative consumption in a certain time
- **Current on neutral wire:** meaning of $I_{unbalanced}$ measurement (unbalanced current). It is frequent now, also in normal distribution nets, the use of devices on which the load is not linear. With the scope to calculate correctly the neutral cable and to verify the correspondence with the project data, measurement of current on neutral (or unbalanced current measure) become fundamental.

  These loads absorb not sinusoidal currents, generating harmonic waves as consequence. Third harmonic waves and their multiples, in a 3phase system, are in phase between them constituting homopolar terns.

  In a 4 wire systems these homopolar terns (I_O) makes an aritmetical sum and go along the neutral cable; as result the current on it is: $I_{no}=3*Io.$ So, as example, a third harmonic component I3, present on 3 phases with amplitude 40% respect to the fundamental, causes on neutral a current higher than the fundamental (1,2*Inom)

  It was in the past a rare situation. Current on neutral was caused principally by the unbalanced loads and the solution was to calculate the section of neutral cables equal or less to the phase cables section.

  Now the standard CEI 64-8 art. 524.3, explain well that: neutral cable in multiphase circuits, on which the phase cables have section more than 16mm² (copper wire) or 25mm2 (aluminium cable), can have less section (min 16mm² or 25mm² in any case) on condition that the section supports the current present on neutral: **unbalanced current added of eventual harmonic waves**,

 Our device 1RANM23 is able to measure this current.
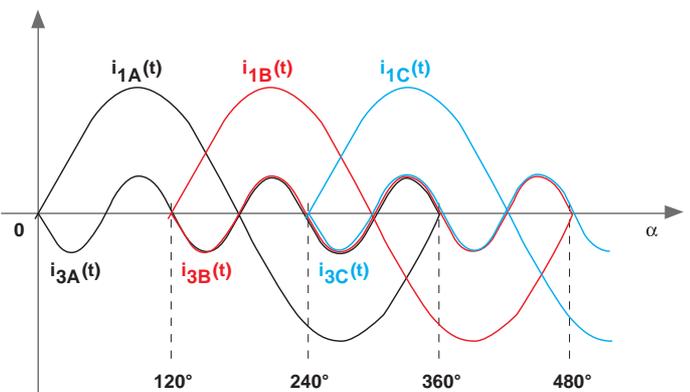
DIMENSIONS in mm

- **The 35 mm dimension correspond to 2 DIN modules**
- **Weight kg. 0,30**
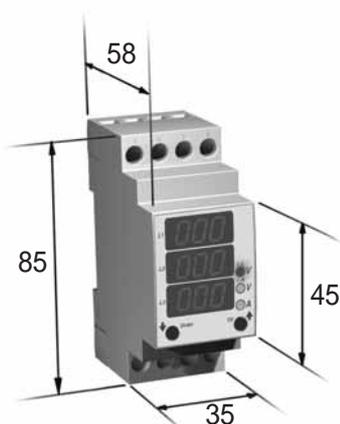
CONNECTION DIAGRAMS

TECHNICAL CHARACTERISTICS
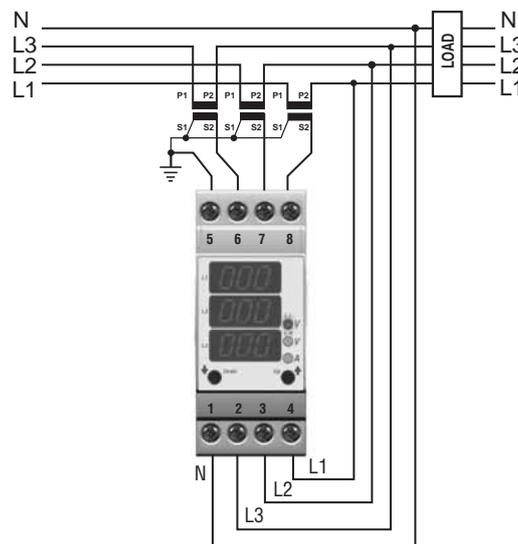
MEASUREMENTS

- Ph-Ph voltage	VL1, VL2, VL3
- Ph-N voltage	VL1-N, VL2-N, VL3-N
- Medium voltage of phase	medium VL
- Phase current	I1, I2, I3
- Medium current of phase	medium I
- Current on neutral	Iun (< unbalance >)
- Phase Active Power (+/-)	L1, L2, L3
- Total Active Power (+/-)	Pw
- Phase Reactive Power	L1, L2, L3
- Total Reactive Power	Pvar
- Phase Apparent Power	L1, L2, L3
- Total Apparent Power	Pva

- Total Active Energy (import)	+kW/h*
- Total Active Energy(export)	-kW/h*
- Total Reactive Energy	kvar/h*
- Total and Partial working time	hh:mm*
- Phase Power Factor	ind/cap L1, L2, L3
- Total Equivalent Power factor	Total ind/cap
- Frequency	Hz
- Sequence of phases	L1>L2>L3 (symbol only)
- Phase-neutral Asimmetry voltage	(>L1 L2 L3-N) - (<L1 L2 L3-N)

*resettable parameters

▬ **True RMS** measurements reading up to 20th harmonic wave

Auxiliary power supply
- nominal value U AUX	230V 50/60 Hz selfsupplied
- range	0.6...1.1 Uaux
- max absorbed power	2 VA

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

Input ammeter circuit — Current:
- nominal current	5 A
- permanent overload	120%
- thermic overload (1 s)	200%
- range adjustment, CT ratio	5...1000

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

Current measurement — range:
- insertion by means of C.T.	0.05...5.00 A
- accuracy class on range 0.05...5.00 A	0.5% f.s ± 2 digit

Frequency measurement — range:
- nominal value	50 / 60 Hz
- range	45...80 Hz
- accuracy class	0.3% vm ± 1 digit
- response time	< 300mS

Apparent Power measurement (S1, S2, S3)
- range	870 KVA
- accuracy class	1% f.s ± 2 digit

Active Energy measurement (Wh)
- import / export kWhmeter	2, different
- resettable	yes
- calculating period	15 minutes
- energy counting	999.999 kWh
- accuracy class with current 0.05...1.0 In	2% fs ± 2 digit

Reactive Energy measurement (varh)
- energy counting	999.999 kVARh
- resettable	yes
- calculating period	15 minutes
- accuracy class with current 0.05...1.0 In	2% fs ± 2 digit

Power Factor measurement
- cosφ range	-1…0…+1
- accuracy class with current 0.1...1.0 In and voltage 0.8...1.2 Un	2% fs ± 2 digit

- cosφ value measured in continuous wave (from 0,00 to 1,00 in all quadrants) permits to display the Active Power in import and export, as consequence inductive and catacitive Reactive Power too.

Three-phase equivalent voltages and currents measurement
- on three-phase without neutral net	V=(V12+V23+V31)/3

Working time
- Total working time (with presence of voltage)	hh 999.999
- Partial working time (from previous reset)	hh 999.999

Digital filter
- Average (to stabilize the measures)	1…15

Compatible current transformers
- Nominal current	5 A
- Ratio	1...200

Visualization
- display	3 numerical lines LED
- number of characters	9 on three lines
- colour	red

Mechanical characteristics
- mounting	on DIN rail DIN50022
- protection	IP20/ frontal IP30

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 CAT III
- Accuracy class CEI EN 60688
- Electromagnetic compatibility (immunity) CEI EN 61000-6-2
- Electromagnetic compatibility (emission) CEI EN 61000-6-4
- Protection IP CEI EN 60529

MEASUREMENT'S TYPOLOGY
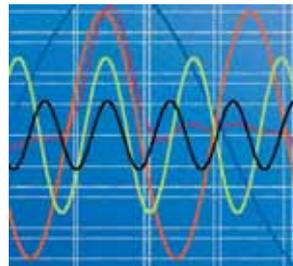
▬ True RMS up to the 20th harmonic wave

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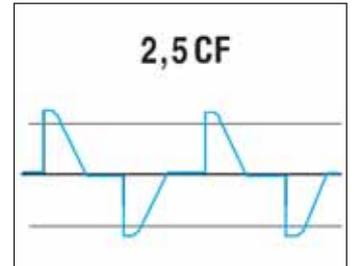
▬ Crest factor up to 2,5 (Voltage and Current)

OPERATION

▬ Instrument furnished already calibrated with the following data: Average = 3

default page = lost voltage
Current transformer = 25/5A
Nominal voltage = 213V (ph-n) and 400V (ph-ph)

▬ When powered the device makes a self test (all segments of leds light-on for some seconds).
Changement of pages can be effected "FORWARD" by short pressure of right button, or "BACKWARD" by short pressure of left button.
Maintaining pressure on buttons you can have: fast forward, reset or configuration of parameters.
When one of the button is pressed, the "title" of the page is shown.

Measurements displaing
The measurements and signalling pages that appear (pushing and releasing the frontal button) are the following:

PUSHED BUTTON	RELEASED	DESCRIPTION
		This FLASHING signal appears only if: - this page is selected as "default page" (see the correspondent configuration chapter) and the instruments is just light-on or if the auxiliary supply light-off and immediately light-on, or the parameters configuration is finished. After the changement of this page, it disappears from the selection pages.
 medium voltage phase-phase		On the downer line the value of the voltage in Volt is displayed
 phase-phase voltages		Measurement of voltage in Volt; the first upper led lights-on If the small points, on the right, light-on (close to each value of the voltage) it means that the sequence of the phases is WRONG.
 phase-neutral voltages		Measurement of voltage in Volt; the central led lights-on If the small points, on the right, light-on (close to each value of the voltage) it means that the sequence of the phases is WRONG.
 phase-phase voltage asimmetry		On the downer line the value of asimmetry in Volt is displayed.
 medium current		On the downer line the value of current in Ampere is displayed.
 phase-phase currents		Values of current in Ampere. The bottom led lights-on
 current on neutral		On the downer line the value of current in Ampere is displayed.
 frequency		On the downer line the value of frequency in Hz is displayed.

PUSHED BUTTON	RELEASED	DESCRIPTION
active power - phase 1		Measurement of Actice Power in Watt. The example shows 5775 W (5,775kW). If on the right side of the value, a little point lights-on it means that the value is NEGATIVE
active power - phase 2		
active power - phase 3		
total active power		Measurement of Actice Power in Watt. The example shows 17325 W (17,325kW). If on the right side of the value, a little point lights-on it means that the value is NEGATIVE
power factor - phase 1		Power factor (cosφ). 4 quadrants value, between 0.00 and +/- 1.00. If the displacement is POSITIVE (inductive) the indications on the display will be <ind> and a point on the right lower side will be lights-off. If the displacement is NEGATIVE (capacitive) the indications on the display will be <cap> and a point on the right lower side will be lights-on. When the value is 1.00, the indication conventionally will be <ind>.
power factor - phase 2		
power factor - phase 3		
tota power factor		Power factor (cosφ). 4 quadrants value, between 0.00 and +/- 1.00. If the displacement is POSITIVE (inductive) the indications on the display will be <ind> and a point on the right lower side will be lights-off. If the displacement is NEGATIVE (capacitive) the indications on the display will be <cap> and a point on the right lower side will be lights-on. When the value is 1.00, the indication conventionally will be <ind>.

PUSHED BUTTON	RELEASED	DESCRIPTION
reactive power - phase 1		Measurement of Reactive Power in Var. The example shows 954 var (0,954kvar). If on the right side of the value, a little point lights-on it means that the value is NEGATIVE, so the measured value is CAPACITIVE instead of INDUCTIVE.
reactive power - phase 2		
reactive power - phase 3		
total reactive power		Measurement of Reactive Power in Var. The example shows 2862var (2,862kvar). If on the right side of the value, a little point lights-on it means that the value is NEGATIVE, so the measured value is CAPACITIVE instead of INDUCTIVE.
apparent power - phase 1		Measurement of Apparent Power in VA. The example shows 5775 VA (5,775kVA). apparent power - phase 2 apparent power - phase 3
total apparent power		Measurement of Apparent Power in VA. The example shows 17325 VA (17,325kVA).
active energy (import)		Measurement of Energy in kWh. The example shows 12521 KWh. When 999999 is displayed, counting start again from 0. RESET: By a long pressure of right button only, the value flashes, and after few seconds it will be resetted.
active energy (export)		Measurement of Energy in kWh. The example shows 327 KWh. When 999999 is displayed, counting start again from 0. RESET: By a long pressure of right button only, the value flashes, and after few seconds it will be resetted.

PUSHED BUTTON	RELEASED	DESCRIPTION
thr	thr 37 820	Measurements of hours (h). It shows the total working time (from powering of instrument). The example shows 37820 h. When 999999 is displayed, counting start again from 0.
total hourmeter		
rhr	rhr 249	Measurements of hours (h). It shows the partial working time (from last reset of instrument). The example shows 249 h. When 999999 is displayed, counting start again from 0. RESET: By a long pressure of right button only, the value flashes, and after few seconds it will be resetted.
partial hourmeter		

CONFIGURATION SELECTION MENU

▬ Make a long pressure (4 seconds about) on the RIGHT button, while you stay in a page where the resettable parameters are NOT allowed.
So not on the pages of Energy or Hour-counter otherwise you obtain the reset of these values without enter on the configuration pages.

The following page appears:

Where in the central line you'll see the device type and release n°. Dot on upper right side of display flashes, three leds light-on meaning the configuration mode. This situation will remain until the end of procedure.

After 4 seconds the pages with configuration parameters start to be displayed; one page every 4 seconds showing the actual selected value.

If it is necessary to see the values without any modification don't touch nothing until the automatic end of the showed pages.

To change the values of parameters, it is enough to press the RIGHT button while this parameter is displayed.

The value change immediately and closed to him a flashing points appear meaning that the value is in modification phase.
To fast forward maintain pressure on the RIGHT button.
The following can be made by pressing the left button:
- pressed during the automatic display of the pages, it increases the time you stay on this page until it is released.
- pressed during the setting of some value (when all the points on the right flashes) decrease step by step this value and it increases the time you stay on this page until it is released.
The modified value is automatically saved in permanent way when the automatic display of the pages starts again.

▬ The following pages can be present or not depending by the model of instruments.

DEFAULT PARAMETER	POSSIBLE VALUES	DESCRIPTION
AUE. 3	VALUE from 1 to 15	It is the number (n) of single measures effected on the electrical parameter before it's visualization on the display. Practically it is the filter of the measure stabilization. The numbering rise up from 1 to 15; more higher is the selected number, more slow are the eventual variations of reading. This is valid for all the measured parameters. $$MEASURE = \frac{\sum_{1}^{n} Measure\ (n)}{n}$$
dEF. PA9	ONE OF THE AVAILABLE PAGES	Select the main page that you want to see after the initial powering of the instrument.
ct. 25	VALUE from 5 to 999 every 5 steps	Select the ratio .../5A of the current transformer.
Ut. 400 231	VALUE from 200 to 262	It represent the NOMINAL voltage value of end scale value. Phase-phase voltage on the central line. Phase-neutral voltage on the lower line. The default value (calibrated in factory) is 231V (400V phase-phase).