

EMM- μ D3h DIGITAL MULTIFUNCTION METER FOR ELECTRICAL PARAMETERS

EMM- μ D3h-p

EMM- μ D3h-485

GENERAL

The digital multimeters series **EMM- μ D3h** allow monitoring the main electrical parameters present on a distribution line. The local display of the various electrical parameters is carried out by 3 displays with red LED, granting a good and simultaneous reading of various values. A simple front panel completes the intuitive selection of several electrical parameters, in order to provide full information.

On top of the instantaneous measures, these instruments display the maximums (peak of the main parameters and maximum demand or average maximum value).

The multifunction meters **EMM- μ D3h** replace in a unique device, all the functions of voltmeters, ammeters, energy meters, cosphimeters, wattmeter's, varmeters, hour meters and frequency meters. This gives a great economic saving, by reducing space and time, optimising also the purchase management of instruments, since one model meets most demanding requirements for local measuring in electrical boards, switch-boards, MCC's, Gen-sets, etc.



AVAILABLE TYPES

Among the large range of the **EMM** multimeters family, find here below the available **EMM- μ D3h** types:

EMM- μ D3h based version.

EMM- μ D3h-p as **EMM- μ D3h** version but with digital outputs for pulse emission or alarm signalling.

EMM- μ D3h-485 as **EMM- μ D3h** version but with RS485 port.

The auxiliary supply for all types, is available with following voltages:

- 230V (rated) 50-60Hz standard version
- 110V (rated) 50-60Hz optional version
- 400V (rated) 50-60Hz optional version

INTRODUCTION

The **EMM- μ D3h** are only featured for local visualising the electrical parameters. The **EMM- μ D3h-p** has two digital outputs. The **EMM- μ D3h-485** has a RS485 port. The auxiliary supply is connected to 2 terminals, separated from the measuring voltage inputs. It is necessary to use of external CT's for measuring the currents.

ACCESSORIES AND OPTIONS

Accessories: Din rail mounting CT's

Options: Auxiliary supply and measuring voltages, other than standard (under request)

Current Input 1A

Others CT secondary input (on request)

MEASURED PARAMETERS

Parameters	Measuring units	Identification symbols			
phase and three phase voltage	[V]	V L1-N	V L2-N	V L3-N	Σ V L-N
phase to phase and three phase system voltages	[V]	V L1-L2	V L2-L3	V L3-L1	Σ V L-L
phase and three phase currents	[A]	I L1	I L2	I L3	Σ I
phase and three phase power factors		PF L1	PF L2	PF L3	Σ PF
phase and three phase active powers	[kW]	W L1	W L2	W L3	Σ W
phase and three phase system reactive powers	[kVAr]	VAr L1	VAr L2	VAr L3	Σ VAr
phase and three-phase system apparent powers	[kVA]	VA L1	VA L2	VA L3	Σ VA
three phase average powers	[kW-kVAr-kVA]	Σ W (avg)	Σ VAr (avg)	Σ VA (avg)	
three phase forecasted average powers	[kW-kVAr-kVA]	Σ W pr (avg)	Σ VAr pr (avg)	Σ VA pr (avg)	
frequency	[Hz]	Hz L1			
three phase active energy	[kWh]	Σ kWh			
three phase reactive energy	[kVArh]	Σ kVArh			
three phase apparent energy	[kVAh]	Σ kVAh			
hour meter	[h]	h			
peak value (maximums):					
phase voltage	[V]	V L1-N max	V L2-N max	V L3-N max	
phase current	[A]	I L1 max	I L2 max	I L3 max	
phase average current (maximum demand)	[A]	I L1 max (avg)	I L2 max (avg)	I L3 max (avg)	
three phase system powers	[kW-kVAr-kVA]	Σ W max	Σ VAr max	Σ VA max	
three phase system average power (max demand)	[kW-kVAr-kVA]	Σ W max (avg)	Σ VAr max (avg)	Σ VA max (avg)	

INSTALLATION

WARNING FOR THE USER

Read carefully the instructions/indications contained in this manual before installing and using the instrument.

The instrument described in this manual is intended for use by properly trained staff only.

SAFETY

This instrument has been manufactured and tested in compliance with EN 61010-1 (IEC1010) standards. In order to maintain these conditions and to ensure safe operation, the person must comply with the indications and markings contained in the manual. When the instrument is received, before beginning installation, check that it's OK and it has not suffered any damage during transport. When starting installations make sure that the operating voltage and mains voltages are compatible with the device instructions. The instrument power supply must not be earthen. Only qualified and authorised personnel must carry out maintenance and/or repair. If there is ever the suspicious that, that there is a lack of safety, during operation, the instrument must be disconnected and cautions taken against accidental use.

Operation is no longer safe when: The instrument doesn't work. - There is clearly visible damage. - After serious damage occurred during transport. - After a storage under unfavourable conditions.

The fixing to the DIN rail is granted by the rear spring fixing device.

It's better to put an external protection with fuses for the voltage inputs and to use adapted cables for the working currents and voltages: section from 0.5 to 4 mm².

WIRING

For a correct use of the device, the wiring diagram contained in the present manual must be respected. The connections are available on the screw terminals:

- Power supply:

The auxiliary power supply is taken from the terminals aux1 and aux2.

The rated supply voltages can be:

standard:	Vn	230V ± 15%	50-60Hz
under request:	Vn	110V ± 15%	50-60Hz
under request	Vn	400V ± 15%	50-60Hz

- measuring voltage inputs:

4 terminals are available for wiring to the 3 phase and neutral of the measuring network, the maximum voltage phase to phase shouldn't be over 500V rms and 290V between phase and neutral.

In case of a 3-phase system without neutral or non-distributed neutral, leave terminal N free.

For single phase use, wiring should be done between terminals L1 and N and bridge L2 and L3 phases to neutral N.

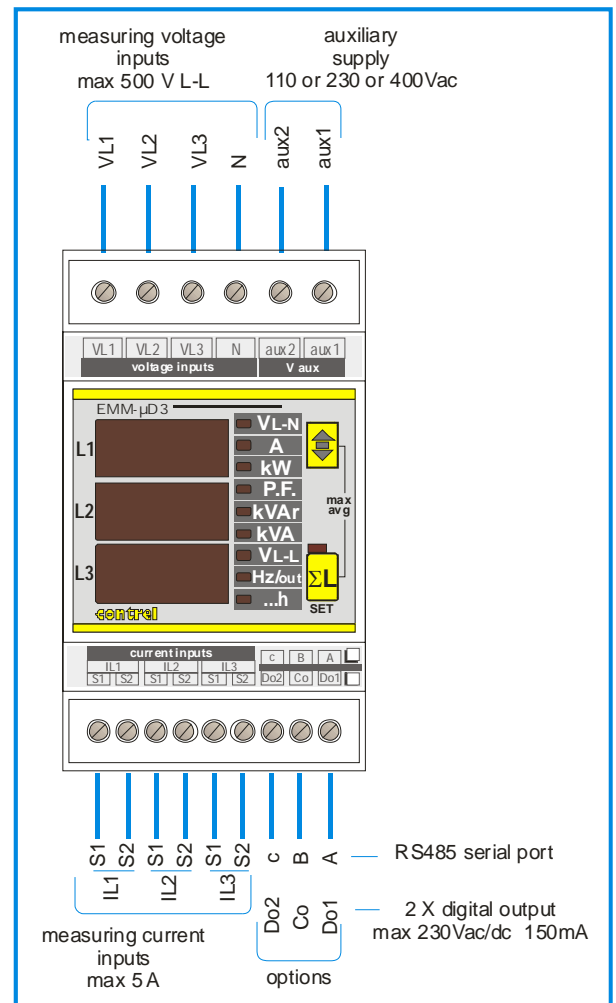
- measuring current inputs:

6 terminals are available for wiring to 3 external CT's with secondary 5A, it's possible to use 2 CT's on 3 wires lines with (Aron three-phase wiring) and the use of 1 CT in case of single phase system (input IL1). External CT's must always be used.

Don't connect CT's secondary to the earth.

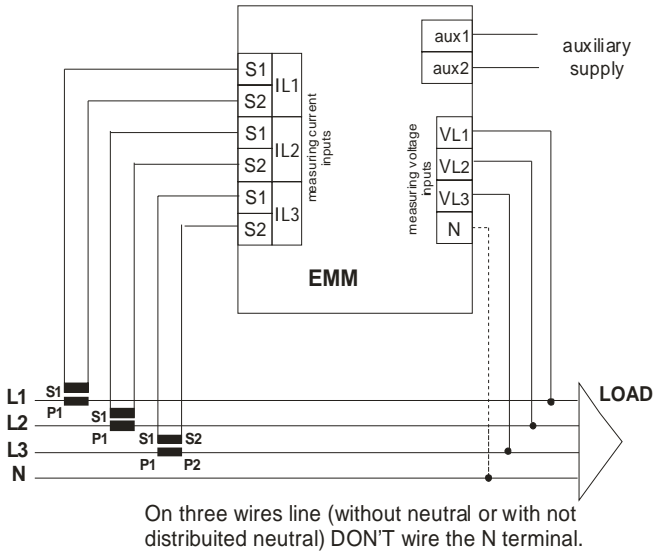
The instrument's SETUP menu allows to set the transformation rate of the external CT and it's possible to visualise readings of current up 999 A. Should the case be that calculated current is higher than the maximum value, the display will show the over range condition. The maximum setting of the transformation ratio is 2000/5=400

NOTE: For a correct measuring of the power factor and energies and powers it's a must to respect the phase sequence. The connections between current and voltage phase inputs must not be inverted (for example, CT placed on phase L1 must correspond to the I1 input). So as it is not correct to invert S1 and S2 of the CT's terminals. The earthing of the CT's secondary should be made using the wires connected to the C.I. terminal.

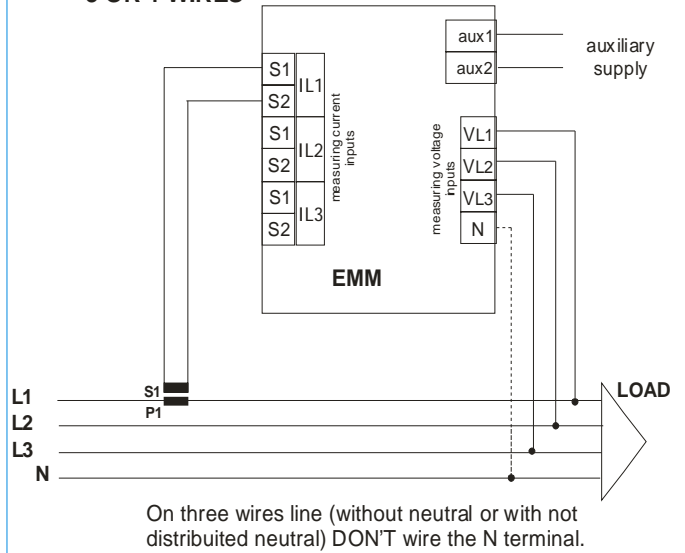


WIRING DIAGRAMS

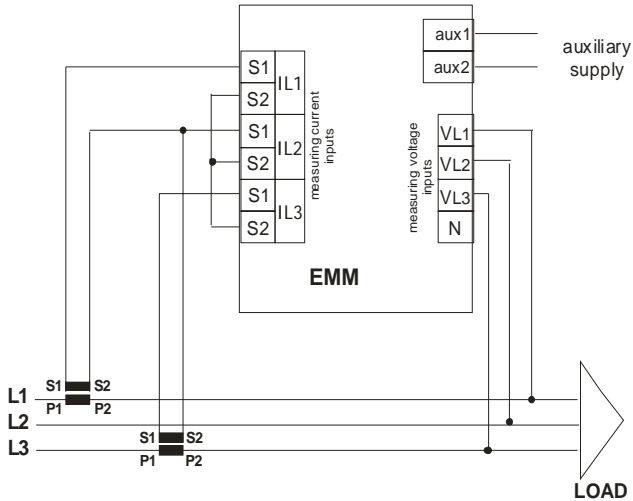
WIRING IN A THREE PHASE LINE WITH 3 OR 4 WIRES



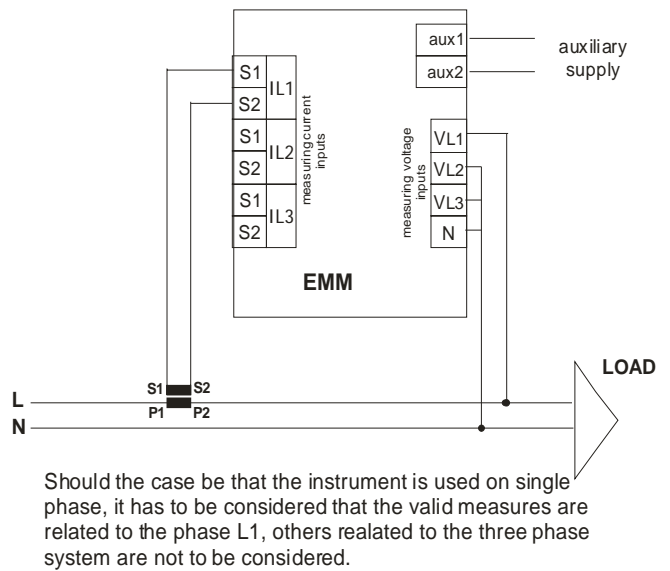
BALANCED THREE PHASE LINE WIRING WITH 3 OR 4 WIRES



THREE PHASE LINE WIRING WITH 3 WIRES AND 2 CT (AARON Wiring)



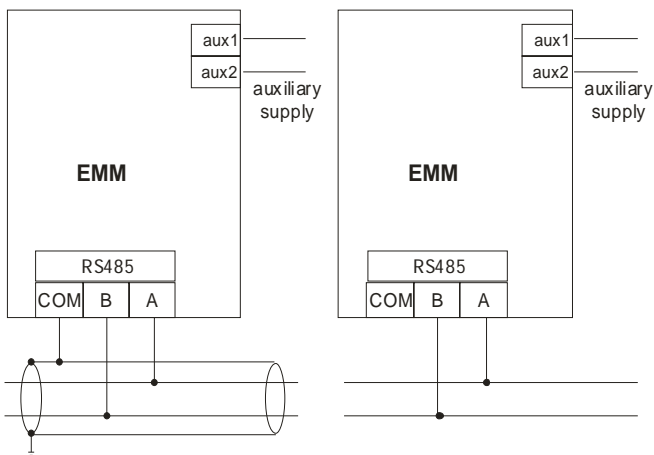
SINGLE PHASE WIRING



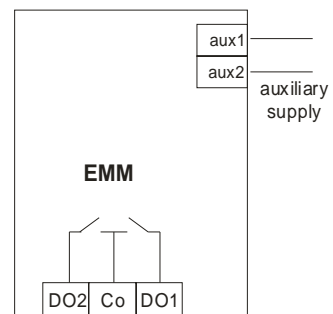
RS485 Connection

Connection with shielded

Connection with not shielded



Digital Output connection



DESCRIPTION:

LEGEND:

A: Key for visualising the three phase system parameters with its corresponding **LED**. By pressing again this key, the instrument returns to reading each individual phase. By keeping the key pressed for 5 seconds the instrument reaches the programming mode (**SETUP**). In **SETUP** mode, this key confirms the values set and by pressing the **B** key simultaneously, it starts decreasing the value.

B: Key for selecting the measured parameters to be shown at the **C** display. In **SETUP** mode selects and modifies the value of the parameters to be set.

A+B: With the simultaneous pressing of both keys the instrument reaches the visualisation of the maximum and average values, which may be selected with the **B** key. To escape from maximum and average values visualisation, don't press any key for 8 seconds.

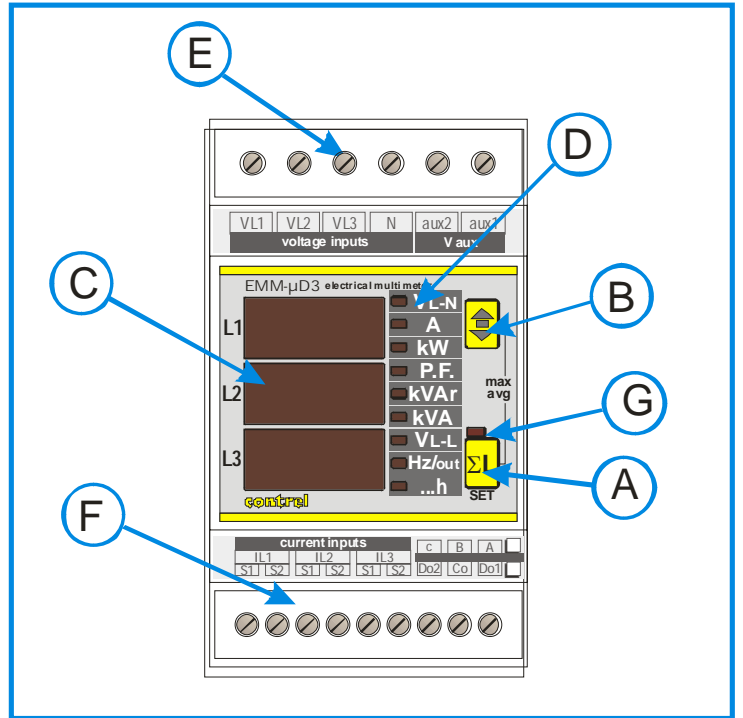
C: Three displays for visualising the measures, subdivided by phase of the parameters indicated by the LED **D** bar. In case that the ΣL LED (**G**) is glowing, the instruments shows the three phase values of the measures, indicated by the LED **D** bar.

D: LED bar for indicating the measures visualised on display **C**.

E: Terminals for wiring the voltage measures input and auxiliary supply.

F: Terminals for wiring the current measures input and the digital output (when present in the instrument).

G: LED for indicating of a three phase value visualisation.



MENU FOR PROGRAMMING THE INSTRUMENT (SETUP)


The instrument's **SETUP** menu is reached by pressing the **A** key during 3 seconds. Once in the **SETUP** menu, it is possible to select or modify the visualised parameter's value, by pressing the **B** key.


If no pressing is made on any key during 8 seconds, the instrument escapes from the **SETUP** menu.


For a correct operation of the multimeters the instrument has to be programmed with the transformation ratio of the external CT's.

It will only be possible to reset the energy meters in those instruments fitted with such a characteristic, so as to program the digital outputs only if the digital outputs is available in the instruments.


The set values are kept without auxiliary supply even.

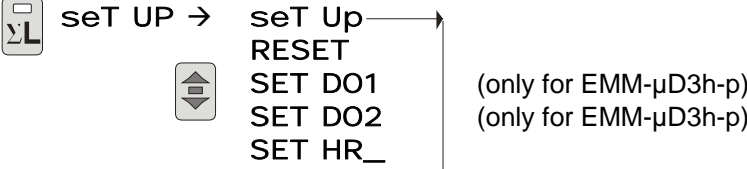
 > 5 seconds, access to the programming menu (**SETUP**)












































 for selecting of a parameter or modifying the parameter's value for programming (**SELECT**)

 for confirming the selection or confirming the programmed parameter's value (**ENTER**)

CONFIGURATION OF GENERAL PARAMETERS (SET UP)

Entry to menu:  seT UP →



		SET CT Set CT ratio from 1 to 2000	 	Increase  Decrease
		SET VT Set VT ratio from 0.1 to 400.0	 	Increase  Decrease
		seT AV9 T Set average time from 1 to 30 minutes	 	Increase  Decrease
		seT 3pH Set connection type	 	BALANC UN_BAL 1PH L1
		seT MDE Set wiring connection type	 	-3- -4-
		seT SYN MDE Set synchronism type	 	L1 50 60
(only for EMM-μD3h-p)		seT PUL SE Set pulse weight	 	10.0 kWh-kVAr / pulse 01.0 kWh-kVAr / pulse 0.10 kWh-kVAr / pulse 0.01 kWh-kVAr / pulse
(only for EMM-μD3h-p)		seT TPL from 100 to 500 mS in step by 100 mS	 	Increase  Decrease
(only for EMM-μD3h-485)		seT ID ADR Set address of network from 001 to 247	 	Increase  Decrease
Set baud rate serial interface (only for EMM-μD3h-485)		seT SER BDR 19200 baud 9600 baud 4800 baud 2400 baud	 	19.2 9.60 4.80 2.40
Set parameters of Communication serial interface (only for EMM-μD3h-485)		seT PAR bit: 8data 1stop-no parity bit: 8data 2stop-no parity bit: 8data 1stop-even parity bit: 8data 1stop-odd parity	 	8.1 paR NO 8.2 paR NO 8.1 paR EVE 8.1 paR ODD
		SET PAS Set Password OFF - 0002 ÷ 9999	 	Increase  Decrease
		Confirm and end of general settings		

Programming the transformation ratio of the external CT's (SET CT)

The programming of the CT's ratio is considered as the rate between the primary and the secondary (i.e.: with CT 1000/5, we must set 200 as value). The setting will be done with the push-button on the front panel.

Some seconds after giving the auxiliary supply to the instrument (during the switching on, all LED and displays will flash alternatively to the firmware indication), by pressing the **A** key, the display **C** will show the message **seT Up**.

Then press **A** again to reach the programming menu and the **C** display will show the message **seT CT** and the value of the transformation ratio (set as 1 by the manufacturer) will appear at the third display. Press the **B** key to increase the value or press simultaneously the **A** key to decrease the value (the variation is performed unit per unit). To speed up the operation, keep on pressing the button **A** and **B**, and the variation will appear successively by tens and hundreds, releasing and pressing the key again it will return to increase or decrease the value at unit per unit. Press the **A** key to confirm, the instrument will pass to successive programming menu. Shouldn't any key be pressed during a 10 seconds interval of time, the instrument will exit automatically from programming without saving the set values.

Programming of the transformation ratio of the external voltage transformers

After the precedent programming phase, on **E** display will appear the inscription **VT** (voltage transformer) and the value of the transformation rate of the external TV (set to 1 from the constructor), considered as the rate between primary and secondary (example with TV 15/0.1 kV the value will be 150).

In the same way at the programming of the CT rate will be possible to set this value. If the external TV are not used the value to set will be 1. To confirm the value press the **A** button.

Programming of the average time (seT AVG T')

After the programming phase previously described, pressing another time the **A** key, on the **C** display will appear the message **AVG T'** and the average time settable from 1 to 30 minutes.

To increase the value press the **B** key. To decrease it, press the **A** key with **B** key already pressed. To confirm it press the **A** key. The average time is the time used to calculate the average parameters (**avg**) and the maximum demand (**maxD**).

Programming insertion mode (3PH)

In a unbalance three phase system it's necessary to set **UN_BAL** (unbalance) while in a balance system (only one CT and only one VT) the correct set is **BALANC** (balance). For a single phase insertion it's necessary to set **1PH L1**.

Programming wiring connection mode (MDE)

This setting allows to definite the wiring type connection. It's possible to chose 3 wires or 4 wires. With the 4 wires connection the neutral parameter are displayed and enabled to use for the digital outputs settings.

Programming of the synchronism type (SYN MDE)

In this setting for the synchronization type, it's possible to choose **L1** to use the external frequency (on L1 phase) or **50**, **60** Hz to use the internal clock.

Programming the weight of the energy pulses (seT PULSE) (only for EMM-µD3h-p)

After the previously described programming step, and pressing the **A** key, the **C** display will show **PUL se** message and the weight value of each single pulse, settable between 4 values: **0,01 - 0,1 - 1 - 10**.

For each emitted pulse, the instrument had counted 0,01 - 0,1 - 1 - 10 kWh, kVArh, kVAh according with what it has been selected in the digital output configuration. Press the **B** key to modify the value in the cyclic mode. Confirm the configuration by pressing the **A** key.

Programming the pulse duration (SET TPL) (only for EMM-µD3h-p)

The message **TPL** will appear together with the pulse duration value, expressed in mS. It is possible to select the value between 100 mS and 500 mS, in 100 mS steps. Press the **B** key to modify the value in the cyclic mode. Confirm the configuration by pressing the **A** key.

Programming of the address for the communication network (SET ID ADR) (only for EMM-µD3h-485)

After the confirm with the **A** key of the previous value, the message **ID aDR** will appear on **C** display; to set the value that will identify the instrument when it will be connected in a EIA485 communication network, proceed with the modality, already described. The settable values are from 1 to 247. To confirm, press the **A** key.

Programming of the baud rate (SET BDR) (only for EMM-µD3h-485)

The following setting is the baud rate. The message **SET BDR** on the first two parts of **C** display to indicate the programming of the baud rate displayed on the third part (L3) of the **C** display. To modify the value set, it's necessary to use the **B** key. The values settable are: **19.2**=> 19200 baud, **9.60**=>9600 baud, **4.80** =>4800 baud, **2.40**=>2400 baud. Press **A** to confirm the value displayed.

Programming of the serial parameters (only for EMM-µD3h-485)

The following message will appear on **C** display using the **B** key. To confirm press the **A** key.

8 1	8 data bit / 1 stop bit	8 2	8 data bit / 2 stop bit	8 1	8 data bit / 1 stop bit	8 1	8 data bit / 1 stop bit
PAR	No parity	PAR	No parity	PAR	Even parity	PAR	Odd parity
NO		NO		EVE		ODD	

Programming of the Password (SET PAS)

The instrument is supplied without password. When a password (from 0002 to 9999) is set, using the **B** (to increase), **A-B** together (to decrease) and **A** (to confirm) keys, only who know this value can to enter in the setup. The password, in fact, is required all the time that someone try to enter in the setup (pressing the **A** key for more of 3 seconds). If the password is wrong, the message **PASS ERR** will appear on **C** display and the instrument go back to the measures visualization. To input the password, when required by the instrument, at the enter of the setup, use the **A** and **B** keys as the same way done previously.

CANCELLING OF THE PEAK VALUES AND ENERGY METERS (RESET)

From the measures visualisation mode, keep the **A** key pressed until the message **seT UP** appears on the **C** display; then press the **B** key until the message **RES ET** appears on the **C** display; access to the reset menu by pressing the **A** key. By pressing the same key we can now select the cancellation type that we wish to activate.

Here below the different types:

- RESET PEA** cancellation of the instantaneous values only
- RESET 15'** cancellation of the average values in the 15' only
- RESET EN** cancellation of the energy meters
- RESET AI I** cancellation of the energy meters, average and the instantaneous values.

To activate the selected cancellation mode, press the **B** key to change the **C** display's indication from **NO** to **yes**. Confirm to activate the cancellation, by pressing the **A** key; the indication in the display **C** will pass from **yes** to ---. Without pressing any key, wait until the instrument returns to the measures visualisation mode.

PROGRAMMING THE DIGITAL OUTPUT (SET DO1 SET DO2) (only for EMM-μD3h-p)

In the menu **SET DO1** and **SET DO2** it's possible to program the function of all digital outputs. In these menus are available the following modality: **PULSE** and **ALR** (alarm).

In **PULSE** mode the digital output DO1 will emit pulses proportional to the active energy counted while the digital output DO2 will emit pulses proportional to the reactive energy counted. The proportionality will depend from the **PULSE** set in the **SETUP** and the duration of the impulse is set in the **TPL** voice of the **SETUP**.

In **ALR** mode there are three settings **ALR SYS 3PH**, **ALR SYS 123** for the three-phase connection and **ALR 1PH** for the single phase connection. With **ALR SYS 3PH** the digital output works as alarm verifying that the (average) three-phase value doesn't exceed the thresholds set (**ALR HI** and **ALR LO**). With **ALR PH_ 123** and **ALR 1PH** the digital output works as alarm verifying that the maximum value of the single phase doesn't exceed the maximum threshold set (**ALR HI**) and that the minimum value of the single phase is below the minimum threshold set.

With **ALR DI** it's possible to activate the digital output after a delay expressed in seconds.

If only **ALR HI** threshold is set, alarm act as "maximum value" function; If only **ALR LO** threshold is set, alarm act as "minimum value" function; if both thresholds are set, alarm works as "BAND" function.

Access to the menu:

The diagram shows the menu flow for digital output configuration. It starts with the **seT UP** screen, where the **RESET** option is selected. From **RESET**, the user can navigate to **seT DO1**, **SET DO2**, or **SET HR_**. The **seT DO1** menu includes options for pulse type and alarm: **PUI se aCT**, **PUI se Rea**, **PUI se app**, **ALR SYS 3PH** (with **SET MDE = BALANC** and **UN_BAL**), **ALR PH_ 123** (with **SET MDE = BALANC** and **UN_BAL**), and **ALR 1PH** (only with **SET MDE = 1PH**). The **ALR SEI** menu allows selecting an alarm parameter: **upH**, **ipH**, **ACT**, **P.f**, **REA**, **APP**, **VLL** (not usable for **ALR 1PH**), and **FRE** (not usable for **ALR PH_ 123**). The **Set maximum alarm threshold** menu includes **ALR HI**. The **Set minimum alarm threshold** menu includes **ALR LO**. The **Set delay** menu includes **ALR DI**. The **Confirm and end of digital output configuration** screen is reached by pressing the **A** key.

Selecting the pulse type or alarm

Selecting the alarm parameter
(see list)

Increase

Decrease (after 0 there is OFF)

Increase

Decrease (after 0 there is OFF)

Increase

Decrease

ENTER IN THE SETUP

To program the digital output from the measures visualization, keep pressed the **A** key (5 seconds), the message **SeT Up** will appear on the **C** display.

CHOOSE THE DIGITAL OUTPUT SETTING

Press repeatedly the **B** key until the message **SET DO1** or **SET DO2** appears on the **C** display. Press the **A** key to select this setting.

SELECT THE MODALITY OF FUNCTIONING OF THE DIGITAL OUTPUT

To select the functioning mode, using the **B** key, it's possible to select: **PULSE**, **ALR SYS 3PH**, **ALR 1PH**.

PULSE (pulse emission) with DO1 linked to **ACT** (active energy) parameter and DO2 linked to **REA** (reactive energy) parameter; **ALR SYS 3PH**, (alarm on three phase value), **ALR PH_ 123** (alarm on minimum and maximum single phase value) and in a three-phase or in a balanced three-phase connection with connection mode set on **BALANC** or **UN_BAL**; **ALR 1PH** alarm on the minimum value and maximum value of L1 phase in a single-phase connection with connection mode set to **1PH_L1**.

Confirm the setting, pressing the **A** Key.

CHOOSE THE PARAMETER TO LINK TO THE DIGITAL OUTPUTS

With an alarm modality set, it's necessary to select the parameters associated to the alarm output; by pressing the **B** key until the parameter choice appears on the third part (L3) of **C** display and the glowing the corresponding led on the **D** bar. Press **A** key to confirm the set.

SET THE HIGH AND THE LOW THRESHOLDS

On **C** display will appear the message **ALR HI** with the high threshold value; confirming with the **A** key on the same display will appear the message **ALR LO** with low threshold value. The high and the low thresholds values are set using the **B** key to increase the values, and **A** and **B** key pressed together (starting from the condition **B** key pressed) to decrease the values. The range depends by the parameter and it is linked to the CT and VT ratios. Pressing **A** key to confirm.

The threshold set is linked with CT and VT ratios, for this reason it's necessary to make this operation after the programming of the CT and VT. The end scale value must be confirmed when CT and VT ratios are modified.

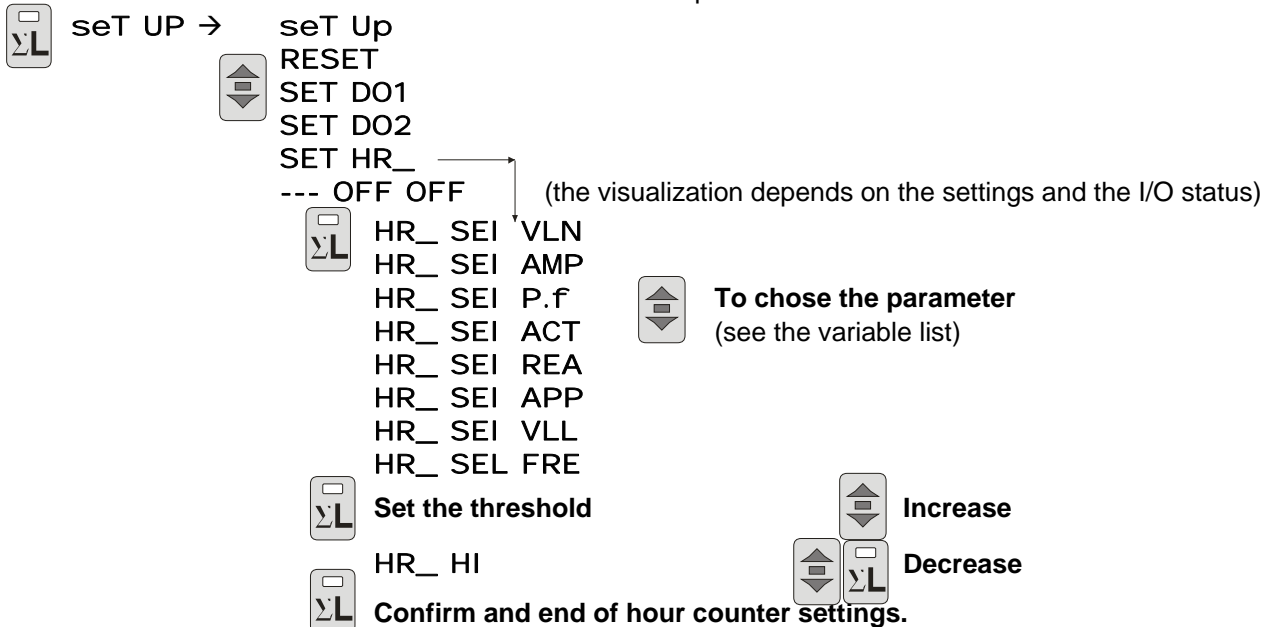
The low threshold will be lower than high threshold. If the high threshold is set as OFF the low threshold will have the range of the high threshold.

SET THE DELAY TO THE DIGITAL OUTPUT ACTIVATION

Now it's possible to set the delay that will pass between the alarm condition set and the activation of digital output. On **C** display will appear **ALR DLY** and the value expressed in seconds (range 1÷900). The modification of the value is done in the same way of the threshold set. With the confirmation (**A** key) the set is complete.

PROGRAMMING OF THE HOURS COUNTER (SET HR_)

The hour counter will be increased when the measure of the parameter will exceed the set threshold value.



SELECT THE PARAMETER TO LINK TO THE HOURS COUNTER

From the previous setting, pressing the **C** key it's possible to set the hours counter: the message **SET HR_** appears on the **F** display. Press the **A** key to define the parameter to link to the hours counter. Press more time the **B** key to select the parameter and the **A** key to confirm it.

SET THE THRESHOLD

Subsequently it's necessary to set the threshold using the **B** (to increase) and **C** (to decrease) keys. Confirm with **A** key.

VARIABLE LIST

VLN	three-phase voltage	REA	reactive power
AMP	three-phase current	APP	apparent power
P.F	three-phase power factor	VLL	phase to phase voltage
ACT	active power	FRE	frequency

MEASURES VISUALISATION

According with the glowing status of the **G** LED the reading of the measures is visualised on display **C**, **either the three measures of the phase values or the three phase measured values** (average of the individual phases for voltage, current, power factor and the sum of the individual phases for powers).

With the **G** LED off, the instrument will visualise the **three measures of phase** (L1, L2 and L3 respectively) of the parameter indicated by the light of the LED **D**. for the phase to phase measures (V L-L), the three measures are understood V L1-L2, V L2-L3, V L3-L1 respectively.

By pressing the **B** key, you may select the parameters to visualise, which will be indicated by the LED **D**.

The visualisation of the frequency page shows also the status of the digital output (if present).

By pressing the **A** key with the **G** LED on, the instrument will visualise the selected parameters in **three phase values** (average of the individual phases for voltage, current, power factor and the sum of the individual phases for powers).

In this mode, each page will show the measures of 3 parameters, indicated by the LED **D**, excluding the frequency pages, the energy meters and the hour meters.

The visualisation of the energy meters is only possible with the **G** LED on.

If the hour meter is available, is visualised: as hour meter per phase, activated by the three phase current, after the visualisation of energies in those types fitted with energy meters.

By pressing the same key again, the instrument returns to the visualisation of the phase parameters.

Should the single phase system wiring been made, the visualisation of the values will be shown in the same way as per the three phase measures, indicating three parameters on each page. In the present case the LED **G** will never glow, since it isn't a three phase system.

VISUALISATION OF ENERGY AND HOUR METERS

The visualisation of the energy meters are shown with the lighting of the LED **kW + ...h** indicating the active energy values (kWh), whilst the lighting of the LED **kVAr + ...h** are indicating the reactive energy values (kVArh).

The lighting of the LED **h** alone, identifies the reading of the hour meter.

The reading of the meters uses the 9 digits (maximum reading 99999999.9) of the display **C**: the measure comes visualised in such a way that, the display L1 will show the first 3 digits, the display L2 the second 3 digits and the display L3 the last 3.

For example if: L1=000, L2=028, L3=53.2, the reading is equal to 00002853.2 kWh.

In the case of the hour meter, it uses only 6 digits (maximum reading 99999,9) of the display **C**: the measure comes visualised in such a way that, the display L2 will show the first 3 digits, and the display L3 the last 3 digits.

For example if: L2=008, L3=53.2 the reading is equal to 00853.2 h.

NOTE ON THE VISUALISATION OF THE PARAMETERS

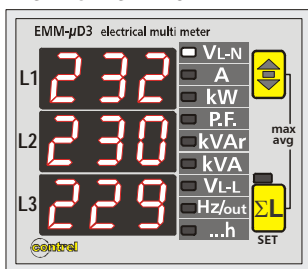
The visualisation of a capacitive power factor value comes represented by a – sign before the first digit of the display (example of reading: -.95 indicates a capacitive power factor of 0.95)

The visualisation of a negative active power (inverted connection of the CT's or cogeneration presence) comes represented by a – sign before the first digit of the display.

VISUALIZATION OF THE PHASE VALUES (for three-phase connection) (connection mode set to BALANC or UN_BAL)

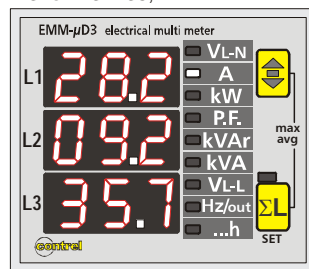
Visualization page 1

VL1-N on L1 = 232 V
VL2-N on L2 = 230 V
VL3-N on L3 = 229 V



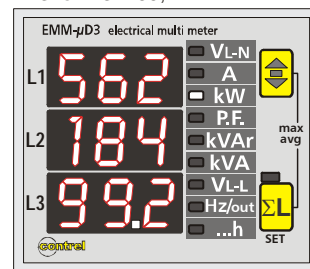
Visualization page 2

IL1 on L1 = 28,2 A
IL2 on L2 = 9,2 A
IL3 on L3 = 35,7 A



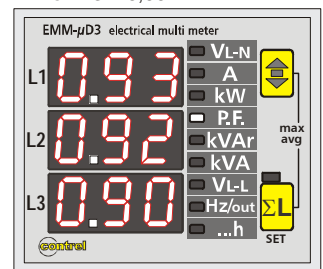
Visualization page 3

PL1 on L1 = 562 kW
PL2 on L2 = 184 kW
PL3 on L3 = 99,2 kW



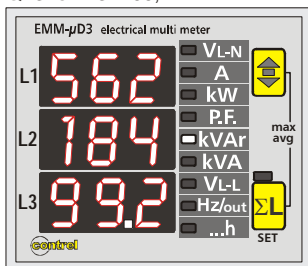
Visualization page 4

PF on L1 = 0,93
PF on L2 = 0,92
PF on L3 = 0,90



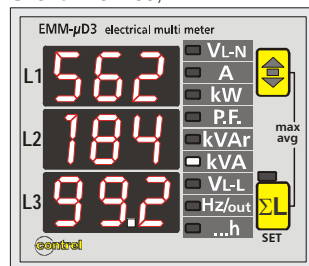
Visualization page 5

QL1 on L1 = 562 kVAr
QL2 on L2 = 184 kVAr
QL3 on L3 = 99,2 kVAr



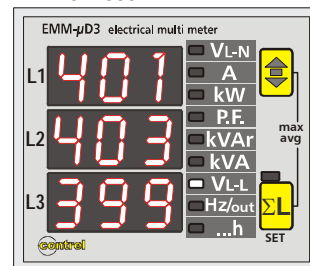
Visualization page 6

SL1 on L1 = 562 kVA
SL2 on L2 = 184 kVA
SL3 on L3 = 99,2 kVA



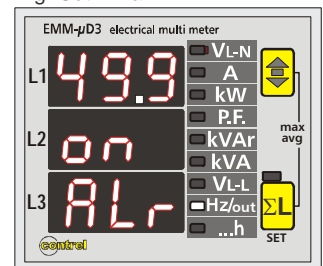
Visualization page 7

VL1-L2 = 401 V
VL2-L3 = 403 V
VL1-L3 = 399 V



Visualization page 8

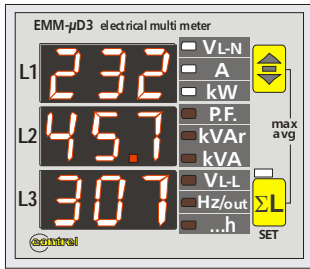
F on L1 = 49,9 Hz
Out = ON
Dig. Out = Alarm



VISUALIZATION OF THE THREE PHASE VALUES

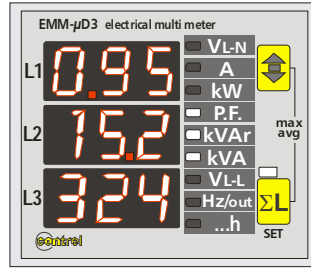
Visualization page 1

ΣVL-N on L1
ΣIL on L2
ΣkW on L3



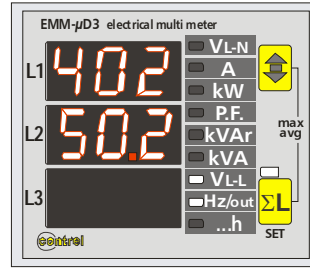
Visualization page 2

ΣPF on L1
ΣkVAr on L2
ΣkVA on L3



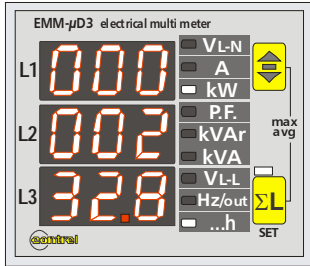
Visualization page 3

ΣVL-L on L1
Freq. on L2



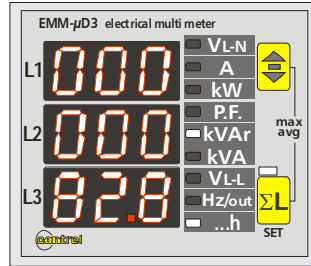
Visualization page 4

Three Phase Active Energy counted
232,8 kWh



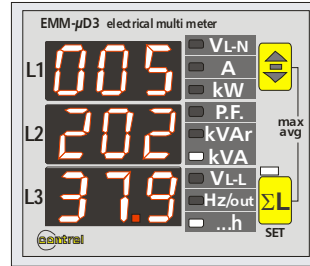
Visualization page 5

Three Phase Reactive Energy counted
82,8 kVArh



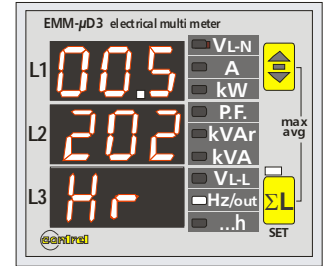
Visualization page 6

Three Phase Apparent Energy counted
520237.9 kVAh



Visualization page 7

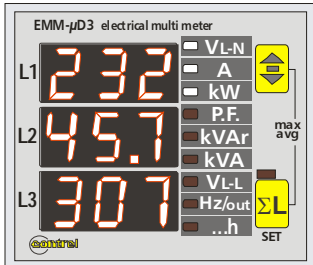
Three Phase Hour counter
520.2 h



VISUALIZATION OF THE SINGLE PHASE VALUES (connection mode set to 1PH_L1)

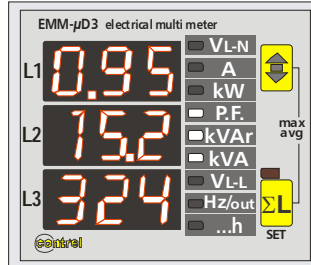
Visualization page 1

VL1-N on L1
IL1 on L2
kWL1 on L3



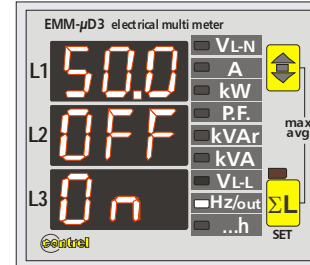
Visualization page 2

PFL1 on L1
kVArL1 on L2
kVAL1 on L3



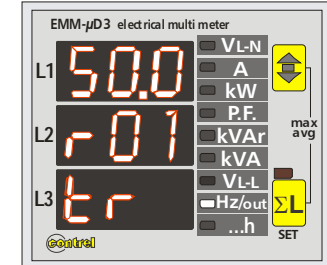
Visualization page 3 for EMM-μD3h-p

Freq. phase L1
Digital Output 1 Status on L2
Digital Output 1 Status on L3



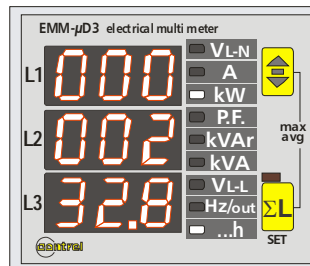
Visualization page 3 for EMM-μD3h-485

Freq. phase L1
Address on L2
Transmission status on L3



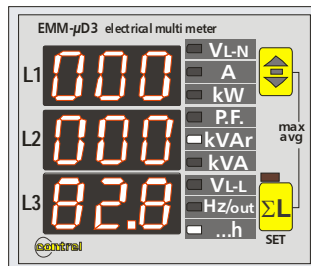
Visualization page 4

Active Energy counted
L1 phase
232,8 kWh



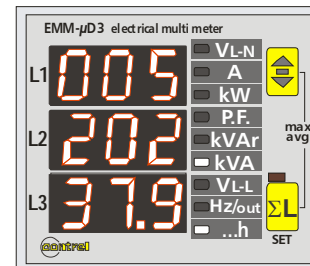
Visualization page 5

Reactive Energy counted
L1 phase
82,8 kVArh



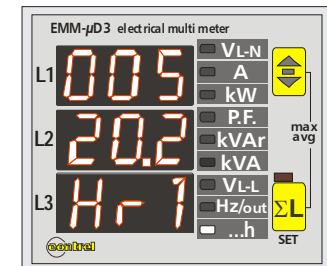
Visualization page 6

Apparent Energy counted
L1 phase
520237.9 kVAh



Visualization page 7

Hour counter L1 phase
00520.2 h



VISUALISATION PEAK VALUES (MAXIMUM) INSTANTANEUS AND AVERAGE.

By pressing the **A** and **B** keys simultaneously the instrument reaches the visualisation of the peak value (maximum): the visualised measures selectable by **B** key, they will start flashing alternatively with the indication of the type of the maximum value.

The maximum memorised values are of two types: the maximum instantaneous values, memorise the maximum reached value of the measured parameter, during at least 1 second, the indicated value will flash alternatively with the message PEA (peak); the average values memorise the average value reached, during the last **AVG T**, of the measured parameter, the value will flash alternatively with the message aug (AVerAge).

The integration for the calculation of the values is synchronised at every switch on of the instrument

The maximum values, which may be selected with the **B** key are the following:

THREE-PHASE SYSTEM				
parameter	Identification symbol			Value type
phase voltage	V L1-N max	V L2-N max	V L3-N max	PEA
phase current	I L1 max	I L2 max	I L3 max	PEA
average phase current (maximum demand)	I L1 max (avg)	I L2 max (avg)	I L3 max (avg)	MDM'
three phase system powers	ΣW max	ΣVAR max	ΣVA max	PEA
average three-phase system powers (maximum demand)	ΣW max (avg)	ΣVAR max (avg)	ΣVA max (avg)	MDM
three phase system average powers	ΣW (avg)	ΣVAR (avg)	ΣVA (avg)	aug'

SINGLE PHASE SYSTEM				
Parameter	Identification symbol			Value type
maximum phase voltage	V L1-N max			PEA
maximum phase current	I L1 max			PEA
maximum phase powers	ΣW max	ΣVAR max	ΣVA max	PEA
average phase current (maximum demand)	I L1 max (avg)			MDM
average phase powers (maximum demand)	ΣW max (avg)	ΣVAR max (avg)	ΣVA max (avg)	MDM
average phase powers	ΣW (avg)	ΣVAR (avg)	ΣVA (avg)	aug'

NOTE relative to measures.

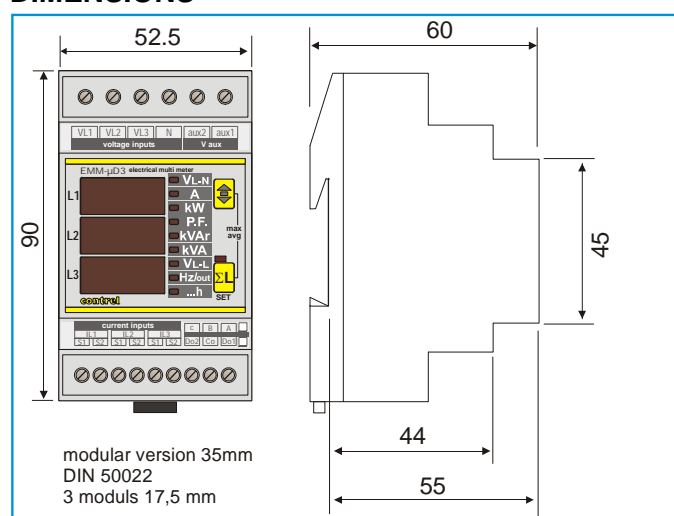
The refresh time of the displays is below 1 second, with a comfortable reading of the measures, even in presence of sudden variations of the measured parameters.

In case that the indicated measures aren't reliable or they are absurd, it's important to check carefully the current and voltage inputs connection, so as the phase sequence. Check that current and voltage correspond to the same phase (on input L1 it will be connected phase voltage L1 and the CT will be placed on phase L1), thence terminal S1 of CT will be wired to the relative terminal S1 on the instrument.

TECHNICAL CHARACTERISTICS

MEASURES AND ACCURACY	
Voltage	True rms value of the phases voltages and phase to phase in a three phase system Total range of measure: 20÷500V trms phase to phase- 380V rms phase-neutral – 40÷100Hz Visualization (20,0÷500V) - measure accuracy: $\pm 0,5\% \pm 1$ digit – maximum values management
Current	True rms value of phase currents and three phase system value Range of measure: 0,02÷5A trms digit – 40÷100Hz Visualization 0,02÷999A - accuracy: $\pm 0,5\% \pm 1$ - average and maximum values management
Frequency	Frequency of phase L1 – measuring range: 30÷500Hz Accuracy: $\pm 0,5\% \pm 1$ digit
Powers	Active, reactive and apparent powers of phase and three phase system Range of measure: 0,01÷999kW - 0,01÷999kVA - 0,01÷999kVA Accuracy: $\pm 1\% \pm 1$ digit - Maximum, average and instantaneous values management
Power factor	Phase and three phase power factor Range of measure: -0,1÷0,1 / accuracy: $\pm 1\% \pm 1$ digit - Maximum and average values management
Hour meter	Time metering in hours and decimal of hours Range of measure 0,0 ÷ 99999,9 h / accuracy $\pm 0,5\%$
Energy measures	Active, reactive and apparent energies of the three phase system Range of measure: 0÷9999999,9 kWh / kVAh / kVAh class 2 (IEC 1036) accuracy: $\pm 1\%$
AUXILIARY POWER SUPPLY AND INPUTS	
Auxiliary supply	Standard 230V $\pm 15\%$ - optional 110V or 400V $\pm 15\%$ - 50-60Hz - max 3VA
Voltage inputs	From 20 to 500V phase-phase; permanent overload +20% - input impedance: 1 M Ω 3, 4 and single phase wiring
Current inputs	From 0,02 to 5A; permanent overload 50% - from external CT's with secondary 5A (optional 1A), Primary programmable from 5 to 2000A - self-consumption <0,5VA
INPUTS / OUTPUTS	
Digital outputs (only for EMM- μ D3h-p)	Digital output ON-OFF(opto-isolated), 5÷230V ac/dc, max 150mA - insulation: 3kV for 60 seconds Proportional pulse emission to the active and reactive energy: DO1: active energy pulse output DO2: reactive energy pulse output Programmable pulse weight 0,01-0,1-1-10 kWh/pulse, pulse duration 100÷500 msec., max frequency 5Hz Alarm signalling function: Setting of measured parameter and time to trip delay 1 ÷ 900 sec
serial output (only for EMM- μ D3h-485)	One output RS485, baud rate selectable, MODBUS-RTU protocol, baud rate 4800÷19200 insulation: 3kV for 60 seconds
GENERAL	
Display, keys	3 display with red LED 7,5mm each of 3 digits 7 segments 2 keys for selecting measures and programming , LED bar 10 points
Mechanical	Protection degree: IP52 front - IP20 enclosure and terminals - weight: 0,3 kg approx. Screw wiring terminal for maximum cross section cable of 4 mm ² Self-extinguishing plastic enclosure – for DIN rail mounting, 3 modules of 17,5mm
Environment	Working temperature:-10÷60°C; humidity<95% - Storing temperature:-25÷70°C - Isolation test: 3kV for 1min.
Standards of reference and marks	CEI EN 50081-2; CEI EN 50082-1; CEI EN 61010-1; CEI-EN 61036

DIMENSIONS



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