

EMM-μD3-VA DIGITAL MULTIFUNCTION METER FOR ELECTRICAL PARAMETERS

GENERAL

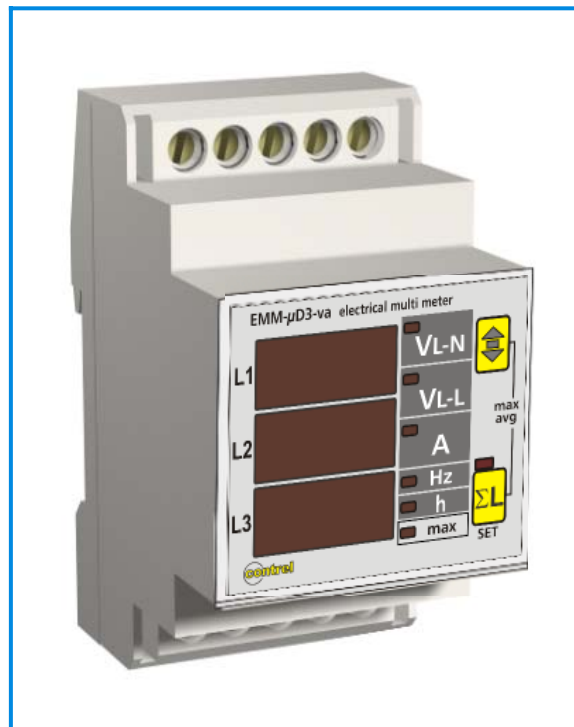
The digital multimeters series **EMM-μD3-VA** allow monitoring the main electrical parameters present on a distribution line. The local display of the various electrical parameters is carried out by 3 displays with red LED, granting a good and simultaneous reading of diverse measures. A simple front 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-μD3-VA** replace in a unique device, all the functions of voltmeters, ammeters, frequency and hour meters. This signifies 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 MODELS

Several models, with various functions and inputs/outputs option, are available, both for mounting on front panel and for mounting on DIN section iron. For others information it's necessary to see relative catalogue.



INTRODUCTION

The **EMM-μD3-VA** is only featured for visualising the electrical parameters. The **EMM-μD3-VA** has a digital output. The auxiliary power supply is separated from the measured voltage. It is necessary to use the external CT's for measuring the currents.

OPTIONS

Options: Auxiliary supplies and measuring voltage, different from standard.
Digital output for alarm.

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
frequency	[Hz]	Hz L1			
hour meter	[h]	hL1	hL2	hL3	
peak value :					
Maximum phase voltage	[V]	V L1-N max	V L2-N max	V L3-N max	
Minimum phase voltage	[V]	V L1-N min	V L2-N min	V L3-N min	
Maximum phase to phase voltage	[V]	V L1-L2 max	V L2-L3 max	V L3-L1 max	
Maximum phase currents	[A]	I L1 max	I L2 max	I L3 max	
Average values in 15'					
Average phase currents (maximum demand)	[A]	I L1 max (avg)	I L2 max (avg)	I L3 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 suspicion 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 storage under unfavourable conditions.

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:

Vn 230V = 220-240V 50-60Hz (standard)

Vn 110V = 100-125V 50-60Hz (under request)

Vn 400V = 380-415V 50-60Hz (under request)

- 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 500 V 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:

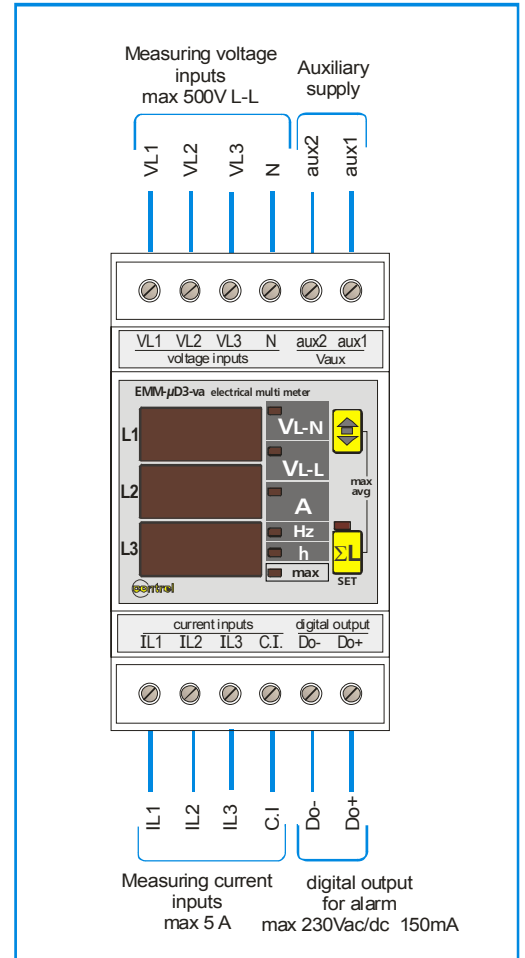
4 terminals are available for wiring to 3 external CT's with secondary 5A; it's possible to use 2 CT's on 3 wires lines with (Aron three-phase wiring) and the use of 1 CT in case of single phase system (input IL1).

External CT's should always be used.

The instrument's SETUP menu allows to set the transformation ratio of the external CT's and it's possible to visualise readings of current up 999 A.

NOTE: For a correct measuring 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.

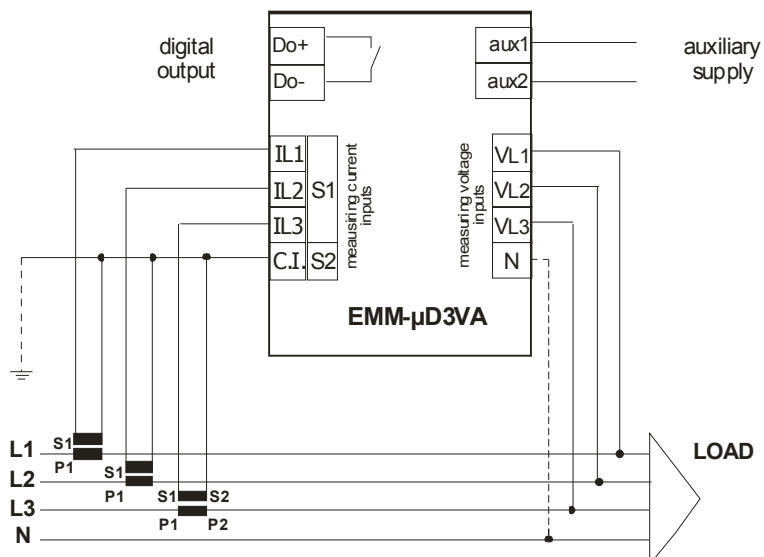
The fixing to the DIN rail is granted by the rear spring fixing device. It's better to put an external protection with fuses for the voltage inputs and auxiliary supply. The advised fuse for the auxiliary protection is 0,1 A. Use adapted cables for the working currents and voltages: cross section from 0.5 to 4 mm².



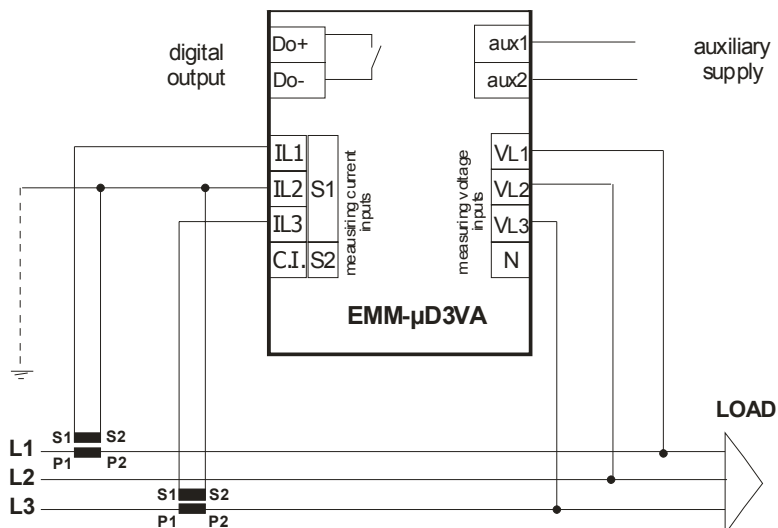
WIRING DIAGRAM

WIRING IN A THREE PHASE LINE WITH 3 OR 4 WIRES

on three wires line (without neutral or with non distributed neutral) DON'T wire the N terminal

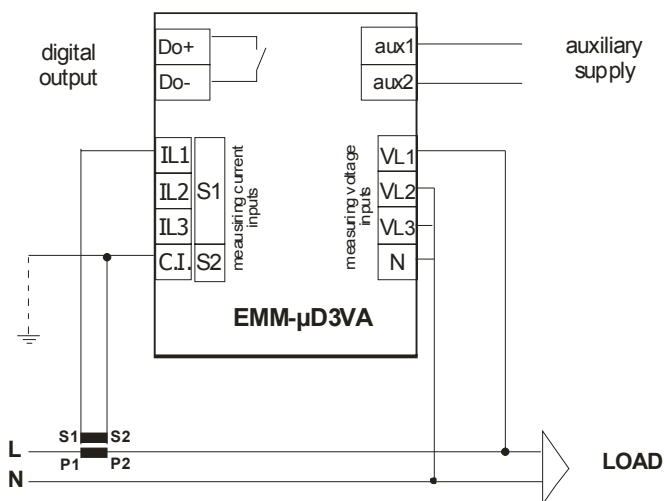


THREE PHASE LINE WIRING WITH 3 WIRES AND 2 CT (AARON Wiring)

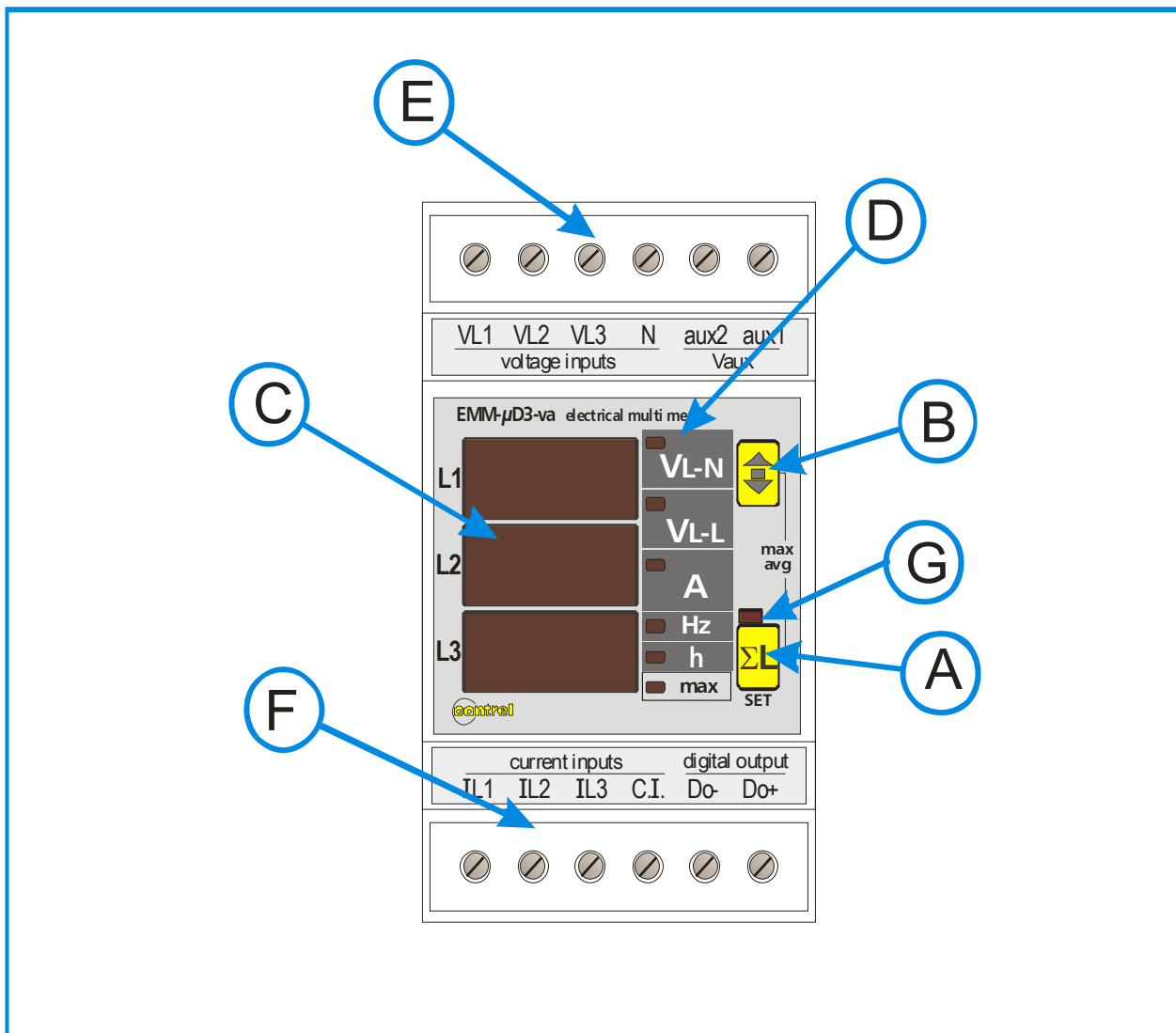


INSERZIONE SU LINEA MONOFASE

Should the case be that the instrument is used on single phase, it has to be considered that the valid measures are related to the phase L1, others related to the three phase system are not to be considered.



DESCRIPTION:



- A:** Key for visualising the three phase system parameters with its corresponding **LED**.
By keeping the key pressed for 5 seconds the instrument reaches the programming mode (**SETUP**).
- B:** Key for selecting the measured parameters to be shown at the **C** display.
- A+B:** In visualisation mode, by pressing both keys simultaneously the instrument reaches the visualisation of the maximum memorised values.
- C:** Three displays for visualising the measures, subdivided by phase of the parameters indicated by the LED **D** bar.
In case that the **G** LED is glowing, the instruments shows the three phase values of the selected measures.
- D:** LED bar for indicating the measures visualised on display **C** and the memorised peak values.
- 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 indication of visualising a three phase value.

INSTRUMENT'S PROGRAMMING MENU (SETUP)

For a correct operation of the multimeters it is necessary to program the transformation ratio of the external CT's. The values will also be maintained even without auxiliary supply.

- Single phase or three phase function configuration

When configuring a single phase function **Mo _ d e 1 p h**, the three displays will only visualise the L1 phase parameters. Whilst configuring a three phase function **Mo _ d e 3 p h** it will visualise the three phase measures and the individual phases (see measures visualisation).

- Programming the transformation ratio of the external CT's

The programming of the CT's ratio, understood as the ratio between the primary and the secondary (i.e. with a CT 1000/5 the ratio to be set is 200), must be done with the keys placed at the front.

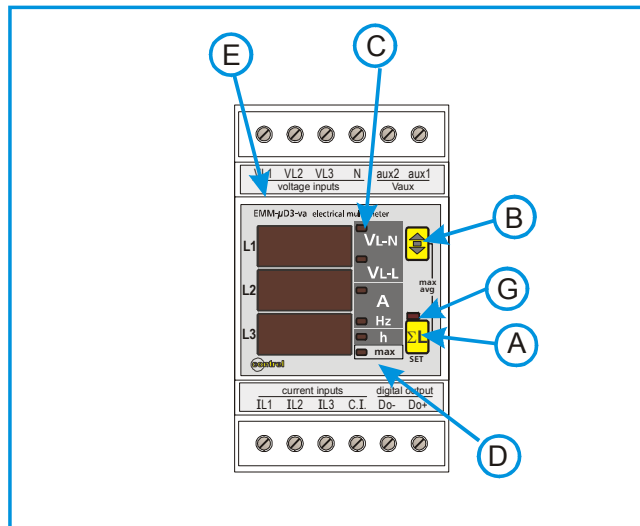
Once the auxiliary supply has been given to the instrument and waiting some seconds (when switching on, all LED's will light and the first indication of the firmware version appears, after this all segments will glow), keep pressed the **A** key during 5 seconds and the display **E** will show the message **set up**, by pressing the **A** key again it will appear the message **CT** (Current Transformer) and the transformation ratio (set at 1 by the manufacturer).

Keep the **B** key pressed to increase the value. During the increasing value process, press the **A** key to decrease the value (variation will be made unit by unit).

By having the **B** key pressed constantly or the **A** and **B** simultaneously, the operation will speed up by increasing by tens and hundreds successively. By releasing and pressing the key again, it will return to increase or decrease the value at the unit rate again. When the maximum settable value has been overcome, such a value restarts from 1.

Once that the required value is visualised, confirm the programming by pressing the **A** key. In this way it will pass to following setting pages.

Should 10 second elapse without pressing any key, the instrument will escape automatically from the programming menu and the eventual setting WILL NOT be memorised.



- Activation / deactivation of the automatic scrolling

The present programming steps allows selecting ON for activation or OFF for deactivation the automatic scrolling of the measures.

MEASURES VISUALISATION

The reading of the measures is visualised on display **E**, in which with LED **G** switched off, are represented the three phase measures (L1, L2 and L3 respectively) of the parameter indicated by the light of the LED **C**. for the phase to phase measures (V L-L), the three measures are understood V L1-L2, V L2-L3, V L3-L1 respectively, as indicated in the front plate.

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

By pressing the **A** the selected parameters will come visualised in **three phase values** (average for individual phases for voltages, currents) with the corresponding lighting of the LED **G**. In the present mode, by pressing the **B** key it will be possible to visualise either the three phase voltage calculated as an average of the individual phases or the average of phase voltages or the phase to phase voltages (each one indicated by the corresponding LED **C**). In the three phase system visualisation mode (LED **G** glowing), the following lights will be on:

- LED **VL-N** or (**VL-L**) it will be shown, on display L1, the average of the phase voltage (or average phase to phase)
- LED **A** it will be shown, on display L2, the indication of the average current.
- LED **Hz** it will be shown, on display L3, the measured frequency on L1.

By pressing the **A** key again, the instrument returns to visualising the phase parameters.

HOOR METER VISUALISATION

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

The reading of the meters uses the 6 digits (maximum reading 99999.9) of the display **E**: 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 identification of the corresponding hour meter (hL1, hL2 ó hL3).

VISUALISATION PEAK VALUES (MAXIMUM) INSTANTANEUS AND AVERAGE

By pressing the **A** and **B** keys the instrument reaches the visualisation of the peak value (maximum): the LED **D (max)** will glow. The display **E** will show the peak values (maximum) of the memorised measures and selectable by the **B** key, they'll appear alternatively on the **E** display, together with the indication of the type of the maximum value.

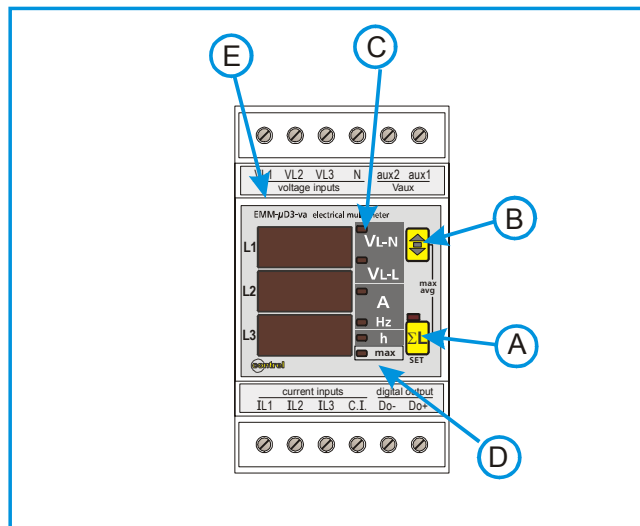
Shouldn't any key be pressed by 10 seconds the instrument returns to measures visualisation.

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 maximum average values (maximum demand) memorise the maximum average value reached, during the last 15 minutes, of the measured parameter.

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



Here below the parameters with maximum values, which can be selected by the **B** key:

Parameter	Display	Signalling LED
VL-N maximum instantaneous	IST HI	VL-N
VL-N minimum instantaneous	IST LO	VL-N
VL-L maximum instantaneous	IST HI	VL-L
I phase maximum instantaneous	IST LO	A
I phase maximum average	15' HI	A

Peak values cancellation.

Enter in programming (SETUP) mode and press the **B** key until the **E** display shows the message **reset**, then press the **A** key and the display **E** will show **RES ALL no**, by pressing the **B** key the message will change to **RES ALL yes**. By confirming with the **A** key, all memorised data will be cancelled and the instrument will escape from the maximum values cancellation menu automatically.

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.

In some applications the secondary of the CT could be connected to other instruments, and some measuring problems may rise, depending on the typology of the current inputs. In such a case we advise to use an instrument with internal CT's built in of the series **R3-VA** o **μ3-VA**.

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- 290V rms phase-neutral Visualisation (20,0÷500V) - measure accuracy: $\pm 0,5\%$ ± 1 digit – maximum values management
Current	True rms value of phase currents and three phase system value Range of measure: 0,02÷5A trms - accuracy: $\pm 0,5\%$ ± 1 digit Visualisation 0,02÷999A - average and maximum values management
Frequency	Frequency of phase L1 – measuring range: 30÷500Hz Accuracy: $\pm 0,5\%$ ± 1 digit

AUXILIARY POWER SUPPLY AND INPUTS

Auxiliary supply	Standard 220-240V $\pm 20\%$ - optional 100-125V or 380-415V $\pm 20\%$ Frequency 50-60Hz - absorption max 3VA
Voltage inputs	From 20 a 500V phase-phase; permanent overload +20% - input impedance: 1 M Ω Connection to three phase lines (3 or 4 wires) and single phase
Current inputs	From 0,02 to 5A; permanent overload 50% - from external CT's with secondary 5A, Primary programmable from 5 to 1000A - self-consumption <0,5VA

OUTPUT FUNCTIONS (only for EMM- μ D3-VA versions optional)

Digital output	Digital output ON-OFF(optomos), 5÷230V ac/dc, max 150mA
Digital output function	Alarm signalling function Setting of measured parameter and time to trip delay 1 ÷ 900 sec.

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 <90% Storing temperature: -25÷70°C Isolation test: 3 kV for 1 minute
Standards of reference and marks	CEI EN 50081-2; CEI EN 50082-1; CEI EN 61010-1; CEI-EN 61036



For other applications, please contact with CONTREL technical assistance department.

NOTE

Due to the continuous evolution of standards and products, the company reserves itself the rights of modifying the characteristics of the present product, at any time.

The manufacturer's liability due to damages caused by defects of the product..." might be reduced or superseded (...) when the damage has been caused jointly, by a product's defect or/and by cause of the injured party or a person under the injured party's responsibility" (Article 8, 85/374/CEE).



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