DC POWER AND MONITOR ANALIZER

TMCc

INSTRUCTION MANUAL

INDEX

EU Regulation 2023/1542 concerning batteries and waste batteries requires that, from 18 February 2027, all products placed on the market incorporating portable batteries shall ensure that those batteries are readily removable and replaceable by the end-user at any time during the lifetime of the product. This requirement does not apply to this equipment (TMCC) as it falls within the exceptions set out in Article 11(3) of Regulation (EU) 2023/1542, as clarified in Commission Notice C/2025/214, since it is a product whose main function is to collect and supply data and the purpose of the battery is to maintain the integrity of that data.

1.- BASIC INSTRUCTIONS

Upon receipt of the equipment, please check the following points:

1) That the instrument hasn't suffered any damage in transit.
2) That the specifications correspond with those stated on your order form.
3) Before connecting the device check that all voltage inputs coincide with those specified.
4) Read carefully this manual paying special attention to the sections devoted to CONNECTION, PROGRAMMING and SAFETY REQUIREMENTS.
5) Check out, as well as the next points:

- Maximum voltage of the circuit of voltage measurement:1,2 Vn, and 2 Vn 10s.

2.- GENERAL FEATURES

Easy installation and programming.
4 digit, 7 segment, high luminosity Led displays with R.M.S. measurements.
More compact panel mount (144 X 144mm).
Possible communication facility via Rs485.
Each display relies on a group of LEDS that allow the identification of any value in a given moment.
5 key keyboard for programming and control
2 digital outputs.

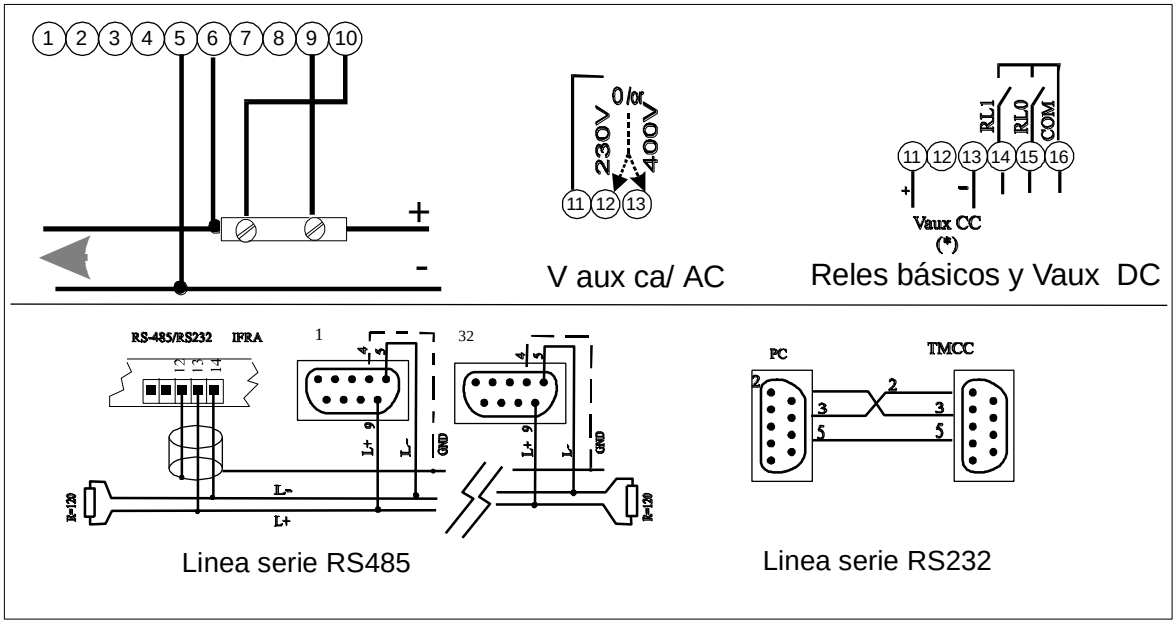
The TMCc, is able to measure and indicate , from the voltage and current signals, the measuring of some electrical magnitudes in a DC net. These electrical magnitudes are:

ELECTRICAL PARAMETERS		
Tensión	Voltage	
Intensidad	Current	
Potencia	Power	
Energía positiva	kilowatt hour	(E+)
Energía negativa	Negative kilowatt hour	(E-)
Amperios hora	Amper hours	(Ah+)
Amperios hora	Amper hours	(Ah-)
Intensidad nominal	Shunt Current rating	(Ip)

Voltage measuring through resistive divisor and isolating amplifier.
Current measuring trough a shunt. The shunt can be from 60 to 200mV

3.- CONNECTIONS

The TMCc has several connectors at the back part of the instrument.



4.- KEYBOARD- DISPLAY

The TMCc has 5 front keys, which allow the programming and operation of the device. The device has three luminosity LED's display, which contains a maximum of 7 parameters each.

The magnitudes appear sequentially page by page. It is possible to hold any of then by touching the front key.

ROTATE-FIXED

Each of the three displays can be rotative or fixed, independently of the others.

1.- Select the display with **UP** and **DOWN** keys. The flickering indicates the active display.

2.- Once selected and stopped the flickering, when pressing the rotation key , it will change. If it was in rotation, it will become fixed, and vice versa.

By pressing **P+ ENTER** at the same time, the three displays start the rotation simultaneously.

ENERGY AND Ah IN 8 DIGITS

The instrument has 8 counters. Total and Partial counters can be reseted individually.

To start the process press "**P**" and "**Rotate**".

You get the counter of E+. The other ones, by pressing **UP** and **DOWN**.

1.- ttPC : Total energy positive kWh +
2.- ttPG : Total energy negative kWh -
3.- ttAC : Total amper-hour positive Ah +
4.- ttAG : Total amper-hour negative Ah -
5.- tPPC : Partial energy positive
6.- tPPG : :Partial energy negative
7.- tPAC : Partial amper-hour positive
8.- tPAG: : Partial amper-hour negative

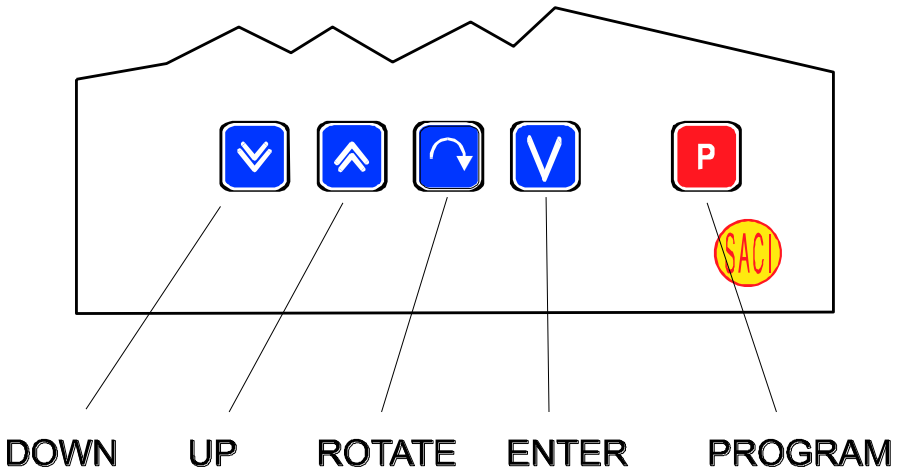
To reset each meter, you get the measure in the display and press **"P"** plus **"ENTER".**
To go to the normal process we have to press "**P**" and "**Down**".

PROGRAM.

The TMCc can be configured through the keyboard or by means of a PC. Using the RS line, assigning or modifying the following parameters.

* Terminal identity code..(1..255) except 0,199 y 205.
* Primary voltage. (V)
* Primary current. (I)
* Energy constant. (kwh)
, Alarms, outp, time...

To set-up the unit it is necessary to press the keys **"P**" and **"UP"** simultaneously:

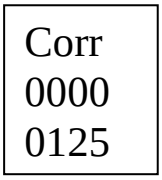


The word "PASS" appears in the upper display, and the lower display shows “----“, apart from this, the right digit of the lower display starts flickering waiting for the introduction of the password. The standard password is **0010.**
The **"Up"** and **"Down"** keys must be pressed to change the flickering digit. The change of the numbers will be rotative.
The key **ENTER** validates the value and pass to the next parameter.
The **" ROTATE**" key, to change to the next left digit

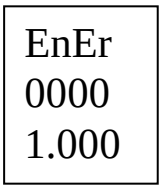
If the password is right, the programming starts. If not, the message "---" appears again.
The variables that can be programmed through the keyboard are the following:

1.- **VOLT:** Voltage scale (Volts of primary)

2.- **CORR**: Value of the current shunt primary. If you have CT 125A/60mV, then:



3.- **ENER**: Energy reference (KWh) .



Affect to display and pulses output.
To have on the display Energy in kWh you have to introduce a constant 1.000.
The coma can be moved pressing "**P**" and " **ROTATE**" at the same time, selecting any constant from 000.1 to 999.9, and always in units of KWh
Deleting energy counters can be done only through the serial line.

4.- **IDEN**: Identity of the instrument (to identify it ,when it is connected to the computer).

5.- **HORA**: Time.

6.- **TIPO**: Type: You select the mode operation of RLO and RL1.
0000 for **pulses** output of E+(RL1) and Ah+. (RL0) If you set before. ENER=1.000 then 1 pulse =1 kwh
0001 for **contacts** managed from the computer.
0002 for **alarms**.

7.- **OUTP**: If 0001 type was selected, choose 0001 to close the contact number 15 , and 0010 to close the contact number 14.

8.- **AL00**: It is necessary to select the parameter, the working mode and the level.
Set the parameter, through the **"Up**" and "**Down"** keys. Then press "**ENTER**".
The second display will flicker to select if it is of maximum or of minimum. Press "**ENTER**".
Then third display flashes to select the alarm value in %. (Range from 0 to 120%). Only recognisable values between 0000 and 0120 will be accepted.
The reference value is not a real one, but only a percentage of the parameter, in such a

way that if the value 0080 is chosen as the maximum alarm activation level, then the alarm will sound when the chosen parameter exceeds 80% of it's own value, that which is fixed by the corresponding SCALE.
The calculation of this percentage value is performed always in accordance with the modulus of the aforementioned value unless sign programming is available.

9.- **AL01**: The same process as AL00.

10.-**PASS**: The password can be modified.
Pressing "**ENTER**" the process will be repeated indefinitely. To go to the normal process we have to press "**P**" and "**Down**".

5.- PULSE/ CONTACT/ ALARM OUTPUTS (Connectors 14 and 15)

1) The measured **(E+) energy positive and (Ah+) ampere-hour** can be sent by pulses through two free potential contacts, corresponding every close-down to a determinate and programmable value of energy (E+) in RL1 and Ah+ in RLO. The link is done through two relay outputs, and consequently the terminal is galvanic isolated from the totalizer.

2) It is also possible to use the pulse outputs as **alarm**

As alarm outputs they can act in two ways:
- Maximum level: If the chosen parameter value surpasses the set reference value, the output is activated and closes the contact.
- Minimum level: If the chosen parameter falls below the set reference value, the output is activated and closes the contact.

The programming of the alarms is performed within the general programming process of the equipment. Page AL00 is selected for the RL0 output, or page AL01 for the RL1 output. Each of the alarms acts in an independent way and if desired both can function with the same value, in such a way that one alarm can work when the parameter exceeds a level whilst the other would work when the parameter falls from a different level.

3) or simply as **contact outputs** activated from the computer or the keyboard.

6.- SERIAL PORT

It can be connected one or more TMCC to a PC, using RS232 line or RS 485 specially when the distance is long or there is more than one unit.
A RS-485 serial port gives the possibility to send the measured values to a computer or central unit. The data sending is performed by blocks. The maximum length of a block is 48 bytes, which corresponds to 12 electrical parameters in floating point format. The link can be done with two or four wires.
Communications protocol is J-Bus, but can be modified to work with an existing protocol. Standard configuration allows the link up to 32 units per serial line, and be wider up to 128 units through an IFR4 converter.
Communication line is galvanic isolated from the measuring circuit by optocouplers and an independent auxiliary supply.
We recommend the use of our converter RS232/RS485 model IFRA ,RTS automatic, 2 wires.

MEMORY MAP :

PROGRAMM :

Voltage	Escale V =	3030H	IEEE	
Current	Escale I =	3038H	IEEE	
Constant	REF-ENER =	3040H	IEEE	
Time	HORA =	32C3H	BCD	HH MM

RELAY OUTPUTS

Store the digital output working mode 32F0 BYTE

00 define energy pulse
01 define digital. outp.
02 define as alarms.

If you chose 01 , then the way to move the contacts is by the address 32f1h byte.

=00 both output to set .
=01 RL0=1, RL1=0.
=02 RL0=0, RL1=1.
=03 RL0=1, RL1=1.

If you chose 02 , as alarms :

Reference alarm 0= 32F7 IEEE
Parameter and value of the alarm =32F3 word

Reference alarm 1= 32FB IEEE
Parameter and value of the alarm = 32F5 word

32F3 y 32F5

F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
				0	0	0	0	0	0	0	0	0	P	V	I

Alarm Flag 1=Alarm active
0=Alarm unactive

Level of alarm. 1=max.
0=mín.

001= Volt alarm
010= Current alarm.
100= Pow. alarm.

Each time you have to change the program is recommended delete all bits except bit "F" , wich indicate the level of the alarm and the bits 2,1,0 then indicate the parameter in which the alarm is set.

Identity	Identidad	32E4H	BYTE	R/W
Serial nº	Nº de serie	32DAH	STRING de 10	R
Type	Tipo.	32E5H	STRING de 6	R

Power scale	Escala de Potencia	3048H	IEEE	R

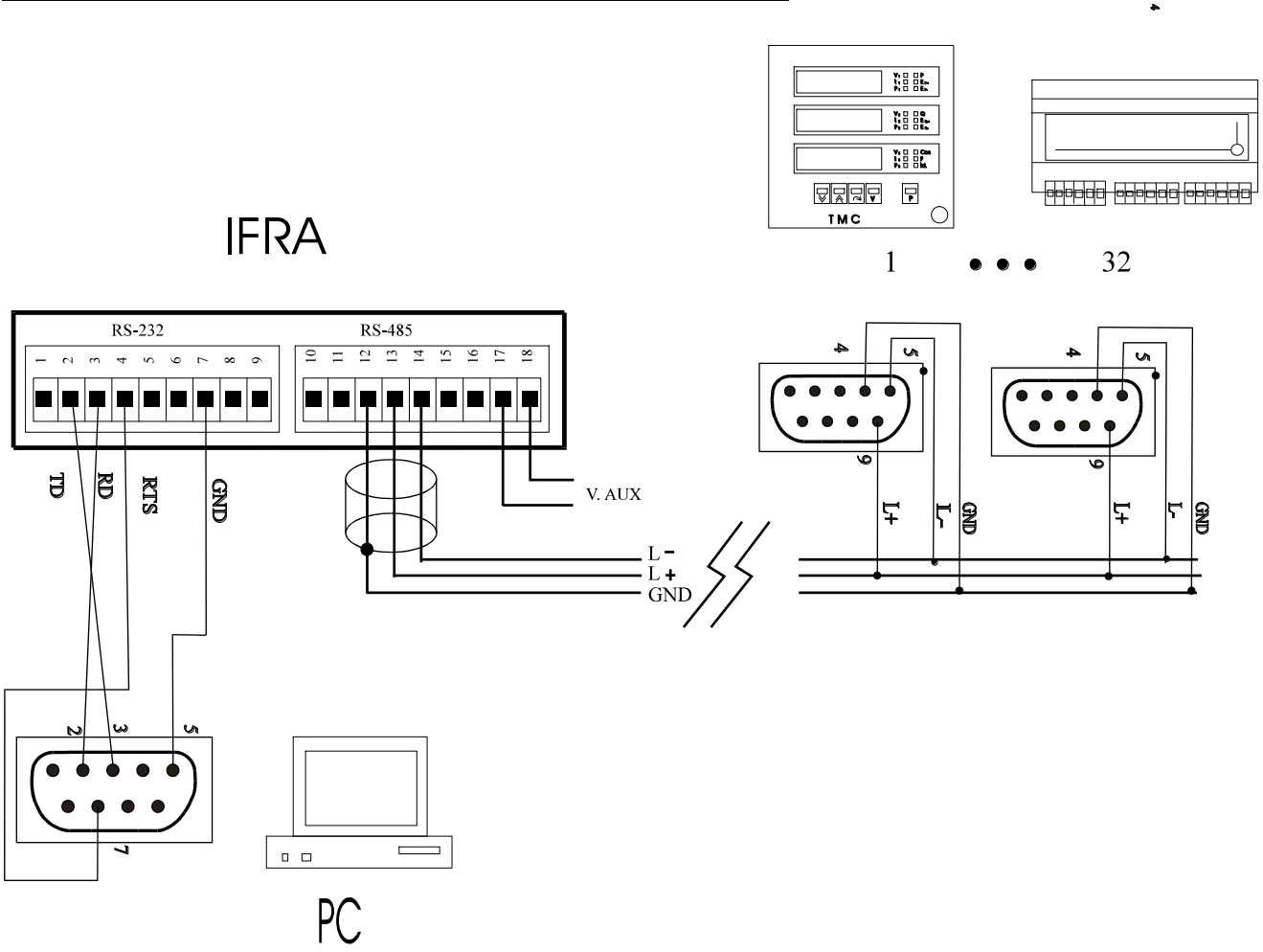
Energy counters 3254H contain 4 counters of 4 bytes.
Wh+ , Wh- , Ah+ y Ah-. R/W
4 4 4 4

Max value of the counters is 1.000.000.000.
Can be set to a particular value. Format Long integer (enters of 32 bits).

<u>Analog parameters.:</u>

Voltage =	3267H	IEEE
Current =	328BH	IEEE
Power =	3273H	IEEE
SW Reset =	3930H	

Connection scheme: terminals/converter IFRA/ PC:



TD	*RD*	*RTS*	*TIERRA*
2	*3*	*4*	*7*
***DB25** del*		*PC*	

7.- TECHNICAL CHARACTERISTICS

■ ENTRADA		INPUT
Tensión nominal (Un)	48 , 110 , 220 o 440 Vcc / DC	Nominal Voltage
Consumo	1 mA.	Burden
Margen de medida	0 - 120 %	**Range**
Corriente I_n	In / 60mV.cc /DC	Current
Margen de medida	0 - 120 % In	Currrent range
■ ALIMENTACIÓN AUXILIAR		AUX SUPPLY
Tensión nominal	110, 230 o 400 Vca / AC 48VDC	Nominal voltage
Consumo	2,8 VA	Burden
Margen de funcionamiento	85 - 110 %	Range
Frecuencia	50 ó 60 Hz	Frecuency
■ CARACTERÍSTICAS DE OPERACIÓN		OPERATING CHARACTERISTICS
Clase	0,5	Accuracy
Margen de temperatura	0 - 40 ºC	Temperature range
■ CARACTERÍSTICAS CONSTRUCTIVAS		OTHER CHARACTERISTICS
Caja metálica	empotrable	Metalic box
Montaje	144 x 144 mm.	Dimensions
Conexiones entrada salida	enchufables / plug in type	Conecctions
Sección de cable máx.	2,5 mm2	Max. Secction wires.
Peso	0,72 kg.	Weight
■ ACCESORIOS		ACCESORIES
Conversores de comunicación.	IFR1, IFRA, IFR4	RS233/ RS485 converters
Shunts	In/ 60 o 150 mV.cc/ DC	Shunts
Terminal totalizador de impulsos	**TTI**	**Pulses totalizer TTI**

8.- SAFETY REQUIREMENTS

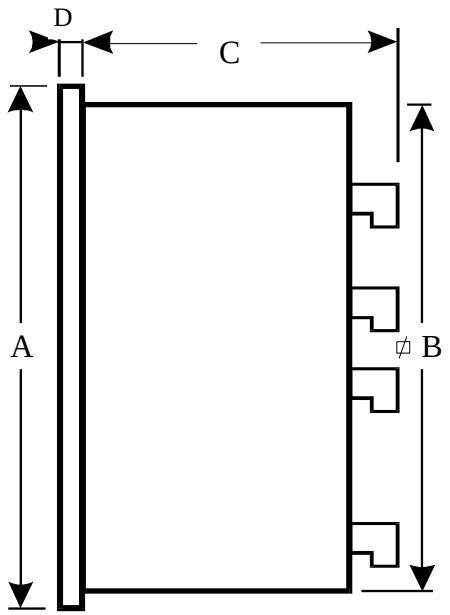
A protection device must be included both in supply lines and measuring inputs. This device can be the one used in the installation, if its rated current does not exceed 10 Amps. In the case of using a specific protection device, 1 Amp fuses are recommended.

The instrument must not be open but by qualified personnel, as dangerous voltages can be found inside the equipment.

Preventive maintenance is not required. In the case of battery failure, the instrument must be sent to our factory for replacement.

The communication cable screen must be connected to earth in one point of the installation for safety purposes.

9.- DIMENSIONS



mm	TMCc
A	144x144
B	135 $^{+0,6}$
C	88
D	6

* Optional Characteristics.

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