EDM-K THREE-PHASE METER

The **EDMk** three-phase electronic energy meter is capable of measuring consumed and generated energy (four quadrants): Active energy (consumed and generated), inductive reactive energy (consumed and generated) and capacitive reactive energy (consumed and generated), plus metering partial energies. Measurements are in true effective value, via three AC. voltage and neutral inputs and three AC. current inputs. (via …/5A or …/1A current transformers). The parameters measured and calculated are shown in the variables table.

> This manual is a quick guide to the use and operation of the **EDM-k** energy meter. This manual may be found in electronic format on the **CIRCUTOR** website:
> **www.circutor.es**

⚠ Before any maintenance, modification to the connections, repair, etc., the equipment must be disconnected from the supply. If any operation or protection fault is suspected the equipment must remain out of service ensuring against any accidental reconnection. The equipment is designed to changed quickly in the event of any breakdown.

1.- KEYBOARD FUNCTIONS.

The ⊝ button allows the user to move through the different energy groups (if any): tariff one and partial tariff, or tariff one, two, three and partial tariff (**EDM3k** type). It used in the set up menu it is used to enter the data and move on to the next parameterisation screen.

The ⊝▲ button the different active or reactive energy display options to be displayed. It is used in the set up menu to increase the value by one digit if a variable has been entered or selected.

Generated or consumed energy can be selected by using ⊝▶ in the option. Inductive or capacitive energy can be selected in the reactive option. In the set up menu, it is used to move the cursor among the digits.

The ⊝Display button allows the display to come on in the absence of any power supply. This function allows the on site reading of meters when the device is out of service. This option is available when the meter has an *optional* station installed inside (*see price list M3*).

The ⊝Setup button gives rapid access to the device's full parameterisation menu. To access this menu, press the button for less than one second.

The ⊝Clear button deletes partial energies. To do this, press the button for less than 4 seconds. The message will then display "*DONE*", indicating that these meters have been successfully started (active and reactive).

The ⊝Set A button starts the meter in one step only with the minimum setting for the meter. (*see section Parameterisation in one step only*).

2.- STARTING-UP IN ONE STEP ONLY

2.1.- Prior information

This option is only valid for installations where there is no voltage transformer to measure. Voltage is only measured directly (300V AC.f-n / 500V AC.f-f); and current measurement is via secondary external current transformers of one or five amperes.

2.2.- Parameterisation in one step only

Keeping the ⊝Set A button pressed for 1 second, the energy meter enables the current primary and secondary parameterisation on screen.

Using the ⊝▲ and ⊝▶ buttons the value of the current transformer primary and secondary is validated using thel ⊝ button.

3.- COMPLETE PARAMETERISATION OF THE METER

Using the complete parameterisation of the meter, all setting options can be set. These options affect the setting of the external voltage transformers, if any, as well as the omission of energy meters which the customer believes to of little relevance or are not required in their installation.

3.1.- Voltage transformer primary

On screen the words "*PRIU*" appear followed by 7 digits. These allow the voltage transformer primary to be set (from *1* to *999,999*).

3.2.- Voltage transformer secondary

On screen the words "*SECU*" appear followed by 3 digits. These allow the voltage transformer secondary to be set (from *1* to *999*).

3.3.- Current transformer primary

On screen the words "*PRIA*" appear followed by 5 digits. These allow the current transformer primary to be set (from *1* to *9,999*).

3.4.- Current transformer secondary

On screen the words "*SECA*" appear followed by the number 5 or 1. These allow the installed current transformer secondary ratio to be set (*5*= …/ 5A or *1*= …/ 1A).

3.5.- Measurement in 2 or 4 quadrants

On screen the words "*QUAD*" appear; one of the two available options must be selected: *2*=power consumption or *4*=consumption and generation.

3.6.- Setting the "backlight" disconnection time

On screen the words "*DISP OFF*" appear; the time the backlight is on can be set after pressing the keypad. The backlight is permanently on if *00* is set.

3.7.- Display or reactive energy omission

On screen the words "*REACT*" appear; this option allows the reactive energy to be displayed or omitted ("*YES*" or "*NO*").

3.8.- Partial energy display or omission

On screen the words "*PART*" appear; this option allows the partial active and reactive energy to be displayed or omitted ("*YES*" or "*NO*"). In the event of omission, the meter does not show energy and stops metering energy.

3.9.- Setting the energy output pulse

The screen shows "*OUT ACT*"; the energy to be associated to digital output 1 must be selected: Consumed active energy (*IMPORT*) or generated (*EXPORT*); once the data has been entered with the ⊝ button, the *W·h* value must be entered by pressing.

The screen shows "*OUT REA*": the reactive energy to be associated to digital output 2 must be selected: *L / C- /*

L- / C; once the data has been entered with the ⊝ button, the *var·h* value must be entered by pressing the keypad. In case of selecting 2 quadrants (*see section 3.5.- Measurement in 2 or 4 quadrants*), only are available *L* and *C*.

4.- DEFAULT SETTINGS

The EDMk-ITF-C2 electronic three-phase meter is supplied with the following default settings:

VARIABLE	POINT	VALUE
Voltage primary	3.1	*000001*
Voltage secondary	3.2	*001*
Current primary	3.3	*0005*
Current secondary	3.4	*5*
Measurement in 2 or 4 quadrants	3.5	*2*
Backlight disconnection	3.6	*10*
Reactive energy display	3.7	*NO*
Partial energy display	3.8	*NO*
Energy pulses		
- Active energy	3.9	*IMPORT*
- W·h / pulse	3.9	*1000*
- Reactive energy	3.9	*L*
- var·h / pulse	3.9	*1000*

5.- TARIFFS (EDM3K TYPE)

The tariff time is carried out using hardware. The equipment has a common and two inputs free of voltage to select the type of tariff required (Tariff 1, Tariff 2 or Tariff 3).

- Tariff 1: Without any bridge between terminals
- Tariff 2: Bridge between terminal A and S
- Tariff 3: Bridge between terminal B and S

6.- COMMUNICATION (RS485-C2 TYPE)

6.1.- Programming of setting parameters

Configurable parameters in the parameterisation menu:

- "*NPER*": Peripheral number 001 to 255
- "*BAUD*": Baud rate 1200-2400-4800-9600-19200
- "*BITS*": Length 8 bits
- "*PARI*": No, Even, Odd
- "*STOP*": Stop bits 1 or 2

Default settings *001 / 9600 / 8 / N / 1*

6.2.- Communication protocol

The **EDMk** meter uses MODBUS RTU© communication protocol and network protocol RS485. The format is as follows:

QUESTION: NP FT AAAA NNNN CRC

NP:	1 Byte	Peripheral number
FT:	1 Byte	Function 04 reading of n Words
AAAA:	2 Bytes	Address of 1st recording
NNNN:	2 Bytes	Number of recordings to be requested
CRC:	1 Byte	Cyclic Redundancy Checking

In the MODBUS© recordings, the energy is accumulated in kW·h x 100 (2 decimal points) with a length of *2 Words*.

6.3.- MODBUS RTU© memory map

PARAMETER	REG.
Active energy +	00-01
Active energy -	02-03
Inductive reactive energy +	04-05
Capacitive reactive energy +	06-07
Inductive reactive energy -	08-09
Capacitive reactive energy -	0A-0B
Partial active energy +	30-31
Partial active energy -	32-33
Partial inductive reactive energy +	34-35
Partial capacitive reactive energy +	36-37
Partial inductive reactive energy -	38-39
Partial capacitive reactive energy -	3A-3B

6.4.- Description communications

One or more **EDM-*k*** meters can be connected to a computer or PLC. As well as the usual operation of each piece of equipment, this system may centralize data at one single point.

The **EDM-*k*** has an RS-485 series communications output. If more than one analyzer is connected to one RS-485 communication bus, it is necessary to assign to each a peripheral address (from 01 to 255) so that the remote computer or PLC sends data on different measured or calculated recordings to those addresses.

The RS-485 connection is made with woven mesh shielded communications cables, with a minimum of three wires and with a maximum distance between remote computer and the last analyzer of 1,200 metres. This RS485 series bus can connect up to a maximum of 32 devices.

The **EDM-*k*** meter communicates using the *MODBUS RTU©* protocol (Pulling Question / Answer).

6.5.- Connection with system converters

Description of connection for the RS485 bus, for communication via an Intelligent Converter (485-RS232), or via an Ethernet Converter (Transparent / Modbus/TCP).

EDMk-ITF-RS485-C2 M31751	Intelligent Converter M54020	Ethernet Converter M54031 / M54032
RS485 TERMINAL	RS485 TERMINAL	RS485/RS232 TERMINAL
A (+)	1 / A	A
B (-)	2 / B	B
S (GND)	5 / GND	S

7.- DISPLAY

The **EDM*k*** energy meter display is divided into two sections: the first of these (on the upper section) displays the value of the energy meters (Active energy and Inductive reactive energy or Capacitive). The second shows the measurement, in real time, being taken by the meter at that time.
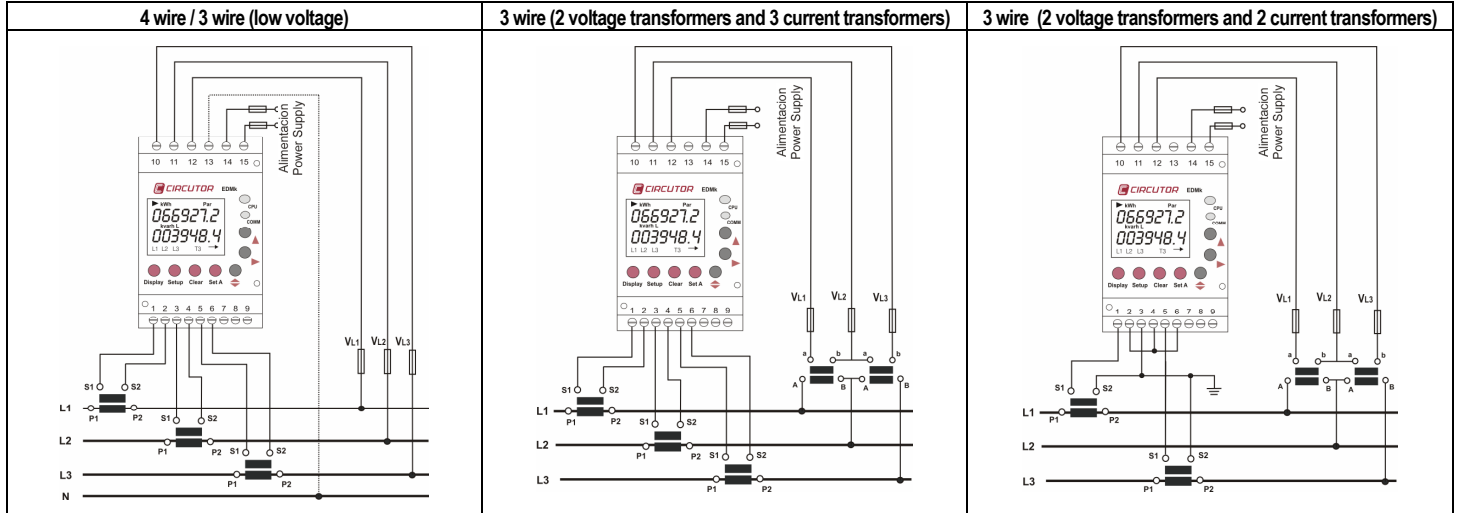

- *L3-L2-L3* shows that the device has measured voltage in each phase. If one of these does not exist, the corresponding identification number does not appear. The symbols appearing behind each phase (L) indicate the direction of the current in the current transformers, showing if the point of measurement is consuming or generating energy (*informs of possible errors of connection with the current transformers*).

- *T1 T2 T3* identification only available on the **EDM3*k***; shows the tariff selected for that time, independently from the tariff displayed on the upper section.

- The ∩ symbol indicates that the load is inductive; the ╫ symbol indicates that the load is capacitive.

- The ➡ symbol shows that the meter is the first and fourth quadrant (consumption); the ⬅ symbol indicates that the meter is in the second and third quadrant (generation).

8.- CONNECTIONS

4 wire / 3 wire (low voltage)	3 wire (2 voltage transformers and 3 current transformers)	3 wire (2 voltage transformers and 2 current transformers)

9.- TECHNICAL FEATURES

Power Supply:	AC. type	AC. and DC. type	Measurement circuit:	
- Single-phase:	230 V AC.	85..265V AC. / 95..300V DC.	- Rated voltage:	300V AC. f-n / 500V AC. f-f
- Voltage tolerance:	-15 % / +10 %		- Frequency:	45…65 Hz
- Frequency:	45…65 Hz	0…65 Hz	- Rated current:	…/ 5A or …/ 1A
- Maximum burden:	5 VA	5 VA	- Permanent overload:	1.2 In
- Operating temperature:	-20ºC …..+ 60ºC	-20ºC …..+ 60 º C	- Voltage circuit burden per phase:	0.3 VA
- Humidity (without condensation):	5% ….. 95%	5% ….. 95%	- Current circuit burden per phase:	0.3 VA at 5A and 0.06 at 1A
Mechanical features:			Pulse output transistors features:	
- Casing material:	Self extinguishing V0 plastic		- Type: Opto-insulated transistor (open collector):	NPN
- Assembled equipment protection (front):	IP 51		- Maximum operating voltage:	24 V DC.
- Non assembled equipment protection (sides and rear):	IP 31		- Maximum operating current:	50 mA
- Dimensions (mm):	85 x 52 x 70 mm (3 step)		- Maximum frequency:	5 pulses / second
- Weight:	0.210 kg		- Impulse length:	50 ms
			Connections	
				Output: 2Terminal 7
				Common: Terminal 8
				Output 2: Terminal 9
- Accuracy class in Active energy:	Class 1 (IEC 61268)		Standards: EN62052-11, EN62053-21, EN62053-23, EN61010-1	
- Accuracy class in reactive energy:	Class 2 (IEC 61268)		Safety: Category III / EN-61010-1 Class II double insulation against electric shock.	

10.- TECHNICAL SERVICE

In the event of any equipment failure or any operational queries please contact the technical service of CIRCUTOR, SA.