

COUNTIS *E03/E04*

Single-phase energy meter
Direct - 40 A Modbus



COUNTIS E03



COUNTIS E04 - MID



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1. DOCUMENTATION

All documentation on the COUNTIS E03 / E04 is available online at:
www.socomec.com/en/countis-e0x



2. HAZARDS AND WARNINGS

The term "device" used in the paragraphs below refers to the COUNTIS E03 / E04.

The assembly, use, servicing and maintenance of this equipment must only be carried out by trained, qualified professionals.

SOCOMEK shall not be held responsible for failure to comply with the instructions in this manual.

2.1. Risk of electrocution, burns or explosion

- Only duly authorised and qualified personnel may work or install/uninstall the device.
- The instructions are valid together with the specific instructions for the device.
- The device is designed only for its intended purpose as set out in the instructions.
- Only accessories authorised or recommended by SOCOMEK may be used in association with the device.
- Before proceeding with installation, maintenance, cleaning, disassembly, connection, or maintenance work, the device and system must be cut off from the mains to avoid electrocution and damaging the system and device.
- This device is not designed to be repaired by the user.
- For any questions related to the disposal of the device, please contact SOCOMEK.

Failure to comply with the instructions of the device and this safety information can cause bodily injury, electric shock, burns, death or damage to property.

2.2. Risk of damaging the unit

To ensure that the unit operates correctly, make sure that:

- The unit is correctly installed.
- There is a maximum voltage at the voltage input terminals of 276 VAC phase-neutral
- The network frequency indicated on the device is observed: 50 or 60 Hz.
- a maximum current 40 A at the current input terminal.

Failure to respect these precautions could cause damage to the unit.

2.3. Responsibility

- Assembly, connection and use must be carried out in accordance with the installation standards currently in force.
- The unit must be installed in accordance with the rules given in this manual.
- Failure to observe the rules for installing this unit may compromise the device's intrinsic protection.
- The unit must be positioned within an installation which complies with the standards currently in force.
- Any cable which needs to be replaced may only be replaced with a cable having the correct rating.

3. PRELIMINARY OPERATIONS

To ensure the safety of staff and the equipment, it is vital to read and absorb the contents of these instructions thoroughly before commissioning.

Check the following points as soon as you receive the package containing the unit:

- The packaging is in good condition
- The unit has not been damaged during transportation
- The device reference number conforms to your order
- The package includes:
 - 1 device
 - 1 sealing kit (for COUNTIS E04)
 - 1 Quick Start guide

4. INTRODUCTION

4.1. Introducing the COUNTIS E03 / E04

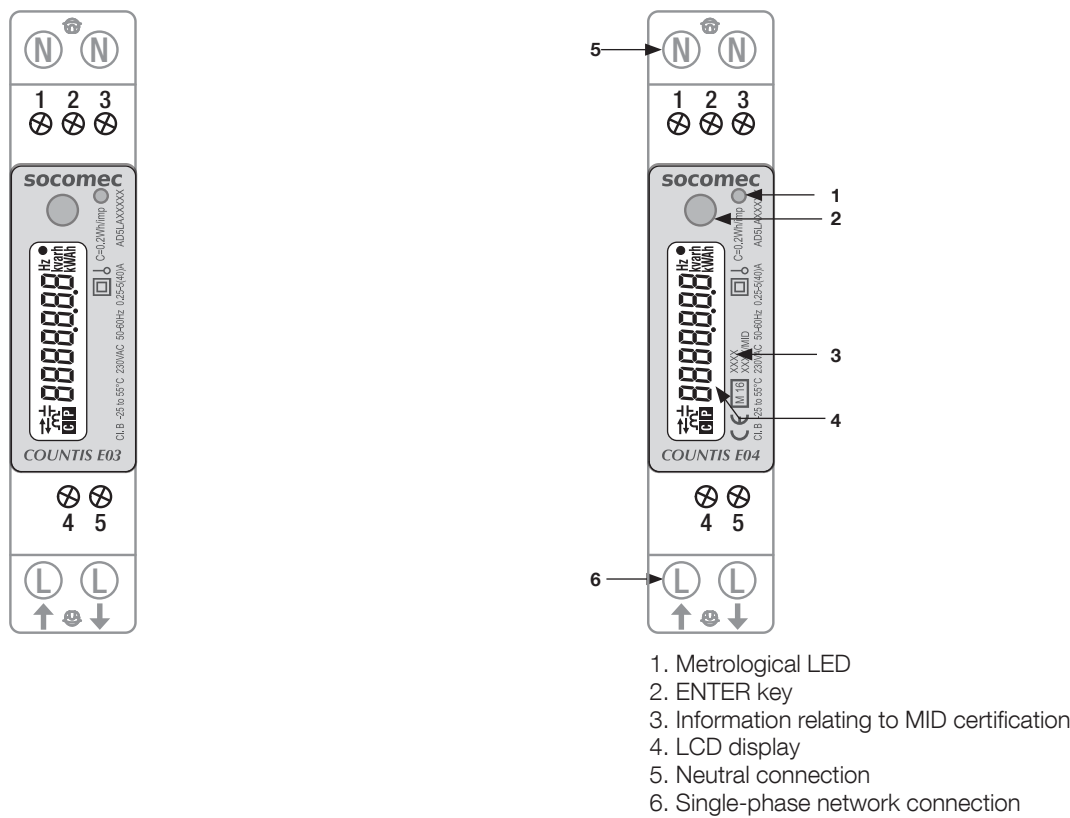
The COUNTIS E03 and E04 are modular active and reactive electrical energy meters that display consumed energy. They are designed for single-phase networks and allow a direct connection of up to 40 A. They are equipped with a Modbus communication bus.

4.2. Functions

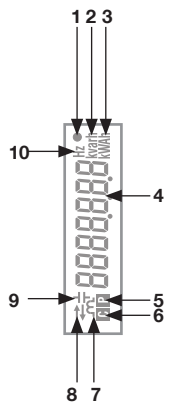
- Measures and displays total and partial energy
- Dual tariff management: T1 / T2
- Electrical parameter measurements: I, U, V, f
- Power, power factor
- RS 485 modbus communication
- MID version (according to reference)

Description	Reference
COUNTIS E03	4850 3039
COUNTIS E04 - Version MID	4850 3040

4.3. Front panels



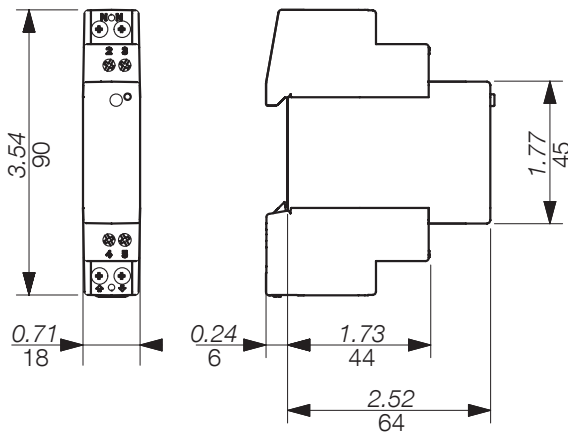
4.4. LCD display



1. Active pulse output
2. Unit of measure
3. Unit of measure
4. Main zone (in the event of Code XX: metrological setting corrupt; return to manufacturer.)
5. Value of the partial meter Flashing = meter stopped
6. Active communication
7. Inductive value
8. Imported (→) or exported (←) energy or power
9. Capacitive value
10. Unit of measure

4.5. Dimensions

Dimensions: in/mm



4.6. Electrical readings

4.6.1. Measurements

Settings vary by model.

Realtime values	Symbol	Unit of measure	LCD display	Via communication
Neutral voltage	V	V	●	●
Current	I	A	●	●
Power factor	PF		●	●
Apparent power	S	kVA		●
Active power	P	kW	●	●
Reactive power	Q	kvar	●	●
Frequency	f	Hz	●	●
Direction of current	↺		●	
Logged data				
Total active and reactive energy	Ea, Er	kWh, kvarh	●	●
Total apparent energy	Eap	kVAh		●
Total reactive, inductive and capacitive energy	Er	kvarh		●
Total active and reactive energy for each tariff (T1/T2)	Ea, Er	kWh, kvarh	●	●
Total apparent energy for each tariff (T1/T2)	Eap	kVAh		●
Total reactive, inductive and capacitive energy for each tariff (T1/T2)	Er	kvarh		●
Partial active and reactive energy	Ea, Er	kWh, kvarh	●	●
Partial apparent energy	Eap	kVAh		●
Miscellaneous				
Current tariff	T	1/2	●	●
Partial meters	P	START/STOP	●	
Status of the pulse output	●	Active / inactive	●	

5. INSTALLATION

The paragraphs below describe how to install the device.

5.1. Recommendations and safety

Refer to the safety instructions (section "2. Hazards and warnings", page 4)

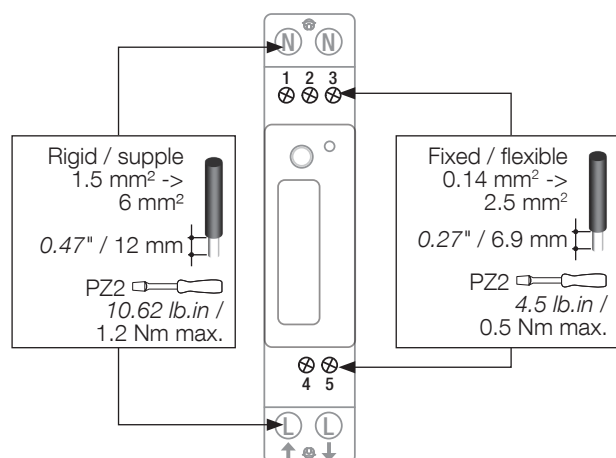
- Keep away from electromagnetic interference generator systems,
- Avoid vibrations with accelerations greater than 1 g for frequencies lower than 60 Hz.

5.2. DIN rail mounting

The COUNTIS E03/E04 can be mounted on a 35-mm DIN rail (EN 60715TM35). They must be used inside electrical cabinets.

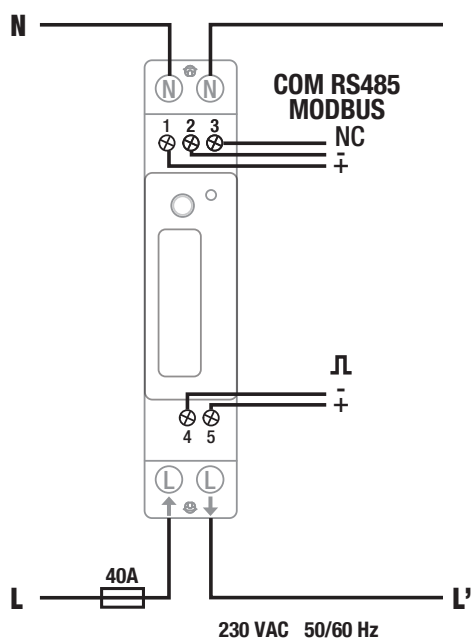
6. CONNECTION

6.1. Connecting the COUNTIS E03/04



6.2. Connection to the electrical network and to the loads

The COUNTIS E03/E04 are intended for single-phase networks with neutral.



Modbus

1: +
2: -

3: NC (not connected). May be used for shielding continuity.

Pulse output

4: -
5: +

Optocoupler pulse outputs

Terminals 4-5 must be supplied with voltage between 5 and 27 VDC (27 mA max)

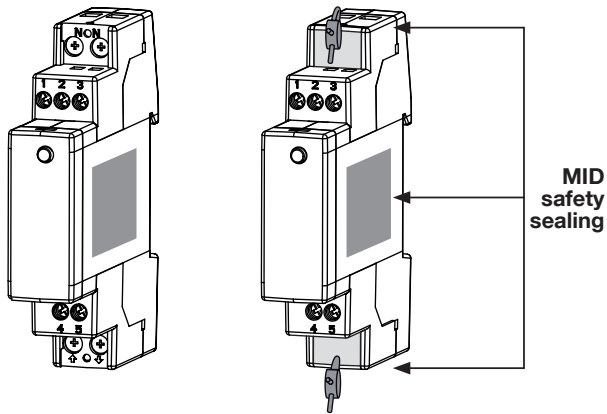
Network

L: ↑ : Phase input
L': ↓ : Phase output
N: Neutral connection

7. MID COMPLIANCE

The following points must be taken into consideration to ensure that the device is used in compliance with directive MID 2014/32/EU:

- **Type of network**
COUNTIS E04 meters comply with the MID directive for connection to networks: 1P+N (see "6.2. Connection to the electrical network and to the loads", page 10)
- **Fitting terminal covers**
After connecting the device, ensure that the terminal covers are fitted properly and secured by the plastic seals provided with the device.
- **RS485 communication**
The information provided via the RS485 COM is transmitted for information only and has no legal value.
- **MID Declaration of Conformity**
The MID Declaration of Conformity is available on the website: www.socomec.com/en/countis-e0x

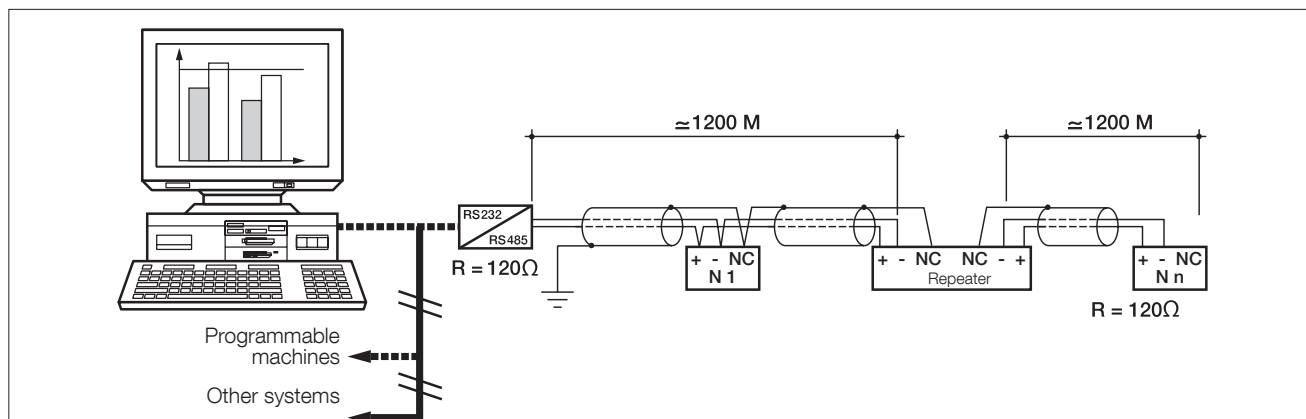
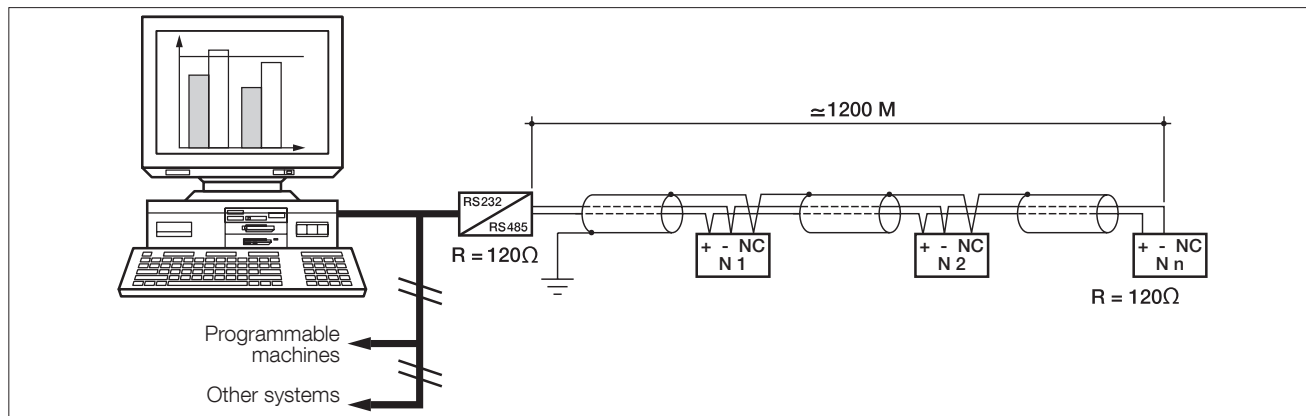


8. COMMUNICATION

8.1. General information

The Modbus communication available on the COUNTIS E03/04 communicates via an RS485 series link (2 or 3 wires) which is used to operate devices from a PC or an API.

In a standard configuration, an RS485 connection is used to connect 32 products to a PC or a controller over 1200 metres.



8.2. RS485 rules

A LIYCY shielded twisted pair must be used. We recommend using a shielded twisted pair with a general LIYCY-CY shielding in an environment where there is interference or in a very long network with a number of products.

If the distance of 1,200 m is exceeded and/or the number of products is greater than 32, a repeater must be added to enable additional products to be connected.

A 120 Ohm resistor must be fixed at both ends of the connection.

8.3. Communication structure

The device communicates via a Modbus protocol which involves a dialogue in accordance with a master/slave structure. The communication mode is the RTU (Remote Terminal Unit) mode with hexadecimal characters composed of at least 8 bits.

Modbus frame structure (master -> slave question):

Slave address	Function code	Address	Number of words to be read	CRC 16
1 byte	1 byte	2 bytes	2 bytes	2 bytes

To comply with the modbus protocol, the inter-character time must be ≤ 3 silences.

This means the time for 3 characters to be emitted so that the message is processed by the COUNTIS E03/E04.

In order to use the information correctly, you must use the modbus functions in accordance with the codes:

- 3: to read n words (maximum 128).
- 6: to write one word.
- 16: to write n words (maximum 128).

N.B.:

1 word $\Leftrightarrow$ 2 bytes $\Leftrightarrow$ 16 bits

2 words $\Leftrightarrow$ 4 bytes $\Leftrightarrow$ 32 bits

The broadcast communication is available for the log that stores the tariff.

8.4. Communication tables

The communication tables and relevant notes are available online on the COUNTIS E03/E04 documentation page at:

www.socomec.com/en/countis-e0x



9. CONFIGURATION

The device can be configured directly from the COUNTIS E03/E04 screen in programming mode or via the communication link. The paragraphs below describe configuring using the screen.

9.1. On-screen configuration

From the screen, go to programming mode to change your communication settings. How to browse through the programming mode is described in the following stages:

Function	Where	Buttons	Press
Switch pages within a menu	Every page within a menu		Realtime
Go to SETUP menu	Menu page SETUP		> 3 sec
Change a value/digit	SETUP pages		real-time
Confirm a value/digit	SETUP pages		> 3 sec
Exit SETUP menu	SAVE screen from the SETUP menu		> 3 sec
Start/stop the displayed partial meter	Partial meter menu		> 3 sec
Reset the displayed partial meter to zero	Partial meter menu		> 3 sec

9.1.1. View all of the menu "SETUP"

In the SETUP menu, press "" for 3 seconds to put the device into programming mode.

Press "" to go to the different screens:

SETUP ?
 >3s

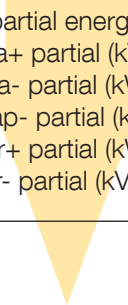
Communication address

Communication speed

Communication parity

Reset partial energy to zero:

Ea+ partial (kWh)
 Ea- partial (kWh)
 Eap- partial (kWh)
 Er+ partial (kWh)
 Er- partial (kVarh)



Back to first screen of "SETUP" menu

9.1.2. Detailed view of menu "SETUP"

SETUP ?

>3s

Communication address

Addr005

1, 2, ... **5**, ..., 246, 247

Communication speed

bAu 384k

2400, 4800, 9600, 19200, **38400**

Communication parity

Prty n

n = no
o = odd
E = even

Reset energy

rES ALL

Ea+ partial; Ea- partial;
Eap partial; Er+ partial; Er- partial

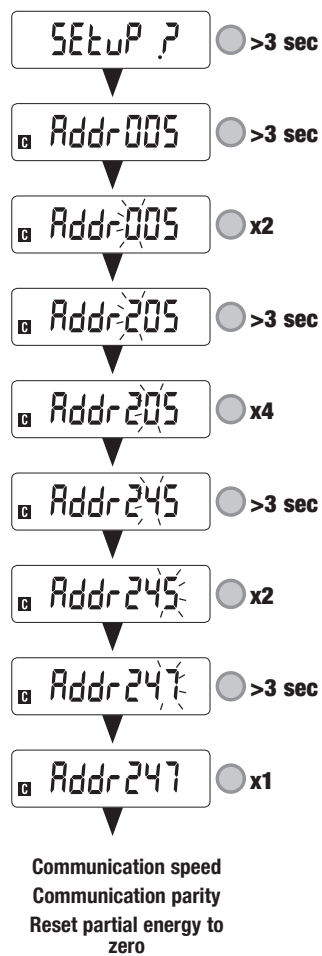
Back to first screen of "SETUP" menu



9.1.3. Example: setting the communication address

In "SETUP" mode (see page 14), go to the "Addr communication address" screen

Example: changing the communication address to 247.



XX = default value

10. USE

The electric measurements or information is/are accessible by pressing the "●" button once.

The associated measurements are described in the table below:

Tariff 1 - Imported active energy	
Tariff 1 - Imported reactive energy	
Tariff 2 - Imported active energy	
Tariff 2 - Imported reactive energy	
Total imported active energy	● >3 sec Partial imported active energy
Total exported active energy	
Total imported reactive energy	● >3 sec Partial imported reactive energy
Active and reactive power	
Voltage	
Current	
Power factor	
Frequency	
Set-up?	
Firmware version	
Checksum of firmware	
Installed communication port	

10.1. Detailed view of the Main menu

Tariff 1 - Imported active energy	
→ 6.1 kW h	→ 0000005 kW h

Tariff 1 - Imported reactive energy	
→ 6.1 kvarh	→ 0000086 kvarh

Tariff 2 - Imported active energy	
→ 6.2 kW h	→ 0000005 kW h

Tariff 2 - Imported reactive energy	
→ 6.2 kvarh	→ 0000086 kvarh

Total imported active energy	
→ 0000005 kW h	description in chapter 10.1.1

Total exported active energy	
← 0000005 kW h	

Total imported reactive energy	
← 0000086 kvarh	description in chapter 10.1.1

Active power	
→ 0086 kW	

Reactive power	
→ 0086 kvar	

Voltage	
2276 V	

Current	
14.76 A	

Power factor	
PF 0.895	

Frequency	
49.5 Hz	

Set-up?	
SETUP ?	

Firmware version	
FrEL 100	

Checksum of firmware	
CS 8d0E	

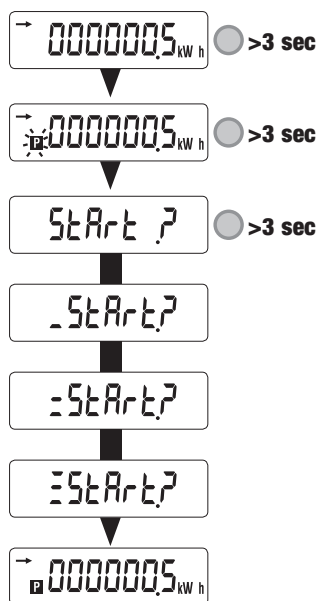
Installed communication port	
Modbus	

10.1.1. Detailed view of the partial energy meter

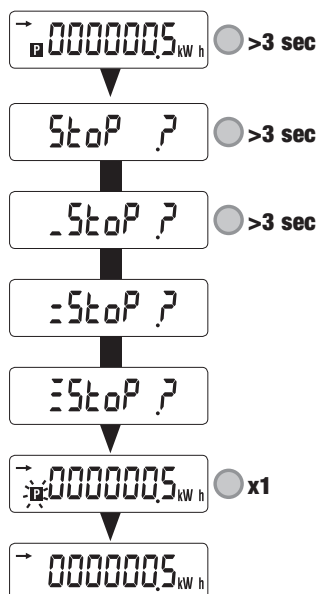
Total imported active energy	
→ 00000005 kWh	

Total imported reactive energy	
→ 00000086 kvarh	

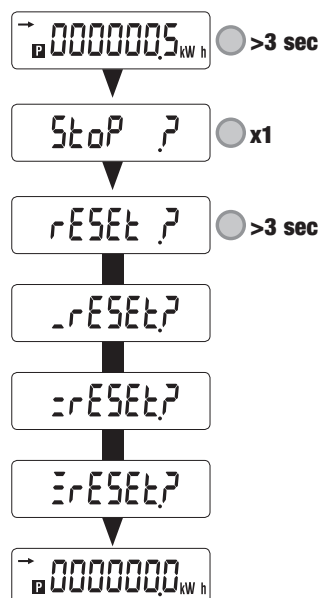
10.1.2. Starting up the partial energy meter



10.1.3. Stopping the partial energy meter



10.1.4. Resetting the partial energy meter to zero



11. DIAGNOSTICS MESSAGES

The following message appears if there are connection or malfunction errors.

11.1. Malfunction



- When messages with the code xx are displayed, the meter has malfunctioned and must be replaced.

12. ASSISTANCE

Causes	Solutions
Device not working	Check the neutral and phase cable connections
Error message	Check the meter is working OK

13. CHARACTERISTICS

GENERAL FEATURES	
Compliant with	European EMC Directive No. 2014/30/EU dated 26/02/2014 LV Directive No. 2014/35/EU dated 26/02/2014 Measuring Instrument Directive MID No. 2014/32/EU dated 26/02/2014 EN50470-1/-3 IEC 62053-21/-23
Frequency	45 and 65 Hz
Power supply	Self-supplied
Rated dissipated power (Wmax.)	1.5 VA - 1 W
FEATURES	
Single-phase connectivity	2 wires 230 V
Stores energy readings and settings	In the EEPROM memory
Identifies display of tariffs	T1 and T2
CURRENT MEASUREMENTS	
Type	Single-phase - direct 40 A
Input consumption	0.5 VA
Start-up current (Ist)	20 A
Minimum current (Imin)	0.25 A
Transition current (Itr)	0.5 A
Reference current (Iref)	5 A
Permanent overload (Imax)	40 A
Intermittent overload	30 Imax for 1/2 cycle
OVERLOAD CAPACITY	
DC voltage Un	276 VAC
Realtime voltage Un (1 s)	300 VAC
DC current Imax	40 A
Realtime current Imax	30 Imax for 1/2 cycle
VOLTAGE MEASUREMENTS	
Range of measurement	230 ± 20%
Power consumption	7.5 VA max
Permanent overload	280 V phase-neutral
FREQUENCY MEASUREMENT	
Frequency measurement	45-65 Hz
ENERGY MEASUREMENT	
Active	Yes
Reactive	Yes
Total and partial reading	Yes
MID metering	Bidirectional with single-phase
Resolution	10 Wh, 10 varh
ENERGY ACCURACY	
Active energy Ea+	Class B (EN 50470-3) E04 Class 1 (EN 62053-21)
Reactive energy Er+	Class 2 (EN 62053-23)

TARIFF for Ea+	
Tariff management	Yes (via communication)
Number of tariffs managed	2
Tariff input	No
METROLOGICAL LED (Ea+)	
Pulse value	5,000 pulses / kWh
Colour	Red
PULSE OUTPUT	
Type	Opto-isolated - 5 ... 27 VDC 27 mA according to EN 62053-31
Pulse weight	100 Wh
DISPLAY	
Type	7-digit LCD with backlight
Refresh time	0.5 s
Backlight activation time	10 s
Active energy: 1 display, 7-digit	000000.0 - 999999.9 kWh
Reactive energy: 1 display, 7-digit	000000.0 - 999999.9 kvarh
Realtime active power: 1 display, 4-digit	00.00 - 99.99 kW
Realtime reactive power: 1 display, 4-digit	00.00 - 99.99 kvar
Realtime voltage: 1 display, 4-digit	000.0 ... 999.9 V
Realtime current: 1 display, 4-digit	00.00 ... 99.99 A
Power factor: 1 display, 4-digit	0.001-1.000
Frequency: 1 display, 4-digit	45.00-65.00 Hz
COMMUNICATION	
RS485	2 wires + shielding/ half duplex
Protocol	Modbus, RTU mode
Baud rate	2400 / 4800 / 9600 / 19200 / 38400 bps
Insulation	SELV
Load unit	1/8
SAVING	
Energy registers	In the EEPROM memory
ENVIRONMENTAL CONDITIONS	
Mechanical environment	M1
Electromagnetic environment	E2
Operating temperature range	-25°C to +55°C
Storage temperature	-25°C to 75°C
Humidity	≤ 80%
Installation	Internal (box/cabinet)
Vibrations	±0.075 mm

HOUSING	
Dimensions W x H x D (mm)	Modular - width of 1 module (DIN 43880) 18 x 90 x 70
Installation	On DIN rail (EN 60715)
Connection capacity, tightening torque	See chapter "6. Connection", page 10
Protection index	Front: IP51 - casing: IP20
Insulation class	Class II (EN 50470-1)
Weight	100 g

GLOSSARY OF ABBREVIATIONS

GB	Metrological firmware version
CS	Checksum of metrological firmware
t.1	Tariff 1
t.1	Tariff 2
Set-up?	Set-up menu
Addr	Slave address
bAu	Communication speed in bauds (bits per second)
Prty	Communication frame parity
n	No parity
o	Off parity
E	Even parity
RESALL	Reset all partial energies
SAVE?	Confirm selection
Y	Save and exit
N	Exit without saving
C	Continue without saving

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