INSTRUCTION MANUAL

COUNTIS E13/E14

Single-phase energy meter
Direct - 80 A MODBUS

EN



COUNTIS E13



COUNTIS E14 - MID

www.socomec.com/
en/countis-e1x

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1. DOCUMENTATION

All documentation on the COUNTIS E13/E14 is available online at:
www.socomec.com/en/countis-e1x

2. HAZARDS AND WARNINGS

The term "device" used in the paragraphs below refers to the COUNTIS E13/E14.

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

SOCOMEC 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 SOCOMEC 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 SOCOMEC.

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 288 VAC phase-neutral
- The network frequency indicated on the device is observed: 50 or 60 Hz.
- There is a maximum current of 80 A at the current input terminals (I1).

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 E14)
  - 1 Quick Start guide

4. INTRODUCTION

4.1. Introducing the COUNTIS E13 / E14

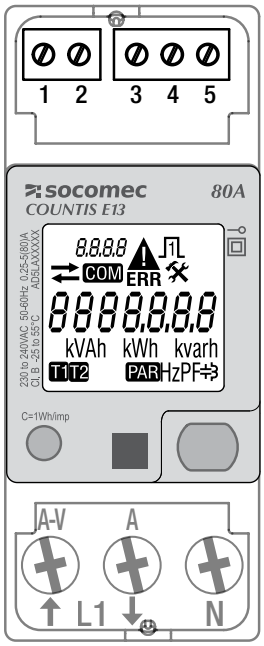
The COUNTIS E13 and E14 are modular active and reactive electrical energy meters that display consumed energy. They are designed for single-phase networks and allow a direct connection of up to 80 A. They are equipped with a MODBUS communication Bus.

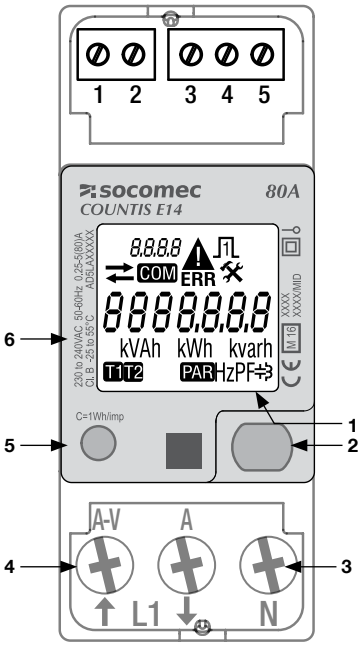
4.2. Functions

- 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 E13	4850 **3043**
COUNTIS E14 - Version MID	4850 **3044**

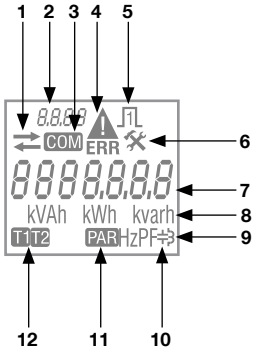
4.3. Front panels





1. LCD display
2. ENTER key
3. Neutral connection
4. Single-phase network connection
5. Metrological LED
6. Information relating to MID certification

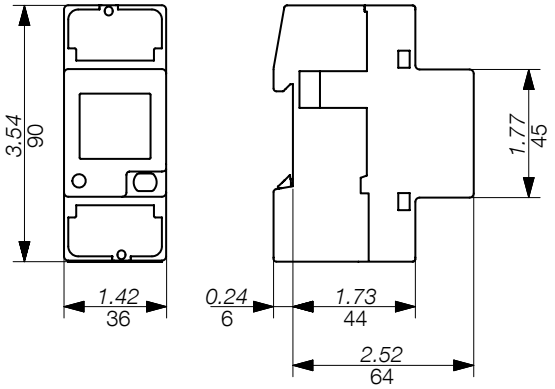
4.4. LCD display



1. Imported (→) or exported (←) energy or power
2. Identification of current menu
3. Active communication
4. Device malfunction. Replace the device
5. Active pulse output
6. Setup menu
7. Main zone
8. Unit of measure
9. Inductive value
10. Capacitive value
11. Partial meters. Flashing = partial meter has stopped
12. Tariff display

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, reactive and apparent energy	Ea, Er, Eap	kWh, kvarh, 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		●
Active, partial energy for each tariff (T1/T2)	Ea	kWh	●	●
Partial active and reactive energy	Ea, Er	kWh, kvarh	●	●
Partial apparent energy	Eap	kVAh		●
Energy balance	∑	kWh, kvarh		●
Miscellaneous				
Current tariff	T	1/2	●	●
Partial meters	BY	START/STOP	●	
State of the pulse output	⎍	Active / inactive	●	

4.6.2. Energy balance; definition

	Formula
kWh	(+kWh T1) – (-kWh T1) + (+kWh T2) – (-kWh T2)
kvarh	(+kvarh T1) – (-kvarh T1) + (+kvarh T2) – (-kvarh T2)

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)

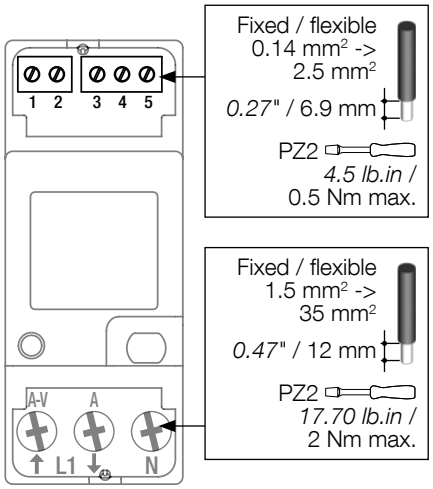
- Keep away from electromagnetic interference generator systems,
- Avoid vibrations with accelerations greater than 1 g for frequencies lower than 60 Hz.

5.2. DIN rail mounted

The COUNTIS E13/E14 can be mounted on a 35-mm DIN rail (EN 60715TM35). They must be used inside electrical cabinets.

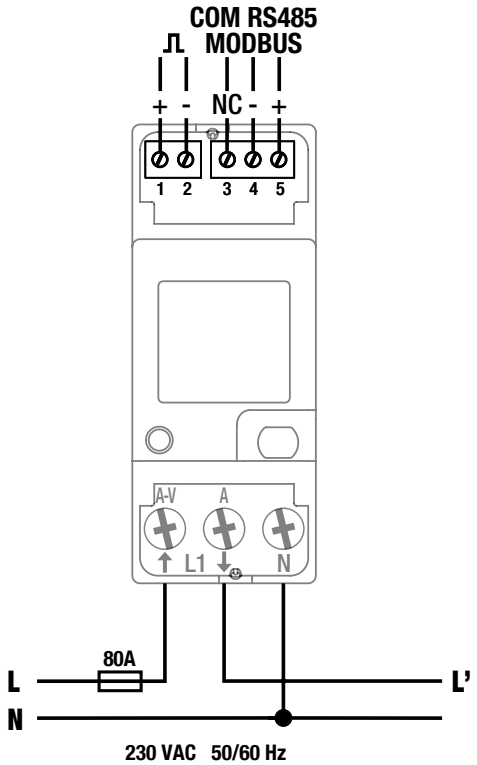
6. CONNECTION

6.1. Connecting the COUNTIS E13/E14



6.2. Connection to the electrical network and to the loads

The COUNTIS E13/E14 are intended for single-phase networks with neutral.



Pulse output
1: +
2: -

Optocoupler pulse outputs
Terminals 1-2 must be supplied with voltage between 5 and 27 VDC (27mA max)

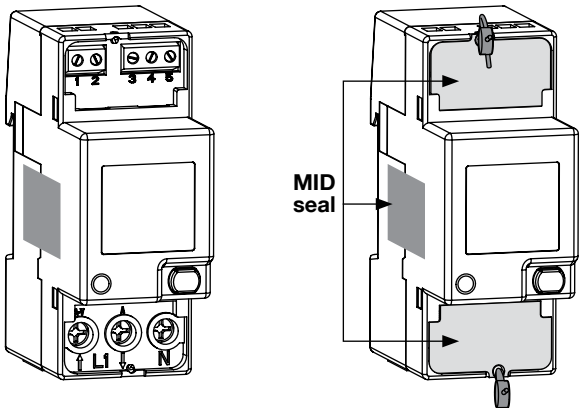
Modbus
3: NC (not connected). May be used for shielding continuity.
4: -
5: +

Network
L1 A-V: Phase input
L': A: 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:

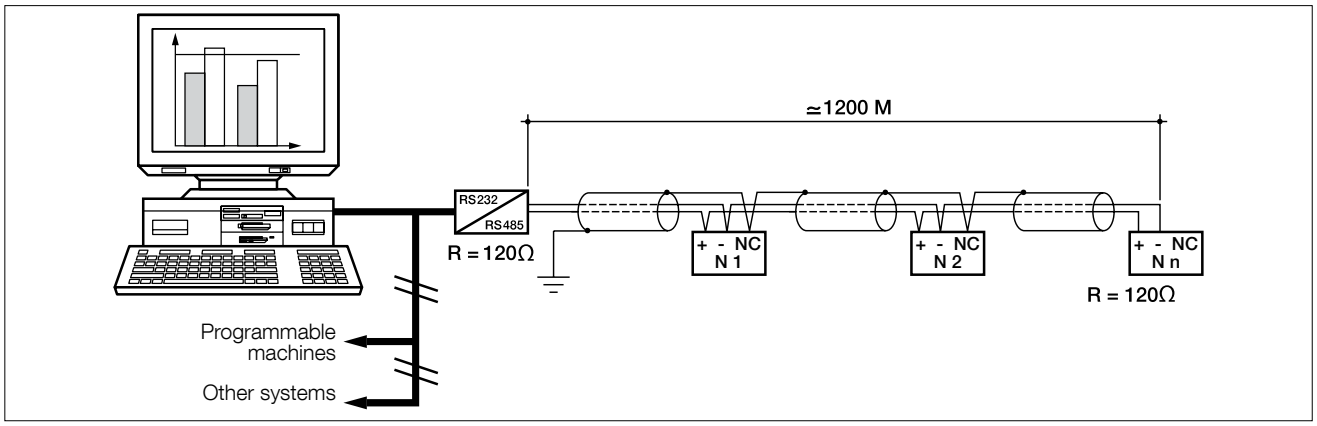
- **Type of network**
  COUNTIS E14 meters comply with the MID directive for connection to networks: 1P+N (see "6.2. Connection to the electrical network and to the loads", page 10)
- **Fitting terminal covers**
  After connecting the device, ensure that the terminal covers are fitted properly and secured 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-e1x

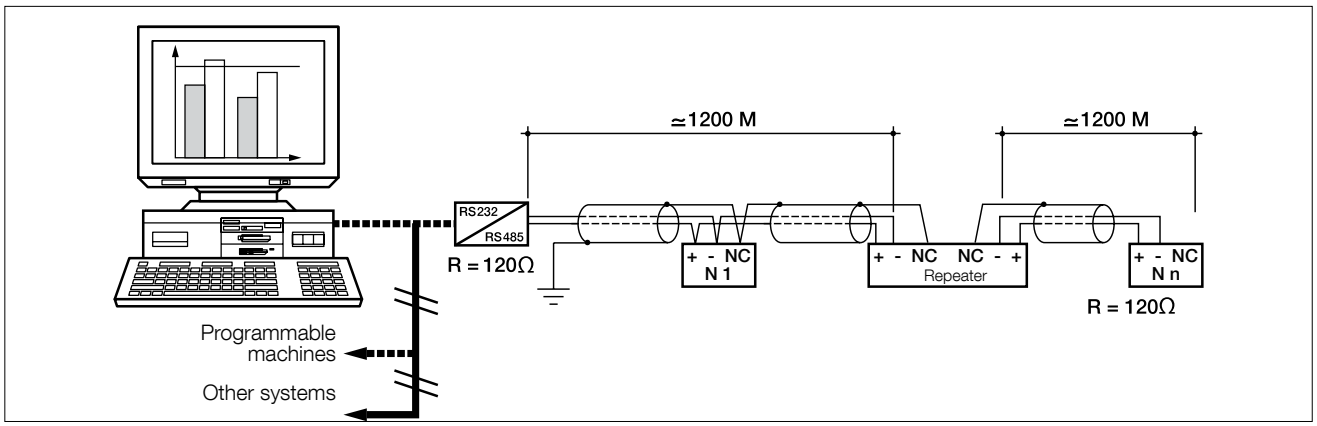


8. COMMUNICATION

8.1. General information

The Modbus communication available on the COUNTIS E13/E14 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 1200 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 E13/E14.
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 <=> 2 bytes <=> 16 bits
2 words <=> 4 bytes <=> 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 E13/E14 documentation page at:
www.socomec.com/en/countis-e1x

9. CONFIGURATION

The device can be configured directly from the COUNTIS E13/E14 screen in programming mode or via the communication link. The paragraphs below describe configuring using the screen.

9.1. Onscreen configuration

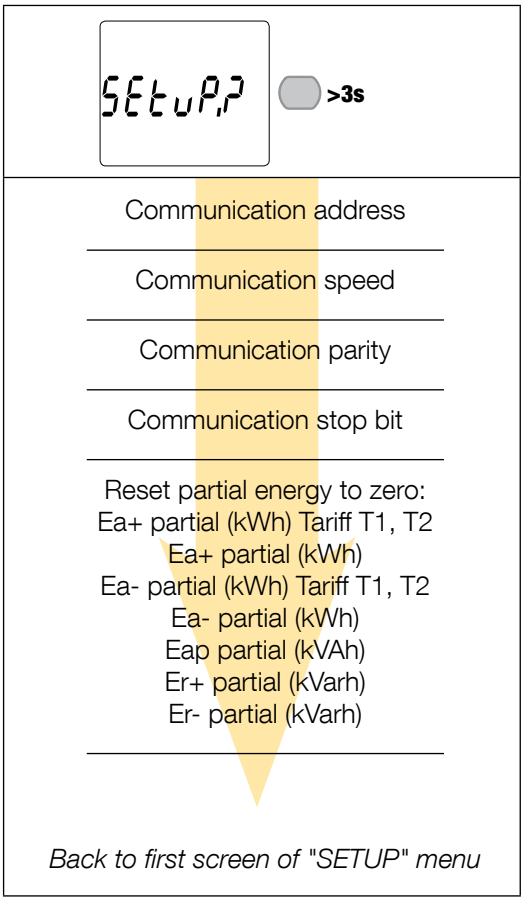
From the screen, go to programming mode to change your communication settings. How to browse through the programming mode is described in the following stages:

Function	Where	Buttons	Press
Switch menus	Every page except SETUP menu		Double speed (x2 < 0.5 sec)
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		realtime
Confirm a value/digit	SETUP pages		Double speed (x2 < 0.5 sec)
Exit SETUP menu	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
Display test	Every page with the exception of SETUP and partial meters		> 10 sec

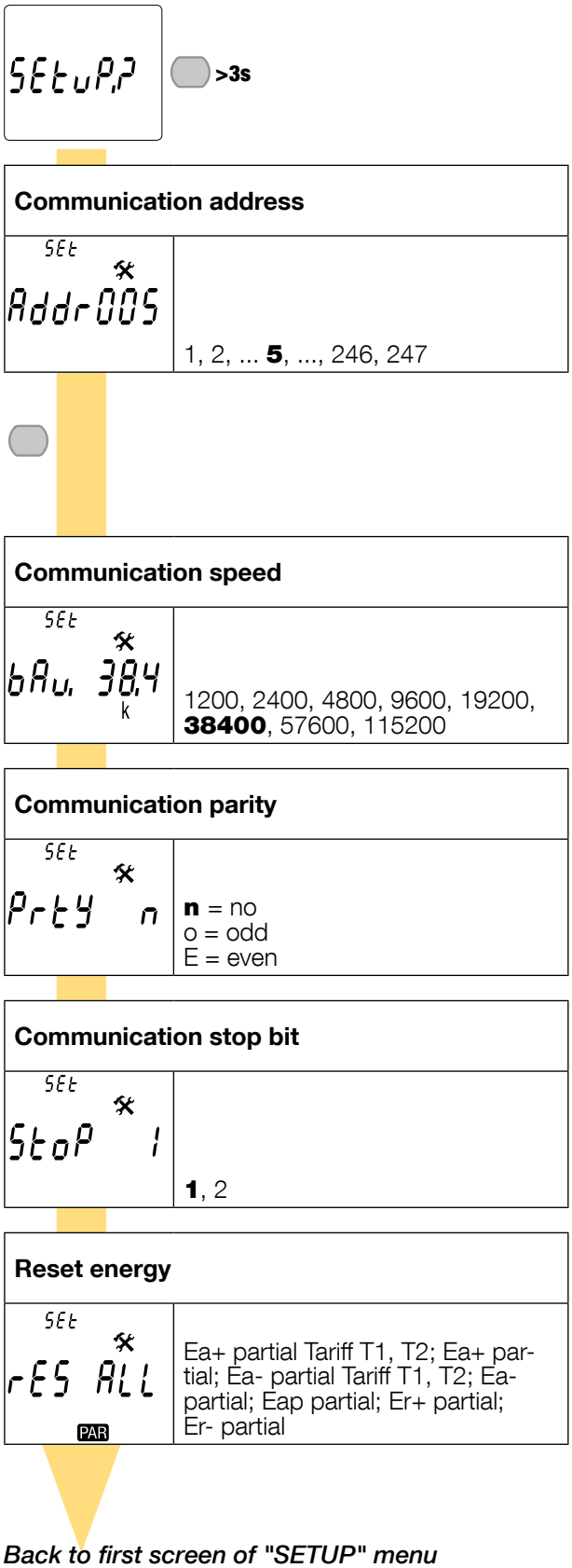
9.1.1. View all of the menu "SETUP"

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

Press " " to go to the different screens:



9.1.2. Detailed view of menu "SETUP"

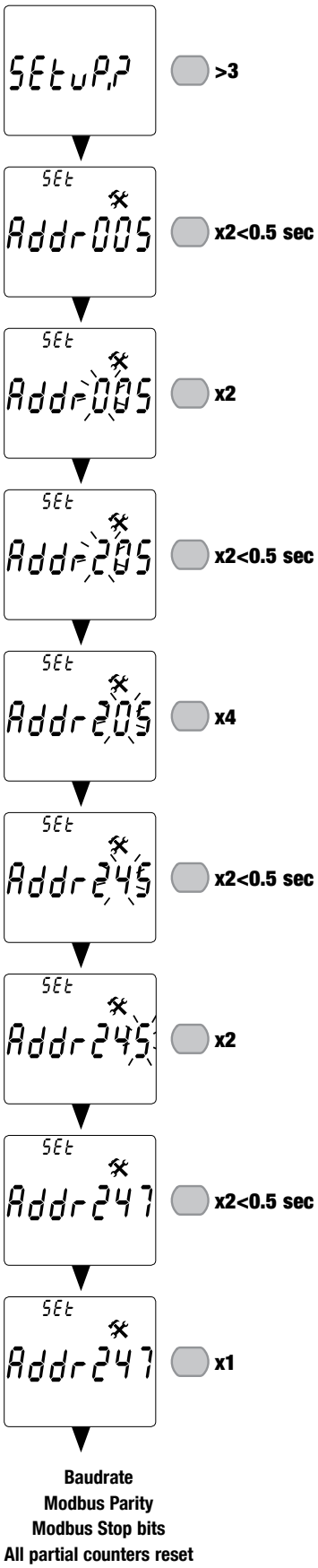


Back to first screen of "SETUP" menu

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

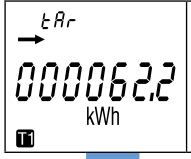
Switch menus by pressing " " twice for at least 0.5 seconds.
Press " " to see the electrical readings or menu information.

The menus and related measurements are described in the table below:

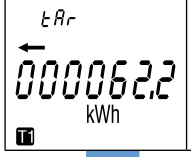
Tariff (Tar.)	Total (tot)	Partial and realtime readings (P. rt)	Information (inFo)
Tariff 1 - Imported and exported active energy	Total imported and exported active energy	Partial imported active energy by tariff	Metrological firmware version
Tariff 1 - Imported and exported reactive energy	Total apparent energy	Partial imported active energy	Non-metrological firmware version
Tariff 2 - Imported and exported active energy	Total imported and exported inductive reactive energy	Partial exported active energy by tariff	Checksum of metrological firmware
Tariff 2 - Imported and exported reactive energy	Total imported and exported capacitive reactive energy	Partial exported active energy	Checksum of non-metrological firmware
	Total imported and exported reactive energy	Partial imported reactive energy	Installed communication port
		Active and reactive power	
		Voltage	
		Current	
		Power factor	
		Frequency	
Back to first screen of "Tar." menu	*Back to first screen of "tot" menu*	*Back to first screen of "P.rt" menu*	*Back to first screen of "InFO" menu*

10.1. Detailed view of the tariff menu, "Tar."

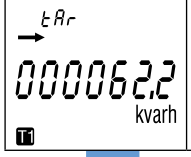
Imported active energy, tariff 1



Exported active energy, tariff 1



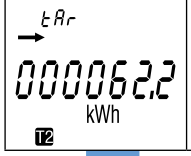
Imported reactive energy, tariff 1



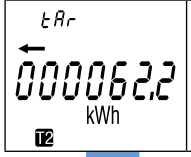
Exported reactive energy, tariff 1



Imported active energy, tariff 2



Exported active energy, tariff 2



Imported reactive energy, tariff 2



Exported reactive energy, tariff 2



Back to first screen of "Tar." menu

10.2. Detailed view of the total menu, "tot"

Total imported active energy



Total exported active energy



Total apparent energy



Total imported inductive reactive energy



Total exported inductive reactive energy



Total imported capacitive reactive energy



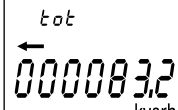
Total exported capacitive reactive energy



Total imported reactive energy



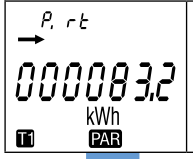
Total exported reactive energy



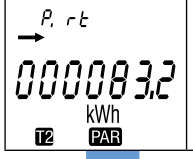
Back to first screen of "tot" menu

10.3. Detailed view of the menu for partial and realtime readings, "P. rt"

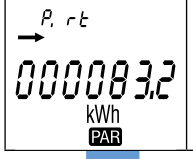
Imported partial active energy for tariff T1



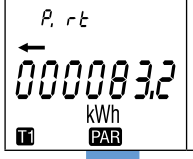
Imported partial active energy for tariff T2



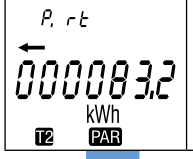
Partial imported active energy



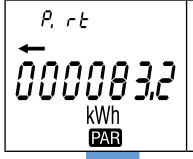
Exported partial active energy for tariff T1



Exported partial active energy for tariff T2



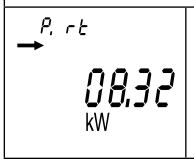
Partial exported active energy



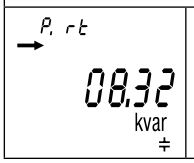
Partial imported reactive energy



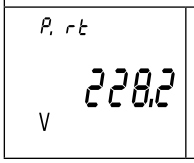
Realtime active power



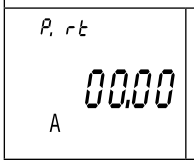
Realtime reactive power



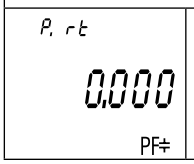
Realtime voltage



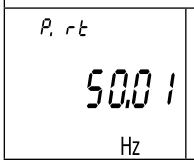
Realtime current



Realtime power factor

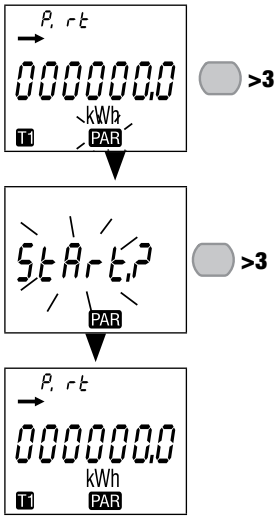


Frequency

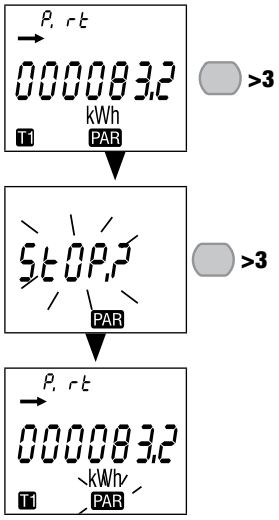


Back to first screen of **"*P. rt*"** menu

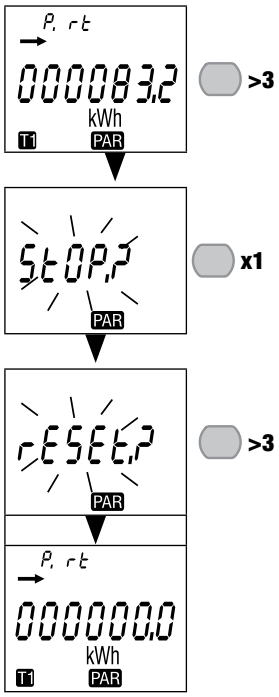
10.3.1. Starting up the partial energy meter



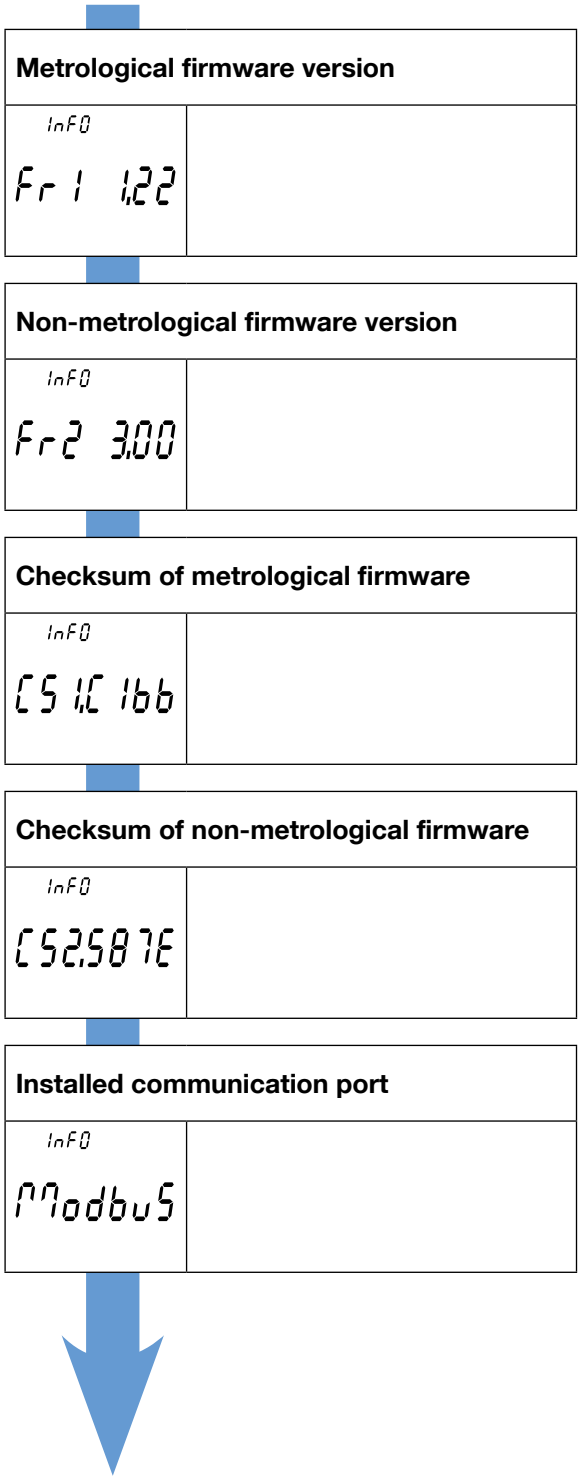
10.3.2. Stopping the partial energy meter



10.3.3. Resetting the partial energy meter to zero



10.4. Detailed view of the menu "info"

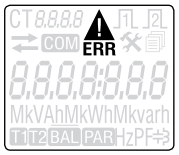


Back to first screen of "info" menu

11. DIAGNOSTICS MESSAGES

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

11.1. Malfunction



- If you see this message, the meter has malfunctioned and must be replaced.

12. ASSISTANCE

Causes	**Solutions**
Device not working	Check the neutral and phase 1 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.)	7.5VA - 0.5W
FEATURES	
Single-phase connectivity	2 wires 230 - 400V
Stores energy readings and settings	In FRAM memory
Identifies display of tariffs	T1 and T2
CURRENT MEASUREMENTS	
Type	Single-phase - direct 80 A
Input consumption	0.5VA
Startup current (Ist)	20mA
Minimum current (Imin)	0.25A
Transition current (Itr)	0.5A
Reference current (Iref)	5A
Permanent overload (Imax)	80A
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	80 A
Realtime current Imax	30 Imax for 1/2 cycle
VOLTAGE MEASUREMENTS	
Range of measurement	230-240V ± 20%
Consumption	7.5VA max
Permanent overload	290V 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) E14 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	1000 pulses / kWh
Colour	Red
PULSE OUTPUT	
Type	Opto-isolated - 5 … 27VDC 27mA according to EN 62053-31
Pulse weight	100 Wh
DISPLAY	
Type	7-digit LCD with backlight
Refresh time	1 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
Apparent energy: 1 display, 7-digit	000000.0 - 999999.9 kVAh
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
Baudrate	1200 / 2400 / 4800 / 9600 / 19200 / 38400 / 57600 / 115200 bps
Insulation	SELV
Load unit	1/8
SAVING	
Energy registers	In FRAM 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 2 modules (DIN 43880) 36 x 90 x 64
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	215 g

GLOSSARY OF ABBREVIATIONS

info	Menu information
Fr1	Metrological firmware version
Fr2	Non-metrological firmware version
CS1.	Checksum of metrological firmware
CS2.	Checksum of non-metrological firmware
tAr.	Tariff menu
tot	Total menu
P. rt	Partial and realtime readings menu
SEtuP.	Setup 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
StoP	Frame stop bit
1	1 stop bit
2	2 stop bits
rESALL	Reset all partial energies
SAVE?	Confirm selection
Y	Save and exit
N	Exit without saving
C	Continue without saving

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