



(GB)

Code	Model
ECSEM456MID	M3PRO 1-5 Modbus MID

Three phase energy meter, with CT connection 1-5A with MID declaration of conformity and Modbus RTU communication.

MID certification concerns active energy only.

User instructions.

Safety instructions

- Read this manual carefully BEFORE installing the instrument.
- This device must be installed indoor only by a professional electrician fitter according to local applicable installation standards.
- Do not plug in or unplug this product when the power supplying is ON. Its use is only permitted within the limits shown and stated in the installation instructions. The device and the equipment connected can be destroyed by loads exceeding the values stated.
- Any type of intervention on the products, including cases in which they cease to function or present defects, can be dangerous for the operator's safety and relieves the Manufacturer from all civil and criminal liability.

Function

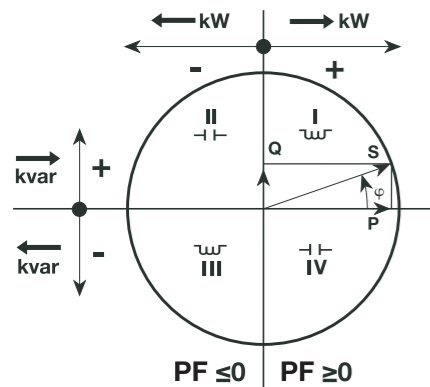
This 4 quadrants Modbus RTU meter measures the active and reactive energy used in an electrical installation. This device can manage 2 tariffs by 230 VAC digital input.

Only the total active energy register can be used for billing purposes according to measuring instrument directive (MID).

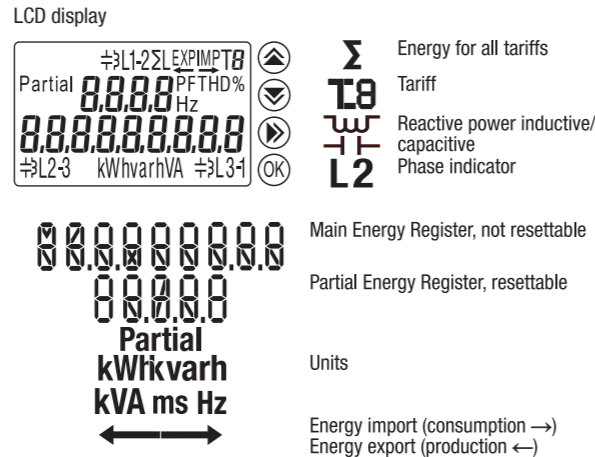
- Active Energy Class B (according to EN 50470-3:2022)
- Active Power Class 1 (according to IEC 62053-21:2020 and IEC 61557-12:2018)
- Reactive Energy Class 2 (according to IEC 62053-23:2020)
- Reactive Power Class 2 (according to IEC 62053-21:2020).

This device has a backlit LCD and 3 push-button keys to read Energies, V, I, PF, F, P, Q and to configure some parameters. The design and manufacture of this meter comply with Standard EN 50470-3:2022 requirements.

Power factor
Convention according to IEC 62053-23:2020

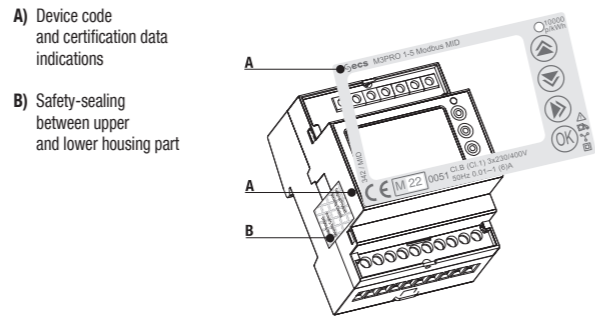


Layout of device

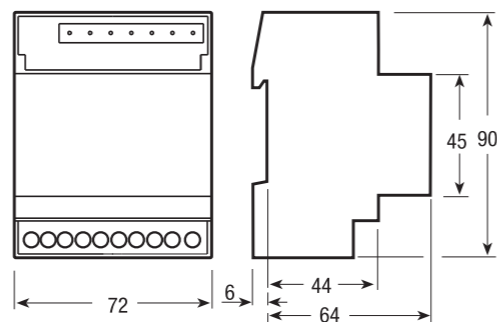


- Commands
- UP button:** to scroll pages and change parameters
 - DOWN button:** to scroll pages and change parameters
 - MENU/ESC button:** to change menu and stop modification procedure of a parameter
 - OK button:** to confirm the modification of a parameter

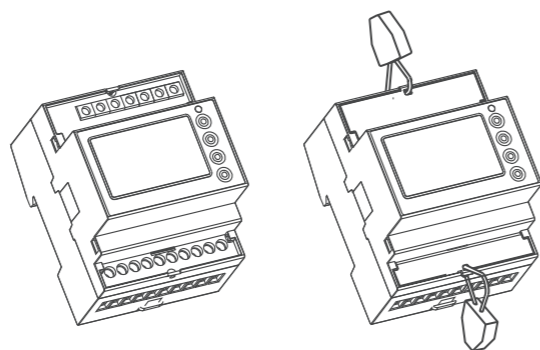
MID certified



Dimensions



Sealable terminal cover

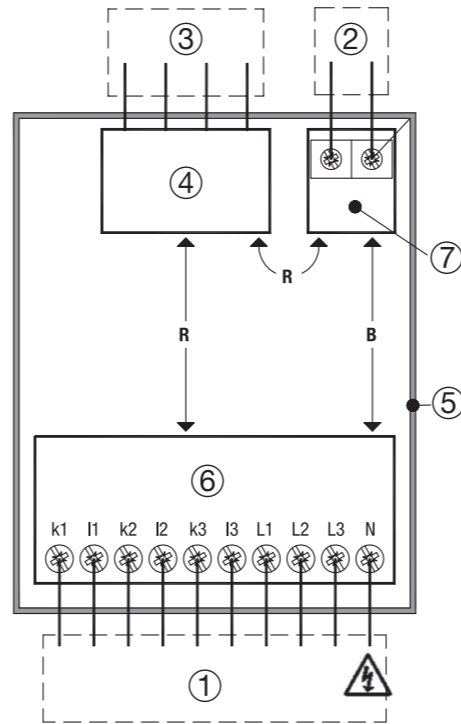


Wiring

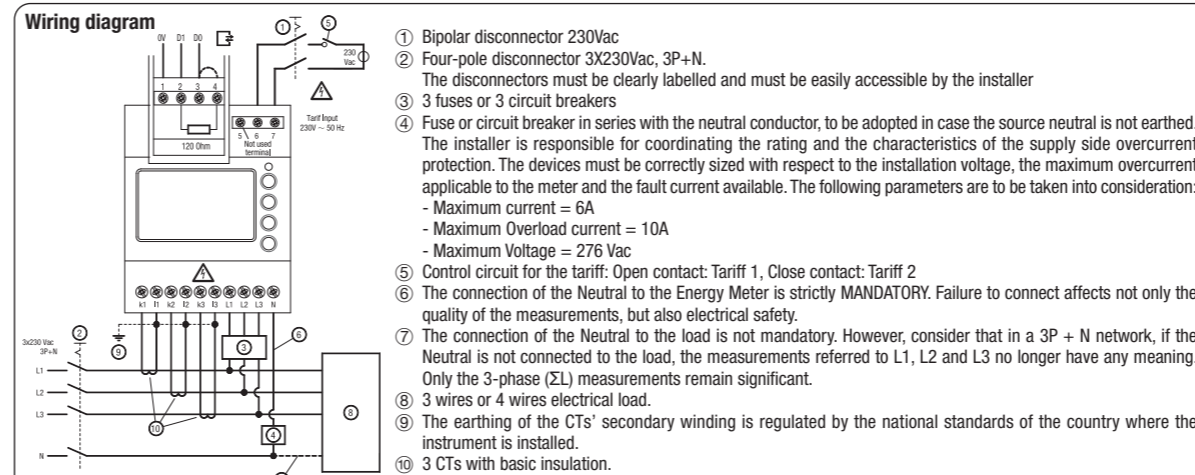
Modbus protocol
The Modbus protocol operates on a master/slave structure:
- Reading
- Writing
The communication method is RTU (Remote Terminal Unit) with hexadecimal.

Important
It is essential to connect a resistance of 120 Ohms at the 2 ends of the connection.

Intended use
The Energy Meter is suitable for use on both impedance grounded networks and not grounded networks.



- There are no accessible parts**
- Legend:
B = Basic insulation
D = Double insulation
R = Reinforced insulation
F = Functional insulation
- ① HLV TERMINAL, 1 terminal for neutral
 - ② HLV TERMINAL, 2 terminal for tariff input
 - ③ SELV TERMINALS, 4 terminals or 2RJ45 connectors
 - ④ SELV CIRCUIT, (communication) working voltage <25 Vac, <60Vdc
 - ⑤ PLASTIC CASE (NOT EARTHED)
 - ⑥ HLV CIRCUIT, (mains) Working Voltage = 300 Vac
 - ⑦ HLV CIRCUIT, (tariff input) working voltage = 300 Vac



Installation and uninstallation

The disconnectors (reference ① and ② in the wiring diagram) must be easy to identify and to operate and must be close to the Meter. They both must be in "OFF" position (open circuits) from the beginning to the end of the installation or of the uninstallation. The Energy Meter, the disconnectors and the overload current protection devices must be easily identifiable, must be installed in an adequate cabinet (IP51 and V1) and it must be easy to intervene on them whenever appropriate. Inside the cabinet, do not install any other device with a flammability class worse than V1.

Commissioning

- Recommendations**
Check the following before putting it into service:
- Make sure that no dangerous voltages are connected to the SELV terminals.
 - Make sure that a phase has not been connected to the Neutral terminal (this would cause the internal protections to intervene with permanent damage to the Meter).
 - Check that the main page appears on the display (see menu description) and not the Phase Sequence Error page.

Maintenance

- Make sure that no voltage is applied to the instrument.
 - Only dry cleaning is allowed with a natural fiber cloth (for example cotton or linen) or synthetic fabric that does not leave residual fibers that can remain on the surface of the Energy Meter or that can penetrate into the Energy Meter.
- For this Energy meter, no maintenance, repair or replacement of parts is foreseen. Such interventions are to be considered prohibited. In case of malfunction, it must be replaced.

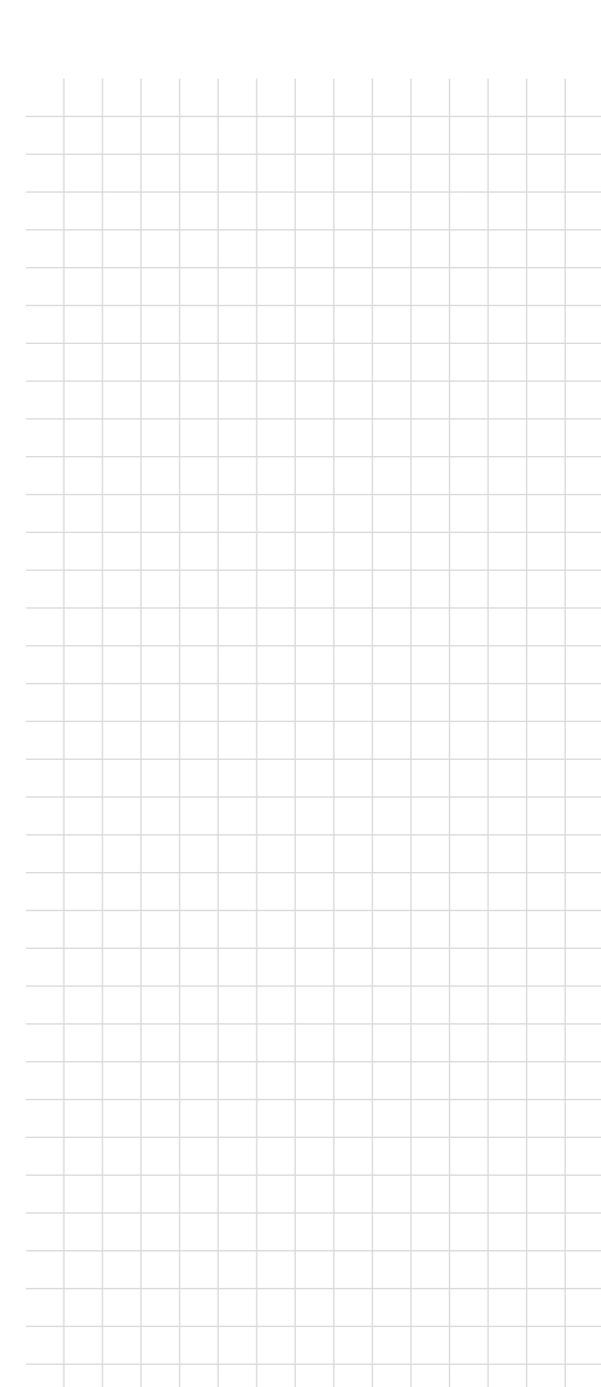
Help in case of problems

Error condition
When partial energy blinks, reset partial energy (maximum partial energy register). When the display shows the message ERROR N02 or ERROR N03, the meter has got a malfunction and must be replaced.

Diagnostic message

The cabling sequence (L1-L2-L3) is wrong. L1, L2 and L3 icons blink. Invert the voltage wires of 2 phases (phase 1 <-> phase 2 or phase 2 <-> phase 3). Otherwise, by pressing the «OK» button for at least 5 seconds, the message disappears until the next restart.

Notes



Cable section. Cable stripping length
Screwdriver type. Maximum terminal screw torque
Adopted cables shall retard flame propagation.
Cables must therefore comply with IEC 60332-1-2:2004 or have a flammability rate UL 2556 VW-1

Note on cable sizing. For the current and voltage connection cables, it is recommended to use multi-strand copper cables with AWG 11 (with a 4.2 mm² section), as they are suitable for I_{max} = 6A and I_{ovl} = 10A. The use of cables with a smaller section falls under the responsibility of the installer, who must, in this case, ensure that the maximum permanent current (I_{max}) and the overload current (I_{ovl}) remain proportionally lower for the entire duration of use. For example, with AWG 14 cable (2.1 mm²) the permanently applied current (I_{max}) cannot exceed 3A and the overload current (I_{ovl}) 5A. The overcurrent protective device must therefore be sized accordingly.

Main Menu

Three Phase Energies List

Main Page

Partial ΣL IMP T1
L1 ΣL IMP T1
L2 2934
L3 793200 156
kWh

Active Imported Energy tariff T1 with partial register

Partial ΣL EXP T1
L1 ΣL EXP T1
L2 647
L3 6 1065
kWh

Active Exported Energy tariff T1 with partial register

Partial ΣL IMP T2
L1 ΣL IMP T2
L2 3528
L3 3208 146
kWh

Active Imported Energy tariff T2 with partial register

Partial ΣL EXP T2
L1 ΣL EXP T2
L2 1986
L3 532608 74
kWh

Active Exported Energy tariff T2 with partial register

Σ IMP T1
3367 124
k varh

Reactive Imported Energy tariff T1

Σ EXP T1
27600983
k varh

Reactive Exported Energy tariff T1

Σ IMP T2
3245 105.76
k varh

Reactive Imported Energy tariff T2

Σ EXP T2
9250.16
k varh

Reactive Exported Energy tariff T2

Selection Menu

By Pushing from Any page of Main Menu

ΣL
E n E r G I E S

Three Phase Energies List

L1
E n E r G I E S

Phase 1 Energies List

L2
E n E r G I E S

Phase 2 Energies List

L3
E n E r G I E S

Phase 3 Energies List

ΣL
I n S t n E R S U r E S

Three Phase Instantaneous measures active power, reactive power, apparent power, frequency, neutral current

L1 L2 L3
I n S t n E R S U r E S

Phase L1, L2 & L3 Instantaneous measures active power L1, active power L2, active power L3, reactive power L1, reactive power L2, reactive power L3, apparent powers, line voltages, system voltage, phase current, power factors, voltage THDs, currents THDs

CONFURE

Parameters List (Read and/or Modify)

Partial E n r G r E S E T

Partial Energies Reset Procedure

CHS 626EH

Firmware checksum

S n 6574

Serial Number (page required by MID directive)

YEAR 2023

Year of manufacturing (page required by MID directive)

TYPE n n E T E r

Instrument type (page required by MID directive)

VER 104

Firmware version

Partial 8888 PF THD %
8888888888

Display test

Password

In Configure Menu it is possible to protect the access to sub-menus of Selection Menu by a password.

OFF P A S S W O R D

Once request, to enter the password user must push both UP button and DOWN button at the same time for 4 seconds

Entr P A S S W O R D

Parameters in models with Modbus on-board

• Modbus Address
Selectable in the range 1 ... 247.
• The default address is 1.

Addr 138

• Modbus Baud rate
Available Baud Rates are: 1200, 2400, 4800, 9600, 19200, 38400 and 57600
• The default baud rate is 19200.

Baud Rate 9600

• Modbus Parity.
Available Parity are None, Even and Odd
• The default Parity is None.

Parity None

• Modbus Number of Stop Bits (1 or 2).
• The default number of Stop Bits is 1

Stop Bits 2

• Password Enabled/Disabled

OFF P A S S W O R D

Parameters List

External CT related parameters

External CT Primary nominal current

- ..5A: configurable between 5 A to 10000 A with step 5 A
- ..1A: configurable between 1 A to 2000 A with step 1 A
- The default value is 5 A

External CT Secondary nominal current

- ..1A or ..5A
- The default value is -5

• Password Enabled/Disabled

OFF P A S S W O R D

In order to read values referred to Secondary side of CTs, push the ESCAPE button for a long time (10 seconds), in the Main Page. For two minutes (120 seconds), the whole set of parameters are displayed with their values referred to Secondary side of CTs, with the CT icon blinking. Also values transmitted through internal bus are referred to Secondary side for 2 minutes

T2 3465 18097
27703 kWh
Partial

T2 1732590
1385 kWh
Partial

10 sec.

Technical data

Data in compliance with EN 62052-11:2021+A11:2022, EN 62052-31:2016-06, EN 50470-3:2022

General characteristics			
Housing	DIN 43880	DIN	4
Mounting	EN 60715	DIN rail	35 mm
Depth		mm	60
Weight		g	293
Operating features			
Connection	to three-phase network - number of wires		4
Storage of energy values and configuration	Internal flash non volatile memory		✓
Tariff	for active and reactive energy		T1 ... T2 230V
Approval (EN 50470-3:2022)			
Connection			CT /5A - CT /1A
Reference Voltage (Un)	phase / neutral	VAC	230
	phase / phase	VAC	400
Nominal Current (In)		A	1
Minimum Current (Imin)		A	0.01
Maximum Current (Imax)		A	6
Starting Current (Ist)		A	0.002
External CT	max. CT ratio		10000/5 2000/1
Reference Frequency (fn)		Hz	50
Number of phases / number of wires			3 / 4
Certified Measures		kWh	→ kWh ← kWh
Accuracy			
- Active Energies (accord. to EN 50470-3:2022)		classe	B / 1
- Active Powers (accord. to IEC 62053-21:2020 and IEC 61557-12:2018)		classe	2
- Reactive Energies (accord. to IEC 62053-23:2020)			
- Reactive Power (accord. to IEC 62053-21:2020)			
Supply Voltage and Power Consumption			
Operating Supply Voltage range		V	92 ... 276 / 160 ... 480
Maximum Power Consumption (Voltage circuit)		VA / W	≤2 / 0.6
Maximum VA burden (Current circuit) @ Imax		VA	≤0.2
Voltage Input Waveform			AC
Voltage impedance		MΩ	1
Current impedance		MΩ	≤20
Overload capability			
Voltage	continuous	phase / neutral	VAC 276
	temporary (1 s)	phase / neutral	VAC 300
	continuous	phase / phase	VAC 480
	temporary (1 s)	phase / phase	VAC 800
	Maximum		A 6
	temporary (0.5 ms)		A 120
Current			
Measuring Features			
Voltage range	phase / neutral	VAC	92 ... 276
	phase / phase	VAC	160 ... 480
Current range		A	0.001 ... 6
Frequency range		Hz	45 ... 65
Measured Quantities			V, A, kWh, kvarh, PF, Hz, kW, kvar
3 phases Energy calculation			WELMEC
Display features			
Display type	LCD with backlight		7.2 +3.2
Active Energy	7 digits + 2 decimal digits	kWh	0.01 ... 99999999.9
Reactive Energy	7 digits + 2 decimal digits	kvarh	0.01 ... 99999999.9
Voltage	3 digits + 1 decimal digit	V	92.0 ... 276.0
Current	2 digits + 2 decimal digits / 3+1 / 4+0	A	0.01 ... 6000
Power factor	1 digit + 3 decimal digits with sign + capac./induc. indic.		-1.000 ... 1.000
Frequency	2 digits + 2 decimal digits	Hz	45.00 ... 65.00
Active Power	2 digits + 2 decimal digits	kW	0.00 ... 1987
Reactive Power	2 digits + 2 decimal digits	kvar	0.00 ... 1987
Apparent Power	2 digits + 2 decimal digits	kVA	0.00 ... 1987
Display refresh period		s	1
Optical metrological LED			
Front mounted red LED (meter constant)	proportional to active imp/exp Energy	imp/kWh	10000
Safety			
Utilization category			UC1
Overvoltage category			3
Protective class		classe	II
AC voltage test (EN 50470-3:2022)		kV	4
Degree of pollution			2
Operational voltage		V	300
Impulse voltage test (Uimp)		1.2/50	6.4
Housing material flame resistance		UL 94	classe V0
Safety-sealing between upper and lower housing part			✓
Printed circuit board flammability class			V1
Material Group			IIIa
IR Connectable Communication Modules			
For communication modules			✓
Embedded Modbus communication			
Physical interface	RS-485 - 3 wires		-, +, 0
Internal termination resistor			120 Ω
Baud rate	adjustable	bps	1200 ... 57600
Parity	adjustable: Odd, Even, None		✓
Stop Bit	adjustable		1, 2
Address	adjustable		1 ... 247
Isolation class	SELV		c
Tariff			
Tariff 1			✓
Tariff 2		VAC	230 ±20%
Input impedance		kΩ	224
Environmental conditions			
Storage temperature range		°C	-25 ... +70
Operating temperature range		°C	-25 ... +55
Mechanical environment			M1
Electromagnetic environment			E2
Installation	indoor only		✓
Altitude (max.)		m	≤2000
Humidity	yearly average, without condensation		≤75%
	on 30 days per year, without condensation		≤95%
	in built-in condition (front part)		IP51
	terminal block		IP20
IP rating			
Emission class compatibility CISPR 32		classe	B