



(GB)

Code	Model
ECSEM454MID	M3PRO 1-5 MID

Three phase energy meter, measure via CT 1 to 10000 A with MID declaration of conformity and 2 pulse (SO) outputs.

MID certification concerns active energy only.

User instruction.

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

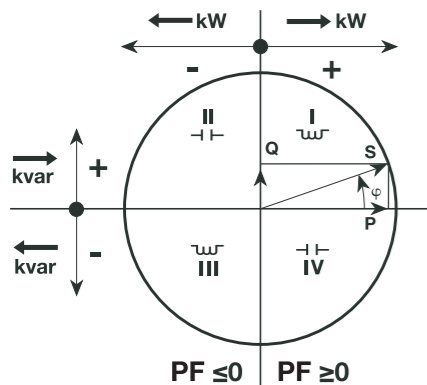
Only the total active energy register can be used for billing purposes according to measuring instrument directive (MID).

- 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



LCD display



Main Energy Register, not resettable

Partial Energy Register, resettable

Partial
kWhkvarh
kVA ms Hz

Units

Energy import (consumption →)
Energy export (production ←)

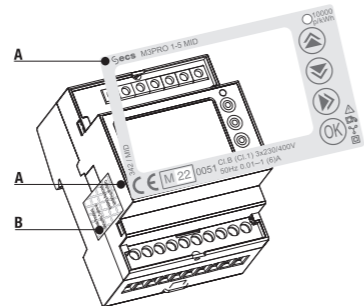
Commands

- 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

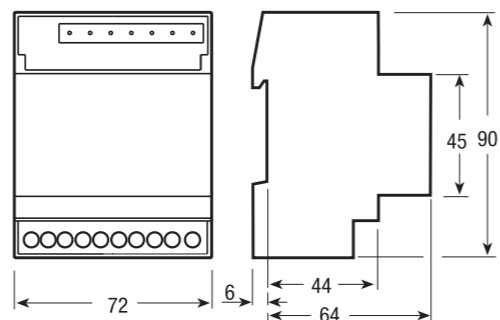
MID certified

A) Device code and certification data indications

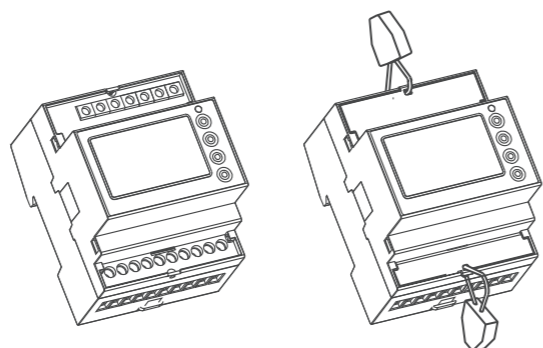
B) Safety-sealing between upper and lower housing part



Dimensions



Sealable terminal cover

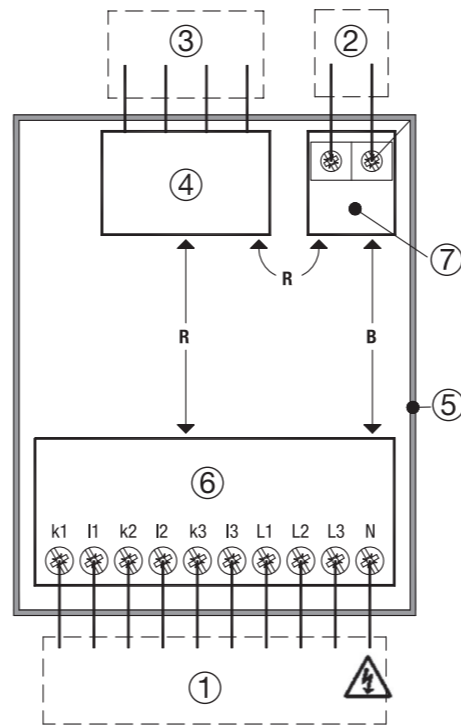


Wiring



Intended use

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



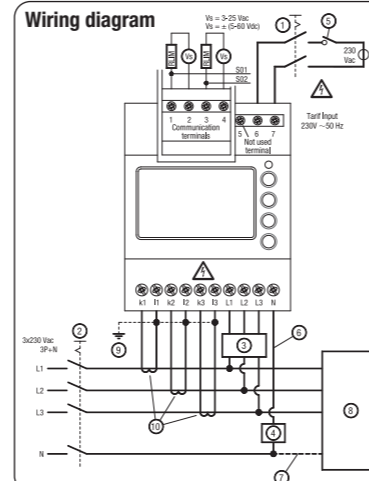
There are no accessible parts

Legend:

- B = Basic insulation
- D = Double insulation
- R = Reinforced insulation
- F = Functional insulation

- HLV TERMINAL, 1 terminal for neutral
- HLV TERMINAL, 2 terminal for tariff input
- SELV TERMINALS, 4 terminals or 2RJ45 connectors
- SELV CIRCUIT, (communication) working voltage <25 Vac, <60Vdc
- PLASTIC CASE (NOT EARTHED)
- HLV CIRCUIT, (mains) Working Voltage = 300 Vac
- HLV CIRCUIT, (tariff input) working voltage = 300 Vac

Wiring diagram



- Bipolar disconnector 230Vac
- Four-pole disconnector 3X230Vac, 3P+N. The disconnectors must be clearly labelled and must be easily accessible by the installer
- 3 fuses or 3 circuit breakers
- Fuse or circuit breaker in series with the neutral conductor, to be adopted in case the source neutral is not earthed. The installer is responsible for coordinating the rating and the characteristics of the supply side overcurrent protection. The devices must be correctly sized with respect to the installation voltage, the maximum overcurrent applicable to the meter and the fault current available. The following parameters are to be taken into consideration:
 - Maximum current = 6A
 - Maximum Overload current = 10A
 - Maximum Voltage = 276 Vac
- Control circuit for the tariff: Open contact: Tariff 1, Close contact: Tariff 2
- The connection of the Neutral to the Energy Meter is strictly MANDATORY. Failure to connect affects not only the quality of the measurements, but also electrical safety.
- The connection of the Neutral to the load is not mandatory. However, consider that in a 3P + N network, if the Neutral is not connected to the load, the measurements referred to L1, L2 and L3 no longer have any meaning. Only the 3-phase (ΣL) measurements remain significant.
- 3 wires or 4 wires electrical load.
- The earthing of the CTs' secondary winding is regulated by the national standards of the country where the instrument is installed.
- 3 CTs with basic insulation.

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.

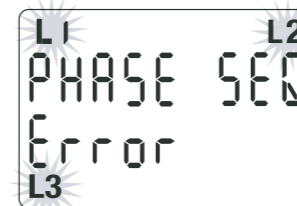
Help in case of problems



Error condition

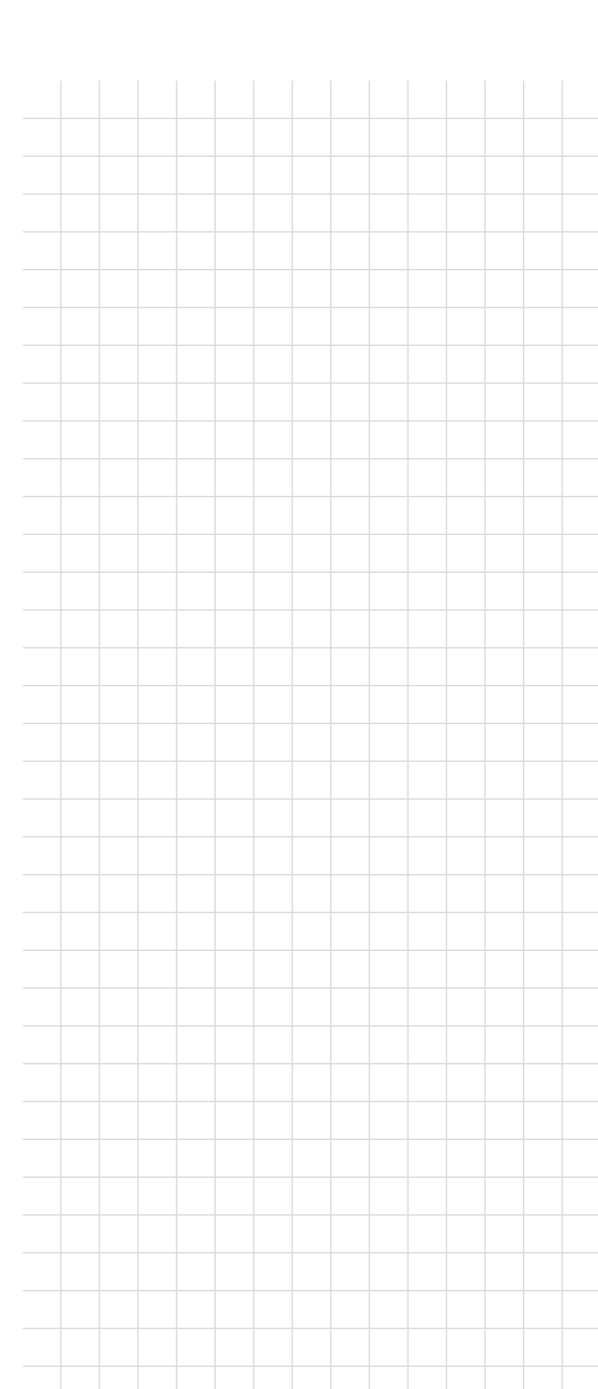
When partial energy blinks, reset partial energy (maximum partial energy register). When the display shows the message ERROR N02 or ERROR N03, the meter has got a malfunction and must be replaced.

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.

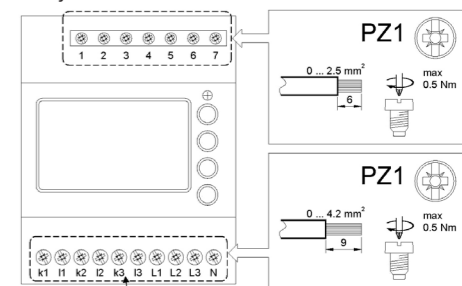
Notes



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_{ov} = 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_{ov}) 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_{ov}) 5A. The overcurrent protective device must therefore be sized accordingly.

Main Menu

Three Phase Energies List

Main Page

Partial ΣL IMP T1

793200 156

L2 kWh

Active Imported Energy tariff T1 with partial register

Partial ΣL EXP T1

647 61065

L2 kWh

Active Exported Energy tariff T1 with partial register

Partial ΣL IMP T2

3528 3208 146

L2 kWh

Active Imported Energy tariff T2 with partial register

Partial ΣL EXP T2

1986 53260874

L2 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

EnErgIES

(*) OK

Three Phase Energies List

L1

EnErgIES

(*) OK

Phase 1 Energies List

L2

EnErgIES

(*) OK

Phase 2 Energies List

L3

EnErgIES

(*) OK

Phase 3 Energies List

ΣL

InSt nEASUR ES

(*) OK

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

L1 L2 L3

InSt nEASUR ES

(*) OK

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

(*) OK

Parameters List (Read and/or Modify)

Partial EnErg rESEt

(*) OK

Partial Energies Reset Procedure

CHS 626CH

Firmware checksum

Sn 6574

Serial Number (page required by MID directive)

YEAR 2023

Year of manufacturing (page required by MID directive)

TYPE nEETEr kWh

Instrument type (page required by MID directive)

VER. 104

Firmware version

Partial 8888 Hz

88888888

88888888

88888888

Display test

Password

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

OFF PASSWORD

Password can be enabled (ON password) or disabled (OFF password), the default value is OFF

Entr PASSWORD

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

Parameters in S0 models

PLS 250 kWh

Pulses per kWh

- 1 ... 10000 depending on CT ratio
- The default value is 5000

PLS 80 tLEn

Pulse time length

- Duration of ON pulse for S0 outputs: 30 to 100 ms.
- The default is 100 ms

PLS In - Out

S0 outputs configuration mode

- In - Out
- S01 proportional to Imported Active Power
- S02 proportional to Exported Active Power

OFF PASSWORD

• Password Enabled/Disabled

Parameters List

External CT related parameters

Pr Ct -5

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

SEt Ct -5

External CT Secondary nominal current

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

OFF PASSWORD

• Password Enabled/Disabled

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

←

10 sec.

T2 →

1732590

1385 kWh

Partial

Technical data

Data in compliance with EN 62052-11:2021+A11:2022, EN 62052-31:2016-06, EN 50470-3:2022, EN 62059-32-1:2012			
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
		A	1
		A	0.01
		A	6
		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)			
- Reactive Energies (accord. to IEC 62053-23:2020)		classe	2
- 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
		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			IIla
IR Connectable Communication Modules			
For communication modules			✓
Pulse Outputs (S0 signals)			
acc. to IEC 62053-3			
Pulse Output 1	adjustable		kWh (T1) →, kWh →, kWh →
Pulse Output 2	adjustable		kWh (T2) →, kWh ←, kvarh →
Pulse Rate	adjustable	p/kWh	1 ... N (*)
			(*) N - dep. on CT-ratio and Pulse on Time
Pulse ON-time	adjustable	ms	30 ... 100
Pulse ON maximum current		mA	90
Pulse OFF leakage current		µA	1
Isolation class			SELV circuit
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