



(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 (S0) 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

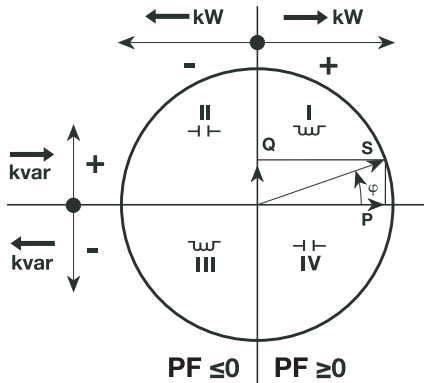
This 4 quadrants meter measures the active and reactive energy used in an electrical installation. This device can manage 2 tariffs by 230 VAC digital input.

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).

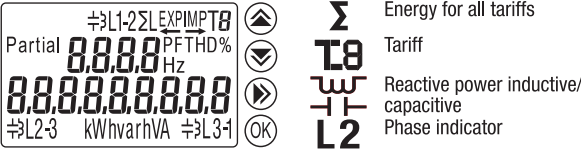
This device has a backlit LCD and 3 push-button keys to read Energies, V, I, PF, F, P, Q and to configure some parameters. The design and manufacture of this meter comply with Standard EN 50470-3:2022 requirements.

**Power factor**  
Convention according to IEC 62053-23:2020



## Layout of device

LCD display



Main Energy Register, not resettable

Partial Energy Register, resettable



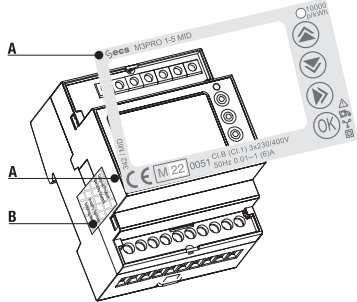
Commands

- 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

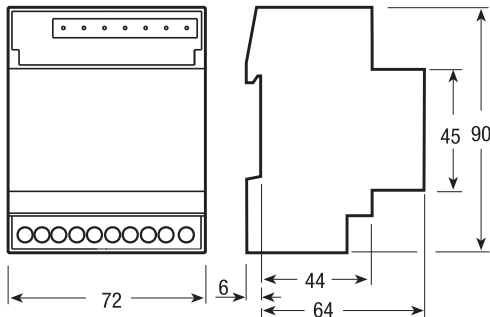
## MID certified

A) Device code and certification data indications

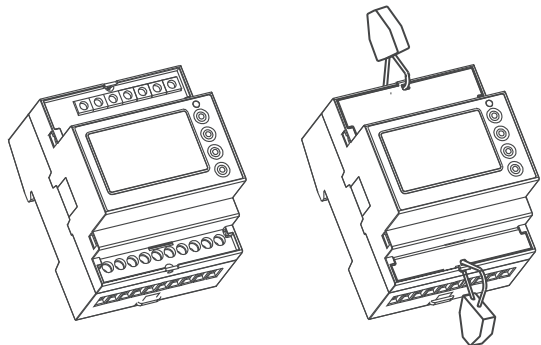
B) Safety-sealing between upper and lower housing part



## Dimensions



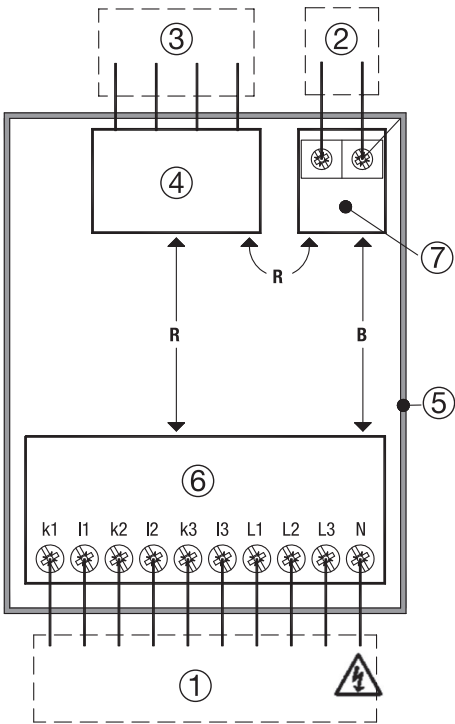
## Sealable terminal cover



## Wiring

### Intended use

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



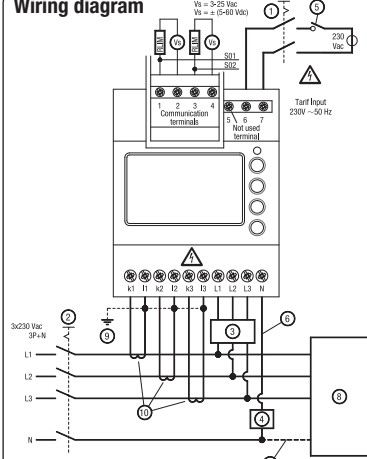
### There are no accessible parts

Legend:

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

- 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

### Wiring diagram



- ① Bipolar disconnector 230Vac
- ② Four-pole disconnector 3X230Vac, 3P+N. The disconnectors must be clearly labelled and must be easily accessible by the installer
- ③ 3 fuses or 3 circuit breakers
- ④ 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
- ⑤ Control circuit for the tariff: Open contact: Tariff 1, Close contact: Tariff 2
- ⑥ 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.
- ⑦ 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 ( $\Sigma L$ ) measurements remain significant.
- ⑧ 3 wires or 4 wires electrical load.
- ⑨ The earthing of the CTs' secondary winding is regulated by the national standards of the country where the instrument is installed.
- ⑩ 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

- 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.

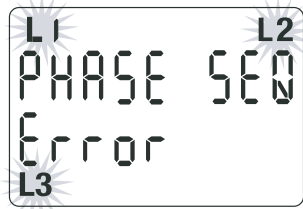
- For this Energy meter, no maintenance, repair or replacement of parts is foreseen. Such interventions are to be considered prohibited. In case of malfunction, it must be replaced.

## 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.

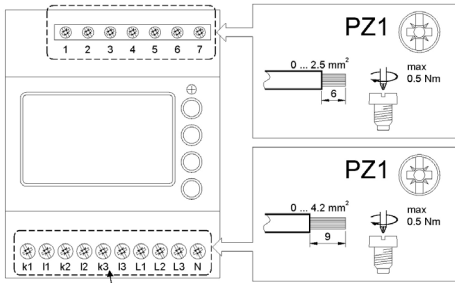
## Notes

### 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 mm<sup>2</sup> section), as they are suitable for I<sub>max</sub> = 6A and I<sub>ovl</sub> = 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<sub>max</sub>) and the overload current (I<sub>ovl</sub>) remain proportionally lower for the entire duration of use. For example, with AWG 14 cable (2.1 mm<sup>2</sup>) the permanently applied current (I<sub>max</sub>) cannot exceed 3A and the overload current (I<sub>ovl</sub>) 5A. The overcurrent protective device must therefore be sized accordingly.

General Menu

Main Menu

Three Phase Energies List

Main Page

Partial  $\Sigma$ L1  $\Sigma$ L2  $\Sigma$ L3 IMP T1

793200.156 kWh

Active Imported Energy tariff T1 with partial register

Partial  $\Sigma$ EXP T1

6.47 kWh

Active Exported Energy tariff T1 with partial register

Partial  $\Sigma$ L1  $\Sigma$ L2  $\Sigma$ L3 IMP T2

3528.3208 kWh

Active Imported Energy tariff T2 with partial register

Partial  $\Sigma$ EXP T2

1986.5326 kWh

Active Exported Energy tariff T2 with partial register

$\Sigma$  IMP T1

3367.124 k varh

Reactive Imported Energy tariff T1

$\Sigma$ EXP T1

27600983 k varh

Reactive Exported Energy tariff T1

$\Sigma$ L1  $\Sigma$ L2  $\Sigma$ L3 IMP T2

3245.105.76 k varh


Reactive Imported Energy tariff T2

$\Sigma$ EXP T2

9250.16 k varh

Reactive Exported Energy tariff T2

Selection Menu

By Pushing  from Any page of Main Menu

$\Sigma$ L

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

$\Sigma$ L

InSt nERStRES

(\*) OK → Three Phase Instantaneous measures active power, reactive power, apparent power, frequency, neutral current

L1

InSt nERStRES

(\*) 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

Partial EnErGIES

RESET

(\*) OK → Partial Energies Reset Procedure

CHS

626CH

Firmware checksum

S.N.

6574

Serial Number (page required by MID directive)

YEAR

2023

Year of manufacturing (page required by MID directive)

TYPE

PHETEr

Instrument type (page required by MID directive)

VER.

104

Firmware version

Partial  $\pm$ 1-2  $\Sigma$ L1  $\Sigma$ EXP T1  $\pm$ 1-2  $\Sigma$ L2  $\Sigma$ EXP T2  $\pm$ 1-2  $\Sigma$ L3  $\Sigma$ IMP T1  $\pm$ 1-2  $\Sigma$ L3  $\Sigma$ IMP T2  $\pm$ 1-2  $\Sigma$ L3  $\Sigma$ EXP T1  $\pm$ 1-2  $\Sigma$ L3  $\Sigma$ EXP T2

8888 Hz

888888888

Display test

Password

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

OFF

PASSWDOrd

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

Enter

PASSWDOrd

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

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 ouputs configuration mode

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

Act-React

S01 proportional to Imported Active Power

S02 proportional to Imported Reactive Power

TAR1-TAR2

S01 proportional to Imported Active Power under T1

S02 proportional to Imported Active Power under T2

OFF

PASSWDOrd

Password Enabled/Disabled

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

Pr  $\Sigma$ t -5

External CT Secondary nominal current

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

SEC  $\Sigma$ t -5

Password Enabled/Disabled

OFF

PASSWDOrd

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  $\rightarrow$


3465.18097 kWh


Partial

T2  $\rightarrow$

1732590 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, 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                          | -               | <input checked="" type="checkbox"/>        |
| 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)  |   |                 |  |
| - 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                                    |
| Current   | Maximum   | A               | 6  |
|   | temporary (0.5 ms)  | A               | 120  |
| 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   |   | -               | <input checked="" type="checkbox"/>        |
| Printed circuit board flammability class  |   | -               | V1   |
| Material Group  |   | -               | IIa  |
| IR Connectable Communication Modules  |   |                 |  |
| For communication modules   |   | -               | <input checked="" type="checkbox"/>        |
| 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  |   | -               | <input checked="" type="checkbox"/>        |
| 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   | -               | <input checked="" type="checkbox"/>        |
| Altitude (max.)   |   | m               | ≤2000                                      |
| Humidity  | yearly average, without condensation                        | -               | ≤75%                                       |
|   | on 30 days per year, without condensation                   | -               | ≤95%                                       |
| IP rating   | in built-in condition (front part)                          | -               | IP51                                       |
|   | terminal block  | -               | IP20                                       |
| Emission class compatibility CISPR 32   |   | classe          | B  |





General Menu

Main Menu

Three Phase Energies List

Main Page

Partial  $\Sigma$ L1  $\Sigma$ L2  $\Sigma$ L3  $\Sigma$ IMP T1

793200.156 kWh

Partial  $\Sigma$ EXP T1

647.6 kWh

Partial  $\Sigma$ L1  $\Sigma$ L2  $\Sigma$ L3  $\Sigma$ IMP T2

3528.3208 kWh

Partial  $\Sigma$ EXP T2

1986.5326 kWh

$\Sigma$ IMP T1

3367.124 k varh

$\Sigma$ EXP T1

27600983 k varh

$\Sigma$ L1  $\Sigma$ L2  $\Sigma$ L3  $\Sigma$ IMP T2

3245.105.76 k varh

$\Sigma$ EXP T2

9250.16 k varh

Active Imported Energy tariff T1 with partial register

Active Exported Energy tariff T1 with partial register

Active Imported Energy tariff T2 with partial register

Active Exported Energy tariff T2 with partial register


Reactive Imported Energy tariff T1

Reactive Exported Energy tariff T1

Reactive Imported Energy tariff T2

Reactive Exported Energy tariff T2

Selection Menu

By Pushing  from Any page of Main Menu

$\Sigma$ L

$\Sigma$ L

ENERGIES

Three Phase Energies List

L1

L1

ENERGIES

Phase 1 Energies List

L2

L2

ENERGIES

Phase 2 Energies List

L3

L3

ENERGIES

Phase 3 Energies List

$\Sigma$ L

$\Sigma$ L

Instant ENERGIES

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

L1

L1

Instant ENERGIES

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

Partial  $\Sigma$ L1  $\Sigma$ L2  $\Sigma$ L3  $\Sigma$ IMP T1

ENERGIES

Parameters List (Read and/or Modify)

Partial  $\Sigma$ EXP T1

ENERGIES

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

meter

Instrument type (page required by MID directive)

VER.

104

Firmware version

Partial  $\Sigma$ L1  $\Sigma$ L2  $\Sigma$ L3  $\Sigma$ IMP T1  $\Sigma$ EXP T1  $\Sigma$ L1  $\Sigma$ L2  $\Sigma$ L3  $\Sigma$ IMP T2  $\Sigma$ EXP T2

8888888888 Hz

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

Enter

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 models with Modbus on-board

Addr

138

Modbus Address Selectable in the range 1 ... 247.

The default address is 1.

Baud

Rate

9600

Modbus Baud rate Available Baud Rates are: 1200, 2400, 4800, 9600, 19200, 38400 and 57600

The default baud rate is 19200.

Parity

Even

Modbus Parity. Available Parity are None, Even and Odd

The default Parity is None.

Stop

bits

Modbus Number of Stops Bits (1 or 2).

The default number of Stop Bits is 1

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

Sec

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 kWh

Partial

T2

1732590 kWh

Partial

10 sec.

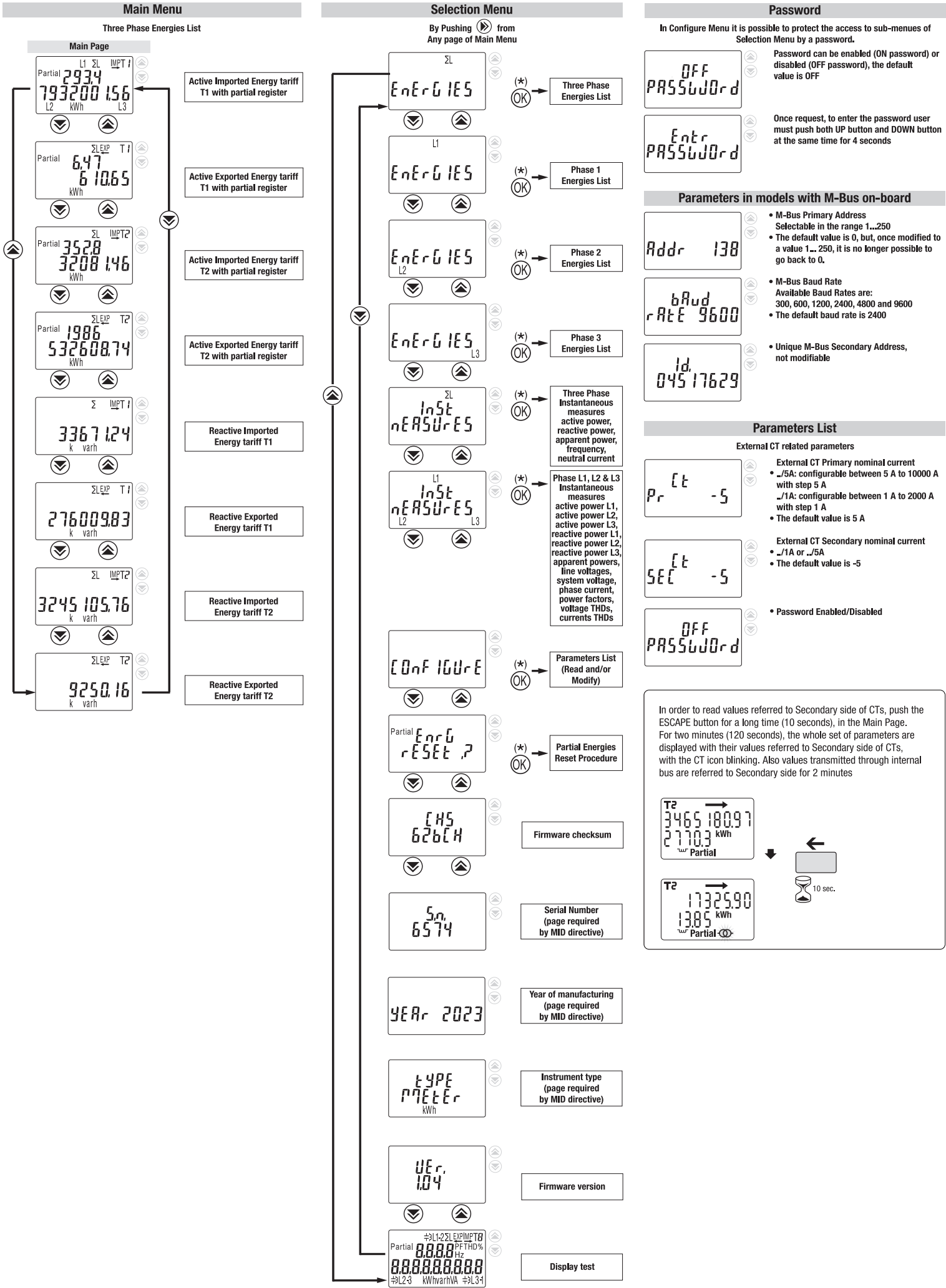
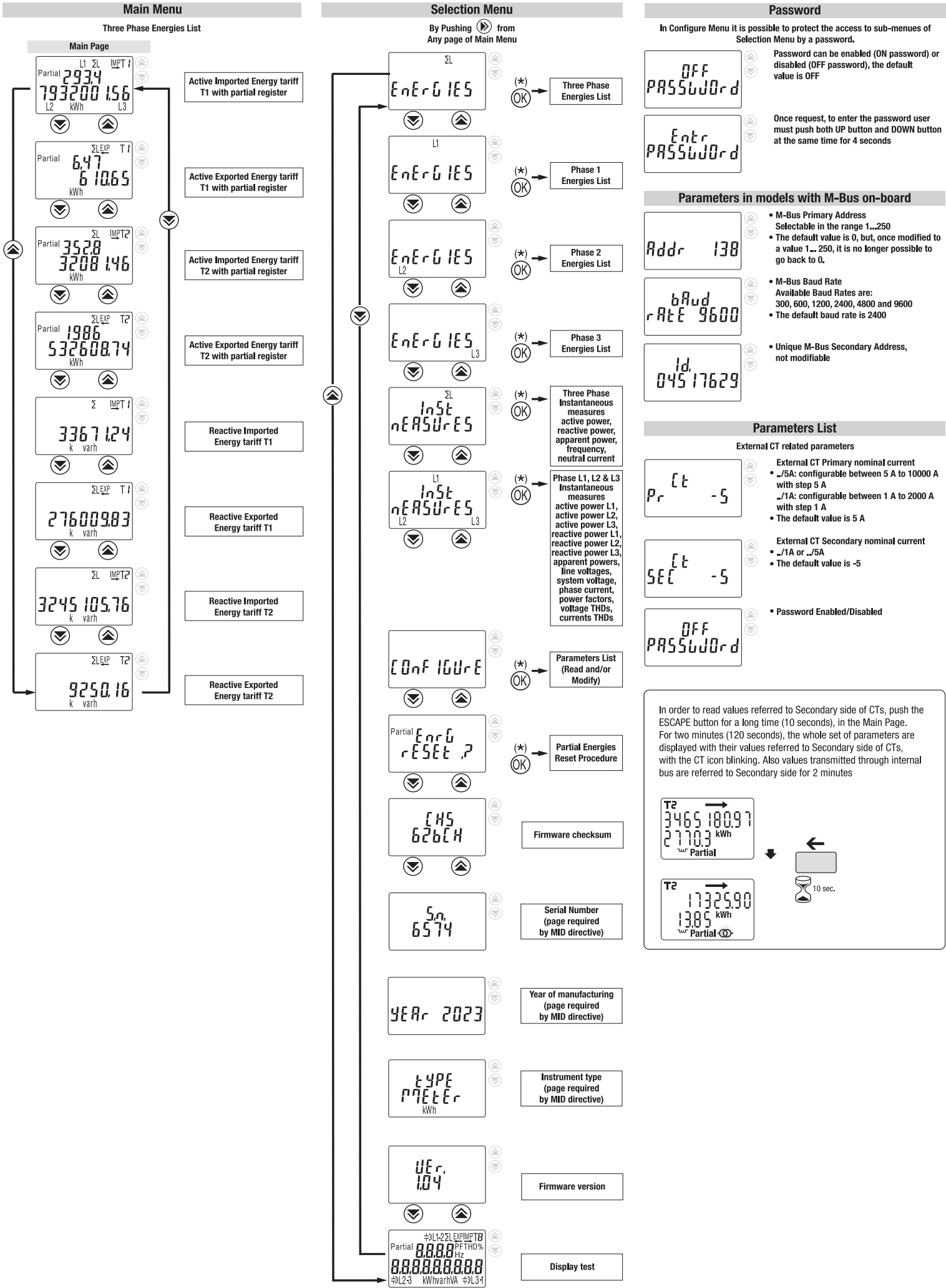
Technical data

|   |   |                                     |                                     |
|---|---|-------------------------------------|-------------------------------------|
| 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                          | <input checked="" type="checkbox"/> |                                     |
| 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)                    |   |                                     |                                     |
| - 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                         |
| 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                                     |   | -                                   | <input checked="" type="checkbox"/> |
| Printed circuit board flammability class  |   | -                                   | V1                                  |
| Material Group  |   | -                                   | IIla                                |
| IR Connectable Communication Modules  |   |                                     |                                     |
| For communication modules   |   | -                                   | <input checked="" type="checkbox"/> |
| 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                                 | -                                   | <input checked="" type="checkbox"/> |
| Stop Bit  | adjustable  | -                                   | 1, 2                                |
| Address   | adjustable  | -                                   | 1 ... 247                           |
| Isolation class   | SELV  | -                                   | c                                   |
| Tariff  |   |                                     |                                     |
| Tariff 1  |   | -                                   | <input checked="" type="checkbox"/> |
| 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   | -                                   | <input checked="" type="checkbox"/> |
| 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                                |
| IP rating   |   | -                                   | IP20                                |
|   | terminal block  | -                                   |                                     |
| Emission class compatibility CISPR 32   |   | classe                              | B                                   |





|          |   |
|----------|---|
| $\Omega$ | V |
| A        | 8 |



|          |   |
|----------|---|
| $\Omega$ | V |
| A        | 8 |

|  |   |          |                                     |
|--|---|----------|-------------------------------------|
| 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                          | -        | <input checked="" type="checkbox"/> |
| 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) |   |          |                                     |
| - 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                                 |
| Current  | Maximum   | A        | 6                                   |
|  | temporary (0.5 ms)  | A        | 120                                 |
| 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                  |   | -        | <input checked="" type="checkbox"/> |
| Printed circuit board flammability class                             |   | -        | V1                                  |
| Material Group   |   | -        | IIla                                |
| IR Connectable Communication Modules                                 |   |          |                                     |
| For communication modules  |   | -        | <input checked="" type="checkbox"/> |
| Embedded communication M-Bus   |   |          |                                     |
| Baud rate  | adjustable  | -        | 300-600-1200-2400-4800-9600         |
| Unit load  |   | -        | 1                                   |
| Isolation class  |   | -        | SELV circuit                        |
| Tariff   |   |          |                                     |
| Tariff 1   |   | -        | <input checked="" type="checkbox"/> |
| 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   | -        | <input checked="" type="checkbox"/> |
| Altitude (max.)  |   | m        | ≤2000                               |
| Humidity   | yearly average, without condensation                        | -        | ≤75%                                |
|  | on 30 days per year, without condensation                   | -        | ≤95%                                |
| IP rating  | in built-in condition (front part)                          | -        | IP51                                |
|  | terminal block  | -        | IP20                                |
| Emission class compatibility CISPR 32                                |   | classe   | B                                   |