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IIST365-01 - 05-02-2024

GB



| Code | Model |
|---|---|
| HC.ECSOP68 | M3PRO 1-5 M-Bus MID |

Three phase energy meter, measure via CT 1 to 10000 A
with MID declaration of conformity and M-Bus 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 equipement connected can be destroyed by loads exceeding the values stated.

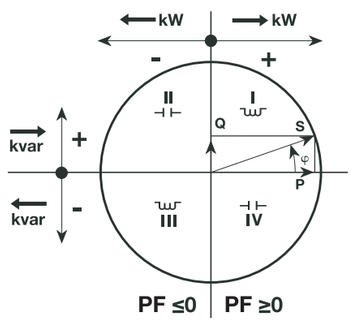
Any type of intervention on the products, including cases in which they cease to function or present defects, can be dangerous for the operator's safety and relieves the Manufacturer from all civil and criminal liability.

## 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).

This device has a backlighted 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




Σ Energy for all tariffs
T1 T2 Tariff
Reactive power inductive/ capacitive
L1 L2 Phase indicator



Main Energy Register, not resettable

kWh kvarh
kVA ms Hz

Units

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

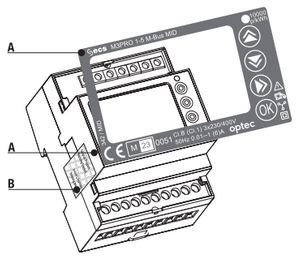
Commands

- **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

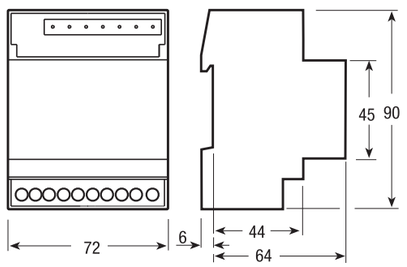
## MID certified

**A)** Device code and certification data indications

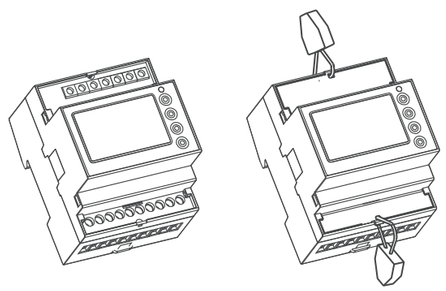
**B)** Safety-sealing between upper and lower housing part




## Dimensions



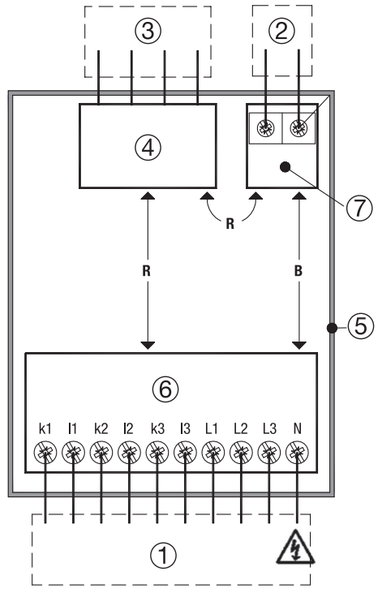

## Sealable terminal cover



## Wiring

**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.

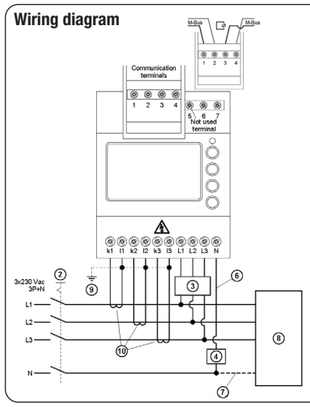



**There are no accessible parts**

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 |

**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 (ΣL) 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

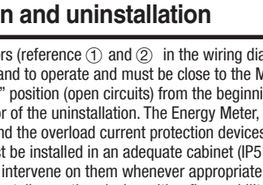
- Make sure that no voltage is applied to the instrument.
- Only dry cleaning is allowed with a natural fiber cloth (for example cotton or linen) or synthetic fabric that does not leave residual fibers that can remain on the surface of the Energy Meter or that can penetrate into the Energy Meter.

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 the display shows the message ERROR N02 or ERROR N03, the meter has got a malfunction and must be replaced.

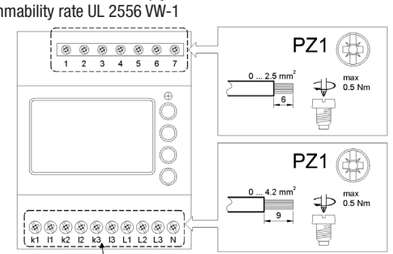
Diagnostic message




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



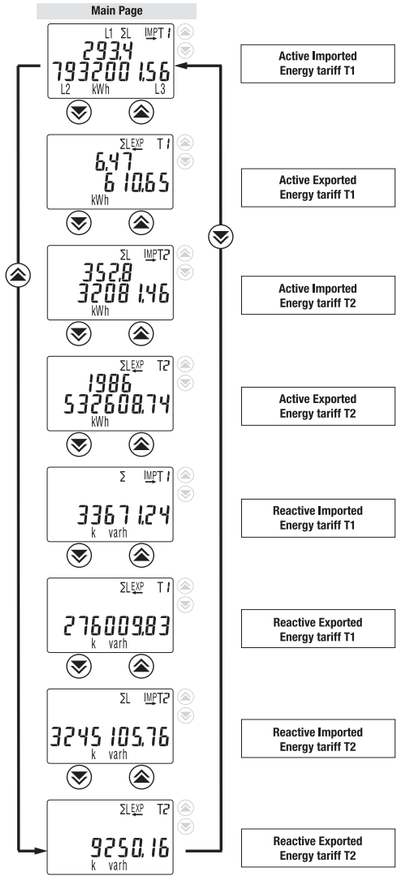

**Note on cable sizing.** For the current and voltage connection cables, it is recommended to use multi-strand copper cables with AWG 11 (with a 4.2 mm2 section), as they are suitable for Imax = 6A and Iovl = 10A. The use of cables with a smaller section falls under the responsibility of the installer,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

# General Menu

## Main Menu

Three Phase Energies List (Reactive energy not available)

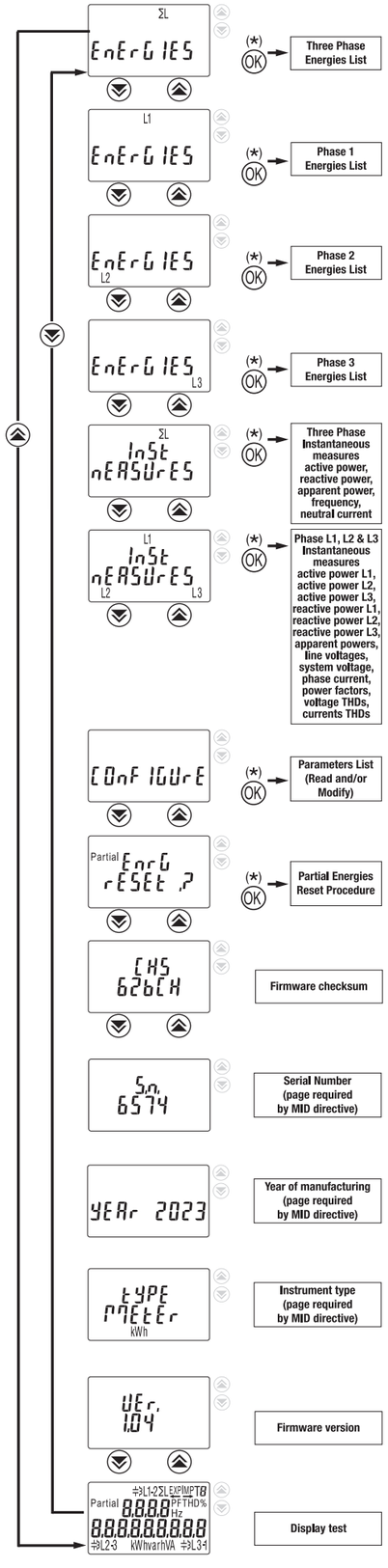
Main Page




- Active Imported Energy tariff T1
- Active Exported Energy tariff T1
- Active Imported Energy tariff T2
- Active Exported Energy tariff T2
- Reactive Imported Energy tariff T1
- Reactive Exported Energy tariff T1
- Reactive Imported Energy tariff T2
- Reactive Exported Energy tariff T2

## Selection Menu

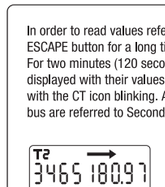
By Pushing (») from Any page of Main Menu




- (*) (OK) → Three Phase Energies List
- (*) (OK) → Phase 1 Energies List
- (*) (OK) → Phase 2 Energies List
- (*) (OK) → Phase 3 Energies List
- (*) (OK) → Three Phase Instantaneous measures active power, reactive power, apparent power, frequency, neutral current
- (*) (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
- (*) (OK) → Parameters List (Read and/or Modify)
- (*) (OK) → Partial Energies Reset Procedure
- Firmware checksum
- Serial Number (page required by MID directive)
- Year of manufacturing (page required by MID directive)
- Instrument type (page required by MID directive)
- Firmware version
- Display test

## Password

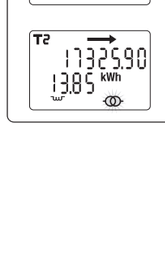
In Configure Menu it is possible to protect the access to sub-menues of Selection Menu by a password.




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

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 M-Bus on-board




- M-Bus Primary Address Selectable in the range 1...250
- The default value is 0, but, once modified to a value 1... 250, it is no longer possible to go back to 0.
- M-Bus Baud Rate Available Baud Rates are: 300, 600, 1200, 2400, 4800 and 9600
- The default baud rate is 2400
- Unique M-Bus Secondary Address, not modifiable

## Parameters List

External CT related parameters

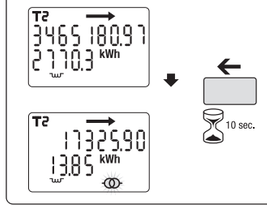



External CT Primary nominal current
- ../5A: configurable between 5 A to 10000 A with step 5 A
  ../1A: configurable between 1 A to 2000 A with step 1 A
- The default value is 5 A

External CT Secondary nominal current
- ../1A or ../5A
- The default value is -5

- Password Enabled/Disabled

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




# 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 |
| 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, PF, Hz, kW |
| 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 |
| 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 |
| 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 |
| **Embedded communication M-Bus** | | | | |
| Baud rate | adjustable | | **-** | 300-600-1200-2400-4800-9600 |
| Unit load | | | **-** | 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% |
| IP rating | in built-in condition (front part) | | **-** | IP51 |
| | terminal block | | **-** | IP20 |
| Emission class compatibility CISPR 32 | | | **classe** | B |