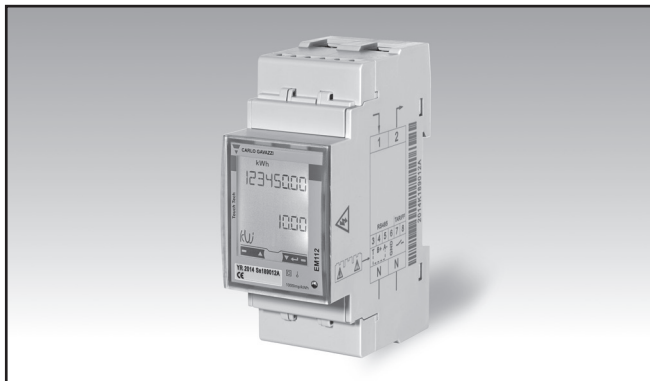


Energy Management Energy Analyzer Type EM112

CARLO GAVAZZI



- Single phase energy analyzer
- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Accuracy $\pm 0.5\%$ RDG (current/voltage)
- Direct current measurement up to 100AAC
- Backlit LCD display (3x 8-digit) with integrated touch key-pad
- Energy readout on display: 8 digit
- Variable readout on display: 4 digit
- Energy measurement: kWh and kvarh (imported/exported); kWh+ by 2 tariffs
- System variables, kW, kvar, V, A, PF, Hz, kWdmd, kWdmd peak
- Self power supply
- Dimensions: 2-DIN module
- Protection degree (front): IP51
- Pulse output (optional, by open collector PNP)
- RS485 Modbus port (optional)
- M-bus port (optional)
- Digital input (for tariff management)
- Easy connection or wrong current direction detection
- Certified according to MID Directive (option PF only): see "how to order" below

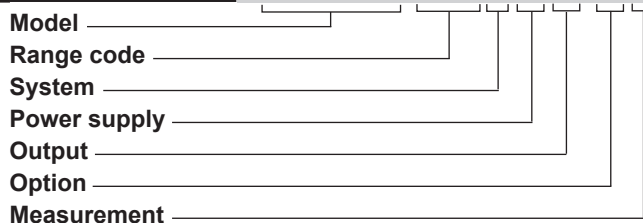
Product description

Single-phase energy analyzer with backlit LCD display with integrated touch keypad. Particularly indicated for active energy metering and for cost allocation in applications up to 100 A (direct connection), with dual tariff management availability. It can measure imported and exported energy or be programmed to consider only

the imported one. Housing for DIN-rail mounting, with IP51 front degree protection. The analyzer is optionally provided with pulse output proportional to the active energy being measured, RS485 Modbus port or M-bus port.

MID Certified according to MID Directive, Module B and Module D of Annex II, for legal metrology relevant to active electrical energy meters (see Annex V, MI003, of MID). Can be used for fiscal (legal) metrology.

How to order EM112-DIN AV0 1 X 01 PF B



Type Selection

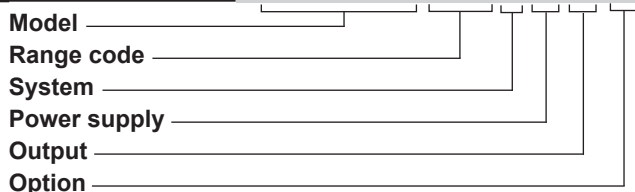
| Range code | System | Power supply | Output |
|--|---|--|--|
| AV0: 230VLN AC - 5(100)A (Direct connection) | 1: 1-phase 2-wire | X: Self power supply -30% +20% of the rated measuring input voltage, 50Hz | O1: pulse output S1: RS485 Modbus port M1: M-bus port |
| Option | Measurement | | |
| PF: Certified according to MID Directive. Can be used for fiscal (legal) metrology. | A: The power is always integrated (both in case of positive imported and negative exported power) and the total energy meter is certified according to MID. B: Only the total positive energy meter is certified according to MID. | | |



STANDARD

Not certified according to MID Directive. Cannot be used for fiscal (legal) metrology.

How to order **EM112-DIN AV0 1 X O1 X**



Type Selection

| Range code | System | Power supply | Output |
|--|--------------------------|---|--|
| AV0: 230VLN AC - 5(100)A (Direct connection) | 1: 1-phase 2-wire | X: Self power supply -30% +20% of the rated measuring input voltage, 45 to 65Hz | O1: pulse output S1: RS485 Modbus port M1: M-bus port |
| AV1: 120VLN AC - 5(100)A (Direct connection). Available on request (MOQ 100 pcs) | | | |
| Option | | | |
| X: | none | | |

Input specifications

| | | | |
|--|---|---------------------------------|---|
| Rated Inputs | | Read-out | Energy: 8 digit. Variables: 4 digit |
| Current type | 1-phase loads, direct connection | Touch key | 2 (Enter/DOWN and UP). |
| Current range | 5(100)A | Max. and Min. indication | |
| Nominal voltage | 230VLN AC (AV0 option), 120 VLN (AV1 option) | Energies | Max. 99 999 999 Min. 0.01 |
| Accuracy (@25°C ±5°C, R.H. ≤60%, 45 to 65 Hz) | | Variables | Max. 9999 Min. 0.01 |
| AV1 | I _{min} =0.25A; I _b : 5A, I _{max} : 100A; Un: 120VLN -30% +30% | Memory energy storage | |
| AV0 | I _{min} =0.25A; I _b : 5A, I _{max} : 100A; Un: 230VLN -30% +20% | Energy | 10 ¹⁰ cycles. Energy value is saved every time the less significant digit increases. |
| Energies | | Programming parameters | 10 ¹⁰ cycles. When a parameter is modified, only the relevant memory cell is overwritten |
| Active energy | Class 1 according to EN62053-21 Class B (kWh) according to EN50470-3 | LEDs | Flashing red light pulses according to EN50470-3, EN62052-11, 1000 imp./ kWh (min. period: 90ms, max. frequency: 11 Hz) Fix orange light: wrong current direction (only with PFB option or with "B" measurement selection in case of X option) |
| Reactive energy | Class 2 according to EN62053-23 | Current overloads | |
| Start-up current: | 40mA (AV0, AV1), positive or negative Self-consumption is not measured. | Continuous | 100A, @ 50Hz |
| Start-up voltage | 84VLN (AV1), 161VLN (AV0) | For 10ms | 3000 A |
| Resolution | Display | Voltage Overloads | |
| Current | 0.1 A | Continuous | 1.2 Un |
| Voltage | 0.1 V | For 500ms | 2 Un |
| Power | 0.01 kW or kVar | Input impedance | |
| Frequency | 0.1 Hz | Voltage input 230VL-N | 1.2Mohm |
| PF | 0.01 | Voltage input 120VL-N | 1.2Mohm |
| Energies (positive) | 0.01 kWh or kvarh | Current inputs: 5(100) A | < 2VA |
| Energies (negative) | 0.01 kWh or kvarh | | |
| Serial communication | | | |
| Current | 0.001 A | | |
| Voltage | 0.1 V | | |
| Power | 0.1 kW or kvar | | |
| Frequency | 0.1Hz | | |
| PF | 0.001 | | |
| Energies (positive) | 0.001 kWh or kvarh | | |
| Energies (negative) | 0.001 kWh or kvarh | | |
| Energy additional errors | | | |
| Influence quantities | According to EN62053-21 | | |
| Temperature drift | ≤200ppm/°C | | |
| Sampling rate | 4096 samples/s @ 50Hz 4096 samples/s @ 60Hz | | |
| Display and touch key-pad | | | |
| Type | Backlit LCD, 3 rows by 8-digit each, h 5 mm | | |

Digital input specifications

| | | | |
|-----------------------------|---|----------|---|
| Digital inputs | Free of voltage contact | Overload | In case a voltage is erroneously applied to the digital input, the input is not damaged up to 30 V ac/dc. |
| Function | Tariff management (switch between 7-8) | | |
| Number of inputs | 1 | | |
| Contact measurement voltage | 5 V | | |
| Contact impedance | ≤ 1kohm | | |
| Contact resistance | ≥ 1kohm, close contact 100kohm, open contact | | |

Output specifications

| | | | |
|-----------------------------|--|----------------------|---|
| RS485 serial port | RS485 by screw connection. | Other | Available functions: wild card, header, initialisation SND_NKE, and req_udr management. Management of primary address modification via M-bus. VIF, VIFE, DIF and DIFE: see protocol |
| Function | For communication of measured data, programming parameters | | |
| Protocol | Modbus RTU (slave function) | | |
| Baud rate | 9.6, 19.2, 38.4, 57.6, 115.2 kbaud, even or no parity, | | |
| Address | 1 to 247 (default: 1) | | |
| Driver input capability | 1/8 unit load. Maximum 247 transceivers on the same bus. | Static output | |
| | | Purpose | For pulse output proportional to the active energy (kWh) |
| Data refresh time | 1s | Pulse rate | Selectable in multiple of 100 |
| Read command | 50 words available in 1 read command | | Max 500 or 2000 pulses/kWh according to pulse ON duration |
| Rx/Tx indication | Rx segment on display is shown when a valid Modbus command is sent to that specific meter; Tx segment on display is shown when a valid Modbus reply is sent back to the master | Pulse ON duration | Selectable: 30ms or 100 ms according to EN62052-31 |
| M-bus port | M-bus by screw connection. | Output type | open collector PNP |
| Function | For communication of measured data | Load | V_{ON} 1 V dc max. 100mA V_{OFF} 80 V dc max. |
| Protocol | M-bus according to EN13757-3 | | |
| Baud rate | 0.3, 2.4, 9.6 kbaud | | |
| Meters in the M-bus network | 250 | | |
| Primary address | Selectable | | |
| Secondary address | Univocally defined in each unit | | |
| Secondary address range | from 7000 0000 to 7999 9999 | | |

General specifications

| | | | |
|----------------------------------|--|--------------------------------|------------------------------------|
| Operating temperature | -25 to +65 °C, indoor, (R.H. from 0 to 90% non-condensing @ 40°C) | Housing | |
| Storage temperature | -30°C to +80°C (R.H. < 90% non-condensing @ 40°C) | Dimensions (WxHxD) | 35 x 63 x 90 mm |
| Overvoltage category | Cat. III | Material | PTB, self-extinguishing: UL 94 V-0 |
| Insulation (for 1 minute) | 4000 VAC RMS between measuring inputs and digital/serial output (see table) 4000 VAC RMS | Sealing covers | Included |
| Dielectric strength | 4000 VAC RMS for 1 minute | Mounting | DIN-rail |
| EMC | According to EN62052-11 | Protection degree | |
| Standard compliance | | Front | IP51 |
| Safety | EN62052-11 | Screw terminals (cable inputs) | IP20 |
| Metrology | EN62053-21, EN50470-3 | Weight | Approx. 160 g (packing included) |
| Approvals | CE, MID (PF option only), UL (AV1 model only) | | |
| Connections | | | |
| Cable cross-section area | Measuring inputs: max. 25 mm ² , min. 5 mm ² with/without metallic cable ferrule; Max. screw tightening torque: 2.8 Nm | | |
| Other terminals | 1.5 mm ² , Min./Max. screws tightening torque: 0.5 Nm | | |

Power supply specifications

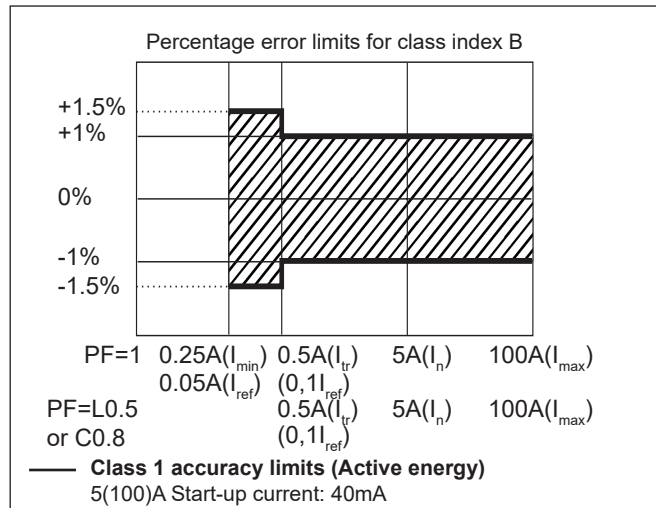
| | | | |
|--------------------------|-----------------------------------|--------------------------|-------------|
| Self power supply | | Power consumption | ≤ 1W, ≤ 8VA |
| AV0 | 230VAC VL-N, -30% +20% 45-65Hz | | |
| AV1 | 120VAC VL-N, -30% +30% 45-65Hz | | |

Insulation (for 1 minute) between inputs and outputs

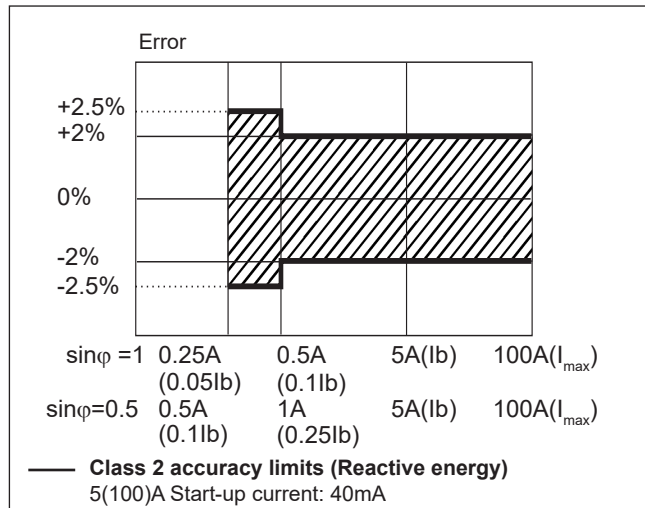
| | Measuring input | Digital or serial output | Digital input |
|--------------------------|-----------------|--------------------------|---------------|
| Measuring input | - | 4 kV | 4 kV |
| Digital or serial output | 4 kV | - | 0 kV |
| Digital input | 4 kV | 0 kV | - |

Accuracy (according to EN50470-3 and EN62053-23)

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



MID compliance (PF option only)

| | |
|------------------------------|---|
| Accuracy | 0.9 Un ≤ U ≤ 1.1 Un; 0.98 fn ≤ f ≤ 1.02 fn; fn: 50 Hz; cosφ: 0.5 inductive to 0.8 capacitive. Class B Considering listed Ib or In values |
| Operating temperature | -25 to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C) |
| EMC compliance | E2 |
| Mechanical compliance | M2 |

Display pages

| No | 1 st row | 2 nd row | 3 rd row | "Full" mode | "Easy" mode | Note |
|----|---------------------|---------------------|---------------------|-------------|-------------|---|
| 0 | kWh+ (imported) | | kW | X | X | In PF version (MID) this is the only certified energy meter. In PFA version and in X version with Measurement menu set to "A", this is considering the total energy without considering the current direction. |
| 1 | kWh- (exported) | | kW | X | X | In PFB version and in X version with Measurement menu set to "B" |
| 2 | kWh+ (imported) | | V | X | X | |
| 3 | kWh+ (imported) | | A | X | X | |
| 4 | kWh+ (imported) | | PF | X | | |
| 5 | kWh+ (imported) | | Hz | X | | |
| 6 | kvarh+ (imported) | | kvar | X | | In PFA version and in X version with Measurement menu set to "A", this is considering the total positive reactive energy without considering the current direction. |
| 7 | kvarh- (exported) | | kvar | X | | In PFB version and in X version with Measurement menu set to "B" |
| 8 | kWh+ (imported) | kWdmd peak | kWdmd | X | | |
| 9 | kWh (t1) | "t1" | kW | X | | Only relevant to kWh+, with Tariff menu set to ON. |
| 10 | kWh (t2) | "t2" | kW | X | | Only relevant to kWh+, with Tariff menu set to ON. |

X= available

List of available menus

| Menu name and description | | Range | Default setting |
|---------------------------|--|---|-----------------|
| PASS | Password request | From 0000 to 9999 | 0000 |
| nPASS | New password | From 0000 to 9999 | 0000 |
| Measure | Measurement type (A=easy connection; B=bidirectional, imported and exported energy). Not available in PFA and PFB versions (MID) | A; b | A |
| P int | Integration time for Wdmd calculation | 1 to 30 min | 1 |
| Mode | Selection of complete or simplified set of variables on display | Full or Easy | Full |
| Tariff | Tariff enabling | Yes/No | No |
| Home | Home page selection (default page at power-on and after 120 s time-out from other pages). Not available in PFA and PFB versions (MID). | 0 to 9 | 0 |
| PULSE (O1 option) | Selection of pulse ON duration | 30 or 100 ms | 30 |
| | Selection of the pulse weight (multiples of 100 pulses/kWh) | 100 to 500 (if duration is 100ms) 100 to 2000 (if 30 ms) | 100 |
| Address (S1 option) | Modbus serial address | 1 to 247 | 01 |
| Kbaud (S1) | Modbus baud rate | 9.6; 19.2; 38.4; 57.6, 115.2 kbps | 9.6 |
| ParlY (S1) | Modbus parity | No/even | No |
| PrI Add (M1 option) | M-bus primary address | 1 to 250 | 0 |
| Kbaud (M1) | M-bus baud rate | 0.3; 2.4; 9.6 kbps | 2.4 |
| RESET | Allow the reset of tariff meters and W dmd peak (kWh/kvarh meter reset available only via serial communication) | Yes/No | No |
| End | Exit to measuring mode | | |

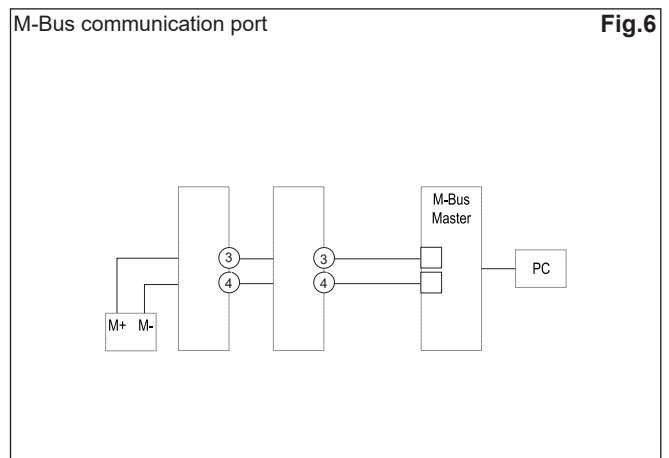
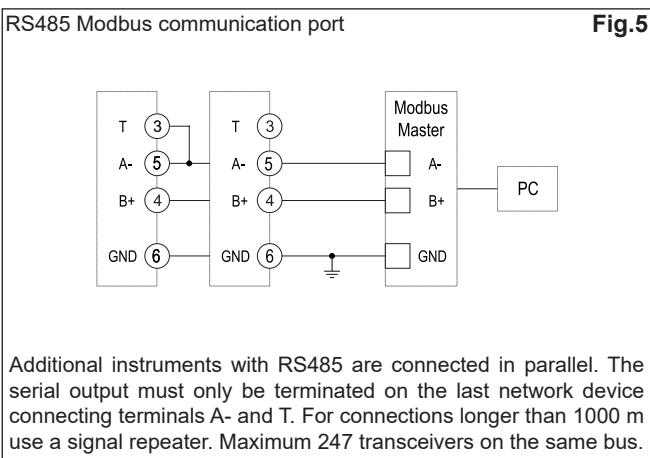
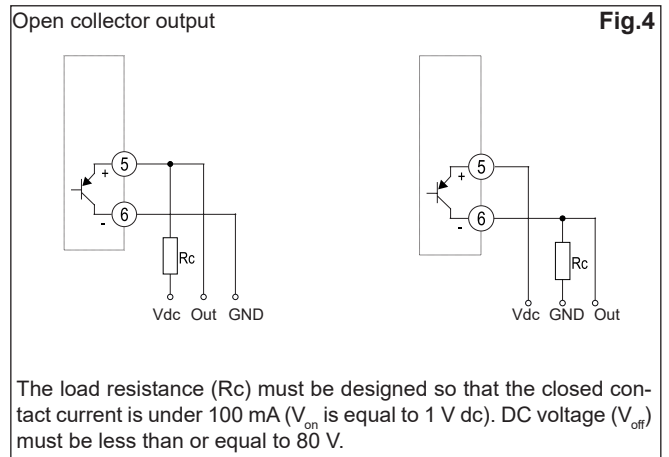
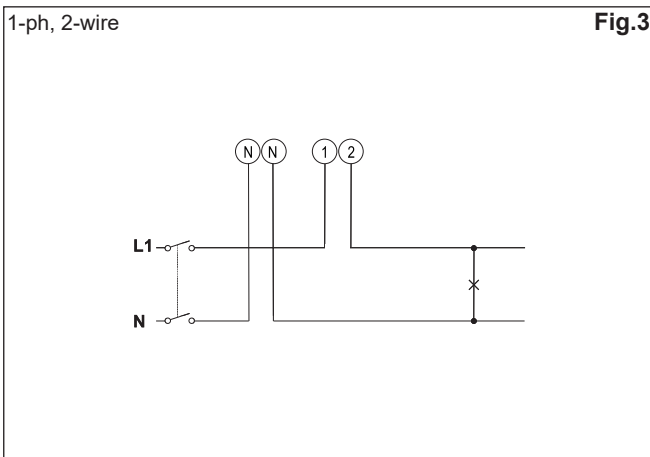
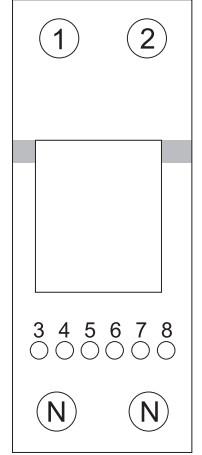
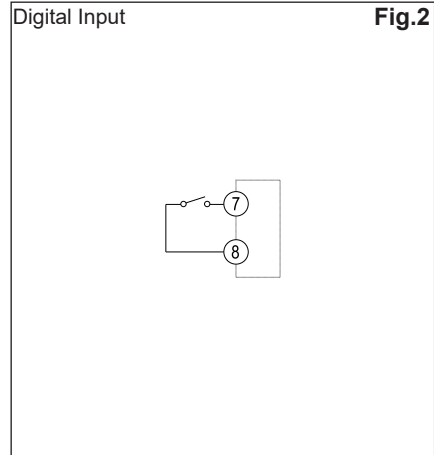
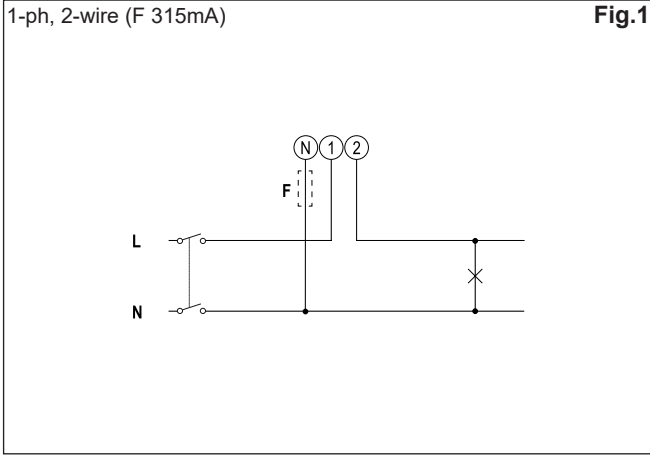
Note: after the confirmation of a new parameter value, the value is stored in the memory without the need to exit the programming mode.

Additional available information on the display (*)

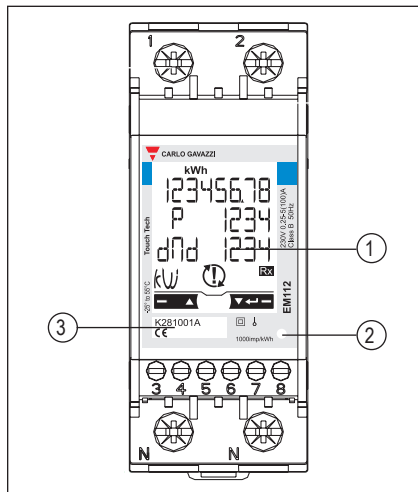
| Page | Code | Description |
|---|--------|--|
| YEAr | InFO 1 | Year of manufacture |
| SErIAL n | InFO 2 | Serial number, corresponds to the one indicated on the front print |
| rEVIStion | InFO 3 | Firmware revision – XY.nn: |
| PuLS Led | InFO 4 | Front LED pulse weight |
| MEASurE | P3 | Measurement type (only X option) |
| P int | P4 | Requested average power calculation interval |
| ModE | P5 | Display mode |
| tArIFF | P6 | Enabling tariff management and any current tariff |
| HoME | P7 | Measurement page set as home page (only X option) |
| Pages specific to the S1 version | | |
| AddrESS | P10 | Modbus address |
| bAUd | P11 | Baud rate |
| PArITY | P12 | Parity |
| StoP bit | P12-2 | Stop bit |
| Pages specific to the O1 version | | |
| PULSE | P8 | Duration |
| PuL rAtE | P8-2 | Pulse weight |
| Pages specific to the M1 version | | |
| Pr I Add | P9 | M-Bus primary address |
| bAUd | P11 | Baud rate |
| SEC Add | InFO 5 | M-Bus secondary address, univocal and set during production |

(*) can be reached by pressing simultaneously the 2 touch keys

Wiring diagrams



Front panel description



1. **Display**
Backlit LCD display with touch key-pad.
Right key: enter, down
Left key: up
2. **LED**
LED proportional to kWh reading
3. **Serial number and MID data**
Area reserved to serial number and MID-relevant data in PF versions

Dimensions (mm)

