

Energy Management Energy Analyzer Type EM271

CARLO GAVAZZI



- Equivalent to Class 1 (kWh) of EN62053-21 (EM271 Base only)
- Equivalent to Class 2 (kvarh) of EN62053-23 (EM271 Base only)
- Equivalent to Class 1 (TCDM split-core current sensors accessory only)
- Virtual meter (sum of two 3-phase or six 1-phase loads)
- Energy meter with 6+1 DGT readout
- Current measurement up to 400 A with external TCDM current transformer accessories
- Single phase variables: V, A, kW
- Total energy measurements: total kWh and kvarh
- Self power supply
- RS485 serial communication port (standard)
- 2 programmable pulsating outputs (optional)
- Fast installation system by:
 - Detachable dual voltage terminal blocks
 - Daisy-chain of max 20 EM271 by dual voltage terminal blocks
 - Detachable serial and pulse outputs terminal blocks
 - RJ11 connection for external TCDM current transformers
- Overall dimensions: 72x72 mm
- Protection degree (front): IP50

Product description

Dual three-phase energy meter with built-in configuration key-pad and LCD data displaying capable to measure the consumed energy (and other electrical parameters) by up to two three-phase loads or by up to six single-phase loads. Housing for both

DIN-rail and panel mounting with IP50 (front) protection degree. The voltage connections are carried out by a couple of detachable terminals so to allow a very fast daisy chain installation of multiple meters. Measurement of the current up to 400

A with external split core current transformer accessories connected by RJ11. Moreover the meter is provided either with two pulsating outputs proportional to the active energy being measured (e.g. one for lighting load and one for power load)

and a serial RS485 port or with a dual serial RS485 port based on detachable terminals for a fast installation. A virtual energy meter can be enabled to provide the total consumptions data of the two 3-phase loads (or of the six 1-phase ones).

How to order

EM271-72D MV5 3 X OS X

| | |
|--------------|-------|
| Model | _____ |
| Range code | _____ |
| System | _____ |
| Power supply | _____ |
| Output | _____ |
| Option | _____ |

Type Selection

| Range code | System | Power supply | Outputs |
|--|---|--|---|
| MV5: 230VLN/400VLL AC | 3: 3-phase 3-wire, 3-phase 4-wire, or 1-phase 2-wire | X: Self power supply from 40V to 460VAC, 45 to 65Hz | OS: dual static output (opto-mosfet) and serial port |
| MV6: 120VLN/230VLL AC | | | |
| <p>Note: for both the models, the current measurements carried out by the external TCDM current transformers.</p> | | | 2S: dual RS485 serial communication port |

Option

- X:** none
- N:** naked version for panel builders

Note. N option is:

- not including 2 voltage terminal blocks
- not including 2 output terminals blocks (code 2S.N)
- including 2 output terminals blocks (code OS.N)
- including protection cover for voltage terminal
- including mounting brackets and terminal seal covers

Accessories: how to order

EM270-WS V 2T 80

Accessory model _____
 Type _____
 Terminal/spare part type _____
 Cable length _____

Accessories Type Selection

| Type | Terminal type | Length |
|---------------------------|---|------------------------------|
| V: Voltage cables | 2T: EM270 detachable terminal at both sides | Accessory cable length in cm |
| S: RS485 cables | 1T: EM270 terminal at one side. Available only for voltage cables (V type) | |
| T: spare terminals | V: set of 20 voltage terminals | |
| | C: set of 20 voltage protection covers | |
| | S: set of 20 serial terminals | |

Available combinations

| | | | |
|----------------------|----------------------|----------------------|----------------|
| EM270 – WS. V.1T.60 | EM270 – WS. V.2T.30 | EM270 – WS. S.2T.60 | EM270 – WS.T.V |
| EM270 – WS. V.1T.100 | EM270 – WS. V.2T.60 | EM270 – WS. S.2T.90 | EM270 – WS.T.C |
| EM270 – WS. V.1T.150 | EM270 – WS. V.2T.90 | EM270 – WS. S.2T.120 | EM270 – WS.T.S |
| EM270 – WS. V.1T.200 | EM270 – WS. V.2T.150 | EM270 – WS. S.2T.180 | |
| | EM270 – WS. V.2T.200 | EM270 – WS. S.2T.230 | |

Input specification

| | | | |
|--|--|---------------------------------|---|
| Rated Input | | Reactive power | From 0.02In to 0.05In, within Un range, $\sin(\phi)=1$: $\pm(3\% \text{ RDG} + 2\text{DGT})$ From 0.05In to 0.2In, within Un range, $\sin(\phi)=1$: $\pm(2.5\% \text{ RDG} + 1\text{DGT})$ From 0.2In to Imax, within Un range, $\sin(\phi)=1$: $\pm(2.25\% \text{ RDG} + 1\text{DGT})$ From 0.05In to 0.1In, within Un range, $\sin(\phi)=0.5$ (L or C): $\pm(3.5\% \text{ RDG} + 2\text{DGT})$ From 0.1In to 0.2In, within Un range, $\sin(\phi)=0.5$ (L or C): $\pm(3\% \text{ RDG} + 1\text{DGT})$ From 0.2In to Imax, within Un range, $\sin(\phi)=0.5$ (L or C): $\pm(2.5\% \text{ RDG} + 1\text{DGT})$ |
| Current type | Galvanic insulation carried out by means of external TCDM current transformer accessories | | |
| Current range | up to 400 A with TCDM current transformers | | |
| Voltage | 230VLN / 400VLL (MV5), 120VLN / 230VLL (MV6) | | |
| Accuracy | The below data considers the whole measuring chain: EM271 base meter and TCDM current transformer | | |
| (Display, serial communication) (@25°C $\pm 5^\circ\text{C}$, R.H. $\leq 60\%$, 45 to 65 Hz) | | | |
| Current range | In: 60A, 100A, 200A and 400A (TCDM primary current) Imax: 1.2In From 0.02In to 0.05In: $\pm(1.25\% \text{ RDG} + 3\text{DGT})$ From 0.05In to 0.2In: $\pm(1\% \text{ RDG} + 2\text{DGT})$ From 0.2In to Imax: $\pm(0.75\% \text{ RDG} + 1\text{DGT})$ | Energies | kWh: better than the combination of a class 1 of EN62053-21 meter (EM271 base) and class 0.5 of EN60044-1 CTs (TCDM current transformer) considering the whole measurement chain. kvarh: better than the combination of a class 2 of EN62053-23 meter (EM271 base) and class 0.5 of EN60044-1 CTs (TCDM current transformer) considering the whole measurement chain |
| Current | | | 0.002In. |
| Voltage range | | Start-up current | |
| MV5 range | Un: 160 to 240VLN (277 to 415VLL) | Temperature drift | $\leq 200\text{ppm}/^\circ\text{C}$ |
| MV6 range | Un: 57.7 to 133VLN (100 to 230VLL) | Sampling rate | 1600 samples/s @ 50Hz; 1900 samples/s @ 60Hz |
| Phase-neutral voltage | In the range Un: $\pm(0,5\% \text{ RDG} + 1\text{DGT})$ | Display | 2 lines (1 x 7-DGT + 1 x 3-DGT) LCD, h 7 mm |
| Phase-phase voltage | In the range Un: $\pm(1\% \text{ RDG} + 1\text{DGT})$ | Type | |
| Frequency | Range: 45 to 65Hz. Resolution: 1Hz | Instantaneous variables readout | 3-DGT (Power: 3-DGT, currents: 3-DGT) |
| Active power | From 0.02In to 0.05In, within Un range, PF=1: $\pm(2\% \text{ RDG} + 2\text{DGT})$ From 0.05In to 0.2In, within Un range, PF=1: $\pm(1.5\% \text{ RDG} + 1\text{DGT})$ From 0.2In to Imax, within Un range, PF=1: $\pm(1.25\% \text{ RDG} + 1\text{DGT})$ From 0.05In to 0.1In, within Un range, PF=0.5L to 0.8C: $\pm(2.5\% \text{ RDG} + 2\text{DGT})$ From 0.1In to 0.2In, within Un range, PF=0.5L to 0.8C: $\pm(2\% \text{ RDG} + 1\text{DGT})$ From 0.2In to Imax, within Un range, PF=0.5L to 0.8C: $\pm(1.5\% \text{ RDG} + 1\text{DGT})$ | Energies | Imported Total: 6+1DGT |
| | | Overload status | EEE indication when the value being measured is exceeding the "Continuous inputs overload" (maximum measurement capacity) |
| | | Max. and Min. indication | Max. instantaneous variables: 999; energies: 9 999 999. Min. instantaneous variables: 0; energies 0.0 |
| | | Refresh time | 1 second |

Input specification (cont.)

| | | | |
|---------------------|---|---|---|
| LEDs | Red LED (Energy consumption only, relevant to the sum of the consumption of any load connected to the meter, 1 imp./kWh according to EN50470-1. Green LED for Power-on (steady) and communication status: RX-TX (blinking in case of RS485 option only). | Crest factor | 1.414 @ I _{max} (I _{max} =1.2 I _n = 0.4V). In any case: V _{peak} max = 0.565V |
| Measurements | See "List of the variables that can be connected to:" TRMS measurements of distorted wave forms. By means of the external current transformer accessories. | Voltage Overloads | 1.2 U _n 2 U _n (except power supply terminals) |
| | | Voltage input impedance Self-power supply | Power Consumption: < 4VA / 2W |
| Method | | Frequency | 45 to 65 Hz |
| Coupling type | | Keypad | 2 pushbuttons for variable selection and programming of the digital output parameters |

Output specifications

| | | | |
|---------------------------|--|--|--|
| Pulse output | 2, Programmable from 0.01 to 9.99 kWh per pulse. Output connectable to the energy meters (kWh) (PuL1 connected to TCDM1 and PuL2 connected to TCDM2). Detachable screw terminal connectors Selectable, 40ms or 100ms (ON), according to EN62052-31. Static: opto-mosfet V _{ON} 2.5 V _{AC/DC} , max. 70 mA V _{OFF} 40 V _{AC/DC} , max. 4kVp/2,5kVAC output to measuring inputs. | Termination | Termination by using a proper jumper in the terminal block. |
| Number of outputs | | Addresses | 247, selectable by means of the front keypad MODBUS/JBUS (RTU) |
| Type | | Protocol Data (bidirectional) Dynamic (reading only) | System and phase variables: see table "List of the variables that can be connected to:". |
| Connection type | | Static (reading and writing) | All the configuration parameters. |
| Pulse duration | | Data format | 1 start bit, 8 data bit, no or even parity, 1 stop bit |
| Output Load Insulation | | Baud-rate Driver input capability | 9.6, 19.2, 38.4 kbaud 1/5 unit load. Maximum 160 transceivers on the same bus. |
| RS485 | Multidrop, bidirectional (static and dynamic variables) 2-wire max. distance 1000m Detachable screw terminal connectors | Insulation | By means of opto-couplers, 4kVp/2,5kVAC output to measuring input. |
| Type | | | |
| Connections | | | |
| Connection type | | | |

Software functions

| | | |
|--------------------------------------|--|---|
| Password | Numeric code of max. 3 digits; 2 protection levels of the programming data: Password "0", no protection; Password from "1" to "999", all data are protected | dependent from the current direction (if negative, A, P, Q are shown with the "-" sign). The displayed energy values are only relevant to the "imported" energies. |
| 1st level | Password "0", no protection; | |
| 2nd level | Password from "1" to "999", all data are protected | |
| Lock knob | Programming (by keypad or serial commands) is not possible with the lock knob located behind the display unit is on lock position | |
| System selection | | |
| System 3P/1.3P | 3-phase (3- or 4-wire) supply. Management of one 3-phase load. | |
| System 3P/2.3P | 3-phase (3- or 4-wire) supply. Management of two 3-phase loads. | |
| System 3P/3.1P | 3-phase (3- or 4-wire) supply. Management of three 1-phase loads. | |
| System 3P/6.1P | 3-phase (3- or 4-wire) supply. Management of six 1-phase loads. | |
| System 1P/3.1P | 1-phase (2-wire) supply. Management of three 1-phase loads. | |
| System 1P/6.1P | 1-phase (2-wire) supply. Management of six 1-phase loads. | |
| Function selection | | |
| Function SUM | ON: each single system and total data (A, W, kWh) available. OFF: each single system data available without total data | |
| Easy connection Function (EC) | ON: measurement independent on current direction. OFF: measurement dependent on current direction (default). When NOT active, energies (kWh and kvarh) and power (kW) measurements are | |
| | | Transformer ratio |
| | | VT (PT) ratio |
| | | CT primary current |
| | | 1.0 to 99.9 / 100 to 999 (999 is internally considered 1000) Auto-detection of the primary current of the TCDM current transformer. The 2 TCDM' can have a different primary current. The maximum value of the VT is limited to grant the measurement of the Max possible power (210MW). The below table "Max VT(PT) ratio" list the max VT values. In case of programming a VT or a current primary value which exceed this limit, an error message appears for 2s, then the previous value is displayed again. An exception is sent via Modbus in case of wrong VT value set via serial communication. |
| | | Max VT (PT) ratio |
| | | MV5 and MV6 models |
| | | See relevant table |
| | | Integration time |
| | | For dmd power calculation |
| | | Selectable, from 1 to 60 min |
| | | Displaying |
| | | Up to 3 variables per page. See «Display pages» |
| | | Reset |
| | | By means of the front keypad: - total energies (function SUM on): kWh and kvarh - partial energies: single load energy (kWh and kvarh) and demanded power (Wdmd) - Max demand (Md) of active and apparent power. |

Max VT (PT) ratio according to the current sensors range

| TCDA2 \ TCDA1 | 60 | | 100 | | 200 | | 400 | |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|
| | MV5 | MV6 | MV5 | MV6 | MV5 | MV6 | MV5 | MV6 |
| 60 | 999 | 999 | 999 | 999 | 764 | 999 | 432 | 744 |
| 100 | 999 | 999 | 994 | 999 | 662 | 999 | 397 | 684 |
| 200 | 764 | 999 | 662 | 999 | 497 | 855 | 331 | 570 |
| 400 | 432 | 744 | 397 | 684 | 331 | 570 | 248 | 427 |
| NO TCD | 999 | 999 | 999 | 999 | 999 | 999 | 999 | 999 |

General specifications

| | | | |
|---|--|--------------------------------------|---|
| Operating temperature | Operating temperature -25 to +55°C (-13°F to +131°F) (R.H. from 0 to 90% non-condensing @ 40°C) according to EN62052-11 | Standard compliance Safety | IEC60664, EN60664, IEC61010-1, EN61010-1 EN62052-11, EN50470-1 DIN43864, IEC62053-31 |
| Storage temperature | -30 to +70°C (-22°F to +158°F) (R.H. < 90% non-condensing @ 40°C) according to EN62052-11 | Pulse output | |
| Overvoltage category | Cat. III (IEC 60664, EN60664) | Approvals | CE, UL |
| Dielectric strength | 4000VAC RMS for 1 minute (all terminals to front panel) | Connections Voltage | Detachable dual screw terminals. Max wire cross section 1.5 mm ² (14 AWG). Min./max. screws tightening torque: 0.2/0.25 Nm |
| Noise rejection CMRR | 100 dB, 48 to 62 Hz | Current inputs | 2x RJ11 (female) for current connections |
| EMC Electrostatic discharges | According to EN62052-11 and EN50470-1 (E2) 15kV air discharge, 8kV contact discharge; | Outputs (pulse and RS485 port) | Detachable screw terminals. Max wire cross section 1.5 mm ² (14 AWG). Min./max. screws tightening torque: 0.2/0.25 Nm. |
| Immunity to irradiated electromagnetic fields | Test with current: 10V/m from 80 to 2000MHz Test without any current: 30V/m from 80 to 2000MHz; | Housing Dimensions (WxHxD) | 72 x 72 x 65 mm |
| Burst | On current (TCDM primary) and voltage measuring inputs circuit: 4kV | Material | Noryl, self-extinguishing: UL 94 V-0 |
| Immunity to conducted disturbances | 10V/m from 150kHz to 80Mhz | Mounting | DIN-rail or Panel mounting |
| Surge | On current (TCDM primary) and voltage measuring inputs circuit: 4kV; | Protection degree Front | IP50 |
| Radio frequency suppression | According to CISPR 22 | Screw terminals | IP20 |
| | | Weight | Approx. 400g (packing included) |

Accessories specifications

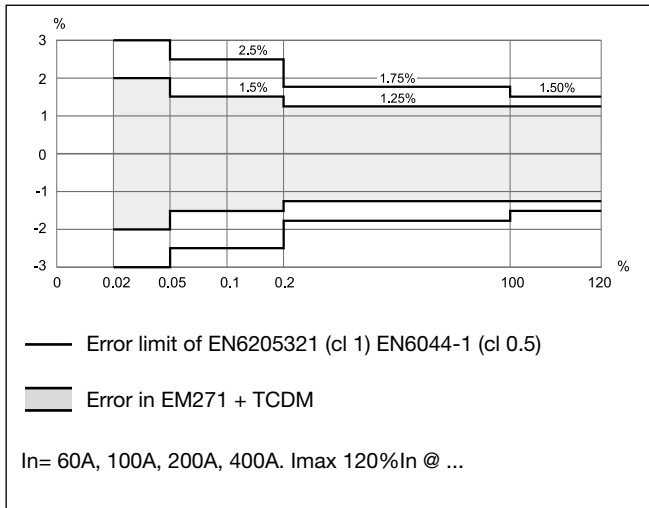
| | | | |
|------------------------------------|---|--|---|
| Voltage cables Terminals | 4 x 1 mm ² , 450/750 V max One (1T) or two (2T) EM271 detachable terminals 4 spare ferrules included in the bag. | Terminals | Two EM271 detachable terminals |
| Serial cables | Total double shielding multipair cable with bootlace ferrules | Pairs and section Single conductor type Dielectric Max. resistivity Capacity | 2x2xAWG22 ST 11x0.20 PVC R2, 1.40 mm 56 ohm/km C1 100 pF/m; C2 165 pF/m |
| | | Approvals | CE |

Power supply specifications

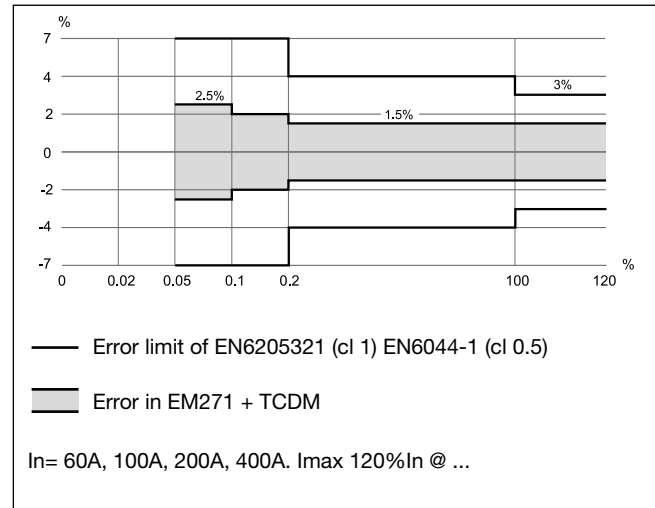
| | | | |
|------------------------------|---|--------------------------|---------|
| Self supplied version | From 40V to 460VAC, 45 to 65Hz, between L2 and L3 (in case of 1-phase supply N is connected to L2, L to L3) | Power consumption | ≤4VA/2W |
|------------------------------|---|--------------------------|---------|

Accuracy

kWh, PF=1, compared with a cl 1 meter EN62053-2 plus a cl 0.5 CT EN60044-1



kvarh, PF=1, compared with a cl 1 meter EN62053-23 plus a cl 0.5 CT EN60044-1



Used calculation formulas

Phase variables

Instantaneous effective current

$$A_1 = \sqrt{\frac{1}{n} \cdot \sum_1^n (A_1)_i^2}$$

Instantaneous apparent power

$$VA_1 = V_{1N} \cdot A_1$$

Instantaneous reactive power

$$\text{var}_1 = \sqrt{(VA_1)^2 - (W_1)^2}$$

System variables

Three-phase reactive power

$$\text{var}_\Sigma = (\text{var}_1 + \text{var}_2 + \text{var}_3)$$

Three-phase active power

$$W_\Sigma = W_1 + W_2 + W_3$$

Three-phase apparent power

$$VA_\Sigma = \sqrt{W_\Sigma^2 + \text{var}_\Sigma^2}$$

Three-phase power factor

$$\cos\varphi_\Sigma = \frac{W_\Sigma}{VA_\Sigma}$$

Energy metering

$$k \text{ var hi} = \int_{t_1}^{t_2} Qi(t) dt \cong \Delta t \sum_{n_1}^{n_2} Qnj$$

Where:

i= considered phase (L1, L2 or L3)
P= active power; **Q**= reactive power;
t1, t2= starting and ending time points of consumption recording; **n**= time unit; **Δt**= time interval between two successive power consumptions;
n1, n2 = starting and ending discrete time points of consumption recording

List of the variables that can be connected to:

RS485 communication port

All the variables listed in the "Display pages" table, when available (according to the selected system), can be read via serial communication

Pulse outputs

Pulse out 1

Pulse out 2

kWh load 1 (3-phase load 1 or sum of 1-phase loads 1, 2, 3)
kWh load 2 (3-phase load 2 or sum of 1-phase loads 4, 5, 6)

Display pages

| No | A (1st line) | B (1st line) | (2nd line) | SYS 1.3P | SYS 2.3P | SYS 3.1P | SYS 6.1P | SYS 1P.3.1P | SYS 1P.6.1P | Note |
|-----|-------------------|-------------------|-------------------|----------|----------|----------|----------|-------------|-------------|---|
| 1 | kWh | | kW (Σ) | | S | S | S | S | S | Σ = Total |
| 2 | dMd | | kW (Σ) | | S | S | S | S | S | Σ = Total, dMd = dmd |
| 3 | Pd | | kW (Σ) | | S | S | S | S | S | Σ = Total, Pd = maximum (peak) demand |
| 4 | A L1 (Σ) | A L2 (Σ) | A L3 (Σ) | | S | S | S | | | Σ (Total) single phase currents |
| 5 | kvarh | | kvar (Σ) | | S | S | S | S | S | Σ = Total |
| 6 | dMd | | kVA (Σ) | | S | S | S | S | S | Σ = Total, demand = dmd |
| 7 | Pd | | kVA (Σ) | | S | S | S | S | S | Σ = Total, Pd = maximum (peak) demand |
| 8a | kWh (Load A1) | | kW (Load A1) | X | X | | | | | |
| 8b | kWh (Load A1) | | L1 | | | X | X | X | X | Relevant to 1-ph load 1 |
| 8c | kWh (Load A1) | | L2 | | | X | X | X | X | Relevant to 1-ph load 2 |
| 8d | kWh (Load A1) | | L3 | | | X | X | X | X | Relevant to 1-ph load 3 |
| 8e | kW L1(Load A1) | kW L2 | kW L3 | | | X | X | X | X | Relevant to 1-ph load 1, 2, 3 |
| 9a | dMd (Load A1) | | kW (Load A1) | X | X | | | | | |
| 9b | dMd L1 (Load A1) | | kW (Load A1 L1) | | | X | X | X | X | Relevant to 1-ph load 1 |
| 9c | dMd L2 (Load A1) | | kW (Load A1 L2) | | | X | X | X | X | Relevant to 1-ph load 2 |
| 9d | dMd L3 (Load A1) | | kW (Load A1 L3) | | | X | X | X | X | Relevant to 1-ph load 3 |
| 10a | Pd (Load A1) | | kW (Load A1) | X | X | | | | | Md = maximum demand |
| 10b | Pd L1 (Load A1) | | kW (Load A1 L1) | | | X | X | X | X | Relevant to 1-ph load 1 |
| 10c | Pd L2 (Load A1) | | kW (Load A1 L2) | | | X | X | X | X | Relevant to 1-ph load 2 |
| 10d | Pd L3 (Load A1) | | kW (Load A1 L3) | | | X | X | X | X | Relevant to 1-ph load 3 |
| 11 | A L1 (Load A1) | A L2 (Load A1) | A L3 (Load A1) | X | X | X | X | X | X | In case of system 3P: load 1 single phase currents. In case of system 1P AL1 is the current of 1-ph load 1, AL2 of load 2, AL3 of load 3. |
| 12 | kvarh (Load A1) | | kvar (Load A1) | X | X | | | | | |
| 13 | dMd (Load A1) | | kVA (Load A1) | X | X | | | | | |
| 14 | Pd (Load A1) | | kVA (Load A1) | X | X | | | | | Pd = maximum (peak) demand |
| 15a | kWh (Load A2) | | kW (Load A2) | | X | | | | | |

Display pages (cont.)

| No | A (1st line) | B (1st line) | (2nd line) | SYS 1.3P | SYS 2.3P | SYS 3.1P | SYS 6.1P | SYS 1P.3.1P | SYS 1P.6.1P | Note |
|-----|------------------|----------------|-------------------|-------------|-------------|-------------|-------------|----------------|----------------|---|
| 15b | kWh (Load A2) | | L1 | | | | X | | X | Relevant to 1-ph load 4 |
| 15c | kWh (Load A2) | | L2 | | | | X | | X | Relevant to 1-ph load 5 |
| 15d | kWh (Load A2) | | L3 | | | | X | | X | Relevant to 1-ph load 6 |
| 15e | kW L1(Load A2) | kW L2 | kW L3 | | | | X | | X | Relevant to 1-ph load 4, 5, 6 |
| 16a | dMd (Load A2) | | kW (Load A2) | | X | | | | | |
| 16b | dMd L1 (Load A2) | | kW (Load A2 L1) | | | | X | | X | Relevant to 1-ph load 4 |
| 16c | dMd L2 (Load A2) | | kW (Load A2 L2) | | | | X | | X | Relevant to 1-ph load 5 |
| 16d | dMd L3 (Load A2) | | kW (Load A2 L3) | | | | X | | X | Relevant to 1-ph load 6 |
| 17a | Pd (Load A2) | | kW (Load A2) | | X | | | | | Pd= maximum demand |
| 17b | Pd L1 (Load A2) | | kW (Load A2 L1) | | | | X | | X | Relevant to 1-ph load 4 |
| 17c | Pd L2 (Load A2) | | kW (Load A2 L2) | | | | X | | X | Relevant to 1-ph load 5 |
| 17d | Pd L3 (Load A2) | | kW (Load A2 L3) | | | | X | | X | Relevant to 1-ph load 6 |
| 18 | A L1 (Load A2) | A L2 (Load A2) | A L3 (Load A2) | | X | | X | | X | In case of system 2.3P: Load 2 single phase currents. In case of system 6.1P AL1 is the current of 1-ph load 4, AL2 of load 5, AL3 of load 6. |
| 19 | kvarh (Load A2) | | kvar (Load A2) | | X | | | | | |
| 20 | dMd (Load A2) | | kVA (Load A2) | | X | | | | | |
| 21 | Pd (Load A2) | | kVA (Load A2) | | X | | | | | Pd = max. demand |
| 22 | V L1N (L1) | V L2N (L2) | V L3N (L3) | X | X | X | X | X(*) | X(*) | (*) = VLn value |
| 23 | V12 (L1) | V23 (L2) | V31 (L3+triangle) | X | X | | | | | |
| 24 | kW (LoadA1) | kW (Load A2) | kW (Σ) | | S | | S | | S | In case of system 6.1P load 1 is the sum of 1-ph loads 1, 2, 3 and load 2 is the sum of 1-ph loads 4, 5, 6. |

Note: whatever page the user has selected, after 120s it goes back to page 1 (if available, otherwise page 8).

X: available;

S: available only if SUM function is ON;

Empty: not available.

Additional available information on the display

| Type | 1st line | 2nd line | Note |
|----------------------|---------------|----------|---|
| Meter information 1 | Y. 2014 | r.A0 | Year of production and firmware release |
| Meter information 2 | PuL_LEd (kWh) | [value] | kWh per pulses of the LED |
| Meter information 3 | SYS [2.3P] | | 1.3P, 2.3P, 3.1P, 6.1P |
| Meter information 4 | Ut rat. | TCDM | Voltage transformer ratio |
| Meter information 5 | Ct Prin load1 | [value] | Current transformer primary value (load1) |
| Meter information 6 | Ct Prin load2 | [value] | Current transformer primary value (load2) |
| Meter information 7* | PuL 1 (kWh) | [value] | Pulse output: kWh per pulse Load A1 |
| Meter information 8* | PuL 2 (kWh) | [value] | Pulse output: kWh per pulse Load A2 |
| Meter information 9 | AddrESS | [value] | Serial communication address |
| Md reset | rESEtuP | no/YES | Reset of maximum demand |

(*) = in case of digital pulse output model

Display resolution

| Variable | Resolution | Range | |
|---------------------------|---|--|---|
| | | From | To |
| Active and Apparent Power | 0.1 W 1 W 0.01 kW 0.1 kW 1 kW | 0.1 W 1 W 1.00 kW 10.0 kW 100 kW | 99.9 W 999 W 9.99 kW 99.9 kW 999 kW |
| Energy (kWh and kvarh) | 0.1 kWh / kvarh 1 kWh / kvarh | 0.1 kWh 1 000 000 kWh | 999 999.9 kWh 9 999 999 kWh |
| Voltage | 1 V | 1 V | 999 V |
| Current | 0.01 A 0.1 A 1 A | 0.01 A 10.0 A 1A | 9.99 A 99.9 A 999 A |

Error message management

| Description | Display message |
|--|-----------------------------------|
| 1st load TCDM not connected | [load 1] MISSInG TCDM |
| 2nd load TCDM enabled (systems 2.3P or 6.1P) but not connected | [load 2] MISSInG TCDM |
| 1st and 2nd loads TCDM not connected | [load 1] [load 2] MISSInG TCDM |
| Over-range condition of the measuring inputs (voltage and current) | E E E |

List of available menus

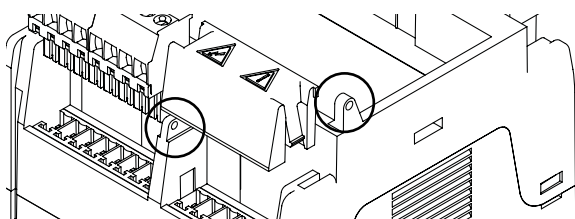
| Always available | | Selection | Default setting |
|------------------|--|--------------------------|-----------------|
| PASS ? | Password | From 0 to 999 | 0 |
| PASS ? (100) | “rESEt UP” Reset of the max value of Wdmd and VAdmd (only for Total) | no / YES | No |
| CnG¬_PASS | New Password | From 0 to 999 | 0 |
| SYS | 3-phase (3- or 4-wire). Management of one 3-phase load. | 1.3P | 1.3P |
| | 3-phase (3- or 4-wire). Management of two 3-phase loads. | 2.3P | |
| | 1-phase (2-wire). Management of three 1-phase load. | 3.1P | |
| | 1-phase (2-wire). Management of six 1-phase loads. | 6.1P | |
| SuM (**) | SUM function | On/OFF | On |
| EC (***) | Easy connection function | On/OFF | OFF |
| P.int ti | Integration time for “dmd” power calculation | From 1 to 60 min | 15 |
| Ut | VT ratio | 1.0 to 99.9 / 100 to 999 | 1.0 |
| PuL 1 (*) | Number of kWh per pulse Load A1 | From 0.01 to 9.99 | 0.1 |
| PuL 2 (*) (**) | Number of kWh per pulse Load A2 | From 0.01 to 9.99 | 0.1 |
| t.on (*) | TON time (milliseconds) (digital output) | 40 or 100ms | 100 |
| AddrESS | Modbus address of the instrument | From 1 to 247 | 1 |
| bAud | Modbus baud rate | 9.6, 19.2, 38.4 kbps | 9.6 |
| PARtY | Modbus parity | No, EvEn | No |
| EnE PA.rE | Reset of the Load A1 and Load A2 energies (6 load in 1-phase system) | no / YES | No |
| EnE to.rE | Reset of the total energy | no / YES | No |

(*) = in case of digital pulse output, only 3-phase systems. In 1-phase system the pulse is relevant to the sum of the first three and second three 1-phase loads.

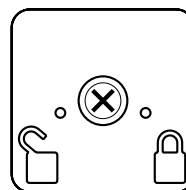
(**) = not present in case of 1.3P

(***) = in case of Easy connection disabled and imported power: A, kW are to be shown with negative sign; only kWh is not integrated; the negative instantaneous contribution to Wdmd calculation is not considered. In all the cases kvar is displayed with the actual sign.

Tamper proof capability



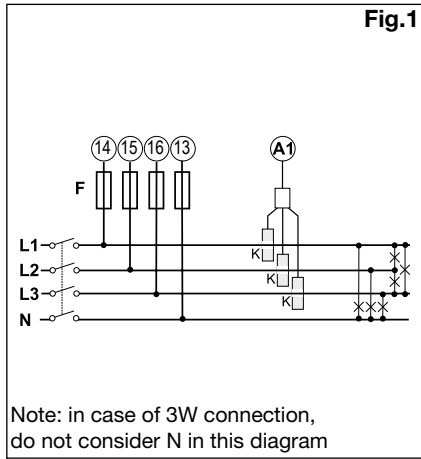
Position of the seals



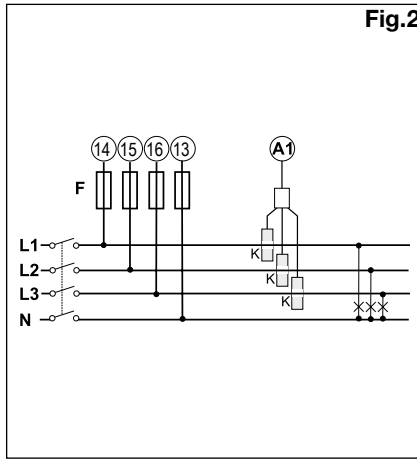
Rear view of the detached display unit with highlight of the programming lock.

Wiring diagrams

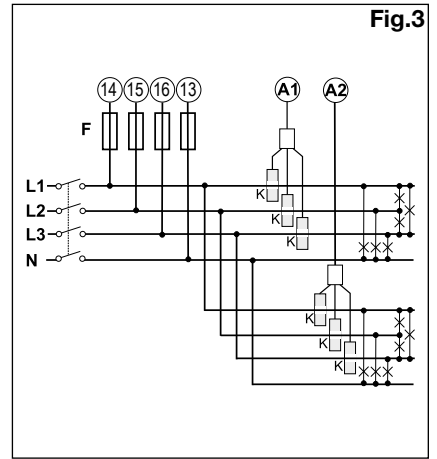
3-ph. system type selection: 3P/1.3P



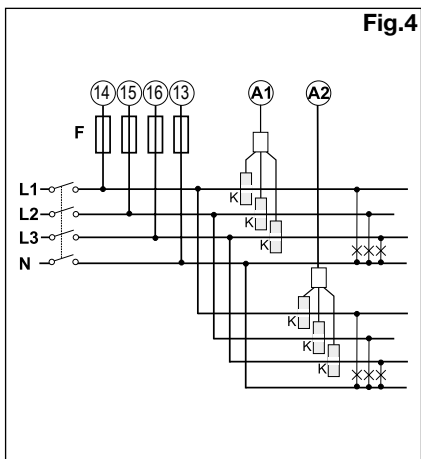
3-phase system type selection: 3P/3.1P



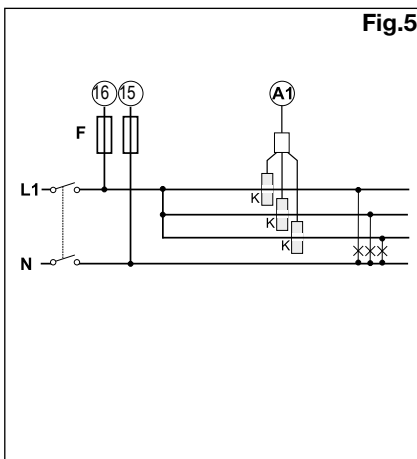
3-phase system type selection: 3P/2.3P



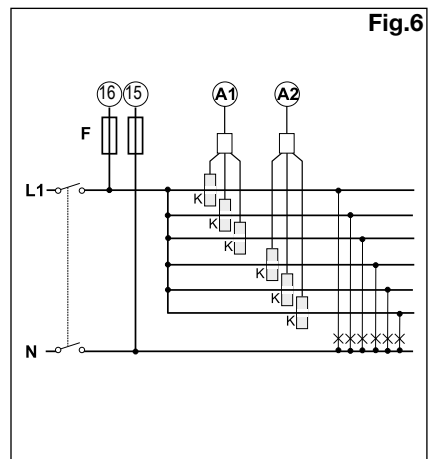
1-phase system type selection: 3P/6.1P



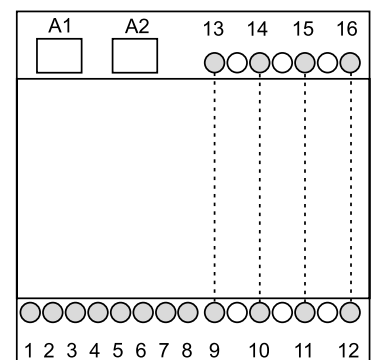
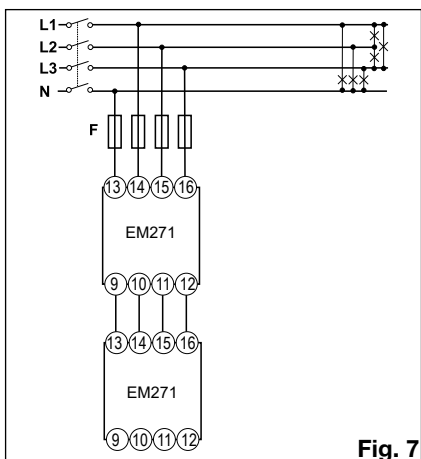
1-phase system type selection: 1P/3.1P



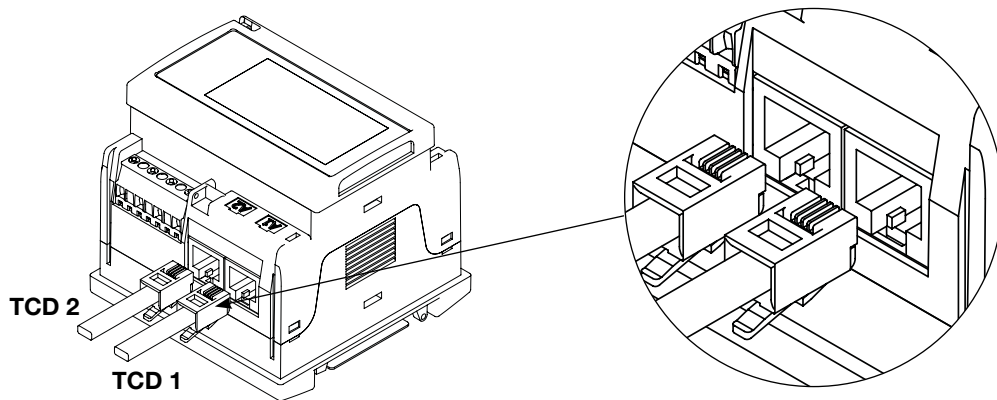
1-phase system type selection: 1P/6.1P



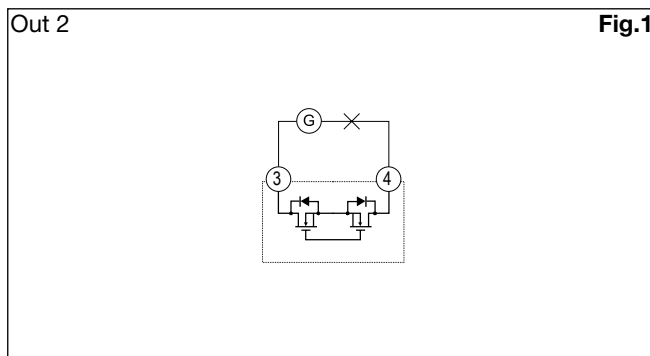
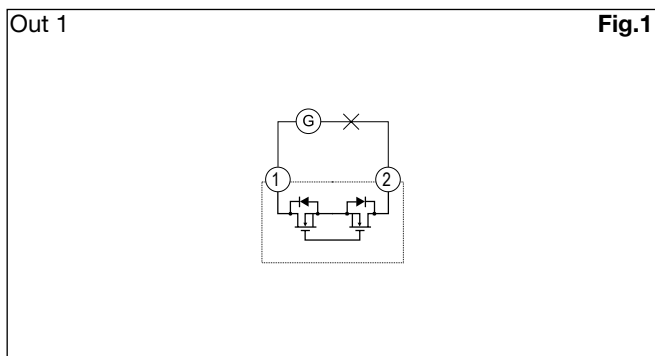
Loom example



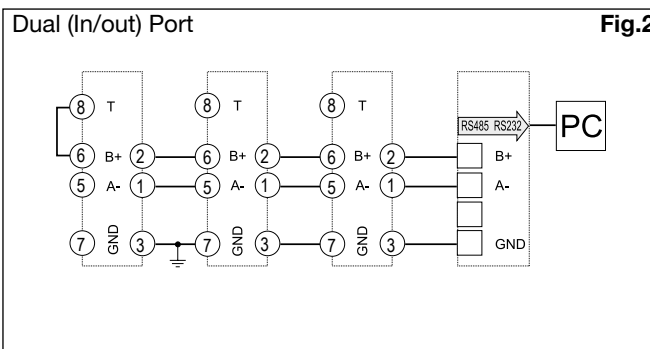
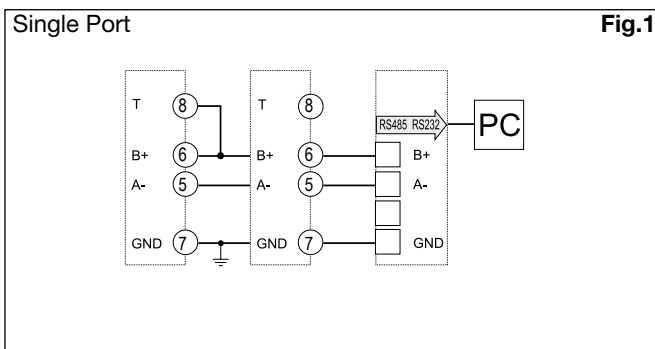
TCDM current transformer connections



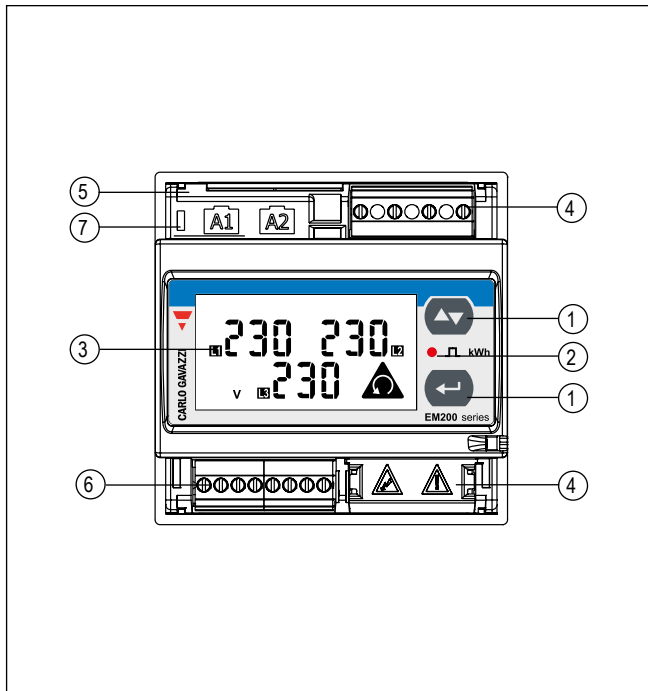
Static output connections



RS485 Serial Port



Front panel description



1. Keypad

2 push-buttons to program the configuration parameters and scroll the variables on the display

2. LED

Red LED blinking proportional to the total active energy being measured (Total= Load A1 + Load A2).

3. Display

LCD-type with alphanumeric indications to:

- display configuration parameters;
- display all the measured variables.

4. Detachable voltage screw terminals

Detachable screw terminal blocks for voltage wiring.
NOTE: max 20 EM271 connected in cascade. No other loads can be connected to voltage terminals.

5. Current RJ11 connectors

RJ11 connectors (female) for quick connection to up to two CT accessories.

6. RS485 or pulse screw terminals

Detachable screw terminal blocks for quick connection in daisy chain of the serial RS485 line or for connection if the 2 independent pulse output.

7. Power-On LED

Green LED lit when power supply is available.

Dimensions and panel cut-out (mm)

