

Panel Meters and Controllers Power Analyzers and Energy meters Type EM2-DIN, Energy Meter

CARLO GAVAZZI



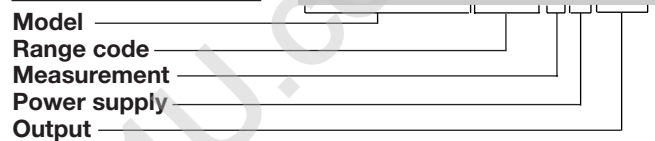
- 6-dgt μ P-based indicator
- Manual scrolling of partial and total energies: kWh, kVAh.
- TRMS measurement of distorted waves (voltage/current)
- All configuration functions selectable by built-in key-pad
- Password protection of programming parameters
- Front reset of partial energies
- Degree of protection (front): IP 40
- Optional serial RS 422/485 output (provided with control relay)
- MODBUS, JBUS protocol.

Product Description

μ P-based energy meter with a built-in configuration key-pad. The energies are both partial and total counted. The housing is easy to mount on DIN-rail and ensures a degree of protection (front) of IP 40.

Ordering Key

EM2-DINAV53DXX



Type Selection

| Range code | Measurement | Power supply | Output |
|---|---|--|--|
| AV5: 250/433 VAC - 5 AAC (max. 300 V (L-N)/ 520 V (L-L) - 6 A) | 3: One phase, three-phase system, 3 or 4 wires, balanced load; three phase system, 3 or 4 wires, unbalanced load | A: 24 VAC, -15% +10%, 50/60 Hz ¹⁾ B: 48 VAC, -15%+10%, 50/60 Hz ¹⁾ C: 115 VAC, -15% +10%, 50/60 Hz ¹⁾ D: 230 VAC, -15% +10%, 50/60 Hz (standard) | XX: No output (standard) XS: Serial output, RS 485 multidrop bidirectional with control relay ¹⁾ |

¹⁾On request

Input Specifications

| | | | |
|--|---|---|--|
| Accuracy (48 to 62 Hz) (@ 25°C \pm 5°C, R.H. \leq 60%) | \pm 1% rdg (hour time base): | Temperature drift | \pm 250 ppm/°C |
| Additional errors Humidity Power supply Magnetic field | <0.3% f.s., 60% to 90% R.H. \pm 0.5% RDG, -15 +10% p.s. < 0.1% f.s. @ 400 A/m | Display | Backlighted LCD, h: 13mm, 6-dgt |
| Rated input Current | 2 inputs (one/three-phase balanced load) 6 inputs (one/three-phase unbalanced load) | Decimal point position | Automatic selection according to the counted energy. Max resolution: 1 Wh/1 VArh Min. resolution: 1 kWh/1 kVAh |
| Voltage | 2 inputs (one/three-phase balanced load) 4 inputs (one/three-phase unbalanced load) | Max. and min. indication Active energy Reactive energy | Max. 999999 min. -199999 Max. 999999 min. 0 |
| Insulation | among the voltage and the current inputs: 2000 Vrms; among the current inputs: 2000 Vrms | Sampling rate | 3 times / second |

Input Specifications (cont.)

| | | | |
|---|---|-----------------|---|
| Measurements Total energies Partial energies Measurement method | kWh, kVAh kWh, kVAh TRMS measurement of a distorted voltage/current wave Coupling type: Direct Crest factor: ≥ 3 | Keyboard | 4 keys: "Δ∇": - to enter programming phase and password confirmation; - for value programming and basic measurement scrolling. "L": - for confirmation of new programmed values and going ahead to the next programming step, - total or partial energy scrolling. "R": - for the reset of the partial counted active and/or reactive energy. |
| Ranges (impedances) | 250 V/433 V ($\geq 1 \text{ M}\Omega$) 5 AAC ($\leq 0.3 \text{ VA} / \leq 0.1 \Omega$) | | |
| Frequency range | 48 to 62 Hz | | |
| Over-load protection Continuous: voltage/current For 1 s Voltage: Current: | 1.2 x rated input 2 x rated input 20 x rated input | | |

Output Specifications

| | | | |
|--|---|--|--|
| Relay output (only with RS485 output) Type Contact Rating Insulation | Driven only by the serial communication 1 x SPST (normally open) 2 A, 250 VAC/DC, 40 W/1200 VA 130.000 cycles By means of optocouplers, 4000 Vrms output to measuring input, 4000 Vrms output to supply input. | Data (bidirectional) Dynamic (reading only) | System variables: P, Q, $\cos \varphi$, V_{L-L} , energies, Single phase variables: P_{L1} , Q_{L1} , $\cos \varphi_{L1}$, V_{L1-N} , I_{L1} , P_{L2} , Q_{L2} , $\cos \varphi_{L2}$, V_{L2-N} , I_{L2} , P_{L3} , Q_{L3} , $\cos \varphi_{L3}$, V_{L3-N} , I_{L3} For the accuracy information refer to WM2-DIN All programming data, reset of energy: - partial kWh - partial kVAh - total kWh - total kVAh Stored energy (EEPROM) $\leq 999999 \text{ kWh}$ $\leq 999999 \text{ kVAh}$ 1-start bit, 8-data bit, no parity/even parity, 1 stop bit 1200, 2400, 4800 and 9600 selectable bauds By means of optocouplers, 4000 Vrms output to measuring inputs 4000 Vrms output to supply input |
| Serial output (on request) Type Connections Adresses Protocol | RS422/RS485; Multidrop bidirectional (static and dynamic variables) 2 or 4 wires, max. distance 1200 m, termination and/or line bias by means of DIP-switches directly on the instrument 255, selectable by key-pad MODBUS/JBUS | Static (writing only) | |
| | | Data format Baud-rate Insulation | |
| | | | |

Software Functions

| | | | |
|------------------------------|---|--|---|
| Password | Numeric code of max. 3 digits; 2 protection levels of the programming data Password "0", no protection Password from 1 to 255, all data are protected | Programmable ratio | 0.1 to 999.9 |
| 1st level 2nd level | | Digital Filter | 0 to 100% of the input electrical scale 1 to 64 Only on the variable being transmitted by the serial communication port |
| Measurement scrolling | total and partial active energy (kWh), total and partial reactive energy (kVArh) | Filter operating range | |
| Transformer ratio | For CT up to 5000 A | Filtering coefficient Filter action | |

Supply Specifications

| | | | |
|-------------------|--|--------------------------|--------|
| AC voltage | 230 VAC (standard), -15%+10% 50/60 Hz 24 VAC, 48 VAC, 115 VAC (on request), -15%+10% 50/60 Hz | Power consumption | ≤ 7 VA |
|-------------------|--|--------------------------|--------|

General Specifications

| | | | |
|-------------------------------------|---|-----------------------------|---|
| Operating temperature | 0° to +50°C (32° to 122°F) (R.H. < 90% non-condensing) | Safety standards | IEC 1010-1, EN 61010-1 |
| Storage temperature | -10° to +60°C (14° to 140°F) (R.H. < 90% non-condensing) | Connector | Screw-type, max. 2.5 mm ² wires |
| Insulation reference voltage | 300 Vrms to ground | Housing | 6 DIN modules, 58.5 x 89 x 107 mm ABS, self-extinguishing: UL 94 V-0 |
| Insulation | 4000 Vrms between all inputs/ outputs to ground | Dimensions | |
| Dielectric strength | 4000 Vrms for 1 minute | Material | |
| Noise rejection | 100 dB, 48 to 62 Hz | Degree of protection | Front: IP40 |
| CMRR | | Weight | Approx. 500 g (packing included) |
| EMC | EN 50 081-2, EN 50 082-2 | | |

Mode of Operation

Waveform of the signals that can be measured

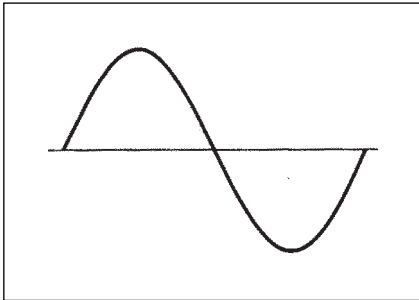


Figure G
Sine wave, undistorted
 Fundamental content 100%
 Harmonic content 0%
 $A_{rms} = 1.1107 | \bar{A} |$

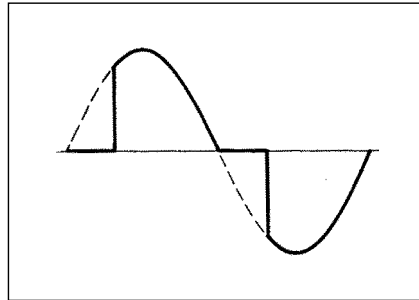


Figure H
Sine wave, indented
 Fundamental content 10...100%
 Harmonic content 0...90%
 Frequency spectrum 3rd to 16th harmonic
 Required result: additional error < 1%

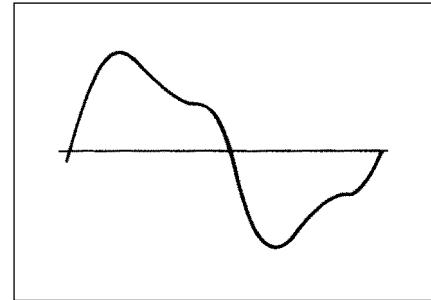
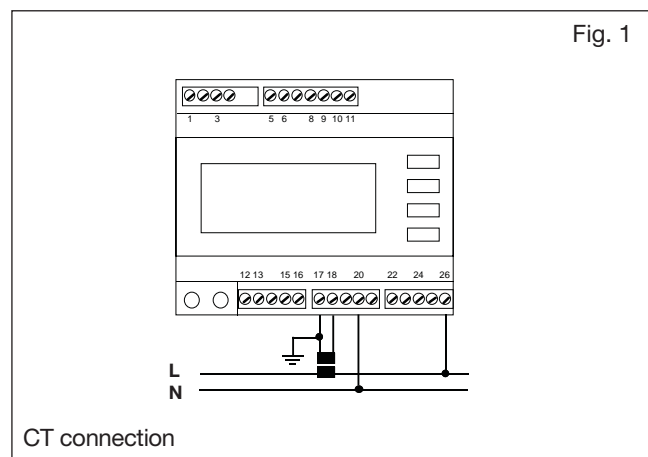
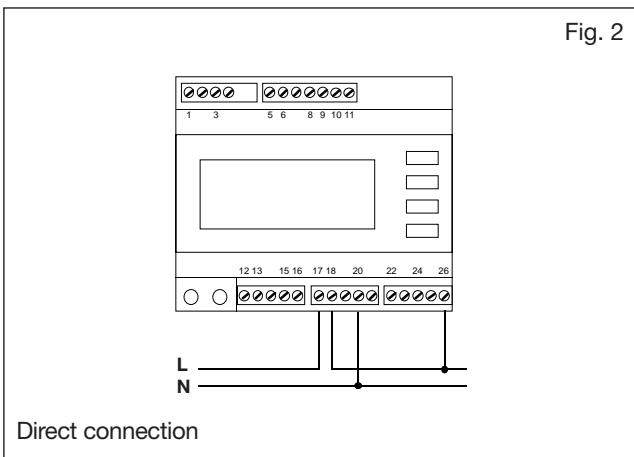


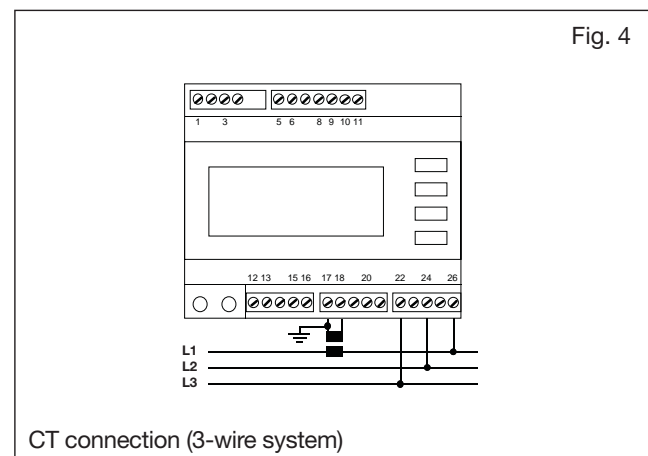
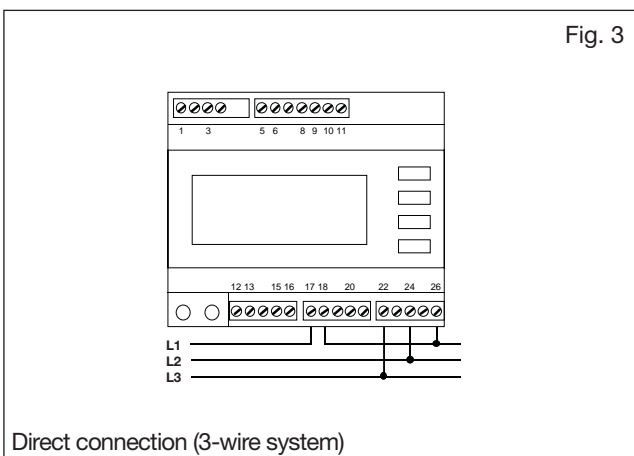
Figure I
Sine wave, distorted
 Fundamental content 70...90%
 Harmonic content 10...30%
 Frequency spectrum 3rd to 15th harmonic
 Required result: additional error < 0.5%

Wiring Diagrams

Single phase input connections

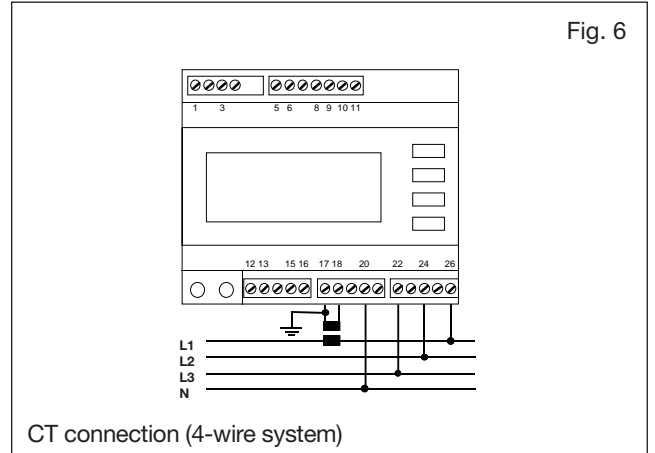
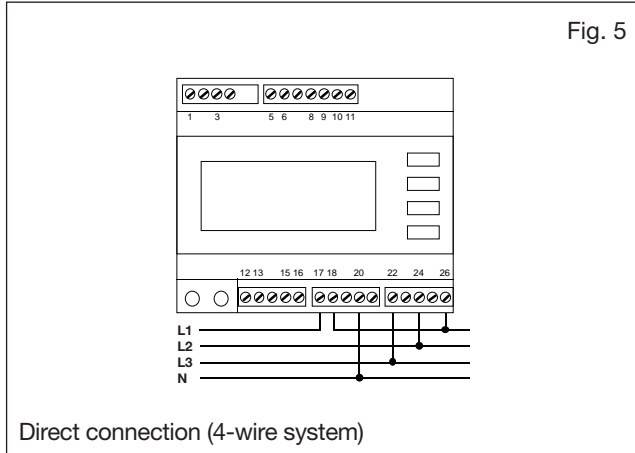


Three phase/3-wire input connections - Balanced loads

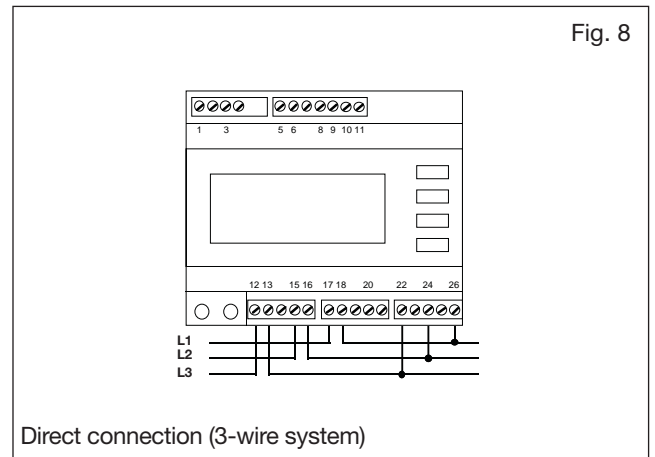
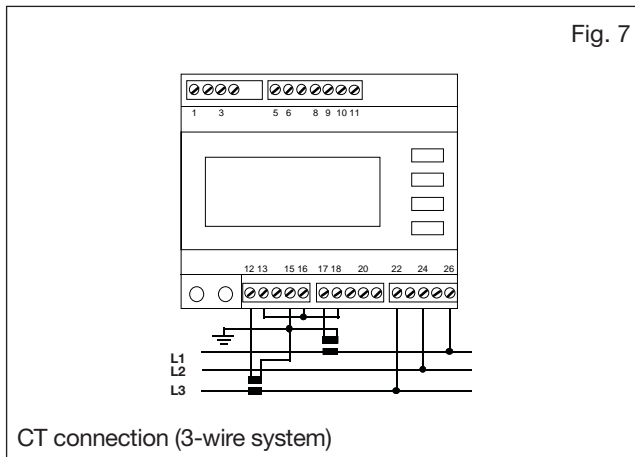


Wiring Diagrams (cont.)

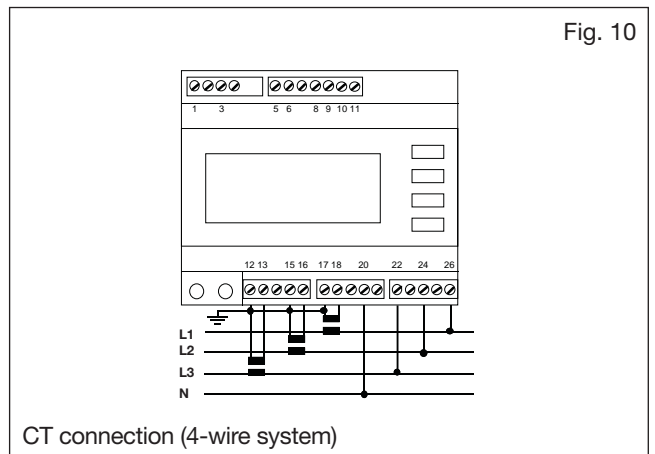
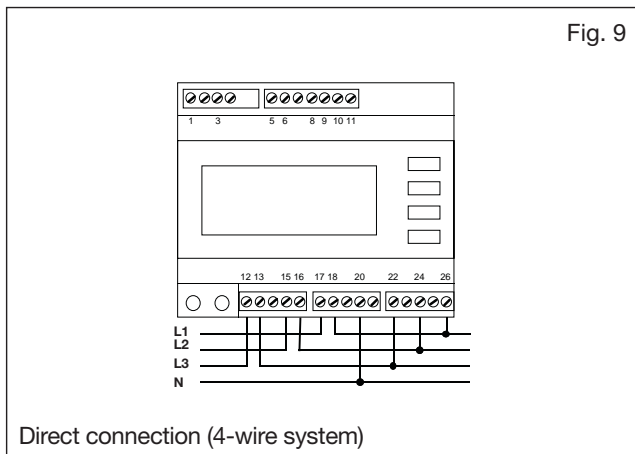
Three phase, 4-wire input connections - Balanced loads



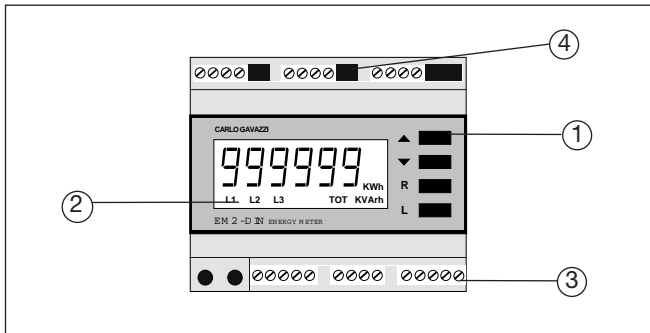
Three-phase, 3-wire input ARON connections - Unbalanced load



Three phase, 4-wire input connections - Unbalanced load



Front Panel Description



1. Key-pad

Set-up and programming procedures are easily controlled by the 4 pushbuttons.

” ▲ ” and ” ▼ ”

- To scroll all the basic measurements (system variables)

- To increase or decrease programming values
- To enter into the programming procedure and select programming functions together with the ”L” key
- ”L”: To select the partial or total counted energy
- ”R”: To reset the partial counted energies (kWh, kVARh).

2. Display

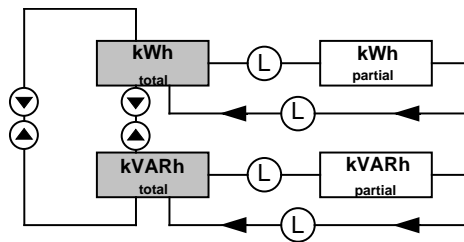
- 6-digit (maximum read-out 999999).
- Alphanumeric indication by means of LCD display for:
 - Displaying the configuration parameters
 - All the measured variables.

3. Connection terminal blocks

4. Dip-switch

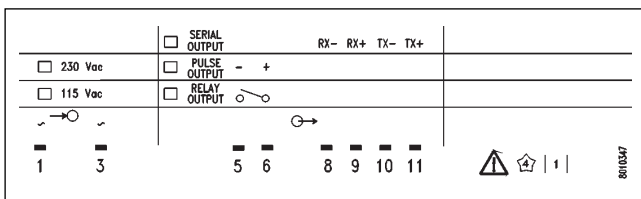
- For the selection of 2/4 wire connection, line biasing and/or line termination (only in case of RS 485 option)

Sequence of the variables on the display

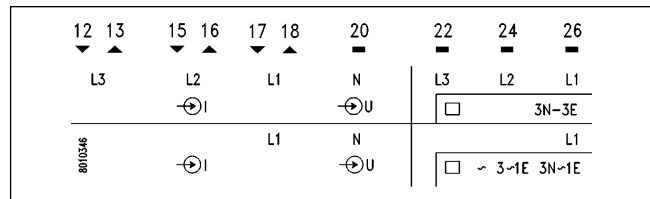


Terminal boards

Upper terminal board



Lower terminal board



Dimensions

