

Energy Management

Energy meter

Type EM2-DIN

CARLO GAVAZZI



- 6-dgt μ P-based indicator
- Manual scrolling of partial and total energies: kWh, kVArh.
- 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.

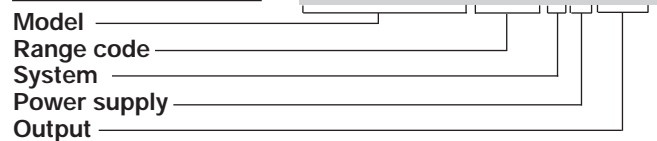
Product Description

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	System	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 (kWh) \pm 2% RDG (kvarh) (hour time base) (PF \geq 0.7L/C, 0 to 1.2In, 0.5 to 1.2Un)	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 KVArh
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		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.
Total energies Partial energies	kWh, kvarh kWh, kvarh (the meters are automatically reset when the values reach 14999*CT ratio). TRMS measurement of a distorted voltage/current wave Coupling type: Direct Crest factor: ≥ 3		
Measurement method			
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)		Data (bidirectional) Dynamic (reading only)	System variables: P, Q, $\cos \phi$, V_{L-L} , energies, Single phase variables: P_{L1} , Q_{L1} , PF_{L1} , V_{L1-N} , A_{L1} , P_{L2} , Q_{L2} , PF_{L2} , V_{L2-N} , A_{L2} , P_{L3} , Q_{L3} , PF_{L3} , V_{L3-N} , A_{L3} For the accuracy information refer to WM2-DIN
Type	Driven only by the serial communication 1 x SPST (normally open) 2 A, 250 VAC/DC, 40 W/1200 VA 130.000 cycles		
Contact Rating	By means of optocouplers, 4000 Vrms output to measuring input, 4000 Vrms output to supply input.	Static (writing only)	All programming data, reset of energy: - partial kWh - partial kVAh - total kWh - total kVAh Stored energy (EEPROM) $\leq 999999 \text{ kWh}$ $\leq 999999 \text{ kVAh}$
Insulation			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)		Data format	
Type	RS422/RS485; Multidrop bidirectional (static and dynamic variables)	Baud-rate	
Connections	4 wires, max. distance 1200 m, termination and/or line bias by means of DIP-switches directly on the instrument	Insulation	
Addresses Protocol	255, selectable by key-pad MODBUS/JBUS		

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 Filter operating range Filtering coefficient Filter action	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 (kVAh)		
Transformer ratio	For CT up to 5000 A		

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
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General Specifications

Operating temperature	0° to +50°C (32° to 122°F) (R.H. < 90% non-condensing)	Safety standards	IEC 61010-1, 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	
Insulation	4000 Vrms between all inputs/ outputs to ground	Dimensions	6 DIN modules, 58.5 x 89 x 107 mm
Dielectric strength	4000 Vrms for 1 minute	Material	ABS, self-extinguishing: UL 94 V-0
Noise rejection CMRR	100 dB, 48 to 62 Hz	Degree of protection	Front: IP40
EMC	EN 50081-2, EN 50082-2	Weight	Approx. 500 g (packing included)
		Approval	CE

Mode of Operation

Waveform of the signals that can be measured

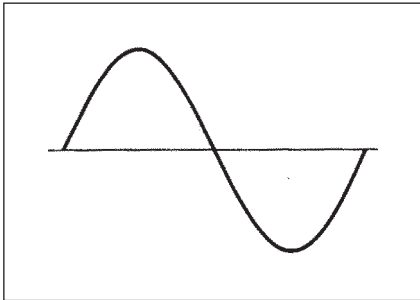


Figure G
Sine wave, undistorted
 Fundamental content 100%
 Harmonic content 0%
 $A_{rms} = 1.1107 | \bar{A} |$

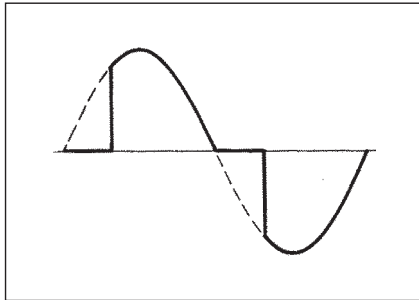


Figure H
Sine wave, indented
 Fundamental content 10...100%
 Harmonic content 0...90%
 Frequency spectrum 3rd to 16th harmonic
 Required result: additional error < 1%

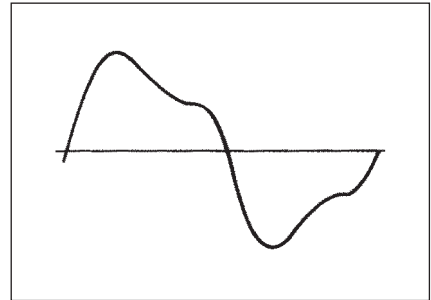
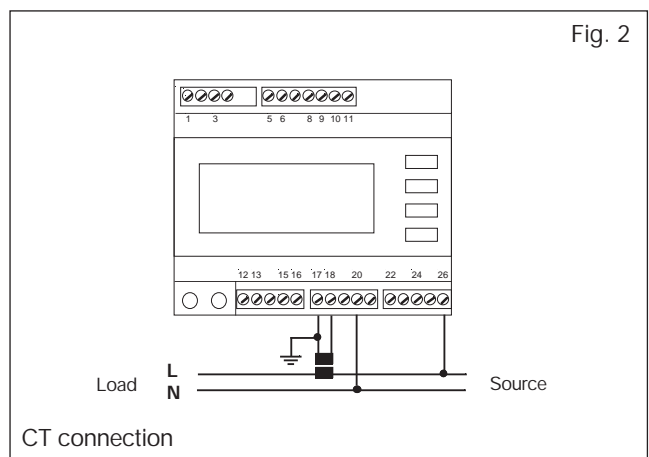
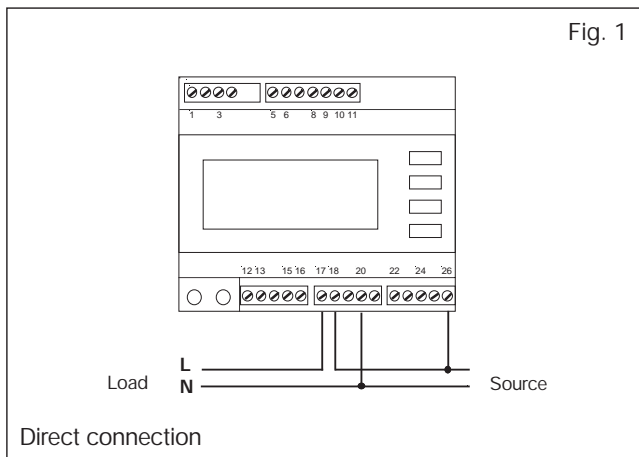


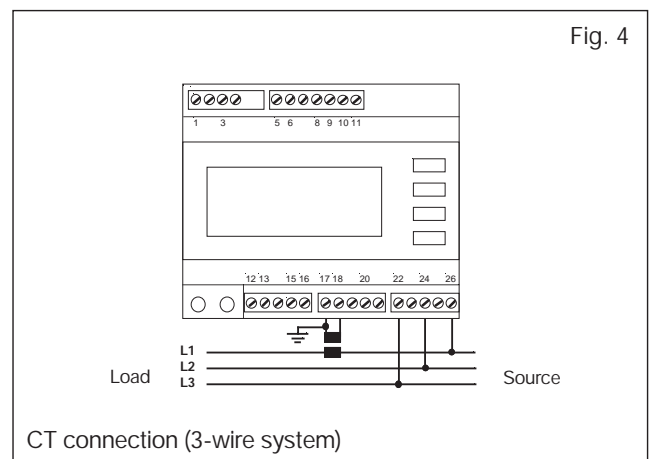
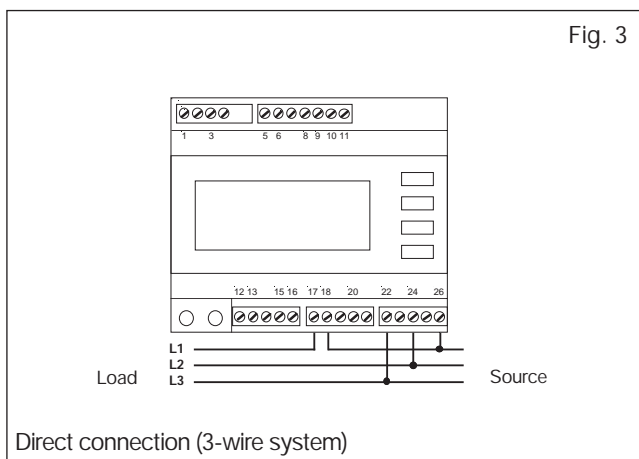
Figure I
Sine wave, distorted
 Fundamental content 70...90%
 Harmonic content 10...30%
 Frequency spectrum 3rd to 15th harmonic
 Required result: additional error < 0.5%

Wiring Diagrams

Single phase input connections

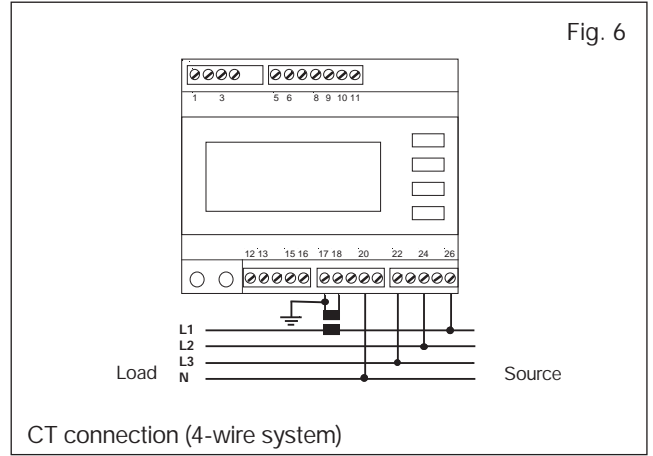
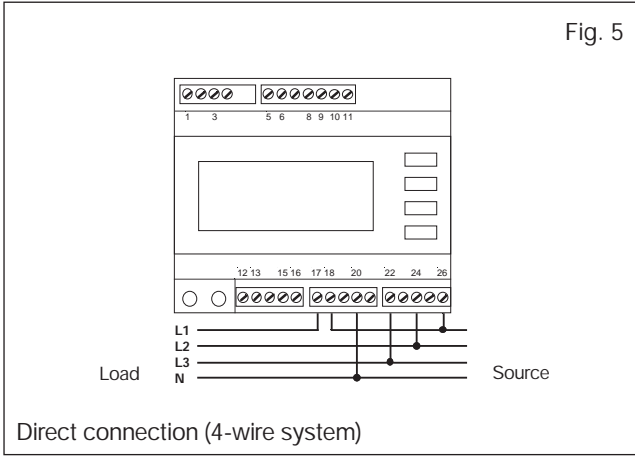


Three phase/3-wire input connections - Balanced loads

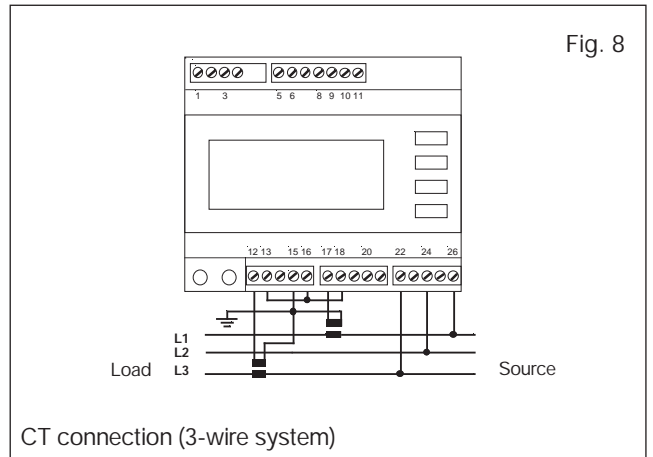
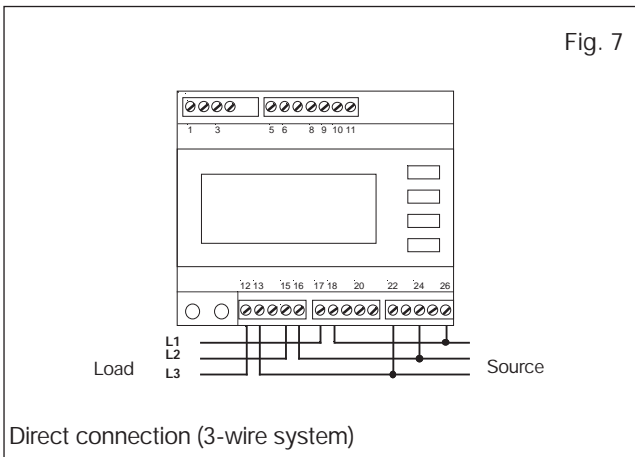


Wiring Diagrams (cont.)

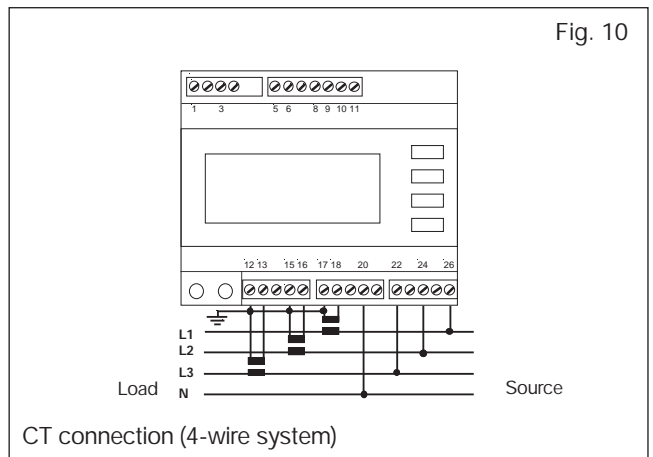
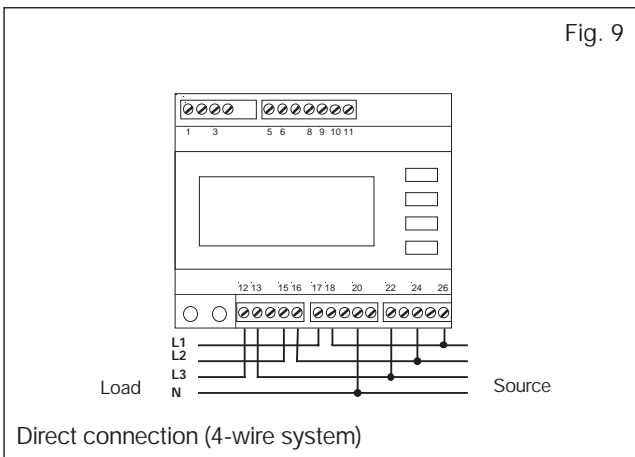
Three phase, 4-wire input connections - Balanced loads



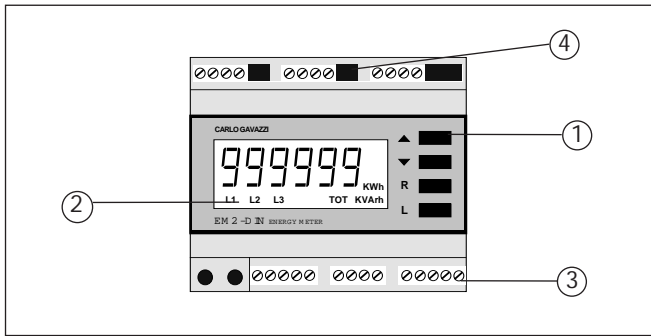
Three-phase, 3-wire input ARON connections - Unbalanced load



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

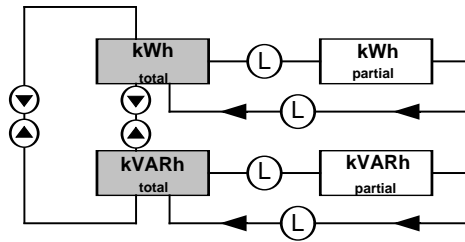
- 6-digit (maximum read-out 999999).
- Alphanumeric indication by means of LCD display for:
 - Displaying the configuration parameters
 - All the measured variables.

3. Connection terminal blocks

4. Dip-switch

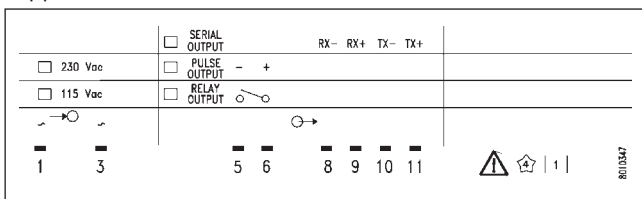
- For the selection of 2/4 wire connection, line biasing and/or line termination (only in case of RS 485 option)

Sequence of the variables on the display

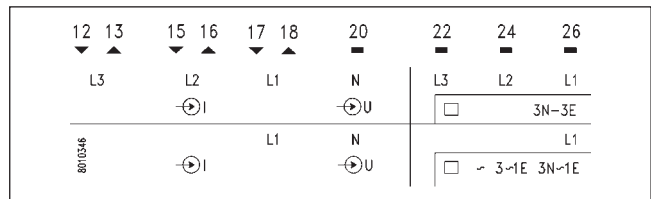


Terminal boards

Upper terminal board



Lower terminal board



Dimensions

