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

- 6-dgt µP-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

µP-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-DINAV53D XX

- Model
- Range code
- Measurement
- Power supply
- Output

Type Selection

Range code

AV5: 250/433 VAC - 5 AAC (max. 300 V (L-N)/ 520 V (L-L) - 6 A)

Measurement

3: One phase, three-phase system, 3 or 4 wires, balanced load; three phase system, 3 or 4 wires, unbalanced load

Power supply

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)

Output

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 ±5°C, R.H. ≤ 60%)	±1% rdg (hour time base):
Additional errors	
Humidity	<0.3% f.s., 60% to 90% R.H.
Power supply	±0.5% RDG, -15 +10% p.s.
Magnetic field	< 0.1% f.s. @ 400 A/m
Rated input	
Current	2 inputs (one/three-phase balanced load) 6 inputs (one/three-phase unbalanced load)
Voltage	2 inputs (one/three-phase balanced load) 4 inputs (one/three-phase unbalanced load)
Insulation	among the voltage and the current inputs: 2000 Vrms; among the current inputs: 2000 Vrms

Temperature drift	±250 ppm/°C
Display	Backlighted LCD, h: 13mm, 6-dgt
Decimal point position	Automatic selection according to the counted energy. Max resolution: 1 Wh/1 VArh Min. resolution: 1 KWh/1 KVArh
Max. and min. indication	
Active energy	Max. 999999 min. –199999
Reactive energy	Max. 999999 min. 0
Sampling rate	3 times / second

Input Specifications (cont.)

Measurements	
Total energies	kWh, kVArh
Partial energies	kWh, kVArh
Measurement method	TRMS measurement of a distorted voltage/current wave Coupling type: Direct Crest factor: ≥ 3
Ranges (impedances)	
	250 V/433 V (≥1 MΩ) 5 AAC (≤ 0.3 VA / ≤ 0.1Ω)
Frequency range	48 to 62 Hz
Over-load protection	
Continuous: voltage/current	1.2 x rated input
For 1 s	
Voltage:	2 x rated input
Current:	20 x rated input

Keyboard	4 keys: "$\Delta\nabla$": - 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.

Output Specifications

Relay output	
(only with RS485 output)	
Type	Driven only by the serial communication
Contact Rating	1 x SPST (normally open) 2 A, 250 VAC/DC, 40 W/1200 VA 130.000 cycles
Insulation	By means of optocouplers, 4000 Vrms output to measuring input, 4000 Vrms output to supply input.
Serial output (on request)	
Type	RS422/RS485; Multidrop bidirectional (static and dynamic variables)
Connections	2 or 4 wires, max. distance 1200 m, termination and/or line bias by means of DIP-switches directly on the instrument
Adresses	255, selectable by key-pad
Protocol	MODBUS/JBUS

Data (bidirectional)	
Dynamic (reading only)	System variables: P, Q, cos φ, V_{L-L}, energies, Single phase variables: P_{L1}, Q_{L1}, Cos φ_{L1}, V_{L1-N}, I_{L1}, P_{L2}, Q_{L2}, Cos φ_{L2}, V_{L2-N}, I_{L2}, P_{L3}, Q_{L3}, Cos φ_{L3}, V_{L3-N}, I_{L3} For the accuracy information refer to WM2-DIN
Static (writing only)	All programming data, reset of energy: - partial kWh - partial kVArh - total kWh - total kVArh Stored energy (EEPROM) ≤ 999999 kWh ≤ 999999 kVArh
Data format	1-start bit, 8-data bit, no parity/even parity, 1 stop bit
Baud-rate	1200, 2400, 4800 and 9600 selectable bauds
Insulation	By means of optocouplers, 4000 Vrms output to measuring inputs 4000 Vrms output to supply input

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Software Functions

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

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

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Mode of Operation

Waveform of the signals that can be measured

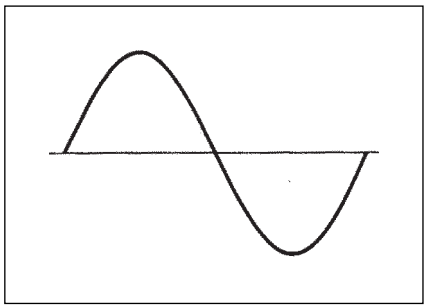


Figure G
Sine wave, undistorted
Fundamental content 100%
Harmonic content 0%
A_{rms} = 1.1107 I $\overline{A}$ I

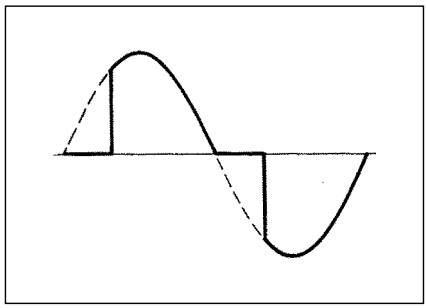


Figure H
Sine wave, indented
Fundamental content 10...100%
Harmonic content 0...90%
Frequency spectrum 3rd to 16th harmonic
Required result: additional error < 1%

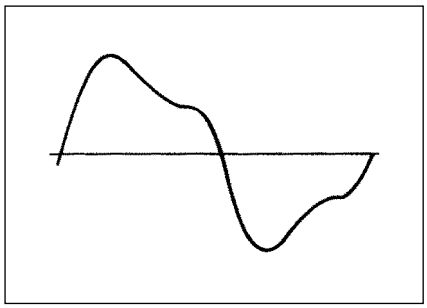
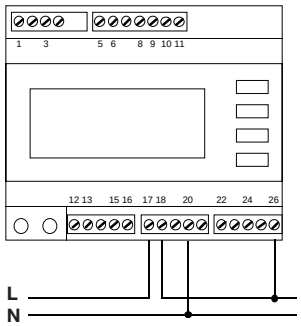


Figure I
Sine wave, distorted
Fundamental content 70...90%
Harmonic content 10...30%
Frequency spectrum 3rd to 15th harmonic
Required result: additional error < 0.5%

Wiring Diagrams

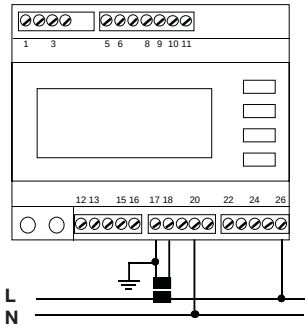
Single phase input connections

Fig. 2



Direct connection

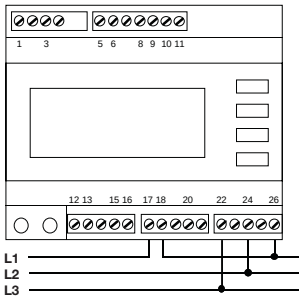
Fig. 1



CT connection

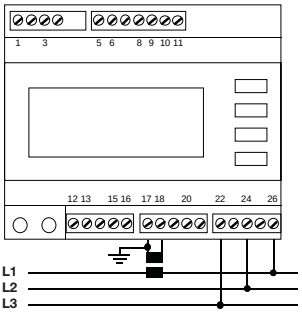
Three phase/3-wire input connections - Balanced loads

Fig. 3



Direct connection (3-wire system)

Fig. 4



CT connection (3-wire system)

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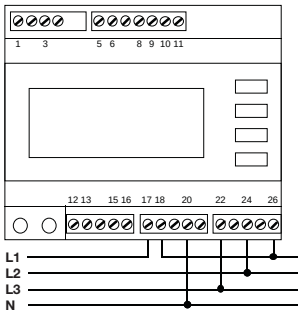
Wiring Diagrams (cont.)

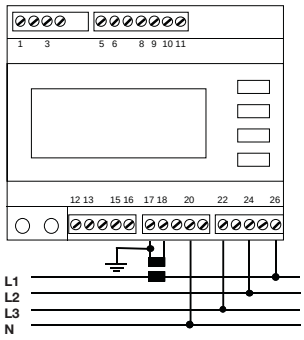
Three phase, 4-wire input connections - Balanced loads

Fig. 5



Direct connection (4-wire system)

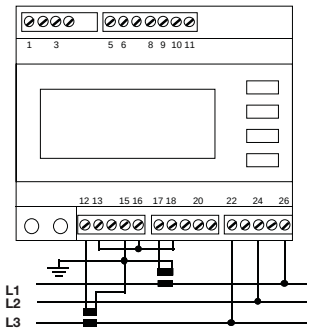
Fig. 6



CT connection (4-wire system)

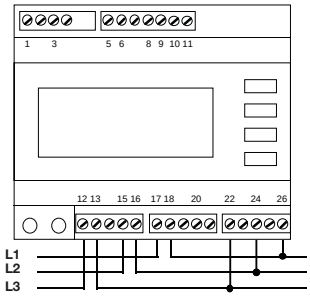
Three-phase, 3-wire input ARON connections - Unbalanced load

Fig. 7



CT connection (3-wire system)

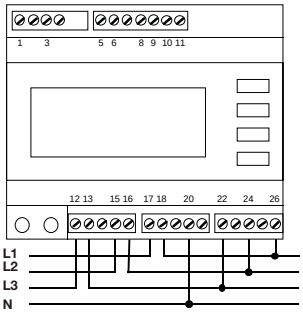
Fig. 8



Direct connection (3-wire system)

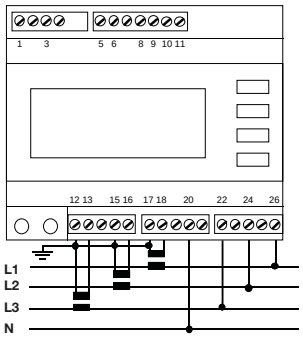
Three phase, 4-wire input connections - Unbalanced load

Fig. 9



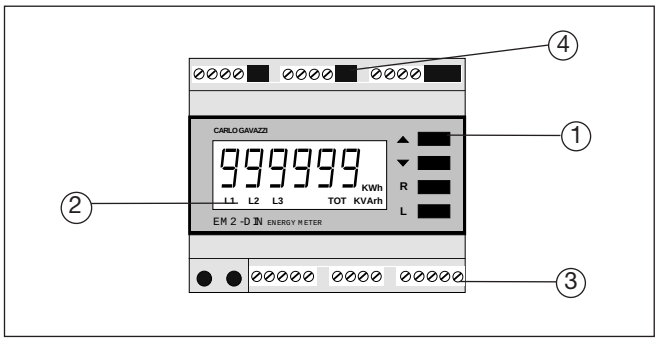
Direct connection (4-wire system)

Fig. 10



CT connection (4-wire system)

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).

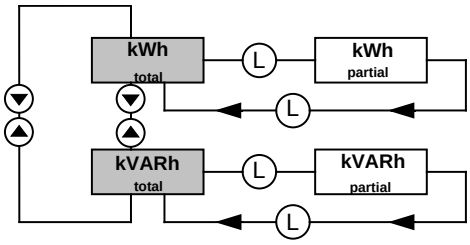
2. **Display**
   - 6-digit (maximum read-out 999999).

   Alphanumeric indication by means of LCD display for:
   - Displaying the configuration parameters
   - All the measured variables.

3. **Connection terminal blocks**

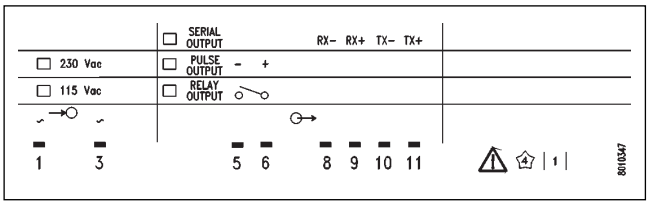
4. **Dip-switch**
   - For the selection of 2/4 wire connection, line biasing and/or line termination (only in case of RS 485 option)

Sequence of the variables on the display

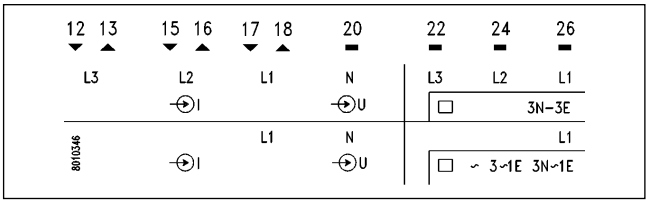


Terminal boards

Upper terminal board



Lower terminal board



Dimensions