Energy Management
Energy meters
Type EM2-DIN

- **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
System
Power supply
Output

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]	**XX:**	No output (standard)
				B:	48 VAC, -15%+10%, 50/60 Hz [1]	**XS:**	Serial output, RS 485 multidrop bidirectional with control relay [1]
				C:	115 VAC, -15% +10%, 50/60 Hz [1]		
				D:	230 VAC, -15% +10%, 50/60 Hz (standard)		

[1] On request

Input Specifications

Accuracy (48 to 62 Hz) (@ 25°C ±5°C, R.H. ≤ 60%)	±1% RDG (kWh) ±2% RDG (kvarh) (hour time base) (PF≥0.7L/C, 0 to1.2In, 0.5 to 1.2Un)
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 (the meters are automatically reset when the values reach 14999*CT ratio).
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	4 wires, max. distance 1200 m, termination and/or line bias by means of DIP-switches directly on the instrument
Addresses	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}, 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
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

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 50081-2, EN 50082-2
Safety standards	IEC 61010-1, 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)
Approval	CE

Mode of Operation

Waveform of the signals that can be measured

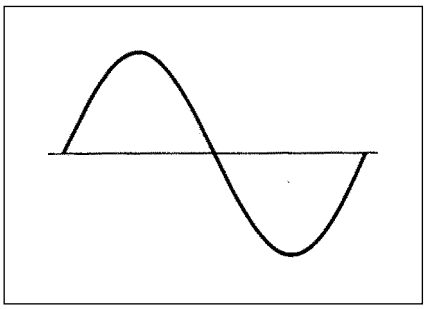


Figure G
Sine wave, undistorted

Fundamental content	100%
Harmonic content	0%
A_{rms} =	1.1107 I $\overline{A}$ I

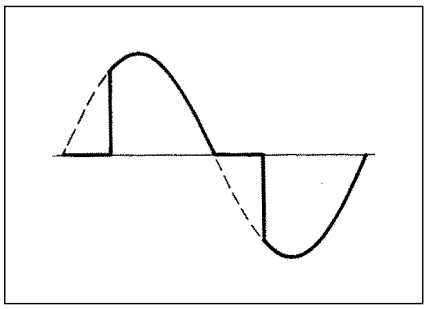


Figure H
Sine wave, indented

Fundamental content	10...100%
Harmonic content	0...90%

Frequency spectrum 3rd to 16th harmonic
Required result: additional error < 1%

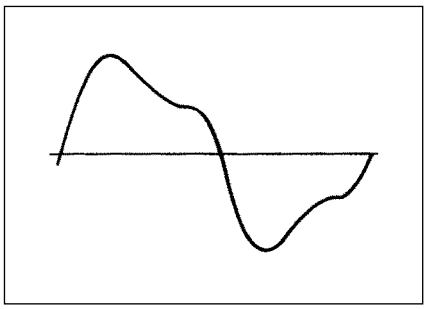


Figure I
Sine wave, distorted

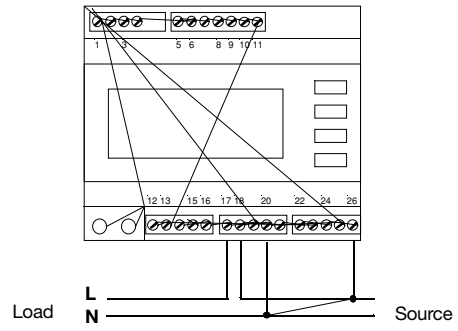
Fundamental content	70...90%
Harmonic content	10...30%

Frequency spectrum 3rd to 15th harmonic
Required result: additional error < 0.5%

Wiring Diagrams

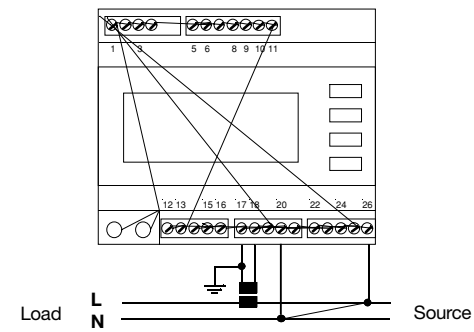
Single phase input connections

Fig. 1



Direct connection

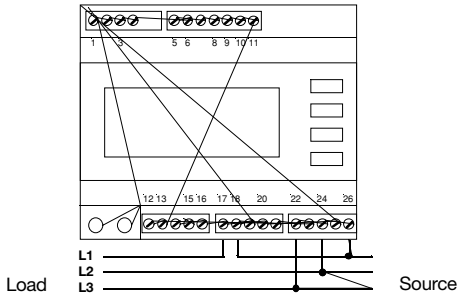
Fig. 2



CT connection

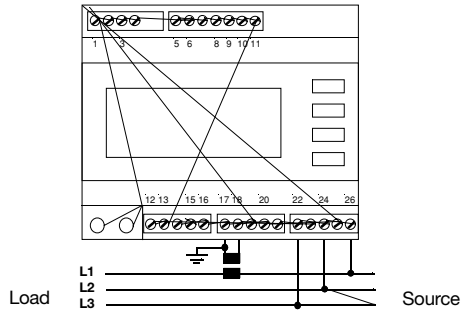
Three phase/3-wire input connections - Balanced loads

Fig. 3



Direct connection (3-wire system)

Fig. 4

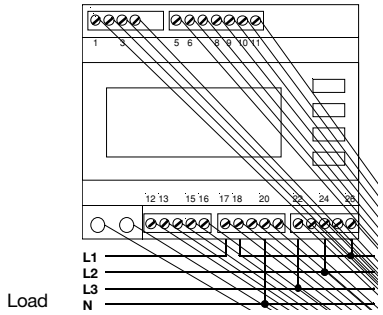


CT connection (3-wire system)

Wiring Diagrams (cont.)

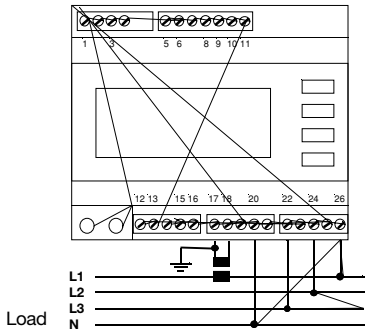
Three phase, 4-wire input connections - Balanced loads

Fig. 5



Direct connection (4-wire system)

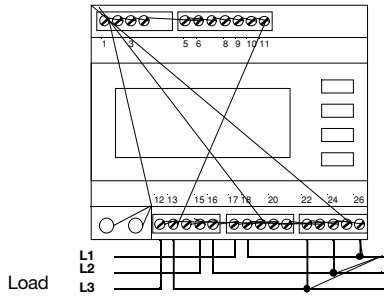
Fig. 6



CT connection (4-wire system)

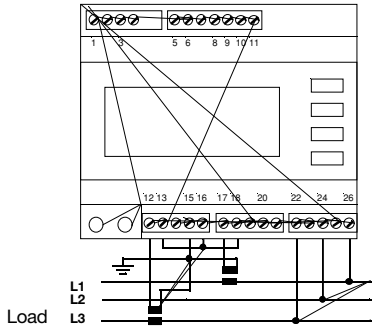
Three-phase, 3-wire input ARON connections - Unbalanced load

Fig. 7



Direct connection (3-wire system)

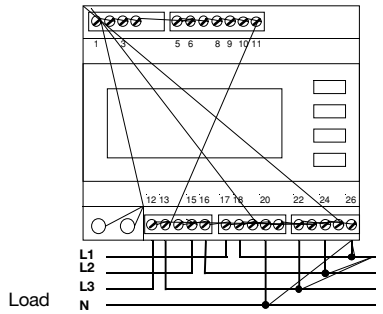
Fig. 8



CT connection (3-wire system)

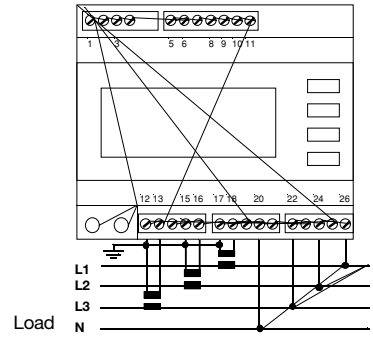
Three phase, 4-wire input connections - Unbalanced load

Fig. 9



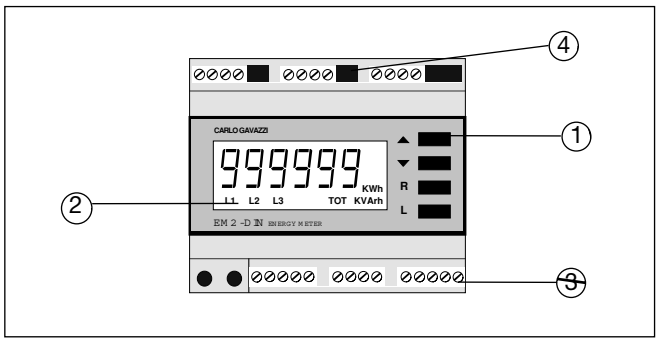
Direct connection (4-wire system)

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).

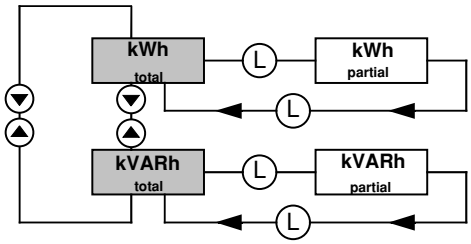
2. **Display**
   - 6-digit (maximum read-out 999999).

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

3. **Connection terminal blocks**

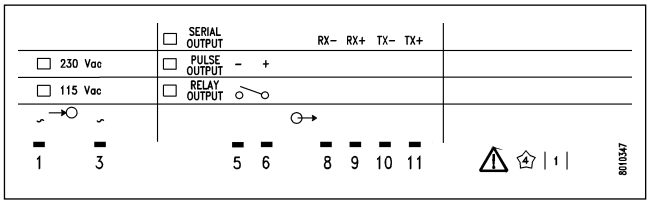
4. **Dip-switch**
   - For the selection of 2/4 wire connection, line biasing and/or line termination (only in case of RS 485 option)

Sequence of the variables on the display

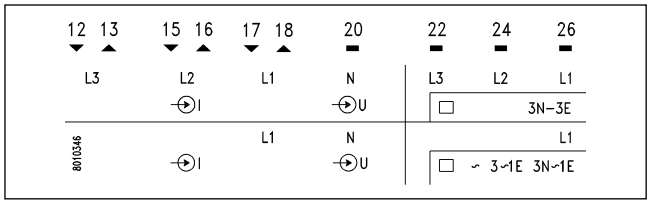


Terminal boards

Upper terminal board



Lower terminal board



Dimensions