

Energy Management Energy Analyzer Type EM26 96

CARLO GAVAZZI



- M-bus communication by means of VMU-B adapter
- Application adaptable display and programming procedure (Easyprog function)
- Easy connections management
- Certified according to MID Directive (option PF only): see "how to order" below
- Other versions available (not certified, option XX): see "how to order" on the next page

- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Class 2 (kvarh) according to EN62053-23
- Accuracy $\pm 0.5\%$ RDG (current/voltage)
- Dual colour backlight: no backlight, blue or white (selectable)
- Energy analyzer
- Instantaneous variables readout: 4 DGT
- Energies/gas/water readout: 8 DGT
- System variables: VLL, VLN, Admd, VA, VAdmd, VAdmd max, W, Wdmd, Wdmd max, var, PF, Hz, Phase-sequence.
- Single phase variables: VLL, VLN, A, VA, W, var, PF
- Energy measurements: total and partial kWh and kvarh or based on 4 different tariffs; single phase measurements
- Gas, cold water, hot water, kWh remote heating measurements
- Hour counter (6+2 DGT)
- Harmonic analysis (FFT) up to 15th harmonic (current/voltage)
- TRMS measurements of distorted sine waves (voltages/currents)
- Universal power supply: 90 to 260AC/VDC
- 3 digital inputs for tariff selection, DMD synchron or gas/water (hot-cold) and remote heating metering (on request)
- 3 digital outputs for pulses or for alarms or as a mix of them (on request)
- Front dimensions: 96x96mm
- Protection degree (front): IP50
- RS485 serial output (on request) (MODBUS-RTU), iFIX SCADA compatibility

Product Description

Three-phase energy analyzer with built-in configuration joystick and LCD data displaying; particularly indicated for active and reactive energy metering

and for cost allocation. Housing for panel mounting with IP50 (front) protection degree. External Current and potential transformers connection. Moreover

the meter can be provided with digital outputs that can be used: for pulses proportional to the active and reactive energy being measured or for alarm outputs,

or for remote control. RS485 communication port and 3 digital inputs are available as an option.



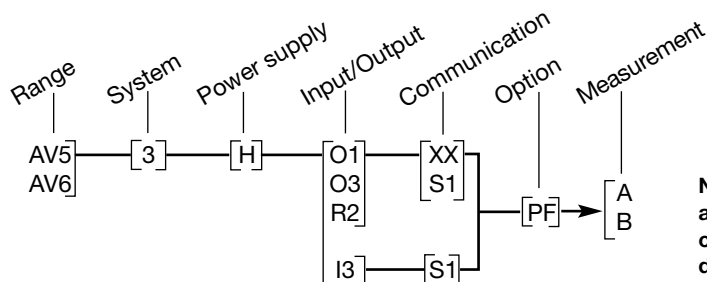
Certified according to MID Directive, Annex "B" + Annex "D" for legal metrology relevant to active electrical energy meters (see Annex MI-003 of MID). Can be used for fiscal (legal) metrology. Only the total positive energy meter is certified according to MID.

How to order EM26 96 AV5 3 H O3 S1 PF A

Model	
Range code	
System	
Power supply	
Input/Output	
Communication	
Options	
Measurement	

Type Selection

Range codes	System	Communication	Options
AV5: 230 V _{LN} /400V _{LL} 1/5(10)A V _{LN} : 160 V to 480 V _{LN} V _{LL} : 277 V to 830 V _{LL} AV6: 120 V _{LN} /208V _{LL} 1/5(10)A V _{LN} : 40 V to 144 V _{LN} V _{LL} : 70 V to 250 V _{LL}	3: 3-phase, 4-wire; Power supply H: 90 to 260VAC/DC (48 to 62Hz)	XX: none S1: RS485 port Input/Output O1: single open collector type (pulse or alarm) O3: 3 open collector type (mixed combination of pulse, alarm and/or remote output) R2: dual relay type (functions as per "O3") I3: 3 digital inputs for tariff selection or Gas/water/energy/remote heating metering	PF: Certified according to MID Directive, Annex "B" + Annex "D" for legal metrology relevant to active electrical energy meters (see Annex MI-003 of MID). Can be used for fiscal (legal) metrology. Measurement A: The power is always integrated (both in case of positive and negative power) and the total energy meter is certified according to MID. B: Only the total positive energy meter is certified according to MID. The negative energy meter is not certified according to MID.



NOTE: please check the availability of the needed code on the verification path diagram on left before order.



STANDARD

Not certified according to MID directive. Cannot be used for fiscal (legal) metrology.

How to order **EM26 96 AV5 3 H O3 S1 XX**

Model

Range code

System

Power supply

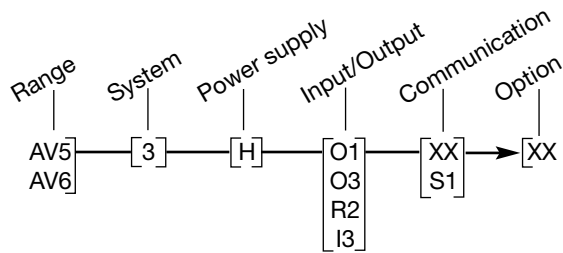
Input/Output

Communication

Options

Type Selection

Range codes	System	Power supply	Input/Output
AV5: 230 V _{LN} /400V _{LL} 1/5(10)A V _{LN} : 160 V to 480 V _{LN} V _{LL} : 277 V to 830 V _{LL}	3: balanced and unbalanced load: 3-phase, 4-wire; 3-phase, 3-wire; 2-phase, 3-wire; 1-phase, 2-wire	H: 90 to 260VAC/DC (48 to 62Hz)	O1: single open collector type (pulse or alarm) O3: 3 open collector type (mixed combination of pulse, alarm and/or remote output) R2: dual relay type (functions as per "O3") I3: 3 digital inputs for tariff selection or Gas/water/energy/remote heating metering
AV6: 120 V _{LN} /208V _{LL} 1/5(10)A V _{LN} : 40 V to 144 V _{LN} V _{LL} : 70 V to 250 V _{LL}		Communication	
		XX: none S1: RS485 port	
			Options
			XX: none



NOTE: please check the availability of the needed code on the verification path tables on left before order.

Input specifications

Rated inputs Current type Current range (by CT) Voltage by direct connection or VT/PT	System type: 3 Galvanic insulation by means of built-in CT's AV5 and AV6: 1/5(10)A AV5: 230 V _{LN} /400V _{LL} ; AV6: 120 V _{LN} /208V _{LL}	Max. and Min. indication	exceeding the "Continuous inputs overload" (maximum measurement capacity) Max. instantaneous variables: 9999; energies: 99 999 999. Min. instantaneous variables: 0; energies 0.00
Accuracy (Display + RS485) (@25°C ±5°C, R.H. ≤60%, 50±5Hz/60±5Hz) AV5 model AV6 model Current AV5, AV6 models Phase-neutral voltage Phase-phase voltage Frequency Active and Apparent power Power Factor Reactive power Active Energy Reactive Energy AV5, AV6 models Harmonic distortion	Ib: see below, Un: see below In: 5A, Imax: 10A; Un: 160 to 480VLN (277 to 830VLL) In: 5A, Imax: 10A; Un: 40 to 144VLN (70 to 250VLL) From 0.002In to 0.2In: ±(0.5% RDG +3DGT) From 0.2In to Imax: ±(0.5% RDG +1DGT). In the range Un: ±(0,5% RDG +1DGT) In the range Un: ±(1% RDG +1DGT) ±0.1Hz (50±5Hz/60±5Hz) ±(1%RDG +2DGT) ±[0.001+1%(1.000 - "PF RDG")] ±(2%RDG +2DGT) Class 1 according to EN62053-21; class B according to EN50470-3. Class 2 according to EN62053-23 In: 5A, Imax: 10A; 0.1 In: 0.5A. Start up current: 10mA THD up to 15th harmonic ±3% reading	LEDs	Red LED (Energy consumption), according to EN50470-3, EN62052-11 0.001 kWh/kvarh by pulse if CT ratio by VT ratio is ≤7; 0.01 kWh/kvarh by pulse if CT ratio by VT ratio is > 7.1 ≤ 70.0; 0.1 kWh/kvarh pulse if CT ratio by VT ratio is > 70.1 ≤ 700.0; 1 kWh/kvarh by pulse if CT ratio by VT ratio is > 700.1; 1000 imp./kWh/kvarh. Max frequency: 16Hz
Energy additional errors Influence quantities	According to EN62053-21, EN62053-23	Measurements	See "List of the variables that can be connected to:" TRMS measurements of distorted wave forms. By means of external CT's
Temperature drift	≤200ppm/°C	Method	
Sampling rate	1600 samples/s @ 50Hz 1900 samples/s @ 60Hz	Coupling type	
Display refresh time	750 msec	Crest factor	≤3 (15A max. peak)
Display	3 lines (1 x 8 DGT; 2 x 4 DGT) LCD, h 9.5mm, dual colour backlight (selectable)	Current Overloads	
Type	LCD, h 9.5mm, dual colour backlight (selectable)	Continuous	10A, @ 50Hz
Instantaneous variables read-out	4 DGT	For 500ms	200A, @ 50Hz
Energies	Exported: Total 6+1DGT or 7DGT (with "- sign). Imported: 6+2, 7+1 or 8DGT	Voltage Overloads	
Overload status	EEEE indication when the value being measured is	Continuous	1.2 Un
		For 500ms	2 Un
		Input impedance	
		208VL-L (AV6)	>1MΩ
		400VL-L (AV5)	>1MΩ
		1/5(10) A (AV5-AV6)	< 0.3VA
		Frequency	50±5Hz/60±5Hz
		Joystick	For variable selection: programming of the instrument working parameters and Wdmd max reset

Output specifications

Digital outputs		Relay output	
Pulse type		Physical outputs	Max. 2
Number of outputs	Up to 3, independent. Programmable from 0.001 to 10.00 kWh/kvarh per pulse.	Purpose	For alarm output, pulse output or remote control.
Type	Outputs connectable to the energy meters (Wh/varh)	Type	Relay, SPST type AC 1-5A @ 250VAC DC 12-5A @ 24VDC AC 15-1.5A @ 250VAC DC 13-1.5A @ 24VDC
Pulse duration	T _{ON} selectable (30 ms or 100 ms) according to EN62053-31 T _{OFF} : ≥120ms, according to EN62052-31	Insulation	4000 VRMS outputs to measuring input. 4000 VRMS outputs to power supply input.
Alarm type		RS485	Multidrop, bidirectional (static and dynamic variables) 2-wire Max. distance 1000m (without amplifier) Termination directly on the instrument 247, selectable by means of the front joystick MODBUS/JBUS (RTU)
Number of outputs	Up to 3, independent	Type	
Alarm modes	Up alarm, down alarm (see the table "List of the variables that can be connected to")	Connections	
Set-point adjustment	From 0 to 100% of the display scale	Addresses	
Hysteresis	From 0 to full scale	Protocol	
On-time delay	0 to 255s	Data (bidirectional)	
Output status	Selectable: normally de-energized or normally energized	Dynamic (reading only)	
Min. response time	≤ 700ms, filters excluded.	Static (reading and writing)	
Remote control	Set-point on-time delay: "0 s"	Data format	
	The digital outputs status can be managed by means of serial communication RS485, if programmed as remote.	Baud-rate	
Note	The 3 digital outputs can also work as a triple pulse output, triple alarm output, or in any other combination.	Driver input capability	
Static output		Insulation	System and phase variables: see table "List of variables..." All the configuration parameters. 1 start bit, 8 data bit, no parity, 1 stop bit 4800, 9600 bits/s 1/5 unit load Maximum 160 transceivers on the same bus, which can be expanded with signal amplifiers. By means of optocouplers, 4000 VRMS output to measuring input. 4000 VRMS output to power supply input
Physical outputs	Max. 3		
Purpose	For pulse output, alarm output or remote control.		
Signal	V _{ON} 1.2 VDC/ max. 100 mA V _{OFF} 30 VDC max.		
Insulation	By means of optocouplers, 4000 VRMS output to measuring inputs, 4000 VRMS output to power supply input.		

Digital input specifications

Number of inputs	3	Working modes	Selectable: • total and partial energy meters (kWh and kvarh) managed by time periods (t1-t2-t3-t4), W dmd synchronisation (the synchronisation is made every time the tariff changes) and GAS (m ³) or WATER (hot-cold m ³) or
Input frequency	20Hz max, duty cycle 50%		
Prescaler adjustment	From 0.001 to 999.9 m ³ or kWh/pulse		
Contact measuring voltage	5VDC +/- 5%		
Contact measuring current	10mA max		
Input impedance	680Ω		
Contact resistance	≤100Ω, closed contact ≥500kΩ, open contact		

Digital input specifications (cont.)

remote heating (kWh) meters or external kWh meter;
 • total and partial energy meters (kWh and kvarh) managed by time periods (t1-t2), W dmd synchronisation (the synchronisation is made independently of the tariff selection) and GAS (m³) or WATER (hot-cold m³) or remote heating (kWh) meters or external kWh meter;
 • total energy (kWh, kvarh) and GAS, WATER (hot-cold m³) and remote heating meters or external kWh meter, 3 choices only.

Note

Insulation

The energy metering is only made by means of the analogue inputs.
 By means of optocouplers, 4000 VRMS digital inputs to measuring inputs.
 4000 VRMS digital inputs to power supply input.

Software functions

Password	Numeric code of max. 4 digits; 2 protection levels of the programming data: Password "0", no protection;		For EN50470-3 compliant applications the maximum power being measured is 25 MW.
1st level	Password "0", no protection;		
2nd level	Password from 1 to 9999, all data are protected		
System selection		Filter	
System 3-Pn unbalanced load	3-phase (4-wire); 3-phase (3-wire).	Operating range	0 to 100% of the input display scale
System 3-P 1 balanced load	3-phase (3-wire) one current and 3-phase to phase voltage measurements. 3-phase (4-wire) one current and one-phase (L1) to neutral voltage measurement.	Filtering coefficient	1 to 32
System 2-P	2-phase (3-wire).	Filter action	Measurements, serial output (fundamental variables: V, A, W and their derived ones).
System 1-P	1-phase (2-wire).		
Transformer ratio		Displaying	Up to 3 variables per page See « Display pages » 8 different set of variables available (see « Display pages ») according to the application being selected
VT (PT)	1.0 to 999.9 / 1000 to 6000.	Alarm highlight	In case of alarm and if the relevant function is enabled, the display changes the colour alternatively from white backlight to blue backlight and vice versa.
CT	1.0 to 999.9 / 1000 to 9999 / 10.00k to 60.00k. The maximum power being measured cannot exceed 210 MW (calculated as maximum input voltage and current, see the "Accuracy" paragraph (on page 2). The maximum VT by CT ratio is 48600. If the currents and/or voltages being measured exceed their maximum limits, the display shows the error message "EEEE".	Reset	By means of the front joystick: - dmd and max. dmd; - total energies and gas/water: kWh, kvarh; - partial energies and tariffs: kWh, kvarh
		Harmonic analysis	Up to the 15th harmonics on single current and voltage



Software functions (cont.)

Easy connection function

For all the display selections, both energy and power measurements are independent of the current direction. The displayed energy is always “imported” with the only exception of “F” and “H” types (see “display pages” table).

For these latter selections the energies can be either “imported” or “exported” depending on the current direction.

General specifications

Operating temperature	-25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C) according to EN62053-21 and EN62053-23	Immunity to conducted disturbances	10V/m from 150KHz to 80MHz
Storage temperature	-30°C to +70°C (-22°F to 158°F) (R.H. < 90% non-condensing @ 40°C) according to EN62053-21 and EN62053-23	Surge	On current and voltage measuring inputs circuit: 4kV; According to CISPR 22
Installation category	Cat. III (IEC60664, EN60664)	Radio frequency suppression	According to CISPR 22
Insulation (for 1 minute)	4000 VRMS between measuring inputs and power supply. 4000 VRMS between power supply and RS485 digital outputs	Standard compliance	
Dielectric strength	4000 VRMS for 1 minute	Safety	IEC60664, IEC61010-1 EN60664, EN61010-1 EN62052-11
Noise rejection CMRR	100 dB, 48 to 62 Hz	Metrology	EN62053-21, EN50470-3, EN62053-23.
EMC	According to EN62052-11	Pulse output Approvals	DIN43864, IEC62053-31 CE, cULus listed, MID (PF option only)
Electrostatic discharges	15kV air discharge;	Connections	Screw-type
Immunity to irradiated	Test with current: 10V/m from 80 to 2000MHz;	Cable cross-section area	Max. 1.5 mm ²
Electromagnetic fields	Test without any current: 30V/m from 80 to 2000MHz;	Housing	
Burst	On current and voltage measuring inputs circuit: 4kV	Dimensions (WxHxD)	96 x 96 x 63 mm
		Material	ABS, self-extinguishing: UL 94 V-0
		Mounting	Panel mounting
		Protection degree	
		Front	IP50
		Screw terminals	IP20
		Weight	Approx. 400 g (packing included)

Power supply specifications

Auxiliary power supply

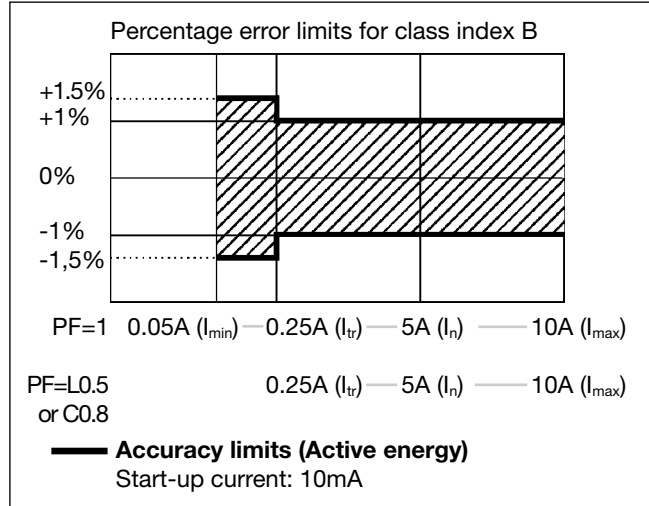
H: 90 to 260VAC/DC
(48 to 62Hz)

Power consumption

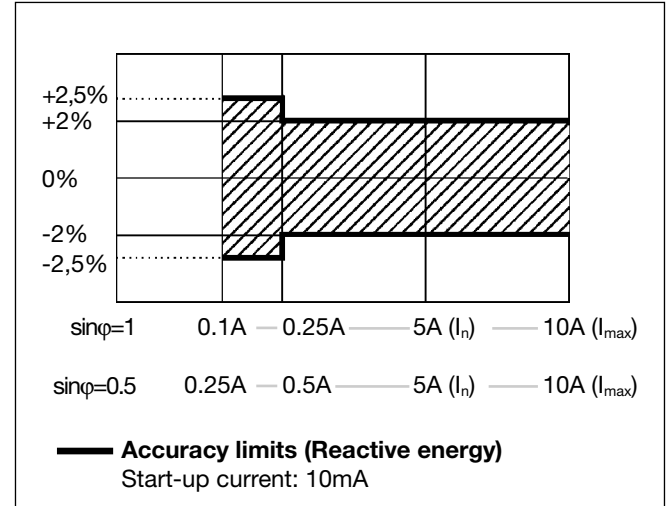
AC: 6VA
DC: 3.5 W

Accuracy (according to EN50470-3 and EN62053-23)

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



MID "Annex MI-003" compliance (PF option only)

Accuracy

AV5-AV6 models

Operating temperature

0.9 $U_n \leq U \leq 1.1 U_n$;
0.98 $f_n \leq f \leq 1.02 f_n$;
 f_n : 50Hz;
 $\cos\varphi$: 0.5 inductive to 0.8 capacitive.
Class B. I_{st} : 0.01A; $I_{\min}$: 0.05A; I_{tr} : 0.25A; I_n : 5A; $I_{\max}$: 10A

-25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C)

EMC compliance

Mechanical compliance

Protection degree

E2

M2

in order to achieve the protection against dust and water required by the norms harmonized to MID, the meter must be used only installed in IP51 (or better) cabinets.

Used calculation formulas

Phase variables

Instantaneous effective voltage

$$V_{1N} = \sqrt{\frac{1}{n} \cdot \sum_{i=1}^n (V_{1N})_i^2}$$

Instantaneous active power

$$W_1 = \frac{1}{n} \cdot \sum_{i=1}^n (V_{1N})_i \cdot (A_1)_i$$

Instantaneous power factor

$$PF = \frac{W_1}{VA_1}$$

Instantaneous effective current

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

Instantaneous apparent power

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

Instantaneous reactive power

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

Where: n = sample number

System variables

Equivalent three-phase voltage

$$V_{\Sigma} = \frac{V_1 + V_2 + V_3}{3}$$

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

$$\cos\varphi_{\Sigma} = \frac{W_{\Sigma}}{VA_{\Sigma}} \quad (\text{TPF})$$

Energy metering

$$kWh_1 = \int_{t_1}^{t_2} P_1(t) dt \cong \Delta t \sum_{j=n_1}^{n_2} P_1(j)$$

$$kvarh_1 = \int_{t_1}^{t_2} Q_1(t) dt \cong \Delta t \sum_{j=n_1}^{n_2} Q_1(j)$$

Where:

P= active power;

Q= reactive power;

t₁, t₂=starting and ending time points of consumption recording;

n_j= 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
- Alarm outputs (“max” variable”, “energies” and “hour counter” excluded)
- Pulse outputs (only positive “energies”)

No	Variable	1-phase system	2-phase system	3-ph. 4-wire balanced sys.	3-ph. 4-wire unbal. sys.	3 ph. 3-wire bal. sys.	3 ph. 3-wire unbal. sys.	Notes
1	V L-N sys		x	x	x	x	x	sys=system
2	V L1	x	x	x	x	x	x	
3	V L2	o	x	x	x	x	x	
4	V L3	o	o	x	x	x	x	
5	V L-L sys	o	x	x	x	x	x	sys=system
6	V L1-2	o	x	x	x	x	x	
7	V L2-3	o	o	x	x	x	x	
8	V L3-1	o	o	x	x	x	x	
9	A dmd max		x	x	x	x	x	Highest “dmd” current among the phases (1)
10	A L1	x	x	x	x	x	x	
11	A L2	o	x	x	x	x	x	
12	A L3	o	o	x	x	x	x	
13	VA sys	x	x	x	x	x	x	sys=system
14	VA sys dmd	x	x	x	x	x	x	sys=system (1)
15	VA L1	x	x	x	x	x	x	
16	VA L2	o	x	x	x	x	x	
17	VA L3	o	o	x	x	x	x	
18	var sys	x	x	x	x	x	x	sys=system
19	var L1	x	x	x	x	x	x	
20	var L2	o	x	x	x	x	x	
21	var L3	o	o	x	x	x	x	
22	W sys	x	x	x	x	x	x	sys=system
23	W sys dmd	x	x	x	x	x	x	sys=system (1)
24	W L1	x	x	x	x	x	x	
25	W L2	o	x	x	x	x	x	
26	W L3	o	o	x	x	x	x	
27	PF sys	x	x	x	x	x	x	
28	PF L1	x	x	x	x	x	x	
29	PF L2	o	x	x	x	x	x	
30	PF L3	o	o	x	x	x	x	
31	Hz	x	x	x	x	x	x	
32	Phase seq.	o	o	x	x	x	x	
33	Hours	x	x	x	x	x	x	
34	kWh (+)	x	x	x	x	x	x	Total or by user
35	kvarh (+)	x	x	x	x	x	x	Total or by user
36	kWh (+)	x	x	x	x	x	x	Partial or by tariff
37	kvarh (+)	x	x	x	x	x	x	Partial or by tariff
38	kWh (-)	x	x	x	x	x	x	Total
39	kvarh (-)	x	x	x	x	x	x	Total
40	m ³ Gas	x	x	x	x	x	x	Total
41	m ³ Cold H ₂ O	x	x	x	x	x	x	Total
42	m ³ Hot H ₂ O	x	x	x	x	x	x	Total
43	kWh H ₂ O	x	x	x	x	x	x	Total
44	kWh out	x	x	x	x	x	x	Total
45	A L1 THD	x	x	x	x	x	x	
46	A L2 THD	o	x	x	x	x	x	
47	A L3 THD	o	o	x	x	x	x	
48	V L1 THD	x	x	x	x	x	x	
49	V L2 THD	o	x	x	x	x	x	
50	V L3 THD	o	o	x	x	x	x	
51	V L1-2 THD	x	x	x	x	x	x	
52	V L2-3 THD	o	x	x	x	x	x	
53	V L3-1 THD	o	o	x	x	x	x	

(x) = available; (o) = not available (zero indication on the display); (1) Max. value with data storage.

Display pages

Sel. pos.	No	1st variable (1st line)	2nd variable (2nd line)	3rd variable (3rd line)	Note	Applications							
						A	B	C	D	E	F	G	H
	1	Total kWh (+)	W sys dmd	W sys dmd max		x	x	x		x	x	x	x
	2	kWh (+)	A dmd max	"PArT"	"PArT" = Partial kWh (+)						x	x	x
	3	Total kvarh (+)	VA sys dmd	VA sys dmd max			x	x			x	x	x
	4	kvarh (+)	VA sys	"PArT"	"PArT" = Partial kvarh (+)						x	x	x
	5	Totalizer 1 (2)	W sys	(text) (3)	(1)			x			x	x	x
	6	Totalizer 2 (2)	W sys	(text) (3)	(1)			x			x	x	x
	7	Totalizer 3 (2)	W sys	(text) (3)	(1)			x			x	x	x
	8	kWh (+)	t1 (text) (4)	W sys dmd	(1) digital input enabled			x			x	x	x
	9	kWh (+)	t2 (text) (4)	W sys dmd	(1) digital input enabled			x			x	x	x
	10	kWh (+)	t3 (text) (4)	W sys dmd	(1) digital input enabled			x			x	x	x
	11	kWh (+)	t4 (text) (4)	W sys dmd	(1) digital input enabled			x			x	x	x
	12	kvarh (+)	t1 (text) (4)	W sys dmd	(1) digital input enabled			x			x	x	x
	13	kvarh (+)	t2 (text) (4)	W sys dmd	(1) digital input enabled			x			x	x	x
	14	kvarh (+)	t3 (text) (4)	W sys dmd	(1) digital input enabled			x			x	x	x
	15	kvarh (+)	t4 (text) (4)	W sys dmd	(1) digital input enabled			x			x	x	x
	16	kWh (+) X	W X	User X	(1) specific function enabled				x				
	17	kWh (+) Y	W Y	User Y	(1) specific function enabled				x				
	18	kWh (+) Z	W Z	User Z	(1) specific function enabled				x				
	19	Total kvarh (-)	VA sys dmd	VA sys dmd max							x		x
	20	Total kWh (-)	W sys dmd	W sys dmd max						x	x		x
	21	Hours	W sys	PF sys						x	x	x	x
	22	Hours	var sys	PF sys						x	x	x	x
	23	W L1	W L2	W L3						x		x	x
	24	VA L1	VA L2	VA L3								x	x
	25	var L1	var L2	var L3								x	x
	26	PF L1	PF L2	PF L3								x	x
	27	V L1	V L2	V L3			x		x	x		x	x
	28	V L1-2	V L2-3	V L3-1								x	x
	29	A L1	A L2	A L3						x		x	x
	30	Phase seq.	V LN sys	Hz		x	x	x		x	x	x	x
	31	Phase seq.	V LL sys	Hz							x	x	x
	32	ASY	V LL sys	%							x	x	x
	33	ASY	V LN sys	%							x	x	x
	34	THD A1	THD A2	THD A3								x	x
	35	THD V1	THD V2	THD V3								x	x
	36	THD V12	THD V23	THD V 31								x	x
	37	Lot number	Year	DMD time		x	x	x	x	x	x	x	x
	38	CT ratio	Value of CT	System		x	x	x	x	x	x	x	x
	39	VT/PT ratio	Value of VT	Connection		x	x	x	x	x	x	x	x
	40 a	Alarm 1 status	Set-point value	Variable type				x		x		x	x
	41 a	Alarm 2 status	Set-point value	Variable type				x		x		x	x
	42 a	Alarm 3 status	Set-point value	Variable type				x		x		x	x
	40 b	Pulse 1 status	Output pulse			x	x	x	x	x	x	x	x
	41 b	Pulse 2 status	Output pulse			x	x	x	x	x	x	x	x
	42 b	Pulse 3 status	Output pulse			x	x	x	x	x	x	x	x
	43	Serial port	Address	RS485 status		x	x	x	x	x	x	x	x
0	Selector position which can be linked to any of the variable combinations listed above (No. from 1 to 36)												
1	Selector position which can be linked to any of the variable combinations listed above (No. from 1 to 36)												
2	Selector position which can be linked to any of the variable combinations listed above (No. from 1 to 36)												
3	Selector position which can be linked to any of the variable combinations listed above (No. from 1 to 36). In this position the front LED blinks proportionally to the reactive energy (kvarh) being measured												

(1) The page is available according to the enabled measurement. (2) m³ Gas, m³ Water, kWh remote heating, external kWh counter. (3) Hot or Cold (water), gas, ENE (external energy meter). (4) The active tariff is displayed with an "A" before the "t1-t2-t3-t4" symbols.

Additional available information on the display

Type	1st line	2nd line	3rd line
Meter information pag. 1	Firmware release	Year	Year of production
Meter information pag. 2	Pulse	LED	Value
Meter information pag. 3	System	2w, 3w or 4w	
Meter information pag. 4	CT ratio	Value of CT ratio	
Meter information pag. 5	PT ratio	Value of PT ratio	
In case of alarm output pag.6a	Alarm output 1, 2 or 3 status (ON/OFF)	Set-point value	Variable type
In case of pulse output pag. 6b	Pulse output 1,2 or 3 variable link (kWh/kvarh)	Output pulse weight (kWh/kvarh per pulse)	
In case of communication port pag.7	Serial port	Address	RS485 status (RX-TX)
In case of communication port pag.8	Secondary address (for M-bus protocol)	Sn	

List of selectable applications

	Description	Notes
A	Basic domestic **	Main energy metering
B	Shopping centres **	Main energy metering
C	Advanced domestic**	Main energy metering (total and based on tariff), gas and water metering
D	Multi domestic (also camping and marinas) * / **	Main energy metering (3 by single phase)
E	Solar *	Energy meter with some basic power analyzer functions
F	Industrial *	Main energy metering
G	Advanced industrial **	Energy metering and power analysis
H	Advanced industrial for power generation *	Complete energy metering and power analysis

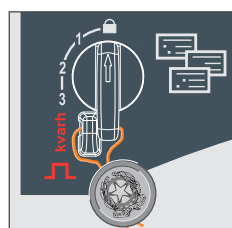
Notes: * Not available with option PF A. ** Not available with option PF B

Insulation between inputs and outputs

	Measuring Inputs	Relay output	Open collector outputs	Comm. port	Digital inputs	Auxiliary power supply
Measuring Inputs	-	4kV	4kV	4kV	4kV	4kV
Relay output	4kV	-	-	4kV	-	4kV
Open collector outputs	4kV	-	-	4kV	-	4kV
Comm. port	4kV	4kV	4kV	-	4kV	4kV
Digital inputs	4kV	-	-	4kV	-	4kV
Aux. power supply	4kV	4kV	4kV	4kV	4kV	-

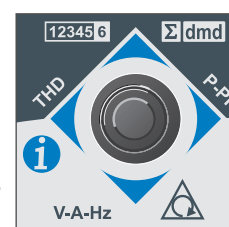
NOTE: all the models with auxiliary power supply have, mandatory, to be connected to external current transformers because the insulation among the current inputs is just functional (100VAC).

Tamper proof and display page selection



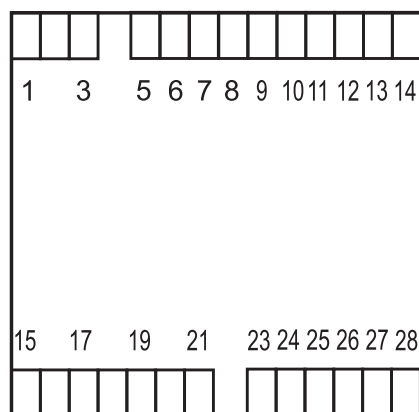
Lock of programming with seal.
Selection of up to 4 main pages
(programmable by the user).

Easy access to specific display pages.

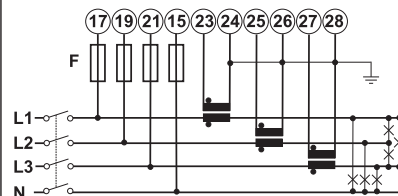


Wiring diagrams

System type selection: 3P.n

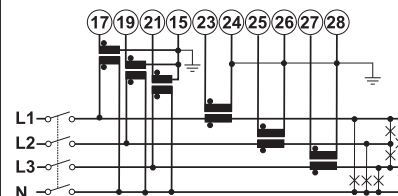


3-ph, 4-wire, unbalanced load **Fig. 1**



3-CT connection

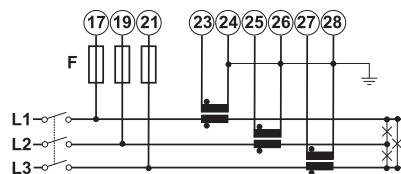
3-ph, 4-wire, unbalanced load **Fig. 2**



3-CT and 3-VT/PT connections

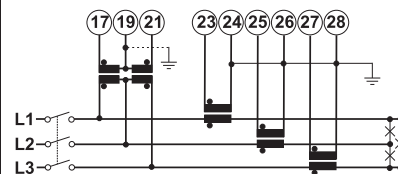
System type selection: 3P.n

3-ph, 3-wire, unbalanced load **Fig. 3**



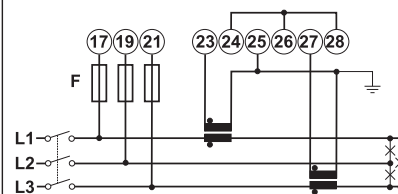
3-CT connection

3-ph, 3-wire, unbalanced load **Fig. 4**



3-CT and 2-VT/PT connections

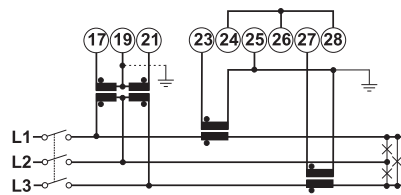
3-ph, 3-wire, unbalanced load **Fig. 5**



2-CT connections (ARON)

System type selection: 3P.1

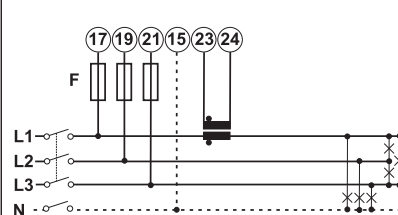
3-ph, 3-wire, unbalanced load **Fig. 6**



2-CT and 2-VT/PT connections ARON

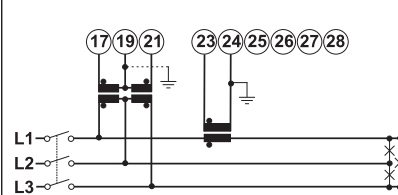
3-ph, 3-wire, balanced load **Fig. 7**

1-CT connection



NOTE: a 2-wire connection for voltage measurement is available across ⑮ and ⑰.

3-ph, 3-wire, balanced load **Fig. 8**

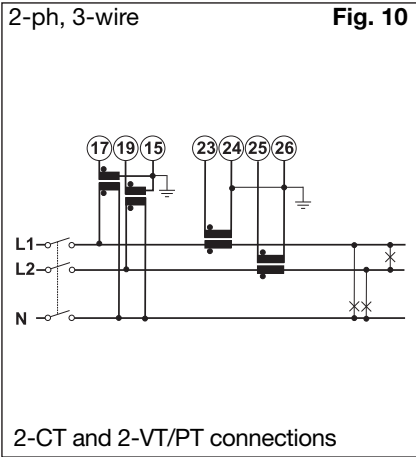
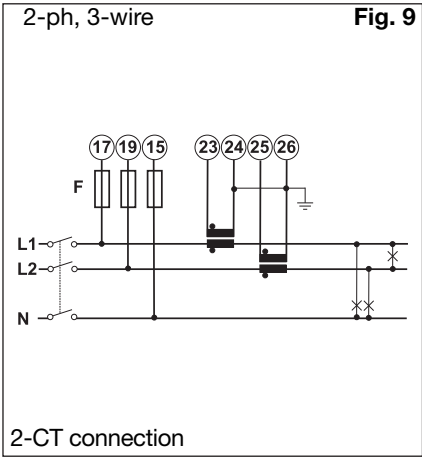


1-CT and 2-VT/PT connections

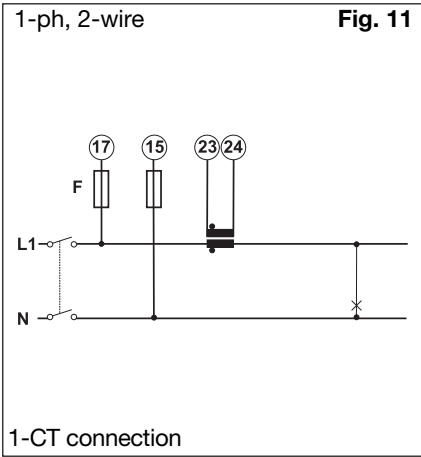


Wiring diagrams

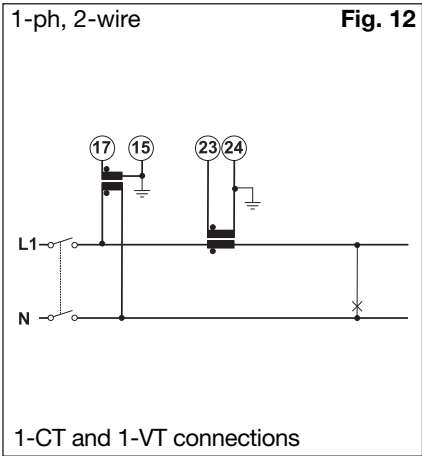
System type selection: 2P



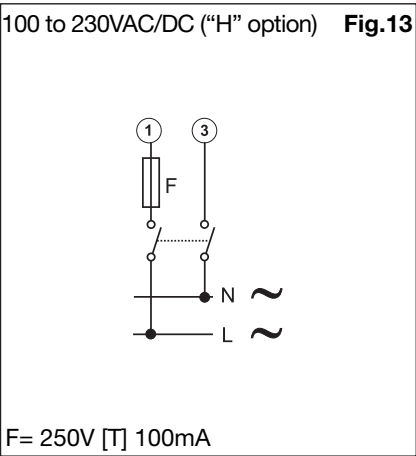
System type selection: 1P



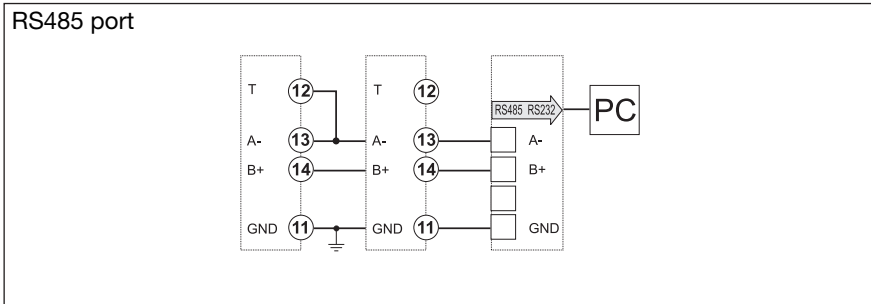
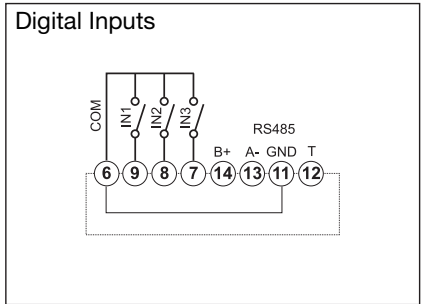
System type selection: 1P



Auxiliary power supply wiring diagrams



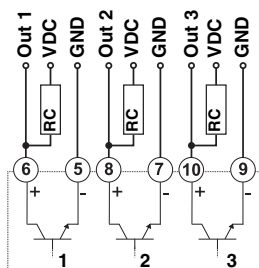
Digital inputs and RS485 port wiring diagrams



RS485 NOTE: additional devices provided with RS485 are connected in parallel. The termination of the serial output is carried out only on the last instrument of the network, by means of a jumper between (A-) and (T).

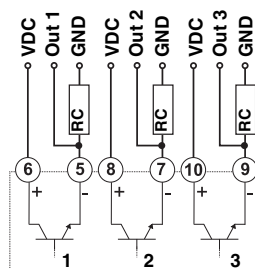
Open collector and relay outputs wiring diagrams

Open Collector



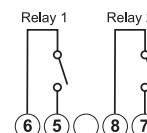
GND reference

Open Collector



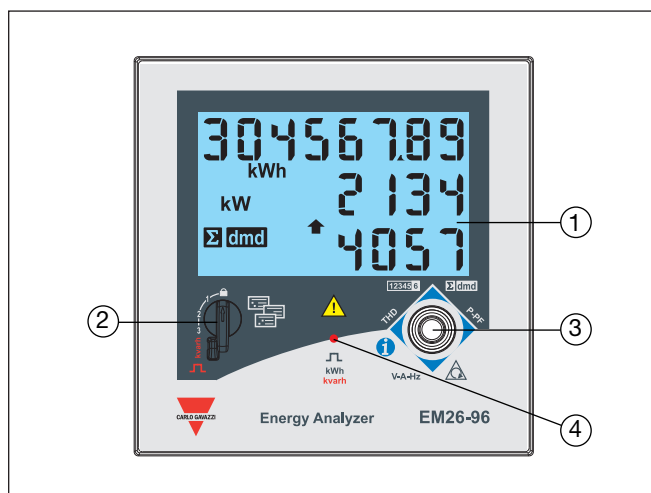
VDC reference

Relay



The load resistances (RC) must be designed so that the close contact current is lower than 100mA; the VDC voltage must be lower than or equal to 30VDC.

Front panel description



1. **Display**
LCD-type with alphanumeric indications to:
- display configuration parameters;
- display all the measured variables.
2. **Selector**
To select the desired display pages and to lock the programming.
3. **Joystick**
To program the configuration parameters and scroll the variables on the display.
4. **LED**
Red LED blinking proportionally to the energy being measured.

Dimensions and Panel Cut-out

