Energy Management
Energy Analyzer
Type EM26 96

CARLO GAVAZZI

- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Class 2 (kvarh) according to EN62053-23
- Accuracy ±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 synch 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
- 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

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.

MID 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

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}

System

3: 3-phase, 4-wire;

Power supply

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

Communication

XX: none
S1: RS485 port

Input/Output

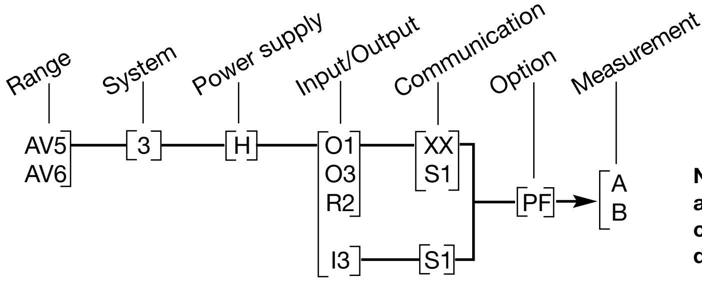
O1: single open collector type (pulse or alarm)
O3: 3 open collector type (mixed combination of pulse, alarm and/or remote output)
R2: dual relay type (functions as per “O3”)
I3: 3 digital inputs for tariff selection or Gas/water/energy/remote heating metering

Options

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.

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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

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}

System

3: balanced and unbalanced load: 3-phase, 4-wire; 3-phase, 3-wire; 2-phase, 3-wire; 1-phase, 2-wire

Power supply

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

Communication

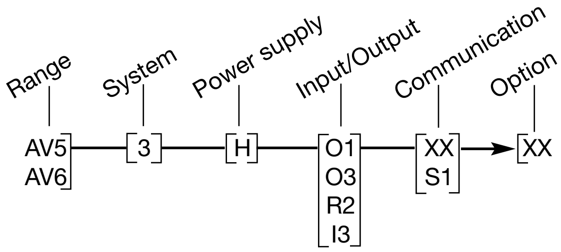
XX: none
S1: RS485 port

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

Options

XX: none



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

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Input specifications

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

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Output specifications

Digital outputs	
Pulse type	
Number of outputs	Up to 3, independent. Programmable from 0.001 to 10.00 kWh/kvarh per pulse.
Type	Outputs connectable to the energy meters (Wh/varh)
Pulse duration	T_{ON} selectable (30 ms or 100 ms) according to EN62053-31 T_{OFF}: ≥120ms, according to EN62052-31
Alarm type	
Number of outputs	Up to 3, independent
Alarm modes	Up alarm, down alarm (see the table “List of the variables that can be connected to”)
Set-point adjustment	From 0 to 100% of the display scale
Hysteresis	From 0 to full scale
On-time delay	0 to 255s
Output status	Selectable: normally de-energized or normally energized
Min. response time	700ms, filters excluded. Set-point on-time delay: “0 s”
Remote control	The digital ouputs status can be managed by means of serial communication RS485, if programmed as remote.
Note	The 3 digital outputs can also work as a triple pulse output, triple alarm output, or in any other combination.
Static output	
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.

Relay output	
Physical outputs	Max. 2
Purpose	For alarm output, pulse output or remote control.
Type	Relay, SPST type AC 1-5A @ 250VAC DC 12-5A @ 24VDC AC 15-1.5A @ 250VAC DC 13-1.5A @ 24VDC
Insulation	4000 VRMS outputs to measuring input. 4000 VRMS outputs to power supply input.
RS485	
Type	Multidrop, bidirectional (static and dynamic variables)
Connections	2-wire Max. distance 1000m (without amplifier) Termination directly on the instrument
Addresses	247, selectable by means of the front joystick
Protocol	MODBUS/JBUS (RTU)
Data (bidirectional)	
Dynamic (reading only)	System and phase variables: see table “List of variables...”
Static (reading and writing)	All the configuration parameters.
Data format	1 start bit, 8 data bit, no parity,1 stop bit
Baud-rate	4800, 9600 bits/s
Driver input capability	1/5 unit load Maximum 160 transceivers on the same bus, which can be expanded with signal amplifiers.
Insulation	By means of optocouplers, 4000 VRMS output to measuring input. 4000 VRMS output to power supply input

Digital input specifications

Number of inputs	3
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
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

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 (m^3) or WATER (hot-cold m^3) or remote heating (kWh) meters or external kWh meter; • total energy (kWh, kvarh) and GAS, WATER (hot-cold m^3) and remote heating meters or external kWh meter, 3 choices only.
Note	The energy metering is only made by means of the analogue inputs.
Insulation	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:
1st level	Password “0”, no protection;
2nd level	Password from 1 to 9999, all data are protected
System selection	
System 3-Pn unbalanced load	3-phase (4-wire); 3-phase (3-wire).
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.
System 2-P	2-phase (3-wire).
System 1-P	1-phase (2-wire).
Transformer ratio	
VT (PT)	1.0 to 999.9 / 1000 to 6000.
CT	1.0 to 999.9 / 1000 to 9999 / 10.00k to 60.00k. Transformer ratio: VT (PT): 1.0 to 999.9 / 1000 to 6000, CT: 1.0 to 999.9 / 1000 to 9999 / 10.00k to 60.00k (only AV5_X and AV6_X). VT (PT) = 1.0 (fixed) for AV5_PF models.The maximum VT by CT ratio is 3150 for AV5_PF models, 4629 for AV5_X models.The maximum VT by CT ratio is 5448 for AV6_PF models, 14529 for AV6_X models. Note 1: for MID complaint applications the maximum power being measured is 25 MW for AV5_PF models. Note 2: for non-MID complaint applications the maximum power (calculated as maximum input voltage and current) being measured cannot exceed 66 MW for AV5_X models and 62 MW for AV6_X models. If the currents and/or voltages being measured exceed their maximum limits, the display shows the error message “EEEE”. For EN50470-3 compliant applications the maximum power being measured is 25 MW.
Filter	
Operating range	0 to 100% of the input display scale
Filtering coefficient	1 to 32
Filter action	Measurements, serial output (fundamental variables: V, A, W and their derived ones).
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
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.
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

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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
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
Installation category	Cat. III (IEC60664, EN60664)
Insulation (for 1 minute)	4000 VRMS between measuring inputs and power supply. 4000 VRMS between power supply and RS485 digital outputs
Dielectric strength	4000 VRMS for 1 minute
Noise rejection CMRR	100 dB, 48 to 62 Hz
EMC	According to EN62052-11
Electrostatic discharges	15kV air discharge;
Immunity to irradiated Electromagnetic fields	Test with current: 10V/m from 80 to 2000MHz; Test without any current: 30V/m from 80 to 2000MHz;
Burst	On current and voltage measuring inputs circuit: 4kV
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz
Surge	On current and voltage measuring inputs circuit: 4kV;
Radio frequency suppression	According to CISPR 22
Standard compliance	
Safety	IEC60664, IEC61010-1 EN60664, EN61010-1 EN62052-11
Metrology	EN62053-21, EN50470-3, EN62053-23.
Pulse output	DIN43864, IEC62053-31
Approvals	CE, cULus listed, MID (PF option only)
Connections	Screw-type
Cable cross-section area	Max. 1.5 mm^2
Housing	
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

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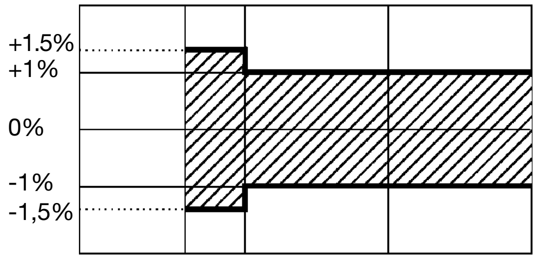
Accuracy (according to EN50470-3 and EN62053-23)

kWh, accuracy (RDG) depending on the current

Percentage error limits for class index B

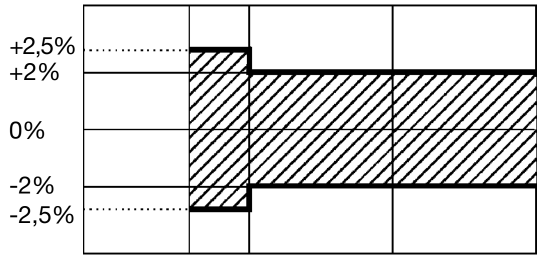


PF=1 0.05A (I_{min}) — 0.25A (I_{tr}) — 5A (I_n) — 10A (I_{max})

PF=L0.5 or C0.8 0.25A (I_{tr}) — 5A (I_n) — 10A (I_{max})

Accuracy limits (Active energy)
Start-up current: 10mA

kvarh, accuracy (RDG) depending on the current



sinj=1 0.1A — 0.25A — 5A (I_n) — 10A (I_{max})

sinj=0.5 0.25A — 0.5A — 5A (I_n) — 10A (I_{max})

Accuracy limits (Reactive energy)
Start-up current: 10mA

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

Accuracy AV5-AV6 models	0.9 Un ≤ U ≤ 1.1 Un; 0.98 fn ≤ f ≤ 1.02 fn; fn: 50Hz; cosj: 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
Operating temperature	-25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C)

EMC compliance	E2
Mechanical compliance	M2
Protection degree	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

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

Where: **n**= sample number

System variables

Equivalent three-phase voltage

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

Three-phase reactive power

$$\mathrm{var}_\Sigma = (\mathrm{var}_1 + \mathrm{var}_2 + \mathrm{var}_3)$$

Three-phase active power

$$W_\Sigma = W_1 + W_2 + W_3$$

Three-phase apparent power

$$VA_\Sigma = \sqrt{W_\Sigma^2 + \mathrm{var}_\Sigma^2}$$

Three-phase power factor (TPF)

$$\cos\varphi_\Sigma = \frac{W_\Sigma}{VA_\Sigma}$$

Energy metering

$$kWh_1 = \int_{t1}^{t2} P_1(t)dt \cong \Delta t \sum_{j=n1}^{n2} P_1(j)$$

$$k\,\mathrm{var}h_1 = \int_{t1}^{t2} Q_1(t)dt \cong \Delta t \sum_{j=n1}^{n2} Q_1(j)$$

Where:
P= active power;
Q= reactive power;
t_1, t_2 =starting and ending time points of consumption recording;
nj= time unit;
t= time interval between two successive power consumptions;
n_1, n_2 = starting and ending discrete time points of consumption recording

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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_2O	x	x	x	x	x	x	Total
42	m^3 Hot H_2O	x	x	x	x	x	x	Total
43	kWh H_2O	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.

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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 enebled			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)** m^3 Gas, m^3 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” simbols.

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

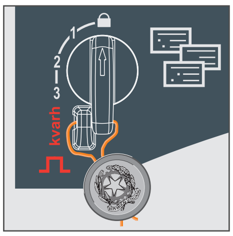
Notes: * Not available with option PF A. ** Not available with option PF B

Insulation between inputs and outputs

	Measuring Inputs	Relay output	Open collector outputs	Comm. port	Digital inputs	Auxiliary power sup-
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 sup-	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

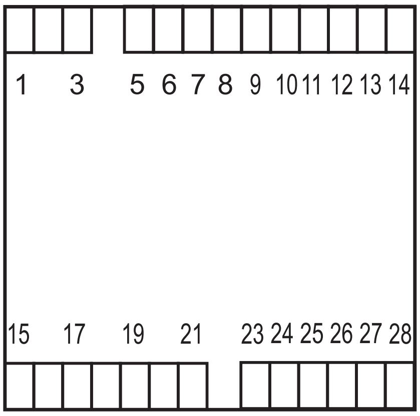


Lock of programming with seal.
Selection of up to 4 main pages (programmable by the user).

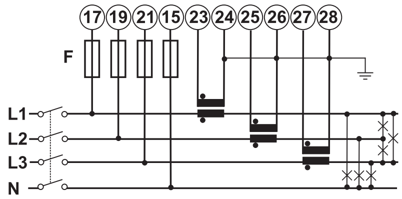
Easy access to specific display pages.

Wiring diagrams

System type selection: 3P.n

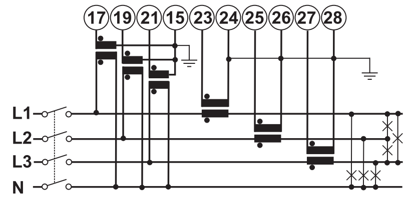


3-ph, 4-wire, unbalanced load **Fig. 1**



3-CT connection

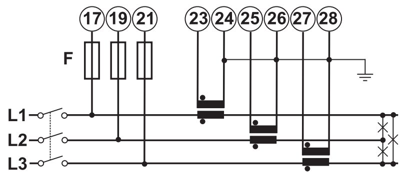
3-ph, 4-wire, unbalanced load **Fig. 2**



3-CT and 3-VT/PT connections

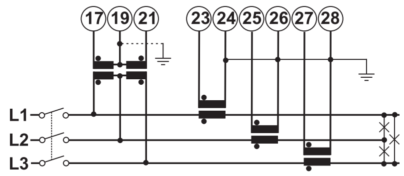
System type selection: 3P.n

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



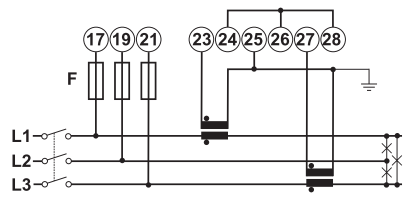
3-CT connection

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



3-CT and 2-VT/PT connections

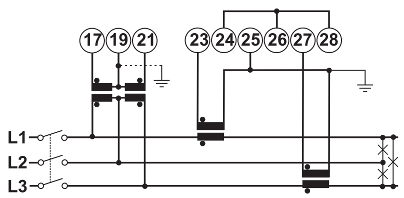
3-ph, 3-wire, unbalanced load **Fig. 5**



2-CT connections (ARON)

System type selection: 3P.1

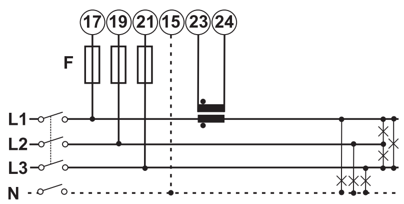
3-ph, 3-wire, unbalanced load **Fig. 6**



2-CT and 2-VT/PT connections ARON

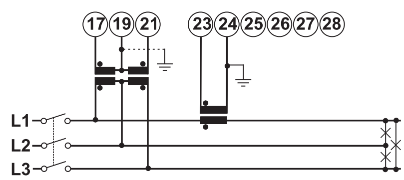
3-ph, 3-wire, balanced load **Fig. 7**

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

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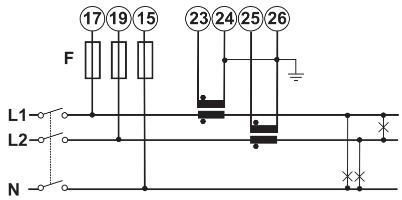
Wiring diagrams

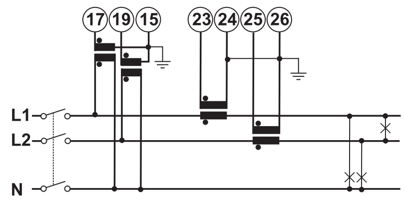
System type selection: 2P

2-ph, 3-wire **Fig. 9**



2-CT connection

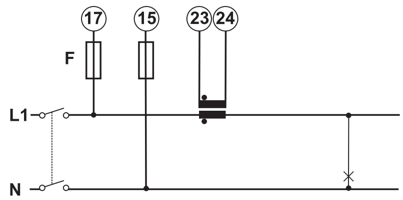
2-ph, 3-wire **Fig. 10**



2-CT and 2-VT/PT connections

System type selection: 1P

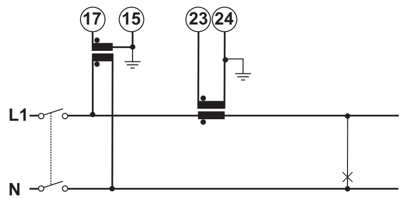
1-ph, 2-wire **Fig. 11**



1-CT connection

System type selection: 1P

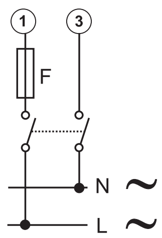
1-ph, 2-wire **Fig. 12**



1-CT and 1-VT connections

Auxiliary power supply wiring diagrams

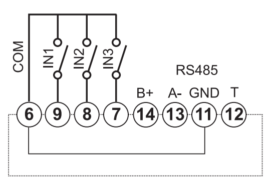
100 to 230VAC/DC (“H” option) **Fig.13**



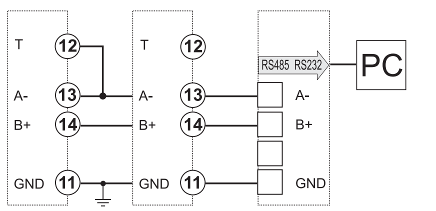
F= 250V [T] 100mA

Digital inputs and RS485 port wiring diagrams

Digital Inputs



RS485 port



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).

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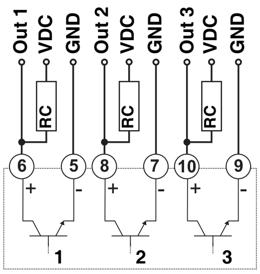
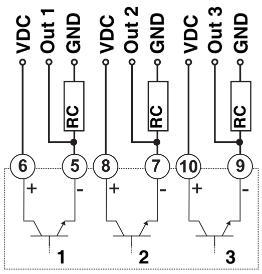
Open collector and relay outputs wiring diagrams

Open Collector



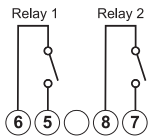
GND reference

Open Collector



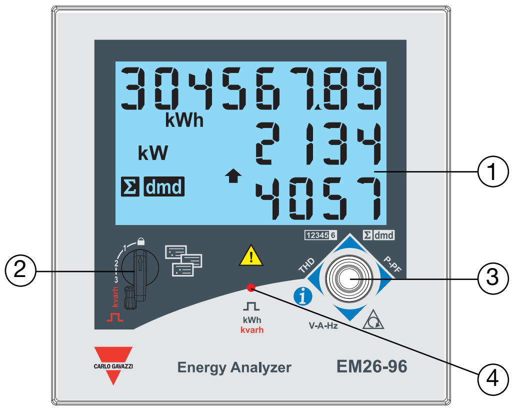
VDC reference

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