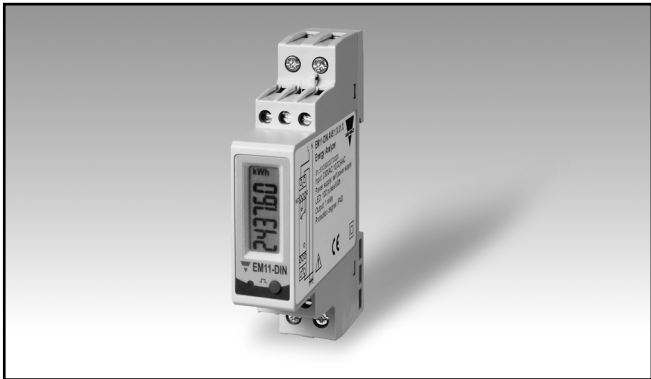


Energy Management
Energy Analyzer
Type EM11 DIN



• Other versions available (not certified, option X): 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 ± 0.5 RDG (current/voltage)
- Energy analyzer
- Instantaneous variables readout: 4 DGT
- Energies readout: 6 DGT
- Instantaneous variables: V, A, W, Wdmd, Wdmd max, var, PF, Hz
- Single phase variables: VLL, VLN, A, VA, W, var, PF
- Energy measurements: total kWh and kvarh
- TRMS measurements of distorted sine waves (voltages/currents)
- Self power supply
- Dimensions: 1-DIN module
- Protection degree (front): IP40
- 1 pulse output on request
- 1 alarm output on request
- Certified according to MID Directive (option PF only): see “how to order” below

Product Description

One-phase energy analyzer with built-in configuration push button and LCD data displaying; particularly indicated for active and reactive energy metering and for cost allocation. Housing for DIN-rail mounting, IP40 (front) protection degree. Direct connection up to

32A. Moreover the meter can be provided with either pulse output proportional to the active energy being measured or alarm control on the available instantaneous variables.



Certified according to MID Directive, Module B and Module D of Annex II, for legal metrology relevant to active electrical energy meters (see Annex V, MI003, of MID). Can be used for fiscal (legal) metrology.

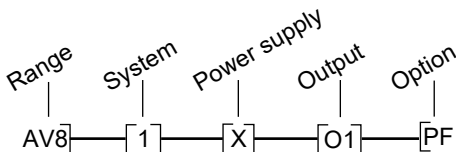
How to order

EM11 DIN AV8 1 X O1 PF

Model _____
Range code _____
System _____
Power supply _____
Output _____
Option _____

Type Selection

Range code	System	Power supply	Option
AV8: 230V _{LN} AC - 5(32)A (direct connection)	1: 1-phase	X: Self power supply (from 48 to 62Hz). The instrument works on the range from -20% to +20% of the measuring input nominal voltage.	PF: Certified according to MID Directive. Can be used for fiscal (legal) metrology.
	Output		
	O1: Pulse type (open collector output)		



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

EM11 DIN AV8 1 X O1 X

Model

Range code

System

Power supply

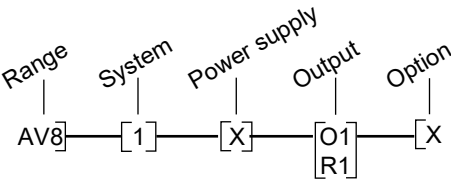
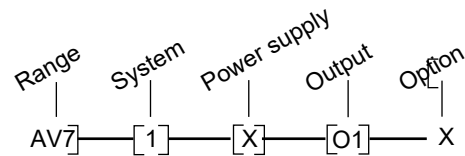
Output

Option

Type Selection

Range code	System	Power supply	Option
AV7: 120V _{LN} AC - 5(32)A (direct connection)	1: 1-phase	X: Self power supply (from 48 to 62Hz). The instrument works on the range from -20% to +20% of the measuring input nominal voltage.	X: none
AV8: 230V _{LN} AC - 5(32)A (direct connection)	Output		
	O1: Pulse type (open col- lector output)		
	R1: Alarm type (relay output)		

NOTE: please check the availability of the needed code on the verification path diagrams below before order.



Input specifications

Rated inputs Current range (by shunt)	System: 1 AV7 and AV8: 5(32) A	Type	LCD, h 7mm
	Voltage range	Instantaneous variables read-out	4 DGT (V and A) 3 DGT (W, var, Wdmd, Wdmd max, Hz, PF) Max. 9 999; Min. 0 (0.0) Total: 6 DGT
Accuracy (Display) (@25°C ±5°C, R.H. ≤60%, 48 to 62Hz)	AV7 model	Min. Max. indication	
	AV8 model	Energies	
Current	lb: 5A, lmax: 32A; Un: 120VLN (-20% +20%)	LEDs	Red LED (Energy consumption), 1000 pulses/kWh (Max Frequency 16 Hz) according to EN62053-11
	lb: 5A, lmax: 32A; Un: 230VLN (-20% +20%)	Measurements	See "Measuring variables and Min. Max. indications"
Voltage	From 0.04lb to 0.2lb, PF=1: ±(0.5% RDG +3DGT)	Method	TRMS measurements of distorted wave forms
	From 0.2lb to lmax, PF=1: ±(0.5% RDG +1DGT).	Coupling type	Direct
Frequency	In the Un range: ±(0.5% RDG +2DGT)	Crest factor	lb 5A ≤4 (45A max. peak)
Active power	±0.1Hz (48 to 62Hz)	Current Overload	
Reactive power	±(1%RDG +2DGT)	Continuous	32A, @ 50Hz
Active energy	±(2%RDG +2DGT)	For 10ms	960A, @ 50Hz
Reactive energy	Class 1 according to EN62053-21 and Class B according to EN50470-3.	Voltage Overload	
	Class 2 according to EN62053-23.	Continuous	1.2 Un
Reference values	lb: 5A, lmax: 32A, 0.1 lb: 0.5A	For 500ms	2 Un
Start up current:	20mA	Input impedance	
Energy additional errors Influence quantities	According to EN62053-21, EN62053-23	120VL-N (AV7)	>720KΩ
		230VL-N (AV8)	>720KΩ
Temperature drift	≤200ppm/°C	5(32) A (AV7-AV8)	< 0.5VA
Sampling rate	4096 samples/s @ 50Hz 4096 samples/s @ 60Hz	Frequency	48 to 62 Hz
Display refresh time	1 sec.	Key-pad	1 push-button for variable selection and programming of the instrument working parameters. Not available in case of "PF" option.
Display	1 line (max: 6 DGT)		

Output specifications

Digital output Number of outputs X Option	1, open collector programmable, from 0.001 to 1 kWh for each pulse.	Alarm modes	DC 13-1.5A @ 24VDC
	PF option	Controlled variables	Up alarm or down alarm kW, kWhdmd, kvar, PF, A, V, Hz
Signal	Fixed, 0,001 kWh/pulse V _{ON} 1.2 VDC/ max. 100 mA V _{OFF} 30 VDC max.	Set-point adjustment	Programmable on all the measuring range (see "Measuring variables and Min. Max. indications")
Pulse duration	≥100ms < 120msec (ON), ≥120ms (OFF), according to EN62052-31	Hysteresis	programmable on all the measuring range (see "Measuring variables and Min. Max. indications")
Insulation	By means of optocouplers, 4000 VRMS output to measuring inputs	On-time delay	0 to 9999s (166min)
Alarm output	Not available in case of PF option.	Off-time delay	0 to 9999s (166min)
	1	Min. response time	1s, set-point on-time delay: "0 s"
Number of outputs	Relay, SPST type	Insulation	4000 VRMS output to measuring inputs
Type	AC 1-5A @ 250VAC DC 12-5A @ 24VDC AC 15-1.5A @ 250VAC		

Software functions (Not available in case of PF option)

Password	Numeric code of max. 4 digits; 2 protection levels of the programming data:	Displaying	1 variable per page (See «Measuring variables and Min. Max. indications»)
1st level	Password "0", no protection;	Reset	By means of the front key-pad:
2nd level	Password from 1 to 9999, all data are protected		- W dmd max; - energies: kWh, kvarh

General specifications

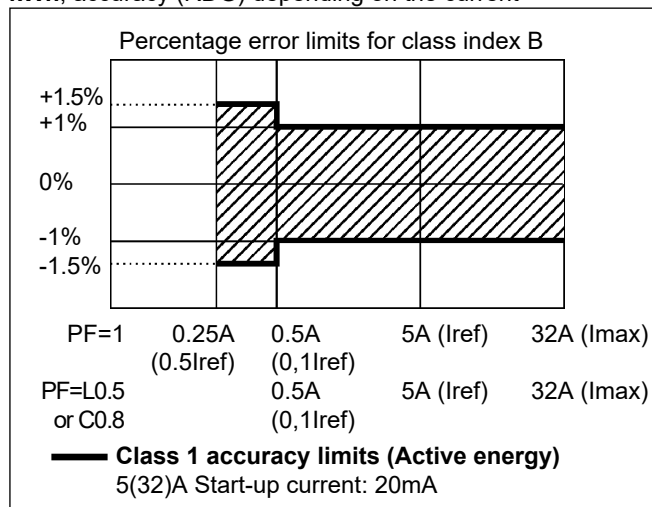
Operating temperature	-25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C) according to EN62053-21, EN50470-1 and EN62053-23	Surge	80MHz On current and voltage measuring input circuits: 4kV;
Storage temperature	-30°C to +70°C (-22°F to 140°F) (R.H. < 90% non-condensing @ 40°C) according to EN62053-21, EN50470-1 and EN62053-23	Radio frequency suppression	According to CISPR 22
Installation category	Cat. III (IEC60664, EN60664)	Standard compliance	
Insulation (for 1 minute)	4000 VRMS between measuring inputs and digital output (O1 and R1).	Safety	IEC60664, IEC61010-1 EN60664, EN61010-1 (EN62052-11) EN50470-1, EN62053-21, EN62053-23, EN50470-3.
Dielectric strength	4000 VRMS for 1 minute	Metrology	DIN43864, IEC62053-31
CMRR Noise rejection	100 dB, 48 to 62 Hz	Pulse output Approvals	CE, cULus (X option) MID (PF option)
EMC	According to EN62052-11	Connections	Screw-type
Electrostatic discharges	8kV air discharge;	Cable cross-section area	Measuring inputs: min. 2.5 mm ² , max. 10 mm ² ;
Immunity to irradiated electromagnetic fields	Test with applied current: 10V/m from 80 to 2000MHz; Test without any applied current: 30V/m from 80 to 2000MHz;		Min./Max. screws tightening torque: 0.5 Nm / 1.1 Nm
Burst	On current and voltage measuring input circuits: 4kV	DIN Housing	Other terminals: 1.5 mm ² . Screws tightening torque: 0.5 Nm
Immunity to conducted disturbances	10V/m from 150KHz to	Dimensions (WxHxD)	17.5 (+0.5 -0) x 90 x 67.5 mm
		Material	Nylon PA66, self-extinguishing: UL 94 V-0
		Mounting	DIN-rail
		Protection degree	
		Front	IP40
		Screw terminals	IP20
		Weight	Approx. 100 g (packing included)

Power supply specifications

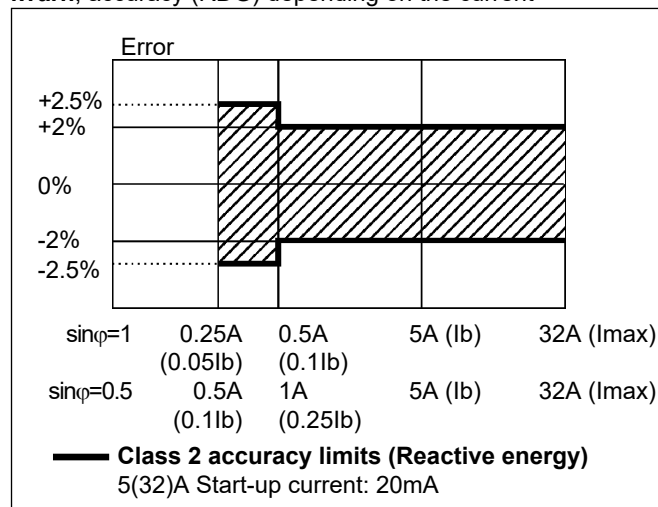
Self supplied version	120VLN (AV7), 230 VLN (AV8) (-20% +20%) 48-62Hz	Power consumption	≤ 3VA
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Accuracy (according to EN50470-3 and EN62053-23)

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



MID compliance (PF option only)

Accuracy

0.9 Un ≤ U ≤ 1.1 Un;
0.98 fn ≤ f ≤ 1.02 fn;
fn: 50 or 60Hz;
cosφ: 0.5 inductive to 0.8 capacitive.
Class B
I st: 0.02A; I min: 0.25A;
I tr: 0.5A; I ref: 5A;
I max: 32A.

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

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

Instantaneous power factor

$$\cos\phi_1 = \frac{W_1}{VA_1}$$

Instantaneous effective current

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

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

Energy metering

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

$$k \text{ var } h_1 = \int_{t_1}^{t_2} Q_1(t) dt \cong \Delta t \sum_{j=n_1}^{n_2} Q_1(j)$$

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



Measuring variables and Min. Max. indications

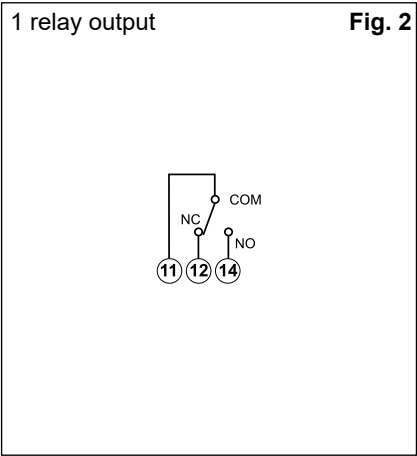
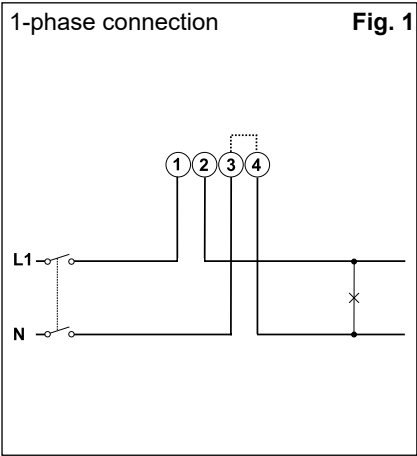
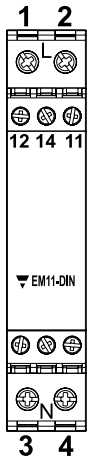
Page number	Variable	Min. Max. Indication	Notes
1	kWh		Total (only consumed energy)
		from 0.01 to 999999, autoranging.	
2	kvarh	from 0.0 to 99999.9	Total (only consumed energy)
3	kW	from 0.00 to 9.99	
4	kW dmd	from 0.00 to 9.99	Integration time programmable from 1 to 30 minutes
5	kW dmd max	from 0.00 to 9.99	Max value with data storage (in EEprom)
6	V	from 0.0 to 999.9	
7	A	from 0.0 to 32.00	
8	Hz	from 48.0 to 62.0	
9	PF (cosφ)	from L/C. 00 to L/C. 99	
10	kvar	from 0.00 to 9.99	

Note: In case of X option all the variables above can be scrolled using the front push button, in case of PF option the push button is not available and the variables are automatically scrolled.

Insulation between inputs and outputs

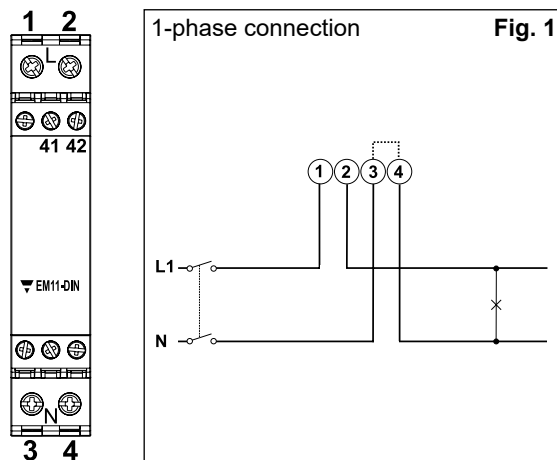
	Measuring inputs	Relay output	Open collector output	AC self-power supply
Measuring inputs	-	4kV	4kV	0kV
Relay output	4kV	-	4kV	4kV
Open collector output	4kV	4kV	-	4kV
AC self-power supply	0kV	4kV	4kV	-

Wiring diagrams and relay output (R1)

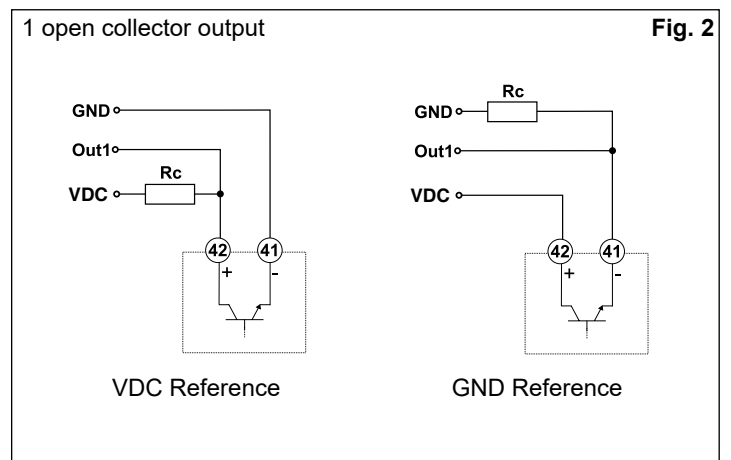


NOTE: The 3 and 4 terminals, in the instrument, are wired together

Wiring diagrams and open collector output (O1)

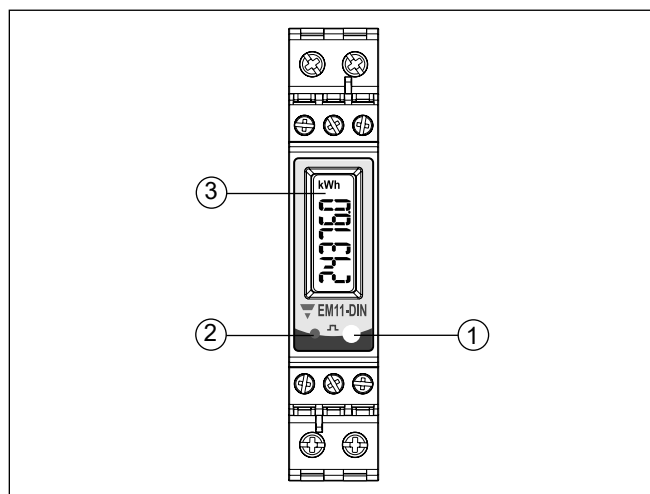


NOTE: The 3 and 4 terminals, in the instrument, are wired together



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

Frontal panel description



1. Push button

To program the configuration parameters and the display of the variables.
Not available in case of PF option.

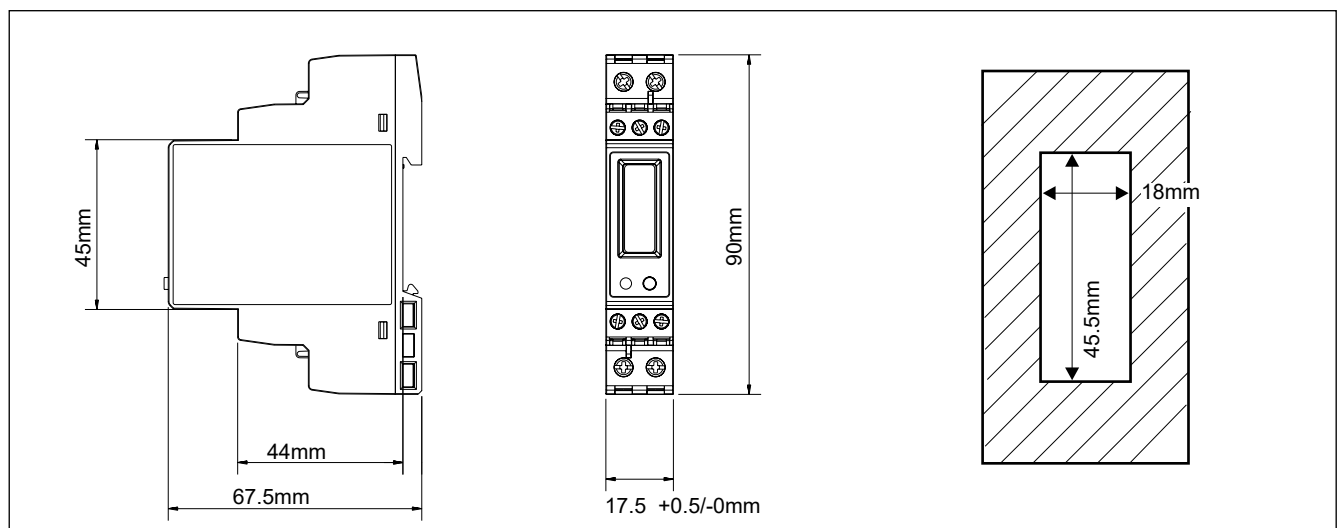
2. LED

Red LED to show the consumed energy.

3. Display

LCD-type with alphanumeric indication to:
- display configuration parameters;
- display all the measured variables.

Dimensions and panel cut-out



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