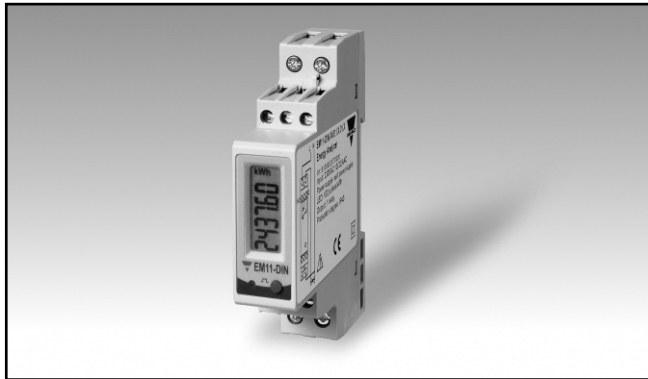


Energy Management Energy Analyzer Type EM11 DIN



• Other versions available (not certified, option X and P): 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: 5+1 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

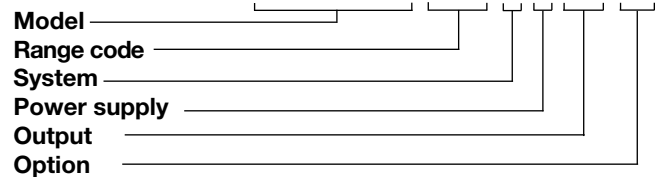
One-phase energy analyzer with built-in configuration push button and LCD data displaying; particularly indicated for active and reactive energy metering and for cost allocation. Housing for DIN-rail mounting, IP40 (front) protection degree. Direct

connection up to 32A. active energy being measured or alarm control provided with either pulse on the available output proportional to the instantaneous variables.



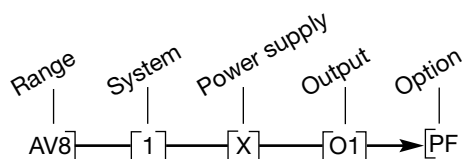
Certified according to MID Directive, Annex "B" + Annex "D" or Annex "B" + Annex "F" for legal metrology relevant to active electrical energy meters (see Annex MI-003 of MID). Can be used for fiscal (legal) metrology.

How to order **EM11 DIN AV8 1 X O1 PF**



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, Annex "B" + Annex "D" or Annex "B" + Annex "F" for legal metrology relevant to active electrical energy meters (see Annex MI-003 of MID). Can be used for fiscal (legal) metrology.
	Output		
	O1: Pulse type (open collector output)		



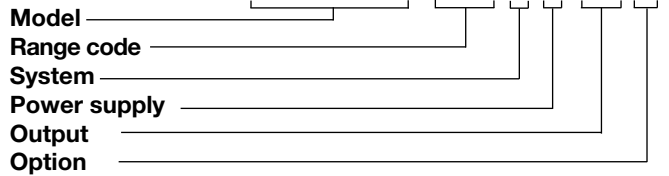
NOTE: please check the availability of the needed code on the verification path diagram on left before order.



STANDARD

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

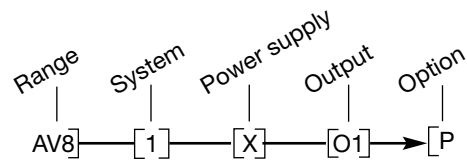
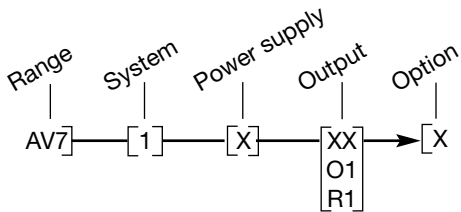
How to order EM11 DIN AV8 1 X O1 X



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		P: Bearing EC "Type examination" (annex B of MID) relevant to active electrical energy meters (see Annex MI-003)
	XX: None O1: Pulse type (open collector output) R1: Alarm type (relay out-put)		

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

Output specifications

Digital output Number of outputs Type "X Option"	(on request) 1 Open collector, programmable from 0.001 to 1 kWh for each pulse.	Alarm modes	DC 12-5A @ 24VDC AC 15-1.5A @ 250VAC DC 13-1.5A @ 24VDC
Type "P Option"	fixed 0,001 kwh/pulse	Controlled variables	Up alarm or down alarm kW, kWdmd, kvar, PF, A, V, Hz
Signal	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	(on request) Not available in case of "P" option.	Off-time delay	0 to 9999s (166min)
Number of outputs	1	Min. response time	1s, set-point on-time delay: "0 s"
Type	Relay, SPST type AC 1-5A @ 250VAC	Insulation	4000 VRMS output to measuring inputs

Software functions (Not available in case of "P" and "PF" options)

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

General specifications

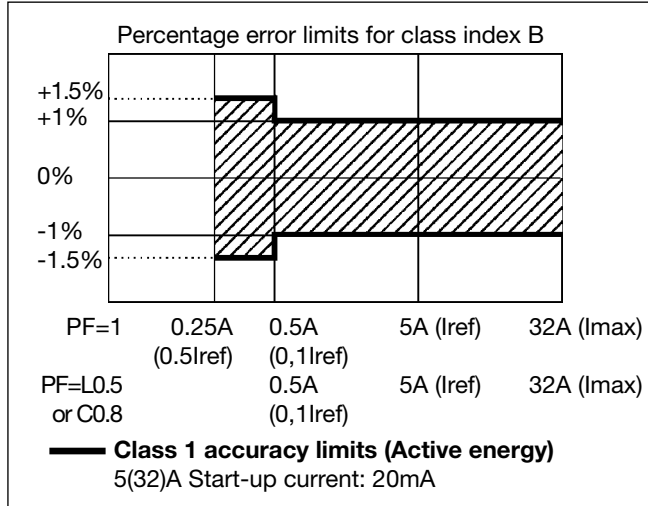
Operating temperature	-25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C) according to EN62053-21, EN50470-1 and EN62053-23	Surge	On current and voltage measuring input circuits: 4kV;
Storage temperature	-30°C to +70°C (-22°F to 140°F) (R.H. < 90% non-condensing @ 40°C) according 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 CE, cULus MID (option PF only)
CMRR Noise rejection	100 dB, 48 to 62 Hz	Pulse output Approvals	
EMC	According to EN62052-11 8kV air discharge;	Connections	Screw-type
Electrostatic discharges	Test with applied current: 10V/m from 80 to 2000MHz;	Cable cross-section area	Min. 2.5 mm ² , Max. 10 mm ² (measuring inputs);
Immunity to irradiated electromagnetic fields	Test without any applied current: 30V/m from 80 to 2000MHz;		Other terminals: 1.5 mm ² Min./Max. screws tightening torque: 0.5 Nm / 1.1 Nm
Burst	On current and voltage measuring input circuits: 4kV	DIN Housing	
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz	Dimensions (WxHxD)	17.5 (+0.5 -0) x 90 x 67.5 mm
		Material	Nylon PA66, self-extinguishing: UL 94 V-0 DIN-rail
		Mounting	
		Protection degree	
		Front Screw terminals	IP40 IP20
		Weight	Approx. 100 g (packing included)

Power supply specifications

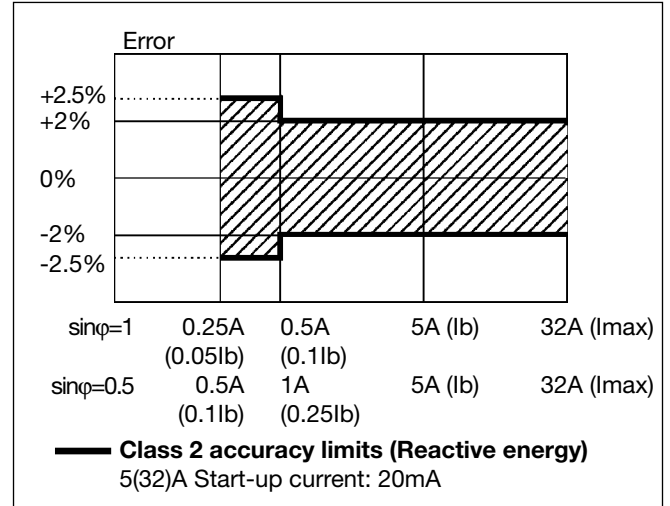
Self supplied version	120VLN, 230 VLN (-20% +20%) 48-62Hz	Power consumption	≤ 3VA
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Accuracy (according to EN50470-3 and EN62053-23)

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



MID "Annex MI-003" 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.

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.

Operating temperature

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

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

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

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

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

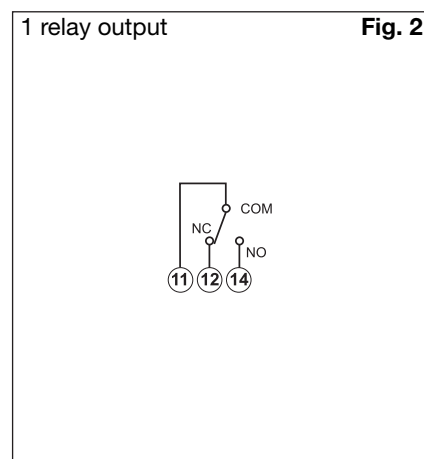
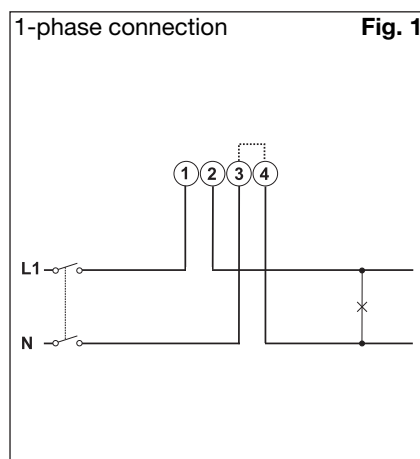
Page number	Variable	Min. Max. Indication	Notes
1	kWh	from 0.0 to 99999.9	Total (only consumed energy)
		from 0.01 to 999999 Autoranging. PF model only.	
2	kvarh	from 0.0 to 99999.9	Total (only consumed energy)
3	kW	from 0.00 to 9.99	
4	kW dmd	from 0.00 to 9.99	Integration time programmable from 1 to 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 “P” and “PF” options the push button is not available and the variables are automatically scrolled.

Insulation between inputs and outputs

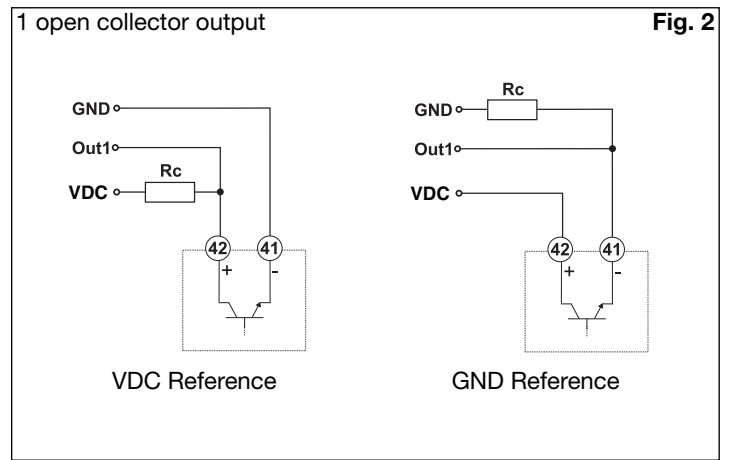
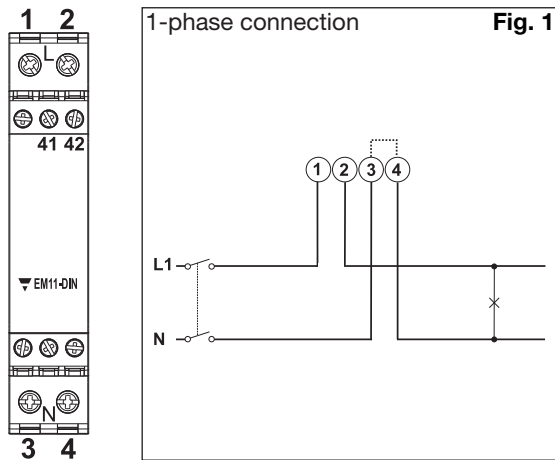
	Measuring inputs	Relay output	Open collector output	AC self-power supply
Measuring inputs	-	4kV	4kV	0kV
Relay output	4kV	-	4kV	4kV
Open collector output	4kV	4kV	-	4kV
AC self-power supply	0kV	4kV	4kV	-

Wiring diagrams and relay output (R1)



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

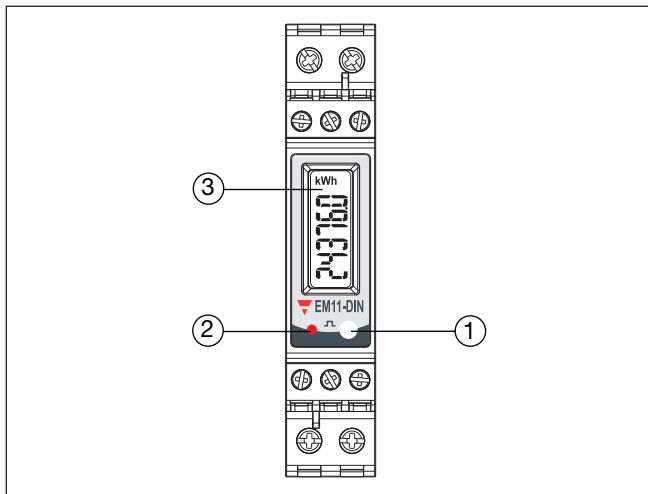
Wiring diagrams and open collector output (O1)



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

The load resistances (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.

Frontal panel description



- 1. Push button**
To program the configuration parameters and the display of the variables.
Not available in case of "P" and "PF" options.
- 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

