

Energy Management Energy Analyzer Type EM11 DIN



- Certified according to MID Directive, Annex "B" "Type examination" relevant to active electrical energy meters (see Annex MI-003).

- 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

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.

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



Type Selection

Range code	System	Power supply	Output
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.	XX: None (**) O1: Pulse type (open collector output) (*) R1: Alarm type (relay out-put) (*) Output not available in case of "P" option
AV8: 230V _{LN} AC - 5(32)A (*) (direct connection)	Option		
(*) as standard. (**) on request.	P: Certified according to MID Directive, Annex "B" "Type examination" relevant to active electrical energy meters (see Annex MI-003) (*) X(**): AV7 range is not in compliance with the MID directive		

Input specifications

Rated inputs	System: 1	Current	From 0.04Ib to 0.2Ib: $\pm(0.5\% \text{ RDG} + 3\text{DGT})$
Current range (by shunt)	AV7 and AV8: 5(32)A		From 0.2Ib to I _{max} : $\pm(0.5\% \text{ RDG} + 1\text{DGT})$.
Voltage range	AV7: 120 VLN AC AV8: 230 VLL AC		In the Un range: $\pm(0.5\% \text{ RDG} + 2\text{DGT})$
Accuracy (Display)		Voltage	$\pm 0.1\text{Hz}$ (48 to 62Hz)
(@25°C $\pm 5^\circ\text{C}$, R.H. $\leq 60\%$, 48 to 62Hz)		Frequency	$\pm(1\% \text{ RDG} + 2\text{DGT})$
AV7 model	Ib: 5A, I _{max} : 32A; Un: 120VLN (-20% +20%)	Active power	$\pm(2\% \text{ RDG} + 2\text{DGT})$
AV8 model	Ib: 5A, I _{max} : 32A; Un: 230VLN (-20% +20%)	Reactive power	Class 1 according to
		Active energy	

Input specifications

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

Output specifications

Digital output	(on request)	Alarm modes	Controlled variables	AC 15-1.5A @ 250VAC DC 13-1.5A @ 24VDC
Number of outputs	1			
Type "X Option" (*)	Open collector, programmable from 0.001 to 1 kWh for each pulse.	Set-point adjustment		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.	Hysteresis		Programmable on all the measuring range (see "Measuring variables and Min. Max. indications")
Pulse duration	≥100ms < 120msec (ON), ≥120ms (OFF), according to EN62052-31	On-time delay		programmable on all the measuring range (see "Measuring variables and Min. Max. indications")
Insulation	By means of optocouplers, 4000 VRMS output to measuring inputs	Off-time delay		programmable on all the measuring range (see "Measuring variables and Min. Max. indications")
Alarm output	(on request)	Min. response time		0 to 9999s (166min)
Number of outputs	Not available in case of "P" option.	Insulation		0 to 9999s (166min)
Type	1 Relay, SPST type AC 1-5A @ 250VAC DC 12-5A @ 24VDC			1s, set-point on-time delay: "0 s"
				4000 VRMS output to measuring inputs

(*) "P option open collector, fixed 1000 pulses/kWh output.

Software functions (Not available in case of "P" option)

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

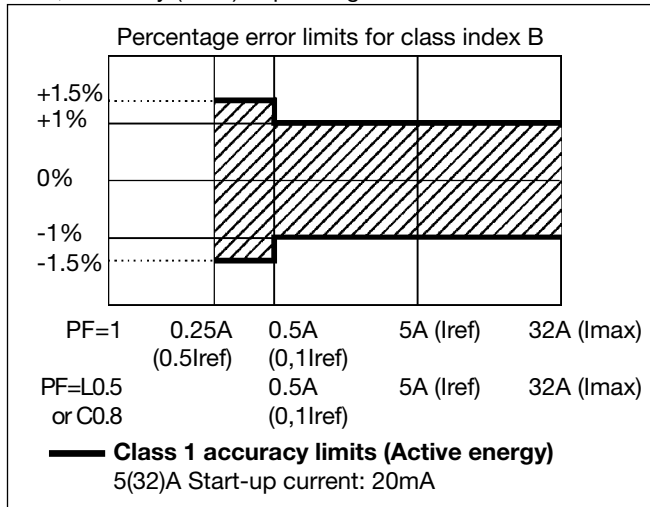
Operating temperature	-25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C) according to EN62053-21, EN50470-1 and EN62053-23	Surge	On current and voltage measuring input circuits: 4kV;
Storage temperature	-30°C to +70°C (-22°F to 140°F) (R.H. < 90% non-condensing @ 40°C) according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

Power supply specifications

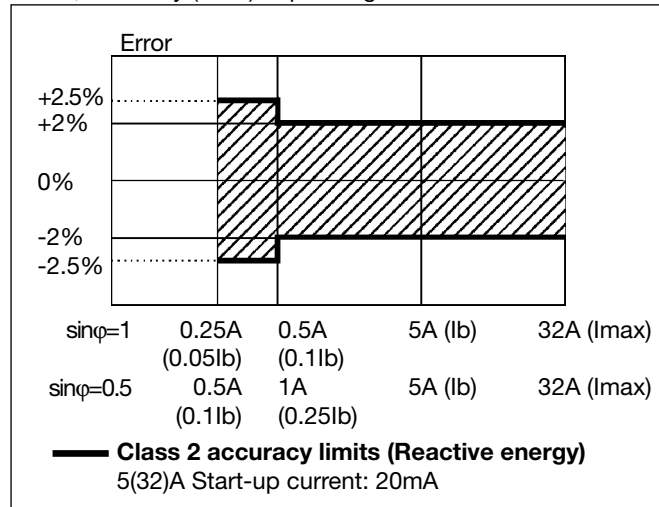
Self supplied version	120VLN, 230 VLN (-20% +20%) 48-62Hz	Power consumption	≤ 3VA
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Accuracy (according to EN50470-3 and EN62053-23)

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



MID "Annex MI-003" compliance

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

Used calculation formulas

Phase variables

Instantaneous effective voltage

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

Instantaneous active power

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

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

$$VA_1 = V_{IN} \cdot A_1$$

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;

nj= 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

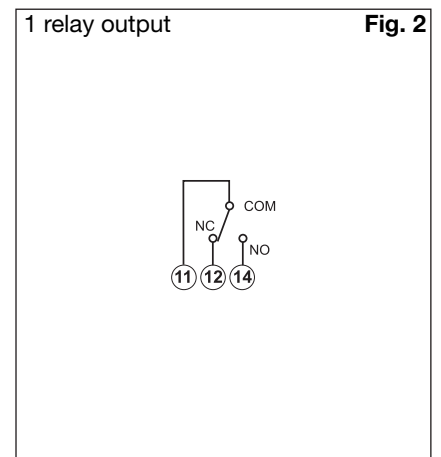
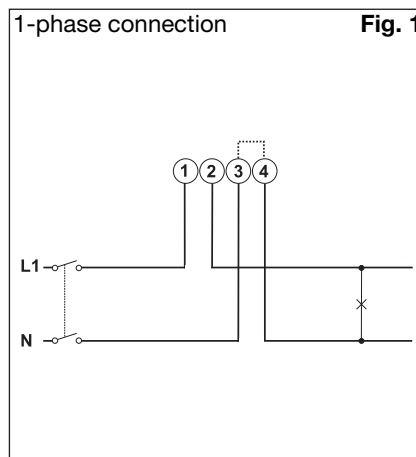
Page number	Variable	Min. Max. Indication	Notes
1	kWh	from 0.0 to 99999.9	Total (only consumed energy)
2	kvarh	from 0.0 to 99999.9	Total (only consumed energy)
3	kW	from 0.00 to 9.99	
4	kW dmd	from 0.00 to 9.99	Integration time programmable from 1 to 30 minutes
5	kW dmd max	from 0.00 to 9.99	Max value 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” option the push button is not available and the variables are scrolled automatically from position 1 to 10 with a time interval of about 5 seconds, for position 1 while positions from 2 to 10 have a time interval of 2 seconds.

Insulation between inputs and outputs

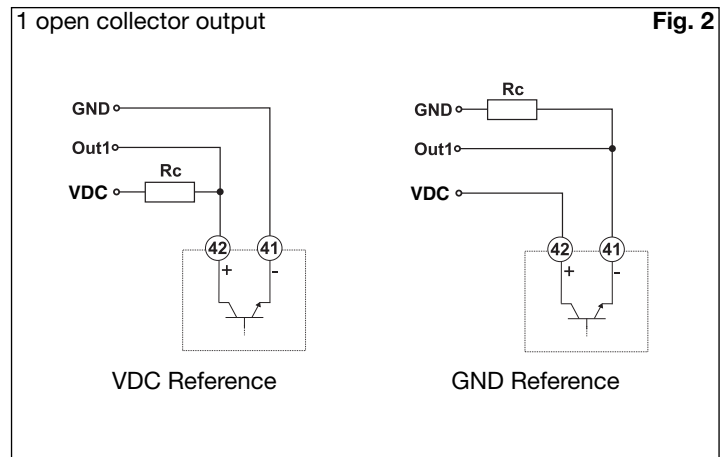
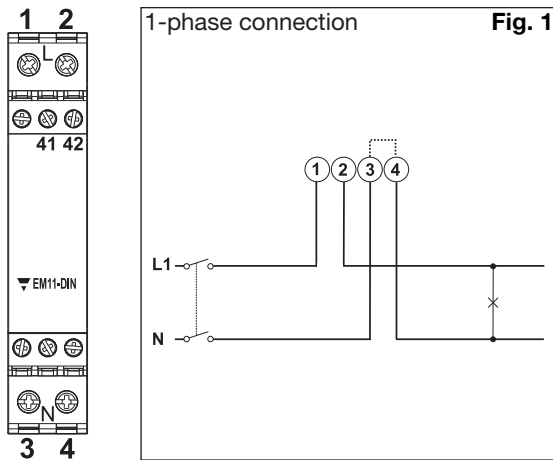
	Measuring inputs	Relay output	Open collector output	AC self-power supply
Measuring inputs	-	4kV	4kV	0kV
Relay output	4kV	-	4kV	4kV
Open collector output	4kV	4kV	-	4kV
AC self-power supply	0kV	4kV	4kV	-

Wiring diagrams and relay output (R1)



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

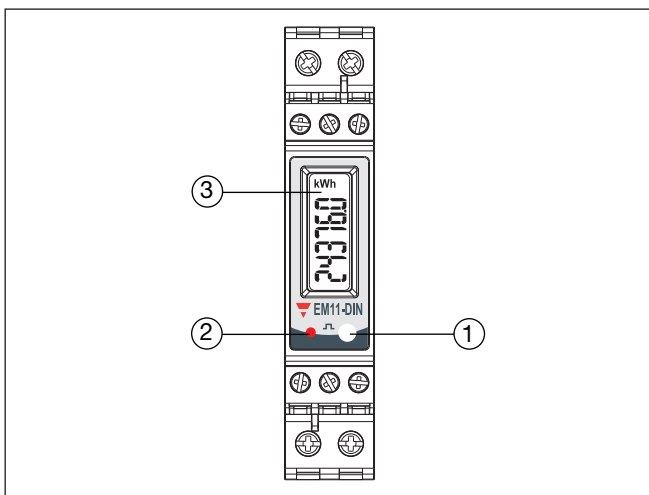
Wiring diagrams and open collector output (O1)



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" 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

