

# Energy Management

## Energy Meter

### Type EM10 DIN



- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Energy meter
- Energy readout: 5+1 DGT
- Energy measurements: total kWh
- TRMS measurements of distorted sine waves (voltages/currents)
- Self power supply
- Dimensions: 1-DIN module
- Protection degree (front): IP40
- 1 pulse output on request
- Certified according to MID Directive (option PF only): see “how to order” below
- Other versions available (not certified, option X and P): see “how to order” on the next page

### Product Description

One-phase energy meter with LCD data displaying; indicated for active energy metering. Housing for DIN-rail mounting, IP40 (front) protection degree. Direct connection up to 32A. More-over the meter can be provided with pulse output proportional to the active energy being measured.

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

EM10 DIN

AV8

1

X

O1

PF

Model

Range code

System

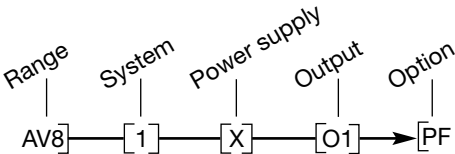
Power supply

Output

Option

### Type Selection

Range code	System	Power supply	Option
<b>AV8:</b> 230V <sub>LN</sub> AC - 5(32)A (direct connection)	<b>1:</b> 1-phase  <b>Output</b>  <b>O1:</b> Pulse type (open collector output)	<b>X:</b> Self power supply (from 48 to 62Hz). The instrument works on the range from -20% to +20% of the measuring nominal input voltage.	<b>PF:</b> 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.



**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.

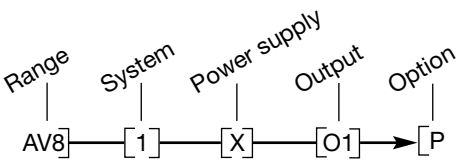
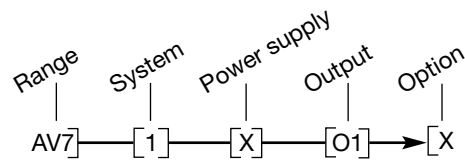
How to order **EM10 DIN AV7 1 X O1 X**

Model \_\_\_\_\_  
Range code \_\_\_\_\_  
System \_\_\_\_\_  
Power supply \_\_\_\_\_  
Output \_\_\_\_\_  
Option \_\_\_\_\_

Type Selection

Range code	System	Power supply	Option
<b>AV7:</b> 120V <sub>LN</sub> AC - 5(32) (direct connection)	<b>1:</b> 1-phase	<b>X:</b> Self power supply (from 48 to 62Hz). The instrument works on the range from -20% to +20% of the measuring nominal input voltage.	<b>X:</b> none <b>P:</b> Bearing EC “Type examination” (annex B of MID) relevant to active electrical energy meters (see Annex MI-003).
<b>AV8:</b> 230V <sub>LN</sub> AC - 5(32)A (direct connection)	<b>Output</b>  <b>O1:</b> Pulse type (open col- lector output)		

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



Input specifications

<b>Rated inputs</b> Current range (by shunt) Voltage range	System: 1 AV7 and AV8: 5(32)A AV7: 120 VLN AC (The option “P” is not avail- able) AV8: 230 VLL AC	Active energy	Class 1 according to EN62053-21 and Class B according to EN50470-3. MID (Annex MI-003) Class B.
<b>Accuracy</b> (Display) (@25°C ±5°C, R.H. ≤60%, 48 to 62Hz)		Reference values	Ib: 5A, Imax: 32A, 0.1 Ib: 0.5A 20mA
AV7 model	Ib: 5A, Imax: 32A; Un: 120VLN (-20% +20%)	Start up current:	
AV8 model	Ib: 5A, Imax: 32A; Un: 230VLN (-20% +20%)	<b>Energy additional errors</b> Influence quantities	According to EN62053-21,
		<b>Temperature drift</b>	≤200ppm/°C
		<b>Sampling rate</b>	4096 samples/s @ 50Hz 4096 samples/s @ 60Hz

## Input specifications (cont.)

<b>Display</b>	1 line (max: 5+1 DGT)	<b>Crest factor</b>	1b 5A ≤4 (45A max. peak)
Type	LCD, h 7mm	<b>Current Overload</b>	
Energie indication	Total: 5+1 DGT	Continuous	32A, @ 50Hz
<b>LEDs</b>	Red LED (Energy consumption), 1000 pulses/kWh (Max Frequency 16 Hz) according to EN62053-11	For 10ms	960A, @ 50Hz
<b>Measurements</b>	kWh from 0,0 to 99999,9	<b>Voltage Overload</b>	
	PF model: kWh from 0,01 to 999999 autorange	Continuous	1.2 Un
Method	TRMS measurements of distorted wave forms	For 500ms	2 Un
Coupling type	Direct	<b>Input impedance</b>	
		120VL-N (AV7)	>720KΩ
		230VL-N (AV8)	>720KΩ
		5(32) A (AV7-AV8)	< 0.5VA
		<b>Frequency</b>	48 to 62 Hz

## Output specifications

<b>Digital output</b>	(on request)		
Number of outputs	1		
Type	Open collector, 1000 pulses/kWh.	<b>Insulation</b>	≥120ms (OFF), according to EN62052-31
Signal	V <sub>ON</sub> 1.2 VDC/ max. 100 mA		By means of optocouplers, 4000 VRMS output to measuring inputs
Pulse duration	V <sub>OFF</sub> 30 VDC max. ≥100ms < 120msec (ON),		

## General specifications

<b>Operating temperature</b>	-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	<b>Surge</b>	On current and voltage measuring input circuits: 4kV;
<b>Storage temperature</b>	-30°C to +70°C (-22°F to 158°F) (R.H. < 90% non-condensing @ 40°C) according to EN62053-21, EN50470-1 and EN62053-23	Radio frequency suppression	According to CISPR 22
<b>Installation category</b>	Cat. III (IEC60664, EN60664)	<b>Standard compliance</b>	
<b>Insulation (for 1 minute)</b>	4000 VRMS between measuring inputs and digital output (O1).	Safety	IEC60664, IEC61010-1, EN60664, EN61010-1 (EN62052-11) EN50470-1, EN62053-21, EN62053-23, EN50470-3
<b>Dielectric strength</b>	4000 VRMS for 1 minute	Metrology	MID "annex MI-003"
<b>CMRR Noise rejection</b>	100 dB, 48 to 62 Hz	Pulse output Approvals	DIN43864, IEC62053-31, CE, cULus, MID (PF option only)
<b>EMC</b>	According to EN62052-11	<b>Connections</b>	Screw-type
Electrostatic discharges	8kV air discharge;	Cable cross-section area	Measuring inputs: min. 2.5 mm <sup>2</sup> , max. 10 mm <sup>2</sup> ;
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	<b>DIN Housing</b>	Other terminals: 1.5 mm <sup>2</sup>
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz	Dimensions (WxHxD)	Min./Max. screws tightening torque: 0.4 Nm/0.8 Nm
		Material	17.5 x 90 x 67.5 mm
		Mounting	Nylon PA66, self-extinguishing: UL 94 V-0
		<b>Protection degree</b>	DIN-rail
		Front	IP40
		Screw terminals	IP20
		<b>Weight</b>	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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## MID "Annex MI-003" compliance (PF option only)

Accuracy	0.9 $U_n \leq U \leq 1.1 U_n$ ; 0.98 $f_n \leq f \leq 1.02 f_n$ ; $f_n$ : 50 or 60Hz; $\cos\phi$ : 0.5 inductive to 0.8 capacitive. Class B $I_{st}$ : 0.02A; $I_{min}$ : 0.25A; $I_{tr}$ : 0.64A; $I_{ref}$ : 5A; $I_{max}$ : 32A.	131°F) (R.H. from 0 to 90% non-condensing @ 40°C)
	EMC compliance	E2
	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	

## Used calculation formula

### Energy metering

$$kWh_i = \int_{t_1}^{t_2} P_i(t) dt \cong \Delta t \sum_{n=1}^{n_2} P_{ni}$$

Where:

$i$ = considered phase (L1)

$P$ = active power;

$t_1, t_2$ =starting and ending time points  
of consumption recording;

$n$ = time unit;

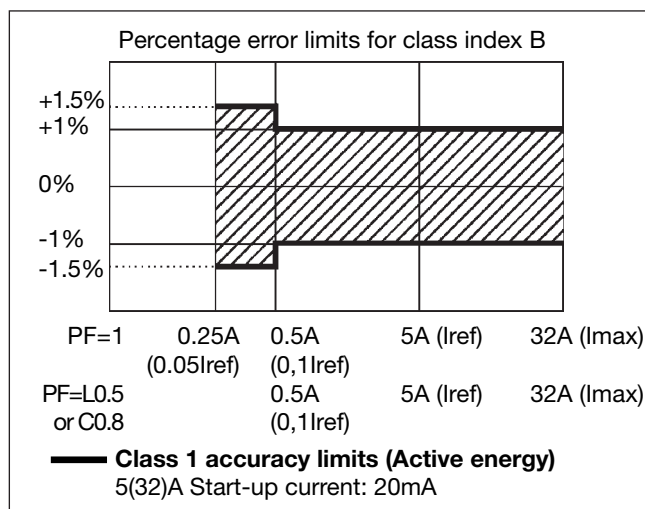
$\Delta t$ = time interval between two

successive power consumptions;

$n_1, n_2$  = starting and ending discrete  
time points of consumption recording

## Accuracy according to EN50470-3

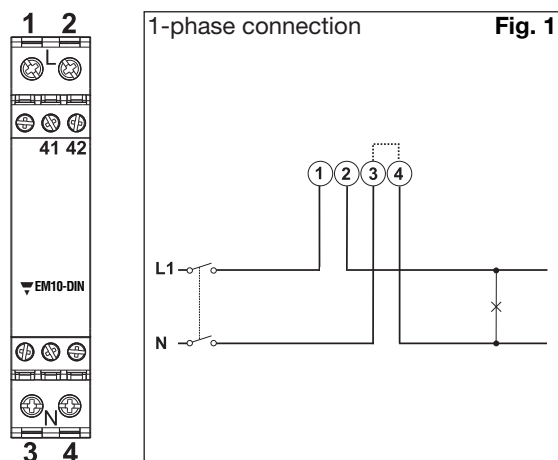
kWh, accuracy (RDG) depending on the current



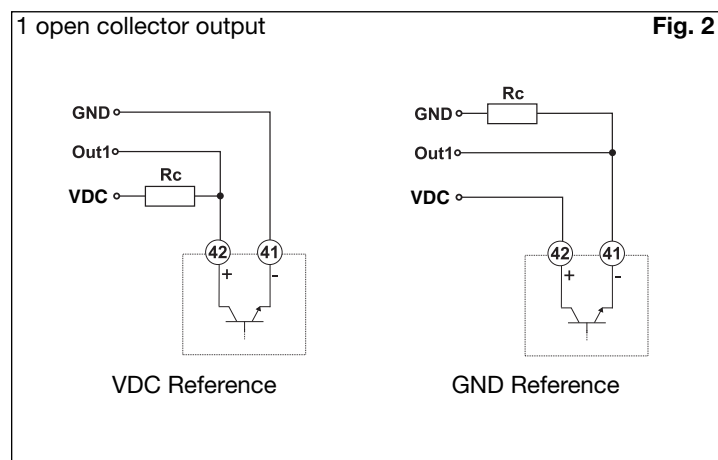
## Insulation between inputs and outputs

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

## Wiring diagram and open collector output (O1)

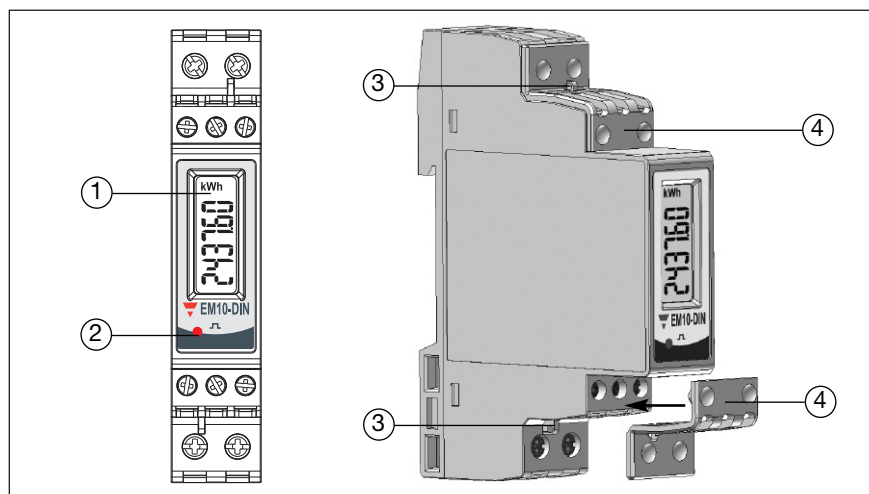


**NOTE:** The 3 and 4 terminals, in the instrument, are wired together



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 and tamper proof



1. **Display**  
LCD-type with energy indication.
2. **LED**  
Red LED to show the consumed energy.
3. **Tamper proof**  
The instrument can be sealed in two points: upper cover and lower cover.
4. **Protection covers for tamper proof**  
The "tamper proof" kit is available with the "P" option.

## Dimensions and panel cut-out

