

# Energy Management Energy Meter Type EM10 DIN



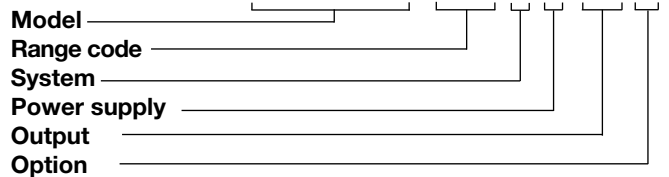
- Class 1 (kWh) according to EN62053-21
- Energy meter
- Energy: 5+1 DGT
- Energy measurements: total kWh
- TRMS measurements of distorted sine waves (voltages/currents)
- Self power supply
- Dimensions: 1-DIN module
- Protection degree (front): IP40
- 1 pulse output on request
- MID "annex MI-003" (Measuring Instruments Directive) compliant

## 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. Moreover the meter can be provided with pulse output proportional to the active energy being measured.

## How to order EM10 DIN AV8 1 X O1 X



## Type Selection

Range code	System	Power supply	Output
<b>AV7:</b> 120V <sub>LN</sub> AC - 5(32)A (**) (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>XX:</b> None (*) <b>O1:</b> Pulse type (open collector output) (*)
<b>AV8:</b> 230V <sub>LN</sub> AC - 5(32)A (*) (direct connection)	<b>Option</b>		
(*) as standard. (**) on request.	<b>X:</b> None (*) <b>P:</b> PTB approval		

## Input specifications

<b>Rated inputs</b> Current range (by shunt) Voltage range	System: 1 AV7 and AV8: 5(32)A AV7: 120 VLN AC AV8: 230 VLL AC	<b>Display</b> Type Energie indication	1 line (max: 5+1 DGT) LCD, h 7mm Total: 5+1 DGT
<b>Accuracy</b> (Display) (@25°C ±5°C, R.H. ≤60%, 48 to 62Hz)	lb: 5A, Imax: 32A; Un: 120VLN (-20% +20%) lb: 5A, Imax: 32A; Un: 230VLN (-20% +20%)	<b>LEDs</b>	Red LED (Energy consumption), 1000 pulses/kWh (Max Frequency 16 Hz) according to EN62053-11
AV7 model		<b>Measurements</b> Method	kWh from 0,0 to 99999,9 TRMS measurements of distorted wave forms Direct
AV8 model		Coupling type	Direct
Active energy	Class 1 according to EN62053-21 and MID Annex MI-003 Class B.	<b>Crest factor</b>	lb 5A ≤4 (45A max. peak)
Reference values	lb: 5A, Imax: 32A, 0.1 lb: 0.5A 20mA	<b>Current Overload</b> Continuous For 10ms	32A, @ 50Hz 960A, @ 50Hz
Start up current:		<b>Voltage Overload</b> Continuous For 500ms	1.2 Un 2 Un
<b>Energy additional errors</b> Influence quantities	According to EN62053-21, EN62053-23	<b>Input impedance</b> 120VL-N (AV7) 230VL-N (AV8) 5(32) A (AV7-AV8)	>720KΩ >720KΩ < 0.5VA
<b>Temperature drift</b>	≤200ppm/°C	<b>Frequency</b>	48 to 62 Hz
<b>Sampling rate</b>	1600 samples/s @ 50Hz 1900 samples/s @ 60Hz		

## Output specifications

<b>Digital output</b>	(on request)		
Number of outputs	1	Insulation	≥120ms (OFF), according to EN62052-31 By means of optocouplers, 4000 VRMS output to measuring inputs
Type	Open collector, 1000 pulses/kWh.		
Signal	V <sub>ON</sub> 1.2 VDC/ max. 100 mA V <sub>OFF</sub> 30 VDC max.		
Pulse duration	≥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 and EN62053-23	Surge	On current and voltage measuring input circuits: 4kV;
<b>Storage temperature</b>	-30°C to +70°C (22°F to 140°F) (R.H. < 90% non-condensing @ 40°C) according to EN62053-21 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
<b>Dielectric strength</b>	4000 VRMS for 1 minute	Metrology	EN62053-21, EN62053-23. MID "annex MI-003"
<b>CMRR Noise rejection</b>	100 dB, 48 to 62 Hz	Pulse output Approvals	DIN43864, IEC62053-31 CE, PTB (Revenue Approvals)
<b>EMC</b>	According to EN62052-11 8kV air discharge;	<b>Connections</b>	Screw-type
Electrostatic discharges		Cable cross-section area	Min. 2.5 mm <sup>2</sup> , Max. 10 mm <sup>2</sup> (measuring inputs);
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;	<b>DIN Housing</b>	Other terminals: 1.5 mm <sup>2</sup> Min./Max. screws tightening torque: 1 Nm / 4 Nm
Burst	On current and voltage measuring input circuits: 4kV	Dimensions (WxHxD)	17.5 x 90 x 67.5 mm
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz	Material	Nylon PA66, self-extinguishing: UL 94 V-0
		Mounting	DIN-rail
		<b>Protection degree</b>	
		Front	IP40
		Screw terminals	IP20
		<b>Weight</b>	Approx. 100 g (packing included)

## Power supply specifications

<b>Self supplied version</b>	120VLN, 230 VLN (-20% +20%) 48-62Hz	<b>Power consumption</b>	≤ 3VA
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## MID "Annex MI-003" compliance

### 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  
 $I_{st}$ : 0.025A;  
 $I_{min}$ : 0.32A;  
 $I_{tr}$ : 0.64A;  
 $I_{max}$ : 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 formula

### Energy metering

$$kWh_i = \int_{t_1}^{t_2} P_i(t) dt \cong \Delta t \sum_{n_1}^{n_2} P_{nj}$$

Where:

$i$ = considered phase (L1)

$P$ = active power;

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

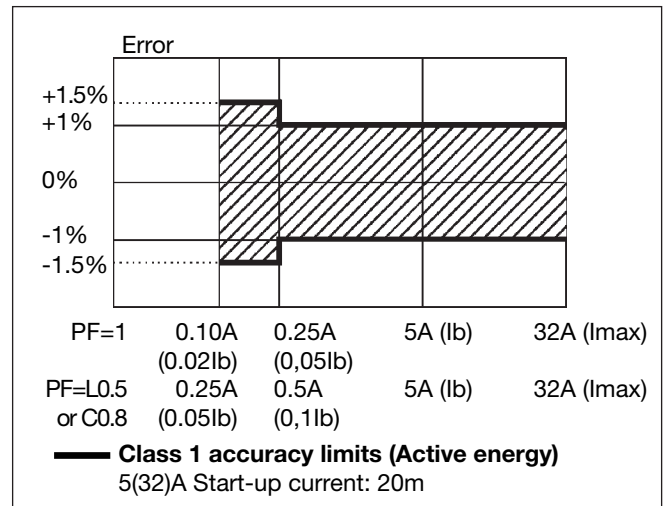
$n$ = time unit;

$\Delta t$ = time interval between two  
 successive power consumptions;

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

## Accuracy

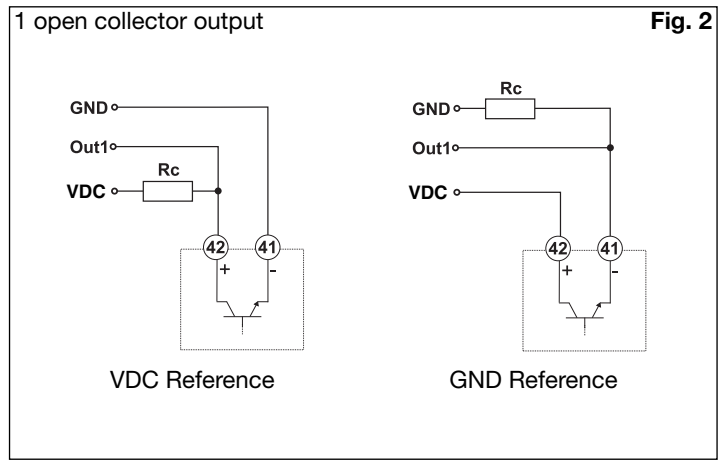
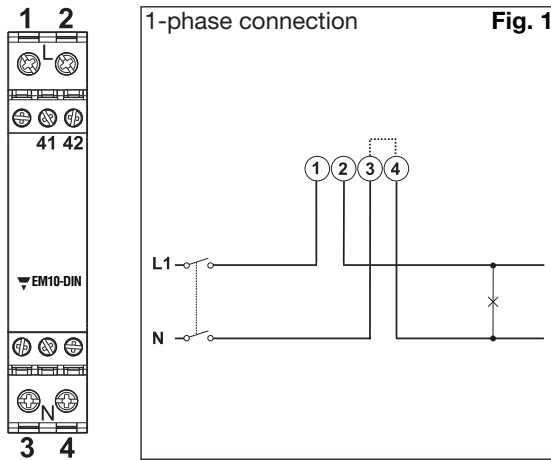
kWh, accuracy (RDG) depending on the current



## 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	-

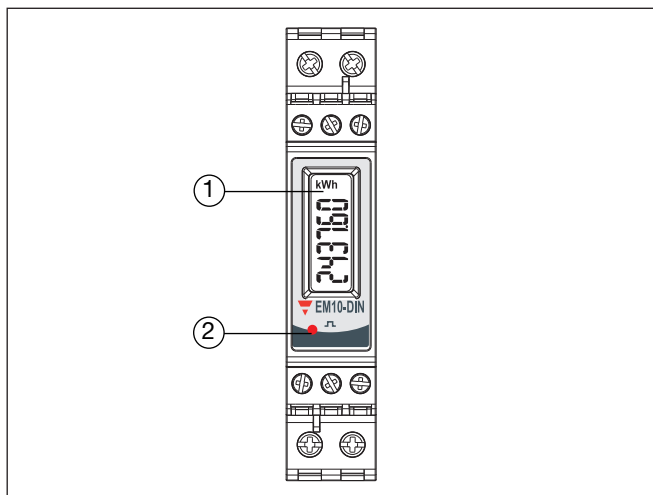
## Wiring diagram and open collector output (O1)



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

The load resistances (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. **Display**  
LCD-type with energy indication.
2. **LED**  
Red LED to show the consumed energy.

## Dimensions and panel cut-out

