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

MID 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

AV8: $230V_{LN}$ AC - 5(32)A (direct connection)

System

1: 1-phase

Output

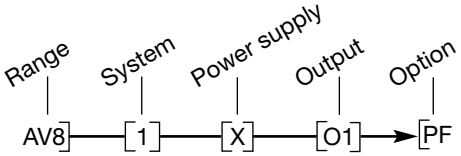
O1: Pulse type (open collector output)

Power supply

X: Self power supply (from 48 to 62Hz). The instrument works on the range from -20% to +20% of the measuring nominal input voltage.

Option

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.



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

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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

AV7: 120V_{LN} AC - 5(32) (direct connection)
AV8: 230V_{LN} AC - 5(32)A (direct connection)

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

System

1: 1-phase

Output

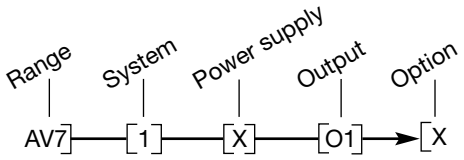
O1: Pulse type (open collector output)

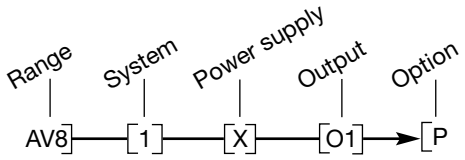
Power supply

X: Self power supply (from 48 to 62Hz). The instrument works on the range from -20% to +20% of the measuring nominal input voltage.

Option

X: none
P: Bearing EC “Type examination” (annex B of MID) relevant to active electrical energy meters (see Annex MI-003).





Input specifications

Rated inputs	System: 1
Current range (by shunt)	AV7 and AV8: 5(32)A
Voltage range	AV7: 120 VLN AC (The option “P” is not available)
	AV8: 230 VLL AC
Accuracy (Display) (@25°C ±5°C, R.H. ≤60%, 48 to 62Hz)	
AV7 model	Ib: 5A, Imax: 32A; Un: 120VLN (-20% +20%)
AV8 model	Ib: 5A, Imax: 32A; Un: 230VLN (-20% +20%)

Active energy	Class 1 according to EN62053-21 and Class B according to EN50470-3. MID (Annex MI-003) Class B.
Reference values	Ib: 5A, Imax: 32A, 0.1 Ib: 0.5A
Start up current:	20mA
Energy additional errors Influence quantities	According to EN62053-21,
Temperature drift	≤200ppm/°C
Sampling rate	4096 samples/s @ 50Hz 4096 samples/s @ 60Hz

Input specifications (cont.)

Display	1 line (max: 5+1 DGT)
Type	LCD, h 7mm
Energie indication	Total: 5+1 DGT
LEDs	Red LED (Energy consumption), 1000 pulses/kWh (Max Frequency 16 Hz) according to EN62053-11
Measurements	kWh from 0,0 to 99999,9 PF model: kWh from 0,01 to 999999 autorange
Method	TRMS measurements of distorted wave forms
Coupling type	Direct

Crest factor	Ib 5A ≤4 (45A max. peak)
Current Overload	
Continuous	32A, @ 50Hz
For 10ms	960A, @ 50Hz
Voltage Overload	
Continuous	1.2 Un
For 500ms	2 Un
Input impedance	
120VL-N (AV7)	>720KΩ
230VL-N (AV8)	>720KΩ
5(32) A (AV7-AV8)	< 0.5VA
Frequency	48 to 62 Hz

Output specifications

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

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
Storage temperature	-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
Installation category	Cat. III (IEC60664, EN60664)
Insulation (for 1 minute)	4000 VRMS between measuring inputs and digital output (O1).
Dielectric strength	4000 VRMS for 1 minute
CMRR **Noise rejection**	100 dB, 48 to 62 Hz
EMC	According to EN62052-11
Electrostatic discharges	8kV air discharge;
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;
Burst	On current and voltage measuring input circuits: 4kV
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz
Surge	On current and voltage measuring input circuits: 4kV;
Radio frequency suppression	According to CISPR 22
Standard compliance	
Safety	IEC60664, IEC61010-1 EN60664, EN61010-1 (EN62052-11) EN50470-1
Metrology	EN62053-21, EN62053-23, EN50470-3 MID "annex MI-003"
Pulse output	DIN43864, IEC62053-31
Approvals	CE, cULus, MID (PF option only)
Connections	Screw-type
Cable cross-section area	Measuring inputs: min. 2.5 mm^2, max. 10 mm^2; Min./Max. screws tightening torque: 0.5 Nm / 1.1 Nm Other terminals: 1.5 mm^2 Min./Max. screws tightening torque: 0.4 Nm/0.8 Nm
DIN Housing	
Dimensions (WxHxD)	17.5 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, 230 VLN (-20% +20%) 48-62Hz	**Power consumption**	≤ 3VA

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: 0.64A; 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
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 formula

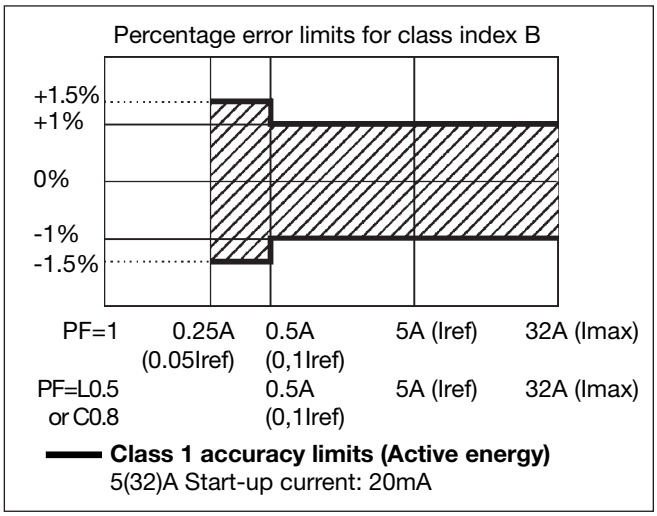
Energy metering

$$kWhi = \int_{t1}^{t2} Pi(t)dt \cong \Delta t \sum_{n1}^{n2} Pnj$$

Where:
i= considered phase (L1)
P= active power;
t_1, t_2 =starting and ending time points of consumption recording;
n= time unit;
Δt= 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

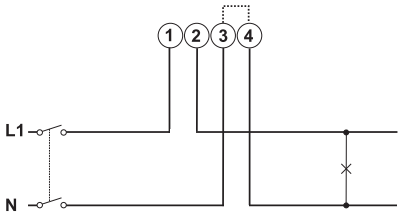


Insulation between inputs and outputs

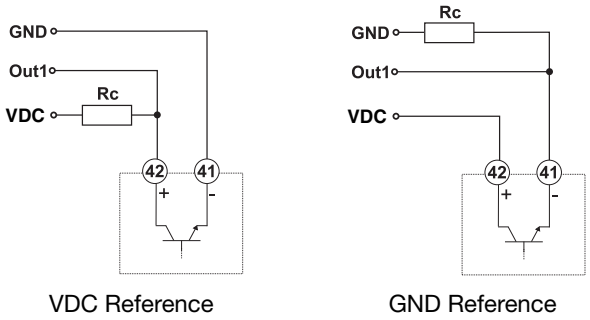
	Measuring inputs	Open collector output	AC self-power supply
Measuring inputs	-	4kV	0kV
Open collector output	4kV	-	4kV
AC self-power supply	0kV	4kV	-

Wiring diagram and open collector output (O1)

1-phase connection **Fig. 1**



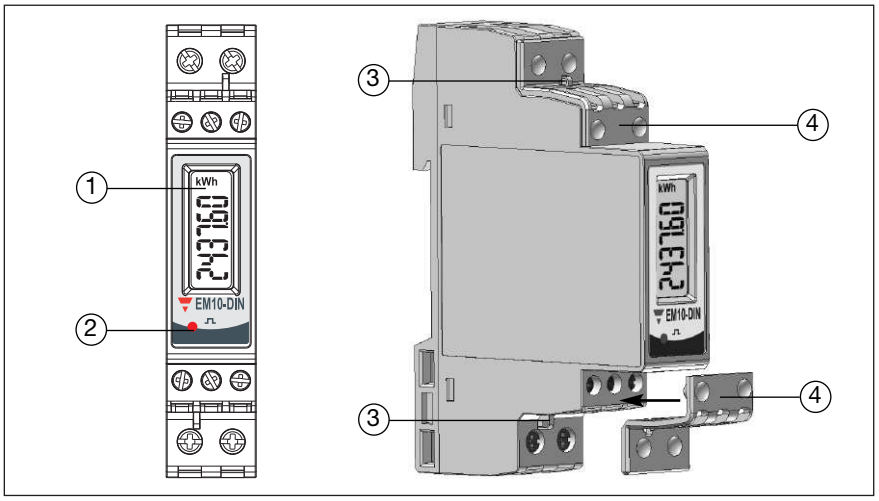
1 open collector output **Fig. 2**



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 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