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

Model
Range code
System
Power supply
Output
Option

Type Selection

Range code

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

(*) as standard.
(**) on request.

System

1: 1-phase

Option

X: None **(*)**
P: PTB approval

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.

Output

XX: None **(*)**
O1: Pulse type (open collector output) **(*)**

Input specifications

Rated inputs	System: 1
Current range (by shunt)	AV7 and AV8: 5(32)A
Voltage range	AV7: 120 VLN AC 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 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, EN62053-23
Temperature drift	≤200ppm/°C
Sampling rate	1600 samples/s @ 50Hz 1900 samples/s @ 60Hz

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
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 and EN62053-23
Storage temperature	-30°C to +70°C (22°F to 140°F) (R.H. < 90% non-condensing @ 40°C) according to EN62053-21 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
Metrology	EN62053-21, EN62053-23. MID ”annex MI-003”
Pulse output	DIN43864, IEC62053-31
Approvals	CE, PTB (Revenue Approvals)
Connections	Screw-type
Cable cross-section area	Min. 2.5 mm^2, Max. 10 mm^2 (measuring inputs); Other terminals: 1.5 mm^2 Min./Max. screws tightening torque: 1 Nm / 4 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

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: 0.025A; 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

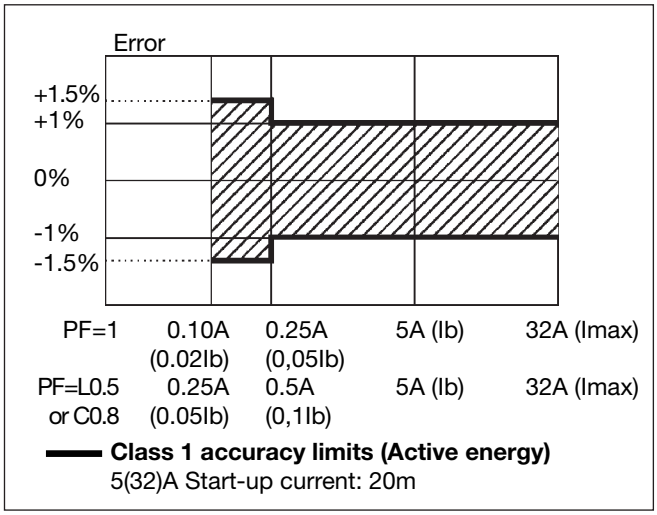
Energy metering

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

Where:
i= considered phase (L1)
P= active power;
$\mathbf{t_1}$, $\mathbf{t_2}$ =starting and ending time points of consumption recording;
n= time unit;
Δt= time interval between two successive power consumptions;
$\mathbf{n_1}$, $\mathbf{n_2}$ = starting and ending discrete time points of consumption recording

Accuracy

kWh, accuracy (RDG) depending on the current

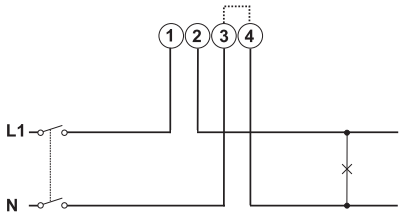


Insulation between inputs and outputs

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

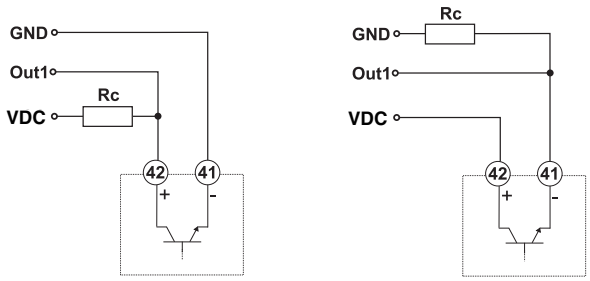
Wiring diagram and open collector output (O1)

1-phase connection **Fig. 1**



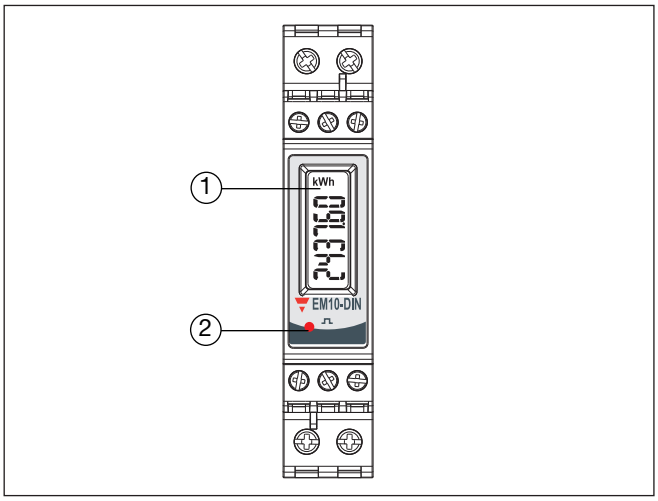
NOTE: The 3 and 4 terminals, in the instrument, are wired together

1 open collector output **Fig. 2**



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