EM
Технические характеристики

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Em²-Server

Software solution for energy monitoring and electrical data analysis

Benefits

- **Ease of energy monitoring and electrical data analysis** thanks to a software-based solution.
- **Full stack solution**. Linux-based solution including operating system, database and web user interface.
- **Multisite data aggregator**: up to 100 remote installations.
- **Configurable account management**: different levels of user accounts and multiple languages available.
- **Ease of deploying**, either On-premises or in the Cloud.
- **One shot license**: no annual fees.

Description

Em²-Server is the extension of the Carlo Gavazzi range of energy meters and power analysers. It allows multiple users to access to information according to their profile through its web interface and to manage energy and electrical data from multiple sites. Data are delivered via Internet by UWP 3.0 and/or VMU-C EM devices connected locally to energy meters and power analysers. Data are also time-normalized, stored on a database and aggregated according to the needs. A set of analysis tools and reporting functions allows users to get the most profitable value from the measured data points.

Main features

- Compatible with any Carlo Gavazzi energy meter and power analyser, via local data aggregators (UWP 3.0 or VMU-C EM).
- Compatible with any Modbus energy meter thanks to the UWP 3.0 Modbus Commander or the VMU-C EM Modbus Driver Editor.
- Distributed as VMware® virtual machine, ready for use without any external database or software tool.

Note: Carlo Gavazzi has not any technical or commercial agreement with VMware®.

- Simple per-gateway licensing plan.
- Robust relational database.
- Account-based data access.

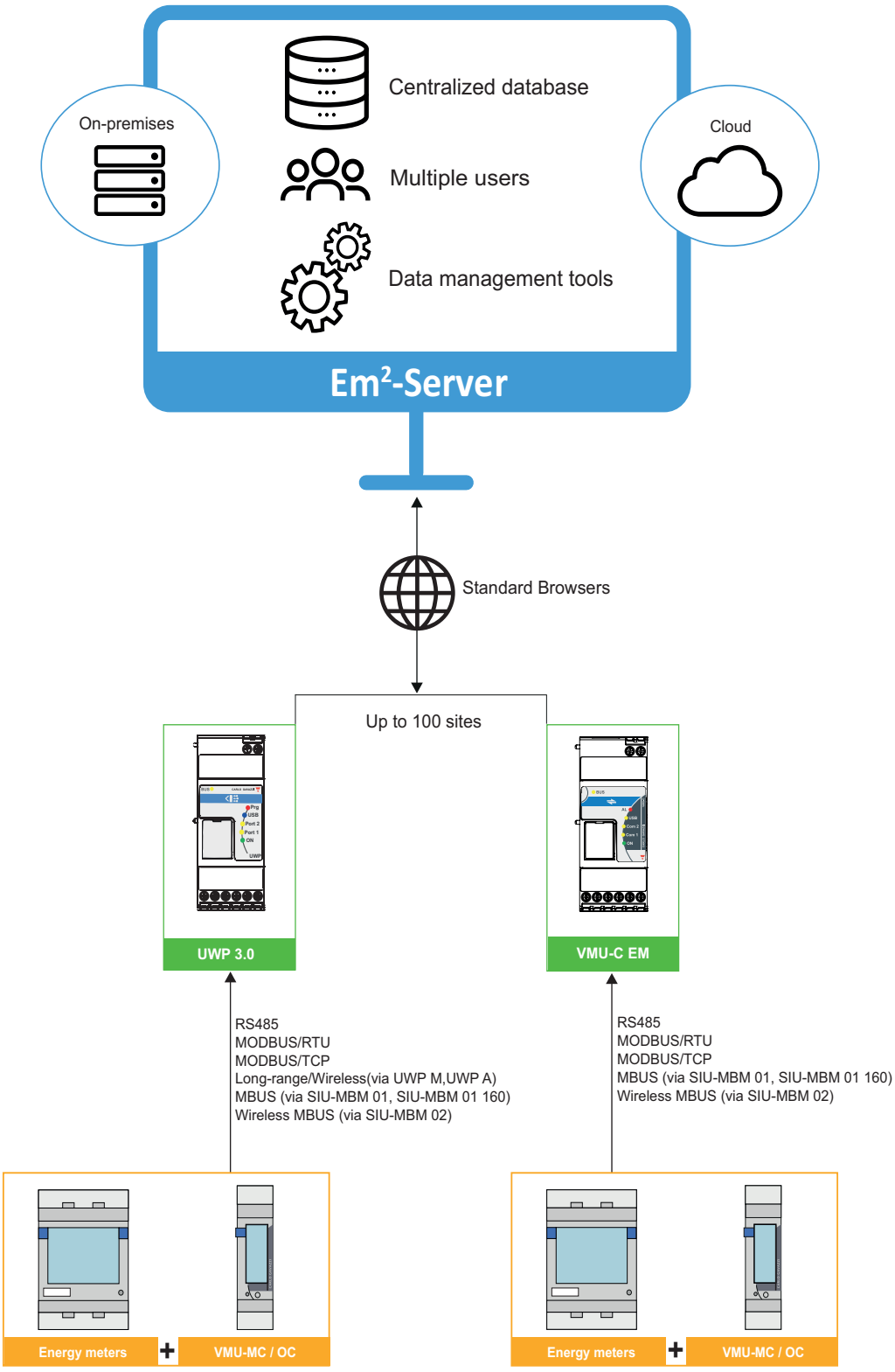
Main functions

- Data aggregation for analysis and reporting from up to 100 distributed sites.
- Compatibility with any Carlo Gavazzi energy meters and power analysers, via UWP 3.0 or VMU-C EM local aggregators.
- Virtual meters and virtual POD (point of delivery) creation.
- On-the-fly data aggregation: data are transmitted by UWP 3.0 or VMU-C EM and immediately processed.
- Multiple users.
- Multiple languages.
- Data analysis tools.
- Load profiling tool.
- Cost analysis and simulation.
- Excel® reporting with embedded Pivot Tables for offline analysis.
- PDF reporting with bill simulation for POD (point of delivery) analysis.

Content

- DVD with Em²-Server software, web-server functions, relational database distributed as OVF virtual machine for easy integration into VMware® environments
- License activation code (see **Em²-Server license** on page 5 for further details)
- Instructions sheet

Architecture



Software features

Deployment

Media	DVD
Format	OVF standard format
Compatibility	VMware® virtual machine

Virtual machine's host characteristics

CPU (min)	64 bit (AMD Opteron / Intel Itanium)
RAM (min)	8 GB (dedicated)
Free disk space (min)	According to portfolio size (100 GB for the bare virtual machine), suggested at least 500GB
Host operating system	VMware® compliant

User interface

Virtual machine installation	VMware® software tools
Network configuration	VMware® console access
Application software (administration)	Web-Browser
Application software (use)	Web-Browser
Web-Browser compatibility	Firefox, Chrome, Internet Explorer, Safari, Opera*

**Note: Carlo Gavazzi tested Em²-Server with the latest versions of the named browsers (2014-April)*

Backup

Backup	Virtual machine backup and snapshot based on VMware® compliant backup tools*

**Note: The user is responsible for data integrity and for putting in place any necessary action to grant that information are stored and managed in a reliable and safe way, including the necessary backup and disaster recovery procedures and solutions.*

Em²-Server license

<table>
<tr><td rowspan="2">License structure</td><td>Base license: it allows activating the server instance to connect up to 20 VMU-C EM and UWP 3.0 units to the target server instance.</td></tr>
<tr><td>Base license extension: it allows extending the actual number of VMU-C EM / UWP 3.0 units.</td></tr>
<tr><td>Necessary license</td><td>
<table>
<tr><th>Managed VMU-C / UWP 3.0 units</th><th>License</th></tr>
<tr><td>20</td><td>1 base license</td></tr>
<tr><td>40</td><td>1 base license + 1 base license extension</td></tr>
<tr><td>60</td><td>1 base license + 2 base license extensions</td></tr>
<tr><td>80</td><td>1 base license + 3 base license extensions</td></tr>
<tr><td>100</td><td>1 base license + 4 base license extensions</td></tr>
</table>
</td></tr>
<tr><td>License check</td><td>It is necessary a valid Internet connection with outbound communication on ports 80 and 443 to activate the Em²-Server's license. Em²-Server periodically and remotely checks the license validity with Carlo Gavazzi's license servers. If the license check is not possible or the result is not valid, the relevant Em²-Server instance is disabled, and data pushed by VMU-C EM / UWP 3.0 units do not enter the Em²-Server's database.</td></tr>
</table>

Em²-Server memory format and data occupancy

Description	Value
Total available memory for database	According to available space in the server(1)
Maximum backup size	Depending on the tool and storage media of choice(1)
Resolution High resolution Low resolution	 From 5 to 60 minutes interval according to configuration Daily interval
Database size management	Dynamic, based on: • Current number of VMU-C EM units which are replicating their database to Em2-Server • Total number of devices (Energy Meters and VMU-M units) connected to the VMU-C EM units • Number of Virtual meters created at Em2-Server level • Data resolution (from 5 to 60 minutes)
Range of historical data available with High resolution	Min.: 5 months Max: 10 years
Range of historical data available with Low resolution	30 years

Notes:
(1): The user is responsible for data integrity and for putting in place any necessary action to grant that information are stored and managed in a reliable and safe way, including the necessary IT architecture sizing and designing, and backup and disaster recovery procedures and solutions

Em2-Server TCP/IP networking

Inbound TCP/IP communication

TCP/IP port number	TCP/IP port description	Purpose
80	HTTP	Access to the internal web-server
52325	SSH	Remote tunnelling feature; connection from VMU-C to VMU-Y
from 1000 to 64000 (customer selected)	SSH	Remote tunnelling feature; user access to remote VMU-C

Outbound TCP/IP communication

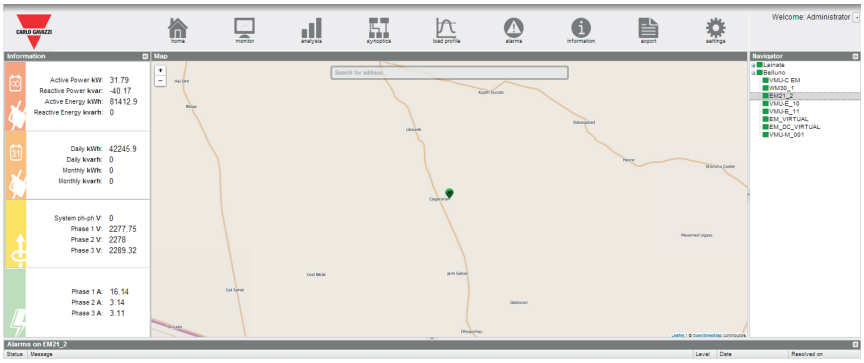
TCP/IP port number	TCP/IP port description	Purpose
53	DNS	Domain name resolution
37	NTP	Network time services access
25	SMTP	Email message dispatching
443	HTTPS	Remote connection to licensing server

Communication

Protocol	Carlo Gavazzi DP (Data Push) protocol based on web-server communication

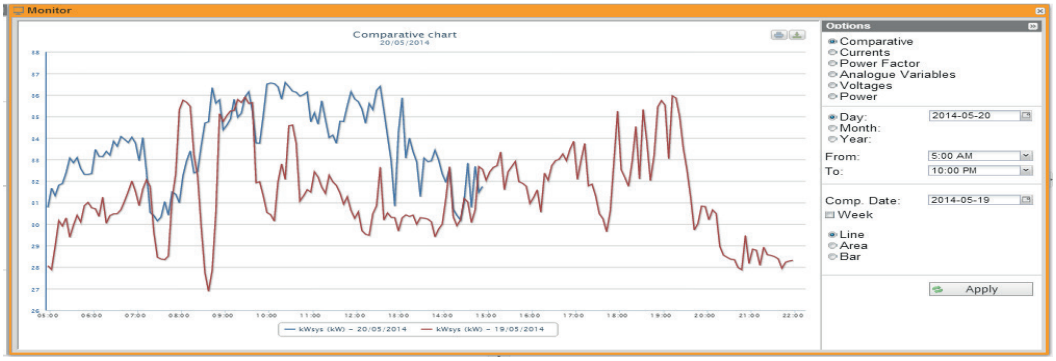
Web server

Main page



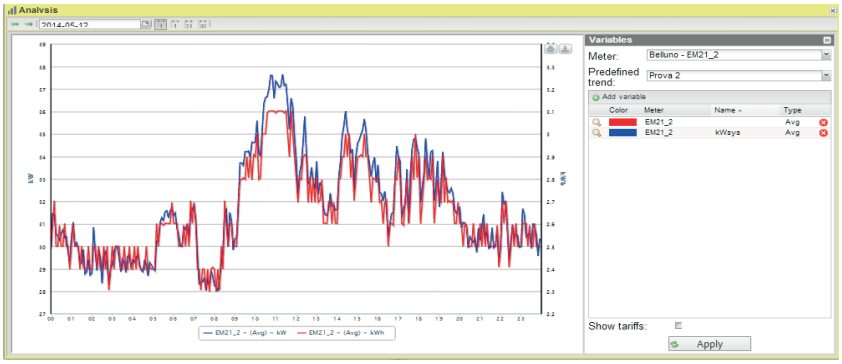
- Web-based access via standard browser.
- Multiple accounts.
- Configurable access rights for each user.
- Map for locating UWP 3.0 and VMU-C EM devices.
- Navigator tool for organizing the system in cost centres according to the needs.
- On-the-fly update of the whole database, during the reception of data.

Monitoring tool



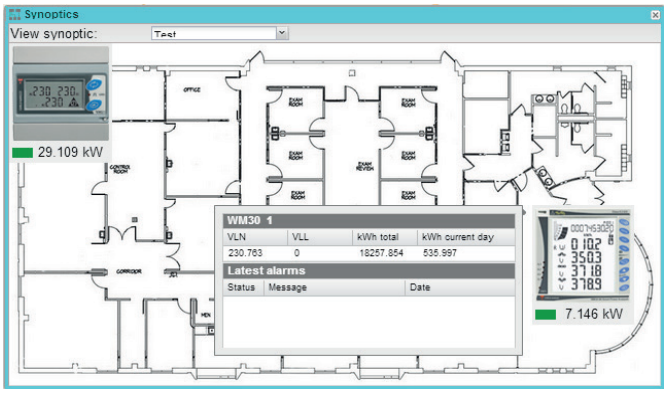
- Real time (according to sampling interval) and historical data displaying of each energy meter and power analyser variables.
- Easy navigation of available meters and cost centres.

Analysis tool



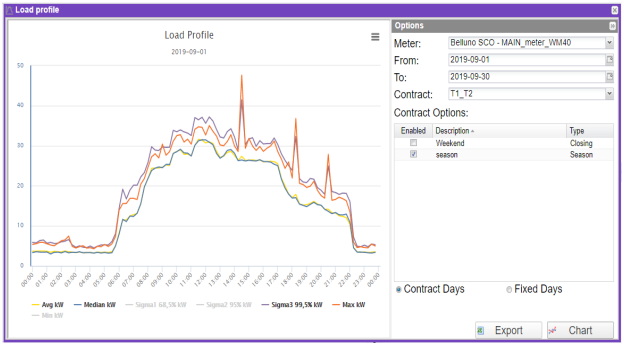
- Real time (according to sampling interval) and historical data displaying of any combination of variables.
- Comparison of trends in different time intervals.

Synoptic tool



- Real time (according to sampling interval) displaying of energy meters and power analysers on top of one or more layouts or schematics.
- Multiple panels can be managed.

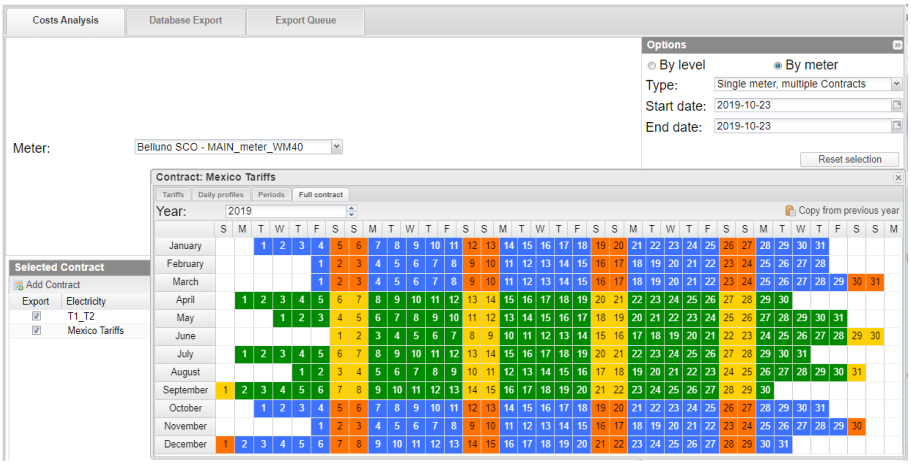
Load profile tool



- Statistical analysis of daily consumption data.
- Calculation of the daily baseline.
- Estimation of the maximum power for dealing with energy suppliers.

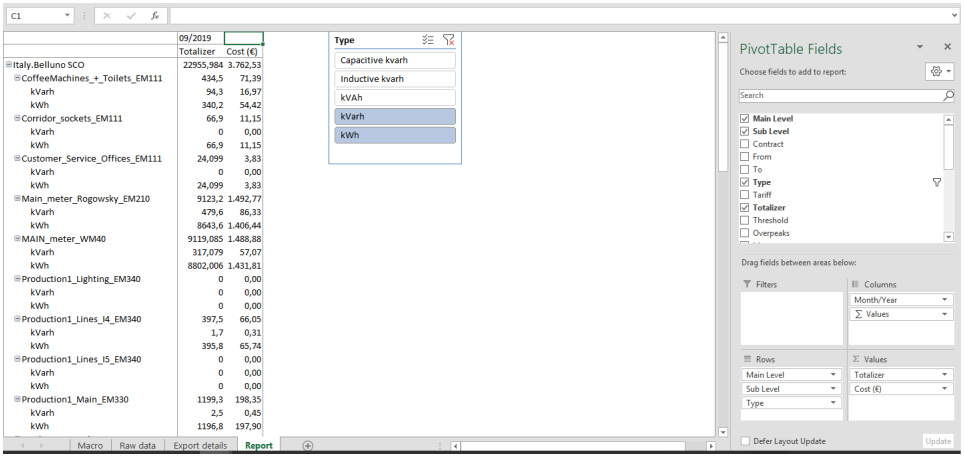
Report

Tariff management



- Calendar and tariff settings for cost calculation.
- Multiple contracts management for cost simulation.

Excel reporting



- Excel reports with Pivot table for analysing consumptions and energy cost over a time interval.
- Report split into user / cost centre (for a selectable group of devices).

Billing simulation report

CARLO GAVAZZI CONTROLS S.p.A.
via Safforze, 8, Belluno, (32100)
controls@gavazziacbu.it
+39 0437 355811

STATEMENT DATE
13/03/2020

AMOUNT DUE
3,985.72 €

SERVICE ADDRESS

CUSTOMER: Name
Address, City, (Zip Code)
Email
Phone Number

MEASUREMENT POINT

MAIN_meter_WM40

BILLING PERIOD

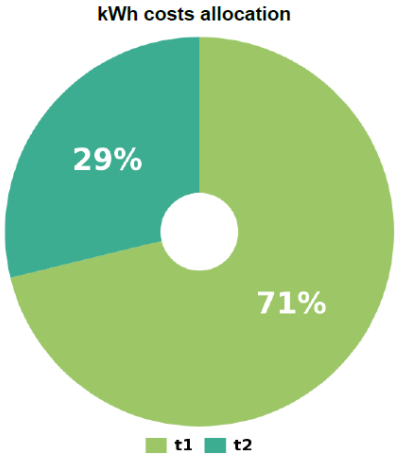
DATE	kWh READING	kvarh READING
01/01/2020	959,990.5 kWh	36,052.3 kvarh
29/02/2020	979,789.1 kWh	39,637.2 kvarh

CHARGES DETAILS

COSTS	QUANTITY	UNIT PRICE	SUBTOTAL
Active energy			
t1	13,578.4 kWh	0.17 €	2,308.32 €
t2	6,219.0 kWh	0.15 €	932.85 €
Total	**19,797.4 kWh**		**3,241.17 €**
Reactive energy			
t1	3,297.5 kvarh	0.60 €	677.04 €
t2	2,398.3 kvarh	0.18 €	67.51 €
Total	**5,695.8 kvarh**		**744.55 €**

TOTAL CHARGES

Total	**3,985.72 €**



- PDF reports with custom templates containing calculated costs according to measured consumptions and contract of choice.
- Report split into user / cost centre (for a selectable group of devices).

References

Further reading

Document	Where to find it
User manual	
Software update	

CARLO GAVAZZI compatible components

Purpose	Component name/code
Web server	VMUCEMAWSSUX
	UWP30RSEXXX
Energy meters and power analysers (families)	CPA
	EM24 EM26
	EM210
	EM111 EM112 EM330 EM340
	EM270 EM271 EM280
	ET112 ET330 ET340
	WM20 WM30 WM40
Pulse concentrator	VMUMCAS1I2EM VMUOCAI3XXEM

How to order

EM2SERVERSTD ☐

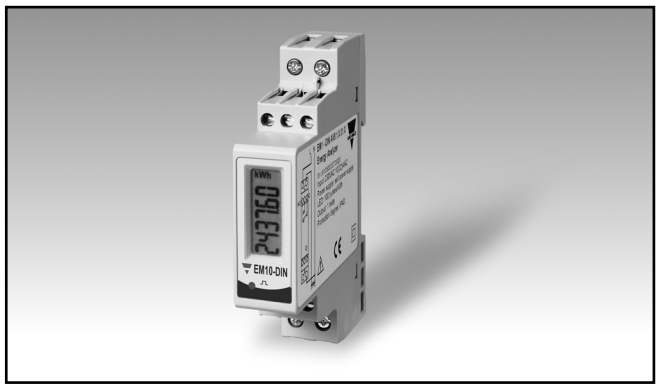
Enter the code replacing the symbol ☐ with the selected option (e.g.: EM2SERVER STD L1)

Options	Description
L1	Base license (up to 20 VMU-C EM/UWP 3.0)
L2	Base license extension (additional 20 VMU-C EM/UWP 3.0)*

**Note: up to 100 VMU-C EM / UWP 3.0 can be managed by a single Em² -Server instance.*

Energy Management
Energy Meter
Type EM10 DIN

CARLO GAVAZZI



- **Class 1 (kWh) according to EN62053-21**
- **Class B (kWh) according to EN50470-3**
- **Energy meter**
- **Energy readout: 6 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): 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, Module B and Module D of Annex II, for legal metrology relevant to active electrical energy meters (see Annex V, MI003, 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. Can be used for fiscal (legal) metrology.

Range — System — Power supply — Output — Option

AV8 — 1 — X — O1 — PF

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

CARLO GAVAZZI

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

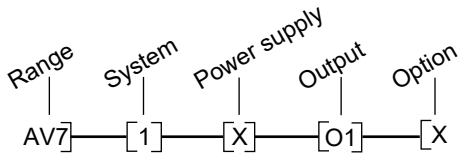
XX: None
O1: Pulse type (open collector output)

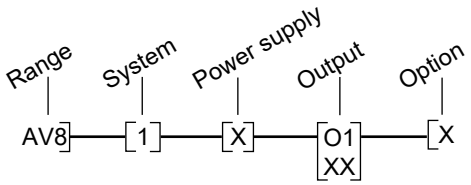
Power supply

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





Input specifications

Rated inputs	
Current range (by shunt)	System: 1 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 Class B according to EN50470-3.
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
Display	1 line (max: 6 DGT)
Type	LCD, h 7mm
Energie indication	Total: 6 DGT
LEDs	Red LED (Energy consumption), 1000 pulses/kWh (Max Frequency 16 Hz) according to EN62053-11
Measurements	kWh from 0.01 to 999999,

Input specifications (cont.)

Method	autorange 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.
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
Pulse output	DIN43864, IEC62053-31
Approvals	CE, cULus (X option only), 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. Screws tightening torque: 0.5 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 (AV7), 230 VLN (AV8) (-20% +20%) 48-62Hz	**Power consumption**	≤ 3VA

MID 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.	**EMC compliance**	E2
Operating temperature	-25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C)	**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

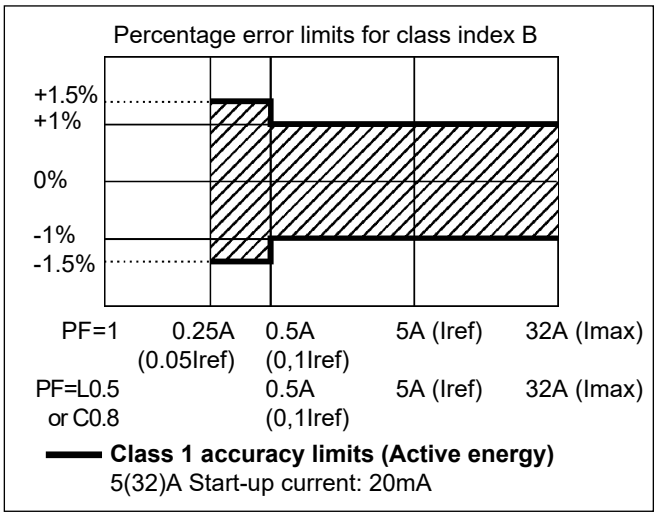
Energy metering

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

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

Accuracy according to EN50470-3

kWh, accuracy (RDG) depending on the current

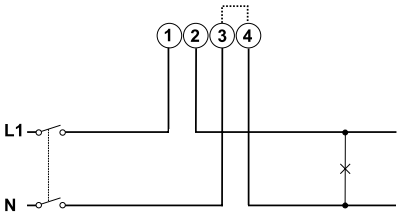


Insulation between inputs and outputs

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

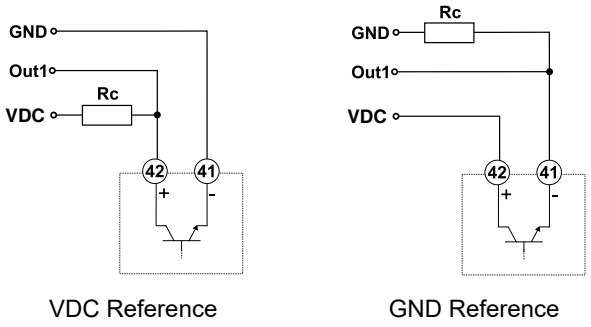
Wiring diagram and open collector output (O1)

1-phase connection **Fig. 1**



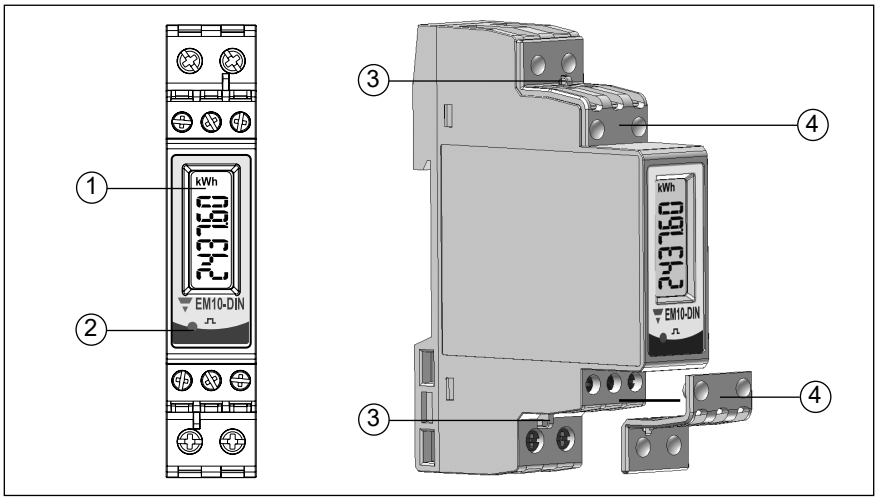
NOTE: The 3 and 4 terminals, in the instrument, are wired together

1 open collector output **Fig. 2**



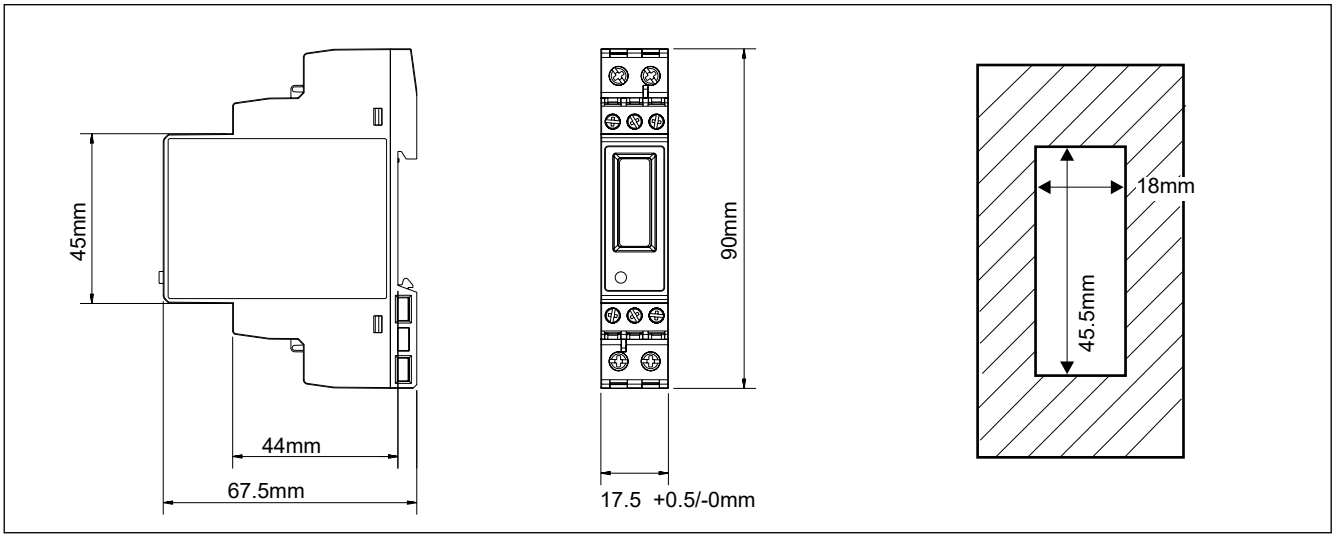
The load resistances (RC) must be designed so that the close contact current is lower than 100mA; the VDC voltage must be lower than or equal to 30VDC.

Frontal panel description and tamper proof

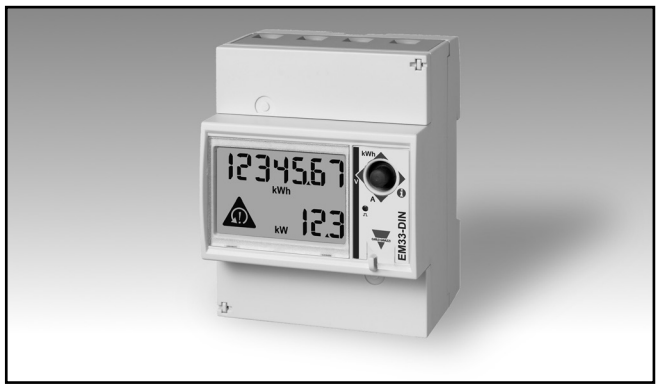


1. **Display**
   LCD-type with energy indication.
2. **LED**
   Red LED to show the consumed energy.
3. **Tamper proof**
   The instrument can be sealed in two points: upper cover and lower cover.
4. **Protection covers for tamper proof**
   The “tamper proof” kit is available with the “PF” option.

Dimensions and panel cut-out



Energy Management Energy Meter Type EM33 DIN



- **Easy connections management**
- **Certified according to MID Directive (option PF only): see "how to order" below**
- **Other version available (not certified, option X):**
- **see "how to order" on the next page**

- **Class 1 (kWh) according to EN62053-21**
- **Class B (kWh) according to EN50470-1-3**
- **Accuracy ±0.5% RDG (current/voltage)**
- **Three –phase energy meter**
- **Instantaneous variables readout: 3 DGT**
- **Energies readout: 7 DGT**
- **System variables: W, phase-sequence.**
- **Single phase variables: A, V**
- **Energy measurements: total kWh**
- **TRMS measurements of distorted sine waves (voltages/ currents)**
- **Direct connection up to 32A**
- **RS485 serial communication port (MODBUS-RTU), iFIX SCADA compatibility**
- **Self power supply**
- **Dimensions: 4-DIN modules**
- **Protection degree (front): IP50**
- **Certified according to MID Directive, Annex "B"+ Annex "D" for legal metrology relevant to active electrical energy meters (see Annex MI-003), see option "PF" below.**

Product Description

Three-phase energy meter with built-in configuration joystick and LCD data displaying; particularly indicated for active energy metering and for cost allocation. Housing for DIN-rail mounting with IP50 (front) protection degree. Direct connection up to 32A, moreover the meter is provided with serial communication port.

MID Certified according to MID Directive, Module B and Module D of Annex II, for legal metrology relevant to active electrical energy meter (see Annex V, MI003, of MID). Can be used for fiscal (legal) metrology.

How to order

EM33 DIN AV3 3 X XS PF

- **Model**
- **Range code**
- **System**
- **Power supply**
- **Output**
- **Option**

Type Selection

Range codes

AV3: 400VLL AC - 5(32)A (direct connection) VLN : 184V to 276VLN VLL : 318V to 480VLL

System

3: unbalanced load: 3-phase, 4-wire

Power supply

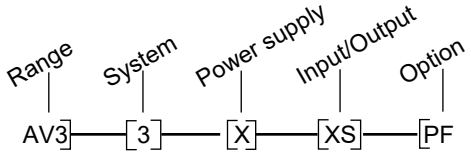
X: Self power supply -15% +20% of the rated measuring input voltage, 45 to 65 Hz

Output

XS: RS485 port

Options

PF: Certified according to MID Directive. Can be used for fiscal (legal) metrology.



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

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STANDARD

Not certified according to MID directive. Cannot be used for fiscal (legal) metering.

How to order

EM33 DIN AV3 3 X XS X

- **Model**
- **Range code**
- **System**
- **Power supply**
- **Output**
- **Option**

Type Selection

Range codes

AV3: 400VLL AC - 5(32)A (direct connection) VLN : 184V to 276VLN VLL : 318V to 480VLL

System

3: unbalanced load: 3-phase, 4-wire

Power supply

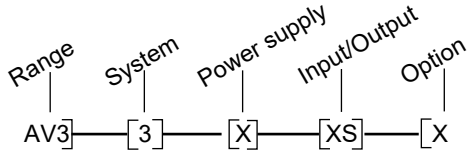
X: Self power supply -15% +20% of the rated measuring input voltage, 45 to 65 Hz

Output

XS: RS485 port

Options

X: None



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

Input specifications

Rated inputs	
System type	3 phase, unbalanced
Current type	By direct connection
Voltage	230 VLN/400 VLL AC
Current	5(32)AAC
Accuracy (Display + RS485) (@25°C ±5°C, R.H. ≤60%, 45 to 65 Hz)	Ib: see below, Un: see below
Ranges	Ib: 5A, Imax: 32A, 0.1 Ib: 0,5A 196 to 265VLN (340 to 460VLL)
Current	From 0.004Ib to 0.2Ib: ±(0.5% RDG +3DGT) From 0.2Ib to Imax: ±(0.5% RDG +1DGT).
Start up current	20mA
Phase-neutral voltage	In the range Un: ±(0,5% RDG +1DGT)
Active power	±(1%RDG +2DGT)
Active energy	Class 1 according to EN62053-21. Class B (kWh) according to EN50470-3
Energy additional errors	
Influence quantities	According to EN62053-21 and EN50470-1-2
Temperature drift	≤ 200ppm/°C
Sampling rate	1600 samples/s @ 50Hz; 1900 samples/s @ 60Hz

Input specifications (cont.)

Display refresh time	750 msec.
Display	2 lines (1 x 7 DGT; 2 x 3 DGT)
Type	LCD, h 9mm
Instantaneous variables read-out	3 DGT
Energy	Imported Total: 5+2, 6+1 or 7DGT
Overload status	EEE indication when the value being measured is exceeding the “Continuous inputs overload” (maximum measurement capacity)
Max. and Min. indication	Max. instantaneous variables: 999; energies: 9 999 999. Min. instantaneous variables: 0; energies 0.00
LEDs	Red LED (Energy consumption), 0.001 kWh by pulse Max frequency: 16Hz according to EN50470-1
Measurements	See “List of the variables that can be displayed and transmitted by means of RS485”
Method	TRMS measurements of distorted wave forms.
Coupling type	Direct
Crest factor	Ib 5A ≤4 (45A max. peak)

Current Overloads	
Continuous	32A, @ 50Hz
For 10ms	960A max, @ 50Hz
Voltage Overloads	
Continuous	265VLN
For 500ms	275VLN
Input impedance	
Voltage	Refer to “Power Consumption”
Current	< 4VA
Frequency	45 to 65 Hz
Joystick	For variable selection and serial communication address/speed programming

RS485 communication port

Type	Multidrop, bidirectional (static and dynamic variables)
Connections	2-wire max. distance 1000m
Addresses	247, selectable by means of the front joystick
Protocol	MODBUS/JBUS (RTU)
Data (bidirectional)	
Dynamic (reading only)	System and phase variables: see table “List of variables...”
Static (reading and writing)	Communication address and baud-rate parameters.
Static (reading only)	Serial number, year of production and firmware revision
Data format	1 start bit, 8 data bit, no parity,1 stop bit
Baud-rate	4800, 9600 bits/s
Driver input capability	1/5 unit load. Maximum 160 transceivers on the same bus.
Insulation	By means of optocouplers, 4000 VRMS output to measuring input

Software functions

System selection	
System 3-Phase unbalanced load	3-phase (4-wire);
Displaying	Up to 3 variables per page. See “Display pages”
Easy connection function	Automatic phase sequence detection with current and voltage synchronisation.

Both energy and power measurements are independent on the current direction. The total energy is displayed as “imported”.

General specifications

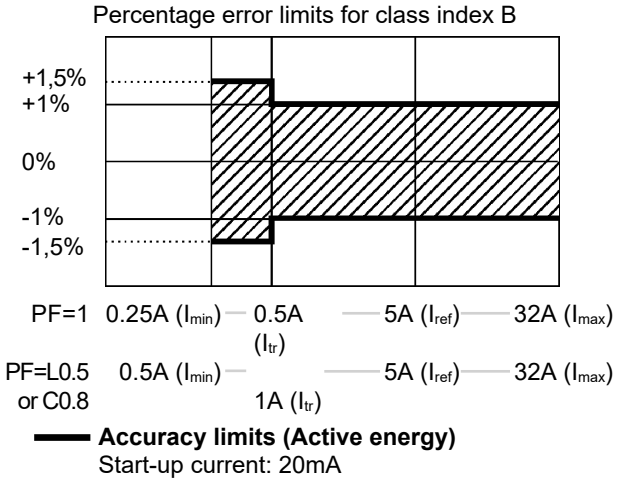
Operating temperature	-25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C) according to EN62053-21, EN62053-23 and EN50470-1
Storage temperature	-30°C to +70°C (-22°F to 158°F) (R.H. < 90% non-condensing @ 40°C) according to EN62053-21, EN62053-23 and EN50470-1
Installation category	Cat. III (IEC60664, EN60664)
Insulation (for 1 minute)	4000 VRMS between measuring inputs and RS485
Dielectric strength	4000 VRMS for 1 minute
Noise rejection CMRR	100 dB, 48 to 62 Hz
EMC	According to EN62052-11
Electrostatic discharges	15kV air discharge;
Immunity to irradiated electromagnetic fields	Test with current: 10V/m from 80 to 2000MHz; Test without any current: 30V/m from 80 to 2000MHz;
Burst	On current and voltage measuring inputs circuit: 4kV
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz
Surge	On current and voltage measuring inputs circuit: 4kV.
Radio frequency suppression	According to CISPR 22
Standard compliance	
Safety	IEC60664, IEC61010-1 EN60664, EN61010-1 EN62052-11, EN50470-1
Metrology	EN62053-21, EN50470-3
Approvals	CE, MID (PF option only)
Connections	Screw-type
Cable cross-section area	Measuring inputs: max. 16 mm^2, min. 2.5 mm^2 (by cable lug); Min./Max. screws tightening torque: 1.7 Nm / 3 Nm Output terminals: 1.5 mm^2 Min./Max. screws tightening torque: 0.4 Nm / 0.8 Nm
Housing DIN	
Dimensions (WxHxD)	71 x 90 x 64.5 mm
Material	Nylon PA66, self-extinguishing: UL 94 V-0
Mounting	DIN-rail
Protection degree	
Front	IP50
Screw terminals	IP20
Weight	Approx. 400 g (packing included)

Power supply specifications

Self supplied version	
Range	230VLN -15% +15%, 45-65Hz.
Note	The instrument works only if all the voltage inputs are connected (3-phase and neutral).
Power consumption	≤12VA/2W

Accuracy (according to EN50470-3)

kWh, accuracy (RDG) depending on the current



MID 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: 0.5A; 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
Mechanical compliance	M2
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 formulas

Phase variables

Instantaneous effective voltage

$$V_{1N} = \sqrt{\frac{1}{n} \cdot \sum_{1}^{n} (V_{1N})_i^2}$$

Instantaneous active power

$$W_1 = \frac{1}{n} \cdot \sum_{1}^{n} (V_{1N})_i \cdot (A_1)_i$$

Instantaneous effective current

$$A_1 = \sqrt{\frac{1}{n} \cdot \sum_{1}^{n} (A_1)_i^2}$$

System variables

Three-phase active power

$$W_\Sigma = W_1 + W_2 + W_3$$

Energy metering

$$kWhi = \int_{i1}^{t2} Pi(t)dt \cong \Delta t \sum_{n1}^{n2} Pnj$$

Where:

i= considered phase (L1, L2 or L3)
P= active power; **Q**= reactive power;
$\mathbf{t_1}$, $\mathbf{t_2}$ =starting and ending time points of consumption recording; **n**= time unit;Δ**t**= time interval between two successive power consumptions;
$\mathbf{n_1}$, $\mathbf{n_2}$ = starting and ending discrete time points of consumption recording

List of the available variables

List of variables that can be displayed and transmitted by means of RS485

No	Variable	3-ph. 4-wire unbalanced system	Notes
1	A L1	x	
2	A L2	x	
3	A L3	x	
4	V L1N	x	
5	V L2N	x	
6	V L3N	x	
7	W sys	x	sys=system
8	kWh	x	Total
9	Phase seq.	x	

(x) = available

Display pages

Display variables in 3-phase systems with neutral

No	1st line	2nd line	Phase Sequence	Notes
1	Total kWh	kW sys	Warning triangle if reverse sequence	Joystick position: Up
2	A L1 - A L2	A L3	Warning triangle if reverse sequence	Joystick position: Down
3	V L1N - V L2N	V L3N	Warning triangle if reverse sequence	Joystick position: Left
4	Information	Information		Joystick position: Right

Note: whatever page the user has selected, after 60s it goes back to page 1.

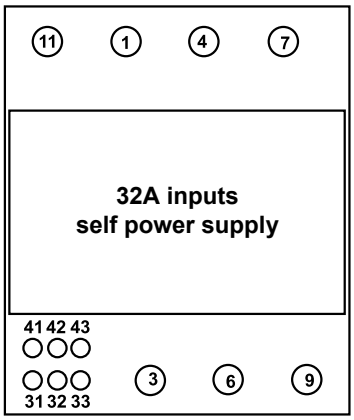
Additional available information on the display

Type	1st line	2nd line	Note
Meter information 1	Serial number (1234567)	Sn (text)	Available also on the RS485
Meter information 2	Year of production (Yr 2009)	Firmware revision (A.00)	Available also on the RS485
Meter information 3	Serial communication Address (Adr 1)	Communication speed (4.8 or 9.6)	Available also on the RS485

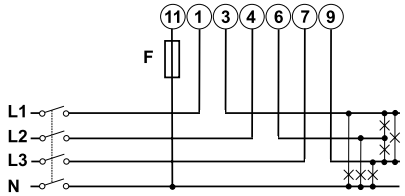
Insulation between inputs and outputs

	Measuring Inputs	Communication port	Self power supply
Measuring Inputs	-	4kV	0kV
Communication port	4kV	-	4kV
Self power supply	0kV	4kV	-

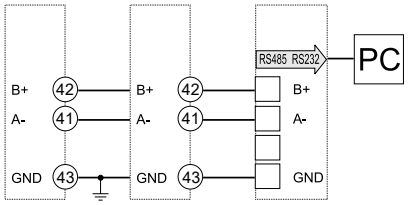
Wiring diagrams



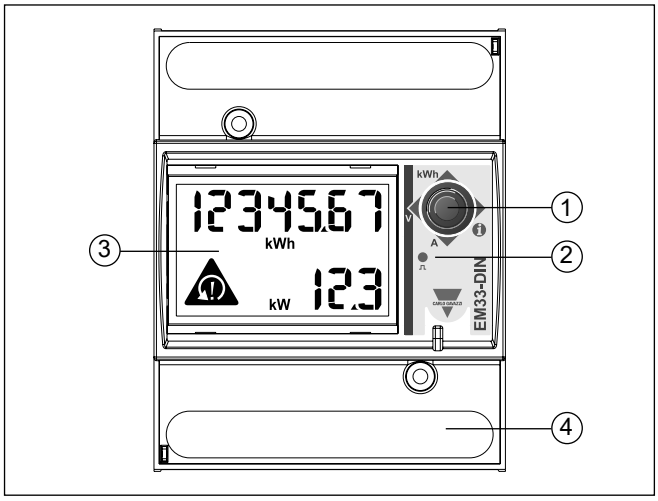
3-ph, 4-wire, unbalanced load **Fig.1**



RS485 port **Fig. 2**



Front panel description



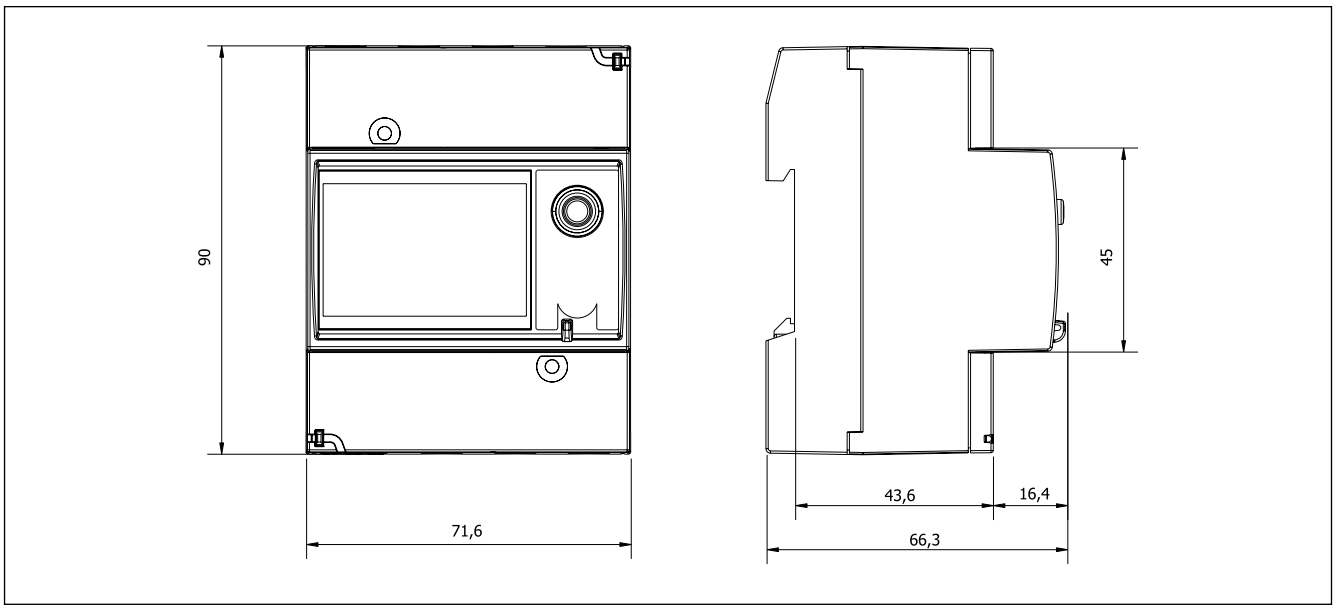
1. **Joystick**
   To scroll the variables on the display, to access to the information pages and to program the needed parameters.

2. **LED**
   Red LED blinking proportional to the energy being measured.

3. **Display**
   LCD-type with alphanumeric indications to display all the measured variables.

4. **Connections**
   Screw terminal blocks for instrument wiring.

Dimensions



Electromechanical Display Counter Type EMCT

EMCT

- 7/6 digit micro adding counter
- Low cost
- High shock resistance
- Low power consumption; suitable for battery operation
- Small dimensions
- Magnified large figures
- Different mounting solutions
- Flush mount with integrated spring clip (snap in)
- PCB-mount versions
- Solderable and wash proof
- Protection to IP 65
- Stores value also at power failure
- Long service life (50 x 10^6 impulses)

Product Description

Charge counting, KWh registration alarm systems, compact units, copiers, fuel dispensers, medical equipment, miniature pumps, dosing machines, gates, general event counting.

Ordering Key

EMCT 46 200 013

Type
Number of digits
Housing type
Supply Voltage

Stock items: **EMCT46200013**
EMCT46800013
EMCT47200013

Approvals

Number of Digits

46	6 digits
47	7 digits

Housing Type

200	(fig.1)	Panel flush mount, flying leads
800	(fig.2)	PCB mount, rear soldering terminals
900	(fig.3)	Horizontal PCB mount, bottom terminals
910	(fig.4)	Horizontal PCB mount, top terminals
940	(fig.5)	Horizontal PCB mount, bottom terminals
950	(fig.6)	Horizontal PCB mount, bottom terminals

Input Type

002	1.5VDC
006	3.0VDC
008	4.5VDC
009	5.0VDC
010	6.0VDC
012	12.0VDC
013	24.0VDC

General Data

Dimensions of digits	
6 digits HxL	4x1.7mm/0.16x0.07”
7 digits HxL	4x1.25mm/0.16x0.05”
Viewing angle	Frontal
Colour of digit figures	White on Black
Power consumption	up to 12VDC: approx. 70mW @ 24VDC: approx. 150mW
Mounting position	horizontal number viewing
Operating life	> 50 x 10^6 pulses
Ambient temperature	–10…+60°C/14°F…140°F
Soldering temperature	Max. 265°C/509°F, max. 3sec.
Solderable and washable	Housing type 800, 900, 910, 940, 950
Degree of protection	IP 65 Frontal (only housing type 200)
Housing colour	Clear plastic
Weight	12…14g/0.42…0.49oz

Measuring Specifications

Counting Frequency	Max. 10imp/s
Pulse duration	Min. 50ms
Pulse interval	Min. 50ms
Cycle duration factor	100%
Counting system	adding
Reset time	No

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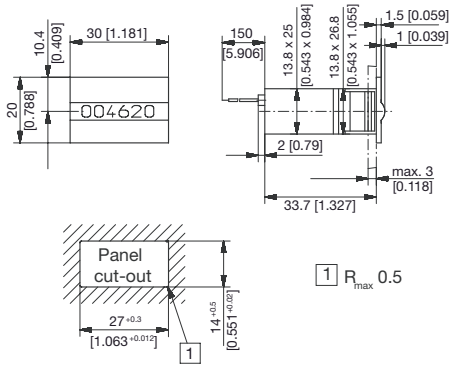
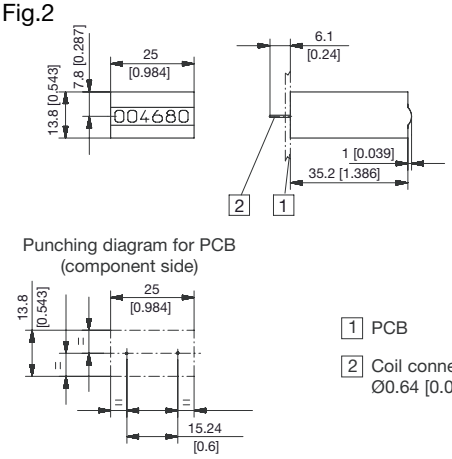
Dimensions mm/inches

Fig.1



1 R_{max} 0.5

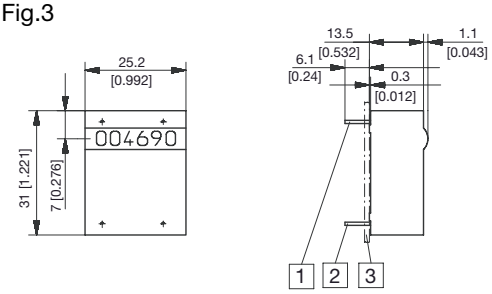
Fig.2



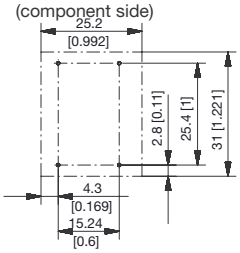
1 PCB

2 Coil connections Ø0.64 [0.025"]

Fig.3



Punching diagram for PCB (component side)

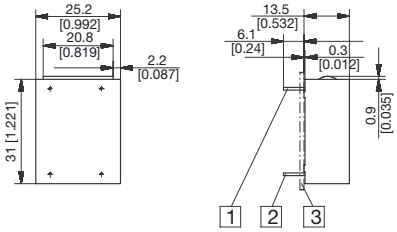


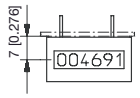
1 Mounting pin without el. function Ø0.64 [0.025"]

2 Coil connections Ø0.64 [0.025"]

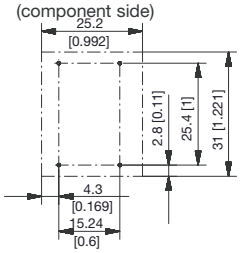
3 PCB

Fig.4





Punching diagram for PCB (component side)

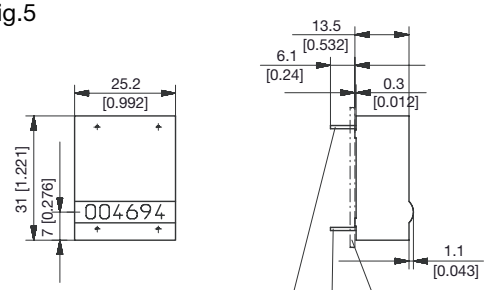


1 Mounting pin without el. function Ø0.64 [0.025"]

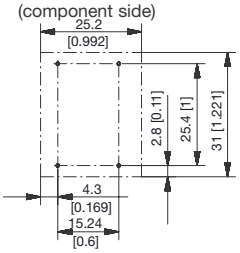
2 Coil connections Ø0.64 [0.025"]

3 PCB

Fig.5



Punching diagram for PCB (component side)

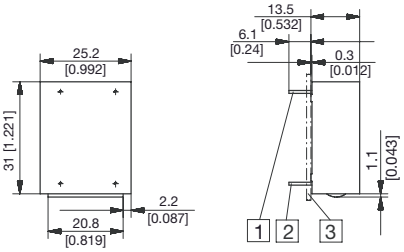


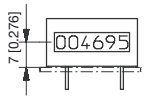
1 Mounting pin without el. function Ø0.64 [0.025"]

2 Coil connections Ø0.64 [0.025"]

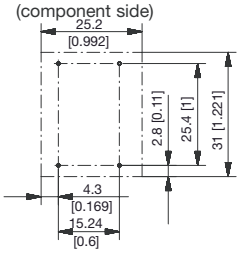
3 PCB

Fig.6





Punching diagram for PCB (component side)



1 Mounting pin without el. function Ø0.64 [0.025"]

2 Coil connections Ø0.64 [0.025"]

3 PCB

По вопросам продаж и поддержки обращайтесь:

Алматы (7273)495-231
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
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