CARLO GAVAZZI
Automation Components

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The evolution in Energy Management

Controls

VMU-C/Y, Em²

The evolution in Energy Management

The VMU-C EM is the ideal web-server based solution for monitoring small to medium size installations. With its integrated M2M functionalities it is capable of automatically transferring data via FTP, HTTP or MODBUS/TCP to a remote server where a SCADA, BMS or other specific database software is running. The VMU-C EM is also the gateway at the core of distributed architectures based on VMU-Y EM and Em²-Server data aggregation servers, allowing to manage multi-site installations.

The VMU-C EM gathers data from:
- Energy meters
- Power analysers
- VMU Series I/O modules

By combining VMU-C EM with VMU-Y EM or Em²-Server multisite management solutions it is possible to remotely manage portfolios of installations.

Monitoring system for Energy Management

VMU-C EM
Integrated web-server unit capable of monitoring up to 32 meters and managing the following data:
- Energy (kWh,kvarh) and instantaneous variable data (V,A,W,var,VA,PF,Hz,THD) with setpoints and datalogger
- Temperature, analogue and pulse rate inputs (with scaling capability)
- Digital input status
- Alarms via Web, email or SMS
- Dual tariff
- Reports in Excel compatible format

All the data of the monitored plant is available via:
- Web-Surfing
- HTTP on-demand polling
- FTP scheduled data-pushing
- Modbus/TCP (master and slave functions)
- Carlo Gavazzi's DP (data push protocol) in combination with VMU-Y EM and Em²-Server data aggregation solutions.
- If wired internet is not available, the VMU-D adapter combined with a USB dongle modem provides 3G or 4G Internet connection.

Energy meters and power quality analyzers
Carlo Gavazzi provides a full range of instruments to be used in conjunction with the VMU-C EM.
- Mounting: both DIN-rail or panel mounting available
- Compact size
- Current measurement: direct up to 65 A, by 5A current transformers, by 0.333 V current sensors
- Optional digital inputs for utility (gas, water) metering, pulse outputs or relay outputs available
- MID certified versions available for fiscal metering
- Full range of solid and split-core current transformers available

VMU Series optional modules
Additional modules can be added, providing further information:
- Temperature measurements
- Scalable analogue and pulse rate inputs
- Digital inputs and digital outputs

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Why the VMU-C EM is the ideal Energy Management solution

How much money will you lose if your plant stops because of electrical problems?

To ensure everything is running effectively, you need a monitoring solution.

The electrical installation is one of the most important systems in any facility, from a production plant to a commercial building.
An unexpected fault can lead to serious damage and/or to a very expensive stop in production.

You can protect your business if:
- you meet the installation limits;
- you know the system is working properly;
- you identify any decrease in performance so as to plan any maintenance before a fault occurs.

How much money will you save if your utility contract is based on your actual needs?

To ensure you optimise your electrical contract you need a monitoring solution.

The electrical utility contract should be tailored to the exact needs of your facility. In order to avoid excessive expense, or penalties for exceeding the limits of the contract, you can negotiate a well calibrated contract if:
- you know the details of your consumption by production load, time, season, etc.;
- you identify in detail where the consumption takes place within your plant;
- you are able to not exceed the contractual terms (maximum power demand, etc.);
- Energy efficiency optimization targets are strong drivers in any Country. Carlo Gavazzi solution for Energy monitoring helps you to implement specific policies for matching your energy efficiency benchmarks.

The VMU-C EM and its optional I/O modules: just to make it easier

The VMU-C EM is modular and the VMU series modules can be added by connecting them via their internal bus: up to one environment variable unit (VMU-P) and up to three I/O units (VMU-O).
If some of the VMU modules are needed remotely, up to ten new arrays can be connected via RS485 using a master module, VMU-M. All the web-server functionalities are ready on your browser if wired internet is available. A solution based on VMU-D adapter plus 3G/4G dongle modem is available for mobile Internet connection, in the case wired Internet is not available.

Advantages

- No need for a dedicated PC for monitoring.
- No crash problems which lead to data loss.
- No compatibility problems due to different operating systems, different languages, libraries, etc.
- Polling device, datalogger, Ethernet gateway in a single, very compact, unit.
- Modular concept for additional input/output whenever needed.
- Optional modular modem for 3G mobile Internet connection.

VMU-C EM

The evolution in Energy Management

An integrated wired or wireless Web-Server and Web-Service solution

The memory

Since plant data are very important, VMU-C EM dedicates 4 GB of memory to secure data storage. VMU-C provides also a micro SD slot (up to 32 GB SDHC cards) and a hot-swap USB interface (for direct memory stick connection) on the top of the unit for:

- plant configuration backup and restore;
- plant database backup and restore.

Ethernet and mini USB

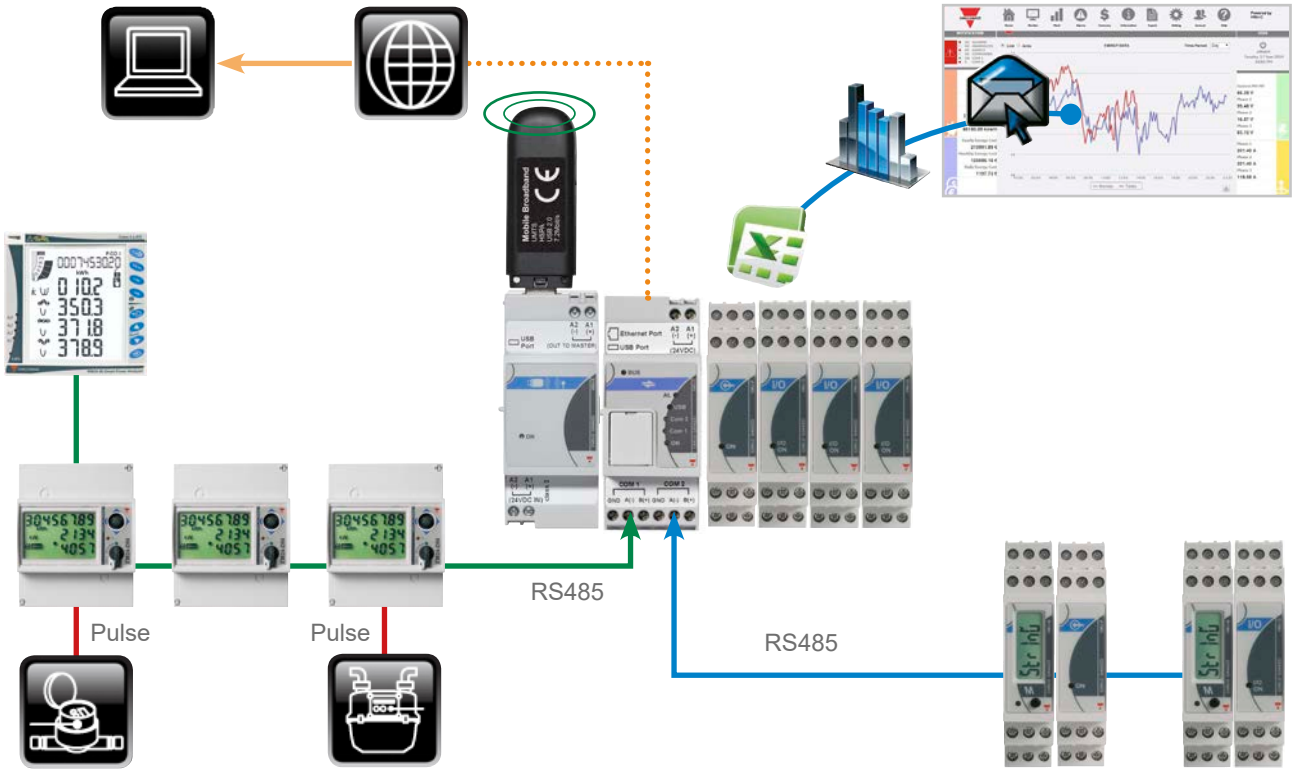
The Ethernet interface allows to operate and configure the VMU-C, by means of LAN or direct connection to a PC, thanks to the integrated web-interface. In the case Ethernet cannot be accessed, the mini USB can be connected to a PC .

Mobile Modem Adapter

Where wired Internet access is not available, Carlo Gavazzi provides the VMU-D adapter module, by which a 3G or 4G USB modem can be used to monitor any remote installation.

Monitoring solution based on web-server communication capability

Example of communication architecture with wired Internet access (only with “VMU-C”) unit or, where wired Internet, is not available, with additional VMU-D adapter and a 3G modem.



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Examples of VMU-C EM pages

The home page allows the following information to be available at a glance:
- Energy consumption information (active and reactive power and energy);
- costs information (yearly, monthly and daily expenses);
- instantaneous 3-phase variables of the plant (voltages and currents).

The main chart displays the present day's total energy consumption of the plant Vs. the previous day's.

The consumption of each energy meter can be analysed on a daily, monthly or annual basis.
In the same section information acquired by pulses from the gas, water or remote heating meters, and also the analogue and environmental variables acquired by the VMU modules, can be displayed and analysed.

The logged instantaneous variables relevant to the main meter, and so to the whole electrical installation, can be analysed on a daily, monthly or annual basis.
The variables can be monitored by specific setpoints. In the case of problems or faults, it is possible to analyse the plant's history before the event, so as to understand the relevant reasons and act accordingly.

All the real-time variables of any meter can be displayed on the web-browser. This means being on-site and looking directly at any meter display: the whole plant is completely under control.

The database, including all the history of the plant, can be accessed to get a set of data in a defined time period. The data is then available in Excel compatible format for further analysis by the user.

VMU-Y EM

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Embedded solution for multi-site applications

VMU-Y EM allows to aggregate information replicated by up to 10 VMU-C EM units within a single centralized database; information may be accessed by users from wherever by using a standard web-browser.

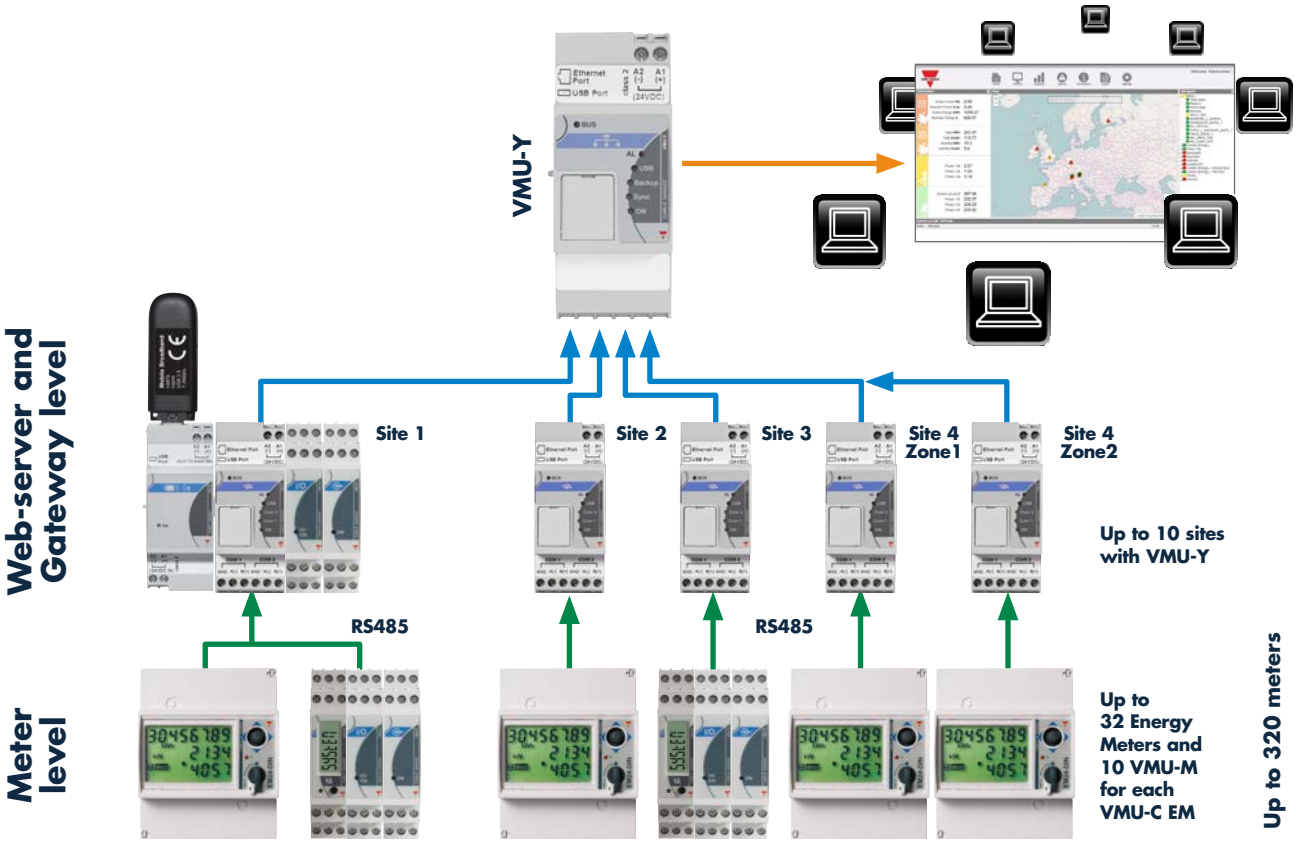
Embedded solution

VMU-Y EM embeds in a compact 2-DIN module ta comprehensive multi-site energy management database and software, without the need of installing any software and operating any IT infrastructure: just set up the network interface and configure the link from VMU-C EM.

Mobile connection

VMU-D adapter allows to connect a 3G or 4G USB modem as a backup in the case the wired Internet connection fails; the mobile communication may be started up and shut down remotely by SMS commands as soon as the wired connection works again.

VMU-Y EM multi-site solution for distributed systems



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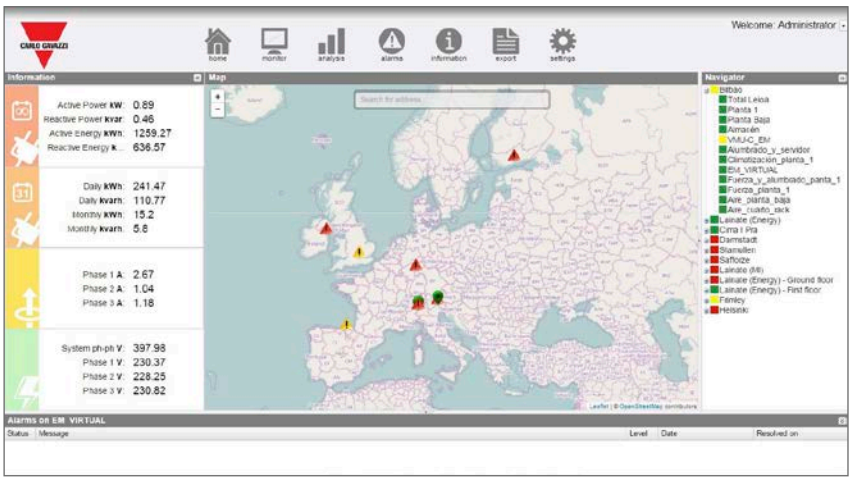
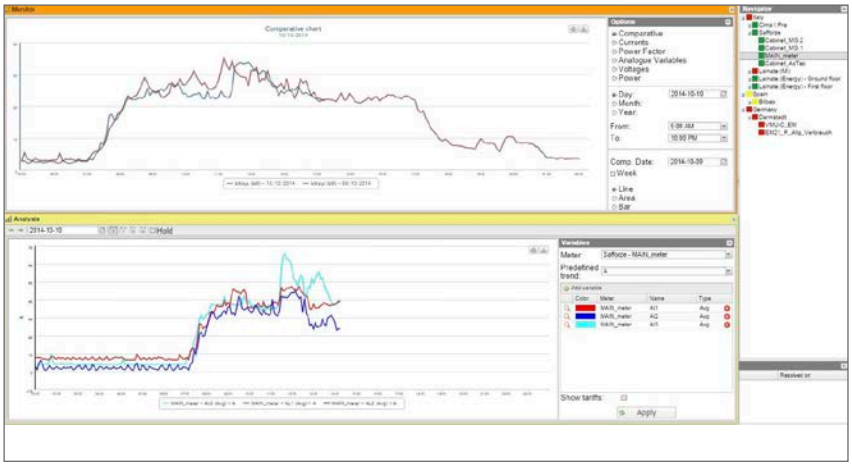
Integrated web based interface

Concurrent access by Internet is possible by using a standard browser. User access to stored information may be allowed or restricted according to company's policies at the level of single meter.



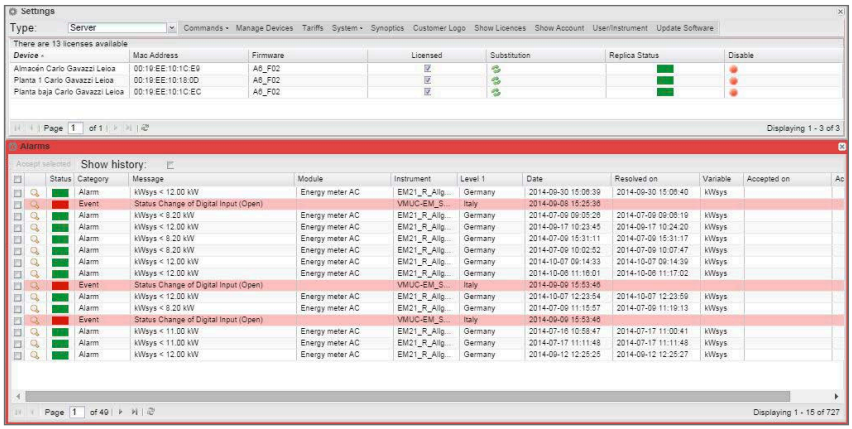
Responsive user interface

The toolbar on the top, the Navigator on the right, tha alarms view on the bottom, the main boxes on the left and the map in the center as the main tools, always available to the user for an immediate feedback



Monitoring and analyzing

Monitor and Analysis are powerful tools which allows users to display both present and historical data from the different instruments (real energy meters, virtual energy meters, VMU-P modules) in the plant



Portfolio management

Alarms and warnings logged by the VMU-C units may be checked and acknowledged while single VMU-C status can be monitored at the same time

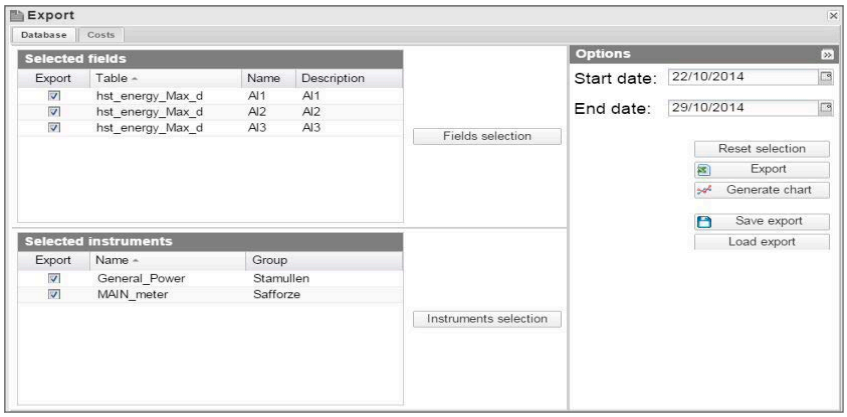
VMU-Y EM

The evolution in Energy Management

Enhanced features for Energy Management

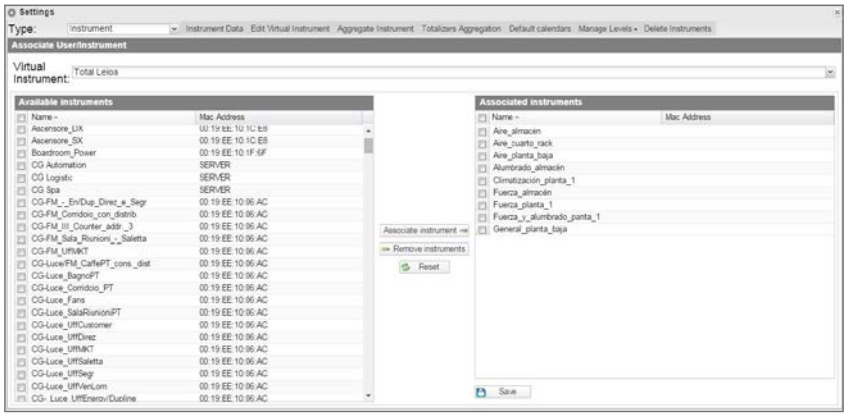
Tariff profiling

Multiple tariffs may be set, splitting days in hourly slices, and defining calendars based on different daily profiles according to company needs; monthly cost reports are available as XLS files based on tariffs and real consumption data.



XLS export and custom charts

It is possible to extract any combination of variables from whatever meter either as Excel file or as a customized chart; extraction profiles can be saved for later use.



Virtual meters creation and management

It is possible to create virtual meters as aggregation of real meters, allowing to consolidate variables from multiple sources into aggregating items, with the proper authorization rights to access data.

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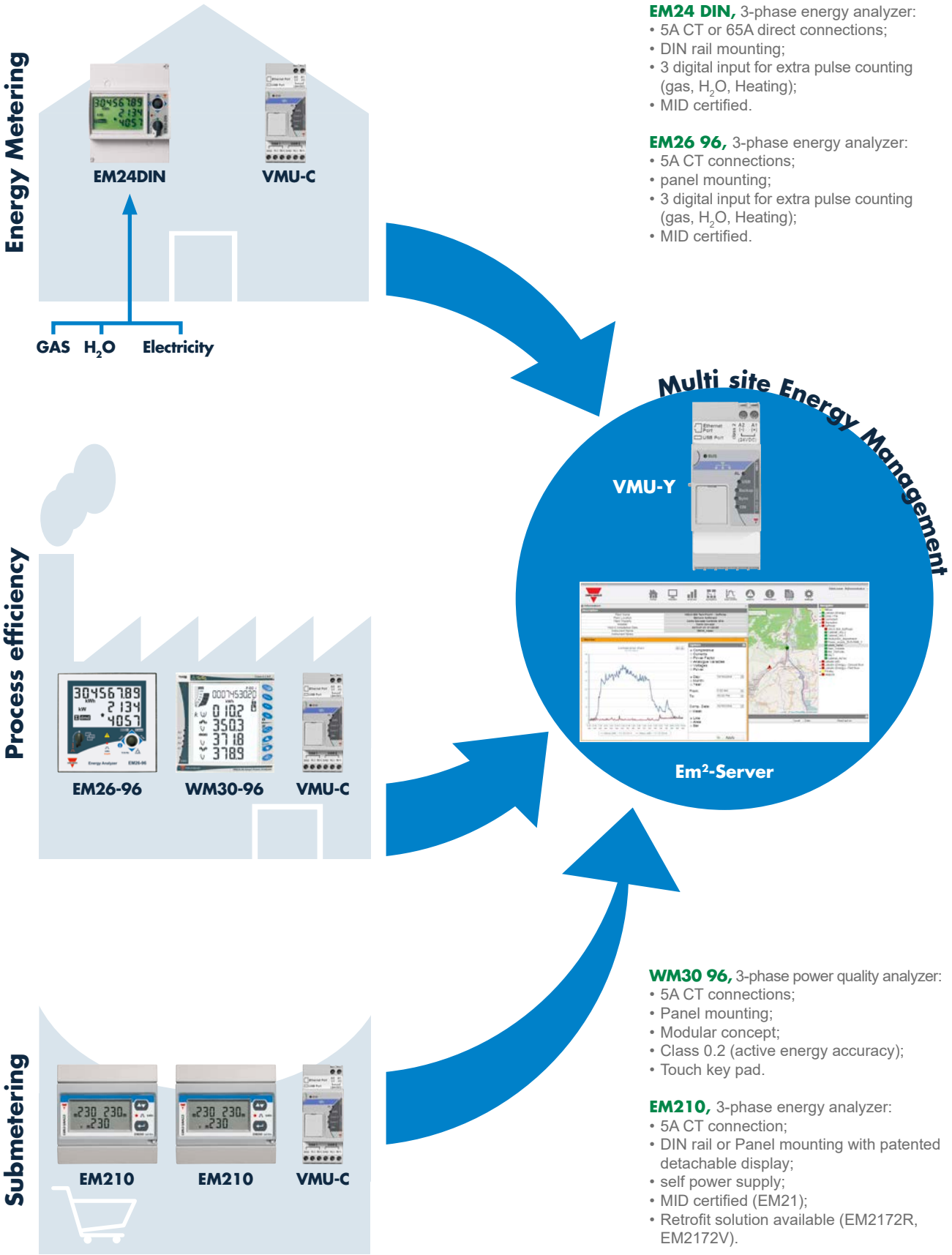
Improving Energy Efficiency with Carlo Gavazzi solutions



EM24 DIN, 3-phase energy analyzer:
- 5A CT or 65A direct connections;
- DIN rail mounting;
- 3 digital input for extra pulse counting (gas, H_2O, Heating);
- MID certified.

EM26 96, 3-phase energy analyzer:
- 5A CT connections;
- panel mounting;
- 3 digital input for extra pulse counting (gas, H_2O, Heating);
- MID certified.

WM30 96, 3-phase power quality analyzer:
- 5A CT connections;
- Panel mounting;
- Modular concept;
- Class 0.2 (active energy accuracy);
- Touch key pad.

EM210, 3-phase energy analyzer:
- 5A CT connection;
- DIN rail or Panel mounting with patented detachable display;
- self power supply;
- MID certified (EM21);
- Retrofit solution available (EM2172R, EM2172V).

Em²-Server

The evolution in Energy Management

Cloud solution for multi-site applications

Em²-Server allows to aggregate information replicated by up to 100 VMU-C EM units within a single centralized database; information may be accessed by users from wherever by using a standard web-browser.

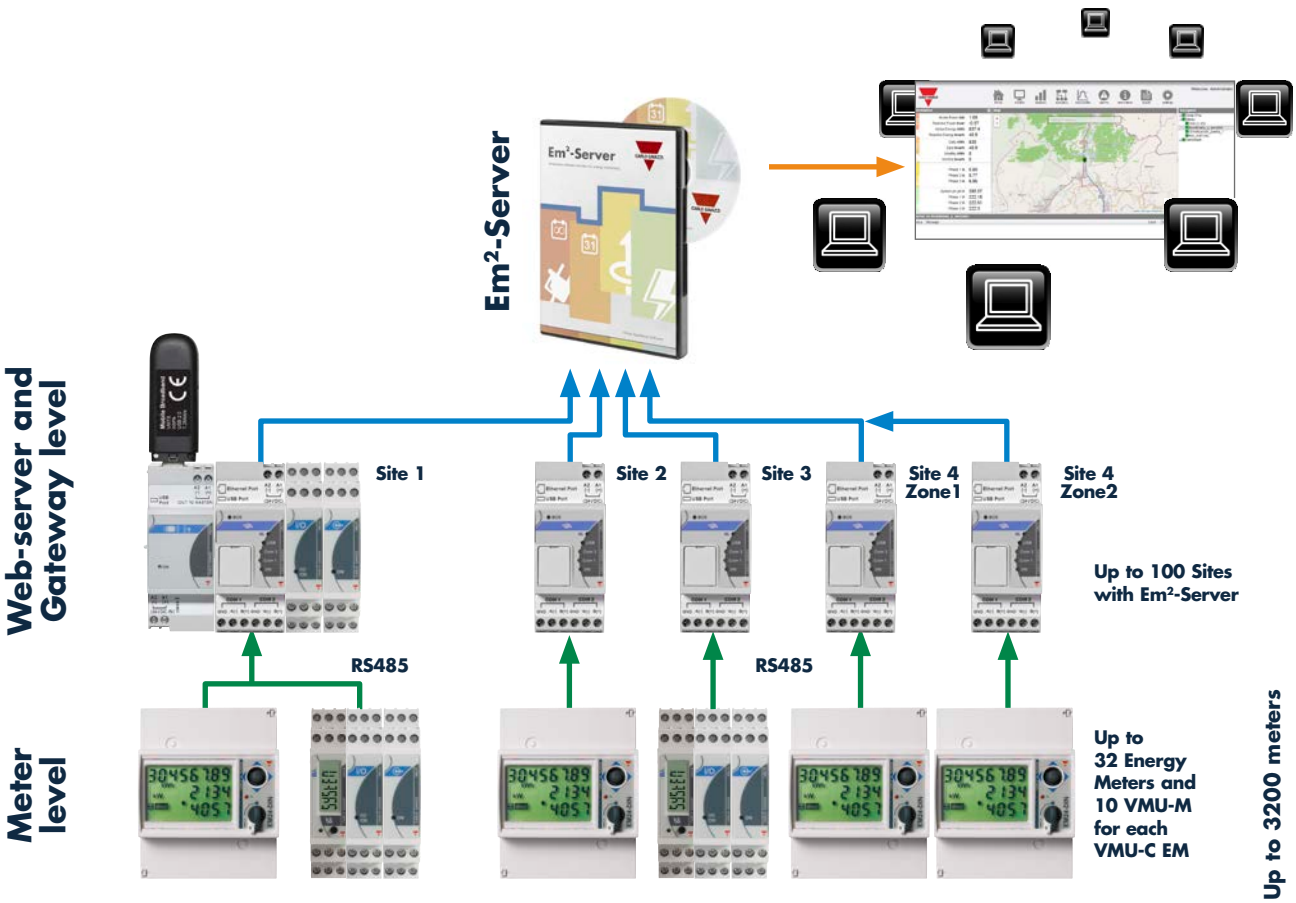
Cloud Solution

Em²-Server is a software solution provided as a Virtual Machine software appliance, to be hosted in the cloud, either in the customer's facility or in a hosting farm.

Centralized database

Installation and operation of Em²-Server are based on the flexibility and ease of the Virtual Machine technology.
Setting up Internet communication between VMU-C EM and Em²-Server is a plug'n play process based on the reliability and effectiveness of the Carlo Gavazzi's DP(Data Push) protocol.

Em²-Server multi-site solution for centralized data management



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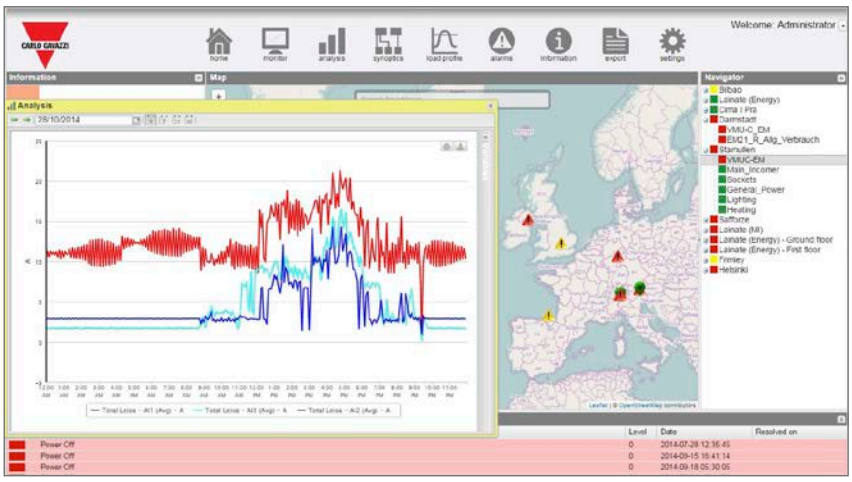
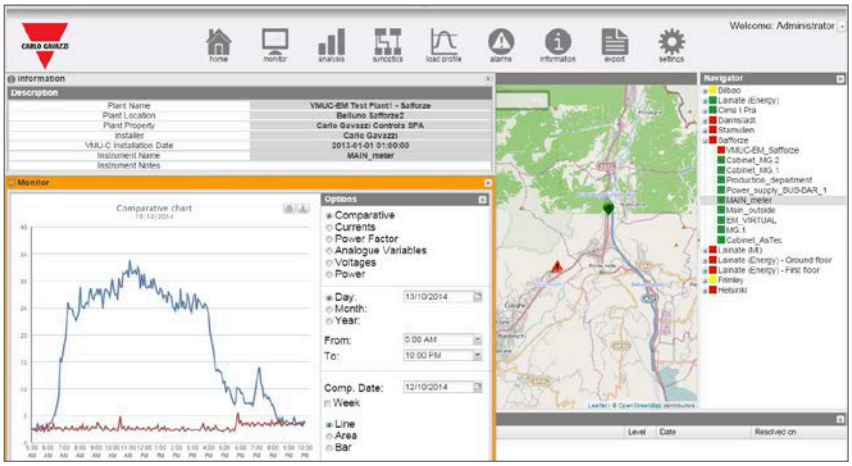
Centralized data base and web server

Em2-Server is the solution for aggregating data from multiple installations, including the database and the web interface in the same comprehensive package.



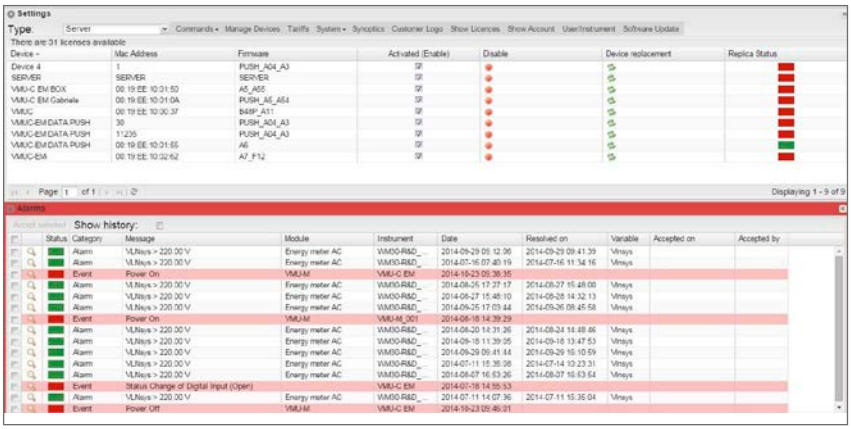
Multiple screens, multiple views

Em²-Server's web interface allow users to match the needs of control rooms, by allowing the simultaneous displaying of different charts and information on the same monitor or on the same screens. Position and size of the desired displaying tools can be saved for later use.



Multi-site information management

By using the Map and Navigator tools it is possible to locate information from distributed installations with ease, according to user's access rights. Present or historical values and charts are displayed according to the selected parameters and filters.



Devices' status and installations' alerts monitoring

Dedicated tools allow user to immediately check if any abnormal situation or unexpected condition is affecting the monitored plants and the monitoring devices. Distributed VMU-C EM units can be surfed via VPN, and commands may be broadcasted to pools of units.

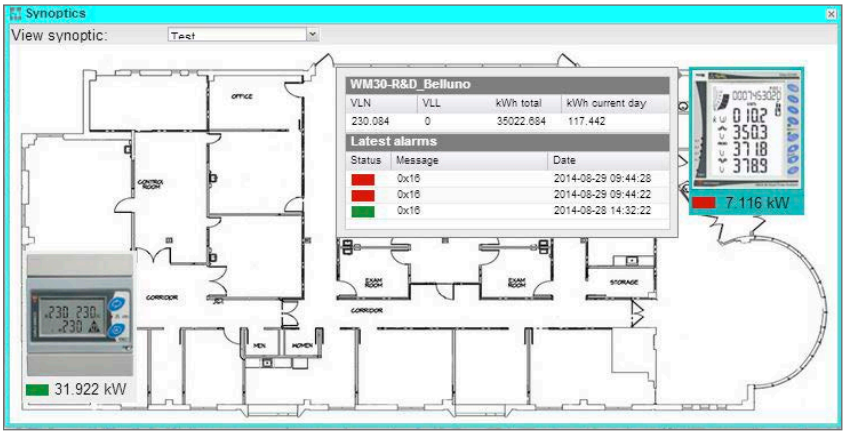
Em²-Server

The evolution in Energy Management

Powerful data analysis and management tools

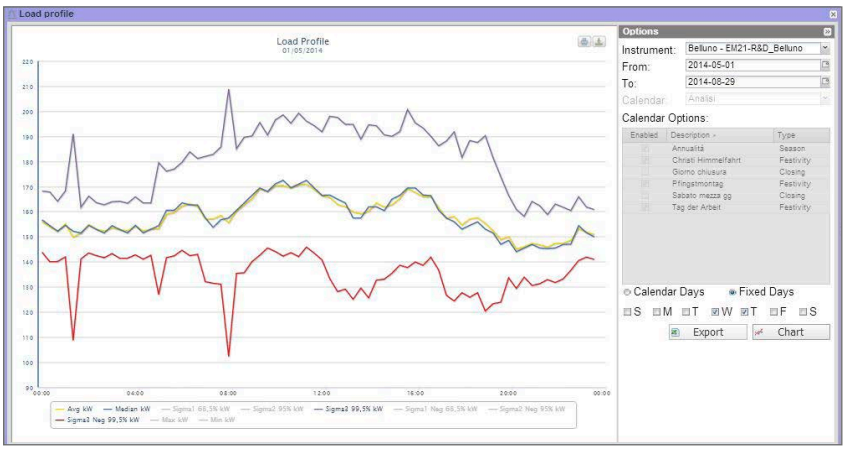
Tariff profiling

Multiple tariffs may be set, splitting days in hourly slices, and defining calendars based on different daily profiles according to company needs; monthly cost reports are available as XLS files based on tariffs and real consumption data.



Synoptics

It is possible to create synoptic views as combinations of maps, diagrams, schematics and live icons representing the desired meters.



Load profiling

The Load Profile tool allow statistical calculation of consumption in the single demand interval for the chosen interval of analysis. It is possible to estimate the typical daily consumption profile according to the desired confidence ratio.

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Features matrix

Group	Feature	VMU-C EM	VMU-C EM + VMU-Y EM	VMU-C EM + Em²-Server
Installation type and scalability	Single Installation	Yes	Yes	Yes
	Multiple installations portfolio	No	UP TO 10	UP TO 100
	Number of meters	32	320	3200
	Form factor	2-DIN	2-DIN	Virtual machine
User management	User and Admin profiles (multiple users)	Yes	Yes	Yes
	Access rights management at instrument level	No	Yes	Yes
	Online Help	Yes	Yes	Yes
Variable monitoring	Variable Monitoring	Yes	Yes	Yes
	Custom Trend analysis tool	Yes	Yes	Yes
	Virtual main meter management	Yes	Yes	Yes
	Free virtual meter management	No	Yes	Yes
	Synoptic tool	No	No	Yes
	Excel data export	Fixed	Free	Free
Tariffs and costs	Tariff profiles	2	Free	Free
	Custom calendars	No	1	Free
Alarms management	Dedicated web-view	Yes	Yes	Yes
	Email	Yes	Yes	Yes
	SMS	With optional VMU-D on VMU-C	With optional VMU-D on VMU-C	With optional VMU-D on VMU-C
VMU-C remote management	SMS commands	With optional VMU-D on VMU-C	With optional VMU-D on VMU-C	With optional VMU-D on VMU-C
	Remote broadcast commands via Web interface	N/A	Yes	Yes

VMU-C EM

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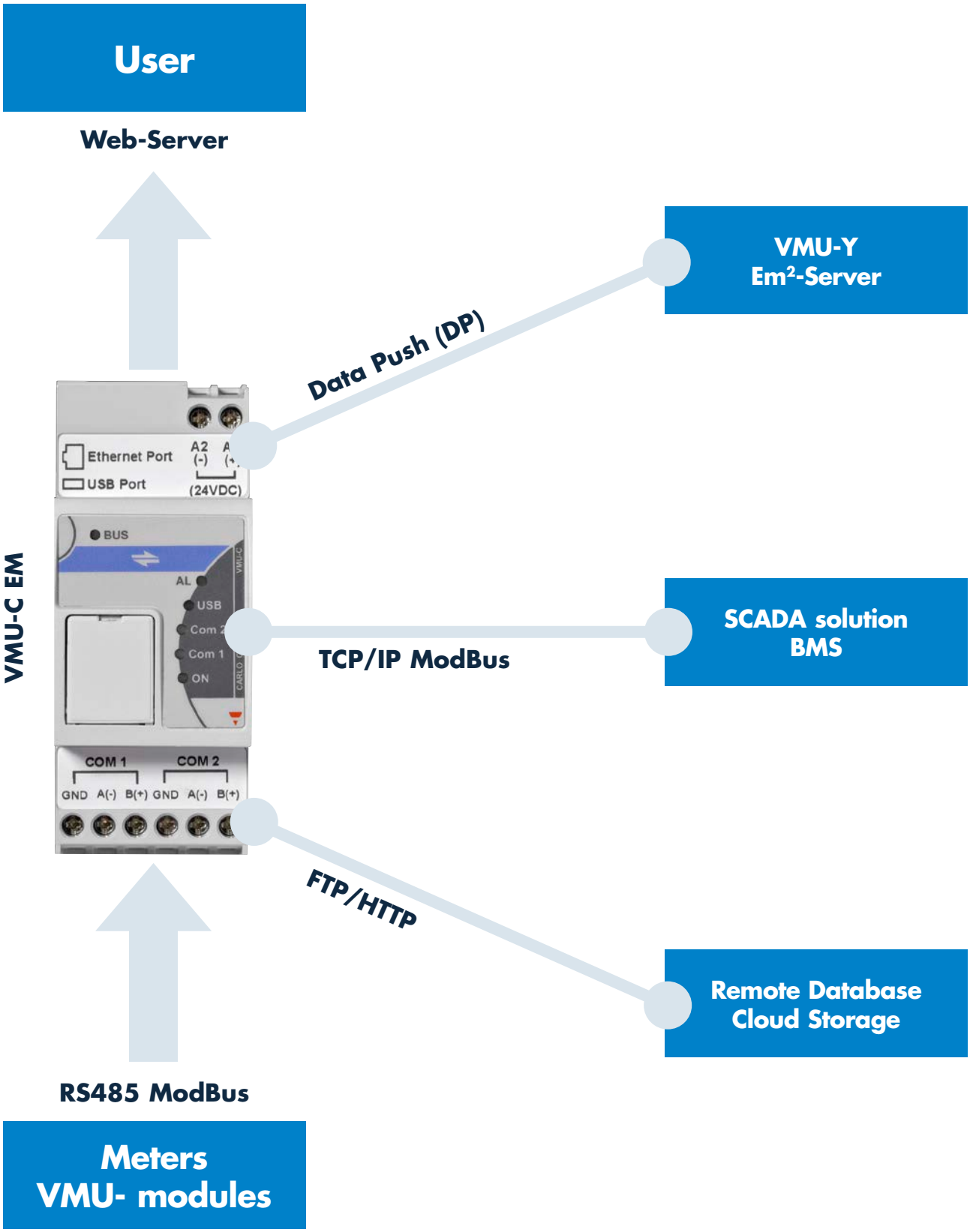
The heart of the system



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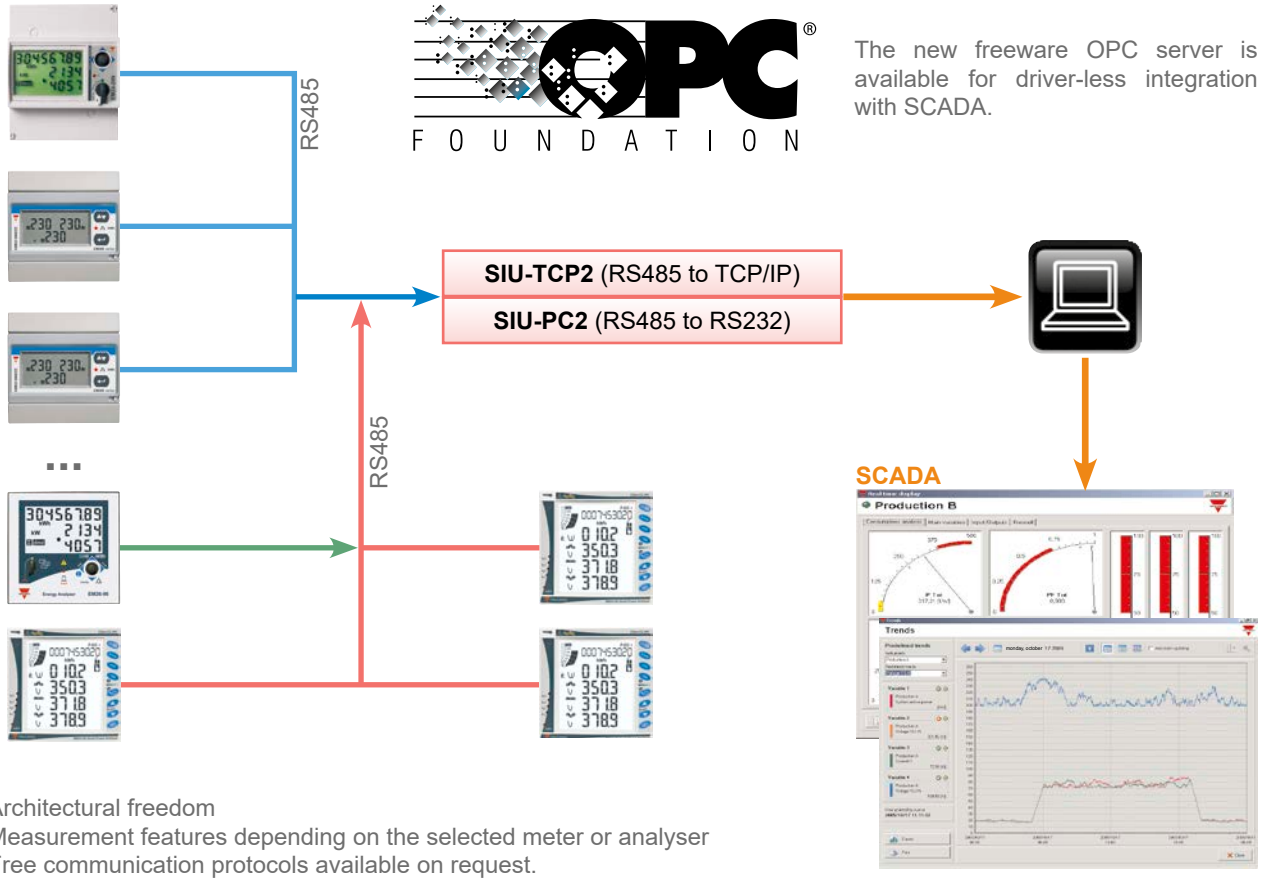
The OPC server link

Monitoring solution based on the System Integrator's own SCADA software



The new freeware OPC server is available for driver-less integration with SCADA.

- Architectural freedom
- Measurement features depending on the selected meter or analyser
- Free communication protocols available on request.

SIU-FO: the solution for an electrically-disturbed environment

This unit converts the standard Mod-Bus communication from the RS485 wired to the fibre-optic type, with the aim to increase the communication distance and providing extremely high communication immunity in the case of an electrically -disturbed environment.

Features
- RS485 to glass fibre optic adaptor.
- Two way communication capability (wire to fibre optics and fibre optics to wire).
- Fibre optic single loop communication (cascade connection: communication loss in the case of loop cut).
- Fibre optic dual loop communication (dual cascade connection: partial communication loss in the case of one loop cut).
- Fibre optic dual loop communication (redundant communication: no communication loss in case of one loop cut).
- 10 to 24VDC/12 to 18VAC power supply.
- DIN-rail mounting type.

Fibre type and communication distances
- Single-mode and multimode glass fibre optic compatibility.
- Point to point distance of up to 800m with 50/125 µm multimode fibre.
- Point to point distance of up to 2000m with 62.5/125 µm multimode fibre.

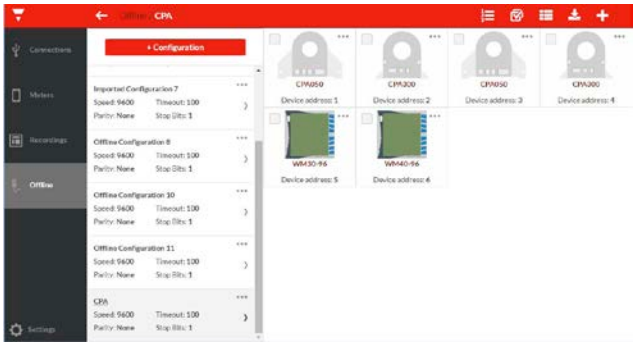
CPA family

The evolution in Energy Management

Contactless power analyzers

CPA is a family of power analyzers for both DC and AC applications

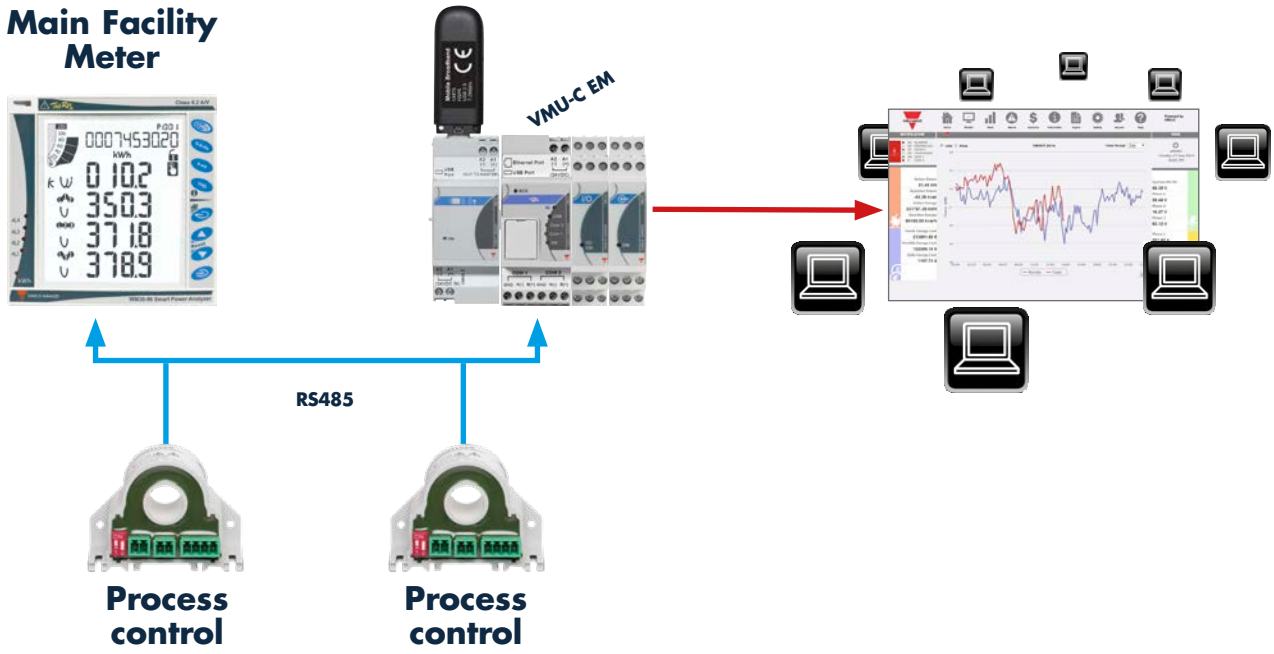
Flexible solution



A contactless Hall effect sensor allows CPA to measure both DC and AC currents; a comprehensive set of measured variables, including voltage,power,energy,frequency, power factor and THD are available through RS485/Modbus communication.

Ease of set-up by means of the UCS (Universal configuration software) and a smart mounting system (allowing either DIN-rail or panel mounting) are the key points to reduce installation time.

Architecture example (process industry)



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Some CPA applications

CPA is a power analyzer which matches the needs of many applications in both industrial automation and energy efficiency monitoring.

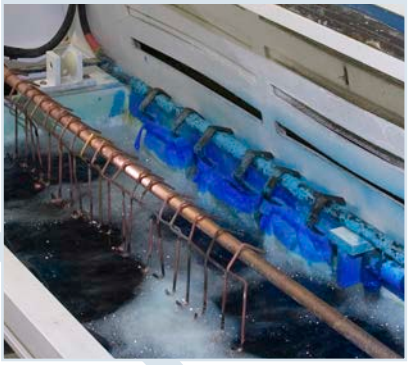
The application areas:

- Energy management
- Industrial processes control
- Monitoring of distorted currents
- Battery charging
- AC and DC motors control

PV plants

Heating control

Galvanic baths



Datacenters

Electric vehicles

Pump control

The evolution in Energy Management

CPA versions

Group	Feature	CPA0501LS1X	CPA3001LS1X
Application	AC monitoring	YES	YES
	DC monitoring	YES	YES
Current measurement	Hall effect sensing	YES	YES
	AC Range	50 A	300 A
	DC Range	50 A	400 A
Voltage measurement	Shunt sensing	YES	YES
	AC Range	800V	800V
	DC Range	1000V	1000V
Max system voltage	AC applications	800V	800V
	DC applications	1000V	1000V
Output	RS485	Modbus	Modbus
Available variables	Modbus communications	A,V,W,var,VA,kWh,PF, Hz, THD	A,V,W,var,VA,kWh,PF, Hz, THD

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