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.
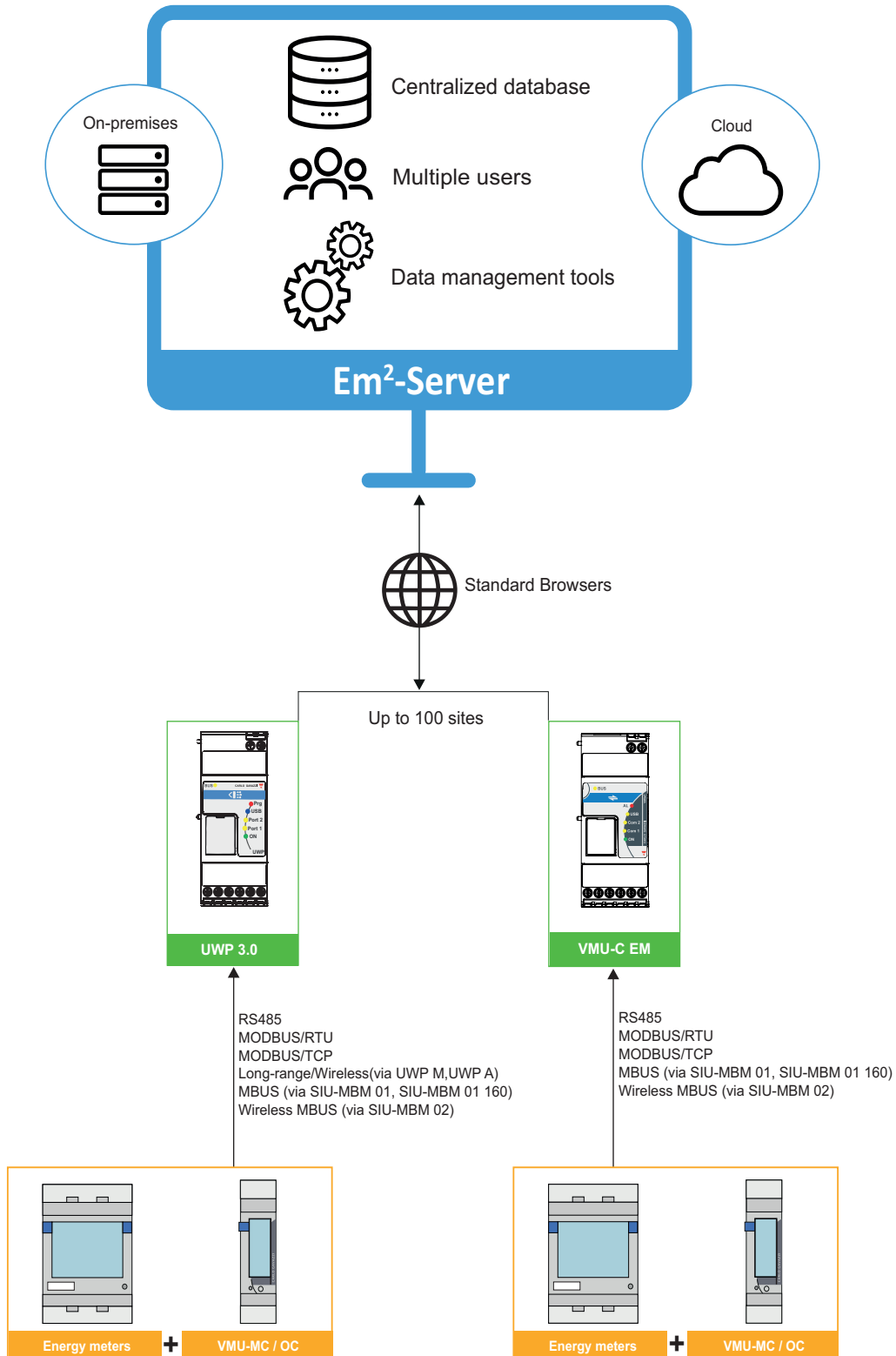- Robust relational database.
- Account-based data access.

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

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► **Architecture**

On-premises

Centralized database

Multiple users

Data management tools

Cloud

Em²-Server

Standard Browsers

Up to 100 sites

UWP 3.0

VMU-C EM

RS485
MODBUS/RTU
MODBUS/TCP
Long-range/Wireless(via UWP M,UWP A)
MBUS (via SIU-MBM 01, SIU-MBM 01 160)
Wireless MBUS (via SIU-MBM 02)

RS485
MODBUS/RTU
MODBUS/TCP
MBUS (via SIU-MBM 01, SIU-MBM 01 160)
Wireless MBUS (via SIU-MBM 02)

Energy meters + **VMU-MC / OC**

Energy meters + **VMU-MC / OC**

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

License structure	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.
	Base license extension: it allows extending the actual number of VMU-C EM / UWP 3.0 units.

Necessary license	Managed VMU-C / UWP 3.0 units	License
	20	1 base license
	40	1 base license + 1 base license extension
	60	1 base license + 2 base license extensions
	80	1 base license + 3 base license extensions
	100	1 base license + 4 base license extensions

License check	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.

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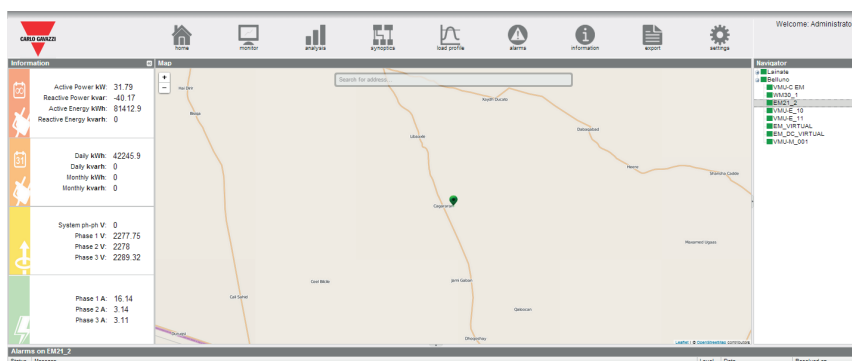
- Web-based access via standard browser.
- Multiple accounts.
- Configurable access rights for each user.
- Map for locating UWP 3.0 and VMU-C EM devices.
- Navigator tool for organizing the system in cost centres according to the needs.
- On-the-fly update of the whole database, during the reception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

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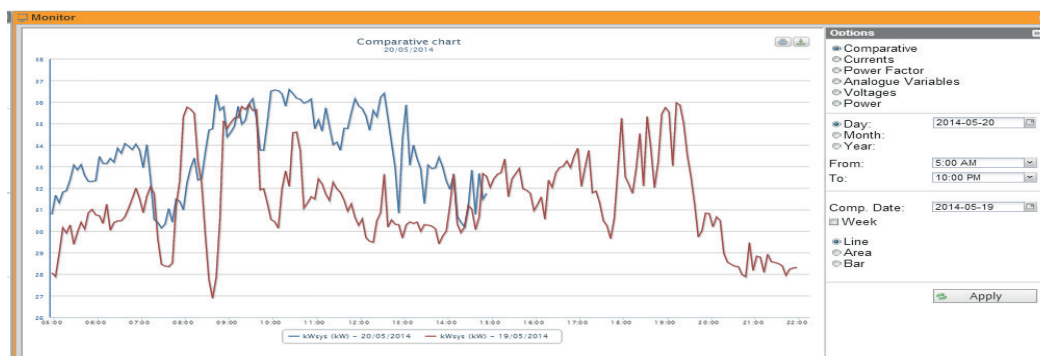
- Real time (according to sampling interval) and historical data displaying of each energy meter and power analyser variables.
- Easy navigation of available meters and cost centres.

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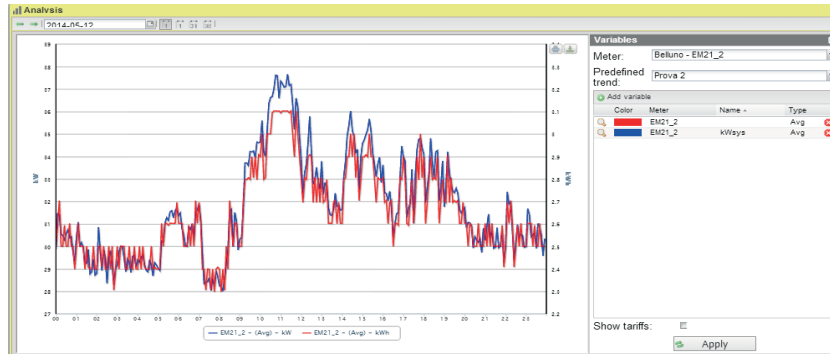
- Real time (according to sampling interval) and historical data displaying of any combination of variables.
- Comparison of trends in different time intervals.

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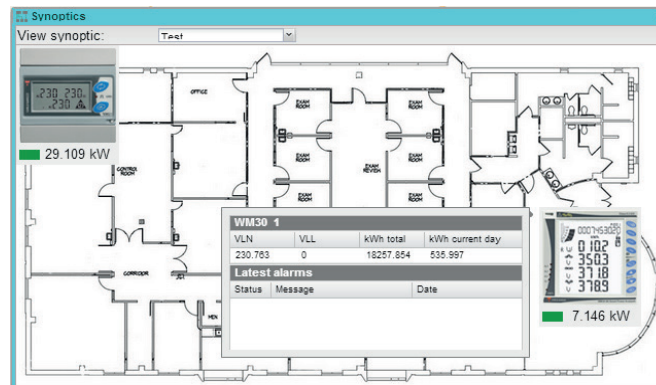
- Real time (according to sampling interval) displaying of energy meters and power analysers on top of one or more layouts or schematics.
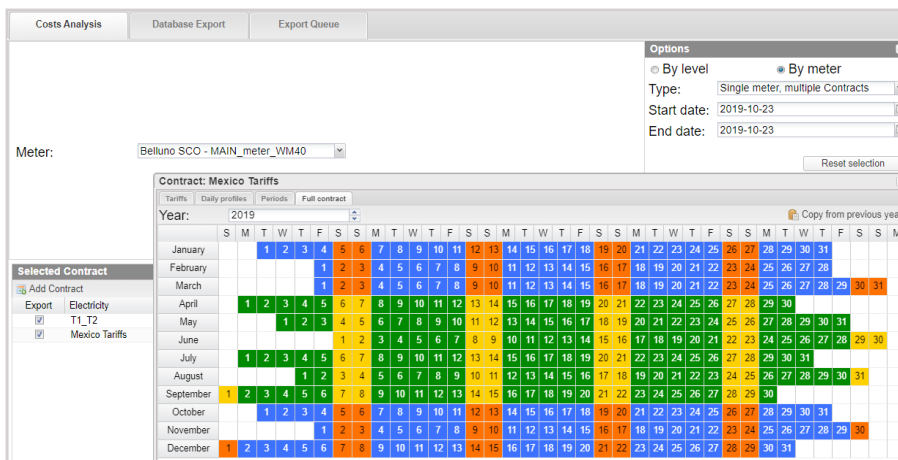- Multiple panels can be managed.

Em²-Server

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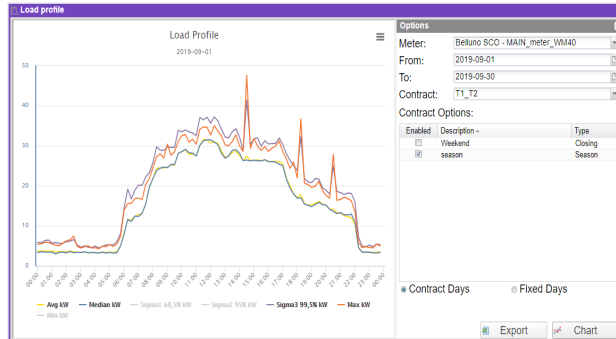
- Statistical analysis of daily consumption data.
- Calculation of the daily baseline.
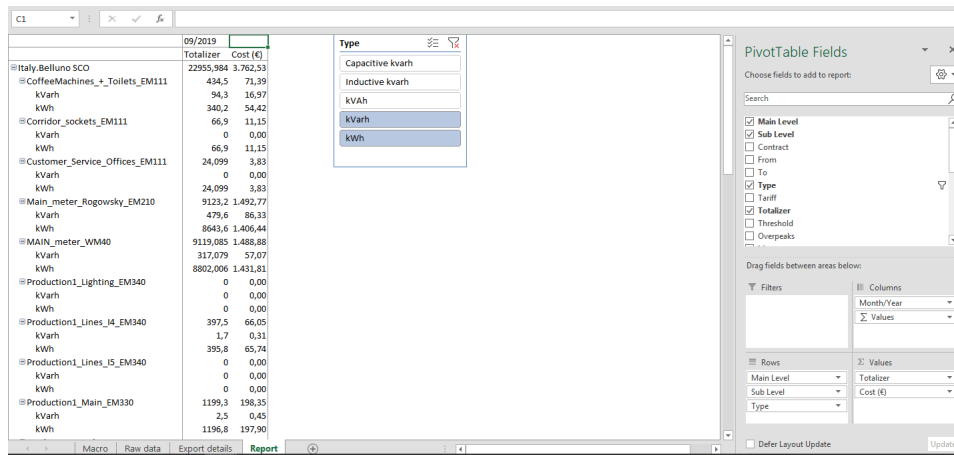- Estimation of the maximum power for dealing with energy suppliers.

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

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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 €**

kWh costs allocation

29%

71%

t1 t2
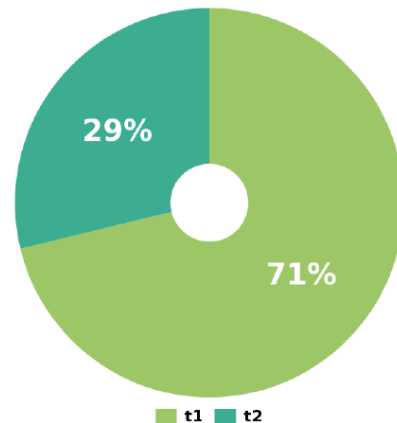
- PDF reports with custom templates containing calculated costs according to measured consumptions and contract of choice.
- Report split into user / cost centre (for a selectable group of devices).

References

![arrow] **Further reading**

Document	Where to find it
User manual	www.productselection.net/MANUALS/UK/em2-server_eim.pdf
Software update	www.productselection.net/MANUALS/UK/em2-server_sw_download.pdf

![arrow] **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.

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