Em²-Server

Software solution for energy monitoring and electrical data analysis

Version: 2.0

User manual

Document revision: 1.0

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Contents

Introduction

Content

This chapter includes the following topics:

This document

This document aims at guiding you through the Em^2-Server system and web interface.

Em²-Server overview

Content
This section includes the following topics:

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.

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.

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: daily, monthly and yearly monitoring charts.
- Cost analysis and simulation.
- Excel® reporting with embedded Pivot Tables for offline analysis.
- PDF reporting with bill simulation for POD (point of delivery) analysis.

Em²-Server system

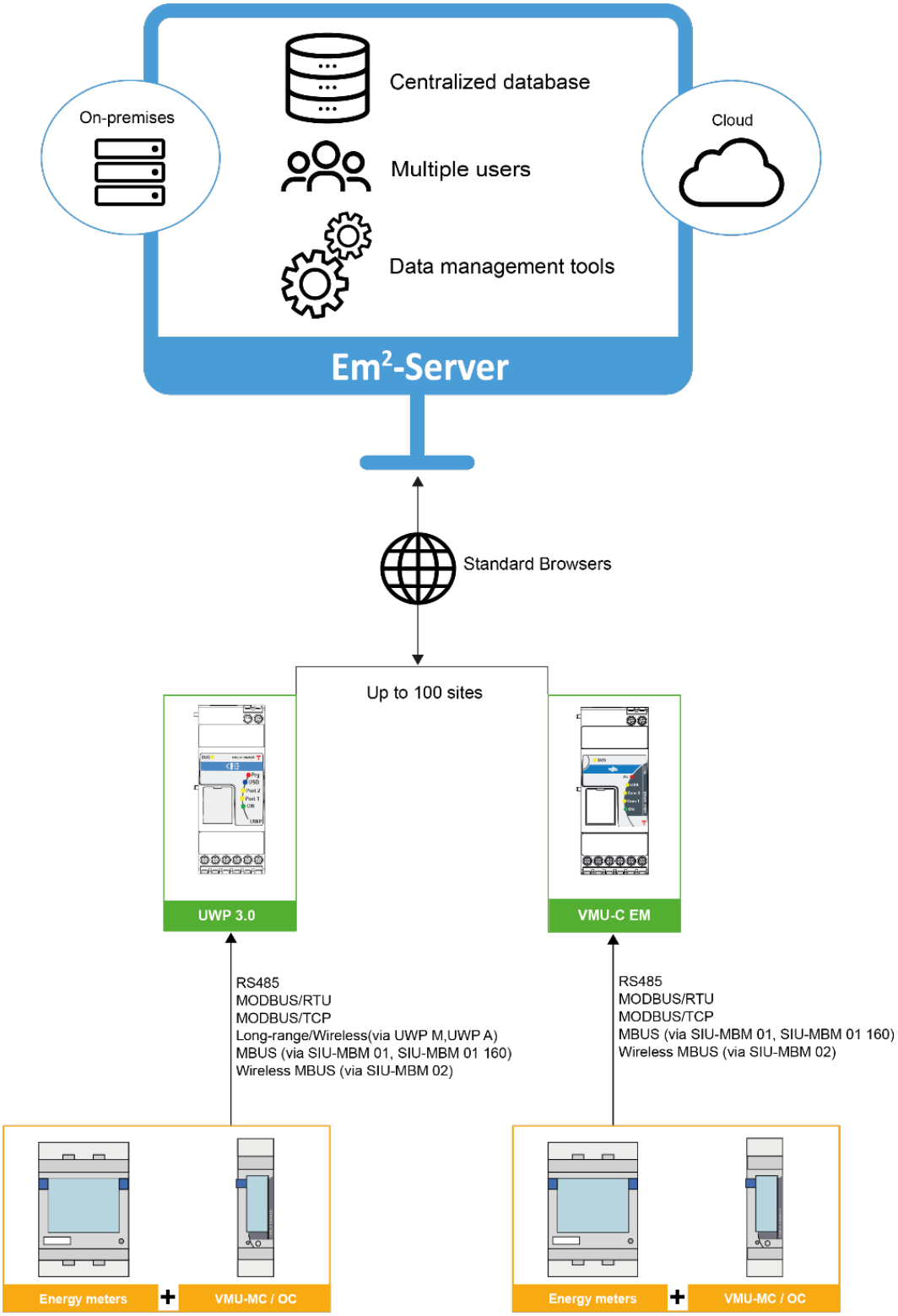
Content

This chapter includes the following topic:

Architecture

The Em²-Server system main features are:

- Highly interactive web interface
- Web-based access via standard browsers
- No pre-set address
- Configurable access right for each user (multiple account)
- TCP/IP communications
- Communicates with VMU-C / UWP 3.0 through web service.



IT security

Em²-Server is designed to be as safe as possible from IT security threats.
However, IT security is a process that depends on the individual components, on the infrastructures connecting them and on the procedures. For that reason, you shall be responsible for implementing all the systems (like firewalls) and procedures required to protect your installation against hacking attempts or malicious software.

Em²-Server start up

Content

This chapter includes the following topics:

Installation requirements

1. The DVD containing:
   - The **license code** (see the relevant chapter).
   - The Em²-Server Virtual Machine (hereinafter referred to as VM[1]) that includes Linux operating system, PostgreSql database and Em²-Server application software (in .OVF format).
   - All the PDF manuals.
2. VM hosting software VMware®.

User license

The Em²-Server software must be equipped with a license key to read data from the installations. Once a day, Em²-Server connects to the *Carlo Gavazzi License Management System* on a secure HTTPS port and checks the consistency of the license key.

If the license key is…	And the connection to the...	Then Em²-Server…
Inconsistent	Carlo Gavazzi servers keeps failing* for 4 weeks (28 days)	disables the data reading from the installations.
Consistent	**License Management System** keeps working	Em²-Server keeps working properly and the user does not notice any change.

**Note: it can be due to the outbound HTTPS connections are blocked by a firewall.*

[1] (VM) is a software program or operating system that not only exhibits the behaviour of a separate computer, but is also capable of performing tasks such as running applications and programs like a separate computer. A virtual machine, usually known as a guest is created within another computing environment referred as a "host." Multiple virtual machines can exist within a single host at one time.

How to start Em²-Server up

1. VM² setup in the vSphere platform

a. **File** > Deploy OVF template.
b. Select the .OVF file from the Em²-Server DVD.
c. From the **Edit virtual machine settings** →**Hardware** tab:
   1. Assign at least 8GB of RAM
   2. Once the deploy has been completed, before powering the virtual machine on, add a network adapter.
   3. Check the **Connected** and **Connect at power** on fields (Device Status).
   4. Select the network to which the adapter has to refer to.
   5. Assign 500 GB to **Hard disk 3**.
d. Power the VM on.
e. Access the VM console (credentials: ***customer / customer***[3])
f. Double-click the **Network_setup** icon on the desktop to change the network settings:
   I. Click **Run**.
   II. Log in with ***admin / admin***
   III. Set the proper **IP address** and click **Save settings**.
   *Note: from the desktop, double-click the **Show IP** icon to check the IP and then click **Run in terminal** to show the current machine IP.*
   Note: the modification of the network parameters is acquired every five minutes, please wait.
g. From a standard browser, type the set IP address and access the portal.

*Note: in order to complete the hard-disk 3 resize (if done at the previous point c.5), it is necessary to access the VM console, open the **disk_management** folder, double-click the **DataDisk_resize** and then click **Run in terminal**. It is possible to verify the outcome of the command by double-clicking **DataDisk_read_log_resize**.*

2. Em²-Server access and licensing

*N.B.: Only for **admin** users.*

a. Go online using a standard browser
b. The VM must be set and running.
c. Type the IP address used for the VM setup
d. Login with the default credentials ***admin / admin***
   *Note: After the first access, change the password to avoid unwanted accesses (see **The account options**).*
e. Open **Settings** from the **Navigator** menu
f. Go to **License** and click **Add License**
g. Type your license code (see ***Installation requirements***)
h. Click **Save Settings**
i. Go to ***Em²- Server and gateways connection.***

[2] As above-mentioned, Em²-Server is provided as a VM compatible with the VM hosting software VMware® (for further information and to check the system hardware requirements, go to http://www.vmware.com/).
[3] Change the password, by double-clicking the **Password** icon on the desktop. Then click **Run in terminal** and type the new password twice.

3. Em²- Server and gateways connection

a. Connect Em²-Server to UWP 3.0 and/or VMUC.

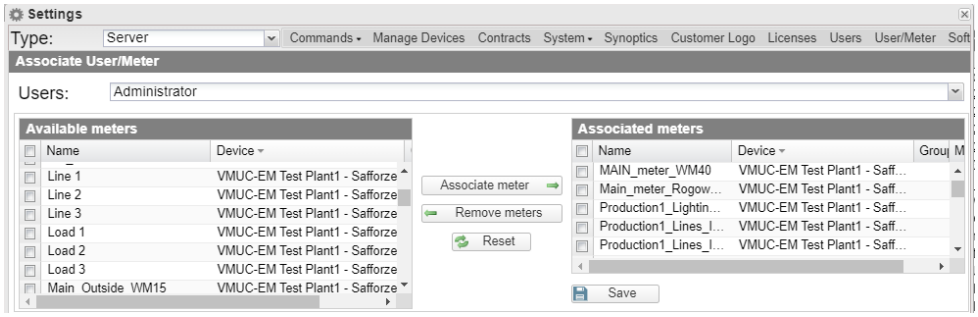
If you want to connect a…	Then open…	And follow this procedure…
VMU-C EM	Its web server	a. Open the **Settings** tab b. In the **System** menu, select the **Push Services**. c. Select the **DP service** d. Open the **Settings**. e. Define the start date / time and click **Apply** f. Check the **Enable the service** field. g. Type the server address. h. **Save** the settings. i. Test the connection. j. If the test connection is OK, select Full Configuration and send.
UWP 3.0	Its web app	a. From the **Navigation bar**, click ☰ to open the **Main menu**. b. From the **Services** menu, select the **Data Push service** to open the configuration page. c. Define the start date / time and click **Apply** d. Type the server address. e. **Enable the service** field. f. **Save** the settings. g. Test the connection. h. If the test connection is OK, select Full Configuration and send.

b. From Em²-Server, open the **Settings** menu
c. Select **Server** from the **Type** drop-down list
d. Select **Manage Devices**.
e. All UWP 3.0 and/or VMUC connected to the Em²-Server are listed: if you want to activate them, check the **Enable License** field. From this moment on the Em²-Server is going to receive data from the gateway.

4. Users and energy meters association

From Em²-server you can manage different users with different meters independently. You can see only the meters associated to your account.

a. From Em²-Server, open the **Settings** menu
b. From the **Users** tab, click to **Add** all the needed users
c. Fill all the fields
   *For further information, go to **How to add a user***
d. From the **User/Meter** tab, select a user and associate all the needed meters, by moving them to the right side

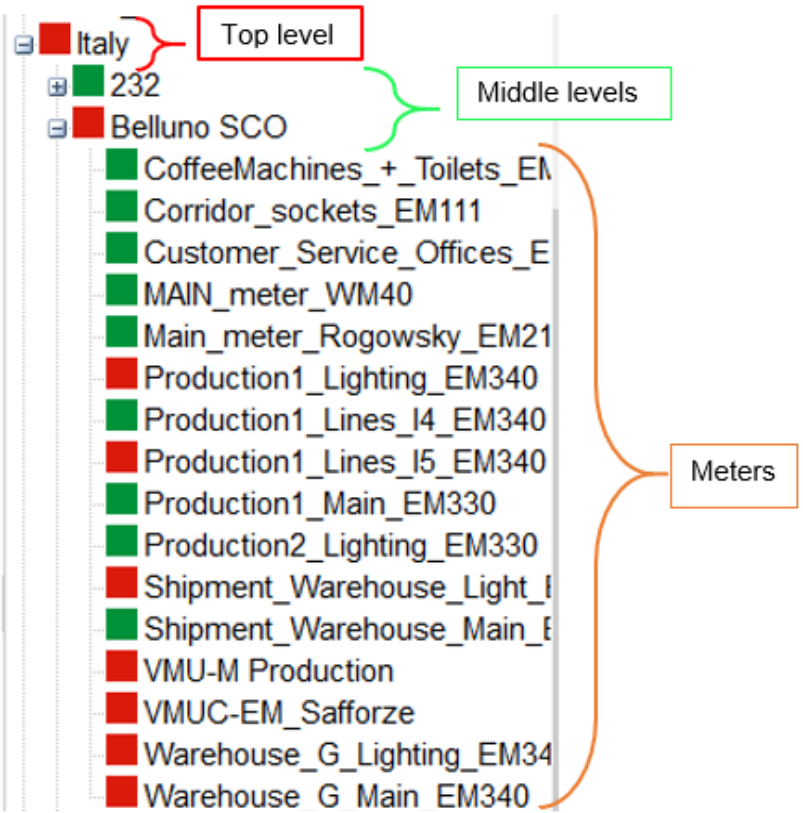


e. Click **Save**
f. Repeat this operation for all previously created users.

Note: without a proper association between meters and users, you cannot see any meter in Em²-server charts.

5. Energy meters organization

After having linked your sites (through VMUC or UWP) to Em²-Server and managed all the needed users, you can leave the meters (end devices) listed in the **Navigator** column or organise them into a tree structure.
Please, refer to the example below representing a tree structure:



In this example, there is a **Top Level** (Italy) including **Middle Levels** (installation, for example *Belluno SCO*). The **Middle Level** include the meters monitoring the loads of *Belluno SCO*. Go to **Settings** for more information**.**

Em²-Server web interface

Content
This chapter includes the following topics:

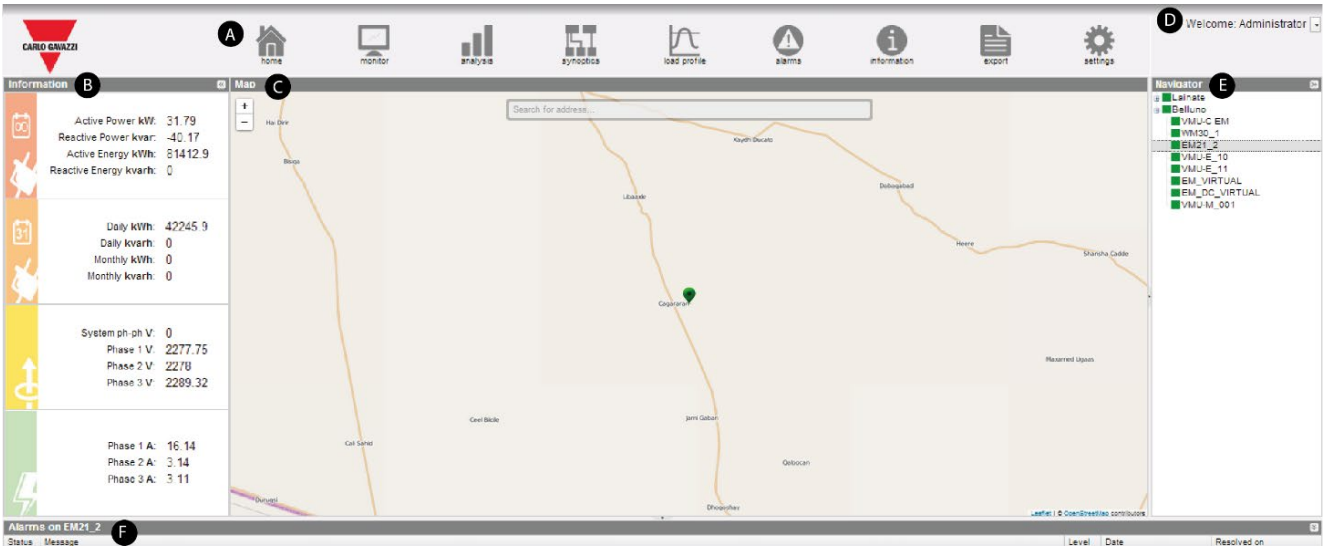
Dashboard

Content

This chapter includes the following topics:

Description

The below-described page is a dashboard that always remains in the background.



Part	Description
A	**The Navigation** menu
B	**The information** column
C	The **Map**
D	**The account** options
E	**The navigator** column
F	**Last ten alarms**

The parts B, E and F can be closed (» or ⌄).

The Navigation menu

Part	Description
A	**Home:** permits going back to the home (main) page.
B	**Monitor:** shows real-time trends measured by the selected energy meter.
C	**Analysis:** permits analysing multi-track history trends of variables from one or more devices, according to pre-set or custom aggregations.
D	**Synoptic:** shows synoptics and icons representing the last status of the alarms and of the device dimensions.
E	**Load Profile:** permits analysing any meter load profiles (tracking the daily consumption) and selecting the proper tariff profile in terms of maximum power.
F	**Alarms:** shows the device alarms that you can acknowledge, filter and/or sort.
G	**Information:** shows the plant characteristics and the database status.
H	**Report:** permits exporting stored data to different format. It contains the following three tabs: a) **Costs Analysis**: export of an active Excel file. The Excel file can contain the final cost data or the cost data simulated according to the supply contract. b) **Database Export**: fully configurable export of all the variables managed in the database. c) **Bill Simulation**: export of a PDF file containing a report useful for point of delivery (POD) analysis d) **Export** Queue.
I	**Settings (for administrator users only):** permits accessing the system settings menu.
J	**:** permits accessing the **Account options.**

The information column

By default, the **Information** column is empty. If you want to see updated data, select a physical or virtual meter (end point) from the **Navigation** column.

The **Information** column contains the following four parts:

Summary data. It shows the following information:

- **Active Power** [kW]: last active AC power measured by the selected energy meter.
- **Reactive Power** [kvar]: last reactive AC power measured by the selected energy meter.
- **Active Energy** [kWh]: cumulated amount of active AC energy measured by the selected energy meter, since its switching-on.
- **Reactive Energy** [kvarh]: cumulated amount of reactive AC energy measured by the selected energy meter, since its switching-on.

Period data. It shows the data as follows:

Daily	[kWh] cumulated amount of active AC energy measured by the selected energy meter, since the beginning of the day.
	[kvarh] cumulated amount of reactive AC energy measured by the selected energy meter, since the beginning of the day.
Monthly	[kWh] cumulated amount of active AC energy measured by the selected energy meter, since the beginning of the month.
	[kvarh] cumulated amount of reactive AC energy measured by the selected energy meter, since the beginning of the month.

Current data (A). It shows the last value of current measured by the selected meter. In case of single-phase application, only the **Phase 1** (L1) shows a value; the other **Phases** (2 and 3) data are 0.

Voltage data (V). It shows the last value of line-to-line voltage (**System ph-ph**) and phase to neutral voltages, measured by the selected meter.
In case of single-phase application, only the **Phase-N 1** (L1n) data are shown; the other **Phases-N** (2 and 3) data are 0. In case of three-phase system, all the data are shown.

The map

The **Map** is the main part of the **Dashboard** and it shows the different installations (**Middle levels**). With the **Zoom** function you can view all the monitored devices (see **Zoom function**). It permits you to see at a glance the status of each specific site:

Plant status	Meaning
	No alarms
	Some alarms are present but already ACK
	Some new alarms are present

The account options

From the **Account options,** you can perform the following tasks:

- Change the interface **Language**
- Change the units of measure
- **Logout.**
- **Reset positions** (that is to go back to the login dashboard).
- **Save** the changes.
- Change your **Password.**
- Open the online **Guide.**

The navigator column

The **Navigator** contains a tree structure showing the following options:

- **Top level**
- **Middle level** (shown in the map)
- Physical or virtual device. If you want to see the real values in the **Information** column, select one of the devices.

*For more information about the setup of the tree structure, go to **Settings**.*

Last ten alarms

The **Last ten alarms** part lists the later alarms (max. 10) relating to the device selected from the **Navigator** column.

Monitoring

Content

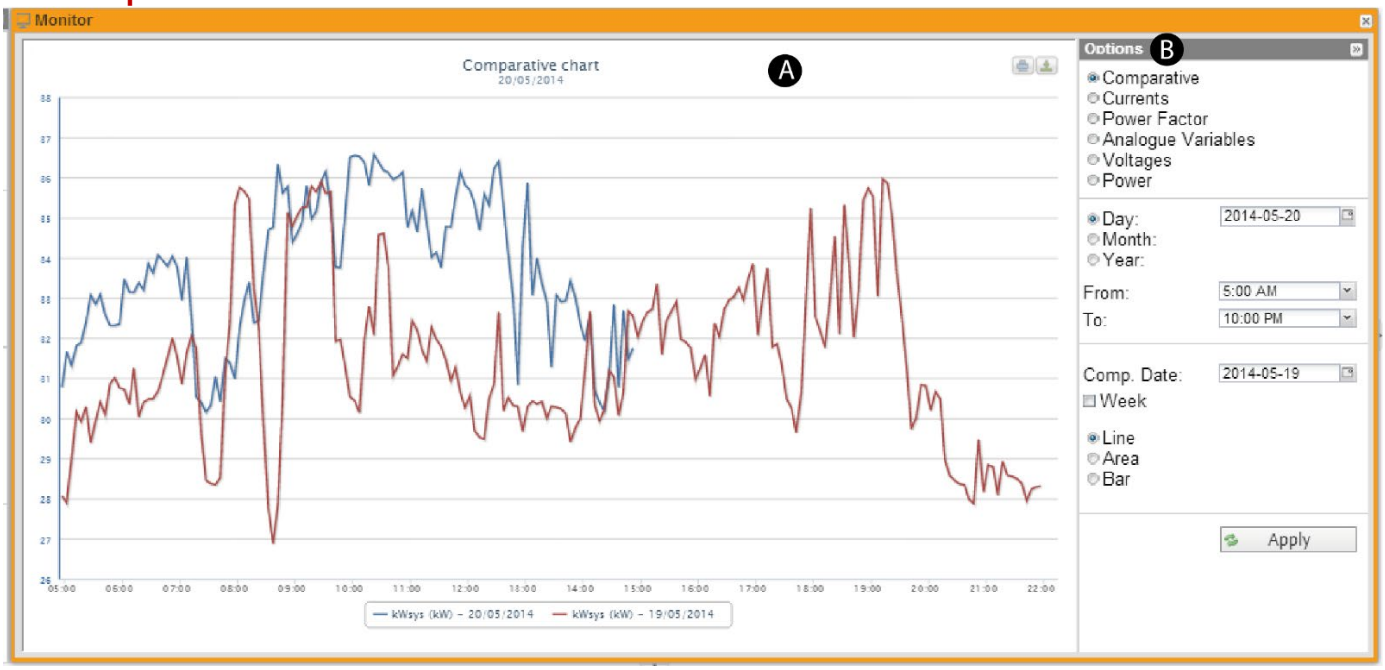
This chapter includes the following topics:

Scope

The **Monitoring** function allows you to view and compare the data of the meter (end point) selected from the **Navigator** column.

If you do not select any meter, no data is shown on the chart.

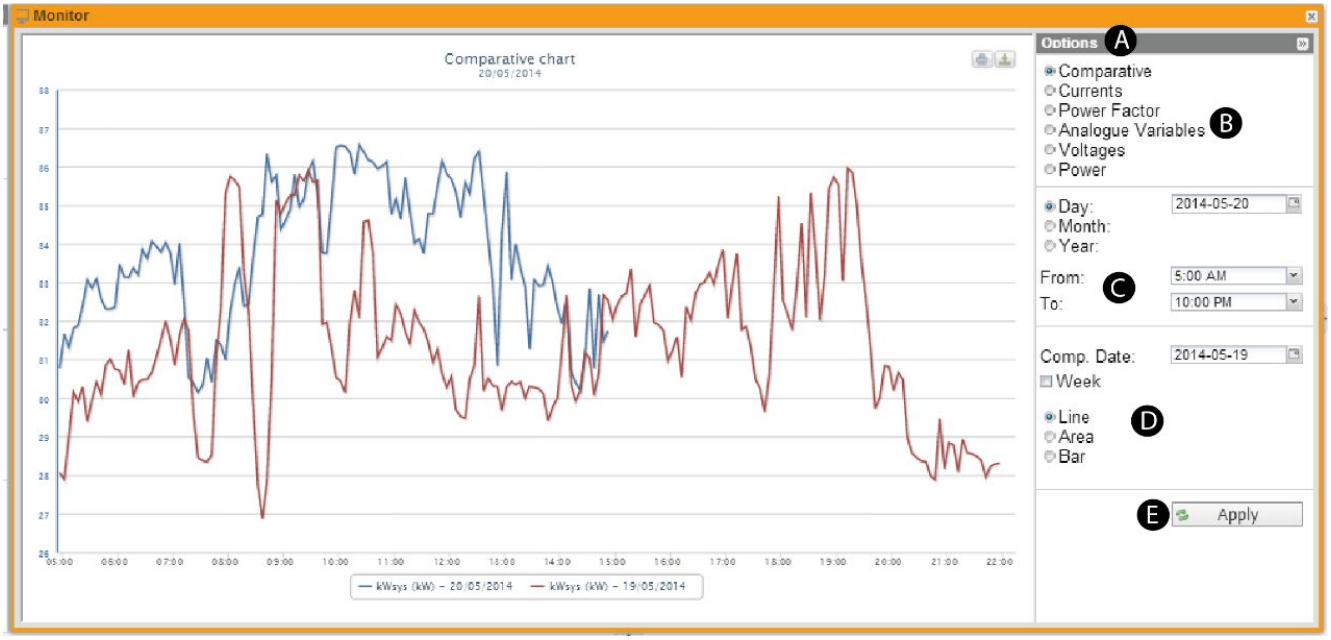
Description



Part	Description
A	**Charts** *For more information, see **Function common elements > Charts***
B	**Options** menu

Options menu

You can open and close the **Options** menu using » in the top-right part of the screen (**Part A**).



B	C	D	E
Types of chart	**Menu 1**	**Menu 2**	**Action**
Active power (comparison) chart	• **Day** • **Month** • **Year** • **From** • **To**	• **Comp. Date** • **Week** • **Line** • **Area** • **Bar**	**Apply**. To show the selected parameters.
Currents chart		• **AC** • **DC** • **Line** • **Area** • **Bar**	
Power Factor chart		• **Line** • **Area** • **Bar**	
Analogue Variables chart		• **Line** • **Area** • **Bar**	
Voltages chart		• **AC** • **DC** • **Line** • **Area** • **Bar**	
Power chart			

Active power (comparison) chart

This chart compares the trend of the active power (kW) absorbed by the monitored / selected meter in two different periods. The sample resolution is defined in VMU-C EM/ UWP 3.0 (minimum 5 minutes).
*Note: When you select the **Active power (comparison)** chart, by default it shows the current day data compared with the data of the day before (from 05:00 a.m. to 10:00 p.m.).*

From the **Options** menu, you can select the following different time periods of comparison:

1. **Day**. You can set the following options:
   - the current **Day** and the **Comp. Day**
   - the range of the X-axis (**time**)
   - a weekly comparison. If you check the **Week** field, the chart compares the trend of the weeks to which the selected **Day** belong to with the trend of the Comp. date.
2. **Month**. You can compare the trend of the selected **Month** with the trend of the selected **Comp. Month** (always from the first to the last day of the month). You can also set the month **Year**.
3. **Year**. You can compare the trend of the selected **Year** with the trend of the selected **Comp. Year** (always from January to December).

Currents chart

This chart shows the three-phase system currents (AI1, AI2 and AI3) referring to the selected meter.
Notes:
- *AI1, AI2 and AI3 are referred to as Phase 1 A, Phase 2 A and Phase 3 A in the **Information** column.*
- *In case of single-phase application, only AI1 is shown.*

ℹ *You can select the time period (**Day**, **Month** or **Year**) and the system typology (**AC** / **DC**) to monitor.*

Power Factor chart

This chart shows the power factor measured by the selected meter.
In the case of three-phase system, it shows the PFsys (the system power factor) and three single-line power factors (PFI1, PFI2 and PFI3). In case of single-phase application, it shows only PFI1.

ℹ *You can select the time period (**Day**, **Month** or **Year**) to monitor.*

Analogue Variables chart

This chart shows four magnitudes:

1. Temperature 1 (channel 1 of the VMUP) °C
2. Temperature 2 (channel 2 of the VMUP) °C
   Note: these inputs (channel 1 and 2) for temperature measurement can read data from "Pt100" or "Pt1000" probes with 2 or 3 wires.
3. Frequency input (VMUP pulse input)
   Note: the pulse frequency input allows measuring a frequency signal for flow or speed measurements.
4. Analogue input (analogue input "**mV**" or "**mA**" of the VMUP)

Notes:
- *The "mV" type analogue input is available on the module VMUP2TIWXSEM. The "mA" type input is available on the module VMUP2TCWXSEM.*
- *All these variables can only be monitored if the VMU-P EM module is properly installed, connected and configured.*

Voltages chart

This chart shows the voltages measured by the selected meter.
In case of three-phase system, it shows the phase-to-neutral voltage (Vlnsys) and the line-to-line voltage (Vllsys). In case of single-phase application, it shows only Vlnsys.

*You can select the time period (**Day**, **Month** or **Year**) and the system typology (**AC** / **DC**) to monitor.*

Power chart

This chart shows the active [kW] and reactive [kvar] power measured by the selected meter.
If it is a virtual meter, the powers shown in the chart represent the sum of the system powers (kW or kvar) measured by each individual real device.

*You can select the time period (**Day**, **Month** or **Year**) and the system typology (**AC** / **DC**) to monitor.*

Analysis

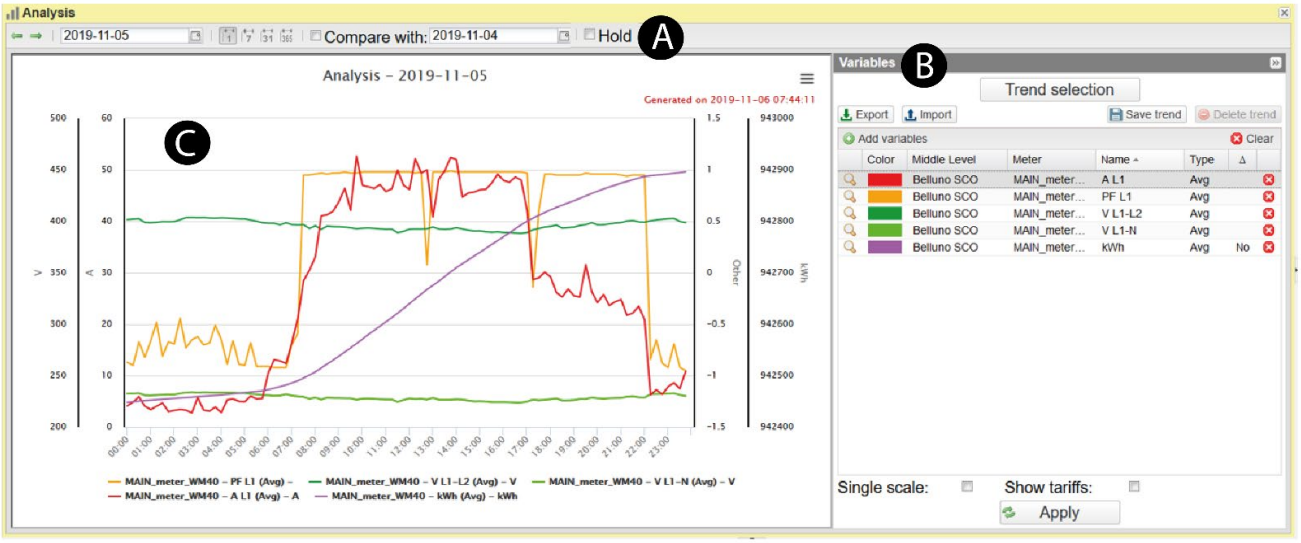
Content

This chapter includes the following topics:

Scope

The **Analysis** function allows you to create analytical or comparative charts of one or more devices, according to predefined or user-defined trends (aggregations of variables).

Description



Part	Description
A	**Top bar**: allows selecting the period to analyse. It includes the following elements: **Element** / **Description** ← / Regenerates the chart of a time period preceding the one being considered → / Regenerates the chart of a time period following the one being considered **Date** / Allows selecting the day to be analysed. **View mode** / **Daily**, **Weekly**, **Monthly**, **Yearly** **Compare with** / Selection of the day for the comparison.
B	**Variables** menu including the following elements: **Element** / **Description** **Trend selection** / Creates charts using predefined trends or selecting variables. *For more information, go to **Trend selection**.* **Add variable** / Permits adding variables manually (go to **How to add a variable**). **Export / import** / Permits exporting and importing a configuration Variable features / **Colour / Middle level / Meter / Name / Type / Δ.** **Single scale** / Shows the same scale for all the Y-axes physical quantities. **Show tariffs** / Shows the tariff time bands. *It is available only if a default calendar has been selected for the analysed device and if the **daily** or **weekly** view is enabled.* *If you select a set of variables from more than one device, tariffs will not be shown.*
C	**Chart** displaying area

Trend selection

The **Trend selection** function allows you to choose one of the three available **Trend types:**

- **Default**
- **User defined**
- **VMU-C**

Trend type: Default trends

The following **Default** trends are available:

Trend name	Variables
A	Current A L1, A L2, A L3
THD A	Total harmonic distortion referred to Current THD A L1, THD A L2, THD A L3
THD V L-N	Total harmonic distortion referred to line-to-neutral voltage
Totalizers	Generic counter (H2O, GAS, …) coming from specific Carlo Gavazzi meters
V L-L	Line-to-Line voltage V L1-L2, V L2-L3, V L3-L1, V L-Lsys
V L-N	Phase-to-Neutral voltage V L1-N, V L2-N, V L3-N, V L-N sys
kW	Active power kW sys
kW kvar kVA	Active Reactive and Apparent power kW, kvar, kVA
kWh kvarh	Active and reactive energy kWh, kWh (-), kvarh, kvarh (-)

Trend type: User-defined

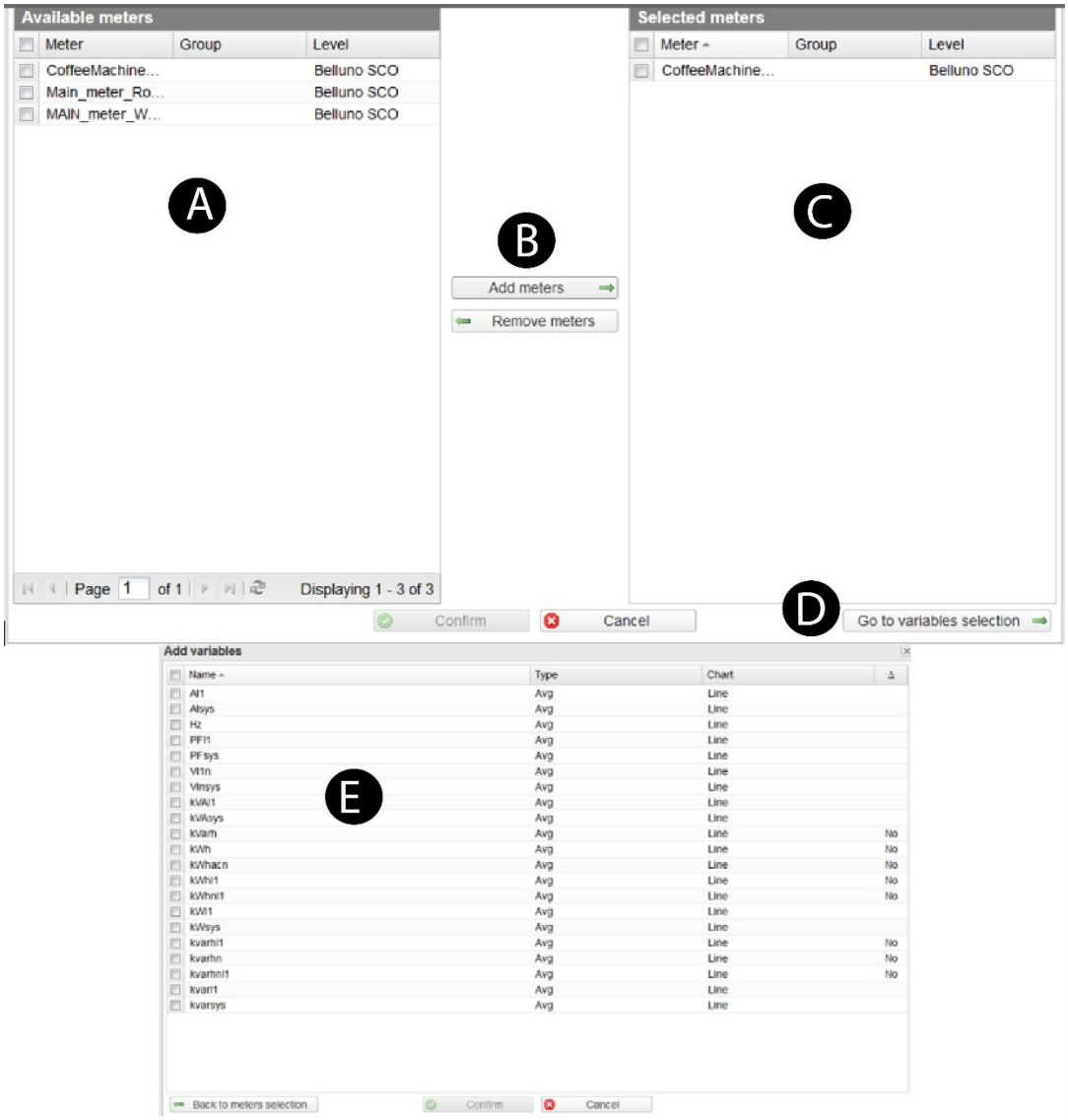
If you have…	Then…
already saved trends	• Click **User defined** from the trend type. • Select one of the saved trends from the list. • Click **Confirm**. • Click **Apply.**
never created a trend	• Add the variables you need from the **Variables** menu (see ***Add variables***) • Save trend • Follow the above-described procedure

Trend type: VMU-C EM

A list of all trends created in all VMU-C devices, as part of the *Modbus driver* definition.

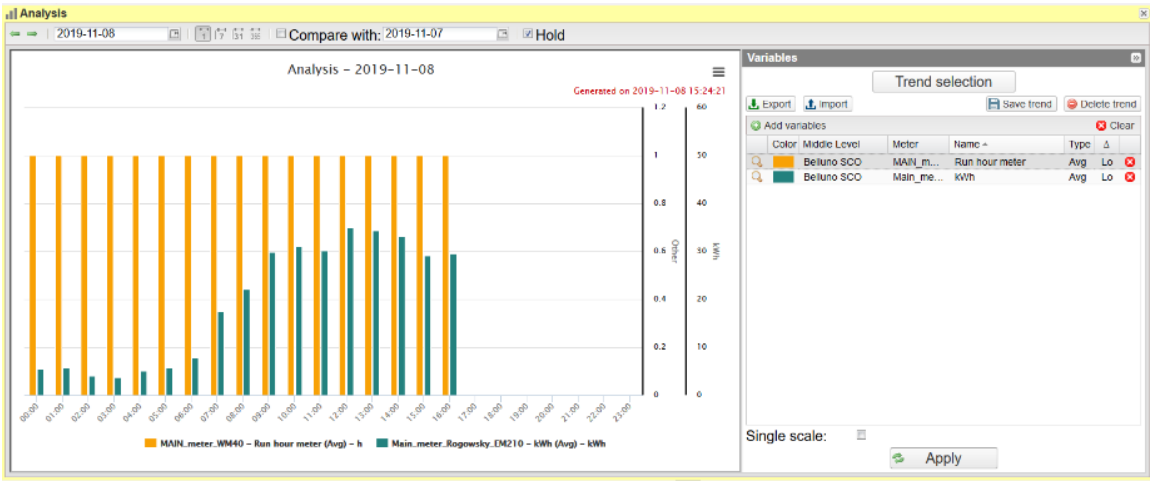
Add variables

Description

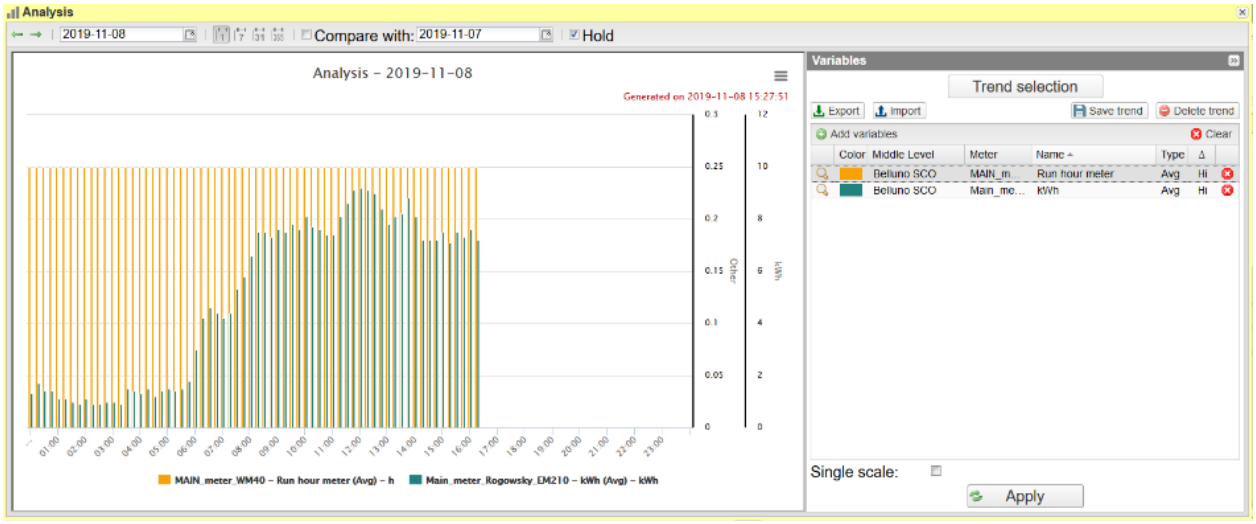


Part	Description
A	**Available meters**
B	**Add meters / Remove meters** button
C	**Selected meters**
D	**Go to variables selection**
E	**Add variables** window. For ***counter*** variables, you can choose the following options: • *NO*, the value is the total quantity measured since the meter start up • *Hi*, the value is shown according to the higher definition (VMU-C or UWP3 sampling time) • *Lo,* the value is shown according to the lower definition (1 hour) See the following ***Example***.

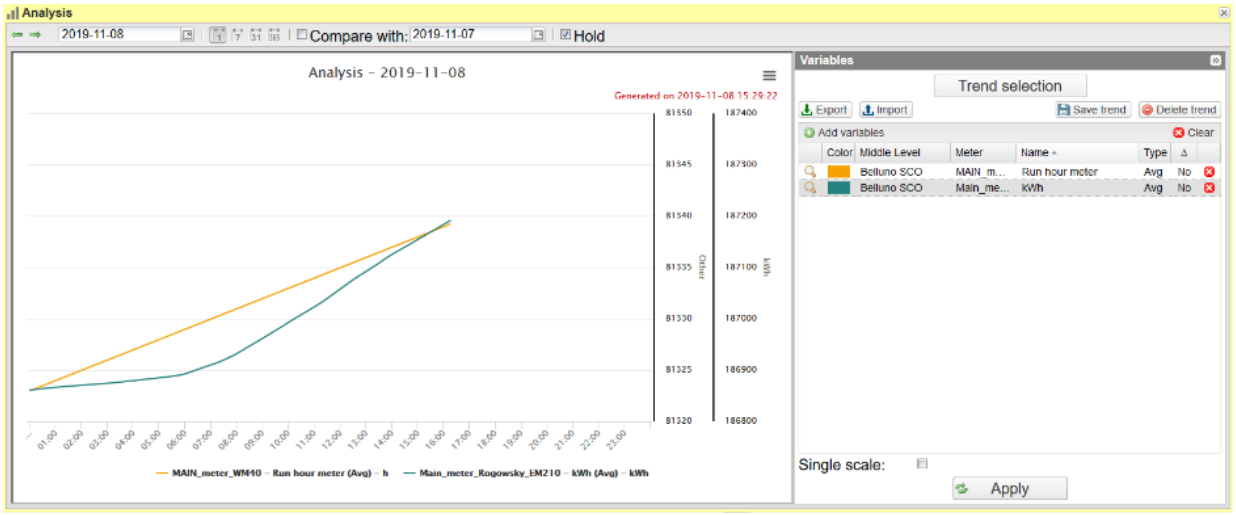
Example



LOwer time definition one hour. Each energy data represents the total hourly energy consumption.



HIgher definition = the delta energy consumption between consecutive logged samples.



NO delta = total amount of collected data.

How to add a variable

1. Click ⊕ to manually add variables
2. Select one or more meter from the list
3. Click **Add meters**
4. Click **Go to variables selection**
5. Select the variables
6. Click **Confirm**
7. Click **Apply** from the **Variables** menu to show the chart.

How to modify a variable

1. From the **Variables** menu, click 🔍
2. From the **Edit variable** menu, change:
   - **Colour** of the chart
   - Variable **Type (max, average, min)**
   - **Chart type (Line, area, bar)**
   - **Delta (Δ)**
3. **Confirm**
4. **Apply**

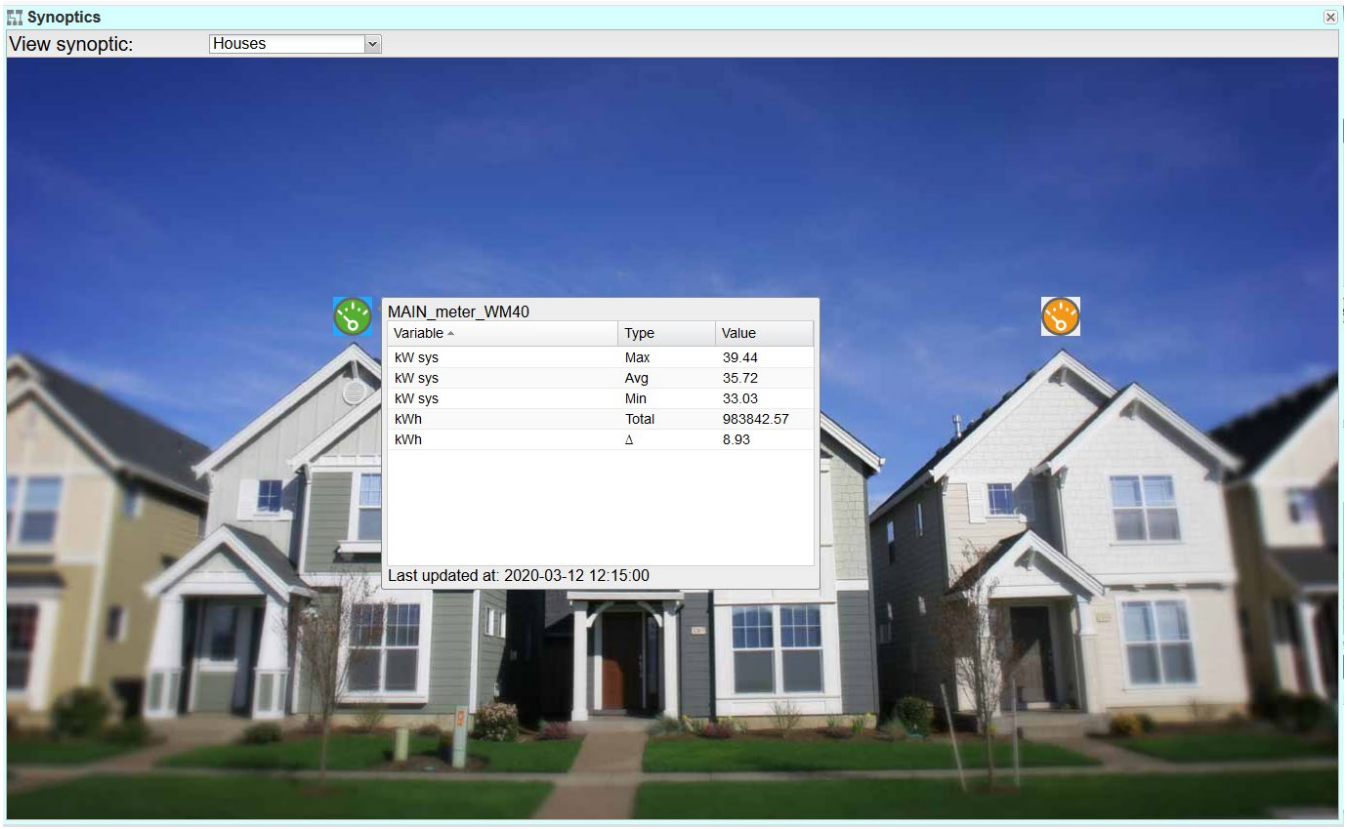
Synoptic

Content

This chapter includes the following topic:

Scope

The **Synoptic** function allows you to upload an image representing your installation and the relevant devices.
In this way, you can control, compare and analyse the last logged values at a glance.



From the **View synoptic** combo box, you can select an existing* synoptic.
**Note: Only an administrator user can edit or create synoptics.*

If you hover the mouse over the device icons, a tooltip shows the real-time variable value measured by the device according to the **Settings** of the administrator user.

If you click a device icon, you lock the tooltip that remains open. In this case, you can hover over another device icon and compare the two devices data.

Device status	Meaning
Green	No alarms
Yellow	Some alarms are present but already ACK
Red	Some new alarms are present

You can lock only one tooltip at a time.

*For more information, see **Settings > Synoptics tab**.*

Load profile

Content

This chapter includes the following topics:

Scope

The **Load profile** function allows you to perform the following tasks:

- Statistical analysis of daily consumption data to build a load profile chart.
- Calculation of the daily baseline.
- Estimation of the maximum power to deal with energy suppliers.

The benefits of this function are the following:

- Reliability of plotted chart
- Automatic data elaboration (not manual)
- Possibility of considering data of specific time periods.

This function aims at evaluating the following options:

- The most advantageous tariff or energetic contract.
- The advantages of interventions aimed at energetic efficiency.
- Industrial activities re-organization in order to reduce consumptions and, subsequently, the energetic cost.

Description

The **Load profile** page has two parts: the **Load profile chart** and the **Options menu**.

Load profile chart

This chart shows the daily load profiles according to the real data acquired during the selected period.
It is possible to plot different profiles according to the following statistical logics:

1. **Avg kW.** The daily load profile according to the arithmetic mean of the measured values.

$$Avg_i = (\sum_{j=1}^{k} P_j|_{t=i}) \, /k$$

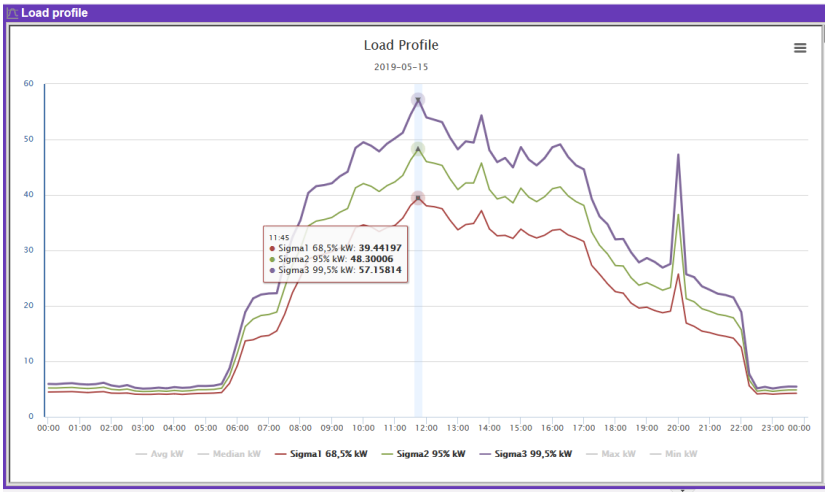
2. **Median kW.** The daily load profile according the median value.

$$Median_i = (MAX(P_i)|_k - min(P_i)|_k)$$

3. **Sigma 1, 2 and 3.** The daily load profiles based on values calculated according to the normal statistical distribution. Each sigma has a different confidence (the probability range):

   - Sigma 3 has 99,5%. This load profile chart is built up also considering the highest - but least likely - values.
   - Sigma 2 has 95%.
   - Sigma 1 has 68,5%.

   Example:
   If you want to evaluate the most advantageous energetic contract according to the power peak, you can analyse the load profile according to the three Sigma.



   If you refer to Sigma 3, you will choose an expensive contract, but you will never exceed the power limit.
   If you refer to Sigma 2 or 1 (with lower power level), you will choose a cheaper contract, but you could exceed the maximum power limit.

4. **Max kW.** The daily load profile based on maximum logged values.

$$Max_i = MAX(P_i)|_k$$

5. **Min kW.** The daily load profile based on minimum logged values.

$$\min_i = \min(P_i)|_k$$

ℹ *1, 2 and 5 are active by default.*

Options menu

This menu permits you to configure the chart.

It can be opened and closed using « and » in the top-right of the screen.

How to configure the chart

1. Open the **Options** menu
2. From the **Meter** drop-down list, select a device.

*Note: If the selected device is related to a default electric contract, the contract is automatically selected from the **Contract drop-down list**.*

3. Select the analysis period (**From** – **To**).
   Note: the larger the period, the longer the chart loading time is.
4. Select the days to consider for the analysis (within the period selected on step 3).

If you want to…	Then select…	And…
Use the settings you have defined in ***Settings > Server > Contracts*** > ***Periods***	**Contract days**	• From the **Contract** drop-down menu, select a contract. • From the **Contract Options** select the existing periods. *For further information, go to **Settings > Server > Contracts** > **Periods***
Manually select a day or few days excluding other (see the ***Example*** below)	**Fixed days**	Select ONLY the days you want to consider

5.

If you want to…	Then click…
Generate an Excel file	**Export**
Show the chart according to the settings	**Chart**

*Note: first, you have to set the **Default Contract** and the **Demand** time period (**Settings > Type > Meter > Default Contracts**).*

Example

If you want to…	And…	Then select…
consider two-month data	exclude weekend days from the analysis	1. select fixed days 2. check only the week days
exclude closing days period and your Country festivities	you have set them in contract periods details	1. choose contract days 2. check the tariff which represent the working days from the list

Excel export

The exported data are the following:

- Time
- Mean
- Median
- Sigma1*
- Sigma2*
- Sigma3
- Max*
- Min*.

**By default, this field is deselected in the chart.*

Alarms

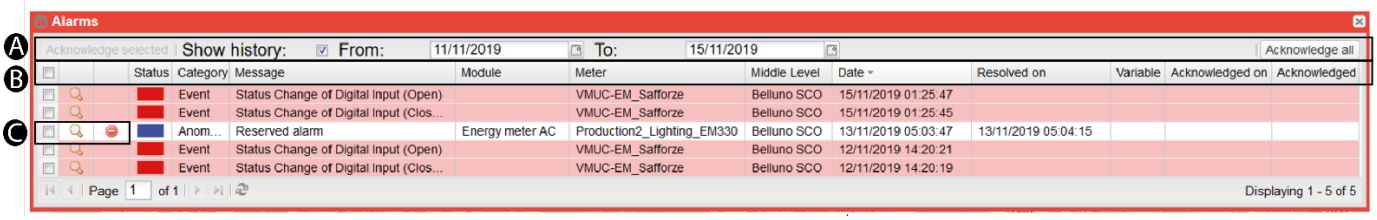
Content

This chapter includes the following topics:

Scope

The **Alarms** function allows you to manage the VMU-C alarms, shown in a chronological list (from the later alarms).

Description



Part	Description
A	**Top bar.** It allows you to perform the following tasks: 1. Check **Show History** to view only the alarms of a set period (see option 2) 2. Set a specific period to consider (**From – To**). 3. **Acknowledge all** the alarms. 4. **Acknowledge selected** alarms.
B	• ☐: allows selecting all the alarms • **Status**: informs about the alarms' status (RED / GREEN / BLUE /YELLOW) • **Category:** shows the different type of category (**Alarm**, **Anomaly**, **Event** or **Command**) • **Message:** describes the alarm • **Module:** shows the device type that raised the alarm. • **Meter:** shows the device name that raised the alarm. • **Middle Level:** shows the name of the level in which the device has been linked. • **Date:** date and time of the alarm activation. • **Resolved on**: date and time of the alarm de-activation. If the alarm is still pending, the field is blank. • **Variable**: shows the variable used to trigger the alarm. • **Acknowledged on**: when the user acknowledged the alarm. • **Acknowledged by**: the user who acknowledged the alarm.
C	🔍: shows the device on the map (**Dashboard**) ⛔: deletes an alarm

Status colour description

Status colour	Description
RED	Open alarm / non acknowledge event
GREEN	Closed alarm / acknowledge event
BLU	Closed alarm without acknowledge
YELLOW	Open and acknowledge alarm

Categories description

Category	Description
ALARM	Event which informs user about a situation to be resolved quickly in the monitored system. It includes all the warnings associated with the temperature measurements and the measurements from analogue and digital inputs.
ANOMALY	Event which informs user about a situation to be resolved quickly in the monitored system. It includes incorrect operation of the temperature probes, or any notification of communication problems and errors.
EVENT	It informs user about status changes (digital inputs, power supply on/off, instruments configuration or connection)
COMMAND	It informs user about command send to the devices

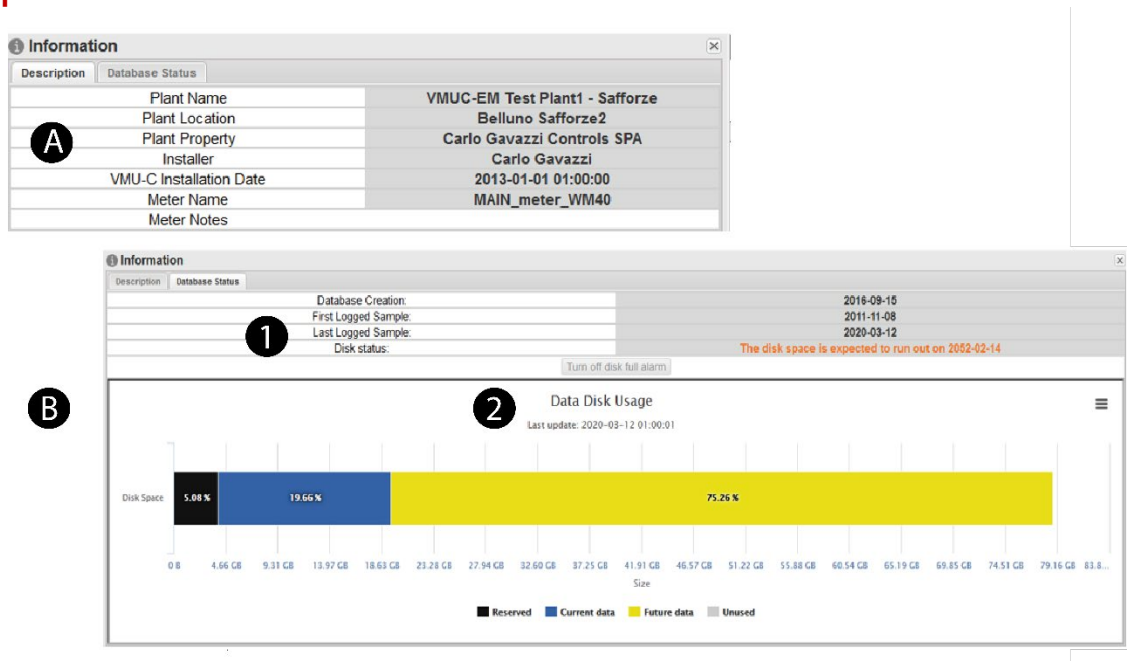
Information

Content
This chapter includes the following topics:

Scope

This function shows general information about meters and database status.

Description



Part	Description
A	**Description** tab: shows the data and the characteristics of the selected energy meter. **Element** / **Description** **Plant name** — Name of the VMUC associated with the selected device **Plant location** — Installation location **Plant property** — VMU-C owner **Installer** — Name of the VMU-C installer **VMU-C installation date** — VMU-C installation date **Meter name** — Name of the selected device **Meter notes** — Notes associated with the device
B	**Database Status** tab: shows general information about the database. It also indicates the estimated date when the data storage is full and allows planning a data disk extension. **Part** / **Description** **1** — • **Database Creation.** • **First Logged Sample.** • **Last Logged Sample.** • **Disk status**. estimated date when the data storage will be full; it allows planning a data disk extension. • **Turn off disk full alarm** button: disables the alarms notifying disk full. **2** — • **Reserved data** / **Current Data** = used space • **Future data** = free space assigned to future data • **Unused** = not assigned free space

Report

Content

This chapter includes the following topics:

Scope

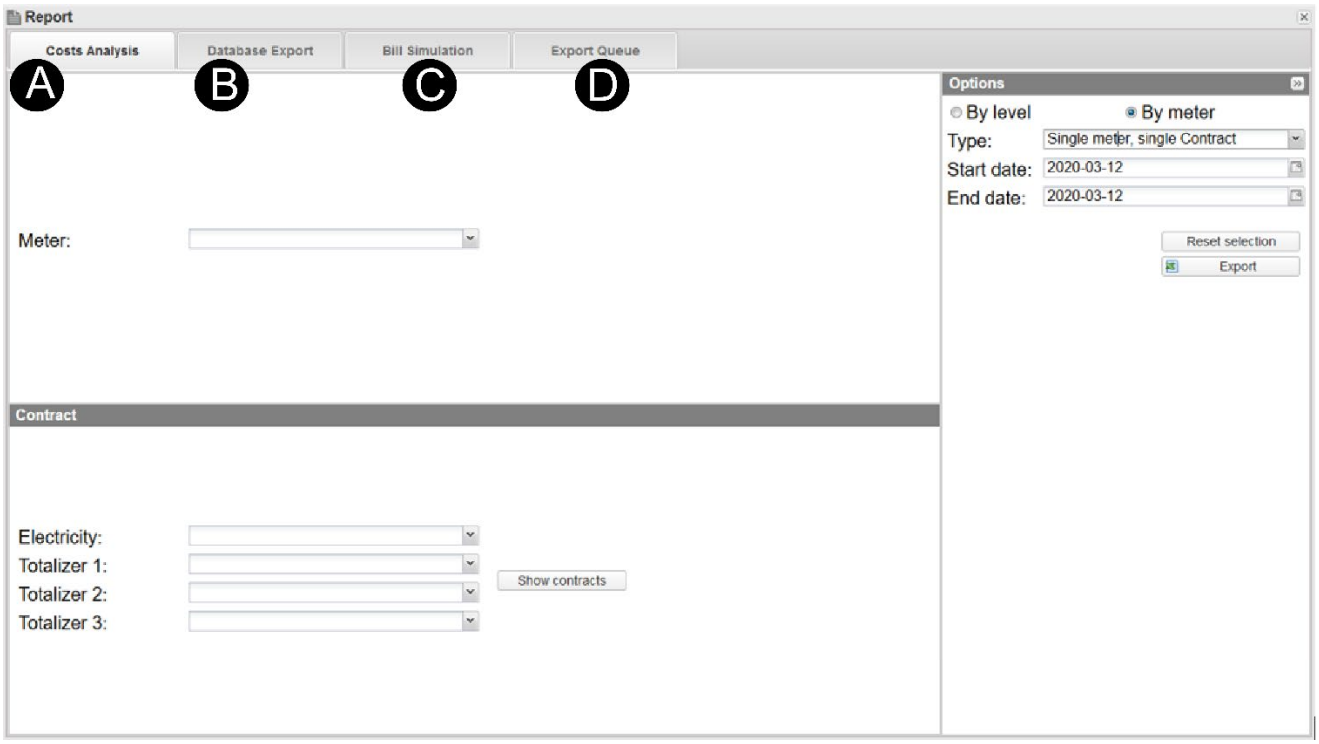
This function allows you to export files that containing processed data collected according to the selected options.

It allows you to perform the following tasks:

- Analysis of cost (cost analysis tab)
- Export an Excel file containing data collected from one device (database export tab)
- Simulate and customize a bill and compare it with a real one (bill simulation)
- Export the created files.

However, if you want to analyse the costs and to use the bill simulation function you must associate a contract to a device or a group of devices. This way, you can estimate the energetic cost of a load / cost centre.

Description



Part	Description
A	**Costs Analysis.** This tab allows you to analyse the costs of data collected by meters. *For further information about **How to set a contract**, see **Settings > Server > Contract tab**.*
B	**Database Export.** This tab allows you to export data directly from the selected device database.
C	**Bill Simulation.** This tab allows you to simulate an electricity bill based on real data collected. *For further information about **How to set a contract**, see **Settings > Server > Contract tab**.*
D	**Export Queue.** This tab contains all the generated report files that you can download or delete.

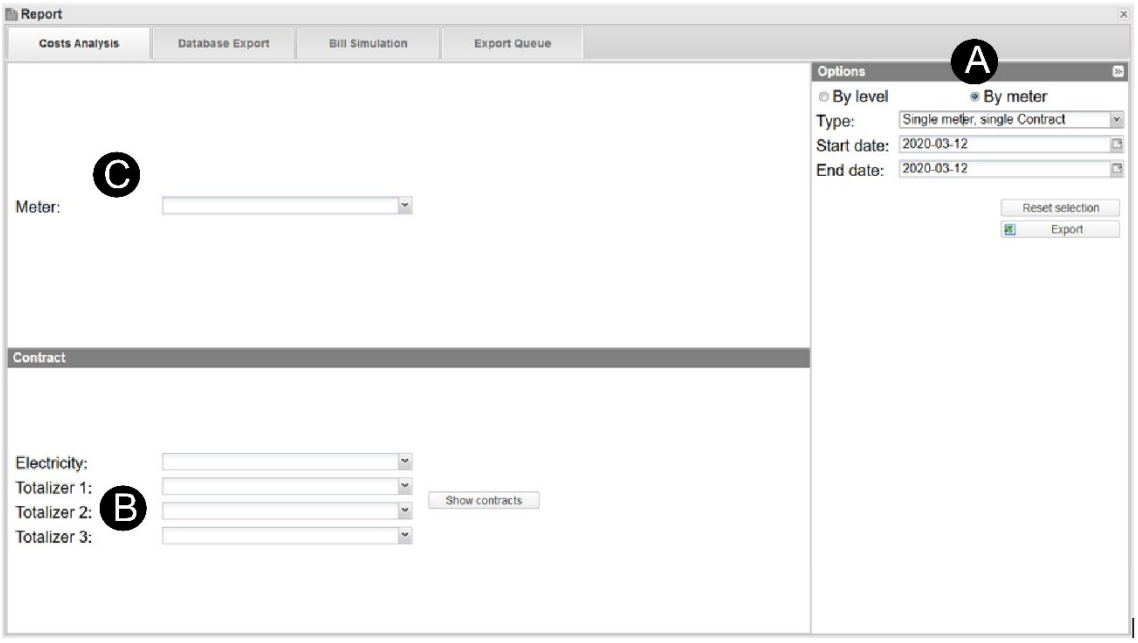
Costs analysis

Scope

This tab allows you to create and export an interactive Excel file. Thanks to this file you can perform the following tasks:

- Analyse the energetic costs according to the collected data. This is useful if you have to split the costs into cost centres
- Compare the energetic costs with different contract. This is useful to evaluate the more advantageous tariff
- Compare the consumptions of a meter in different periods of time. This is useful to evaluate energy efficiency investments.

Description



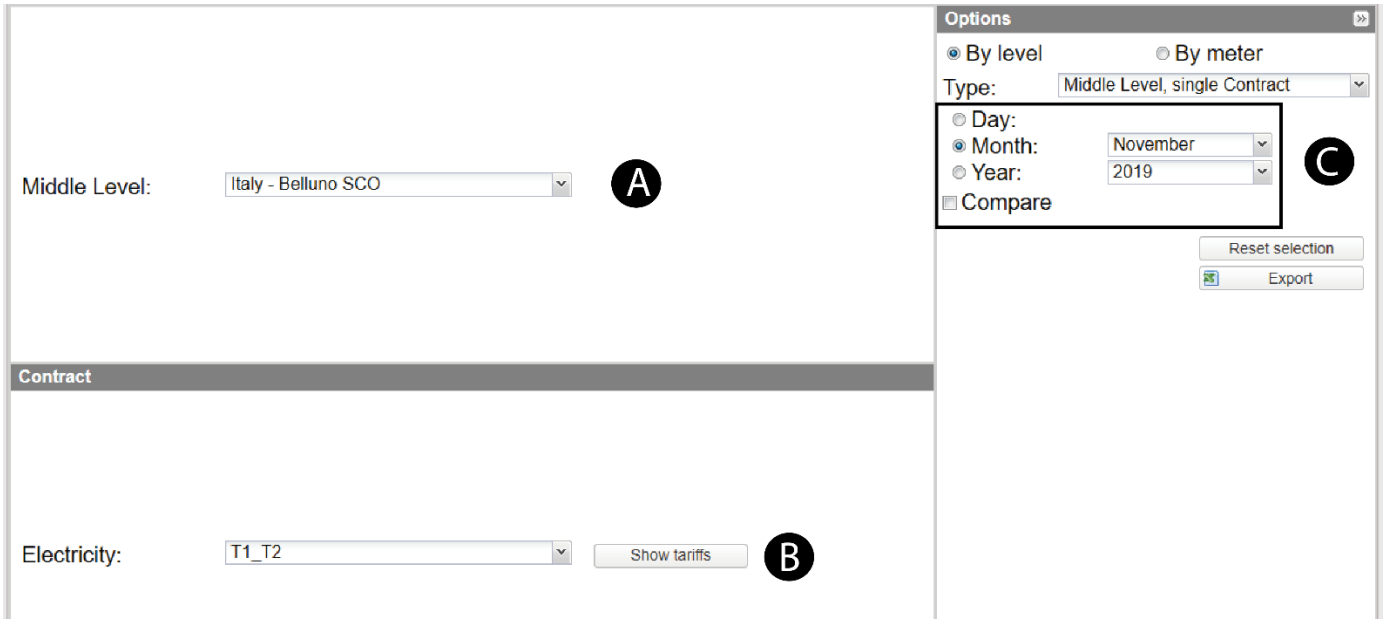
Part	Description	Note
A	Export options. You can choose the level or the meter to export (see **Part C**).	
B	**Contract** selection section.	
C	**Options** section. • Export option (**By level** or **By meter**) • **Type** menu (see the relevant description) • **Reset selection** • **Export.** You can export an interactive Excel file. If you want to download the Excel, go to ***Export Queue.*** *For further information about the Excel file go to **Report**.*	It changes according to the selected export option

Export options

By level

This type of export permits you to analyse your cost centre according to the selected period.
You can analyse your data basing on two different levels:

- Middle level, single contract. It permits evaluating the cost centre of a single-plant according to the selected contract.
- Top level, single contract. It permits comparing the energy cost of different plants according to the selected contract.



Part	Description
A	Level selection (**Middle** and **Top**).
B	Contract selection.
C	Time frame and **Compare** check box.

By meter

This export type permits you to analyse costs by meter, choosing the period according to your needs.
There are three report types:

- **Single meter, single contract**. It permits simulating the energy cost of the load monitored by a single meter, according to the selected contract.
- **Multiple meters, single contract**. It permits comparing the energy costs of some loads according to the selected contract. It can be useful, for example, to compare the electric energy consumption of different offices.
- **Single meter, multiple contracts**. It permits comparing the energy costs of a load monitored by a single meter, according to different tariffs. It can be useful when you want to find the cheapest electric contract according to your real electric demand.

Part	Description
A	**Meter** selection.
B	**Selected contract** details.
C	Time frame (**Start** and **End date**).

How to create a pivot

After the export (using the **By meter** or **By level** options), you can analyse the data based on two pre-defined macros*, by selecting the report type from the drop-down menu in the **Base Panel** spreadsheet.

**Note: The two pre-defined macros are "Energy report by level" or "Energy report with power factor".*

Energy report by level

This type of report contains the three following spreadsheets:

- **Base Panel**, for using macros to create pivot
- **Raw Data**, with all database exported
- **Export details**, containing the set options (**Export date/time**, **User**, **Export type**, **Main level**, **Period**, **From**, **To**, **Compare**, **Compare To**).

From the Excel file, you can select the **Type** of data to display (**Capacitive kvarh**, **Inductive kvarh**, **kVAh**, **kVarh**, **kWh**).

ℹ *If you check **kvarh**, the table automatically shows the total measured amount of each level (Totalizer) and the relevant total cost according to the set tariff.*

Energy report with power factor

This type of report shows:

- the active/reactive power consumption, costs and the power factor[4], divided in tariffs
- the total amount for each level variables.
- a summary of the pivot table content.

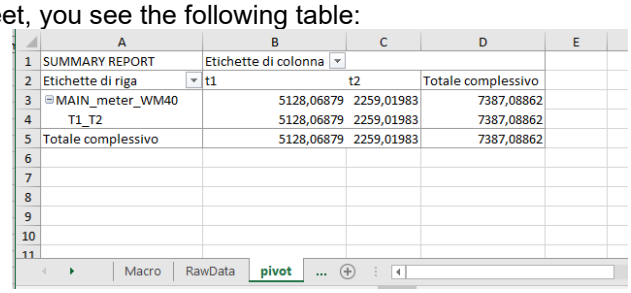
[4] Power factor is a dimensionless number, defined as the ratio between real power absorbed by the load and the apparent power ($\mathrm{PF} = \frac{\mathrm{Pactive}}{\mathrm{Papparent}} = \frac{\mathrm{VI}\cos\varphi}{\mathrm{VI}}$)

Examples of data elaboration

This type of report contains the two following spreadsheets:

- **Base Panel**, for using macros to create pivot.
- **Raw Data**, with all the database exported.

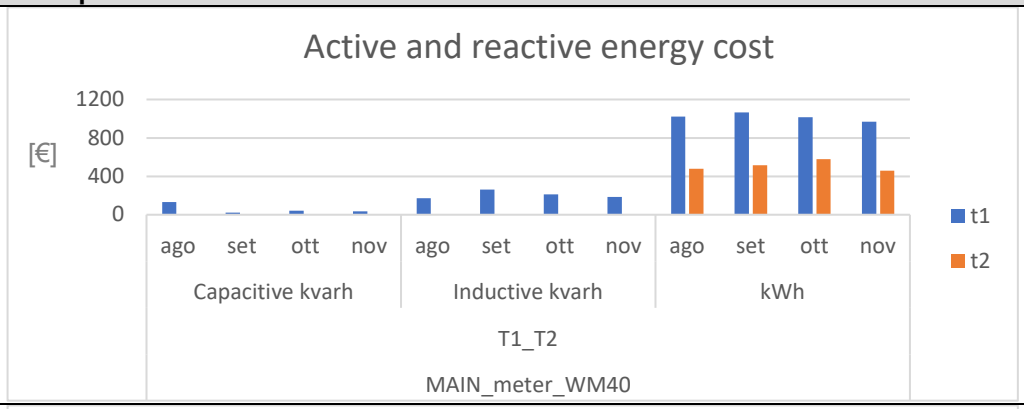
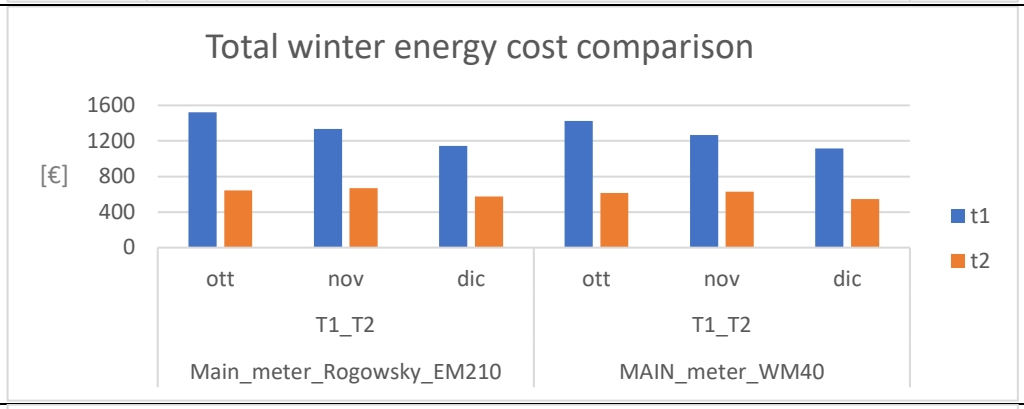
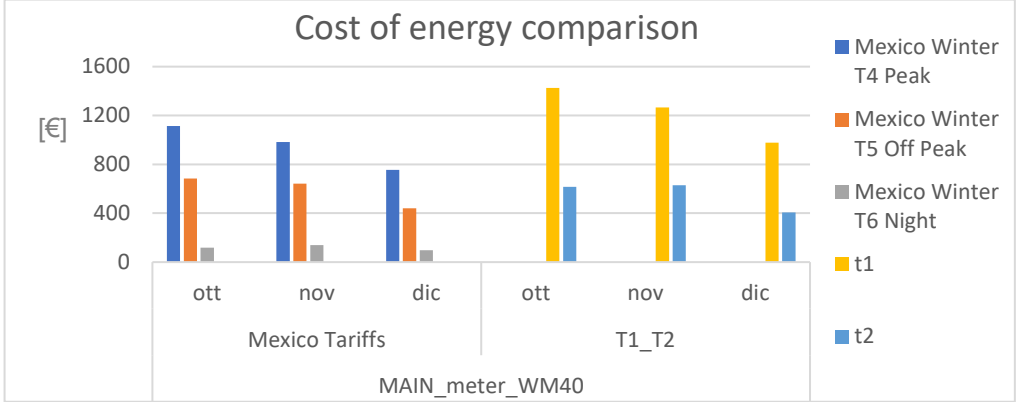
If you go to the ***pivot*** spreadsheet, you see the following table:



	A	B	C	D	E
1	SUMMARY REPORT	Etichette di colonna			
2	Etichette di riga	t1	t2	Totale complessivo	
3	MAIN_meter_WM40	5128,06879	2259,01983	7387,08862	
4	T1_T2	5128,06879	2259,01983	7387,08862	
5	Totale complessivo	5128,06879	2259,01983	7387,08862	
6					
7					
8					
9					
10					
11					

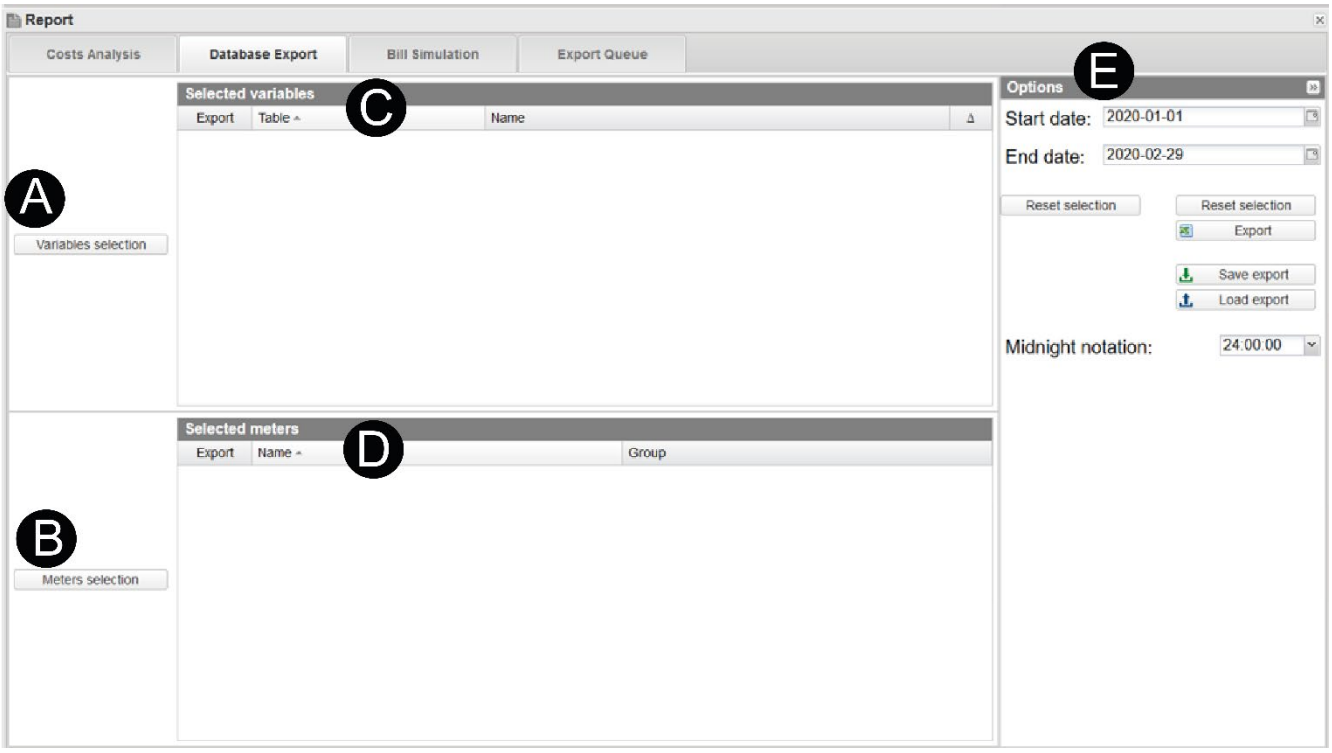
Macro | RawData | pivot | ...

According to the **Options Type**, you can perform the following elaborations:

Type	Example
Single meter, single contract	
Multiple meters, single contract	
Single meter, multiple contracts	

Database export

Description



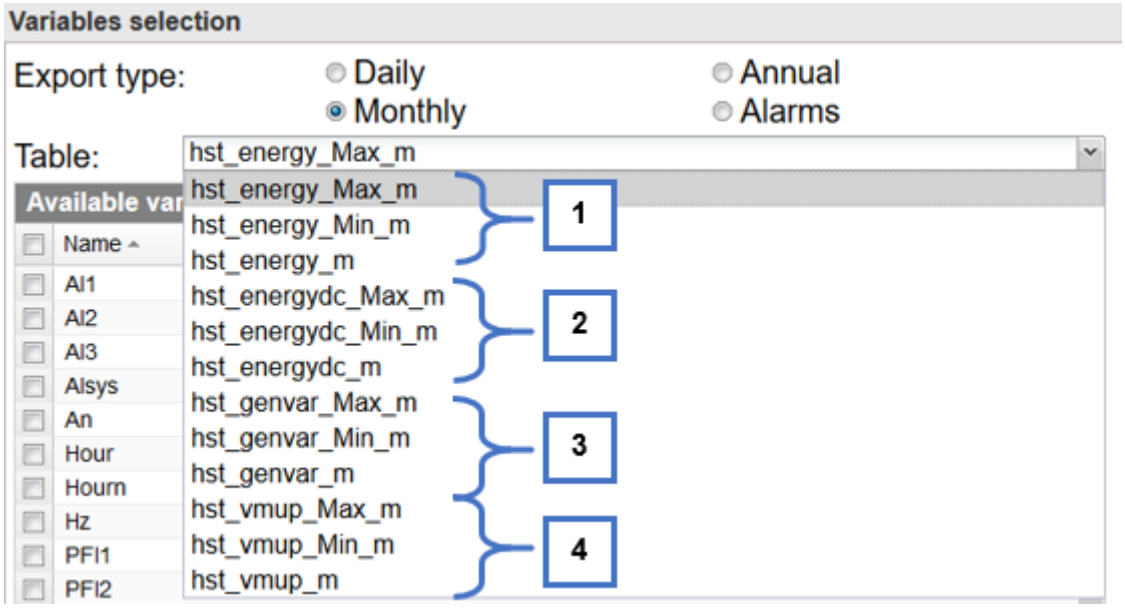
Part	Description
A	**Variables selection:** permits you to select the variables to export. It contains the following options: • ***Export type*** (Daily, Monthly, Annual, Alarms) • ***Table*** (combo box) • Available variables (list of all variables). *For further information, go to **Variables selection.***
B	**Meters selection:** permits you to select the meters to export.
C	**Selected variables**: displays the variables selected for the export from the **Variables selection.**
D	**Selected meters**: displays the meters selected for the export from the **Meters selection.**
E	**Options.** It permits you to perform the following tasks: • Select the export **Start** / **End** date • **Reset selections** to the previously selected values. • **Export** an Excel file. • Save all the selected settings in a file (**Save export**). You can also share predefined Export configurations and to archive your analyses. • Open a previously saved analysis (**Load export**). • Select the **Midnight notation** (24:00:00 / 23:59:59 / 00:00:00)

Variables selection

Export type

Daily: It permits exporting all daily samples with the maximum resolution.
Monthly: It permits exporting one sample for each day.
Annual: It permits exporting sample for each month.
Alarm: It permits exporting alarms.

Table



Part	Description
1	Export of alternative current variables
2	Export of direct current variables
3	Export of other variables database
4	Export of VMU-P variables

Caption:
Max = Maximum value
Min= minimum value
Not state = mean value

*Note: the last letter of **Table** options, depends on the **Export type**.*

How to create a database export

1. Click **Variables selection**
2. Choose the **Export Type** (**Daily, Monthly, Annual** and **Alarms**) according to your analysis needs.
3. From the **Table** drop-down menu, select the database to export.
4. From **Available variables**, select the variables to export
5. Click **Add variables**
6. Click **Confirm**
7. Click **Meter selection**
8. From **Available meters**, select the variables to export
9. Click **Add meter**
10. Click **Confirm**
11. From the **Options**, set the **Start / End date** and the **Midnight notation** (if needed).
12. **Export** or **Save** configuration.

*Note: if you click **Export**, your configuration appears in the **Export Queue** tab; if you click **Save**, you can load your configuration later on.*

Bill Simulation

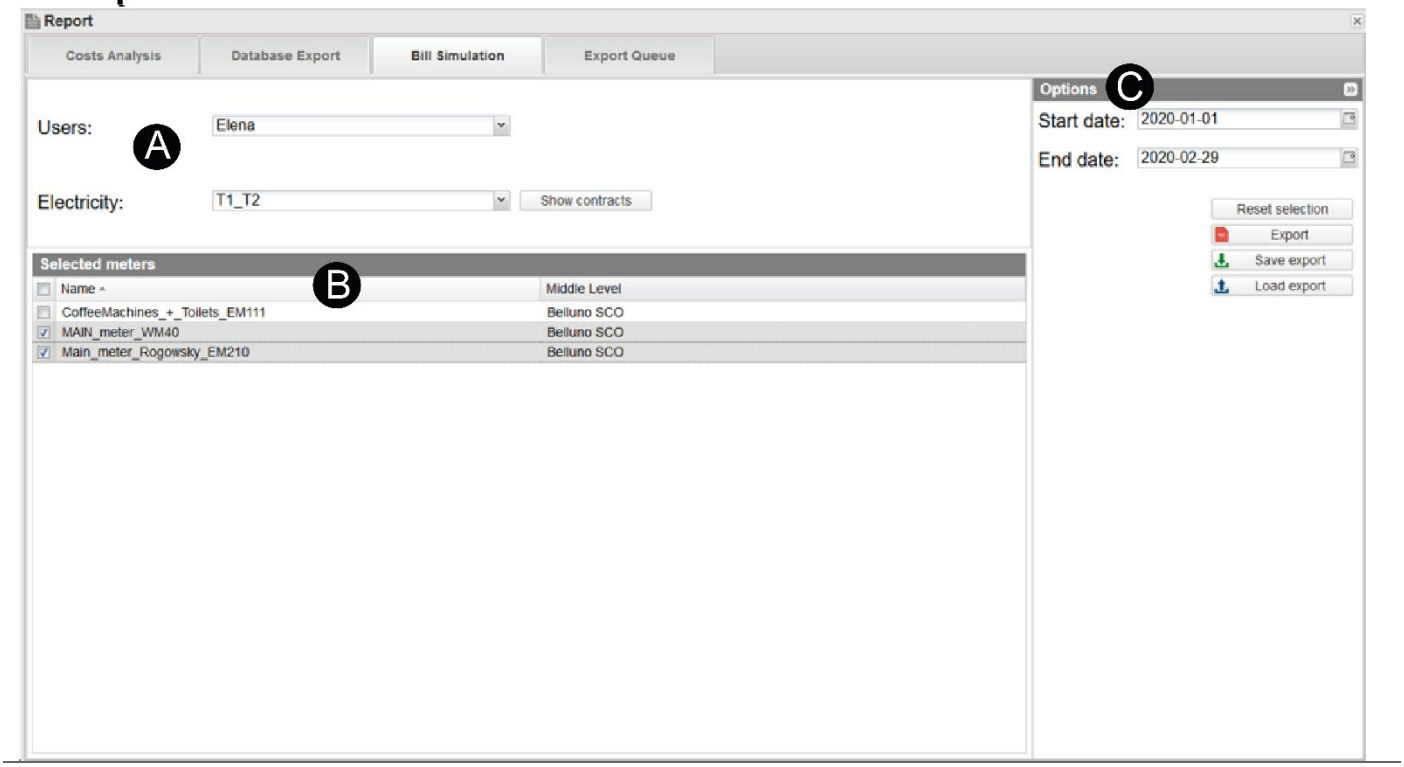
Scope

It allows you to simulate and export an electricity bill. You can choose the energy meters and the time period to consider and create the bill simulation according to the selected energy contract. You can also customize the document header by adding a Logo and other data from ***Setting*** > ***Server*** > ***Customer Logo*** tab.

The generated document (pdf format) is composed by the two following sections:

1. **Summary page,** containing the measurement details, the total energy cost and a diagram that represents the cost allocation.
2. **Details pages,** containing the measurement point details according to the selected contract.
   ℹ *There is a page for each energy meter.*

Description



Part	Description
A	• **Users:** selects the recipient of the bill. • **Electricity:** selects the reference contract for the billing simulation. • **Show contract**: shows more information about each contract.
B	**Selected meters:** permits you to select one or more meters to be considered in the billing. The list is composed by meters which are associated with the selected user.
C	**Options.** It permits you to perform the following tasks: • Select the export **Start** / **End** date • **Reset selections** to the previously selected values. • **Export** a pdf file. • Save all the selected settings in a file (**Save export**). You can also share predefined Export configurations and to archive your analyses. • Open a previously saved analysis (**Load export**).

How to create a bill simulation

This function is available for all kind of users but only the admin users can select another user and set the bill header.

1. Go to **Report** > **Bill simulation**
2. Select the bill recipient from the **User** combo-box.
3. Select the contract to be considered for the billing from the **electricity** combo-box

*For more information about **How to create a contract,** go to **Settings > Server >Tariffs**.*

4. From the **Selected meters** list, select the meters to include in the billing.

The list is composed by meters associated with the relevant user.

5. From the **Option** menu, choose the time period to be considered

If you want to…	Then click…
Delete a contract and the selected meters	**Reset selection**
Generate the pdf file	**Export**
Save the export configuration in your PC	**Save Export**
Upload an export configuration	**Load export**

The exported file can be viewed, downloaded or deleted from the **Export Queue** tab.

It is possible to customize the PDF-header information.

If you want to…	Then go to…
customize the service provider data	***Settings > Server > Customer logo tab***
add customer details	***Settings > Server > Users for further information***

Bill Simulation PDF

The Bill Simulation PDF is composed by:

1. **Headers section:** each page of the report has two customizable headers one with supplier logo and information and one for the customer data
2. **Summary page,** containing the measurement details, the total energy cost and a diagram that represents the cost allocation.
3. **Details pages,** containing the measurement point details according to the selected contract.
   Note: There is a page for each energy meter.

The headers

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

SERVICE ADDRESS

CUSTOMER: Name

Address, City, (Zip Code)
Email
Phone Number

Part	Description
A	**Supplier logo and data** *For further information about how to change the logo go to* ***Settings >Server > Customer Logo > Logo for Customer report***
B	**Customer name:** this is the User name, chosen by the administrator as the bill recipient. **Customer data.** *For further information about how to change customer data, go to* ***Settings > Server > Users tab***

The summary page

STATEMENT DATE
13/03/2020

AMOUNT DUE
8,253.33 €

BILLING PERIOD
01/01/2020
29/02/2020

MEASUREMENT POINTS

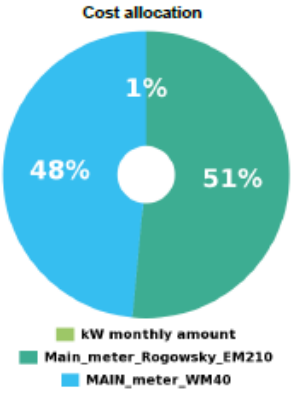
MEASUREMENT POINT	kWh consumption	kvarh consumption
Main_meter_Rogowsky_EM210	19,500.4 kWh	5,323.9 kvarh
MAIN_meter_WM40	19,797.4 kWh	5,695.8 kvarh

CHARGES DETAILS

COSTS	SUBTOTAL
kW monthly amount	26.00 €
Main_meter_Rogowsky_EM210	4,241.61 €
MAIN_meter_WM40	3,985.72 €

TOTAL CHARGES

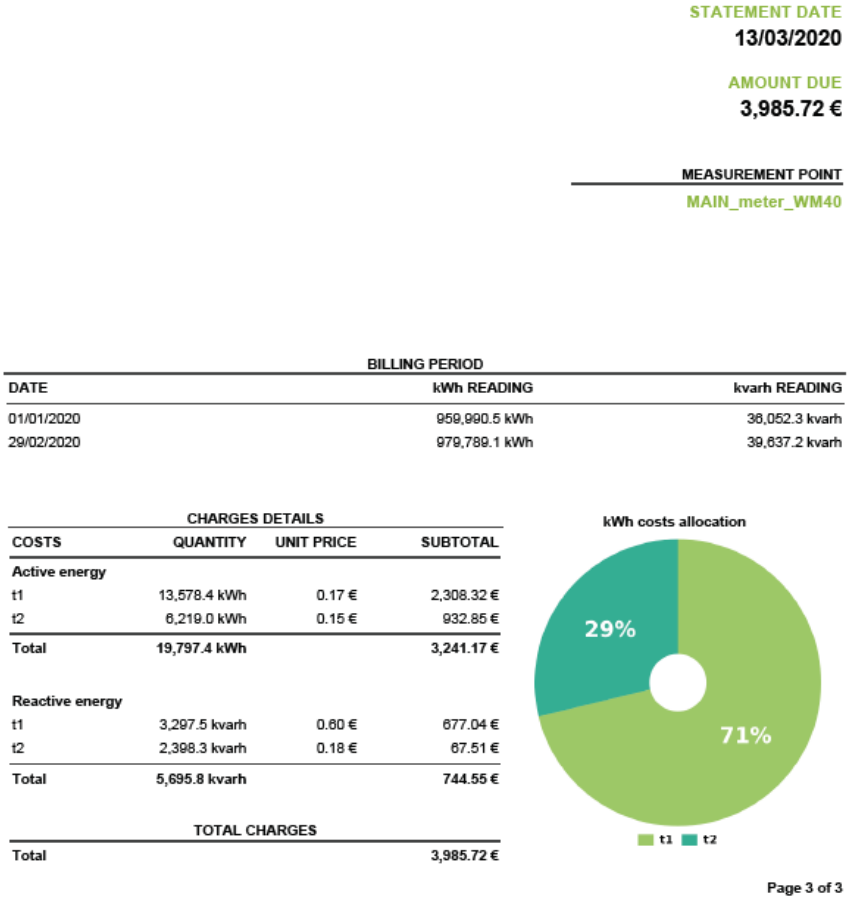
Total	**8,253.33 €**



Page 1 of 3

Part	Description
A	**Billing summary** • **Statement date**: document creation date • **Amount due:** the bill simulation result. This cost is composed by the sum of active reactive energy costs of each meters and by the eventually monthly fixed cost. • **Billing period:** Time interval considered for the bill simulation
B	**Measurement points:** this table shows total active [**kWh consumption**] and reactive [**kvarh consumption**] energy consumptions measured by the relevant meter [**measurement point**] for the billing period
C	**Charges details:** this table shows the energy cost allocation for each meter. Moreover, if the relevant contract contains a monthly fixed cost, it is shown in the first row.
D	**Cost allocation** a pie chart with all energy meters charges details, in percentage. ℹ *This diagram is shown only for billing simulation with less than 9 meters*

The detail pages



STATEMENT DATE
13/03/2020

AMOUNT DUE
3,985.72 €

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

Page 3 of 3

Part	Description
A	**Measurement point summary** • **Statement date**: document creation date • **Amount due:** this cost is composed by the sum of active reactive energy costs of the relevant measurement point. • **Measurement point:** the name of the meter analysed in the relevant detail page
B	**Billing period:** this table shows active energy [**kWh**] and reactive energy [**kvarh**] readings at the beginning and at the end of the time interval considered for the bill simulation.
C	**Charges details** this table shows for active and reactive energy the following data, for each tariff of the relevant contract**:** • Quantity: is the energy consumption measured by the relevant measured point in the relevant time period • Unit Price: is the energy cost (kWh or kvarh) for the relevant tariff. *For more information about tariff go to Settings>Server>Contract tab.* • Subtotal: the relevant net energy cost
D	**kWh cost allocation:** this is the active energy charges details data represent in diagram form. The net energy cost for each tariff is shown in %.

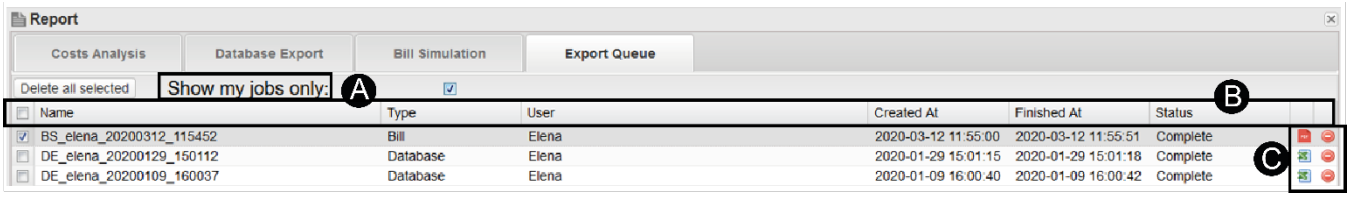
Export Queue

Scope

It allows you to perform the following tasks:

- check the status of the cost analysis export
- download an Excel or PDF file
- delete an Excel or PDF file.

Description



Part	Description
A	**Delete all selected**: deletes the selected reports. **Show my jobs only**: if checked, you don't see the other users' reports.
B	**Name**: report name **Type**: report type **User**: user name **Created at**: report creation date/time **Finished at**: report ending date/time **Status:** report status
C	: exports an Excel report : exports a pdf report : exports a report

Settings

Content

This chapter includes the following topics:

Scope

The **Settings** function allows you to start Em²-Server up. Moreover, you can perform the following tasks:

- View or modify server's settings
- Send commands to VMU-C and UWP 3.0
- Create or modify tariffs
- Create users
- Manage meters
- Create virtual meters

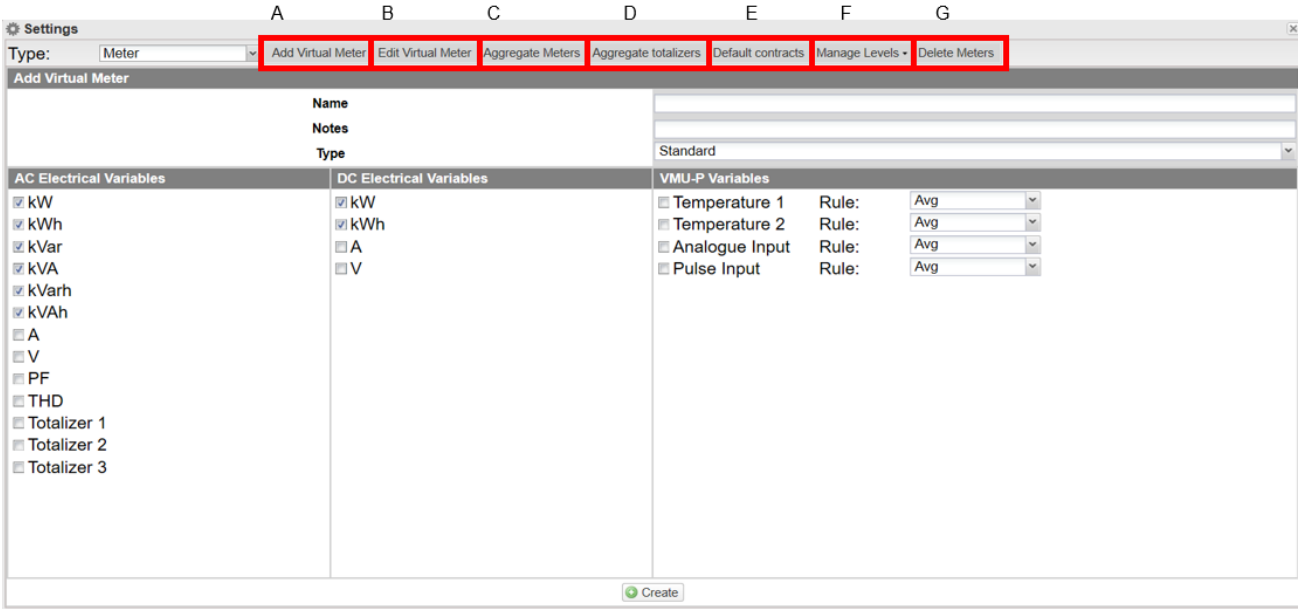
*This function is available for **administrator** users only.*

The **Settings** menus change according to the **Type (Meter** or **Server)** you select.

Meter

Settings > Type > Meter

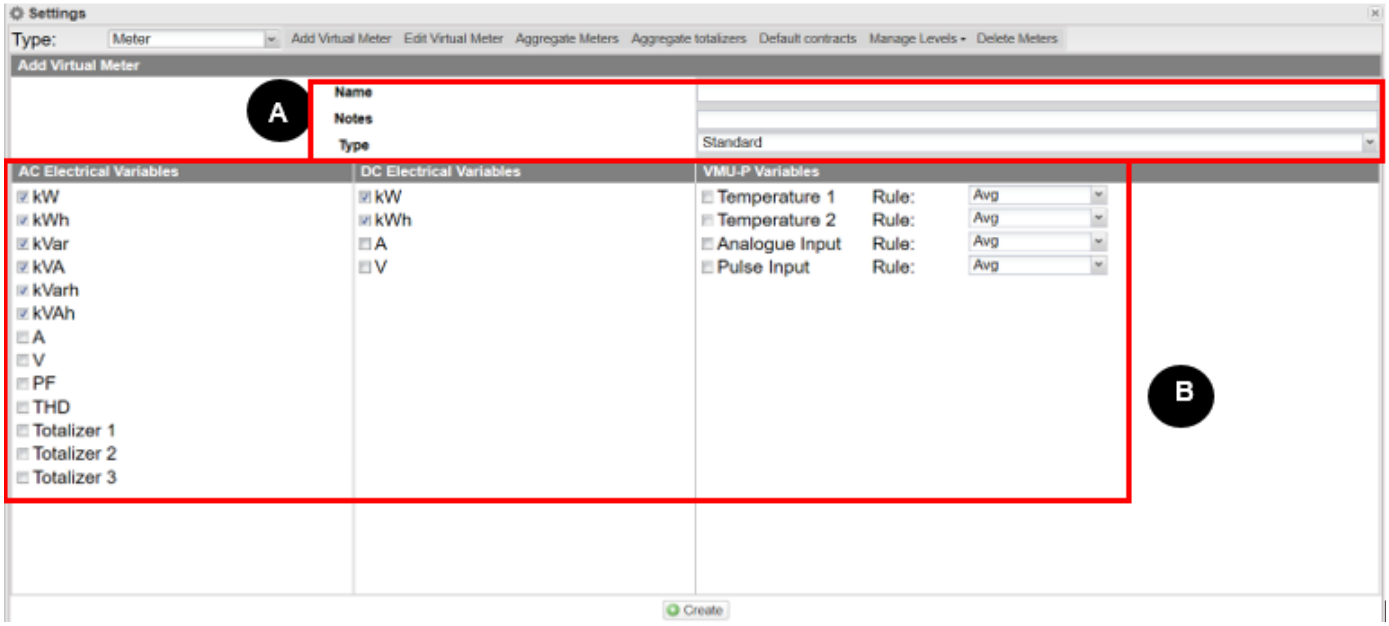
Description



Part	Description
A	**Add virtual meter:** It permits creating virtual meters as aggregates of real and/or virtual devices.
B	**Edit virtual meter:** It permits modifying the parameters of the existing virtual meter.
C	**Aggregate meters:** It permits associating a real or virtual meter to another virtual meter.
D	**Aggregate totalizers:** It permits associating totalizers (generally aimed at counting H2O and gas).
E	**Default contacts:** It permits setting the default contracts.
F	**Manage levels:** It permits building up the energy meters organization (see ***Em²-Server start up***).
G	**Delete meters:** It permits deleting or freezing the listed virtual devices.

Add virtual meter tab

Description



Part	Description
A	• **Name** • **Notes** • **Type:** Standard and difference
B	**Variables selection area.**

	Variable
AC electric variables	• kW (Selected by default)
	• kvar (Selected by default)
	• kVA (Selected by default)
	• kvarh (Selected by default)
	• kVAh (Selected by default)
	• A
	• V
	• PF
	• THD
	• Totalizer 1
	• Totalizer 2
DC electric variables	• kW (Selected by default)
	• kWh (Selected by default)
	• A
	• V
VMU-P variables	• Temperature 1
	• Temperature 2
	• Analogue Input
	• Pulse input

ℹ *For **Difference** virtual meters there are not the **VMU-P variables**.*

Virtual meter types

- **Standard** virtual meter. According to its variables, it represents the sum or average of the values measured from different meters.
  Example: M1 is the measure of the fridge energy consumption and M2 is the microwave one. If you want to get the kitchen energy consumptions (Mk), you have to calculate

  $$Mk=M1+M2$$

- **Difference** virtual meter. Its variables are the difference between the values measured from different meters.
  Example: a building has two offices and a laboratory. Mb is the measure of the building energy consumption, M1 and M2 are the measures of the offices. If you want to get the laboratory consumption (Ml), you have to calculate

  $$Ml=Mb-M1-M2$$

How to add a virtual meter

1. Type the virtual meter **Name** and the virtual meter related **Notes**.
2. Choose the virtual meter **Type**: it can be **Standard** or **Difference**
   For further information about meter type go to > virtual meter type
3. Select the variable to aggregate in the new virtual meter.

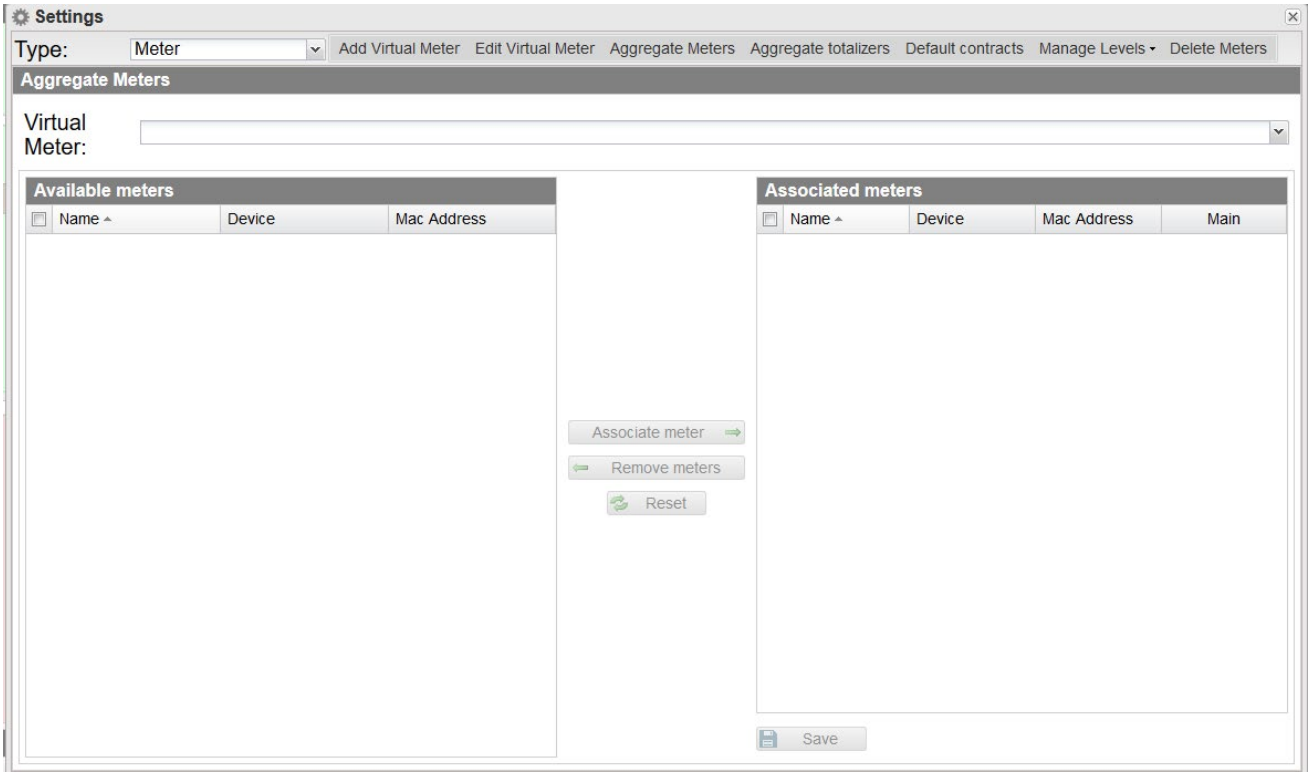
   For the VMU-P variables, you can also select the type of operation to be performed during the aggregation stage. Please, select the operation that best meets the application requirements.
4. Click **Create**.

How to edit a virtual meter

1. Select the meter you want to modify from the **Virtual Meter** drop-down list.
2. Edit the virtual meter **Name** and **Notes**.
3. Select the variables.
4. Click **Save**.

Aggregate meters tab

Description



Part	Description
A	**Virtual Meter**
B	List of the **Available Meters**
C	List of the already **Associated Meters**

How to aggregate meters

1. Select the meter you want to edit from the **Virtual Meter** drop-down list.
2. Select the desired devices from the **Available meters** column.
3. Click **Associate meter**.
4. Click **Save**.

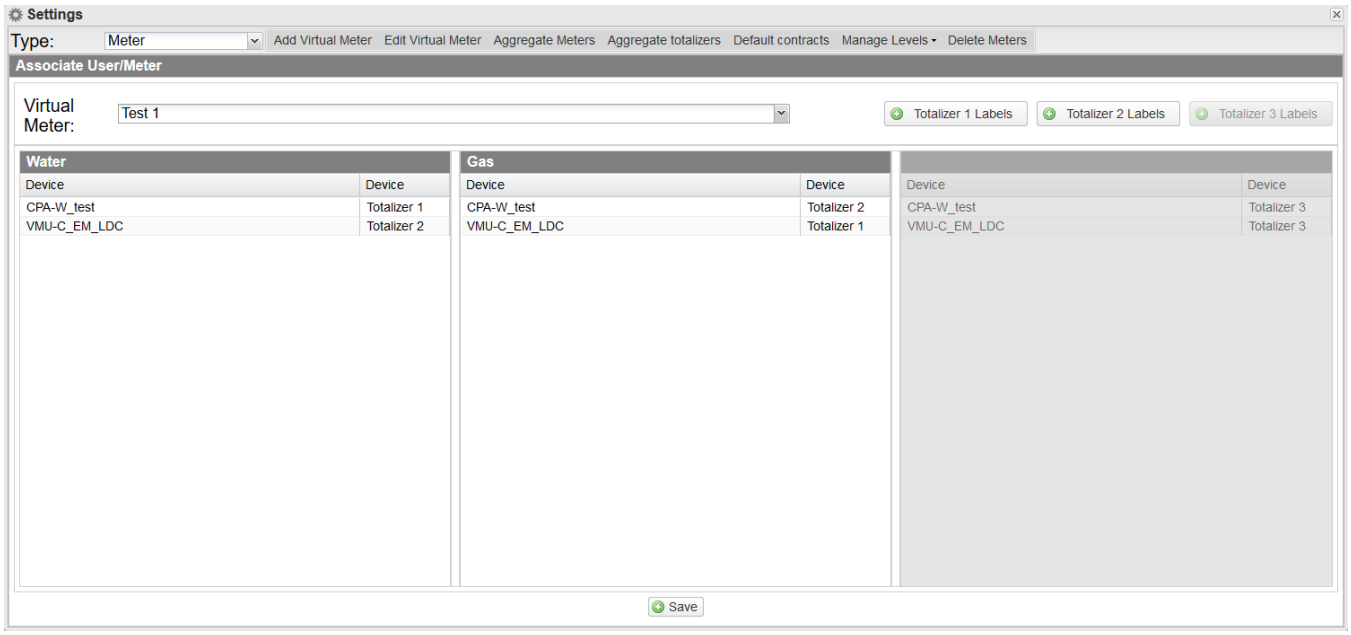
*The **Reset** button deletes any unsaved changes.*

Aggregate totalizers tab

What are totalizers

Totalizers count the digital pulses sent by third-party meters measuring H2O and gas. With Em²-Server you can manage up to three inputs (T1, T2 and T3).

Example



In this example, two devices measure the water / gas consumption of a two-floor building. The structure is as follows:

Device 1 Totalizer T1: measures water consumption of first floor
Totalizer T2: measures gas consumption of first floor

Device 2 Totalizer T1: measures gas consumption of second floor
Totalizer T2: measures water consumption of second floor

From the **Aggregate totalizer**, you can group the same type of variables into a virtual meter.

If you…	Then you can…
have already created a virtual meter (**Edit virtual meter** or **Add virtual meter**)	**First column** — **Water** signals: Device 1 T1; Device 2 T2 **Second column** — **Gas** signals: Device 1 T2; Device 2 T1
Want to create a virtual meter	1. Select the virtual device you want to manage from the combo-box. *Note: You see only the totalizer frames enabled during the device creation / editing.* 2. Select the ⊕ Totalizer 1, ⊕ Totalizer 2 or ⊕ Totalizer 3 parameters. *Note: If you select these three parameters, you can select for each row the three totalizers of the device corresponding to the virtual device "basket".* 3. Modify the totalizer labels using the top buttons.

*Note: The names you give to the columns (for example **Water** and **Gas**) are assigned to the virtual devices.*

Default contracts tab

How to define a contract

1. Click « to open the **Edit default contract menu.**
2. Set the following fields:
   - **Electricity**
   - **Totalizer 1**
   - **Totalizer 2**
   - **Totalizer 3**
   - **Demand** time interval used for DMD calculation. This value is related with load profile chart construction.
3. Click **Save.**

Manage levels tab

Scope

This function allows you to organise the energy meters into a tree-structure (see ***Em²-Server start up***), useful in case of different plants* with a huge number of devices.

**Note: Em²-Server monitors up to 100 sites.*

The **Manage levels** function has the following four sub-menus:

- **Manage top level.** It shows all the top levels of Em²-Server.
- **Manage middle level.** It shows all the middle levels of Em²-Server. A middle level can represent plants, factory's cost centres or building's zones.
- **Meter / Middle level**. It allows associating a device to a middle level.
- **Middle Level / Top Level.** It allows associating a middle level to a top-level.

How to create a tree structure

1. Select all the meters you want to include in the configuration (see ***Settings > Type: Server > User/Meter***)
2. Open the Manage Levels menu and select **Manage Middle level**.

If you want to…	Then…
Modify an existing Middle Level	1. Click 🔍 **2.** Edit the **Middle level details** **3.** Click **Save Middle Level**
Create a Middle Level	**1.** Click ⊕ **Add Middle Level** **2.** Complete the **Middle level details** **3.** Click **Save**
Delete an existing Middle Level	Click the ⊗ icon

3. Open the **Manage Levels** menu and select **Meter / Middle Level**.
4. Select the **Middle level** from the drop-down menu.
5. Choose the **Available meters** from the left column.
6. Click **Associate meter** and click **Save**.
7. Open the **Manage Levels** menu and select **Manage Top Levels.**

If you want to…	Then…
Modify an existing Top Level	4. Click 🔍 **5.** Edit the **Top-level detail** **6.** Click **Save Top Level.**
Create a Top Level	**4.** Click ⊕ **Add Top Level** **5.** Complete the **Top-level detail** **6.** Click **Save.**
Delete an existing Top Level	Click the ⊗ icon

8.

9. Open the **Manage Levels** menu and select **Middle Level / Top Level**.
10. Select the **Top level** from the drop-down menu.
11. Choose the **Available meters** from the left column.
12. Click **Associate meter** and click **Save**.

    Notes:
    - *If you want to remove an associated meter just select them from right column and click **Remove meters.***
    - *The **Reset** button deletes any unsaved changes.*

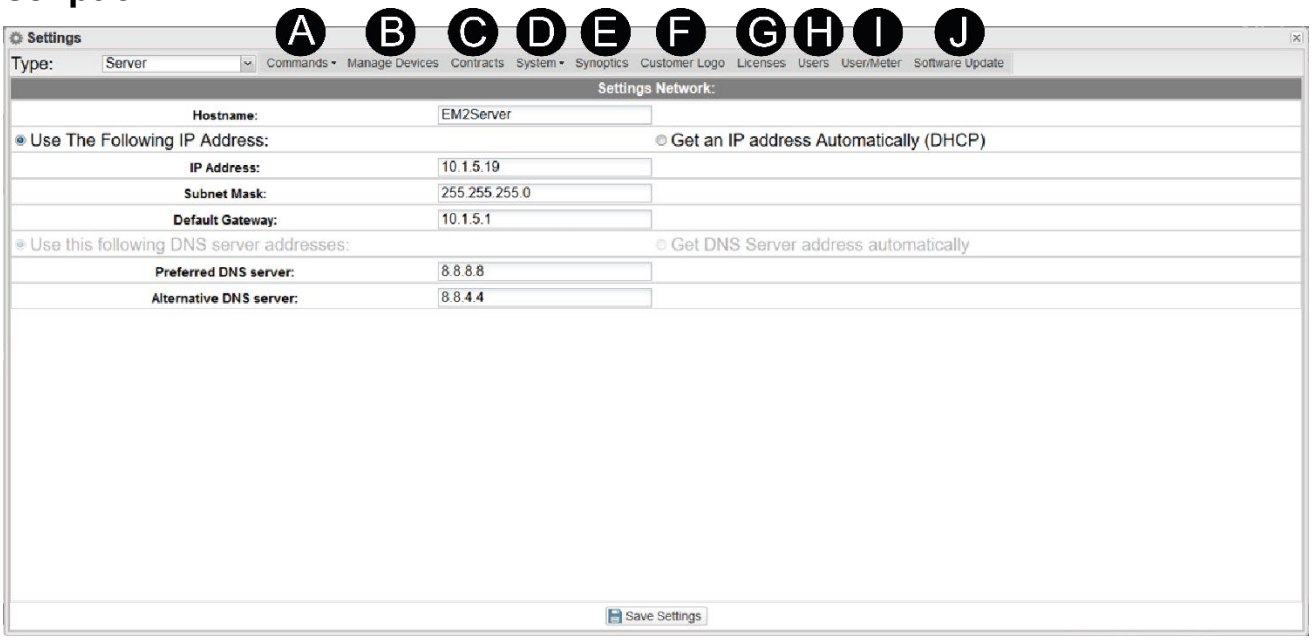
Delete meters tab

With the **Delete meters** function you can ❄ **Freeze** (the device is not considered for the data aggregation and it is not updated) or ⊗ **Delete** a device.

Server

Settings > Type > Server

Description



Part	Description
A	**Commands:** allows you to send command and to view the sent commands. You can select **New command** or **Command history**.
B	**Manage devices:** shows the list of all the UWP 3.0 and/or VMU-C devices connected to Em²-Server.
C	**Contracts:** shows the list of all the contracts you have created.
D	**System.** It allows you to perform the following tasks: • Synchronise the date and time settings through the NTP service (if configured). • Communicate with the remote gateways (VMU-C EM or UWP3) using the Reverse Tunnel.
E	**Synoptics**: manages the list of all the synoptics configured in the system.
F	**Customer logo.** It allows you to perform the following tasks: • Customise the logo in the top-right corner of the home page and in the bill simulation. • Type other optional information about the Em²-Server's owner shown in the bill simulation. ℹ *The logo size is 280x73. If an image is larger, it is automatically resized.*
G	**License:** allows typing a license code.
H	**Users:** shows a list of all created accounts and allows you to manage the information of each account.
I	**User / Meter:** allows associating a device with a user.
J	**Software update:** allows upgrading the Em²-Server software and shows the installed software version. ℹ *The valid update packages are supplied by the Carlo Gavazzi's sales network and technical support.*

Commands tab
Description

Element	Menu	Options
New command **(see the relevant procedure)**	**User management**	***Add a user*** and ***Delete a user*** (VMU-C EM only).
	Networking	**NTP server** (see ***How to synchronise the device clock***).
		Email configuration: allows sending alarm emails or SMS to multiple receivers at the same time. See ***How to configure E-mail sending*** (VMU-C EM only).
		Tunnelling: You can select one the two following options: • **SSH**: Request for SSH protocol tunnelling, to use an SSH client connection (function available at Carlo Gavazzi technical support). • **HTTP**: Reverse tunnel of the HTTP protocol to show the Web server on the UWP 3.0 or VMU-C being tunnelled. See ***How to set a tunnelling request up***.
	Configuration management	**Firmware update**. There are no options in the **Options** panel. The command is sent to the selected VMUC (this feature is not available for UWP3.0). Receiving the command, the VMUC will automatically download and install the firmware from the Carlo Gavazzi server (if the device hasn't any firewall restriction).
		Database reset: allows you to delete all the database history data until a selected date (**Date back**). *Note: VMU-C EM only.*
		Sampling interval: allows to change the sampling interval set on the VMUC. All values are in minutes. Available only for VMU-C EM.
		Configuration copy: from the **Options** panel, it allows to copy a configuration from a gateway and write it to the selected units. Available only for VMU-C EM.
	Emergency	**Reboot:** allows sending a request to UWP 3.0 or VMU-C for restarting the device (VMU-C EM or UWP 3.0).
Commands history	-	Shows the list of all commands.

How to add a user

New command > User management > Add user

1. From the **Add user** column, select the device that receives the command.
2. From the **Options** column, write the **Username** / **Password** and select a **User Type** (**Administrator** or **User**).
   *For more information about user types, see **Settings > Type > Server > Users tab**.*
3. Click on **Send Command**.

How to delete a user

New command > User management > Delete user

1. From the **Delete user** column, select the device that receives the command.
2. From the **Options** column, select the user to delete (**Delete user** drop-down menu).
3. Click on **Send Command.**

How to synchronise the device clock

New command > Networking > NTP server

1. From the **NTP server** column, select the device that receives the command.
1. Check the **Enable Network Clock Synchronization** field.
2. Set the **NTP servers.**
3. Click on **Send Command.**

How to configure E-mail sending

New command > Networking > E-mail configuration

1. From the **E-mail configuration** column, select the devices that have to send alarms messages.
2. In the **Options** column, write the e-mail addresses in **Recipients Addresses** field.
   You can type multiple addresses separated by a semicolon (;) without any space.
3. Write the e-mail's **Object** (Ex. *Alarm from PH Plant*).
4. Write the phone numbers (with international prefix) in **SMS Addresses.**
5. Check the **Action** fields (**Send Mail** or/and **Send SMS**) according to your needs.
6. Check the **Send for** field according to your aim (**Alarms**, **Anomalies**, **Events** and/or **Commands**).

Notes:

- *Configure the outgoing mail server properly.*
- *If the e-mail is not received, check the outgoing-mail server settings, receiver's address, and VMU-C reachability from Internet.*
- *If the SMS is not received, check the phone number and the international prefix.*

How to set a tunnelling request up

New command > Networking > Tunnelling

1. Select only one device from the **Tunnelling** column.
2. From the **Options** column, select the server **Type** between these two following options:
   - **Local** to request a tunnel to the used local server.
   - **Remote** to request a tunnel to a third-party server supporting the reverse tunnel (server authorised and enabled by Carlo Gavazzi).
3. Write the **Hostname.**
4. Select the **Port** number for the tunnel on server.
   Note: This port must be open on the firewall.
5. From the **Protocol** drop-down menu select one of the two following options:
6. Click **Send Command**.

*Note: 5 minutes after the request (if the command execution time has been set to 5 minute (from VMU-C EM and UWP 3.0) the tunnel is active and you can manage it from **Settings > Server > System > Tunnelling**.*

Manage devices tab

Scope

This function shows the list of all the UWP 3.0 and VMU-C devices that are connected to Em²-Server.
The devices are in alphabetical order.

The function shows the following fields:

- **VMU-C.**
- **MAC address.** Name of the plant the device is aggregated to.
- **Firmware.**
- **Enable license.** The field appears checked if the user has activated the license.
- **Disable data push.** It will remove the device from the table. The license will be available again for other devices
- **VMU-C replacement.**
- **Replica Status.**
- **Latest Synchronization.**

Contract tab

Scope

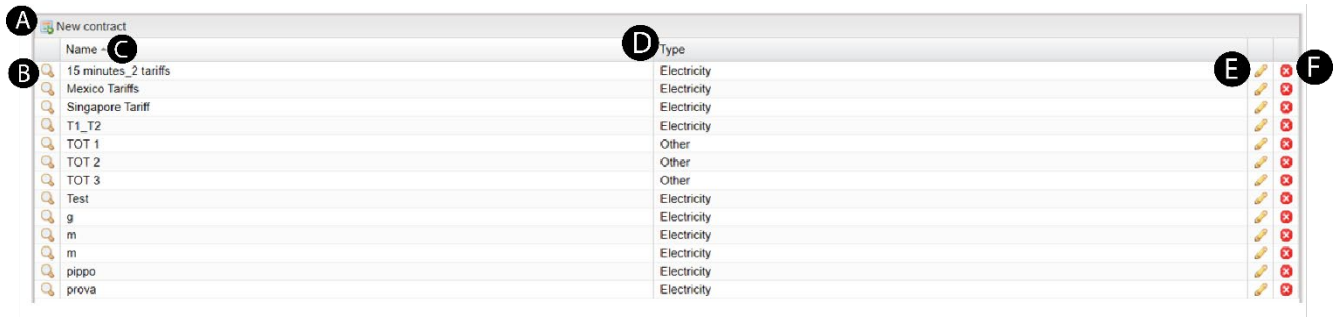
This function permits you to view all the existing contracts and to create other contracts.

An energy contract is composed by different tariffs (containing energy costs and power peak information according to the selected day, hour, season and so on) and by different periods (working day or week end).
For each period, you can define a daily profile split into time slots (15 minutes each): to each time slot, you can associate a different tariff.

If you create at least a contract, you can perform the following tasks:

- Show the tariff time period in the **Analysis** tab chart
- Use the defined periods in the **Load profile** analysis (go to **Load profile**)
- Create cost analysis reports
- Simulate an electricity billing.

Description



Part	Description
A	**New contract**. *For further information, see **How to add a contract**.*
B	shows the contract details. You can change all the values associated with the tariff. *Note: The values are set during the creation of a contract.*
C	**Name** of the contract.
D	**Type** of contract selected during the creation.
E	to change the contract name.
F	to delete a contract from the list.

How to add a contract

1. Click **New contract.**
2. You can create two types of contract:

If you want to…	Then…
Create a new contract	• Type the **Name** of the contract (it is mandatory) • Select the contract **Type** (**Electricity** or **Other**) • Select **Empty contract** • Click **Create**
Import an existing contract	• Type the **Name** of the contract (it is mandatory) • Select the contract **Type** (**Electricity** or **Other**) • Select **Import from existing contract** • Select the **Contract** • Select **Import all** (import the whole calendar) or **Partial import** (select the items to be imported) • Click **Create**

3. In the **Contract** window, complete the following tabs according to your needs:

Tab	Select	Options
Tariff	**Add tariff**	• Tariff **Name** • **Colour** for identifying the tariff • **kWh price** (cost value per kWh) • **kvarh price** (cost value per kvarh) • **kVAh price** (cost value per kVAh) • **kW threshold** (threshold on the kW value that identifies extra-peak values of the variable) • **kVA threshold** (threshold on the kVA value that identifies extra-peak values of the variable)
	An existing tariff from the list	
Daily Profiles	Select a **Profile** from the drop-down list	• **Change name / colour** • **Delete** • **Set time slot**
	Add	• **Name** • **Colour**
Periods	**Year**	**Reference year**
	Add period	• **Description** • **Profile** • **Type** • **From – To**
	Import festivities	• **Country** • **Profile**
Fixed cost	**Add cost**	**Monthly cost** **From – To** **Cost**
Full contract	**Year** **Copy from previous year**	**Whole calendar**

The new contract appears in the list.

4. Click **Create.**
5. From the contract list, you can perform the following tasks:

   edit the above-described contract options.

   edit the contract name.

   delete the contract.

System tab

Description

Menu	Function
LAN settings	Configuration of the LAN port. You can select one of the two following options: • **Use the following IP Address**. IP address, subnet mask and gateway are manually assigned during the commissioning. • **Get an IP address Automatically (DHCP).** The address is automatically acquired from a DHCP server. ➢ **Use this following DNS server addresses.** ➢ **Get DNS Server address automatically.**
Date & Time	Manually setting of date and time. *Note: To set the date and time manually, you first have to disable network clock synchronization from the **System > NTP menu**.*
NTP (Clock synchronization)	Setting of the two NTP servers. NTP servers allow to constantly synchronise date and time. Check the **Enable clock synchronisation** check box and type the two NTP servers (**NTP Server 1** and **NTP Server 2**) for the synchronisation.
Tunnelling	Allows showing all the open tunnels (pending and active). The information is the following: • **Device.** Name of the device the tunnel has been sent to; • **Plant.** Name of the plant the device is aggregated into (not used in Em²-Server; only applies to Eos-Server); • **Virtual Plant.** Name of the virtual plant the device is aggregated into (only applies to Eos-Server); • **Hostname**. Name of the server the tunnel has been sent to; • **Protocol**. It specifies if it is a HTTP or SSH tunnel; • **Local**. If this field is checked, it means that the tunnel has been created on the Em²-Server; if it is not checked, it means that the tunnel has been created on a third-party server; • **Connect**. In case of HTTP tunnel, clicking this icon allows to show the Web site of the device connected to the tunnel; • **Delete**. It generates a tunnel deletion command on the remote device. *Note: If 20 minutes after the request the tunnel is still inactive, delete it and repeat the request.*

How to define the LAN settings

1. Assign Em²-Server an address belonging to the same class as those of the other existing devices (e.g.: ADSL router)
2. Type 255.255.255.0 in the **Subnet Mask** field.
3. If you access Em²-Server from Internet using the LAN connection, type the IP address of the ADSL router in the **Default Gateway** field.
4. If you select **Get an IP address Automatically (DHCP)** and **Use the following DNS server addresses**, specify the addresses of the **Preferred** and **Alternative DNS servers** to access the Internet. You can also allow Em²-Server to acquire the DNS servers from the DHCP server (**Get DNS Server address Automatically**).
5. Click **Save Settings** button to save the network configuration.

Synoptics tab

Description

For the **Synoptic** description, please see **Synoptic**.

How to add a synoptic

1. Click the **Add synoptic** icon.
2. Type the synoptic name.
3. Load a background image from the computer.

   Note: It can be a bitmap image containing a wiring diagram, a graphic layout, a plant map or any graphic diagram you want to use to aggregate a group of devices.
4. Click **Add meter.**
5. Select a meter from the drop-down menu.

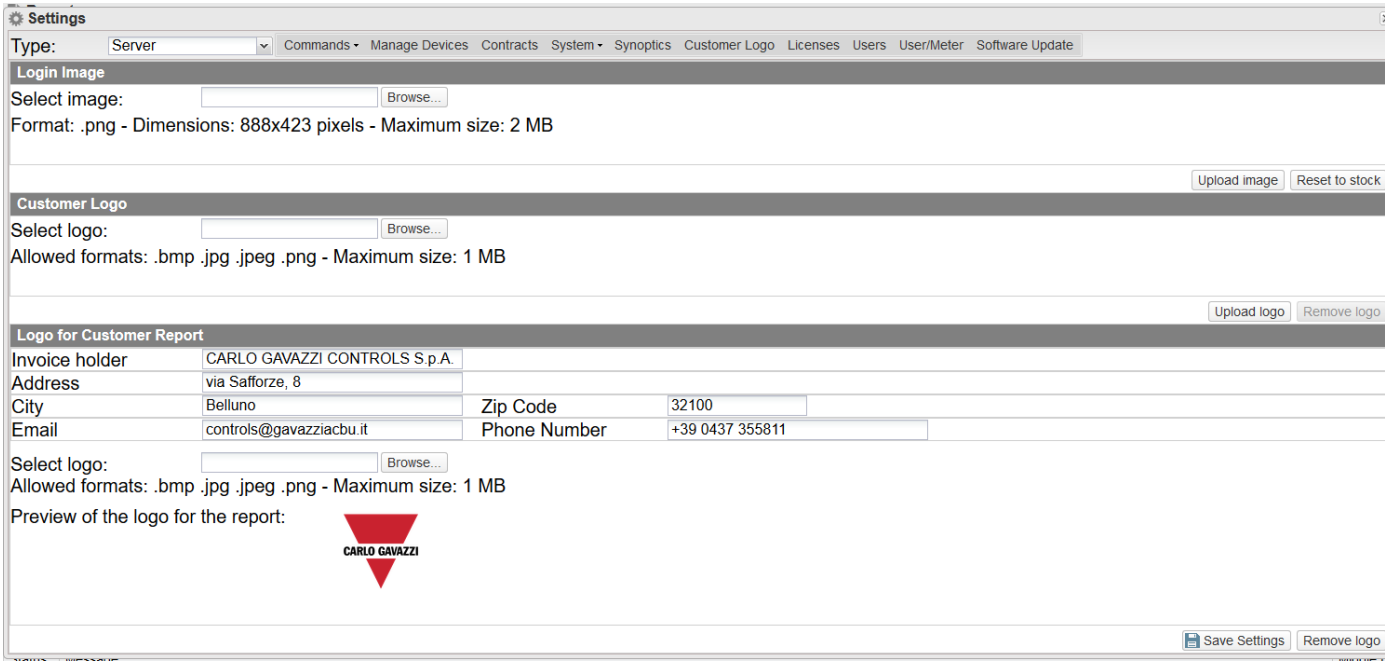
   Note: It is possible to add more than a meter.
6. From the left column (**Available variables**), select the variables to display.
7. Click **Add variables**: the selected variables appear in the right column (**Selected variables**).
8. Click **Confirm.**

   Note: When you save your settings, this icon  *appears in the synoptic page. You can resize it and place it wherever you want.*
9. Click **Save synoptic** to save the changes.

Customer logo tab

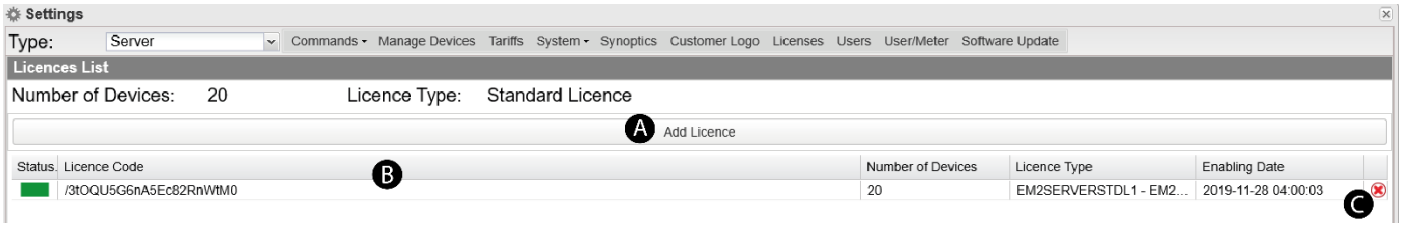
This tab allows customising the logo (displayed in the top-right corner of the home page).

The logo size is 280x73. If an image is larger, it is automatically resized.



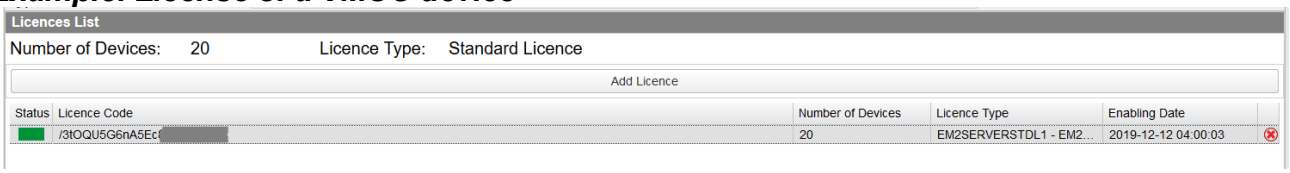
License tab

Description



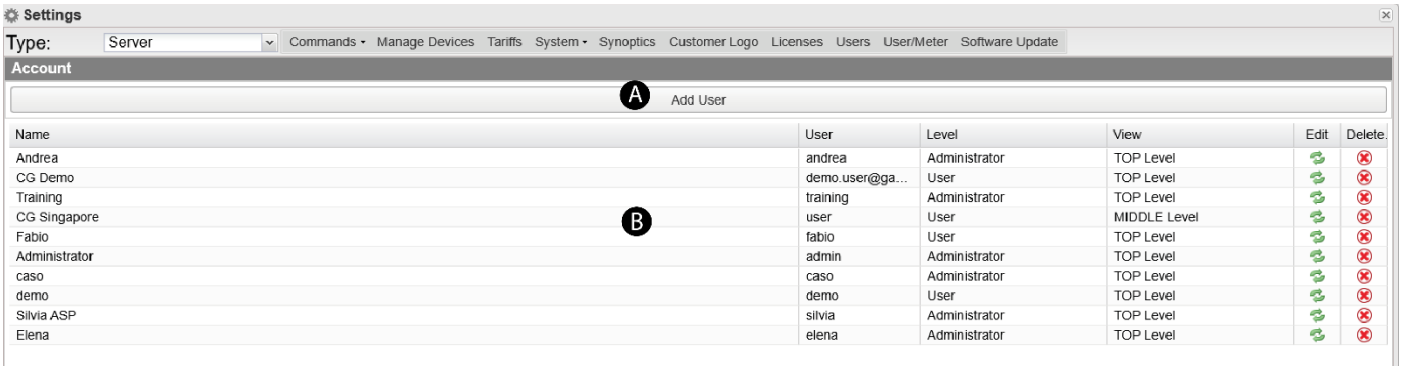
Part	Description
A	**Add license** button.
B	License characteristics. • **Status.** the license is active. the license is disabled. • **License Code**. The license code typed by the user. • **Number of devices.** The permitted number of devices. • **License type.** • **Enabling Date**. License typing date.
C	⊗: deletes the selected license

Example: License of a VMUC device



Users tab

Description



Part	Description
A	**Add user** button.
B	**User's characteristics**: • **Name**. Account owner's name • **User**. Account user's name • **Address.** • **City and ZIP code.** • **Email.** • **Phone number.** • **Level** of visibility/authorisations. **Administrator** | All the functions / authorisations **User** | No **Settings** menu • **View**. Account viewing level: a. **Device**. b. **Middle level**. c. **Top level.** Maximum visibility level. • **Edit.** It permits changing the above-described **Options** *Note: administrators can change the customer data of bill simulation header.* • **Delete.** It permits deleting the selected user

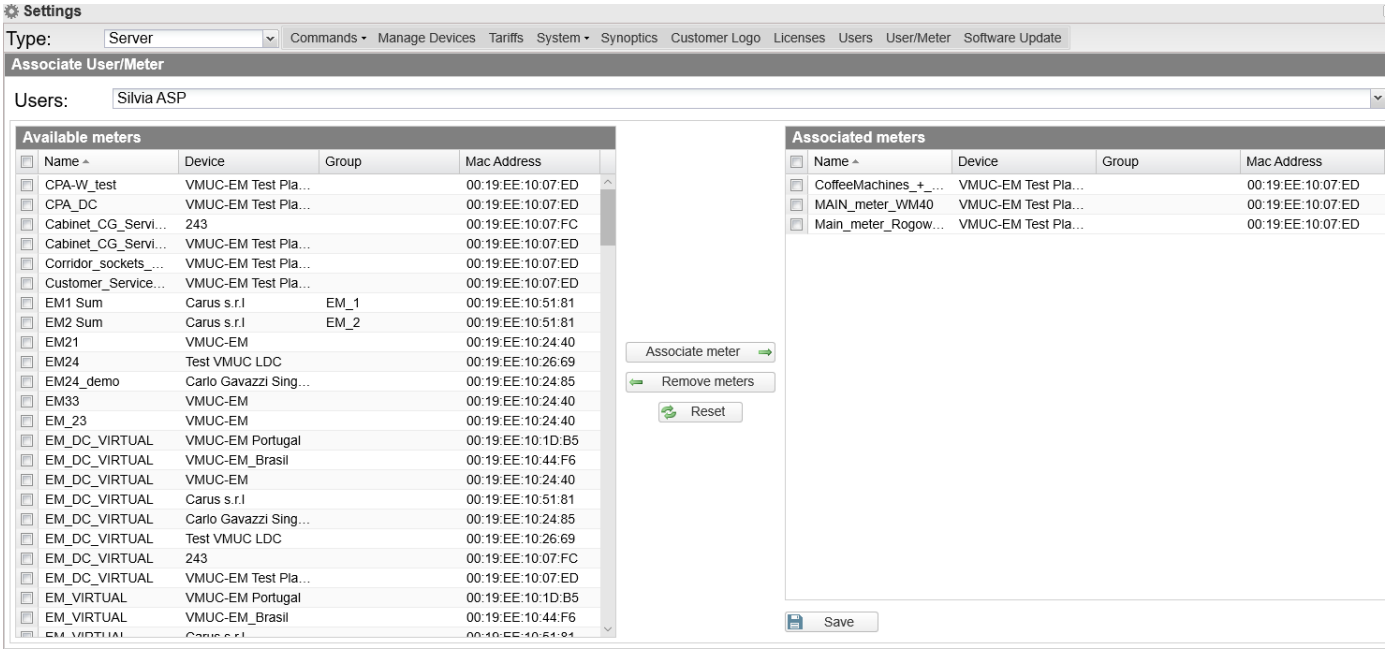
How to add a user

1. Click **Add User** to add an account.
2. Complete the fields.
3. Click **Save Settings**.

Note: For safety reasons, you cannot edit the password. You can reset it and use your username as password.

User / meter tab

Description



Part	Description
A	**Users** drop-down list.
B	List of the **Available Meters.**
C	Buttons to **Associate, Remove** or **Reset** meters.
D	List of the already **Associated Meters.**

Software update tab

How to install an update

1. Click **Check online for software updates.**
2. From the **Select File row**, click the **Browse** button.
3. Select the software to be loaded.
4. Click **Upload file** to start the upgrade process.
5. When the loading is finished, click **OK** to start the software updating process.

ℹ *When the procedure is complete, the system shows the home page.*

Function common elements

Content

This chapter includes the following topic:

Charts

Charts appear in the following functions:

- **Monitoring**
- **Analysis**
- **Load profile.**

Charts consist of:

- an x-axis showing day-time (from 05:00 a.m. to 10:00 p.m. for monitor; from 00:00 a.m. to 24:00 p.m. for analysis and load profile)
- as many y-axes as the number of dimensions to show. Each y-axis has its own full scale, properly sized for the dimension it refers to.

From a chart you can:

- enable or disable a variable trending clicking the name of the variable (x-axis).
- see the value of each variable hovering the mouse over it.
- click the ☰ icon on the top-right corner of the window to **Print** the chart or to **Download** it (SVG / CSV format).

Zoom function

The **Zoom** function is available in all the chart types and allows analysing an area in greater detail.
Put the ↖ on a point and, holding the left button, drag it to another point. As you release the left button, the selected area is immediately zoomed.

Hold function

In the **Monitoring** and **Analysis** functions, when you select the current day, you can check the **Hold** field.

With this field you can avoid the chart update: if the field is unchecked, the chart is updated every 30 seconds.

Note: when the data are updated, the system restores any variable previously deselected and the Y-axes scale can change according to the updated value.

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