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SYNERGY



Supervision and energy management software

INSTRUCTION MANUAL



INDEX

1	INTRODUCTION	4
2	HARDWARE AND SOFTWARE REQUIREMENTS	4
3	SETUP	4
4	SYNERGY LOGIN AND USERS	5
4.1	Users	6
4.2	Browsing the software and menu bar	6
4.3	Users management	6
5	HOME PAGE	7
6	CHANNEL	9
6.1	Channel creation ( Channel→New)	10
6.1.1	<i>Creation of a client type ethernet channel</i>	10
6.1.2	<i>Creation of a server type ethernet channel</i>	11
6.1.3	<i>Creation of a serial channel</i>	11
6.1.4	<i>Creation of a modem channel</i>	12
6.2	Showing and modifying channels ( Channel→Show).....	12
6.3	Modem status panel ( Channel→Modem status)	13
7	DEVICE	14
7.1	Creation of a device ( Device→New).....	14
7.2	Showing and modifying devices ( Device→Show)	15
8	PAGE	17
8.1	Creation of a page ( Page→New).....	17
8.2	Showing and modifying pages ( Page→Show).....	18
8.3	Configuring the indicators in the page ( Page→Show→ ).....	19
9	DATA LOG	22
9.1	Creation of a data log ( Data log→New)	22
9.2	Showing and modifying a datalog ( Datalog→Show).....	24
9.3	Live data visualisation	25
9.4	Historic data visualisation	25
9.5	Calculated field	26
10	CHART	27
10.1	Creation of a chart ( Chart→New)	27
10.2	Showing and modifying a chart ( Chart→Show)	28
10.3	Live data visualisation	29
10.4	Historic data visualisation	30
11	ALARM	30
11.1	Creation of an alarm ( Alarm→New).....	30
11.2	Showing and modifying an alarm ( Alarm→Show)	31
11.3	Alarm event visualisation ( Alarm→Measures alarm list).....	31
11.4	Communication alarm visualisation ( Alarm→Communication alarm list)	32
12	REPORT	33
12.1	Introduction.....	33
12.2	Creation of ranges ( Report→New range)	33
12.3	Showing and modifying ranges ( Report→Show range).....	36

12.4	Creation of tables ( Report→New table)	36
12.5	Showing and modifying tables ( Report→Show table).....	37
13	UTILITIES	41
13.1	Licence	41
13.2	Server	42
13.2.1	<i>Server</i>	42
13.2.2	<i>Server settings</i>	43
13.2.3	<i>Mail client settings (SMTP server settings)</i>	43
13.2.4	<i>FTP server settings</i>	43
13.3	Export definitions	44
13.4	Import definitions	44
13.5	Import drivers.....	44
13.6	Import language.....	44
13.7	Import theme	44
13.8	Import logo.....	45
13.9	System log.....	45
13.10	System diagnostic.....	45

1 Introduction

Synergy is a software for control and supervision of Lovato Electric products equipped with communication capabilities via serial ports, ethernet or modem. Supported protocols are Modbus RTU, Modbus ASCII and Modbus TCP. For the updated list of Lovato Electric products supported by Synergy please visit www.lovatoelectric.com at the section dedicated to the software.

The software is able to:

- manage multiple communication channels at the same time;
- pair the devices to the various channels;
- collect data from all devices and store them in a database;
- display the collected data in graphical pages or tables;
- generate graphs and alarms from the contents of the data tables;
- allow access to the devices and their data according to the rights of the different users.

Synergy is a client-server application based on MS SQL Express. It runs the web server MS IIS Express to manage the user interface.

This manual describes the functionalities available for the users updated to version 5. If some features mentioned in this manual is not present in the software, proceed with the upgrade to the latest version.

2 Hardware and software requirements

PC/SERVER HARDWARE REQUIREMENTS

- Dual core CPU, 2GHz;
- 4GB RAM;
- hard disk 60GB (dimensions depend on how many data will be recorded);
- SVGA 1024x768, 16bit colours;
- ethernet RJ45 LAN board;
- communication port number and type according to the application: ethernet, serial RS485, serial RS232 or modem types.

Synergy is an application based on services (SQL and web) for which we do not recommend the use of laptops due to the limited hardware and software performance.

SUPPORTED OPERATING SYSTEMS AND BROWSERS

- MS Windows XP SP3, Windows Vista, Windows 7, Windows Server 2003, Windows Server 2008, Windows Server 2012, Windows 8.1.
Both the 32bit and 64bit versions are supported.
- MS IExplorer 9, Google Chrome 36, Mozilla FireFox 26 or higher (latest versions recommended for each browser).

For updates of the requirements please visit www.lovatoelectric.com at the section dedicated to the software.

3 Setup

It is recommended to faithfully follow the steps below. In case assistance is needed during the installation, please contact our Customer Service.

In order to install the software properly, an account with the privileges of the "true" administrator of the PC (users of user or poweruser type are not allowed) is required.

During installation of the software, anti-virus and firewall should be temporarily disabled.

If the wireless network is supposed to be used while Synergy runs, please enable the wireless lan board and connect it to an available access point before installing.

To run the setup for Synergy installation, log in the PC/Server as an administrator user:

- click with the mouse right button on the **setup.bat** file and choose "Run as administrator";
- for Windows XP: double-click on **setup.bat** file.

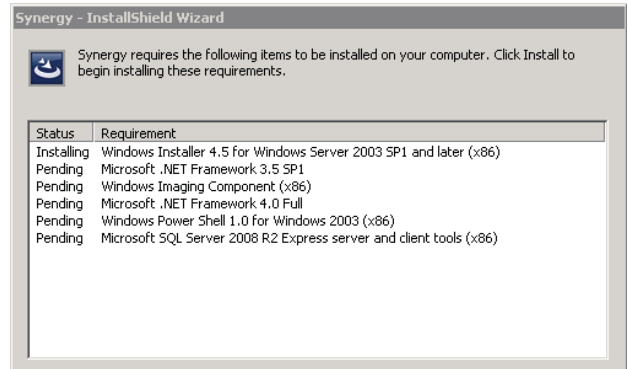
The setup proceeds automatically to install Synergy and all the necessary prerequisites that vary according to the operating system and the components already installed on the machine. The whole process may take several minutes. A window lists the operations which are carried out.

During the installation process, you may be asked for rebooting the machine. Failure to reboot during the setup could cause an improper installation.

The onscreen instructions should also be followed to complete the job successfully.

After installation, Synergy can be accessed opening a browser and typing in the address bar:

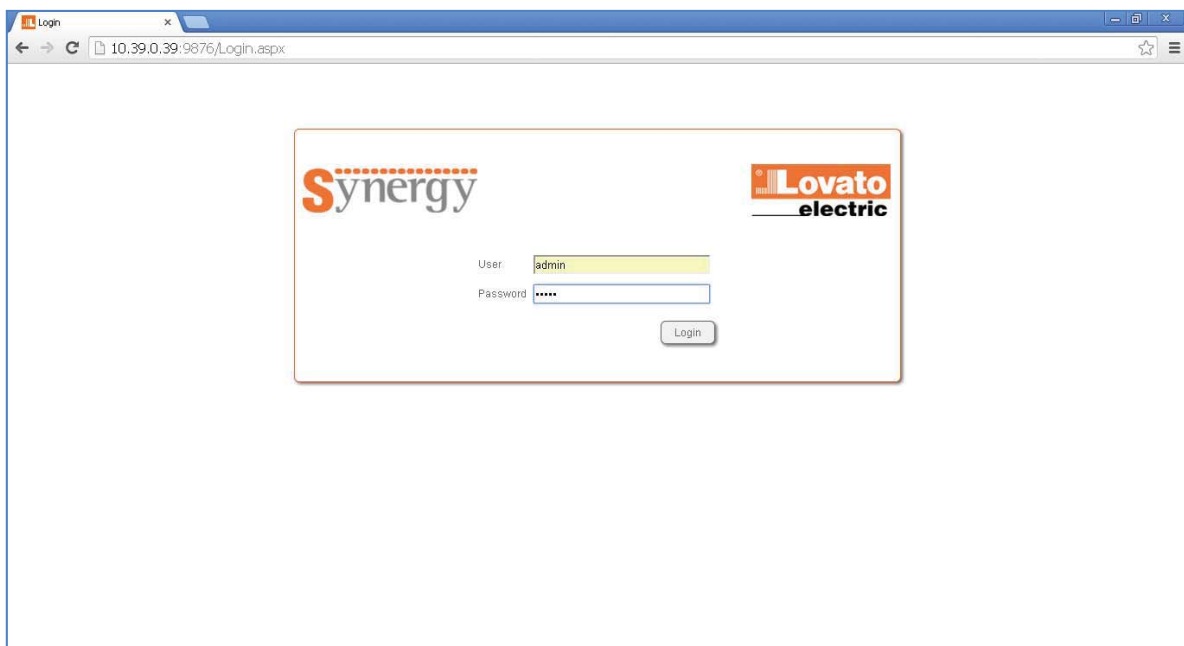
- <http://localhost:9876/> if opening the browser on the same machine where the installation took place;
- <http://<HOST>:9876/> if opening the browser on another PC on the same network, where <host> means the IP address assigned to the machine on which Synergy is located.



In case of need to remove Synergy, go through Windows Control Panel.

4 Synergy login and users

Synergy access requires authentication.



4.1 Users

3 types of users are defined.

- **Administrator.** One of these users is already predefined after setup:
 - ✓ user: admin
 - ✓ password: admin

After the first login, it is recommended to change the password.

The "Administrator" type user has no limit of action. It defines all other users and for each of them decides on which devices, pages and datalogs it can operate.

For example, it is the company IT manager.

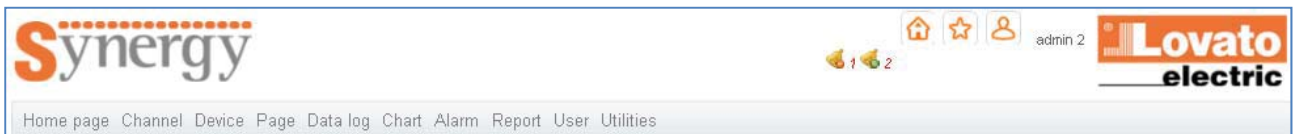
- **Poweruser.**

The "Poweruser" type user can not perform operations on the channels of communication, but it can act without restrictions on all devices assigned to it by the administrator.
Typically it is the manager of energy services in the company.
- **User.**




The "User" type user can access information about the devices assigned to it by the administrator, but it is not allowed to make changes to the pages, data tables, graphs and alarms.
For example, it is the manager of a department in the company.

4.2 Browsing the software and menu bar

Once logged in Synergy with one of the credentials, the upper part of the page is always available to the user and contains everything needed to navigate through the functions of the software.



There are three graphical icons to click on:

-  to get to Synergy home page (see section 5);
-  to get to the page identified as main (see section 8);
-  to log out Synergy to end the session or to change the user (closing the browser will carry to the same result).



Below the graphical icons the message area is available to show information for the user (open alarms, elapsed license, ...).

The menu bar contains links to all the functions to which the current user has the rights. Along the manual the symbol

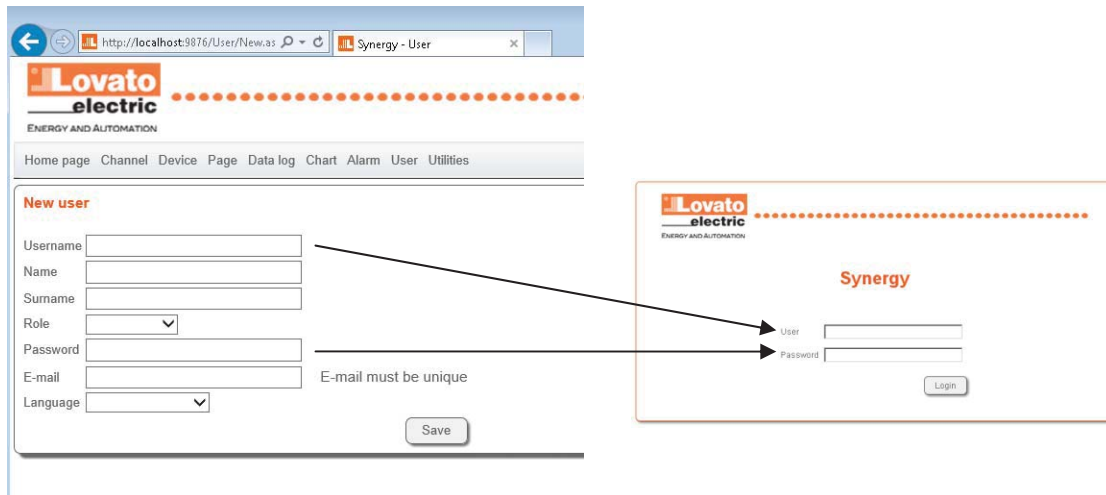


will appear followed by a text of the menu bar to be clicked to access a function.


4.3 Users management

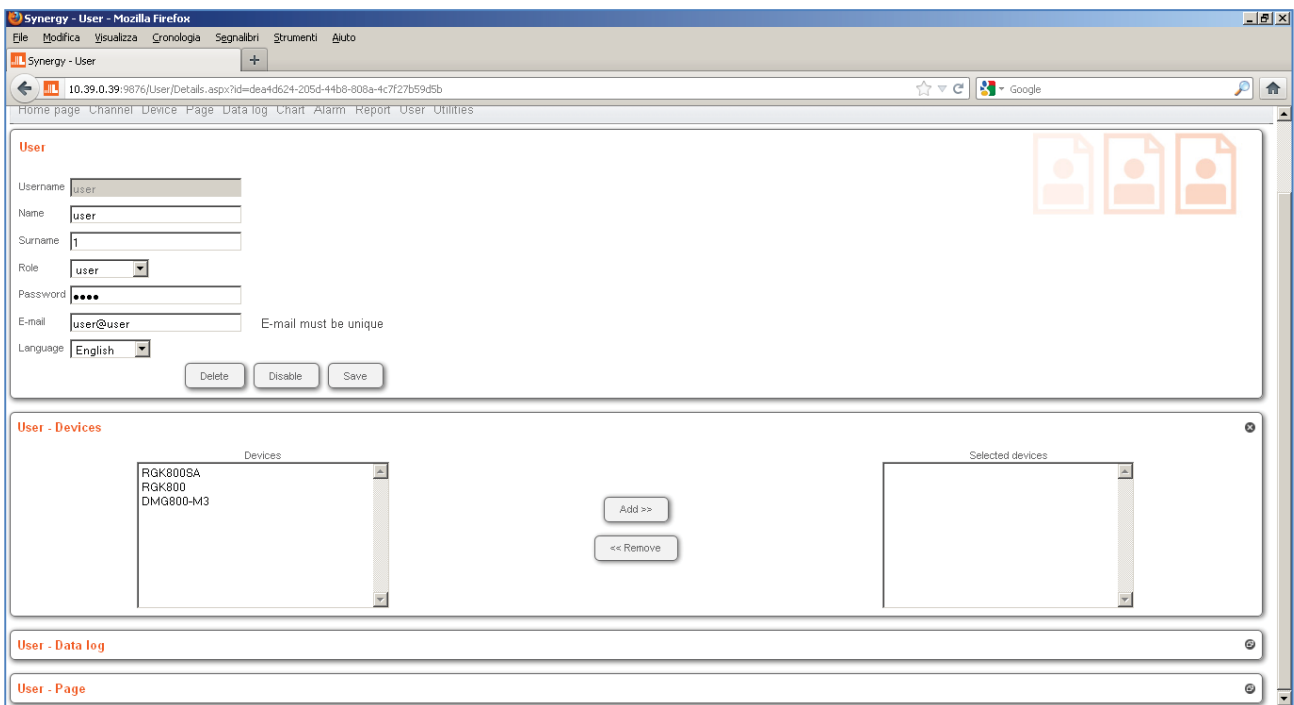
"Administrator" type user can create ( *User→New*), manage and modify ( *User→Show*) all the other users of different type, selecting the role.

The creation of a user involves the filling of the following fields.



User name and password are used to log in, while the name, surname and e-mail fields are identifiers within Synergy. A language among those available can be assigned to the user.

If the user is not an "administrator" it should be given the devices, pages and tables which it can access to. Thus, after saving the new user, enter the modification option by clicking  next to the user to be modified, accessing the following screen.



Opening the User - Devices tab, select the devices for which the user is given access rights from the list on left. The same procedure must be followed for data logs, pages and reports.

Logging in with his credentials, the user sees only the items selected by the administrator at this stage. References to unauthorized items are not displayed.

5 Home page

The home page of the web application is a great starting point to monitor the status of the network and to begin the usage of the basic functions, thanks to the buttons that lead quickly to the required function.

The screenshot shows the Synergy web interface. The top navigation bar includes 'Home page', 'Channel', 'Device', 'Page', 'Data log', 'Chart', 'Alarm', 'Report', 'User', and 'Utilities'. The 'Alarms' panel displays a table of the last 10 alarm events. The 'Information' panel shows a summary of device and channel status.

Alarm starting date	Device	Measure	Starting value	Ending value	Min	Max
10/13/2013 10:11:00 AM	Impianto distr. polveri	kWh	55844.99		0	8
9/29/2013 7:12:00 AM	Fotovoltaico ST	V L1	237.13		100	150
9/18/2013 8:21:00 AM	Fotovoltaico ST	kW L2	1		100	1500
7/23/2013 11:12:20 AM	DMG300 R&D	kW EQV	3.98448		1	2

	With communication error	Disabled	Configured
Devices	7	0	85
Channels	5	5	23

Current SW version 8
Current drivers version 8

In the orange panel, the channel, the device and the software and driver release status can be checked:

- devices: the number of set devices is indicated, together with how many of them are disabled or in communication error (the number indicates how many devices have the "red light", the meaning of which is explained below);
- channels: the number of set channels is indicated, together with how many of them are disabled or in communication error, that is with all the connected devices with communication error (the number indicates how many channels have the "red light", the meaning of which is explained below);
- software version - latest version of the software - URL of the page to download the latest version available;
- driver version - latest version of the driver - URL of the page to download the latest version of the drivers.

The latest version available for download and URL are displayed only in case the software and drivers are not updated and Synergy has available an internet connection.

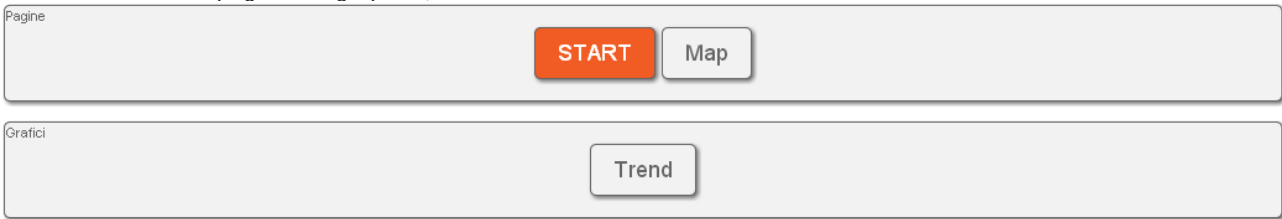
In the alarm box the list of the last 10 open alarm events is presented.

The detailed view of the Alarms panel shows the last 10 alarm events. The table lists the alarm starting date, device, measure, starting value, ending value, minimum, and maximum values.

Alarm starting date	Device	Measure	Starting value	Ending value	Min	Max
7/28/2014 9:04:01 AM	RGK800	Vbatt	14.46		0	13
7/28/2014 7:56:01 AM	RGK800	Vbatt	14.46		0	12
7/23/2014 10:03:03 AM	DMG800-M3	V EQV	276.18		0	100

Show complete list

Finally, at the bottom of the page there are buttons for quick access to pages and graphics identified as favourites (see below how to create pages and graphics).

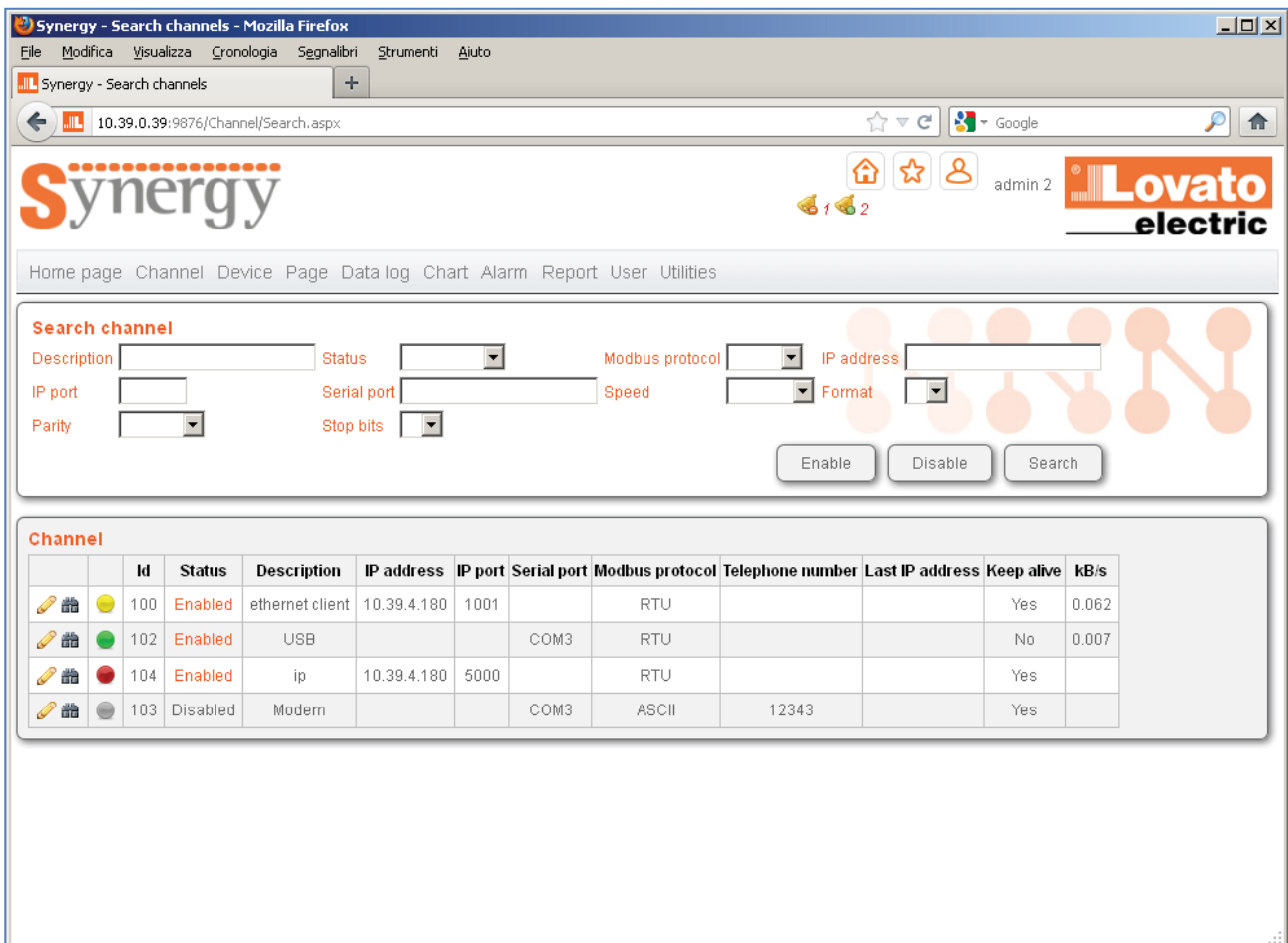


6 Channel

A channel identifies the means by which the server communicates with the devices in the field, such as a serial or ethernet connection. Synergy manages multiple channels, whether they are of the same type or different. The communication channel can be of 3 types:

- ethernet
 - ✓ outgoing (Synergy is TCP client, so it opens the initial connection with the channel which must be assigned with static IP address);
 - ✓ incoming (Synergy is TCP server, assigned with static IP, and therefore the devices of the channel will open the initial connection);

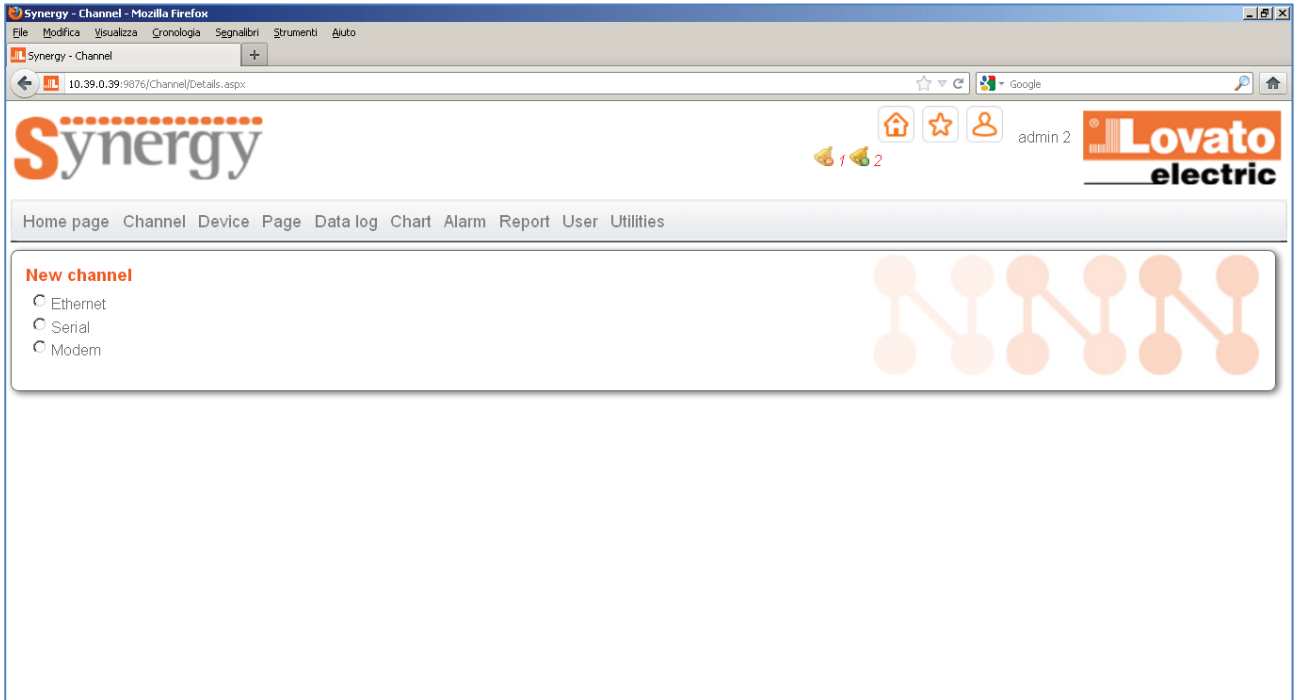
Which opens the connection (TCP client) can have static or dynamic IP.
- Serial (RS232, RS485, virtual COM);
- Modem (dial-up).



The channel management is reserved to "administrator" type users.

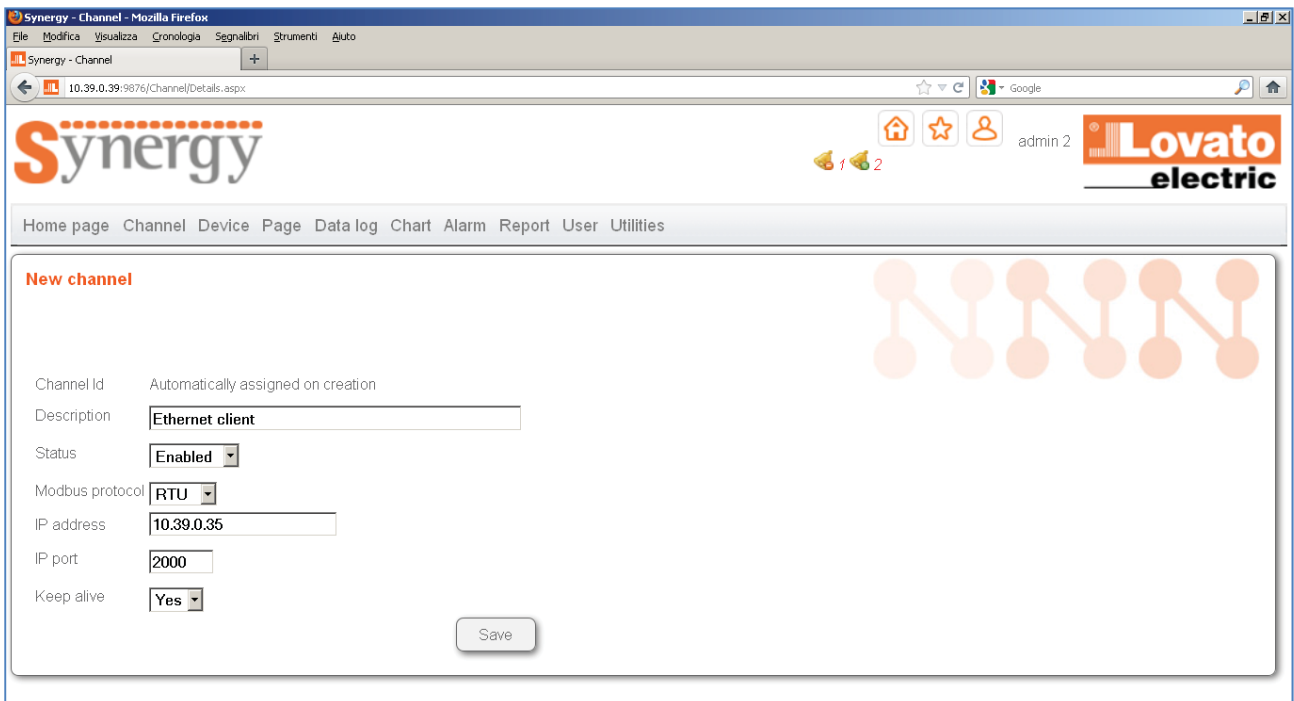
6.1 Channel creation (Channel → New)

At the creation of a new channel the administrator is prompted to select the type, thus determining the necessary parameters to be included in following steps.



The screenshot shows a web browser window titled "Synergy - Channel - Mozilla Firefox". The address bar shows "10.39.0.39:9876/Channel/Details.aspx". The page header includes the "Synergy" logo, navigation icons, and the "Lovato electric" logo. A menu bar contains "Home page", "Channel", "Device", "Page", "Data log", "Chart", "Alarm", "Report", "User", and "Utilities". The main content area is titled "New channel" and features three radio button options: "Ethernet", "Serial", and "Modem". A decorative graphic of orange circles connected by lines is visible on the right side of the form.

6.1.1 Creation of a client type ethernet channel



The screenshot shows the same web browser window as above, but the "New channel" form is now filled out for an "Ethernet client" channel. The form fields are as follows:

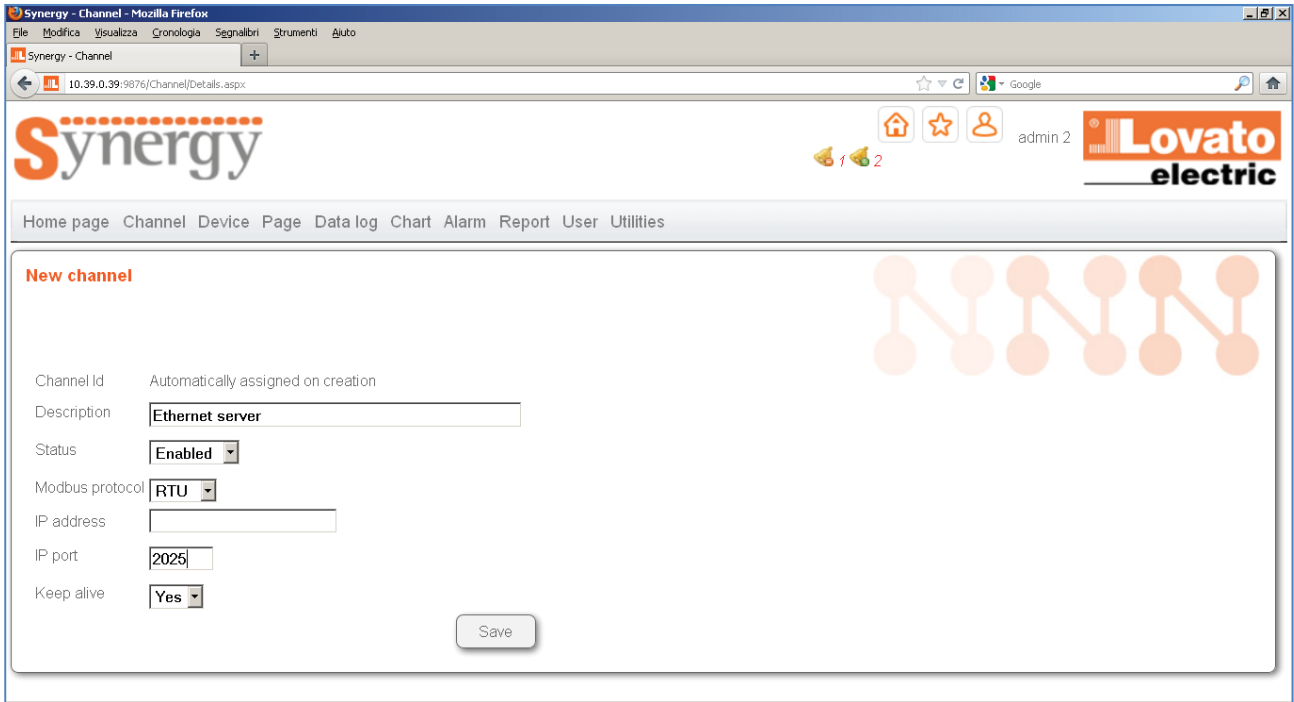
Channel Id	Automatically assigned on creation
Description	<input type="text" value="Ethernet client"/>
Status	<input type="button" value="Enabled"/>
Modbus protocol	<input type="button" value="RTU"/>
IP address	<input type="text" value="10.39.0.35"/>
IP port	<input type="text" value="2000"/>
Keep alive	<input type="button" value="Yes"/>

A "Save" button is located at the bottom right of the form area. The decorative graphic of orange circles remains on the right side.

All fields are required. IP address and port represent the coordinates to open the channel (socket) to the server of the TCP session. With this type of channel one of the available protocols can be set: Modbus RTU, Modbus TCP, Modbus ASCII.

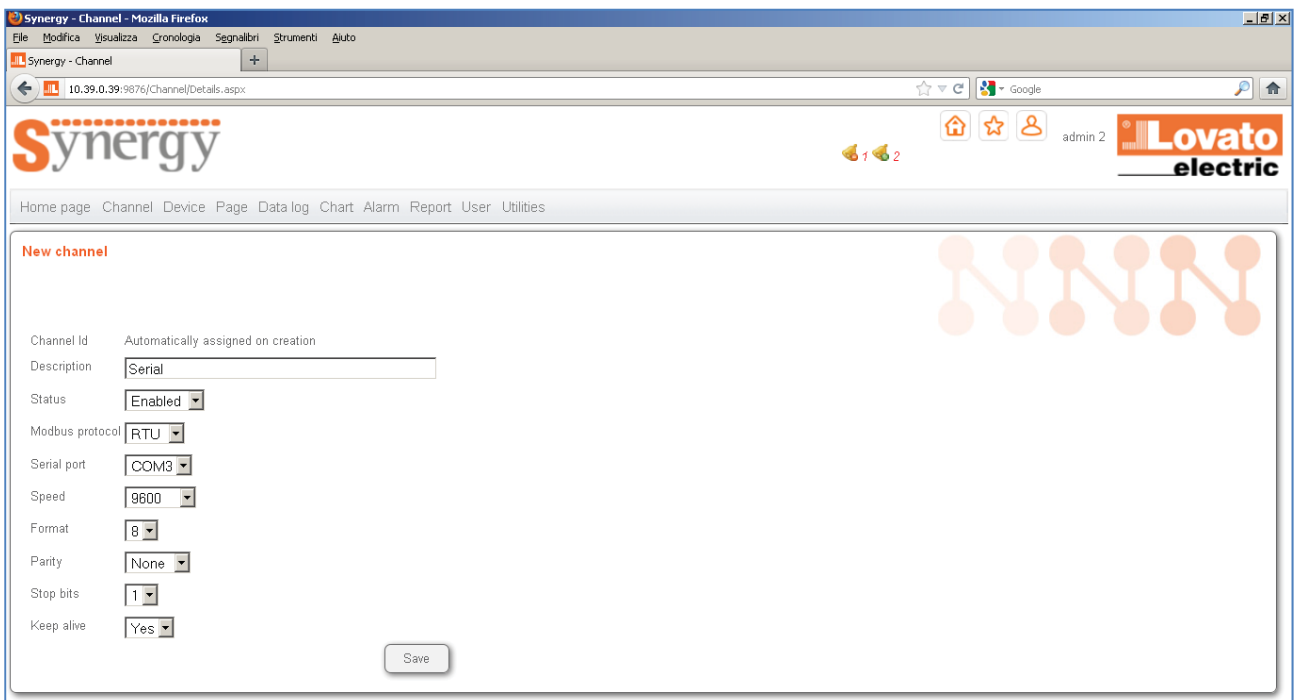
If the keep alive option is enabled, Synergy periodically checks the actual activities of the communication channel.

6.1.2 Creation of a server type ethernet channel



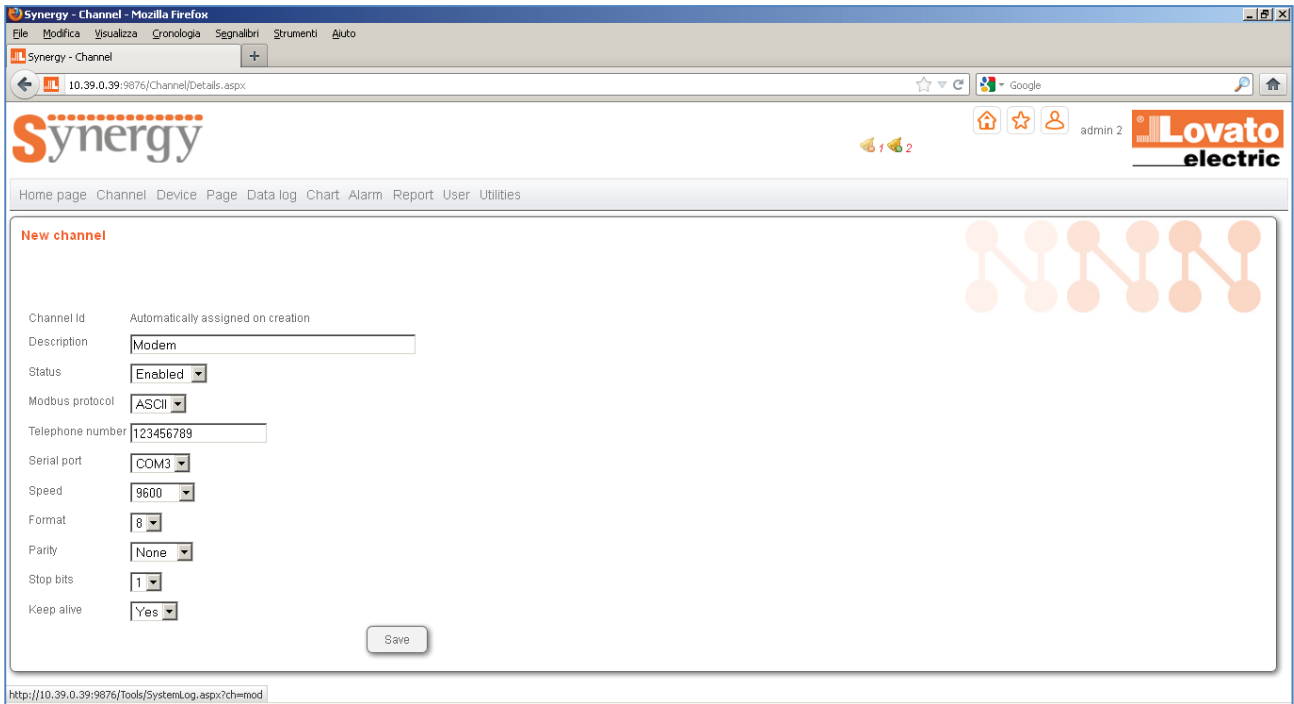
Compared with the client type ethernet channel, the IP address field is not to be filled in, since it is unknown and however not necessary.

6.1.3 Creation of a serial channel



All fields are required. With this type of channel Modbus TCP is not supported.
If the keep alive option is enabled, Synergy periodically checks the actual activities of the communication channel.

6.1.4 Creation of a modem channel



The screenshot shows a web browser window titled 'Synergy - Channel - Mozilla Firefox'. The address bar displays '10.39.0.39:9876/Channel/Details.aspx'. The page header includes the 'Synergy' logo, navigation links (Home page, Channel, Device, Page, Data log, Chart, Alarm, Report, User, Utilities), and the 'Lovato electric' logo. The main content area is titled 'New channel' and contains a form with the following fields:

Channel Id	Automatically assigned on creation
Description	Modem
Status	Enabled
Modbus protocol	ASCII
Telephone number	123456789
Serial port	COM3
Speed	9600
Format	8
Parity	None
Stop bits	1
Keep alive	Yes

A 'Save' button is located at the bottom right of the form. The browser's status bar at the bottom shows the URL 'http://10.39.0.39:9876/Tools/SystemLog.aspx?ch=mod'.

The phone number field contains the phone number of the modem connected to the device to call.
The serial parameters refer to the connection between the PC on which Synergy is installed and the modem connected to the PC. The only selectable communication protocol is Modbus ASCII. The keep-alive function can be activated, paying attention because every modem call is subject to costs related to the telephone operator. For this reason, the keep alive message is sent to the channel with a frequency lower than the other channel types.

6.2 Showing and modifying channels (Channel → Show)

The channels are listed along with the relevant parameters in order to get a quick summary of the network architecture.

Search channel

Description Status Modbus protocol IP address
 IP port Serial port Speed Format
 Parity Stop bits

Channel

		Id	Status	Description	IP address	IP port	Serial port	Modbus protocol	Telephone number	Last IP address	Keep alive	kB/s
		100	Enabled	ethernet client	10.39.4.180	1001		RTU			Yes	0.062
		102	Enabled	USB			COM3	RTU			No	0.007
		104	Enabled	ip	10.39.4.180	5000		RTU			Yes	
		103	Disabled	Modem			COM3	ASCII	12343		Yes	

Clicking on icon the channel settings can be modified.
 A traffic lights for each channel indicates the communication status.
 For ethernet or serial type channels:

- the channel is disabled;
- all devices on the channel are on line or disabled; the light is green in case all devices on the channel are disable as well;
- all devices on the channel are off line or disabled;
- some of the devices on the channel are off line.

For modem type channels:

- outgoing call not active;
- outgoing call active.

If the keep alive function is enabled, the quantity of exchanged data per second (kB/s) is calculated. The information can be used to estimate the necessary bandwidth to avoid bottle necks during the communication between Synergy and the devices on the channel or to correctly make the dimensioning of a data transmission agreement based on exchanged data (as for GPRS connection, for example).

6.3 Modem status panel (Channel → Modem status)

In case modem type channels are present, Synergy logs the phone calls identifying the beginning and the end of them, distinguishing when the phone call is regularly closed because no longer necessary (connection closed by Synergy) and when the phone call is interrupted because of communication problems.

Id	Date	Description
10637	7/29/2014 3:15:49 PM	RGK800: Last reading result success
10632	7/29/2014 1:13:10 PM	DMG800-M3: Last reading result failed
10633	7/29/2014 1:13:10 PM	DMG800-M3: Last reading result success
10631	7/29/2014 11:11:39 AM	RGK800: Last reading result failed
10629	7/29/2014 11:06:58 AM	RGK800: Last reading result success
10628	7/29/2014 11:06:58 AM	RGK800: Last reading result failed
10627	7/29/2014 11:04:06 AM	RGK800: Last reading result success
10626	7/29/2014 11:04:06 AM	RGK800: Last reading result failed
10624	7/29/2014 10:54:55 AM	RGK800: Last reading result success
10616	7/29/2014 8:35:59 AM	RGK800: Last reading result failed

7 Device

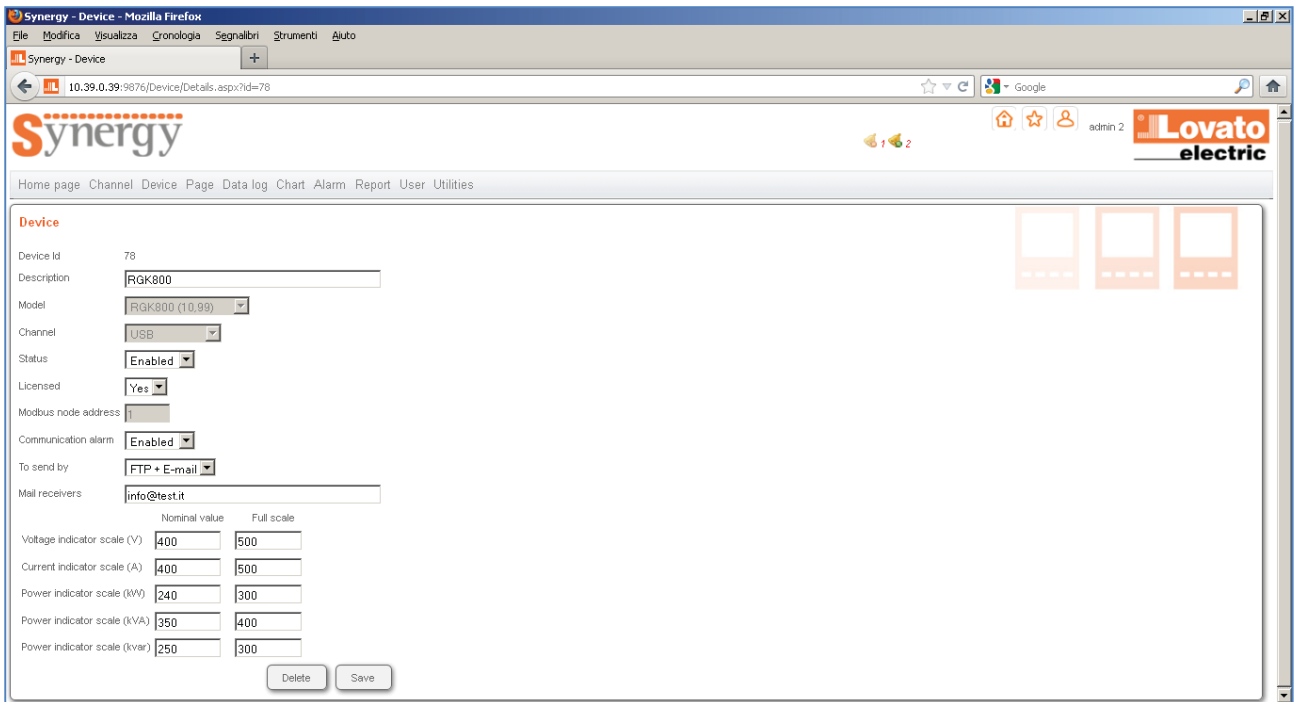
The devices are the products in the field which Synergy makes data exchange with, using the modbus protocol. For the updated list of supported Lovato Electric products consult the website www.lovatoelectric.com at the section dedicated to software.

7.1 Creation of a device (📄 Device → New)

In order to create a device, all the information required must be filled in.

- Description: free text that lets the users recognize the device in Synergy;
- model: type of device selection;
- channel: channel name on which the device is located;
- status: the device must be enabled to work;
- licensed: option to assign one of the available licenses to the device;
- modbus node address: modbus node by which the device is identified during the communication; on the same channel the node number must be unique, while it can be repeated among different channels;
- communication alarm: if this function is enabled, in case of communication problems an alarm is generated;
- to send: option to send the communication alarm via mail or to FTP server;
- mail receivers: list of mail address receiving the communication alarm notification; the addresses must be separated by comma.

Synergy will access the device data only if the device is enabled and licensed. It means it is selected as one of the devices using the available licences by "licensed" property (see the section about licences).

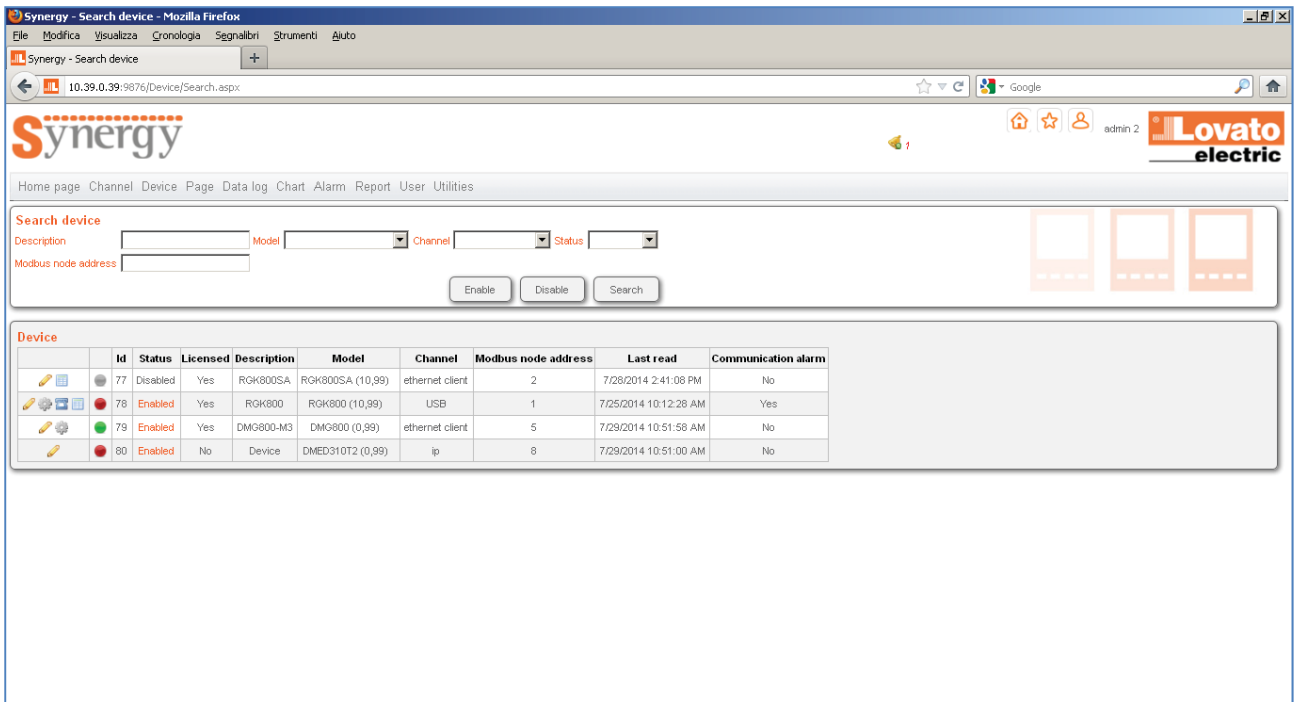


The ratings and the full-scale values for some measurements can be entered as attributes of the device, so that graphical indicators are automatically sized in the most appropriate way when showing these quantities. The rated and full-scale values included in the creation mask of the device can be overridden if necessary at the time of the creation of an indicator or a chart.

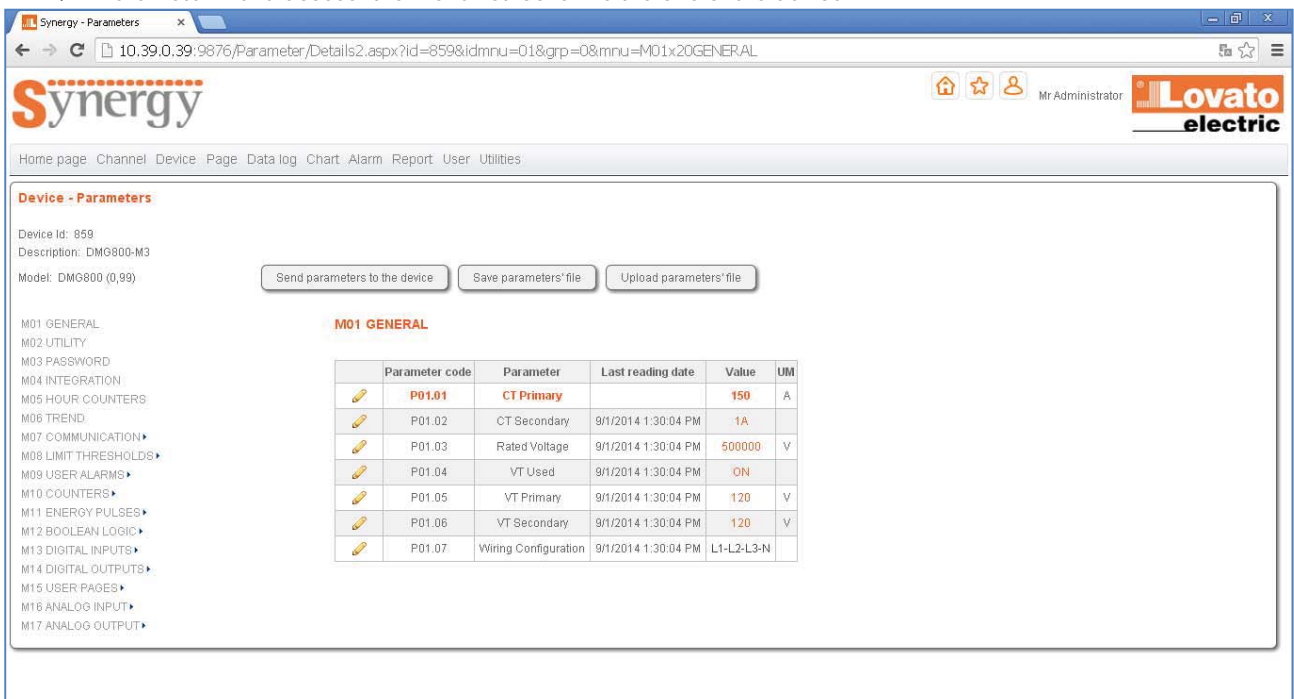
7.2 Showing and modifying devices (📄 Device → Show)

In the list of devices, in addition to the summary of the main configuration parameters, there is an indicator associated with each device to indicate the status of communication with Synergy:

- 🟢 device on line;
- 🔴 communication problem;
- ⚪ disabled communication (i.e. the device or the channel is not enabled).



The characteristics of the device can be changed by accessing the configuration via the icon . Starting from this page setup menu icons and event (stored in the device memory) reading are available. Parameter menu access: the menu list looks like the one of the device.




Clicking on the menu title, if there are submenus, they are shown. When the last level of submenus is expanded, clicking on them the relevant parameters of the selected submenu are read from the device and shown on screen. Click on icon to modify one of the parameter, change the value to desired and confirm it with icon or cancel the operation with icon . The parameters with value different from default have the value highlighted with orange color (as P01.02 in figure); the modified parameters, but not yet sent to device, have both description and value highlighted in orange color (as P01.01 in figure).

The following functions are available as well:

- send parameters to the device: all the parameters belonging to the current menu are sent; execute the function before leaving the menu if some of the parameters have been changed;
- save parameters' file on HD: a file with a copy of the parameters programmed on the device is created;
- upload parameters' from HD: load to the device the parameters saved in a file saved before.

 Access to parameters relevant to EXP1015: only for devices supporting GSM/GPRS EXP1015 module, specific parameters are available to set up the modem communication.

 Event list: only for devices with built-in memory for event recording, a copy of event memory can be retrieved on the screen through this function.

If the device and the channel on which it is are not both enabled, the only available icon is the pencil to modify the device configuration.

If Synergy recognises a device model different from the one set, in the "Model" field both the configured and the detected device models are indicated. Due to this discrepancy, Synergy does not let parameter menu access hiding the relevant icons and the supervision is stopped, in order to avoid to work with data which are not consistent.



The devices are cyclically polled by Synergy. If a device does not answer to the query, the software repeats twice the same message. If the device does not answer for three times, Synergy considers the behaviour as inability to exchange data, caused by network problems or by a switched off device. As a consequence, in order to optimise the time division on channels, the device is temporarily suspended for three minutes, after which it is again included in the polling sequence. If the user wants to force the re-introduction of the device before three minutes are elapsed, the channel on which the device is must be disabled and enabled back.

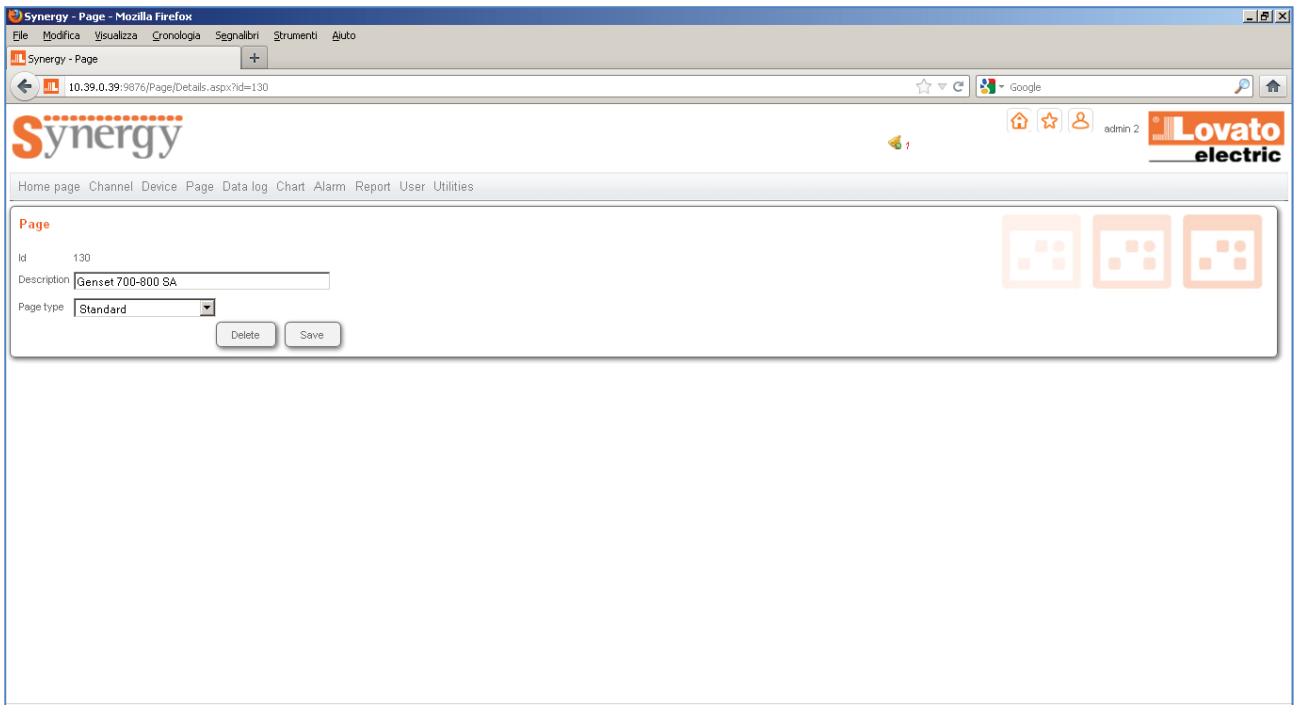
8 Page

The graphic page is the most intuitive way to read the measurements from Lovato Electric devices in the field connected with Synergy. The pages are fully configurable and can therefore be constructed by the user and adapted to its needs.

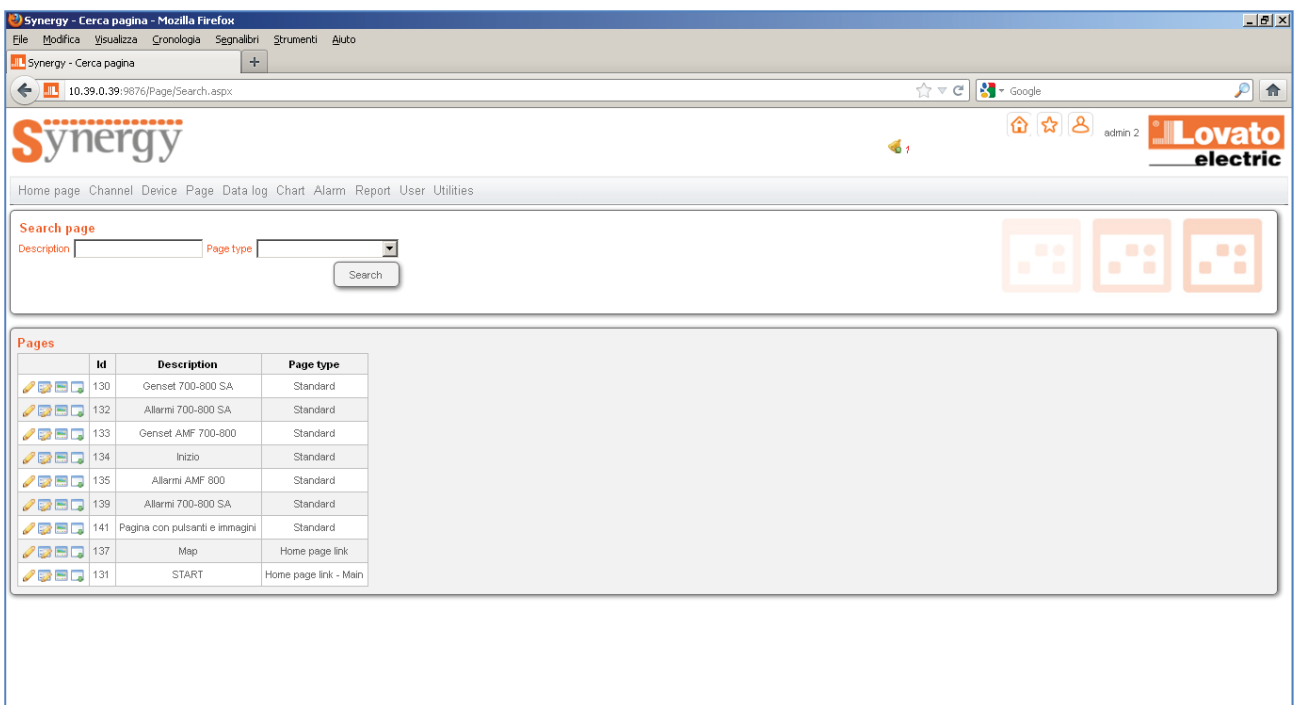
8.1 Creation of a page (Page→New)

At this step, a new page is added to the list of those available. The user simply needs to provide a description that identifies it and decides on the visibility through the "page type" property:





- **home page link:** in the home page, a button with the name of the page is created, being a direct link to the page itself;
- **home page link - main:** it is a favourite page, but the button is better highlighted with orange colour; the icon  in the upper right corner is a direct link as well; the main page is only one, if there is already one it loses its role as the main and becomes favourite.
- **standard:** links are not created, the only way to access this type of page is to go through the list (Page→Show).




8.2 Showing and modifying pages (Page → Show)



In the list of existing pages the following functions are available:

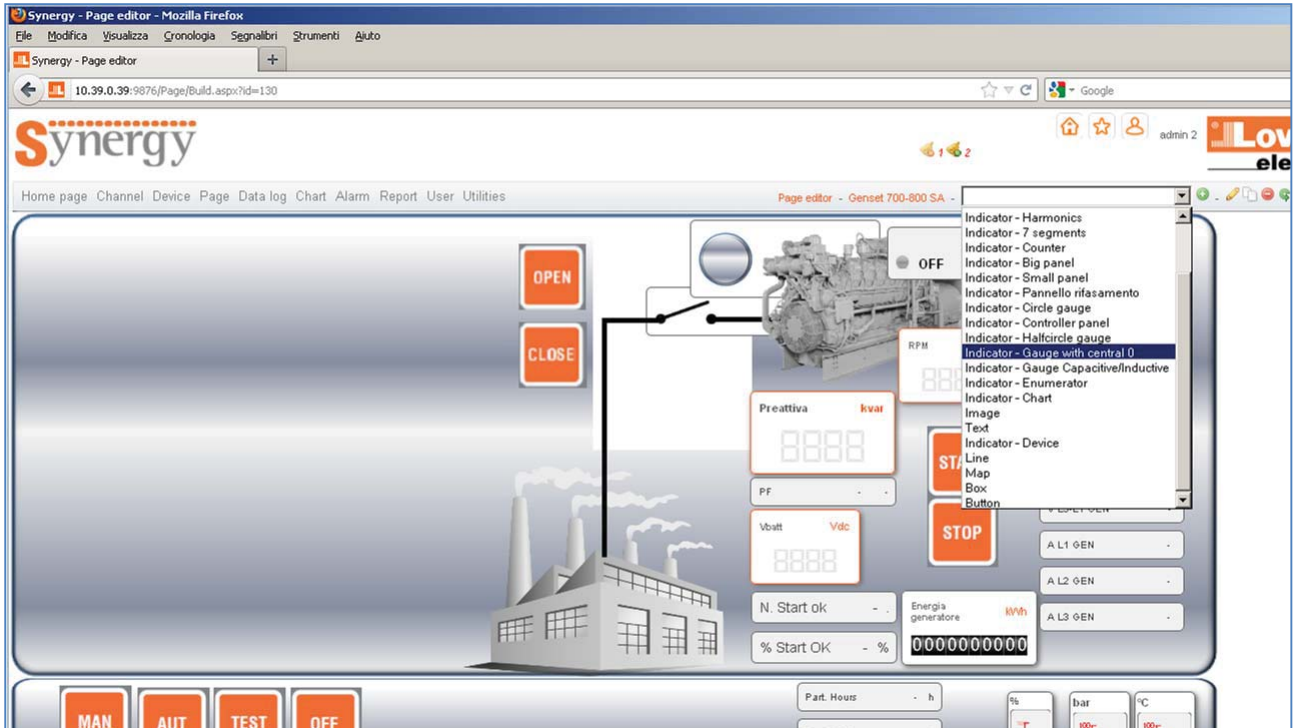
-  page modification: change the page properties set during the creation;
-  indicator (in the page) configuration (see next section);
-  visualisation of indicators and measurements collected from the devices.
-  page export: a template of the page is saved on the hard disc.

An exported page can be imported by a different Synergy installation using the  Page → Import function.

Once the page is imported, the user is asked for completing the setup of the indicators in the page.

8.3 Configuring the indicators in the page (📄Page→Show→🔧)

A new page is completely blank. The indicators must be added by selecting them from the menu in the upper right corner.



Once the type of indicator has been selected the following functions can be performed:

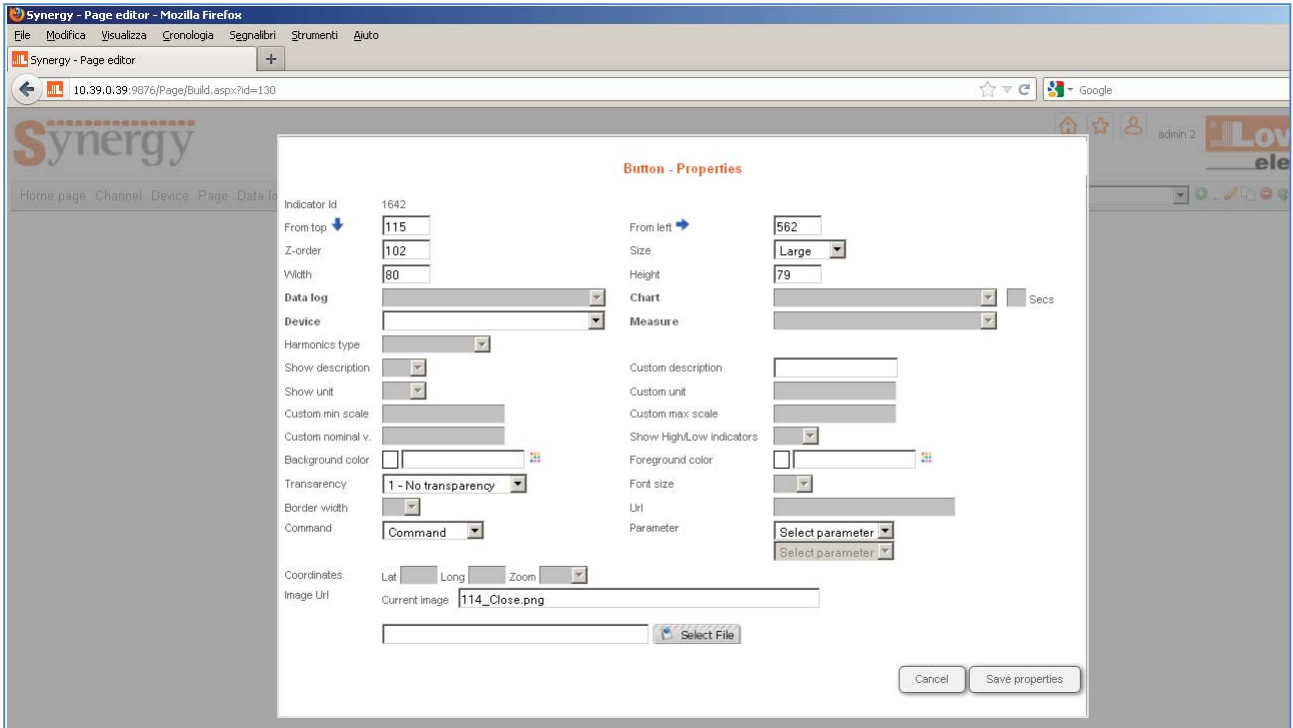
- ➕ press the button to add the selected indicator to the page;
- 🔧 configuration of the indicator: select the indicator on the page and press the button to modify its properties;
- 📄 copy of the indicator: select the indicator on the page and press the button to copy;
- ⊖ elimination of the indicator: select the indicator on the page and press the button to delete it;
- 🔄 cancel: abort the last modification;
- Grid activate a grid to help the indicators alignment.

📄 access to the page just edited to verify the functionality. In the live page, if the logged-in user is administrator or poweruser, the 🔄 icon is available to quickly go back to the editor.

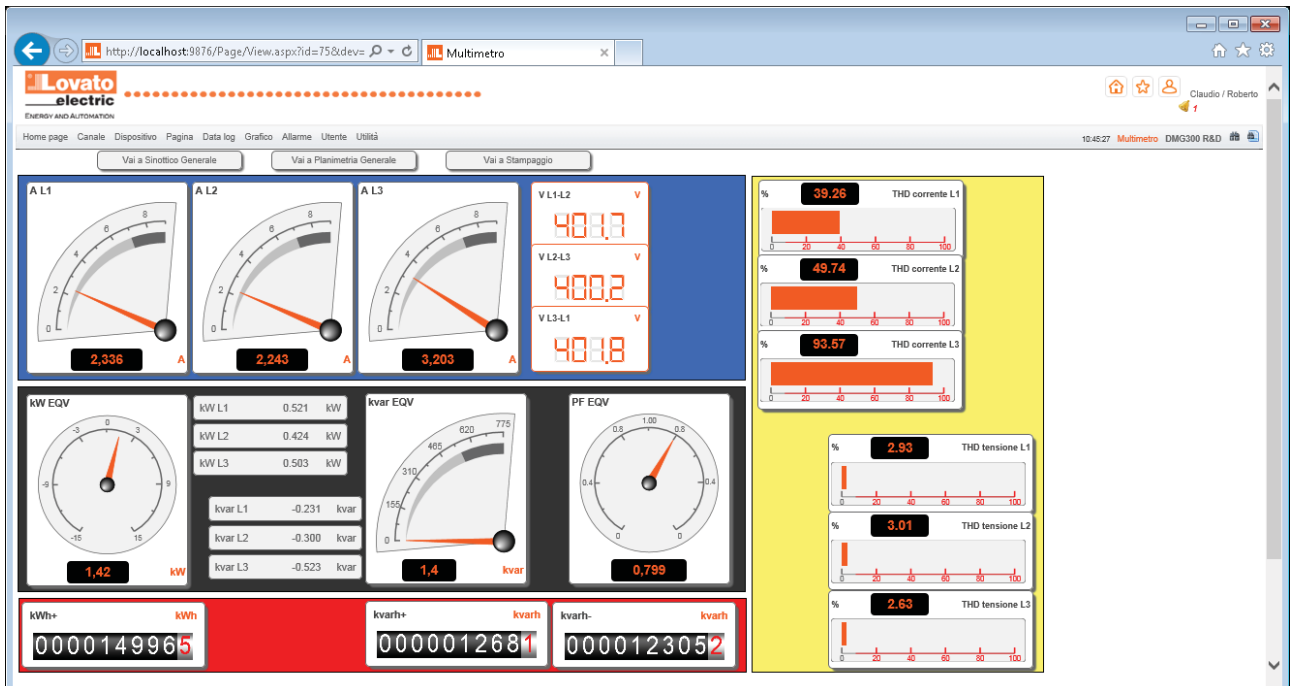
To select an indicator, click on it with the mouse left button: the indicator becomes yellow.

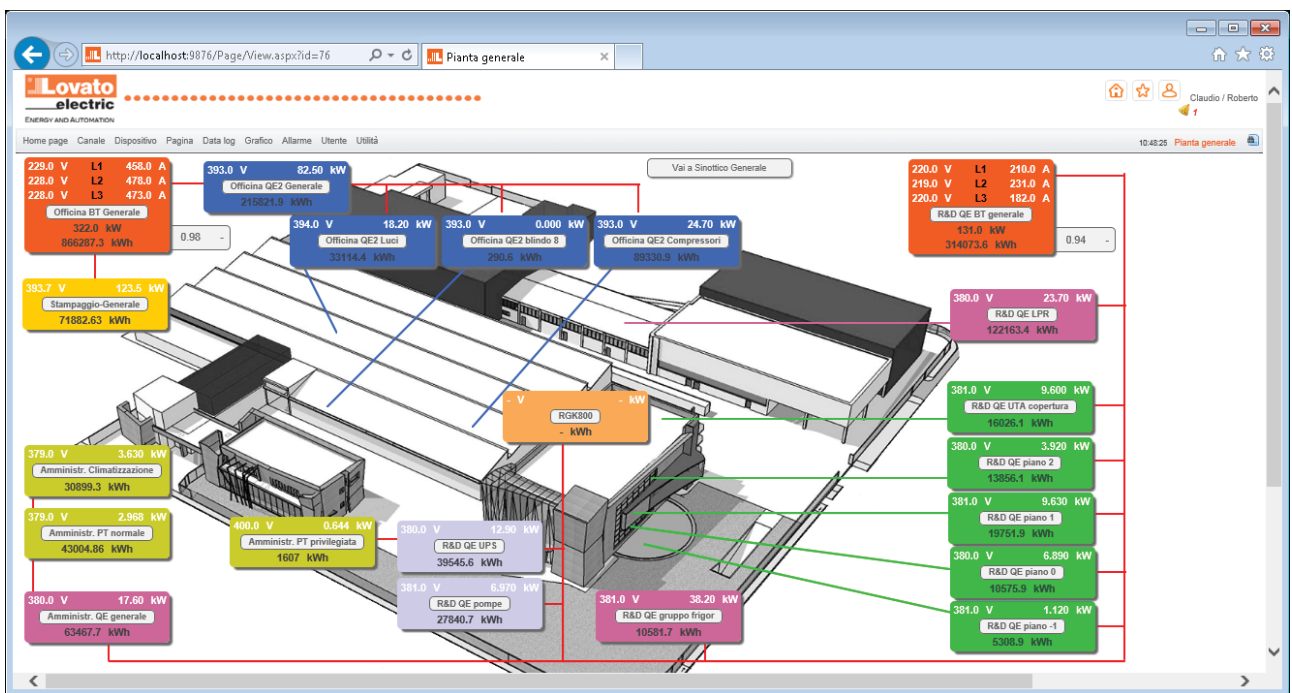
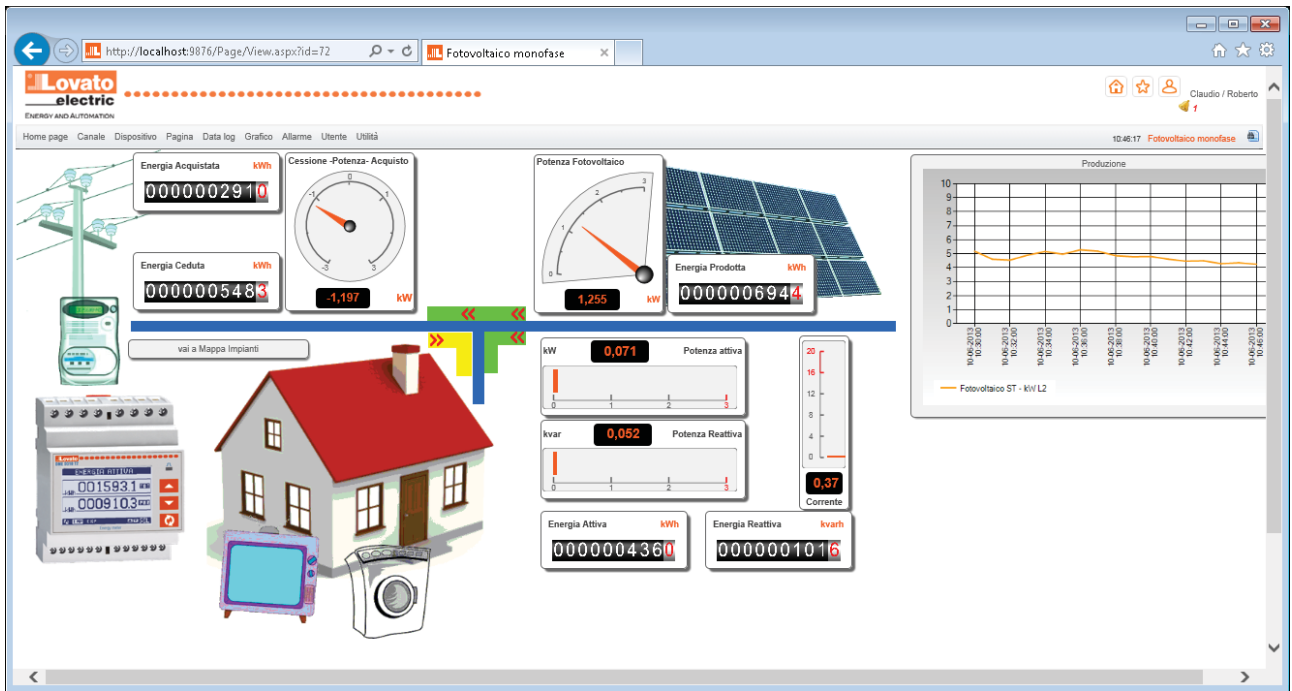
To move an indicator, select it and hold down the mouse left button, then move it to the desired position.

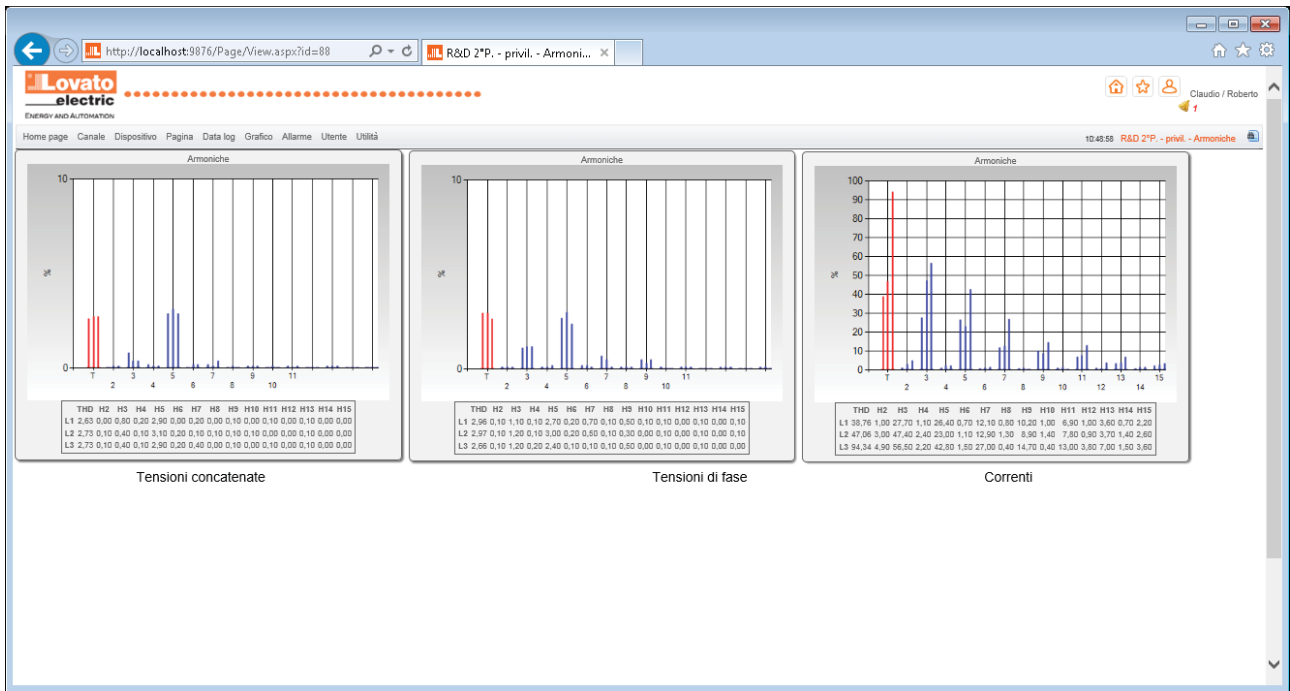
When an indicator is to be configured, clicking on the icon 🔧, a window appears which is valid for all indicators: not all properties are available for all indicators. If a property is not available, the relative modifying area is grey.



Some example pages follow to show the set of available indicators.







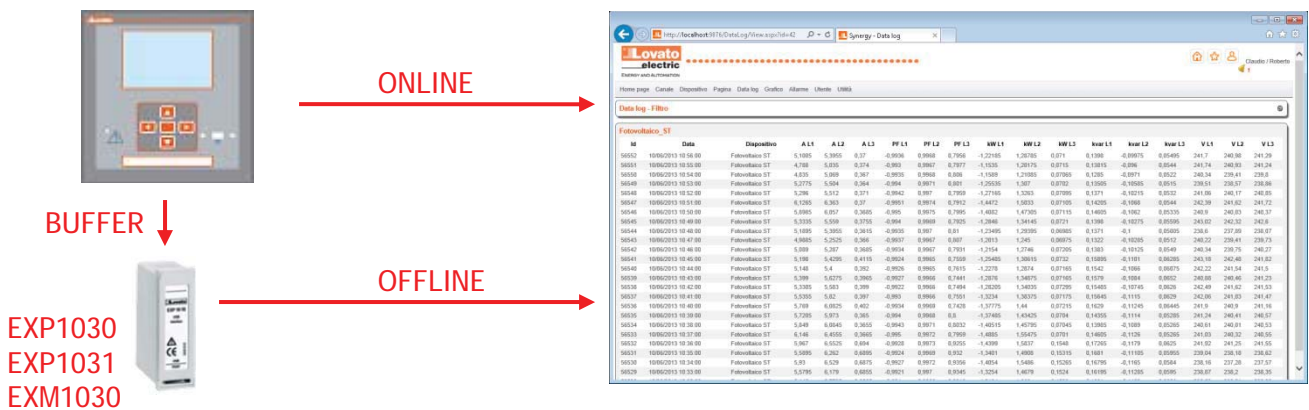
9 Data log

A data log is a data table consisting of a set of measurements associated with the devices in the field, collected at regular time intervals. Synergy can manage multiple data log simultaneously.

9.1 Creation of a data log (Data log → New)

The creation of a new data log requires the user to fill in the following fields:

- description: free text that identifies the data log;
- status: to enable and disable data collection;
- type: to select the use of external memory module (EXP1030 or EXM1030) as a buffer.
 - online: without memory module
 - offline: with memory module



- sampling interval: time interval between a data reading and the next one;
- downloading interval: when this time elapses, Synergy copies the new content of the memory installed on the device to the data log of the software (enabled only if the data log is OFFLINE type);
- synchronize with clock: if enabled, this property binds recording measurements to the PC clock (for example, if a sampling interval of 30 seconds is selected, the data is collected with the taking of minutes and when the second of the minute are 30); this property is not available with OFFLINE type data log;
- keep data of last (N days): time depth of the data log; the data will be deleted from the database after N days;
- scheduled export: option to get the data table to be exported to an Excel worksheet or in a text file; the export operation can be performed daily, weekly or monthly and should generally be more frequent than the time specified in the previous point;
- format: choice of the file type for the data export, Excel or text files;
- to send by: the exported files can be sent via e-mail or to a FTP server (Synergy is an FTP client);
- mail receivers: list of mail address which the exported data log file is sent to (enumerate more than one e-mail address by separating them with a comma).

Once the datalog is defined and saved, devices and measurements are to be added.


Start to show the datalog (Datalog→Show), then press the button . The page that appears lets the user define the devices and measurements included in the data collection.

Screenshot of the Synergy Data log configuration page. The page is titled "Synergy - Data log - Mozilla Firefox" and shows the following configuration options:

- Scheduled export: Every day
- Format: XLS
- To send by: FTP + E-mail
- Mail receivers: mail@mail.it

The "Data log - Devices" section shows a list of devices: DMG800-M3 and RGK800. The "Data log - Measures" section shows a table of measures:

Id	UM	Description	Description	
<input type="checkbox"/>	2054	KW	KW EQV	Eqv Active Power - GEN
<input type="checkbox"/>	2022	KW	KW L1	L1 Active Power - GEN
<input type="checkbox"/>	2023	KW	KW L2	L2 Active Power - GEN
<input type="checkbox"/>	2024	KW	KW L3	L3 Active Power - GEN

The list of measures contains only the quantities relevant to the selected devices and it can be furthermore filtered according to the units to simplify the searching operation. Select the measures of interest before adding them by clicking on "Add" push button. Every measures in the data log, clicking on  icon, can have the "delta" calculation activated as difference between the current value and the previous one. Finally, a dedicated description can be associated to each measure to be used as name if a chart is designed (see below how to manage the charts).

9.2 Showing and modifying a datalog (Datalog → Show)


Screenshot of the Synergy Search data log page. The page is titled "Synergy - Search data log - Mozilla Firefox" and shows the following search filters:






- Description:
- Status:
- Type:
- Sampling I.:
- Downloading I.:
- Synchronize with clock:

The "Data log" section shows a table of data logs:

Id	Status	Description	Type	Sampling I.	Downloading I.	Synchronize with clock	Days	Scheduled export	Format	To send by
	79	Disabled	Potenza attiva	On line	10 secs		No	30	No	No
	80	Disabled	Potenza attiva 2	On line	10 secs		No	30	No	No
	89	Disabled	OFFLINE2	Off line	1 sec	5 min	No	30	No	No
	87	Enabled	Allarmi	On line	10 secs		No	30	Tutti i giorni	XLS FTP + E-mail
	82	Disabled	test delta	On line	30 secs		Yes	30	No	No

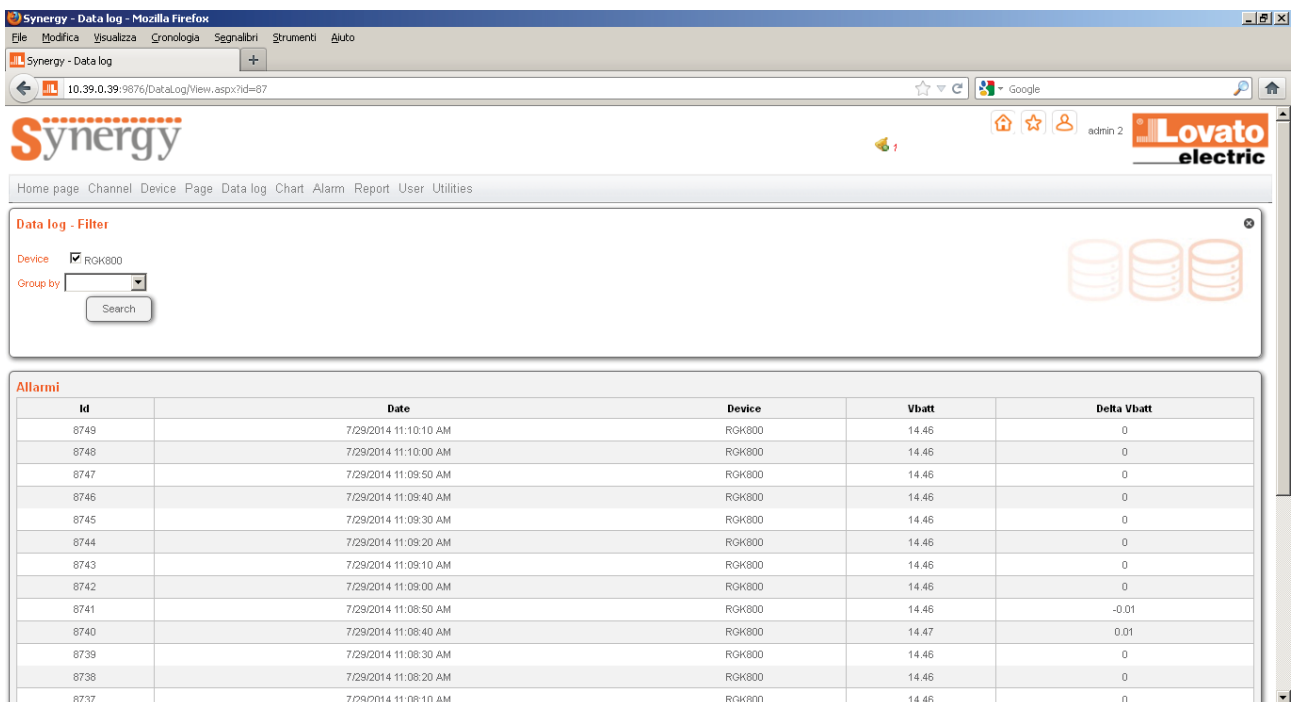
Opening the datalog list, the following functions are available:

 datalog modification (to define the devices and the measurements included in the data collection);

-  selection of device-measures pairs which are visible in the data log;
-  live data visualisation (last readings);
-  Show and visualisation of historic data;
-  addition of a calculated field to the datalog (data log "on line" type only);
-  Showing and modifying a calculated field in the datalog (data log "on line" type only).

9.3 Live data visualisation

This page displays the last reading defined for this datalog. The page reloads the data automatically and periodically. The data can be displayed grouped by the device (default) or timestamp. It is also possible to select of which devices belonging to the datalog the user wants to read data.



Id	Date	Device	Vbatt	Delta Vbatt
8749	7/29/2014 11:10:10 AM	RGK800	14.46	0
8748	7/29/2014 11:10:00 AM	RGK800	14.46	0
8747	7/29/2014 11:09:50 AM	RGK800	14.46	0
8746	7/29/2014 11:09:40 AM	RGK800	14.46	0
8745	7/29/2014 11:09:30 AM	RGK800	14.46	0
8744	7/29/2014 11:09:20 AM	RGK800	14.46	0
8743	7/29/2014 11:09:10 AM	RGK800	14.46	0
8742	7/29/2014 11:09:00 AM	RGK800	14.46	0
8741	7/29/2014 11:08:50 AM	RGK800	14.46	-0.01
8740	7/29/2014 11:08:40 AM	RGK800	14.47	0.01
8739	7/29/2014 11:08:30 AM	RGK800	14.46	0
8738	7/29/2014 11:08:20 AM	RGK800	14.46	0
8737	7/29/2014 11:08:10 AM	RGK800	14.46	0

9.4 Historic data visualisation

On this page the data collected so far with this datalog can be searched and viewed, setting the search criteria to filter the result.

The data can be displayed grouped by the device (default) or timestamp. It is also possible to select of which devices belonging to the datalog the user wants to read data.

Data can be exported to Excel (.xlsx) by pressing the button "Export to XLS".

The screenshot shows the 'Synergy - Data log' interface in Mozilla Firefox. The browser address bar shows the URL: 10.39.0.39:9876/DataLog/ViewSearch.aspx?id=87. The page header includes the Synergy logo and the Lovato electric logo. Below the header, there is a navigation menu with options: Home page, Channel, Device, Page, Data log, Chart, Alarm, Report, User Utilities.

The 'Data log - Filter' section contains the following fields:

- Device: RGK800
- From: 7/28/2014 14:08 To: 7/29/2014 14:08
- Group by: Timestamp
- Buttons: Export to XLS, Search

The 'Allarmi' table displays the following data:

Date	RGK800 - Vbatt	RGK800 - Delta Vbatt
7/28/2014 2:11:10 PM	14.46	0
7/28/2014 2:11:20 PM	14.46	0
7/28/2014 2:11:30 PM	14.44	-0.02
7/28/2014 2:11:40 PM	14.46	0.02
7/28/2014 2:11:50 PM	14.46	0
7/28/2014 2:12:00 PM	14.46	0
7/28/2014 2:12:10 PM	14.46	0
7/28/2014 2:12:20 PM	14.46	0
7/28/2014 2:12:30 PM	14.46	0
7/28/2014 2:12:40 PM	14.46	0
7/28/2014 2:12:50 PM	14.46	0
7/28/2014 2:13:00 PM	14.46	0
7/28/2014 2:13:10 PM	14.46	0
7/28/2014 2:13:20 PM	14.46	0

9.5 Calculated field

The readings present in the datalog can be used to generate others, introducing a calculated field.

To add a measurements in the formula of the calculated field, select the device, the measurement and press the "Add to the formula" button.

To add arithmetic and boolean operations or aggregation (MAX, MIN), numeric constants and parentheses simply click on the corresponding button.

Once the formula is ready, it is possible to verify the syntax by pressing the "Verify Formula" button.

The screenshot shows the 'Synergy - Calculated field' interface in Mozilla Firefox. The browser address bar shows the URL: 10.39.0.39:9876/DataLog/Calc.aspx?idlog=80. The page header includes the Synergy logo and the Lovato electric logo. Below the header, there is a navigation menu with options: Home page, Channel, Device, Page, Data log, Chart, Alarm, Report, User Utilities.

The 'New calculated field' section contains the following fields:

- Id calculated field: Automatically assigned on creation
- Data log: Potenza attiva 2
- Description: Sum
- Formula: $[RGK800].[kW\ EQV] + [RGK800].[kW\ EQV]$

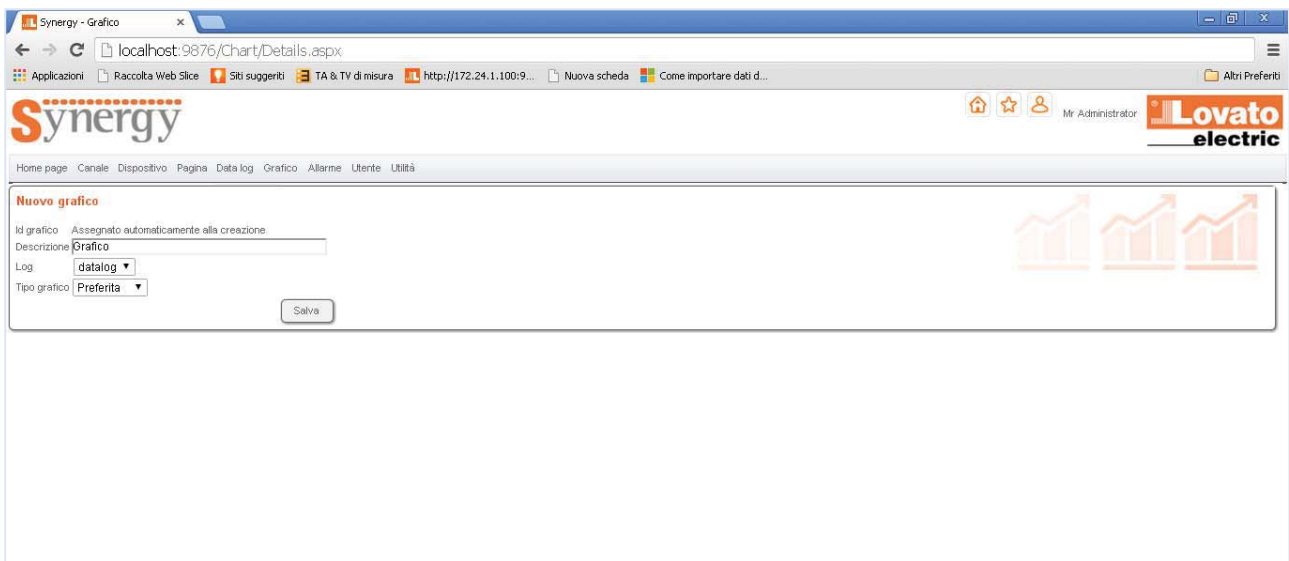
The formula editor includes a dropdown menu for selecting measurements, currently showing 'RGK800' and 'kW EQV - Eqv Active Power - MAINS'. Below the formula field, there are buttons for 'Check formula', 'Clean', 'Save', and 'Add to the formula'. A keyboard interface is also visible, containing arithmetic operators (+, -, *, /, (,)), logical operators (MAX, MIN, AND, OR, NOT), and a 'Field separator' button.

The aggregation formula are according to the following structure:
 $MAX([DeviceN].[MeasurementJ],[DeviceN].[MeasurementK],[DeviceM].[MeasurementJ])$
 $MIN([DeviceN].[MeasurementJ],[DeviceN].[MeasurementK],[DeviceM].[MeasurementJ])$

To divide the fields in the aggregation formula, add a separator clicking on "Field separator" button.
 The aggregation function must terminate with the close bracket ")".

10 Chart

10.1 Creation of a chart (Chart→New)



The source data of a chart are the data collected from a specific datalog to be selected when creating the chart.
 The user needs to decide on the visibility through the "chart type" property:

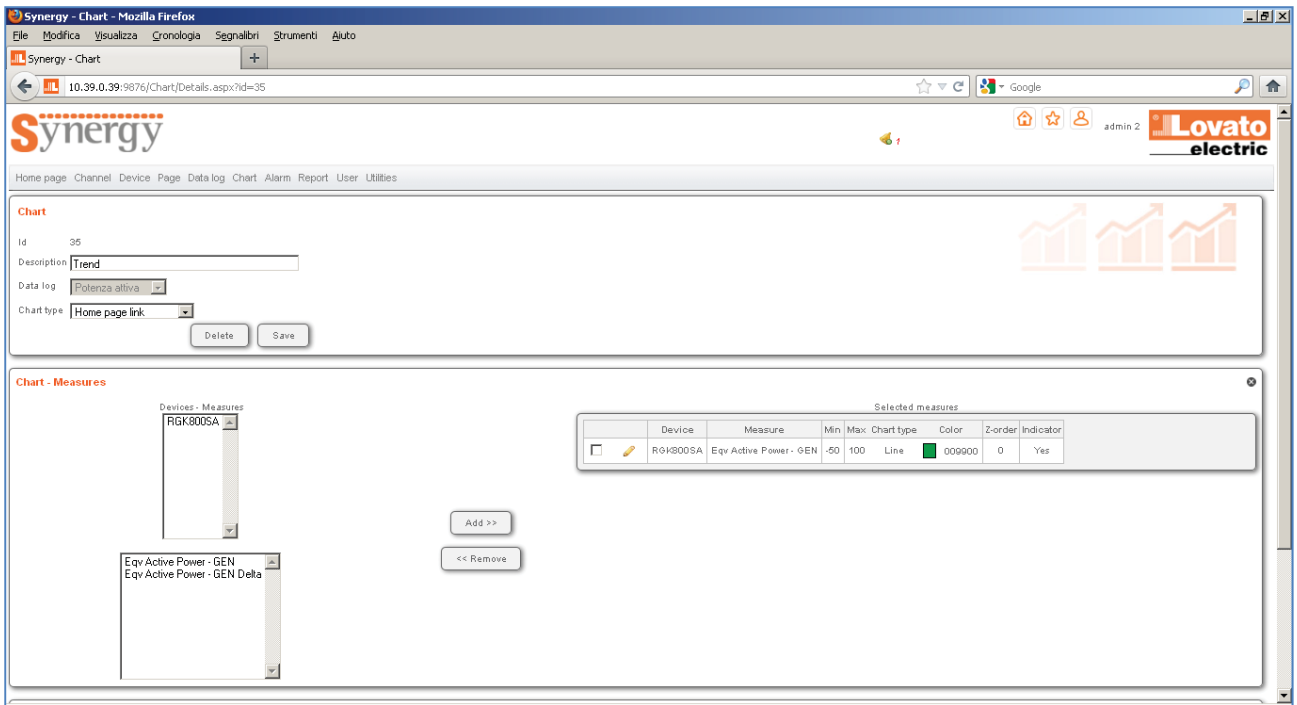
- **Home page link:** in the home page, a button with the name of the chart is created, being a direct link to the chart itself;
- **Home page link - Main:** it is a favourite chart, but the button is better highlighted with orange colour; the main chart is only one, if there is already one it loses its role as the main and becomes favourite.
- **Standard:** links are not created, the only way to access this type of chart is to go through the list (Chart→Show).

Once the chart is defined and saved, it is possible to add the measurements to display. Show the chart (Chart→Show) and press the button . The page that appears lets the user define the measurements included in the chart and configure the appearance.

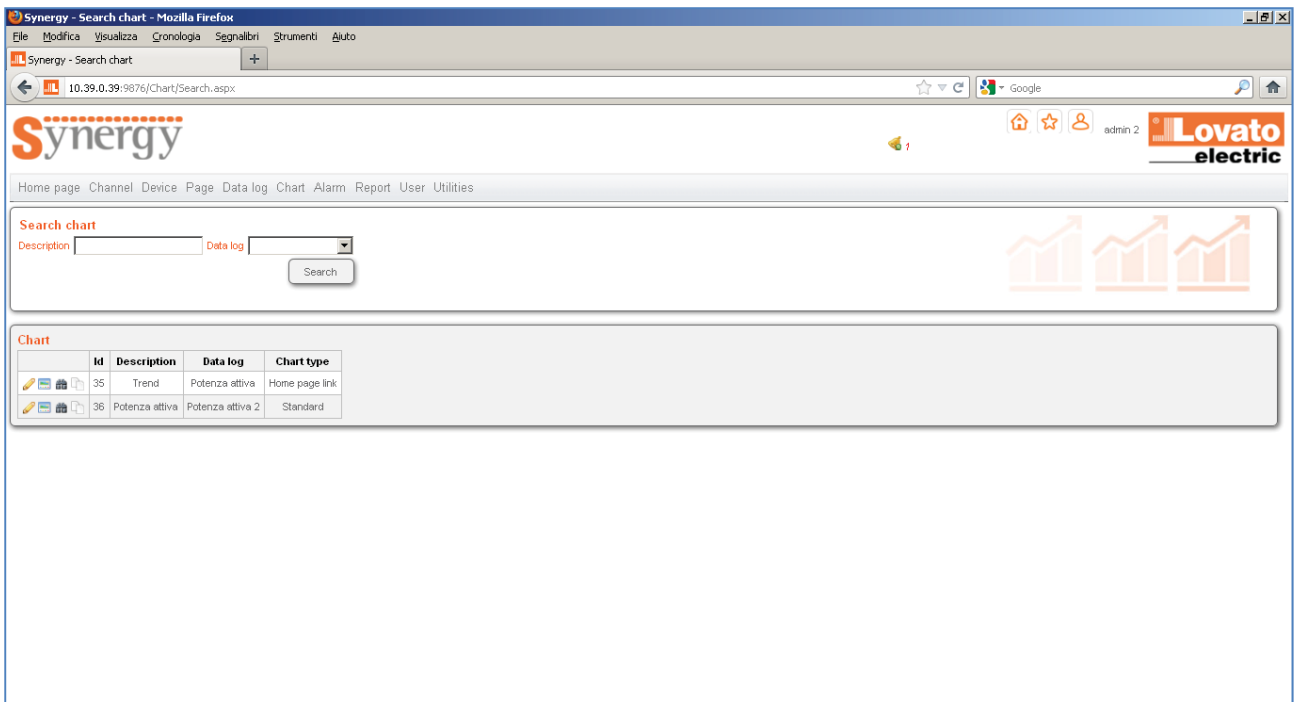
	Device	Measure	Min	Max	Chart type	Color	Z-order	Indicator
<input type="checkbox"/>	RGK800SA	Eqv Active Power - GEN	-50	100	Line	009900	0	Yes

Annotations in the image:

- Chart type (column, point, line) points to the 'Chart type' column.
- Visibility in the indicators of graphical pages points to the 'Indicator' column.
- Full scale points to the 'Min' and 'Max' columns.
- Colour points to the 'Color' column.
- Z-order with respect to the others points to the 'Z-order' column.



10.2 Showing and modifying a chart (Chart → Show)



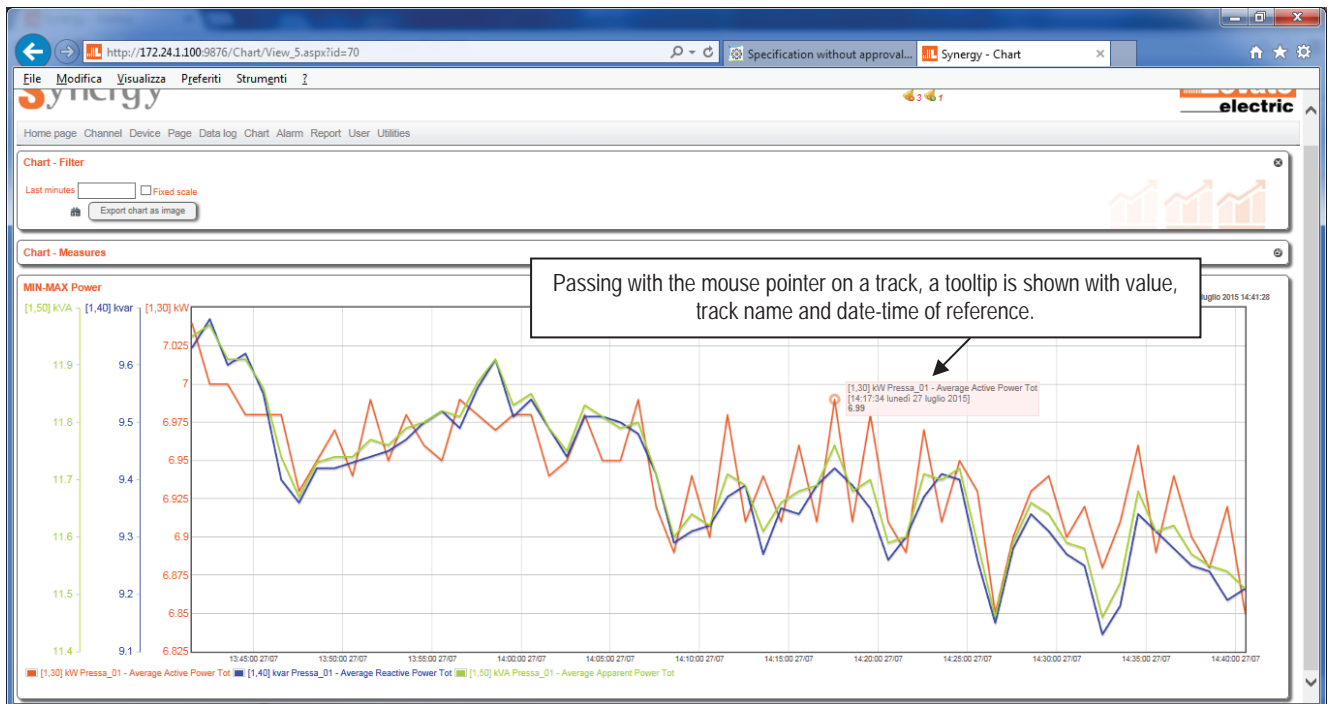
In the chart list the following functions are available:

- chart modification;
- live data visualisation;
- historic data search and visualisation;
- chart copy: a copy of the chart is generated; the function is useful when charts with small differences are required, for example if the visibility in the graphical page indicators is the only difference.

10.3 Live data visualisation

What follows refers to Synergy from release 5. This page displays the chart based on the latest readings. The page reloads the data automatically and periodically.

The chart can be exported as an image by pressing the "Export chart as image" button. The image is prepared: right-click the mouse pushbutton and select "save image as" to create the image file on your PC, or left-click to cancel the operation.



The chart can show more than one vertical scale. A new vertical scale is generated for each different vertical range (that is when at least one of MIN or MAX fullscale values are different) and for each unit of measure.

For example, if on a chart the following must be plotted:

1. Equivalent active power – plant 1, scale 0...100 kW
2. Equivalent active power – plant 2, scale 0...100 kW
3. Equivalent reactive power – plant 1, scale 0...100 kvar
4. Equivalent reactive power – plant 2, scale 0...50 kvar

three scales are generated:

- scale 1, **0...100kW**, reference for track 1 and 2 which share the unit of measure (kW) and range (0...100);
- scale 2, **0...100kvar**, reference for track 3, which shares the range (0...100) with track 1 and 2, but the unit of measure is different (kvar);
- scale 3, **0...50kvar**, reference for track 4, which shares the unit (kvar) with track 3, but the range is different (0...50).

Every scale is represented with the color of the track. If the scale is shared, the scale color is inherited by the track with the highest value for the "Z-order" property (it means foreground level).

Some more options are available:

- Last minutes: field where the user can set how many minutes in the past must be shown starting from the moment of visualisation; if the field is left blank, 60 minutes are considered;
- Fixed scale: with the option selected, the chart is shown with the vertical ranges indicated during the set of tracks, otherwise the scales are dimensioned according to the track values to better use the chart height.




10.4 Historic data visualisation

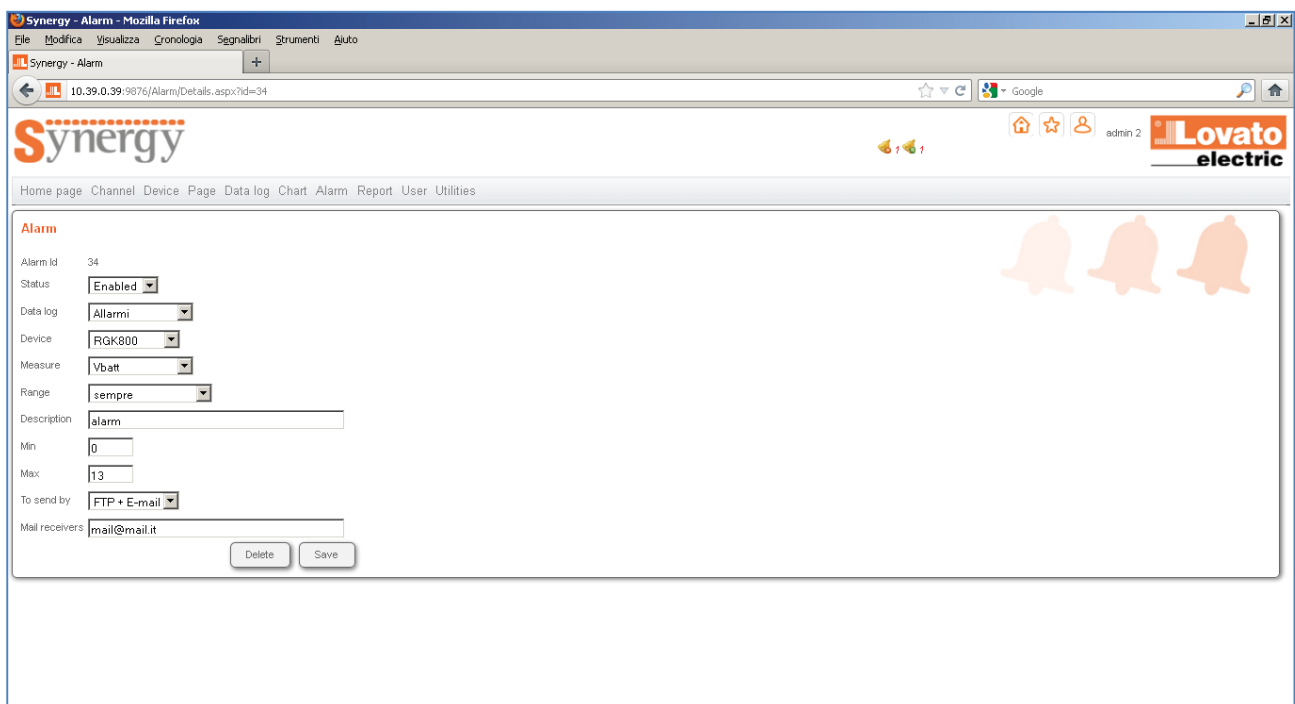
On this page a chart displaying data referred to a time window can be viewed. The graph can be exported as an image by pressing the "Export chart as image" button. All the other functions are the same described for live data visualisation. Moreover, it is possible to zoom in along the time axis, going to the beginning of the time range of interest with the mouse pointer and then keeping down the left button up to the end of the time range itself.

11 Alarm

11.1 Creation of an alarm (Alarm → New)

On data collected from a datalog an alarm can be activated by setting the limit values of a measurement with MIN and MAX fields. If the measurement sample is below the minimum or above the maximum limit, an alarm is generated and notified:

- with the symbol  in the upper right corner of every page; close to the symbol the number of open alarms is indicated;
- in the last 10 alarm list in the home page ;
- in the complete list of alarms ( Alarm → Measures alarm list);
- by e-mail or to an FTP server (Synergy is an FTP client).



The screenshot shows the 'Alarm' configuration page in a Mozilla Firefox browser. The page title is 'Synergy - Alarm'. The browser address bar shows '10.39.0.39:9876/Alarm/Details.aspx?id=34'. The page features the Synergy logo and navigation links: Home page, Channel, Device, Page, Data log, Chart, Alarm, Report, User, Utilities. The 'Alarm' configuration form includes the following fields:

- Alarm Id: 34
- Status: Enabled (dropdown)
- Data log: Allarmi (dropdown)
- Device: FGK800 (dropdown)
- Measure: Vbatt (dropdown)
- Range: sempre (dropdown)
- Description: alarm
- Min: 0
- Max: 13
- To send by: FTP + E-mail (dropdown)
- Mail receivers: mail@mail.it

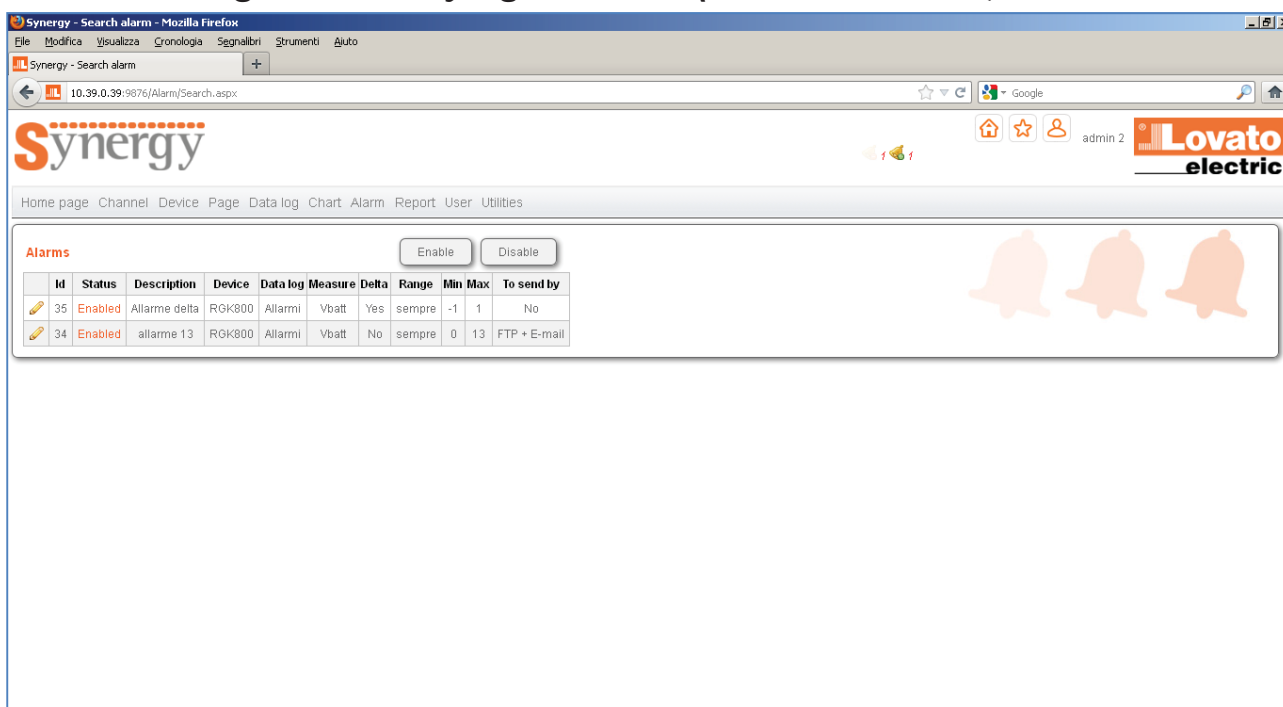
At the bottom of the form are 'Delete' and 'Save' buttons. In the top right corner of the page, there are three alarm bell icons, indicating the number of open alarms.

The receivers of the notification mail are customised for each alarm (enumerate more than one e-mail address by separating them with a comma).

An alarm configuration is active within a time range (see below how to configure a time range): it means if a measure goes out of set limits, the alarm notification appears only if within the associated time range.


Once the alarm referring to a data log has been created, if any chart based on the same data log exists, using the configuration options of the chart the user can add in it horizontal lines indicating the minimum and maximum thresholds for the monitored measurement.

11.2 Showing and modifying an alarm (Alarm → Show)











In this page the alarm properties can be modified clicking on .

11.3 Alarm event visualisation (Alarm → Measures alarm list)

On this page, which can be also entered through  icon in the upper right corner, alarm events that have occurred and registered in the system are shown.

Starting from software release 4, Synergy identifies with different symbols the alarms according to the following table which defines active, reset, recognised and closed alarms.

Type of alarms	In progress or ended alarm?	Acknowledged or not alarm?	Notification area symbol	Symbol in the tables
Active alarm	In progress	Not acknowledged		
Reset alarm	Ended	Not acknowledged	No symbols	
Recognised alarm	In progress	Acknowledged		
Closed alarm	Ended	Acknowledged	No symbols	

By default, only the open (active, reset and recognised) alarms are shown. The search filter can be modified to select events to be displayed. For each alarm, the time stamp and relevant values of the measurement for the begin and end of the alarm are recorded. Clicking on  symbol, the alarm is acknowledged and the symbol shown becomes , while the name of the user who made the action is noted. It is possible to cancel the acknowledgement clicking on : the symbol comes back to , but the last user acting on the alarm is recorded.

Alarms - Filter

Alarm status: Device: Alarm:

From: : To: :

Id	Device	Alarm	Measure	Min	Max	Alarm starting date	Starting value	Alarm ending date	Ending value	User
330	RGK800	allarme 13	Vbatt	0	13	7/29/2014 4:37:00 PM	14.47			
280	DMG800-M3	export	V EGV	0	100	7/23/2014 10:03:03 AM	276.18			Mr Administrator

The list of alarm events can be exported in Excel format (.xlsx) by pressing the "Export to XLS" button. In the home page the last 10 active, reset and recognised alarms are listed.

11.4 Communication alarm visualisation (Alarm → Communication alarm list)

Starting from Synergy V4, entering this page, a system log is available with all the events relevant to device communication errors, leading to the network diagnostic.

Search system log

Type: User login User logout Channel enabled Channel disabled Device enabled Device disabled Server switch on Server switch off Last reading result failed Last reading result success Last reading result unknown Command Write parameters Call attempt Connection established Connection closed by Synergy Connection closed

Device: From: : To: :

Id	Date	Description
10637	7/29/2014 3:15:49 PM	RGK800: Last reading result success
10632	7/29/2014 1:13:10 PM	DMG800-M3: Last reading result failed
10633	7/29/2014 1:13:10 PM	DMG800-M3: Last reading result success
10631	7/29/2014 11:11:39 AM	RGK800: Last reading result failed
10629	7/29/2014 11:06:58 AM	RGK800: Last reading result success
10628	7/29/2014 11:06:58 AM	RGK800: Last reading result failed
10627	7/29/2014 11:04:06 AM	RGK800: Last reading result success
10626	7/29/2014 11:04:06 AM	RGK800: Last reading result failed
10624	7/29/2014 10:54:55 AM	RGK800: Last reading result success
10616	7/29/2014 8:35:59 AM	RGK800: Last reading result failed

12 Report

12.1 Introduction

The reports are post-processed data starting from the data collected through the data log set in Synergy. Therefore, they are not a further data collection from devices which increases the network traffic, but they take advantage from the contents of the database. The immediate advantage is that a report can be created, modified and deleted without the risk of losing or affecting the data collected by Synergy.

The starting point for the management of reports are the time range (simply called "range" in Synergy), that is periods of time which serve as a filter for the collected data. The ranges are also properties used by the alarm functions as described above. Reports are available starting from Synergy release 4.

12.2 Creation of ranges (📄 Report → New range)

A range is a filter whose mesh is made by the hours of the day, the days of the week and the months of the year. Range examples are:

- 1) all the days, from 8:00am to 5:00pm;
- 2) from Monday to Friday;
- 3) December;
- 4) all Sundays from 3:00pm to 5:00pm;
- 5) ...

Furthermore, a time range has a period of validity which can be well confined between a start date and an end date, or it may be mobile, such as the last week or last month starting from the time of analysis, or it may not have a beginning and an end.

By accessing the creation function of the range, the user can set all the properties described above.

The screenshot displays the Synergy web application interface for creating a range. The browser window title is "Synergy - Range" and the address bar shows the URL "10.39.0.39:9876/Report/DetailsRange.aspx". The Synergy logo is prominently displayed on the left, and the user is logged in as "Mr Administrator" on the right. The interface is divided into two main sections: "Range" and "Filter".

The "Range" section includes a "Description" text input field. Below it, the "From" section has three radio button options: "Always" (selected), "From" (with a time input field), and "To" (with a time input field and a "Days" dropdown menu). The "To" section has two radio button options: "To" (with a time input field) and "Now" (selected). A "Save" button is located at the bottom of this section.

The "Filter" section includes a "From" time picker (HH:MM:SS) and a "To" time picker (HH:MM:SS). Below these are two dropdown menus for "Days" (set to "Sunday") and "Months" (set to "January"). To the right, there are three buttons: "All hours", "All days", and "All months", each with an "AND" operator. A "Remove from the filter" button is also present.

The first operations to be performed are the typing of a description which will identify the range in the software when used in other functions, and the definition of the validity period, which by default is set to:

- "from": always
- "to": now

which is the typical case with the range always valid (active).

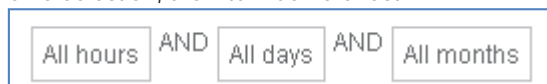
If the other fields are selected, that is one of the options available for property "from" and one of the options of the property "to", because all combinations are valid, the user can create different types of validity periods:

- 1) from 2014 January 30th to now;
- 2) from 2014 April 1st to 2014 April 30th;
- 3) from "last 7 days" to now;
- 4) from "last 15 days" to 2014 March 25th;
- 5) ...

After the determination of the validity period, the user is required to save the information by clicking on the button



The next step is the application of the filter made by the hours of the day, the days of the week, the months of the year or any combination of these. If there is no selection, the filter has no effect.



The filter logic makes the homogeneous selections valid at the same time (logic OR), while the created groups are intersected among them (logic AND). In other words:

- 1) all selections of hours of the day are valid at the same time;
- 2) all selections of the days of the week are valid at the same time;
- 3) all selections of the months of the year are valid at the same time;
- 4) hours of the day, the days of the week, the months of the year are crossed among them.

Examples.

- 1) (8:00 – 11:59, 15:00 – 16:59) AND (Monday) AND (All months).
The involved data are the ones collected on Monday, from 8:00am to 12:00am (11:59:59" p.m.) or from 3:00pm to 5:00pm (4:59:59" p.m.).
- 2) (8:00 - 16:59) AND (All days) AND (All months).
The involved data are the ones collected all the days from 8:00am to 5:00pm (4:59:59" p.m.).
- 3) (15:00 – 19:29) AND (Monday, Tuesday, Wednesday) AND (January, February).
The involved data are the ones collected all Mondays, Tuesdays and Wednesdays of January and February, from 3:00pm to 7:30pm (7:29:59" p.m.).

Note the use of 0-24 hour format for hours.

The ranges are typically used to determine the energy consumption within different energy tariffs.

ENERGY TARIFF	DAYS	HOURS
F1	From Monday to Friday	8:00am – 7:00pm
F2	From Monday to Friday	0:00am – 8:00am and 7:00pm – 12:00pm
	Saturday and Sunday	0:00am – 12:00pm

In Synergy a range for each of the three combinations in the table must be created (F2 consists of two "sub ranges").

Energy tariff F1.

- 1) Report → New range.

Range

Description

From Always
 From
 Last Days

To To
 Now

- 2) Click on , then on
- 3) Select hours from 8:00 to 18:59, click on
- 4) Select days Monday, Tuesday, ..., Friday adding each of them by clicking on

Filter

From 08 : 00 To 18 : 59

AND AND

- 5) Click on

Energy tariff F2.

F2 is made of two ranges, the former for days from Monday to Friday during the night, the latter for weekends.

Range

Description

From Always
 From
 Last Days

To To
 Now

AND AND

Range

Description


From Always
 From
 Last Days

To To
 Now

AND AND

If desired, the F2 ranges can be aggregated in a table as described below.

12.3 Showing and modifying ranges (Report → Show range)

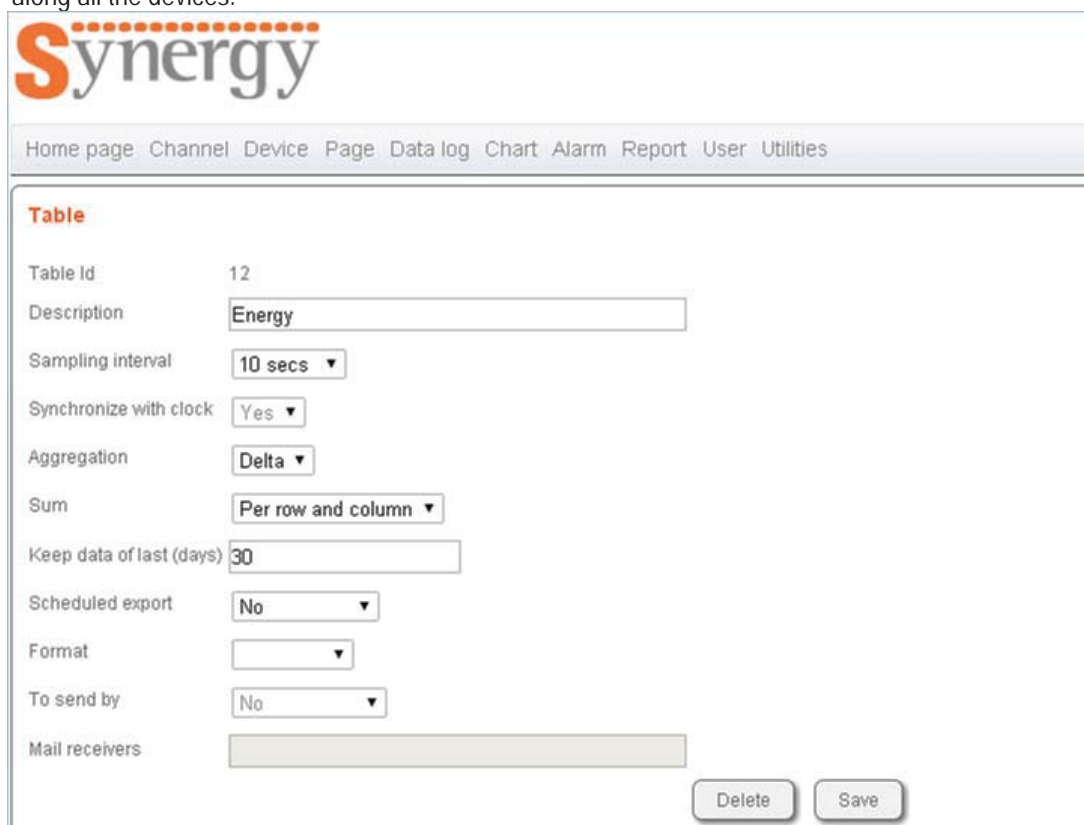
Access this section to search and modify the ranges clicking on .

In case of modification of a range, the collected data are not cancelled. The “visibility” is what changes.

12.4 Creation of tables (Report → New table)

The tables are different “views” of data collected in the data logs. In the same table it is possible to:

- join data belonging to different data logs;
- filter data with the time ranges;
- aggregate values to get the minimum, average, maximum and delta (that is the variation of the value) of each measures within each time range;
- sum the aggregate values (for example all the average values) of each device along all the time ranges;
- sum the aggregate values (for example the energy delta, that is the energy consumption) of each time range along all the devices.



Synergy

Home page Channel Device Page Data log Chart Alarm Report User Utilities

Table

Table Id: 12

Description: Energy

Sampling interval: 10 secs

Synchronize with clock: Yes

Aggregation: Delta

Sum: Per row and column

Keep data of last (days): 30

Scheduled export: No

Format:

To send by: No

Mail receivers:

Delete Save

The creation of a new table requires the filling of the following fields:

- description: free text identifying the table;
- sampling interval: time distance between a table updating and the following;
- synchronize with clock: this property is fixed and binds the measures recording to PC clock (for example, if a sampling interval of 30 seconds is selected, the data are synchronised with the value of seconds as 00 and 30);
- aggregation: choice of the type of aggregation for the data in the table among the options of minimum, maximum, average or variation (delta) of the value;
- sum: option to sum the data relevant to a measure of a device in a data log (rows) along the time ranges and/or the data relevant to all the measures in a time range (column);
- keep data of last (days): time depth of the table;
- scheduled export: option to get the data table to be exported to an Excel worksheet or in a text file; the export operation can be performed daily, weekly or monthly and should generally be more frequent than the time specified in the previous point;

- format: choice of the file type for the data export, Excel or text files;
- to send by: the exported files can be sent via e-mail or to a FTP server (Synergy is an FTP client);
- mail receivers: list of mail address which the exported table file is sent to (enumerate more than one e-mail address by separating them with a comma).

12.5 Showing and modifying tables (📄Report→Show table)

Once the user has defined and saved a table, the selection of Data logs–Devices–Measures triplets among all the ones generated by the created data logs can be made. In other terms, the columns with the data relevant to a measure of a device can be taken from different data logs.

In order to do this the table must be searched (📄Report→Show table) and the button 🖋 must be pressed. The page which appears lets the user indicate the time ranges of interest as well.

The screenshot displays the Synergy web interface for configuring a table. The 'Table' section includes the following fields:

- Table Id: 12
- Description: Energy
- Sampling interval: 10 sec
- Synchronize with clock: Yes
- Aggregation: Delta
- Sum: Per row and column
- Keep data of last (days): 30
- Scheduled export: No
- Format: [dropdown]
- To send by: No
- Mail receivers: [text input]

The 'Range' section shows:

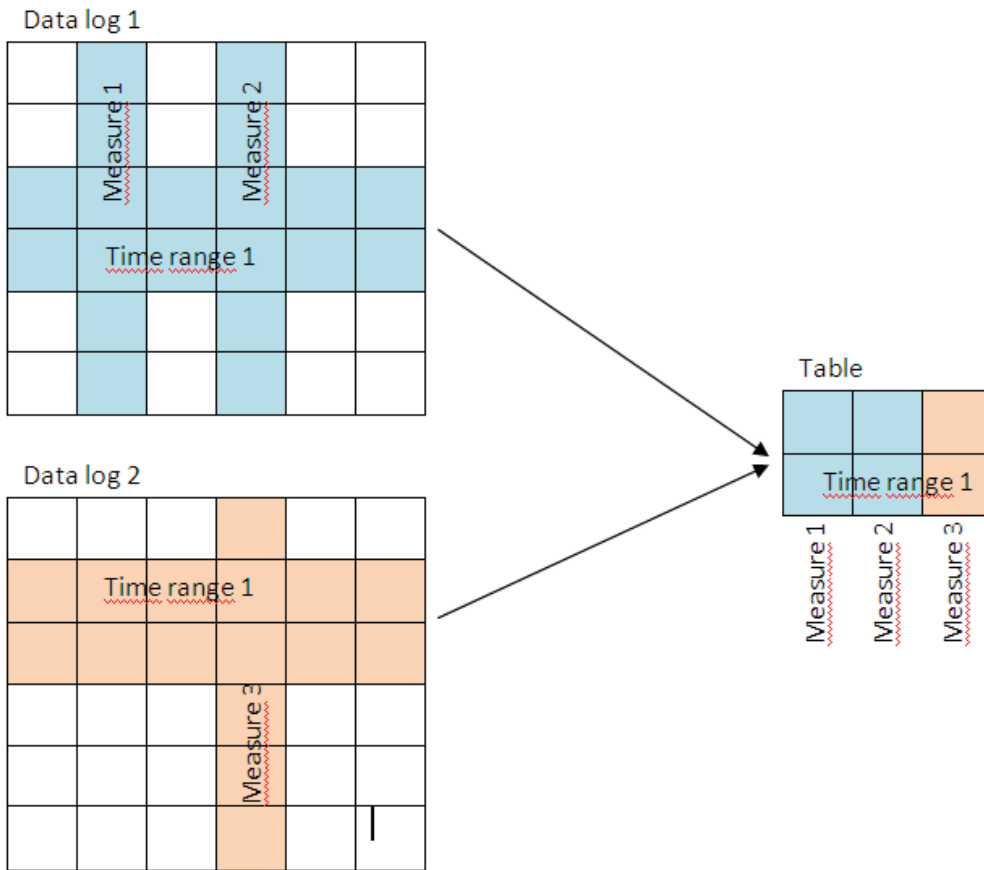
- Available ranges: No ranges
- Selected ranges: F1, F2 - Nights, F2 - Weekends

The 'Data logs - Devices - Measures' section shows:

- Available Data log/Device/Measure: [dropdown], [dropdown], kW EDV
- Selected Data log/Device/Measure:

Data log	Device	Measure
Energy consumption	DM0800-M3	kWh+
Power absorption	DM0800-M3	kW EDV

It is obtained a filter per rows (with the time ranges) and per columns (with the Data logs–Devices–Measures triplets) of all configured data logs. The result can be viewed by clicking on 📄Reports→Show table and then on 🖥 to see the last updates, or click on 📅 to retrieve the data for a period of interest. If, for example, two data logs are considered with two columns taken from the first one and one column taken from the second one (highlighted with colours) with a time range applied, the following result is got.



For each time range, a table with the same measures is automatically generated. By accessing the aggregated data updated in real time (Report→Show table +) or retrieved by date (Report→Show table +) , for all time ranges and all the measures maximum, minimum, average or delta values are available according to what selected in the "aggregation" property of the table. It could be useful to have multiple tables which differ from each other only for the type of aggregation. Each table can be exported by clicking on .

Search table												
		Id	Description	Sampling I.	Synchronize with clock	Days	Scheduled export	Format	To send by	Aggregation		Sum
		12	Energy	10 secs	Yes	30	No		No	Delta		Per row and column
		15	Average power	10 secs	Yes	30	No		No	Average		Per row and column
		14	Minimum power	10 secs	Yes	30	No		No	Min		Per row and column
		13	Maximum power	10 secs	Yes	30	No		No	Max		Per row and column

Energy

Pivot ranges				
Data log-Device-Measure	F1	F2 - Nights	F2 - Weekends	Total
Energy consumption-DMG800-M3-kWh+	1381.53	1258.69	672.89	3313.11
Chiller energy-DMG800-M3-kWh+	1211.92	1206.46	500.07	2918.45
	2593.45	2465.15	1172.96	

Average power


Pivot ranges				
Data log-Device-Measure	F1	F2 - Nights	F2 - Weekends	Total
Power absorption-DMG800-M3-kW EQV	91.89	91.09	92.76	275.74
Chiller power absorption-DMG800-M3-kW L1	31.9	31.9	31.9	95.7
	123.79	122.99	124.66	

Minimum power

Pivot ranges				
Data log-Device-Measure	F1	F2 - Nights	F2 - Weekends	Total
Power absorption-DMG800-M3-KW EQV	35.04	35.04	91.09	161.17
Chiller power absorption-DMG800-M3-KW L1	12.27	12.27	31.9	56.44
	47.31	47.31	122.99	

Maximum power

Pivot ranges				
Data log-Device-Measure	F1	F2 - Nights	F2 - Weekends	Total
Power absorption-DMG800-M3-KW EQV	490.5	140.14	490.5	1121.14
Chiller power absorption-DMG800-M3-KW L1	49.07	49.07	31.9	130.04
	539.57	189.21	522.4	

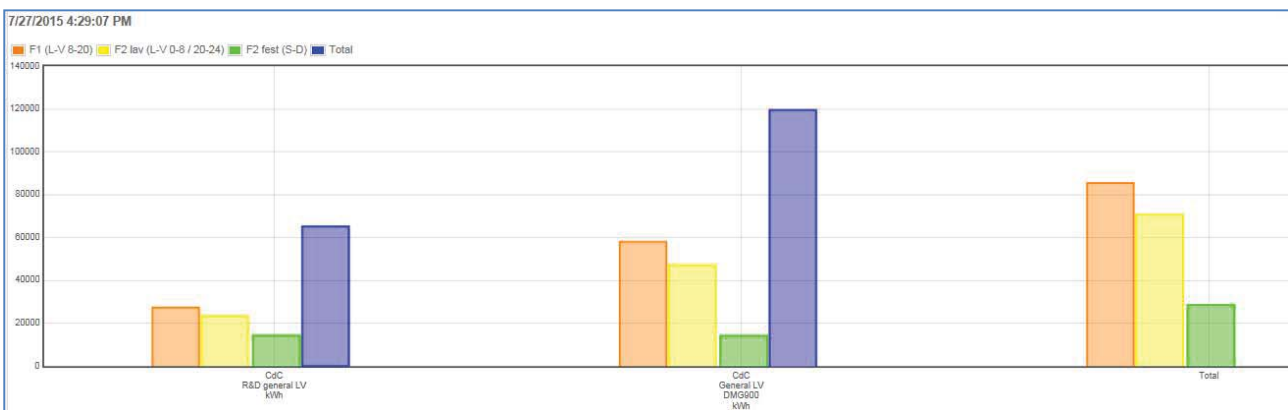
Moreover, starting from Synergy release 5, limited to historical data (Report→Show table + ) , the same tables can be represented with pie and column charts. All charts can be exported as an image.

To see the charts, it is necessary to enable the selection closed to the chart of interest. The selections are available for columns if the sum by columns is enabled, while the selections for row are available if the sum by rows is enabled.

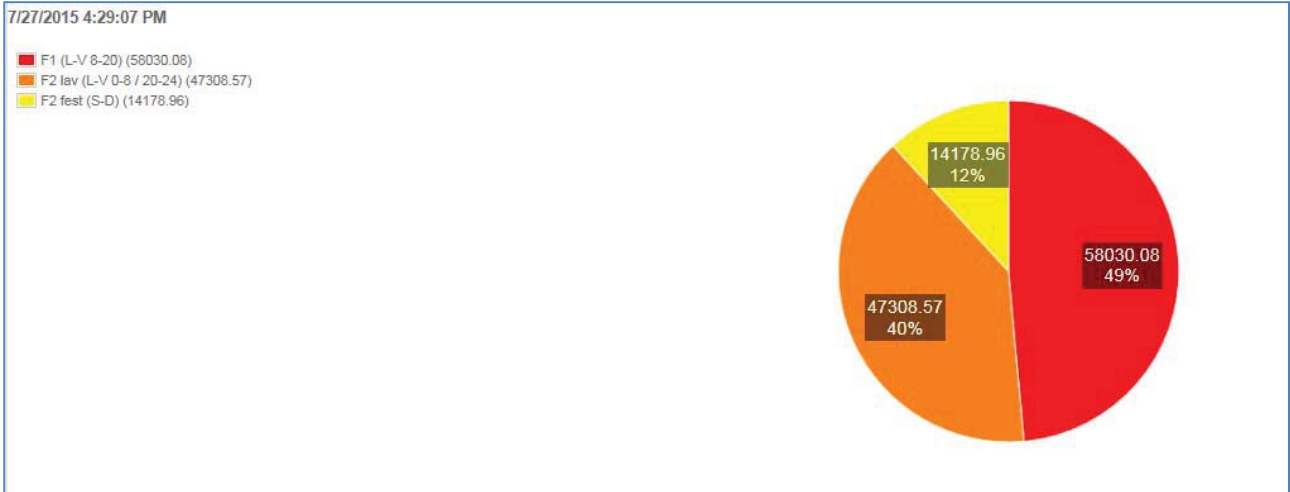
<input checked="" type="checkbox"/> Data log-Device-Measure	<input checked="" type="checkbox"/> F1 (L-V 8-20)	<input type="checkbox"/> F2 lav (L-V 0-8 / 20-24)	<input type="checkbox"/> F2 fest (S-D)	<input type="checkbox"/> Total
<input type="checkbox"/> CdC-R&D general LV-kWh	27385.38	23448.47	14300.05	65133.9
<input checked="" type="checkbox"/> CdC-General LV - DMG900-kWh	58030.08	47308.57	14178.96	119517.61
<input type="checkbox"/> Total	85415.46	70757.04	28479.01	

In the example above, The column chart for the whole table Data log-Device-Measure and the pie charts for General LV – DMG900 and F1 range (From Monday to Friday, from 8a.m to 8p.m.) have been selected. Automatically the following three charts are generated.

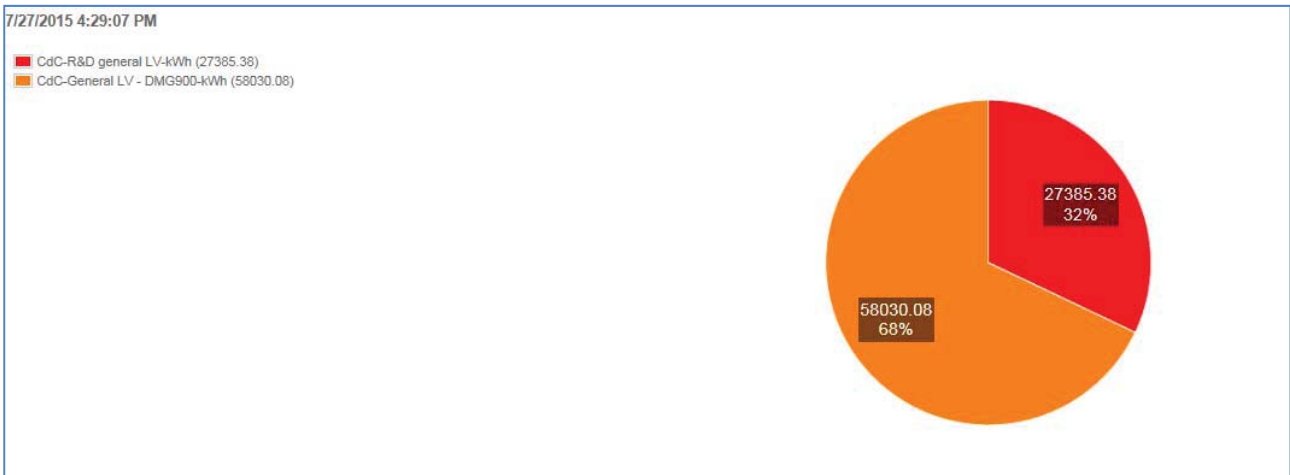
Column chart for the whole table Data log-Device-Measure: for both the devices in the table and for the sum of them the aggregate values are represented for each range and total in different colors. In case of energy consumption, the distribution of the consumption along the ranges can be analysed for all the loads monitored by the devices.



Pie chart for device General LV – DMG900: for this device, the aggregate values are represented with different colors in absolute and percentage values in the pie. In case of energy consumption, it is possible to have a picture of the energy consumption distribution in the different time ranges for the loads monitored by the device.



Pie chart for time range F1: the aggregate values for this time range are represented with different colors in absolute and percentage values in the pie. In case of energy consumption, it is possible to understand how the energy consumed in a time range is divided among the loads monitored by the devices.



Lastly, if the automatic reports are enabled, more tables are available for analysis.

Daily report: for each device in the table, a new table is generated with the values calculated for all days of the week.

Daily report				7/27/2015 5:00:28 PM
CdC-R&D general LV-kWh	F1 (L-V 8-20)	F2 lav (L-V 0-8 / 20-24)	F2 fest (S-D)	Total
Monday	5556.16	4356.6	0	9912.76
Tuesday	5535.66	5137.94	0	10673.6
Wednesday	5438.82	4728.9	0	10167.72
Thursday	5709.54	4814.12	0	10523.66
Friday	5145.2	4410.91	0	9556.11
Saturday	0	0	7452.49	7452.49
Sunday	0	0	6847.56	6847.56
Total	27385.38	23448.47	14300.05	
CdC-General LV - DMG900-kWh	F1 (L-V 8-20)	F2 lav (L-V 0-8 / 20-24)	F2 fest (S-D)	Total
Monday	13506.97	7277.88	0	20784.85
Tuesday	10681.62	9867.8	0	20549.42
Wednesday	10741.48	9890.47	0	20631.95
Thursday	11124.45	9641.16	0	20765.61
Friday	12278.98	10631.26	0	22910.24
Saturday	0	0	9232.04	9232.04
Sunday	0	0	4946.92	4946.92
Total	58333.5	47308.57	14178.96	

Monthly report: for each device in the table, a new table is generated with the values calculated for all months of the year.

Monthly report				7/27/2015 5:01:58 PM
CdC-R&D general LV-kWh	F1 (L-V 8-20)	F2 lav (L-V 0-8 / 20-24)	F2 fest (S-D)	Total
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	0	0	0	0
June	0	0	0	0
July	27385.38	23448.47	14300.05	65133.9
August	0	0	0	0
September	0	0	0	0
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
Total	27385.38	23448.47	14300.05	
CdC-General LV - DMG900-kWh	F1 (L-V 8-20)	F2 lav (L-V 0-8 / 20-24)	F2 fest (S-D)	Total
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	0	0	0	0
June	0	0	0	0
July	58333.5	47308.57	14178.96	119821.03
August	0	0	0	0
September	0	0	0	0
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
Total	58333.5	47308.57	14178.96	

The new tables, which can be exported in the same Excel file of the main table, are useful to make comparisons between different periods, for example to verify the effects of an intervention on the system to improve the energy consumption.

13 Utilities

13.1 Licence

At the first run the application creates a temporary license file directly in the installation folder. For example, if the software has been installed in the default directory suggested by the setup, the file is:
 c:\Lovato Electric\Licence.xml

A temporary license lets the user work with all the Synergy functions available for a period of 60 days from installation. After this period, the software remains active only for the configuration of device parameters. To re-enable the functions, a new license is to be asked to the supplier by sending the activation code (Utilities → Licence).

The page shows the licence status as well:

- Group: go to www.lovatoelectric.com web page at the section dedicated to the software to verify which group the involved devices belong to;
- N. devices: number of devices set in Synergy; the license do not limit the number of devices which can be created, but their use determined by the "Licenced" property of the devices;
- N. activated device: number of devices selected by the administrator as licence owners;
- Licences: maximum number of devices which can be activated at the same time;
- Expiry date: date on which the licences are no longer valid;
- Export licence: verification of e-mail sending and FTP client usage licence activation;
- Activation code: licence code which must be used to get new licences.

The activation code must be communicated taking care to report it faithfully (pay attention to upper/lower case). For that reason it is recommended to proceed sending directly the current copy of the file Licence.xml in the directory indicated above.

Once the new license file Licence.xml with the new permissions is received, overwrite the previous version.

Licence

Group	No. devices	No. activated devices	Licences	Expiry date
1	1	1	9999	3/31/2014
2	0	0	9999	3/31/2014

	Status	Expiry date
Export licence	Enable	3/31/2014

Licence activation code **MTA2MDRCNUJENzkz**

13.2 Server

This page lets the user start and stop the server and set some parameters to configure the application.

The screenshot shows a web browser window with the URL `http://localhost:3876/Tools/Server.aspx`. The page title is "Synergy - Server". The browser's address bar shows the URL. The page content includes a navigation menu with links: Home page, Channel, Device, Page, Data log, Chart, Alarm, User, Utilities. The main content area is divided into four sections: "Server", "Server settings", "SMTP server", and "FTP server". Each section contains input fields and a "Save" button. The "Server" section has fields for "User" and "Password" and buttons for "Server status", "Run server", and "Stop server". The "Server settings" section has fields for "#Threads" (set to 5) and "Thread pause (ms)" (set to 20). The "SMTP server" section has fields for "SMTP server", "SMTP port", "SMTP user", "SMTP password", "Mail sender", and "Mail receivers". The "FTP server" section has fields for "FTP server", "FTP port", "FTP user", and "FTP password".

13.2.1 Server

To start and stop the server or check the status, enter the username and password of an administrator of the PC on which Synergy is installed and then press the button for the function required.

In case a restart of the server is needed, first stop it, then wait 10 seconds to allow an orderly shutdown and then start it.

Server

User \

Password

Windows users to run/stop the server

13.2.2 Server settings

Do not change these settings unless specific instructions from Lovato Electric.
Recommended values are:

- #Threads: 5
- Thread pause (ms): 20

If you need to change these parameters, proceed as follows:

1. stop the server (see par. 13.2.1);
2. change the parameters and save;
3. start the server (see par. 13.2.1).

Server settings

#Threads

Thread pause (ms)

13.2.3 Mail client settings (SMTP server settings)

To make the e-mail service available for the application, specify a valid mail outgoing server (SMTP). Contact your network administrator to know the correct configuration parameters.

The name shown in the "sender" field will appear as the sender of the e-mails from the system (not necessarily it has to be an existing email).

SMTP server

SMTP server

SMTP port

SMTP user

SMTP password

Mail sender

Mail receivers

13.2.4 FTP server settings

In order to enable the file transfer through FTP protocol, it is necessary to indicate a valid FTP server.
Contact your network administrator to know the correct configuration parameters.

FTP server

FTP server	<input type="text" value="ftp.domain.it"/>
FTP port	<input type="text" value="21"/>
FTP user	<input type="text" value="user"/>
FTP password	<input type="text" value="password"/>

13.3 Export definitions

The export definition function produces a *.zip file with complete definitions and images used in Synergy.

13.4 Import definitions

A *.zip file produced by the export function can be imported into other instances of Synergy through the import function. To import the file, press the "Select file" button and wait for loading (loading is finished when the file name appears on a green background). Press the "Import" button and wait for the import message occurred.

Find on website www.lovatoelectric.com (section dedicated to the software) some "scenarios", which are sets of definitions for typical configurations.

The imported scenarios must be "fitted" to the specific application. Step by step guides are also available on the website to help the user in the configuration.

13.5 Import drivers

To import the drivers, press the "Select File" button to select the XLS file downloaded from www.lovatoelectric.com website (section dedicated to software) and wait for the file upload (the upload is finished when the file name appears on a green background). Press the "Import" button and wait for the import message occurred.

13.6 Import language

In the standard installation of Synergy the user interface is available in 6 languages:

- Italian;
- English;
- French;
- Spanish;
- Russian;
- Polish.

On website www.lovatoelectric.com (section dedicated to the software) other languages are available. Use "Import language" function to import the file downloaded from the website. If the language already exists, it is overwritten, otherwise it is added to the other ones available for the users.

13.7 Import theme

Some of the features of the theme of the web pages of Synergy can be changed by modifying the style sheet. On the website www.lovatoelectric.com in the section dedicated to the software some style sheets (*.css file) which can be imported using the "Import theme" function are available.

13.8 Import logo

If the system administrator wants to introduce its own logo always present in every page of the web application, using the "Import logo" function the Synergy logo in the upper left corner can be replaced. The size of the file, *.png type, must be 215x70 pixels. The Lovato Electric logo can not be changed.

13.9 System log

The system log lists all important events, in order to monitor the use of the application.

13.10 System diagnostic

This page contains some useful diagnostic information in the event of malfunction.

If requested by Lovato Electric, copy the contents of the page and paste them into the body of an e-mail to be sent to the referring person in Lovato Electric.