WEB-SERVER
FOR PHOTOVOLTAIC APPLICATIONS

USER GUIDE
Ver. 3.5

sinapsi
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INDEX

1 INSTALLATION

1.1 INTRODUCTION

The present manual constitutes the complete guide for eSolar installation, configuration and commissioning; it is intended for technical staff with an average knowledge of electro-technology, computer science and the basing principles of networking on TCP/IP.

eSolar is a web server and it's a complete monitoring system for the devices present on a photovoltaic plant such as inverters, string controllers, electrical energy meters, solar radiation sensors, temperature, wind, KNX applications etc.
For eSolar configuring and consulting it's necessary a web browser like Google Chrome Ver. 29.0.1547.66, Microsoft Internet Explorer Ver. 10.0 or Mozilla Firefox Ver. 23.0.1 or following installed on own PC. It's necessary install Flash Player Ver. 12.0.0.43 or following too.

Please read the note to follow

- Locate the system behind firewalls, and isolate them from the business network.
- For remote access to system we suggest to employ secure methods, such as Virtual Private Networks (VPNs), recognizing that VPN is only as secure as the connected devices.

1.2 PACKAGE CONTENTS

The eSolar packaging contains:

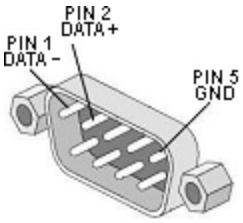
- 1 eSolar
- power supply cable for connection to the electrical net
- 1 connector for KNX bus connections
- kit for DIN rail connection
- kit for connection on level surface
- 1 CD-ROM containing the present manual

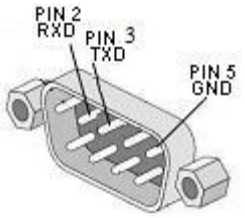
1.3 TECHNICAL CHARACTERISTICS

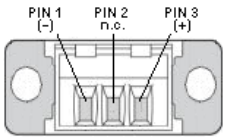
The hardware of the eSolar is fan-less embedded with standards manufacturing realization without moving parts; the reduced size, the reduced electrical consumptions and absolute silence make it ideal for monitoring applications which require characteristics such as robustness and reliability in time, allowing installation both in technical and living environments.

The following table and the following Figure 1 report in shorts the product characteristics:

eSolar CONNECTIONS TABLE

<table>
<tr><td>Ports and connections</td><td>
1 X 100 to 230VCA electrical power supply
2 X RS-485 (COM1 – COM3) - 9 pin D-sub :
<table>
<tr><td>pin 1</td><td>Data -</td></tr>
<tr><td>pin 2</td><td>Data +</td></tr>
<tr><td>pin 5</td><td>GND</td></tr>
</table>


1 X RS-232 (COM4) - 9 pin D-sub :
<table>
<tr><td>pin 2</td><td>RXD</td></tr>
<tr><td>pin 3</td><td>TXD</td></tr>
<tr><td>pin 5</td><td>GND</td></tr>
</table>


1 X KNX Interface:
<table>
<tr><td>pin 1</td><td>-</td></tr>
<tr><td>pin 2</td><td>Not used</td></tr>
<tr><td>pin 3</td><td>+</td></tr>
</table>


1 X RJ-45 port for 10/100 Base-T Ethernet [Communication]
[Communication port – default IP: 192.168.1.110]
1 X RJ-45 port for 10/100 Base-T Ethernet (with Logo)
[Service port – IP not changeable: 192.168.1.100]
3 X USB
1 X DB25 D-Sub connector [Not enabled]
1 X VGA [Not enabled]
1 X PS/2 connector [Not enabled]
</td></tr>
<tr><td>Consumption</td><td>Typical 16W (70W Max.)</td></tr>
<tr><td>Operating temperature range</td><td>-20°C to 50°C</td></tr>
</table>

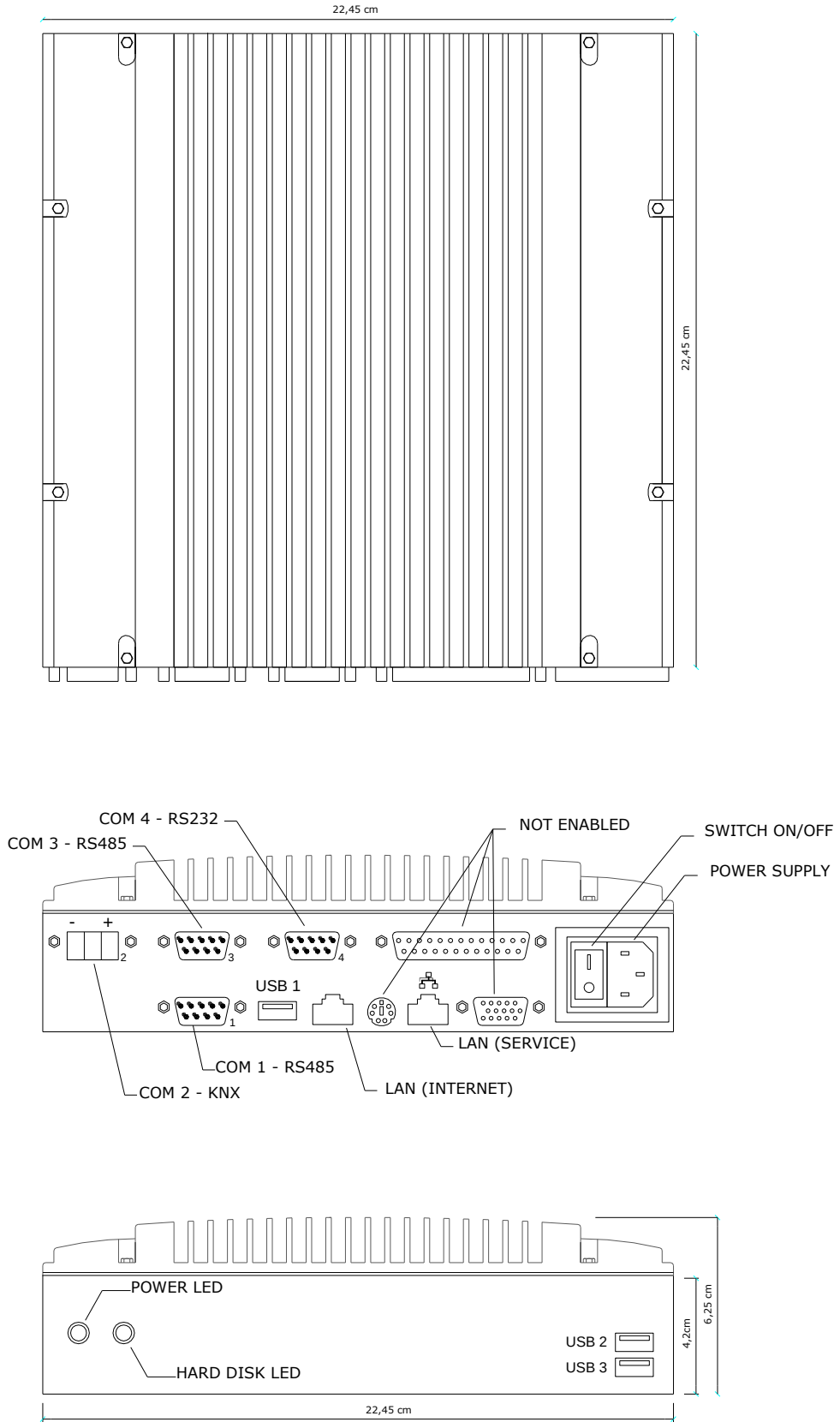


Figure 1 - eSolar Characteristics and Sizes

1.4 ASSEMBLY AND CONNECTIONS

Before installing eSolar refer to the compatibility table; the table is downloadable under the DOC documentation section, see Cap. 3.1.3

- Connect the device to the RS-485 communication ports. The devices' communication interfaces must be connected in parallel topology (Figure 2) according to what is prescribed by standards RS485 line.

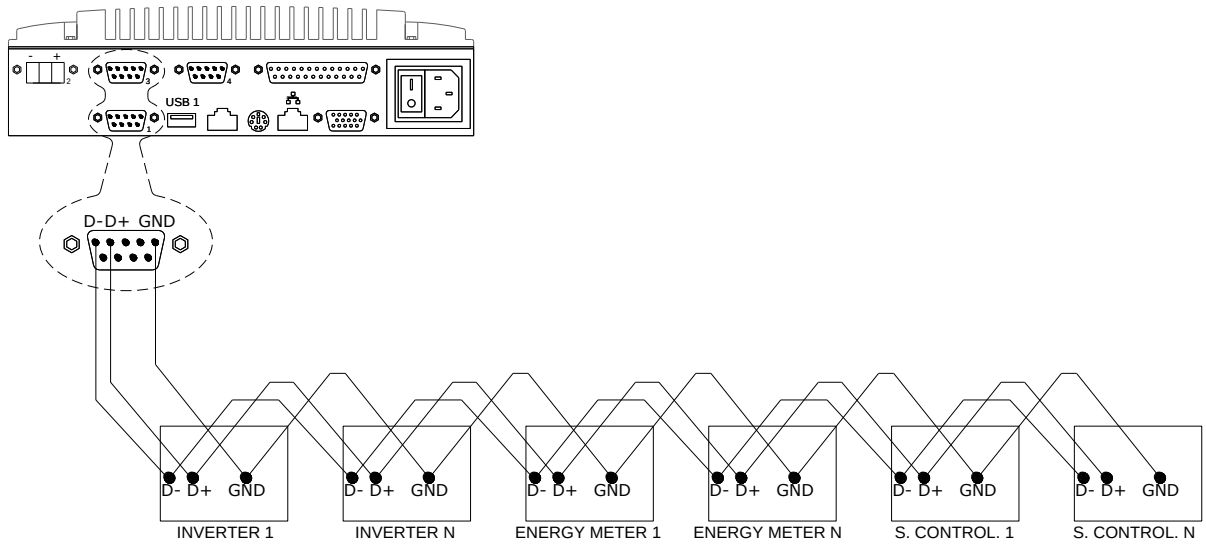


Figure 2 - RS-485 Bus Connection

We suggest ***DO NOT exceed a length of 500m for the communication bus RS-485 and DO NOT exceed a length of 3 m for the communications line RS-232***. Don't make star connections or loops. We recommend the use a cable 2x2x0, 22mmq, twisted and shielded. ***Never connect the shield to the ground***.

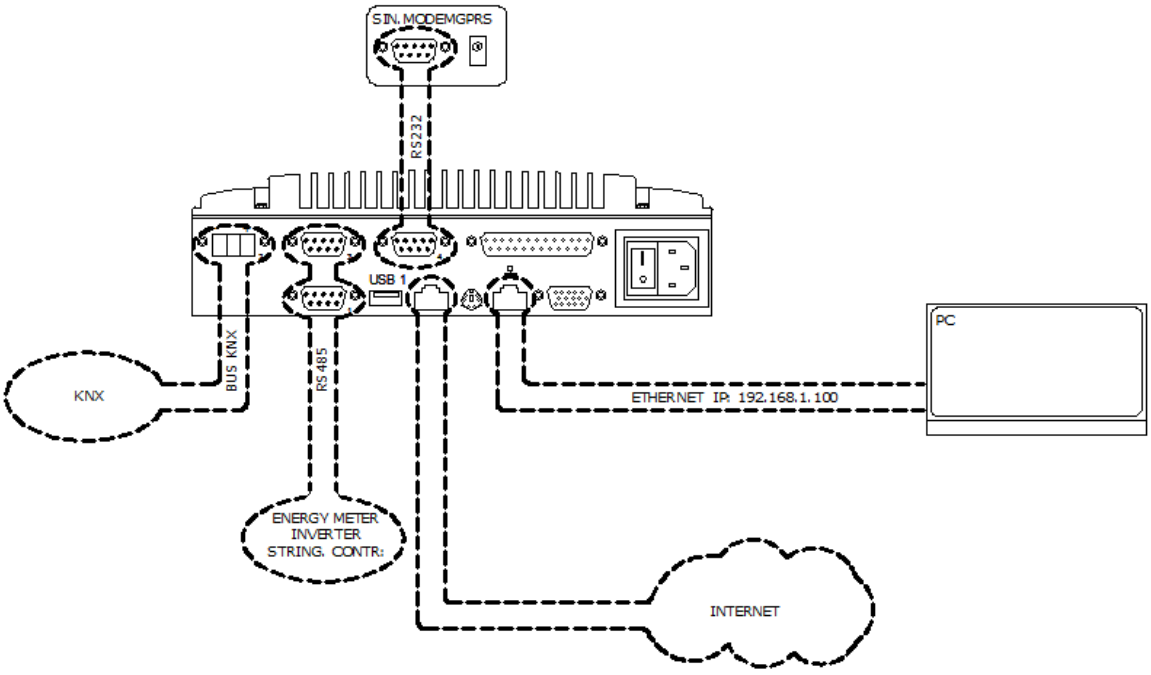
> For a plant where the RS485 line exceed 500m we suggest you to use a RS-485 REPEATER. This device is useful for protects the device too

The slave devices can communicate with different communication parameters; these are already preconfigured in eSolar according to their default value declared by the manufacturer.
If there are devices with RS-232 communication port is necessary to adopt the RS232->RS485 converter if you want to connect the device to the RS85 communication ports (COM1, COM3); You can also use the communication port RS232 COM4, in this case make attention to the distance

- Connection to the LAN via standard Ethernet cable, using the LAN port without the logo ( ). This port is configured with default IP address 192.168.1.110.
- (Optional) Connect the GSM modem via RS232 cable to COM4 for alarm notification via SMS.
- (Optional) Connect the KNX cable to COM2 with the green connector supplied with the machine. Note: respect the nomenclature on connector: - Black wire; + Red wire.
- Connect the AC power supply at 230V using the supplied cable

By bringing the switch-on power supply button to "1", the frontal LEDs light up, green and orange respectively indicate the presence of power and the activity of the eSolar mass storage; also, upon network cable connection, the LEDs in correspondence to the corresponding ethernet port light up (if there are no problems on the LAN network).

Once eSolar is connected and powered, wait a few minutes (typically 2 minutes) and access its configuration web pages according to what is specified in the following chapter.


SIN. MODEMGPRS
RS232
USB 1
BUS KNX
RS 485
KNX
PC
ETHERNET IP: 192.168.1.100
ENERGY METER
INVERTER
STRING. CONTR:
INTERNET

2 GENERAL OVERVIEW

2.1 WHAT IS ESOLAR

Since eSolar is based on web technology, it follows the same prerogatives as a common internet website; the display of data and the status of devices installed in the system (inverters, strings, environmental sensors) happens through AJAX technology (Asynchronous JavaScript and XML), which enables a automatic web page refresh.

2.2 SYSTEM ACCESS

To access the system, it is necessary to establish a network connection between the own PC and eSolar **using the LAN port with the logo;** it is possible to proceed in two ways:

- Connect own your PC with eSolar using a cross network cable.
- Connect own your PC and eSolar to the same local network.

The default address is **192.168.1.110** eSolar; make sure your PC has the same class of network with netmask **255.255.255.0**.

> The modality to check/configure the network settings of the PC used to connect to eSolar depends by the operating system installed on the PC.

Digit on own internet browser the following IP:

http://192.168.1.110

The following access page will be displayed (Figure 3):

Figure 3 - System access page

Access the login page by selecting the key “REGISTERED USERS” (Cap. 3.11):
The predefined user and relative password are:

Username	Password	User type
admin	admin	Administrator

To avoid undesired access by third parties, we recommend to change the predefined password. The procedure to change the password is reported in chapter 3.11.

2.3 HOME PAGE

The following figure shows the Home Page of eSolar (Figure 4). For more detail refer to 4. The possible visualizations are

- Photovoltaic Production
- Plant Energy flow
- Plant Energy balance (optional)

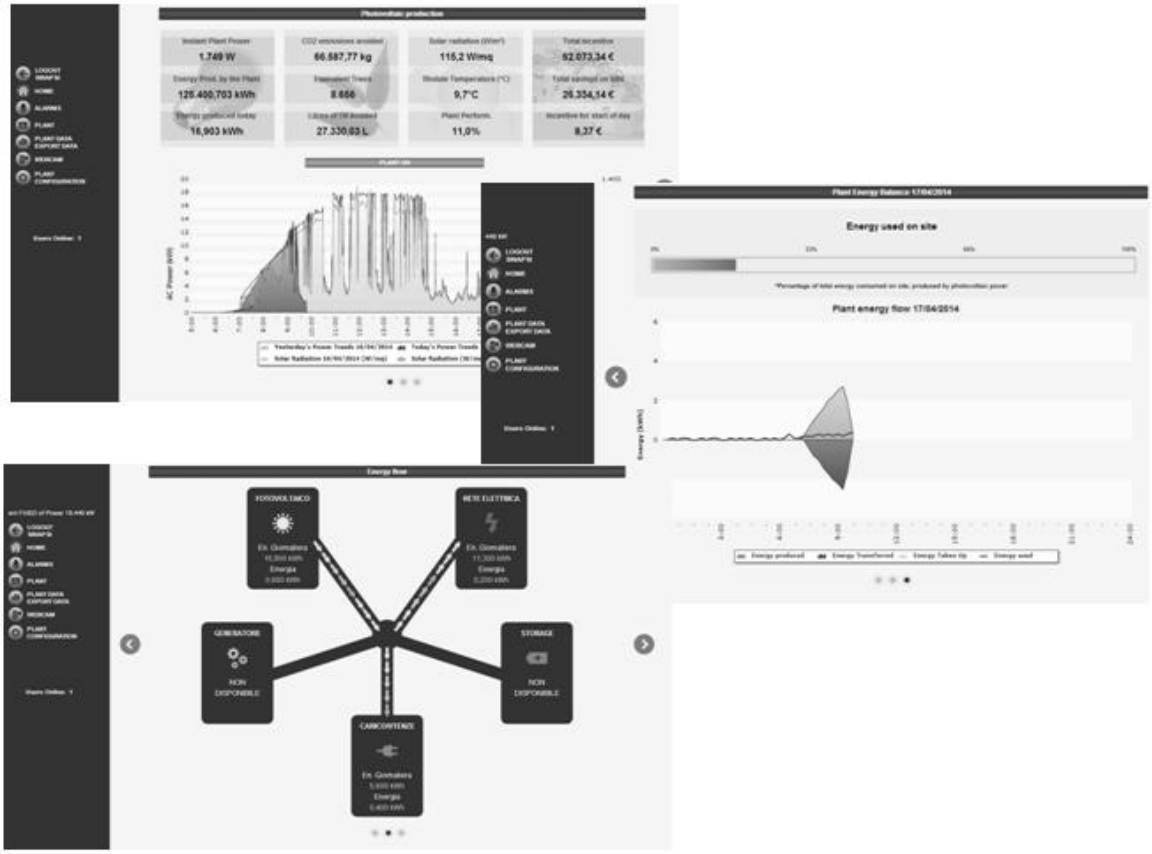


Figure 4 – Home Page

2.4 NAVIGATION MENU'

Select the icon to access to the corresponding section

Logout
Logs out the account currently in use

Home
Shows the eSolar Home Page. If available, the indicator will glow green when all the energy produced is locally consumed, Red when an amount of energy not equal to zero is not locally consumed

Alarms
Opens the alarms section

Plant
Opens the Plant section for historical production data consulting

System Data – Data exportation
View of the technical and project data of the system. Exportation of the data by .xls and .csv format.

WebCam
Opens the webcam section

Plant configuration
Accesses to system configuration menù

3 CONFIGURATION

Selecting *System Configuration* in the navigation menu, are displayed the various configuration pages:

- *Plant Data*
- *Inverter*
- *Sensors*
- *I/O devices*
- *Energy meter*
- *Protections*
- *Display LED*
- *Planning*
- *Alarms*
- *Webcam*
- *Account*
- *Customization*
- *Diagnostics*
- *SNPDS*
- *System set up*

3.1 SYSTEM DATA

The section is composed by three sub-sections:

- *System data*
- *Project data*
- *DOC*

3.1.1 PLANT DATA

From the System Configuration menu, selecting the item of plant data, you will see the following Figure 5:

Figure 5 – Plant Data

Fill in the Description and Technical Data sections paying attention to the format of the data and measure units (the numbers indicate the decimal point). Total area for the PV modules exposed to the sun it means the sum of the surfaces of the plate of all modules in the system.
The Energy meter correction factor, by default it's set to one. The parameter is made available if you want to correct a linear mismatch between the energy from energy meter counters and from inverters.
From Economic Data section, you can select the country in which the plant is placed; the choice is between Italy and Other Countries. Selecting Other countries you will be able to enter data regarding the tariffs for the energy production.

Selecting Italy you can choose from:
The Fourth Energy Renumeration, or earlier, allows you to select the type of incentives between Self-consumption or sale.

- Selecting sale will be enabled the fields:
  - *estimated % of sold Energy (partial cession)*. This parameter ranges from 0-100% of the total energy produced and it will calculate the economic value resulting by the sale of energy.
  - *Amount paid for each kWh sold.*
- Selecting Power consumption the fields above mentioned will be automatically deselected

The Fifth remuneration energy bill, with a feed-in tariff, shares the energy fed into the grid from the plant with a premium rate net energy consumed on site. Under the Fifth energy bill you will be able to choose between Internal consumption and Grid Parity.

- Selecting Power consumption you must insert the reference tariff values such as bonus rates on the energy consumed on site and the tariffs on energy fed into the grid.
- Selecting Grid Parity, aimed at those who don't fit in the Fifth remuneration energy, you can enter the price per kWh Purchased Energy that remunerates the not purchased energy less than the price of not sold energy and amount paid per kWh sold remunerates the plant production without getting any incentive

Selecting Other countries you have two choices: *Auto-consumption* and *Sale*. For both you can fill

- *estimated % of sold Energy (partial cession)*. This parameter ranges from 0-100% of the total energy produced and it will calculate the economic value resulting by the sale of energy.
- *Amount paid for each kWh sold.*

In *Value of produced AC energy acquired by:* it is possible to choose the source of the system production data. If eSolar is configured with a production energy meter, it will be possible to acquire the data directly from it, the production data will be acquired by the inverters by default and the data are showed as sum of all the energy inverters. The selection has an effect on the future calculation of the economic counter values and on the home page summary displays. ***Pay care attention in variation of this item after the regular working state of the eSolar***.

By Default Home page (Cap. 4) you can choose:

- Photovoltaic Production
- Plant Energy flow
- Plant Energy balance (optional)

In *Default external monitor* (Cap. 9) you can choose:

- Photovoltaic Production
- Plant Energy flow

Press *Save* to memorise the data.

In the section labeled Initialize Counters Manufacturing (optional), it's possible to enter the value of energy produced until the date indicated on the left side of the field to be filled. It's possible to insert the value read on the production energy meter (if present) or the value obtained by adding all the energy values by all the inverter
These data allow the calculation of peak value kWh/kW during the first monitoring year by eSolar.

Press *Save* to memorise the data.

> All the decimal digits entered must be separated by a dot
> It's not possible to partially fill out the areas in the Description and Technical data sections: all the required data must be entered or all fields must be left blank.

3.1.2 PROJECT DATA

Selecting *Project Data* (Figure 6):

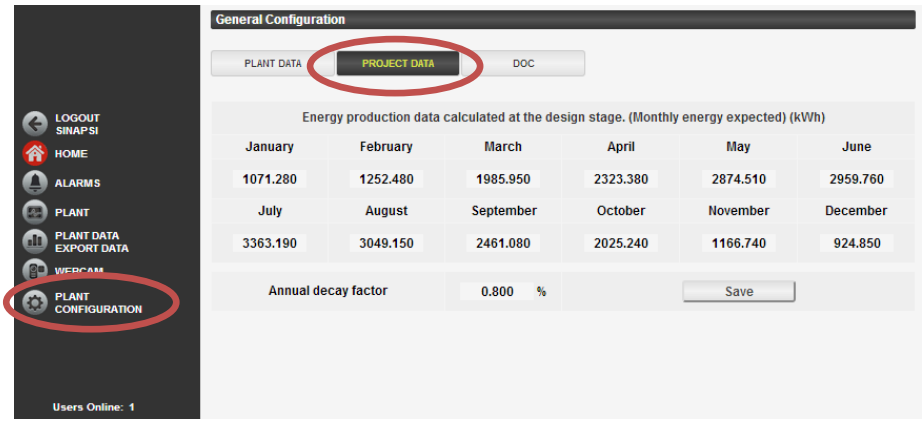


Figure 6 – Project Data

In the Data Project page you can enter your monthly energy values and the annual decay factor estimated by geographic location where plant is placed. With these data, the eSolar will display in the Plant section the difference between the value of energy actually produced and estimated, in the selected period. The module takes account of the month / year of installation of PV modules. The weight of the decay factor is increased progressively to the completion of the production year

3.1.3 Doc

Under Doc section are given a set of documents .Pdf for a correct installation of the eSolar. All documents can be downloaded on your PC.

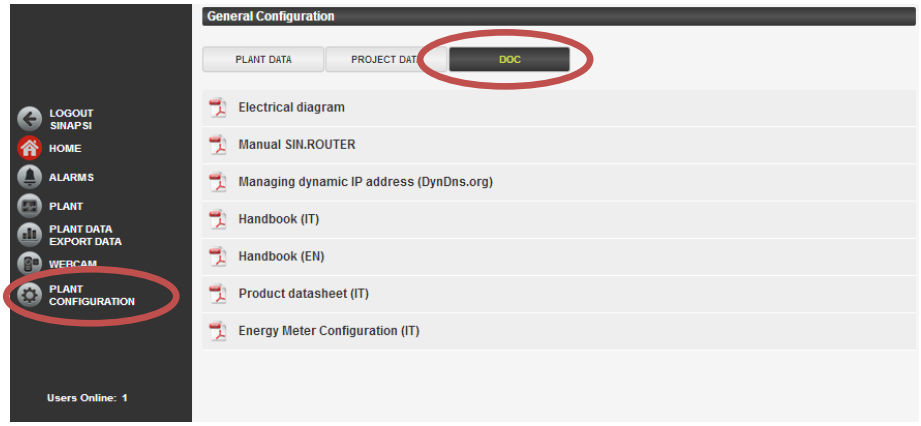


Figure 7 – Doc

3.2 INVERTER CONFIGURATION

Selecting *Inverter Configuration* it's possible to access to the *Inverters* section as showed in Figure 8 and Figure 9.

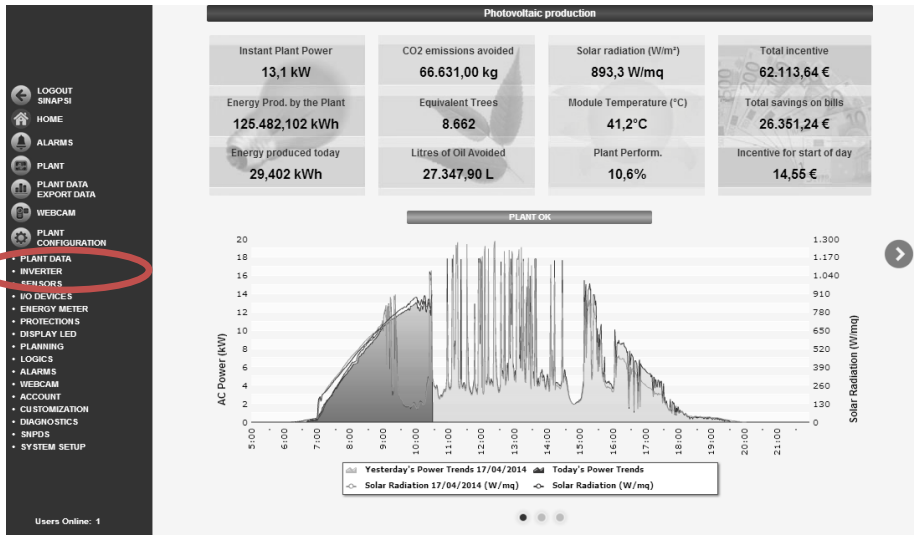


Figure 8 – *Inverter configuration*

The Figure 9 show the page for management and configuration of the inverters

Figure 9 – Management Inverters configurations

3.2.1 ADD INVERTER

Press Add inverter button at the bottom of the Inverter page, see Figure 10.

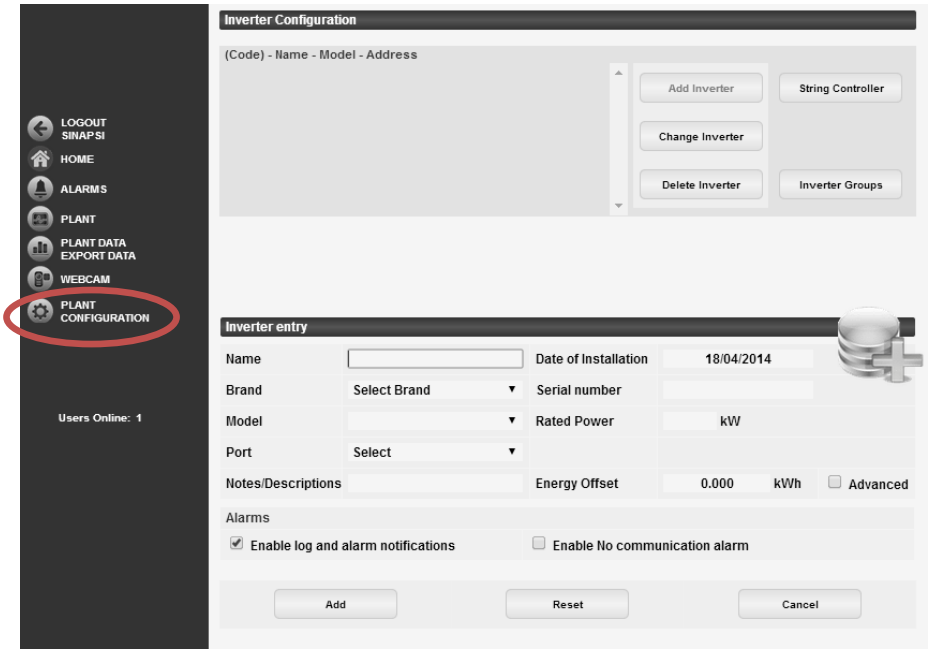


Figure 10 – Adds an inverter

FIll the fields:

- *Name*: name for the inverter. It is advisable to appoint inverters in sequential order so as to make them easily identifiable when searching inverters data or alarms. (eg. INVERTER1 - INVERTER2...).

  Never assign the same name to two different inverters

- *Brand*: select the inverter's brand
- *Model:* select the inverter's model
- *Port*: select the communication port which connect the inverters

  You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

- *Notes/Descriptions*: insert the inverter notes/description
- *Date of installations*: it will be automatically inserted by eSolar
- *Serial number:* insert the inverter's Serial Number
- *Rated Power*: insert the inverter's rated power

  The max installation plant power must be lower than 1300kW.

- *Address*: if required insert the inverter's address. Always refer to the inverter installation manual in order to obtain this information.

  Can't exist two inverter in the same RS-485 line with the same address. The presence of two or more inverters with the same address prevents the proper communication.

- *Energy Offset*: Use this parameter when changing a damaged inverter in the plant. Enter the amount of energy produced by the inverter to replace less energy of the inverter who replace the damaged. ***This operation has to be done when both inverters are disconnected from the communications port to maintain the energy amount of the entire PV plant***. Below the formula for the offset calculation

$$Offset = E_{damaged} - E_{new\ inverter}$$

- *Advanced*: selecting *Advanced* you can modify the communication parameters like, see Figure 11.

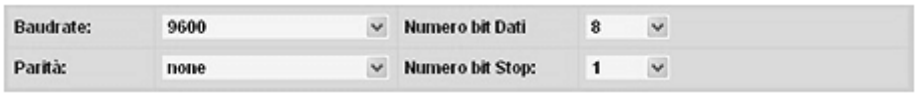


Figure 11 – Mask communication parameters

Each parameter can be changed by a drop-down menu.

> The configurations parameters showed for every device model are default parameters. It's not necessary to change the parameters unless the inverters is configured by factory default.

You can select which type of alarm the eSolar will have to manage and how it will signal it if via email and / or SMS. Selectable items are:

- *Enable LOG and alarm notifications*: activating this flag eSolar will report in *Home* (cap 4), *Alarm* (cap 5) and prior mail/SMS notification (if enabled, see Cap. 3.9) ***every*** alarms signaled by the device. *No Energy Production alarm* too will be activated with this flag; this alarm is generated automatically by eSolar if there is a lack of communication between the inverter and eSolar for a time greater than 15 minutes. If the flag is unchecked all the errors are showned only in the real-time section (see Cap.6.5))
- *Enable No communications alarm*: activating this flag eSolar will report in *Home* (cap 4), *Alarm* (cap 5) and prior mail/SMS notification (if enabled, see Cap. 3.9) the *No communication alarm* from every device regardless of the threshold solar radiation or the time period of supervision. This alarm will be handled directly by the eSolar. If the flag is unchecked errors are shown only in the real-time data (see Cap.6.5))

By default *Enable LOG and alarm notifications* is flagged and *Enable No communications alarm* is not flagged. Regardless of the selection or otherwise of the report prior email / SMS alerts, *Alarms* are always displayed in the real-time section.

Press the *Add* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration.

> **Fields Name, Brand, Model, Port, Serial Number, Power Rating, Address are required fields**

3.2.2 CHANGE INVERTER

From *Inverter configuration* page select *Change inverter* for modify the current inverter configuration .See Figure 9 and Figure 12.

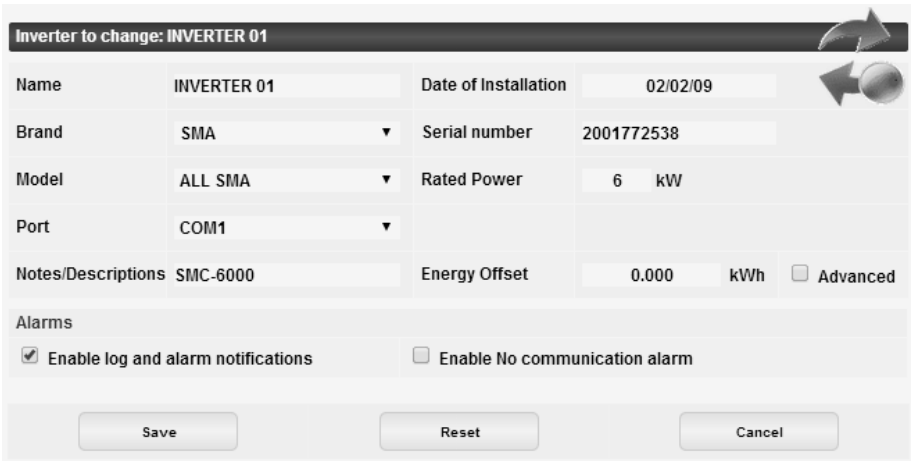


Figure 12 – Change inverter parameters

Make the changes as already described in the previous section. Press *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; press *Save* for save configuration

3.2.3 DELETE INVERTER

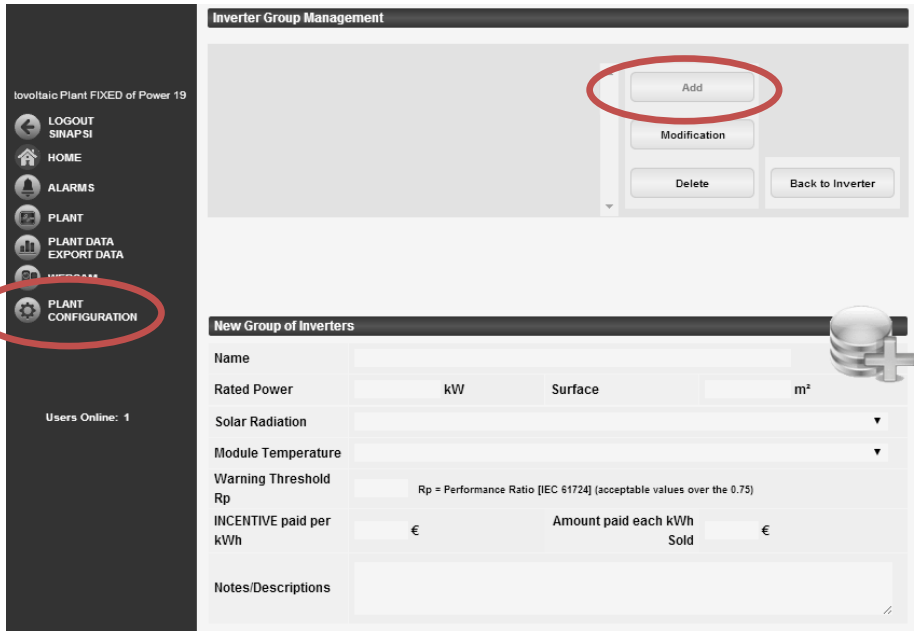
From *Inverter configuration* page select *Delete inverter* for delete definitively the current inverter configuration. In the central part of the page you will see a confirmation message. Press *OK* to confirm the deletion or Cancel for abort the operation. If you select *OK* every inverter data will be definitively delete from the eSolar

> ***WARNING: The data acquired by the inverter eliminated will be permanently deleted from the eSolar mass storage***

> Insertions, deletions and modifications of the inverters will take effect after a few seconds without the need to reboot the machine.

3.2.4 INVERTER GROUPS

It's possible to create a inverters group with the inverters already configured to obtain graphs and summarize data of the aggregation of selected inverters. For a group creation select *Inverter Groups* and *Add* , see Figure 9 and Figure 13.



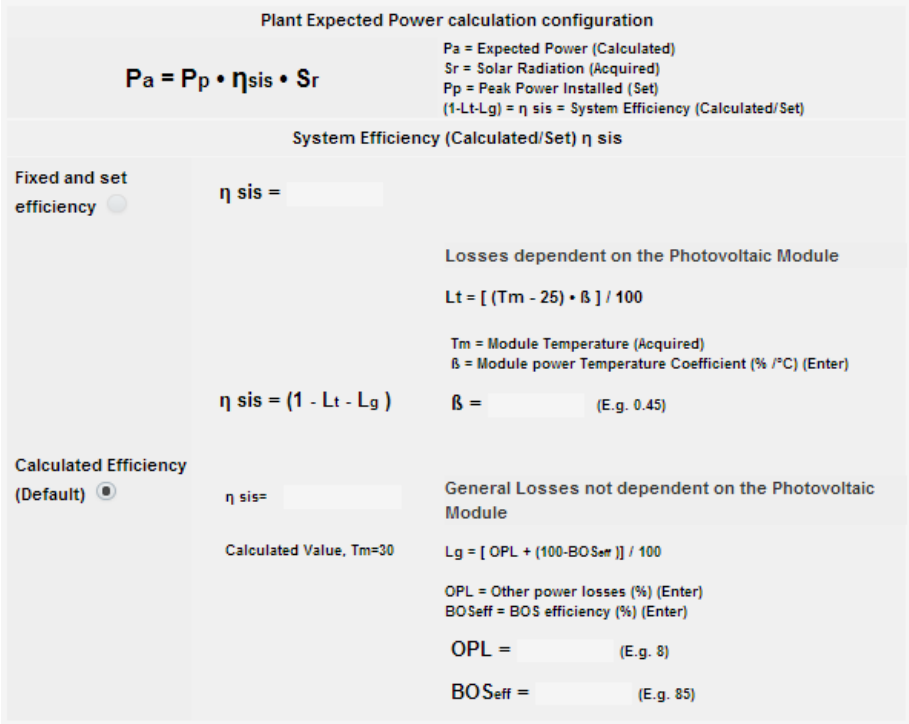


Figure 13 – Management inverter groups

Fill the fields:

- *Name*: group's name
- *Rated power*: sum of every rated power photovoltaic panel underlying the inverters belonging to the group
- *Surface*: sum of every photovoltaic panel plate surface underlying the inverters belonging to the group
- Solar dariation: select the solar radiation sensor as a reference for the plant section. It's possible to select the main or additional radiation sensor (Cap 3.3)
- Module Temeperature: select the temperature module sensor as a reference for the plant section. It's possible to select the main or additional radiation sensor (Cap 3.3).
- Warning Threshold RP: the Performance Ratio it's a parameter for to estimate the PV system quality, independently of its geographical location so the PR is defined like a quality parameter; the PR is reported in a percentage form and represents the ratio between the effective yield and the theoretical yield of the PV system. Therefore indicates the percentage of energy actually available for feeding into the grid after deducting energy losses (eg. Due to heat losses and power) and the consumption of the PV plant. It is recommended to set the threshold value to 0.75 as reported by IEC 61724. Below is the formula for the calculation of the variable Rp according to the IEC 61724

  $$R_p = Y_f / Y_r$$

  Where

  $$Y_f = \tau_r \frac{\sum_{daily} P_a}{P_0} \frac{E_{use,\tau}}{E_{in,\tau}}$$

  $$Y_r = \tau_r \frac{\sum_{\text{daily}} \mathrm{G_I}}{\mathrm{G_{I,ref}}}$$

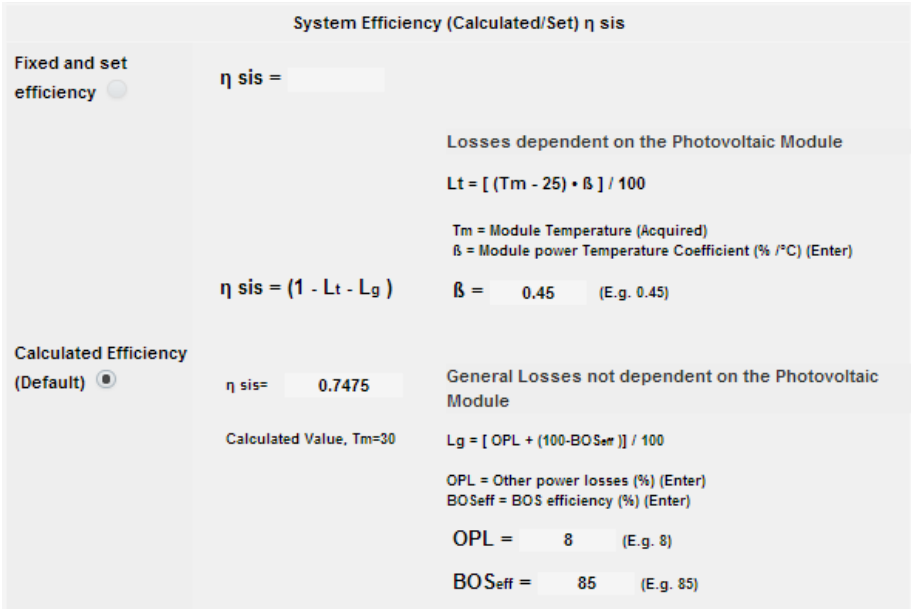
  - $\mathrm{P_a}$ = photovoltaicpanel output power
  - $\mathrm{P_0}$ = Photovoltaicpanel rated powerci
  - $\mathrm{E_{use,\tau}}$ = PV plant production total energy
  - $\mathrm{E_{in,\tau}}$ = PV plant entry total energy
  - $\mathrm{G_I}$ = total PV plant fotocoltaic panel irradation
  - $\mathrm{G_{I,ref}}$ = irradation referenze equal to $1\mathrm{kWm^{-2}}$
  - τ_r = registration data time

- INCENTIVE paid per kWh: insert the kWh product incentive
- Amount paid for each kWh sold: insert the kWh sold incentive

- Notes/Descriptions: insert Notes/descriptions if needed

In the bottom of the window is possible to configure the section Plant expected power calculation configuration function of the actual PV plant measure. It's possible to select two kind of power expected power efficiency calculation

- Fixed and set efficiency: selecting this choice the η_{SIS} value is fixed
- Calculated efficiency (default): selecting this choice the η_{SIS} value is variable in function of the formula $\eta_{SIS} = (1 - L_t - L_g)$ where:
  - $L_t = [(T_m - 25) \cdot \beta]/100$
  - T_m $[^{\circ}C]$ is the temperature of the module dynamically acquired by eSolar
  - B $[1/^{\circ}C]$ is the temperature coefficient of the module
  - $L_g = [OPL + (100 - BOS_{eff})]/100$
  - OPL: Other Plant Loss (%)
  - BOS_{eff} : BOS efficiency BOS_{eff}(%)



Press the *Add* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration. Once a group creations it's possible to add or remove the inverters. Just select the inverter of interest and add / remove it from the group using the two arrow buttons. The Figure 14 shows the mask for this operation.
Once you have finished this operation push Back to inverter to return to the inverters list.

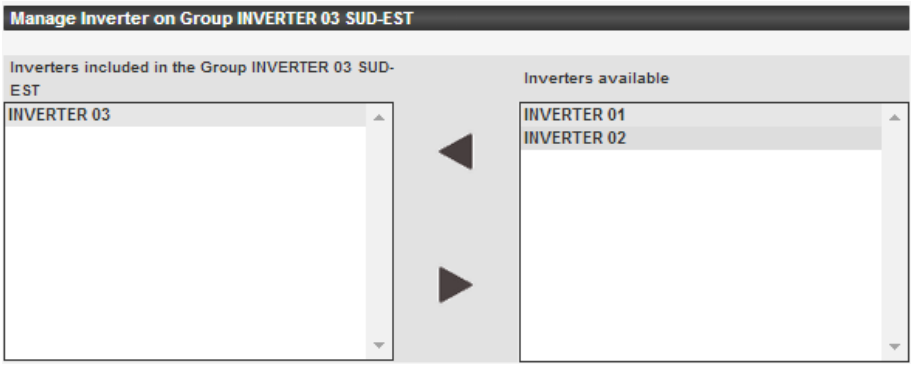


Figure 14 – Management inverters mask

3.2.5 MODIFICATION

Select the group to modify from the groups list (Figure 9) and push the button Modification. See Figure 15.

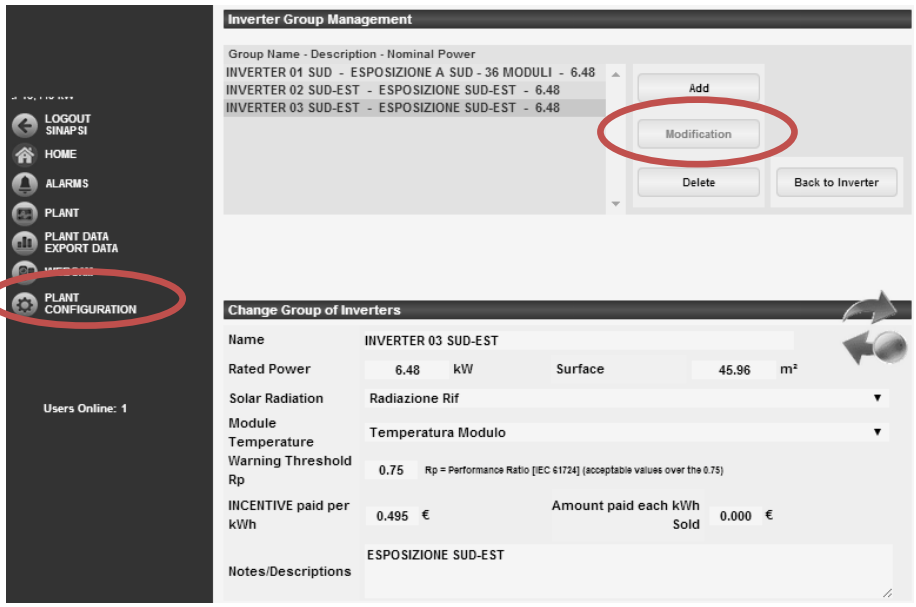


Figure 15 – Modifications inverter group

Make the changes as already described in the previous section (Cap 3.2.4). Press the *Add* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration. Push Back to inverter to return to the inverters list.

3.2.6 DELETE

Select the group to delete from the groups list and push *Delete*. Press the *OK* button to confirm the operation; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration. Push Back to inverter to return to the inverters list.

3.2.7 STRING CONTROLLER CONFIGURATION

Operation available under the section *Plant Configuration*, *Inverter*. Select the inverter in which the Strings are connected and push the button *Sting Controller*.

3.2.8 ADD A NEW STRING CONTROLLER

Push the button Add for inset a new String controller (Figure 16).

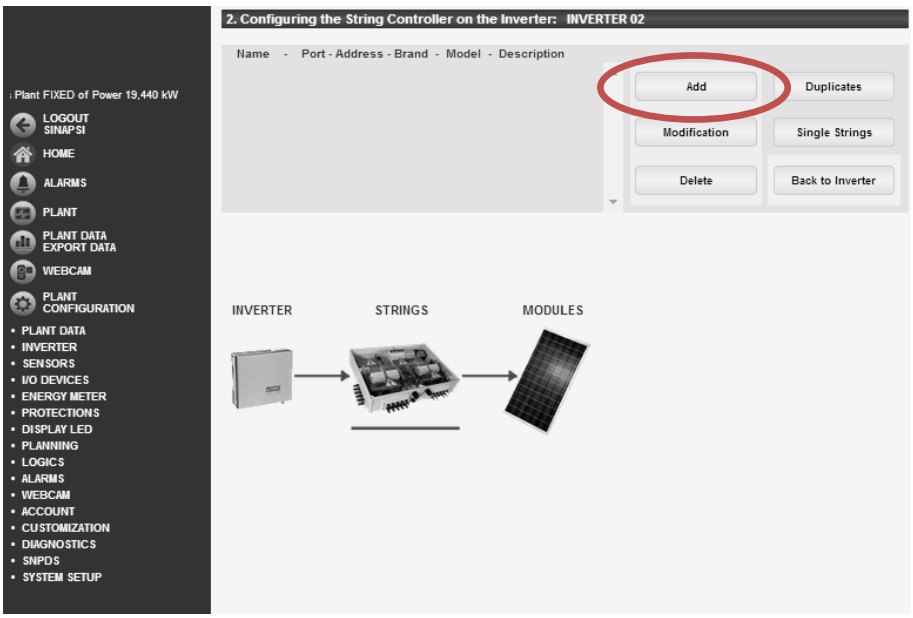


Figure 16 – String controller insertion

Fill the fileds:

- *Name*: insert the string controller name.

  The channels of the string belonging to the same string controller will be automatically generated according to the number of channels inserted.

- *Brand*: select the brand of the string controller.
- *Model*: select the model of the string controller.
- *Port*: select the communication port which connect the string controller.

  You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100***

- *Notes/Descriptions*: field for notes and descriptions.
- *Date of installation*: it will be automatically inserted by eSolar
- *Serial Number*: insert the string controller serial number
- *Number of channel*: insert channels number of the string controller.
- *Address*: insert the string controller address.
- *Advanced*: selecting *Advanced* you can access the communication parameter mask, see Figure 17.

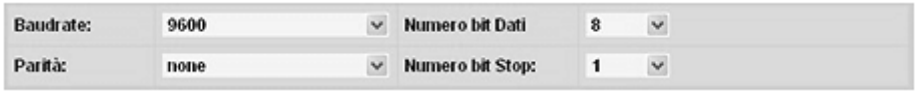


Figure 17 - Mask communication parameters

Each parameter can be changed by a drop-down menu.

The showed configuration parameters are the default parameters of the controller model selected. It is therefore not necessary to make any changes unless you are the controller settings other than the factory

You can select which type of alarm the eSolar will manage for email and / or SMS notification. The selectable items are:

- *Enable log and alarm notifications*: in the section *Home* (cap 4) and *Alarms* (cap 5) eSolar will notify via email/SMS (if enabled in the alarm section, see Cap. 3.9) ***all*** the alarms originated by the under monitored devices. Checking this option will also be enabled the *No Energy Production* alarm (only available in certain models of controllers string); this alarm is automatically generated by eSolar when there is not communication between eSolar and string controller for a time greater of 15 minutes. If the option is unchecked errors are shown only in the real-time data (see Cap. 6.5)
- *Enable No Communication alarm*: in the section *Home* (cap 4) and *Alarms* (cap 5) eSolar will notify via mail/SMS (if enabled in the alarm section, see Cap. 3.9) the No Communication alarm for every string controller regardless of the solar radiation threshold value or time slot monitoring. This alarm is automatically generated by eSolar. If the option is unchecked errors are shown only in the real-time data (see Cap.6.5)

By default *Enable LOG and alarm notifications* is flagged and *Enable No communications alarm* is not flagged. Regardless of the selection or otherwise of the report prior email / SMS alerts, *Alarms* are always displayed in the real-time section.

Press the *Add* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration.

Fields Name, Brand, Model, Port, Serial Number, Power Rating, Address are required fields

Clicking *Return to the inverter* for to back to inverters section.

3.2.1 DUPLICATES THE STRING CONTROLLER

The button *Duplicates* (see Figure 16) allows to duplicate a string controller already existing. The new string controller name and channel must be different for every configured string controller.
Press the *Add* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration.
Clicking *Return to the inverter* for to back to inverters section.

3.2.2 MODIFY A STRING CONTROLLER

The button *Modify* allows to modify a existing string controller. Select the string controller to modify from the list (Figure 16) and push *Modify*. In the bottom the modifiable fields like showed in Figure 18.

Figure 18 – Modify string controller mask

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration.
Clicking *Return to the inverter* for to back to inverters section.

3.2.3 DELETE STRING CONTROLLER

Select the string controller to delete (Figure 16) and push the button *Delete*. In the top of the page pusk *OK* to confirm the string controller deleting otherwise push the button *Cancel*. Pressing *OK* it will be removed from the controllers list. See Figure 19.

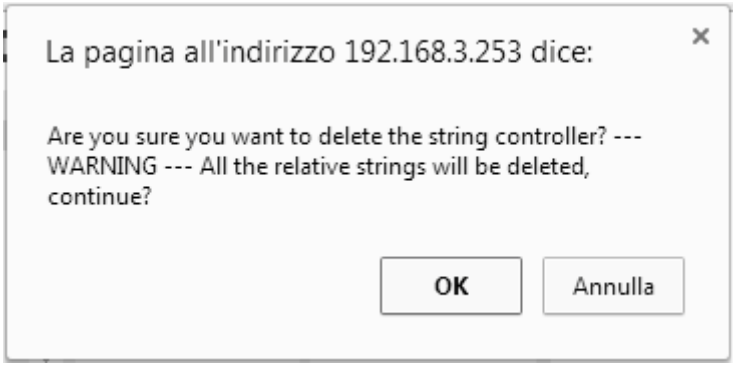


Figure 19 – Deleting string controller confirmation

3.2.4 SINGLES STRING CONTROLLER

To follow the creation of a string controller i t will be possible to modify the single string controller channel under the section Single Strings (Figure 20).

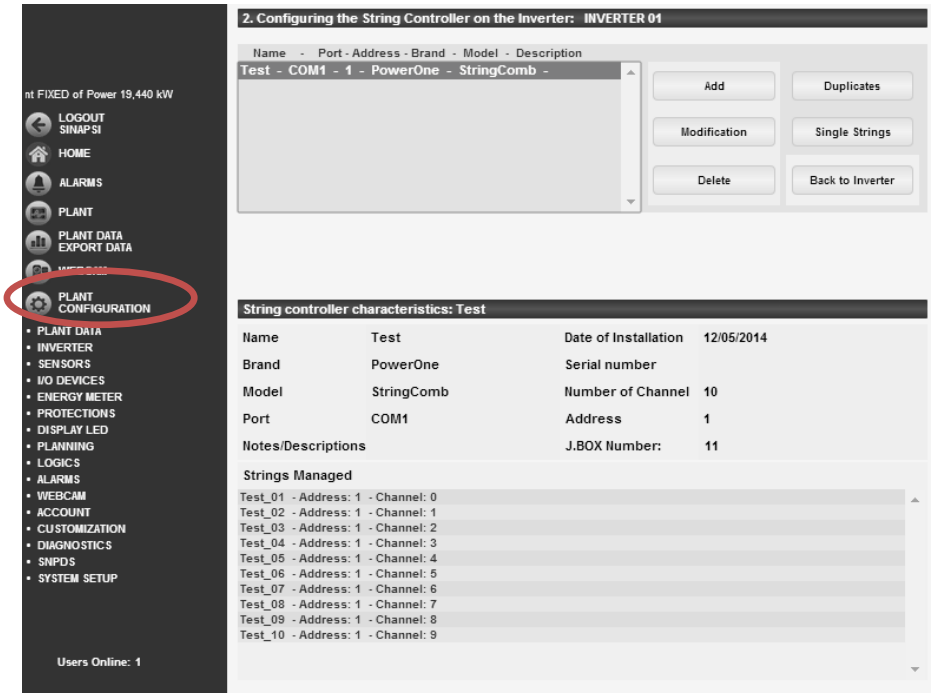


Figure 20 – Management string controller mask

Selecting a single string channel it will be possible to modify the fields like: *Name*, *Inverter* and *Notes/Descriptions*. Through *Inverter's* field it's possible to change the single string belonging (Figure 21). This voice can be used if you want to manage the single string controller channel by a different inverters

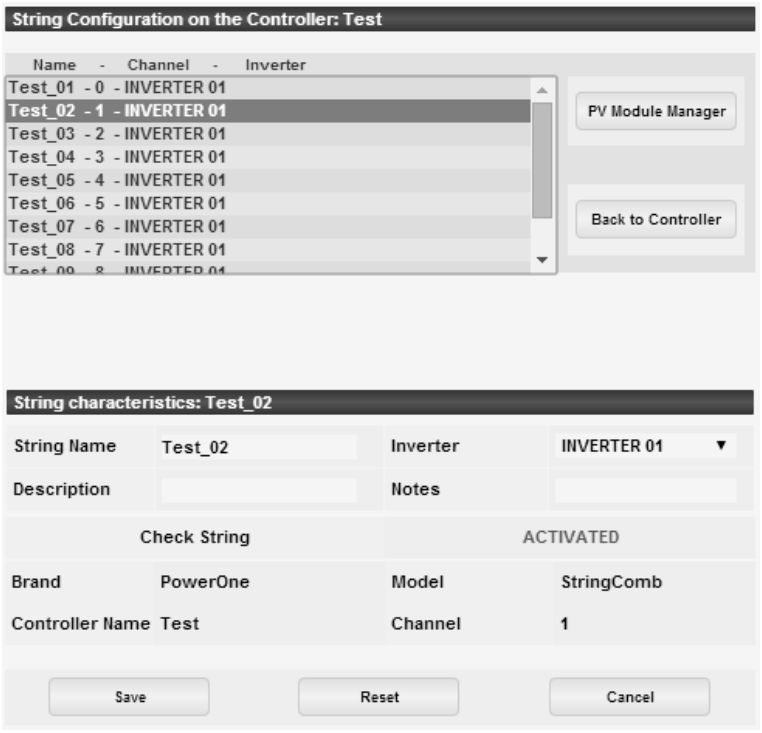


Figure 21 - Management string controller mask

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration.
Clicking *Back to Controller* for to back to string controllers section.

3.2.5 MANAGEMENT SOLAR MODULE

Pointing out a string controller it's possible to associate to associate its models of PV modules by clicking the *PV Module Manager* button located on the right side of the screen. See Figure 22.

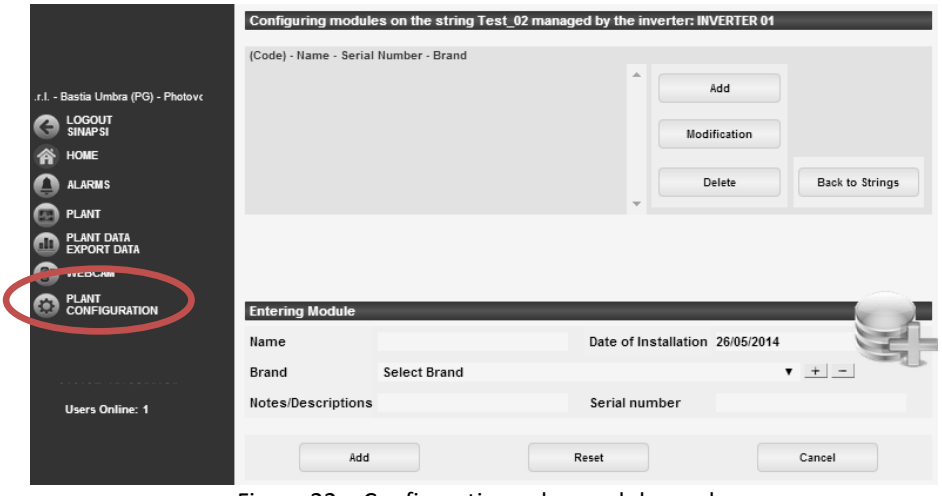


Figure 22 – Configuration solar module mask

After setting the data for the module will simply highlight the module created in order to have a summary of the characteristics as shown Figure 23.

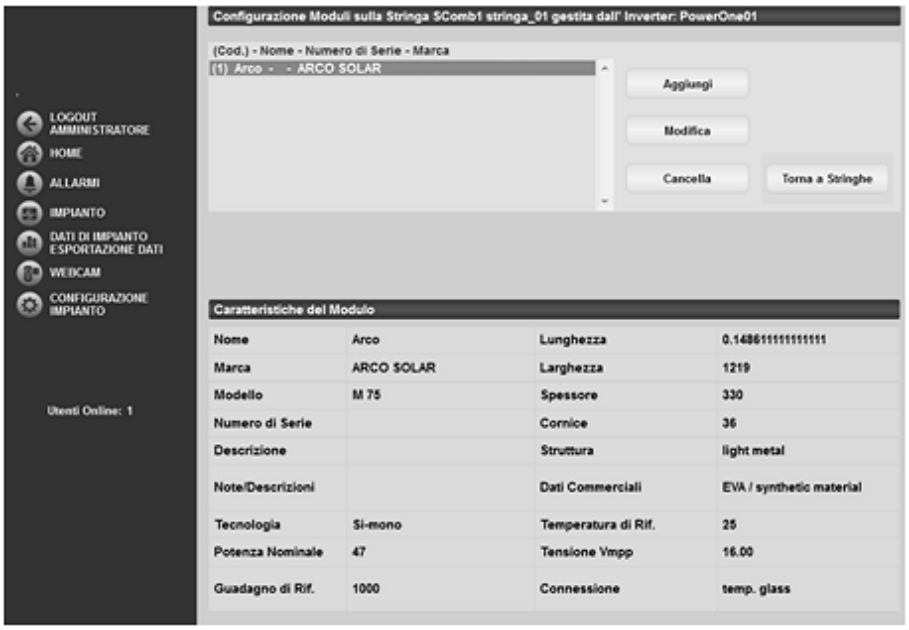


Figure 23 – Characteristic solar module mask

With the buttons *Edit* and *Delete* you can at any time change the characteristics of the module, and delete it.
Clicking *Back* to Controller for to back to string controllers section.

3.3 SENSORS

Under *Plant Configuration*, *Sensors* can be configured several kind of sensors like:

- *Sensor of Main Solar Radiation (*).*
- *Sensor of Module Temperature*
- *Sensor of Outdoor Temperature*
- *Sensor of Panel Temperature*
- *Sensor Anemometer*
- *Sensor of Solar Radiation (+).*
- *Sensore of Rain*
- *Weather station*

The reference (*) solar radiation sensor is used to calculate the efficiency of the system displayed in the *Home Page*. Other solar radiation sensors (+) can be configured and used in GROUPS of INVERTER, see Cap. 3.2.4
To follow the screen that you will find under the *Sensors* section (Figure 24).

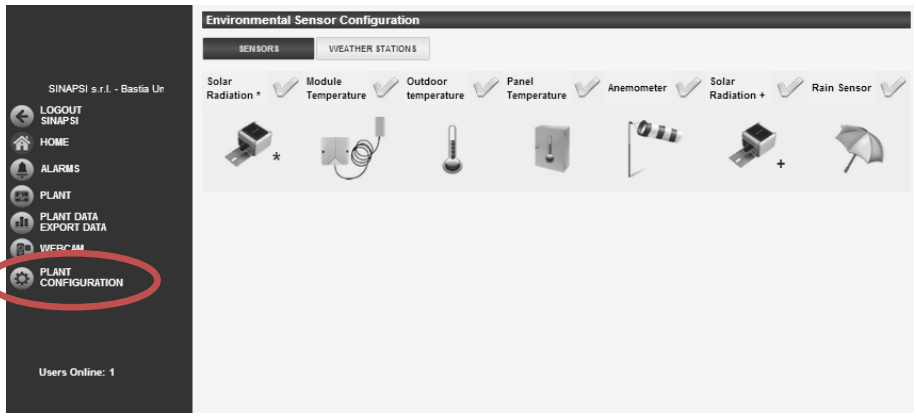


Figure 24 - Configuration environmental sensors mask

The sensors with red X are not configured while in green are already entered.

3.3.1 MAIN SOLAR RADIATION (*)

Selecting *Solar Radiation ** follow Figure 25

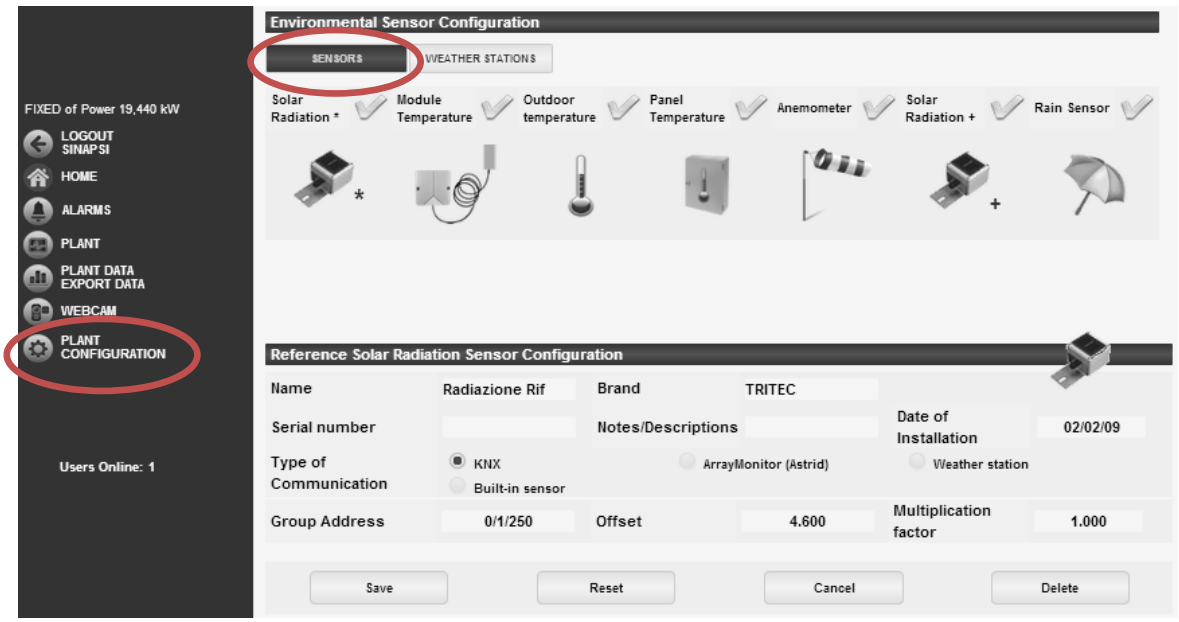


Figure 25 - Configuration environmental sensors mask (solar radiation of reference)

The fields to fill are:

- *Name*: insert the sensor name
- *Brand*: insert the brand name
- *Serial Number*: insert the sensor serial number
- *Note/Descriptions*: insert note/Description
- *Date of installation*: it will be automatically inserted by eSolar
- *Type of Communication*: it's possible to select:
  - *KNX*: it's used the Konnex physical layer. In order to use this technology equip the eSolar with the corresponding Kit KNX
  - *ArrayMinitor(Astrid)*: the value for the sensor of the solar radiation will be directly debited from the inverter Astrid, if present in the system.
  - *Weather Station*: the value for the sensor of the solar radiation will be directly debited from the weather station, if present in the system
  - *Built-in sensor*: the value for the sensor of the solar radiation will be directly debited from the integrated device, if present in the system

3.3.1.1 KNX

Fill the fields in Figure 26

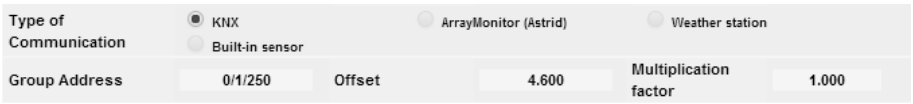


Figure 26 - Configuration environmental sensors mask (KNX bus communication)

The *Group Address* identifies the device channel KNX in the field, the *Offset* and the *Multiplication factor* are parameters for a linear correction of the input value. The group address of the channels is always reported to the side of the KNX device

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

The Multiplication factors follow the mathematical equation of the straight line;

$$y=mx+q$$

where:

- *m* it's the multiplication factor
- *q* it's the offset
- *x* x-axis
- *y* y-axis

If you want to add / remove a constant value to the data from the sensor, we use the offset (positive or negative); but if the sensor's data must be multiplied by a constant value using a linear function we will use the multiplication factor.

3.3.1.2 ARRAY MONITOR (ASTRID)

Fill the fields below if you are using an Astrid Array Monitor (Figure 27).

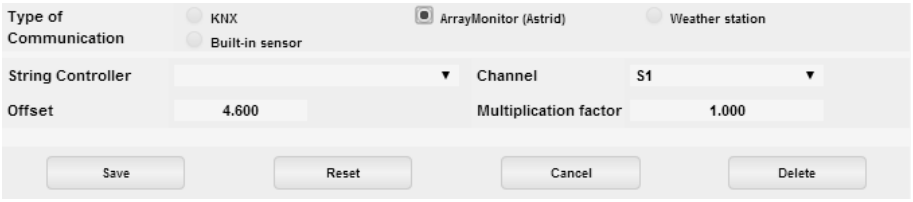


Figure 27 - Configuration environmental sensors mask (ArrayMonitor communication)

The controller can be selected from the appropriate drop-down menu , as well as the channel to which the sensor is connected. Here too we can insert the appropriate correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.1.3 WEATHER STATION

Fill the fields below if you are using an weather station (Figure 28).

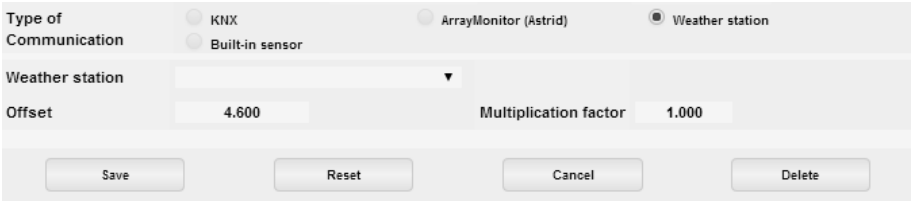


Figure 28 - Configuration environmental sensors mask (Weather station communication)

The sensor can be selected from the appropriate menu-down menu; the same will automatically show if the device is connected. The channel of the solar radiation will be automatically acquired. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.1.4 BUILT-IN SENSOR

Fill the fields below if you are using an integrated device (Figure 29).

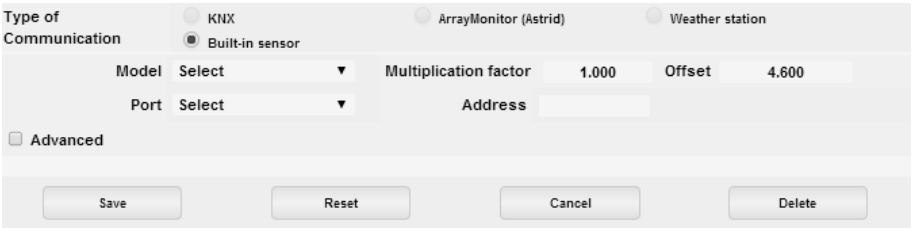


Figure 29 - Configuration environmental sensors mask (built-in sensor communication)

The sensor can be selected from the appropriate menu drop down. In this case it must also be included communication *port* with its logical address of the device. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.2 MODULE TEMPERATURE

Selecting *Module Temperature* follow Figure 30

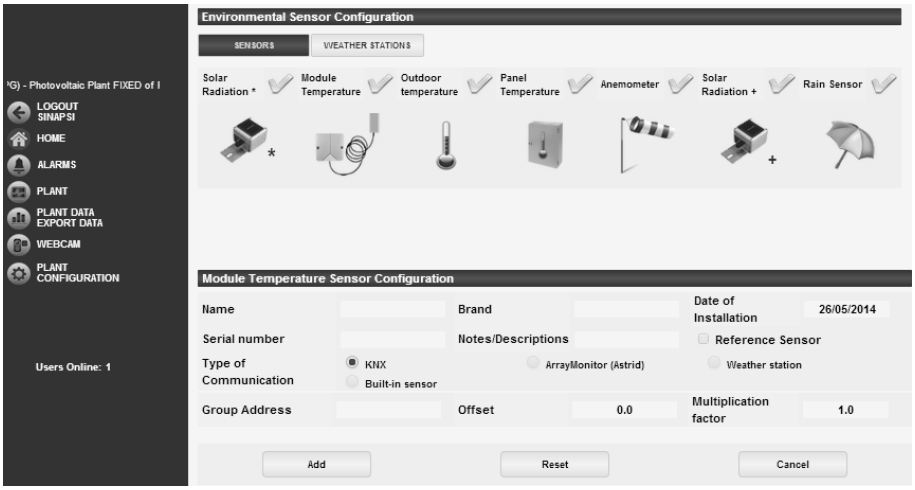


Figure 30 - Configuration environmental sensors mask (es. Module temperature)

The fields to fill are:

- *Name*: insert the sensor name
- *Brand*: insert the brand name
- *Serial Number*: insert the sensor serial number
- *Note/Descriptions*: insert note/Description
- *Date of installation*: it will be automatically inserted by eSolar
- *Type of Communication*: it's possible to select:
  - *KNX*: it's used the Konnex physical layer. In order to use this technology equip the eSolar with the corresponding Kit KNX

- *ArrayMinitor(Astrid)*: the value for the sensor of the solar radiation will be directly debited from the inverter Astrid, if present in the system.
- *Weather Station*: the value for the sensor of the solar radiation will be directly debited from the weather station, if present in the system
- *Built-in sensor*: the value for the sensor of the solar radiation will be directly debited from the integrated device, if present in the system

3.3.2.1 KNX

Fill the fields in Figure 31.

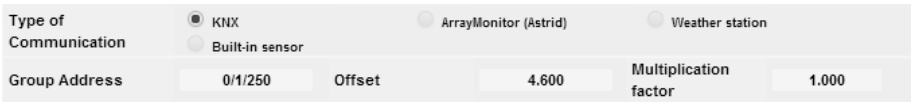


Figure 31 - Configuration environmental sensors mask (KNX bus communication)

The *Group Address* identifies the device channel KNX in the field, the *Offset* and the *Multiplication factor* are parameters for a linear correction of the input value. The group address of the channels is always reported to the side of the KNX device
Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.
Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.2.2 ARRAY MONITOR (ASTRID)

Fill the fields below if you are using an Astrid Array Monitor (Figure 32).

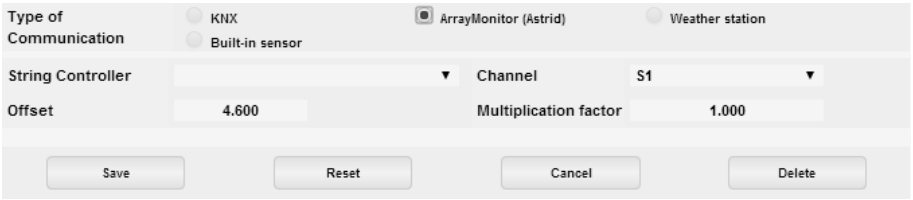


Figure 32 - Configuration environmental sensors mask (ArrayMonitor communication)

The controller can be selected from the appropriate drop-down menu , as well as the channel to which the sensor is connected. Here too we can insert the appropriate correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.2.3 WEATHER STATION

Fill the fields below if you are using an weather station (Figure 33).

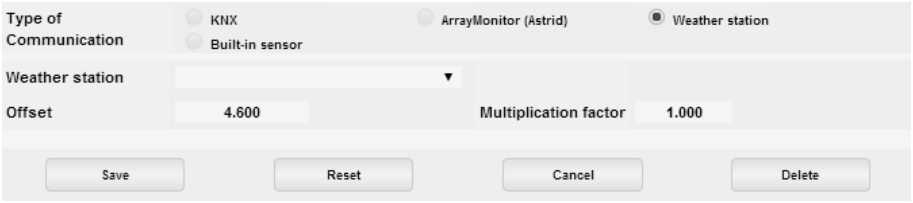


Figure 33 - Configuration environmental sensors mask (Weather station communication)

The sensor can be selected from the appropriate menu-down menu; the same will automatically show if the device is connected. The channel of the solar radiation will be automatically acquired. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.2.4 BUILT-IN DEVICE

Fill the fields below if you are using an integrated device (Figure 34).

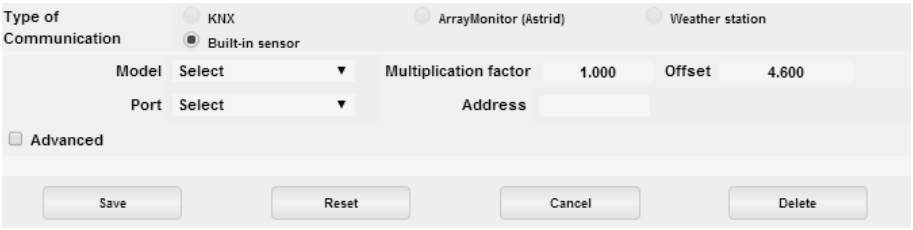


Figure 34 - Configuration environmental sensors mask (built-in sensor communication)

The sensor can be selected from the appropriate menu drop down. In this case it must also be included communication *port* with its logical address of the device. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.3 OUTDOOT TEMPERATURE

Selecting *Outdoor temperature* follow Figure 35

Figure 35 - Configuration environmental sensors mask (es. Temperatura Esterna)

The fields to fill are:

- *Name*: insert the sensor name
- *Brand*: insert the brand name
- *Serial Number*: insert the sensor serial number
- *Note/Descriptions*: insert note/Description
- *Date of installation*: it will be automatically inserted by eSolar
- *Type of Communication*: it's possible to select:
  - *KNX*: it's used the Konnex physical layer. In order to use this technology equip the eSolar with the corresponding Kit KNX
  - *ArrayMinitor(Astrid)*: the value for the sensor of the solar radiation will be directly debited from the inverter Astrid, if present in the system.
  - *Weather Station*: the value for the sensor of the solar radiation will be directly debited from the weather station, if present in the system
  - *Built-in sensor*: the value for the sensor of the solar radiation will be directly debited from the integrated device, if present in the system

3.3.3.1 KNX

Fill the fields in Figure 36.

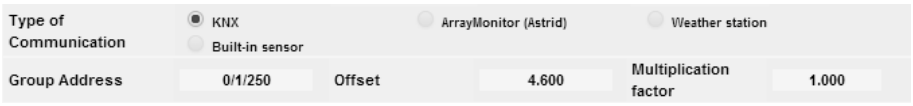


Figure 36 - Configuration environmental sensors mask (KNX bus communication)

The *Group Address* identifies the device channel KNX in the field, the *Offset* and the *Multiplication factor* are parameters for a linear correction of the input value. The group address of the channels is always reported to the side of the KNX device

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.3.2 ARRAY MONITOR (ASTRID)

Fill the fields below if you are using an Astrid Array Monitor (Figure 37).

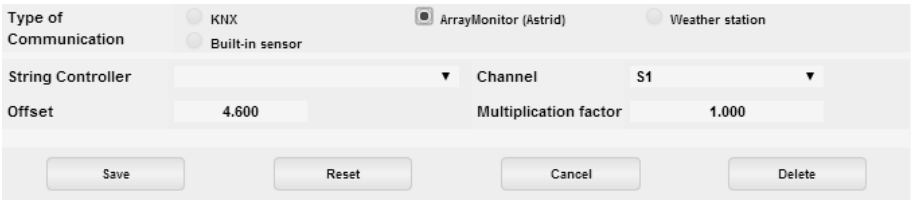


Figure 37 - Configuration environmental sensors mask (ArrayMonitor communication)

The controller can be selected from the appropriate drop-down menu , as well as the channel to which the sensor is connected. Here too we can insert the appropriate correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.3.3 WEATHER STATTION

Fill the fields below if you are using an weather station (Figure 38).

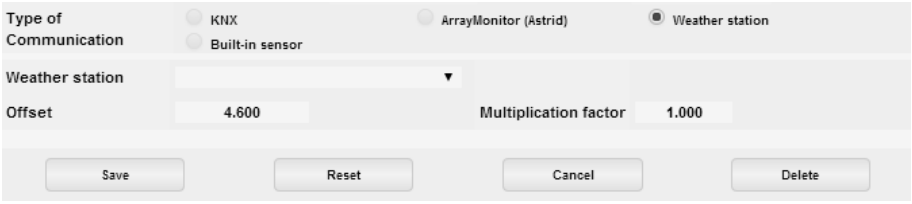


Figure 38 - Configuration environmental sensors mask (Weather station communication)

The sensor can be selected from the appropriate menu-down menu; the same will automatically show if the device is connected. The channel of the solar radiation will be automatically acquired. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.3.4 BUIL-IN SENSOR

Fill the fields below if you are using an integrated device (Figure 39).

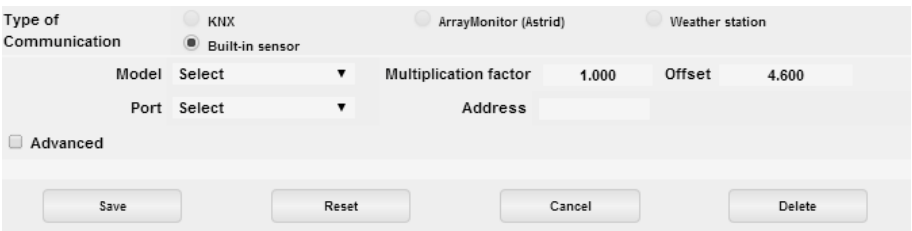


Figure 39 - Configuration environmental sensors mask (built-in sensor communication)

The sensor can be selected from the appropriate menu drop down. In this case it must also be included communication *port* with its logical address of the device. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.4 PANEL TEMPERATURE

Selecting *Panel Temperature* follow Figure 40

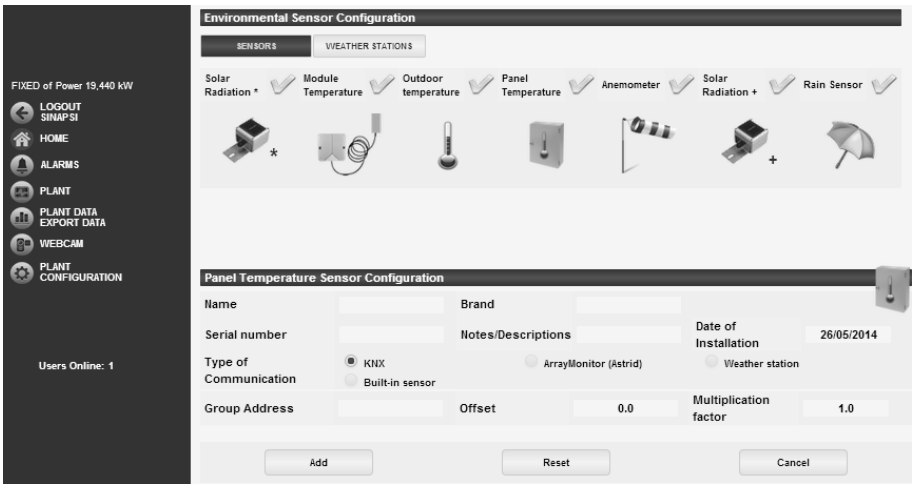


Figure 40 - Configuration environmental sensors mask (es. Temperatura Quadro)

The fields to fill are:

- *Name*: insert the sensor name
- *Brand*: insert the brand name
- *Serial Number*: insert the sensor serial number
- *Note/Descriptions*: insert note/Description
- *Date of installation*: it will be automatically inserted by eSolar
- *Type of Communication*: it's possible to select:
  - *KNX*: it's used the Konnex physical layer. In order to use this technology equip the eSolar with the corresponding Kit KNX
  - *ArrayMinitor(Astrid)*: the value for the sensor of the solar radiation will be directly debited from the inverter Astrid, if present in the system.
  - *Weather Station*: the value for the sensor of the solar radiation will be directly debited from the weather station, if present in the system
  - *Built-in sensor*: the value for the sensor of the solar radiation will be directly debited from the integrated device, if present in the system

3.3.4.1 KNX

Fill the fields in Figure 41.

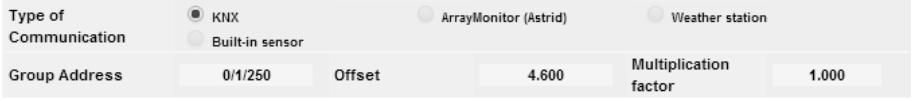


Figure 41 - Configuration environmental sensors mask (KNX bus communication)

The *Group Address* identifies the device channel KNX in the field, the *Offset* and the *Multiplication factor* are parameters for a linear correction of the input value. The group address of the channels is always reported to the side of the KNX device
Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.
Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.4.2 ARRAY MONITOR (ASTRID)

Fill the fields below if you are using an Astrid Array Monitor (Figure 42).

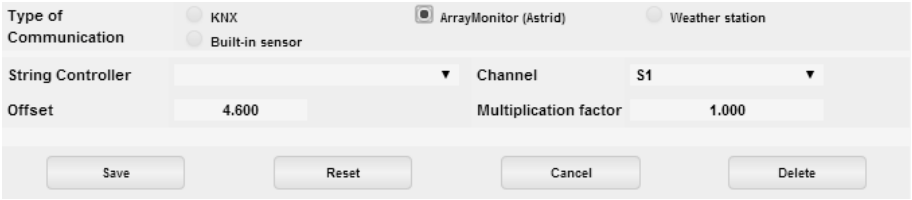


Figure 42 - Configuration environmental sensors mask (ArrayMonitor communication)

The controller can be selected from the appropriate drop-down menu , as well as the channel to which the sensor is connected. Here too we can insert the appropriate correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.4.3 WEATHER STATION

Fill the fields below if you are using an weather station (Figure 43).

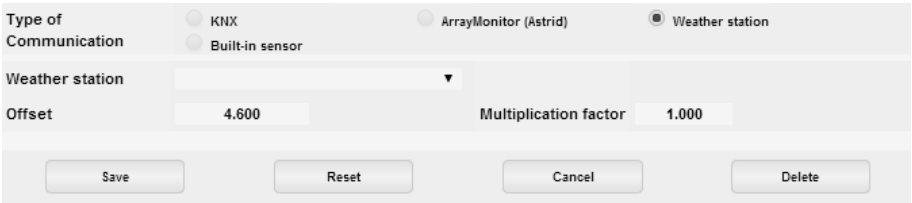


Figure 43 - Configuration environmental sensors mask (Weather station communication)

The sensor can be selected from the appropriate menu-down menu; the same will automatically show if the device is connected. The channel of the solar radiation will be automatically acquired. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.4.4 BUILT-IN SENSOR

Fill the fields below if you are using an integrated device (Figure 44).

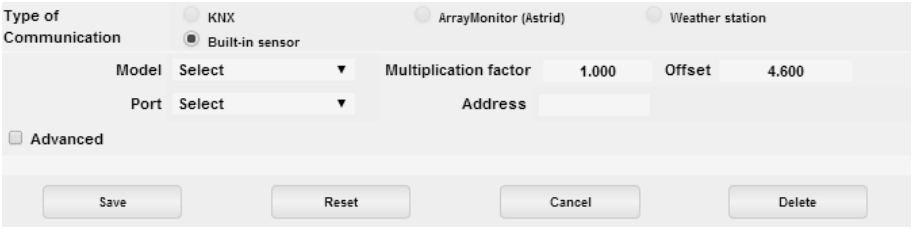


Figure 44 - Configuration environmental sensors mask (built-in sensor communication)

The sensor can be selected from the appropriate menu drop down. In this case it must also be included communication *port* with its logical address of the device. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.5 SOLAR RADIATION (+)

Selecting *Solar Radiation* follow Figure 45

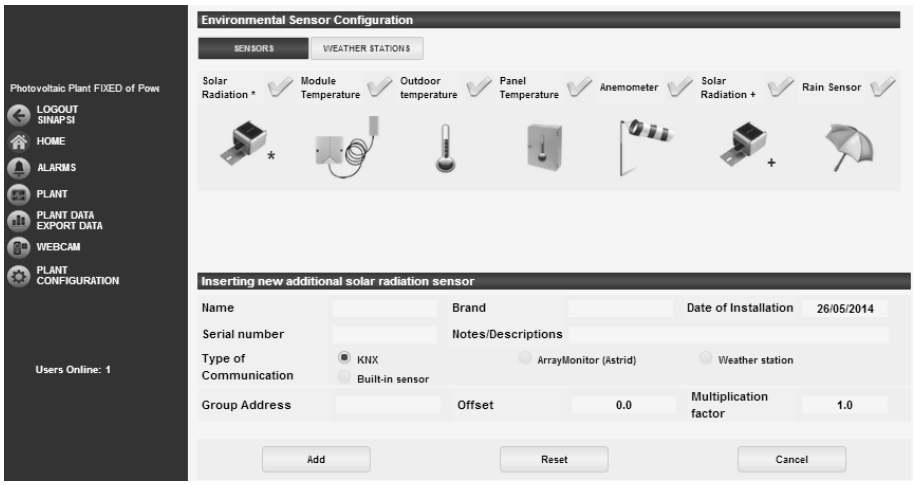


Figure 45 - Configuration environmental sensors mask (es. Radiazione Solare +)

The fields to fill are:

- *Name*: insert the sensor name
- *Brand*: insert the brand name
- *Serial Number*: insert the sensor serial number
- *Note/Descriptions*: insert note/Description
- *Date of installation*: it will be automatically inserted by eSolar
- *Type of Communication*: it's possible to select:
  - *KNX*: it's used the Konnex physical layer. In order to use this technology equip the eSolar with the corresponding Kit KNX
  - *ArrayMinitor(Astrid)*: the value for the sensor of the solar radiation will be directly debited from the inverter Astrid, if present in the system.

- *Weather Station*: the value for the sensor of the solar radiation will be directly debited from the weather station, if present in the system
- *Built-in sensor*: the value for the sensor of the solar radiation will be directly debited from the integrated device, if present in the system

3.3.5.1 KNX

Fill the fields in Figure 46.

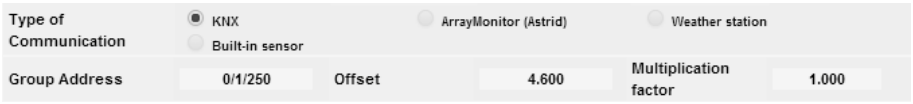


Figure 46 - Configuration environmental sensors mask (KNX bus communication)

The *Group Address* identifies the device channel KNX in the field, the *Offset* and the *Multiplication factor* are parameters for a linear correction of the input value. The group address of the channels is always reported to the side of the KNX device
Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.5.2 ARRAY MONITOR (ASTRID)

Fill the fields below if you are using an Astrid Array Monitor (Figure 47).

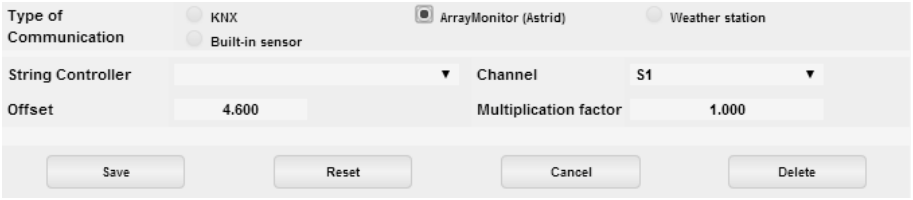


Figure 47 - Configuration environmental sensors mask (ArrayMonitor communication)

The controller can be selected from the appropriate drop-down menu , as well as the channel to which the sensor is connected. Here too we can insert the appropriate correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.5.3 WEATHER STATION

Fill the fields below if you are using an weather station (Figure 48).

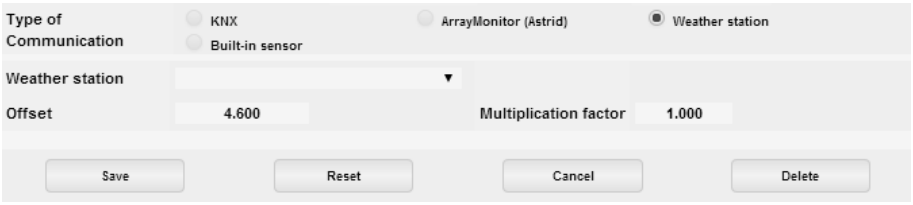


Figure 48 - Configuration environmental sensors mask (Weather station communication)

The sensor can be selected from the appropriate menu-down menu; the same will automatically show if the device is connected. The channel of the solar radiation will be automatically acquired. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.5.4 BUILT.IN SENSOR

Fill the fields below if you are using an integrated device (Figure 49).

Figure 49 - Configuration environmental sensors mask (built-in sensor communication)

The sensor can be selected from the appropriate menu drop down. In this case it must also be included communication *port* with its logical address of the device. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.6 ANEMOMETER

Selecting *Anemometer* follow Figure 50

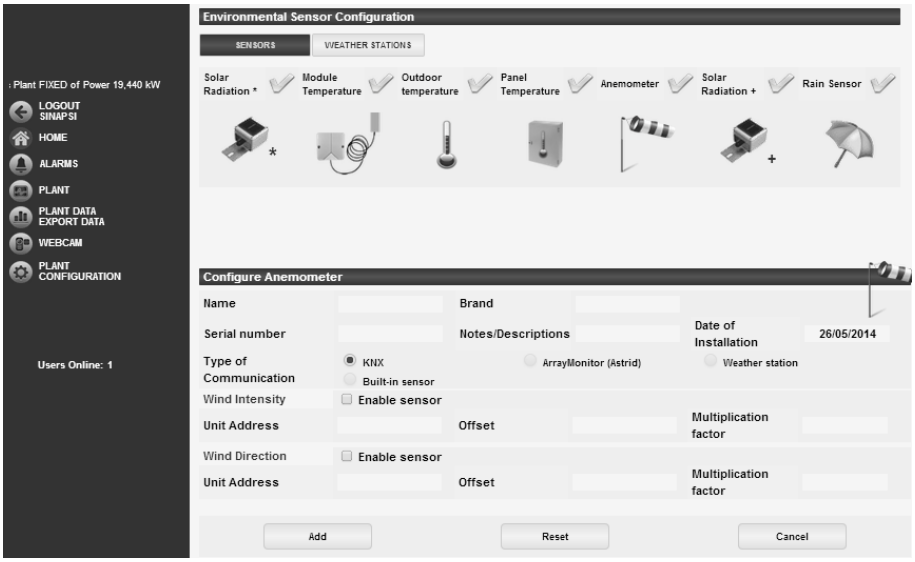


Figure 50 - Configuration environmental sensors mask (es Anemometro)

The fields to fill are:

- *Name*: insert the sensor name
- *Brand*: insert the brand name
- *Serial Number*: insert the sensor serial number
- *Note/Descriptions*: insert note/Description
- *Date of installation*: it will be automatically inserted by eSolar
- *Type of Communication*: it's possible to select:
  - *KNX*: it's used the Konnex physical layer. In order to use this technology equip the eSolar with the corresponding Kit KNX
  - *ArrayMinitor(Astrid)*: the value for the sensor of the solar radiation will be directly debited from the inverter Astrid, if present in the system.
  - *Weather Station*: the value for the sensor of the solar radiation will be directly debited from the weather station, if present in the system
  - *Built-in sensor*: the value for the sensor of the solar radiation will be directly debited from the integrated device, if present in the system

3.3.6.1 KNX

Fill the fields in Figure 51.

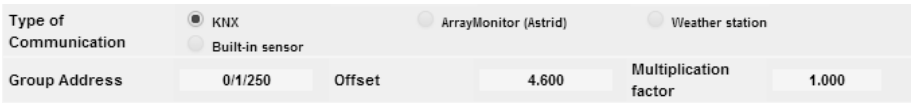


Figure 51 - Configuration environmental sensors mask (KNX bus communication)

The *Group Address* identifies the device channel KNX in the field, the *Offset* and the *Multiplication factor* are parameters for a linear correction of the input value. The group address of the channels is always reported to the side of the KNX device

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.6.2 ARRAY MONITOR (ASTRID)

Fill the fields below if you are using an Astrid Array Monitor (Figure 52).

Figure 52 - Configuration environmental sensors mask (ArrayMonitor communication)

The controller can be selected from the appropriate drop-down menu , as well as the channel to which the sensor is connected. Here too we can insert the appropriate correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.6.3 WEATHER STATION

Fill the fields below if you are using an weather station (Figure 53).

Figure 53 - Configuration environmental sensors mask (Weather station communication)

The sensor can be selected from the appropriate menu-down menu; the same will automatically show if the device is connected. The channel of the solar radiation will be automatically acquired. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.6.4 BUILT-IN SENSOR

Fill the fields below if you are using an integrated device (Figure 54).

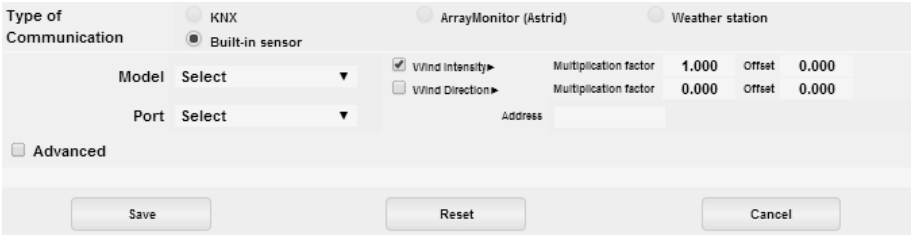


Figure 54 - Configuration environmental sensors mask (built-in sensor communication)

The sensor can be selected from the appropriate menu drop down. In this case it must also be included communication *port* with its logical address of the device. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.7 RAIN

Selecting *Rain* follow Figure 55

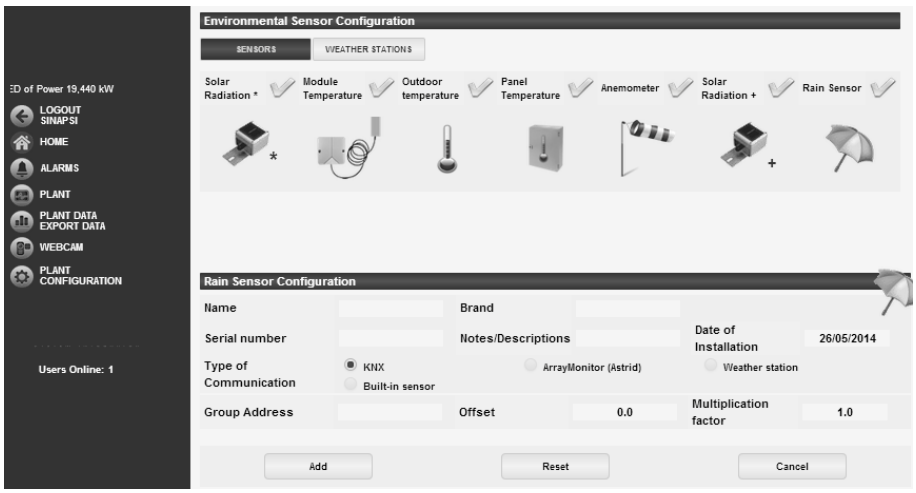


Figure 55 - Configuration environmental sensors mask (es Pioggia)

The fields to fill are:

- *Name*: insert the sensor name
- *Brand*: insert the brand name
- *Serial Number*: insert the sensor serial number
- *Note/Descriptions*: insert note/Description
- *Date of installation*: it will be automatically inserted by eSolar
- *Type of Communication*: it's possible to select:
  - *KNX*: it's used the Konnex physical layer. In order to use this technology equip the eSolar with the corresponding Kit KNX
  - *ArrayMinitor(Astrid)*: the value for the sensor of the solar radiation will be directly debited from the inverter Astrid, if present in the system.
  - *Weather Station*: the value for the sensor of the solar radiation will be directly debited from the weather station, if present in the system
  - *Built-in sensor*: the value for the sensor of the solar radiation will be directly debited from the integrated device, if present in the system

3.3.7.1 KNX

Fill the fields in Figure 56.

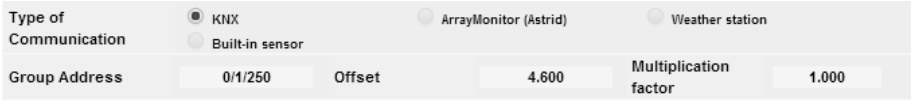


Figure 56 - Configuration environmental sensors mask (KNX bus communication)

The *Group Address* identifies the device channel KNX in the field, the *Offset* and the *Multiplication factor* are parameters for a linear correction of the input value. The group address of the channels is always reported to the side of the KNX device
Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.7.2 ARRAY MONITOR (ASTRID)

Fill the fields below if you are using an Astrid Array Monitor (Figure 57).

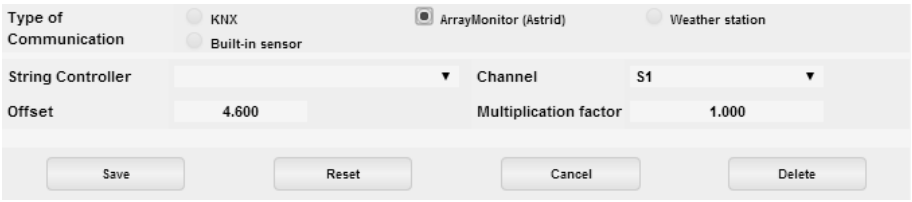


Figure 57 - Configuration environmental sensors mask (ArrayMonitor communication)

The controller can be selected from the appropriate drop-down menu , as well as the channel to which the sensor is connected. Here too we can insert the appropriate correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.7.3 WEATHER STATION

Fill the fields below if you are using an weather station (Figure 58).

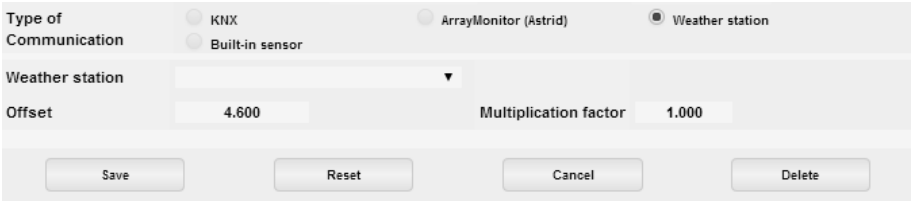


Figure 58 - Configuration environmental sensors mask (Weather station communication)

The sensor can be selected from the appropriate menu-down menu; the same will automatically show if the device is connected. The channel of the solar radiation will be automatically acquired. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.7.4 BUILT-IN SENSOR

Fill the fields below if you are using an integrated device (Figure 54).

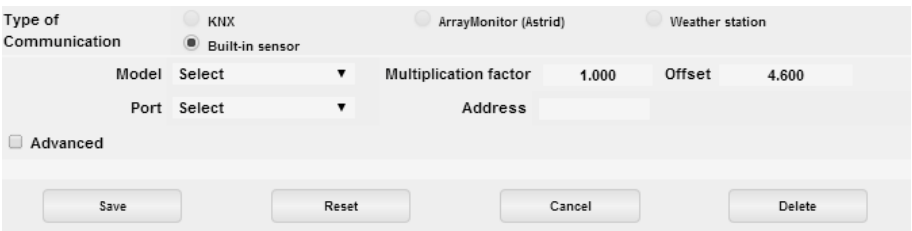


Figure 59 - Configuration environmental sensors mask (built-in sensor communication)

The sensor can be selected from the appropriate menu drop down. In this case it must also be included communication *port* with its logical address of the device. Here too we find the correction factors.

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

Press the *Save* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration; *Delete* for delete the device.

3.3.8 WEATHER STATION

It's possible to install weather stations clicking on the appropriate item, see Figure 60.

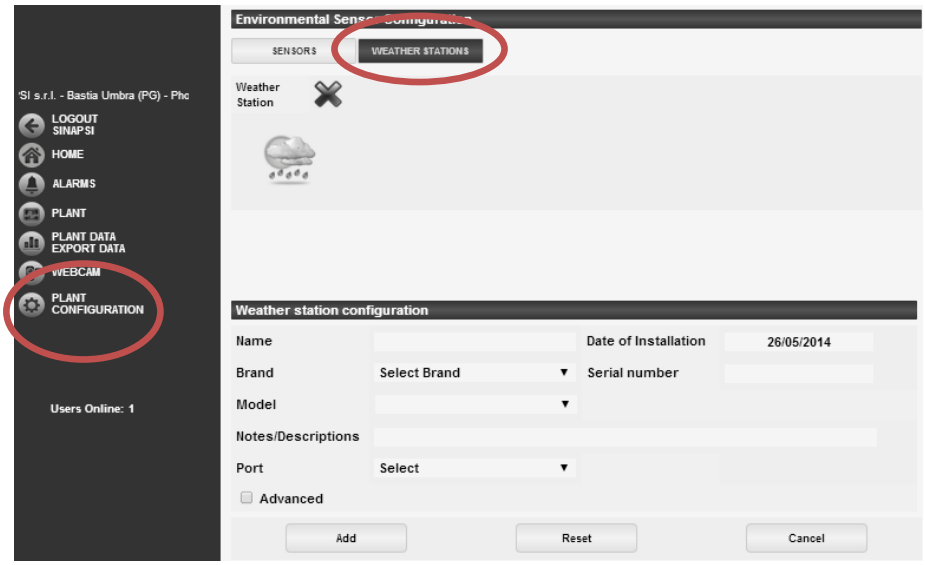


Figure 60 – Weather station

To configure weather stations, press *Add* a screen like the one shown in Figure 61 will open, where you can add the device

Figure 61 – Weather station configuration

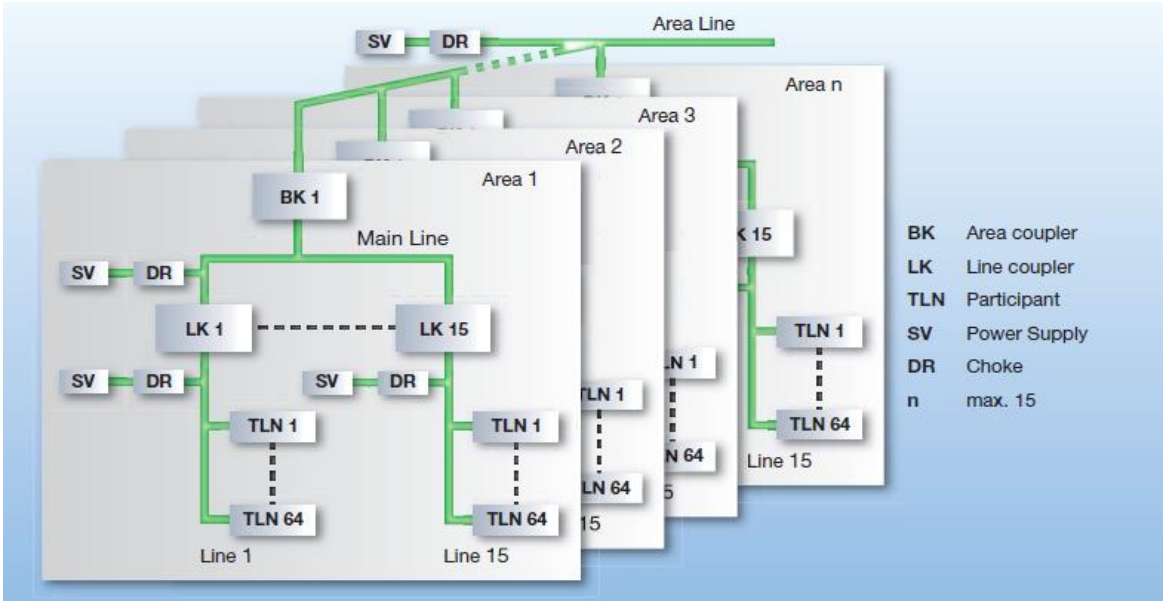
You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

3.4 BUS KNX

Before the entering of a KNX Object KNX we'll mention the functional logic of an EIB / KNX bus.

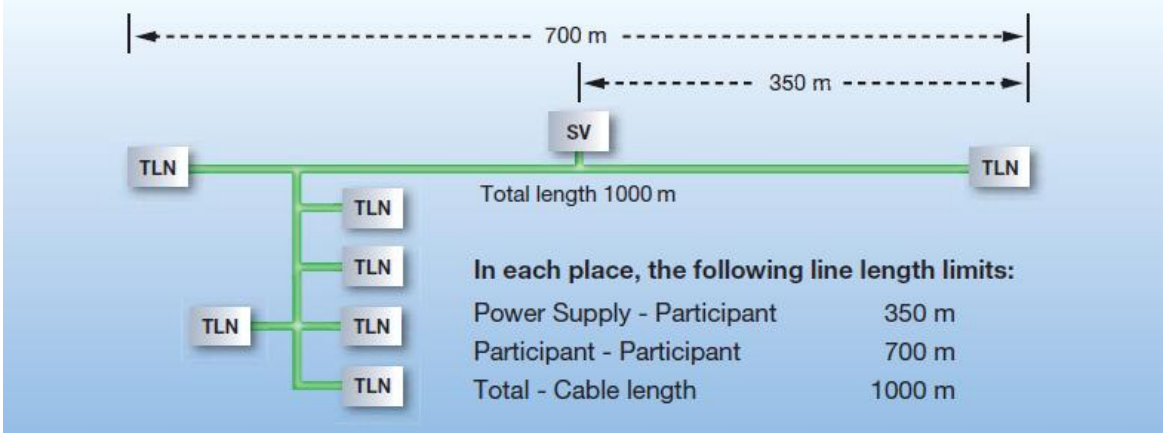
3.4.1 BRIEF OPERATING SYSTEM KONNEX

KNX (abbreviation of Konnex) is a standard for home automation applications based on 7 levels of the ISO/OSI and complying with standard EN 50090 which intelligence is distributed, event- driven and serial data transmission for the operational functions of command, implementation, control, monitoring and signaling .
Through a common transmission line (the bus), all devices connected to the bus can exchange information; the data is transferred serially according to established rules: the transmission protocol bus. The messages are organized into " frames " and sent to a device on the bus line (the "sender") to one or more units (a/the "recipient/s") .
Inside a network Konnex we can distinguish various devices grouped into lines, in turn belonging to one of the "Zone" or "areas" that constitute the complete system. The line that connects them all is the bus, consisting of a twisted pair is used for the transmission of signals for both power devices. Each line consists of up to 64 devices, each area up to 15 lines and each system can include up to 15 distinct areas. In each system, KNX is therefore possible to connect more than 14,400 different devices. Lines are connected to the mains by means of line couplers (AL); more main lines can then be coupled together using a dorsal line and area couplers (AA). What is important to point out is that individual devices can be connected at any point of the bus cable, on any level of connection and therefore any type of line.



Each type of line (or even the main ridge), which defines a section of the system, can have the distribution that you want (line, star, tree or any combination thereof), provided that you comply with the following standard KNX to ensure perfect operation of the system:

- maximum length of a single line 1000 meters
- maximum number of devices on a single line 64
- maximum distance between 2 devices is 700 meters
- device from a distance of up to 350 meters
- maximum number of ballasts for line 2 (located at least 200 meters apart)



If there are 30 or more devices connected to each other on a bus cable length lesser or equal than to 10 meters must place the power supply in the immediate vicinity. Since the transmission of signals and commands is performed through the system bus, the power supply line to 230V for the controlled electric users (motors, lamps , air conditioners, etc.), must be brought exclusively close to the users themselves, without involving wiring switches and switchgear/control. These devices provide a secure interface between man and the system being powered only by the voltage to 24 VDC SELV present on the bus. On the line 230V power can still be inserted all the protection of the users that the installer considers most appropriate (automatic switches, differentials, etc.) in a similar way to what occurs in a traditional installation. Due to its characteristics bus cable can be installed without any problem, next to the power supply line 230, in the same pipes or ducts.

Each KNX device has a physical address (not to be confused with the group address) that is used to identify when programming each device in a system. A physical address has the following structure: abc where a can take values between 0 and 15, between 0 and 15 b c between 1 and 255.

Let's take a practical example: it requires the activation of the valve that supplies water to the cooling/cleaning of the PV system. We will install a thermostat in a suitable temperature closes a contact which is connected to a digital input KNX. When the contact closes the input sends an ON command is associated with the group 0/0/1 which is also associated to the actuator that powers the solenoid. When the temperature drops below the threshold, the thermostat contact opens, the input sends an OFF to the group address 0/0/1 and remove power from the actuator to the valve.

Another example is the reporting of changes in the status of your contacts in a photovoltaic system. It connects an input to an auxiliary contact of KNX in circuit breaker (MCCB or ELCB) is associated with a KNX group address entry (eg 1/3/2) that sends an ON when the contact is opened and an OFF when you close (or vice versa). In this case, the command is sent to an actuator, but will be received by eSolar properly configured (see the following paragraphs) that will indicate the change in status of the circuit breaker with a lamp on the web interface and , if configured, will send an alarm through mail or sms.

3.4.2 INSERT I/O DEVCES

From *Plant Configuration* it's possible to select *I/O Devices*; selecting *Add* will be possible to configure different parameter according to the type of object KNX that you want to create. You can choose from several options, whether it is a command, a value or an indicator or sensor. See Figure 62.

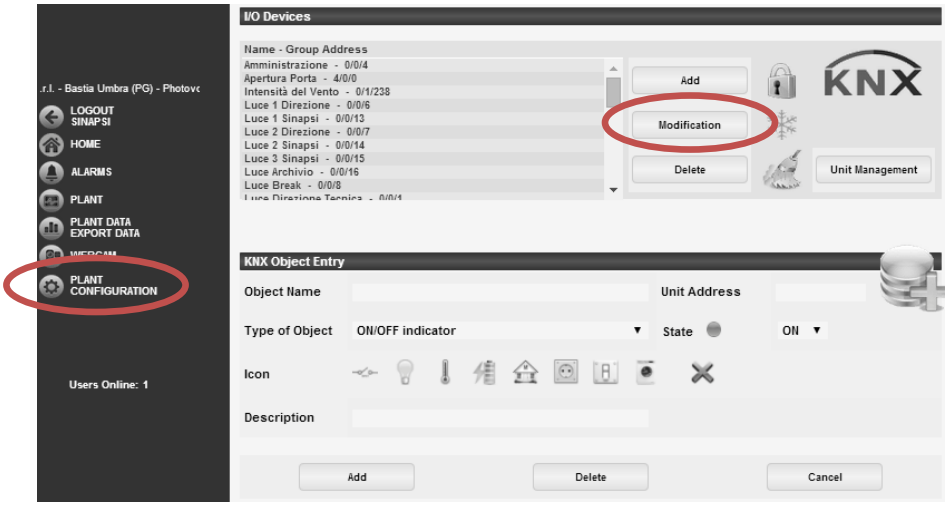


Figure 62 - Configuration object KNX

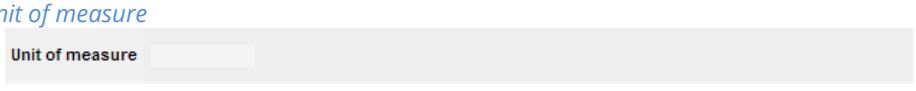
The tunable parameters will change on depending of the object. In all of the objects will be common fields:

- *Object Name*: KNX device name
- *Unit Address:* enter the group address of the object to be inserted. The group address of every channels is always reported to the side of the device
- *Type of Object* : select the type of data to be treated with the KNX device (the type of data to be treated must be expressly required to staff SINAPSI if outside by a standard programming)
- *Icon*: select an icon to associate with the channel KNX device in the configuration in the set available between

- *Decription*: enter any notes and / or additional descriptions

The fields which *Unit of measure* and *Transmission* will appear only for some KNX objects

- *Unit of measure*



- *Transmission*

For the option of *Transmission* it's possible to select between

- *Cyclic*: the data is collected at a equal frequency intervals request
- *On variation* the data is collected when there is a change in the current value

Press the *Add* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration.
Once created an objects simply select it and click the *Modification* button to change the features, or the *Delete* key to remove them. See Figure 63.

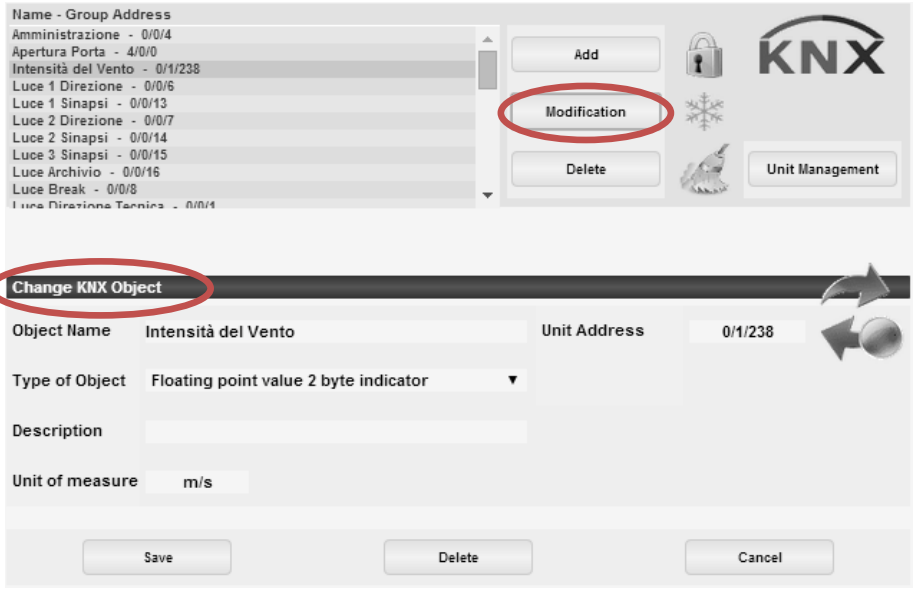


Figure 63 - Configuration of the KNX object

Returning to the example of the auxiliary contact in the previous section, we are going to set *indicator ON/OFF* in the *Type of Object* and 1/3/2 in *Unit Address*. After this put the object in a KNX group using the item *Unit Management* (see next paragraph).

3.4.3 UNIT MANAGEMENT

It's 'necessary to create groups with KNX objects configured for display them, see Cap. 3.3. Select *New Group* (Figure 64).

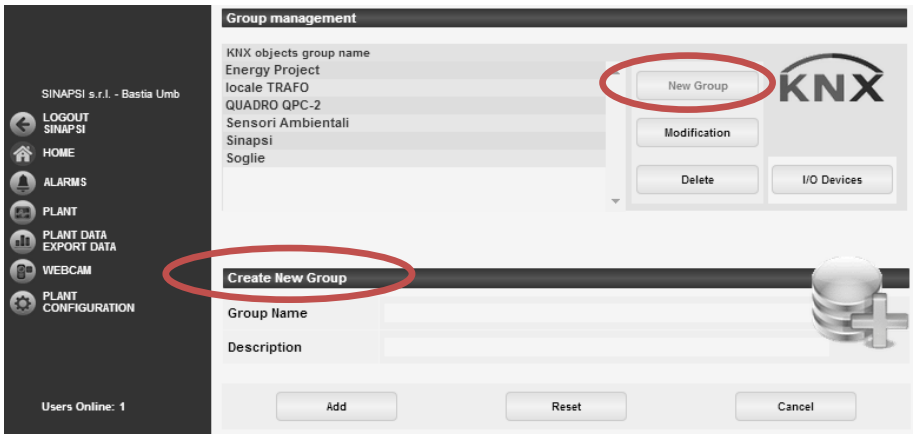


Figure 64 - Configuration object KNX

Insert new *Group Name* ad *Description*; Press the *Add* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration.

Once you have created the group select the object to include into the group using the double arrow, see Figure 65.

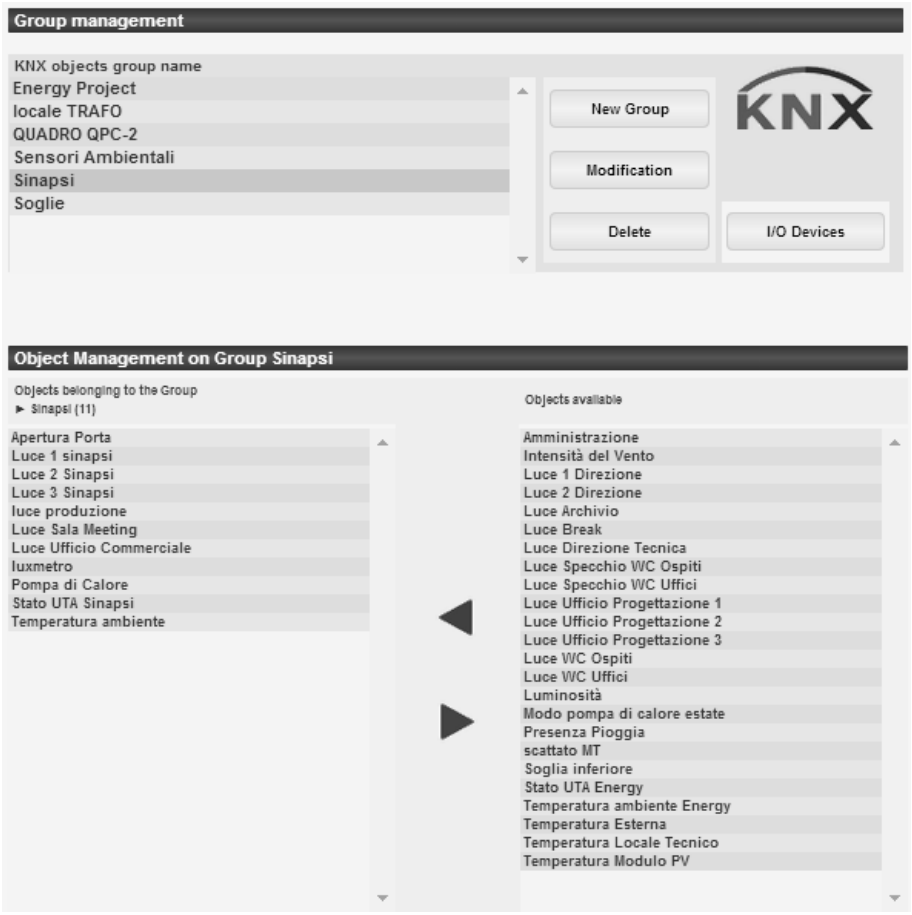


Figure 65 – Add/Remove object KNX in a group

Use *Modify* or *Delete* for modify or delete the group. See Figure 66.

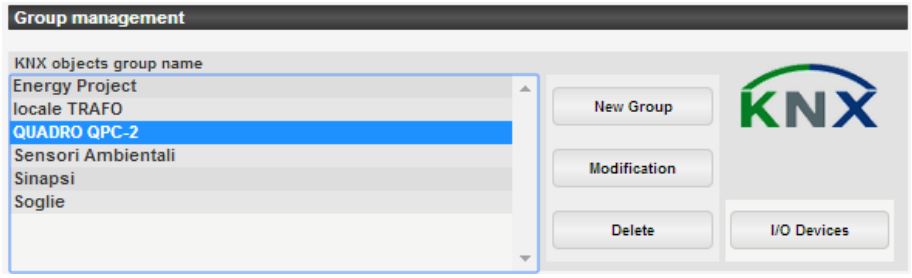


Figure 66 – Modify/Remove object KNX

Once the group is created it's possible to monitor it under the section *Plant*, *I/O Device* (Cap 6.9).
You can also select the follow items

-  - allows the insertion of the anti-theft device (cap 3.8.3)
-  - allows the insertion of the device for operations planning of PV modules (cap 3.8.4)
-  - allows the insertion of the device for planning the cooling PV modules (cap 3.8.4)

3.5 CONFIGURATIONOF ENERGY METER

From *Plant*, *Energy Meter* it's possible to configure five types of Energy meters, see Figure 67.

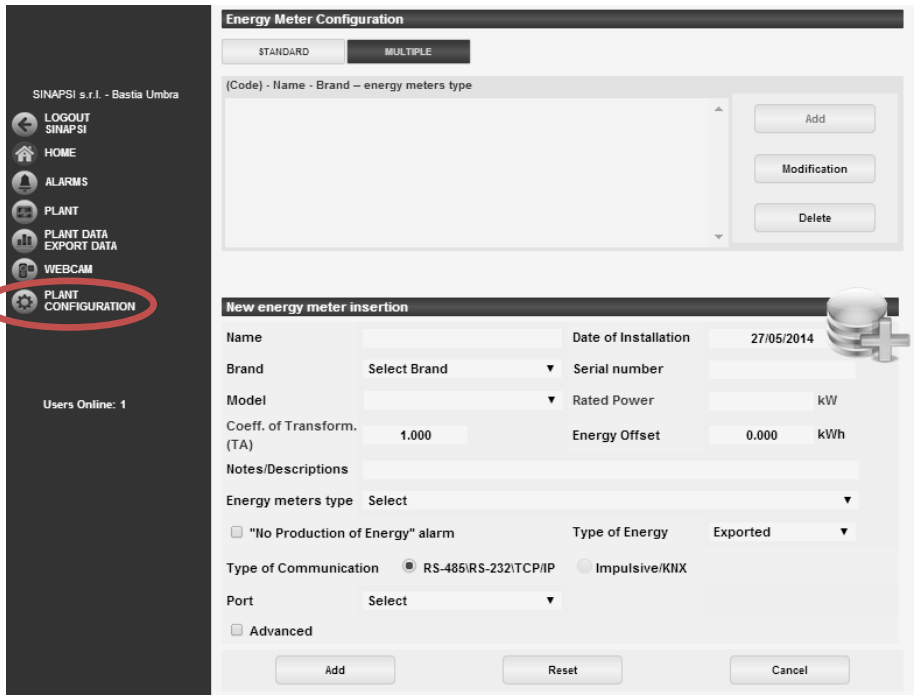


Figure 67 – Energy Meter Mask

Through the item Energy meters type will be possible to select between:

- *Total Production (REF)*: set the Energy meter like main production meter of the plant (OBIS A-). This choice will affect the creation of historic production (Cap. 3.1.1) if you select *External production meter* in *Value of AC Energy gained by* under *Plant Configuration*(see Cap 3.1.1)
- *Energy released to the net (REF)*: set the Energy meter like main released meter to the grid (OBIS A-)
- *Energy taken from the grid (REF)*: set the Energy meter like main taken from the grid (OBIS A+)
- *Partial production (REF)*: set the energy meter like imported (OBIS A-) or exported (OBIS A+) meter
- *Partial*: set the Energy meter like imported (OBIS A-) or exported (OBIS A+) meter

The insertion of the counters of type total, released and taken will have consequences on the graphical display of energy flows. For clarification see Cap 4
It's not possible to insert more than one category Energy meter except for the types Partial Production.

In this section it's possible to create a Virtual Energy Mete selecting *VIRTUAL.* This particular Energy meter can aggregate one or more partial counters under it like sum of the measure of all the energy meter selected.

For all the energy meters it's possible to insert item like:

- Name: energy meter name
- *Brand* : energy meter brand
- *Model*: energy meter model
- *Date of installation*: it will be automatically inserted by eSolar
- *Serial numbere*: energy meter serial number
- *Rated power:* energy meter model rated power [kW]
- *Coeff. Of trasform. [TA]:* This parameter refers to the multiplicative coefficient K (constant) depending on the ratio of the TA and possibly the TV inserted upstream of the meter. Enter the parameter to normalize the energy reading to the multiplier.
- *Energy offset*:

- *Using communication port S-485\RS-232\TCP IP\GTW TCP:* use this parameter in case of replacement / alignment of the in field energy counter. The value should take into account the *Coeff. Of trasform. [TA]*. Enter the amount of energy produced from the meter to be replaced less energy meter in place ***This operation must be completed by the counters disconnected from the communications port to maintain the accounting of the production of the entire PV system.*** Below the formula to calculate the offset.

$$Offset = E_{to\ be\ replaced\ energy\ meter} - E_{new\ energy\ meter}$$

- *Impulsive/KNX:* use this parameter in case of replacement / alignment of the in field energy counter. The value should take into account the *Coeff. Of trasform. [TA]*. ***This operation must be completed by the counters disconnected from the communications port to maintain the accounting of the production of the entire PV system***

- *Energy meters type*: energy meter type
- *"No Production of Energy" alarm*: eSolar will report, under the *Home* (cap 4) and *Alarm* (cap 5) section a mail/SMS notification (if enabled under the section alarms, see Cap. 3.9) the *No Energy Production* alarm; this is a automatic generated system alarm when there is not communication between eSolar and the energy meter for a time longer of 15. If the option is not fagged the alarm will be however displayed under the readout section (see Cap. 6.6 e 6.7).
- *Type of energy*: Imported (A-) or exported (A+)
- *Type of communication*: RS 485\RS-232\TCP/IP\GTW TCP/IP
- *Port*: select the communication port

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

In *Type of Energy* it's possible to select between *Exported* (OBIS A+) and *Imported* (OBIS A-) if the energy meter is bidirectional. In the case of a bidirectional energy meter it can be inserted twice like *Energy released to the net* and *Energy taken from the grid*. The parameters to be set will be the same except for the items *Exported* and *Imported*.

In type of Communication it's possible to select between

- *RS-485\RS-232\TCP IP\GTW TCP:* energy reading is directly taken from the meter via its native protocol. The value of the energy will be increasingly aligned to counter in the first reading of the registers
- *Impulsive/KNX e*nergy reading will be managed by KNX device BE.S 4.20.1 or 8.20.1. The device is a adder of pulses taken directly from the pulse counter then the value of the energy will require the insertion of an appropriate offset value and will remain aligned until the power supply will be guaranteed KNX BE.S 4.20. 1 or 8.20.1. If the choice falls on the KNX the power value of production will not be shown on the *Home* (Chapter 4) and the data in real time (Cap 6.6 e 6.7)

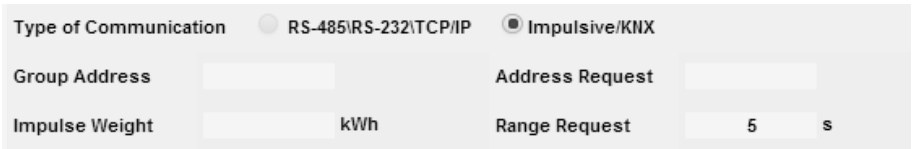


Figure 68 - Impulsive Energy meter configuration

- *Group Address*: identifies the channel of the device bus EIB / KNX BE.S 4.20.1 or 8.20.1 (digital inputs) that takes the progressive number of pulses from the meter. The group address of the channels is always reported to the side of the device.

- *Impulse weight*: energy is accounted for by the counter in the interval between two pulses. The impulse weight is a rating plate of the counter and defines how many pulses must be done to account one kWh produced. For example, if the impulsive weight is 10000 this means that each pulse accounts 1/10000 kWh; in eSolar insert the value 1/10000 = 0.0001.
- *Address Request*: must be set when you select the *On Demand* and is used to send the request for reading the pulses value. The address is always returned to the side of the device.
- *Range Request*: specifies how many seconds you want to get the. The default value is 5 second.
- *Energy Offset*: This parameter is used when replacing the meter and you don't want to lose the value already acquired and to align the counter at the first reading..

The inputs of the device BE / S 4.20.1 or 8.20.1 must be connected as contacts. The input status is displayed by LED 4. The device is powered by the system bus and requires no auxiliary voltage.

Default configuration of the device KNX BE/S 4.20.1

Physical address: 1.1.220
Group address:
Channel A: 13/2/0 digital input "0" open – "1" close – cyclic 30s
Channel B: 13/2/1 digital input "0" open – "1" close – cyclic 30s
Channel C: 13/2/2 digital input "0" open – "1" close – cyclic 30s
Channel D: 13/2/3 energy meter impulsive input
13/2/103 energy meter impulsive

3.6 Protections

From the *Plant Configuration*, *Protections* it's possible to insert the interface protection device

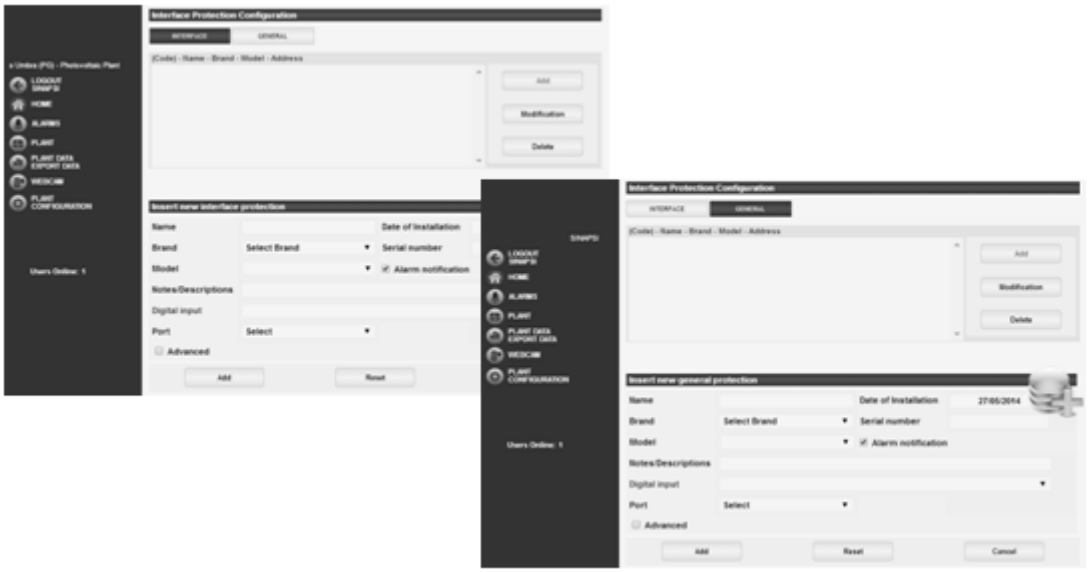


Figure 69 – Insert interface protections

- *Name*: protection name
- *Brand*: protection brand
- *Serial Number*: protection serial number
- *Alarm notification:* activate the alarm notification
- *Notes/Descriptions*: insert note/Description
- *Date of installation*: it will be automatically inserted by eSolar
- *Digital input:* select a digital input to omit the remote control, after the KNX network for safety reasons, if they are present in the field technicians to perform maintenance operations
- *Port*: select the port

> You can use COM1, COM3, COM4 and Ethernet. The choice of the port depends on the type of protocol integration in the eSolar and on the type of cabling. Refer to ***Table Compatibility downloaded in the Doc Data System***. They can be connected simultaneously to different models of inverters. ***The sum of the devices connected to COM1, COM3, COM4 and Ethernet must be lower than 100 devices***.

- *Address*: insert the protection address.
- *Advanced*: accesses the configuration or the communication parameters showed in Figure 17.

3.7 Display LED

From *Plant configuration, Setup Dsplay LED* it's possible conFigurete LED display like showedFigure 70

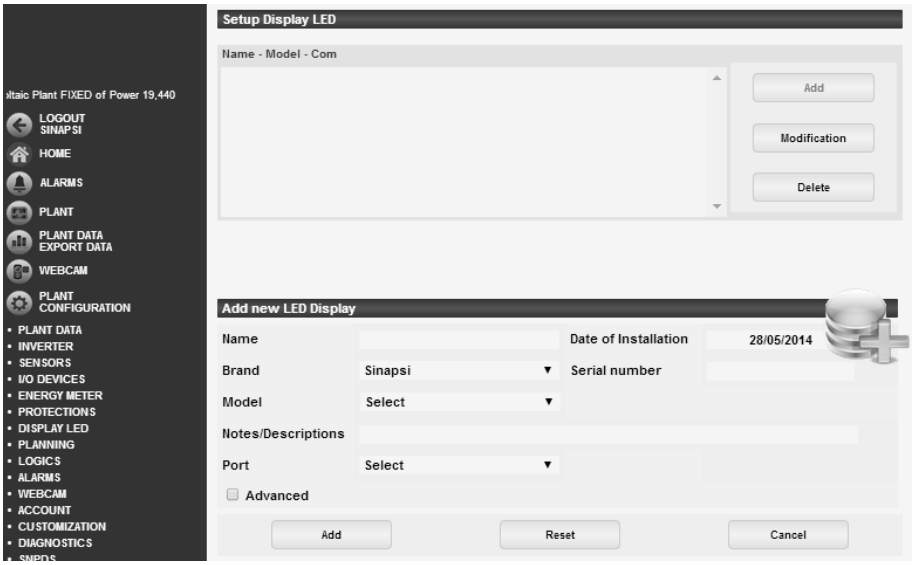


Figure 70 – Display LED

For every Display LED it's possible to fill

- Name: Display LED name
- *Brand*: Display LED brand
- *Model*: Display LED model
- *Date of installation* it will be automatically inserted by eSolar
- *Serial number*: Display LED name
- *Notes/Descriptions*: insert note/Description
- *Port*: only COM1 or COM3
- *Address*: for everu display LED the address is 1

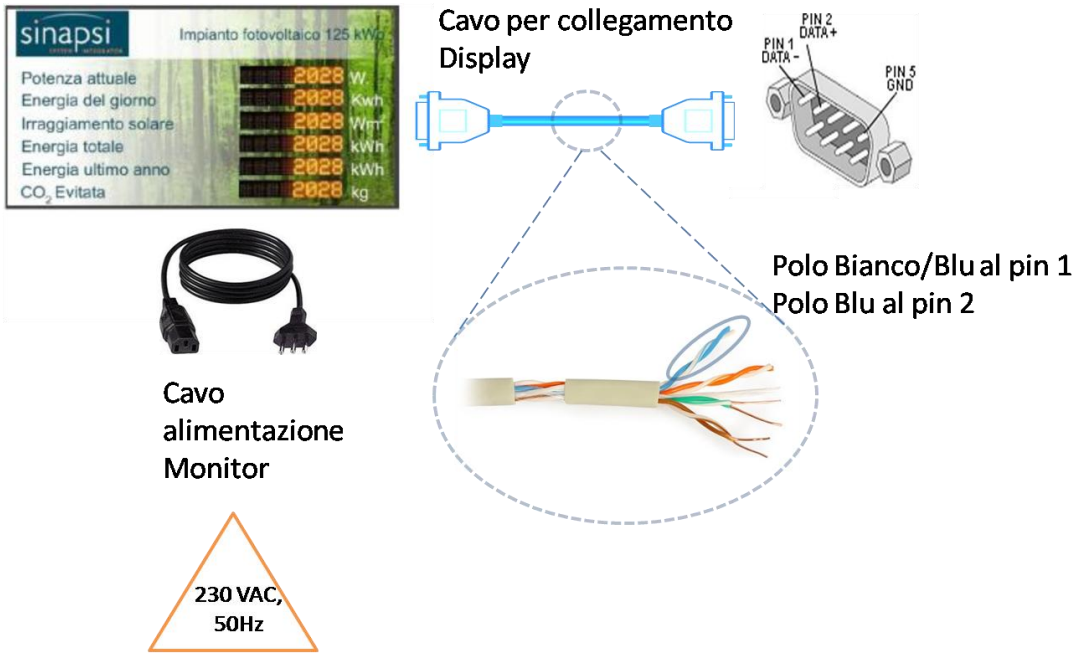
The selectable models are:

- *SIN.EXTLED3* 3 fields.
  - 1° field - instantaneous power $[W]$
  - 2° field – total Energy produced $[kWh]$
  - 3° field - CO_2 emissions avoided $[Kg]$
- *SIN.EXTLED3a* 3 fields
  - 1° field - instantaneous power $[W]$
  - 2° field - total Energy produced $[MWh]$
  - 3° field - CO_2 emissions avoided $[t]$
- *SIN.EXTLED3b* 3 fields
  - 1° field – total Energy produced $[MWh]$
  - 2° field - instantaneous power $[W]$
  - 3° field - CO_2 emissions avoided $[t]$
- *SIN.EXTLED3c* 3 fields
  - 1° field – instantaneous power $[kW]$
  - 2° field – total Energy produced $[MWh]$
  - 3° field - CO_2 emissions avoided $[t]$
- *SIN.EXTLED4* 4 fields.
  - 1° field - instantaneous power $[kW]$
  - 2° field - total Energy produced $[MWh]$
  - 3° field – daily Energy produced $[kWh]$
  - 4° field - CO_2 emissions avoided $[t]$

- *SIN.EXTLED6* 6 fields.
  - 1° field - instantaneous power $[kW]$
  - 2° field - daily Energy produced $[kWh]$
  - 3° field – piranometer $[W/m^2]$
  - 4° field - total Energy produced $[MWh]$
  - 5° field – annual Energy produced $[MWh]$
  - 6° field - CO_2 emissions avoided $[t]$
- *SIN.EXTLED6a* 6 fields.
  - 1° field - instantaneous power $[W]$
  - 2° field – Daily Energy produced $[kWh]$
  - 3° field - piranometer $[W/m^2]$
  - 4° field - total Energy produced $[kWh]$
  - 5° field - annual Energy produced $[kWh]$
  - 6° field - CO_2 emissions avoided $[Kg]$

The correct representation of the data of the monitor LED that is not present in the list requires the implementation of the Protocol.

To follow a connection scheme for the LED monitor.



3.8 PLANT CONFIGURATION

From *Plant Configuration* it's possible to configure the *Planning* section:

- Sending plant production data by mail: send a email with the synthetic data of in various formats and timescales
- Data Backup on External Memory: it automatically generates a database backup at preset intervals on external storage media such as USB
- PV Module Cleaning Setup: planning the cleaning of the photovoltaic panels when the performance of the panels drops below a certain percentage. A KNX device is required
- PV Module Cooling Setup: active cooling of the PV panels when the temperature exceeds a threshold temperature. A KNX device is required
- Events: It manages events in relation to the state of a given object KNX, if installed in the plant

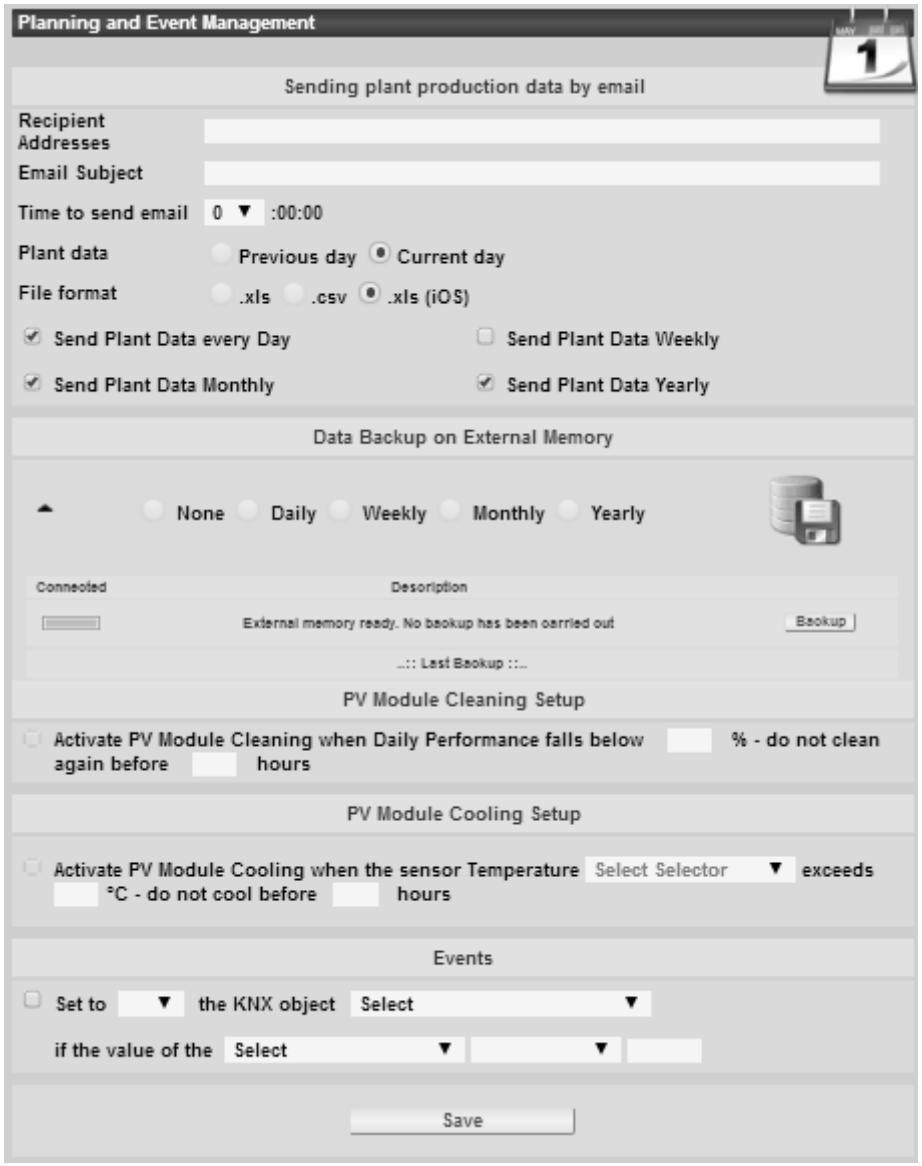


Figure 71 – Planning section

3.8.1 SENDING PLANT PRODUCTION BY MAIL

Fill the following fields for enable the planning of the expedition of production data. The eSolar allows you to send scheduled daily production of daily, weekly, monthly and yearly in .xls, .xsv and. xls(iOS) formats. The email can be sent to one or multiple recipients at the same time (Figure 72). **It is advisable not to put more than ten recipients of e-mail.**

> To receive mail correctly in the system must be properly configured the mail outgoing SMTP server (Cap **Errore. L'origine riferimento non è stata trovata.**).

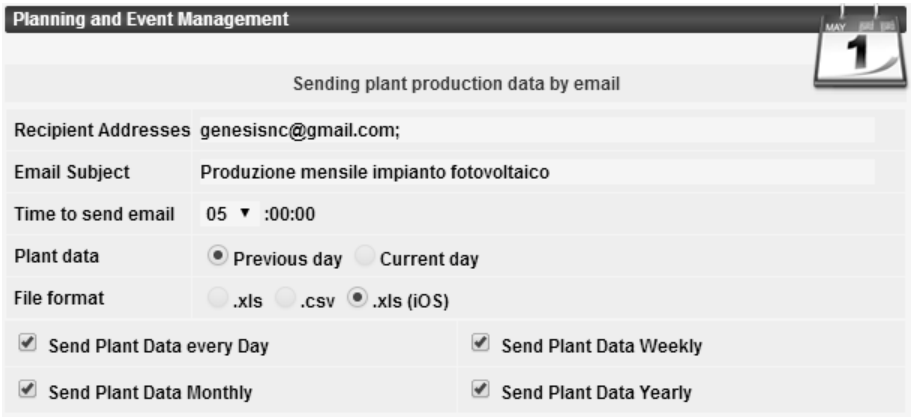


Figure 72 - Configuration mail sending

- *Recipient Addresses:* insert the recipients

> The addresses must be separated from each other by a semicolon (;) without spaces.

- *Email Subject*: enter the subject of your message
- *Time to send email*: select the schedule for sending the email. The entered time refers to the current day
- *Plant data*: select if you want to send the production of the current day or of the previous day
  - If you choose to send an email with the production data for the current day, select a delivery times less than 00:00 over which the plant is no longer in production
  - If you choose to send an email with the production data of the previous day select any delivery time
- *File Format*: select the file format between.xls, .csv e .xls (iOS)
- *Send Plant Data every Day*: at the set time sends a file with daily production data
- *Send Plant Data weekly:* at the set time on Monday, sending a file with the production data of the previous week
- *Send Plant Data monthly*: at the set time on the first day of the month sends a file with the production data of the previous month
- *Send Plant Data yearly*: at the set time on January 1 sends a file with data from previous year's production

3.8.2 DATA BACKUP ON EXTERNAL MEMORY

It's possible to set backup of the database on physical support such as external USB drive. The screen for the backup schedule is shown in Figure 73. ***The schedule allows a depth of 7 backup from the starting date.***
Daily: 7 days; **Weekly**: 7 weeks; **Monthly**: 7 months; **Annual**: 7 years.
After writing 7 backup files on physical support of USB memory the system overwrites the previous files.

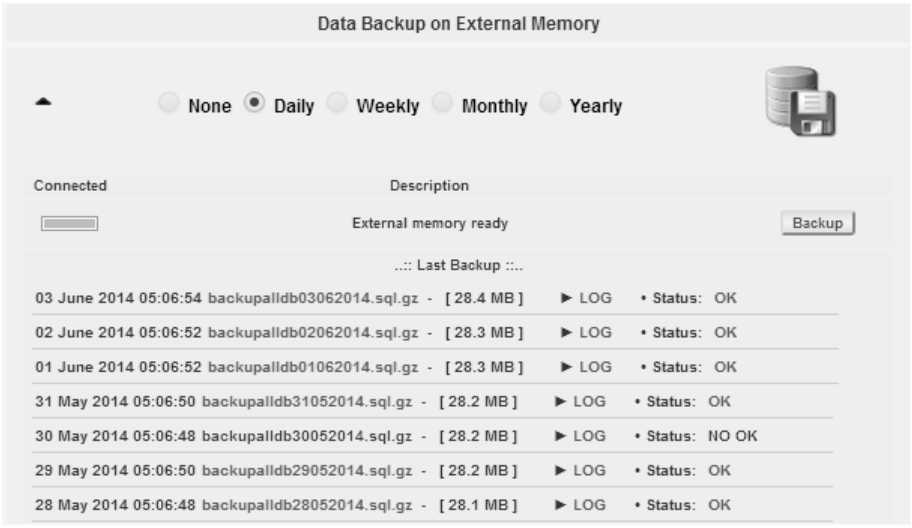


Figure 73 – Backup Mask

Once you have inserted a USB stick and it's recognized correctly by eSolar the Connected indicator will change from Red to Green. To Follow the correct state transition choose the backup between (see Figure 74)

- *Daily*: make a backup per day
- *Weekly*: make a backup per week
- *Monthly*: make a backup per month
- *Yearly*: make a backup per year

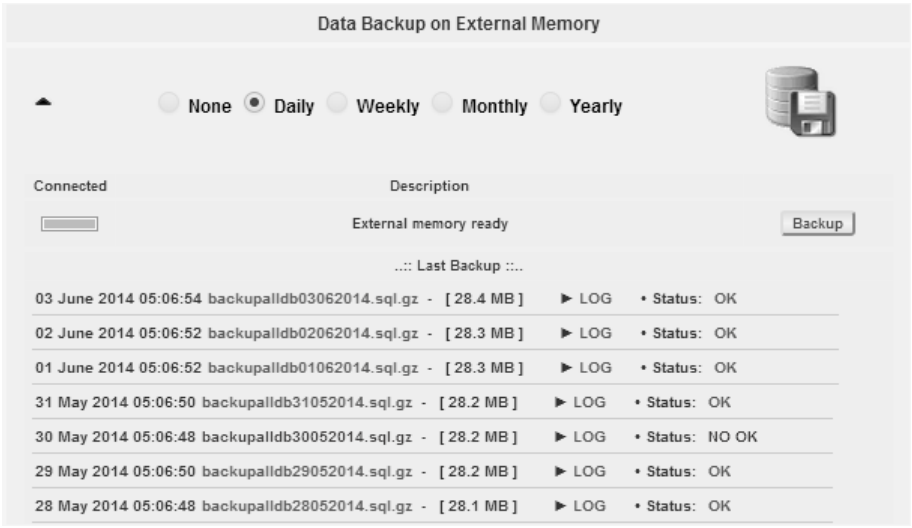


Figure 74 – Backup Mask Planning

Any backup line shows the date, time, name, size and status of the backup. Press LOG to download the back. The backup can be loaded in eSolar only by our technicians.
The backup will have a depth of 8 days from the start of her schedule. **As eSolar is installed on photovoltaic plants, subjected to electrostatic discharge, we strongly recommend to use this feature with daily and/or weekly backup. Proper Backup allows our technicians to restore the**

history of the eSolar in its entirety if the latter incurs to hardware damage.

The USB memory is not included in eSolar.

3.8.3 ANTI-THEFT DEVICE

It's possible to configure an anti-theft device like a ON/OFF indicator.

Figure 75 – Antitheft device

Enter the group address of the device anti-theft. The group address of the channels is always returned to the side of the device

3.8.4 PV MODULE CLEANING SETUP – PV MODULE COOLING SETUP

It's possible to activate the cleaning and the cooling of the PV panel if are present the respective KNX devices

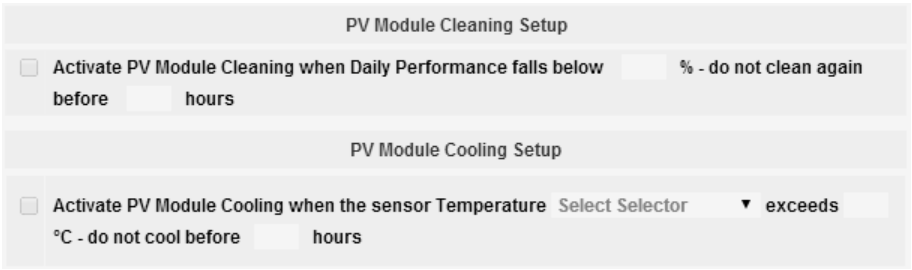


Figure 76 – Clean up, Refresh PV Moduls

The section allows the activations of:

- *PV Module Cleaning Setup*: the operation can be activated if the value of the daily performance falls below a threshold value. The choice "not clean before" allows the insertion of n hours before the asset is put into operation
- *PV Module Cooling Setup*: the operation is activated if the temperature of the PV module exceeds n degrees Celsius. The choice "not clean before" allows the insertion of n hours before the asset is put into operation

3.8.5 EVENTS

This section allows to configure the logical operations in KNX technology. For example the events section allows you to activate an actuator, "Synapses Light 1" when a transducer, "Solar Radiation", reaches a configurable set.

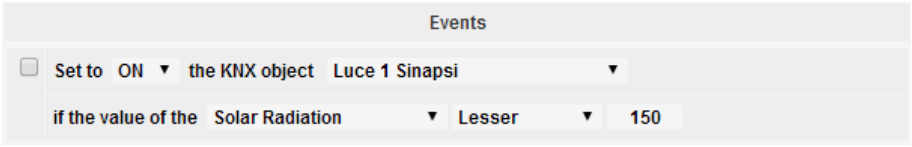


Figure 77 – Events section

3.8.1 KNX OBJECTS PLANNING

KNX Objects Planning allows to configure a series of periodic actions using the KNX objects. For example can be activated a KNX command every Monday at a given time. By clicking the button at the top right, you can create a new schedule (Figure 78).

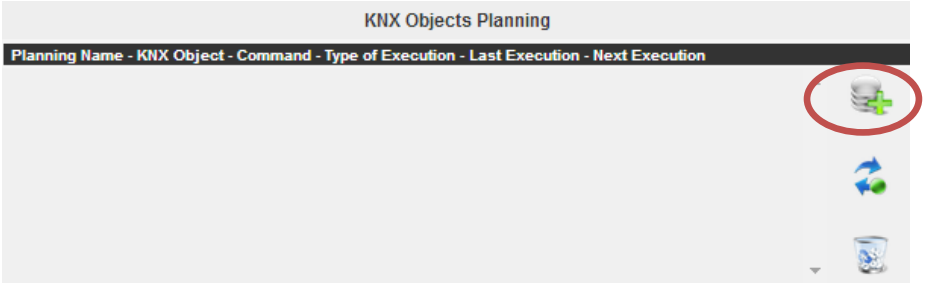


Figure 78 – KNX Objects planning

It's sufficient to give a name to the palling and select the KNX object and to the time period (Figure 79).

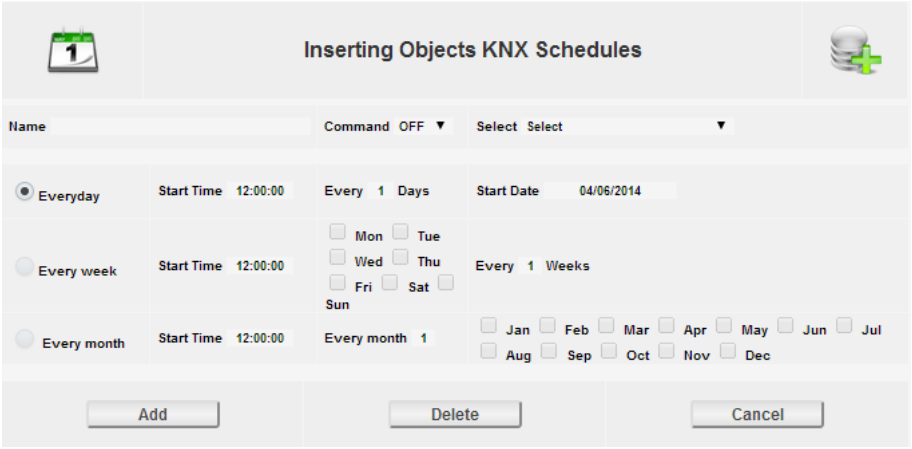


Figure 79 - KNX Objects planning scheduling

Press the *Add* button for save the configuration; *Delete* for delete the prior configuration; *Cancel* for delete the prior configuration

3.9 ALARMS

From the *Plant Configuration* menu it's possible to configure the parameters for the signaling/sending alarms/faults prior email and/or SMS management (for the SMS option is necessary equip the eSolar with the SIN.MODEMGPRS device). See (Figure 80).

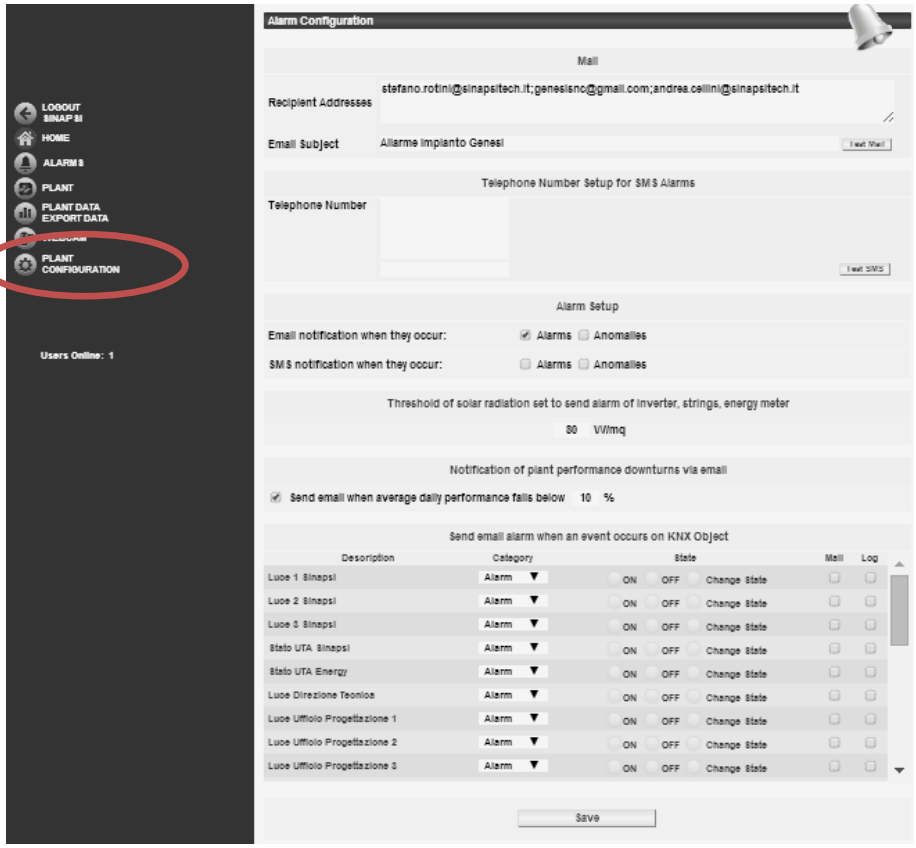


Figure 80 – Alarms configuration

Compilare i campi come specificato di seguito:

- *Recipient Addresses*: insert the recipients. **It is advisable not to put more than ten recipients of e-mail.**

  The addresses must be separated from each other by a semicolon (;) without spaces.

- *Email Subject*: enter the subject of your message

  In order to send email, the system must be properly configured the outgoing mail server (see 3.15.3).

- *Test Mail*: press the button to receive a test mail to the e-mail addresses listed in the *Recipient Addresses*

  If the email is not received check the server settings for outgoing mail and/or address of the recipients.

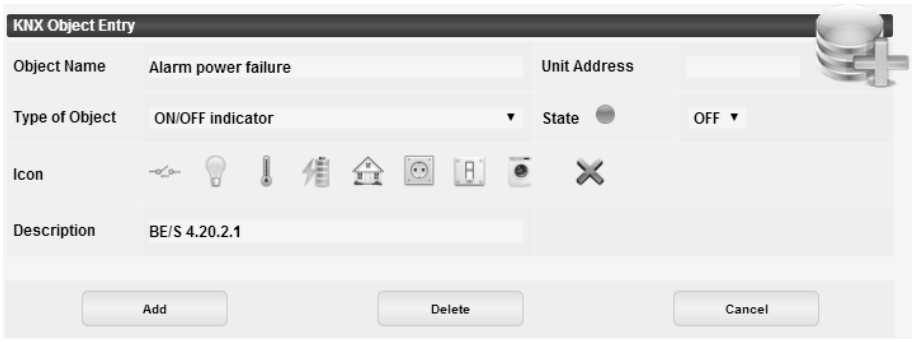
- *Telephone number*: enter up to a maximum of five phone numbers including country code to which to send the SMS notifications

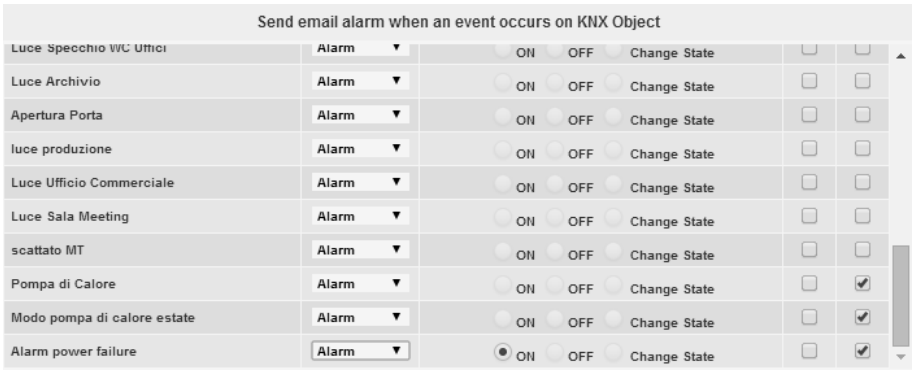
  If in the eSolar is not configured a modem for sending SMS, the SMS fields are disabled.

- *Test SMS*: press the button to receive an SMS to the numbers entered.

If the message is not received check if the number is correct, the signal quality is acceptable and that the SIM card has enough credit

- *Alarms Setup*: allows you to choose how to report alarms and faults if by email, SMS, or both. The distinction between alarms and faults authentic to their classification in the proprietary communication protocols of the devices. If you decide not to notify alarms, however these will be stored and visible on the monitor in the alarm list, accessible from the *Home Page*
- *Threshold of solar radiation set to send alarm of inverter, strings, energy meter:* allows you to set a minimum threshold value of solar radiation above it the eSolar sends an alarm and/or anomaly notifications. This choice sets up a dynamic time slot, depending on the solar radiation, within which to notify alarms and/or anomalies. If it is not present in a pyranometer, you can choose a static time slot in which to notify alarms and/or anomalies.
- *Notification of plant performance downturns via email*: you can select this option to receive an email alert when the performance of the system falls below a set threshold. Performance is calculated using the following formula: (AC power produced during the day) / (solar panels radiated per unit surface area in the day). Do not confuse this item with the inverters conversion efficiency AC / DC, usually the value does not exceed 15%. Refer to the datasheet of photovoltaic panels before inserting an appropriate value. The alarm message will be sent by eSolar at 24:00
- *Send email alarm when an event occurs on KNX Object*: once you have created the KNX objects and a *Group KNX*, see Cap 3.4, you can set to send email by checking the send an e-mail to the senders configured in 3.15.3). The check box *Mail* box also automatically activates box *Log* show the alarm status in the *Home Page* Cap. 4 and *Alarms Page* 3.9). Conversely, activating the box *Log* the box *Mail* is not checked automatically. For example, if you select the KNX object "*Alarm power failure*" in the drop-down menu, you can set the system to send an email when the KNX object takes value ON, or OFF, or whenever there is a change of state. **Be careful when setting the alarm activation condition**. If *Alarm power failure* has been set as normally closed (section 3.4.2) in green color, the activation of the OFF condition must be set to *ON* or *change state*, see pictures to follow, respectively, fot the KNX configuration and activation





It's possible to set many alarm as the number of KNX devices entered in eSolar

3.10 WEBCAM

The eSolar is able to see the video from IP cameras Video Server or DVR (Digital Video Recorders), provided they have an integrated web server. The operation is to capture web pages, provided by video devices, within the webcam section dell'eSolar
L'eSolar è in grado di visualizzare al suo interno le immagini provenienti da videocamere IP, da Video Server o da DVR (Videoregistratori digitali) ***provided with a integrated web server***.
From *Configuration Plant* select *Webcam*, see (Figure 81).

Figure 81 - Webcam Configuration

3.10.1 INSERIMENTO WEBCAM

Press the *Add* button. In the bottom of the page will appear as shown in Figure 82.

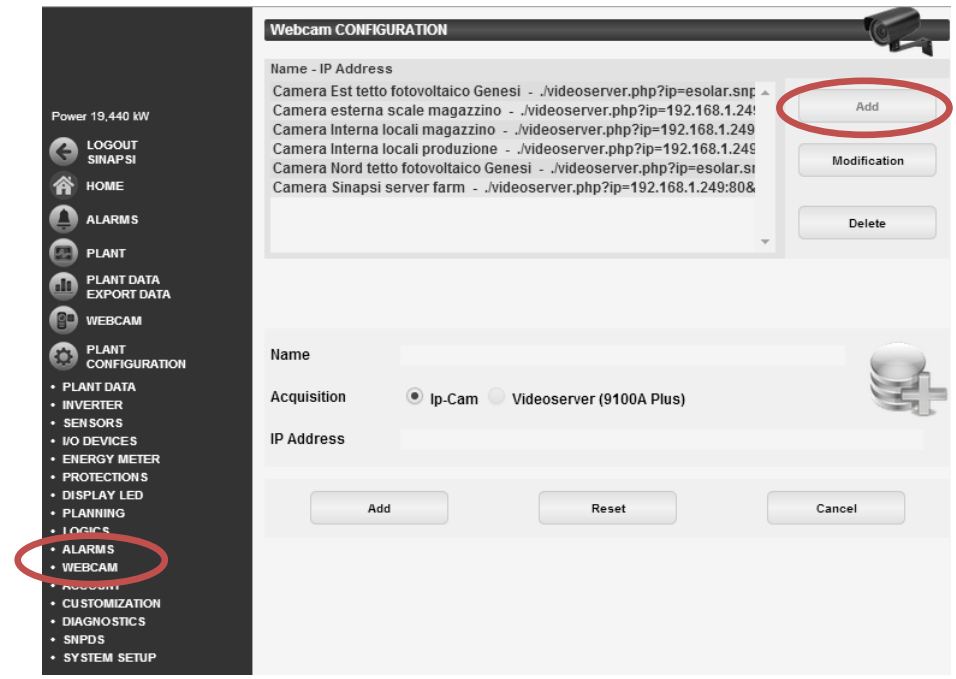


Figure 82 – Webcam configuration mask

Fill the fields:

- *Nome*: webcam name
- *Acquisizione*: select between Ip-Cam or Videoserver (9100A Plus)
- *IP Address*: insert the IP address of the webcam or videoserver

The IP address of the WebCam have to be a public static address

Press the *Add* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration.

3.10.2 MODIFICATION

Select the webcam you want to modify and press *Modification*. In the bottom of the page will appear as shown in the screenshot in Figure 81. Here you can modify the information already entered.

3.10.3 DELETE

Select the webcam you want to delete and press *Delete*. Press the *OK* for delete configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration

3.11 ACCOUNT

In *Account*, under Plant Configuration, you can modify/add the account.

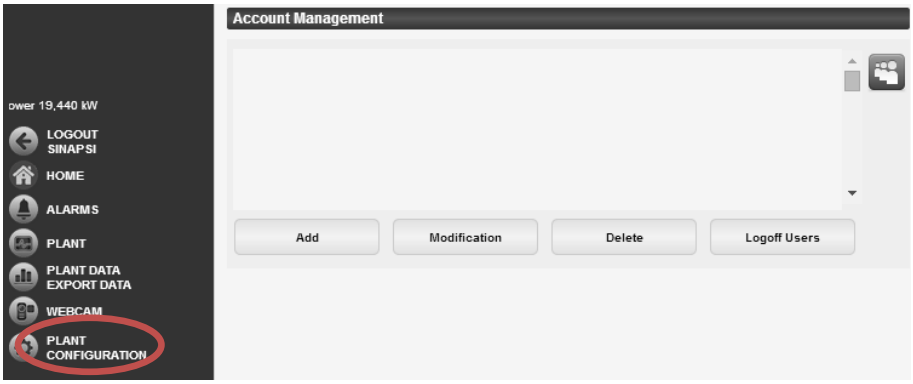


Figure 83 – Account management

3.11.1 ACCOUNT MANAGEMENT

It's possible to create two kinds of account

- Administrator: can access on every page of the web interface: system configuration, configuration Accounts.
- User: DO NOT have access Plant Configuration menu.

For Default the Administrator for the first access is:

Username	Password	User Type
admin	admin	Administrator

We recommend that you change the default user during the first configuration, in order to prevent unauthorized access.

In the system must be always present a Administrator account otherwise you will not be able to access the Configuration. To reset the Administrator account you need to contact technical support.

3.11.2 ADD NEW ACCOUNT

Press *Add* to create a new account, see Figure 84.

Figure 84 - Account management

Fill the fileds:

- *Name*: account name

  E' consigliabile non assegnare lo stesso "Nome" a due utenti diversi.

- *Username*: account username

  Non possono essere inseriti due utenti con stesso "Username".

- *Password*: password username
- *Level*: select between *User* or *Administrator*

Press the *Add* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration.

3.11.3 MODIFICATION

Select the account to modify and press *modification*, see Figure 85.

Figure 85 - Account management

Make the changes as already described in the previous section.
Press the *Add* button for save the configuration; *Reset* for reset the prior configuration; *Cancel* for delete the prior configuration.

3.11.4 DELETE

Select the account to delete and press *Delete*. Press *OK* to confirm the deleting; *Cancel* for stop the operation.

3.11.5 LOGOFF UTENTE

The administrator has the ability to disconnect a user through a task list and force the logoff. Select the account you want to disconnect from the list showedin Figure 83. Press *Logoff Users*. All users associated with the selected username are disconnected. In the list of users (Figure 83), in red are not connected an in green are connected.

3.11.6 USER LOG

In Figure 83 selecting  will be opened the full user list access in the last two week.

3.12 CUSTOMIZATION

In this section you can customize the Logo and fields to show in *Extern Monitor*

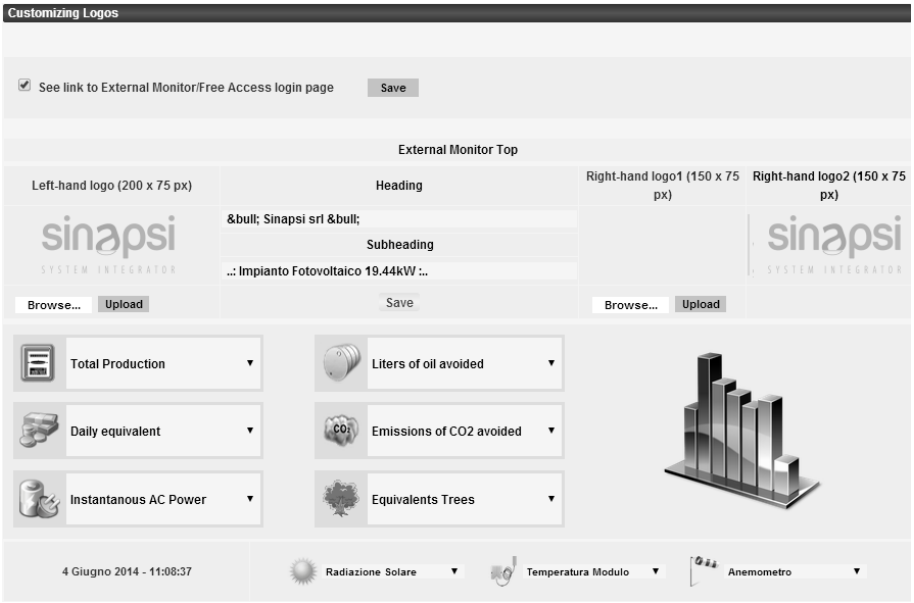
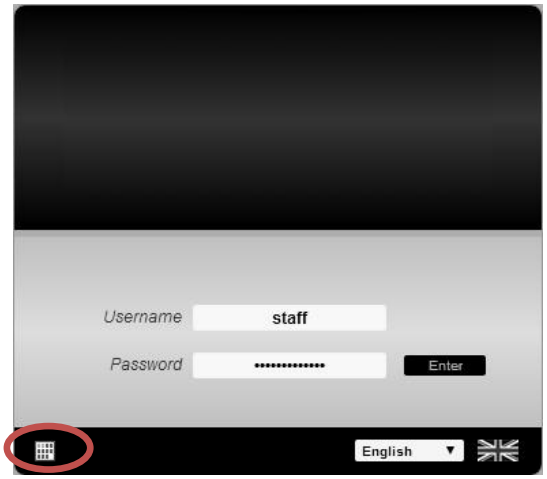


Figure 86 – External monitor customization

See link to External Monitor/Free Access login page: enables or disables in the Login page the opening of the *External Monitor*.



- *Heading:* sets the page header of the external monitor
- *SubHeading*: sets the page subheader of the external monitor
- *Logo SX*: upload the logo in the left page of the external monitor. Use .Png or .JPG format

- *Logo DX*: upload the logo in the right page of the external monitor. Use .Png or .JPG format
- *Fields displayed*: allows the selection of six fields, referring to the production plant, to be displayed in the external monitor
- *Sensor*: allows the selection, of up to a maximum of three sensors, to be displayed in the external monitor

Once you have set the data to be displayed in the external monitor it will display as showed in Figure 87.

Figure 87 – External monitor

The *External Monitor* shows dynamically the real-time data showing the current production system and the daily energy production in the current month. The two information cyclically rotate in the middle graph. ***The page uses Java Script compatible with devices iOS6 and 7.***

3.13 DIAGNOSTIC

Entering in *Diagnostic* you'll have a page like in Figure 88

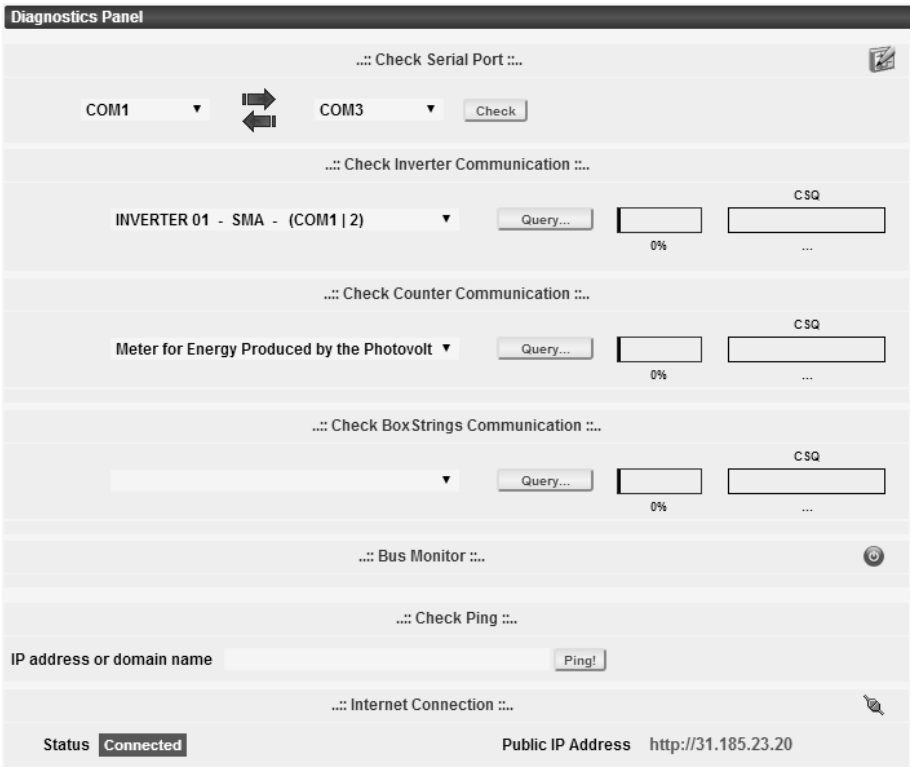


Figure 88 – Diagnostic section

The *Diagnostic* Section allows you to test the communication port/inverter/strings/Energy connected to the eSolar.

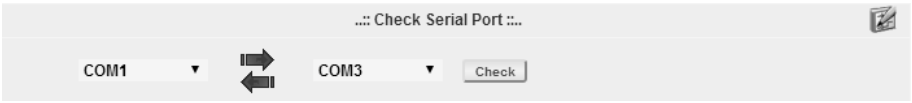


Figure 89 – Serial port check

You can check:

- *Check Serial Port:* allows to test the properly communication of COM1 (RS485), COM3 (RS485) and COM4 (RS232). To perform the test ports follow the wiring diagram by placing the mouse cursor over the icon
- *Inverter*: allows to query an inverter already configured in the eSolar, see Cap 3.2.1
- *Energy Meter*: allows to query an energy meter already configured in the eSolar, see Cap 3.5
- *String Box*: allows to query a string box already configured in the eSolar, see Cap 3.2.7
- *Bus Monitor*: show all packets circulating in the KNX bus
- *Check Ping*: ping a LAN IP in the same net of the eSolar
- *Internet Connection*: shows the status of the internet connection and the public address, if acquired by the eSolar

We reiterate that, except for the test of the communication ports, for test a device it must be previously loaded in eSolar.

3.14 SNPDS

Make sure your eSolar is regularly connected to the Internet. Go under *Plant Configuration*, *System Setup*. See Figure 90

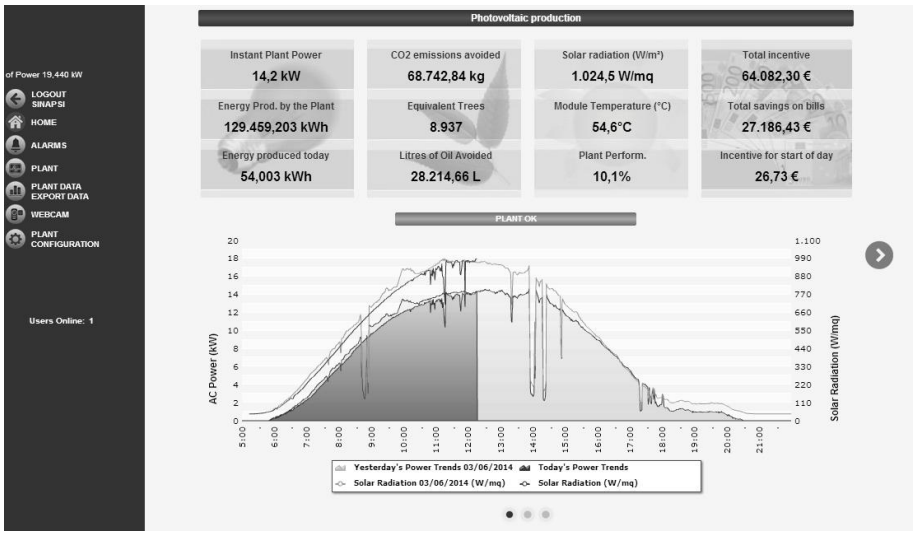


Figure 90 – eSolar online

S

Verify that there is a remote IP address with a green led indicator on the left. See Figure 91

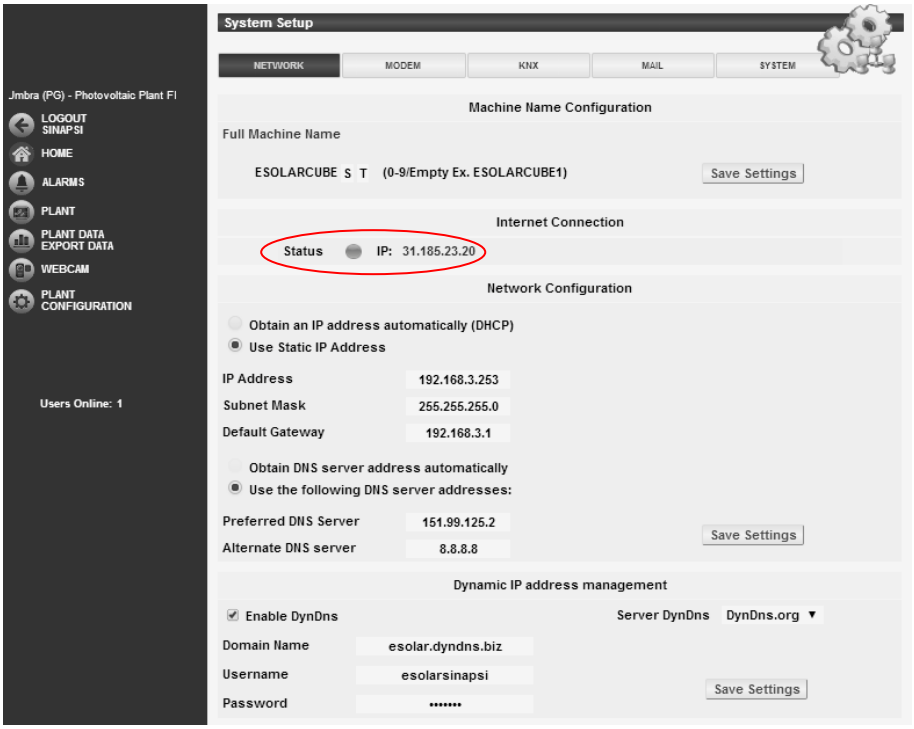


Figure 91 – eSolar online

This state of the eSolar guarantees the full internet functionality. If the indicator is red, please verify the internet configuration, see Cap 3.15.
Once verified the above go under *Plant Configuration*, *SNPDS*, and select *Connected to a Server* (Figure 92)

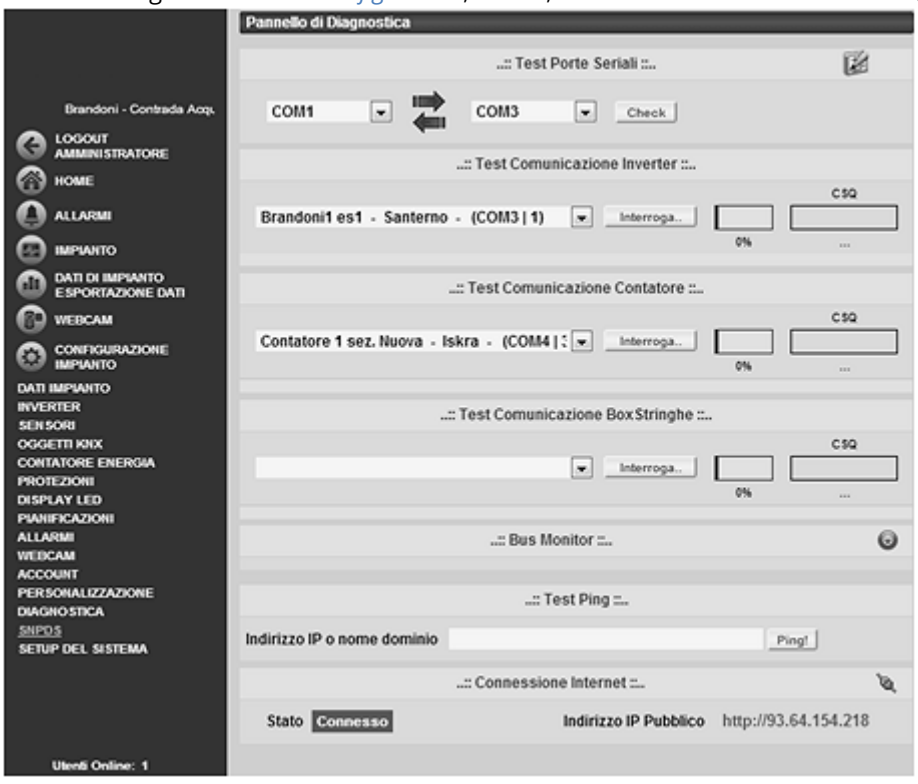


Figure 92 – Activation SNPDS service

To follow the Figure 94 shows the field to fill for a a proper engagement of the eSolar to SNDS service.

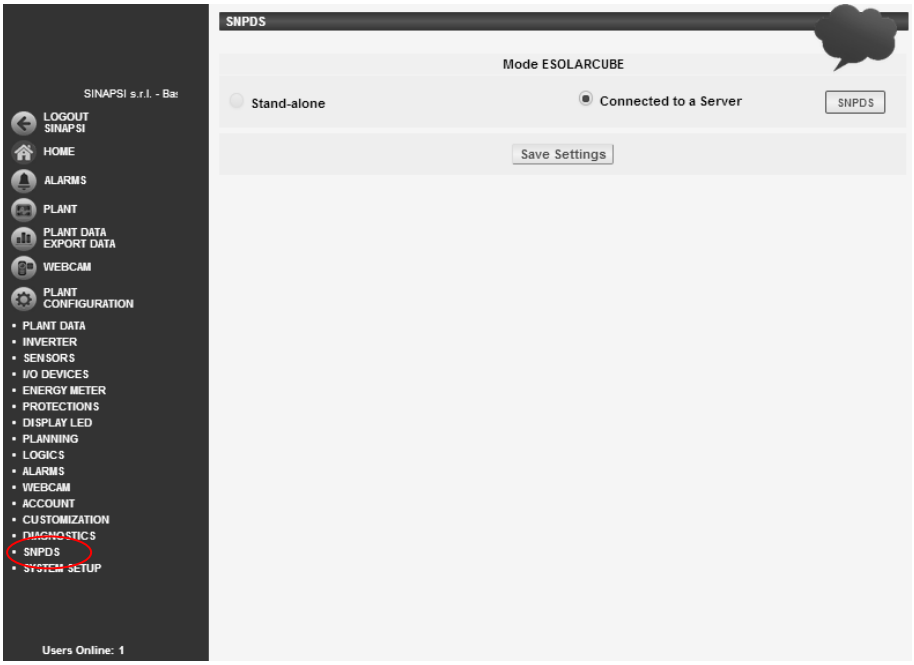


Figure 93 – Activation SNPDS service

Figure 94 shows the items to be included for proper engagement.

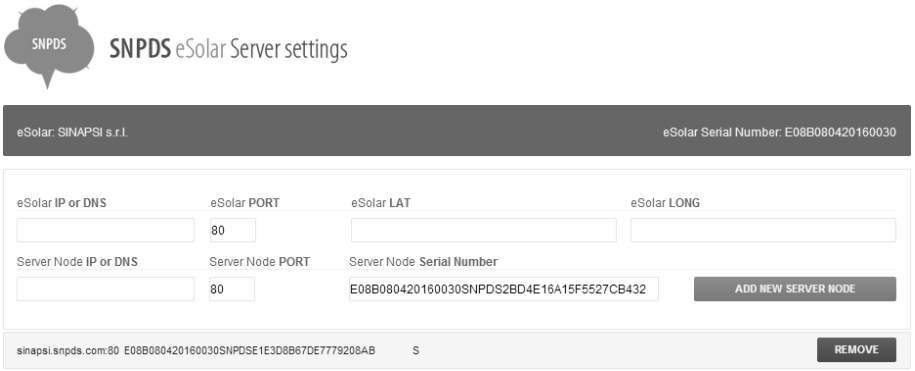


Figure 94 – Engagement in the SNPDS service

- *eSolar IP or DNS:* enter the public static IP or DynDNS IP of the eSolar
- *eSolar PORT:* enter the external port for reaching the static IP or DynDNS IP of the eSolar. Defualt is 80.
- *eSolar LAT:* enter the latitude of eSolar
- *eSolar LONG:* enter the longitude of eSolar
- *Server Node IP or DNS:* enter the static IP address of the service SNPDS. This information is provided by Sinapsi Srl
- *Serial Node Port:* enter the external port for reaching the static IP or DynDNS IP of the SNPDS. Defualt is 80.
- *Server Node PORT Server Node Serial Number:* the code is generated automatically by SNPDS

To follow a SNPDS engagement example See Figure 95

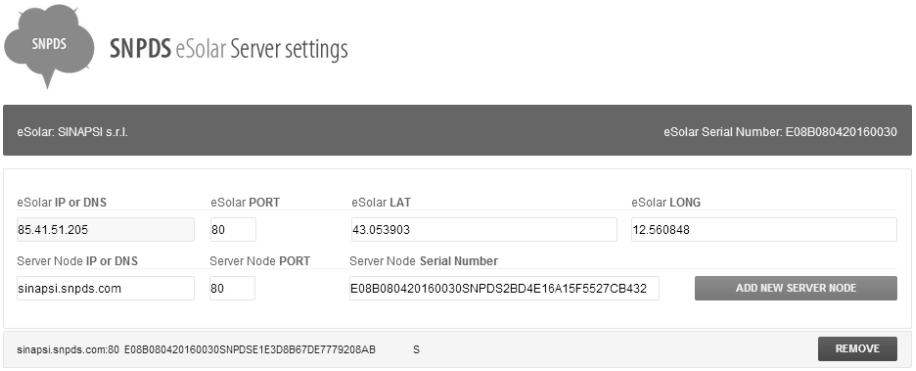


Figure 95 – Example of engagement in the SNPDS service

- *eSolar IP or DNS:* 85.41.51.205
- *eSolar PORT:* 80
- *eSolar LAT:* 43.053903
- *eSolar LONG:* 12.540848
- *Server Node IP or DNS:* sinapsi.snpds.com
- *Serial Node Port:* 80
- *Server Node PORT Server Node Serial Number:* 08B080420160030SNPDSEF19F7B60BD7B497485E

In this case we have engaged the eSolar with public IP address 85.41.51.205:80 (see *Plant Configuration*, *System Setup*), latitude=43.053903 and longitude=12.540848 (coordinates of the geolocation of Bastia Umbra, PG) to SNPDS with DynDNS sinapsi.snpds.com: 80. The unique server Node is automatically generated by the system SNPDS, in this case is 08B080420160030SNPDSEF19F7B60BD7B497485E.
To get the coordinates of the geolocation of your system just go to Google Maps (http://maps.google.it/), search your system by browsing the map of Google Maps and once identified in the map, press the right mouse button and select "what's here." Service automatically provides the latitude and longitude of the selected point in the research window. See Figure 96.

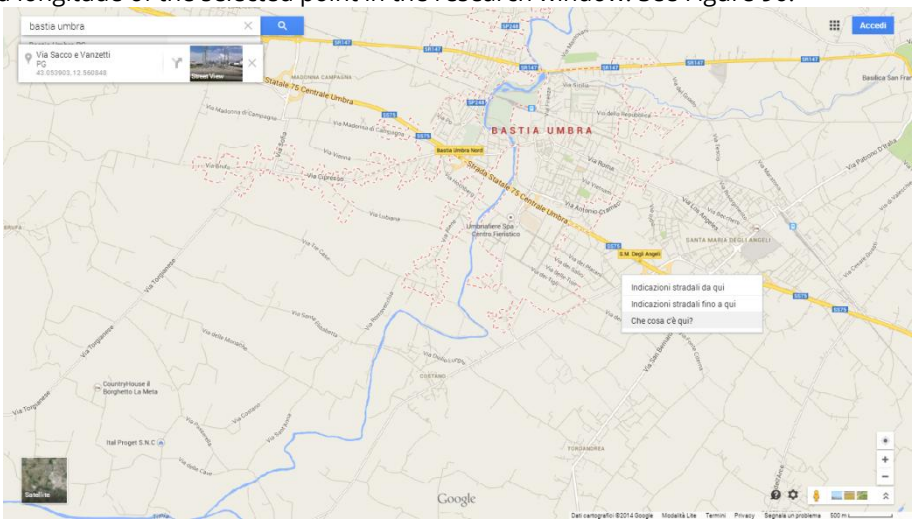


Figure 96 – Plant LAT and LONG

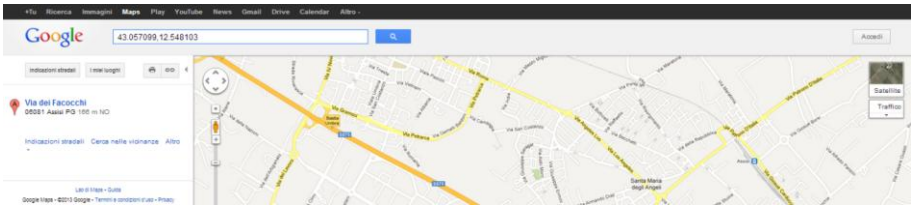


Figure 97 – Plant LAT and LONG

Once entered all the required information push *ADD NEW SERVER NODE* (Figure 98), wait few seconds an push *SYNC* (Figure 98).

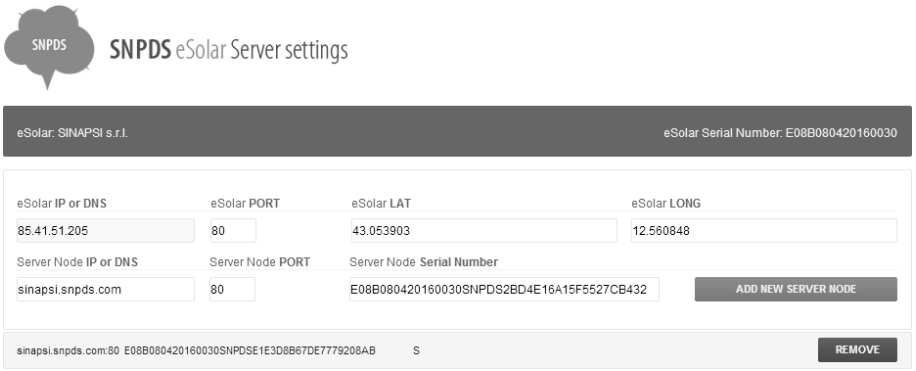


Figure 98 – ADD NEW SERVER NODE

The engagement procedure is finished. In depending on the lifetime of the machine and the type of internet connection the process of transferring data to SNPDS from the eSolar SNPDS can take more or less time.

3.15 PLANT CONFIGURATION– SYSTEM SETUP

Section dedicated to the network configuration of the eSolar. Selecting *Plant Configuration*, *System Setup*, *Network* you will enter in the page like showedin Figure 99. ***Always refer to the network administrator for proper configuration.***

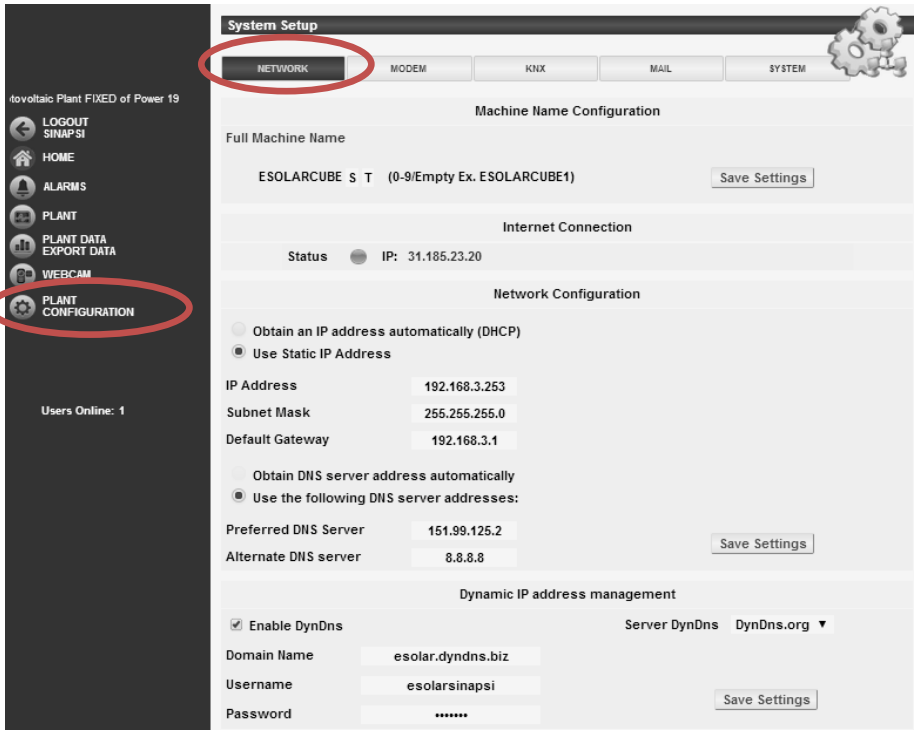


Figure 99 – Net Configuration

All network settings described below are related to the LAN port without logo. The LAN port with the logo (🖧) is the service port and it can't be modified by the customer; can't be used to connect the eSolar to the network

The page has four sections:
Machine name configuration: allows you to assign a name to eSolar, where Y and W can only be numbers or letters. This feature allows you to reach the eSolar from the LAN network by typing in the address bar of the browser the name assigned to the *Full machine name*. If the network configuration is set to DHCP this appears to be the only way to reach the eSolar

Two or more eSolar belonging to the same LAN must have different machine names. The **Full machine name** is eSolar for default

Press the *Save Settings* button to save the machine name. To apply the new settings, the eSolar will restart automatically; wait for the countdown, after which you will be redirected to the homepage.

Internet Connection: the green indicator shows the public internet IP address acquired. Conversely an incorrect configuration of the network will color the LED in red and any IP will be showned.

Network Configuration: the LAN without Logo can be configured in two ways. *Obtain an IP address automatically (DHCP).* The address is automatically acquired by the eSolar through a DHCP server. The LAN IP address will be dynamic and not known a priori. In this case it is possible to reach the eSolar using the *Full Machine Name*.
Use Static IP Address: you must manually specify an IP address, a subnet mask, a gateway and at least one DNS. *Always refer to the network administrator*.

It's possible to specify manually the addresses of the primary and secondary DNS server to use for internet access (*Use the following DNS server addresses*) or, if the LAN port is configured in DHCP mode, you can allow to acquire the DNS server from the DHCP server (*Obtain DNS server address automatically*).

Push the button *Save Settings* to save the network configurations.
Once saved the configurations the system will automatically reboot Wait for the countdown, time estimated 180 seconds.

> Don't power off the eSolar until the countdown process is not ended. AN ABRUCT INTERRUPTIONS OF THE SYSTEM SURING THE COUNTDOWN CAN COMPROMISE THE SYSTEM

If is not possible to reach the eSolar after the net configuration try to reach it with the old parameters and start for a new time the net configuration.

> ***In the event that you don't know the LAN IP address of the eSolar you can always use the service port 192.168.1.100 (with loco); this IP can't be never modified. From the service IP you can read the actual eSolar IP and reach it through the IP port without the loco.***

> ***To make the eSolar accessible from the WEB it is necessary to redirect the TCP/IP external traffic to the eSolar local LAN IP with port 80. You can do this only through the ROUTER PortForwarding configuration. Make sure that the router is equipped with the service PortForwarding. We suggest to open the 3306 and 5900 ports too to allow a complete service by specialized technician. You can't use a proxy server.***

Dynamic IP address management: if you have a dynamic external IP (see your ISP, Internet Service Provider, contract) you can use a DNS servers that keep constantly synchronized address dynamic public IP address to a static domain name. The eSolar supports dyndns.com and no-ip.com. To use this service you must log onto http://www.dyndns.org/ or http://www.noip.com/, register you by creating an account and then create a new "Dynamic DNS Host". A Dynamic DNS host is a address domain that will be the same as typing in the address bar of the browser to reach to the eSolar (Ex. eSolar.homeip.net). During the configuration phase of the dyndns.com/noip.com in the eSolar you must insert the username and password, which must match the username and password of your account DynDNS or No-IP
Per abilitare la gestione dell'indirizzo IP pubblico dinamico è necessario (Figure 100):

- *Enable DynDns*: enable the check box
- *Domain name*: insert the domain provided by dyndns.com or NOIP.com
- *Username*: insert the username for access to dyndns.org orNOIP.com
- *Password*: insert the password for access to dyndns.org or NOIP.com
- *Server DyndDns*: select the server between NOIP.com or dyndns.org

Push the button *Save Settings*.

Figure 100 – Insertion of a Dynamic Host

The service will be activated in 5-6 minutes.

> The using of this service is essential if your internet connection don't include a static IP address

> The time synchronization between the domain name (Dynamic DNS host) and the IP address assigned is estimated to be about 1 minute. The assignment of a new IP from the eSolar ISP can also be done several times a day, this can temporarily disable the eSolar reachable through a web request. Be especially careful with this passage. You are advised to read carefully the documents related to the DYNDNS, appearing in chapter 3.1.3.

3.15.1 MODEM CONFIGURATION

The modem is used specifically for sending SMS. To connect the modem to the eSolar you will have to follow the following steps:

- Verify the absence of a PIN protection in you SIM
- Insert the SIM inside the modem using the appropriate slot
- Connect the antenna in a place with a strong signal
- Power supply the modem with an alimentation of **230VAC**
- Connect the RS232 cable Female/Female in the **COM4** port of the eSolar
- Protect the modem from humidity and dust

> It's not possible connect more of a one modem

The modem page is reachable under the section *System Setup*, *Modem*, as showed by Figure 101.

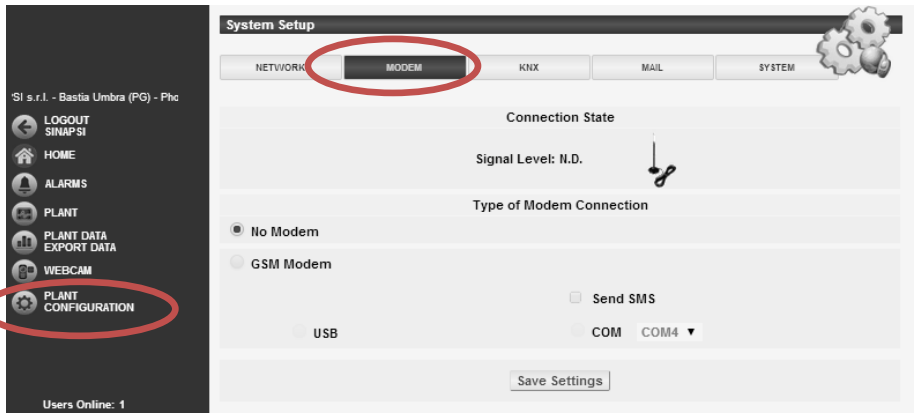


Figure 101 – Modem configuration

Check GSM Modem to enable the modem connection

Push the button Save Settings and wait a few moments; verify the signal strength, it has to be over the 50% for guarantee an appropriate service.

> If after the connection and configuration of the modem the signal is N.D. you have to verify the connection by RS232 cable

3.15.2 KNX CONFIGURATION

Page reachable under *System Setup*, *KNX*, see Figure 102.

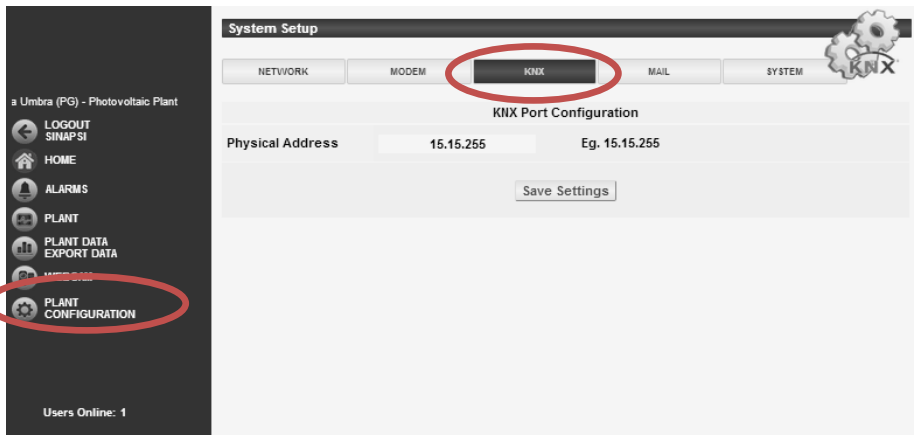


Figure 102 – KNX port configuration

The default KNX Physical Address is 15.15.255 and is not necessary to modify it.

3.15.3 MAIL CONFIGURATION

From *Plant Setup*, *Mail* it's possible to configure the mail section, see Figure 103

Figure 103 – MAIL configuration

The mail server configuration is necessary for the purposes of sending email with alarms/faults reports and production data. Make sure that eSolar is connected to internet. Fill the fields according to the following specifications

- *Sender Address*: associate a sender address to eSolar. Don't use strange name otherwise the email can be processed as spam
- *Sender Name*: associate a sender name to eSolar
- *SMTP Server*: configure the SMTP server for he outgoing mail. Use a owner SMTP server
- *SMTP Server Username*: insert the username for access to SMTP server
- *SMTP Server password*: insert the password for access to SMTP server
- *SMTP Server Gate*: select the type of transmission if standard or SSL (Secure Sockets Layer Handshake Protocol). For the proper choice of the port always refer to your IT Manager. For default you can select between

Not Encrypted Communication	Encrypted Communication
Pot = 25 or alternative (contact your Service Provider)	*Port* = 465

Check that the doors are opened in the FIREWALL system.

Push *Save Settings* to save the previous configurations.

To check a proper operation use test mail service

In the window below are showed at max 100 mails sent by eSoal, with the email state, see Figure 104

Outgoing mail: 0 .:: Log Mail ::. Mail on log: 100

Date	Time	Recipient addresses	Body Mail	Att.	SMTP Server	State	Delete
01/06/2014	05:00:15	genesisnc@gmail.com	(N° 24) Messaggio generato		smtp.sinapsitech.it	OK	
25/05/2014	17:05:56	stefano.rotini@sinapsite genesisnc@gmail.com	(N° 23) Notifica allarmi Impianto fotovoltaico	-	smtp.sinapsitech.it	OK	
25/05/2014	17:05:39	stefano.rotini@sinapsite genesisnc@gmail.com	(N° 22) Notifica allarmi Impianto fotovoltaico	-	smtp.sinapsitech.it	OK	
25/05/2014	17:05:22	stefano.rotini@sinapsite genesisnc@gmail.com	(N° 21) Notifica allarmi Impianto fotovoltaico	-	smtp.sinapsitech.it	OK	
01/05/2014	05:00:13	genesisnc@gmail.com	(N° 20) Messaggio generato		smtp.sinapsitech.it	OK	
21/04/2014	10:45:11	stefano.rotini@sinapsite genesisnc@gmail.com	(N° 19) Notifica allarmi Impianto fotovoltaico	-	smtp.sinapsitech.it	OK	
21/04/2014	10:45:07	stefano.rotini@sinapsite genesisnc@gmail.com	(N° 18) Notifica allarmi Impianto fotovoltaico	-	smtp.sinapsitech.it	OK	
21/04/2014	10:31:10	stefano.rotini@sinapsite genesisnc@gmail.com	(N° 19) Notifica allarmi Impianto fotovoltaico	-	smtp.sinapsitech.it	$MTP Error: Impossibile connettersi al server $MTP	
21/04/2014	10:30:37	stefano.rotini@sinapsite genesisnc@gmail.com	(N° 18) Notifica allarmi Impianto fotovoltaico	-	smtp.sinapsitech.it	$MTP Error: Impossibile connettersi al server $MTP	
21/04/2014	10:29:53	stefano.rotini@sinapsite genesisnc@gmail.com	(N° 19) Notifica allarmi Impianto fotovoltaico	-	smtp.sinapsitech.it	$MTP Error: Impossibile connettersi al server $MTP	
21/04/2014	10:29:19	stefano.rotini@sinapsite genesisnc@gmail.com	(N° 18) Notifica allarmi Impianto fotovoltaico	-	smtp.sinapsitech.it	$MTP Error: Impossibile connettersi al server $MTP	
21/04/2014	10:28:46	stefano.rotini@sinapsite genesisnc@gmail.com	(N° 18) Notifica allarmi Impianto fotovoltaico	-	smtp.sinapsitech.it	$MTP Error: Impossibile connettersi al server $MTP	
01/04/2014	05:00:14	genesisnc@gmail.com	(N° 17) Messaggio generato		smtp.sinapsitech.it	OK	
01/03/2014	05:00:20	genesisnc@gmail.com	(N° 16) Messaggio generato		smtp.sinapsitech.it	OK	
06/02/2014	12:11:17	stefano.rotini@sinapsite genesisnc@gmail.com	(N° 15) Notifica allarmi Impianto fotovoltaico	-	smtp.sinapsitech.it	OK	
01/02/2014	05:00:13	genesisnc@gmail.com	(N° 14) Messaggio generato		smtp.sinapsitech.it	OK	
01/01/2014	05:01:49	genesisnc@gmail.com	(N° 13) Messaggio generato		smtp.sinapsitech.it	OK	
04/12/2013	09:34:35	stefano.rotini@sinapsite genesisnc@gmail.com	(N° 12) Notifica allarmi Impianto fotovoltaico	-	smtp.sinapsitech.it	OK	
01/12/2013	05:03:31	genesisnc@gmail.com	(N° 11) Messaggio generato		smtp.sinapsitech.it	OK	
28/11/2013	13:29:22	stefano.rotini@sinapsite	(N° 10) Test Mail ESOLARCUBE	-	smtp.sinapsitech.it	OK	

Figure 104 – Alarms page

The columns table are:

- Date: date of email expedition
- Time: time of email expedition
- Recipient address: shows the email address to which reports the alarms/production mail
- Body Mail: shows the body of the email. To read the entire body text open the message by clicking the right mouse button over the message, see Figure 105

◄ Mail | N18_ID3923 ►

Date 21/04/2014

System time 10:45:07

Email Subject Allarme Impianto Genesi

Recipient Addresses stefano.rotini@sinapsitech.it;genesisnc@gmail.com;andrea.cellini@sinapsitech.it

-

SMTP Server smtp.sinapsitech.it

State OK

Body Mail

Notifica allarmi Impianto fotovoltaico SINAPSI s.r.l.

Indirizzo: Bastia Umbra (PG)
Proprietà Impianto: Genesi s.n.c.
Azienda installatrice: Emicom s.r.l.
Indirizzo IP: 31.185.23.20

Sono presenti 2 eventi

Nome dispositivo	Tipo dispositivo	Tipo Evento	Data Ora	Descrizione evento
INVERTER 03	Inverter	Allarme	2014-04-21 10:28:42	Stop:;
INVERTER 02	Inverter	Allarme	2014-04-21 10:28:39	Stop:;

Figure 105 – Mail example

- Att. : show, if present, an email attachment (see Cap. 3.7 for reference)

- Server SMTP: show the SMTP server used for mails sending
- Status: shows the reply coupon of the email. In red if an error occurs
- Delete: delete the delete the corresponding email

3.15.4 SYSTEM CONFIGURATION

In *System Setup* you can access to the follow page like in Figure 106.

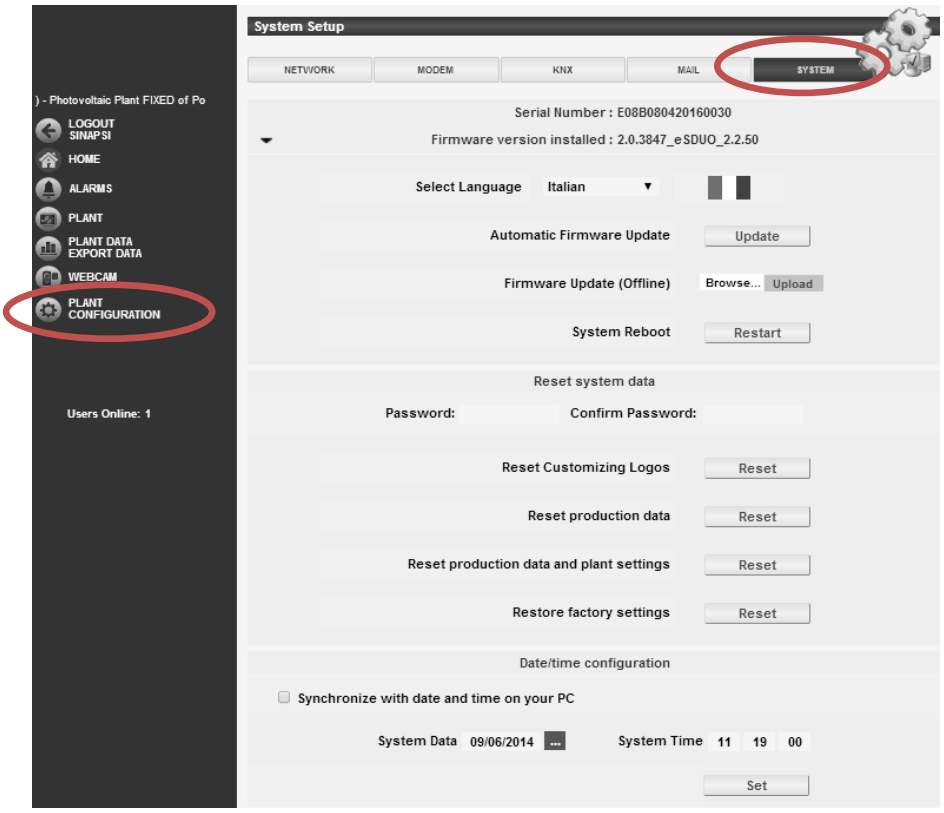


Figure 106 – System Mask

Here is shown:

- Serial Number: shows the eSolar Serial Number. Bring always the SN before contacting the service
- Firmware version installed: indicates the version of the firmware currently in use in the eSolar
- Select Language: selectable languages are English, Italian, German, French and Slovenian
- Automatic firmware Update: pressing this button the eSolar will be automatically updated. If present a new firmware version Solar will signal it with a flashing icon
- Firmware Update (Offline): if the machine is not provided for an internet connection you can make an offline update. The file must be requested directly to the technicians of the Synapse.
- System Reboot: reboot the system
- Reset Customizing Logos: eliminates all the logos and returns them to factory settings
- Reset Production Data: reset the production data. The reset requires an Administrator account
- Reset production data and plant settings: resets the historic production and configurations of eSolar. The reset requires an Administrator account
- Restore factory settings: sets the eSolar to factory settings
- Synchronize with date and time on your PC: allows synchronization of date and time of the eSolar to your PC data and time

3.15.5 UPDATE FIRMWARE

Pushing the button *UPDATE* you can update the firmware version, see Figure 107.

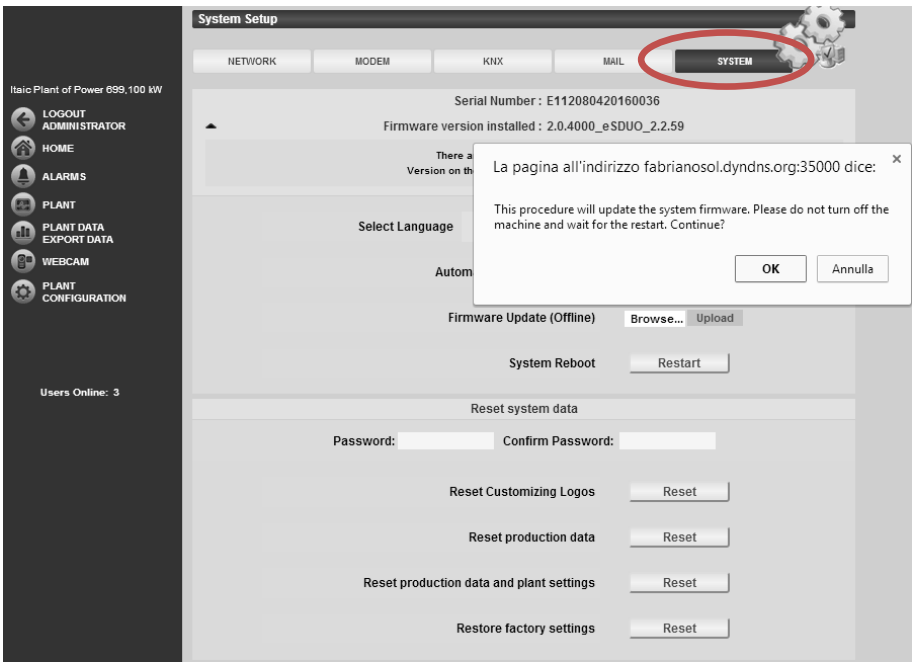


Figure 107 – Firmware update

Press *OK* to continue or *Cancel* to stop.
The system starts downloading the latest firmware version available on the server. You will see the size of the download and the progress bar that shows the actual development of the download in progress; under the bar, the relative percentage.

> ***If the eSolar is offline update operation can't be performed.***

The download process can be stopped by pushing the button *Cancel Download*.

> If the internet connections is not more active during the downloading file the scroll bar it's blocked. Star a new time the download process.

The download process is complete when the scroll bar reach the 100%.

> The time required to download the update is depending on the speed of the Internet connection and may take several minutes

> If you run multiple updates simultaneously, the system will process only the first and the windows update status show the progress of the latter.

If it is not present an internet connection and you can chose to update the firmware using the *Update Firmware (Offline)*, as shown in Figure 108. For this operations you need the binary file provided by Sinapsi. Selecting the Browse window, you can access to the repository of this file present in your PC. Once you have selected the file press the button to proceed

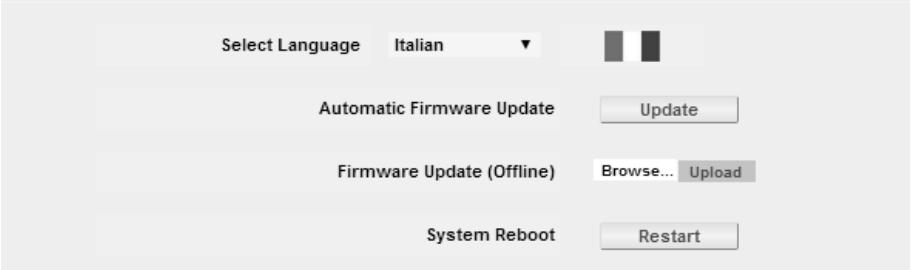


Figure 108 - Firmware update (Offline)

3.15.6 RESET SYSTEM DATA

In this section you can chose to select an option reset of the actual data present in you eSolar. Every action require entering the Admin password. ***The operations performed by these buttons are irreversible, so you will see a confirmation window before executing the command. We invite you to use extreme caution with these features.***

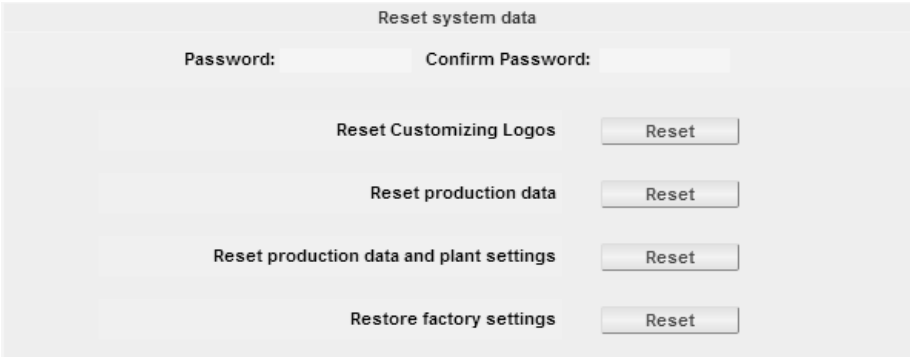


Figure 109 - Reset of the system

4 HOMEPAGE

Selecting Home you can browse te home page section. Here it's possible to display

- Photovoltaic production
- Energy flow
- Plant Energy balance

Every visualizations will be esamine. (Optional) every visualizations can be switched by the selector as showedin figure

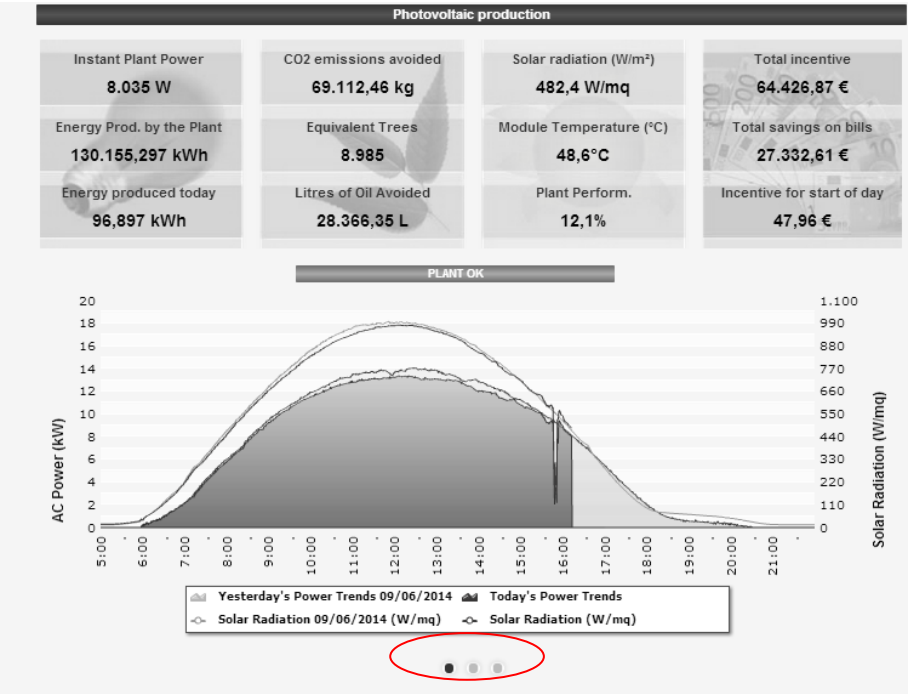


Figure 110 - Home Page

4.1 PHOTOVOLTAIC PRODUCTION

This graph shows some real-time readouts. The graphic curves are red, to indicate the current day, and gray to indicate the previous day. The readouts have a frequency of 1 minute (Figure 111).

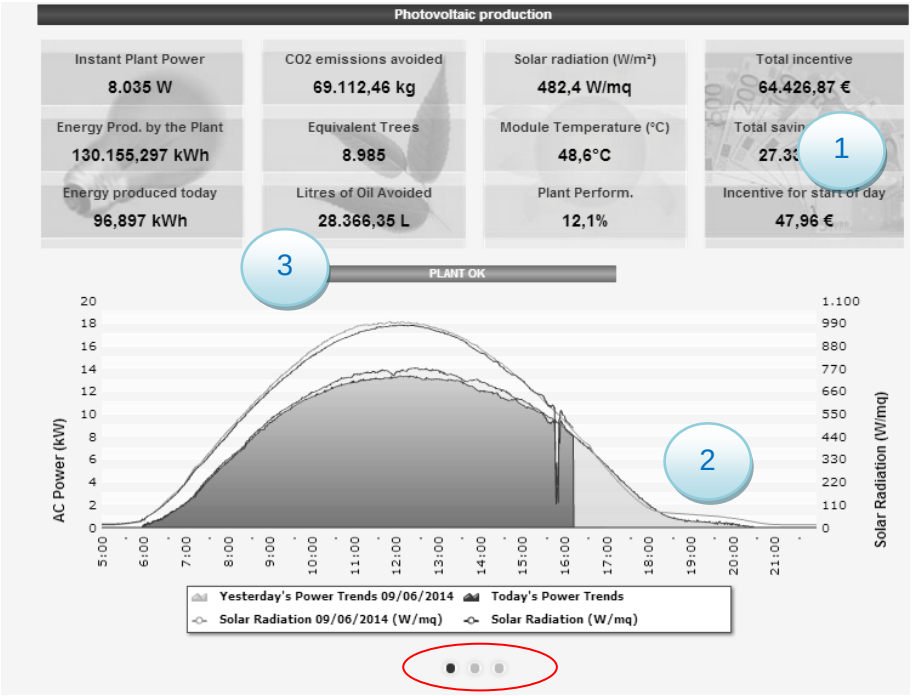


Figure 111 – Home page

1. **High frame:** shows a set of photovoltaic values

   a. **Electricals data:**

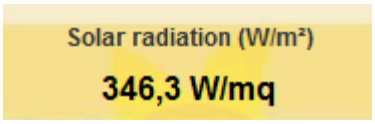
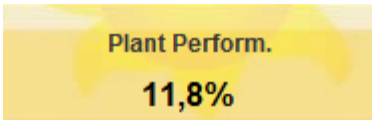
Instant Plant Power 5.284 W	Instantaneous power(W) produced by the system. The data is supplied either by the inverters or by the energy meter based on the the settings indicated on *System Data*.
Energy Prod. by the Plant 63.430,801 kWh	Total energy produced by the system from the activation date. The data is supplied either by the inverters or by the energy meter based on the settings indicated on *System Data*.
Energy produced today 60,199 kWh	Daily energy produced by the system. The data is supplied either by the inverters or by the energy meter based on the settings indicated on *System Data*.

   b. **Ecologicals data:**

CO2 emissions avoided 33.681,76 kg	Number of carbon dioxide kg not dispersed in the environment. The calculation refers to the total energy in CA produced by the system. *(A thermal power station emits about 0.53 kg of CO_2 into the atmosphere for every kWh produced, so 1 kWh produced by a photovoltaic system avoids emitting 530g of CO_2 into the air)*

	Number of trees that would have contributed to waste the eventual emission of CO_2. The calculation refers to the total energy in CA produced by the system. *(Equivalent in trees = Avoided CO_2 Emissions x 0.13)*
	Litres of petroleum necessary to generate total energy in CA produced by the system. *(Saved petroleum = TEP x 7.33 x 159* *TEP = [0.187 x Total CA Energy (kWh)]/1000* *1 TEP (Equivalent tons of petroleum)= 7.33 oil drums* *1 oil drum = 159 litres of petroleum)*

c. **Sensors data:**

	olar radiation (W/m^2) affecting the referential solar radiation sensor.
	Temperature (°C) acquired by the temperature probe.
	The system performance is obtained as the ratio between the instantaneous power emitted by the inverters and the product between the surface of the installed photovoltaic panels and the measured solar radiation. In particular situations (scarce radiation, erred measure of solar radiation) the performance calculation originates non realistic values. In these cases the character **/** is displayed instead of the numeric value.

d. **Economics data:**.

	Total amount (€) received as incentive. *(Total Incentive = Tot. CA Energy x Incentive)*
	The space reports "Total amount saved on bill" or "Total amount energy sold (€)" based on the set economic regime: Auto-consumption/Sale. *(Total saved amount on bill = Total CA Energy x Cost of 1 kWh* *Total Amount of Sold Energy = Total CA Energy x Amount paid out for the sale of 1 kWh)*
	Counter value received in the form of incentive in relation to energy production of the current day.

2. **Low frame:** show the production graphic with a 11 minute frequency:

- AC power produced in the current day and the previous
- Solar radiation produced in the current day and the previous day (optional)
- From the legend below the chart, you can check whether or not the curve

3. **Plant state:** shows the plant state:

   a. *Plant OK* = non è presente alcun allarme
   b. *Attention the system presents anomalies* = the inverters or the environmental sensors are not functioning correctly. The alarm history is displayed by clicking on them

In the x-axis are present the hours of the day from 5:00 to 22:00, while the y-axis are present the power in kW (left side) and solar radiation in W/m² (right side). The maximum of the y-axis can be configured under the section *Data Plant (Cap. 3.1.1)*.

Exporting data from the chart
Clicking with the right button upside it's possible to open the drop-down menu shown in Figure 112.

Figure 112 - Data export

Select Copy data to clipboard to copy the graph data into a spreadsheet.
Select Print Chart to print the graph.

4.2 ENERGY FLOW

This graph shows the Energy E1, E2 and E3 cardinality refers to the plant (Figure 113).

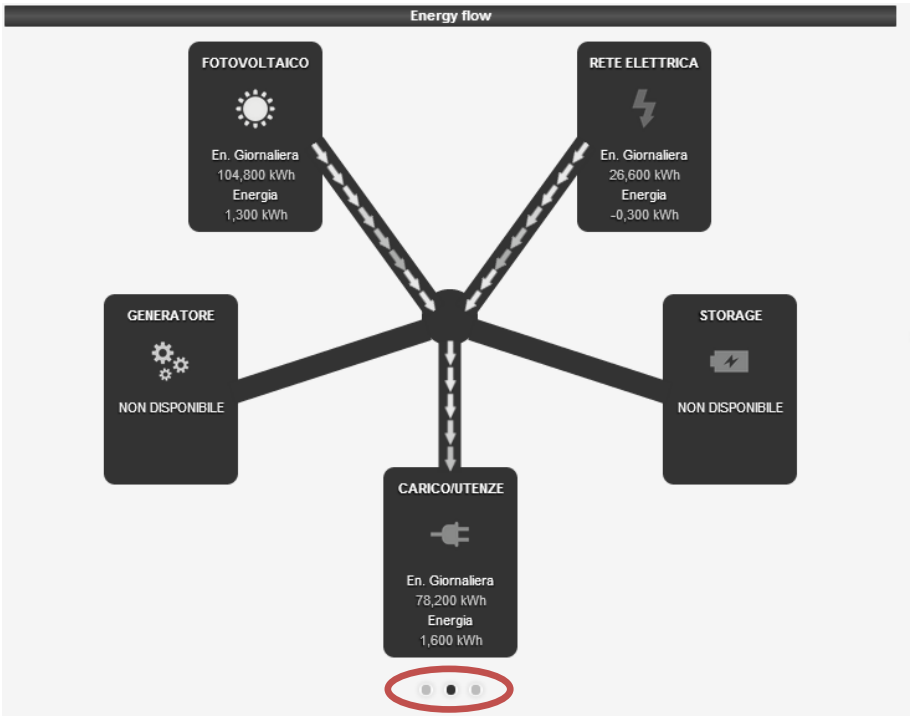


Figure 113 – Energy flow

The energy flows display the energy flows direction in the plant like configured in the Configurationsection Energy Meters (chapter 3.5). The central node represents the PV system monitored by eSolar. In the above figure the total energy produced 85.200kWh is divided between 79.700kWh entered in grid and 5.500kWh used in loco. The same argument can be extended to the production of energy every day, to those just mentioned items below. The Red icon indicates that an amount of energy is transferred to the grid. The indicator will glow green when all the energy produced is consumed locally.

4.3 PLANT ENERGY BALANCE (optional)

The graph shows the Energy E1, E2 and E3 (Figure 114).

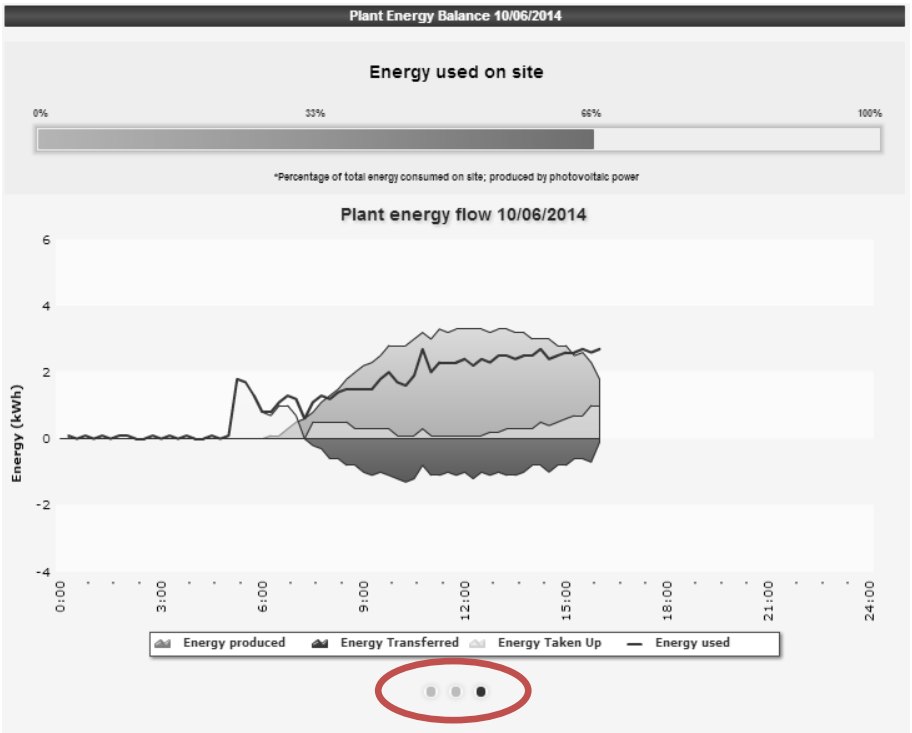


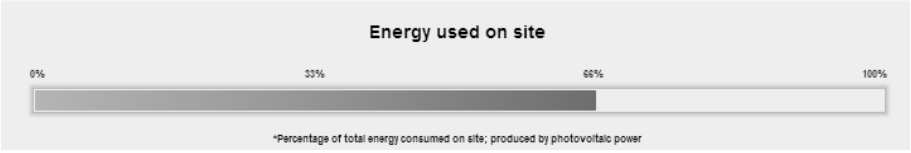
Figure 114 – Energy efficency

Like in Energy flow The Red icon indicates that an amount of energy is transferred to the grid. The energy values make reference to the Configuration section Energy Meters (cap 3.5).
You can see

- Energy produced, green: entire energy produced by the photovoltaic plant E3
- Energy transferred, in red: energy transferred from the plant to the grid E2
- Energy taken up, in yellow: energy drawn from the grid to the photovoltaic plant E1
- Energy used: energy consumed in the photovoltaic plant according to the formula

$$E_{used} = E_{produced} + E_{taken-up} - E_{trasferred}$$

The bar reports the percentage of consumed energy used on site.



Exporting data from the chart
licking with the right button upside it's possible to open the drop-down menu shown in Figure 116.

Figure 115 - Data export

Select Copy data to clipboard to copy the graph data into a spreadsheet.
Select Print Chart to print the graph.

5 ALARMS

To access the *Alarms* section select the *Alarms* item directly to the main menu or through the voice signal status in the Home section shown in Figure 116. A page will open as shown in Figure 117. ***Alarms section show only the active alarms.***

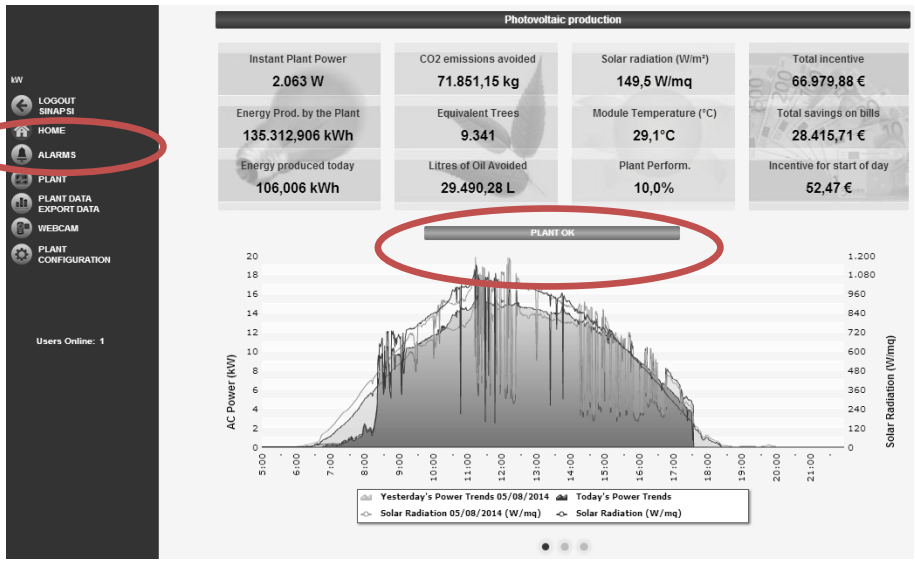


Figure 116 – Access to the alarm section from Home page

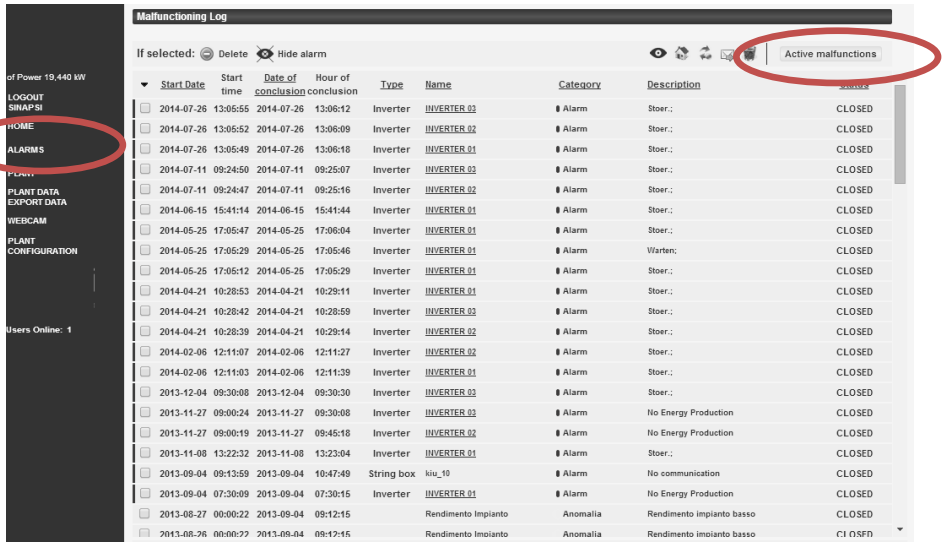


Figure 117 – Alarms section screen

The alarms table shows:

- Start Date: indicates the date on which the alarm occurred
- Start Time: indicates the time at which the alarm occurred
- End Date: indicates the date on which the alarm is closed
- End Time: indicates the time at which the alarm is closed
- Type: indicates the device type affected by alarm
- Name: displays the device name affected by alarm
- Category: indicates the message category associated with the event. The categories are six overall and specifically
    - Alarm – inverter source, energy meter, string controller (Ref. Ch. 3.2.1, 3.2.7, 3.5)

- Anomaly – inverter, energy meter, string controller (Rif. Ch. 3.2.1, 3.2.7, 3.5)
- Alarms – I/O device (Ref. Ch. 3.4.2)
- Anomaly – I/O device (Ref. Ch. 3.4.2, 3.9)
- Event – I/O device (Ref. Ch. 3.4.2, 3.9)

The differentiations, in addition to being identified type, are visual type in associated coloration with the existing event. Mark in red an alarm event and in yellow an Anomaly event

- Description: the existing event description attests its classifications in respect of proprietary communication protocols of devices. The only error generated by eSolar is No Communication and No Energy Production. The No Energy Production will be activated by eSolar after 15 minutes of lacking communication by monitored device.
- Alarm Status: shows whether the alarm / Anomaly is active, respectively, red or yellow

It is possible to view the alarms history using *Historical Malfunctions* button by accessing the respective page as shown in Figure 118.

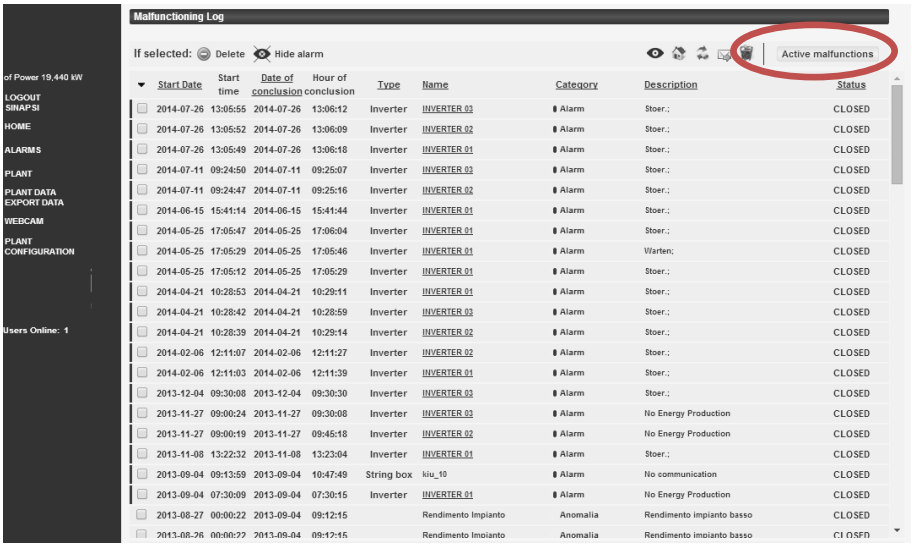


Figure 118 – Historical Malfunctions

Up to a maximum of 3000 alarms will be stored. Above that limit eSolar automatically will erase the alarms in excess according to a rule of FIFO. Pressing on the name of any malfunction, it is possible to access the graphics page of device affected with an abnormal status. A typical example is show in Figure 119

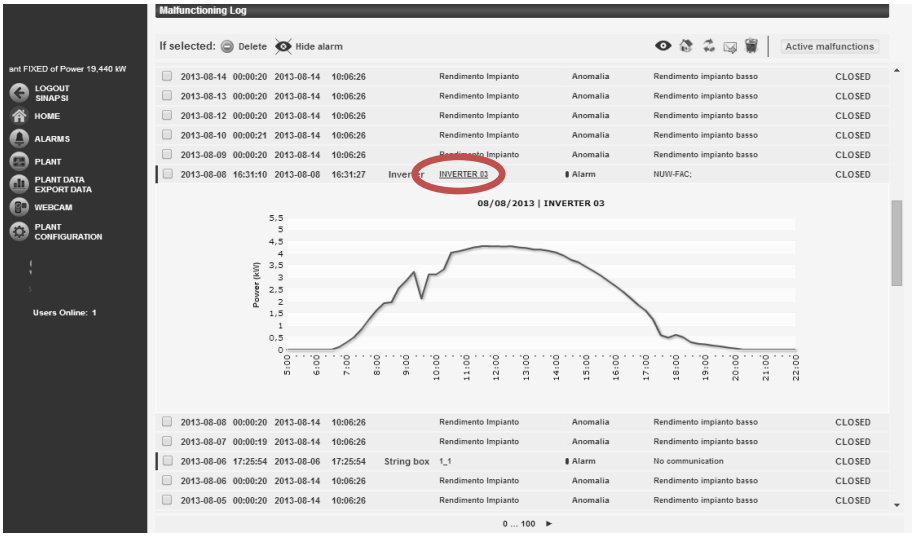


Figure 119 – Malfunction Chart

5.1 ALARMS SECTION NAVIGATION

Alarms section allows a navigation using keys

deletes one or more alerts. ***The deletion of an alert is irreversible***.

hides one or more alerts. ***Hide all active alarms in the Alarms section involves passing eSolar by a fault status to a status of correct operation. If an hidden alarm will be made again visible, and the same it is still active, eSolar will return to a status of abnormal operation***

displays, alarms previously hidden, if any. If there is only one hidden message icon will turn from gray to black color

resends in *Home* section

refreshes existing reports

opens mail section (see Ch. 3.15.3)

shows the messages previously deleted by user

Below we will report a logical flow for alarm management using the Hide function.

It starts from a situation as in Figure 120

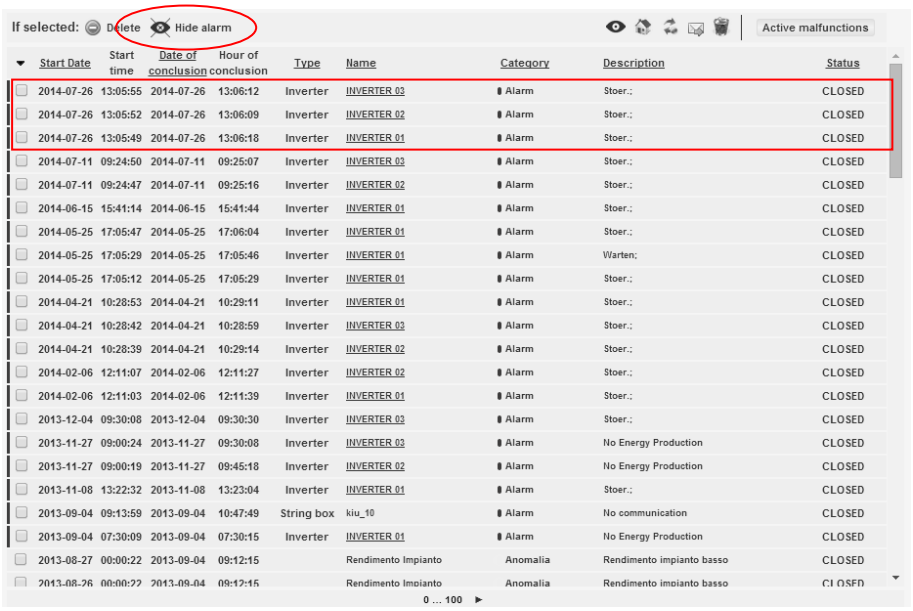


Figure 120 – Selection of messages to be deleted

We're going to hide the first three alarms by selecting and clicking the button highlighted in red.

At this point, the icon changes its color passing from gray to black. See marked icon in Figure 121.

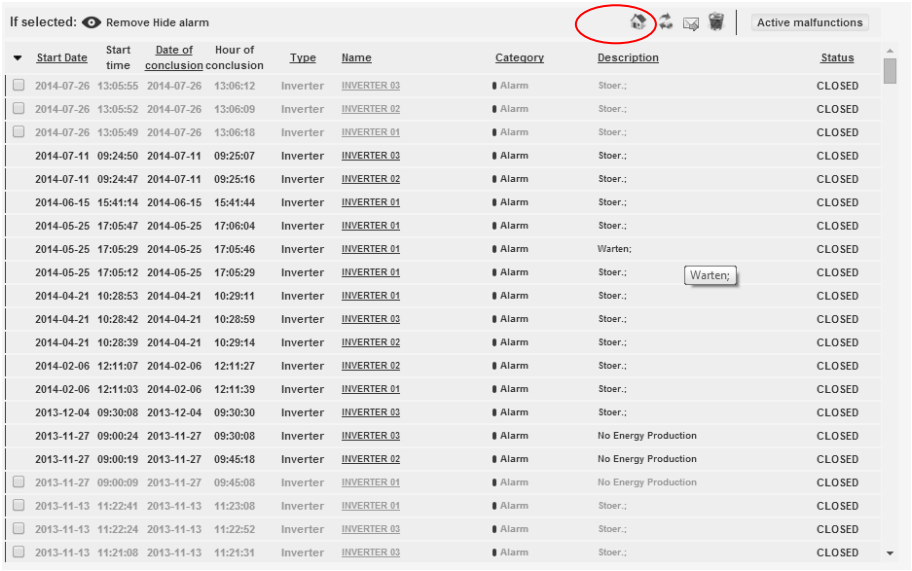


Figure 121 – change icon color from gray to black.

Clicking on the icon will have a screen where the previously hidden signal are shown in gray.

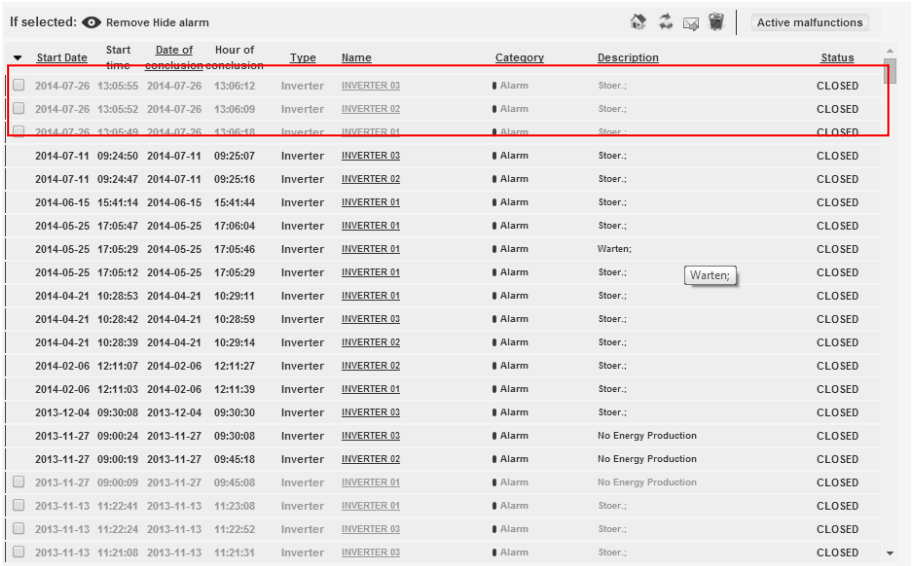


Figure 122 – opening of messages and identification of previously deleted messages and recovery of the same

Selecting reports in gray and clicking on the icon circled in red will report the previously hidden messages in the page ***Malfunctions History*** or ***Alarms***. See Figure 123

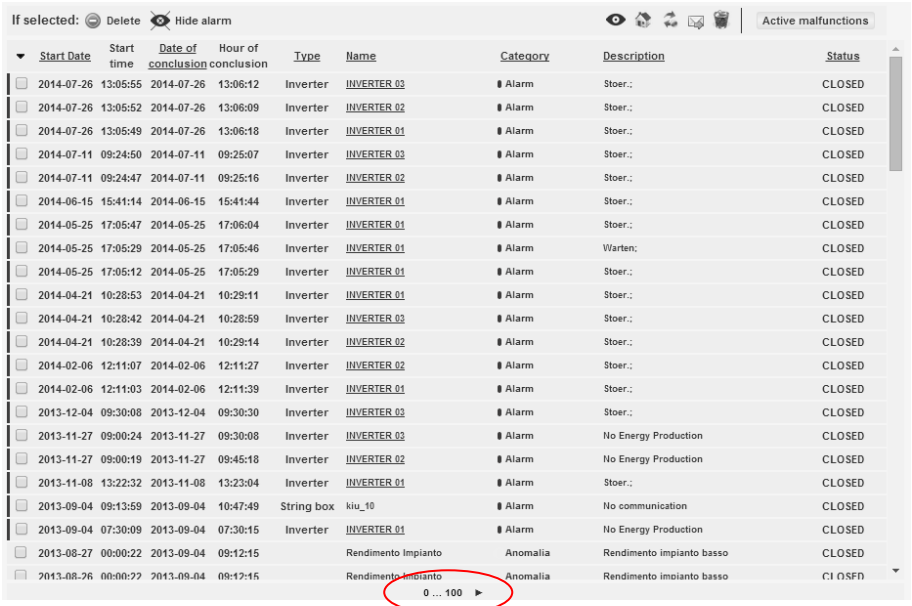


Figure 123 – Visualization of retrive messages

By default, the navigation of signals includes a visualization of 100 reports at a time, that can be consulted upon navigator placed in the lower part of the table (see in red circled in Figure 123). By placing an order for one of the fields in the table, the message display will switch automatically to a maximum value of 100 to a maximum value corresponding to all the reports historicized in eSolar, but no later than 3000. See Figure 124

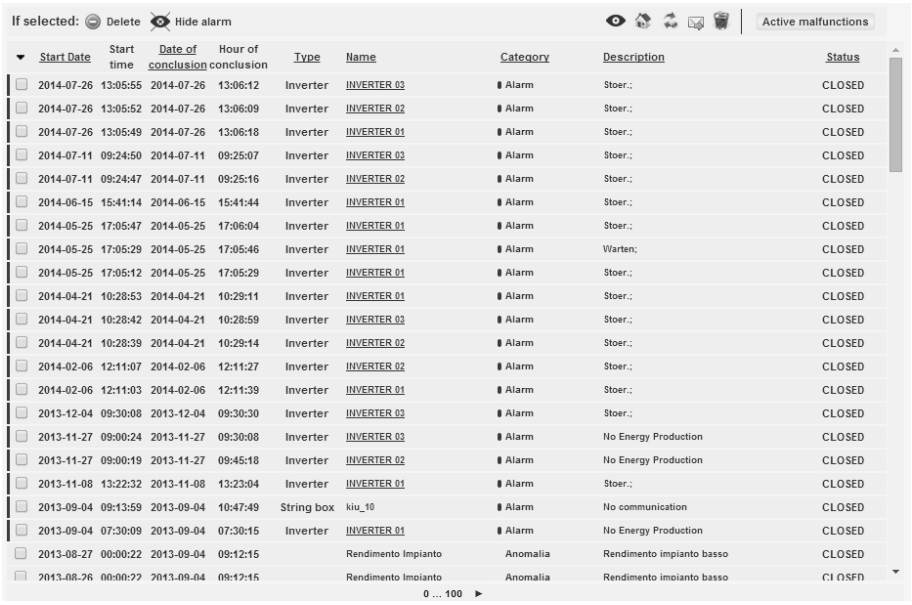


Figure 124 – Signals organization

6 PLANT

The *Plant* section is used to display graphically all of monitored devices by eSolar.

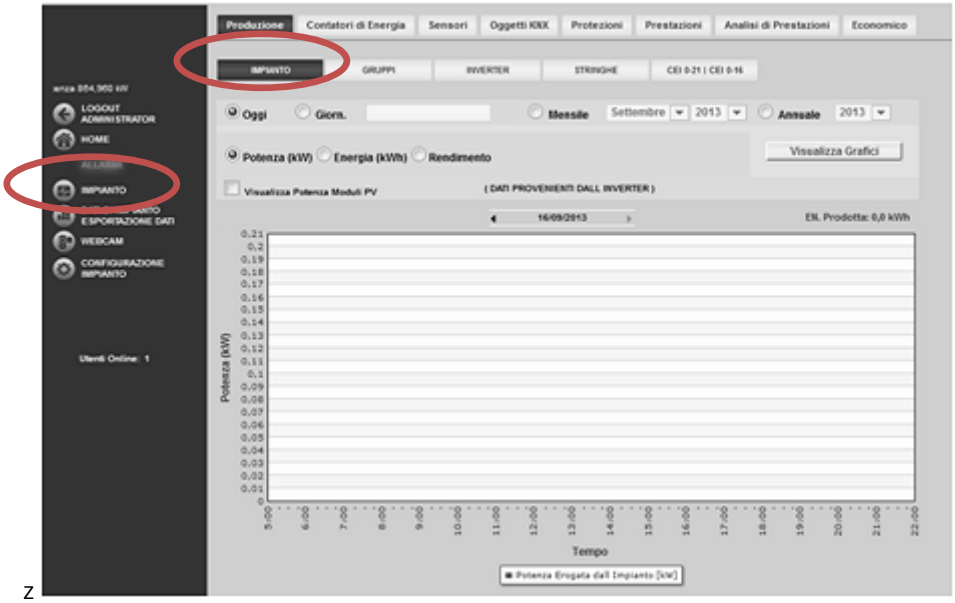


Figure 125 – Production data charts

The page is divided in (see Figure 125):

- *Efficiency (optional):* shows the evolution of energy efficiency of entire system. For a correct visualization of the efficiency data efficiency refer to Ch. 3.5
- *Production*: shows the trend of total production of the plant. It will be influenced by the selection of data source as described in section 0
- *Energy meters*: section dedicated to the visualization of data from energy meters
- *Sensors*: shows sensors visualization
- *KNX Objects*: shows KNX objects visualization
- *Protections*: indicates the interface protections visualization
- *Performance*: shows plant performance visualization
- *Analysis of performance*: shows the visualization of previously configured groups as in Ch. 3.2.4. ***The page will not show any data if there is no inverter group***
- *Economic*: shows the economic performance of the plant in relation to the selected type of incentive

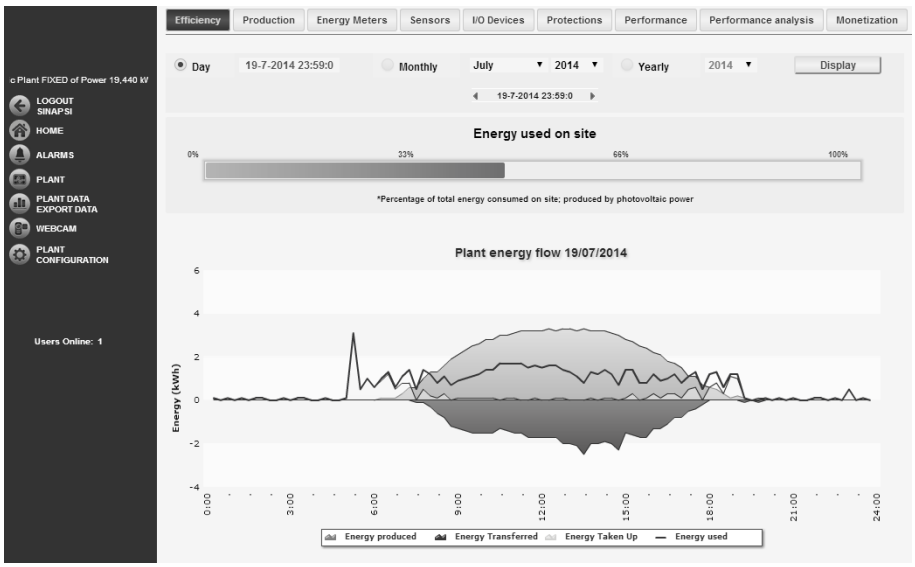
6.1 PRODUCTION - EFFICIENCY (Optional)

Below the Efficiency screen. Refer to Ch. 3.5 for the configuration of the *Energy Meters*.

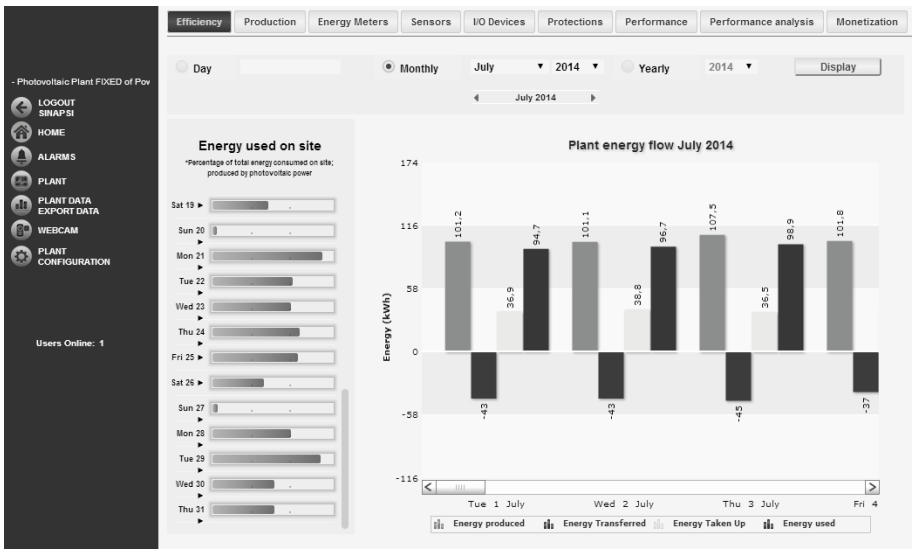
Figure 126 - Efficiency (Optional)

The page is divided into two sections:

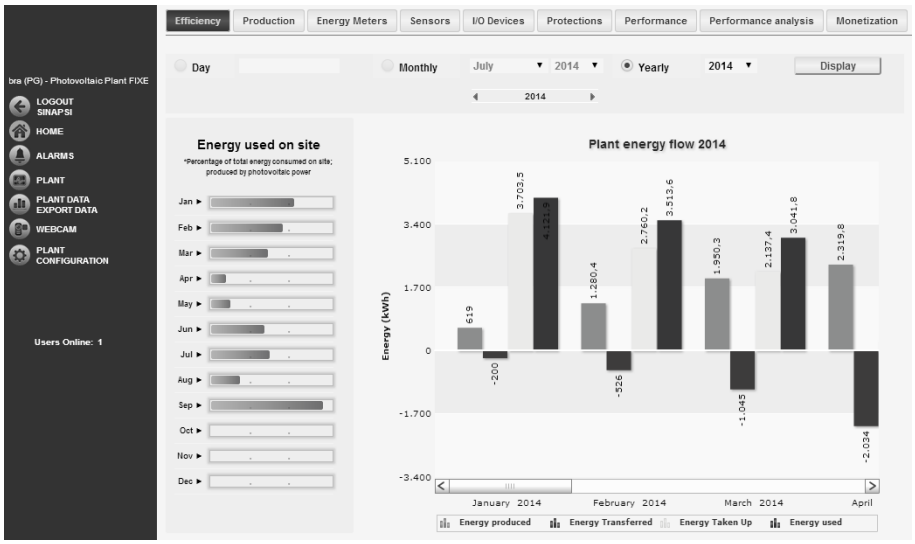
1. *-Navigator*:
   - *Daily*: shows the daily trend of E1, E2 and E3 energies (if configured under Meters section Ch. 3.5) of the selected day. To choose the day use the specific calendar and press *View Charts*. The sampling has interval of 15 minutes. The power value is mediated between all valid samples taken over the 15 minutes while the energy is calculated as integral of the power. The percentage bar shows the amount of energy quantity auto consumed on site.



- *Monthly*: shows E1, E2 and E3 energies produced each day in the selected month as the difference of the maximum value and the historical minimum value in a quarter hour by eSolar for each day. For the selection of the month use the specific calendar and press *View Charts*.



- *Annual*: shows E1, E2 and E3 energies produced in each month as the difference between the value of the last day and the first day of the month in the selected year. For the choice of the year use the specific calendar and press *View Charts*.



2. -*Chart*:

   In the axis of abscissas (X) is given the time and depending on the type of chosen view (daily, monthly, yearly), we will have the relative measure (hours, days, months). In the ordinate axis (Y) there is the energy [kWh]

Value visualization in chart

Moving the mouse over the chart function a box is shown that displays: the type of measure, the reference date and the value expressed in the unit of measure indicated in the Y axis.

Exporting data from the chart

Clicking with the right button inside the chart the drop-down menu shown is opened as in Figure129.

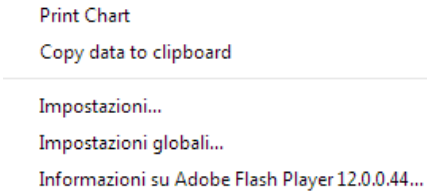


Figure127 - Data export

Click with the left mouse button on Copy data to clipboard. Open any spreadsheet and paste the data.

Print the graph

Click with the left mouse button on the "Print Chart"; select the printer and press the *Print* button.

If eSolar is off or in a status of malfunction, data will not be stored. It is not possible to recover the acquired data. Contact Customer Care if this problem is occurred.

6.2 PRODUCTION - PLANT

Below the *Production* screen (Figure 128).

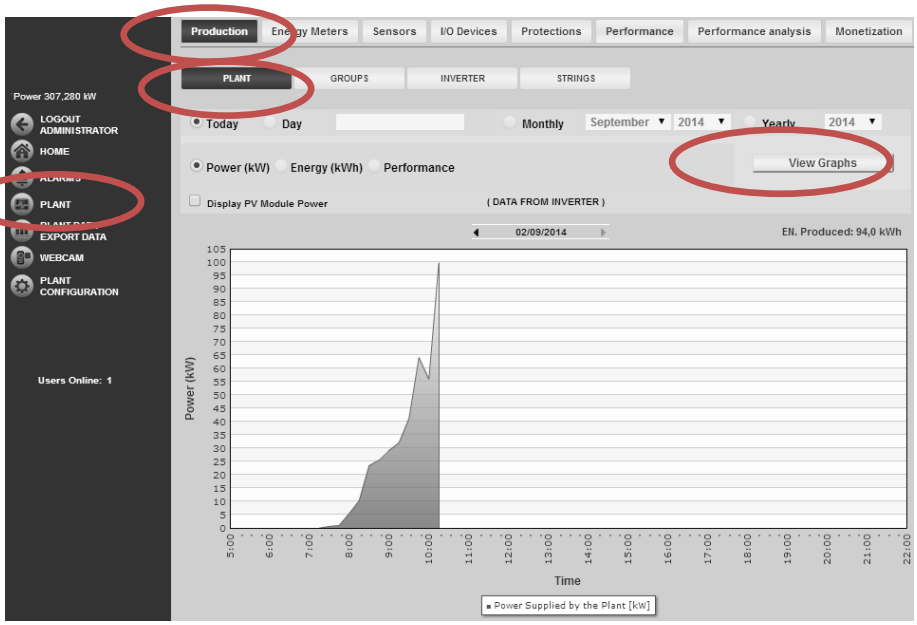


Figure 128 – Data production charts

The page is divided into two sections:

3. *-Navigator*:
   - *Today*: shows the performance of power or energy or efficiency of the current day. The sampling has interval of 15 minutes. The value is mediated between all valid samples taken over 15 minutes.
   - *Daily*: shows the daily trend of power or energy or efficiency of selected day. To choose the day use the specific calendar and press *View Charts*. The sampling has interval of 15 minutes. The power value is mediated between all valid samples taken over the 15 minutes while the energy is calculated as integral of the power.
   - *Monthly*: shows the energy produced each day in the selected month as the difference of the maximum value and the historical minimum value in a quarter hour by eSolar for each day. For the selection of the month use the specific calendar and press *View Charts*.
   - *Annual*: shows the energy produced in each month as the difference between the value of the last day and the first day of the month in the selected year. For the choice of the year use the specific calendar and press *View Charts*.

4. -*Chart*:
   In the axis of abscissas (X) is given the time and depending on the type of chosen view (daily, monthly, yearly), we will have the relative measure (hours, days, months). In the ordinate axis (Y) there is the energy [kWh] or Performance with a full scale appropriately dimensioned according to the peak power added in the plant Data section. See Ch 3.1.1.

In hight to the right of the graph the total energy produced by the plant in the selected period is shown.

Value visualization in chart
Moving the mouse over the chart function a box is shown that displays: the type of measure, the reference date and the value expressed in the unit of measure indicated in the Y axis.

Exporting data from the chart
Clicking with the right button inside the chart the drop-down menu shown is opened as in Figure129.

Figure129 - Exporting data from the Chart

Click with the left mouse button on Copy data to clipboard. Open any spreadsheet and paste the data.
Print the graph
Click with the left mouse button on the "Print Chart"; select the printer and press the *Print* button.

If eSolar is off or in a status of malfunction, data will not be stored. It is not possible to recover the no acquired data. Contact Customer Care if this problem is occurred.

6.3 PRODUCTION - INVERTER

Selecting *Inverter* has the following (Figure 130)

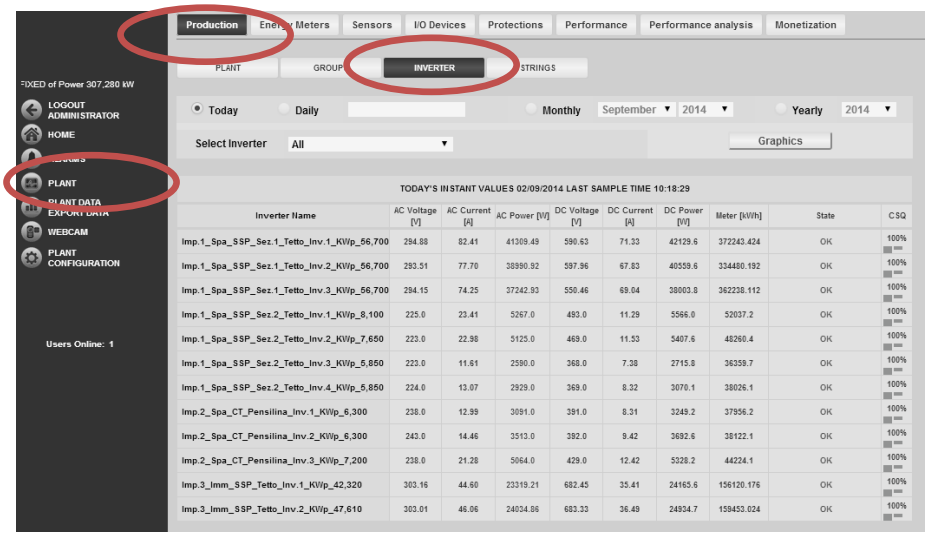


Figure 130 - inverter list window

The fields are displayed in real-time:

- *Inverter name*: name given to the inverter
- *AC Voltage [V]*: AC voltage
- *AC Current [A]*: AC current
- *AC Power [kW]*: AC power
- *Potential Difference DC [V]*: DC potential difference
- *DC Current [A]*: DC current
- *DC Power [kW]*: DC power
- *Meter [kWh]*: total produced energy
- *Status*: inverter status. If the device has a normal status of operation
- *CSQ*: signal quality. The parameter is calculated as the ratio between the number of attempts of data request on the maximum number of attempts (fixed at a value of 15 attempts)

The page is divided into two sections:

1. *-Navigator*:
   - *Today*: shows the performance of power or energy or efficiency of the current day. The sampling has interval of 15 minutes. The value is mediated between all valid samples taken over 15 minutes.
   - *Daily*: shows the daily trend of power or energy or efficiency of selected day. To choose the day use the specific calendar and press *View Charts*. The sampling has interval of 15 minutes. The power value is mediated between all valid samples taken over the 15 minutes while the energy is calculated as integral of the power.
   - *Monthly*: shows the energy produced each day in the selected month as the difference of the maximum value and the historical minimum value in a quarter hour by eSolar for each day. For the selection of the month use the specific calendar and press *View Charts*. Vedi Figure 131.
   - *Annual*: shows the energy produced in each month as the difference between the value of the last day and the first day of the month in the selected year. For the choice of the year use the specific calendar and press *View Charts*.

2. -*Chart*:
   In the axis of abscissas (X) is given the time and depending on the type of chosen view (daily, monthly, yearly), we will have the relative measure (hours, days, months). In the ordinate axis (Y) there is the energy [kWh] or Performance with a full scale appropriately dimensioned according to the peak power added in the plant Data section. See Ch 3.1.1.

Figure 131 – energy monthly trend

With the selection of *Today* or *Daily Data* will open the drop-down menu for selecting the inverter or all of the inverters (*all*) to display. After selecting the desired item in the inverter field press *Refresh Charts*. Keys on the type of data to display, in addition to the chart, will appear such as: *Power [kW]* or *Energy [kWh]* in *Line* or *Line Zoom* mode. Selecting, for example, all inverters will get a graph as follows (Figure 132 in *Line* mode and Figure 133 in *Line Zoom*).

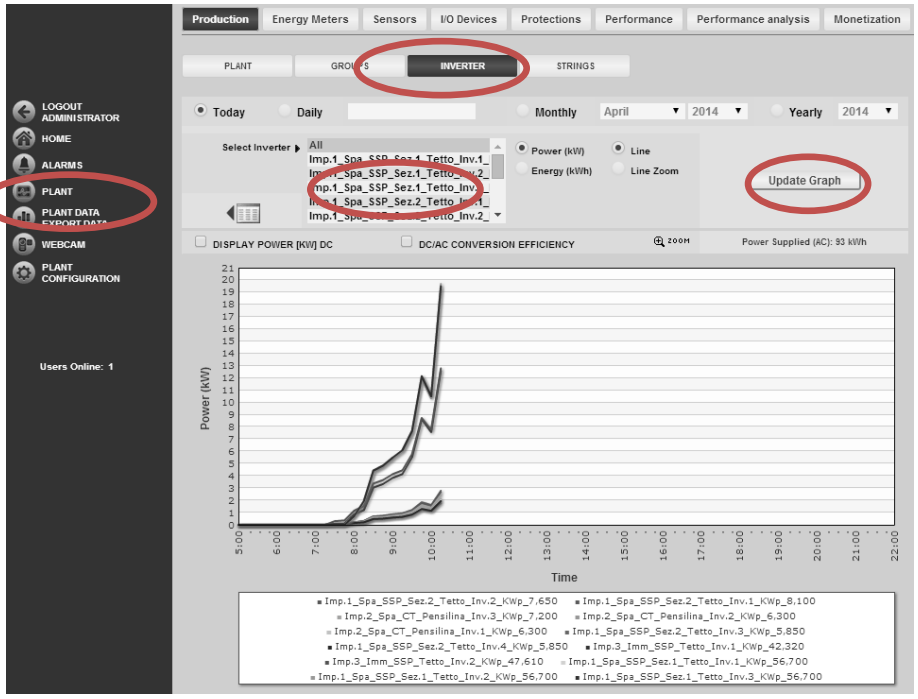


Figure 132 – supplied Power - all inverters in *Line* mode

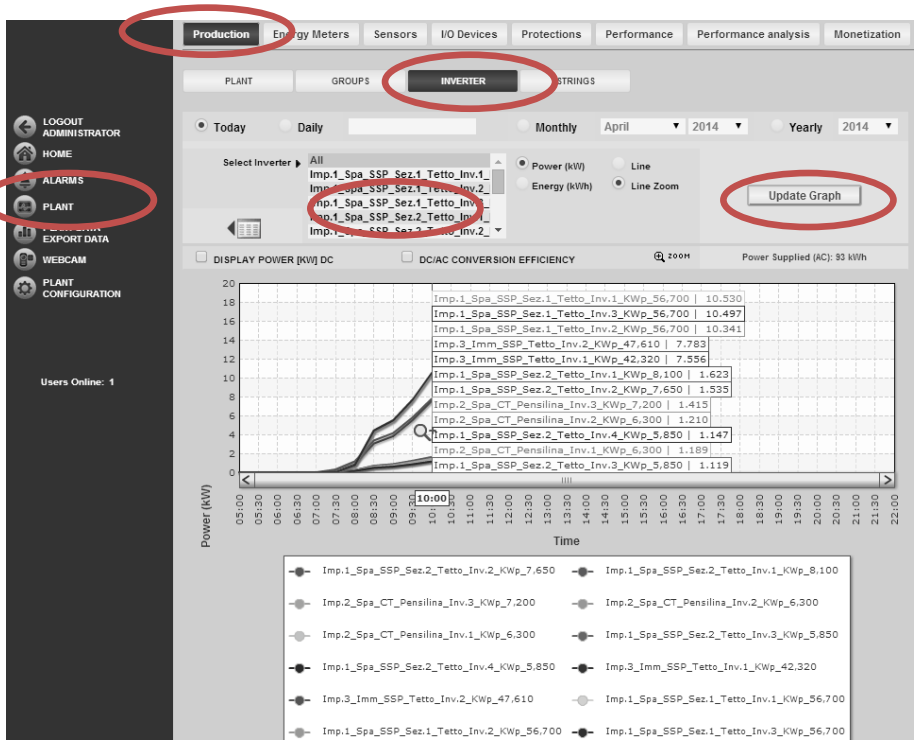


Figure 133 – supplied Power – all inverters in *Line Zoom* mode

Line Zoom mode allows the fenestration of a chart section, in this case about the powers supplied by all inverters, selectable by holding the mouse cursor over the chart (See Figure 133).

> The comparison between the trends of various inverter production allows to detect any anomalies in plant production easily.

For the inverter section is always possible to check, and thus to plot the value of the *DC power* and the *efficiency of the DC / AC conversion*.
Power [kW] DC viewing, Figure 134, in *Line Zoom* mode.

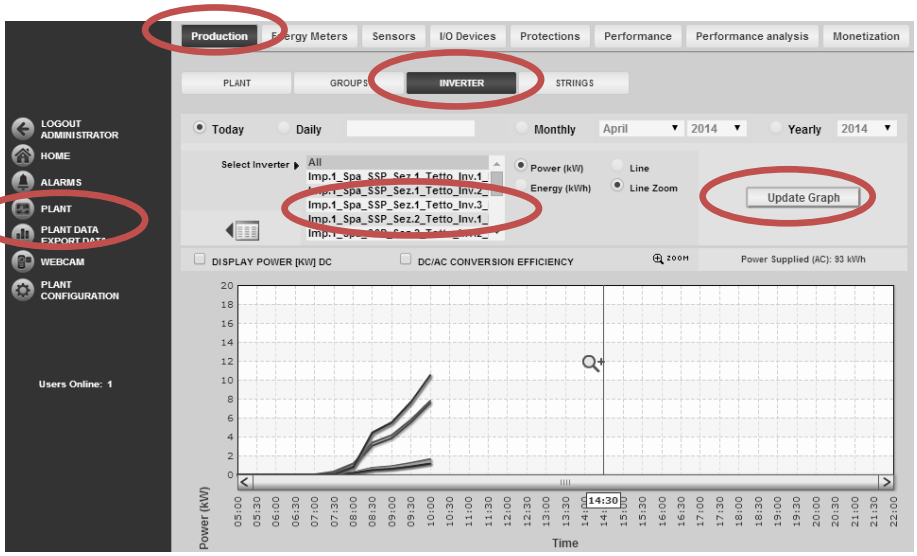


Figure 134 - View Power [kW] DC Chart

DC / AC Performance conversion Viewing, Figure 135, in *Line Zoom* mode

Figure 135 - DC/AC Performance conversion

The functions just mentioned, *View Power [kW] DC* and *DC / AC Performance Conversion* are applicable only by selecting *Today* or *Daily*.

At the top right of the chart the total energy produced by the plant in the selected period is shown.

Value display in chart

Moving the mouse over the chart function a box is shown that reports: the type of measure, the reference date and the expressed value in the unit of measure indicated in the Y axis

Exporting data from chart

Clicking with the right button inside the chart to open the drop-down menu as in Figure 136.

Figure 136 – Exporting data from chart

Click with the left mouse button on *Copy data to clipboard*. Open any spreadsheet and paste the data.
Print the graph
Click with the left mouse button on the "Print Chart"; select the printer and press the *Print* button.

If eSolar showing off or in a status of malfunction data will not be stored. It is not possible to recover no acquired data. Contact Customer Care if this problem is occurred.

6.4 PRODUCTION - GROUPS

From *Production* menu, selecting *Groups*, to access as Figure 137.

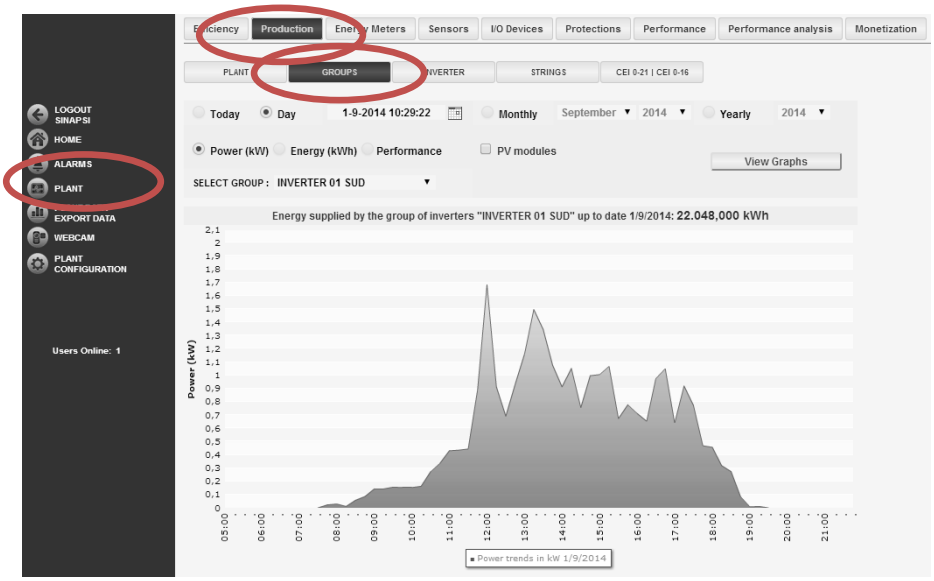


Figure 137 – Energy supplied by inverter group

The chart will be displayed only if the groups of inverters are configured correctly as described in Cap 3.2.4. The visualization is like that already described in the previous Ch.
In alto a destra del grafico si riporta l'energia totale prodotta dall'impianto nel periodo selezionato.
At the top right of the chart the total energy produced by the plant in the selected period is shown.

6.5 PRODUCTION - STRINGS

In this section it is possible to visualize the underlying string data to an inverter. By clicking the corresponding button *Strings* from the *Production* section, it will appear as follows (Figure 138).

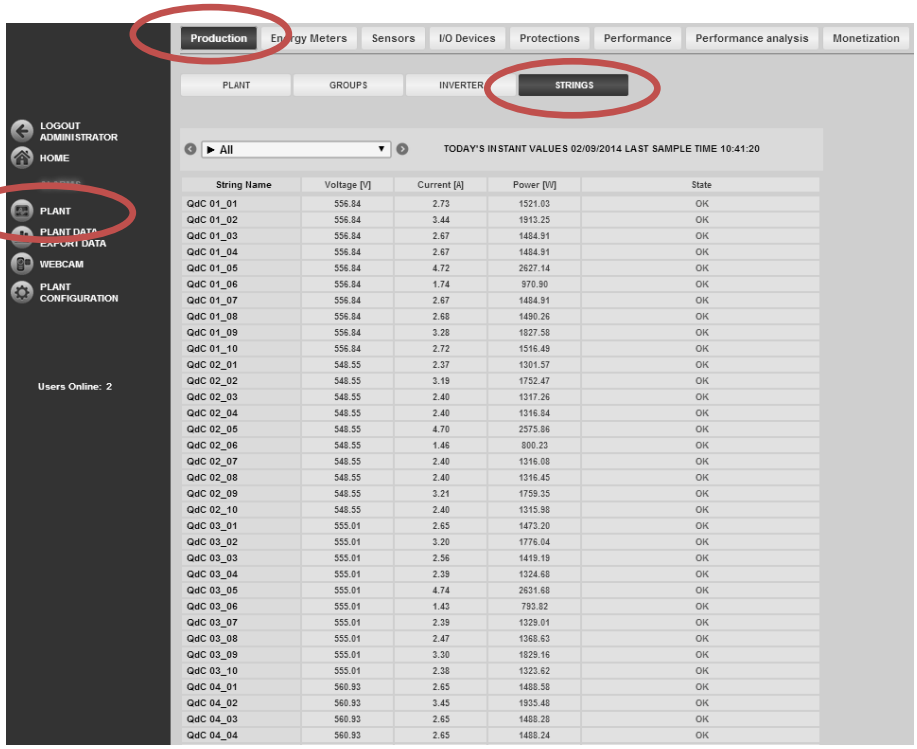


Figure 138 – inverter strings

The fields displayed are

- *String Name*: name given to the controller of string
- *Voltage [V]*: DC Voltage
- *Current [A]*: DC Current
- *DC Power [W]*: DC Power
- *Status*: Controller status. OK if the device has a normal status of operation

The page is divided into two sections:

1. *-Navigator*:
   - *Today:* shows the performance of power or energy or efficiency of the current day. The sampling has interval of 15 minutes. The value is mediated between all valid samples taken over 15 minutes.
   - *Daily*: shows the daily trend of power or energy or efficiency of selected day. To choose the day use the specific calendar and press *View Charts*. The sampling has interval of 15 minutes. The power value is mediated between all valid samples taken over the 15 minutes while the energy is calculated as integral of the power.
   - *Monthly*: shows the energy produced each day in the selected month as the difference of the maximum value and the historical minimum value in a quarter hour by eSolar for each day. For the selection of the month use the specific calendar and press *View Charts*.
   - *Annual*: shows the energy produced in each month as the difference between the value of the last day and the first day of the month in the selected year. For the choice of the year use the specific calendar and press *View Charts*.

2. -*Chart*:

   In the axis of abscissas (X) is given the time and depending on the type of chosen view (daily, monthly, yearly), we will have the relative measure (hours, days, months). In the

ordinate axis (Y) there is the energy [kWh] or Performance with a full scale appropriately dimensioned according to the peak power added in the plant Data section. See Ch 3.1.1.

From the menu select the *Inverter* of interest or *ALL* **to display all the data in real time for all strings controllers configured in eSolar, see Figure 139. For the choice for *ALL* the strings are ordered by String_Name.** Remind as recommended in *Plant Configuration* phase, or the assignment of a clear naming for ease of consultation.

By *Charts* button a graphical representation of the power of all string controllers with respective channels is shown. (Figure 139)

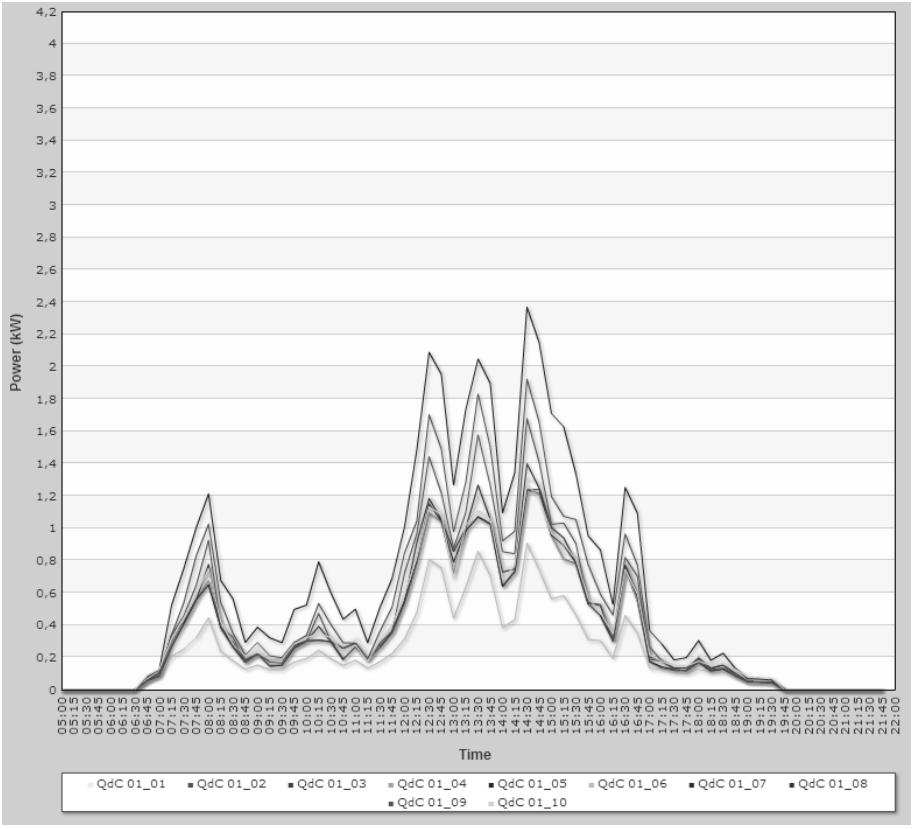


Figure 139 – All strings power

The X-axis will be set according to the type of display you want to do, daily, monthly or yearly.

For each string channel it will be possible to display the voltage, current and power in a time interval in *Today* and *Daily* section (Figure 140). In the bottom section of the chart, it possible to add or remove entries to visualize.

Figure 140 – Strings Chart

Exporting data from the Chart

Clicking with the right button inside the chart to open the drop-down menu shown in Figure 141.

Figure 141 – Exporting data from the Chart

Click with the left mouse button on Copy data to clipboard. Open any spreadsheet and paste the data.

Print the chart

Click with the left mouse button on the "Print Chart"; select the printer and press the *Print* button.

If eSolar showing off or in a status of malfunction data will not be stored. It is not possible to recover no acquired data. Contact Customer Care if this problem is occurred.

6.6 ENERGY METERS

From *Plant* menu selecting *Energy Meters* it occurs (Figure 142).

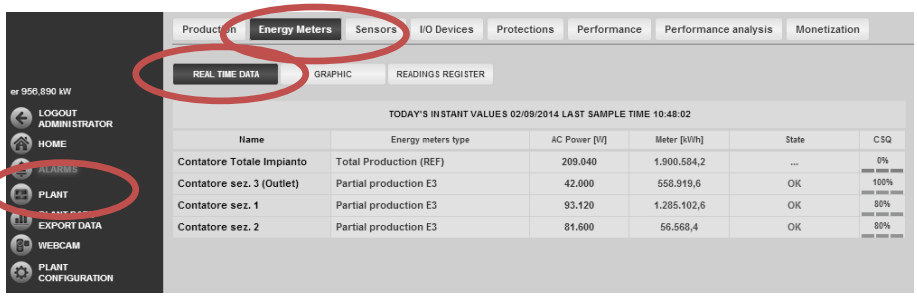


Figure 142 – Energy meters - STANDARD

The displayed Data in real-time are:

- *Name*: name of the meter
- *Meter Type*: type of meter previously configured
- *Power AC [W]*: supplied AC Power
- *Meter[kWh]*: total energy produced
- *Status*: Meter status. OK if the device has a normal status of operation
- *CSQ*: signal quality. The parameter is calculated as the ratio between the number of attempts required data on the maximum number of attempts (fixed at a value of 15 attempts). ***NB: For the virtual meters status will always be shown in gray.***

Selecting *Charts* we have:

1. *- Navigator*:
   - *Today:* shows the performance of power or energy or efficiency of the current day. The sampling has interval of 15 minutes. The value is mediated between all valid samples taken over 15 minutes.
   - *Daily*: shows the daily trend of power or energy or efficiency of selected day. To choose the day use the specific calendar and press *View Charts*. The sampling has interval of 15 minutes. The power value is mediated between all valid samples taken over the 15 minutes while the energy is calculated as integral of the power.
   - *Monthly*: shows the energy produced each day in the selected month as the difference of the maximum value and the historical minimum value in a quarter hour by eSolar for each day. For the selection of the month use the specific calendar and press *View Charts*.
   - *Annual*: shows the energy produced in each month as the difference between the value of the last day and the first day of the month in the selected year. For the choice of the year use the specific calendar and press *View Charts*.

2. -*Chart*:

   In the axis of abscissas (X) is given the time and depending on the type of chosen view (daily, monthly, yearly), we will have the relative measure (hours, days, months). In the ordinate axis (Y) there is the energy [kWh] or Performance with a full scale appropriately dimensioned according to the peak power added in the plant Data section. See Ch 3.1.1.

The flows of energies, see Figure **143**, within eSolar follow the following formula:

ECC=EP+EPR-ECD

Where:

- ECC= Energy transferred to the loads
- EP= Energy Produced by the plant
- EPR= Energy taken from the grid
- ECR= Energy transferred to the grid

Selecting Charts, see Figure 143, it occurs

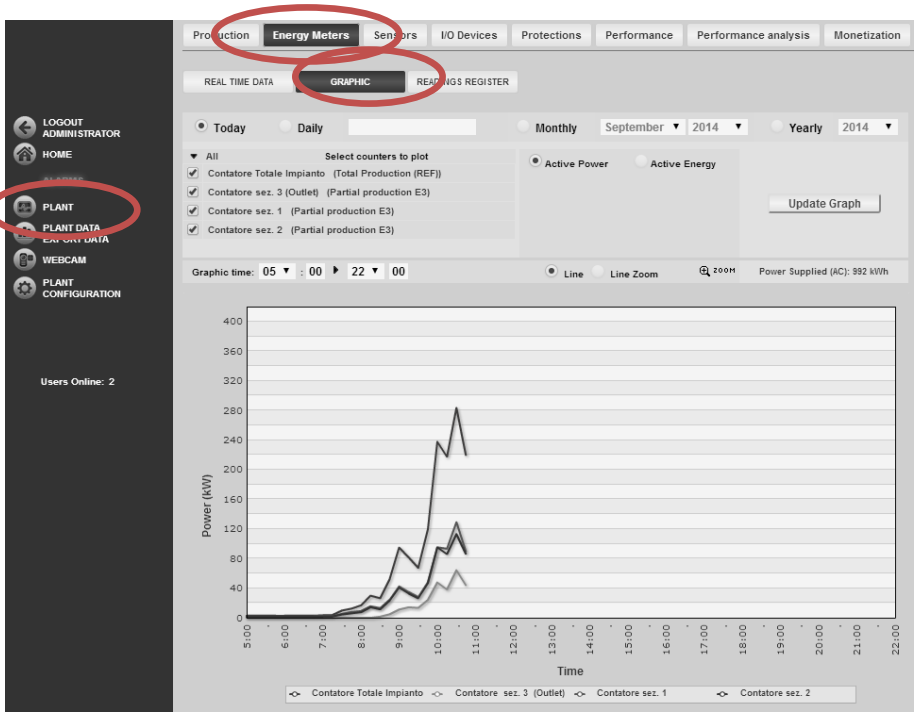


Figure 143 – Energy Meter Chart

The visualization follows the same characteristics as described in the Inverter section. It will be possible to represent the Active Power and Active Energy using Line or Line Zoom.
In the Readings register section it is possible to view all the readings from both the inverter energy that meters or both in tabular form for daily, monthly and annual

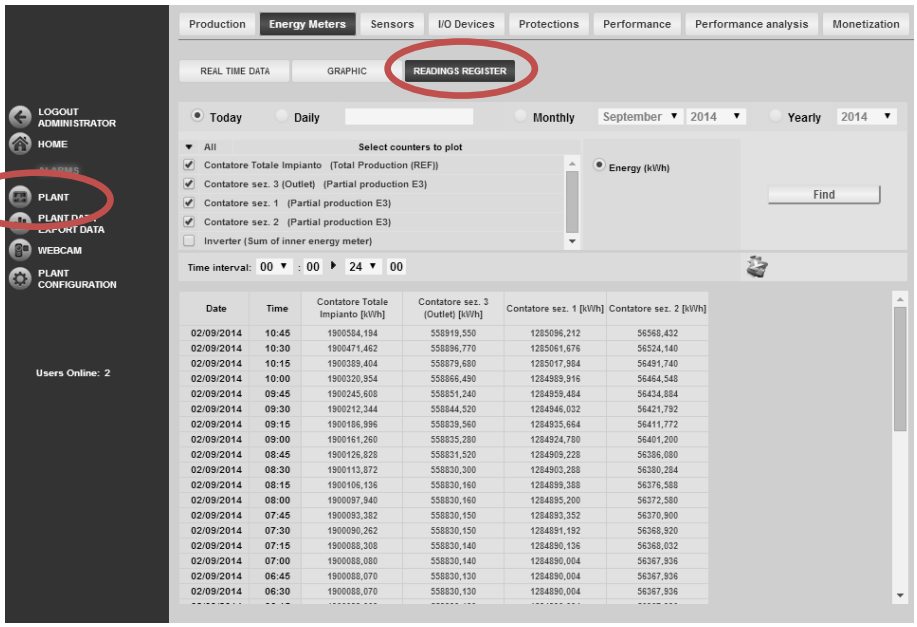


Figure 144 – Readings Register

In this section by selecting a period of interest for viewing the measure, it is possible to export directly the data in . xls format by clicking the icon  (Figure 145).

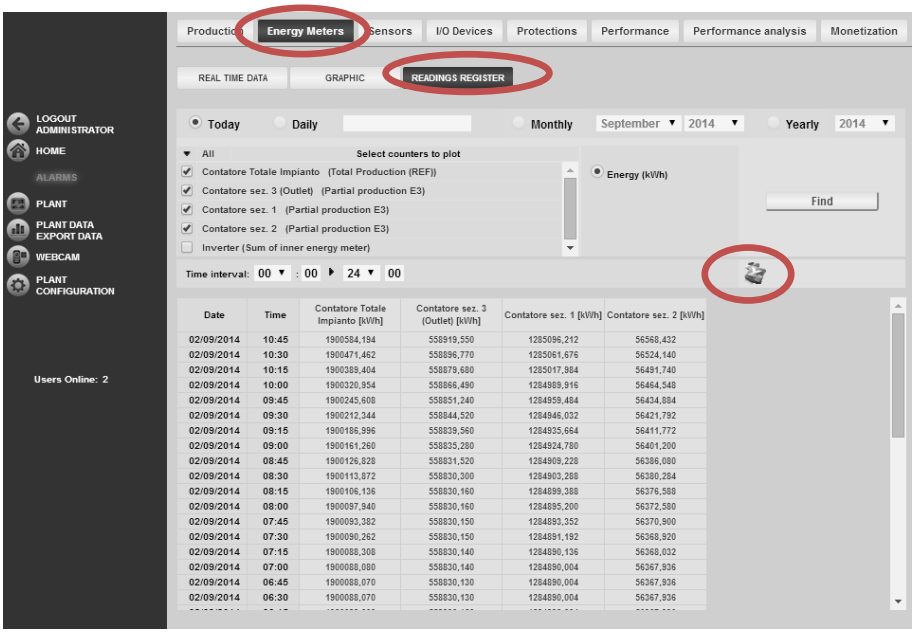


Figure 145 – Reading Register

Exporting data from the Chart

Clicking with the right button inside the chart to open the drop-down menu shown in Figure 146

Figure 146 – Exporting Data from the Chart

Click with the left mouse button on Copy data to clipboard. Open any spreadsheet and paste the data.

Print the chart

Click with the left mouse button on the "Print Chart"; select the printer and press the *Print* button.

If eSolar showing off or in a status of malfunction data will not be stored. It is not possible to recover no acquired data. Contact Customer Care if this problem is occurred.

6.7 ENERGY METERS (OPTIONAL)

From *Plant* menu selecting *Energy Meters* it occurs (Figure 142).

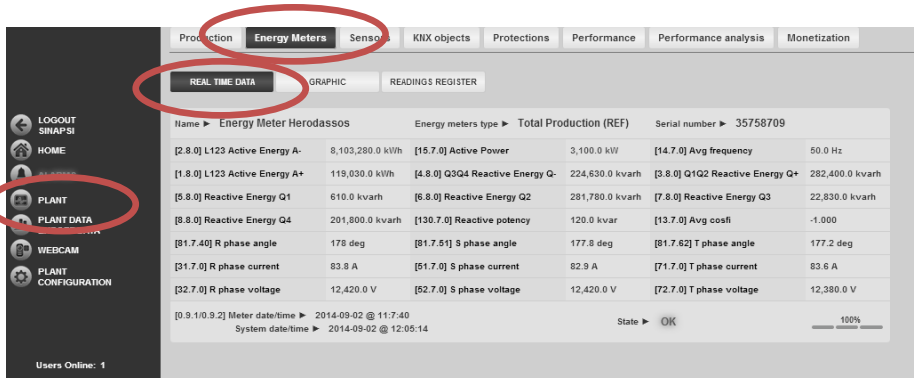


Figure 147 – Energy meters – OPTIONAL

The displayed real-time data are:

- *Name*: name given to the meter
- *Meter Type*: type of meter previously configured
- *Number:* shows the serial number of the meter, when side counter placed
- *OBIS*: a series of OBIS are listed according to the type of data provided by meter protocol. For a complete list please refer to the website http://www.visualenergy.de/en/obis-codes.aspx. See Figure **147** for an example
- *Date/Meter time:* date and time read directly from the meter
- *Date/System time:* date and time read directly from the system
- *CSQ*: signal quality. The parameter is calculated as the ratio between the number of attempts required data on the maximum number of attempts (fixed at a value of 15 attempts). ***NB: For the counters virtual status will always be shown in gray.***

Selecting *Charts* it occurs:

3. *- Navigator*: the navigation section follows the same logic shown in Chapter 6.6. In the optional section a larger amount of data can be selected. The values reported are:
    - *Active Power*
    - *Active Energy*
    - *Average Cosfi*
    - *Average Frequency*
    - *Phase Current*
    - *Phase Voltage*
    - *Reactive Power*
    - *Phase angle*

See Figure 148. One size at a time can be displayed.

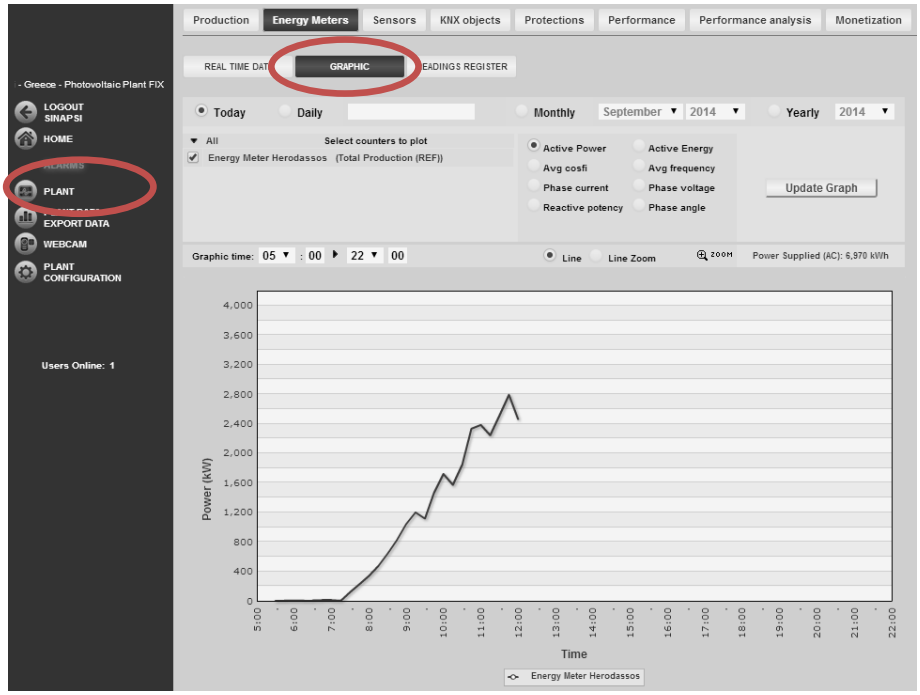


Figure 148 – Energy Meters (Optional)

In the Readings register section all the energies readings from both the inverter that meters or both in tabular form for daily, monthly and annual can be visualized.

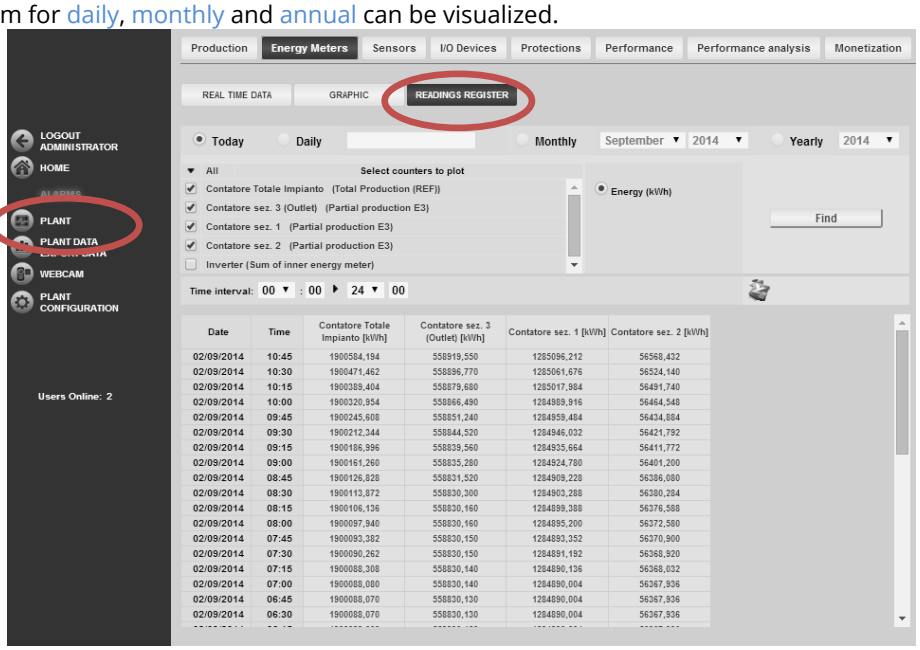


Figure 149 – Readings Register

In this section a selected period of interest for viewing the size, to export the data directly in .xls format by clicking the icon  (Figure 150).

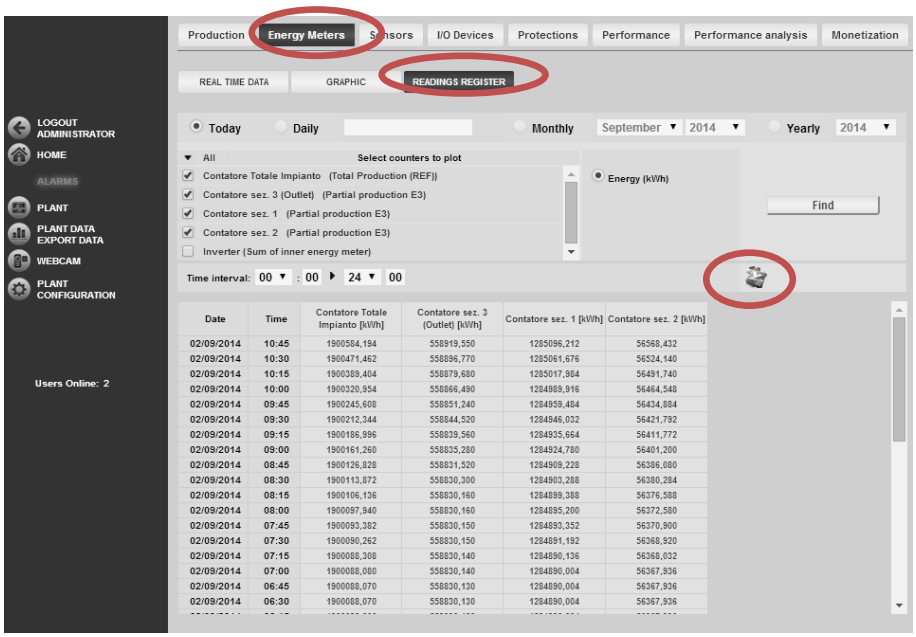


Figure 150 – Reading Register

Exporting data from the Chart

Clicking with the right button inside the chart to open the drop-down menu shown in Figure 151

Figure 151 - Exporting data from the chart

Click with the left mouse button on Copy data to clipboard. Open any spreadsheet and paste the data.

Print the chart

Click with the left mouse button on the "Print Chart"; select the printer and press the *Print* button.

If eSolar showing off or in a status of malfunction data will not be stored. It is not possible to recover no acquired data. Contact Customer Care if this problem is occurred.

6.8 SENSORS

The access to the *Sensors* section displays the page as shown in Figure 152.

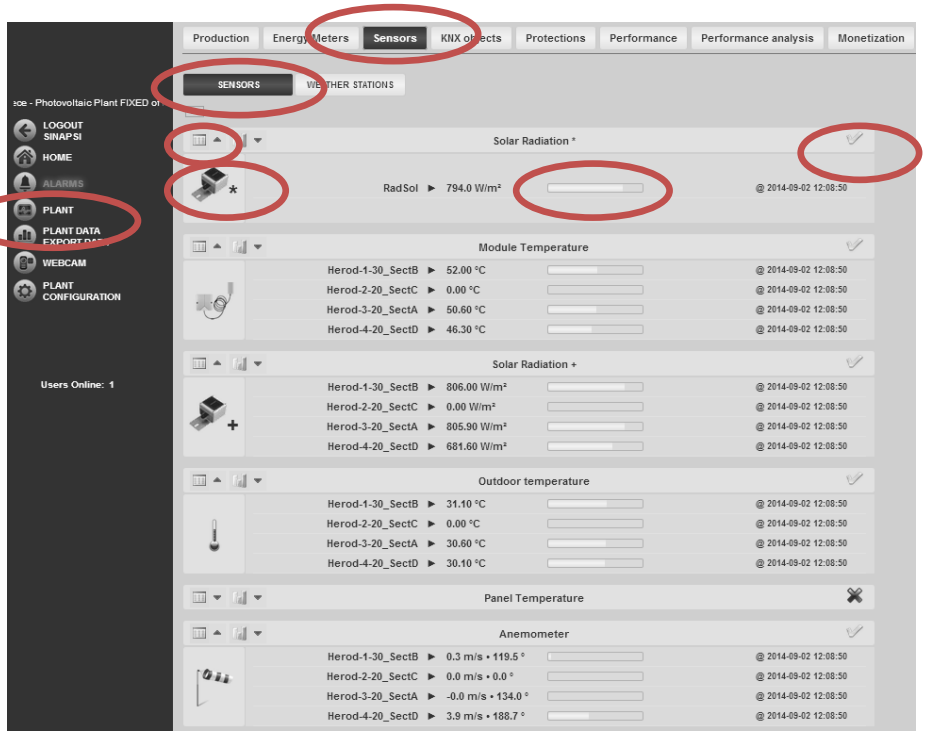


Figure 152 - Configurable Sensors

To open the chart of the sensor, use the button as shown in Figure 153. To select a different date or a time interval of monthly or annual type, make use of the selection keys and press the *View Graphs* button.
Push the button to close the chart window.

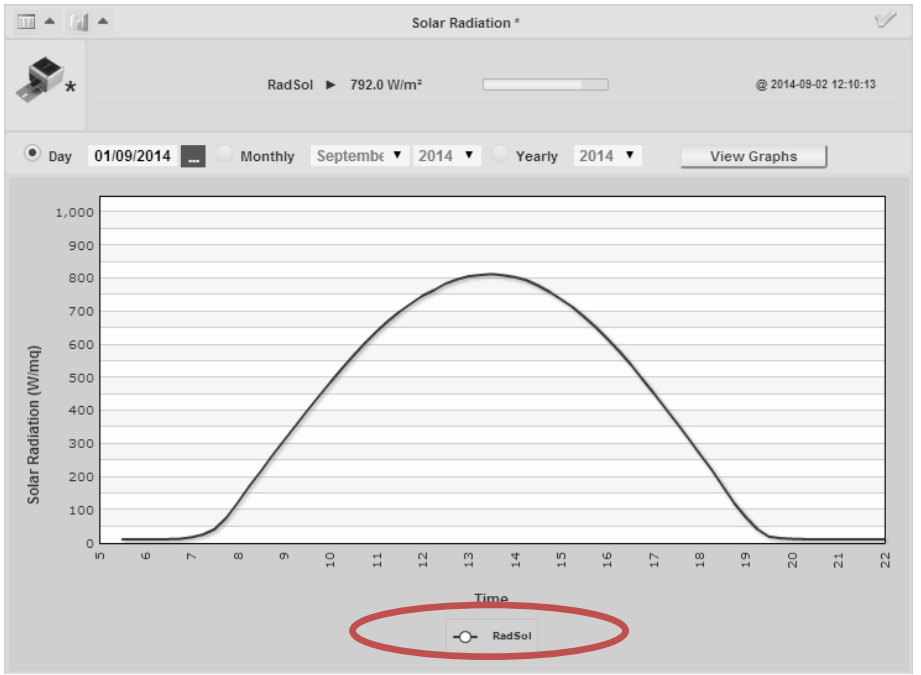


Figure 153 – Solar radiation Chart

Below there are the names of the sensors previously configured (see Ch. 3.3). From the drop-down menu select a sensor and press the View Graphs.

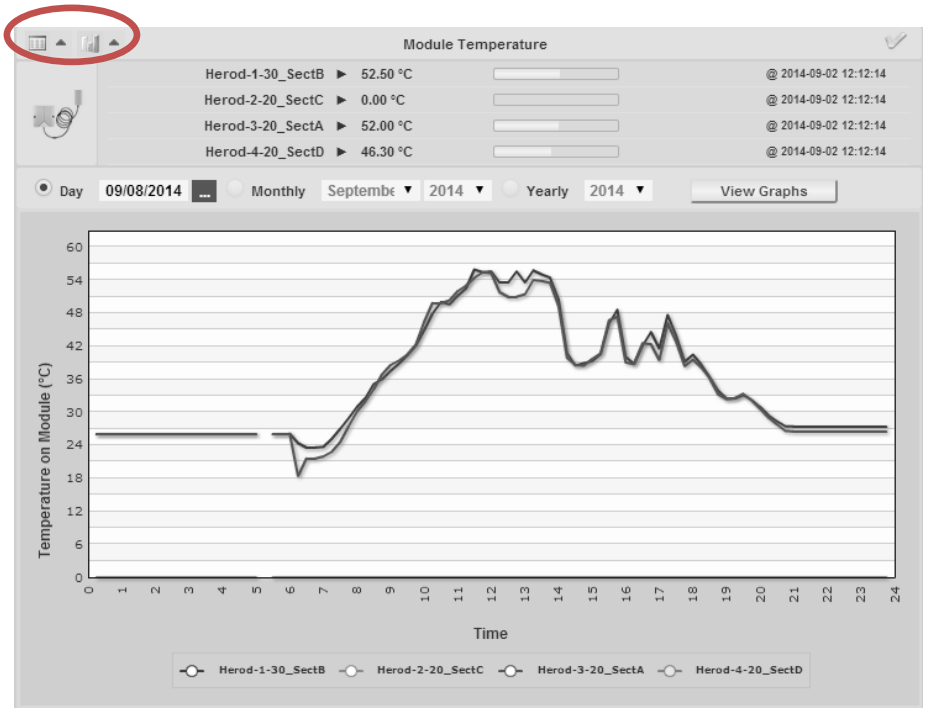


Figure 154 – Module temperature

Figure 155 shows the trend of the anemometer. Only for anemometer section the displayed values can be plotted on the basis of value:

- *MAX*: shows the maximum values of the chart
- *AVG*: shows the average values of the chart
- *MIN*: shows the minimum values of the chart

The x-axis of the graph is the selected time, in this case the y will be given by the temperature / Wind intensity / Direction.

Figure 155 – Wind Intensity (m/s) and Direction (0°-360 °) of an Anemometer

The Weather Station we will access to a screen like the one shown in Figure 156. Graphical display follows as reported in the previus paragraphs

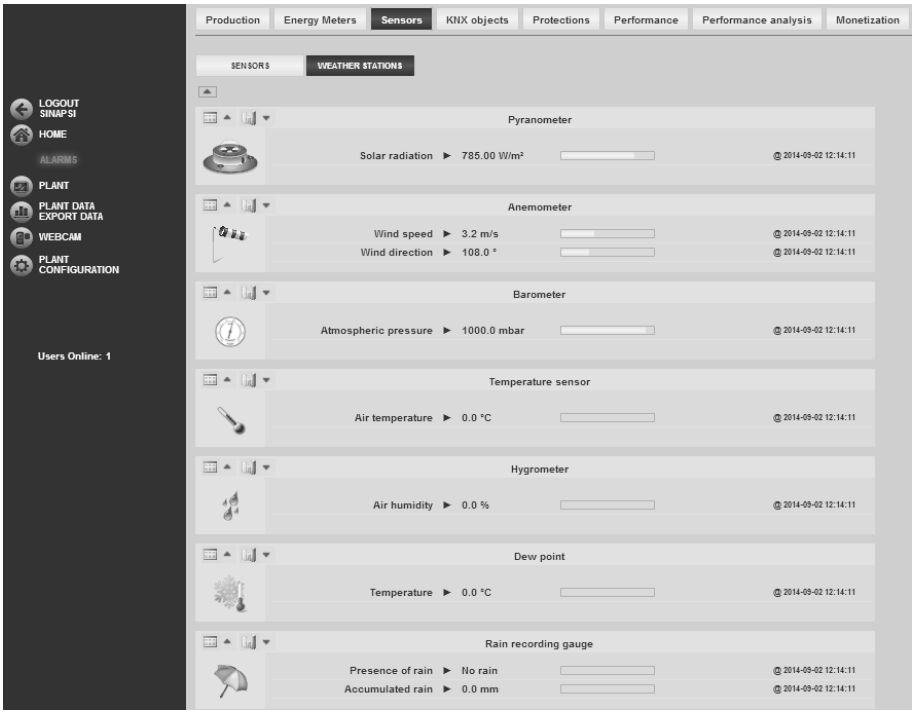


Figure 156 – Wheater Station

Exporting data from the Chart

Clicking with the right button inside the chart to open the drop-down menu

Figure 157 - Exporting data from the chart

Click with the left mouse button on Copy data to clipboard. Open any spreadsheet and paste the data.

Print the chart

Click with the left mouse button on the "Print Chart"; select the printer and press the *Print* button.

If eSolar showing off or in a status of malfunction data will not be stored. It is not possible to recover no acquired data. Contact Customer Care if this problem is occurred.

6.9 KNX OBJECTS

KNX Groups previously configured are shown in this section (Figure 158). Remember to create a group of KNX objects as described in Ch. 3.4.3.

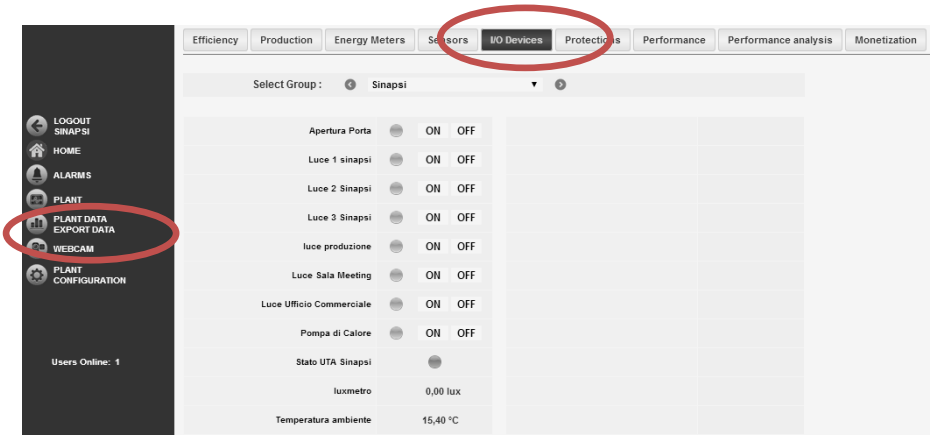


Figure 158 – KNX Groups

Specifically, by selecting the *KNX Group* called *Energy Proje*ct, it is possible to view / control the status of the KNX device depending on its configuration, as described in the Ch. 3.4. Positioning over any KNX object to the date and time of the last received packet will be shown in video.

6.10 PROTECTIONS

Below , the *Protections* screen (Figure 159).

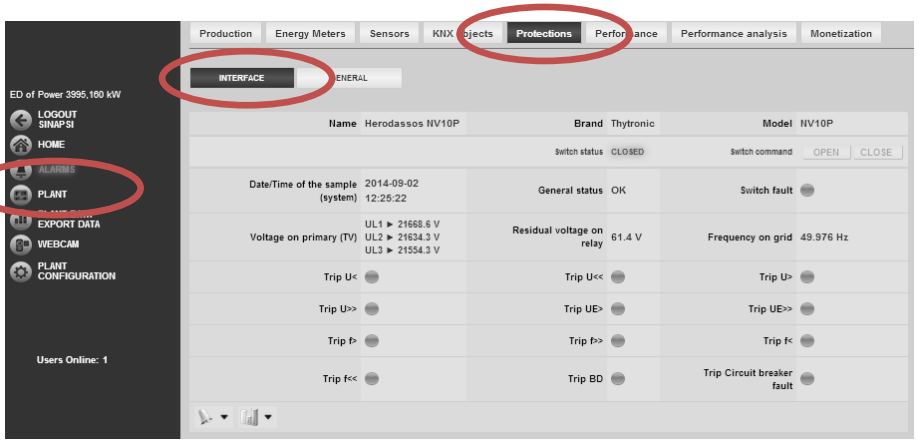


Figure 159 – Protections Interface

It is possible to choise between:

- *Interface*
- *General*

For both it is reported:

- *Name*: Interface Name
- *Brand:* Interface Brand
- *Model*: Interface Model
- *Status Switch:* from device register
- *Control Switch*: slow
- *Date time sample system*: last sample acquired from the device
- *General Status:* device status. OK if the device has a normal status of operation
- *Fault Switch*: from device register
- *Primary Voltage [TV]* : from device register
- *Residual voltage on relay*: from device register
- *Frequency on relay*: from device register
- *TRIP values*: from device register

Through the panel in Figure 160 for both the Interface section and for General:

Figure 160 –Bar of the protections charts

- : opens the page relating to the device alarms. It can display up to 3000 alarms.
- : opens the Charts page (Figure 161)
- *MIN*: displays minimum values
- *AVG*: displays the average values
- *MAX*: displays maximum values

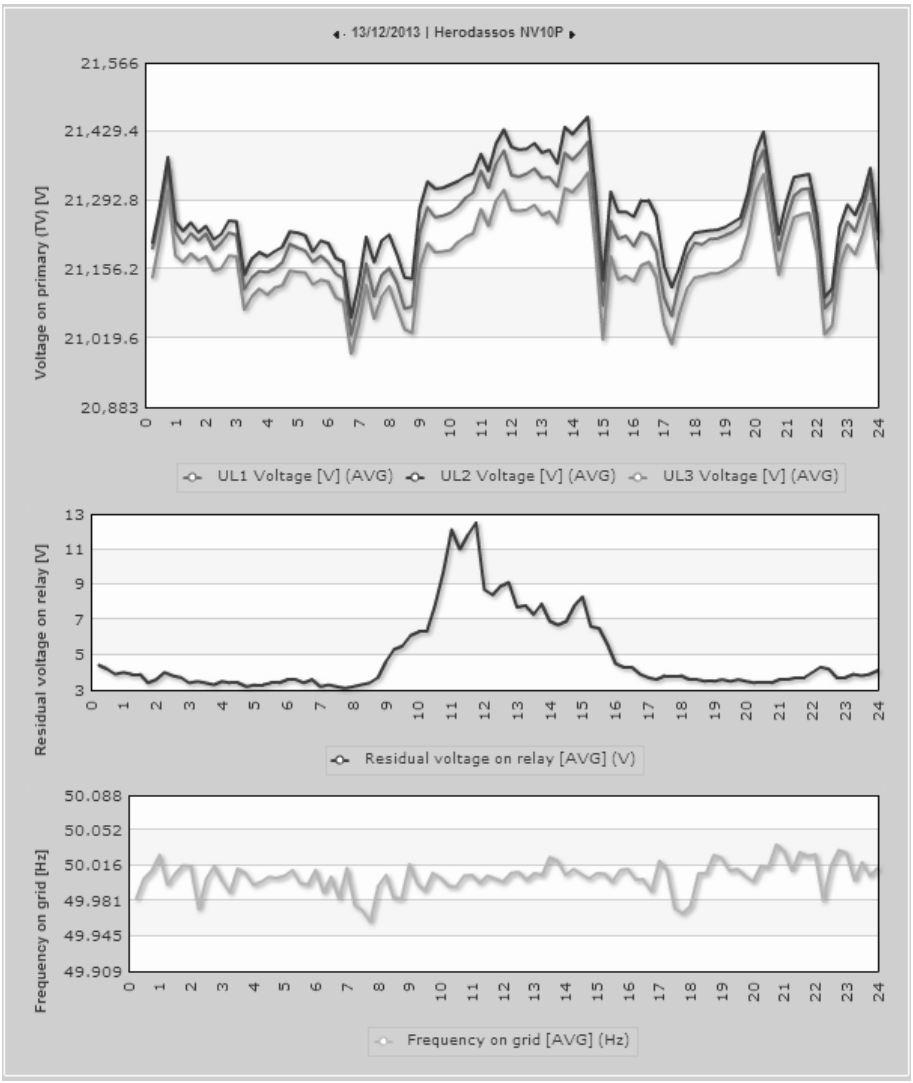


Figure 161 – Protections/General Charts

The charts show:

- *UL1, UL2, UL3*
- *Residual voltage on relay*
- *Frequency on relay*

Value visualization in the Chart

Moving the mouse over the function of the graph a box is shown that reports: the type of magnitude, the reference date and the value expressed in the unit of measure indicated in the Y axis

Exporting data from the Chart

Clicking with the right button inside the chart to open the drop-down menu shown in Figure162.

Figure162 - Exporting data from the Chart

Click with the left mouse button on Copy data to clipboard. Open any spreadsheet and paste the data.
Print the chart
Click with the left mouse button on the "Print Chart"; select the printer and press the *Print* button.

6.11 PERFORMANCE

Following the *Performance* screen (Figure163). Refer to Ch. 3.2.4

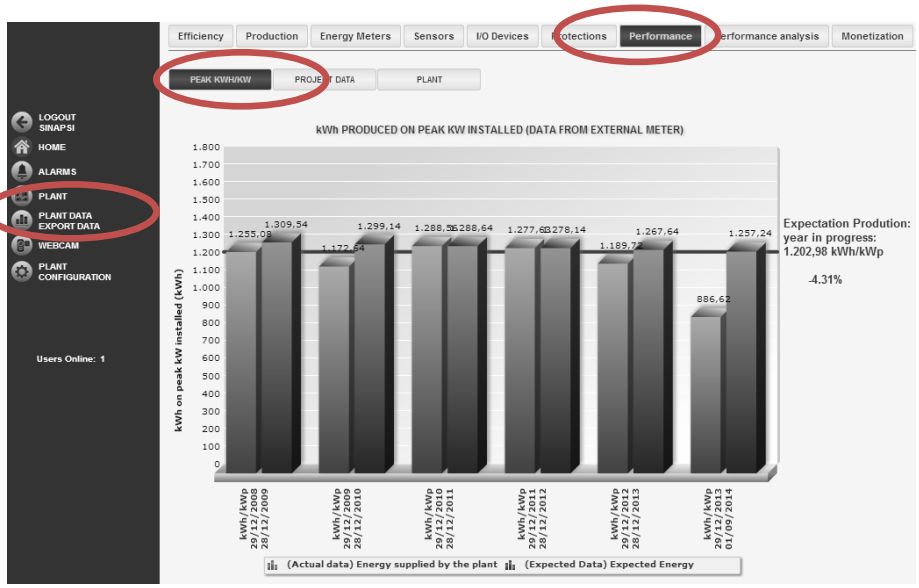


Figure163 – kWh/kW di picco

The selectable fields are:

- PEAK kWH/kW
- PROJECT DATA
- PLANT

6.11.1 PEAK KWH/KW

It's the ratio between the kWh produced on kW peak; ie the ratio between the total energy produced and kW peak system (Figure164). You will see two groups of parallelepipeds in blue and red: the blue represents the value of kWh / kW peak recorded during the year, while the red represents the value kWh / kW peak estimated. The line, called Forecasting production year, takes into account two components, one real and one residual calculated at the design stage.

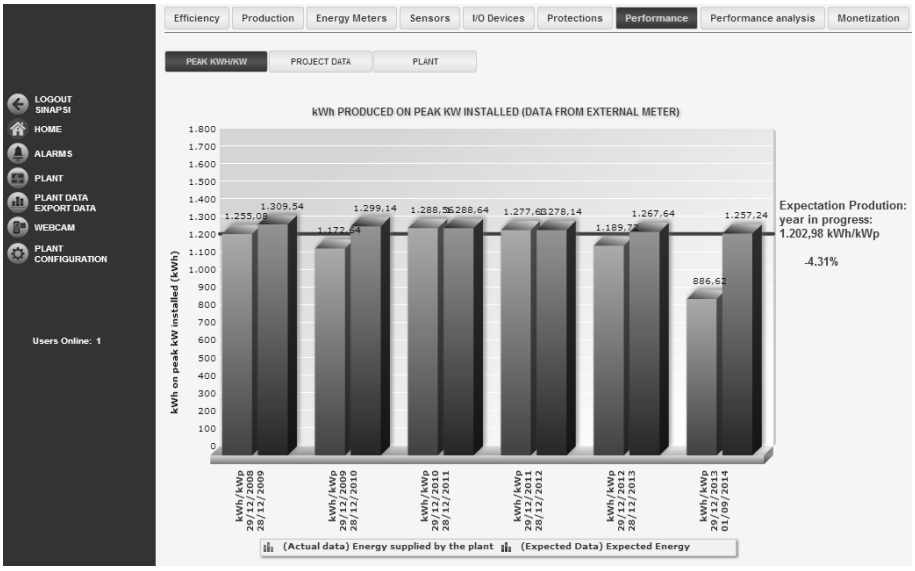


Figure164 – Peak kWh/kW

6.11.2 PROJECT DATA

Shows the values of the energies stored into the eSolar, in this case daily. You can isolate three distinct elements:

- Green line: is the energy produced by the media on a daily / monthly (kWh)
- Black line: is the target design
- Parallelepipeds: energy produced daily / monthly by the plant

Figure165 - Dati di progetto

6.11.3 PLANT

It shows the reference image (Figure166)

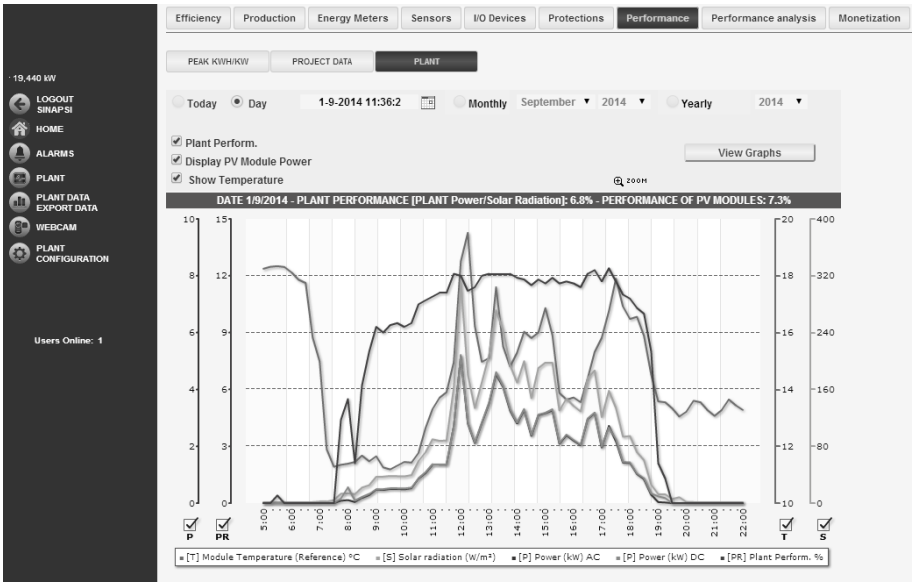


Figure166 - Plant

To select the energy of the system data, you can choose between:

- *Plant Perform.*
- *Display PV Module Power*
- *Show Temperature*

The legend below the graphs show the values which can be displayed:

- *Temperature Module (Reference) °C*
- *Solar Radiation (W/mq)*
- *Power (kW) AC*

Only for Today and Daily views, you can select and superimpose the current graph even for *Performance* and Disp*l*ay *Power plant PV modules*, as shown in Figure167. Graph will show the acronym of selected items (the description of which is given in the legend below the graph) to represent an intuitive reading of the graph.

Figure167 – Module Temperature (Rif.) °C, Plant Performance, Power Module PV Temperature

Below is given a monthly representation (Figure168). In this case, you can not select more than one value at a time to be graphed.

Figure168 – Plant Performance

Figure169 shows the representation for the annual *performance of the PV modules*

Figure169 – Plant Performance

These two values are what is produced each month by the module on both the AC and DC

Display the value in the graph

Moving the mouse over the graph function shows a box that says: the type of magnitude, the reference date and the value expressed in the unit of measurement shown in the Y axis

Exporting data from the Chart

Clicking with the right button inside the chart to open the drop-down menu shown in Figure171

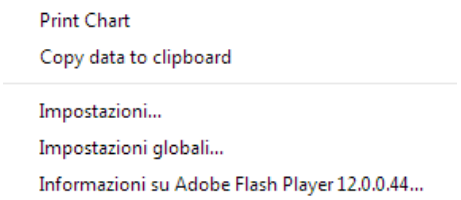


Figure170 - Exporting data from the Chart

Click with the left mouse button on Copy data to clipboard. Open any spreadsheet and paste the data.

Print the chart
Click with the left mouse button on the "Print Chart"; select the printer and press the *Print* button.

If the eSolar is off or in a state of malfunction data will not be stored. You can't recover lost data.

6.12 PERFORMANCE ANALYSIS

From *Plant*, *Performance Analysis* (Figure171).

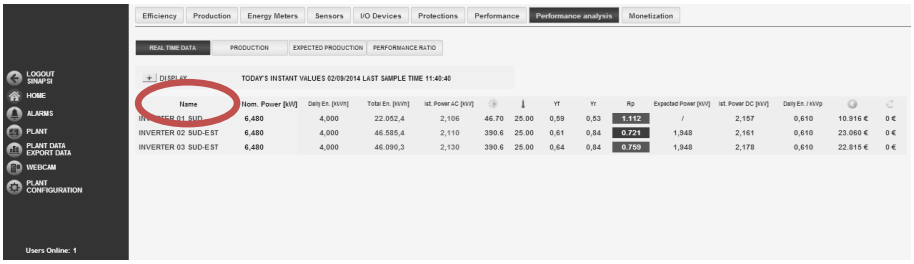
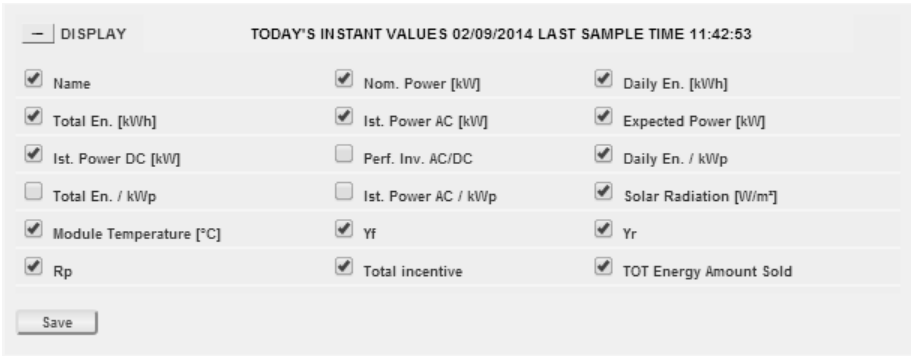


Figure171 – Data in real time

By clicking on the *Display* you can add the data of interest



Press *Save* to set the configuration.

The Figure171 shows the Default visualization:

- *Name*: group's name
- *Nom. Power [kW]*: sum of the nominal power of all inverters belonging the group
- *Total En. [kWh]*: sum of the Energies of all inverters belonging the group
- *Radiation*: solar radiation from the reference pyranometer
- *Yf*: hours for which the group of inverter should work to match his contribution to the daily load. See CEI EN 61724
- *Yr*: number of hours in which the solar radiation is 1000 W/m². See CEI EN 61724
- *RP*: report the performance overall effect of losses on the energy produced in ac the PV system. The value of Rp is calculated according to CEI EN 61724
- *Expected Power AC [kW]*: power expected for the group
- *En. Today/kWp*: ratio between the energy and the daily kWp of the group
- *En. Total/kWp*: ratio between the total energy and the kWp of the group
- *Pot. Inst. AC/kWp*: ratio of the sum of the power of all inverters in the group and the corresponding value of the peak power of the group
- *Totla Incentive*: shows the total incentive produced by the group
- *Total Amount of Energy Sold*: shows the total sold by the group incentive

Under the sections *Productions* it's possible to consult:

- Power AC (kW)
- Power AC/ kWp
- Energy AC/ kWp
- Energy (kWh)

- Perf. Inv. AC/ DC
- DC Power (kW)

The visualizations can be done by *Line* o *Line Zoom* Figure172

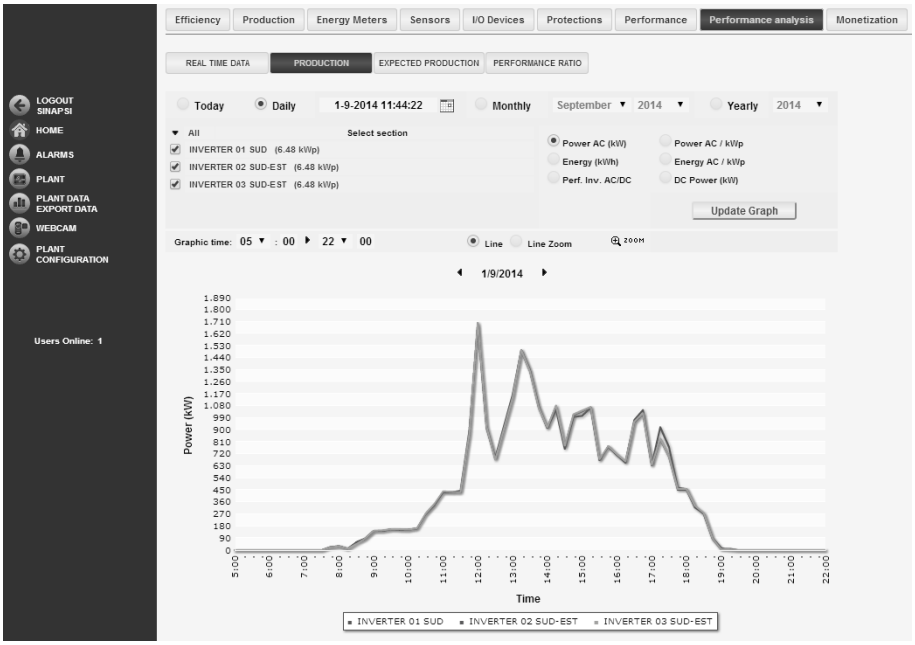


Figure172 – Production

Like for the other sections:

1. - *Navigator*:
   - *Today*: shows the performance of power or energy or efficiency of the current day. The sampling has interval of 15 minutes. The value is mediated between all valid samples taken over 15 minutes.
   - *Daily*: shows the daily trend of power or energy or efficiency of selected day. To choose the day use the specific calendar and press *View Charts*. The sampling has interval of 15 minutes. The power value is mediated between all valid samples taken over the 15 minutes while the energy is calculated as integral of the power.
   - *Monthly*: shows the energy produced each day in the selected month as the difference of the maximum value and the historical minimum value in a quarter hour by eSolar for each day. For the selection of the month use the specific calendar and press *View Charts*.
   - *Annual*: shows the energy produced in each month as the difference between the value of the last day and the first day of the month in the selected year. For the choice of the year use the specific calendar and press *View Charts*.

2. -*Chart*:

   In the axis of abscissas (X) is given the time and depending on the type of chosen view (daily, monthly, yearly), we will have the relative measure (hours, days, months). In the ordinate axis (Y) there is the energy [kWh] or Performance with a full scale appropriately dimensioned according to the peak power added in the plant Data section. See Ch 3.1.1

Select the desired item in the inverter field press *Refresh Chart*

Going in the *Expected Production* (Figure173) you'll have the follow screen

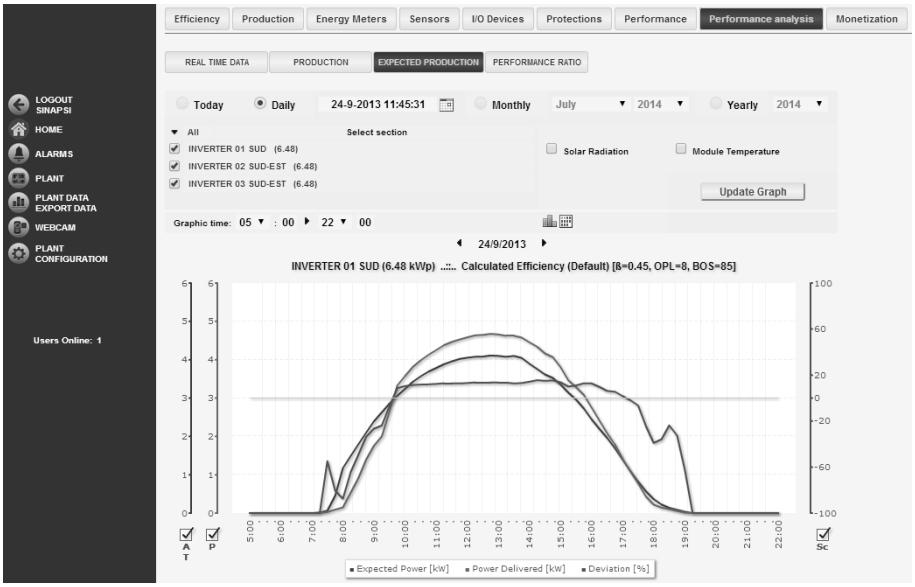


Figure173 – Chart expected production, Daily

For the *Today*/*Daily* visualization will be possible to add the values of *Solar Radiation* and *Temperature Module* (Figure169), while for the remaining views will be possible to insert only the Solar Radiation. The visualization Monthly and Yearly present a dual graph

- Chart of actual energy/expectations of the group
- Chart of the deviations between the actual energy/expectations of the group

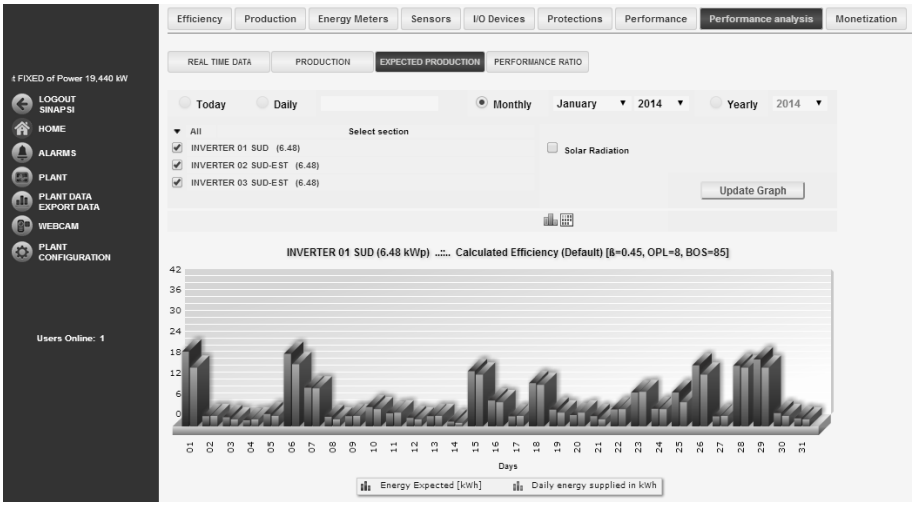


Figure174 – Chart expected production, Monthly

By clicking the button you will go to a tabular display, see Figure175

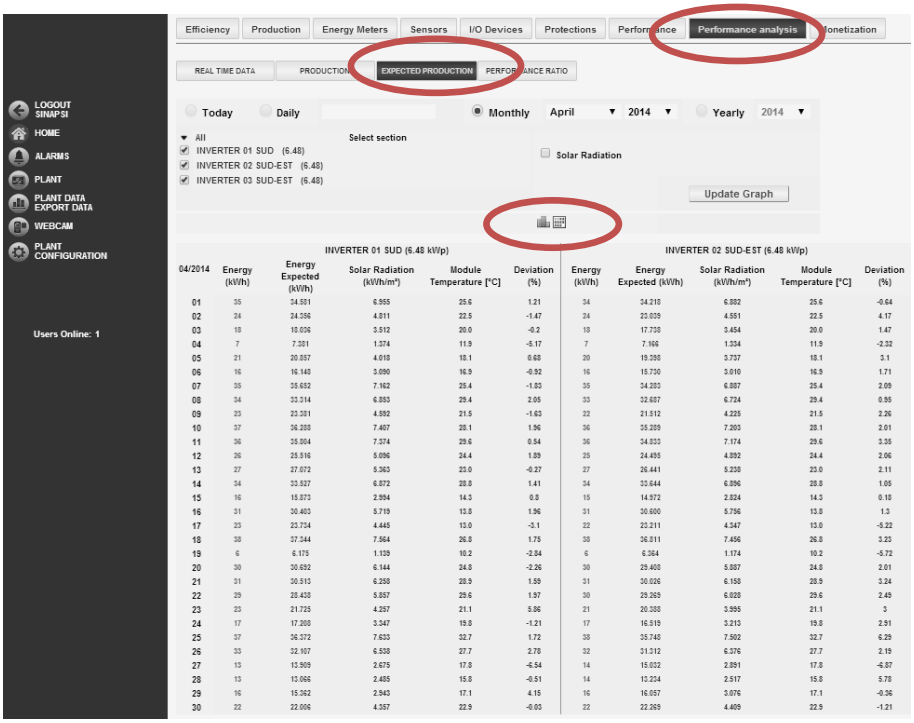


Figure175 – Table expected production

In *Performance Ratio* (See Ch 3.2.4) are presents (Figure176)

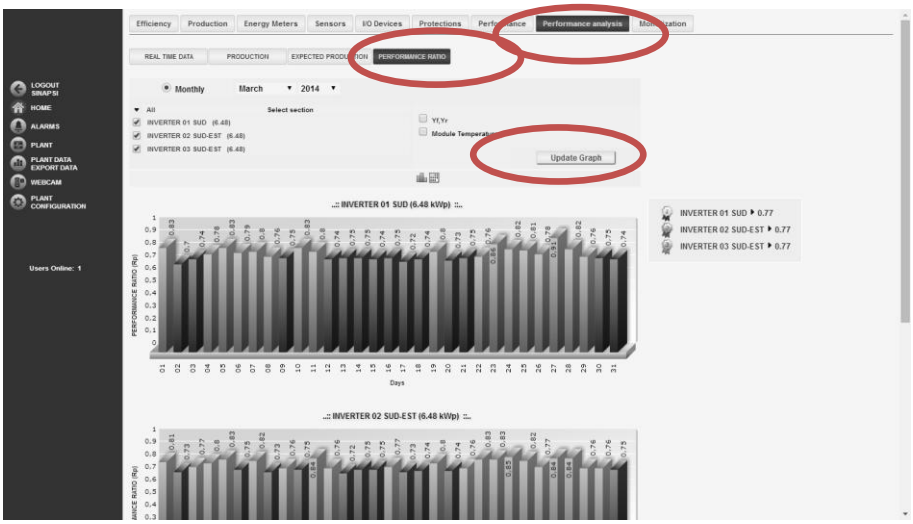


Figure176 – Chart Performance Ratio

In this section the display it's only monthly. The value of *Rp* is calculated according to CEI EN 61724. You can add in the graphical display the values of *Yf*, *Yr* and *module temperature*.
Also in this case it will switch to selecting a tabular display coke shown in Figure177.

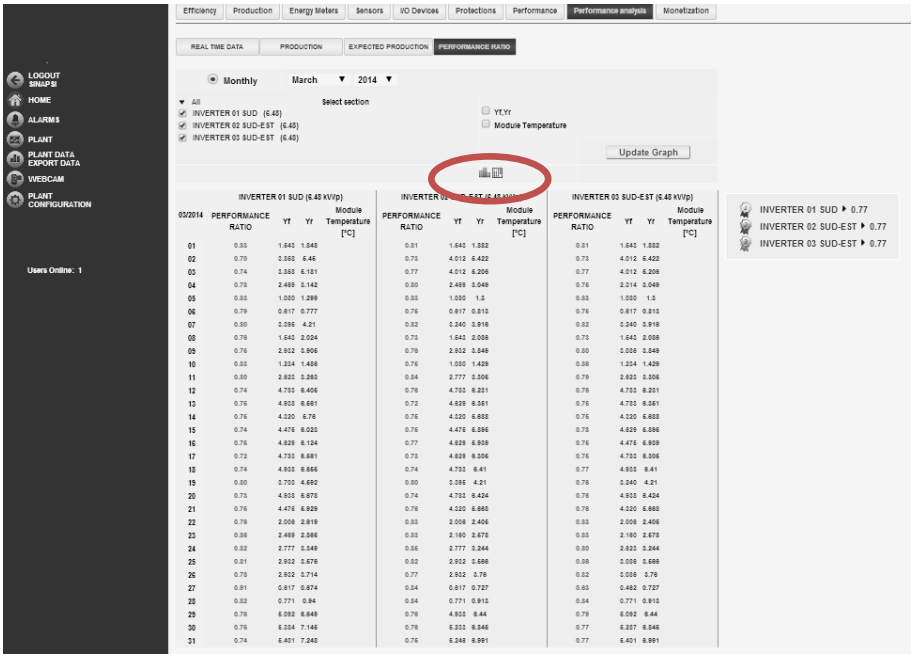


Figure177 – Table Performance Ratio

Display the value in the graph

Moving the mouse over the graph function shows a box that says: the type of magnitude, the reference date and the value expressed in the unit of measurement shown in the Y axis

Exporting data from the Chart

Clicking with the right button inside the chart to open the drop-down menu shown in Figure178

Figure178 - Exporting data from the Chart

Click with the left mouse button on Copy data to clipboard. Open any spreadsheet and paste the data.

Print the chart

Click with the left mouse button on the "Print Chart"; select the printer and press the *Print* button.

6.13 MONETIZATION

Selecting *Monetization* you can read the economic data related to the system (Figure179)

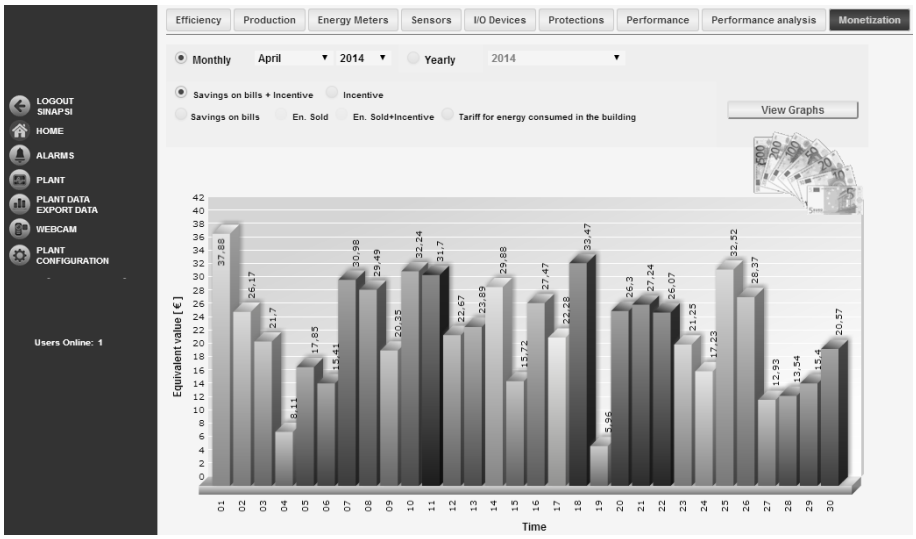


Figure179 – Economic value

It's possible to select a representation

- • *Monthly* - displays the status of economic month selected (Figure179)
- • *Annual* - View the economic incentive for the selected year (Figure179)

The items displayed are:

- *Savnigs on bills + Incentive*
- *Incentive*
- *Savnigs on bills*
- *En. Sold*
- *En. Sold+Incentive*
- *Tariff for Energy consumed in the building*

7 PLANT DATA EXPORT DATA

Under *Plant Data Export Data* (Figure180).

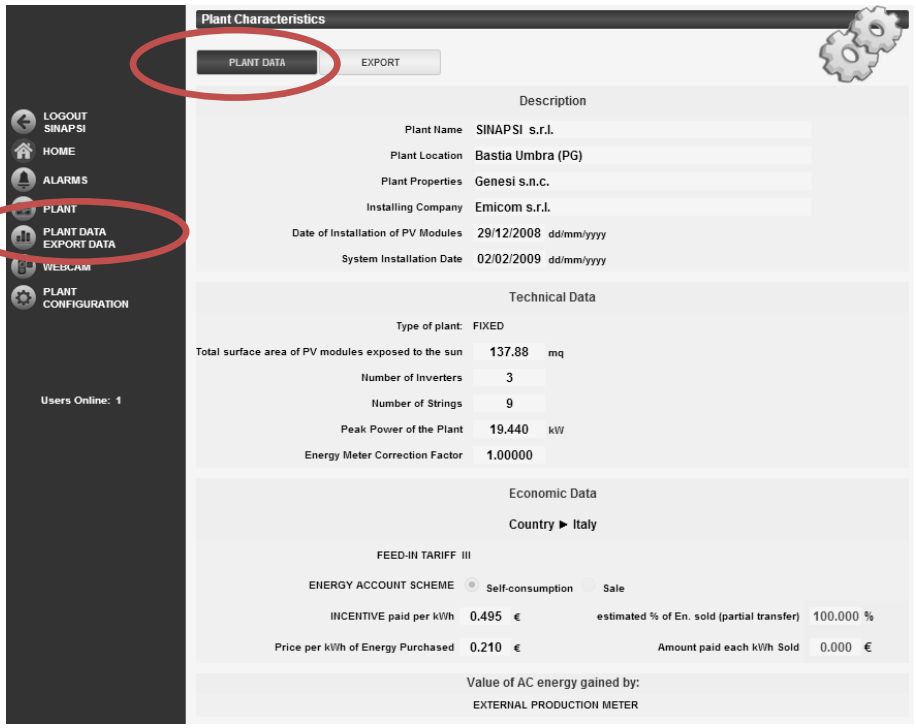


Figure180 – Plant Data

In the *Plant data* shows the data already entered in the *Plant Configuration* section.

Selecting *Export* will be able to select the type of data to be exported in a period of interest in xls formatted, unformatted xls, csv and txt (Figure181). The timing of the eSolar for the export the data depends on the connection type and the amount of data to be exported. If the two above conditions prove to be critical it is recommended to export the data with the smaller time size.

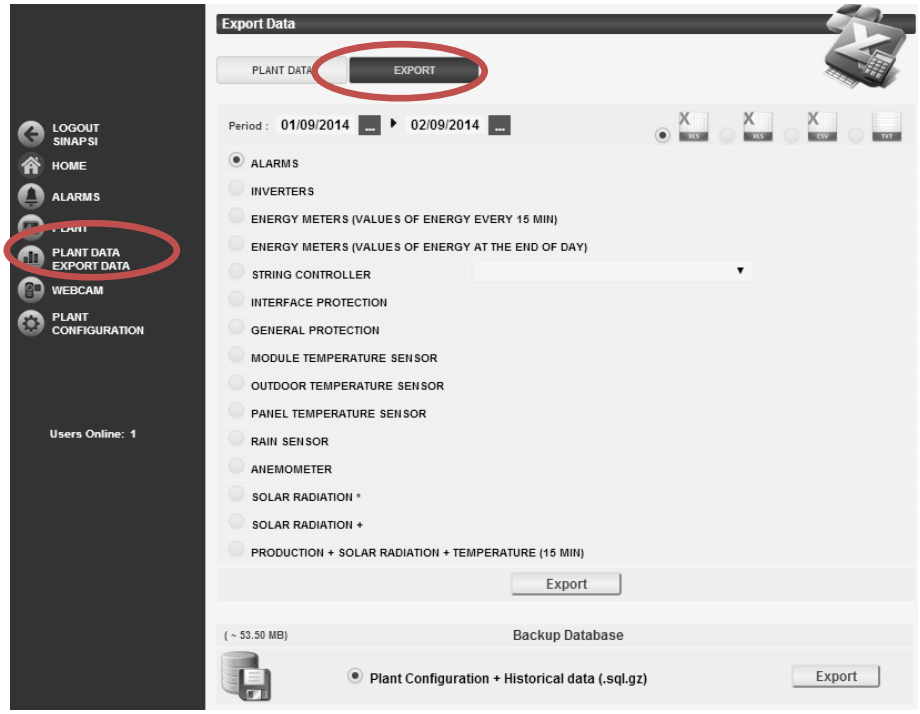


Figure181 – Export Data

To follow an example of exporting the *Module Temperature Sensor*. Chose the item of interest and the period of export and press the *Export* button. A window as shown in Figure182 will be opened

Figure182 - Opening / Saving the File Export

The file can be opened directly in xls format or saved to a location on your PC.

At the bottom of the page there is an icon for the backup of the database, where you can download the *configuration of the system* plus the *Historical Data*.

Selecting the backup of both entries the system will produce a rar file saved directly to a location on your PC, as shown in Figure183

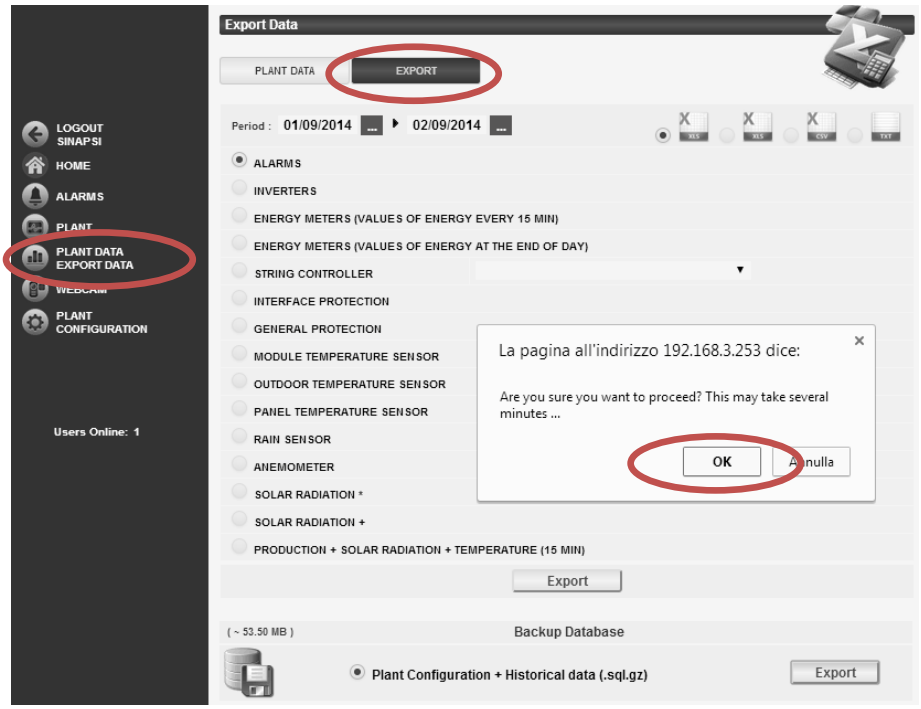


Figure183 – Backup

The decompressed file will contain a .sql file format and can be handled by Specialized technical

8 WEBCAM

Here will be displayed the webcam previously configured in *Configuration Plant ->Webcam*.

The type of display may be just the individual webcam (Figure184) or type Mosaic, where they can be displayed at a time up to a maximum of four webcam (Figure185).

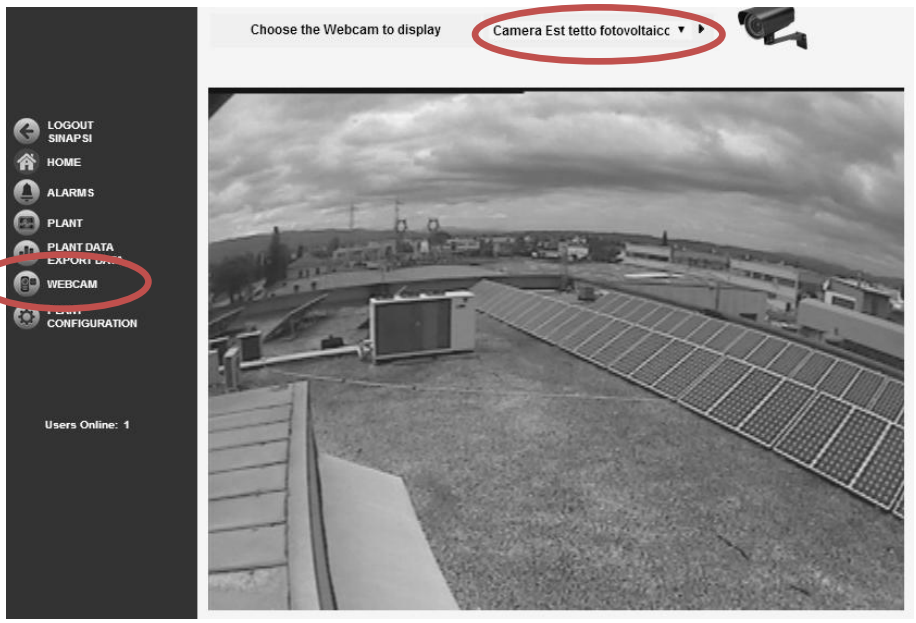


Figure184 - Display single video webcam

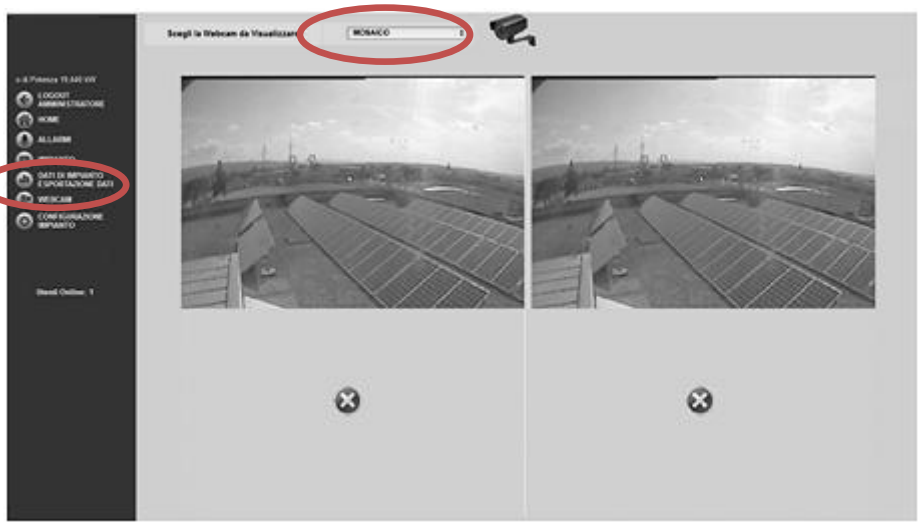


Figure185 - Display mosaic video webcam

We suggest you to install IP video management devices (IP Cam, DVR video server) that provide video streams cleaned of any frame or side menu management so you can get directly through its IP address exclusively the video.

9 EXTERNAL MONITOR

This section opens a summary page of the eSolar without headers and customized with logos and headers included and specifically defined in *Configuration Plant -> Customizations* (Ch. 3.12). This page (Figure186) is typically used as a monitor to be prepared in a demonstration of supervision to the public.

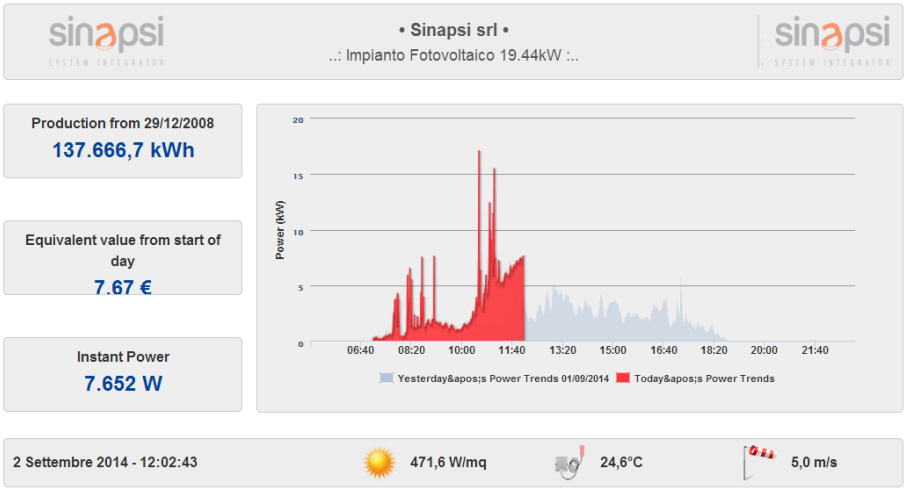


Figure186 – External monitor

The page of the External Monitor, dynamics, shows the real-time data of the current production system and the daily energy production in the current month. The two information cyclically rotate in the middle graph.

Display the value in the graph

Moving the mouse over the graph function shows a box that says: the type of magnitude, the reference date and the value expressed in the unit of measurement shown in the Y axis

Exporting data from the Chart

Clicking with the right button inside the chart to open the drop-down menu shown in **Errore. L'origine riferimento non è stata trovata.**.

Figure187 - Exporting data from the Chart

Click with the left mouse button on Copy data to clipboard. Open any spreadsheet and paste the data.

Print the chart

Click with the left mouse button on the "Print Chart"; select the printer and press the *Print* button.

The page of the external monitor uses Java technology for the correct display on iOS devices

10 APP

For each device eSolar it's possible to download an APP for mobile systems for a summary display system.
The APP can be accessed directly from the browser of your mobile system and downloadable like APP for iOS systems. The application is accessible from http: eSolar // IP / Mobile.
For example, if the address of your eSolar is http://31.185.23.20 to access the section APP simply type http://31.185.23.20/mobile directly from the browser Safari.

It will open a page as shown

Figure188 - Steps to download APP

Press on the dialog box to download the application in your iPhone and select Add to Home Screen. This operations will be automatically download the APP in your phone. The APP is recognizable by the symbol

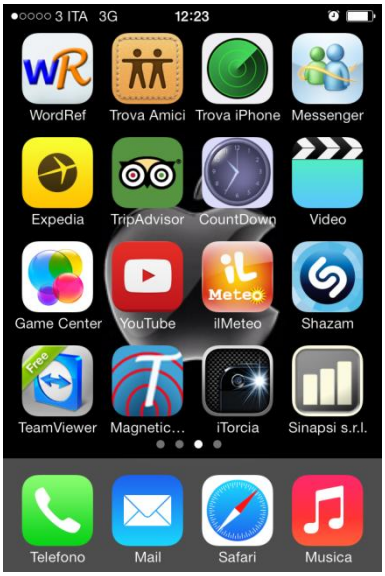


Figure189 - App

Selecting the icon will open a page

Figure190 – APP Access

Insert row in *eSolar PIN login* the password AAAA.

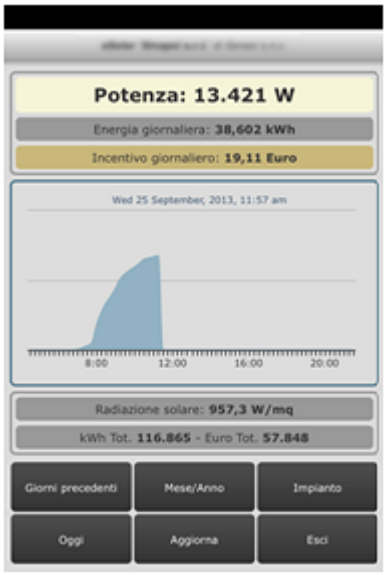


Figure191 – APP

The main features of the APP:

- • *Days*: show up three days earlier than the current date (Figure191)
- • *Month / Year*: shows the trend of the current month and year (Figure192)
- • *System*: show basic information of the system (Figure192)
- • *Today*: displays the daily trend (Figure192)
- • *Refresh*: Updates the data to the last quarter of an hour
- • *Exit*: exit the application

Figure192 – Days earlier, Month / Year, Hi

11 APPENDIX A – ELECTRICAL SCHEME

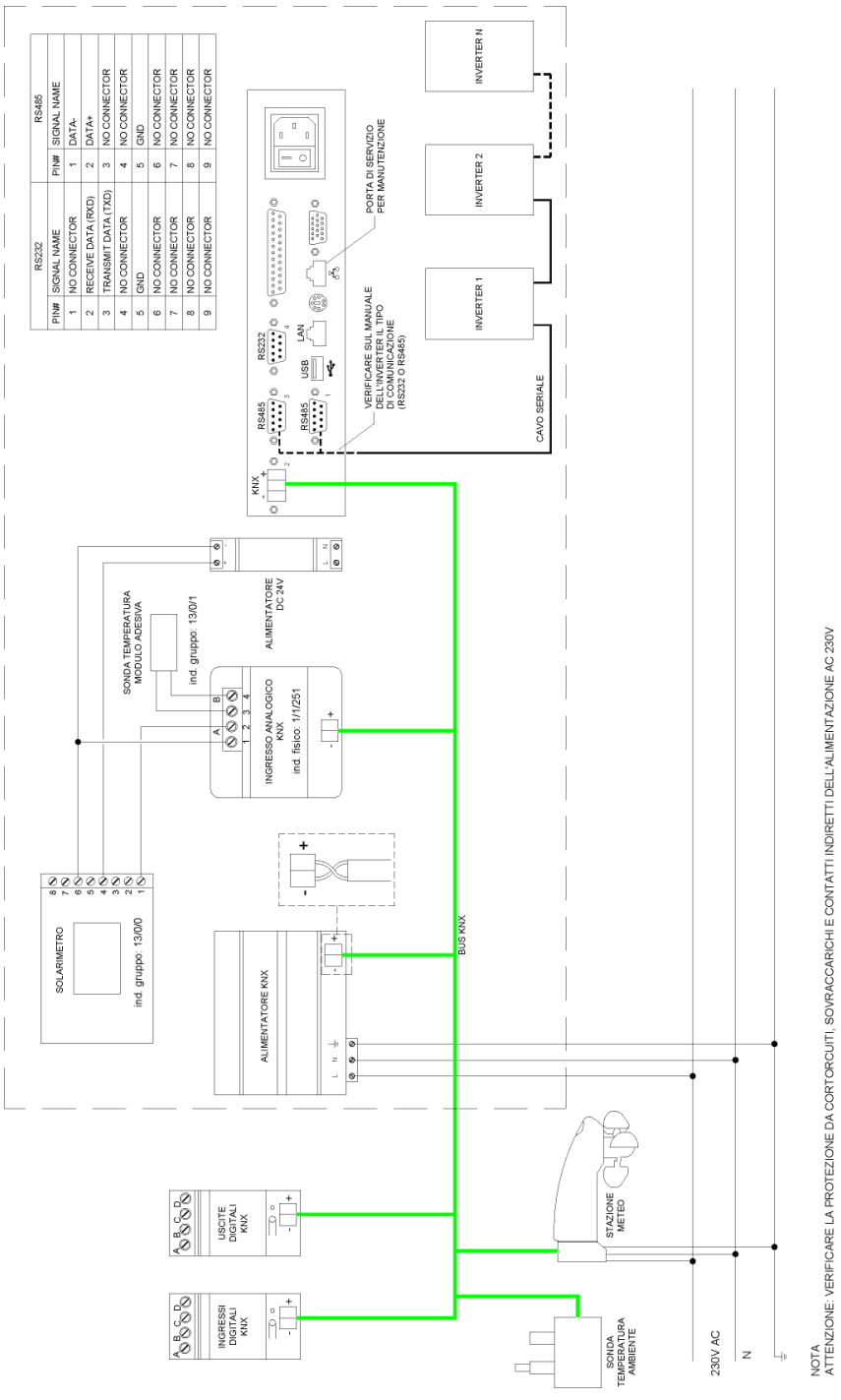


Figure 193 - ESolar - Bus KNX connection layout

12 APPENDIX B– LCD CONNECTION SCHEME

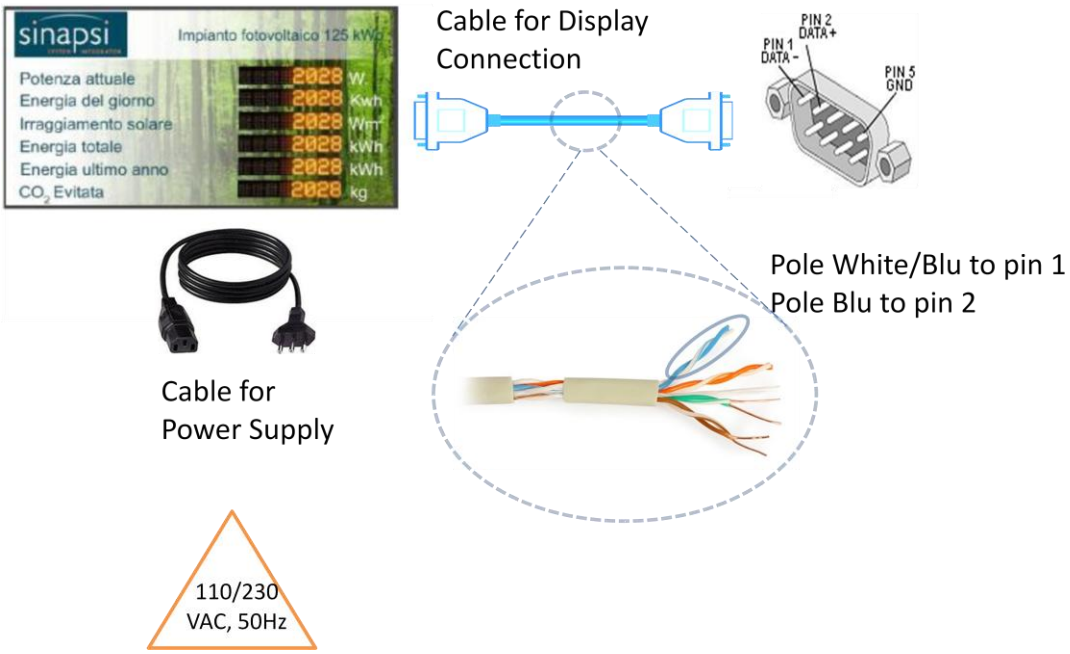


Figure 194 - Display Connection SIN.EXT.LED3, SIN.EXT.LED6

13 APPENDIX C – IP PC ADDRESS

13.1 WINDOWS XP

Select *Start*, *Setting* and choose *Control Panel*; see Figure 195

In *Control Panel* select *Network Connections* Figure 196

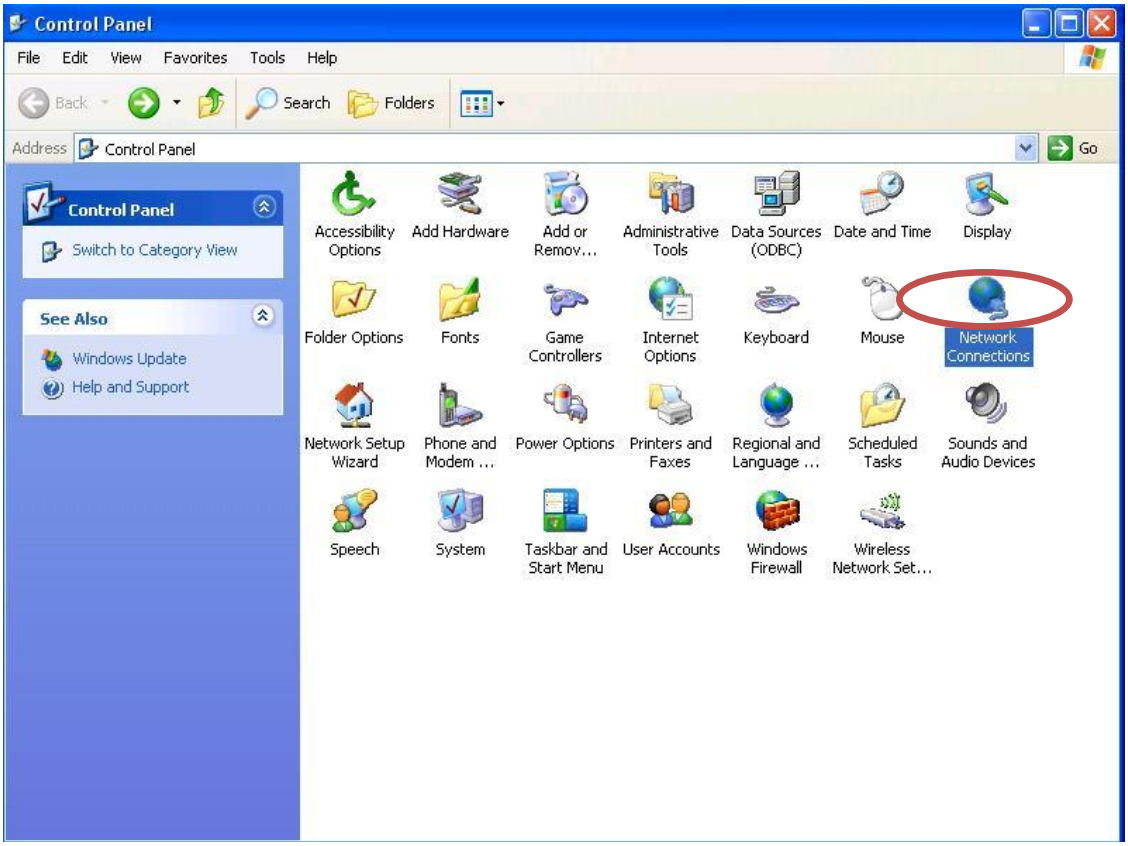


Figure 195 - Network Connections

In *Local Area Connection* (LAN), select *Properties*.

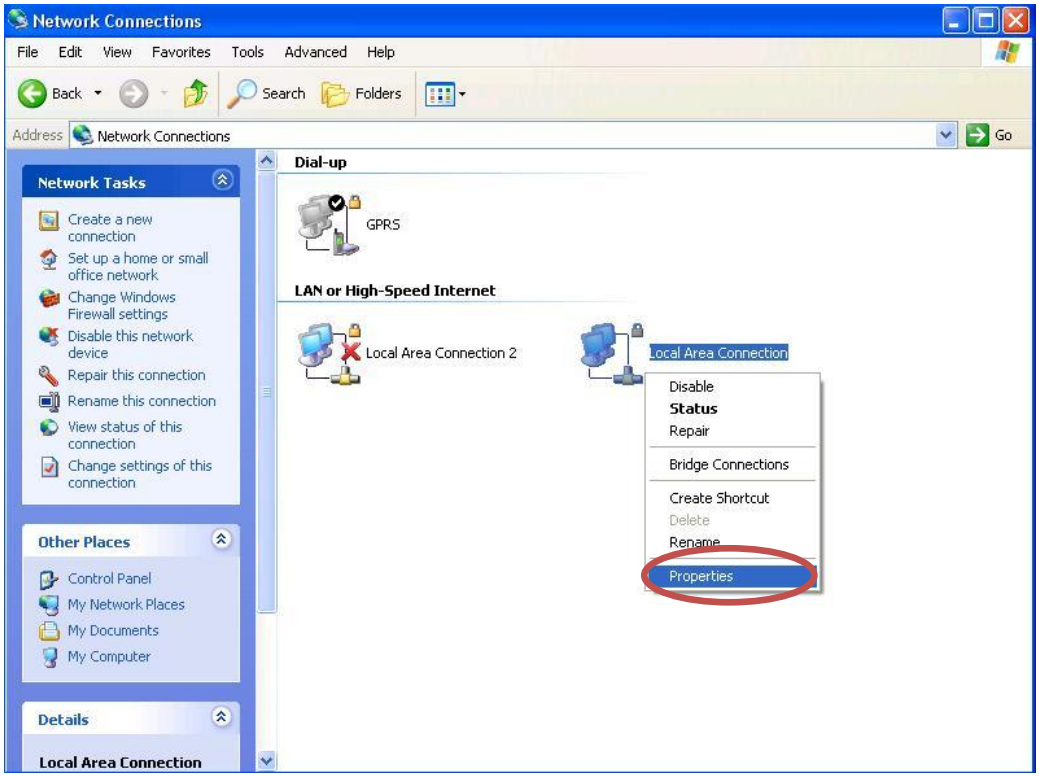


Figure 196 - Local Area Connection (LAN) - Properties

In the field ***IP Address*** insert the IP address which you want to assign in the net Figure 197.

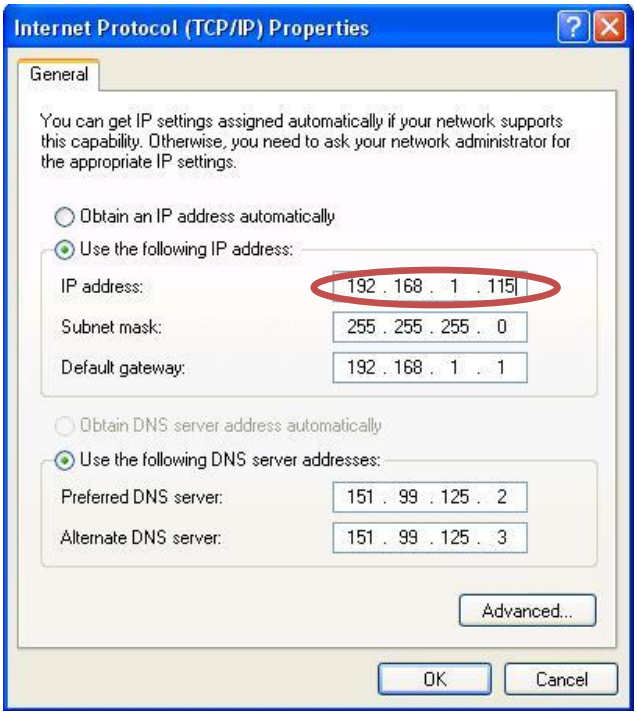


Figure 197 - IP Address

In the specific case, see Figure 198, we are changing the IP address from 192.168.1.115 to 192.168.1.111.

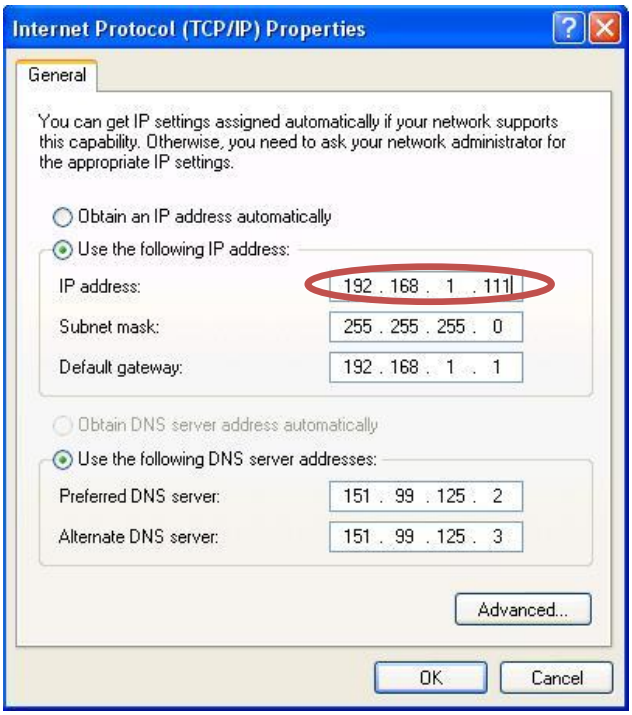


Figure 198 - IP Address

Push *OK* for confirmation.

13.2 WINDOWS SEVEN

Select *Start* and *Control Panel*.

In *Control Panel* select *Network Connection* Figure 199

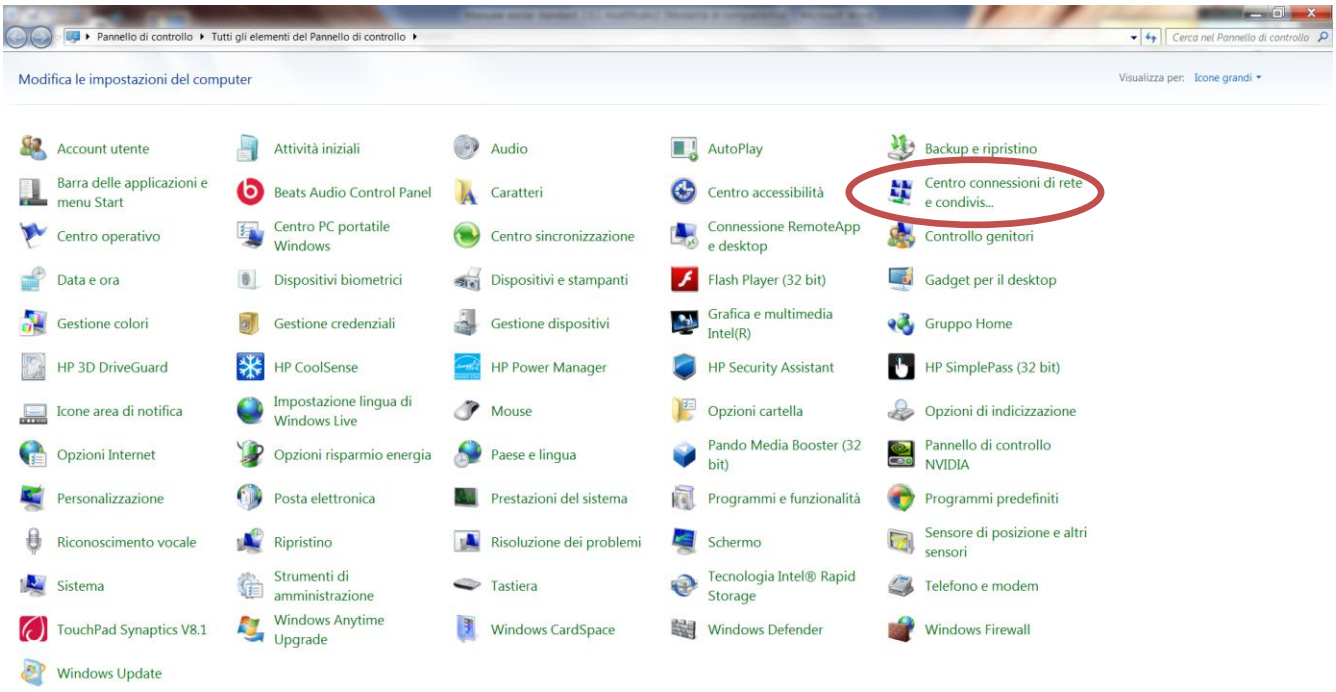


Figure 199 – Centro connessioni di rete

In *Local Area Connection* (LAN), select *Properties*; see Figure 200.

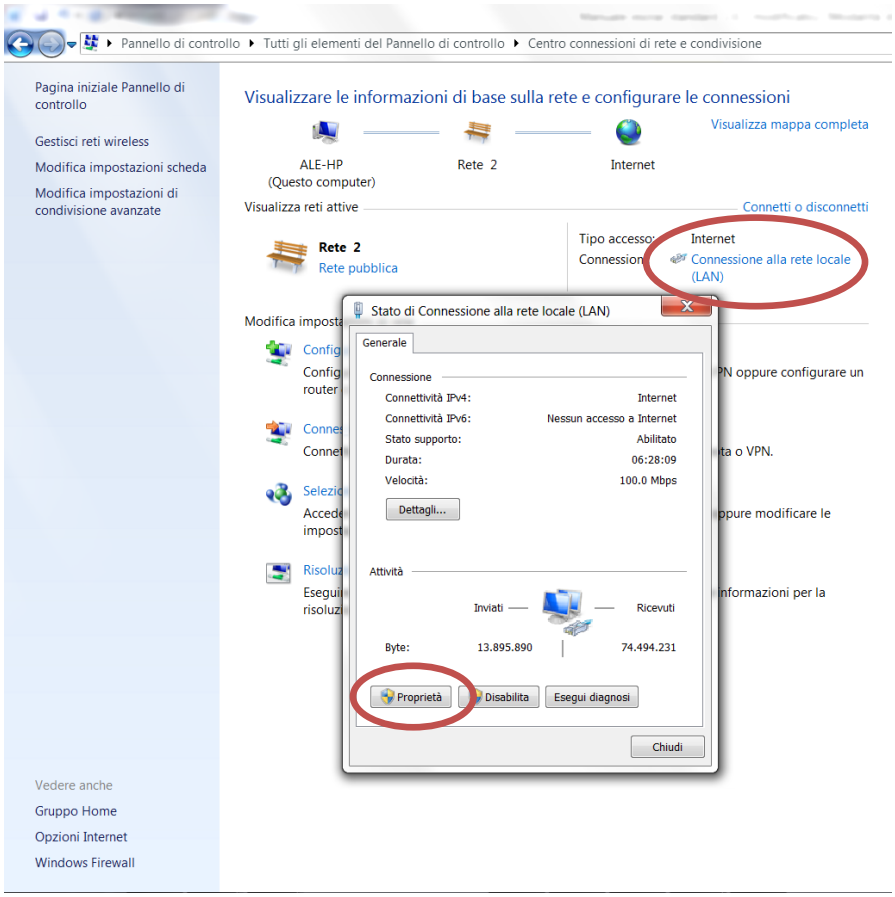


Figure 200 – Connessione rete locale (LAN)

In Local *Net Connection* select Internet *Protocol Version 4* eg Figure 201.

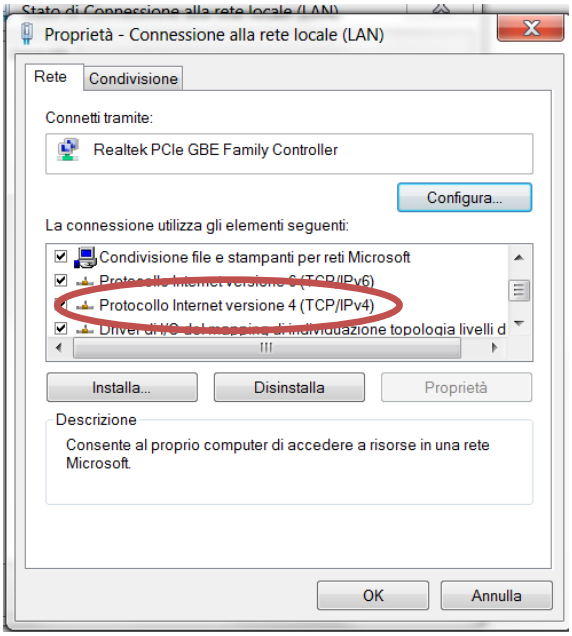


Figure 201 - Connessione rete locale

In the field *IP Address* insert the IP address which you want to assign in the net Figure 202

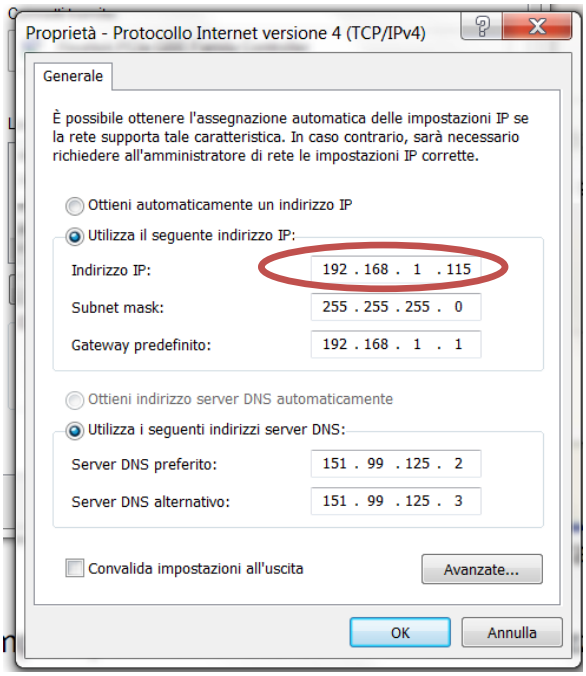


Figure 202 – Indirizzo IP

In the specific case, see Figure 203, we are changing the IP address from 192.168.1.115 to 192.168.1.111.

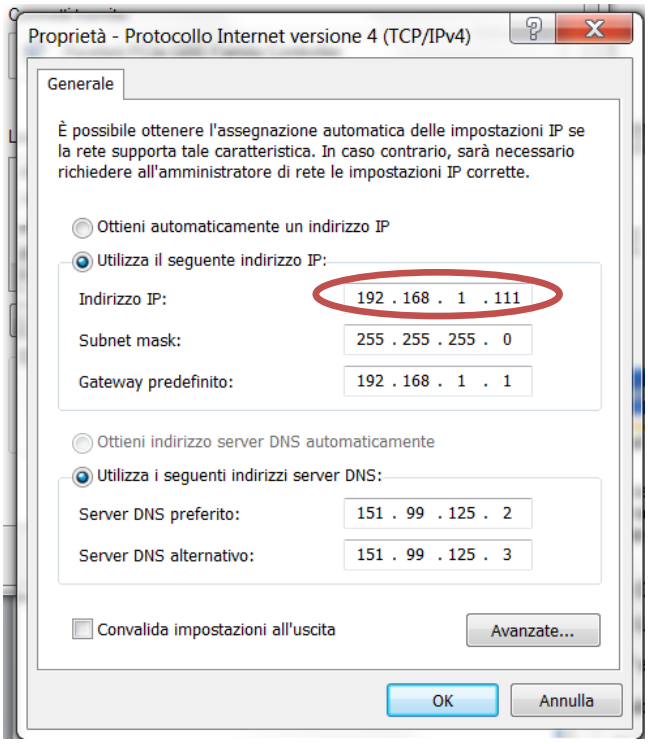


Figure 203 – Indirizzo IP

Push *OK* for confirmation.

14 APPENDIX D– CONNECTION MODULE

Connections allowed

- Use COM4 – RS232 for connect GSM, **SIN.MODEMGPRS**
- Use ETHERNET with the PC logo for configuration/diagnostic of the eSolar. The IP address is 192.168.1.100
- Use ETHERNET without the PC logo for connect **SIN.ROUTER**
- Use COM1 or COM3 for connect INVERTER, ENERGY METERR, STRING CONTROLLER on the plant using RS 485
- Use KNX 2 for connect a KNX bus

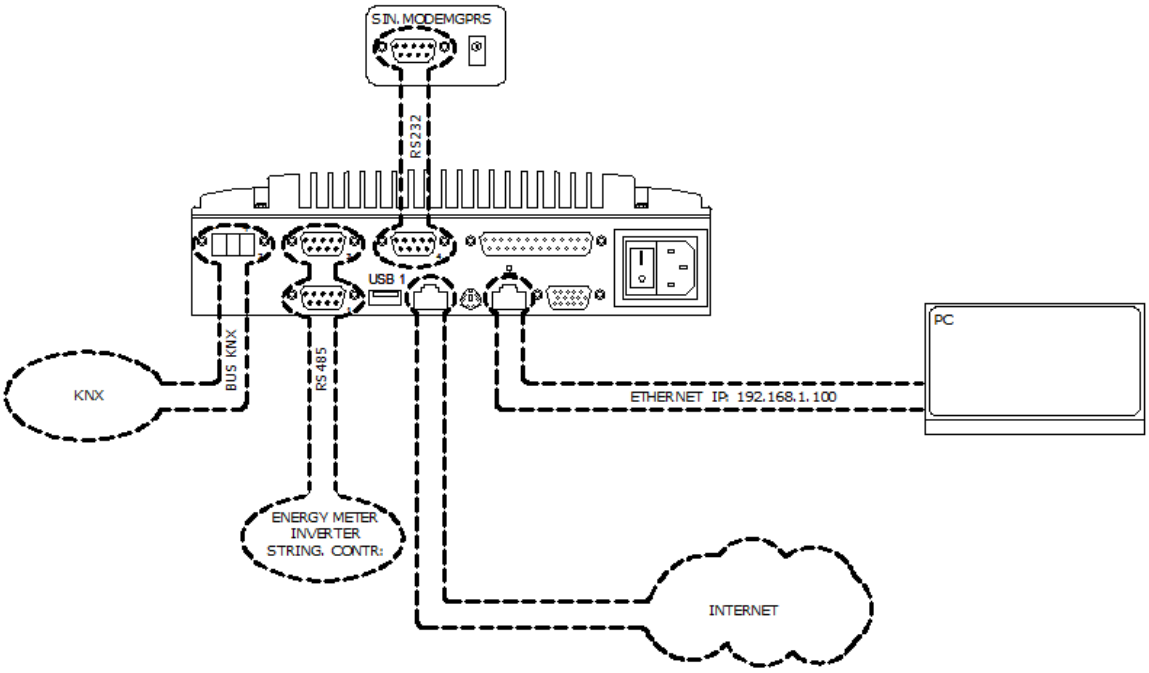


Figura 204 – Connection of modules

15 APPENDIX E – DEVICES CONNECTION

We suggest ***DO NOT exceed a length of 500m for the communication bus RS-485 and DO NOT exceed a length of 3 m for the communications line RS-232***. Don't make star connections or loops. We recommend the use a cable 2x2x0, 22mmq, twisted and shielded. ***Never connect the shield to the ground***.

Connect INVERTER, i ENERGY METER and STING CONTROLLER following Figure 205. Use only a parallel topology. Do not create nodes

- Positive pole D+ to pin 2 of the eSolar
- Negative pole D- to pin 1 of the eSolar
- GND to pin 5 of the eSolar

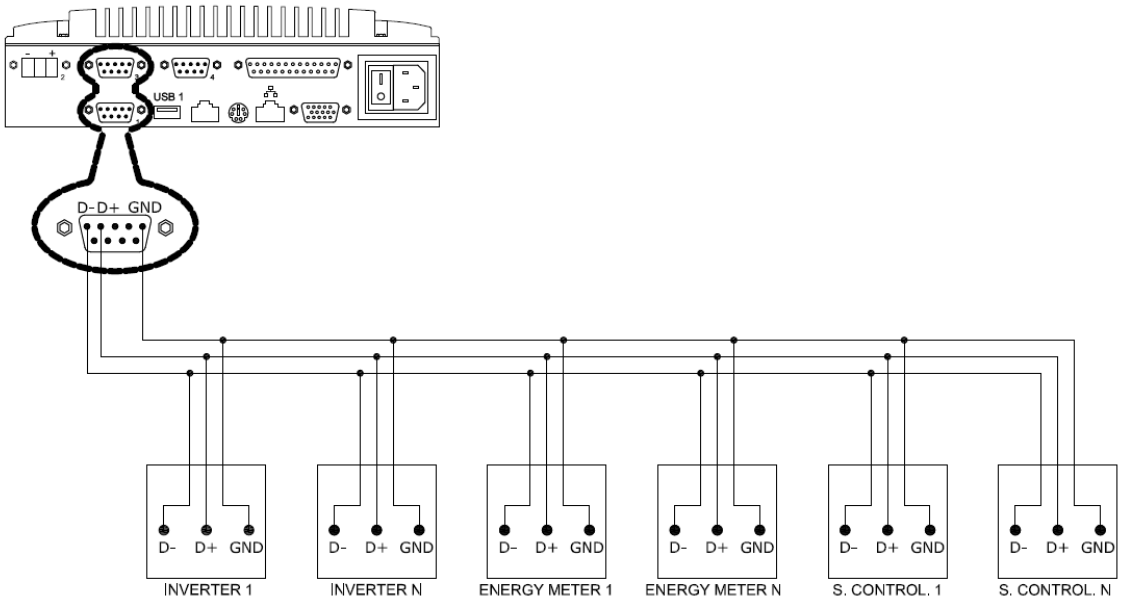


Figure 205 - Wiring diagram for INVERTER, ENERGY METERS, STRING CONTROLLER

Use a DB female connector for or a RS485 adapter **SIN.RS485ADAPT** for wiring the device to eSolar. See next chapter.

To make wiring from devices to the controller use a DSUB9P female connector or a connector **SIN.RS485ADAPT**. See next chapter.

16 APPENDIX F – CHOOSING A CONNECTOR

Is Possible to use two types of connectors for wiring in input to eSolar. See the figure below

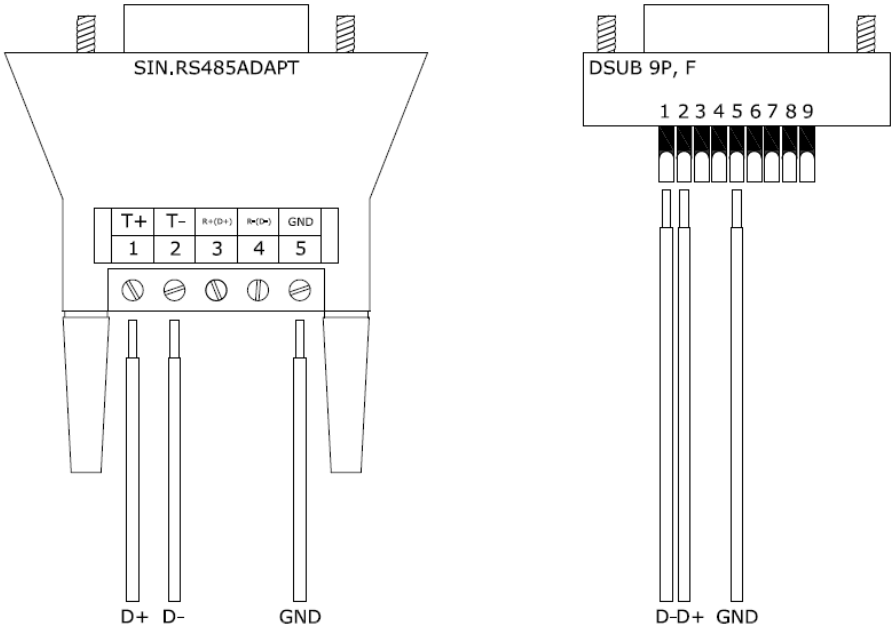


Figure 206 – Wiring

POLI WEB CONTROLLER	*PORTA SIN.RS485ADAPT*	*PORTA DSUB 9P, F*
Positive pole D+	Clamp 1 (T+)	Solder/Crimp Clamp 2
Negative pole D-	Clamp 2 (T-)	Solder/Crimp Clamp 1
GND	Clamp 5 (GND)	Solder/Crimp Clamp 5

17 APPENIX G–RS485 NET

For the correct wiring of the RS485 net

- DO NOT use different types of cable, but always and only the same type of cable
- The cable network is traversed by signals with voltage SELV (Safety Extra Low Voltage) and should not be cabled in close proximity to dangerous voltage cables, such as 230/110VAC or carrying high currents
- Wire the cable as relaxed as possible, avoiding bending and twisting greater than the limits given in the datasheet of the cable
- Do not twist the cable around the power conductors, and if you must go through a power cable to provide an intersection of 90°
- Avoid higher voltages provided in the datasheet of the cable
- Do not try to reverse polarity
- Mark the start and end terminations and lengths to avoid open clips
- Always check the electrical continuity between nodes of the network as shown in Figure 207

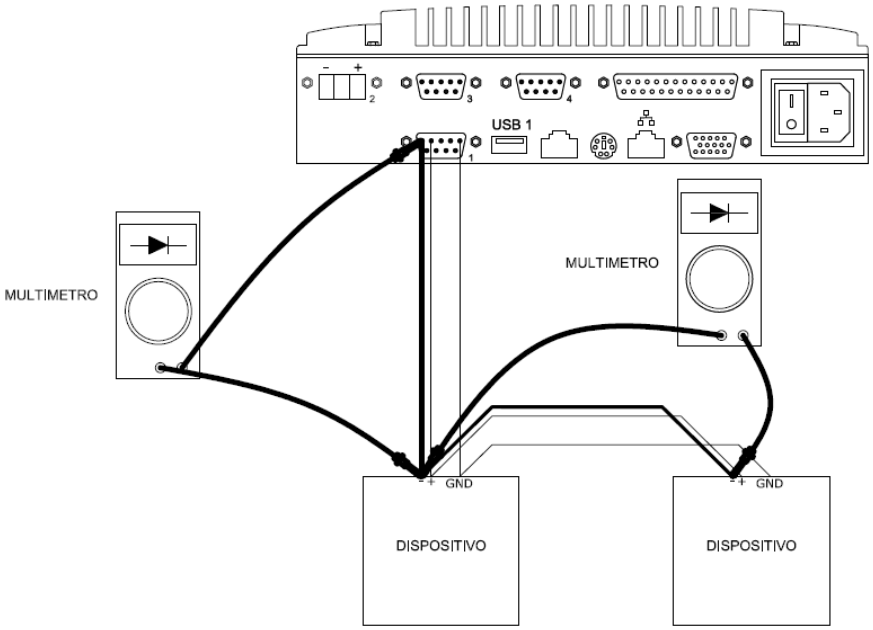


Figure 207 - Electrical continuity

- Terminate with resistors 100-120Ω. The eSolar is already termined, check the fastener line downstream

We recommend using a cable with the following properties

- AWG 20/22 tripole
- Characteristic impedance of 120 Ω
- Multi-stranded copper conductors and twisted
- Presence of braided insulated shielding

Following these rules the RS485 network can provide benefits as Figure 208

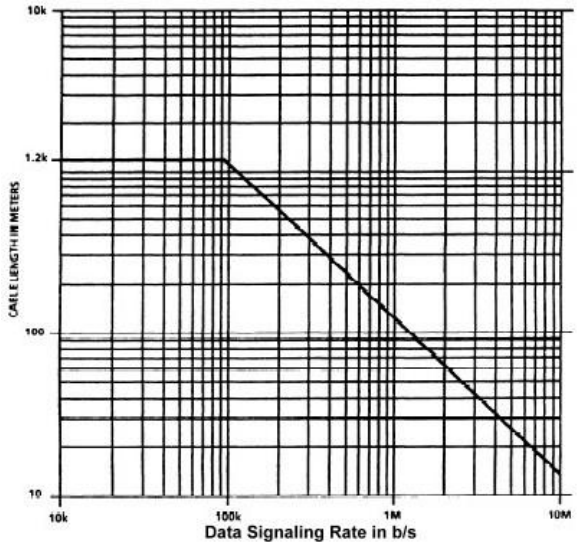


Figure 208 - Lenght VS Signal Rate

Nevertheless in plants with the inverter the signal 485 is disturbed by interference. For this reason it is often advisable to install one or more modules 485 Repeater **SIN.I7510A**.

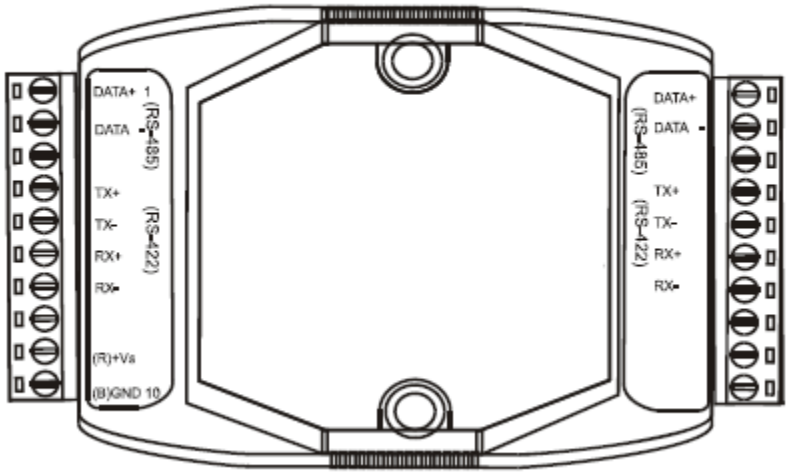


Figure 209 - Repeater **SIN.I7510A**

One **SIN.I7510A** o more **SIN.I7510A** can be inserted along the line 485, according to the losses reported in the same line. The topology for the wiring of a serial repeater, as shown in
Figure **210**

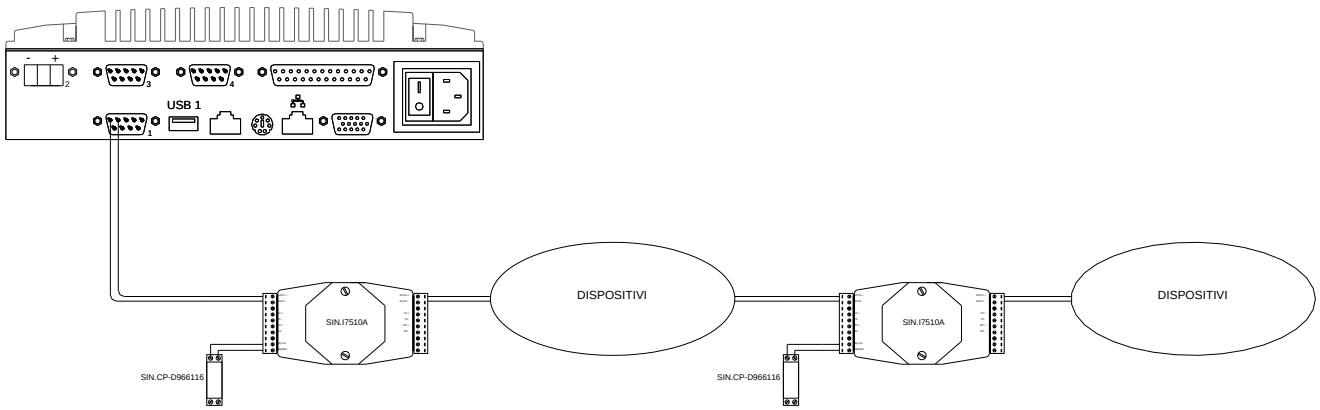


Figure 210 - Using SIN.I7510A

In Figure 211 a wiring zoom for **SIN.I7510A** with power supply at 24VDC **SIN.CP-D366116**

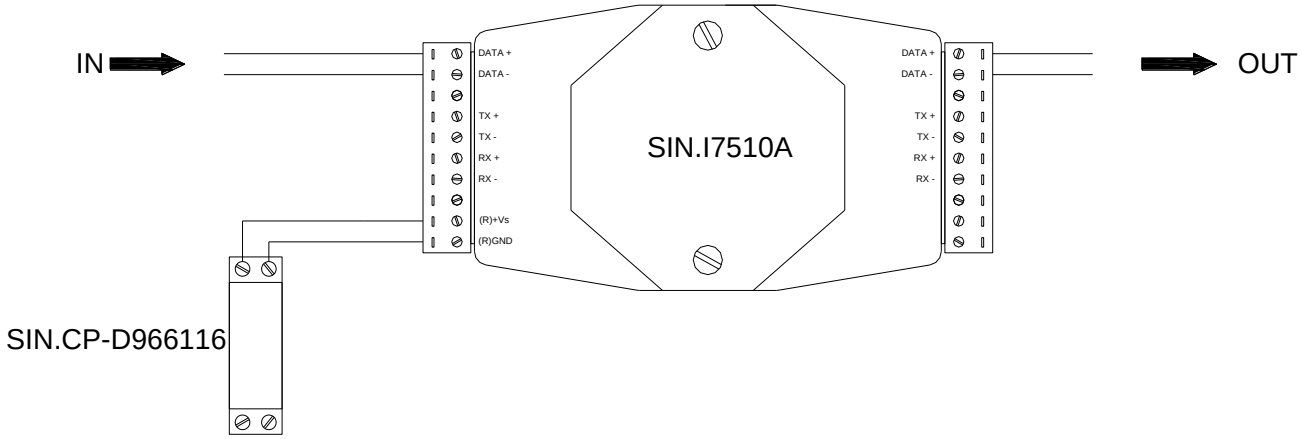
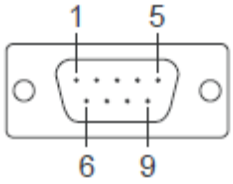


Figure 211 - Wiring

18 APPENDIX H – CONFIGURATION OF RS48-TCP/IP NP5130

Is possible to use the adapter RS485-TCP/IP **SIN.NP5130**.

Lato Dispositivo/eSolar	Lato SIN.NP5130
Data +	Data + (pin 3)
Data -	Data - (pin 4)



To configure the module, follow these steps:

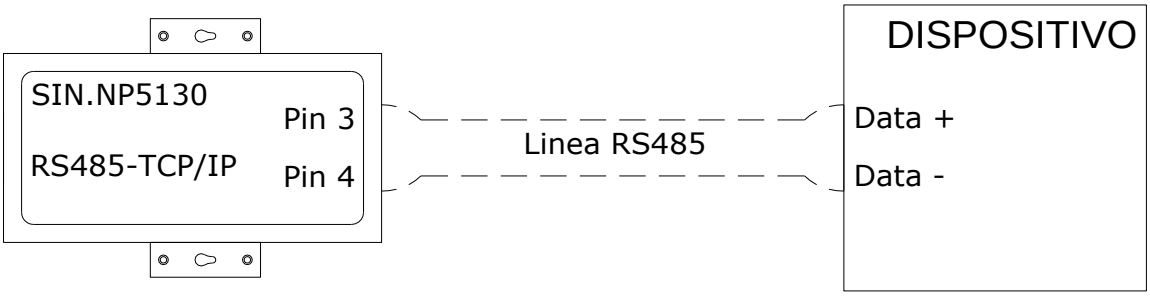


Figura 212 – Configurazione modulo

1. Power **SIN.NP5130**
2. Install the software on the CD packaging
3. open *Nport Administrator*

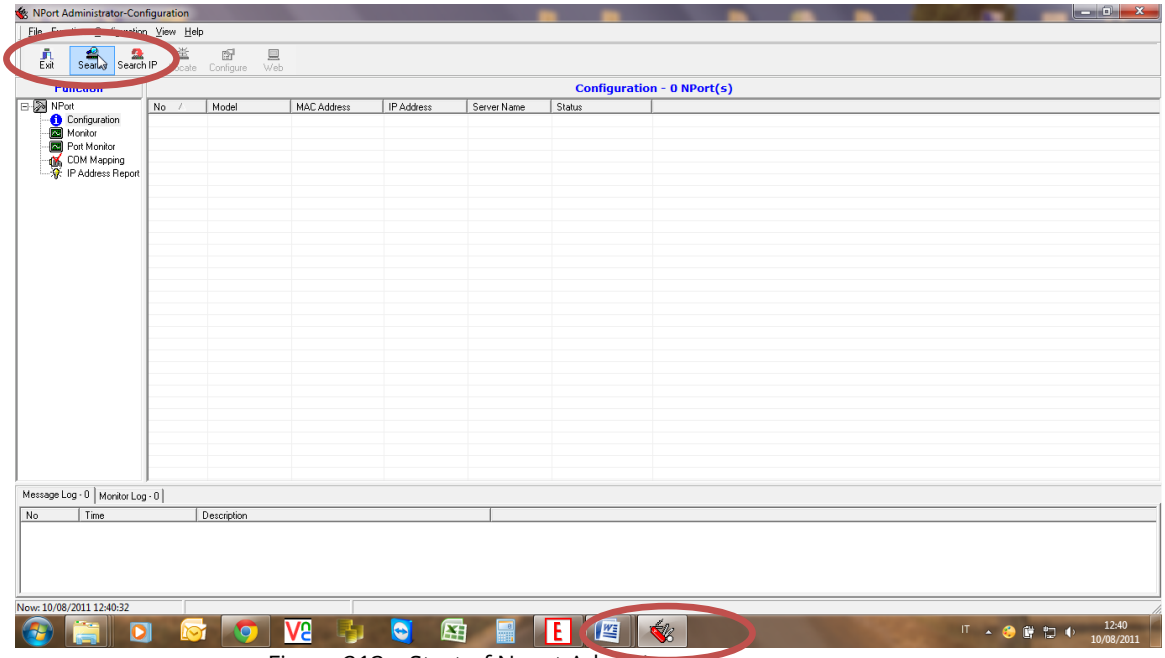


Figure 213 – Start of Nport Administrator

4. Press the *Search* button. A window with address of **SIN.NP5130** will appear. In this case it is 192.168.1.136

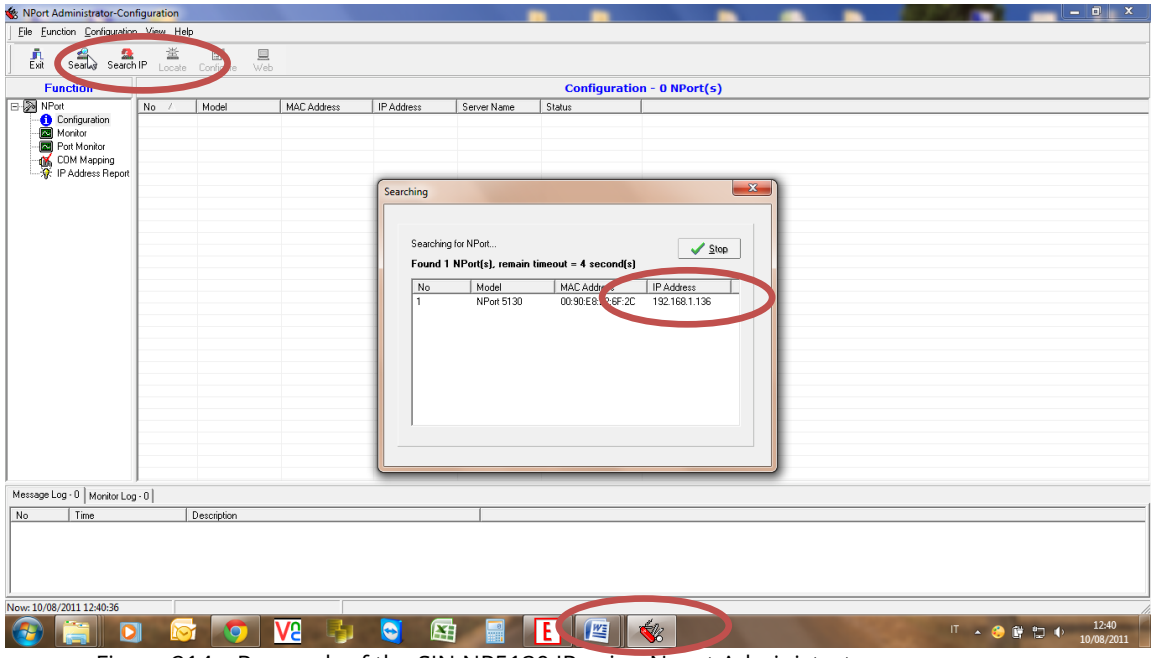


Figure 214 – Research of the SIN.NP5130 IP using Nport Administrator

5. Open a browser and type the address reported by the local program *NPort Administrator*. This will open the page to follow.

Figure 215 – Starting page of SIN.NP5130

6. Select *Network Settings*. Correctly set the rules of connection to the network, such as

- New IP address, if necessary, to assign to **SIN.NP5130**
- *Net Mask* of local net
- Gateway IP
- *IP configuration* on *Static*
- *SNMP* on state *Disabled*
- Push *Submit* for save the configuration
- If the IP address of **SIN.NP5130** is changed, type the new IP address assigned to point back to **SIN.NP5130**.

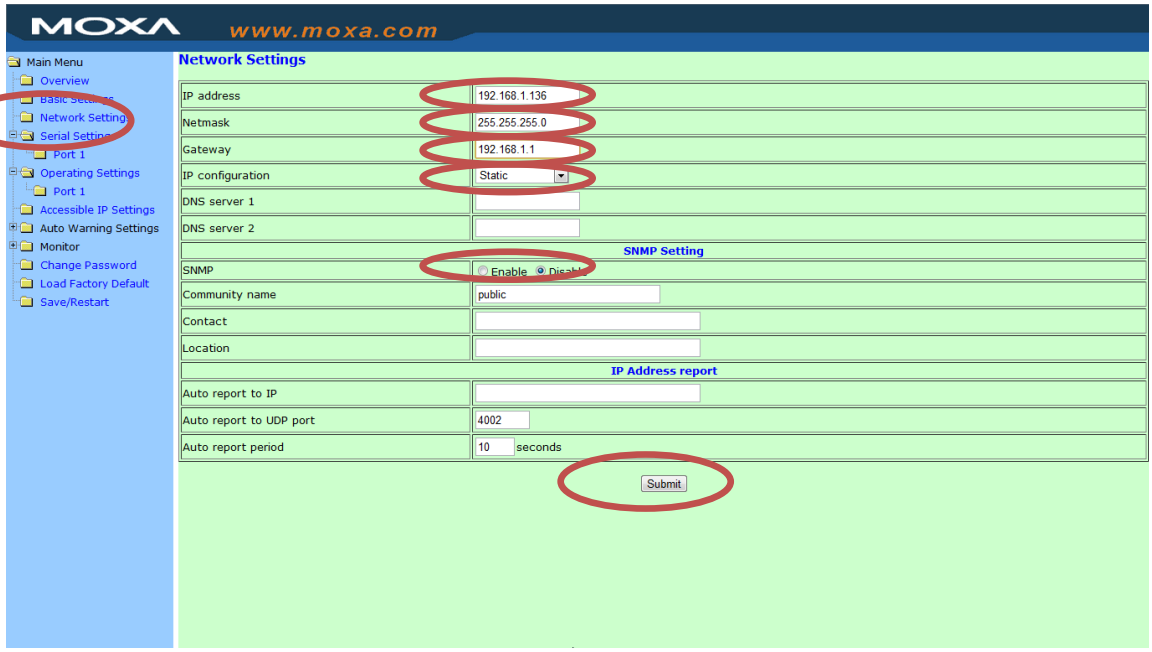


Figure 216 – Net configuration

7. Select *Serial Settings → Port 1*. Pull in

- Before you enter data for the RS 485 communication port make sure the data of the inverter. Each inverter model has a itself configuration for the data communication in port RS 485
- *Port alias* assign a port name
- *Baud rate*: insert if different from *9600*
- *Data bits*: insert if different from *1*
- *Stop bits*: insert if different from *None*
- *Parity*: insert if different from *None*
- *Flow control*: insert if different from *None*
- *FIFO*: leave *Enabled*
- *Interface*: leave RS-485 2-Wire
- Push *Submit* for saving configuration

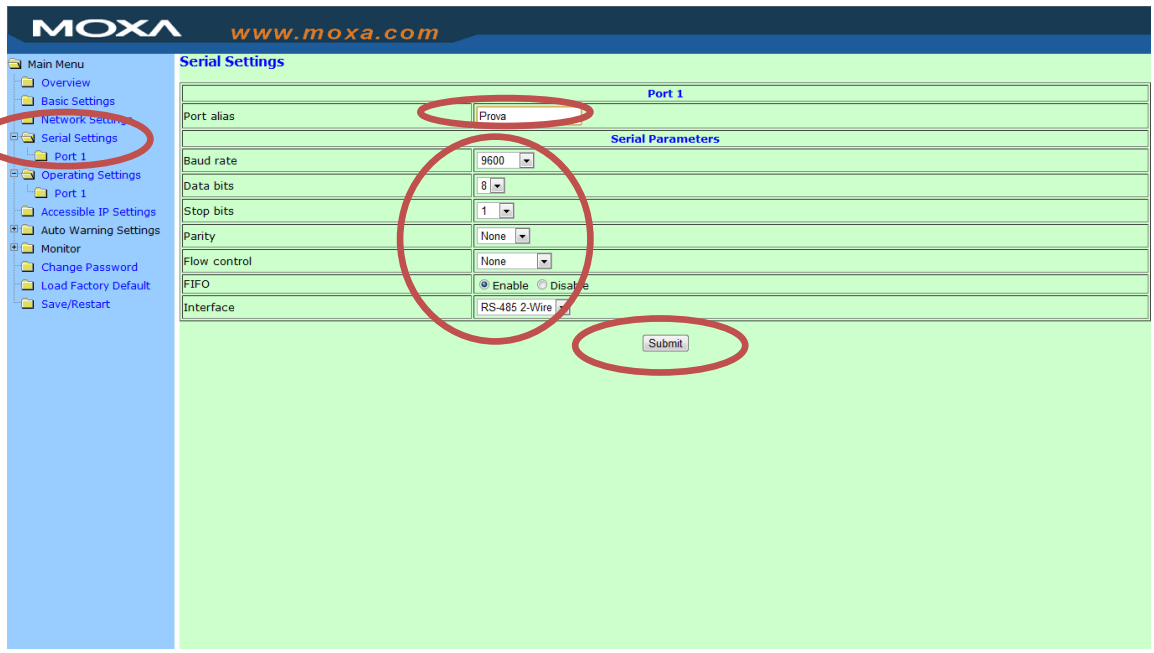
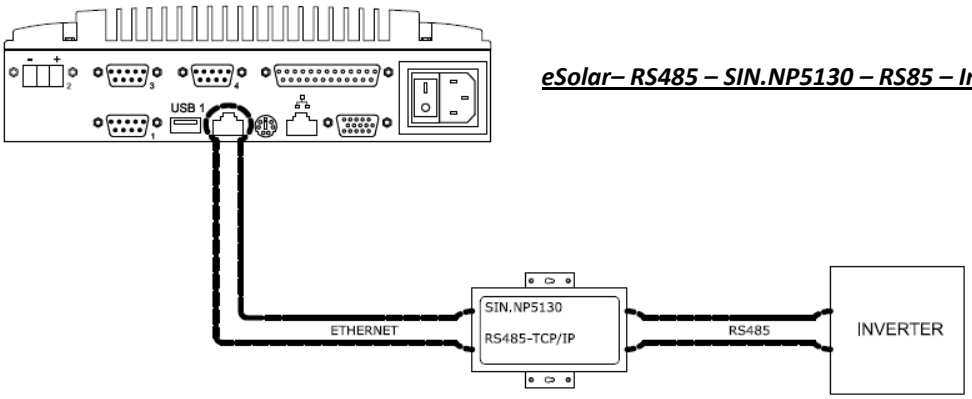


Figure 217 – Definitions of RS485 parameters

At this point choose the configuration to use of the module/modules **SIN.NP5130**. This product can be used for two different types of configuration

18.1 MODEL 1



eSolar– RS485 – SIN.NP5130 – RS85 – Inverter

Figure 218 – Model 1 for **SIN.NP5130**

One **SIN.NP5130** is required for this configuration**.** For complete the configuration follow the rule. Select *Operating Settings → Port 1*. Insert

- Select *TCP Server Mode*
- Not change *TCP alive check time*
- Not change *Inactivity time*
- Select *4* on *Max connection*
- Not change *Ignore jammed IP*
- Not change *Allow driver control*
- Not change *Packing lenght*
- Not change *Force transmit*
- Not change *Local TCP port*
- Not change *Command port*
- Push *Submit* for saving configuration

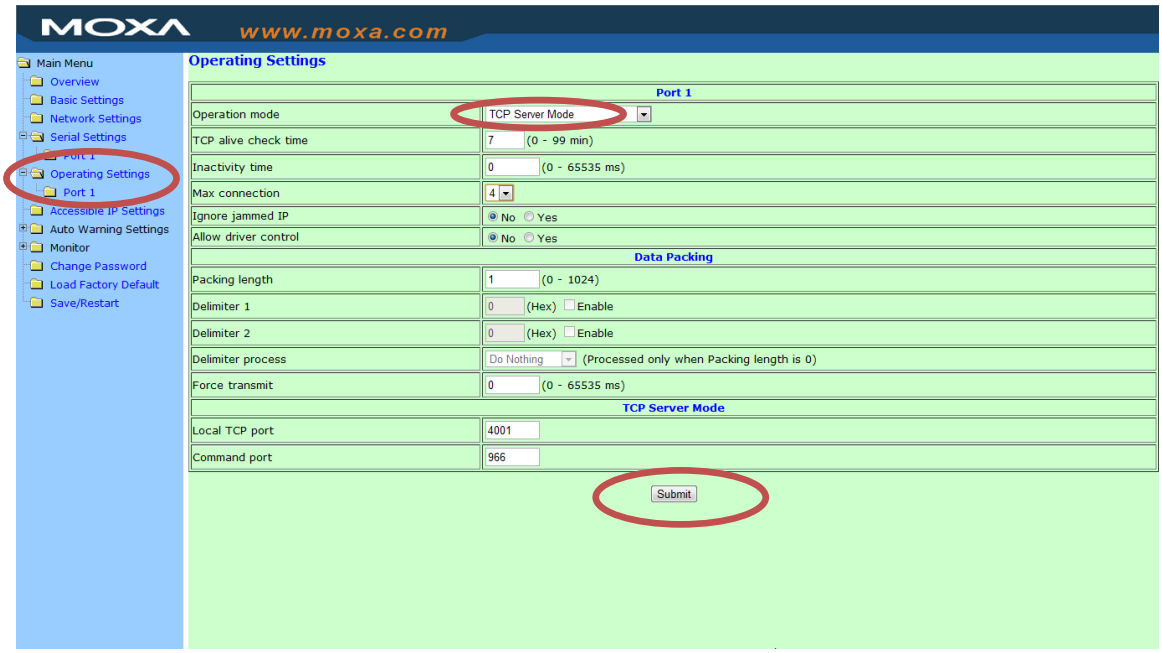
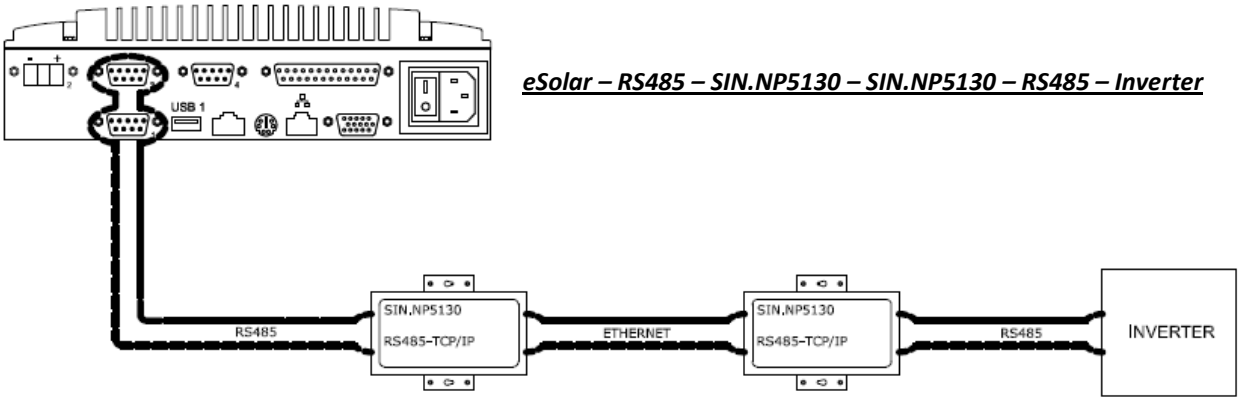


Figure 219 - Definition of parameters for SIN.NP5130 functionality of TCP server mode

18.2 MODEL 2



eSolar – RS485 – SIN.NP5130 – SIN.NP5130 – RS485 – Inverter

Figure 220 - Connection scheme with two **SIN.NP5130** modules

Two **SIN.NP5130** are required for this configuration. Both **SIN.NP5130** must be configured as explained previously 1-2-3-4-6-7. The only exception is associated with two different IP addresses, as explained in Section 5, one for MASTER and one for SLAVE for.

- 192.168.1.136 IP address for MASTER
- 192.168.1.137 IP address for SLAVE

To finish the MASTER configuration select *Operating Settings → Port 1*. Insert

- Select *Pair Connection Master Mode*
- Not change *TCP alive check time*
- Insert the SLAVE IP. For us 192.168.1.137. Not change 4001
- Push *Submit* for saving the configuration

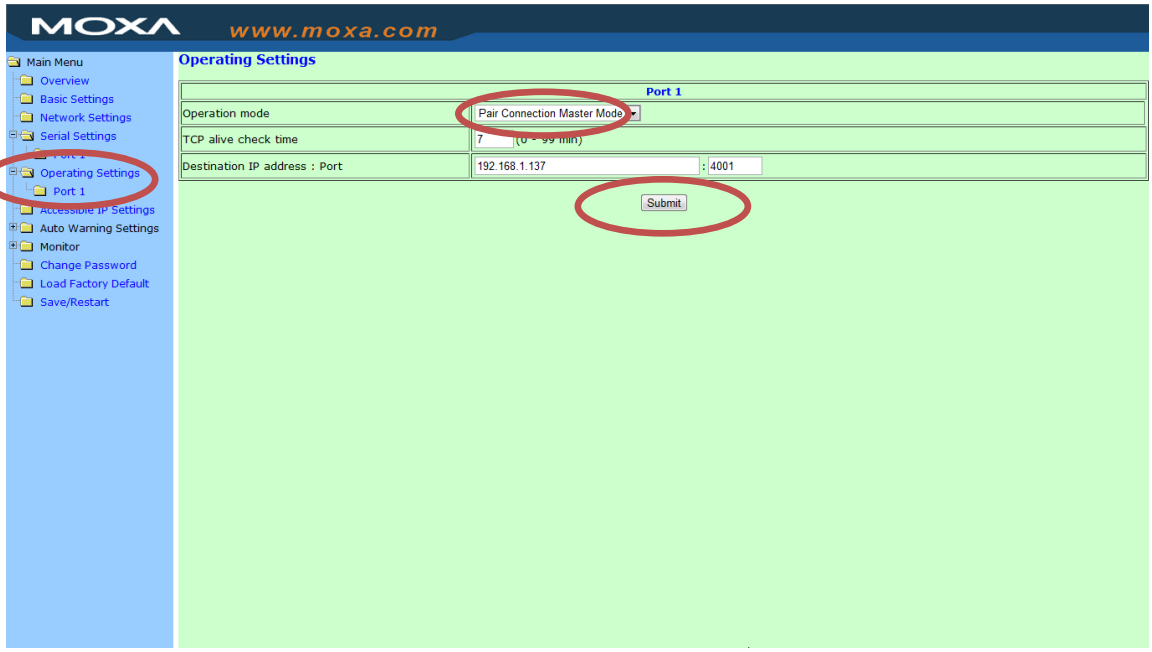


Figure 221 – MASTER configuration

To complete the SLAVE configuration select *Operating Settings → Port 1*. Insert

- Select *Pair Connection Slave Mode*
- Not change *TCP alive check time*
- Not change *Local TCP port*
- Push *Submit* for saving configuration

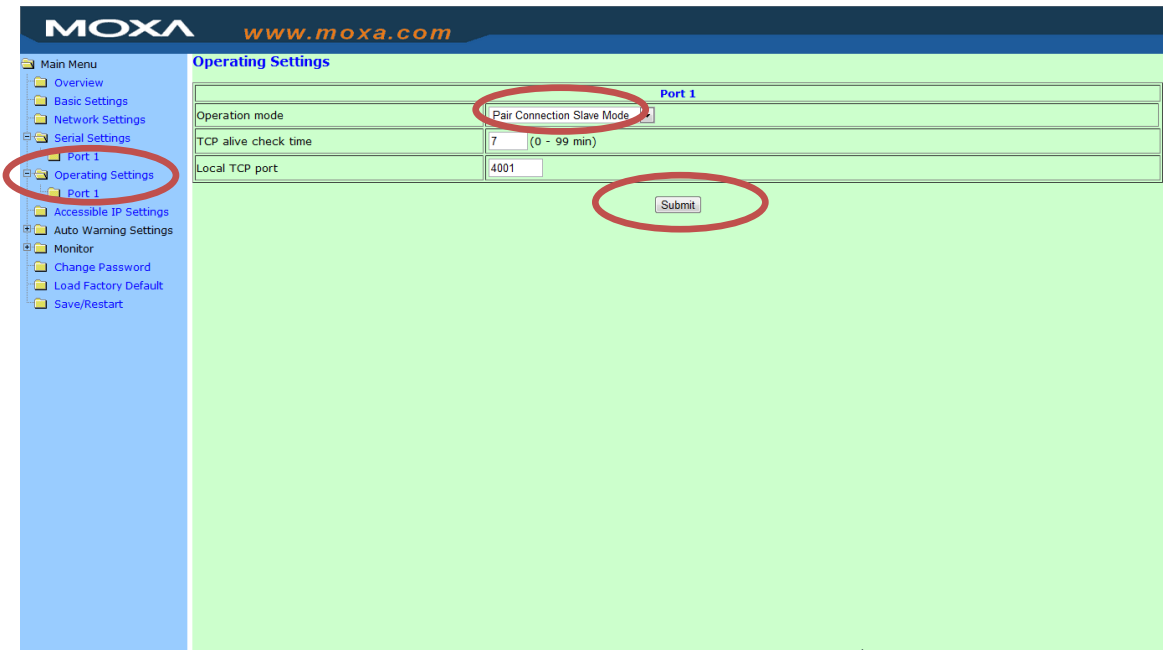


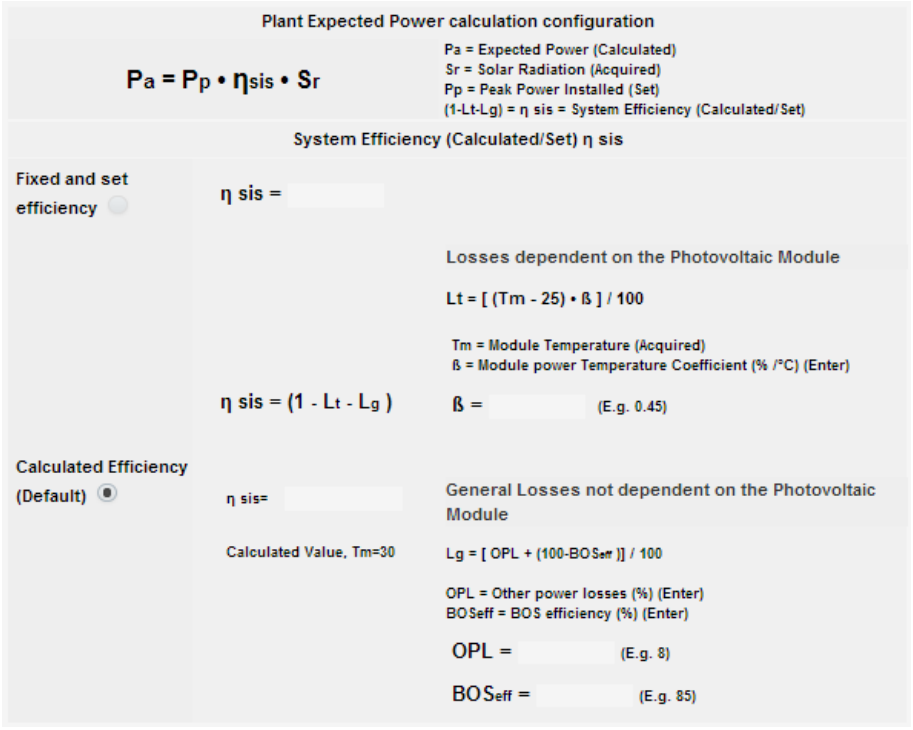
Figure 222 – Slave configuration

19 APPENDIX I – MODEM SMS

The **SIN.MODEMGPRS** SMS modem is already set to work correctly with any telephone operator. Follow the following steps

- Insert a prepaid SIM card GSM in the modem **SIN.MODEMGPRS**
- Connect the antenna to the modem **SIN.MODEMGPRS**
- Power the modem **SIN.MODEMGPRS**

Connect the modem **SIN.MODEMGPRS** to esolar



- Figure **13**

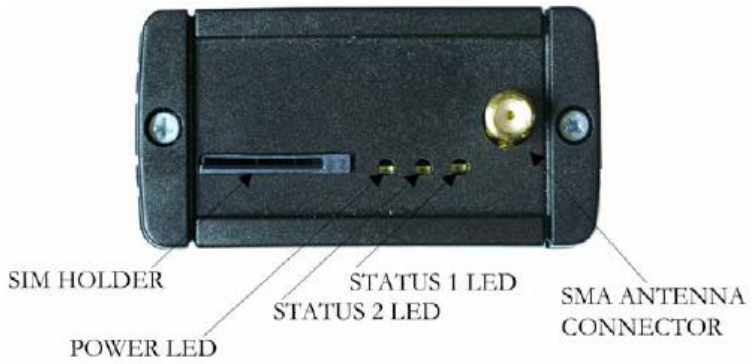


Figure 223 - Stato modem **SIN.MODEMGRPS**

- Verify the *POWER LED* in on
- Wait for *STATUS 1 LED* stops blinking
- Verify the *STATUS 2 LED* is off
- If the modem does not work properly, the *STATUS 2 LED* may have the following states
- Blinking, in this case there is not GSM net
- Double blinking, in this case there are problems with the SIM card inserted. Check the correct insertion of the card. Otherwise contact the carrier to seek clarification

20 APPENDIX L - MOBILE ROUTER 3G CONFIGURATION

The router supplied is already configured for connection with eSolar and with TIM Italia provider. In case of necessity to change the parameters, carry out the following operations:

- enter the SIM card ensuring that it does not require a PIN code
- connect the router to the power pack
- connect the router to a pc with a cross cable
- connect the antenna to the "GSM MAIN" output

open the browser at the address:

http://192.168.1.1

The following access data will be requested:

Username	Password
admin	admin01

Check the connection status to ensure the presence of a signal. From the menu at the top press *Status*. A screenshot will appear as shown in Figure 224 - Modem Status.

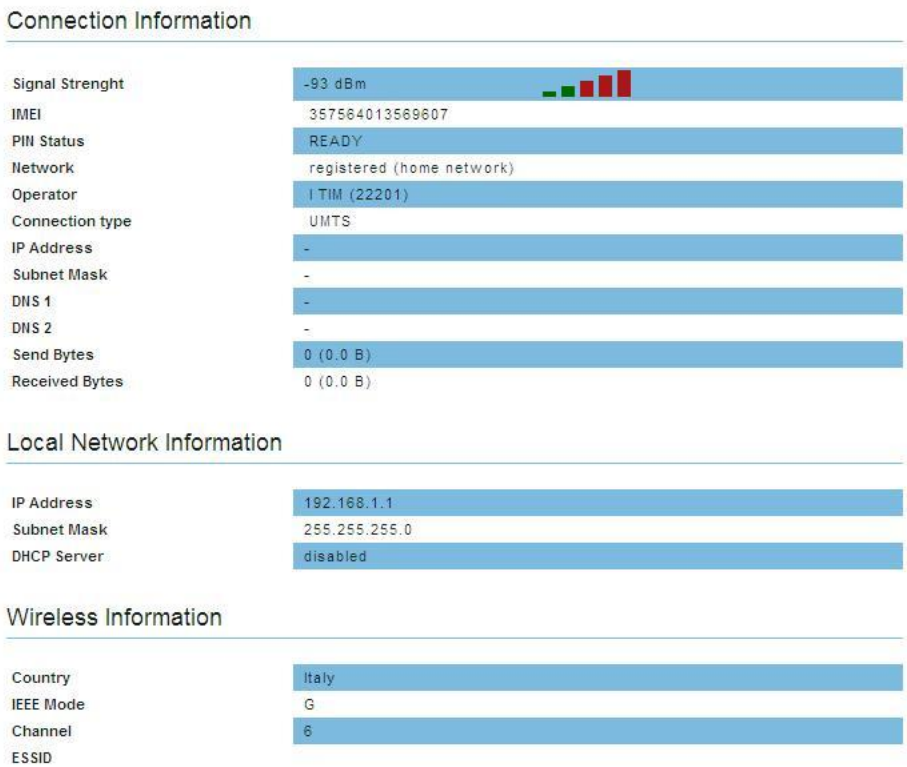


Figure 224 - Modem Status

For an acceptable connection which enables to navigate the internet, at least two green signal levels must be present in the *Signal Strength* row. In case of their absence, apply the second antenna equipped with the router, connecting it to the *GSM AUX* output. The presence of a sufficient signal allows a connection to the internet, the absence of an IP address in the *IP Address* row means that a connection has not taken place.

In case different information should be set for its function, it is possible to use *Quick Setup*, which enables to quickly and simply set only certain router parameters.

In the *Configuration* section there are also the sections present in *Quick Setup*, but complete with other functions. The screenshots that follow refer exclusively to the *Configuration* area. The following Figure 225 - Mobile Network Settings shows the sub-menu *Mobile Network Settings*.

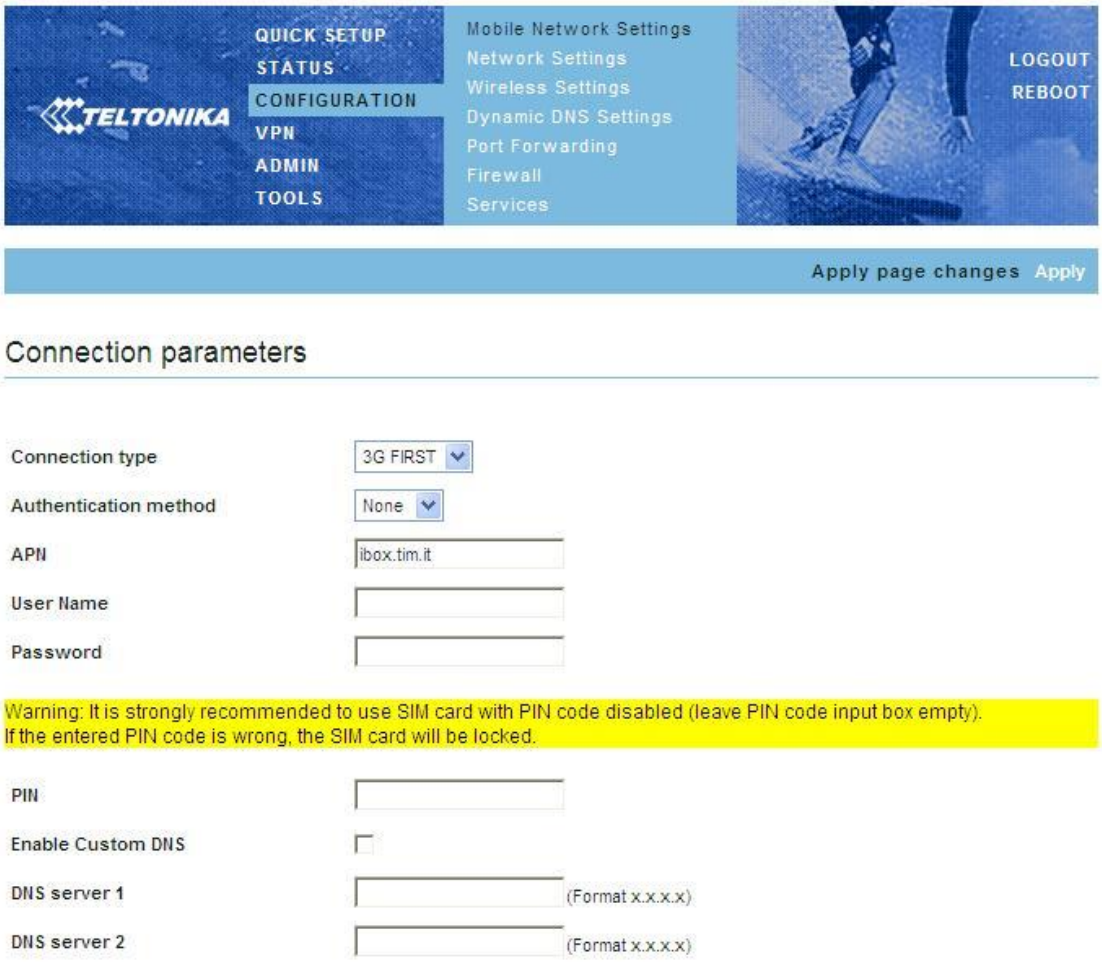


Figure 225 - Mobile Network Settings

Here it is possible to change the information of own telephone provider, by entering the type of connection, the APN (contact customer service of own provider to know the SIM card APN), the authentication method and eventual user names and passwords. It is also possible to enter an eventual present PIN code, but it is advised to insert a SIM card on which this code has already been disabled. Please be reminded to select *Apply* for every operation, located at the top right of every configuration page.
The screen which follows shows the sub-menu *Network Settings*, still a part of the *Configuration* section in Figure 226 - Configurations.

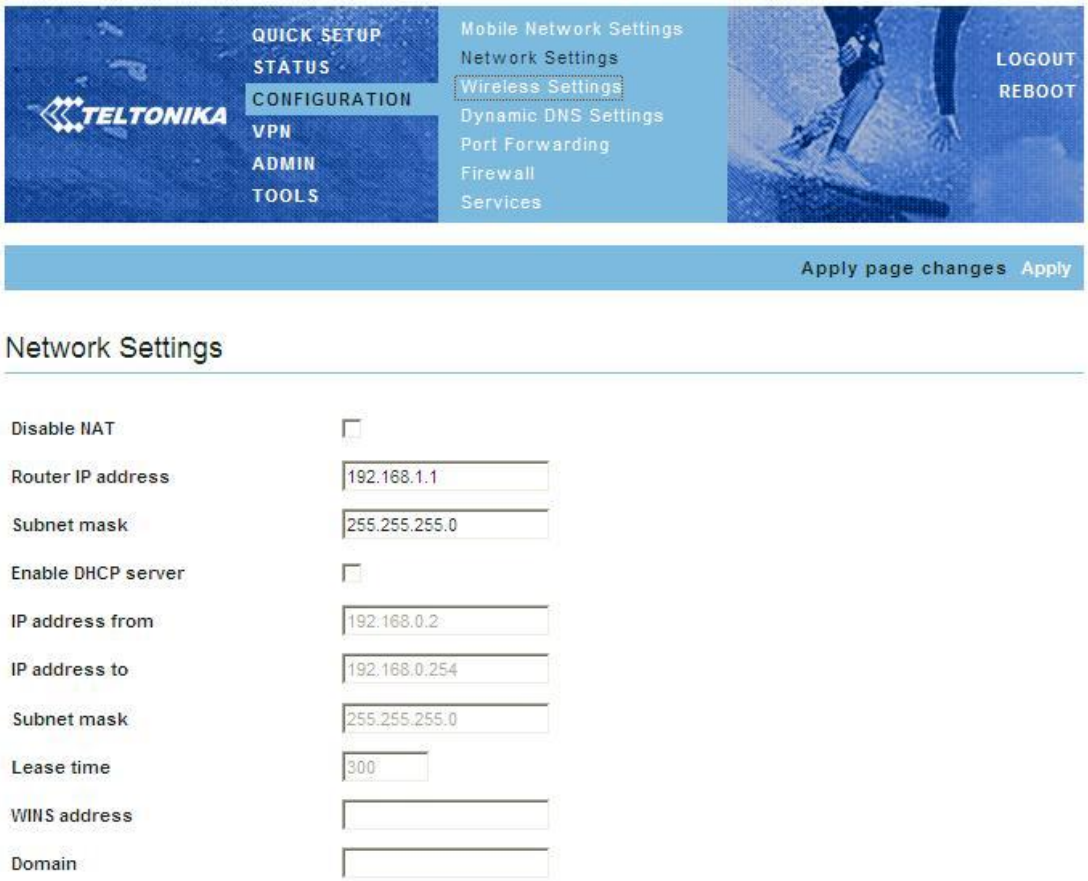


Figure 226 - Configurations

Here it is possible to change the IP address of the Router and eventually enable the DHCP function.

In case a wireless configuration is necessary, enter the *Wireless Settings* area in Figure 227 - Wireless Settings.

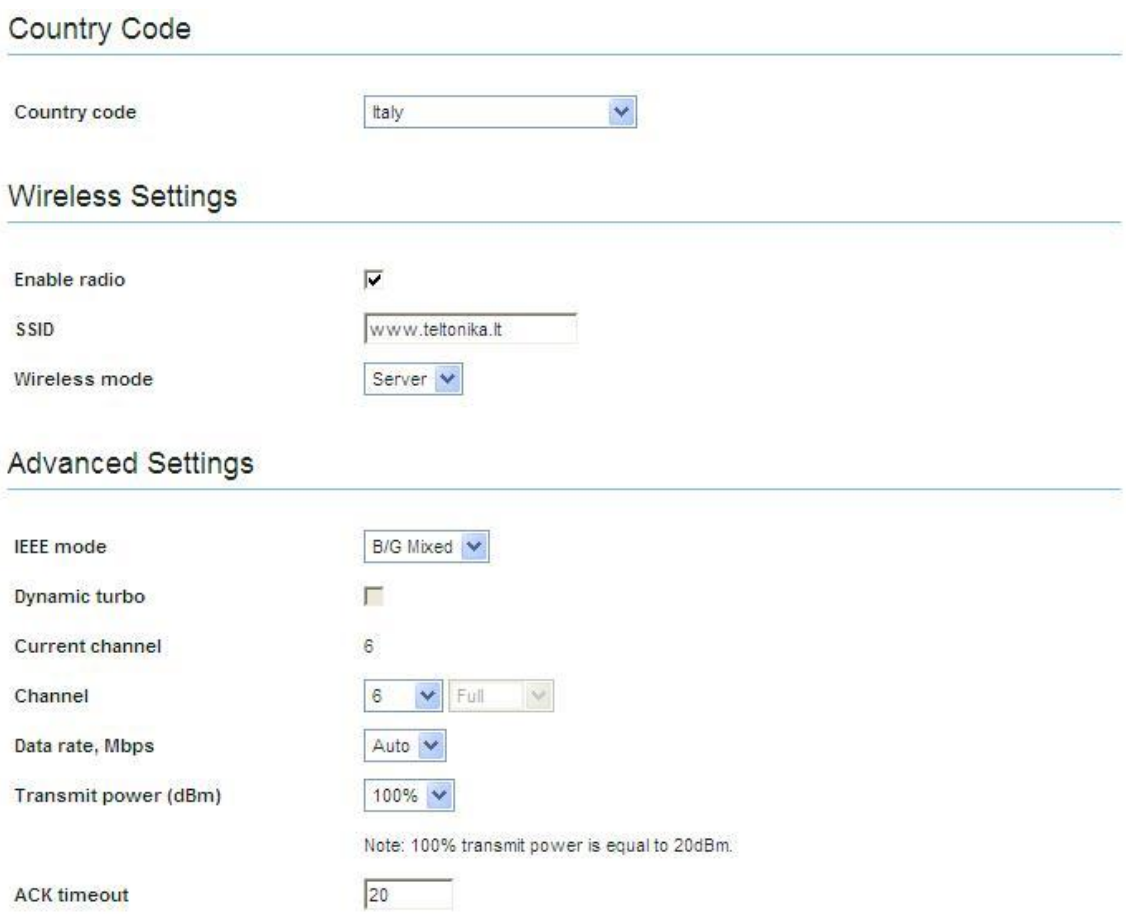


Figure 227 - Wireless Settings

Tick *Enable radio*, set the name of the connection and the appropriate cryptography in the *Wireless mode* entry.

To enable a dyndns address, enter the *Dynamic DNS Settings* area (see Appendix C). Figure 228 - Dynamic DNS Settings shows the section.

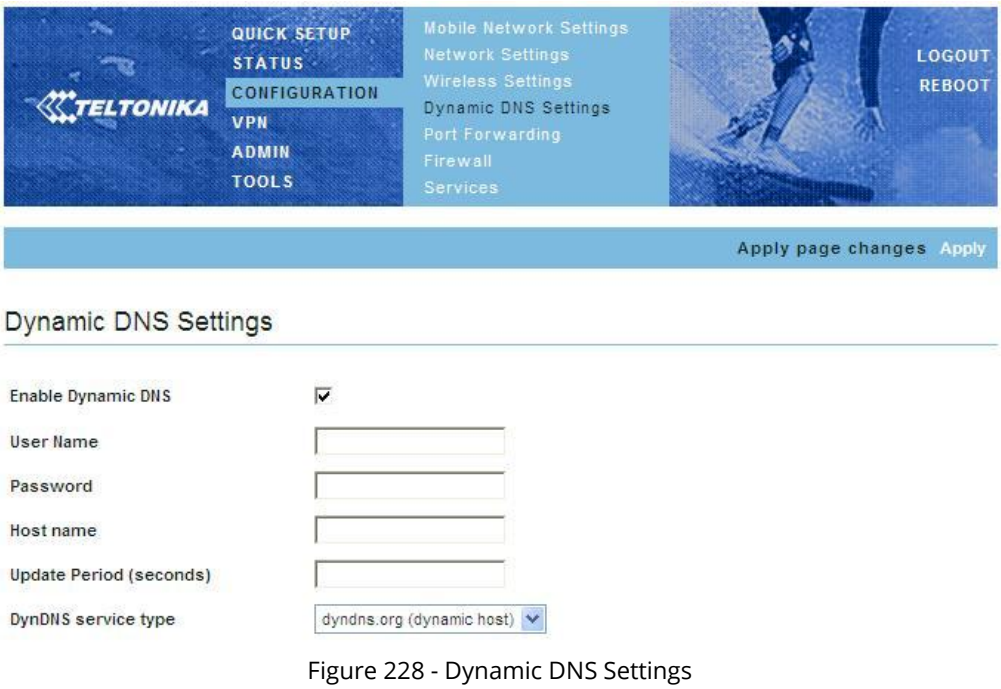


Figure 228 - Dynamic DNS Settings

Remember to select the tick *Enable Dynamic DNS* and eventually press *Apply* at the top right.

Figure 229 - Dynamic DNS Settings

In case there is need to reach a machine from a public address, a *Port Forwarding* rule must be created. This function enables to redirect the internet traffic towards the machine, which responds through port "***80***", Port Forwarding allows to reach the machine through this port, and to be redirected through a secondary port (*Incoming Port*), to another device or function. Press *Save* to create the rule, which will be added to the list below Figure 230 - Dynamic DNS Settings.

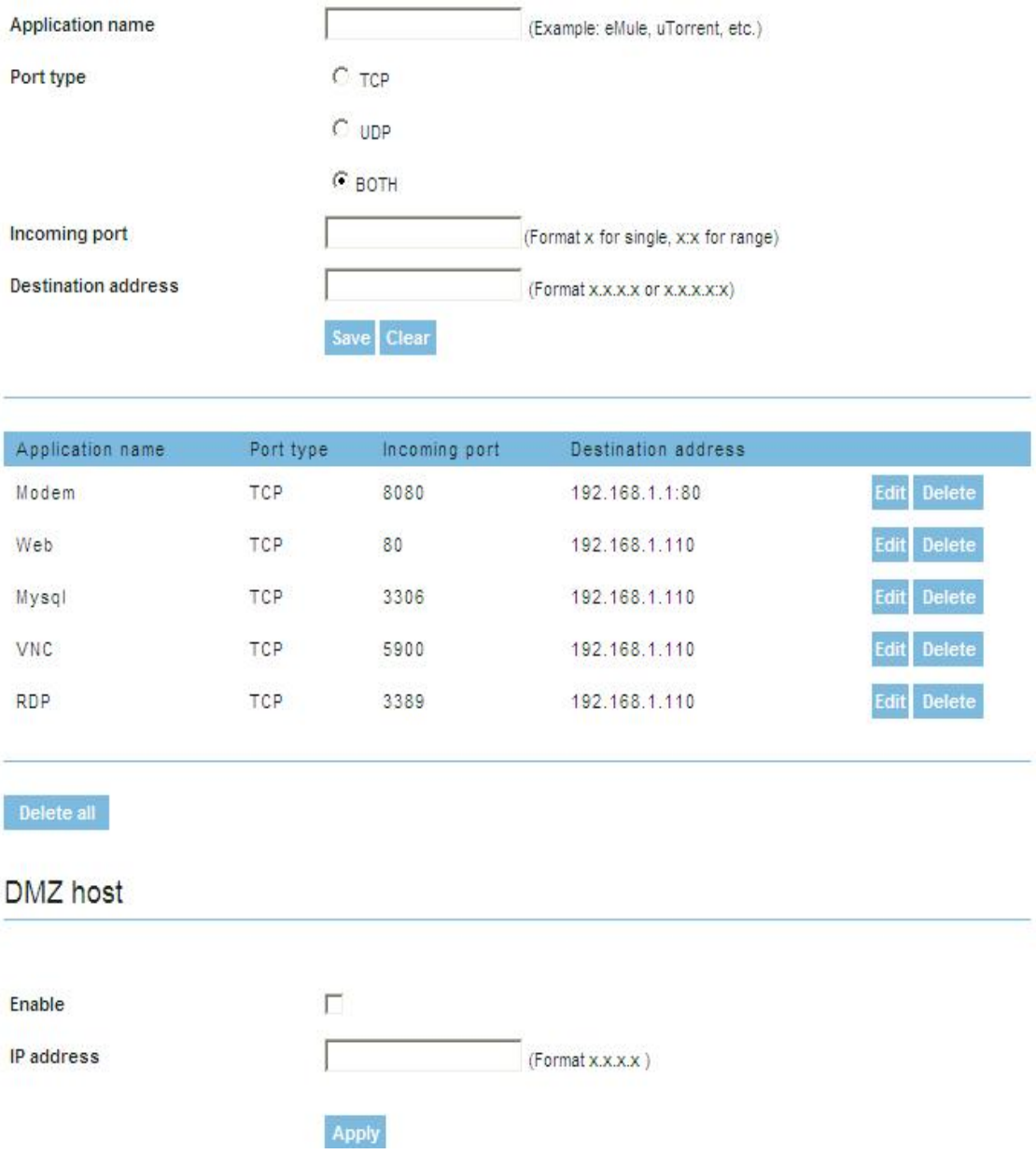


Figure 230 - Dynamic DNS Settings

The rule was added, and, most importantly, created on a free port. With the *Edit* key it will be possible to change it, and to delete it with *Delete*.
Below we will find *DMZ Host*, which is none other than a direct connection between a public address and a machine address. Remember to tick the key *Enable* and eventually press *Apply* directly under the address entered.

With the sub-menus *Firewall* Figure 231 - Firewall and *Services* Figure 232 - Services, it will be possible to set safety functions, such as addresses to filter from the system or set https addresses, meaning asymmetric cryptography protocols for managing the transfer of reserved information.

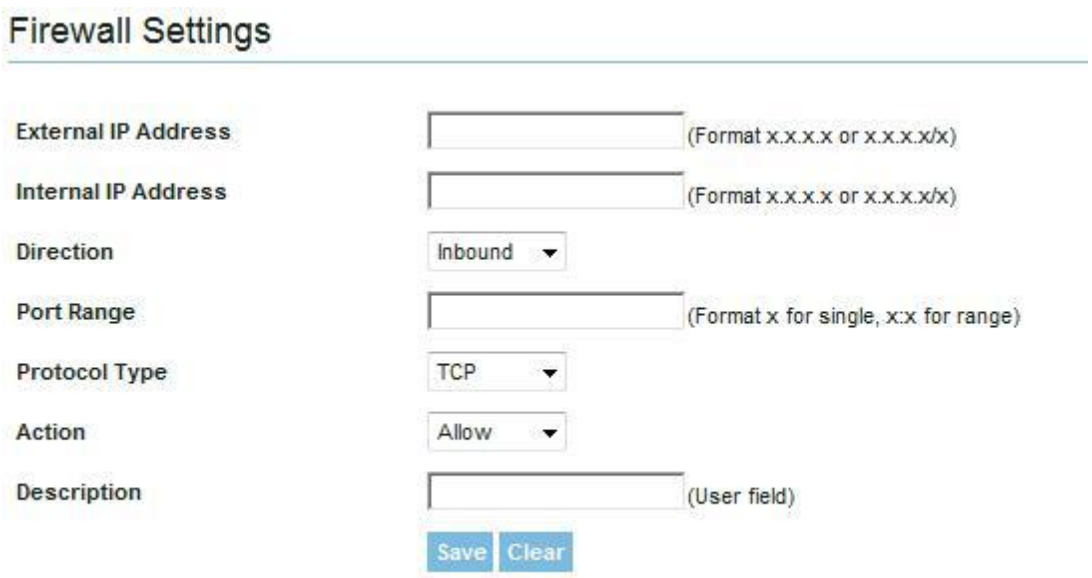


Figure 231 - Firewall

Figure 232 - Services

In case one wishes to use a *VPN*, or create a private virtual network, this is the screenshot that will allow the setting Figure 233 - VPN. This page may be reached through the main menu, by clicking on the appropriate VPN section.

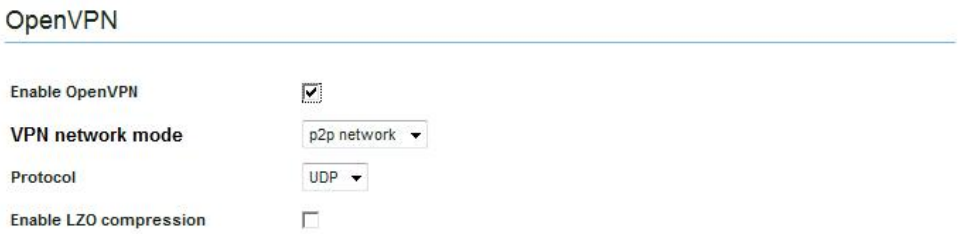


Figure 233 - VPN

Remember to check *Enable Open VPN* and set the method and the protocol to use.

To change the system password, access the *Admin* section from the main menu and click on the relative sub-menu *Account*. It is possible to carry out a system Upgrade and Reset. Always pay attention to the

possibility of losing entered data. Still from the *Admin* main menu enter into *Maintenance* and carry out the desired operation Figure 234 - Maintenance.

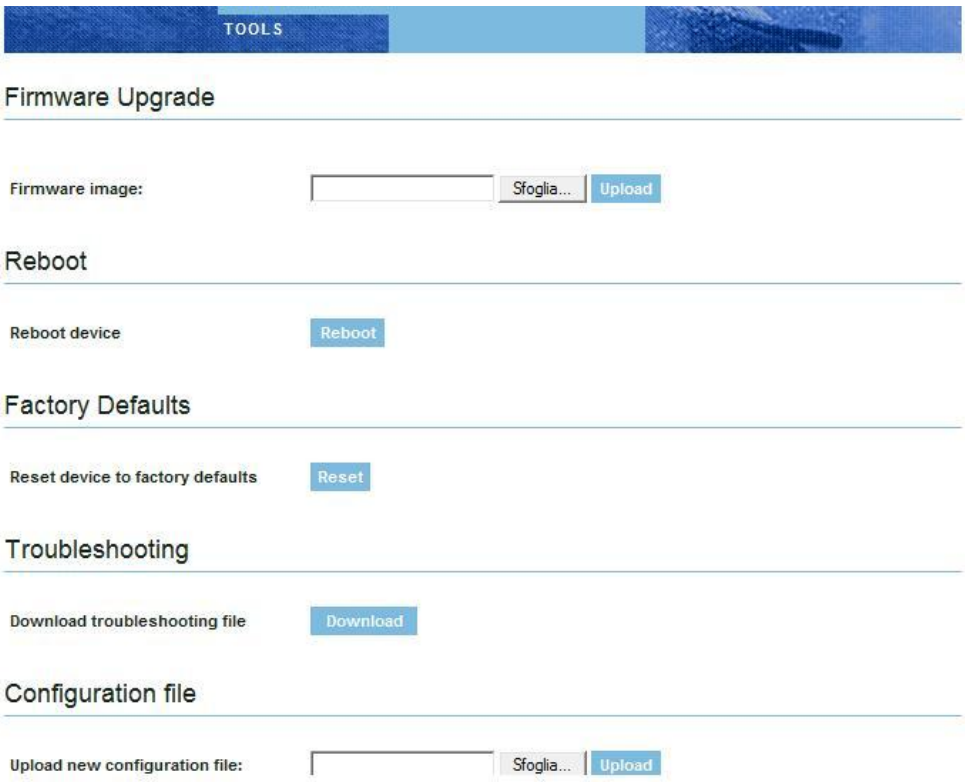


Figure 234 - Maintenance

For further information and details refer to the CD supplied with the router.

21 APPENDIX M- DYNDNS ACCOUNT CREATION

From any browser open the page www.dyndns.com, this is the page that we will find at the first access Figure**Errore. L'origine riferimento non è stata trovata.**.

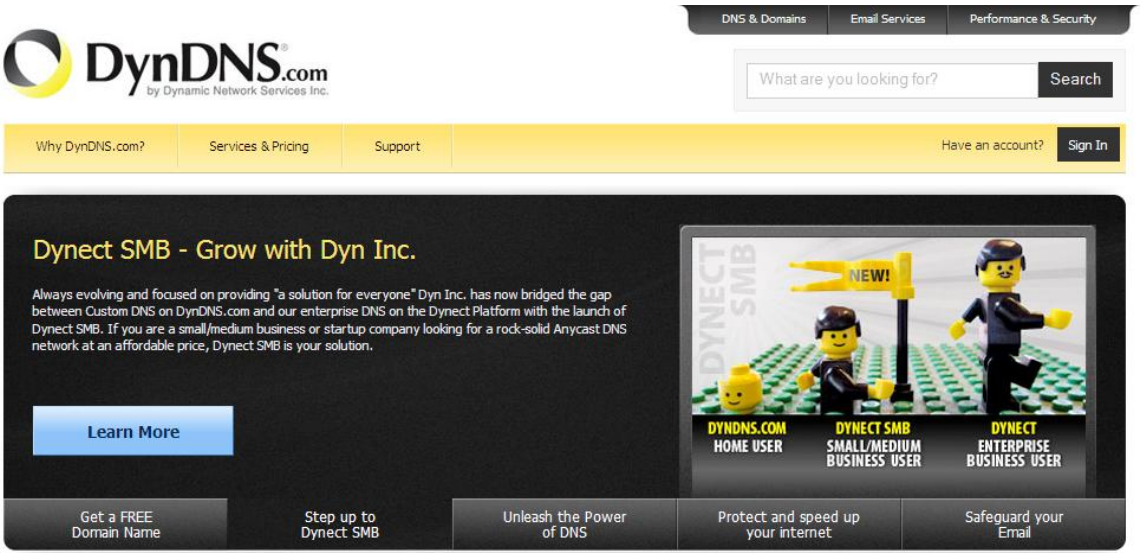


Figure 235 - Image of DunDNS.com website

At the top right, the *SIGN IN* key is present to create an account. The following Figure shows what we will find after the click Figure 235.

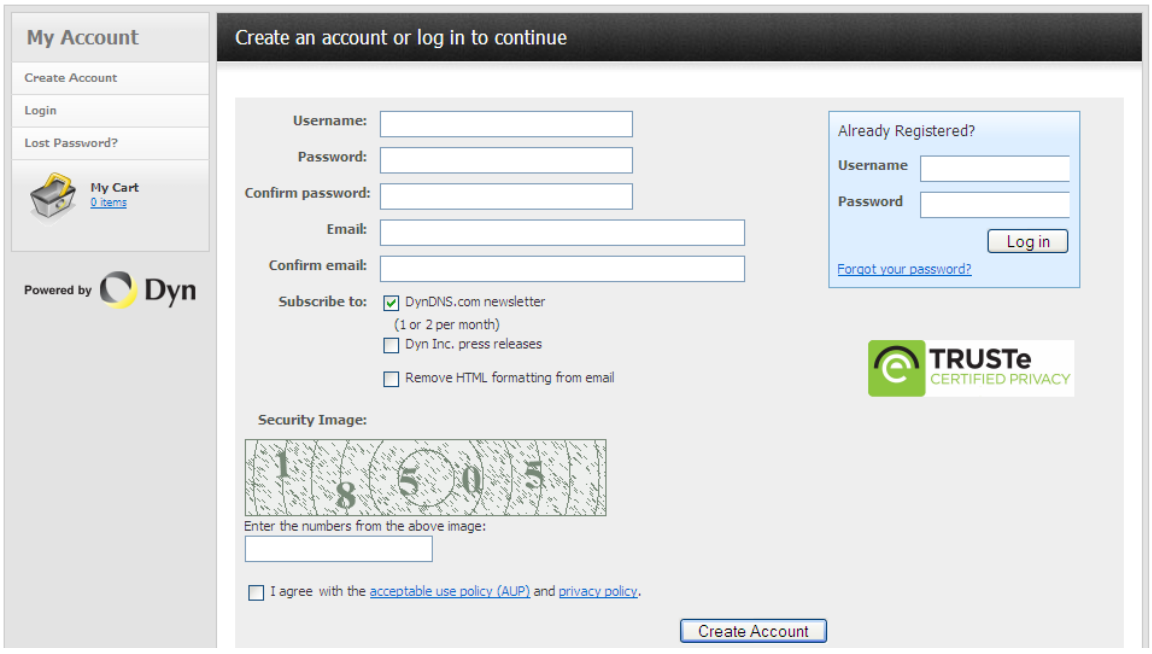
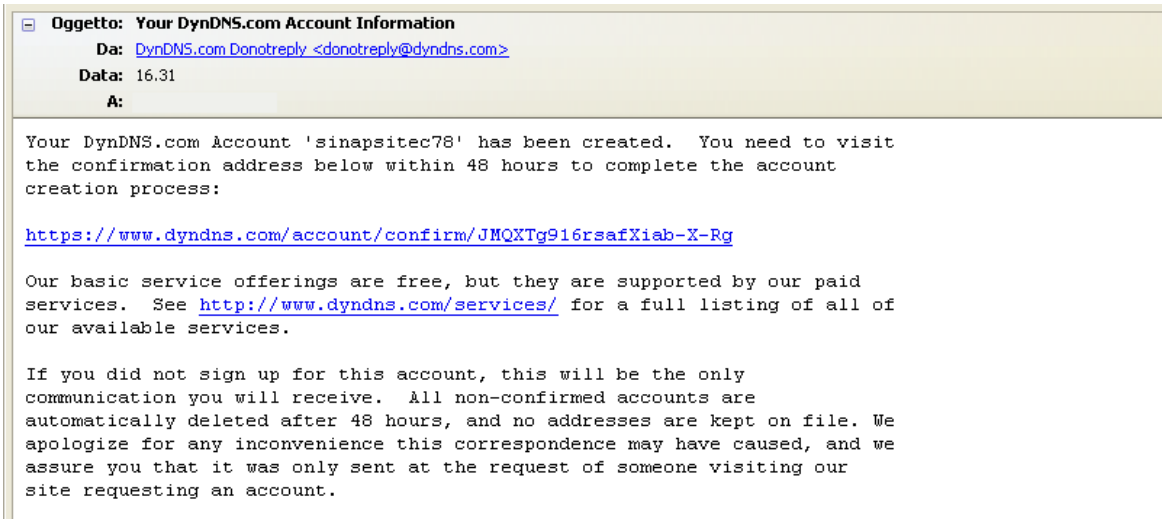


Figure 236 - Sign In

Fill in the required fields and wait for a confirmation email at the address that you have entered.

Open your email and press the confirmation link (blue string positioned at the centre of the page) sent by the website DynDns.com, as shown in Figure 236.



Oggetto: **Your DynDNS.com Account Information**
Da: DynDNS.com Donotreply <donotreply@dyndns.com>
Data: 16.31
A:

Your DynDNS.com Account 'sinapsitec78' has been created. You need to visit the confirmation address below within 48 hours to complete the account creation process:

https://www.dyndns.com/account/confirm/JMQXTg916rsafXiab-X-Rg

Our basic service offerings are free, but they are supported by our paid services. See http://www.dyndns.com/services/ for a full listing of all of our available services.

If you did not sign up for this account, this will be the only communication you will receive. All non-confirmed accounts are automatically deleted after 48 hours, and no addresses are kept on file. We apologize for any inconvenience this correspondence may have caused, and we assure you that it was only sent at the request of someone visiting our site requesting an account.

Figure 237- confirmation email

After having validated the confirmation link, access own account with the user name and password previously entered in the new account creation phase. Figure 237

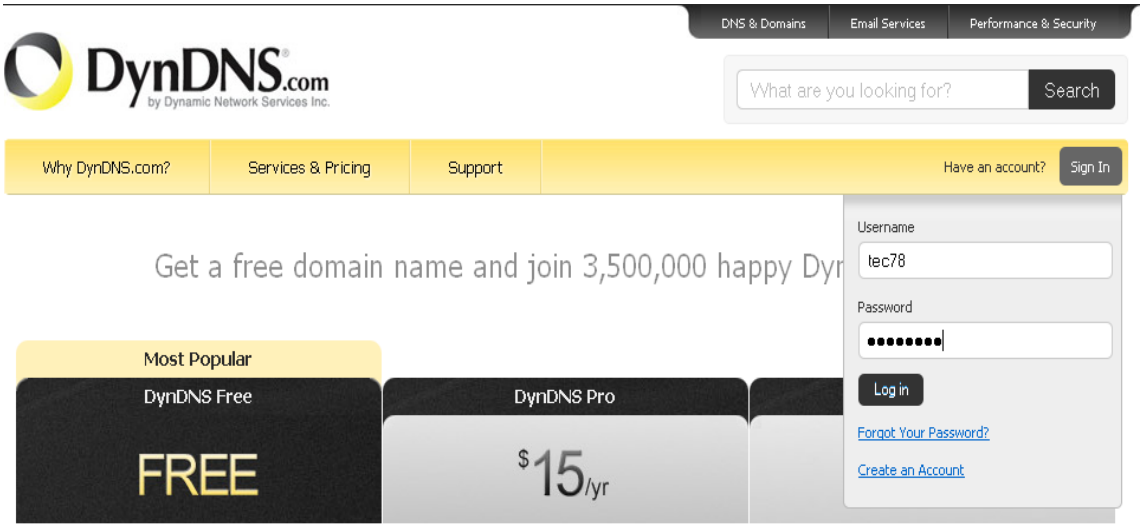


Figure 238 - Access with Username and PSW

Once access is executed, we will find ourselves in the configuration page of our newly created account Figure 238.

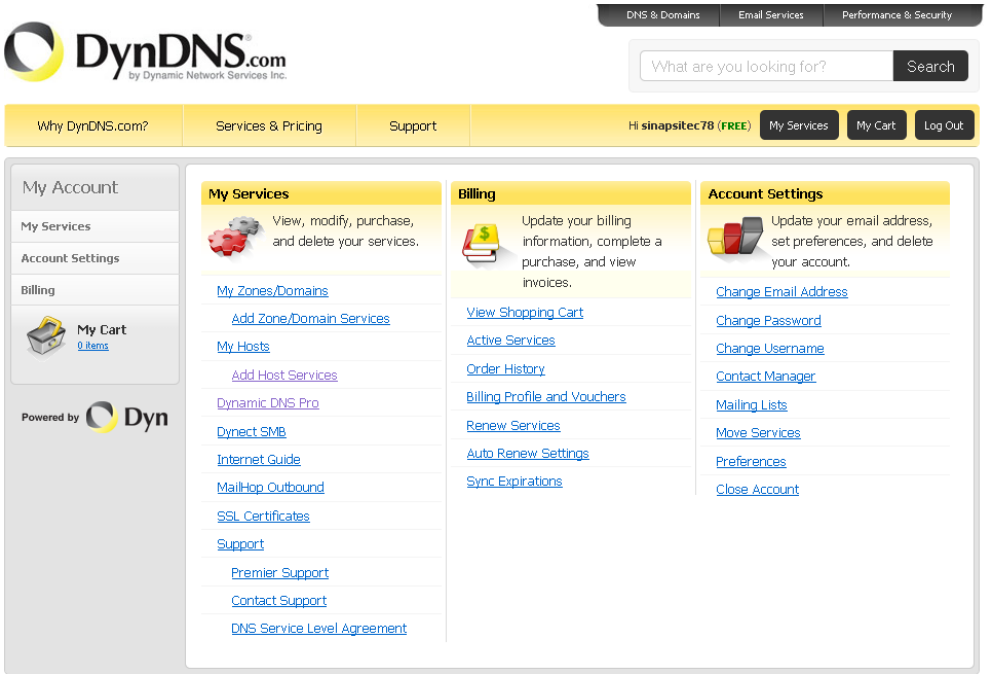


Figure 239 - Main Dyndns page

From the *My Services* column select the entry *Add Host Services*, this is the new page that we will view Figure 239.

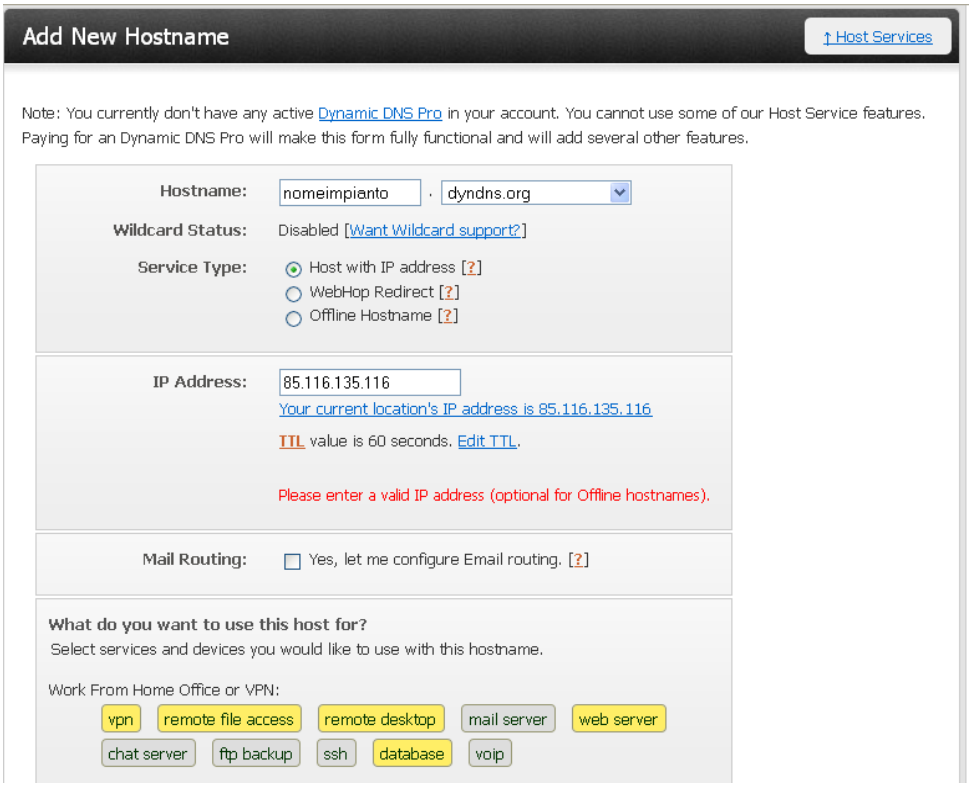


Figure 240 - My Services, Add Host Service

Here it will be possible to name the host (in the example a generic "system name" was entered). In the *IP Address* area the IP of the machine that we are configuring will have to be entered. In the low part of the page it will instead be possible to choose the services that may be used with the newly created host, it is advised to enter the same that were highlighted on the screen, meaning *VPN*, *Remote File Access*, *Remote Desktop*, *Web Server* and *Database*. At this point press the key at the bottom right *Add to Cart*. The following Figure 241 shows the following passage.

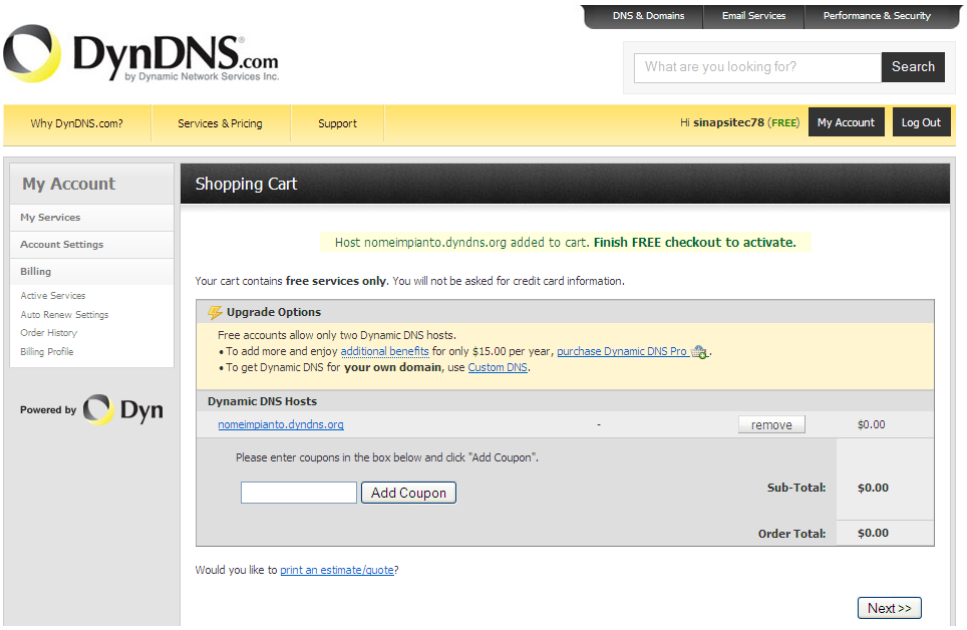


Figure 241

At this point the host "systemname.dyndns.org" has been created, to make it available the last activation steps must be carried out. Press *Next* at the bottom right and we will find ourselves in the screen shown in Figure 242.

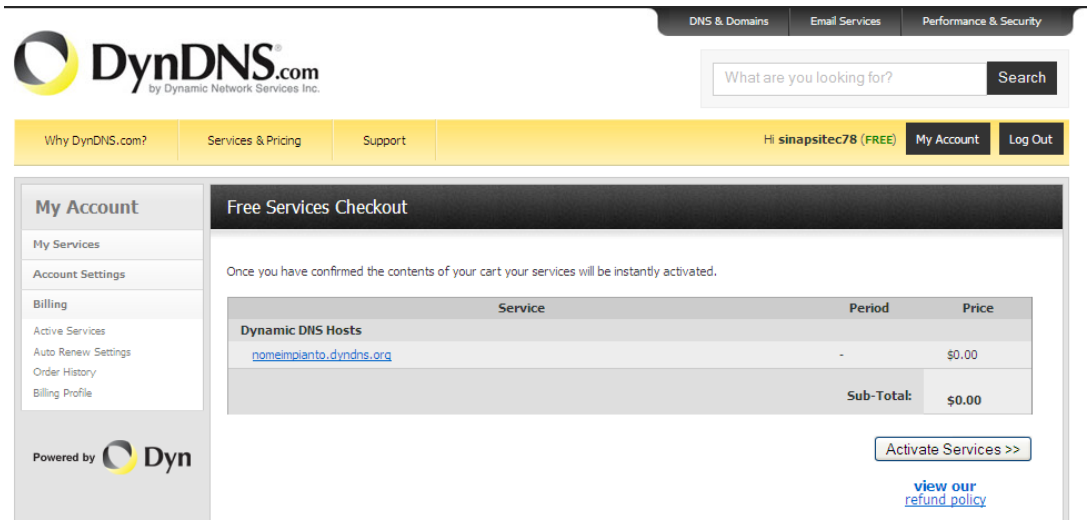


Figure 242

Press the key *Activate Services* to complete the operation.

22 APPENDICE N - O-IP.COM ACCOUNT CREATION

Open a browser to the link www.noip-com; See Figure 243 for example

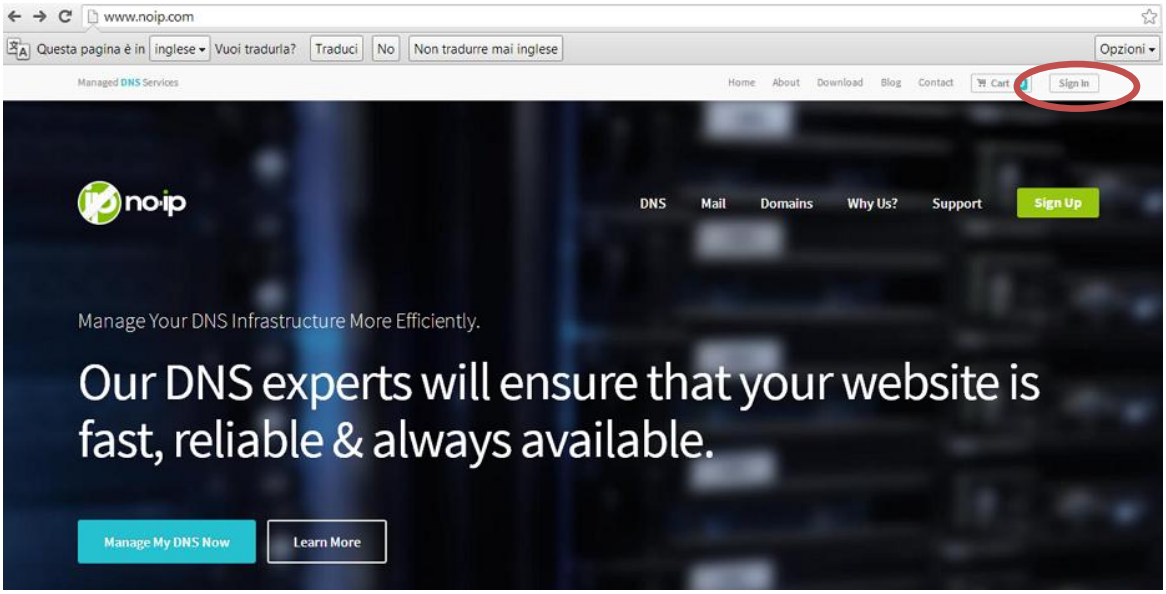


Figure 243 - NO-IP.com site aspect

In the upper right is present the key SIGN IN for account creation. Fill in the required fields and wait for a confirmation e-mail address you have entered. See Figure 244.

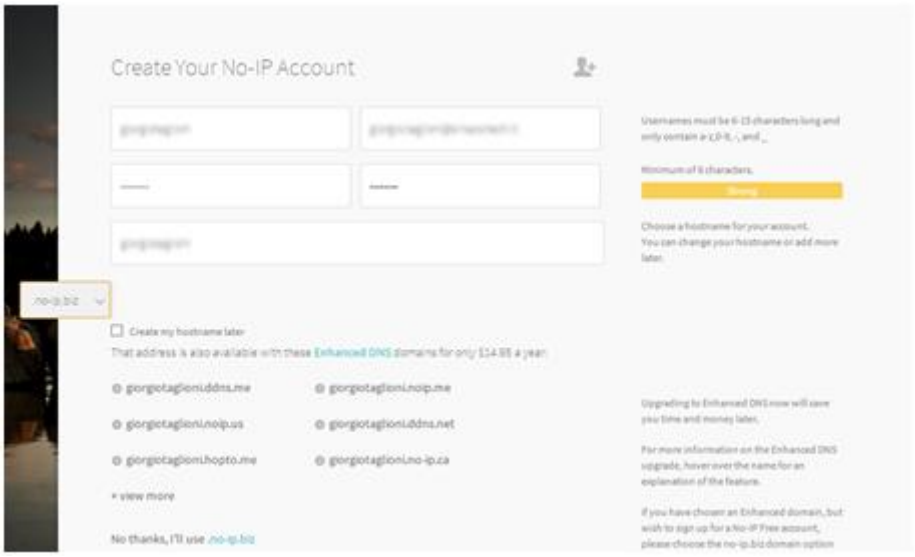


Figure 244 - Sign In

Select the typology of contract.

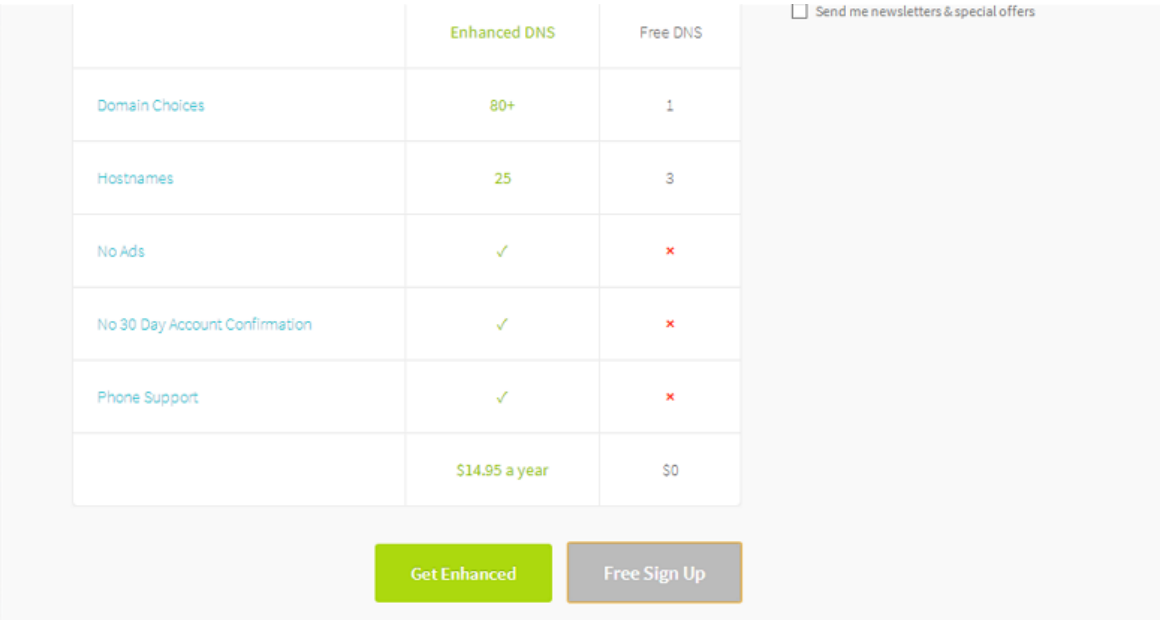


Figure 245 – Type of Contract

Wait for a confirmation email to the address that you entered during registration. Open your email and click the confirmation link.
After validating the confirmation link, log in to your account with your username and password previously entered during the creation of the new account. Figure 246

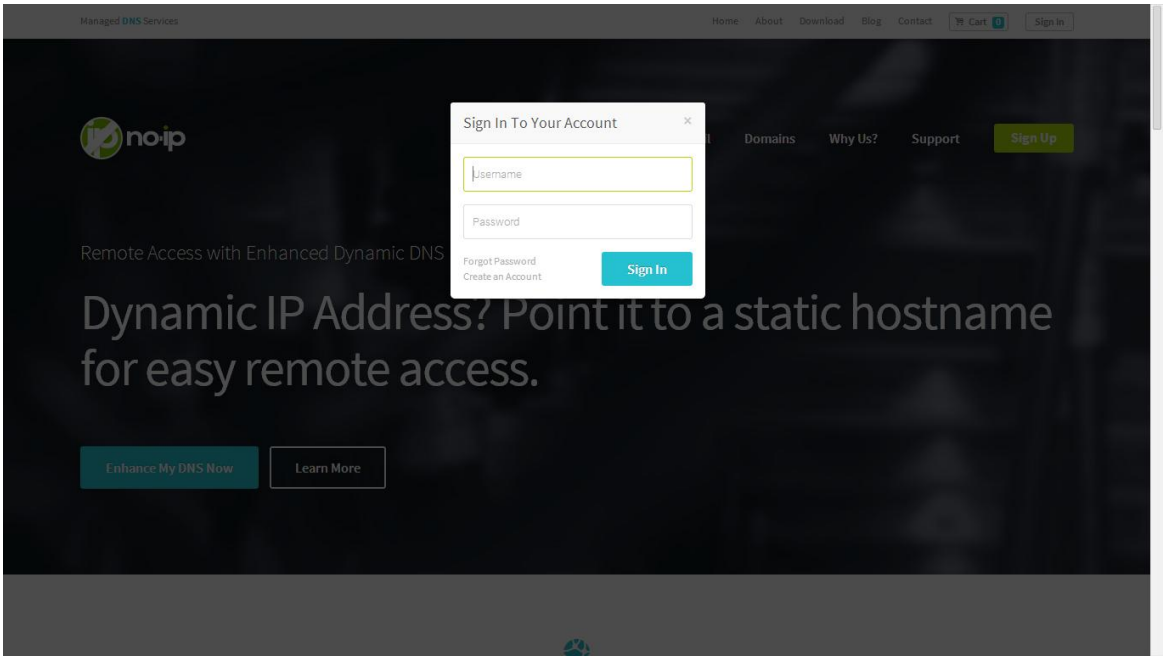


Figure 246 - Login with Username and PSW

Select *Add a Host*

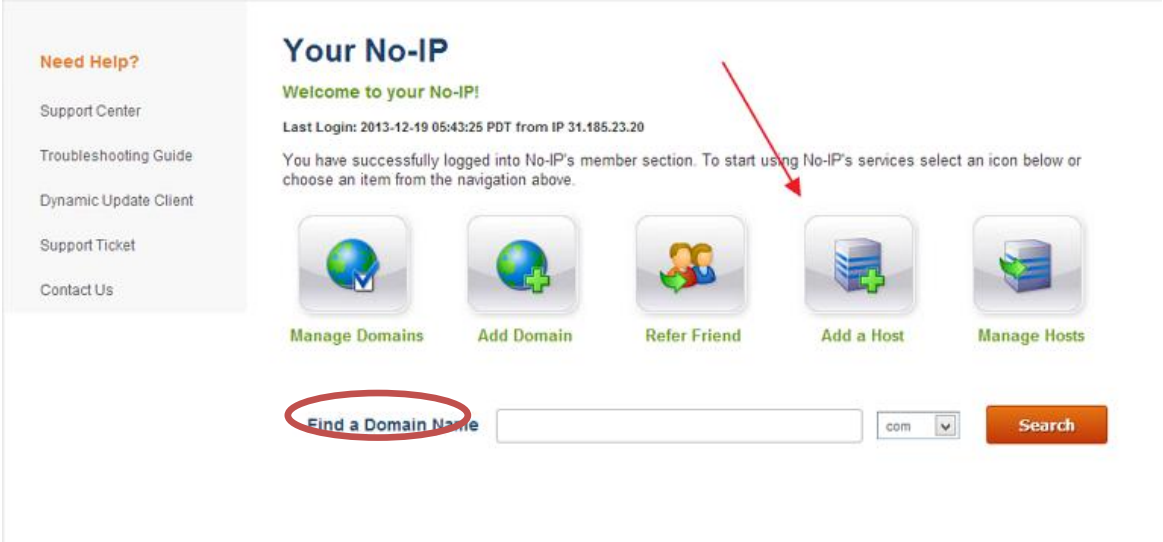


Figure 247 - NO-IP Main Page

Fill the fields in the web page

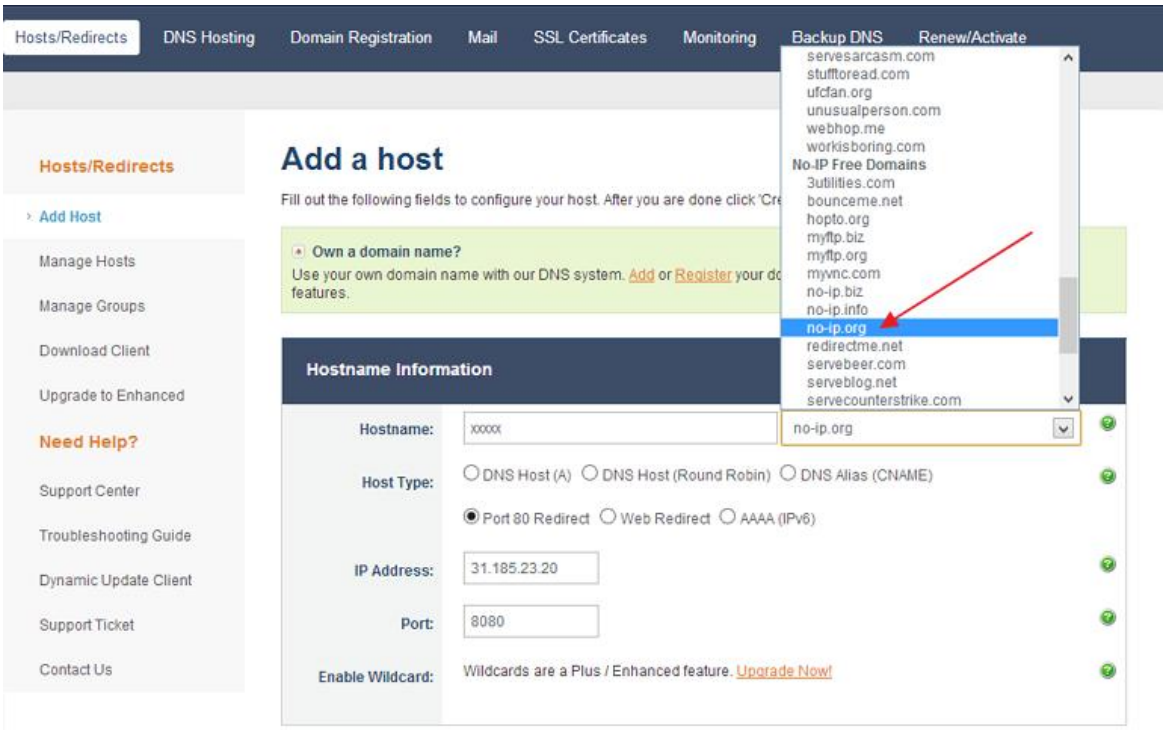


Figure 248 - My Services, Add Host Service

In the line IP Address enter the eSolar IP remote, see Chap. 3.15 and select a name for your dynamic IP among the possible choices offered by the service. At this point the host has been created.

NOTE