

Monitoring and Visualization of Plant Data

Micro Inverters in **SUNNY PORTAL**

User Manual



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1 Information on this Document

Validity

This document applies to plants in Sunny Portal that consist of micro inverters and the Sunny Multigate.

Target Group









This document is intended for end users.

Additional Information

Links to additional information can be found at www.SMA-Solar.com:

Document title	Document type
CO ₂ factor	Technical Information

Icons

Icon	Explanation
	Indicates a hazardous situation which, if not avoided, will result in death or serious injury
	Indicates a hazardous situation which, if not avoided, can result in death or serious injury
	Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury
	Indicates a situation which, if not avoided, could result in property damage
	Information that is important for a specific topic or goal, but is not safety-relevant
	Indicates a requirement for meeting a specific goal
	Desired result
	A problem that could occur

Typographies

Typography	Usage	Example
bold	<ul style="list-style-type: none"> • Display texts • Elements on a user interface • Connections • Elements to be selected • Elements to be entered 	<ul style="list-style-type: none"> • The value can be found in the Energy field. • Select Settings. • Enter value 10 in the Minutes field.
>	<ul style="list-style-type: none"> • Connects several elements to be selected 	<ul style="list-style-type: none"> • Select Settings > Date.
[Button/Key]	<ul style="list-style-type: none"> • The button or key to be selected or pressed 	<ul style="list-style-type: none"> • Select [Next].

Nomenclature

Complete designation	Designation in this document
Micro inverter	Inverter
PV plant	Plant
SMA Solar Technology AG	SMA

The designation „My micro inverter plant“ is used as a placeholder for the name that you have given your micro inverter plant in Sunny Portal.

Abbreviations

Abbreviation	Designation	Explanation
DHCP	Dynamic Host Configuration Protocol	Protocol for the dynamic assignment of IP configurations
IP	Internet Protocol	-
PIC	Product Identification Code	Identification key for registration in Sunny Portal
PV	Photovoltaics	-
RID	Registration Identifier	Registration key for registration in Sunny Portal

2 Sunny Portal

2.1 Intended Use

Sunny Portal is an Internet portal for the monitoring of plants as well as the visualization and presentation of plant data.

In order to use Sunny Portal, you will need an SMA product that can record your plant data and send it to Sunny Portal (see Section 2.3 "System Requirements", page 9). Depending on the product that sends the data, various functions are available in Sunny Portal.

2.2 Sunny Multigate

The Sunny Multigate is a communication box and the electrical termination point of a plant with up to twelve micro inverters to the utility grid. Sunny Portal requests the inverter data via the Sunny Multigate.

2.3 System Requirements

- A computer with Internet access must be available.
- An Internet browser must be installed on the computer.
- JavaScript must be activated in the Internet browser.

Required SMA products:

In order to use Sunny Portal for plants with micro inverters, you need the following SMA products:

- Inverter of the type Sunny Boy (SB):
 - SB 240-10
- Multigate-10 (Sunny Multigate)

Supported Internet browsers:

You can find a list of supported Internet browsers in the technical data on the Sunny Portal product page www.sma-uk.com/sunny-portal.

Recommended screen resolution:

- Minimum 1.024 pixels x 768 pixels

3 Getting Started

3.1 Registering Sunny WebBox in Sunny Portal

Requirements:

- The PV plant must be commissioned.
- The PIC and RID of the Sunny Multigate must be available (see type label or label supplied with the Sunny Multigate).

Procedure:

- Starting the Plant Setup Assistant in Sunny Portal
- Registering as a new user in Sunny Portal
 or
 Registering as an existing user in Sunny Portal
- Identifying devices in Sunny Portal
- Configuring module groups

Starting the Plant Setup Assistant in Sunny Portal

The Plant Setup Assistant guides you step-by-step through user registration and the registration of your plant in Sunny Portal.

1. Go to **www.SunnyPortal.com**.
2. Select [**Plant Setup Assistant**].
 - The Plant Setup Assistant opens.
3. Select [**Next**].
 - The **User Registration** page opens.

Registering as a New User in Sunny Portal

1. Activate the **I am not yet registered** option and select [**Next**].
2. Enter the necessary data for registration.
3. Select [**Next**].
 - You will receive an e-mail containing a hyperlink and your access data to Sunny Portal after a few minutes.
 - You did not receive an e-mail from Sunny Portal?
 Possibly, the e-mail was automatically redirected to your spam mail folder.
 - Check whether the e-mail was redirected to the spam mail folder.
 You may have stated a different e-mail address.
 - Check whether the e-mail was sent to another e-mail address.

- If the other e-mail address is an unknown address, restart the Plant Setup Assistant and register as a new user again.
4. Follow the hyperlink in the confirmation e-mail within 24 hours.
 - Sunny Portal opens a separate window and confirms successful registration.
 5. Select [**Next**].
 - The **Select Plant** page opens.

Registering as an Existing User in Sunny Portal

An additional plant is added to your plant in Sunny Portal: your micro inverter plant.

Requirement:

- You must already be registered in Sunny Portal.

Procedure:

1. Activate the **I am already registered in the Sunny Portal** option.
2. Enter the e-mail address and the Sunny Portal password in the **E-mail address** and **Password** fields.
3. Select [**Next**].
 - The **Select Plant** page opens.

Identifying Devices in Sunny Portal

1. Select the option **Create new plant** and enter a plant name (e.g. **My micro inverter plant**) in the **Plant Name** field.
2. Enter the plant password for the user role **Installer** of your plant in the **Plant Password** field. If you have not yet changed the plant password for the user role **Installer**, the standard plant password **1111** is set. In such cases, you must now assign a new plant password.
3. Enter the plant password again in the **Repeat password** field.
4. Select [**Next**].
 - The **Select devices** page opens.
5. Enter the PIC and RID of the Sunny Multigate in the **PIC** and **RID** fields.
6. Select [**Identify**].
 - The Plant Setup Assistant adopts the data entered and compiles it into a list.
7. To select up to three additional Sunny Multigates, enter the PIC and RID of another Sunny Multigate and select [**Identify**]. A maximum of four Sunny Multigates form a micro inverter plant. If you would like to register more Sunny Multigates, you have to create another micro inverter plant after having completed the registration.
8. Select [**Next**].
 - The page **Micro Inverter Detection** opens and the number of the micro inverters found will be displayed below the Sunny Multigate.

9. In order to display the serial numbers of the micro inverters found, click onto the number of the micro inverters found.
10. Select [**Next**].
 - The **Configure Module Groups** page opens.

Configuring Module Groups

If different module types are installed in your plant, or the PV modules are from different manufacturers or have different azimuth or tilt angles, you must combine PV modules with the same properties into groups. The groups are referred to as „module groups“ in Sunny Portal. If all the PV modules of your plant have the same properties, you can combine the PV modules into one group. Your plant then consists of one module group.

Requirement:

- The serial number of the inverters must be available as well as the following data of the connected PV module: manufacturer, type, tilt and azimuth angle.

Procedure:

1. Enter a name in the **Name** field for the module group (e.g. „garage“ or „south roof“).
2. Select the manufacturer of your PV module in the drop-down list **Manufacturer** and select the module type in the drop-down list **PV module**. If the manufacturer of your PV module is not listed, select [**Unknown PV module**] and enter the PV module power in the **Module Power** field.
3. Enter the tilt angle of the PV modules in the **Tilt** field.
4. Enter the alignment (azimuth angle) of the PV modules in the **Alignment** field.
5. In the **Select Inverter** area, select all inverters to which PV modules with the same properties are connected.
6. Select [**<<**].
 - The selected inverters are being moved to the area **Assigned Inverters**.
The selected inverters form a module group and are no longer available in the area **Available Inverters**.
7. In order to move inverters from the area **Assigned Inverters** back to the **Available Inverters** area, select the desired inverters and then [**>>**].
8. Select [**Submit**].
 - The module group is created with the selected inverters.
9. To change a created module group, select [**Edit**] and change the desired settings.
10. To delete a created module group, select [**Delete**].
11. Select [**+ Add**] in order to set up other module groups and repeat steps 1 to 8 until all inverters have been assigned.
12. Select [**Next**].
 - The **Extended Plant Properties** page opens.

13. Enter the plant properties and select [**Next**].
 - Sunny Portal displays a summary of the data you entered.
14. Select [**Finish**].
 - Sunny Portal sets up your plant and then confirms that your plant registration was successful.
15. To call up your plant, select [**Go to plant**].

3.2 Logging In and Out of Sunny Portal

Logging into Sunny Portal

Requirement:

- You must already be registered in Sunny Portal.

Procedure:


1. Go to **www.SunnyPortal.com**.
2. Enter your e-mail address in the **E-mail** field in the **Login** area.
3. Enter the Sunny Portal password in the **Password** field.
4. Activate the **SSL** checkbox to transmit the encrypted login data.
5. Activate the **Remain logged in** checkbox to stay logged in for your next Sunny Portal visits. This means you remain logged into Sunny Portal until you actively log out.
6. Select [**Login**].

Logging Out of Sunny Portal

When you log out of the Sunny Portal user interface, you protect your plant against unauthorized access.

- Select [**Logout**] in the header.
- or
- Select **User Info/Logout > Logout** in the page and drop-down menu.

3.3 Setting the Language

1. In the user interface header, move the mouse pointer onto .
 - A drop-down menu opens.
2. Select the desired language.

4 User Interface

4.1 Overview of the User Interface

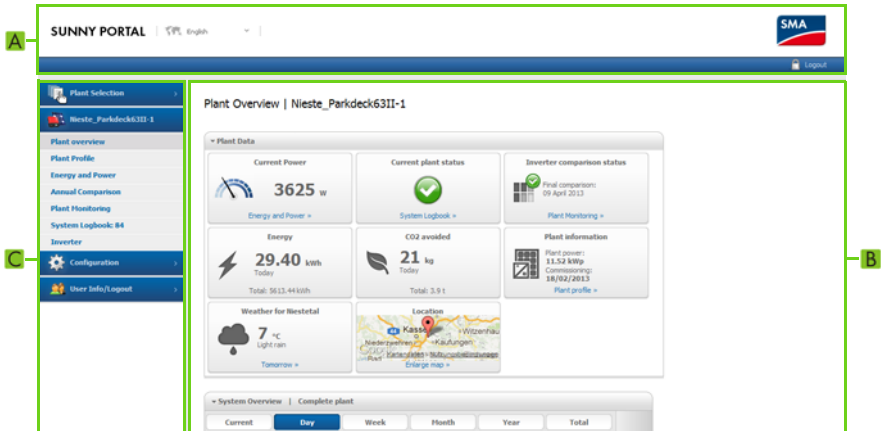



Figure 1: User interface of Sunny Portal (example)

Item	Designation	Explanation
A	Header	Contains the language selection and logout option of Sunny Portal
B	Contents area	Contents of the selected page
C	Page and drop-down menu	Access to the pages and menu items Released pages of the „ My micro inverter plant “ menu are marked with the icon  (see Section 5.4.2 "Releasing Pages for Viewing in Sunny Portal", page 29).

4.2 Overview of Menus and Pages

Plant Selection Menu

Requirement for displaying the menu:

- Your e-mail address must be assigned to at least two plants in Sunny Portal.


In this menu you can select the requested plant by selecting the menu item with the name of the requested plant in **Menu Selection**. The name of the currently selected plant is used as the name of the second menu. All pages always refer to the currently selected plant.

Page	Explanation
Plant List	The page includes an overview of plants that are assigned to your e-mail address. By default, the plant list is always sorted in ascending order according to the specific plant yield. You can also sort the plant list by other values and in descending order (see Section 5 "Page Settings", page 26).

The „My Micro Inverter Plant“ Menu


This menu contains all pages with information, plant data, and visualizations for your plant.

Page	Explanation
Plant Overview	<p>This page provides you with an overview of the most important information about your plant. The display and range of functions of the page depend on your user role (see Section 10.1 "User Roles and User Rights", page 60).</p> <p>Plant Data area</p> <p>This area provides you with an overview of the most important information about your plant.</p> <p>System Overview area</p> <p>This area contains a graphical representation of the PV modules. The power and possible errors of each individual inverter are displayed (see Section 4.3.2 "System Overview", page 21).</p>
Plant Description	Sunny Portal compiles the plant profile from information that you can enter in different Sunny Portal pages (see Section 4.4 "Information in the Plant Profile", page 25).
Energy and Power	This page provides you with an overview of the energy and power curve of your plant.

Page	Explanation
Annual Comparison	<p>This page provides you with an overview of the total yield and the specific plant yield per month in a yearly overview.</p> <p>The average expected yield is also displayed if the checkbox Display the monthly distribution in the yearly comparison, as well as energy and power is activated (see Section 7.1.1 "Setting the Monthly Distribution of the Predicted Annual Yield", page 49).</p>
Plant Monitoring	<p>On this page the following plant monitoring functions are available:</p> <ul style="list-style-type: none"> • Communication monitoring: monitoring of the communication between Sunny Portal and Sunny Multigate • Inverter comparison: plant monitoring via comparison of the inverter yields <p>If the communication monitoring or the inverter comparison show an error or warning, the page and menu selection displays the icon  next to the menu Plant Monitoring. The icon will be shown as long as the error persists.</p>
Plant Log Book	<p>This page shows messages regarding the plant status, e.g. disturbances of your plant. The number after the colon shows the number of unread messages.</p>
Inverters	<p>On this page you can view power and yield values for individual inverters (see Section 5). The Details area contains a table with values of the inverters for the time frame selected in the diagram.</p>

Configuration Menu

This menu contains pages on which you can carry out configurations. The menu is only displayed if you have the user role **Installer** or **Plant administrator**.

Page	Explanation
Plant Properties	On this page you can configure your Sunny Portal plant.
System Presentation	On this page you have the following options: <ul style="list-style-type: none"> Send third parties a hyperlink to one of your released pages (see Section 5.4.2 "Releasing Pages for Viewing in Sunny Portal", page 29). Incorporate the Plant Profile page into other websites.
Layout Assistant	On this page you can draw your micro inverter plant (see Section 7.2.2 "Creating a Plant Layout", page 41). If you expanded your plant by other inverters, the icon  will be displayed in the page and menu selection next to the menu Configuration > Layout Assistant . The icon is shown until you have aligned the PV modules of the new inverters in the plant layout and have assigned the inverter serial numbers to the PV modules (see Section 7.2.2).
Module Group Configuration	On this page you can adjust the module group configuration (see Section 7.1 "Configuring Module Groups", page 39).
Device Overview	Device Overview tab All the devices of your plant are listed on this tab. You can call up device properties, parameters, and messages. Overview of New Devices tab Using this tab, you can look for new devices in your plant and add them to your Sunny Portal plant or replace devices.
Report Configuration	On this page you can select a setting so that Sunny Portal informs you of events and other information such as yield by e-mail (see Section 6.3 "Reports", page 33).
User Management	This page displays a list of all users to whom you have given access to the plant (see Section 10.2 "Creating a New User", page 62).

User Info/Logout Menu





Via this menu, you can call up a list of all users to whom you have given access to the plant.






Page	Explanation
User Information	This page shows your user information.
Logout	Ends your session in Sunny Portal

4.3 Page „My Micro Inverter Plant“ > Plant Overview

4.3.1 Plant Data Area

4.3.1.1 Overview

Information	Icon	Explanation
Current power	 *	<p>The value states the current power of the plant. If the value cannot be updated due to a temporary connection problem with your plant, the time at which this value was retrieved by Sunny Portal will be displayed.</p> <p>The icon shows how high the current power is compared to the installed plant power (peak power). The cursor moves between the yellow area (low current power) and the red area (high current power).</p> <p>You can activate the page Energy and Power using the hyperlink Energy and Power.</p>
Current plant status	 *	<p>The icon displays the current plant status (for explanation refer to section 4.3.1.2).</p> <p>You can activate the page Plant Log Book using the hyperlink Plant Log Book.</p>
Inverter comparison status	 *	<p>The icon will only be displayed if there are at least two inverters in your Sunny Portal plant. The icon displays the status of the inverter comparison (for explanation see section 4.3.1.3).</p> <p>You can activate the page Plant Monitoring by using the hyperlink Plant Monitoring.</p>
Energy		<p>Today: the value states the energy produced so far by the plant for the current day.</p> <p>Total: the value states the total energy produced so far based on the combined meter readings of the inverters.</p>





Information	Icon	Explanation
Revenue		The icon is only displayed if the feed-in tariff has been set up (see Section 7.8). Today: the value states the feed-in tariff calculated so far for the current day.** Total: the value states the total feed-in tariff calculated so far.**
CO ₂ avoided		Today: the value states the CO ₂ emission avoided by the plant so far for the current day. Total: the value states the CO ₂ emission avoided so far since commissioning the plant.
Plant information		The value states the installed plant power (peak power) of the plant. The date is the commissioning day of the plant. You can activate the page Plant Profile by using the hyperlink Plant Profile .
Weather		The current weather for the plant location is displayed. You can scroll to the weather forecast for the next day at noon using the hyperlink Tomorrow .
Location		Displays the plant location on a map extract. A larger view of the map can be called up by using the hyperlink Enlarge map .

* This icon is an example. The icon adjusts to the current information.

** The data is not suitable for billing purposes. The data may deviate from the data provided by the electricity meter.





4.3.1.2 Plant Status

The text below the icon is a hyperlink that can be used to call up the plant log book.

Icon	Text below the icon	Explanation
	Plant log book Device/s cannot be reached	Device/s with warnings All existing status information for the devices is OK; however, this information is not available for all devices. The text below the icon shows the number of devices that cannot be reached. Thus, the status of these devices could not be captured.
	Device/s with warnings	A warning has occurred. The text below the icon shows the number of devices that are affected by the warning.
	Device/s with errors	An error has occurred. The text below the icon shows the number of devices that are affected by the error.
	Plant log book	The status of all devices is unknown. Further information can be accessed by using the hyperlink Plant Log Book below the icon.

4.3.1.3 Inverter Comparison Status

The inverter comparison icon is only displayed if there are at least two inverters in your Sunny Portal plant. The text **Plant Monitoring** below the icon is a hyperlink that can be used to access the page **Plant Monitoring**. On the **Plant Monitoring** page you can call up more information using the hyperlink **Details** if there is a fault. For further information on the inverter comparison, read Section 6.6.

Icon	Explanation
	The specific yields of the monitored inverters are within the configured range. Next to the icon is shown when the last inverter comparison took place.
	Warning: the specific yield is outside the tolerance for at least one monitored inverter.
	Information: the inverter comparison is activated but no comparison has occurred yet.
	Inverter comparison is not activated.

4.3.2 System Overview

The system overview is displayed on the page „My micro inverter plant“ > **Plant Overview** in the **System Overview** area. The functions and view of the system overview depend on your user role (see Section 10.1 "User Roles and User Rights", page 60).

Explanation of the System Overview „Current“ (Example)

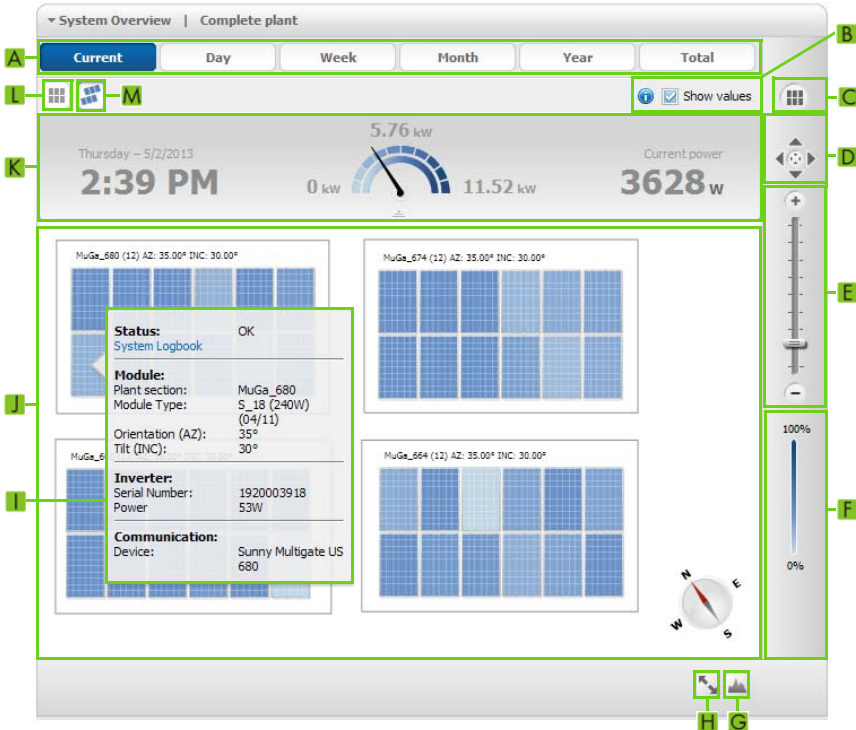









Figure 2: System overview **Current** (example)

Item	Icon	Explanation
A	–	Buttons for selecting the display period
B	–	Checkbox for the inverter power fading in and out. If the display view has been selected too small, no values are displayed and an info icon will be shown next to the checkbox. In order to view values, enlarge the display (see item E).
C		Drop-down list for selecting the module group or entire plant to be displayed

Item	Icon	Explanation
D		Buttons for moving the display. The button in the middle centers the display. Tip: you can also move the display by holding down the left or right mouse button.
E	–	Buttons and scroll bar for enlarging und reducing the display. Tip: you can also change the display by turning the mouse wheel.
F	–	Color legend that assigns the power percentage to the colors of the PV modules. The power percentage is based on the maximum achievable power of the inverter.
G		Hyperlink to the page „ My micro inverter plant “ > Energy and Power .
H		Button for activating full screen mode
I	–	If you move the mouse pointer onto a PV module, a window opens containing information about the PV module and the corresponding inverter.
J	–	<p>Display range for the PV modules, values, and information</p> <p>Possible PV module colors:</p> <ul style="list-style-type: none"> • The color of a PV module visualizes the inverter power in percentage (see item F). • Black = the inverter is not accessible. • Gray = the data acceptance of the inverter is deactivated in Sunny Portal (see Section 9.5). <p>Possible icons on a PV module:</p> <ul style="list-style-type: none"> •  = there is a warning for the inverter. •  = there is an error for the inverter. <p>The icons are only visible for the user roles Installer and Plant administrator.</p>
K	–	<p>Display range with current values</p> <p>The values are based on the selected module group or entire plant that is indicated in the title.</p>
L		Button for activating the organized view. The PV modules of a module group are displayed in one row. The rows are shown row by row, arranged in descending order according to the number of PV modules.
M		Button for activating the view according to the specified plant layout (see Section 7.2.2 "Creating a Plant Layout", page 41). The orientation of the display is adopted according to the plant layout. Each module groups is labeled with its respective designation.

Characteristics of the System Overviews Day, Week (Example)

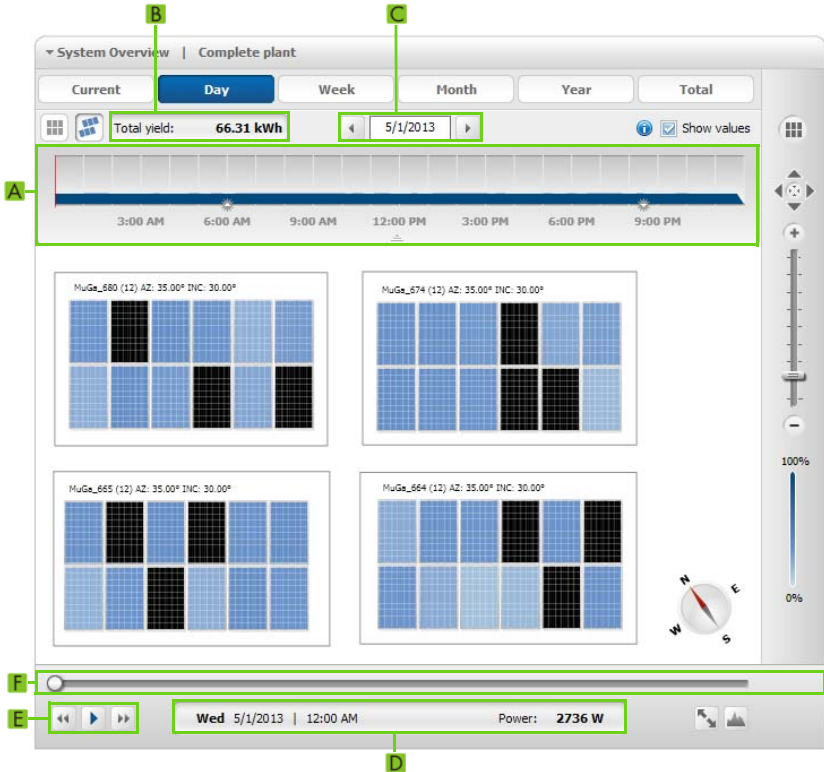


Figure 3: System overview Day (example)

Item	Explanation
A	Graph derived from power values for the display period
B	Displays the total yield of the display period
C	Buttons for selecting the day to be displayed
D	Shows the displayed point in time and the power value
E	Buttons for forwarding, rewinding, and starting the animated yield progress
F	Slide control for selecting the displayed point in time

Characteristics of the System Overviews Day, Week (Example)

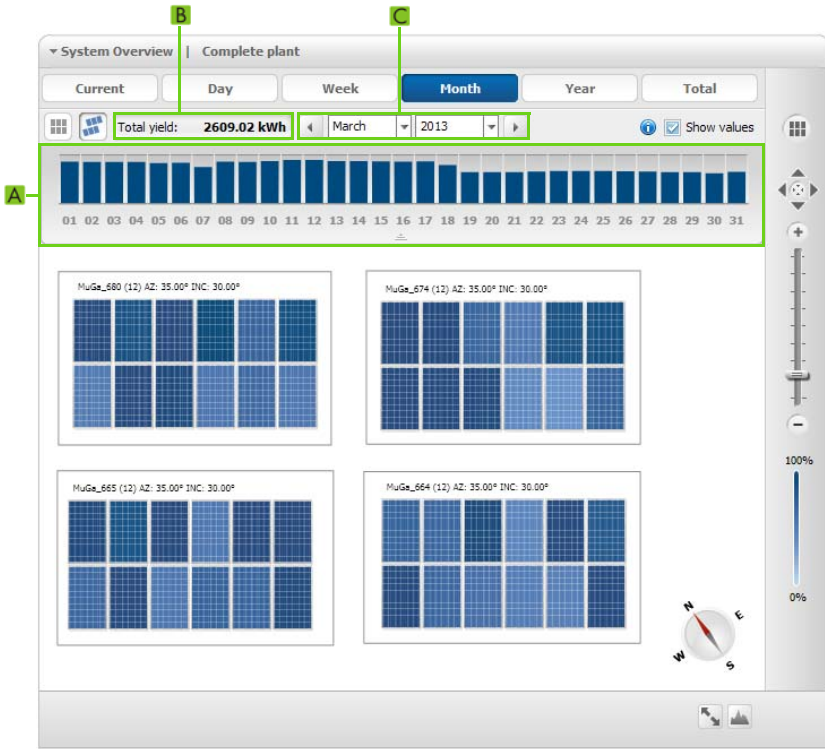


Figure 4: System overview **Month** (example)

Item	Explanation
A	Diagram derived from yield values of the display period If you select a bar in the diagram, the system overview is displayed for this display period.
B	Displays the total yield of the display period
C	Buttons for selecting the month and year to be displayed*

* The buttons are not displayed in the system overview **Total**

4.4 Information in the Plant Profile

Sunny Portal compiles the plant profile from information that you can enter in different Sunny Portal pages. The following table includes the possible information in the plant profile and the sources for changing or entering the information.



Information	Configuration
Location	See Section 7.3
Operators	See Section 7.6
Commissioning	See Section 7.3
Annual Production	See Section 7.10
CO ₂ Avoided	See Section 7.9
Communication	No configuration necessary, this information is automatically detected.
Inverters	
Modules	See Section 7.2
Description	See Section 7.5
Plant image	See Section 7.7

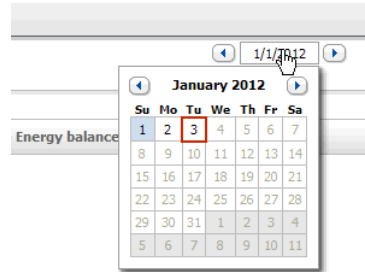
5 Page Settings

5.1 Configuring Settings for Diagrams

5.1.1 Setting the Display Period

Depending on the diagram, you can set various display periods. The control element for setting the display period can be found below each diagram.

- If there is a date and arrow icon below the diagram, set the date using the arrow icons or a calendar:
 - To set the date using the arrow icons, browse backward using  and browse forward using  and set the desired date.
 - To set the date using a calendar, click the date between the arrow icons and select the desired date.
- If there are drop-down lists between the arrow icons, select the desired time period in the drop-down lists.






5.1.2 Saving Diagram Data

You can save diagram data as csv files.



Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).





Procedure:

1. If there is a gearwheel icon  on the right below the diagram, move the mouse pointer onto the gearwheel icon and select  in the drop-down menu.
2. If there are two icons on the right below the diagram, select .
3. Select [**Save**].
4. Select the target directory.
5. Select [**Save**].

5.1.3 Printing Diagram Data

1. Move the mouse pointer onto  on the right below the diagram.
 A drop-down menu opens.
2. Select  and then select [**Print**].
3. Select the desired printer and select [**Print**].

5.1.4 Enlarging the View

- Click on the diagram.
or
If  is on the right below the diagram, move the mouse pointer onto  and select .
- or**
If there are two icons on the right below the diagram, select .

5.2 Sorting the Plant List

By default, the plant list is always sorted in ascending order according to the specific plant yield. You can also sort the plant list by other values and in descending order.

1. Select **Plant Selection > Plant List** in the page and menu selection.
2. Select the desired sorting:
 - To sort the list by another value, click on another blue value in the header of the list.
 - To sort the list in descending order, click on the blue value in the header again.

5.3 Setting Options on the Inverter Page

On the page „My micro inverter plant“ > Inverter you have the following setting options:

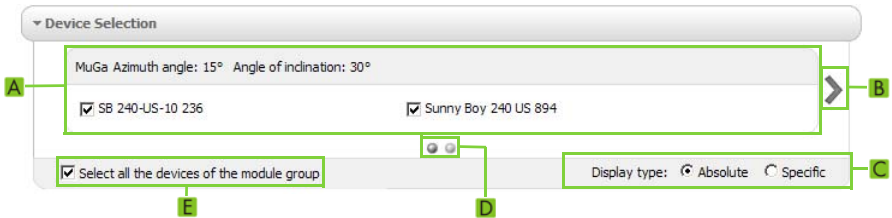


Figure 5: Structure of the settings area on the **Inverter** page

Item	Meaning
A	Area for selecting the inverters to be shown
B	Button for scrolling between the module groups
C	Fields for selecting the display type of the energy values of the selected inverters. <ul style="list-style-type: none"> absolute: displays the energy in kWh specific: displays the energy in kWh/kWp The fields are only displayed if the tab Month , Year , or Total has been selected.
D	Button for selecting the module group. The number of buttons corresponds to the number of module groups, e.g. two buttons will be displayed for two module groups.
E	Checkbox for selecting or deselecting all inverters in the area (A)

5.4 Publishing Sunny Portal Pages

5.4.1 Pages to Be Published

You can publish the following pages of the menu „My micro inverter plant“:

- Plant overview
- Plant description
- Energy and power
- Annual comparison



5.4.2 Releasing Pages for Viewing in Sunny Portal

If you release pages for viewing in Sunny Portal, other Sunny Portal users can view the pages.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select the desired page in the page and drop-down menu.
2. In the Contents area, select [**Configuration - „Name of the page“**].
3. In the **Approval** area, activate the checkbox **Also release page on www.sunnyportal.com**.
4. To send the page by e-mail, select **Send the website by e-mail**, enter the e-mail address of the recipient, select [**Send e-mail**], and select .
5. Select [**Save**].
 - The icon  is displayed in the page and drop-down menu next to the name of the released page.

5.4.3 Presenting Pages on the Internet

Each of your Sunny Portal pages has its own URL. Using these URLs you can place a hyperlink to your Sunny Portal page on other websites.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select the desired page in the page and drop-down menu.
2. In the Contents area, select [**Configuration - „Name of the page“**].
3. To view a preview of the page, select **Open page in a new window**.
4. Copy the URL from the **URL of the Page** field onto the clipboard.
5. Copy the URL from the clipboard to a program for creating websites (e.g. Microsoft Office Frontpage) or integrate it into your own website by means of a so-called inline frame.

6 Plant Monitoring

6.1 Plant Monitoring Options

Monitoring	Option in Sunny Portal	See
Plant events	Plant Log Book You can view messages regarding plant events.	Section 6.2
	Report Configuration You receive e-mails with the plant events.	Section 6.3
Yield, power, and CO ₂ avoided	Report Configuration You receive e-mails with your plant data.	
Inverter yields	Inverter Comparison You are informed by e-mail if the specific yield of an inverter is outside the average specific yield of all the inverters. Requirement for displaying the inverter comparison: <input type="checkbox"/> Your Sunny Portal plant must contain at least two inverters.	Section 6.6
Communication between Sunny Portal and Sunny Multigate	Communication monitoring You are informed by e-mail if a Sunny Multigate cannot be reached for 24 hours.	Section 6.5

6.2 Plant Log Book

6.2.1 Calling up and Filtering Messages

Messages help you detect disturbances of your plant, for example. Depending on your user role, you can only view the messages that are relevant for your user group.

In the plant log book messages are entered for:

- Plant
- Inverters
- Communication device
- Sunny Portal

The following types of messages are available, in ascending order according to the importance of the event:

Message type	Explanation
Info	Displays events that serve as information
Warning	Displays events as warnings if an unusual operating condition is present
Disturbance	Displays events as disturbance if operation is temporarily not possible As soon as the failure is remedied, operation is restarted automatically.
Error	Displays events as errors if operation is permanently not possible Operation cannot be started automatically.

Requirement:

- You must have the user role **Standard user**, **Installer**, or **Plant administrator** (see Section 10.1).

Calling up Messages

- Select „**My micro inverter plant**“ > **Plant log book** in the page and drop-down menu.

Filtering Messages

1. Select „**My micro inverter plant**“ > **Plant log book** in the page and drop-down menu.
2. To filter messages, set one or more of the following filters:

Input field or drop-down list	Explanation
Go to	<ul style="list-style-type: none"> To display messages up to a certain date, enter the date. Tip: click the calendar icon and select a date in the calendar.
Status	<p>The status of a message indicates whether you have already confirmed the message (see Section 6.2.2).</p> <ul style="list-style-type: none"> To display all unconfirmed messages, select Not approved. To display all confirmed messages, select Approved. To have all confirmed and unconfirmed messages displayed, select all.
Plant/Devices	<ul style="list-style-type: none"> To display Sunny Portal, plant, and device messages, select All. To display Sunny Portal messages, select Portal. To display plant messages, select Plant. To display device-specific messages, select the desired device.
Number per page	<ul style="list-style-type: none"> Select the number of messages that you would like to display.
Type	<ul style="list-style-type: none"> To display messages of a specific type, activate the desired checkbox Info, Warning, Failure, or Error.

6.2.2 Confirming Messages

You can confirm messages in order to mark them as read. This allows you to differentiate between messages that you have already read and new messages.

Requirement:

- You must have the user role **Standard user**, **Installer**, or **Plant administrator** (see Section 10.1).

Procedure:

1. Select „**My micro inverter plant**“ > **Plant log book** in the page and drop-down menu.
2. To confirm messages individually, select **✗** in the message row and in the **Confirmed** column.
3. To confirm several messages, mark the desired messages:
 - To mark individual messages, activate the relevant checkboxes on the left of the messages.
 - To mark all messages, select the **Select all** checkbox.
4. Select [**Submit**].

6.3 Reports

6.3.1 Report Overview

Reports are documents containing plant data or plant events. You can set the contents to be included in the reports and have them sent to you via e-mail from Sunny Portal.

The following report types are available:

- Info reports: contain plant data and are being sent to you regularly
- Event reports: inform you if certain plant events occur

Report	Possible content
Daily info report	<ul style="list-style-type: none"> • Daily yield (kWh) • Feed-in tariff today • CO₂ avoided today (kg)
Monthly info report	<ul style="list-style-type: none"> • Monthly yield (kWh) • Monthly feed-in tariff • Monthly CO₂ avoided (kg)
Event report	<ul style="list-style-type: none"> • Information • Warnings • Error

6.3.2 Creating Info Reports

You can create three daily info reports and three monthly info reports with different content. Sunny Portal sends you the daily info reports when it has processed all the data of the previous day. You receive the monthly info reports as soon as Sunny Portal has processed all data of the month's last day.

Requirements:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).
- The CO₂ avoided must be entered (see Section 7.9).

Procedure:

1. Select **Configuration > Report Configuration** in the page and drop-down menu.
2. In the **Report Configuration** drop-down list, select a daily info report or a monthly info report.
3. Select [**Edit**].
4. In the **Activate Report** area, activate the **Active** checkbox.
5. In the **E-mail Address(es)** field in the **Recipient** area, enter the e-mail addresses of the recipient(s). Separate multiple e-mail addresses by commas. The number of characters for the input field is limited. Therefore you can enter only a certain number of e-mail addresses.
6. In the **Send Report at** field in the **Interval** area, set the time from which the report is to be sent.
7. Configure the settings in the **Contents** area:
 - In the **Select Channel(s)** area, activate the content that is to be displayed in the e-mail.
 - In the **Send Report as** area, select the format in which Sunny Portal is to send the report.
 - If you wish to receive a page with the report, select the page in the drop-down list in the **Portal Page to Be Sent** area.
 - If you do not wish to receive a page with the report, select **Send no page** in the drop-down list in the **Portal Page to Be Sent** area.
8. To send a test report to the stated e-mail address, select [**Send Test Report**].
9. Select [**Save**].

6.3.3 Creating Event Reports

You can create three event reports with different content.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Report Configuration** in the page and drop-down menu.
2. In the **Report Configuration** drop-down list, select an event report.
3. Select **[Edit]**.
4. In the **Activate Report** area, activate the **Active** checkbox.
5. In the **E-mail Address(es)** field in the **Recipient** area, enter the e-mail addresses of the recipient(s). Separate multiple e-mail addresses by commas. The number of characters for the input field is limited. Therefore you can enter only a certain number of e-mail addresses.
6. Configure the settings in the **Interval** area:
 - To receive an hourly e-mail with the event report, activate the option **Hourly**.
 - To receive one daily e-mail with the event report, activate the option **Daily** and, in the drop-down list, select the time you would like to receive the e-mail.
7. Configure the settings in the **Contents** area:
 - Activate the checkboxes for the desired messages. In each case, you can select up to three event types from Sunny Portal and the plant: **Information, Warnings, Errors**.
 - In the **Send Report as** area, select the format in which Sunny Portal is to send the report.
 - In the area **Limit messages in one report**, use the drop-down list to select the maximum number of messages to be displayed in the e-mail.
 - If you wish to send reports even if there are no new events, activate the checkbox **Send empty reports if no new events are available**.
8. To send a test report to the stated e-mail address, select **[Send Test Report]**.
9. Select **[Save]**.

6.3.4 Retroactively Generating a Report

You can create a report for a specific date in the past.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Report Configuration** in the page and drop-down menu.
2. Select the desired report in the **Report Configuration** drop-down list.
3. In the **Report Date** field in the **Regenerate Report Manually** area, enter the date for which you wish to create a report. Tip: click the calendar icon and select a date in the calendar.
4. Select [**Generate**].
 - A message that the report has been successfully sent is displayed.





6.4 Overview of the Plant Monitoring Page

The page „My micro inverter plant“ > **Plant Monitoring** consists of the **Communication Monitoring** and **Inverter Comparison** areas.

Communication Monitoring Area

Communication monitoring shows the current communication status between all Sunny Multigates and Sunny Portal. If a Sunny Multigate cannot be reached, Sunny Portal informs you by e-mail (see Section 6.5 "Setting Communication Monitoring", page 37).

The communication monitoring status is displayed in Sunny Portal with the following icons:




Icon	Status	Explanation
	Deactivated	Communication monitoring is not set (see Section 6.5 "Setting Communication Monitoring", page 37).
	OK	The communication with all Sunny Multigates is flawless. The time of last contact is displayed.
	Error	The communication with all Sunny Multigates is interrupted. Use the Details hyperlink to access detailed information on the time of last contact. The error is displayed until it is corrected. If the error is not corrected, Sunny Portal sends another e-mail reminder up to three days after the first e-mail was sent.
	E-mail reminder is activated	Clicking the bell icon stops the sending of reminder e-mails for the current error. If a new error occurs, the e-mail reminder is sent again.

Inverter Comparison Area

Requirement for display of the area:

- The plant must contain at least two inverters.

Sunny Portal can recognize possible yield losses via the inverter comparison. If the specific yield of an inverter differs significantly from the average of all the inverters, Sunny Portal can inform you by e-mail (see Section 6.6 "Setting Inverter Comparison", page 38).

Icon	Status	Explanation
	Deactivated	The inverter comparison is not activated (see Section 6.6 "Setting Inverter Comparison", page 38).
	OK	The yields of the monitored inverters are within the configured range. The total yield of the last day for all inverters is displayed.
	Error	The specific yield is outside of tolerance for at least one monitored inverter. Use the Details hyperlink to access the following information: <ul style="list-style-type: none"> • The level of the specific yield of the affected inverters • The average value of all monitored inverters

6.5 Setting Communication Monitoring

By means of communication monitoring, you can be informed by e-mail if a Sunny Multigate cannot be reached for 24 hours.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select „**My micro inverter plant**“ > **Plant Monitoring** in the page and drop-down menu.
2. In the **Communication Monitoring** area, select [**Settings**].
 - The **Configuration communication monitoring** page opens.
3. To activate the communication monitoring, activate the **Active** checkbox and enter the e-mail address of the recipient(s) in the **Recipient** field. Separate multiple e-mail addresses by commas.
4. To deactivate the communication monitoring, deactivate the **Active** checkbox.
5. Select [**Save**].

6.6 Setting Inverter Comparison

Sunny Portal can recognize possible yield losses via the inverter comparison. If the specific yield of an inverter differs significantly from the average of all the inverters, Sunny Portal can inform you by e-mail. The inverter comparison is only displayed if there are at least two inverters in your Sunny Portal plant. Sunny Portal always carries out the inverter comparison at the beginning of the day for the previous day.

Requirements:

- The plant must contain at least two inverters.
- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select „**My micro inverter plant**“ > **Plant Monitoring** in the page and drop-down menu.
2. In the **Inverter comparison** area, select [**Settings**].
 - The **Configuration of inverter comparison** page opens.
3. Enter the recipient's e-mail address in the „Recipient“ field. Separate multiple e-mail addresses by commas.



PV array power

The PV array power has been preset in the **PV array power [kWp]** field. Sunny Portal calculates the generator power based on the nominal power of each inverter.

4. Enter the permissible tolerance in the **Tolerance** field for the specific yield of the inverter. This will also set the point from which the deviation of inverter specific yield is sufficient to trigger e-mail notification by Sunny Portal.
5. To select an inverter for the inverter comparison, activate the **Monitoring** checkbox in the line of the inverter.
6. Select [**Save**].

7 Plant Settings

7.1 Configuring Module Groups

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Module group configuration** in the page and drop-down menu.
2. Change settings regarding module group configuration as desired (see Section 3.1, paragraph „Configuring module groups“).

7.2 Layout Assistant

With the Layout Assistant you can create a plant layout showing the position of your PV modules and the associated micro inverters on the building graphically. Sunny Portal uses the plant layout for the system overview on the „**My micro inverter plant**“ > **Plant Overview** page. In the system overview, the yields, the power and any possible errors for each individual inverter are shown on the plant layout. The position of the PV module and the associated inverter in the plant are immediately recognizable via the plant layout.

7.2.1 User Interface

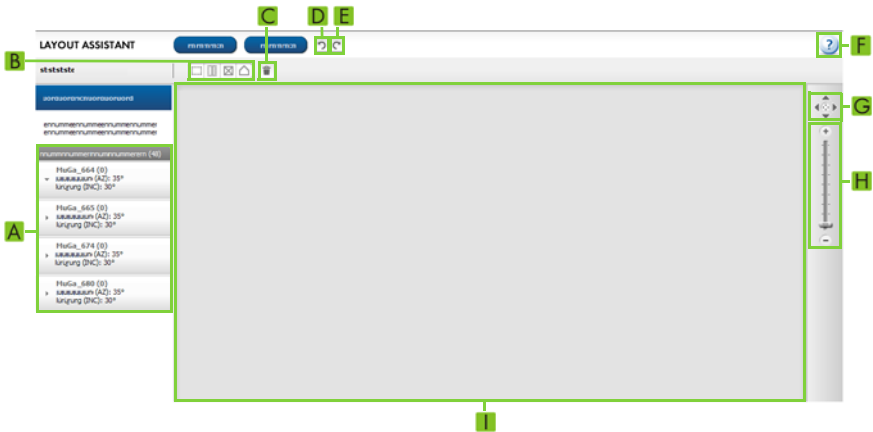







Figure 6: User interface of the Layout Assistant (example)

Item	Icon	Explanation
A	–	Area for the allocation of the inverter serial numbers to the PV modules and the associated inverters
B	–	Drawing tools
C		Button for deleting the selected object
D		Button for canceling the last action
E		Button for restoring the last action
F		Button for calling up help
G		Buttons for moving the display. The button in the middle centers the display. Tip: you can also move the display by holding down the left or right mouse button.
H	–	Buttons and scroll bar for enlarging und reducing the display. Tip: you can also change the display by turning the mouse wheel.
I	–	Work area for creation of the plant layout

Example of a finished plant layout:

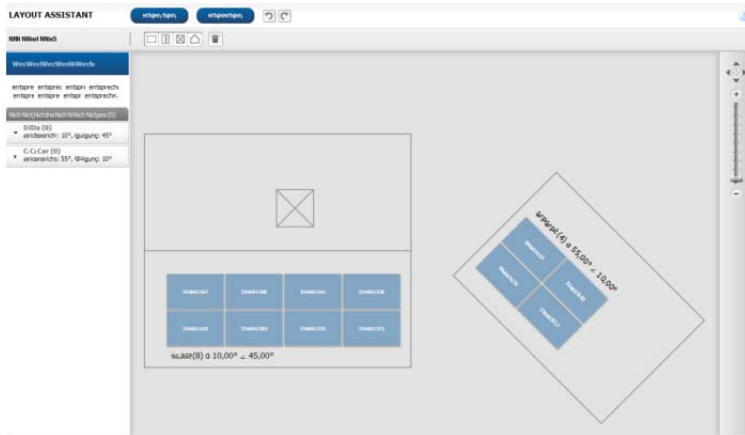


Figure 7: Completed plant layout (example)

7.2.2 Creating a Plant Layout

Requirements:





- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).
- The properties of the PV modules must be entered (see Section 7.1).
- You must know the position of the inverters in the plant.

Procedure:




- Draw the plant layout
- Align the PV modules in the plant layout and assign the serial numbers of the associated inverters to them.

Drawing the Plant Layout

1. Select **Configuration > Plant layout** in the page and drop-down menu.
 - The Layout Assistant opens.
2. Select the drawing tool for the desired element in the Layout Assistant. Tip: you can also drag the drawing tool into the drawing area by holding the left mouse button pressed and releasing it at the desired point in the drawing area.

Drawing tool	Explanation
	Draws a flat roof With this drawing tool you can draw a flat or pitched roof, for example.
	Draws a roof with an apex With this drawing tool you can draw a classic saddle roof. Tip: the roof apex can be moved by holding down the left mouse button.
	Draws a forbidden area You can use the forbidden areas to mark the position of chimneys or skylights, for example. The forbidden area can only be positioned on the roof area. If the roof area is moved, the forbidden area is also moved.
	Draws a façade The façade element can be adjusted.


- The selected element is placed in the drawing area.
3. In order to change the size of the element, proceed as follows:
 - Select element.
 - The outer lines of the element become a dotted line.
 - Move the mouse pointer onto a corner of the element.
 - The mouse pointer turns into two arrows.
 - Hold the left mouse button pressed and drag to make the element larger or smaller.
4. To move the element, proceed as follows:
 - Select element.
 - The outer lines of the element become a dotted line.
 - Move the mouse pointer onto the element.
 - The mouse pointer turns into a cross with arrows on the ends.
 - Hold the left mouse button pressed and move the element. Tip: you can also move the element with the arrow buttons on the keyboard.

5. To rotate an element, proceed as follows:
 - Select element.
 - The outer lines of the element become a dotted line and  will be displayed over one corner.
 - To rotate the element using the mouse, move the mouse over , hold the left mouse button down and rotate the element.
6. To delete the element, select the element and select .

Aligning the PV Modules in the Plant Layout and Assigning the Serial Numbers of the Associated Inverters to them

You must align the PV modules in the plant layout and assign the serial numbers of the associated inverters to them. This allows you to see which PV modules are connected to which inverters.

If PV modules or PV modules and forbidden areas overlap, this is indicated via a warning color.

1. Select a serial number in the **Unassigned serial numbers** area and drag it to a PV module in the drawing area. You cannot undo this procedure.
2. To move a PV module, proceed as follows:
 - Select the desired PV module.
 - The PV module will be highlighted.
 - Move the mouse pointer onto the PV module.
 - The mouse pointer turns into a cross with arrows on the ends.
 - Hold down the left mouse button and move the PV module as desired.
3. To rotate a PV module, proceed as follows:
 - Select the desired PV module.
 - The PV module will be highlighted.
 - Move the mouse pointer onto the PV module.
 - Select .
 - The PV module is rotated by 90 degrees.
4. To adopt the changes, select [**Save**] and select [**Close**].
5. To discard the changes, select [**Close**] and select [**No**].

7.3 Changing Plant Data

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the **Plant Data** tab.
3. Select **[Edit]**.
 - The setting menu for the plant data opens.
4. Make the desired changes to the plant data.
5. Select **[Save]**.

7.4 Changing the Plant Name

You can change the plant name that you entered during registration of the plant.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Plant name requirement:

- The plant name may consist of a maximum of 30 characters.

Procedure:

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the **Plant Data** tab.
3. Select **[Edit]**.
 - The setting menu for the plant data opens.
4. In the **Name** field, enter the desired plant name.
5. Select **[Save]**.

7.5 Changing the Plant Description

You can enter important features of the plant in the description. The text is displayed on the **Plant Profile** page.

The editor only supports text and does not support typography with HTML tags.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the **Plant Data** tab.
3. Select **[Edit]**.
 - The setting menu for the plant data opens.
4. Enter a description in the **Description** area.
5. Select **[Save]**.

7.6 Changing Operator Data

The operator is a private individual or legal entity that owns plants for business purposes, for example. The operator can prompt the use of the plant without necessarily being the user him/himself. The name of the operator is displayed on the **Plant Profile** page.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the **Operator** tab.
3. Select **[Edit]**.
 - The setting menu for the operator data opens.
4. Enter the operator data.
5. Select **[Save]**.

7.7 Changing/Deleting the Plant Image

The plant image is the image in the page and drop-down menu, next to the menu item „My micro inverter plant“.

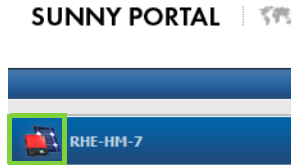


Figure 8: Plant image

You can replace the standard plant image with a user-defined plant image. The user-defined plant image is also displayed on the following pages:

- **Plant Profile** page
- If pages for Sunny Portal are released, it is also displayed on the list of released plants on the www.SunnyPortal.com homepage.

You can save several images in a gallery in Sunny Portal. This allows you to easily change the plant image and access your images from different computers.

Changing the Plant Image

Requirement:


- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Plant image requirements:

- Maximum image size: 500 kB
- Possible image formats: JPG, PNG, GIF

Procedure:

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the **Plant Data** tab.
3. Select **[Edit]**.
 - The setting menu for the plant data opens.
4. Select **[Load image]** in the **Plant Image** area.
5. Select the desired image from one of your directories.
6. Select **[Open]**.
7. To change the plant image size, move the gray squares with the mouse.
8. To move the image section, click on the image section and move it while holding the left mouse button pressed.
9. Select **[Save]**.

10. To save an image in the gallery, upload the image to the gallery:
 - Select [**Select from the gallery**].
 - Select [**Upload**].
 - Select [**Browse**].
 - Select the desired image from one of your directories.
 - Select [**Upload selected file**].
 - Select .

The image is saved in the gallery.
11. To upload an image from the gallery as the plant image, select [**Select from the gallery**].
12. Double-click the desired image.
13. Select [**Save**].

Deleting the User-Defined Plant Image

If you delete the user-defined plant image, Sunny Portal displays the default plant image.

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the **Plant Data** tab.
3. Select [**Edit**].
 - The setting menu for the plant data opens.
4. Select [**No plant image**] in the **Plant Image** area.
5. Select [**Save**].

7.8 Entering the Feed-In Tariff

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the tab **Parameters**.
3. Select [**Edit**].
 - The setting menu for parameters opens.
4. In the **Reimbursement** area, enter the feed-in tariff per kWh in the **Feed-in compensation** field. Also select the desired currency in the accompanying drop-down list.
5. Select [**Save**].

7.9 Entering the Value of CO₂ Avoided

The CO₂ factor indicates how much CO₂ is produced during the power generation of one kilowatt hour. The CO₂ factor can vary depending on the grid operator. You can find out the level of the CO₂ factor for one kilowatt hour of electric current by contacting your grid operator.

Sunny Portal can use the CO₂ factor value to calculate how much CO₂ was saved due to the power generation of your plant.

You can view the value of CO₂ avoided on the following pages:

- **Plant Overview** page
- **Plant Profile** page
- Daily info report or monthly info report (see Section 6.3).

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the tab **Parameters**.
3. Select **[Edit]**.
 - The setting menu for parameters opens.
4. In the **Factor** area, enter the CO₂ factor in the field or click the slide control and set the CO₂ factor holding the left mouse button pressed.
5. Select **[Save]**.

7.10 Calculating the Predicted Annual Yield

Sunny Portal can display in a table how the predicted annual yield of your plant is likely to be distributed throughout the months of a year.

The predicted annual yield of the plant is calculated from the specific annual yield (kWh/kWp) at the plant location multiplied by the plant power.

You can obtain the specific annual yield for your plant location from irradiation maps. Local conditions such as shading of your plant or the plant orientation are not taken into account by Sunny Portal.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the tab **Parameters**.
3. Select **[Edit]**.
 - The setting menu for parameters opens.

4. In the **Yield Expectations** area, enter the specific annual yield in the **Specific Annual Yield** field.
 - The predicted annual yield is displayed in the Predicted Annual Yield field.
5. To make it possible to configure the average expected yield on the **Energy and Power** and **Annual Comparison** pages, activate the checkbox **The monthly distribution can be configured in the diagrams**.
6. Select [**Save**].

7.11 Setting the Monthly Distribution of the Predicted Annual Yield

The monthly distribution shows how the predicted annual yield is distributed throughout the months of the year.

You have the following options:

- Having Sunny Portal suggest the monthly distribution
- Manually entering the monthly distribution

Having Sunny Portal Suggest the Monthly Distribution

Requirements:

- The plant location must be entered (see Section 7.3).
- Have the predicted annual yield calculated (see Section 7.10).
- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the tab **Parameters**.
3. Select [**Edit**].
 - The setting menu for parameters opens.
4. In the **Yield Expectations** area, select [**Suggest a Monthly Distribution**].
 - The monthly distribution is displayed in the table with the months.
5. To display the average expected yield and the monthly distribution in the diagrams on the **Annual Comparison** and **Energy and Power** pages, activate the checkbox **Display the monthly distribution in the yearly comparison, as well as energy and power**.
6. To make it possible to configure the average expected yield on the **Annual Comparison** and **Energy and Power** pages, activate the checkbox **The monthly distribution can be configured in the diagrams**.

Manually Entering the Monthly Distribution

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the tab **Parameters**.
3. Select **[Edit]**.
 - The setting menu for parameters opens.
4. In the **Yield expectations** area, enter values in the **in %** fields of the table with the months.
5. To display the predicted annual yield and the monthly distribution in the diagrams on the **Annual Comparison** and **Energy and Power** pages, activate the checkbox **Display the monthly distribution in the yearly comparison, as well as energy and power**.
6. To make it possible to configure the predicted annual yield on the **Annual Comparison** and **Energy and Power** pages, activate the checkbox **The monthly distribution can be configured in the diagrams**.
7. Select **[Save]**.

7.12 Editing the Data Releases

You can set whether you would like to provide the „sonnenertrag.eu“ PV database with your plant data. By providing this data, you can contribute to improving this PV database. The more users participate, the better „sonnenertrag.eu“ can indicate the yields to be expected for the different locations.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the **Data releases** tab.
3. Select **[Edit]**.
 - The setting menu for the data releases opens.
4. Activate or deactivate the data releases checkbox.
5. Select **[Save]**.

8 Device Settings



8.1 Filtering the Device Overview Page

You can find individual devices more easily if you filter the device overview.

Requirement:

- You must have the user role **Standard user**, **Installer**, or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Device Overview** in the page and drop-down menu.
2. To adjust how the devices are arranged in the device overview, do the following:
 - To view the device overview in hierarchical structure, select .
 - To view the device overview in tree structure, select  (default setting).
3. Set one or more of the following filters:

Field or drop-down list	Explanation
Device Name	Complete name of the device or part of the device name
Serial Number	Complete device serial number or parts of the serial number
Devices	Device class searched, e.g. Photovoltaic inverter , Sunny Multigate .
Data Collection	<ul style="list-style-type: none"> • All: activated and deactivated devices are searched. • Active: only activated devices are searched. • Deactivated: only deactivated devices are searched.

4. Select **[Refresh]**. Tip: you can sort the devices in the device overview in ascending or descending order by clicking the blue entry in the table header (**Device Name**, **Serial Number**, **Product Group**, **Data Collection**).
5. To clear the filter, select **[Reset]**.

8.2 Calling up the Device Properties

The tab with the device properties displays information on each device. Depending on the device and the device settings, various device properties can be displayed on this tab.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Device Overview** in the page and drop-down menu.
2. In the row for the device and the **Properties** column, select .



8.3 Calling up the Device Parameters

The parameters of a device are described in the respective device manual. You can only read the device parameters on this page, you cannot change them. If you want to change the parameters, use the Sunny Explorer software (see Sunny Explorer help). You can obtain Sunny Explorer free of charge from the download area at www.SMA-Solar.com. Sunny Explorer is compatible with micro inverter plants from Sunny Explorer software version 1.06.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Device Overview** in the page and drop-down menu.
2. In the row for the device and the **Parameters** column, select .
 - You can find the parameters in the parameter list.
3. To display changes to the parameters, select  in the **History** column.

8.4 Entering Line Conductors

Sunny Portal can display the line conductors to which each inverter is connected in the device properties. In order to display the line conductors, you must enter them first.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Call up the inverter properties (see Section 8.2).
2. Select **[Edit]**.
 - The menu for setting the device properties opens.
3. In the **Line conductor** area, activate the checkbox of the line conductor to which the inverter is connected.
4. Select **[Save]**.

8.5 Changing the Device Name

The serial number of the device is displayed as the default device name.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Device name requirement:

- The device name may consist of a maximum of 20 characters.

Procedure:

1. Call up device properties (see Section 8.2).
2. Select [**Edit**].
 - The menu for setting the device properties opens.
3. Enter a device name in the **Device Name** field.
4. Select [**Save**].

8.6 Changing a Device Description

You can enter an arbitrary description for each device. The description of the device is displayed in the **Device Properties**.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Call up device properties (see Section 8.2).
2. Select [**Edit**].
 - The menu for setting the device properties opens.
3. Enter a description in the Description field.
4. Select [**Save**].

9 Plant Management

9.1 Adding a Sunny Multigate

A micro inverter plant in Sunny Portal can consist of up to four Sunny Multigates. If your micro inverter plant in Sunny Portal already consists of four Sunny Multigates, you must create a new plant in Sunny Portal (see Section 3.1 "Registering Sunny WebBox in Sunny Portal", page 10).

Requirements:

- The new Sunny Multigate must be commissioned in your plant.
- The new Sunny Multigate must be connected to the router/network switch and connected to the Internet (see installation manual of the Sunny Multigate).
- The PIC and RID of the Sunny Multigate must be available (see type label or label supplied with the Sunny Multigate).
- The serial number of the inverters must be available as well as the following data of the connected PV module: manufacturer, type, tilt and azimuth angle.
- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Go to **www.SunnyPortal.com**.
2. Select [**Plant Setup Assistant**].
 - The Plant Setup Assistant opens.
3. Select [**Next**].
 - The **User Registration** page opens.
4. Enter the e-mail address and the Sunny Portal password in the E-mail address and **Password** fields.
5. Select [**Next**].
 - The **Select Plant** page opens.
6. Select the option **Add or replace devices**.
7. In the row for the plant and the **Option** column, select **+**.
 - The **Select devices** page opens.
8. Enter the PIC and RID of a new Sunny Multigate in the **PIC** and **RID** fields.
9. Select [**Identify**].
10. To add other Sunny Multigate, enter the PIC and RID of another Sunny Multigate and select [**Identify**].
11. Select [**Next**].
 - The page **Micro Inverter Detection** opens and the number of the inverters found will be displayed below the Sunny Multigate.
12. In order to display the serial numbers of the micro inverters found, click onto the number of the micro inverters found.

13. Select [**Next**].
 - The **Configure Module Groups** page opens.
14. Select [**Edit**] in the module group row in order to add new inverters to an existing module group.
15. Select [**+ Add**] in order to add the new inverters to a new module group.
16. In the **Select Inverter** area, select all inverters to which PV modules with the same properties are connected.
17. Select [**<<**].
 - The selected inverters are being moved to the area **Assigned Inverters**.
The selected inverters form a module group and are no longer available in the area **Available Inverters**.
18. In order to move inverters from the area **Assigned Inverters** back to the **Available Inverters** area, select the desired inverters and then [**>>**].
19. Select [**Submit**].
20. Once you have assigned all inverters, select [**Next**].
 - The Plant Setup Assistant shows a summary of your entered data.
21. Select [**Finish**].
 - Sunny Portal will confirm in a window that your plant registration was successful.

9.2 Adding an Inverter

Requirements:

- The new inverter must be a micro inverter.
- The new inverter must be commissioned in your plant.
- The new inverter must be connected to the Sunny Multigate (see inverter installation manual).
- The new Sunny Multigate must be connected to the router/network switch and connected to the Internet (see installation manual of the Sunny Multigate).
- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Plant Selection > „My micro inverter plant“** in the page and drop-down menu if you have several Sunny Portal plants.
2. Select **Configuration > Device Overview** in the page and drop-down menu.
3. Select the **Overview of New Devices** tab.
4. Select [**Refresh devices**]. Your plant is then searched for new devices.
 - After around one minute, the new inverter is displayed.
5. In the row for the new inverter, select .
 - Sunny Portal establishes a connection to the new inverter via the Sunny Multigate.
Page 2 of the Configuration Assistant opens.

6. Follow the Configuration Assistant instructions.
- The new inverter is displayed on the page **Configuration > Device Overview**.

9.3 Replacing the Sunny Multigate

Requirements:

- The new Sunny Multigate must be commissioned in your plant.
- The new Sunny Multigate must be connected to the router/network switch and connected to the Internet (see installation manual of the Sunny Multigate).
- The PIC and RID of the new Sunny Multigate must be available (see type label or label supplied with the Sunny Multigate).
- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).




Device replacement: Do not delete old device

If you delete the device that you wish to replace from Sunny Portal, all the device data is irretrievably deleted.

- To retain the data of the old device in Sunny Portal, do **not** delete the device.

Procedure:

1. Go to **www.SunnyPortal.com**.
2. Select [**Plant Setup Assistant**].
 - The Plant Setup Assistant opens.
3. Select [**Next**].
 - The **User Registration** page opens.
4. Enter the e-mail address and the Sunny Portal password in the **E-mail address** and **Password** fields.
5. Select [**Next**].
 - The **Select Plant** page opens.
6. Select the option **Add or replace devices**.
7. Select  and then [**Next**] in the plant row in which you wish to replace the Sunny Multigate.
 - The **Select devices** page opens.
8. Enter the PIC and RID of the Sunny Multigate in the **PIC** and **RID** fields.
9. Select [**Identify**].
10. To add other Sunny Multigate, enter the PIC and RID of another Sunny Multigate and select [**Identify**].
11. Select [**Next**].
 - The **Replace Devices** page opens.

12. In the row for the old Sunny Multigate, select the new Sunny Multigate in the **Replace with** drop-down list.
13. Select [**Next**].
 - A summary is displayed.
14. Select [**Finish**].

9.4 Replacing an Inverter

Requirements:

- The new inverter must be a micro inverter.
- The new inverter must be commissioned in your plant.
- The new inverter must be connected to the Sunny Multigate (see installation manual for the Sunny Multigate).
- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).




Device replacement: Do not delete old device

If you delete the device that you wish to replace from Sunny Portal, all the device data is irretrievably deleted.

- To retain the data of the old device in Sunny Portal, do **not** delete the device.

Procedure:

1. Select **Plant Selection > „My micro inverter plant“** in the page and drop-down menu if you have several Sunny Portal plants.
2. Select **Configuration > Device Overview** in the page and drop-down menu.
3. Select the **Overview of New Devices** tab.
4. Select [**Refresh devices**]. Your plant is then searched for new devices.
 - After around one minute, the new inverter is displayed.
5. In the row for the inverter to be replaced, select .
 - Sunny Portal establishes a connection to the new inverter via the Sunny Multigate. Page 2 of the Configuration Assistant opens.
6. Follow the Configuration Assistant instructions.

9.5 Deactivating/Activating a Device

In the following cases, you must deactivate devices in Sunny Portal:

- You have removed a device from your plant.
- or**
- You no longer wish to display a device in Sunny Portal.

The data of the deactivated device is retained in Sunny Portal.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Call up device properties (see Section 8.2).
2. Select **[Edit]**.
 - The menu for setting the device properties opens.
3. To deactivate the device in Sunny Portal, deactivate the **Active** checkbox in the **Data Collection** area.
4. To activate the device in Sunny Portal, activate the **Active** checkbox in the **Data Collection** area.
5. Select **[Save]**.

9.6 Deleting a Device

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Device data and measured values are irretrievably deleted

If you delete a device, all the data of that device is irretrievably deleted.

- Check whether it is sufficient to deactivate the device (see Section 9.5).

Procedure:

1. Call up device properties (see Section 8.2).
2. Select **[Delete]**.
 - A window containing a security question opens.
3. To irretrievably delete the device, select **[Delete]**.

9.7 Deleting a Sunny Portal Plant

If you delete your plant, the plant and its data are irretrievably deleted in Sunny Portal.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > Plant Properties** in the page and drop-down menu.
2. Select the **Plant Data** tab.
3. Select **[Edit]**.
4. In the **Plant Data** area, select **[Irretrievably delete plant]**.
 - A security question opens.
5. To irretrievably delete the plant, select **[Yes]**.

10 User Management

10.1 User Roles and User Rights

If you have the user role **Plant administrator**, you can create other users in Sunny Portal so that they have access to your Sunny Portal plant. You must assign every user a user role. The user roles have different rights in your Sunny Portal plant.

The following user roles are possible:

- Guest
- Standard user
- Installer
- Plant administrator

General Rights

Rights	User role			
	Guest	Standard user	Installer	Plant administrator
View pages	✓	✓	✓	✓
Change and delete pages	-	-	✓	✓
Release pages for viewing in Sunny Portal and publish pages	-	-	✓	✓
Save diagram data	-	✓	✓	✓
View/change user information	✓	✓	✓	✓
Change Sunny Portal password	-	✓	✓	✓
Change plant password	-	-	✓	✓
View and read out device properties	-	-	✓	✓
View/change plant properties	-	-	✓	✓
Set plant layout	-	-	✓	✓
Configure PV modules	-	-	✓	✓
View/change report configuration	-	-	✓	✓
Change device properties	-	-	✓	✓
Add/replace/delete devices	-	-	✓	✓
Delete plant	-	-	✓	✓
Set communication monitoring	-	-	✓	✓
Set inverter comparison	-	-	✓	✓

Rights	User role			
	Guest	Standard user	Installer	Plant administrator
View plant log book and approve entries	-	✓	✓	✓
Import data	-	-	✓	✓
Ascertain the software package version	-	✓	✓	✓
View user management	-	-	-	✓
Create/delete users and assign user roles	-	-	-	✓

Rights for the Plant Overview Page

Plant Data area:

Rights	User role			
	Guest	Standard user	Installer	Plant administrator
View current power	✓	✓	✓	✓
View plant status	-	-	✓	✓
View the status of the inverter comparison	-	-	✓	✓
View energy	✓	✓	✓	✓
View revenue*	-	✓	✓	✓
View CO ₂ avoided	✓	✓	✓	✓
View plant information	✓	✓	✓	✓
View weather	✓	✓	✓	✓
View location	-	✓	✓	✓

* Is only displayed if the feed-in tariff has been set up (see Section 7.8).

System Overview area:

Rights	User role			
	Guest	Standard user	Installer	Plant administrator
Show the current power of each inverter	-	-	✓	✓
View inverter problems highlighted in color in the display	-	-	✓	✓
View status of the inverter in the display	-	-	✓	✓

10.2 Creating a New User

Requirement:

- You must have the user role **Plant administrator** (see Section 10.1).

Procedure:


1. Select **Configuration > User Management** in the page and drop-down menu.
2. Select [**New User**].
3. Enter the e-mail address of the new user in the **E-mail Address** field.
4. Activate the desired user role in the **Roles** area.
5. Select [**Save**].
 - The new user receives an e-mail with the access data.

10.3 Deleting a User

Requirement:

- You must have the user role **Plant administrator** (see Section 10.1).

Procedure:


1. Select **Configuration > User Management** in the page and drop-down menu.
2. In the row for the user and the **Delete** column, select .
3. Confirm the security question with [**Yes**].

10.4 Changing User Rights

Requirement:

- You must have the user role **Plant administrator** (see Section 10.1).

Procedure:

1. Select **Configuration > User Management** in the page and drop-down menu.
2. In the row for the user and the **Edit** column, select .
 - The **E-mail Address** and **Roles** areas open.
3. Activate the desired user role in the **Roles** area.
4. Select [**Save**].

10.5 Changing User Information

Each user can enter individual user information. User information includes the name and the address, for example.

1. Select **User Info/Logout > User Information** in the page and drop-down menu.
2. Select [**Edit**].
 - The setting menu for user information opens.
3. Enter the user information.
4. Select [**Save**].

11 Passwords

11.1 Selecting Secure Passwords

You increase the security of your password with the following measures:

- Select passwords that contain at least eight characters.
- Use combinations of upper and lowercase letters, special characters and numbers.
- Do not use names or common words (e.g. „dog“, „cat“, „house“).
- Avoid using words that have any personal relevance to you such as the names of persons or pets, personnel numbers, identification numbers, or car license plates.
- Do not repeat names or words (e.g. „househouse“ or „catcat“).
- Do not combine numbers or letters in the same order as they appear on your keyboard (e.g. „12345“, „qwerty“).

11.2 Required Passwords

11.2.1 Sunny Portal Password

The Sunny Portal password protects your Sunny Portal access against unauthorized access. You can log into Sunny Portal with the Sunny Portal password. If you register a plant in Sunny Portal, you must specify a Sunny Portal password during registration. You can change the Sunny Portal password (see Section 11.3.1).

11.2.2 Plant Password

Plant Password Basics

The safety concept for plants from Solar Technology AG generally distinguishes between two user groups **User** and **Installer**. The user groups have different rights. The following plant passwords are configured in the devices by default: **User** = **0000**, **Installer** = **1111**. You can only access all devices of your plant with your communication product (e.g. Sunny Explorer) if the same plant password has been set for all devices. You can find more information on the plant passwords and on the user group and safety concept in the Sunny Explorer help.

Plant Password in Sunny Portal

For the registration of your plant, Sunny Portal requires the plant password for the **Installer** user group. You entered the plant password when registering your plant in Sunny Portal.

You can use Sunny Portal to change the plant password for the **Installer** user group for all devices that are registered in your Sunny Portal plant (see Section 11.3.2). The plant password for the **User** user group cannot be changed in Sunny Portal. You can change the plant password for the **User** user group with Sunny Explorer, for example (see Sunny Explorer help).

11.3 Changing Passwords

11.3.1 Changing the Sunny Portal Password

Sunny Portal password requirements:

- The Sunny Portal password may consist of a maximum of 8 characters.
- You must have the user role **Standard user**, **Installer**, or **Plant administrator** (see Section 10.1).

The following special characters are permitted:

- ! \$ % & / () = ? + - . ; : _ < > #
- Space

Procedure:

1. Select **User Info/Logout > User Information** in the page and drop-down menu.
2. Select the hyperlink **If you want to change your password, please click here** on the **User Information** tab.
3. Enter the old and the new Sunny Portal password in the fields provided.
4. Select [**Save**].

11.3.2 Changing the Plant Password

If you change the plant password in Sunny Portal, the plant password of all Sunny Multigates registered in your Sunny Portal plant is also being changed.

Requirement:

- You must have the user role **Installer** or **Plant administrator** (see Section 10.1).

Plant password requirement:

- The plant password can be a maximum of twelve characters.

The following special characters are permitted:

- ? _ ! -

Procedure:

1. Select **Configuration > Plant Properties**.
2. Select the **Plant Data** tab.
3. Select [**Edit**].
4. Enter the old password in the **Old plant password** field in the **Plant Data** area.
Tip: if you do not know the old plant password and would like to change the plant password to the currently used plant password for the Sunny Multigate, enter the current password in the **Old plant password** field.
5. Enter a new plant password in the **New plant password** field in the **Plant Data** area.
6. Enter the new password again in the **Repeat password** field in the **Plant Data** area.

7. Select [**Save**].
- A message that the plant password has been successfully changed is displayed.
- Is a message displayed stating that the plant password has not successfully been changed?
It is possible that a device can currently not be reached.
 - Try to change the plant password again later.
 - If the problem persists, change the plant password of the devices with Sunny Explorer (see Sunny Explorer help) and then enter the new password in Sunny Portal. Otherwise, Sunny Portal cannot display any new data from the devices.

11.4 Forgotten Sunny Portal Password

1. Go to **www.SunnyPortal.com**.
2. Select the **Forgotten Password?** hyperlink in the **Login** area.
3. Enter your e-mail address in the **E-mail** field that you used for registering in Sunny Portal.
4. Select [**Generate New Password**].
 - You will receive an e-mail with a new password.
5. Change the assigned password (see Section 11.3.1).

11.5 Forgotten Plant Password

If you have forgotten the plant password that is set in Sunny Multigate for the user group **Installer**, you can unlock the Sunny Multigate with a Personal Unlocking Key (PUK). For each Sunny Multigate there is one PUK per user group (**User** and **Installer**). Sunny Portal uses the plant password of the **Installer** user group.

Requirement:

- A computer with Sunny Explorer from software version 1.06 on must be connected to the plant (see Sunny Explorer help).

Procedure:

1. Request PUK for the Sunny Multigate (see Sunny Explorer help).
2. Unlock the Sunny Multigate using the PUK you received via the Sunny Explorer (see Sunny Explorer help).
3. Enter the new plant password in Sunny Portal (see Section 11.3.2).

12 Glossary

Azimuth Angle (Orientation)

In the Northern hemisphere, the azimuth angle indicates by how many degrees the module surface deviates from the compass point South. In the southern hemisphere, it indicates the deviation from the direction North. The azimuth angle is counted from south (0°) via west (+90°) with positive values and from south (0°) via east (-90°) with negative values.

DHCP

DHCP is short for „Dynamic Host Configuration Protocol“ and is a server service with which devices are automatically integrated into a network. If no DHCP is activated in the network (e.g. on the router), devices must be integrated into the network manually. In order to do this, an IP address and subnet mask that are suitable for the network must be created manually for the device to be integrated, for example.

Inline Frame

An inline frame is an HTML element for structuring websites. It is used to display another website's content on a website. An inline frame is being inserted in the website's source code that contains the website's address that is supposed to be embedded.

kWp

See peak power.

Log File

A log file is an automatically run log of events on a computer system. A log file contains errors that occurred during operation of the computer system, for example.

Module Group

A module group in Sunny Portal consists of micro inverters with PV modules that fulfill the following criteria:

- Same manufacturer
- Same module type
- Same azimuth and tilt angle

Nominal Power (kWp)

See peak power

Peak Power (kWp)

The peak power is the maximum power output calculated for a PV module under STC (Standard Test Conditions).

The peak power is measured in watt peak (Wp), kilowatt-peak (kWp), or megawatt-peak (MWp). Peak power is also called nominal power.

STC: standard test conditions in the laboratory under which the electrical characteristics of a PV module are measured. This allows different PV modules to be compared with one another.

The PV modules are exposed to a vertical irradiation of 1.000 W/m², an ambient temperature of

+25 °C (+77 °F), and a wind speed of 1 m/s. The electrical characteristics are then measured. The test conditions are designed to correspond to the ideal ambient conditions for operation of an installed PV module.

PIC

See abbreviations in Section 1.

Plant Power in kWp

The plant power in kWp (kilowatt peak) is the maximum possible plant power. The plant power in kWp is also known as the nominal power of the plant.

The peak power of a PV plant is the sum of the peak powers of all PV modules installed (see peak power of a PV module). The peak power of a PV plant is used to compare the plant yield and plant costs with other PV plants, for example. The peak power of a PV plant is often referred to as „plant power (kWp)“.

An installed plant can rarely achieve peak power because it is not installed in laboratory conditions.

Plant Setup Assistant

The Plant Setup Assistant is an application in Sunny Portal that helps you register your plant in Sunny Portal.

Predicted Annual Yield (kWh)

The predicted annual yield of a plant is calculated using the specific annual yield (kWh/kWp) at the plant location and the plant power in kWp (also known as nominal power).

You can obtain the specific annual yield for your PV plant location from irradiation maps.

Specific annual yield (kWh/kWp) × nominal power (kWp) = predicted annual yield (kWh)

Example calculation of the predicted annual yield

The specific annual yield at a PV plant location is approximately 900 kWh/kWp. The nominal power of the PV plant is 4,8 kWp.

Predicted annual yield = 900 kWh/kWp × 4,8 kWp = 4.320 kWh

PV Array

Technical device for the conversion of solar energy into electrical energy. All electrically connected PV modules installed in series or in parallel within a plant are referred to as a PV array.

For plants with micro inverters, a PV array consists of one PV module, as only one PV module can be connected to a micro inverter.

PV Array Power

The PV array power is the maximum power of the PV modules that are connected to one inverter.

PV Module

Electrical connection of several PV cells encapsulated in an enclosure to protect the sensitive cells from mechanical stress and environmental influences.

RID

See abbreviations in Section 1.

SMA Connection Assist

SMA Connection Assist helps you configure the devices for your network if they do not automatically integrate into your network and connect to Sunny Portal.

Specific Plant Yield (kWh/kWp)

The specific plant yield is a key figure that describes the efficiency of a PV plant, regardless of its size. The specific plant yield is dependent on the irradiation at the location, the ambient temperature, shading, tilt and azimuth angle of the PV modules, and the power of the PV modules and inverters.

You can assess the efficiency of your PV plant by comparing the specific plant yield of your PV plant with the specific annual yield for your PV plant location.

The specific plant yield is calculated from the actual measured energy yield (kWh) of a PV plant for a specific period (e.g. a year or a month) divided by the peak power (kWp) of the PV plant.

Example: calculation of the specific plant yield for a year

Your PV plant consists of 40 PV modules, each with a peak power of 120 Wp (watt peak) according to the manufacturer specification. Thus, your PV plant has a peak power of $40 \times 120 \text{ Wp} = 4.800 \text{ Wp} = 4,8 \text{ kWp}$.

To calculate the specific plant yield of your PV plant for the year 2011, for example, you will need the actual (measured) energy yield of your PV plant for 2011, e.g. 3.200 kWh. You can now calculate the specific plant yield of your PV plant for the year 2011: 3.200 kWh divided by $4,8 \text{ kWp} = 666 \text{ kWh/kWp}$ in 2011.

Tilt Angle

The tilt angle indicates by how many degrees the tilt of the the module surface deviates from the horizontal.

13 Contact

If you have technical problems concerning our products, contact the SMA Service Line. We require the following information in order to provide you with the necessary assistance:

- Type and serial number of the inverter
- Quantity and type of all inverters
- Connection type between the computer and Sunny Multigate (cable or wireless connection)
- Firmware and hardware version of the Sunny Multigate (for firmware version see Section 8.2, for hardware version see type label of the Sunny Multigate).
- Fault description

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