SINVERT

WebMonitor

Operating Manual · 08/2012

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Inverter
SINVERT WebMonitor

Operating Manual

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

> **⚠ DANGER**
>
> indicates that death or severe personal injury **will** result if proper precautions are not taken.

> **⚠ WARNING**
>
> indicates that death or severe personal injury **may** result if proper precautions are not taken.

> **⚠ CAUTION**
>
> indicates that minor personal injury can result if proper precautions are not taken.

> **NOTICE**
>
> indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

> **⚠ WARNING**
>
> Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

1

SINVERT WebMonitor is a Web application for monitoring solar plants in which SINVERT PVM / PVS inverters are used.

It is used for transmitting the status of the solar plant, for displaying production and income, or optionally for reporting any problems.

Main features

- Solar plant configuration
- Display of current and historical data
- Plant monitoring and reporting mechanisms
- Graphical representation of the monitored data
- Map

System requirements

SINVERT WebMonitor works with most modern Web browsers:

- Microsoft Internet (7.0 or later)
- Mozilla Firefox (2.0 or later)
- Opera (8.5 or later)
- Apple Safari (3.0 or later)

Note

JavaScript must be activated for the browser used, and cookies must be enabled.

Note

Appropriate protective measures (among other things, IT security, e.g. network segmentation) are to be taken in order to ensure safe operation of the system in the case of networking. Additional information about Industrial Security is available on the Siemens Internet (www.siemens.com/industrialsecurity).

Target group

This documentation is designed for use by operators of solar plants.

Note

SINVERT WebMonitor is not suitable for accounting purposes.

Getting started

<div style="text-align: right; font-size: 3em;">2</div>

Purpose of this chapter

This chapter supports you in learning how to use the SINVERT WebMonitor.
You will learn how to call up the Web interface, how to register, and how to log in.

2.1 Calling the Web portal

How do you enter the Web portal?

Call up one of the two Internet addresses below:

- www.siemens.com/sinvert-webmonitor
- www.siemens.com/sinvert-WebMonitor

The first page that appears welcomes you and offers the following options:

- Register
- Login
- Start tour

Figure 2-1   Welcome page

Start tour

> This guest access provides you with an overview of the WebMonitor functionality and allows you to view the live data of an existing solar plant. Settings and configurations cannot be modified here.

2.2   Register

How do I register?

1. Select "Register" on the Welcome page.

   The "Registration window" then opens.

Figure 2-2   Registration window

2. Enter the necessary data in the text fields.
   Whereby:

   – Username: This is the name you use to log in;
     it cannot be changed later!

   – E-mail: A valid e-mail address that is used to send you the desired registration data, to confirm the validation, or re-apply for a lost password.

   – You can modify this information later via the user menu (see Chapter "Editing users (Page 65)").

3. Finally, enter the text shown in the image in the adjacent text field, and click "Register".

Validating registration data

A short time after sending off the completed registration screen form, you will receive an e-mail with the authorization data required for logging in.
The e-mail includes:

- The username

- The password

- The link for validation

Follow the link given to validate your registration data.

When you have successfully carried out validation, you will receive an appropriate message.

Note
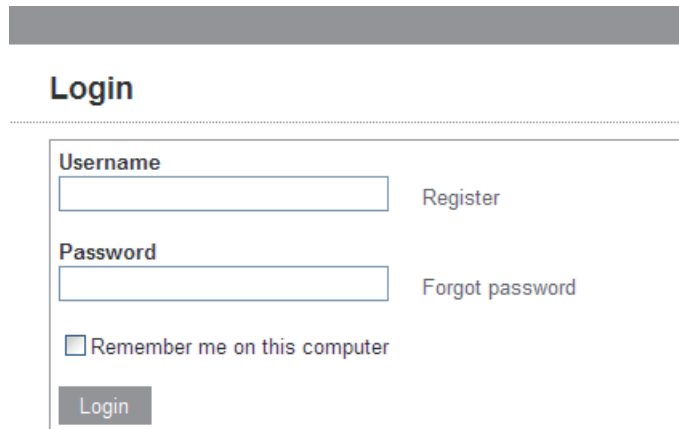
You cannot log in to the SINVERT WebMonitor until you have validated your registration data.

2.3 Login

Login procedure:

1. Select "Login" on the Welcome page.

   The following login screen appears:

   ### Login

   Username

   Register

   Password

   Forgot password

   ☐ Remember me on this computer

   Login

2. Enter your username and password and click "Login".

   After logging in, you are taken to the Web site where you can manage your solar plant.

Forgot password

If you have forgotten your password for logging in to the system, you can request a new password.

1. On the Login page, click "Forgot password".

2. Enter the e-mail address you used for registration.

3. You will receive a new password by e-mail within a very short time.

Plant management

<div align="right">3</div>

3.1 Solar plants

3.1.1 Plant hierarchy

A solar plant is a logical group of subplants or inverters.

Plants, subplants and inverters are combined into a hierarchy in which the plant represents the highest level. Subplants and inverters can be assigned to a plant, and inverters can be assigned to a subplant.

The inverters can only be added to a plant direct if no subplants have been defined for this plant. Otherwise, the inverters must be assigned to a subplant.
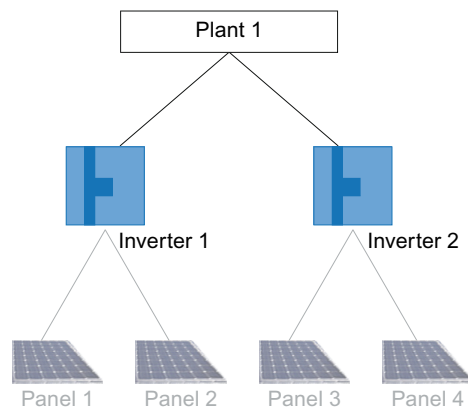
Figure 3-1   Graphical representation of a plant hierarchy (without sub-plants)
(The solar panels cannot be configured in SINVERT WebMonitor.)
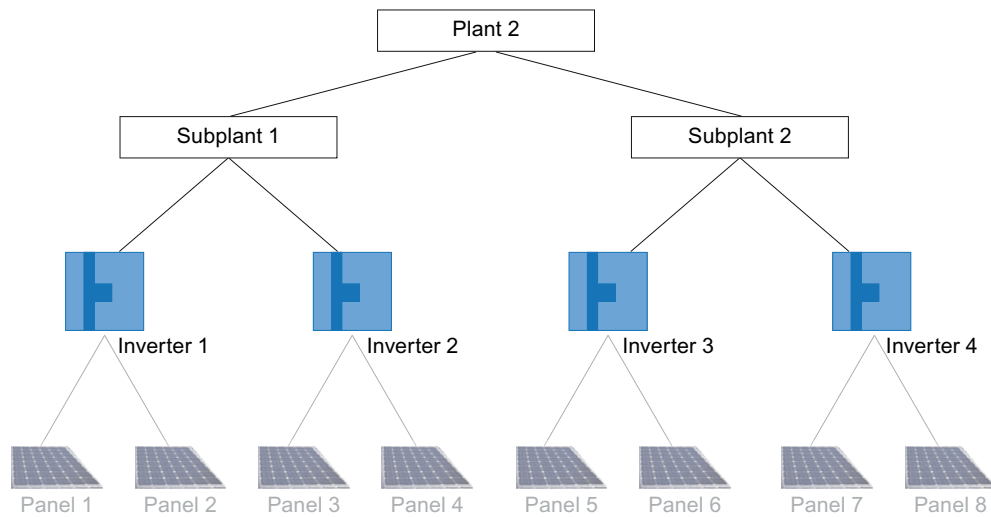
Figure 3-2   Graphical representation of a plant hierarchy (with subplants)
(The solar panels cannot be configured in SINVERT WebMonitor.)

Representation of the plant hierarchy in the WebMonitor

The plant hierarchy is represented in a tree structure in the "Plant overview" area on the left of the plant page. You can use the plant view to switch from one plant to another.

Figure 3-3   Example: Tree structure in the Plant overview

Display of the plant status

You can see the status of each plant from the color of the symbols:

- Green: Normal operation

- Yellow: Warning

- Red: Error

- Gray: No data received yet.

If the operating status (plant/subplant/inverter) has changed during the course of a day, an exclamation mark (fault) or a warning triangle (warning) is added to the symbol. The status is reset at night.

In the following example, the exclamation mark indicates that faults occurred today in inverters I_001 and I_002. The associated subplant/plant is also marked with an exclamation mark.

Figure 3-4   Example: Display of the plant status

3.1.2 Overview page ("Dashboard")

The "Dashboard" page can be selected in the menu when several plants have been set up.

On this page, you can view some general information about your plants direct, such as the number of plants and inverters, income and total energy, daily energy and actual power of your plant.
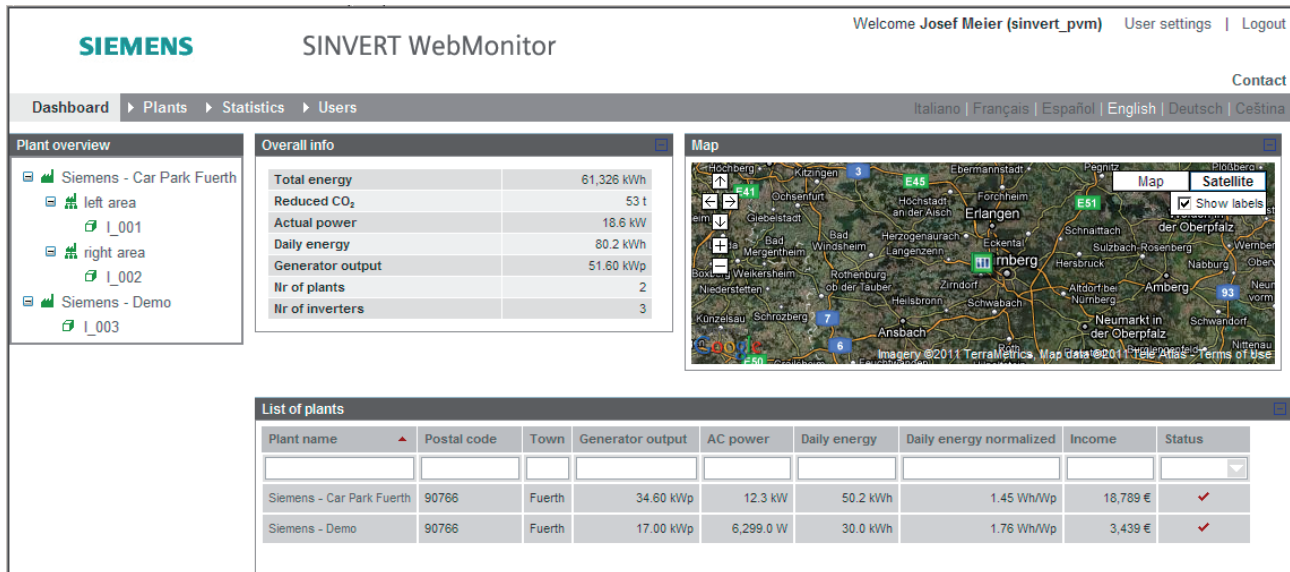
Figure 3-5   Overview page ("Dashboard")

The areas of the "Dashboard" page

The "Dashboard" page is divided into 4 main areas:

- **Plant overview** (top-left)

  Here you can find all accessible plants, subplants and inverters represented in a hierarchical structure (see Chapter "Plant hierarchy (Page 17)").

- **Overall info** (top-center)

  This area summarizes the important key statistics of all recorded solar plants.

- **List of plants** (bottom-center)

  Here you can find a list of the plants you can access.

  In the first free line you can search for entries in the list. If you do not want to enter the complete name, then insert a "*" before and after your entry as a wildcard character.

  The plant list can be displayed in "Compact" or "Detailed" form. The Detailed view provides signficantly more information about the plant.

  See Chapter "Plant details (Page 23)" for details.

- **Plant position on the world map** (top-right)

  This area shows your plants on the map of the world.

  The map contains a symbol for each solar plant via which you can receive some basic information about your plant directly.
  See Chapter "Plant position on the world map (Page 29)" for details.

Changing user settings

The "User Profile" page allows you to change your user info or your password.

1. To reach this page, first log in

2. Then click on the link "User settings" in the top-right corner of the page.

3. On this page, you can modify all user info with the exception of the username. You can also change your password.

3.1.3 The plant page

SINVERT WebMonitor offers the option of managing your solar plants and their components on a "Plant page".

Calling the Plant page:

1. Click on "Plants" > "List of plants".

   The plant page is opened:
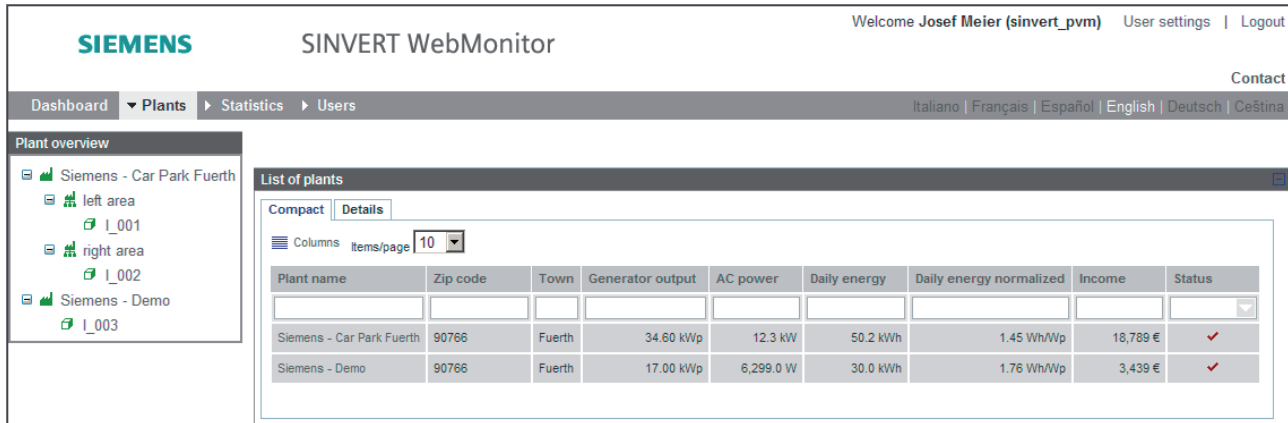
Figure 3-6   Plant page - compact form

The Plant page consists of the following main areas:

- **Plant overview**: This is used to navigate in the plant hierarchy

- **List of plants**: This is a list of the plants you can access.
  It is offered in 2 forms of representation:

  - **Compact form**

  - **Detailed form**: This offers more plant information and contains a graphical representation of the energy produced for the current day.

Figure 3-7   Plant page - detailed form

3.1.4   Plant details

You can display specific information about your plant:

- Photograph of the plant

- Plant data

- Actual production data

- Statistical data, represented in graphical form

- List of error messages that occurred in your plant.

Procedure for viewing plant details:

1. Select the plant name in the "Plant overview" on the left
   or

   Click on a plant name in the "List of plants".

   The resulting page has the following appearance:
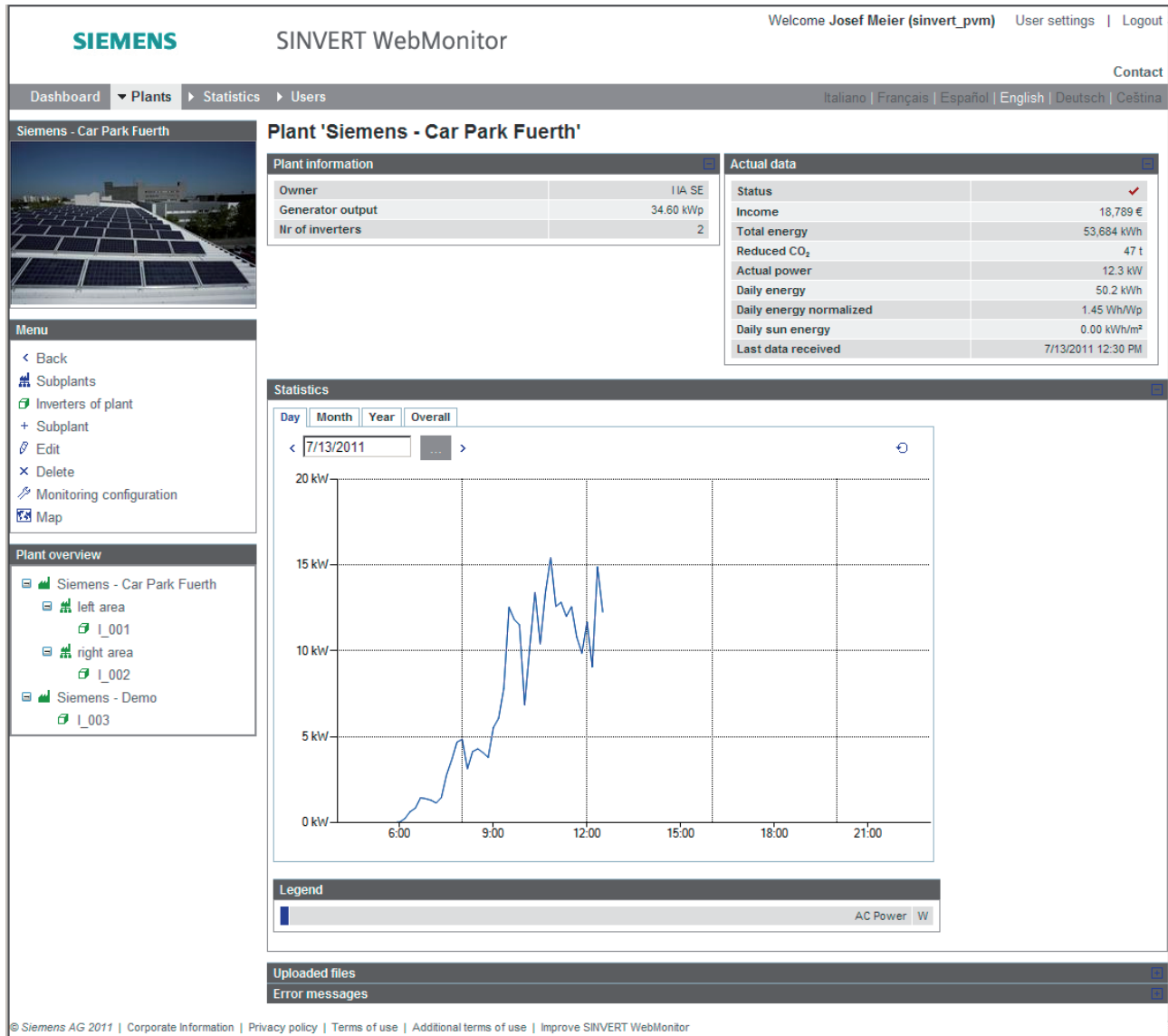
Figure 3-8   Plant details

The Plants page consists of the following main areas:

- **Plant photo:** contains a photo of your plant, if you have already stored one

- **Menu:** contains various options for navigation in the WebMonitor and for processing your plants

- **Plant overview:** contains all plants with subplants and inverters

- **Plant information:** Contains specific plant data

- **Actual data**: Contains information about the current status of the plant and also provides an overview of the produced energy:

    – Status: Shows the plant status (determined by the status of the assigned inverters):

    Normal: No errors have occurred in the plant

    Warning: The plant is not operating in the optimal range

    Error: The plant or subplant is non-operational or the inverter has not sent any data for some time.

    – Income: Total income since the plant has been in operation

    – Total energy: Total energy produced by the plant since it has been in operation

    – Reduced CO_2: Total CO_2 reductions achieved by this plant since it has been in operation

    – Actual power: Current AC power of the entire plant

    – Daily sun energy: Energy with which the sun has shone on the plant during the current day

    – Daily energy: Energy production of the current day

    – Daily energy normalized: Energy production of the current day, divided by the generator output

    – Last data received: Time of the last data packet received from the inverters of the plants

- **Statistics**: Shows the current AC power of the plant.

    On the other tabs (Month, Year, Overall), you can find the corresponding energy production.

- **File storage**: contains files you have stored

- **Error messages**: Contains a list of all errors that have occurred in the inverters of the plant in the last seven days.

    Details of the time of occurrence of the error, a brief description, and the name and status of the faulty inverter are displayed.

    You can display all stored error messages via "Display all messages".

3.1.5   Adding plants

New plants are added via the "Add plant" page.

Procedure:

1. Click on "Plants" > "+ Add plant".

   The following page opens:
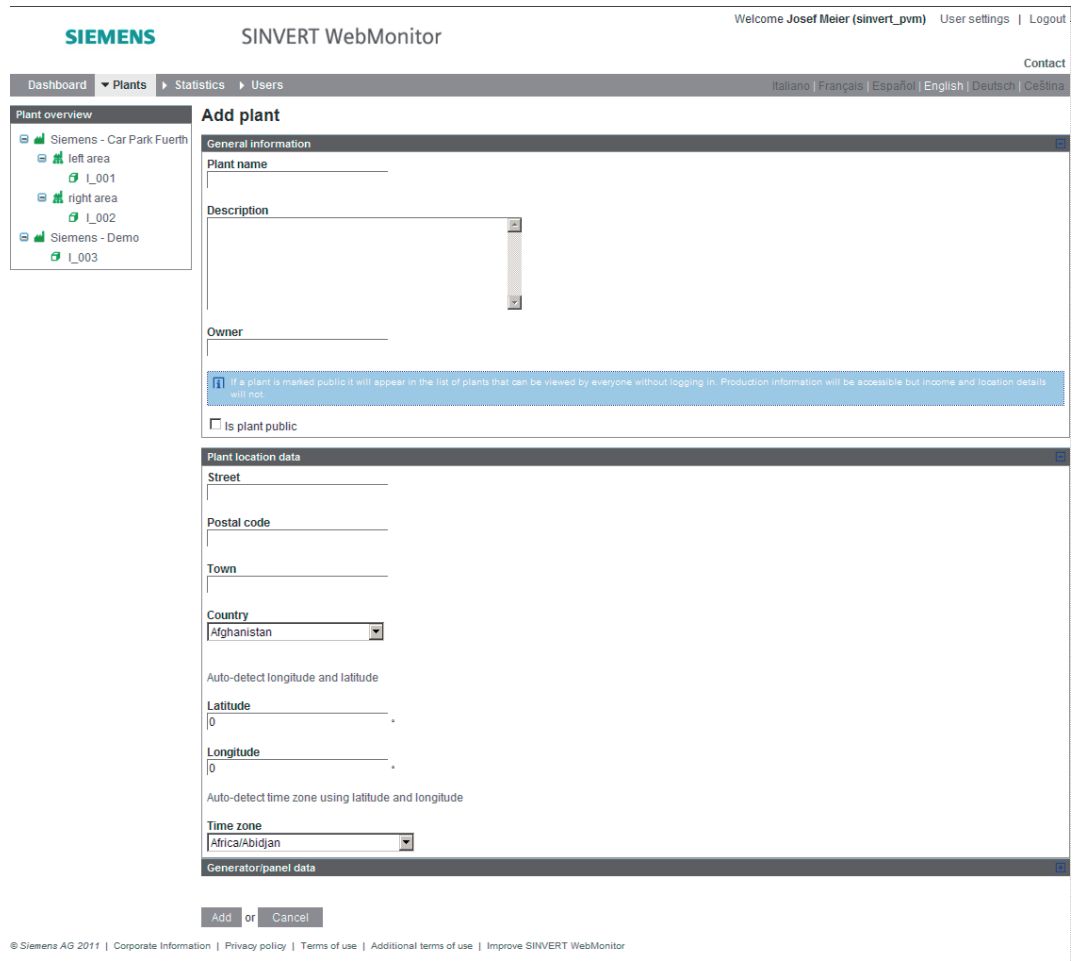
2. Enter the following information about your plant:

   – Plant name: Name of the new plant

   – Description: A summary description of your plant

   – Owner: Name of the plant owner

   – Street: Street where the plant is located

   – Postal code: Postal code (zip code) of the plant address

   – Town: Town in which the plant is located

   – Country: Country where the plant is located

   – Latitude: Geographical latitude of the plant location

   – Longitude: Geographical longitude of the plant location

   The latitude and longitude coordinates of the plant can be determined by clicking on the link "Auto-detect longitude and latitude" after filling in the fields "Country", "Town", and "Street".

   – Time zone: Time zone of the region where the plant is located

   The time zone of the plant can be determined by clicking on the link "Auto-detect time zone using latitude and longitude" after filling in latitude and longitude.

   – Is plant public: Choose whether you want the plant information to be made public or not. If "Is plant public?" is selected, the plant is accessible to every SINVERT WebMonitor user and can be viewed via the start page.

   – Panels: Type of solar panels used in the plant

   – Power temperature coefficient: Required for calculating the ideal AC power when the insolation sensor is connected.

   – Orientation to the south: Orientation of the panels to the south. Negative values mean orientation to the east, positive values to the west, 0 means direct orientation to the south.

   – Panel tilt: Tilt of the panels from the horizontal

   – Area: Surface area of the panels (in square meters)

   – Feed-in tariff: Received income (in €) for 1 kWh fed into the electrical power supply plant

After successful input of all data, the relevant plant page is displayed with the current data.

3.1.6 Editing plant data

You can modify the plant-specific data.

Procedure:

1. Click "Edit" on the relevant plant page.

   The "Edit plant" page opens (similar to the "Add plant" page).

2. Make the desired modifications here.

Plant photo and file upload

As well as the data entered when the plant was added, two other functionalities are available here.

● Plant photo

   A plant photo can be downloaded, modified and removed again. The plant photo will be visible in the top-left area of all pages connected with this plant or its inverters.

● File upload

   See chapter "File upload (Page 74)".

3.1.7 Deleting plants

You can also delete a set-up plant at a later time.

Procedure:

1. Select the relevant plant in the "List of plants".

2. Click on "Delete" on the plant page.

   The "Delete plant" page that then appears shows you detailed information of the plant you want to delete to make sure you have selected the correct plant.

3. After checking, activate the checkbox "I agree and am aware of the consequences".

   The "Delete" button is now enabled.

4. Only now can you "delete" the plant.

If you change your mind about deleting before clicking the "Delete" button, you can click "Cancel" at any time.

Note

Deletion of a plant also affects the other users who have access to the deleted plant. All data are deleted irretrievably!

3.1.8 Plant position on the world map

Overview

SINVERT WebMonitor allows you to view your plants on the world map. Correct positioning of the plant depends on the coordinates for longitude and latitude you have entered for the plant. You are therefore recommended to specify the precise coordinates or to use "Auto-detect longitude and latitude".

- You can find a **small** map of your solar plants on the "Overview page".
- A **large** map can be called up from all "Plant pages".

Procedure for opening the large map:

1. Open a plant page and click on "Map" in the menu.

   The map that then opens contains a symbol for every solar plant.

2. If you click on the symbol of a plant, an information window opens with a photo of the plant, the daily diagram, and diverse information about plant production.
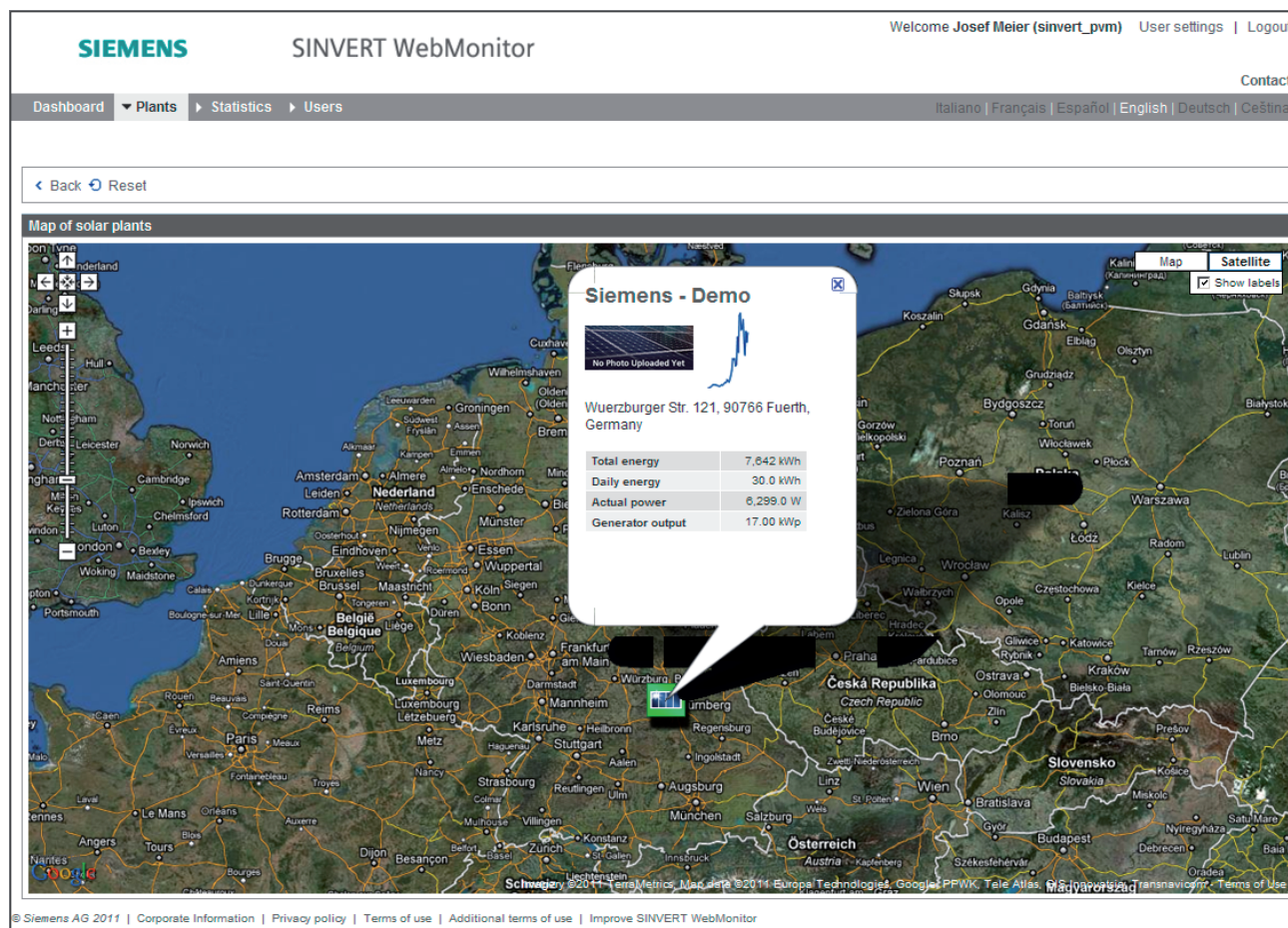
Figure 3-9   Map with information window of a solar plant

3.2 Subplants

3.2.1 Overview

A subplant is part of a plant to which inverters are assigned. If a plant has no subplants, the inverters can be assigned direct to the plants.

If a plant has at least one subplant, the inverters must be added to the subplant.

Note

When the first subplant is added to a plant, the existing inverters are assigned to this subplant.

A general example of the use of subplants is for the purpose of separating the panels and inverters installed on the roof of the building from those installed in the garden.

Displaying a list of subplants:

1. Select the appropriate plant.

2. Then click on "Subplants".

   The "List of subplants" is then displayed.

3. Choose between a "Compact" or a "Detailed" list.

   – The compact view shows a simple table with the basic data of each subplant.

   – The detailed view provides more information and also shows a graphic representing the AC output power for the current day.

4. In the first free line in the compact list you can search for entries. If you do not want to enter the complete name, then insert a "*" before and after your entry as a wildcard character.

3.2.2   Subplant details

You can display specific information about your subplant:

- Subplant data

- Actual production data

- Graphical representation of statistical data and

- List of error messages that occurred in your plant.

Procedure for viewing subplant details:

1. Select the subplant name in the "Plant overview" on the left
   or

   Click on a subplant name in the "List of subplants".

   The resulting page has the following appearance:
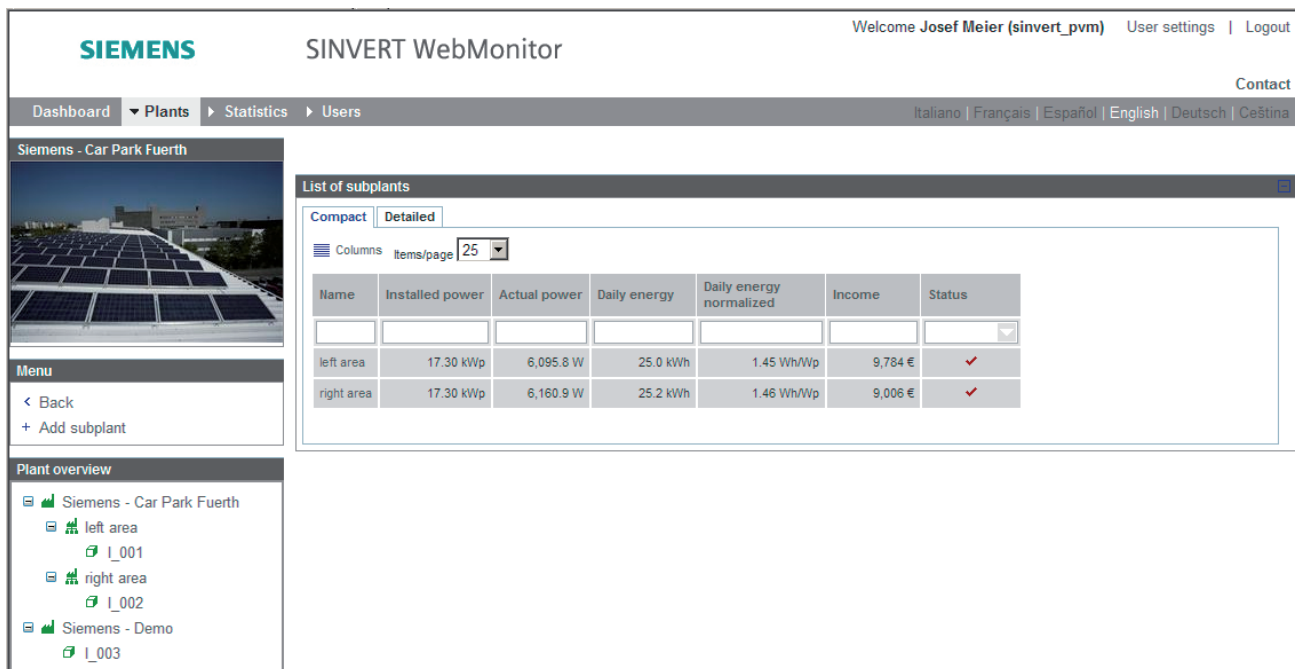
Figure 3-10   Details of the subplant

The Subplant page consists of the following main areas:

- **Subplant:** Contains general information about the subplant.

- **Actual data:** Contains information about the current status of the plant, as well as an overview of all plant production:

  - Status: Shows the plant status (determined by the status of its inverters):

    Normal: No errors have occurred in the subplant

    Warning: The subplant is not operating in the optimal range

    Error: The subplant is non-operational or the inverter has not sent any data for some time.

  - Income: Total income since the plant has been in operation

  - Total energy: Total energy produced by the plant since it has been in operation

  - Reduced CO_2: Total $CO_{2,}$reductions achieved by this plant

  - Actual power: Current AC power of the entire plant

  - Daily sun energy: Energy with which the sun has shone on the plant during the current day

  - Daily energy: Energy production of the current day

  - Daily energy normalized: Energy production of the current day, divided by the generator output

  - Solar irradiation: measured solar irradiation

  - Device temperature: measured temperature if appropriate sensors are connected

  - Last data received: Time of the last data packet received from the inverters of the plants

- **Statistics**: Shows the current AC power of the subplant.
  On the other tabs (Month, Year, Overall), you can find the corresponding energy production.

- **Error messages**: Contains a list of all errors that have occurred in the inverters of the plant in the last seven days.

  Details of the time of occurrence of the error, a brief description, and the name and status of the faulty inverter are displayed.

  You can display all stored error messages via "Display all messages".

3.2.3 Adding subplants

New subplants are added via the "Add subplant" page.

Procedure:

1. First, select the plant to which you want to add a subplant.

2. Click on "+ Subplant" in the menu.

   The following page opens:
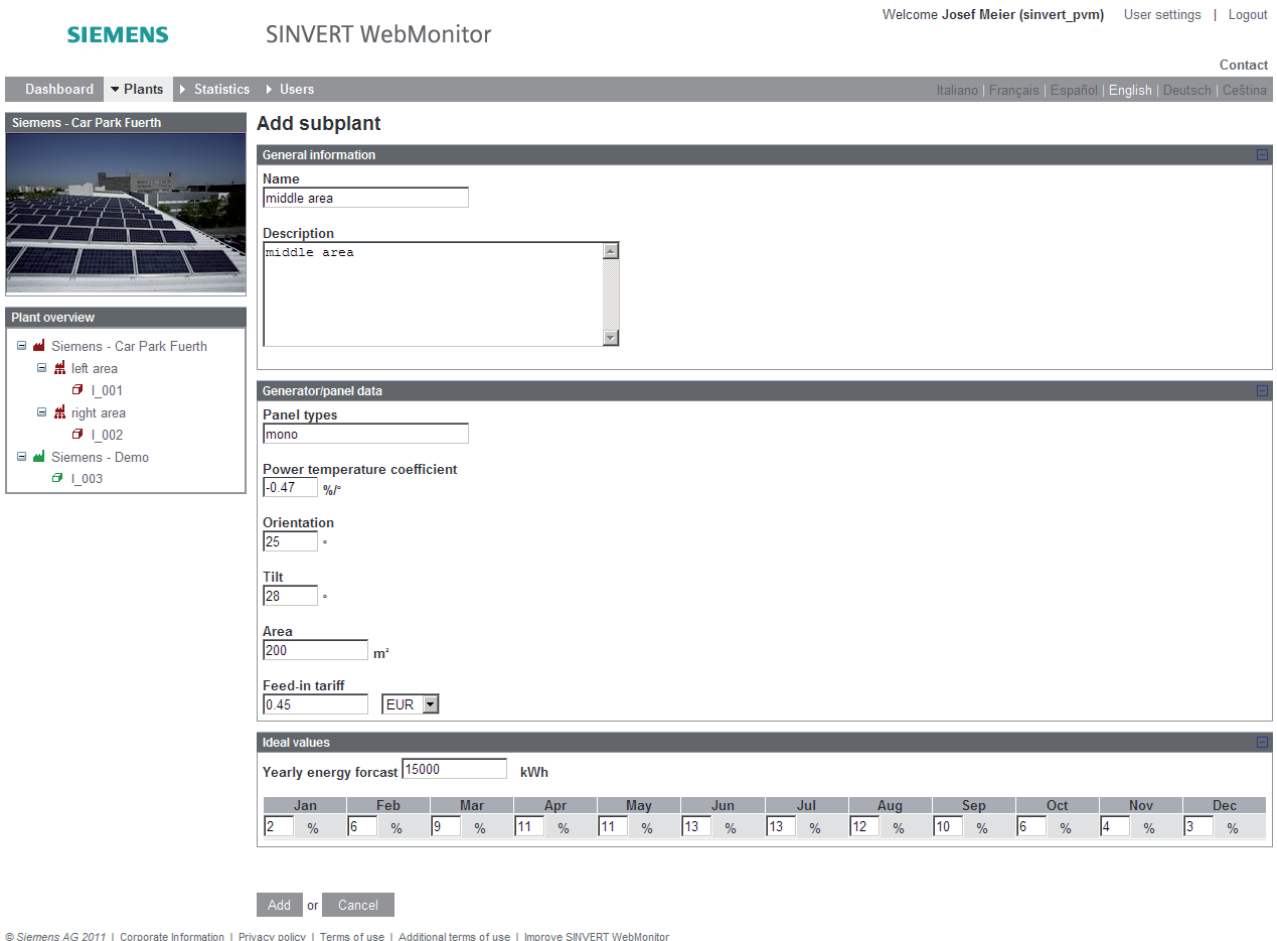
Figure 3-11   Add subplant

3. Enter the following information about your subplant:

– Name: Name for the new subplant

– Description: Description of the subplant to be added

– Panel type: Type of solar panels

– Power temperature coefficient: Required for calculating the ideal AC power when the insolation sensor is connected.

– Orientation to the south: Orientation of the panels to the south. Negative values mean orientation to the east, positive values to the west, 0 means direct orientation to the south

– Panel tilt: Tilt of the panels from the horizontal

– Area: Surface area of the panels (in square meters)

– Feed-in tariff: Received income (in €) for 1 kWh fed into the electrical power supply plant

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Note

The field for entering the "Ideal AC power" does not appear if no inverter has been configured.

3.2.4   Edit subplant data

You can also modify specific information of a subplant at a later time.

Procedure:

1. Select the relevant subplant in the "Plant overview".

2. Click "Edit".

   The "Edit subplant" page opens (similar to the "Add subplant" page).

3. Make your relevant changes.

Plant photo and ideal value

As well as the data entered when the plant was added, two other functionalities are available here.

- **Plant photo**: Can be downloaded, modified and removed again.
  The plant photo will be visible in the top-left area of all pages connected with this subplant or its inverters.

- **Ideal value**: Estimated expected annual value entered in monthly installments. For each month the estimated proportion of the annual forecast is entered as a percentage. The total of all months must be 100%.

  This value appears as a red dot in the relevant diagrams.

3.2.5   Delete subplant

You can also delete a set-up subplant at a later time.

Note

When a subplant is deleted, all the underlying inverter data is also deleted irretrievably!

Procedure:

1. Select the relevant subplant in the "Plant list"

2. Click "Delete".

   The "Delete subplant" page that then appears shows you detailed information of the subplant you want to delete to make sure you have selected the correct subplant.

3. After checking, activate the checkbox "I agree and am aware of the consequences".

   The "Delete" button is now available.

4. You can now "delete" the subplant or undo with "Cancel".

3.3   Inverters

3.3.1   Overview

Inverters are assigned to plants or subplants. If a plant has no subplants, the inverter is assigned direct to the plant. If a plant has subplants, the inverter must be assigned to one of the available subplants.

Note

When the first subplant is added to a plant, the existing inverters are assigned to the newly added subplant.

Displaying the list of inverters:

1. Select the relevant subplant (or plant) from the "Plant overview".

2. Click "Inverters".

   The "List of inverters" is then displayed.

Figure 3-12   Inverter Overview

3. Now you can choose between a "Compact" or a "Detailed" list.

   – The compact view shows a simple table with the basic data of the inverter.

   – The detailed view shows more information and also provides a graphic representing the AC energy generation for the current day.

4. In the first free line in the compact list you can search for entries. If you do not want to enter the complete name, then insert a "*" before and after your entry as a wildcard character.

3.3.2   Inverter details

You can display specific information about your inverter:

- The inverter information

- The current status

- The current produced energy

- Statistical data, represented in graphical form

- List of error messages that occurred in your inverter.

Procedure for viewing inverter details:

1. Select the inverter name in the "Plant overview"
   or

   Click on an inverter name in the "List of inverters".

   The resulting page has the following appearance:

Figure 3-13   Inverter details

The Inverter page consists of the following main areas:

- **Inverter information:** Contains general inverter data.

- **Actual data:** Contains information about the current status of the plant, as well as an overview of all plant production:

    – Status: Displays the status of the inverter:

    Normal value: No error has occurred in the inverter

    Warning: A problem has occurred or the inverter is not operating in the optimal range

    Error: The inverter is non-operational or has not sent any data for some time.

    – Income: Total income since the subplant has been in operation

    – Total energy: Total energy produced since the plant has been in operation

    – Power, temperature and radiation values

    – Daily sun energy: Energy with which the sun has shone on the plant during the current day

    – Daily energy: Energy production of the current day

    – Daily energy normalized: Energy production of the current day, divided by the generator output

    – Last data received: Time of the last data packet received from the inverters of the plants

- **Statistics:** Shows the AC power of the inverter when data was last received (the data transfer cycle is 10 minutes). On the other tabs (Month, Year, Overall), you can find the corresponding energy production.

- **Error messages:** Contains a list of all faults occurring in the last seven days in the inverter concerned.

    Details of the time of occurrence of the error, a brief description, and the name and status of the faulty inverter are displayed.

    You can display all stored error messages via "Display all messages".

3.3.3 Adding inverters

New inverters are added via the "Add inverter" page.

Procedure:

1. Select your subplant (or plant) to which you want to add an inverter.
2. Click "+ Inverter".

   The following page opens:
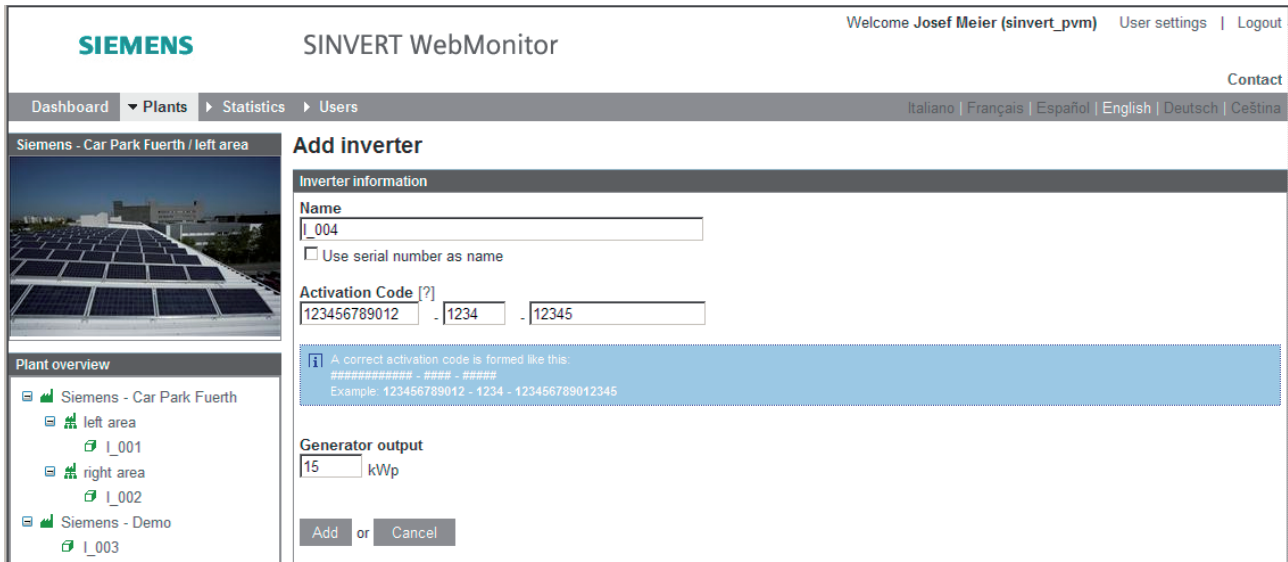
Figure 3-14   "Add inverter" page

Note

If no subplants have been defined in a plant, this button is located on the detailed plant page.

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3. Enter the following information about your inverter:

   – Name: Name for the new inverter

   – Activation code: Registration code that comes with the inverter

   – Generator output: Total DC power of all solar panels linked to this inverter

3.3.4 Editing inverter data

You can also modify specific information of an inverter at a later time.

Procedure:

1. Select the relevant inverter in the "Plant overview".

2. Click "Edit".

   The "Edit inverter" page opens (similar to the "Add inverter" page).

3. Make the desired modifications here.

3.3.5 Replacing inverters

In the event of a defect, or for any other reason, it may be necessary to replace an inverter. Replacement in the SINVERT WebMonitor takes place via the "Change inverter" page. The data of the old inverter is replaced with the data of the new inverter. The historical statistical data of the old inverter is retained.

Procedure:

1. Select the relevant inverters in the "Plant overview"

2. Click "Change inverter".

   The following page opens:
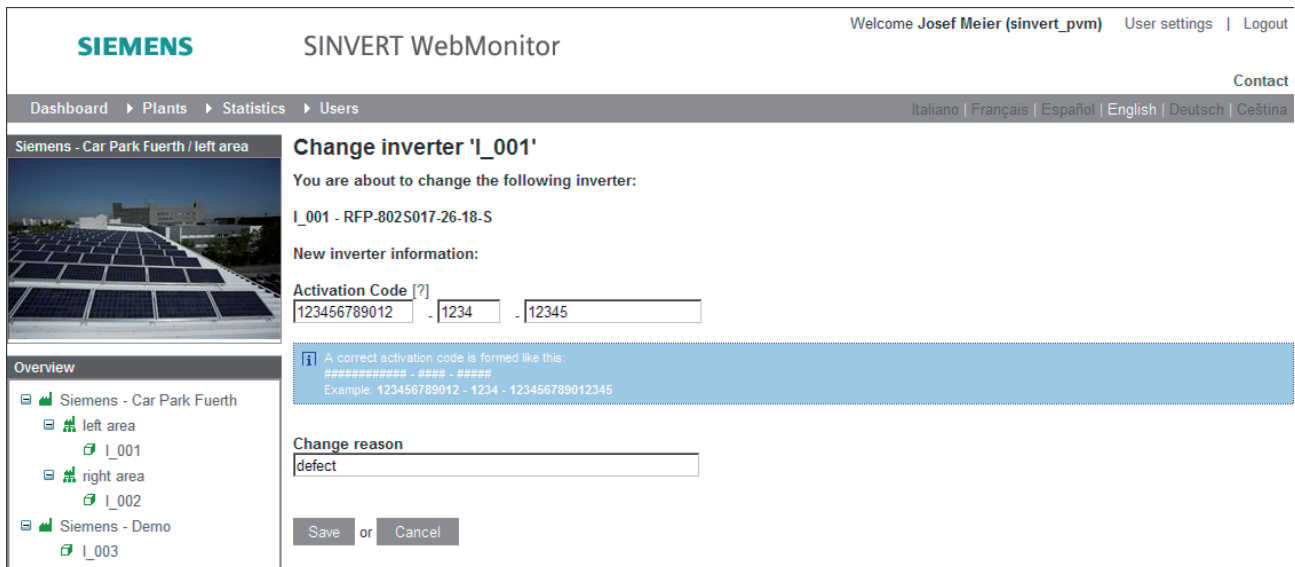
3. Enter the activation code of the new inverter and a brief description of the reason for replacing the inverter.

3.3.6   Move inverter

You can move an inverter to another (sub)plant.

Procedure:

1. Select the relevant inverter in the "Plant overview".

2. Click on "Move".

   The "Move inverter" page opens.

3. Select the (sub)plant to which you want to move the inverter and confirm your selection by checking the selection box.

4. Click on the "Move" button. The inverter is moved.

3.3.7   Deleting inverters

You can also delete a set-up inverter.

Note

When an inverter is deleted, the data is irretrievably lost.

Procedure:

1. Select the relevant inverters in the "Plant list"

2. Click "Delete".

   The "Delete inverter" page that then appears shows you detailed information of the inverter you want to delete to make sure you have selected the correct inverter.

3. After checking, activate the checkbox "I agree and am aware of the consequences".

   The "Delete" button is now enabled.

4. Only now can you "delete" the inverter.

   If you change your mind about deleting before clicking the "Delete" button, you can click "Cancel" at any time.

Statistics

<div style="text-align: right; font-size: 2em;">4</div>

4.1 Overview

SINVERT WebMonitor enables you to represent the data sent from your inverters in graphical form.

Note

Availability of the data

- Daily curves can be called up for 2 years.
- Day/month/year values are also available after this time.

Procedure for displaying the Statistics page

1. Select the "Statistics" > "Graphical" menu.

   The following page opens:
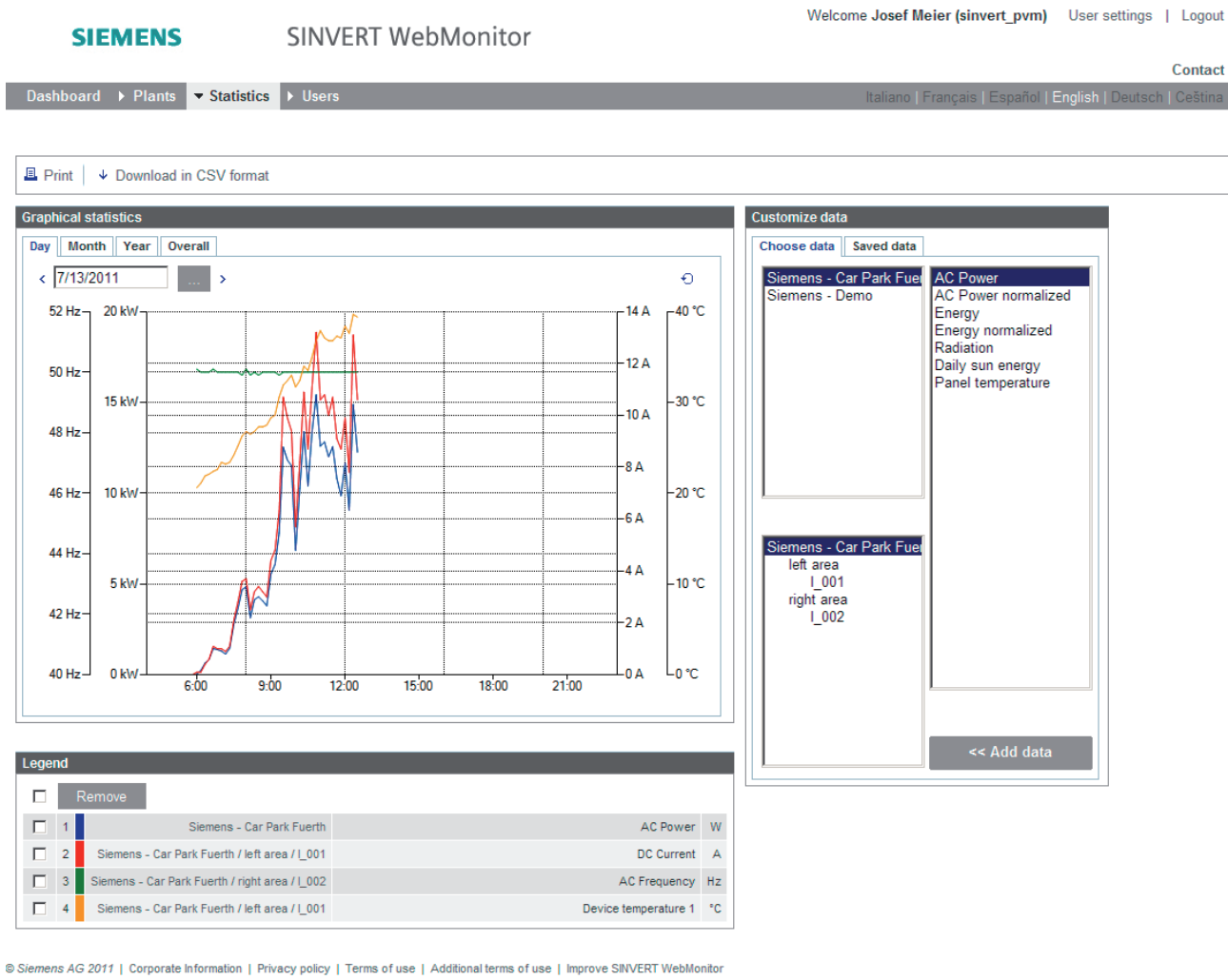
Figure 4-1   Statistics page

The recorded data sent from a solar plant or its components, or the values calculated from this data, are displayed in the form of a trend curve or a bar chart.

Examples of this include "AC power", "DC current", "AC frequency" or "Device temperature 1".

Main areas of the Statistics page

The main areas of the "Statistics" page are:

- **Graphical statistics**

  Graphical representation of the received or calculated data.

  There is one tab each for the representable periods "Day", "Month", "Year" or "Overall".

- **Legend**

  Shows the values displayed in the present diagram.
  The following information is shown for each display value:

  - The color in the diagram

  - The name of the plant or its components

  - The name of the value with its unit

- **Configuration**

  - **Customize data**

    For selecting the data to be represented in the diagram.
    This window contains two lists:

    The **list on the left** shows all available solar plants and their components for which data can be represented graphically. The list shows all plants to which you have access, with their subplants and inverters.

    The **list on the right** shows all available display values for the selected solar plants or their components.

  - **Saved data**

    Save channel configuration

    Saves a combined channel configuration under a specific name.

    Load channel configuration

    You can select the saved channel configurations here for viewing and processing.

4.2 The trend diagrams

There are diagrams for the four representable time periods that you can select via the corresponding tab:

- Day: shows the data for one day
- Month: shows the data for a whole month divided into days
- Year: shows the data for a year divided into months
- Overall: shows the total of all archived data, subdivided by years

Day diagram

The Day diagram shows all the data for a specific date in the form of a trend curve.

- The date of the diagram is shown in the text field at top left.

- Using the button "(...)" to the right of this, a calendar can be opened in which you can select the desired date for the display.

- The data can also be changed by means of the two buttons "<" and ">" that set the displayed date to the previous/next day respectively.
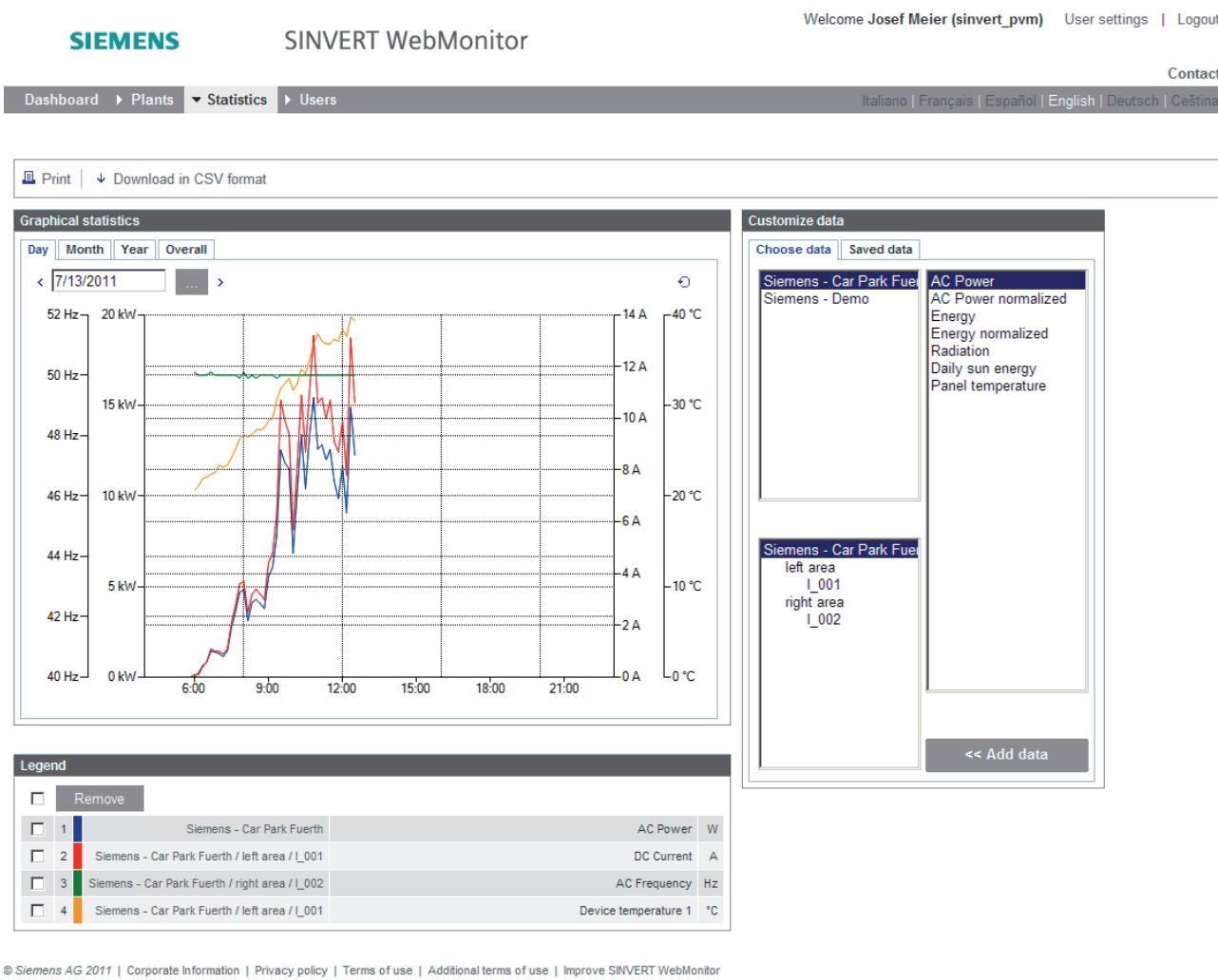
Figure 4-2   Statistics page with Day diagram

Month diagram

The Month diagram shows all the data for a specific month in the form of a bar chart.

- There are two dropdown list boxes to choose from, one for the "Year" and one for the "Month"

- You can also change between the next month or the previous month using the two buttons "<" and ">".
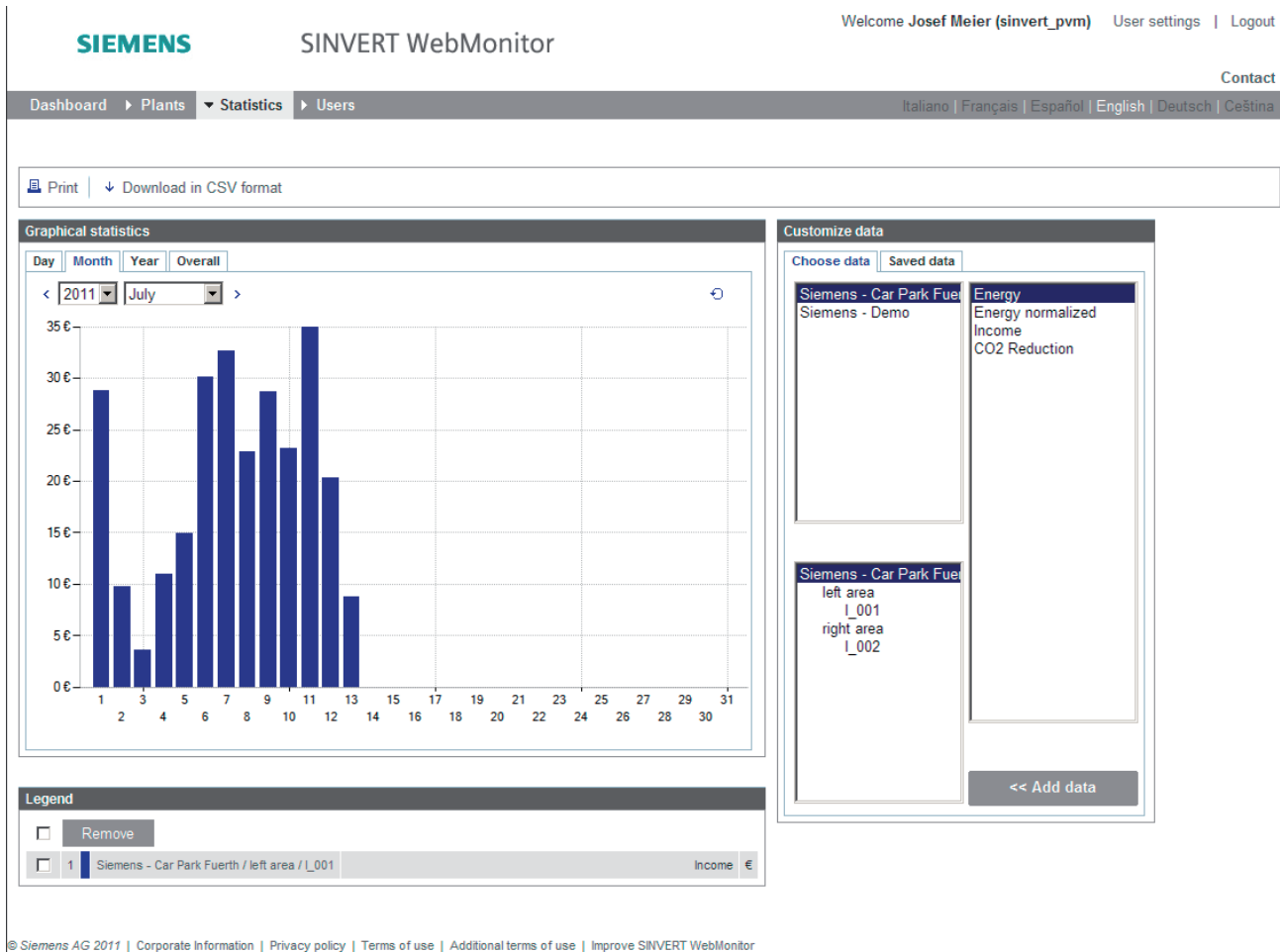
Figure 4-3   Statistics page with Month diagram

Year diagram

The Year diagram shows all the data for a specific year in the form of a bar chart.

- There is a dropdown list box in which you can select the year

- You can also change between the next year or the previous year using the two buttons "<" and ">".

Transferring the date when changing tabs

If you change tab from left to right on the Statistics page, the selected date is transferred to the next tab.

Example:
04.03.2009 is selected as the date in the Day diagram.
Day diagram: 04.03.2009 - Month diagram: 2009 March - Year diagram: 2009

Note

Changing tabs from right to left leaves the dates unchanged.

Update function

Each diagram has an update symbol ↺ at top right that you can click on when you want to update the diagram.

4.3 Adding a display value

If you want to add a value to the present diagram, proceed as follows.

Procedure:

1. Select the relevant solar plant or a component from the two lists on the left of the "Customize data" area.

2. Then select the desired variable from the list on the right.

3. Finally, click "<< Add data"
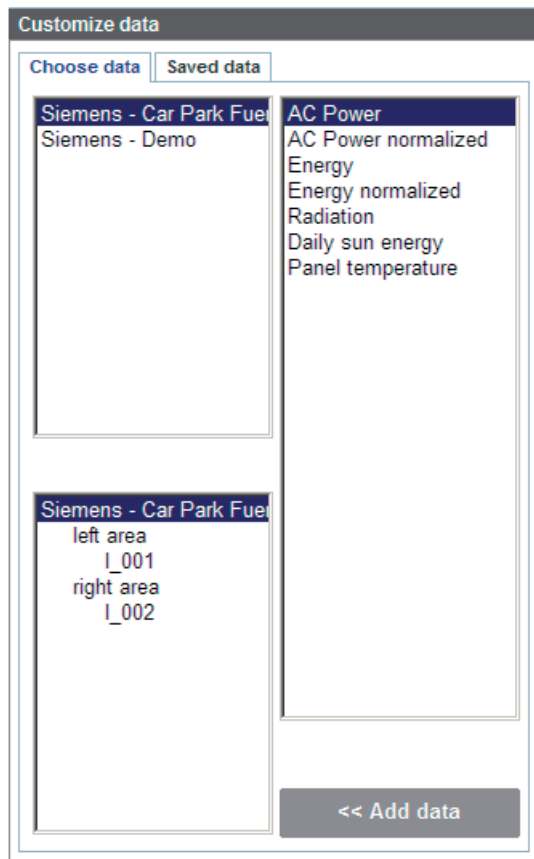
The value appears in the diagram and its description appears in the legend.

4.4 Removing a value from the display

You can remove a displayed value from the present diagram.

Procedure

1. Search for the value to be deleted in the "Legend" and check the option box.

2. Click "Remove".

   The value is deleted both from the diagram and from the Legend table.
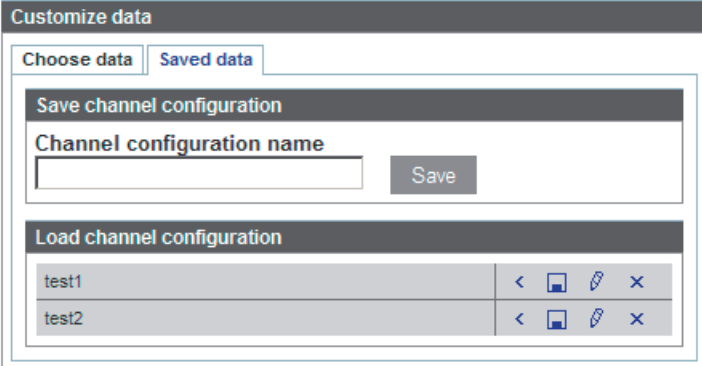
   By checking the option box next to the "Remove" button you can select all the values.

4.5 Back up channel configuration

SINVERT WebMonitor allows you to save a "channel configuration" so that it can be displayed or processed again later. A channel configuration refers to all saved values that are displayed for a plant or its components.

Procedure for saving a channel configuration

- Enter the name of the new configuration in the text field "Channel configuration name".

- Click "Save".

Your new channel configuration appears in the table "Load channel configurations".

4.6 Load, process and delete channel configuration

SINVERT WebMonitor allows you to load, process, rename or delete a specific channel configuration.

Procedure for opening channel configuration

1. Find the required channel configuration in the table "Load channel configuration"

2. Click the "Open" button (<) next to it.

   All the saved values for this channel configuration are loaded for the relevant diagrams.

Procedure for overwriting a channel configuration

1. Modify your channel configuration.

2. Click the "Overwrite" button (▣) next to it.

   The saved channel configuration is overwritten with the current values.

Procedure for renaming a channel configuration

1. Click on the "Rename" button (✎) to the right of the channel configuration that you want to change.

   A dialog box opens.

2. In the dialog box, enter the new name and confirm by clicking "OK".

   The new name is saved and is displayed in the list.

Procedure for deleting a channel configuration

1. Find the required channel configuration in the table "Load channel configuration"

2. Click the "Delete" button (✕) next to it.

   The function is deleted without a prompt.

4.7 Saving plant data in CSV format.

You have the option of saving plant data in the CSV format for processing and evaluation in other programs such as Excel.

Procedure for downloading statistics in CSV format

1. In the diagram, configure the plant data that you want to save in CSV format.
2. Click on the link "Download in CSV format".

   A dialog box opens
3. You have the option of opening or saving the downloaded file.

Procedure for importing statistics in CSV format into an external program

1. Save the downloaded file.
2. Open your external program and import the data.

   The data is then available to you in individual cells.

4.8 Overview of possible display values

You will find all the available display values listed here, divided into tabs (Day, Month, Year and Overall), and plant components (all plants, inverters, subplants and plants).

Note

Availability of the data

- Daily curves can be called up for 2 years.
- Day/month/year values are also available after this time.

Tabs	Day		Month		Year/Overall	
Plant components Display value	All plants Subplants Plants	Invert- ers	All plants Subplants Plants	Invert- ers	Subplants Plant	Invert- ers
AC Power	X	X				
AC power normalized	X	X				
Energy	X	X	X	X	X	X
Energy normalized	X	X	X	X	X	X
Solar irradiation	X	X				
Daily sun energy	X	X				
Device temperature	X	X				
Income		X	X	X	X	X
Reduced CO2		X	X	X	X	X
Energy forecast		X			X	X
Income forecast		X			X	X
AC Voltage		X				
AC Current		X				
AC Frequency		X				
DC Power		X				
DC Current		X				
DC Voltage		X				
Device temperature 1		X				
Device temperature 1		X				
Ideal AC Power		X				
Absolute deviation				X		X
Relative deviation				X		X

You can find a brief description of the individual display values and their origins or underlying calculation formula.

Display value	Description	Unit
AC Power	Output power (measured value from the inverter)	W
AC Power normalized	Output power of the inverter/generator output	W/Wp
Energy	Energy (measured value from the inverter)	kWh
AC Voltage	Output voltage (measured value from the inverter)	V
AC Current	Output current (measured value from the inverter)	A
AC Frequency	Output frequency (measured value from the inverter)	Hz
DC Power	Input power (measured value from the inverter)	W
DC Current	Input current (measured value from the inverter)	A
DC Voltage	Input voltage (measured value from the inverter)	V
Device temperature 1	Heat sink temperature (measured value from the inverter)	° Celcius
Device temperature 2	Inverter internal temperature (measured value from the inverter)	° Celcius
Solar irradiation	Solar irradiation (measured value from the inverter)	W/m²
Device temperature	Device temperature (measured value from the inverter)	° Celcius

Ideal AC Power	The expected power at the inverter output depending on solar irradiation and temperature is calculated using the following formula:
	`Ideal AC power = (Solar irradiation • Generator output/1000) •`
	`(1 + (Output temperature coefficient • (Device temperature – 25ºC))) •`
	`Inverter efficiency`
		W

Energy normalized	The normalized produced energy is calculated using the following formula: `Energy normalized = Energy/generator output`	Wh/Wp
Income	The income is calculated using the following formula: `Income = Energy • Feed-in tariff`	€
Reduced CO_2	The volume of CO_2 that would have been produced if traditional power sources had been used. Calculated using the following formula: `Reduced CO2 = Energy • CO2 coefficient`	CO_2
Absolute deviation	The deviation of the normalized energy production of an individual inverter from the average is calculated.	Wh/Wp
Relative deviation	This value shows the deviation of an inverter from the average in %.	%
Energy forecast	Annual energy forecast divided into months based on the expected values that can be set on the Plants page/Subplants page. This display value is only available if the statistical energy forecast is activated for the plant.	kWh
Income forecast	The income forecast is calculated by multiplying the calculated energy forecast by the feed-in tariff of the plant/subplant. This display value is only available if the statistical energy forecast is activated for the plant.	€

4.9   Increasing the level of detail in the diagram

If you click on a bar in a diagram, the diagram of the period represented by the bar is loaded.

- If you are in the "Overall diagram" and you click on a bar corresponding to a specific year, you will be taken to the diagram for this year.

- If you click in the Year diagram on the bar corresponding to a specific month, you will be taken to the diagram for this month.

- If you click in the Month diagram on the bar for a specific day, you are taken to the Day diagram.

4.10 Data tooltips

In the Statistics diagram, you can display a current value by positioning the mouse pointer at the relevant point on the graphic.

- If you are viewing a bar diagram, position the mouse pointer on the bar to display the relevant value as a tooltip.

- If you position the mouse pointer on a curve in a trend diagram, the value of this point is displayed as a tooltip.
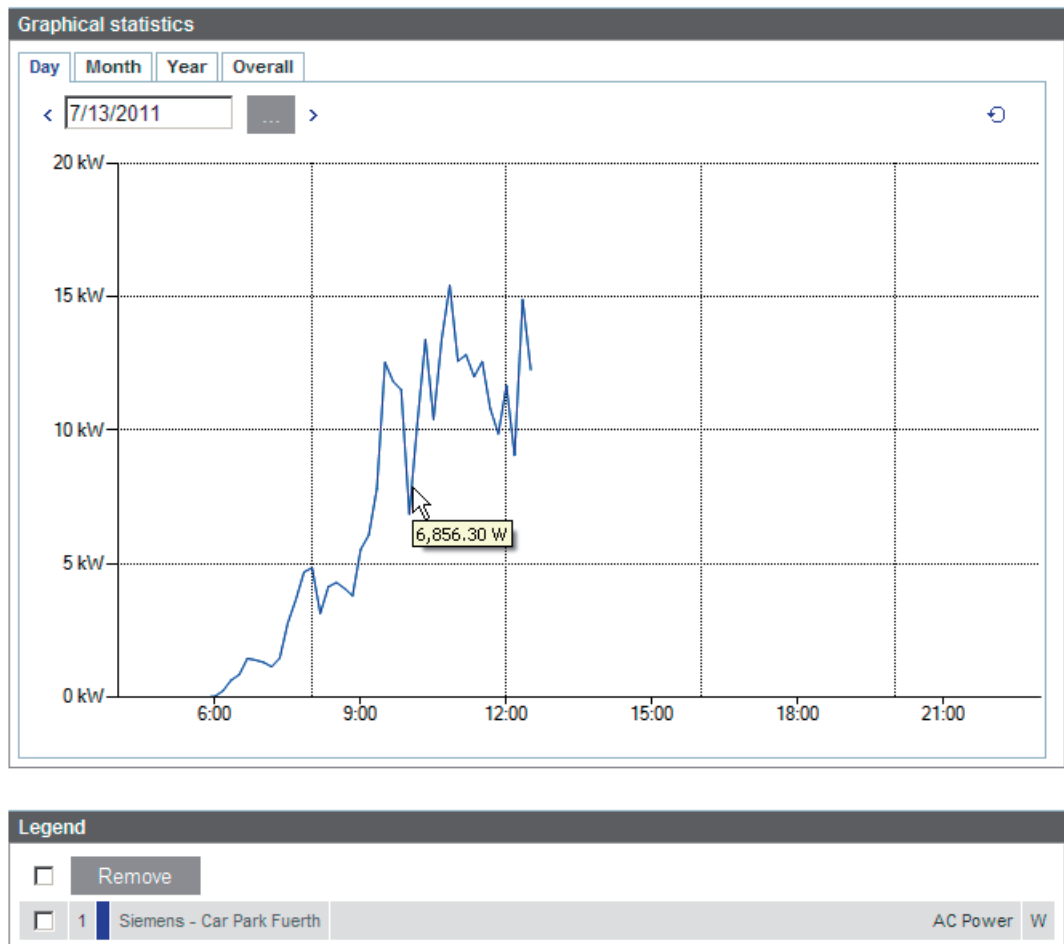
Figure 4-4   Tooltip in the trend curve diagram

User administration

<div style="text-align: right; font-size: 2em;">5</div>

5.1 Overview

SINVERT WebMonitor allows you to administer users centrally.
Only the main user has the right to administer other users.
The main user is the user who is registered direct with SINVERT WebMonitor and who has set up the plants.

Only the main user can set up other users for the installed plants.
Access to the set-up plants and their authorizations can be assigned or restricted as required!

The Users page provides an overview of all set-up users.

Calling the Users page:

1. Click the "Users" menu.

   The following page opens:

Note

If you do not see the "Users" menu item, you are not authorized for user administration. This is the case if your user has been generated by another user who was already registered with SINVERT WebMonitor.

In the first free line you can search for entries in the list. If you do not want to enter the complete name, then insert a "*" before and after your entry as a wildcard character.

5.2   User details

This page shows you details of the SINVERT WebMonitor user.

Procedure for viewing the user details:

1. First, select the "Users" menu.

2. Click on the desired user in the displayed list.

   The "User Profile" is opened:

This User Profile contains the following personal information about the user:

– Name and e-mail address

– User's permissions

– Current status of the user's account.
  This status can either be validated or invalidated (for details on validation, see Chapter " Add users (Page 63) ").

5.3   Add users

New users are added via the "Add user" page.

Procedure for adding a new user:

1. Select the "Users" menu.

2. Click "+ User".

   The following page opens:

Figure 5-1   "Add user" page

3. Enter the following information about your user:

   – Username: Name with which the user is identified in the system

   – First name

   – Last name

   – E-mail: E-mail address of the user. This is used to inform the users when they are added to the SINVERT WebMonitor.

   – Telephone: Telephone number of the user (optional)

   – Assigned plants: You select the plants assigned to the user here. The possible plants are listed.

   – Permissions: You can specify which permissions you want to assign to the new user. A list of all available user permissions is given.

   If the permission for "Plant configuration" is not granted, the user must be assigned to a plant. If the permission for "Plant configuration" is granted, the user can add his/her own plants after logging in.

Further procedure in the case of a new user:

1. The newly set-up user receives an e-mail with the permission data required for login. The e-mail includes:

   – The username

   – The password

   – The link for validation

2. The new user now follows the specified link to validate his/her login.

   When validation has been successfully carried out, the user receives an appropriate message.

Note

A user cannot log in to SINVERT WebMonitor before validating their login data.

5.4 Editing users

You can also modify the data of a user at a later time.

Procedure:

1. Open the "User profile" of the desired user

2. Click "Edit".

   The "Edit user" page opens (similar to the "Add user" page).

3. Carry out the desired changes to the user data.
   You must note the following here:

   – The username cannot be modified

   – If you want to change an access permission, tick the relevant point on the list.

   – If you want to revoke a specific permission, deactivate it in the list.

   – If you are the main user, you can also modify your extended personal data.

5.5 Assigning a plant to a user

Plants can be assigned to users in two ways:

- The main user creates a new user (see "Add users")
- Via the "Plant associations" page

Procedure

Proceed as follows to assign a plant to an existing user:

1. Change to the "Users" menu.

2. Click "Plant associations".

   The following page opens:
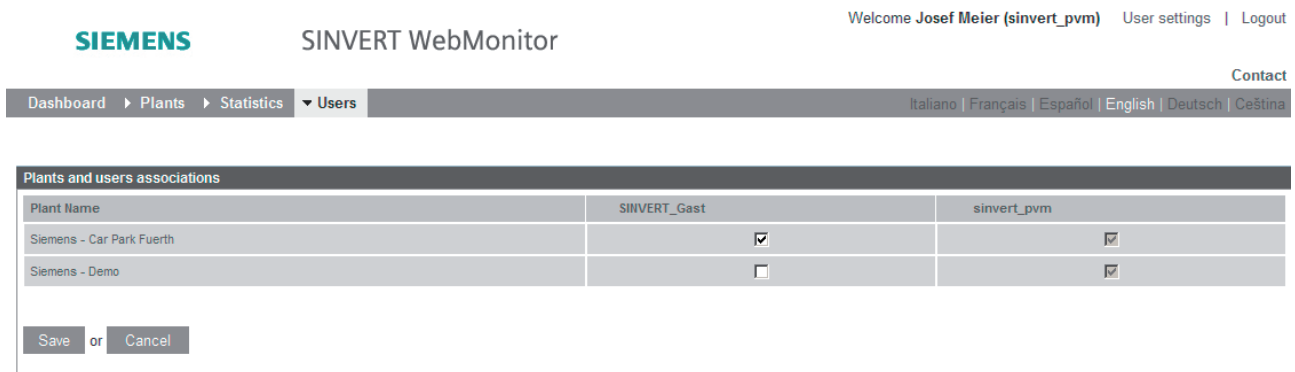
Figure 5-2   "Plant associations" page

3. Plants can be assigned to users and removed again by activating or deactivating the relevant checkbox in the "Plant associations" table.

   Main user associations cannot be modified. They are always set. This is indicated by the blocked checkboxes.

5.6   Deleting users

You can also delete a set-up user at a later time.

Procedure:

1. Change to the "User Profile" page of the relevant user.

2. Click "Delete".

   A message window appears on your screen prompting you for confirmation.

3. Click "OK" to carry out the deletion.

5.7   Resetting the password

You can reset the password of a user if, for example, the user has forgotten it.

Procedure:

1. Change to the "User Profile" page of the relevant user

2. Click "Reset password".

   A message window appears on your screen prompting you for confirmation.

3. As soon as the password has been reset, the new password is e-mailed to the user.

5.8 User permissions

Users can have three types of permissions:

- Plant configuration

- Monitoring configuration

- User administration

If the user does not possess specific permissions, the menus and buttons connected with these permissions are not displayed.

Plant configuration

With the "Plant configuration" permission, the user can perform the following tasks:

- Add plants, subplants and inverters

- Edit plants, subplants and inverters

- Delete plants, subplants and inverters

- Save plant documentation

- Delete plant documentation

Monitoring configuration

The "Monitoring" permission allows the user access to the "Monitoring configuration" (see Chapter "Monitoring functions (Page 69)").

User administration

This permission cannot be assigned to a user.
It belongs automatically to the main user.

This permission allows the main user to perform the following tasks:

- Add users

- Edit users

- Delete users

- Edit plant association

Monitoring functions

<div style="text-align: right; font-size: 3em;">6</div>

6.1 Overview and configuration

SINVERT WebMonitor contains functions for automatic monitoring of the plant, and for generating error messages and warnings.

The following monitoring functionalities are available in the SINVERT WebMonitor:

- Monitoring whether data has been sent from the inverter to the SINVERT WebMonitor

- Monitoring the deviation of the AC power from the ideal power, calculated with the values of the insolation sensors

- Statistical energy forecast; monitoring the deviation of the monthly overall energy from the simulated plant production

- Monitoring the deviation of the normalized overall energy of the inverters from each other

Configuration page of the monitoring functions

The Configuration page is opened as follows:

1. Select the plant for which you want to activate monitoring functions
(You can use the plant list or the plant overview to make the selection)

2. Click "Monitoring configuration".

The following Configuration page opens:
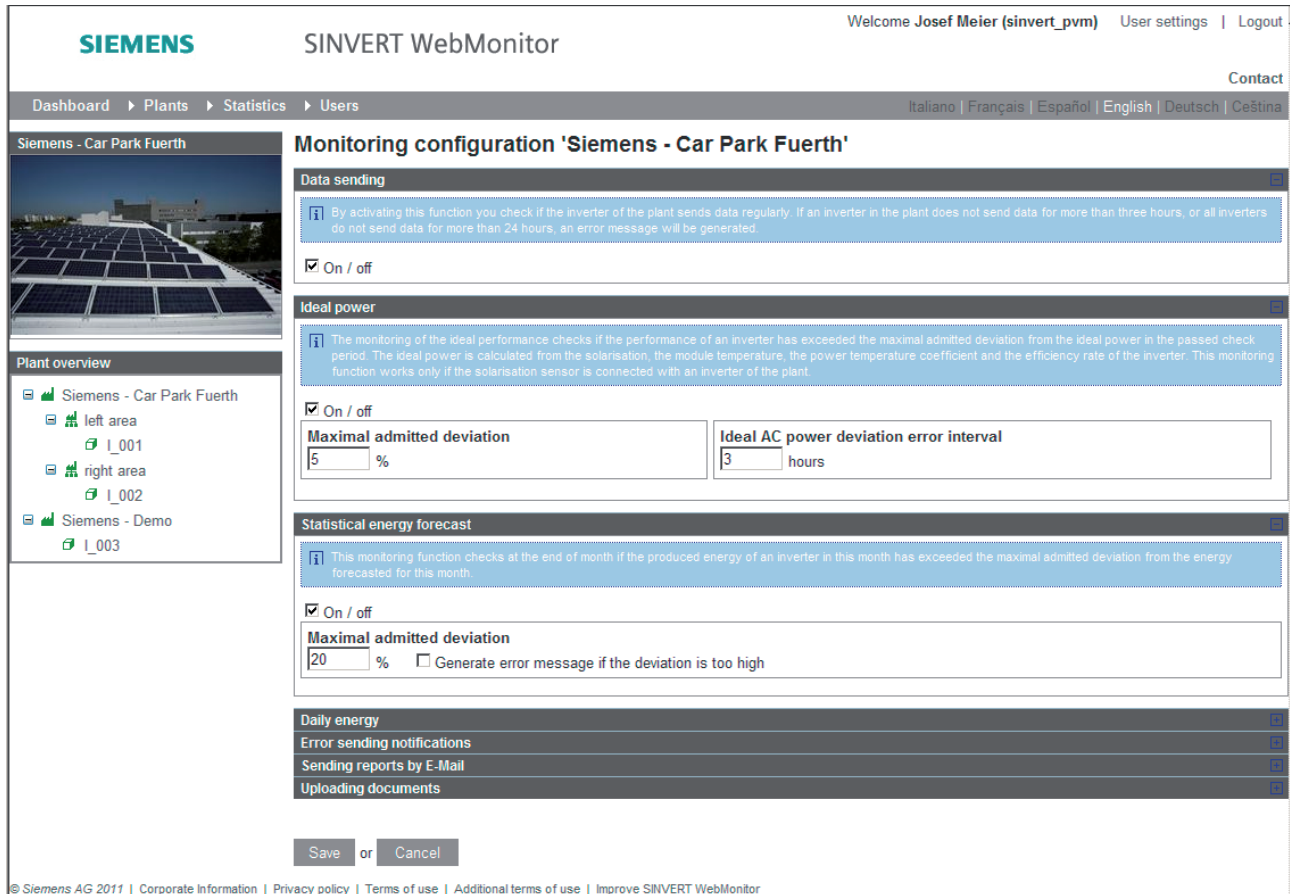
Figure 6-1   Configuration page of the monitoring functions

Each function can be switched on and off individually via the Configuration page of the monitoring functions.

This Configuration page also contains other configuration options for the plant such as "Uploading documents" and "Sending reports".

6.2 Monitoring data sending

After the function "Data sending" has been activated on the Configuration page, the application starts to check whether the inverter is transmitting data regularly.

- If one inverter has not sent any data for more than three hours, an error message is generated.

- If all inverters have not sent any data for more than four hours, an error message is generated.

6.3 Deviation from the ideal power

The ideal generated power of an inverter is an estimated expected annual value. It is calculated with the help of the average value supplied by the insolation sensors of the inverters.

The monitoring of the ideal power checks whether the power of an inverter during the elapsed period has exceeded the maximum permissible deviation from the ideal power value.

The ideal power is calculated from the irradiation, the module temperature, the power temperature coefficients and the efficiency of the inverter.

This monitoring function only operates if an insolation sensor is connected to one of the inverters in the plant.

Note

A maximum of one message per day is generated.

6.4 Statistical energy forecast

This function activates the parameter "Ideal energy forecast" in the statistics tabs "Year" and "Overall". It shows the statistical energy forecast for each month. These values are calculated from an annual energy forecast (in kWh) and its distribution over the months.

- If this option is activated, these values can be modified on the "Edit subplant" page.

- An error message can be generated if the actual production falls below the predicted production by the maximum permissible deviation. To do this, activate the option "Generate error message if the deviation is too high". The permitted deviation is specified under "Maximum permitted deviation".

6.5 Daily energy

An average of the normalized energy of all inverters assigned to a subplant (or plant if there are no subplants) is calculated every day.

This function checks whether the production of each inverter deviates from this calculated average by more than the set limit value.

- If this deviation is greater than the set value, an error message is generated.
- Additional trend curves also appear in the Month, Year and Overall views showing the deviation for each day, month or year; absolute (in Wh/Wp) or relative (in %).

6.6 Error notification

If a fault occurs in the system (determined by the inverter or calculated in the system), the user can configure the system in such a way that he/she receives notification by e-mail.

It is possible to save up to ten e-mail addresses. The period during which the messages are sent can also be configured.

Procedure for activating error notification

Figure 6-2   Error notifications dialog box

1. Activate the checkbox "Enable/Disable" under "Error notifications"
2. Enter the desired sending interval
3. Add the desired e-mail addresses
4. Finally, confirm your entry with "Save".

6.7 Report sending

The user can generate a plant report cyclically and have it sent in the form of an e-mail. The report contains current information about the present status of the plant and an overview of plant production.

The user can configure the frequency of reporting, the time of sending, and the e-mail addresses of the recipients. Up to 10 e-mail addresses can be specified.

Procedure for activating the plant report

Figure 6-3   Report sending dialog box

1. Activate the checkbox "Enable/disable" in the "Report sending" area
2. Specify the desired "Report interval" and "Time of sending"
3. Add the desired addresses under "E-mail"
4. Finally, confirm your entry with "Save".

6.8 File upload

Users with plant configuration permissions (see Chapter User permissions (Page 67)) can attribute documentation to a plant. This is stored on the server.

Procedure for file upload

Requirement: The "File upload" function is activated.

1. Go to the relevant plant page and click "Edit".

2. Scroll down to "File upload".

3. Upload the desired file (text field "Upload new file").

The documents stored in this way can be downloaded and deleted again.

File upload rules

The following rules must be observed when uploading a file:

- The total size of the uploaded files must not exceed 20 MB.

- The size of an individually uploaded file must not exceed 5 MB.

- The files must have a minimum size;
  It is therefore not permissible to store files of the size "0".

- The maximum number of uploaded files must not exceed 100.

- The uploaded file must be one of the following types:
  Text, Microsoft Office, graphics or PDF

If you store a new file but a file of the same name already exists, the new file is added with the suffix "_2".

SINVERT WebMonitor MobileApp

7

Using the MobileApp of the SINVERT WebMonitor, you have the option of calling up the data of your solar plant at any time on the road using a smart phone or tablet computer. The solar plants must first be set up using the desktop version of the SINVERT WebMonitor.

You only need an Internet Web browser to use the WebMonitor MobileApp. An app is not installed.

Requirement

The MobileApp is optimized for smartphones and tablet computers with a WebKit-based browser.

This is included on all devices with the operating system Android, Version 2.1 or higher, as well as all iPhone, iPad and iPod touch devices.

In addition, smartphones with the browsers Opera Mini and/or Opera Mobile are supported.

The MobileApp has been optimized for display resolutions in the range 320 x 480 pixels to 768 x 1024 pixels.

7.1 Start page / Login

Calling the MobileApp

Start the MobileApp by calling the Internet address of the SINVERT WebMonitor with your smart phone or tablet computer:

- www.siemens.com/sinvert-webmonitor
- www.siemens.com/sinvert-WebMonitor

The Web application of the SINVERT WebMonitor starts. You are taken automatically to the start page of the MobileApp.

Start page
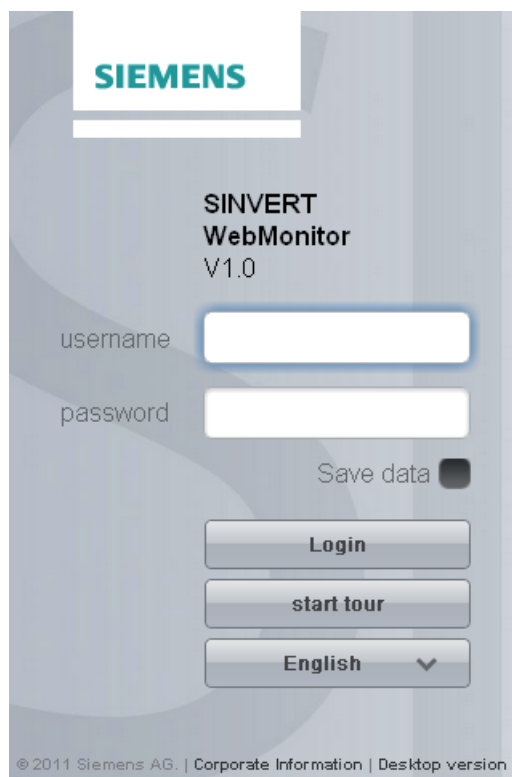
Figure 7-1   Start page

You can perform the following actions on the start page:

- Login

  Log in with your SINVERT WebMonitor user ID.

- Save data

  If you check this box your login data will be saved. The next time you call the WebMonitor, the login data will already be entered.

- Start tour

  Start a tour and view the live data of an existing solar plant.

- English

  Select your language from the dropdown list. You can choose between German, Czech, English, Spanish, French, Italian, Greek and Romanian.

- Desktop version

  Change here to the desktop version of the SINVERT WebMonitor.

7.2 Plant overview

Structure of the plant overview

After logging in, all your PV plants that you manage with the WebMonitor are displayed. The plants hierarchy is represented with the same symbols as described in Chapter "Plant hierarchy (Page 17)". Plant parts and inverters can be dropped down or closed up in the list using the plus/minus sign.

You can see the status of each plant from the color of the symbols:

- Green: Normal operation
- Yellow: Warning
- Red: Error
- Gray: No data received yet.

If there is not enough space for all the plants a scroll bar appears on the right hand side. You can use this to navigate to each plant. Long plant names are abbreviated with "...".
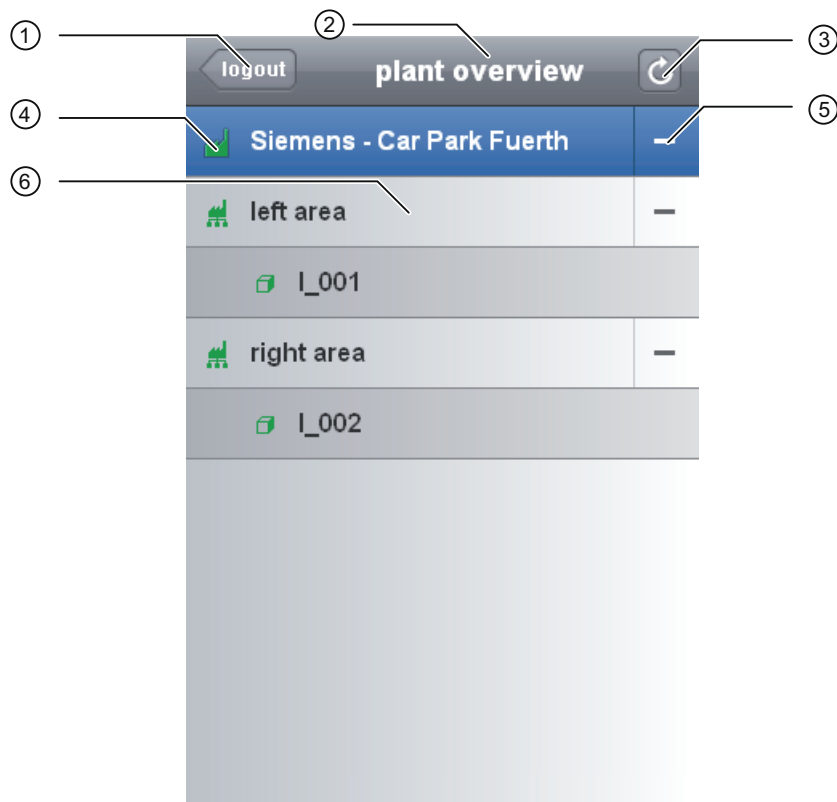
①   Logout

Logout returns you to the start page.

②   Plant overview

You are in the plant overview.

③   Update

If you click on this button, the current data is reloaded and updated.

④   Symbols of the components

The symbols indicate whether you are dealing with a plant, a plant part, or an inverter. You can see the status of the component from the color.

⑤   Plus/minus sign

You can drop down or close up sub-components of plants (plant parts, inverters) using the plus or minus sign. If there is no plant part, the inverters are displayed direct as sub-components of the plant.

⑥   Plant selection

If you click on the name of the plant, plant part or inverter, its overview page is displayed.

7.3 Plant details

If you select a plant, plant part or inverter in the plant overview, you will be taken to the plant details.

Structure of the plant details

In the plant details, the current output data of the selected PV component is displayed.
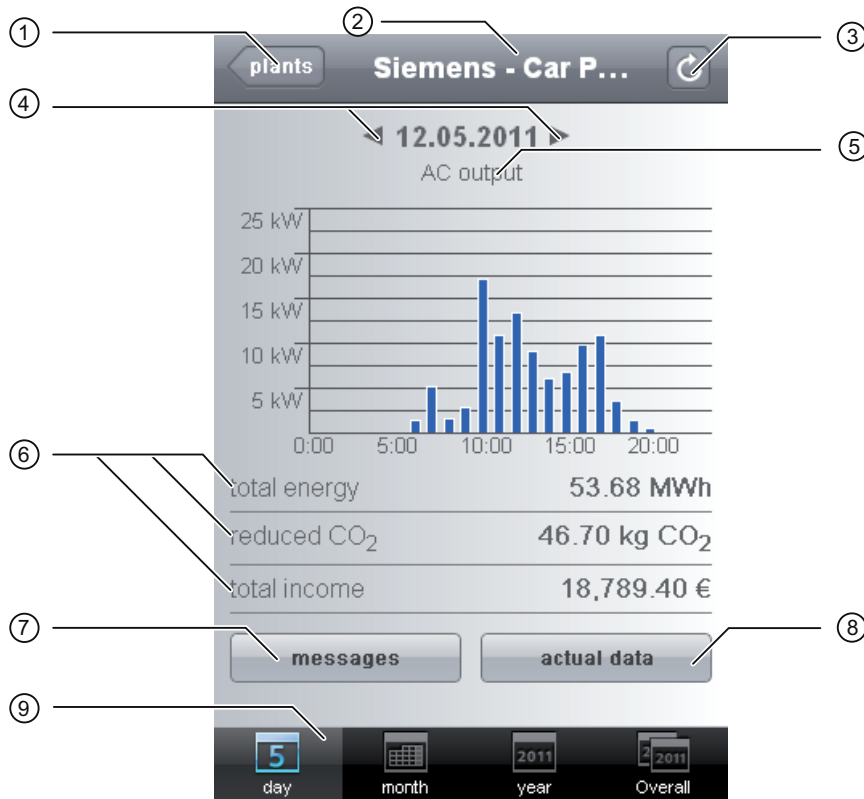
①   Plants

      This button returns you to the plant overview.

②   Title bar

      The name of the selected component is displayed here.

③   Update

      If you click on this button, the current data is reloaded and updated.

④   Arrow left/arrow right

      You can use the arrows to select the day, month or year according to the preselection. For "Overall", the word "overall" is displayed instead of the date, and the arrows disappear.

⑤   AC output (daily view) or energy (monthly, annual, and overall view)

      In the daily view, the power output of the inverters is displayed based on the hourly average.

      In the other views, the energy generated over the day, the month or the year is displayed.

⑥   Performance data

      The total energy, the CO_2 reduction, and the total income of the component are displayed here.

⑦   Messages

      If you click on the button, a list with the last 20 messages opens.

⑧   Actual data

      If you click on this button, a new page with additional output data opens.

⑨   Register

      On the register, the period for which the performance data is to be displayed can be selected. The selected period is highlighted in blue.

Actual data

If you select "Actual data", you will see an overview of all information on the selected plant, plant part or inverter.
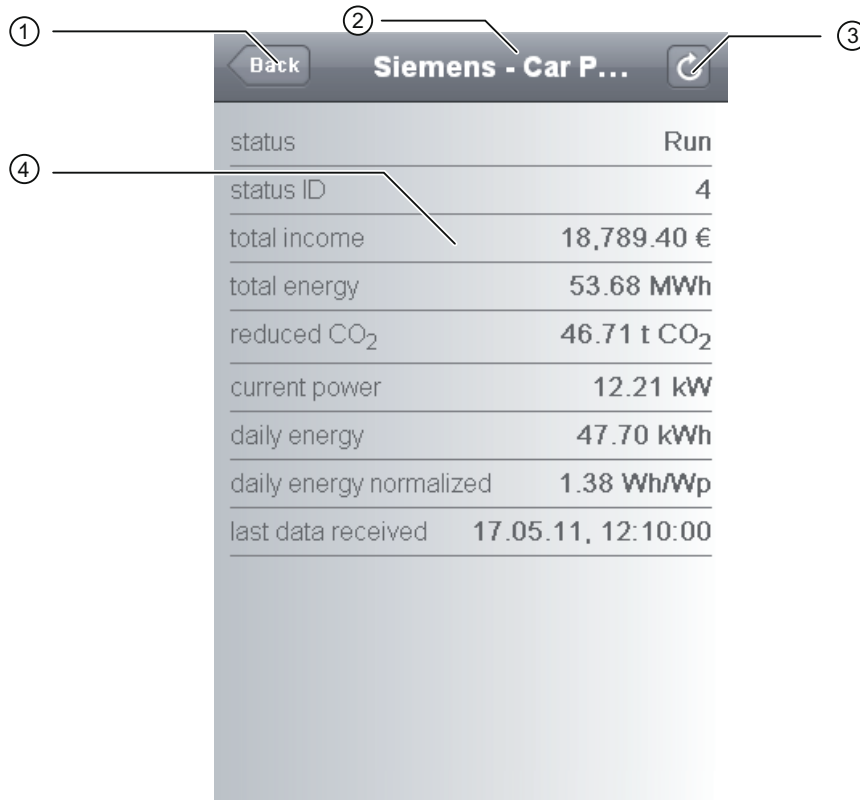
① Back

This button returns you to the selected component.

② Title bar

The name of the selected component is displayed here.

③ Update

If you click on this button, the current data is reloaded and updated.

④ Actual data

You receive all the available information and data on the selected plant, plant part or inverter here. At the end of the list is the date and time when data was last received.

Reference

You can find more information on the plant details in Chapter "Plant details (Page 23)".

7.4   Messages/error overview/error details

If you select the messages in the plant details, you will be taken to the error overview. The error messages are listed chronologically according to date. The last 20 messages of the selected component are displayed. You can navigate to all messages using the scroll bar on the right.

Structure of the messages
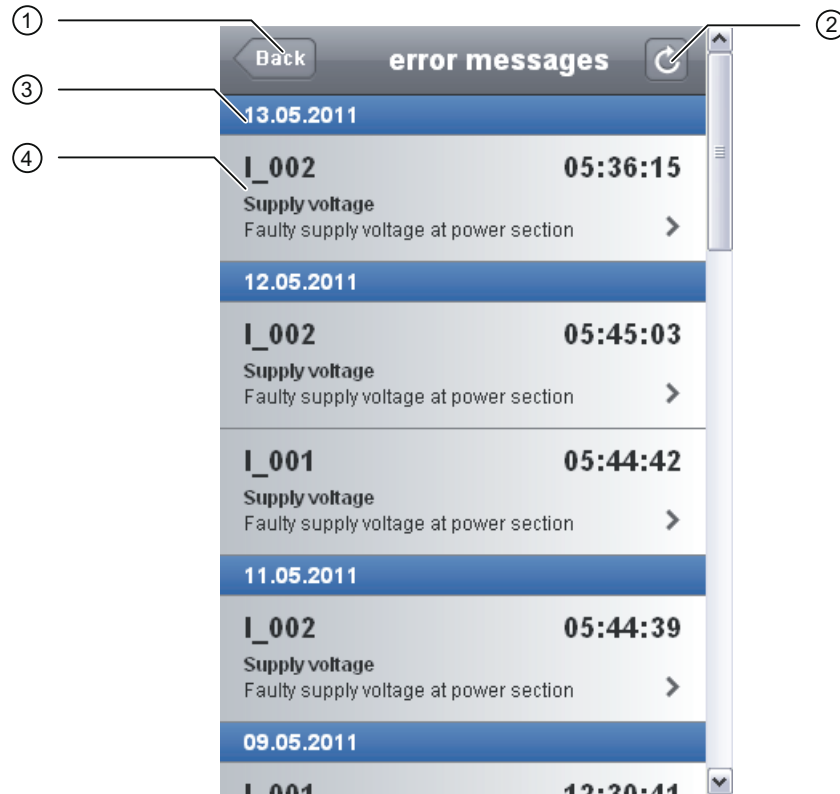
① Back

This button returns you to the selected component.

② Update

If you click on this button, the current data is reloaded and updated.

③ Date

Shows the date on which the message occurred

④ Message

The name of the plant, plant part or inverter is displayed here with the message and the time of day.

If the error text is too long, it is abbreviated with "...".

Error details

If you click on a message, you are taken to the error details.
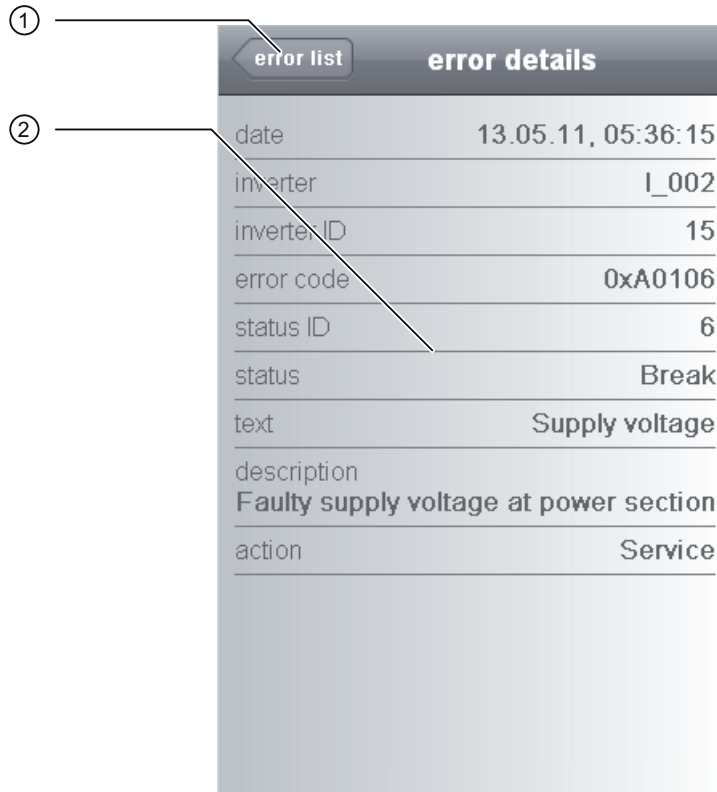
①   Error list

This button returns you to the error overview.

②   Error details

You will find details of the message here.

SINVERT WebMonitor DataProvider

<div align="right">8</div>

Plant data of the SINVERT WebMonitor can be requested as an XML data record via the data interface "SINVERT WebMonitor DataProvider".

In this chapter, the structure of the message frames for communication with the WebMonitor DataProvider is described. This description is to be used to create an application for data exchange. Programming knowledge is required to create an application.

The following data is available:

- Plant structure

- Historical inverter data

- Current plant/subplant/inverter data

- Messages/error messages

8.1 Frame transmission

You can access the SINVERT WebMonitor DataProvider via the following URL:
https://www.automation.siemens.com/sinvertwebmonitor/mobile/svc/MobileDataProvider.svc/GetData

Requests to the SINVERT WebMonitor DataProvider are made via an HTTP request using the "POST" method. In the request, the "Content-Type" header must be set to "text/xml", and the authorization header must also be set.

8.2 Authentication

In order to request data via the SINVERT WebMonitor DataProvider you require a user account in the SINVERT WebMonitor. The user data must be transferred by means of "Basic Authentication". To this end, the following HTTP header must be set:

"Authorization: Basic dGVzdDpwwYXNzd29yZA=="

where "dGVzdDpwwYXNzd29yZA==" is the base64-coded string "test:password". "test" is the user name and "password" is the password.

If you have not specified the authorization header in your request, then the server returns the HTTP status code "401–Unauthorized".

If the specified user data is invalid, however, the server signals "403–Forbidden".

Note

The header must be inserted with every request.

8.3 Frame content

8.3.1 Plant overview

Request

You can request information about the structure of all plants to which you have access. You can request the list by means of the following query:

```
<RequestData>
  <GetPlantList />
</RequestData>
```

Response

The SINVERT WebMonitor DataProvider responds with a frame in the following format:

```
<ResponseData>
  <PlantList>
    <ItemStructure>
      <ID>2</ID>
      <IsDummy>false</IsDummy>
      <Name>test plant</Name>
      <SubItemList>
        <ItemStructure>
          <ID>1</ID>
          <IsDummy>false</IsDummy>
          <Name>test subplant 1</Name>
          <SubItemList>
            <ItemStructure>
              <ID>10</ID>
              <IsDummy>false</IsDummy>
              <Name>inverter 2</Name>
              <SubItemList i:nil="true"/>
            </ItemStructure>
          </SubItemList>
        </ItemStructure>
        <ItemStructure>
          <ID>2</ID>
          <IsDummy>false</IsDummy>
          <Name>test subplant 2</Name>
          <SubItemList>
            <ItemStructure>
              <ID>9</ID>
              <IsDummy>false</IsDummy>
              <Name>inverter 1</Name>
              <SubItemList i:nil="true"/>
            </ItemStructure>
          </SubItemList>
        </ItemStructure>
      </SubItemList>
    </ItemStructure>
```

```
    </PlantList>
</ResponseData>
```

The response represents the plant "Test plant". The plant has two subplants: "Test subplant 1" and "Test subplant 2", each subplant having one inverter.

The individual fields have the following meaning:

Field	Description
ID	Identification of the plant, subplant or inverter.
IsDummy	Only relevant to subplants. Specifies whether the subplant is a "dummy subplant" and is not shown in the listing.
Name	Name of the plant, subplant or inverter.
SubItemList	Contains the respective subitems. In the case of a plant, the subplants are located here, while in the case of a subplant, the inverters. Inverters do not contain any items.

8.3.2   Plant details

Request

For any inverter you can request the data transmitted from this inverter to the WebMonitor. For the request, you must specify the ID of the inverter and the period for which you would like to retrieve data. The ID of the inverter can be obtained from the query of the plant structure.

The request frame must have following format:

```
<RequestData>
  <GetInverterData>
    <Id>9</Id>
    <FromDate>2011-03-09T04:45:00</FromDate>
    <ToDate>2011-03-09T15:00:00</ToDate>
  </GetInverterData>
</RequestData>
```

The date is formatted according to the DIN ISO 8601 standard:

YYYY-mm-ddTHH:MM:ss (e.g. 2011-03-09T14:50:32).

Response

The SINVERT WebMonitor DataProvider responds with a frame in the following format:

```
<ResponseData>
  <InverterDataList>
    <Id>9</Id>
    <OperatingHours>
      <UnitString>h</UnitString>
      <Value>16</Value>
    </OperatingHours >
    <TotalYield>
      <UnitString>kWh</UnitString>
      <Value>6789</Value>
    </TotalYield>
    <DataList>
      <HistoricalInverterData>
        <Date>2011-03-09T09:10:00</Date>
        <ACCurrent>
          <UnitString>A</UnitString>
          <Value>16</Value>
          </ACCurrent>
        <ACFrequency>
          <UnitString>Hz</UnitString>
          <Value>50</Value>
        </ACFrequency>
        <ACPower>
          <UnitString>W</UnitString>
          <Value>2345</Value>
        </ACPower>
        <ACVoltage>
          <UnitString>V</UnitString>
```

```
          <Value>230</Value>
        </ACVoltage>
        <DCCurrent>
          <UnitString>A</UnitString>
          <Value>10</Value>
        </DCCurrent>
        <DCPower>
          <UnitString>W</UnitString>
          <Value>1234</Value>
        </DCPower>
        <DCVoltage>
          <UnitString>V</UnitString>
          <Value>500</Value>
        </DCVoltage>
        <DailySunEnergy>
          <UnitString>kWhPerm2</UnitString>
          <Value>123</Value>
        </DailySunEnergy >
        <DailyYield>
          <UnitString>kWh</UnitString>
          <Value>500</Value>
        </DailyYield>
        <ExtRadiationSensor>
          <UnitString>WPerm2</UnitString>
          <Value>0</Value>
        </ExtRadiationSensor>
        <ExtTemperatureSensor>
          <UnitString>DEG_C</UnitString>
          <Value>0</Value>
        </ExtTemperatureSensor>
        <StateId>1</StateId>
        <Temperature1>
          <UnitString>DEG_C</UnitString>
          <Value>20</Value>
        </Temperature1>
        <Temperature2>
          <UnitString>DEG_C</UnitString>
          <Value>44</Value>
        </Temperature2>
      </HistoricalInverterData>
      <HistoricalInverterData>
        ...
      </HistoricalInverterData>
    </DataList>
  </InverterDataList>
</ResponseData>
```

Each value is transmitted with the associated unit. One "HistoricalInverterData" object represents one data record.

The individual fields have the following meaning:

General fields of the response frame:

Field	Description
Id	Identification of the inverter
OperatingHours	Operating hours of the inverter
TotalYield	Total energy yield of the inverter
DataList	List of data records for the required period

Fields of the "HistoricalInverterData" object:

Field	Description
Date	Time of the data record in the format "YYYY-mm-ddTHH:MM:ss"
ACCurrent	AC current
ACFrequency	AC frequency
ACPower	AC power
ACVoltage	AC voltage
DCCurrent	DC current
DCPower	DC power
DCVoltage	DC voltage
DailySunEnergy	Daily solar energy up to the time of the data record
DailyYield	Daily energy yield up to the time of the data record
ExtRadiationSensor	Measured value from the external insolation sensor
ExtTemperatureSensor	Measured value from the external insolation sensor
StateID	Status of the inverter
Temperature1	Temperature measured value 1
Temperature2	Temperature measured value 2

8.3.3   Messages / error messages

Request

The querying of error messages stored in the WebMonitor is also possible for a specified period. The date is formatted according to the DIN ISO 8601 standard: YYYY-mm-ddTHH:MM:ss (e.g. 2011-03-09T14:50:32).

The frame for the data request must have the following format:
```
<RequestData>
  <GetInverterEvents>
    <Id>9</Id>
    <FromDate>2011-03-09T04:45:00</FromDate>
    <ToDate>2011-03-09T16:00:00</ToDate>
  </GetInverterEvents>
</RequestData>
```

Response

The SINVERT WebMonitor DataProvider responds with a frame in the following format:
```
<ResponseData>
  <InverterEvents>
    <Id>9</Id>
    <EventList>
      <InverterEvent>
        <ErrorTime>2011-03-09T15:27:09</ErrorTime>
        <ErrorCode>9009</ErrorCode>
        <StateId>2</StateId>
        <ValueLong>12345</ValueLong>
        <ValueShort>123</ValueShort>
      </InverterEvent>
      <InverterEvent>
        <ErrorTime>2011-03-09T15:53:09</ErrorTime>
        <ErrorCode>9019</ErrorCode>
        <StateId>5</StateId>
        <ValueLong>56789</ValueLong>
        <ValueShort>567</ValueShort>
      </InverterEvent>
    </EventList>
  </InverterEvents>
</ResponseData>
```

The individual fields have the following meaning:

Field	Meaning
Id	Identification of the inverter
ErrorTime	Time of the message in the format "YYYY-mm-ddTHH:MM:ss"
ErrorCode	Error code as decimal number. (represented in the WebMonitor as a hexadecimal value)
StateId	Error status
ValueLong	Additional data, long
ValueShort	Additional data, short

8.3.4 Current plant data

Request

This request returns the current yield data of the plant (in the same way as the display field at top right of the SINVERT WebMonitor). The ID of the plant must be specified in the request frame. The ID can be found using the message frame for requesting the plant structure.

```
<RequestData>
  <GetActualPlantData>
    <Id>1</Id>
  </ GetActualPlantData >
</RequestData>
```

Response

The DataProvider returns the following data record:

```
<ResponseData>
    <ActualPlantData>
        <CurrentPower>
            <UnitString>kW</UnitString>
            <Value>28.29</Value>
        </CurrentPower>
        <DailyEnergy>
            <UnitString>kWh</UnitString>
            <Value>101.4</Value>
        </DailyEnergy>
        <DailyEnergyNormalized>
            <UnitString>WhPerWp</UnitString>
            <Value>2.93</Value>
        </DailyEnergyNormalized>
        <DailySunEnergy />
```

```
            <DataActuality>Good</DataActuality>
            <LastDataReceived>2012-03-26T12:50:00</LastDataReceived>
            <ModuleTemperature />
            <PlantId>1</PlantId>
            <Radiation />
            <ReducedCO2>
                <UnitString>t_CO2</UnitString>
                <Value>77.87</Value>
            </ReducedCO2>
            <StateId>4</StateId>
            <StateText>Run</StateText>
            <TotalEnergy>
                <UnitString>MWh</UnitString>
                <Value>89.5</Value>
            </TotalEnergy>
            <TotalIncome>
                <Currency>EUR</Currency>
                <Value>40276.8</Value>
            </TotalIncome>
        </ActualPlantData>
</ResponseData>
```

If there is no value for the current plant, no value is returned for the respective node.

DataActuality:

Specifies how up-to-date the data is.

Return value	Meaning
"Good"	The data records of all inverters originated during the last 15 minutes
"Bad"	At least one data record is out-of-date.

8.3.5   Current subplant data

Request

This request returns the current yield data of the subplant (in the same way as the display field at top right of the SINVERT WebMonitor). The ID of the subplant must be specified in the request frame. The ID can be found using the message frame for requesting the plant structure.

```
<RequestData>
  <GetActualSubPlantData>
    <Id>1</Id>
  </ GetActualSubPlantData >
</RequestData>
```

Response

The response message frame corresponds to the structure of the response frame in the chapter Current plant data (Page 92) .

8.3.6   Current inverter data

Request

The request returns the current data of an inverter.
```
<RequestData>
  <GetActualInverterData>
    <Id>9</Id>
  </ GetActualInverterData >
</RequestData>
```

Response

```
<ResponseData>
    <ActualInverterData>
        <ACCurrent>
            <UnitString>A</UnitString>
            <Value>59.6</Value>
        </ACCurrent>
        <ACFrequency>
            <UnitString>Hz</UnitString>
            <Value>50</Value>
        </ACFrequency>
        <ACPower>
            <UnitString>kW</UnitString>
            <Value>14.17</Value>
        </ACPower>
        <ACPowerNormalized>
```

```xml
                <UnitString>WPerWp</UnitString>
                <Value>0.82</Value>
            </ACPowerNormalized>
            <ACVoltage>
                <UnitString>V</UnitString>
                <Value>237.4</Value>
            </ACVoltage>
            <DCCurrent>
                <UnitString>A</UnitString>
                <Value>25.4</Value>
            </DCCurrent>
            <DCPower>
                <UnitString>kW</UnitString>
                <Value>14.27</Value>
            </DCPower>
            <DCVoltage>
                <UnitString>V</UnitString>
                <Value>561.3</Value>
            </DCVoltage>
            <DailyEnergy>
                <UnitString>kWh</UnitString>
                <Value>50.4</Value>
            </DailyEnergy>
            <DailyEnergyNormalized>
                <UnitString>WhPerWp</UnitString>
                <Value>2.91</Value>
            </DailyEnergyNormalized>
            <DailySunEnergy />
            <InverterId>9</InverterId>
            <LastDataReceived>2012-03-26T12:50:00</LastDataReceived>
            <ModuleTemperature />
            <Radiation />
            <StateId>4</StateId>
            <StateText>Run</StateText>
            <Temperature1>
                <UnitString>DEG_C</UnitString>
                <Value>43.7</Value>
            </Temperature1>
            <Temperature2>
                <UnitString>DEG_C</UnitString>
                <Value>51</Value>
            </Temperature2>
            <TotalEnergy>
                <UnitString>MWh</UnitString>
                <Value>43.56</Value>
            </TotalEnergy>
            <TotalIncome>
                <Currency>EUR</Currency>
                <Value>19599.75</Value>
            </TotalIncome>
        </ActualInverterData>
    </ResponseData>
```

8.3.7 Meaning of the values in the field "StateId"

The individual fields have the following meaning:

StateId	Meaning
0	Initialization
1	Turned off
2	Activation
3	Operational readiness
4	Operation
5	Standstill
6	Transient fault
7	Malfunction
20	<blank>
21	No data

8.4 HTTP status codes and possible causes

Status codes are defined for the HTTP protocol. These are also sent with every response from the server. The following table lists some of the status codes relevant for the DataProvider, as well as possible causes and solutions in the event of an error.

HTTP status codes

Status code	Cause	Solution
200 – OK	Request was successful	---
400 – Bad Request	Request contained errors	Check whether the XML structure in the body of the request is correct
401 - Authorization required	No login data was sent in the HTTP header	Complete the authorization header in the HTTP header (see the chapter Authentication (Page 85))
403 – Forbidden	Your login data are incorrect	Check whether the login data have been correctly entered and encoded. (see the chapter Authentication (Page 85))
404 – Not Found	The requested URL could not be found	Check whether the URL for calling the DataProvider has been entered correctly (see the chapter Frame transmission (Page 85))
405 – Method not allowed	The method used for the request was not valid	Use the "POST" method for sending the HTTP request.
500 – Server Error	There is an error on the server	Check your request data or try again later.
503 – Service Unavailable	The service is temporarily not available	Try again later, the server is possibly overloaded.

8.5 Implementation example for the DataProvider interface

The Siemens test plant with the user data SINVERT_Guest (without password) is also available for test purposes.

Example for calling inverter data

The programming language is C#

```csharp
//Create the HTTP request
HttpWebRequest request =
(HttpWebRequest)HttpWebRequest.Create(this.m_RequestUri);
try
{
  //Add necessary headers and the request method
  request.Headers.Add(HttpRequestHeader.Authorization, "Basic " +
this.m_AuthHeaderString);
  request.ContentType = "text/xml";
  request.Method = "POST";

  //Set the request body
  String requestString = "<RequestData><GetInverterData><Id>" +
inverterId + "</Id>";
  requestString += "<FromDate>" + startDateTime.ToString("yyyy-MM-dd
HH:mm:ss") + "</FromDate>";
  requestString += "<ToDate>" + endDateTime.ToString("yyyy-MM-dd
HH:mm:ss") + "</ToDate>";
  requestString += "</GetInverterEvents></RequestData>";

  request.ContentLength = requestString.Length;
  Stream requestStream = request.GetRequestStream();

  StreamWriter requestWriter = new StreamWriter(requestStream);
  requestWriter.Write(requestString);

  requestWriter.Close();

  //Send request and wait for response
  HttpWebResponse response = (HttpWebResponse)request.GetResponse();

  //Add http headers of response to a textbox
  String statusText = "Statuscode: " + ((int)response.StatusCode);
  statusText += " (" + response.StatusDescription + ")\r\n";
  ResponseHeaderTextBox.AppendText(statusText);

  foreach (String header in response.Headers)
  {
    String val = response.GetResponseHeader(header);
    ResponseHeaderTextBox.AppendText(header + ": " + val + "\r\n");
  }

  //Read the response body
  Stream responseStream = response.GetResponseStream();
```

```
      StreamReader responseReader = new StreamReader(responseStream);
      String responseString = String.Empty;
      while (!responseReader.EndOfStream)
      {
        responseString += responseReader.ReadLine();
      }

      response.Close();
      ParseXml(responseString);
    }
    catch (WebException wex)
    {
      if (wex.Response != null)
      {
        HttpWebResponse response = (HttpWebResponse)wex.Response;
        //Analyze result...
        response.Close();
      }
      else
      {
        if (wex.Status == WebExceptionStatus.Timeout)
        {
          MessageBox.Show(this, "Request timed out!");
        }
        else
        {
          MessageBox.Show(this, "Error on getting data!");
        }
      }
      request.Abort();
    }
    catch (Exception ex)
    {
      MessageBox.Show(this, "Error on getting data!");
      request.Abort();
    }
```

Appendix A

A.1 Technical support

Technical support for SINVERT products

- Information material and downloads for SINVERT products:
  SINVERT-infocenter (http://www.siemens.com/sinvert-infocenter)
  Here you can find, for example:
  - Catalogs
  - Brochures
- Documentation on SINVERT products:
  SINVERT support (http://www.siemens.com/sinvert-support)
  Here you can find, for example:
  - Manuals and operating instructions
  - The latest product information, FAQs, downloads, tips and tricks
  - Characteristics and certificates
- Contacts for SINVERT are available at:
  SINVERT-partners (http://www.siemens.com/sinvert-partner)

Technical assistance for SINVERT products

For all technical queries, please contact:

- Phone: +49 (911) 895-5900
  Monday to Friday, 8 am – 5 pm CET
- Fax: +49 (911) 895-5907
- E-mail: Technical assistance (mailto:technical-assistance@siemens.com)

Handling of replacements and returns for SINVERT products

For questions concerning replacing and returning devices, please contact:

Germany:

- Phone: +49 (911) 895-5999
  Monday to Friday, 8 am – 5 pm CET

International:

- Your competent sales partner

Service & Support

Download catalogs and information material:
www.siemens.com/sinvert/infomaterial

Newsletter - always up to date:
www.siemens.com/sinvert/newsletter

E-Business in the Industry Mall:
www.siemens.com/sinvert/mall

Online-Support:
www.siemens.com/sinvert/support

Contact for all technical information:
Technical Assistance
Tel.: +49 (911) 895-5900
E-Mail: technical-assistance@siemens.com
www.siemens.com/sinvert/technical-assistance

www.siemens.com/industry