iMaster NetEco
V600R022C10

Smart PV Management System (Cloud) User Manual

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Preface

Purpose

This document describes the common operations of the SmartPVMS .

Product Version

The following table lists the product versions related to this document.

Product Name	Product Version
SmartPVMS	V600R022C00

Intended Audience

This document is intended for photovoltaic (PV) plant operating personnel and management personnel.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in previous issues.

01 (2022-04-12)

This issue is the first official release of iMaster NetEco V600R022C00.

Draft B (2021-12-04)

This issue is used for the FOA of SmartPVMS V600R021C10 and is the second draft release.

Draft A (2021-10-15)

This issue is used for the FOA of SmartPVMS V600R021C10 and is the first draft release.

Contents

1 Getting Started

This topic describes how to register an installer, log in to and log out of the system, retrieve the password, and experience the plant functions.

1.1 Overview

The Smart PV Management System (Cloud) is a software system for the monitoring and O&M of PV power systems. It aims to display the current and historical running status of PV plants in a real-time and comprehensive manner. It also provides functions such as intelligent alarming, analysis, diagnosis, and O&M to help customers improve the power generation efficiency and lower the O&M cost, achieving refined management and improved profitability. The Smart PV Management System (Cloud) is deployed on a public network, which can be accessed over the Internet through 4G or Wi-Fi. The Smart PV Management System (Cloud) provides the following functions:

Full-lifetime Management Allows You to Learn the Plant Operating Status

- PV plant information on one screen, facilitating management.
- Real-time monitoring of plant-level, device-level, and module-level running data.
- Traceable and presentable plant-level and device-level historical data of multiple types.
- Real-time display of fault alarms, facilitating quick response and troubleshooting.
- Report and alarm push and subscription for learning the plant running status.

Intelligent and Efficient O&M

- Simple and efficient centralized O&M and monitoring.
- Real-time alarm push and troubleshooting suggestions, enabling quick response.
- Accurate locating of arc faults, reducing the onsite troubleshooting time (full optimizer configuration required).
- Mobile O&M/Electronic tickets, delivering simple and efficient O&M.

- Remote health check and proactive optimization, ensuring the healthy and stable operation of PV plants.

Networking Mode

Figure 1-1 shows the system networking.

Figure 1-1 System networking

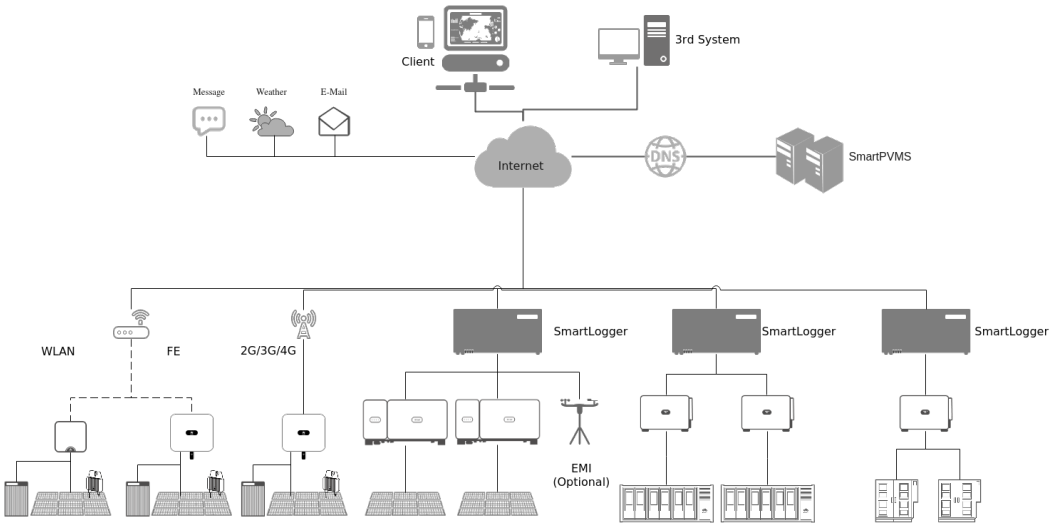


Table 1-1 lists the device types that can be managed by the system.

Table 1-1 Types of supported devices

Device Type	Description
Inverter	Only Huawei inverters can be managed.
SmartLogger	Can be connected to, managed and remotely upgraded on the system, covering performance indicator monitoring, configuration information, alarm information, and log information.
SDongle	
Residential battery	
LG battery	Can be connected to and managed on the system, covering performance indicator monitoring, configuration information, alarm information, and log information. Remote upgrade is not supported.
Electricity meter	Can be connected to and managed on the system, covering performance indicator monitoring, configuration information, and alarm information.
Environmental monitoring instrument	Can be connected to and managed on the system, covering performance indicator monitoring and configuration information.

1.2 User Registration

This topic describes how to register installer and owner accounts.

Register an owner account

The installer registers an account for the owner. The user needs to provide the personal information required for creating the account, such as the name and mobile number or email address. After the registration is complete, the system sends the account and initial password to the owner by email.

Register an installer account

- If your company has never registered an account in the management system, you can register it through the **Installer Registration** function. Registering the first installer user also enrolls a company.
  a. Open a web browser, enter **https://intl.fusionsolar.huawei.com** in the address box, and press **Enter**. The login page is displayed.
  b. Click **Installer Registration**. The **Installer Registration** page is displayed.
  c. Sign up as an installer as prompted.

  NOTE

  The email address and user name entered during registration can be logging in to the management system.
- If your company has registered an account in the management system, contact the administrator to add you to the user list. For details, see **3.7.1.2 Creating a User in the Company and Associating the User with the Plant**.

1.3 Login and Logout

This topic describes how to log in to and log out of the management system .

Prerequisites

You have obtained the username or email address and password for logging in to the system.

Context

To ensure account security, change the password periodically and keep the new password in mind. Not changing the initial password may cause password disclosure. A password left unchanged for a long period of time may be stolen or cracked. If a password is lost, the user cannot access the system. In these cases, the user is liable for any loss caused to the PV plant.

Procedure

Step 1 Open a web browser, enter **https://intl.fusionsolar.huawei.com** in the address box, and press **Enter**. The login page is displayed.

Step 2 Enter the username or email address and password, and click **Log In**.

NOTE

- If you log in to the system for the first time or for the first time after the privacy policy is updated, select the item for agreeing to the terms of use and privacy policy.
- If you have changed your password after login, keep the new password secure.
- For security purposes, do not set the browser to remember the password.

----End

Follow-up Procedure

To log out, move the pointer to  on the home page and choose **Log Out** from the drop-down list box.

1.4 Associate Email Address

If you have verified the email address associated with your account, you can reset your password using the email address when you forgot your login password.

Prerequisites

You have logged in to the management system.

Procedure

Step 1 Choose **System** > **System Settings** > **Personal Settings** from the main menu.

Step 2 In the navigation pane, choose **Modify Personal Info**.

Step 3 On **Associate Email Address** area, click **Verify**.

Step 4 Click **Send Code** and enter the obtained verification code to verify that the email address is valid.

Step 5 Click **OK**.

----End

1.5 Password Retrieval

You can reset the password using the associated email address or contact your installer when you forgot the password.

Procedure

- If you have verified the email address associated with your account, you can reset the password using the email address.
  a. Open a web browser, enter **https://intl.fusionsolar.huawei.com** in the address box, and press **Enter**. The login page is displayed.
  b. Click  . The **Forgot password** page is displayed.

c. Set a new password as prompted.

- If you have not verified the email address associated with your account, you can contact your installer to reset the password. For details, see **3.7.1.2 Creating a User in the Company and Associating the User with the Plant**.

2 I am an Owner

2.1 Home

On the home page, you can learn about the running status of all plants in the management system. In the list view, you can view the global information about multiple plants. In the map view, you can view the location and distribution of plants. In the KPI view, you can view the key energy yield indicators of the plants.

Procedure

Step 1 Perform the following operations as required.

Function	Function Access	Description
List View **NOTE** If two or more plants are bound to the user, the list view is displayed by default after the user logs in to the system. If only one PV plant is bound to the user, the monitoring page is displayed by default after the user logs in to the system.	Choose **Home** > **Home** > **List View**. Or in the upper-right corner of the home page, click  .	You can view the global information about the plant to learn about the plant running status. • Click the PV plant icon to view details. For details, see **2.2.1 Viewing Plant Running Information**.

Function	Function Access	Description
Map View **NOTE** The management system system provides only the capability of map service interconnection. The map service is provided by a third-party map service provider who is responsible for whether map data is available and accurate. If the map information is blank, contact the installer to configure map interconnection parameters.	Choose **Home** > **Home** > **Map View**. Or in the upper-right corner of the home page, click  .	You can intuitively view the location and distribution of a plant in this mode. • Move the pointer to the location of the target PV plant. The PV plant information of the Location, energy yield, and weather window is displayed. • Click the PV plant icon to view details. For details, see **2.2.2 Viewing Device Running Information**.
KPI View	Choose **Home** > **Home** > **KPI View**. Or in the upper-right corner of the home page, click  .	Displays key energy yield indicators of the plants, facilitating monitoring and management.

----End

2.2 Monitoring

This section describes how to monitor the topology of a PV plant to reflect the networking and running status of devices. You can learn about and monitor the running status of devices in real time by browsing views.

2.2.1 Viewing Plant Running Information

By monitoring the plant overview, view, and device information, you can learn about the plant running status in real time.

Context

Based on the functions of managed devices, PV plants can be classified into the following types:

- PV plant: Contains only PV devices and subcomponents, such as the maximum power point tracking (MPPT) and inverter (non-PCS).
- Energy storage plant: Contains only energy storage devices and subcomponents, such as energy storage containers and energy storage cabinets.

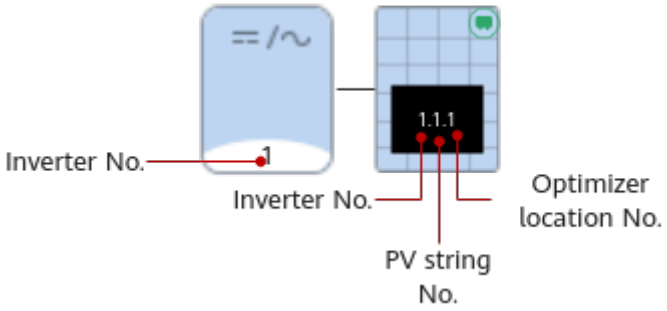
- PV+storage plant: Contains PV devices and energy storage devices.

Procedure

1. Choose **Monitoring** > **Monitoring** from the main menu.
2. In the navigation tree on the left, click the PV plant to be queried.

Table 2-1 Plant monitoring function description

Tab Page	Description
Overview	Views basic plant information, real-time running information, energy management, and plant revenue statistics. • Weather: displays the weather forecast of the current day and the next two days in the plant location. **NOTE** If the weather information is not displayed, contact the installer to configure the weather service. • Energy flow diagram: Displays the current power supply direction of the plant. **NOTE** The energy flow diagram is displayed only when three or more elements among PV, battery, grid, and load are involved in the system. • Energy management: Displays the energy yield, energy consumption, and self-consumption of a plant in different time dimensions, helping you analyze the energy consumption trend and optimize electricity consumption. In scenarios where energy storage is available, energy storage devices can store excess power and discharge power when PV power is inadequate or unavailable to improve the self-consumption rate. • Revenue: Calculates the sum of feed-in revenue of a plant (feed-in electricity x feed-in tariff) and savings in electricity bills (self-consumed electricity x purchase price) to display the benefits brought by the plant. **NOTE** • If revenue data is not displayed, contact the installer to check whether the electricity price is configured. • If the price unit is inconsistent with the local type, contact the installer to change the currency.

Tab Page	Description
Layout	Displays the logical view and physical layout of PV modules in a plant to monitor energy yield at PV module level (each module requires an optimizer). The logical layout displays the logical relationship between the inverters and the PV modules configured with optimizers. The physical layout displays the actual positions of the PV modules. If an optimizer is faulty, you can quickly locate it based on the physical layout. • The optimizer number is displayed on the PV module icon, as shown in **Figure 2-1**. **Figure 2-1** Optimizer number description  • Place the cursor on the icon of an inverter or a module to view the SN and running information of the inverter or PV module. **NOTE** If the real-time device data cannot be obtained and the running information is displayed as -, contact the installer to check whether the device is offline or faulty. • Click to display the logical connections between inverters and PV modules in different colors. Strings connected to the same inverter are in the same color. • The energy yield of the current day, month, year, or accumulated can be displayed on the component. You can set the energy yield based on site requirements.
Device Management	You can view the communication status and basic device information of all devices in the plant. Click a device name to view the running status of the device. For details, see **2.2.2 Viewing Device Running Information**.

2.2.2 Viewing Device Running Information

You can monitor devices in real time. This helps you learn about the running status of devices in a timely manner.

Context

Table 2-2 Device status description

Status	Color	Description
Running		The device is running properly (including the grid-connected, off-grid, and terminal test status).
Standby		The device is on standby or shut down unexpectedly or on command.
Faulty		The device is faulty or shut down unexpectedly.
Offline		The communication is interrupted.
Loading		The device has been identified and feature information is being collected.

NOTE

If the real-time device data cannot be obtained and the running information is displayed as -, contact the installer to check whether the device is offline or faulty.

Procedure

1. Choose **Monitoring** > **Monitoring** from the main menu.
2. In the navigation tree on the left, click the device to be queried. You can view the detailed information, historical data.

Table 2-3

Tab Page	Description	Procedure
Overview **NOTE** • The overview of devices such as SmartLogger can be displayed. • The SmartLogger-level overview page is displayed only when the SmartLogger software version is FusionSolar V800R021C10 or later.	Displays the physical logical relationships and running status of devices and their connected devices in a topology view, and renders devices in different colors based on the running status.	In the subarray topology view and battery topology view, you can perform the following operations: • Move the cursor to the icon of a subcomponent and view the tips that are displayed. • Click a device icon to view the running information about the subcomponent. • Reporting cell statistics consumes a large amount of data. Therefore, the system does not automatically refresh the data. To view the latest cell data, you need to manually refresh. 1. Click **Refresh** in the **Curent Data of battery cell** area. 2. In the dialog box that is displayed, click **OK**, and then click **OK**.
Details	Views the key running parameters of the device. **NOTE** If PV strings are attached to the inverter but the PV string details are empty, contact the installer to configure PV string parameters.	
Historical Information	Queries the running status of a device in a specified period. **NOTE** If the data is incomplete or lost in a certain period, contact the installer to collect the lost data.	1. Choose a device from the navigation tree on the left and click **Historical Information**. 2. On the top of the query page, select the query time and signal point name. 3. Click **Query** to view the historical information query result.

NOTE

The function tab pages vary depending on the device.

2.2.3 Sharing Plant Running Information

The owner can share the plant running information through the Kiosk view with other users who can view the shared information without logging in to the management system.

Procedure

Step 1 Choose **Monitoring** > **Monitoring** from the main menu.

Step 2 In the navigation tree on the left, click the PV plant to be queried. The **Overview** page is displayed by default.

Step 3 On the **Overview** page, click **Kiosk** in the upper right corner.

Step 4 In the dialog box that is displayed, set the Kiosk view as prompted.

Step 5 Click **Copy** to copy the URL and save it to the local PC and click **OK**.

After the setting is complete, you can share the URL with others who need to know the plant information.

NOTE

- The validity period of the URL of the Kiosk view is one year.
- After the Kiosk view is generated, the plant running data is refreshed every 30 minutes. You can refresh the browser to obtain the latest data.

----End

2.3 Plant Management

On the **Plant Management** page, you can manage multiple plants in a centralized manner, and query, export, and modify plant information.

Prerequisites

You have logged in to the management system as an installer.

Procedure

Step 1 Choose **Plants** > **Plants** > **Plan Management**.

Step 2 On the **Plant Management** page, you can perform the operations listed in **Table 1** as required.

Table 2-4 Plan management operations

Operation	Procedure
Querying Power Plants	Enter a plant name and click **Query**.
Modifying Plant Information	1. Click in the **Operation** column. 2. In the displayed dialog box, enter the basic information about the plant and click **Apply**. 3. Click **Save**.
Export Plant Information	Select the plants to be exported and click **Export** to export the plant information.
Unbinding or Deleting a Device	1. Click in the **Operation** column. In the displayed dialog box, click the **Device List** tab. 2. Select the device and click **Delete**. 3. In the displayed dialog box, **select Unbind** or **Delete** as required and click **OK**. **NOTE** • After a device is unbound, the data of the device and its subdevices is stored in the database. The default data retention period is six months. To change the retention period, contact the system administrator. – If the device is rebound to a plant within the data retention period, the device inherits the retained data. – If the device is not bound to a plant within the data retention period, the data will be automatically deleted. • After a device is deleted, the data of the device and its subdevices is permanently deleted. When the device is rebound to a plant, the device data cannot be restored.

----End

2.4 System

2.4.1 Personal Settings

This feature enables users to customize personal settings.

2.4.1.1 Changing Personal Password

If passwords are disclosed or remain unchanged for a long time, users can change their personal passwords by setting personal information. To improve user security, it is recommended that passwords be changed periodically (for example, every three months). When a user logs in to the SmartPVMS for the first time or the the user password is resets, the user needs to change the initial password.

Context

If you cannot change your password, contact the installer or company administrator.

Procedure

Step 1 Choose **System** > **System Settings** > **Personal Settings** from the main menu.

Step 2 In the navigation pane, choose **Change Password**.

Step 3 On the **Change Password** tab page, enter **Old password** and set **New password** and **Confirm password**.

Step 4 Click **Apply**.

NOTE

User information is more secure if a password is changed more frequently. If a user forgets the password due to frequent password changes, the user needs to contact installer or company administrators to reset the password.

----End

Related Tasks

In the following cases, the system prompts a user to change the password after the user logs in to the SmartPVMS:

- The user uses the initial password for login. For example, the password for the user has been reset, or the password is the one used for creating the user account.
- The user account is enabled again, but the user uses the password when the account is disabled for login.

2.4.1.2 Modifying Personal Information

When personal information such as mobile numbers and email addresses changes or needs to be supplemented, users can periodically maintain their personal information by setting personal information to ensure its accuracy.

Procedure

Step 1 Choose **System** > **System Settings** > **Personal Settings** from the main menu.

NOTICE

- When you modify your personal information, such as mobile numbers and email addresses, you are obligated to take considerable measures, in compliance with the laws of the countries concerned and the user privacy policies of your company, to ensure that your personal data is fully protected.
- To ensure the security of personal information, such as mobile numbers and email addresses, these data is anonymized on the page, and HTTPS encryption transmission channels are used.

Step 2 In the navigation pane, choose **Modify Personal Info**.

Step 3 On **Modify Personal Info**, modify personal information as required.

NOTE

If the SMS and email verification codes cannot be obtained, ensure that the mailbox service is configured correctly.

Table 2-5 Parameter description

Parameter	Description	Procedure
Associate Mobile Number	Mobile number associated with a user account.	• Editing the mobile number 1. Click **Edit**. 2. Verify the identity information as prompted and click **Next**. 3. Select a country or region code and enter a new mobile number. 4. Click **OK**. • Verifying the mobile number 1. Click **Verify**. 2. Click **Send Code** and enter the obtained verification code to verify that the mobile number is valid. 3. Click **OK**.
Associate Email Address	Email address associated with a user account. After an email is associated, you can use the associated email to reset the password if you forgets the login password.	• Editing the email address 1. Click **Edit**. 2. Verify the identity information as prompted and click **Next**. 3. Enter a new email address. 4. Click **OK**. • Verifying the email address 1. Click **Verify**. 2. Click **Send Code** and enter the obtained verification code to verify that the email address is valid. 3. Click **OK**.

Parameter	Description	Procedure
Auto-Logout If No Activity Within	If a user does not perform any operation within the period specified by this parameter after login, the user will be logged out. This parameter can be set for local users and remote users. The default value for the third-party user is 30 minutes and cannot be changed.	1. Click the drop-down list and select a value for **Auto-Logout If No Activity Within**. 2. Click **Save**.
Max. Online Sessions	You can set the maximum number of online sessions. This parameter is unselected by default, indicating that the maximum number of online sessions of an account is not limited. If this parameter is enabled, the default value is **1**, and the value range is from 1 to 500. ● If this parameter is set to **1**, **Login when maximum online sessions already in use** can be **Not allowed** or **Log out of the session**. ● If this parameter is set to a value from 2 to 500, **Login when maximum online sessions already in use** is set to **Not allowed** and cannot be changed.	1. Select **Max. online sessions** to enable this function. 2. Set the number of maximum online sessions. 3. Click **Save**.
Welcome Message	You can set the information to be displayed upon the next login.	1. Click **Edit**. 2. Enter the information to be displayed upon the next login. 3. Click **OK**.

----End

2.4.1.3 Viewing Client IP Address Control Policy

Users can view their own client IP address control policies.

Procedure

Step 1 Choose **System** > **System Settings** > **Personal Settings** from the main menu.

Step 2 In the navigation pane, choose **Personal Client IP Address Policies**.

Step 3 On the **Personal Client IP Address Policies** page, view your IP address control policies.

----End

2.4.2 Viewing Announcements

This topic describes how to view received public notices to learn broadcast messages.

Procedure

Step 1 Choose **System** > **Message Management** > **Public Notice** to go to the **Public Notice** page.

Step 2 Click the **Message Subject** of an unread message. In the displayed **Message** dialog box, view the details about the message.

----End

3 I am an Installer

3.1 Home

On the home page, you can learn about the running status of all plants in the management system. In the list view, you can view the global information about multiple plants. In the map view, you can view the location and distribution of plants. In the KPI view, you can view the key energy yield indicators of the plants. In addition, you can view the overall O&M and operational status of plants in a dashboard.

Procedure

Step 1 Perform the following operations as required.

Function	Function Access	Procedure
List View **NOTE** If two or more plants are bound to the user, the list view is displayed by default after the user logs in to the system. If only one PV plant is bound to the user, the monitoring page is displayed by default after the user logs in to the system.	Choose **Home** > **Home** > **List View**. Or in the upper-right corner of the home page, click  .	You can gain an overview of plants and important plant information, and navigate to individual plants for details. • View the running status of the PV plant. – The **Plant KPIs** area displays the energy yield and revenue.. – The **Plant Status** area displays the real-time status of the plant. – The **Real-Time Alarms** area displays device alarms. • Creating a plant. 1. Click **Add Plant**. 2. In the displayed **Add Plant** dialog box, complete the configuration wizard, and click **Save.**
Map View **NOTE** The SmartPVMS system provides only the capability of map service interconnection. The map service is provided by a third-party map service provider who is responsible for whether map data is available and accurate. If the map information is blank, contact the system administrator to configure map interconnection parameters.	Choose **Home** > **Home** > **Map View**. Or in the upper-right corner of the home page, click  .	You can intuitively view the location and distribution of a plant in this mode. • Move the pointer to the location of the target PV plant. The PV plant information of the Location, energy yield, and weather window is displayed. • Click the PV plant icon to view details.
KPI View	Choose **Home** > **Home** > **KPI View**. Or in the upper-right corner of the home page, click  .	Displays key energy yield indicators of the plants, facilitating monitoring and management.

Function	Function Access	Procedure
Dashboard	Choose **Home** > **Home** > **Dashboard**.	The Dashboard allows you to monitor the O&M and operation status of all PV plants. • Displays KPI information modules in six dimensions. 1. In the upper-right corner of the company-level dashboard, click  . 2. In the dialog box that is displayed, select a function block and drag it to set the layout. 3. Click **OK**. • Exit the dashboard display. You can click the logo or title to return to the plant home page.

----End

3.2 Monitoring

This section describes how to monitor the topology of a PV plant to reflect the networking and running status of devices. You can learn about and monitor the running status of devices in real time by browsing views.

3.2.1 Plant Overview

Views the real-time monitoring data of the PV plant to learn the operating status of the PV plant in a timely manner.

Prerequisites

- You have the operation rights for viewing **Monitoring**.
- The device has been connected to the management system and bound to a plant. For details, see **3.4.1.1 Creating a Plant**.

Context

Based on the functions of managed devices, PV plants can be classified into the following types:

- PV plant: Contains only PV devices and subcomponents, such as the maximum power point tracking (MPPT) and inverter (non-PCS).
- Energy storage plant: Contains only energy storage devices and subcomponents, such as energy storage containers and energy storage cabinets.

- PV+storage plant: Contains PV devices and energy storage devices.

Procedure

Step 1 Choose **Monitoring** > **Monitoring** from the main menu.

Step 2 In the navigation tree on the left, click the PV plant to be queried.

On the **Overview** page, you can view the basic plant information, real-time running information, energy management, and plant revenue statistics.

Table 3-1 Plant overview function description

Tab Page	Description
Weather	Weather: displays the weather forecast of the current day and the next two days in the plant location. **NOTE** If the weather information is not displayed, contact system administrator to configure the weather service.
Energy flow diagram	Energy flow diagram: Displays the current power supply direction of the plant. **NOTE** The energy flow diagram is displayed only when three or more elements among PV, battery, grid, and load are involved in the system.
Energy management	Energy management: Displays the energy yield, energy consumption, and self-consumption of a plant in different time dimensions, helping you analyze the energy consumption trend and optimize electricity consumption. In scenarios where energy storage is available, energy storage devices can store excess power and discharge power when PV power is inadequate or unavailable to improve the self-consumption rate.
Revenue	Revenue: Calculates the sum of feed-in revenue of a plant (feed-in electricity x feed-in tariff) and savings in electricity bills (self-consumed electricity x purchase price) to display the benefits brought by the plant. **NOTE** • You need to set the electricity prices when adding a PV plant. Otherwise, the system cannot calculate the revenue. For details, see **3.4.1.1 Creating a Plant**. • If the price unit is inconsistent with the local type, contact the company administrator to change the currency. For details, see **3.7.1.3 Configuring Company Information**.

NOTE

If a large number of devices are connected to the plant, it may take 30 to 40 minutes to transmit the real-time data of all devices to the management system.

----End

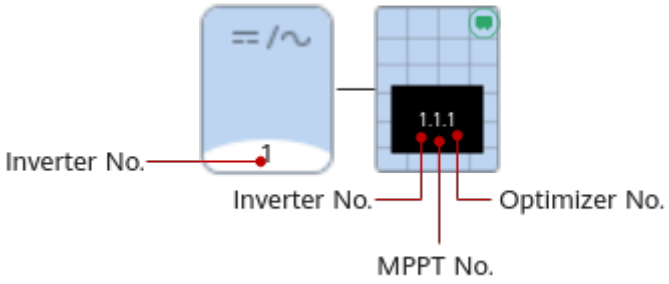
3.2.2 Plant View

The system generates a logical layout based on the connected optimizers, which displays the logical relationship between the inverters and the PV modules configured with optimizers. You can create a physical layout based on the actual positions of the PV modules. If an optimizer is faulty, you can quickly locate it based on the physical layout, facilitating maintenance.

Context

- The optimizer number is displayed on the PV module icon, as shown in **Figure 3-1**.

  Figure 3-1 Optimizer number description

- Place the cursor on the icon of an inverter or a module to view the SN and running information of the inverter or PV module.

  NOTE

  If the real-time device data cannot be obtained and the running information is displayed as -, check whether the device is offline or faulty.

- Click to display the logical connections between inverters and PV modules in different colors. Strings connected to the same inverter are in the same color.
- In the view area, hold down the left mouse button and drag the mouse to move the canvas.
- The energy yield of the current day, month, year, or accumulated can be displayed on the component. You can set the energy yield based on site requirements.
- After the management system is upgraded, you need to re-collect data from the optimizer to ensure the accuracy of the current month, current year, and accumulated energy yield. For details, see **3.7.2.1.1 Data Recovery**.

3.2.2.1 Physical Layout Configuration

For a PV plant with an optimizer, the management system generates a logical view by default. You can create a PV plant physical layout diagram based on the

physical location of the optimizer and bind the optimizer to PV modules to implement module-level monitoring.

Prerequisites

- You have obtained the physical layout of PV modules.
- In the scenario where the physical layout diagram is automatically generated, you need to correctly paste the SN label of the optimizer to the physical layout template, take a photo of the template, and save the photo to the local PC. For details about the physical layout template, see the *Smart PV Optimizer Quick Guide*.

NOTICE

Pay attention to the following points when taking a picture of the template:

- Place the template on a flat table, keep the phone level with the template, and take a photo in landscape mode.
- Ensure that the four positioning points are within the picture.
- Ensure that the QR code is attached in the frame and does not exceed the frame.
- Ensure that the QR code in the picture is clear and has no reflection or shadow. Otherwise, the recognition accuracy will be reduced.

Procedure

- Automatic generation of the physical layout diagram
  a. Choose **Monitoring** > **Monitoring** from the main menu.
  b. In the navigation tree on the left, select a PV plant, and click the **Layout** tab page.
     - If no physical layout diagram is created for the plant, the **Logical Layout** page is displayed. Click **Add Physical Layout** in the upper right corner of the **Logical Layout** page.
     - If a physical layout diagram has been created for the plant, the **Physical Layout** page is displayed. Click **Edit Physical Layout** in the upper right corner of the **Physical Layout** page.
  c. In the **Layout** tab page of a plant, click **Click to Upload** to upload a layout diagram.

     NOTE

     - Click an image thumbnail to zoom in.
     - Click the button in the upper right corner of the thumbnail to delete the layout diagram.
     - Click **Move Drawing** to adjust the position of the layout diagram.
  d. Click **Generate Physical Layout**, in the displayed dialog box, click **Save** to save the generated physical layout diagram.
  e. If any optimizers are not recognized, you can manually bind the optimizers.

i. In the **Physical Layout** area, click the saved layout diagram.
ii. On the **Physical Layout Configuration** page, drag the optimizers in the **Device List** area on the left to the PV modules that are not successfully bound.
iii. Click  .

- Manual configuration of the physical layout diagram
  a. Choose **Monitoring** > **Monitoring** from the main menu.
  b. In the navigation tree on the left, select a PV plant, and click the **Layout** tab page.
     - If no physical layout diagram is created for the plant, the **Logical Layout** page is displayed. Click **Add Physical Layout** in the upper right corner of the **Logical Layout** page.
     - If a physical layout diagram has been created for the plant, the **Physical Layout** page is displayed. Click **Edit Physical Layout** in the upper right corner of the **Physical Layout** page.
  c. In the **Physical Layout** area, click **Click to Create**.
  d. On the **Physical Layout Configuration** page, drag the diagram elements on the left to the design area based on the plant drawing.
  e. Set the parameters based on actual conditions.
  f. Click **Save**. The created device diagram element is displayed in the view area.
  g. Click a device diagram element and set device attribute values in the **Device Attribute** area.
  h. After the diagram element is created, drag the optimizer in the **Device List** area to the corresponding diagram element position for binding.
  i. Click  . The physical layout diagram is created successfully.

----End

3.2.2.2 Optimizer Disconnection Detection

Detects optimizer disconnections, detects faulty optimizers in a timely manner, and rectifies faults to reduce energy yield loss of PV modules.

Procedure

Step 1 Choose **Monitoring** > **Monitoring** from the main menu.

Step 2 In the navigation tree on the left, select a PV plant, and click the **Layout** tab page. If no physical layout diagram is created for the plant, the **Logical Layout** page is displayed.

Step 3 Click **Disconnection detection** in the upper right corner of the page.

- If there are multiple inverters in the plant and all of them are equipped with optimizers, select the inverter to be detected in the displayed dialog box and click **Confirm**.
- If only one inverter in the plant is equipped with an optimizer, the detection task is directly executed after you click **Disconnection detection**.

Step 4 If a disconnected optimizer is detected, you can quickly locate the optimizer based on the physical layout diagram and rectify the fault based on the repair suggestions.

----End

Follow-up Procedure

After the disconnection fault is rectified, perform the disconnection detection again to ensure that the fault is rectified.

3.2.3 Device Management

Views the communication status and basic device information of all devices in the plant. You can export device performance data and replace faulty or expired devices based on O&M requirements.

Context

Table 3-2 Device status description

Status	Color	Description
Running		The device is running properly (including the grid-connected, off-grid, and terminal test status).
Standby		The device is on standby or shut down unexpectedly or on command.
Faulty		The device is faulty or shut down unexpectedly.
Offline		The communication is interrupted.
Loading		The device has been identified and feature information is being collected.

NOTE

If the real-time device data cannot be obtained and the running information is displayed as -, check whether the device is offline or faulty.

Procedure

Step 1 Choose **Monitoring** > **Monitoring** from the main menu.

Step 2 In the navigation tree on the left, select the PV plant to be queried and click the **Device Management** tab page.

Step 3 On the **Device Management** page, perform operations based on the application scenario. For details about the procedure, see **Table 3-3**.

Table 3-3 Device management operations

Application Scenario	Procedure
Deleting a device	Select one or more devices and click **Delete**. In the displayed dialog box, click **OK**.
Setting device parameters	1. In the device list, select one or more devices of the same model and click **Set Parameters**. 2. In the displayed dialog box, set parameters as required and click **Set**.
Exporting basic device information	Click **Export Basic Info**, or select one or more target devices and then click **Export Basic Info** to export basic information about all or selected devices, respectively.
Exporting device performance data	1. Select one or more devices and click **Export Performance Data**. 2. Select the signal points to be exported and click **OK**. 3. In the **Export** dialog box, enter **Task Name**, set **Start date** and **End date**, and click **OK**. 4. In the dialog box that is displayed, click  .
Modifying a device name	1. Select a device and click  . 2. Change the name of the selected device and click **OK**.
Viewing device details	You can click a device name to view the device details.
Replacing a device **NOTE** The following conditions must be met for device replacement: • The current device is disconnected from the management system. • Device replacement and commissioning have been completed on the device. For details, see *FusionSolar Smart PV Solution-Device Replacement Commissioning Guide*. • The following types of devices can be replaced: inverter, SmartLogger, and communications module.	1. Select a device and click **Replace Device**. 2. In the dialog box that is displayed, enter the SN of the target device and click **View**.. 3. Click **Replace**. **NOTE** When an inverter is replaced, the total energy yield data of the old device can be synchronized to the new device. After the device is replaced, the data is automatically calibrated on the new device.

----End

Follow-up Procedure

If automatic calibration fails due to device disconnection or poor network quality, manually calibrate the device after the fault is rectified.

1. Export the device performance data.
   a. Select the target inverter and click **Export Performance Data**.
   b. Select the total energy yield, and click **OK**.
   c. In the **Export** dialog box that is displayed, enter **Task name**, set **Start date** and **End date**, and click **OK**.

      NOTE

      Start date: You are advised to set this parameter to 30 days before the old device is disconnected. For example, if the old device is disconnected on September 30, set this parameter to August 30.

      End date: You are advised to set this parameter to any date after the device is disconnected.

   d. In the **Export Performance Data** dialog box that is displayed, click .
   e. Open the downloaded performance data file and record the latest valid values.
2. Calibrate the energy parameters.
   a. Select the target inverter and click **Set Parameters**.
   b. In the displayed dialog box, click **Feature Parameter**.
   c. Enter the values of the total energy yield obtained in step **1.e**.
   d. Click **Set**.

3.2.4 Report Management

Displays plant, inverter, PCS, and battery reports in different dimensions and allows you to subscribe to and export reports.

Prerequisites

The email server of the company has been configured. For details, see **3.7.1.4 Configuring an Email Server**.

Context

The revenue unit displayed for PV plants is the currency selected by the company to which the plant belongs. If the price unit is inconsistent with the local type, contact the company administrator to change the currency. For details, see **3.7.1.3 Configuring Company Information**.

Procedure

Step 1 Choose **Monitoring** > **Monitoring** from the main menu.

Step 2 In the left pane, select the plant to be queried and click **Report Management**.

NOTE

- Plant report: The statistics on yield, consumption, and revenue can be displayed by time or plant.
- Inverter report: The statistics on yield and running status can be displayed by day, month, and year.
- PCS report: collects statistics on the energy yield, peak AC power, and power supply from grid of PCSs by year, month, and day.
- Battery report: The charging and discharging status of batteries can be displayed by day, month, and year.

Step 3 Select a report function as required. For details, see **Table 3-4**.

Table 3-4 Report task

Task	Description	Procedure
Querying reports	Used to view the running data of a plant or device in a specified period.	Select a plant or device, set the statistical time, and click **Query**.
Exporting reports	Used to save the query result to the local client.	Click **Export**.
Subscribing to reports	Used to send the report data of the plant or device to a user's mailbox.	Click **Subscribe**. On the displayed page, click **Add**. **NOTE** The system sends the statistical report of the previous day to the user's mailbox at 04:30 in the time zone corresponding to the selected plant or device.

----End

3.2.5 Device Monitoring

You can monitor devices in real time. This helps you learn about the running status of devices in a timely manner and handle exceptions to ensure device safety.

Prerequisites

- You have the operation rights for viewing **Monitoring**.
- The device has been connected to the management system and bound to a plant. For details, see **3.4.1.1 Creating a Plant**.

Context

Table 3-5 Device status description

Status	Color	Description
Running		The device is running properly (including the grid-connected, off-grid, and terminal test status).
Standby		The device is on standby or shut down unexpectedly or on command.
Faulty		The device is faulty or shut down unexpectedly.
Offline		The communication is interrupted.
Loading		The device has been identified and feature information is being collected.

NOTE

If the real-time device data cannot be obtained and the running information is displayed as -, check whether the device is offline or faulty.

Procedure

1. Choose **Monitoring** > **Monitoring** from the main menu.
2. In the navigation tree on the left, click the device to be queried. You can view the detailed information, historical data, and alarms of the device, and set device parameters.

Table 3-6 Device monitoring function

Tab Page	Description	Procedure
Overview **NOTE** The SmartLogger-level overview page is displayed only when the SmartLogger software version is FusionSolar V800R021C10 or later.	Displays the physical logical relationships and running status of devices and their connected devices in a topology view, and renders devices in different colors based on the running status.	In the subarray topology view and battery topology view, you can perform the following operations: • Move the cursor to the icon of a subcomponent and view the tips that are displayed. • Click a device icon to view the running information about the subcomponent. • Reporting cell statistics consumes a large amount of data. Therefore, the system does not automatically refresh the data. To view the latest cell data, you need to manually refresh. 1. Click **Refresh** in the **Curent Data of battery cell** area. 2. In the dialog box that is displayed, click **OK**, and then click **OK**.
Details	Views the key running parameters of the device. **NOTE** If a string is connected to the inverter, you need to set string parameters when adding a PV plant. Otherwise, the string details are empty. For details, see **3.4.1.1 Creating a Plant**.	-

Tab Page	Description	Procedure
Configuration	Sets access parameters, power grid parameters, feature parameters, and power parameters for devices to improve the device running efficiency.	1. Choose a device from the navigation tree on the left and click **Configuration**. 2. On the **Configuration** page, select the parameters to be set and enter the parameter values. 3. Click **Set** to synchronize the parameter settings to the device.
Alarms	Queries alarms that are updated in real time for devices and subcomponents to quickly detect, locate, and rectify device faults.	For details, see **3.5.2 Alarm Management**.
Historical Information	Queries the running status of a device in a specified period. **NOTE** If the data in a certain period is incomplete or lost, you can re-collect the lost data. For details, see **3.7.2.1.1 Data Recovery**.	1. Choose a device from the navigation tree on the left and click **Historical Information**. 2. On the top of the query page, select the query time and signal point name. 3. Click **Search** to view the historical information query result.

NOTE

The function tab pages vary depending on the device.

3.3 Report Management

Displays plant, inverter, PCS, and battery reports in different dimensions and allows you to subscribe to and export reports.

Prerequisites

The email server of the company has been configured. For details, see **3.7.1.4 Configuring an Email Server**.

Context

The revenue unit displayed for PV plants is the currency selected by the company to which the plant belongs. If the price unit is inconsistent with the local type, contact the company administrator to change the currency. For details, see **3.7.1.3 Configuring Company Information**.

Procedure

Step 1 Choose **Monitoring** > **Monitoring** from the main menu.

Step 2 In the left pane, select the plant to be queried and click **Report Management**.

NOTE

- Plant report: The statistics on yield, consumption, and revenue can be displayed by time or plant.
- Inverter report: The statistics on yield and running status can be displayed by day, month, and year.
- PCS report: collects statistics on the energy yield, peak AC power, and power supply from grid of PCSs by year, month, and day.
- Battery report: The charging and discharging status of batteries can be displayed by day, month, and year.

Step 3 Select a report function as required. For details, see **Table 3-7**.

Table 3-7 Report task

Task	Description	Procedure
Querying reports	Used to view the running data of a plant or device in a specified period.	Select a plant or device, set the statistical time, and click **Query**.
Exporting reports	Used to save the query result to the local client.	Click **Export**.
Subscribing to reports	Used to send the report data of the plant or device to a user's mailbox.	Click **Subscribe**. On the displayed page, click **Add**. **NOTE** The system sends the statistical report of the previous day to the user's mailbox at 04:30 in the time zone corresponding to the selected plant or device.

----End

3.4 Plant

You can centrally manage multiple PV plants, upgrade devices, and export logs.

3.4.1 Plant

You can create a PV plant in the management system and manage the PV plant in a centralized manner.

3.4.1.1 Creating a Plant

After a device is connected to the management system, you can create a plant in the management system.

Prerequisites

- You have commissioned devices and set management system parameters. For details, see the *FusionSolar App Quick Guide*.
- You have obtained the SN of the access device.

  NOTE

  If the devices are cascaded, record the SN of only one device so that the system automatically identifies the cascaded device when a PV plant is created.

Procedure

Step 1 Choose **Plants** > **Plants** > **Plant Management**.

Step 2 On the **Plant Management** page, click **Add Plant**.

Step 3 In the displayed dialog box, enter the basic information about the plant and click **Next**.

Step 4 Enter the SN of the device and click **Next**.

NOTE

- If multiple devices need to be connected, click **Add**.
- If the connected devices are cascaded, you only need to enter the SN of one device. The system automatically identifies the SNs of cascaded devices.

Step 5 Set the string capacity.

1. Select an inverter and click **Set String Capacity**.
2. In the displayed dialog box, enter the PV capacity values and click **OK**.
3. Confirm the configured string capacity and click **Next**.

Step 6 On the **Set Electricity Prices** page, set **Feed-in Tariff** and **Purchase Price**, and click **Next**.

NOTICE

- The system can calculate revenue data only after electricity price information is configured. If the default electricity prices set by the company are applicable to your plant, you can click **Use Default Electricity Prices** to apply the company electricity prices.
- If the price unit is inconsistent with the local type, contact the company administrator to change the currency. For details, see **3.7.1.3 Configuring Company Information**.

Step 7 On the **Set Other Info** page, configure the address, location, and time zone of the plant.

NOTE

When setting the plant time zone, ensure that the plant time zone is the same as the device time zone. Otherwise, the management system delivers the plant time zone to the devices to overwrite the time zone configured on devices after the plant is created.

Step 8 Click **Save**.

----End

Follow-up Procedure

For details about other operations, see **3.4.1.2 Managing Plants**.

3.4.1.2 Managing Plants

On the **Plant Management** page, you can manage multiple plants in a centralized manner, such as sharing EMI (Environmental Monitoring Instrument) and modifying plant information.

Procedure

Step 1 Choose **Plants** > **Plants** > **Plant Management**.

Step 2 On the **Plant Management** page, you can perform the operations listed in **Table 1** as required.

Table 3-8 Plant management operations

Operation	Procedure
Sharing EMI	1. In the plant list, select one or more plants that require EMI sharing and click **Shared EMI**. 2. In the displayed dialog box, select the EMI to be shared, and click **Save**. **NOTE** Each plant can receive a maximum of one EMI.

Operation	Procedure
Canceling EMI sharing	1. Select a plant that has received a shared EMI and click **Shared EMI**. 2. In the displayed dialog box, click **Reset**, and then click **Save**. 3. In the displayed dialog box, click **Confirm**.
Sharing a plant	1. Select a plant in the plant list and click **Share**. 2. In the displayed dialog box, enter the recipient contact information and click **OK**. **NOTE** A shared plant cannot be shared again.
Viewing sharing details	• For those who offered shared plants 1. In the plant list, click **Shared** in the **Shared Plant** column to view the sharing details. • For those who received shared plants 1. Click **Shared Plants** in the company list on the left. 2. In the plant list, click **Received** in the **Share Plant** column to view the sharing details.
Canceling plant sharing	1. Select a shared plant in the plant list and click **Cancel Sharing**. 2. In the displayed dialog box, select the plant the sharing of which is to be canceled and click **Cancel Sharing**. **NOTE** Only those who have offered shared plants can cancel the plant sharing.
Modifying plant information	1. Click  in the **Operation** column. 2. In the displayed dialog box, enter the basic information about the plant and click **Apply**. 3. Click **Save**.
Deleting a plant	Select a plant in the plant list and click **Delete** or  in the **Operation** column. **NOTE** If there are a large number of devices in the plant, it takes about 10 to 20 minutes to delete the plant.

----End

3.4.2 Device

Manage mediation packages on devices, upgrade devices, export device logs, and manage device licenses.

3.4.2.1 Device Management

Views the communication status and basic device information of all devices in the plant. You can export device performance data and replace faulty or expired devices based on O&M requirements.

Context

Table 3-9 Device status description

Status	Color	Description
Running		The device is running properly (including the grid-connected, off-grid, and terminal test status).
Standby		The device is on standby or shut down unexpectedly or on command.
Faulty		The device is faulty or shut down unexpectedly.
Offline		The communication is interrupted.
Loading		The device has been identified and feature information is being collected.

NOTE

If the real-time device data cannot be obtained and the running information is displayed as -, check whether the device is offline or faulty.

Procedure

Step 1 Choose **Monitoring** > **Monitoring** from the main menu.

Step 2 In the navigation tree on the left, select the PV plant to be queried and click the **Device Management** tab page.

Step 3 On the **Device Management** page, perform operations based on the application scenario. For details about the procedure, see **Table 3-10**.

Table 3-10 Device management operations

Application Scenario	Procedure
Deleting a device	Select one or more devices and click **Delete**. In the displayed dialog box, click **OK**.
Setting device parameters	1. In the device list, select one or more devices of the same model and click **Set Parameters**. 2. In the displayed dialog box, set parameters as required and click **Set**.

Application Scenario	Procedure
Exporting basic device information	Click **Export Basic Info**, or select one or more target devices and then click **Export Basic Info** to export basic information about all or selected devices, respectively.
Exporting device performance data	1. Select one or more devices and click **Export Performance Data**. 2. Select the signal points to be exported and click **OK**. 3. In the **Export** dialog box, enter **Task Name**, set **Start date** and **End date**, and click **OK**. 4. In the dialog box that is displayed, click .
Modifying a device name	1. Select a device and click . 2. Change the name of the selected device and click **OK**.
Viewing device details	You can click a device name to view the device details.
Replacing a device **NOTE** The following conditions must be met for device replacement: • The current device is disconnected from the management system. • Device replacement and commissioning have been completed on the device. For details, see *FusionSolar Smart PV Solution-Device Replacement Commissioning Guide*. • The following types of devices can be replaced: inverter, SmartLogger, and communications module.	1. Select a device and click **Replace Device**. 2. In the dialog box that is displayed, enter the SN of the target device and click **View**.. 3. Click **Replace**. **NOTE** When an inverter is replaced, the total energy yield data of the old device can be synchronized to the new device. After the device is replaced, the data is automatically calibrated on the new device.

----End

Follow-up Procedure

If automatic calibration fails due to device disconnection or poor network quality, manually calibrate the device after the fault is rectified.

1. Export the device performance data.
   a. Select the target inverter and click **Export Performance Data**.

b. Select the total energy yield, and click **OK**.

c. In the **Export** dialog box that is displayed, enter **Task name**, set **Start date** and **End date**, and click **OK**.

NOTE

Start date: You are advised to set this parameter to 30 days before the old device is disconnected. For example, if the old device is disconnected on September 30, set this parameter to August 30.

End date: You are advised to set this parameter to any date after the device is disconnected.

d. In the **Export Performance Data** dialog box that is displayed, click .

e. Open the downloaded performance data file and record the latest valid values.

2. Calibrate the energy parameters.

a. Select the target inverter and click **Set Parameters**.

b. In the displayed dialog box, click **Feature Parameter**.

c. Enter the values of the total energy yield obtained in step **1.e**.

d. Click **Set**.

3.4.2.2 Device Upgrade Management

This topic describes how to remotely upgrade a device through the SmartPVMS.

Prerequisites

The software package of the target version has been uploaded.

Context

This feature applies to the following devices: SmartLogger, SUN2000, Smart Dongle, optimizer, battery, .

Procedure

Step 1 Choose **Plants** > **Device** > **Upgrade Management.**

Step 2 Click the **Device Upgrade** tab. On the page that is displayed, click **Add** to create an upgrade task.

Step 3 In the dialog box that is displayed, enter the task information and click **OK**.

NOTICE

Upgrade now: Device upgrade is performed immediately after the upgrade task is created, without asking the user for confirmation.

Upgrade after user authorization: After an upgrade task is created, the system pushes an upgrade message to all concerned residential plant owners. Residential plant owners need to log in to the system using an app and confirm whether to perform the upgrade.

- The equipment can be upgraded if the owner confirms the upgrade within 48 hours.
- If the owner does not confirm the upgrade message within 48 hours, the device cannot be upgraded and the upgrade result is marked as timeout. The owner needs to wait for the next upgrade message.

Step 4 In the displayed dialog box, click **I Know**.

Step 5 In the upgrade task list, click + to view the upgrade details.

----End

3.4.2.3 Device Log Export

Allows users to export and view device logs, optimizer logs, and battery storage logs.

Procedure

Step 1 Choose **Plants** > **Device** > **Device Log Export**.

Step 2 On the Log Export, Optimizer Log Export, and Battery Log Export tab pages, perform the following operations:

- **Start Export**: In the log list, select one or more devices whose logs need to be exported and click **Start Export**to create an export task.
- **Save Log**: After the logs are exported, select the device whose logs need to be saved and click **Save Log**to download the logs to the local PC.

  NOTE

  - After the logs are exported successfully, the logs will be automatically cleared after 24 hours if the logs are not saved to the local PC.
  - After the logs are saved successfully, the logs will be automatically cleared after 2 hours.
- **Stop Export**: Select one or more ongoing export tasks and click **Stop Export**to stop the selected tasks.

----End

3.4.2.4 Device License Management

This section describes how to check device license status on the **Device License Management** page. When the license files are about to expire or have expired, or the I-V curve or smart tracking function needs to be enabled for devices, you can

apply for and update the licenses in a timely manner to ensure that the I-V curve and smart tracking function can be used properly.

Context

Before starting the I-V curve scanning, you need to load the corresponding device licenses.

Procedure

1. Choose **Plants** > **Device** > **Device License Management** from the main menu.
2. **Table 3-11** describes the operations related to device license management.

Table 3-11 Operations related to device license management

Task Name	Procedure
Checking license information	On the **License Information** tab page, enter the **Device name**, **Plant name**, and **Device SN**, or select **License status**, and click **Search**.
Applying for device licenses	1. On the **License Application** tab page, click **Export All** or select the devices for which you want to apply for licenses, and click **Export Selected**. 2. After exporting the application form, send it to system administratortechnical support engineers to apply for a license file.
Loading device licenses	1. On the **License Loading** tab page, click **Upload License** to upload license files. 2. After the license files are uploaded successfully, click **Load All** to load the licenses for all devices. Alternatively, select the devices for which licenses need to be loaded and click **Load Selected** to load the licenses for the selected devices. During the loading, click **Stop Loading** to stop all loading tasks. If you select the loading tasks to be stopped and then click **Stop Loading**, the selected tasks will be stopped.
Revoking device licenses	1. On the **License Revocation** tab page, select one or more target devices and click **Revoke License**. 2. Revoke the device license as prompted. **NOTE** 1. For devices whose licenses have been revoked, click **Export All Revocation Codes** or **Export Selected Revocation Codes** to export the license revocation codes of all or selected devices. After obtaining the revocation codes, contact system administratortechnical support engineers to apply for new license files using the ESNs and revocation codes of the current licenses.

3.4.2.5 Device Inspection

You can perform preventive maintenance inspection on devices and obtain reports about the running status and health status of the devices for maintenance and quick fault location.

Prerequisites

You have the **Device Inspection** permission.

Procedure

Step 1 Choose **Plants** > **Device** > **Device Inspection** from the main menu.

Step 2 In the device list, click  in the **Operation** column, or select one or more devices to be inspected and click **Start Inspection** to create an inspection task.

Step 3 Click  in the **Operation** column, or select one or more devices that are being inspected and click **Stop Inspection** to stop the inspection task.

Step 4 After the inspection is complete, select one or more devices and click **Export Report** to download the inspection reports.

----End

3.5 Maintenance

You can learn the real-time status, location distribution, and alarm information of PV plants through O&M, and quickly trace and handle PV plant faults.

3.5.1 Real-time Status

The real-time status of plants allows you to learn about the plant status, location, and alarm information, facilitating quick tracking and handling of plant faults.

Procedure

Step 1 Choose **Maintenance** > **Maintenance** > **Real-Time Status** from the main menu.

- View the plant status and evaluate the plant advantages by comparing the plants in the same environment.
  a. In the Plant Status Center area, select a maximum of five plants to be compared and click the  in the upper-left corner.In the displayed Comparison of plants dialog box, view the plant comparison charts about power per MW and specific energy (kWh/kWp).
  b. Drag  below a comparison chart to display the plant comparison chart in the specified period.

NOTE

- Click to remove a plant that participates in the comparison.
- Click to add a plant for comparison.

- View the plant map to learn about the geographical distribution of the plant.
  - In the list in the **Plant Status Center** area, select a plant and click . The location details of the plant are displayed under the SmartPVMS, and the alarms of the plant are displayed in the **Plant Alarm Center** area.
  - Under the SmartPVMS, enter a plant name to search for the plant, or select **All** as the plant status. The plants that meet the search criteria are displayed on the map.

    NOTE

    Move the pointer over a plant icon to display the plant details.

    Click in the lower-left corner of the map to switch between maps.

    Click in the lower-left corner of the map. In the **Map Settings** dialog box, set the default map and API key.
- View the real-time alarms of the PV plant, and acknowledge and trace the alarms.
  a. In the **Plant Alarm Center** area that displays active and acknowledged alarms, click to expand the alarm cause and handling suggestions.
  b. Analyze and handle the alarm based on the alarm cause.
     - Click **Clear**. In the displayed dialog box, click **OK**. The alarm is deleted from the list.
     - Click **Confirm**. In the displayed dialog box, click **OK**. The alarm status changes to **Acknowledged**.
     - Click **Recovery**. In the displayed **New Defect Elimination** dialog box, set related information and submit the defect elimination process. The handler will receive the defect elimination task.
     - Click **Device details** to view the device details.

----End

3.5.2 Alarm Management

This section describes how to view and manage current and historical alarms of devices, the system alarms. Device alarms are used to trace real-time and historical alarms of devices. System alarms are used to trace alarms generated during system operations.

3.5.2.1 Monitoring and Viewing Current Alarms

On the **Current Alarms** page, O&M personnel can view current alarms that are updated in real time to better understand the latest alarm information.

Context

- The maximum number of alarms displayed on the **Current Alarms** page is 300,000 when the physical memory is 3.5 GB. If a new alarm is reported and the number of current alarms exceeds the upper limit, alarm management enables the function of processing full current alarm cache and moves some alarms to the historical-alarm list.
- When you go to the **Current Alarms** page for the first time, alarms in the alarm list are sorted in descending order of **Arrived On** by default.
- The newly reported alarms are displayed in bold on the page.
- The background color of cleared alarms is green by default.
- You can only monitor and view alarms of authorized MOs.
- Alarm synchronization period.
  - SmartLogger3000, Distributed SmartLogger, Dongle2.0: 1 minute.
  - SmartLogger1000, SmartLogger2000, Inverter, Dongle1.0: 5 minutes.

  NOTE

  - A maximum of 50 to 100 alarms can be synchronized every minute. Synchronizing more alarms will take longer time.
  - If a device upgrade, historical data recovery, or log export task is being executed, start alarm synchronization after the task is complete.

Procedure

- Monitoring alarms
  a. Choose **Maintenance** > **Maintenance** > **Alarm Management** from the main menu.
  b. **Table 3-12** describes alarm monitoring methods.

  Table 3-12 Alarm monitoring methods

Task	Task Description
Monitoring alarms using the alarm list	O&M personnel can monitor alarms reported by all NEs and systems on the **Current Alarms** page in real time. A maximum of 300,000 alarms can be displayed on the page when the physical memory is 3.5 GB.
Monitoring alarms using alarm indicators	The alarm indicators in the upper right corner of the **Current Alarms** page show the number of critical alarms, number of major alarms, number of minor alarms, and number of warning alarms.

Task	Task Description
Monitoring alarms using the statistics panel	Click  in the upper right corner of the **Current Alarms** page to view the alarm statistics charts. The statistical result is obtained based on the filtered alarms. The **Top 10 Alarms**, **Duration**, **Top 10 Alarm Sources**, **Severity**, and **Status** statistical charts can be displayed on the statistics panel. Four statistical charts can be displayed at the same time. You can click  in the upper right corner of the statistics panel and then select the chart to be displayed from the drop-down menu in the upper right corner of each chart. On the statistics panel, you can click any statistical result to quickly display the alarms that meet the condition. If you close the statistics panel, the filter criteria selected on the panel are automatically deselected. **NOTE** • Alarm management allows a maximum of 10 statistics panels to be opened by online users concurrently. • You can click  in the upper right corner of the statistics panel to manually refresh the statistical data. Within 10 minutes after you open the statistics panel or manually refresh the statistical data, the system automatically refreshes the data every minute.

- Querying alarms
  a. Choose **Maintenance** > **Maintenance** > **Alarm Management** from the main menu.
  b. You can click **Template Management** in the upper left corner of the page to view all filter templates and select a filter template from the **Quick Filter** panel. Users with the **Administrators** role can manage templates saved by all users.

     The following types of templates are provided:

     - **Favorite**: You can add the templates that you often use to your favorites.
     - **Custom**: Filter templates customized by the current user, which can be shared to other users.
     - **Shared**: Available filter templates shared by other users.
     - **Default**: Default filter template.
     - **Other**: Filter templates that are not shared by other users. These templates are visible only to users with the **Administrators** role.

NOTE

The filter templates on the **Current Alarms**, and **Historical Alarms** pages are independent from each other and cannot be shared.

c. If the filter templates on the **Template Management** panel do not meet your requirements, click **Filter** in the upper left corner of the **Current Alarms** page. Set filter criteria and click OK to search for the alarms to be concerned about and handled.

d. Click **Save** or **Save As** to save the current filter criteria as a filter template.

e. Export current alarms. Alarms can be exported to an .xlsx or .csv file. When the export file format is set to .xlsx and the number of alarms exceeds 100,000, the file is exported as a .zip package. When the exported file format is set to .csv and the number of alarms exceeds 10,000, the file is exported as a .zip package.

- Export some alarms: Select the alarms to be exported, click **Export**, and choose **Selected**.
- Export all alarms: Click **Export** and choose **All**.

NOTE

Only the information about the alarm columns displayed on the page can be exported. You can click in the upper right corner of the alarm list to set the alarm columns to be displayed.

- Alarm sound

  Alarm Management provides the alarm sound notification function. By default, the function is mute. If you do need the function, click in the upper-right corner of the **Current Alarms** page to enabled the alarm sound.

  – : Sound is enabled. When an alarm is reported, the sound box on the user's PC plays a sound.

  – : Indicates the mute mode. No sound is played when an alarm is reported.

Parameter Description

For details about parameters on the alarm filter panel, see **Table 3-13**.

Table 3-13 Description of parameters on the alarm filter panel

Parameter	Description
Alarm name	Name of the alarms to be queried.
Alarm source	Device where an alarm is generated. If multiple alarm source conditions are set, the filtering result is the union of all the conditions. That is, all the alarms that meet any of the conditions are displayed on the page.

Parameter	Description
Severity	Alarm severities, including critical, major, minor, and warning. By default, all severities are selected. You need to select at least one alarm severity.
Alarm status	Alarm status, including the acknowledged and cleared, acknowledged and uncleared, unacknowledged and cleared, unacknowledged and uncleared.
Last occurred	Time when the alarm last occurred. This parameter is displayed as **Occurred** in **Historical Alarms**, indicating the last occurrence time of an alarm.
Cleared	Time when an alarm is cleared.
Advanced settings	You can set filter criteria to filter desired alarms. If multiple advanced setting conditions are set, the filtering result is the intersection of all the conditions. That is, the alarms that meet all the advanced setting conditions are displayed on the page. Operators (case-sensitive): • **contains**: Filters the alarms that contain the specified character string. • **does not contain**: Filters alarms that do not contain the specified character string. • **begins with**: Filters alarms that begin with the specified character string. • **ends with**: Filters alarms that end with the specified character string. • **is in**: Filters the alarms that are the same as the specified character string. For example, in the **Location Info** area, set **Operator** to **is in** and set **Value** to *XXX*. In this case, the location information of the filtered alarms contains *XXX*, and the alarms whose location information contains *XXX***123** are not displayed. • **is not in**: Filters alarms that are different from the specified character string. For example, in the **Location Info** area, set **Operator** to **is not in** and set **Value** to *XXX*. In this case, the location information of the filtered alarms does not contain *XXX*, and the alarms whose location information contains *XXX***123** are displayed. • **Blank**: Filters the alarms if their values of this parameter are empty. • **Non-blank**: Filters the alarms if their values of this parameter are not empty.

For details about parameters in the alarm list, see **Table 3-14**.

Table 3-14 Description of parameters in the alarm list

Name	Description
Plant Name	Plant of an alarm source.
Device Type	Type of the Device where an alarm is generated.
Device Name	Device where an alarm is generated.
Type	Type of an alarm, indicating the type of the cause which triggers the alarm.
Name	Name of an alarm. An alarm name tells what faults occur on an alarm source. For example, the high CPU usage alarm can be known by its name that the alarm is sent from the CPU.
Alarm ID	ID of an alarm, which corresponds to the alarm name.
Possible ID	ID of the specific cause of the alarm.
Severity	Four alarm severities, which include acknowledge, clear, comment, and copy.
Clearance Status	Clearance status of an alarm. Available options are: • **Cleared** • **Uncleared**

Name	Description
Clearance Type	Alarm clearance type: • **(Blank)**: uncleared. • **normal clear**: A device fault is rectified and alarm management receives a clear alarm. Then the alarm is automatically cleared. • **restore clear**: After a device restarts, alarm management detects whether a fault exists. The original fault alarm is automatically cleared. • **manual clear**: An alarm is manually cleared. • **configure clear**: A resource object is deleted, and the alarms generated by the resource object are automatically cleared. • **correlation clear**: When receiving a root alarm of uncleared correlative alarms, alarm management handles the alarms using a correlation rule, reports the root alarm, and automatically clears the correlative alarms. The clearance type of the correlative alarms is correlation clearance. • **clear from system**: The system clears earlier alarms according to the full-cache processing rule because the storage space is limited. • **status switch clear**: Because the device status switches, the active alarm in the previous status is automatically cleared and is reported again in the device status after the switch. The clearance type of the active alarm in the previous status is status switch clearance. • **alarm synchronization-based clear**: During alarm synchronization, if some uncleared alarms exist in alarm management but cannot be found in the alarms synchronized from NEs, these uncleared alarms are automatically cleared. This parameter is not displayed on the **Masked Alarms** page.
Acknowledgement Status	Acknowledgement status of the alarm. Available options are: • **Acknowledged** • **Unacknowledged**
Acknowledged On	Time when an alarm is acknowledged.

Name	Description
Defect Status	If a defect ticket has been created for the alarm, the defect status can be either of the following: • **In Elimination** • **Processed** If no defect ticket is created for the alarm, this field is left blank.

For details about the parameters on the Alarm Information tab page, see **Table 3-15**.

Table 3-15 Description of the Alarm Information tab page

Tab Page	Description	Operation Method
Details	For details about alarm parameters, see **Table 3-14**.	To set the parameters to be displayed on the **Details** tab page, click  in the upper right corner of the **Details** tab page.
Handling and Experience	• On the **Handling** tab page, you can view alarm handling recommendations pre-configured in alarm management. • On the **Experience** tab page, you can view or modify alarm handling experience.	To modify the experience records, click **Experience**. On the tab page that is displayed, click **Modify**, record the experience, and then click **Save**.
Comments	On the **Comments** tab page, you can add comments for the alarm.	To modify comments, click **Modify** in the upper right corner of the tab page, enter comments, and then click **Save**.
Handling Records in Last 2 Months	You can view all manual operations performed on the alarm in the last two months for O&M personnel to handle alarms.	-

Description of the Buttons in the alarm operation bar, see **Table 3-16**.

Table 3-16 Buttons in the alarm operation bar

Button	Description
Combo Sorting	Sorts alarms by multiple alarm fields. A maximum of four alarm fields can be set.
Clear	When the fault that triggers an alarm is rectified but the alarm is not cleared automatically, click **Clear** to manually clear the alarm. After the alarm is cleared, its status is changed to **Cleared**.
Acknowledge/ Unacknowledge	After an alarm is acknowledged, the alarm will be or has been handled. When the alarm is acknowledged, the alarm status is changed from unacknowledged to acknowledged. If you want another engineer to handle the alarm, you can unacknowledge the alarm. When the alarm is unacknowledged, the alarm status is changed from acknowledged to unacknowledged.
Comment	Edits the comments of an alarm.
Export	Alarms can be exported to an .xlsx or .csv file. When the export file format is set to .xlsx and the number of alarms exceeds 100,000, the file is exported as a .zip package. When the exported file format is set to .csv and the number of alarms exceeds 10,000, the file is exported as a .zip package. A maximum of five users can export some alarms at a time, and a maximum of two users can export all alarms at a time.
Recovery	Recording, tracking, and monitoring of faults or defects.

For details about the parameters on the **Template Management** panel, see **Table 3-17**.

Table 3-17 Buttons on the Template Management panel

Button	Description	Operation Method
Search Template	You can search for a filter template based on the template name, name of the user who created the template, or comments.	1. On the **Quick Filter** panel, enter a template name, username, or comment in the search box. 2. Click to search the template.

Button	Description	Operation Method
Share/ Unshare	You can share or cancel the sharing of custom templates. You can also select a template shared by other users from the **Shared** area. The administrator can share or cancel the sharing of all templates except the default templates. Other users can only share or cancel the sharing of custom templates. • : The template is not shared. • : The template is shared.	1. On the **Quick Filter** panel, select the desired template. 2. Click the icon next to the template name.
Add to Favorites/ Remove from Favorites	You can add a template to or remove a template from your favorites. The favorite template will be displayed in the **Favorite** area. You can only perform the following operations on the preset templates: **Add to Favorites**, **Remove from Favorites**, **Set as Default Template**, or **Cancel Default Template**. • : The template is not added to favorites. • : The template is added to favorites.	
Set as Default Template/ Cancel Default Template	You can set or cancel the default template for the current page. Filtered alarms will be displayed based on the default template when you enter this page. If is displayed on the right of a template, it is a default template.	1. On the **Quick Filter** panel, select the desired template. 2. Click on the right of the template. 3. In the displayed menu, select **Set as Default Template** or **Cancel Default Template**.

Button	Description	Operation Method
Rename	Renames a filter template. The administrator can rename all the templates except the templates in the **Default** area. Other users can rename only custom templates.	1. On the **Quick Filter** panel, select the desired template. 2. Click  on the right of the template. 3. Choose **Rename** from the displayed menu. 4. In the dialog box that is displayed, enter the new template name.
Modify Comments	Modifies the comments of a filter template. The administrator can modify the comments of all templates except the templates in the **Default** area. Other users can modify only the comments of the custom templates.	1. On the **Quick Filter** panel, select the desired template. 2. Click  on the right of the template. 3. Choose **Modify Comments** from the displayed menu. 4. In the dialog box that is displayed, modify the comments.
Delete	Deletes a filter template. The administrator can delete all the templates except the templates in the **Default** area. Other users can delete only custom templates.	1. On the **Quick Filter** panel, select the desired template. 2. Click  on the right of the template. 3. Choose **Delete** from the displayed menu.
Open Template on New Tab	A new tab page is opened and the list of the alarms or events that are filtered using the filter template is displayed on the new tab page.	1. On the **Quick Filter** panel, select the desired template. 2. Click  on the right of the template, or click  and choose **Open Template on New Tab**.

3.5.2.2 Viewing Historical Alarms

By analyzing historical alarms, users can understand device running statuses and determine whether rules are properly configured.

Context

- By default, 20,000 historical alarms can be displayed. When the number of alarms exceeds the upper limit, the first 20,000 alarms are displayed based on the filter criteria and sorting. If you want to query other alarms, you can modify the filter criteria and sort the alarms.
- You can only monitor and view alarms of authorized MOs.
- A total number of 30 **Historical Alarms** pages can be opened concurrently by online users.

Procedure

Step 1 Choose **Maintenance** > **Maintenance** > **Alarm Management** from the main menu.

Step 2 On the **Historical Alarms** page, click **Filter** to expand the panel and set filter criteria to find desired historical alarms.

Step 3 Click **Save** or **Save As** to save the current filter criteria as a filter template.

You can click **Template Management** in the upper left corner of the page to view all filter templates and select a filter template from the **Quick Filter** panel. Users with the **Administrators** role can manage templates saved by all users.

The following types of templates are provided:

- **Favorite**: You can add the templates that you often use to your favorites.
- **Custom**: Filter templates customized by the current user, which can be shared to other users.
- **Shared**: Available filter templates shared by other users.
- **Other**: Filter templates that are not shared by other users. These templates are visible only to users with the **Administrators** role.

NOTE

The filter templates on the **Current Alarms**, and **Historical Alarms** pages are independent from each other and cannot be shared.

Step 4 Export historical alarms. Alarms can be exported to an .xlsx or .csv file. When the export file format is set to .xlsx and the number of alarms exceeds 100,000, the file is exported as a .zip package. When the exported file format is set to .csv and the number of alarms exceeds 10,000, the file is exported as a .zip package.

- Export some alarms: Select the alarms to be exported, click **Export**, and choose **Selected**.
- Export all alarms: Click **Export** and choose **All**.

NOTE

Only the information about the alarm columns displayed on the page can be exported. You can click  in the upper right corner of the alarm list to set the alarm columns to be displayed.

----End

3.5.3 Task Management

Manages inspection tasks and defect elimination tasks to ensure the normal running of plant devices.

3.5.3.1 (Optional) Basic Information Configuration

You can set inspection items and node handlers based on the site requirements.

3.5.3.2 Inspection

Inspection tasks are used to check plant devices, detect device exceptions in a timely manner, and report the exceptions for handling.

3.5.3.3 Defect Elimination

Defect elimination tasks are used to handle and eliminate device defects in a timely manner to ensure safety.

3.6 Value-Added Services

3.6.1 Smart I-V Curve Diagnosis

Supports I-V curve scanning and diagnosis of PV strings to quickly detect faults and risks.

3.6.1.1 Setting String Details

The I-V curve diagnosis can be performed only after string parameters are set.

Prerequisites

The I-V license of the corresponding device has been loaded. For details about the procedure, see **3.4.2.4 Device License Management**.

Procedure

Step 1 Choose **Value-Added Services** > **Value-Added Services** > **Smart I-V Curve Diagnosis** from the main menu.

Step 2 In the navigation tree on the left, click **Configure Strings**.

Step 3 Set string details as prompted.

1. Select the plant in the navigation tree on the left, select the target device in the device list on the right, and click **Next**.
2. Select the module information template and click **Next**.
3. Set parameters on the **String Settings** page, and click **Next**.

4. Confirm that the string parameters are set correctly, and click **Finished**.

----End

3.6.1.2 Creating a Smart I-V Curve Diagnosis Task

Scans all PV strings to collect voltage and current data, diagnoses faults, and generates diagnosis reports for O&M.

Prerequisites

The I-V license of the corresponding device has been loaded. For details about the procedure, see **3.4.2.4 Device License Management**.

Context

- Diagnosis tasks are executed from 9:00 to 16:30. If a scheduled task fails to be executed for the first time, the system automatically retries every 30 minutes until the task is completed. If the retrying time exceeds the diagnosis period, this task will be ended. Then you can create a new task or wait for the task to be executed next time.
- If the irradiance is less than 600 W/m^2, the I-V scanning cannot be started. It can be started only when the irradiance meets the requirement.
- The I-V curve diagnosis is not available for inverters connected to optimizers.

Procedure

Step 1 Choose **Value-Added Services** > **Value-Added Services** > **Smart I-V Curve Diagnosis** from the main menu.

Step 2 Create a diagnosis task on the **Diagnosis Task Management** page.

1. Click **Add Diagnosis Task**.
2. Select the plant in the navigation tree on the left, select the target device in the device list, and click **Next**.
3. On the **String Settings** page, check whether the string information is configured.
   - If the string information is configured, click **Next**.
   - If the string information is not configured, click **Configure** in the Operation column. In the dialog box that is displayed, configure string details and click **Next**.
4. On the **Configure task** page, set task details and click **Finished**.

Table 3-18 Diagnosis task parameters

Parameter	Description
Cleaning Status	Specifies the cleaning status of strings. Select **Cleaned** or **Not cleaned** based on the actual cleaning status.

Parameter	Description
Environmental parameters	– The system automatically calculates the PV module plane irradiance and PV module backsheet surface temperature. – Manually setting: The PV module plane irradiance and PV module backsheet surface temperature need to be manually specified.
Execution Mode	– Now: The diagnosis task is executed immediately after being created. – Schedule for later: The scheduled diagnosis task is executed only once. – Repeat: The scheduled diagnosis task is executed periodically.
Automatic Emai	After the related information is specified, diagnosis reports will be sent to the specified email address.

Step 3 Manage completed and scheduled tasks on the **Diagnosis Task Management** page. For details about the procedure, see **Table 3-19**.

Table 3-19 Managing diagnosis tasks

Task Status	Procedure
Completed	• Click to view the detailed diagnosis result. – The **Legend** area displays the fault type. You can click to view the troubleshooting suggestions and handle the fault accordingly. – In the **Inspection Details** area, click **View** to view the basic string information and I-V curve. – In the **Inspection Details** area, select a PV string to view its I-V curve comparison analysis diagram. • Click . In the dialog box that is displayed, you can export corresponding reports as required. • Click to view details.
Scheduled	You can delete and modify a scheduled task.

----End

3.6.1.3 Module Library Management

Common module information templates are available. If the preset templates cannot meet requirements, you can customize templates through module library management to improve the accuracy of I-V curve diagnosis.

Context

A maximum of 100 templates can be added at a time. If a template is in use, modifying or deleting the template does not affect the use by the configured PV modules.

Procedure

Step 1 Choose **Value-Added Services** > **Value-Added Services** > **Smart I-V Curve Diagnosis** from the main menu.

Step 2 In the navigation tree on the left, choose **Module Library Management**.

Step 3 On the **Module Library Management** page, perform the following operations as required.

Table 3-20 Module library management

Operation	Procedure
Querying a module information template	Set the search criteria and click **Search**.
Adding a module information template	• Adding a single module information template Click **Add**. In the dialog box that is displayed, enter the module information and click **Save**. • Adding module information templates in batches 1. Click **Download Template**, edit the module information in the downloaded template file, and save it. 2. Click **Import** and select the edited template file.
Exporting a module information template	1. In the list, select the module information template to be exported. 2. Click **Export** to save the exported module information file to the local PC.
Deleting a module information template	Select the module information template to be deleted and click **Delete**.

----End

3.6.2 Smart Tracking

Helps users monitor the running status of the smart tracker and displays the energy yield improvement facilitated by the smart tracker through array comparison.

3.6.2.1 Smart Tracking

The tracker angle is adjusted based on tracker status and weather conditions to ensure the maximum energy yield and avoid damage to PV modules due to unfavorable weather, in order to increase plant revenue.

Prerequisites

- The SDS license of the corresponding device has been loaded. For details about the procedure, see **3.4.2.4 Device License Management**.
- The SDS mode is supported only when the NCU (Network Control Unit) is connected to the management system via the SmartLogger3000.

Procedure

Step 1 Choose **Value-Added Services** > **Value-Added Services** > **Smart Tracking** from the main menu.

Step 2 In the navigation tree on the left, click the plant to be queried. Information about all trackers of the plant is displayed on the right.

Step 3 Set the tracker control mode. For details about the procedure, see **Table 3-21**.

Table 3-21 Tracker control mode

Mode	Description	Procedure
SDS (Smart DC System)	Trackers are controlled by the smart tracking algorithm to automatically adjust the angle based on sunlight for maximum energy yield.	1. Click **SDS**. 2. In the displayed dialog box, select the target array and click **Confirm**.
Tracking stopped	Trackers stop automatically adjusting the angle.	1. Click **Tracking stopped**. 2. In the displayed dialog box, select the target array and click **Confirm**.
Weather	Set PV arrays in **Wind**, **Rain**, **Overcast**, or **Snow** mode based on weather conditions for protection.	Click **Wind**, **Rain**, **Overcast**, or **Snow**. In the dialog box that is displayed, select the target array and click **Confirm**.

Mode	Description	Procedure
Auto	Trackers operate based on the parameters and algorithms set by the vendor. The tracker angle can be automatically adjusted based on sunlight for maximum energy yield.	1. Click **Auto**. 2. In the displayed dialog box, select the target array and click **Confirm**. **NOTE** After the smart tracking algorithm is enabled, trackers are controlled by the smart tracking algorithm in **Auto** mode.
Manual	Manually adjust the tracker angle based on the tracker status and weather conditions.	1. Click **Manual**. The **Manual** dialog box is displayed. 2. Select the target array in the navigation tree on the left, enter the azimuth on the right pane, and click **Confirm**. **NOTE** If the azimuths of multiple arrays are the same, select **Keep all arrays in sync** to set the azimuths in batches
Maintenance	Trackers are in maintenance.	1. Click **Maintenance**. 2. In the displayed dialog box, select the target array and click **Confirm**.
Fault Rectification	Tracker faults are to be cleared.	1. Click **Fault Rectification**. 2. In the displayed dialog box, select the target array and click **Confirm**.

----End

3.6.2.2 Smart Comparison

Displays the energy yield improvement by comparing the energy yield of PV arrays that use and do not use the Smart DC System (SDS) to help users evaluate the SDS feature.

Prerequisites

- You have the **Smart Tracking** permission.
- The SDS license of the corresponding device has been loaded. For details about the procedure, see **3.4.2.4 Device License Management**.

Procedure

Step 1 Choose **Value-Added Services** > **Value-Added Services** > **Smart Tracking** from the main menu.

Step 2 In the navigation tree on the left, choose **Smart Comparison**.

Step 3 Specify **Comparison Object** and **Comparison Item**.

- If the tracker is connected to the management system through the SmartLogger, choose **SmartLogger comparison**.
- If the tracker is connected to the management system through an inverter, choose **Inverter comparison**.

Step 4 Click **Add Benchmark** and **Add to Compare** to select the compared objects.

Step 5 Calculate the benchmark.

1. Click **Calculate Benchmark**. In the displayed dialog box, set the start date and end date.

   NOTE

   If abnormal data exists in the specified period, click to remove abnormal data.
2. Click **OK**.

Step 6 **Optional:** Remove abnormal data.

1. Click **Remove Abnormal Data**. In the displayed dialog box, set the start date and end date.
2. Click to remove abnormal data and click **OK**.

Step 7 Select a time period and click **Compare** to view the yield comparison result.

NOTE

The improvement value and the yield comparison curves do not contain the removed abnormal data.

Step 8 **Optional:** Click **Export** to export the comparison data.

----End

3.6.3 Software and Service Purchase

3.6.3.1 Service Purchase

You can purchase warranty services online to extend the warranty period of devices.

Prerequisites

- You have logged in to the management system as an installer.
- The region of the plant where the device resides has been set to China or Germany.

Context

Online service purchase is available only in China and Germany.

Procedure

Step 1 Choose **Value-Added Services** > **Buy** > **Buy Services**.

Step 2 Select the target device and click **Refresh Warranty Information** to refresh the warranty information. The warranty period of the device is displayed in the device area.

Step 3 Select the devices whose warranty state is **Expiring** and click **Extend Warranty**.

NOTE

A maximum of 50 devices in the same region can be selected to purchase warranty services for them.

Step 4 On the displayed Huawei PV official website, purchase the warranty service as prompted.

----End

Follow-up Procedure

After the warranty service is purchased successfully, return to the service purchase page of the management system, select the devices for which you have purchased a warranty service, and click **Refresh Warranty Information** to refresh the warranty information to verify that the warranty validity period is the same as the purchased one.

3.6.3.2 Software Purchase

You can view the I-V license expiration date on the software purchase page. If the license enters the grace period or has expired, renew the license offline to continue using the Smart I-V Curve Diagnosis function.

Procedure

Step 1 Choose **Value-Added Services** > **Buy** > **Buy Software**.

Step 2 Select the target devices and click **Refresh I-V License** to refresh the license status.

The license status is displayed in the device area.

----End

3.7 System

3.7.1 Company Management

Company administrators can create and manage companies and users, maintain company information, and configure email servers based on service requirements.

3.7.1.1 Creating a company

Create a company under the root node or create a subsidiary under a company node based on service requirements.

Prerequisites

You have permission to perform operations on **Company Management**.

Context

- The system administrator or a user who has the rights of the system administrator can select the root node to create a company, or select a company from the navigation tree on the left to create a subsidiary for the company.
- An installer user can create a subsidiary for the company to which the installer belongs, or select a target subsidiary and create a lower-level subsidiary for the selected subsidiary.

Procedure

1. Choose **System** > **System** > **Company Management** from the main menu.
2. Click **Add Company**.
3. In the dialog box that is displayed, enter the basic information about the company.

   NOTE

   - When a company is created under the root node, a company administrator account of the installer role is also created.
     - **Username**: Indicates the username used by the company administrator to log in to the management system.
     - **Mobile number**: Indicates the mobile number used by the company administrator to log in to the management system.
     - **Email**: Indicates the personal email address of the company administrator. The email address can be used to receive subscribed reports, alarm push messages, and verification codes for password retrieval.
   - **Start date of safe running**: Indicates the day when the plant starts to generate energy normally. It is mainly used to calculate the safe running days of the plant.
   - **Longitude and latitude**: Indicates the location and scope of a company. Click . On the displayed map, drag the circle to set the longitude and latitude, and drag the hollow area of the arc to set the radius.
4. Click **OK**.

Follow-up Procedure

After a company is created, you can click the **Company Info** tab page to supplement or modify the basic information about the company.

Related Operations

- Modifying company information: Select the target company, click the **Company Info** tab page, and modify or supplement the basic information about the company.

- Deleting a company:
  a. Select the target company and click **Delete Company**.

     NOTE

     - Before deleting a company, you need to delete the users and PV plants managed by the company.
     - If a subsidiary already exists under the company, delete the subsidiary first.

  b. Click **OK**.

3.7.1.2 Creating a User in the Company and Associating the User with the Plant

After an administrator or installer creates a user and adds the user to a role, the user has the rights of the role. User authorization is complete.

Prerequisites

You have permission to perform operations on **Company Management**.

Procedure

1. Choose **System** > **System** > **Company Management** from the main menu.
2. Choose a company or subsidiary from the navigation tree on the left and click **Add user**.
3. In the displayed dialog box, enter the basic information about the user and click **Next**.

   NOTE

   The mobile number entered can be used as the mobile number used to log in to the management system.
4. Select a role to which the user belongs and click **Next**.
5. Select the plant associated with the user and click  .

   NOTE

   When the user is an **installer** and associated with plants, the installer can manage the associated plants within the permission of the user's role, but cannot create new plants. If the user is associated with a company, the installer can manage all plants under the associated company and has the permission to create new plants.
6. click **Confirm**.

Related Operations

- Modifying user information: Select the target user and click  .
- Resetting user password: Select the target user and click  .
- Deleting a user: Select the target user and click  .

NOTE

- The current user cannot be deleted.
- Deleting a logged-in user will force a logout of the user. Therefore, exercise caution when performing this operation.

- Disabling a user: Select the target user and click .
- Enabling a user: Select the target user and click .
- Export personal information: Only the system administrator with the user management permission can modify or export user information. If you need to export personal information, contact and authorize the system administrator to export the information.

3.7.1.3 Configuring Company Information

After a company is created, a system administrator or user who has the system management permission can add or modify the basic information about the company.

Prerequisites

You have permission to perform operations on **Company Management**.

Procedure

1. Choose **System** > **System** > **Company Management** from the main menu.
2. In the navigation tree on the left, choose the target company and click **Company Info**.
3. On the **Company Info** page, add or modify basic company information.
   - **Currency**: You can select a currency based on the site requirements.

     NOTE

     The revenue unit displayed for PV plants is the currency selected by the company to which the plant belongs. You cannot switch the currency unit by switching the system language.
   - **Support for poverty alleviation PV plant**: When the status is , the poverty alleviation PV plant can be connected.
   - **Title/Logo on the home page**: You can customize the title and company logo on the home page as needed.
   - **Title/Logo on the dashboard**: You can customize the title and company logo on the dashboard as needed.
4. Click **Save**.

3.7.1.4 Configuring an Email Server

Configure an email server for the company to send subscription emails to users for service functions such as report subscription and alarm push. For data security during communication, you are advised to configure the email server certificate. To prevent certificate expiration or private key leakage, you need to periodically update the certificate (once every three months is recommended). If the certificate is about to expire, update them in a timely manner.

Prerequisites

- You have permission to perform operations on **Company Management**.
- The interconnected email server must support the Simple Mail Transfer Protocol (SMTP).
- You have obtained the server information from the SMTP server administrator, such as the domain name or IP address, port number, whether identity authentication is required, user name, and user password.
- The SMTP port is available.
  - In common connection mode, port 25 is used.
  - In TLS connection mode, port 587 is used.
  - In SSL connection mode, port 465 is used.

Context

- If a company has multiple levels of subsidiaries, the email server must be configured based on the following rules:
  - If a company has configured an email server but no subsidiary has, all subsidiaries use the email server to send subscription emails.
  - If no email server is configured for a subsidiary, the email server configured for the upper-level subsidiary is used by default to send subscription emails. The email server configured for the lower-level subsidiary cannot be used.

<table>
<tr><th colspan="6">Company Level</th><th>Email Server</th><th>Subscribing to Emails</th><th>Sender Email</th></tr>
<tr><td>Company</td><td></td><td></td><td></td><td></td><td></td><td>Unconfigured</td><td>Subscription is not allowed.</td><td>An email server needs to be configured.</td></tr>
<tr><td></td><td>Level-1 subsidiary</td><td></td><td></td><td></td><td></td><td>Configured</td><td>Subscription is allowed.</td><td rowspan="2">Use the email server configured for the level-1 subsidiary to send subscription emails.</td></tr>
<tr><td></td><td></td><td>Level-2 subsidiary</td><td></td><td></td><td></td><td>Unconfigured</td><td>Subscription is allowed.</td></tr>
</table>

Company Level						Email Server	Subscribing to Emails	Sender Email
			Level-3 subsidiary			Configured	Subscription is allowed.	Use the email server configured for the level-3 subsidiary to send subscription emails.
				Level-4 subsidiary		Unconfigured	Subscription is allowed.	
					.....	Unconfigured	Subscription is allowed.	

- To ensure data security and improve the security of sending notifications, the TLSv1.2 protocol is recommended on the email server.
- To send notifications, you need to enter personal data such as email addresses. You are obligated to take considerable measures, in compliance with the laws of the countries concerned and the user privacy policies of your company, to ensure that users' personal data is fully protected.
- For personal data security, the personal data, such as email addresses, are anonymized on the user interface and encrypted during transmission.
- Google Mailbox Service limits the number of emails that a user can send every day and the number of recipients of each email. If they exceed the limit, you are advised to switch to an unlimited mailbox service.

Restriction Type	Description	Quantity Limit
Number of emails per day (For internal and external recipients)	Maximum number of emails that can be sent per day	2000 (500 for trial accounts)
Number of automatically forwarded emails	The number of emails that are automatically forwarded to other accounts is not counted in the maximum number of emails that can be sent per day.	10,000

Restriction Type	Description	Quantity Limit
Auto-forward email filter	Account filter for automatically forwarding emails	20
Number of recipients of each email (For internal and external recipients)	Addresses in the **To**, **Cc**, and **Bcc** fields of a single email	2000 (500 for external recipients)
Number of recipients of each email sent through **SMTP** (**POP** or **IMAP** users) or **Gmail API** (For internal and external recipients)	Addresses in the **To**, **Cc**, and **Bcc** fields of a single email This includes emails sent via smtp-relay.gmail.com or smtp.gmail.com.	100
Total number of recipients per day (For internal and external recipients)	The system counts the number of email addresses (recipients) each time an email is sent. Five emails to each of the 10 addresses are counted as 50 recipients.	10000
Number of external recipients per day	Email addresses other than your primary domain name, including the domain alias and alternate domain name	3000
Number of unique identity recipients per day (For internal and external recipients)	Each email address (each unique identity recipient) is counted only once a day: • Five emails to each of the 10 addresses are counted as 10 unique identity recipients. • Five emails sent to a single address are counted as one unique identity recipient.	3000 (2000 for external recipients, and 500 for external recipients of the trial account)

NOTE

The preceding description is for reference only. Google Mail may change the maximum number of emails that can be sent. Visit https://support.google.com and search for **Gmail sending limit** to view the latest description.

Procedure

1. Choose **System** > **System** > **Company Management** from the main menu.
2. In the navigation tree on the left, choose the target company and click **Mailbox**.
3. Set the domain name or IP address of the SMTP server, sender email address, and server port.

   NOTE

   - The sender email address must be registered on the interconnected SMTP server and must be complete. Otherwise, the email fails to be sent. Recipients can view the email address when receiving the email. You are not advised to use a personal email address to send notifications.
   - If the SMTP server requires secure connections, you are advised to enable the default TLS secure connection. When the SMTP server does not require secure connections, the default port number of SMTP is 25. To ensure that emails are sent successfully, check that the email server port is available and the configuration certificate is valid.
   - If the SMTP server requires user identity verification, obtain the username and user password from the SMTP server administrator.
     - The username must be the same as that contained in the value of **Sender email address**. You are not advised to use a personal username.
     - If no authorization code is available for logging in to the SMTP email server, set the password to the password of **Sender email address**. Otherwise, set the password to the authorization code for logging in to the SMTP email server.
4. **Optional:** If **Enable secure connection over SMTP (Applies when an email server certificate for SMTP server is already installed. TLS is recommended.)** is selected, choose TLS or SSL, import a certificate and CRL. For data security purpose, TLS is recommended.
   - Configuring certificates
     i. Obtain an email server SSL/TLS certificate and save it to your local PC.

        NOTE

        - For details about how to obtain the mail server certificate, see FAQs.
        - The certificate is used for two-way authentication between the system and the email server. The system and the email server can communicate with each other only after both of them trust the certificate.
        - For data security, the notification function supports only the email server certificate generated using the TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 or TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 signature algorithm.

     ii. Press win+R to open the **Run** dialog box, enter **CMD**, and click **OK**.
     iii. Run the following command to switch to the keytool directory:

        cd /d <*Directory storing keytool*>

        NOTE

        - In most cases, *Directory storing keytool* is *JDK installation path***bin**.
        - Keytool is a Java runtime environment (JRE) command. Ensure that the JRE has been installed on the local PC.

iv. In the **cmd** window, run the following command to convert the certificate format and encrypt the keystore:

keytool -import -file *<Path for saving the original certificate>|<Name of the original certificate>* **-keystore** *<Path for saving the certificate after conversion>|<Name of the certificate after conversion>*

```
Enter keystore Password:
Reenter New Password:
```

The file name extension of the converted certificate is .keystore. Remember the password set here. You need to enter the password when importing the certificate.

NOTE

The keystore password is user-defined and must contain 6 to 32 characters. For security purposes, it is recommended that the keystore password meet the following requirements:

- Cannot contain the user name or its reverse.
- Contain at least one uppercase letter (A to Z), one lowercase letter (a to z), and one digit (0 to 9).
- Contain at least one of the following special characters: !"#$%&'()* +,-./:;<=>?@[\]^`{_|}~ and spaces.

v. Click **Configure Certificate**.

vi. In the **Configure Certificate** dialog box, click ... next to **Certificate file** and select the certificate after format conversion.

vii. In the **Certificate password** text box, enter the keystore password set in **4.iv**.

viii. Click **Save**.

– Configuring the CRL

i. Obtain the latest CRL from the CA and save the CRL to your local PC.

ii. Click **Configure CRL**.

iii. In the **Configure CRL** dialog box, click ... next to **CRL file** and select the CRL.

iv. Click **Save**.

5. Click **Test** to check whether the system is connected to the email server properly.
   – If the test successfully, **Test email sent successfully. The email server is available.** is displayed on the user interface.
   – If the test fails, check whether the email settings are correct. If the email server still cannot be connected after the parameter are correctly set, contact the system administrator.
6. Click **Apply**. In the displayed **Warning** dialog box, click **OK**.

NOTE

If you click **Test** but do not click **Apply**, only the connectivity between the system and the email server is tested, and the entered parameter values are not saved to the database. The entered parameter values are saved to the database only after you click **Apply**.

Follow-up Procedure

After interconnecting with an SMTP server, the system sends notifications to specified personnel by email through the SMTP server.

3.7.1.5 Default Electricity Prices

You can set an electricity price for each time period to accurately calculate the revenue.

Prerequisites

You have permission to manage **Default Electricity Price**.

Procedure

Step 1 Choose **System** > **System** > **Company Management** from the main menu.

Step 2 In the navigation pane, select the target company , click **Default Electricity Prices**.

Step 3 On the **Default Electricity Price** page, manage the electricity price for power supply and purchase. For details about other operations, see **Table 3-22**.

Table 3-22 Operations allowed on the Default Electricity Price tab page

Operation	Procedure
Adding electricity price	1. Click **Add**. 2. Set **Date Range**, **Start Time**, **End Time**, and **Electric price**, and click **Save**.
Adding a time range	Click  , set parameters as required, and click **Save**.
Deleting a date range	Click  .
Deleting a time range	Click **Delete**.
Modifying a time range and electric price	Modify parameters as required and click **Save**.

NOTE

If the price unit is inconsistent with the local type, contact the company administrator to change the currency. For details, see **3.7.1.3 Configuring Company Information**.

----End

3.7.2 Business settings

3.7.2.1 Data Amendment

3.7.2.1.1 Data Recovery

After the communication between the device and the system recovers, you can create a data synchronization task to synchronize data to ensure the integrity of the plant data.

Prerequisites

You have the permission for **Business Configuration**.

Procedure

Step 1 Choose **System** > **Business Configuration** > **Data Amendment**. The **Data Recovery** page is displayed.

Step 2 Under the root node in the left pane, select device.

Step 3 **Optional:** Select the device type.

Step 4 Select the time range for supplementary collection.

Step 5 Click **Create Tasks**.

Step 6 In the displayed dialog box, click **Yes**.

The synchronization progress of the device is updated in the right pane.

----End

Follow-up Procedure

You can perform the following operations on the **Synchronize Data** page.

Operation	Note	Procedure
Querying supplementary collection tasks	You can view the status of supplementary collection tasks and retry or cancel a task.	1. Select the device under the root node on the left. 2. Specify the time range for supplementary collection. 3. Click **Query Tasks**.
Retrying data collection	You can re-collect the data that is in the **Canceled** or **Failed** state.	In the supplementary collection task list, select the **Canceled** or **Failed** state and click **Retry**.

Operation	Note	Procedure
Canceling the supplementary collection of data	Cancel the supplementary collection operation in the data collection process.	In the supplementary collection task list, select the task whose progress does not reach 100% and click **Cancel**.

3.7.2.1.2 Data Repair

If the collected device running data is incorrect, you can use the data repair function to correct the data.

Prerequisites

You have the **Business Configuration** permission.

Procedure

Step 1 Choose **System** > **Business Configuration** > **Data Amendment**.

Step 2 In the right pane, click the **Data Repair** tab.

Step 3 Export repair data.

1. Click **Export Repair Data**.
2. In the dialog box that is displayed, select devices and the time period, and then click **Next**.

   NOTE

   The data of a maximum of 10 devices can be exported at a time, and the time span cannot exceed three months.
3. Select the signal points to be repaired and click **OK**.

   NOTE

   A maximum of 10 signal points can be exported at a time.

Step 4 Open the data exported in **Step 3** and correct the signal data.

Step 5 Create a repair task.

1. Click **Create Repair Task**.
2. In the dialog box that is displayed, click **Upload** and select the file whose data has been corrected in **Step 4**.
3. Select the checkbox of the statement (This operation will directly modify equipment data and may affect the accuracy of plant statistics and report data. Ensure that you have obtained authorization from the owner.) and click **OK**.

----End

3.7.2.1.3 Manual Aggregation

If the report data of a device in a specified period is missing, you can aggregate the report data manually.

Prerequisites

You have the **Business Configuration** permission.

Procedure

Step 1 Choose **System** > **Business Configuration** > **Data Amendment**.

Step 2 In the right pane, click the **Manual Aggregation** tab.

Step 3 Specify the devices and time period.

Step 4 Click **Create Task**.

Step 5 In the dialog box that is displayed, click **Yes**.

The page displays the data aggregation progress and whether the aggregation succeeded or not.

----End

3.7.2.2 Alarm Configuration

3.7.2.2.1 Configuring Notification Rules

Notification rules enable O&M personnel to email notifications about concerned alarms so that they can handle alarms in real time.

Prerequisites

- You have the permission for **Business Configuration**.
- The email server has been configured. For details, see **3.7.1.4 Configuring an Email Server**.

Context

- The alarm push rule takes effect only for newly reported alarms. If an alarm has been reported to the management system before the push rule takes effect, no notification email will be sent.
- When a new alarm that meets the push rule is reported to the management system, the push rule is triggered immediately to send an email to the specified users.
- If the time zone of the recipient is different from that of the server, the alarm generation time in the email is displayed based on the time zone of the server.
- By default, the rules are sorted by the enabled and disabled states, and the rules in the same state are sorted by update time in descending order.
- A maximum of 1000 notification rules can be created.

Procedure

1. Choose **System** > **Business Configuration** > **Alarm Configuration**.
2. In the navigation pane, choose **Push Configuration**.
3. On the **Push Settings** page, click **Add**.
4. In the **Create Rule** dialog box, set the rule as prompted.

   NOTE

   To send notifications to relevant personnel, you need to enter their personal information, such as email addresses. You are obligated to take considerable measures, in compliance with the laws of the countries concerned and the user privacy policies of your company, to ensure that the user's personal information is fully protected.
5. Click **Save**.

Related Tasks

- Deleting a rule: You can select a redundant rule from the rule list and click **Delete** to reduce the rule maintenance workload.
- Enabling/disabling a rule: You can select a rule that is not used temporarily from the rule list and click **Disable**. To use a disabled rule, select the rule and click **Enable**.
- Backing up, collecting statistics on, and reviewing rules: You can click **Export** on the rule page to export rules and back up, review, and collect statistics on the rules.

  NOTE

  When the notification rules are exported, the email addresses of the recipient users are exported. You are obligated to take considerable measures, in compliance with the laws of the countries concerned and the user privacy policies of your company, to ensure that the user's personal information is fully protected.

3.7.2.2.2 Redefine Alarm

To quickly search for and handle key device alarms to which you pay special attention, you can redefine these alarms. The management system provides three types of alarm redefinition rules: redefine alarm name, redefine alarm type and redefine alarm severity.

Table 3-23 description of the function of redefining alarms.

Table 3-23 Function of Redefining Alarms

Task Description	Operation entry	Procedure
Configuring Redefinition Alarms	1. Choose **System** > **Business Configuration** > **Alarm Configuration**. 2. In the navigation tree on the left, choose **Redefine Alarm**.	1. In the device tree and select a target device. 2. Click the operation column  . 3. Enter the **New Alarm Name** and **New Alarm Severity** based on the site requirements. 4. Click the operation column  , saving customized alarm information. **NOTE** After saving redefinition alarms, the redefined alarm status is changed to enabled after the synchronization is complete.
Clearing Redefining Alarm Rules **NOTE** After saving redefinition alarms, the alarm redefinition rule can be cleared.		Use either of the following methods to clear redefinition alarms: • On the **Redefine Alarm** page, Click  in the row where the indicator to be cleared is located. • On the **Redefine Alarm** page, Select the target data to be cleared and click **Clear** above the page.

Task Description	Operation entry	Procedure
enabling Redefining Alarm Rules **NOTE** After saving redefinition alarms, the alarm redefinition rule can be enabled redefining alarm rules.		Use either of the following methods to enable redefinition alarms: • On the **Redefine Alarm** page, click  the row of the target data row to be enabled. • On the **Redefine Alarm** page, select the target data for which redefinition alarm rules need to be enabled, click **Enable** in the upper part of the page.
Disabling Redefining Alarm Rules **NOTE** After saving redefinition alarms, the alarm redefinition rule can be disabled Redefining alarm rules.		Use either of the following methods to disable redefinition alarms: • On the **Redefine Alarm** page,Click  the row of the target data row to be disabled. • On the **Redefine Alarm** page, select the target data for which redefinition alarm rules need to be disabled, click **Disable** in the upper part of the page.
Refresh the redefined alarm		On the **Redefine Alarm** page, click **Refresh** in the upper part of the page to refresh the redefined alarm page.

Task Description	Operation entry	Procedure
Batch Redefinition Rule Application		On the **Redefine Alarm** page, click  in the operation column for the target alarm in the active alarm list to apply **Alarm Severity** and **Alarm Type** specified in the alarm rule to other rules in batches.
Batch Apply to Devices		1. In the device tree and choose a target device. 2. You can click Batch Apply below the active alarm list to apply the selected alarm rules to other devices in batches. **NOTE** Rules for applying an empty rule: For two devices of the same type, if the redefinition alarm rule is not set for one device and you want to apply the rule to another device that has been configured with an alarm rule, the redefinition alarm rule that has been set on the other device is cleared.

3.7.3 Personal Settings

This feature enables users to customize personal settings.

3.7.3.1 Changing Personal Password

If passwords are disclosed or remain unchanged for a long time, users can change their personal passwords by setting personal information. To improve user security, it is recommended that passwords be changed periodically (for example, every three months). When a user logs in to the SmartPVMS for the first time or the the user password is resets, the user needs to change the initial password.

Context

If you cannot change your password, contact the installer or company administrator.

Procedure

Step 1 Choose **System** > **System Settings** > **Personal Settings** from the main menu.

Step 2 In the navigation pane, choose **Change Password**.

Step 3 On the **Change Password** tab page, enter **Old password** and set **New password** and **Confirm password**.

Step 4 Click **Apply**.

NOTE

User information is more secure if a password is changed more frequently. If a user forgets the password due to frequent password changes, the user needs to contact installer or company administrators to reset the password.

----End

Related Tasks

In the following cases, the system prompts a user to change the password after the user logs in to the SmartPVMS:

- The user uses the initial password for login. For example, the password for the user has been reset, or the password is the one used for creating the user account.
- The user account is enabled again, but the user uses the password when the account is disabled for login.

3.7.3.2 Modifying Personal Information

When personal information such as mobile numbers and email addresses changes or needs to be supplemented, users can periodically maintain their personal information by setting personal information to ensure its accuracy.

Procedure

Step 1 Choose **System** > **System Settings** > **Personal Settings** from the main menu.

NOTICE

- When you modify your personal information, such as mobile numbers and email addresses, you are obligated to take considerable measures, in compliance with the laws of the countries concerned and the user privacy policies of your company, to ensure that your personal data is fully protected.
- To ensure the security of personal information, such as mobile numbers and email addresses, these data is anonymized on the page, and HTTPS encryption transmission channels are used.

Step 2 In the navigation pane, choose **Modify Personal Info**.

Step 3 On **Modify Personal Info**, modify personal information as required.

NOTE

If the SMS and email verification codes cannot be obtained, ensure that the mailbox service is configured correctly.

Table 3-24 Parameter description

Parameter	Description	Procedure
Associate Mobile Number	Mobile number associated with a user account.	• Editing the mobile number 1. Click **Edit**. 2. Verify the identity information as prompted and click **Next**. 3. Select a country or region code and enter a new mobile number. 4. Click **OK**. • Verifying the mobile number 1. Click **Verify**. 2. Click **Send Code** and enter the obtained verification code to verify that the mobile number is valid. 3. Click **OK**.
Associate Email Address	Email address associated with a user account. After an email is associated, you can use the associated email to reset the password if you forgets the login password.	• Editing the email address 1. Click **Edit**. 2. Verify the identity information as prompted and click **Next**. 3. Enter a new email address. 4. Click **OK**. • Verifying the email address 1. Click **Verify**. 2. Click **Send Code** and enter the obtained verification code to verify that the email address is valid. 3. Click **OK**.

Parameter	Description	Procedure
Auto-Logout If No Activity Within	If a user does not perform any operation within the period specified by this parameter after login, the user will be logged out. This parameter can be set for local users and remote users. The default value for the third-party user is 30 minutes and cannot be changed.	1. Click the drop-down list and select a value for **Auto-Logout If No Activity Within**. 2. Click **Save**.
Max. Online Sessions	You can set the maximum number of online sessions. This parameter is unselected by default, indicating that the maximum number of online sessions of an account is not limited. If this parameter is enabled, the default value is **1**, and the value range is from 1 to 500. ● If this parameter is set to **1**, **Login when maximum online sessions already in use** can be **Not allowed** or **Log out of the session**. ● If this parameter is set to a value from 2 to 500, **Login when maximum online sessions already in use** is set to **Not allowed** and cannot be changed.	1. Select **Max. online sessions** to enable this function. 2. Set the number of maximum online sessions. 3. Click **Save**.
Welcome Message	You can set the information to be displayed upon the next login.	1. Click **Edit**. 2. Enter the information to be displayed upon the next login. 3. Click **OK**.

----End

3.7.3.3 Viewing Client IP Address Control Policy

Users can view their own client IP address control policies.

Procedure

Step 1 Choose **System** > **System Settings** > **Personal Settings** from the main menu.

Step 2 In the navigation pane, choose **Personal Client IP Address Policies**.

Step 3 On the **Personal Client IP Address Policies** page, view your IP address control policies.

----End

3.7.4 Message Management

3.7.4.1 Public Notice

This topic describes how to view received public notices to learn messages.

Procedure

Step 1 Choose **System** > **Message Management** > **Announcements**.

Step 2 Click the **Message Subject** of an unread message. In the displayed **Message** dialog box, view the details about the message.

----End

3.7.4.2 Sending a Public Notice

This topic describes how to create, send, and delete public notices.

Prerequisites

You have the permission for **Send Public Notice**.

Procedure

Step 1 Choose **System** > **Message Management** > **Send Announcement**.

The messages created by the current user are displayed. You can click a message subject to view the message details.

Step 2 Click **Add**. The **Create message** dialog box is displayed.

Step 3 Set **Recipient** or select **All**, and set **Subject** and **Content**.

Step 4 Perform either of the following operations as required:

- Click **Sending** to send the message. The message status is **Sent**.
- Click **Save** to save but not send the message. The message status is **Draft**.

  NOTE

  For a message in **Draft** state, you can click the message subject to edit, save, or send the message.

----End

4 Parameter

4.1 Environment Parameters

Parameter	Unit	Definition	Formula	PV+Storage	PV-Only	Storage-Only	Remarks
Global irradiation	kWh/m²	Total solar radiation energy measured by an environmental monitoring instrument (EMI).	/	Optional	Optional	Optional	An EMI is required.
Average temperature	°C	Average ambient temperature measured by the EMI in the plant.	/	Optional	Optional	Optional	
CO_2 avoided	kg	Amount of CO_2 emitted by burning fossil fuel to produce the same amount of power generated by the plant. 1 kWh of power is equivalent to about 475 g of CO_2 emission (global average value).	Energy yield (kWh) of the plant x per kWh CO_2 emission (0.475)	Supported	Supported	Not supported	If the value changes, contact the administrator to modify it.

Parameter	Unit	Definition	Formula	PV+Storage	PV-Only	Storage-Only	Remarks
Equivalent trees planted	N/A	Number of trees that can absorb the amount of CO_2 avoided by the plant. A tree absorbs 18.3 kg of CO_2 in one year and has a lifespan of 40 years.	CO_2 avoided/CO_2 absorbed by a tree in one year (18.3)/40	Supported	Supported	Not supported	
Standard coal saved	kg	Amount of standard coal needed to produce the amount of PV power generated by the plant. 0.4 kg of standard coal is needed to produce 1 kWh of power.	Energy yield (kWh) of the plant x Standard coal needed per kWh (0.4)	Supported	Supported	Not supported	

4.2 Power Parameters

Parameter	Unit	Definition	Formula	PV+Storage	PV-Only	Storage-Only	Remarks
Total string capacity	kWp	Total capacity of PV arrays installed in the PV plant.	Total capacity of the strings connected to all inverters	Supported	Supported	Not supported	This parameter is configured during plant creation.

Parameter	Unit	Definition	Formula	PV+Storage	PV-Only	Storage-Only	Remarks
Power per MWp	kW/MWp	Power generated per MWp.	Active power/Total string capacity x 1000	Supported	Supported	Not supported	-
Theoretical yield (daily/monthly/yearly)	kWh	Theoretical amount of power that can be generated by the PV arrays installed in a plant.	Hourly: Hourly global irradiation x String capacity Daily: Daily irradiation x String capacity Monthly: Total theoretical yield of each day in a month Yearly: Total theoretical yield of each month in a year	Supported	Supported	Not supported	An EMI is required.
PV output power	kW	Total output power of PV arrays.	PV output power	Supported	Supported	Not supported	-
PV yield	kWh	Total yield of PV arrays in a given reporting period.	Hourly: PV yield each hour Daily: PV yield each day Monthly: Total yield of each day in a month Yearly: Total yield of each month in a year	Supported	Supported	Not supported	-

Parameter	Unit	Definition	Formula	PV+Storage	PV-Only	Storage-Only	Remarks
Inverter yield	kWh	Yield of a plant.	Hourly: Inverter output energy each hour Daily: Inverter output energy each day Monthly: Total inverter output energy of each day in a month Yearly: Total inverter output energy of each month in a year	Supported	Supported	Supported	-
Total yield	kWh	Total output energy of the PV plant throughout the lifetime.	Total PV energy yield	Supported	Supported	Not supported	-
Performance ratio	%	Ratio of measured output energy to total irradiation received by the plant.	PV energy yield/ Theoretical energy yield	Supported	Supported	Not supported	-
Specific yield	kWh/kWp	Ratio of the energy yield to the total string capacity.	PV energy yield/Total PV string capacity	Supported	Supported	Not supported	-

Parameter	Unit	Definition	Formula	PV+Storage	PV-Only	Storage-Only	Remarks
Consumption (daily/monthly/yearly)	kWh	Power consumed by the loads during a given reporting period.	Daily: Amount of power consumed by the loads each day Monthly: Total amount of power consumed by the loads each day in a month Yearly: Total amount of power consumed by the loads each month in a year	Supported	Supported	Supported	-
Feed-in to grid (daily/monthly/yearly)	kWh	Amount of power fed to the power grid from the plant in a give reporting period.	Daily: Amount of power fed to the grid from the plant each day Monthly: Total amount of power fed to the grid from the plant each day in a month Yearly: Total amount of power fed to the grid from the plant each month in a year	Supported	Supported	Supported	A power meter is required. Otherwise, the amount of power purchased from or fed to the grid cannot be displayed.

Parameter	Unit	Definition	Formula	PV+Storage	PV-Only	Storage-Only	Remarks
Supply from grid (daily/monthly/yearly)	kWh	Amount of power purchased from the grid in a given reporting period.	Daily: Amount of power purchased from the grid each day Monthly: Total amount of power purchased from the grid each day in a month Yearly: Total amount of power purchased from the grid each month in a year	Supported	Supported	Supported	
Self-consumption (daily/monthly/yearly)	kWh	PV energy consumed by loads and charged to batteries. It includes the amount of PV power consumed directly by loads and the amount of PV power stored in batteries.	Daily: Daily PV yield – Daily feed-in to grid Monthly: Total amount of self-consumed power of each day in a month Yearly: Total amount of self-consumed power of each month in a year	Supported	Supported	Not supported	-

Parameter	Unit	Definition	Formula	PV+Storage	PV-Only	Storage-Only	Remarks
Self-supplied power (daily/monthly/yearly)	kWh	Load consumption from PV. It includes the amount of PV power consumed directly by loads and the amount of PV power discharged from batteries.	Daily: Daily power consumption – Daily supply from grid Monthly: Total amount of self-supplied power of each day in a month Yearly: Total amount of self-supplied power of each day month in a year	Supported	Supported	Not supported	-
Load power	kW	Load consumption power.	Load consumption power	-	-	-	Supported when loads exist. Not supported when no load exits.

Parameter	Unit	Definition	Formula	PV+Storage	PV-Only	Storage-Only	Remarks
Self-consumption power	kW	Power of PV energy consumed locally.	When feeding to the grid: PV output power – Feed-in power When purchasing power from the grid: PV output power	Supported	Supported	Not supported	When the active power of the bi-directional meter is a positive value, the power is the feed-in power. When the active power of the bi-directional meter is a negative value, the power is the power of supply from the grid.

Parameter	Unit	Definition	Formula	PV+Storage	PV-Only	Storage-Only	Remarks
Battery charge/ discharge power	kW	Battery charge/ discharge power.	Battery charge/ discharge power	Supported	Not supported	Supported	If the symbol before the power value is +, the battery is charging. If the symbol before the power value is –, the battery is discharging.
Yield loss due to curtailment	kWh	Energy yield loss caused by power limitation at the grid-connection point.	Theoretical yield x Performance ratio – Actual PV yield	Supported	Supported	Not supported	An EMI is required.
Revenue loss due to curtailment	-	Loss of revenue due to power limitation.	Yield loss due to curtailment x Feed-in tariff	Supported	Supported	Not supported	If the price unit is inconsistent with the local type, contact the company administrator to

Parameter	Unit	Definition	Formula	PV+Storage	PV-Only	Storage-Only	Remarks
PV revenue	-	Revenues from photovoltaic power generation. It consists of two parts, which are revenue of power fed in to the grid and the saved electricity bills. Electricity prices need to be configured.	Revenue of power fed in to the grid (power fed to the grid x feed-in tariff) + Saved electricity bills (self-supplied power x electricity price)	Supported	Supported	Not supported	change the currency. For details, see **3.7.1.3 Configuring Company Information**.
On-grid duration	h	The time period during which the inverter is connected to the power grid.	Daily: daily on-grid duration Monthly: total daily on-grid durations in a month Year: total monthly on-grid durations in a year	Supported	Supported	Not supported	The string capacity needs to be configured. If the string capacity is not configured, the calculated on-grid duration will be inaccurate.

NOTE

Unless otherwise specified, the energy yield in this document refers to AC power yield.

5 FAQs

This section describes the common faults of the management system, possible causes of the faults, and troubleshooting methods.

5.1 What Do I Do to Avoid the Logout When No Operation Is Prformed on the SmartPVMS Page for a Long Time

When users use browser to visit the management system, avoid the Logout When No Operation Is Performed on the management system Page for a Long Time.

Problem Description

To prevent other users from performing unauthorized operations, the management system allows you to set related idle parameters. If you do not perform operations on the management system page for a long time, you will automatically log out of the client and the current page is switched back to the login page. In this case, you need to log in to the client again. This is not friendly for some special application scenarios, such as presentation or large-screen display.

Procedure

1. Choose **System** > **System Settings >Personal Settings** from the main menu.
2. In the navigation tree on the left, choose **Personal Settings** > **Modify Personal Info**.
3. On the **Modify Personal Info** page, modify the property of **Auto-logout if no activity within** .
4. Click **Apply**.

NOTE

To prevent other users from performing unauthorized operations during the absence of a login user, you are advised to enable the **Auto-logout if no activity within** function after the special application scenarios are finished.

5.2 How Do I Handle the Problem of Certificate Error or Security Alarm Displayed in the Web Browser

Symptom

- When the Google Chrome is used to log in to management system, the system displays a connection error message as shown in **Figure 5-1**.
- When the Mozilla Firefox is used to log in to management system, the system displays a connection error message as shown in **Figure 5-2**.

Figure 5-1 A connection error prompted by the Chrome

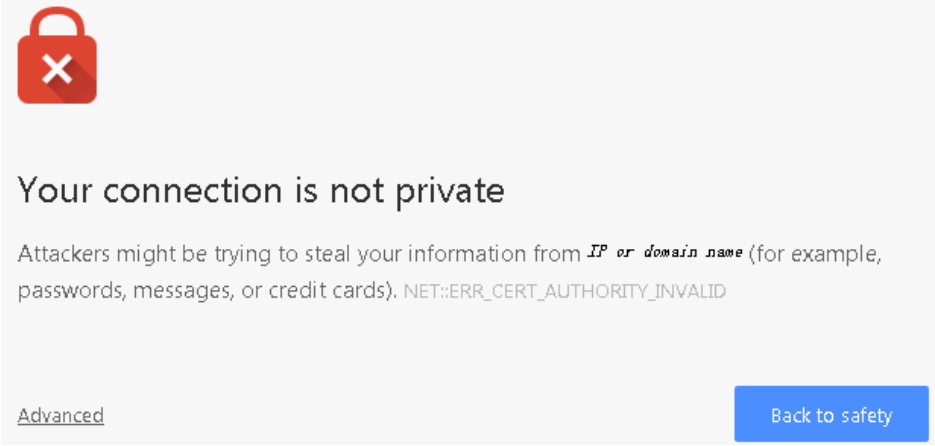
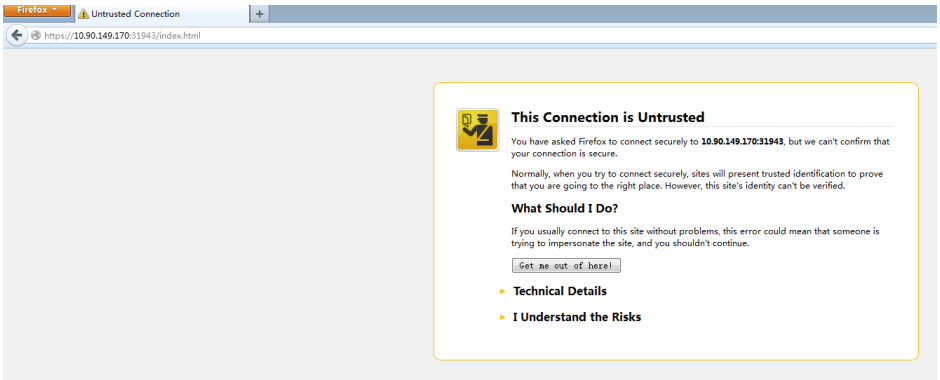


Figure 5-2 A connection error prompted by the Firefox



Procedure

NOTE

Operations on the browser may vary depending on browser versions but are similar to the examples in the following steps. You are advised to perform the operations based on actual situations.

- Install the security certificate in Google Chrome.

  Please select whether to execute the subsequent operations according to the following scenarios.

  a. Obtaining the Trust Certificate from the management system Server.

     Use FileZilla to download the **trust.cer** certificate file from the **/opt/oss/NetEco/etc/ssl/er** directory on the management system server as user **ossuser** to the local PC.

  b. Installing the Trust Certificate on the Browser:

     i. Open Google Chrome and click in the upper right corner of the browser Icon Go to **Customise and control Google Chrome** Interface.

     ii. Click **Settings**.

     iii. Click **Show advanced settings**,Click again **Manage certificates**.

     iv. Importing Steps in a Trusted Root Certification Authorities **a** Certificates that have been saved to the local computer,Click **Import**.

     v. Click **Next step** Browse **Selecting a certificate**.

     vi. Click **Next step**.

     vii. Click **Next step**.

     viii. Click **Completed**.

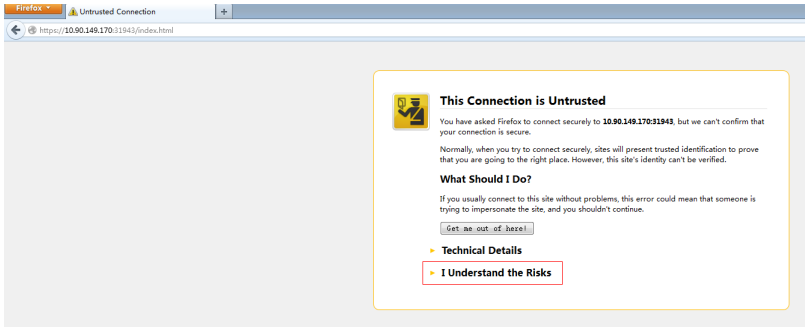
     ix. The **Security Warning** dialog box is displayed. Select **Yes(Y)**.

     x. Click **Yes** Restart the browser.

- Add the exception in Mozilla Firefox.

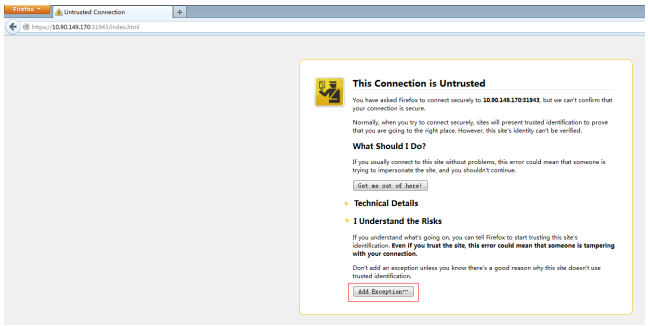
  a. Click **I Understand the Risks** as shown in **Figure 5-3**.

  Figure 5-3 Clicking I Understand the Risks

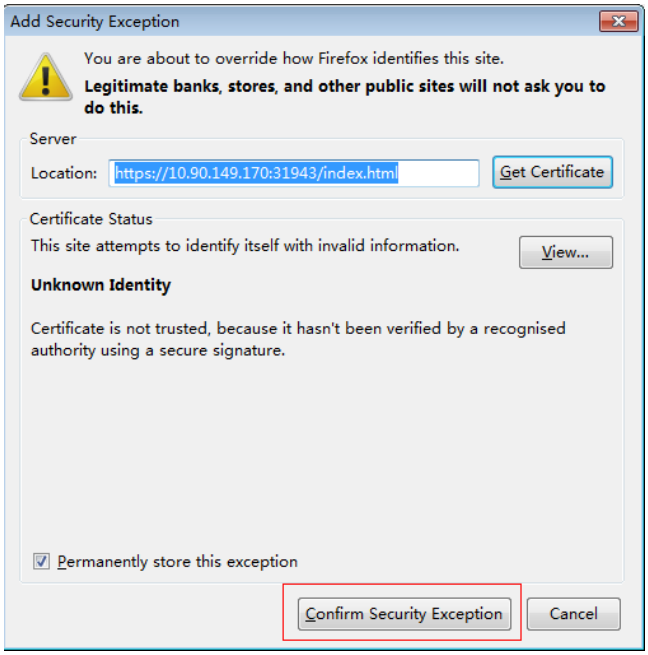
  b. In the expanded area, click **Add Exception** as shown in **Figure 5-4**.

Figure 5-4 Adding exception.



c. Click **Confirm Security Exception** as shown in **Figure 5-5**.

Figure 5-5 Confirming security exception



5.3 How Do I Resolve the Failure to Upload or Download a File?

Symptom

When a user attempts to upload or download a file on the management system, the system displays a message indicating that the operation fails or the page does not respond after the user clicks the upload or download button.

Possible Causes

The file exceeds the upload and download traffic limit of the network firewall when the client accesses the management system. As a result, the operation fails.

Solution

- Contact the network administrator to remove the traffic limit. After the operation is complete, reconfigure the firewall.
- Access the management system from a public network that is not restricted by networks.

5.4 How Do I Obtain a Mail Server Certificate on Google Chrome?

Question

How do I obtain a mail server certificate on Google Chrome?

Answer

NOTE

Operations on the browser may vary depending on browser versions but are similar to the examples in the following steps. You are advised to perform the operations based on actual situations.

Step 1 In the address box on Google Chrome, enter the IP address for logging in to the mail server and press **Enter**.

Step 2 Press **F12**. On the displayed console, click the **Security** tab and click **View Certificate**.

NOTE

If the console is not displayed after you press **F12**, allow the console to be displayed in the pop-up blocker and press **F12** again.

Step 3 In the **Certificate** window, click the **Certificate Path** tab, and select the certificate under the root certificate.

Step 4 Click the **Details** tab and click **Copy to File**.

Step 5 In the displayed **Certificate Export Wizard** window, click **Next**.

Step 6 Select **Base64 code X.509 (.CER)** for **Export Format** and click **Next**.

Step 7 Click **Browse**. In the displayed **Save As** dialog box, select the certificate storage path, enter a name for the certificate, and click **Save**.

Step 8 Click **Next**.

Step 9 In the displayed dialog box, click **Finish**."The export was successful." is displayed.

----End

5.5 How Do I Obtain an Email Server Certificate on Firefox?

Question

How do I obtain an email server certificate on Firefox?

Answer

NOTE

Operations on the browser may vary depending on browser versions but are similar to the examples in the following steps. You are advised to perform the operations based on actual situations.

Step 1 In the address box on Firefox, enter the IP address for logging in to the email server and press **Enter**.

Step 2 Click on the left of the address box.

Step 3 Click **More Information**.

Step 4 On the **Security** tab page, click **View Certificate**.

Step 5 On the **Details** tab page, click **Export**.

Step 6 Select the certificate storage path, enter a name for the certificate, and click **Save**.

----End

6 Acronyms and Abbreviations

A	
AC	Alternating Current
AFCI	Arc-Fault Circuit Interrupter
API	Application Platform Interface
APP	Application
C	
CMU	Central Monitoring Unit
D	
DC	Direct Current
DCDC	Direct Current Distribution Box
E	
EMI	Environmental Monitoring Instrument
ESM	Energy Storage Module
ESC	Energy Storage Controller
ESU	Energy Storage Unit
ESR	Energy Storage Rack
ESS	Energy Storage System
F	
FTP	File Transfer Protocol
H	
HTTPS	Hypertext Transfer Protocol Secure

I	
IV	Current-Voltage
K	
KPI	Key Performance Indicator
M	
MPPT	Maximum Power Point Tracking
N	
NAT	Network Address Translation
NCU	Network Control Unit
NTP	Network Time Protocol
P	
PV	Photovoltaic
PCS	Power Control System
PID	Potential Induced Degradation
S	
SDS	Smart DC System
SN	Serial Number
SMTP	Simple Mail Transfer Protocol
SOC	State Of Capacity
SOH	State Of Health
SSL	Secure Sockets Layer
T	
TCP	Transmission Control Protocol
TCU	Tracker Control Unit
TLS	Transport Layer Security
U	
UDP	User Datagram Protocol
URL	Universal Resource Locator
UTC	Coordinated Universal Time