# EMS1000

## User Manual

Version 3.0

www.solaxpower.com

eManual in the QR code or
at http://kb.solaxpower.com/

# STATEMENT

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# About This Manual

## Scope of Validity

This manual is an integral part of EMS1000 (hereinafter referred to as "EMS1000" or "the Device"). It introduces the installation, electrical connection and webpage operations of the Device. Please read it carefully before operating.

## Target Group

This manual is intended for EMS1000 installers, operators and maintenance personnel. Among the manual, the installation and electric connection procedures can only be performed by qualified personnel who:

- Are licensed and/or satisfy state and local regulations.
- Have good knowledge of this manual and other related documents.

## Conventions

The symbols that may be found in this manual are defined as follows.

| Symbol | Description |
|---|---|
| DANGER | Indicates a hazardous situation which, if not avoided, will result in death or serious injury. |
| WARNING | Indicates a hazardous situation which, if not avoided, could result in death or serious injury. |
| CAUTION! | Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. |
| NOTICE! | Provides tips for the optimal operation of the product. |

## Frequently Used Functions

Icons and parameters that may be found on the webpage of EMS1000 and this manual are defined as follows:

| Parameter/Icon | Description |
|---|---|
| * | The parameter must be configured. |
| × | Cancel selection or close the current page |
|  | Display the content that you entered |
|  | Hide the content that you entered |
|  | View the description for the function or parameter |

## Change History

**Version 3.0 (2025-02-25)**

Modified "5.1 Device Terminals" (Revised the terminal definition of NET 1 to 4)

Modified "3.1 Installation Requirements" (Updated the image of industrial and commercial plants)

**Version 2.0 (2025-01-21)**

Modified "5.1 Device Terminals" (Revised the terminal definition of NET and RS485 terminals)

Modified "6.1 Logging in" (Revised ther method of logging, specifically the cable connection method)

Modified "6.4 Overview" (Changed the basic information layout)

Modified "6.5.1 Adding Devices", and added "6.5.5 Deleting Devices" (Changed the string of adding devices, and added the section of Deleteing Devices)

Modified "6.6.1 EMS1000" and "6.6.8 Supervision System" (Added NET IP status on EMS1000 information page, added descripiton for Setting Access Control Protection, and added Viewing HIstory Data)

Modified "6.7.2.1 Work Mode", "6.7.2.5 External Control" and "6.7.2.5 External Control", and added "6.7.3 Smart Scene" (TRENE system added peak shaving mode, and manual mode operations changed)

Version 1.0 (2024-09-02)

Modified "3.2 Scope of Delivery" and "5.7 Antenna Connection" (Changed the image of the antenna)

Modified "6 Webpage Operations" (Modified the content based on the modification on the product webpage, such as the strings, screenshots and new functions)

Changed the email address of Australia

Version 0.0 (2024-07-15)

Initial release

# Table of Contents

# 1 Safety

## 1.1 General Safety

EMS1000 has been meticulously designed and thoroughly tested to comply with the relevant state and international safety standards. Nevertheless, like all electrical and electronic equipment, safety precautions must be observed and followed during the installation and electrical connection of the Device to minimize the risk of personal injury.

Please thoroughly read, comprehend, and strictly adhere to the comprehensive instructions provided in the user manual and any other relevant regulations prior to the installation of the Device. The safety instructions in this document serve as supplementary guidelines to local laws and regulations.

SolaX shall not be liable for any consequences resulting from the violation of the storage, transportation, installation, and operation regulations outlined in this document. Such consequences include, but are not limited to:

- Device damage due to force majeure, such as earthquake, flooding, thunderstorm, lighting, fire hazard, volcanic eruption and overvoltage
- Device damage due to human causes
- Failure to follow the operation instructions and safety precautions on the product and in this document
- Installation and use under improper environment or electrical condition
- Unauthorized modifications to the product or software
- Use of incompatible devices

## 1.2 Explanation of Symbols

Table 1-1 Symbols on Device labels

| Symbol | Description |
|---|---|
|  | CE mark of conformity |
|  | RCM mark of conformity |
|  | Do not dispose of the device together with household waste. |

## EU DECLARATION OF CONFORMITY

WIFI EIRP: 802.11b/g/n: 18 dBm

- This equipment complies with CE radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.
- Hereby, SolaX Power Network Technology (Zhejiang) Co. ,Ltd. declares that EMS1000 supports 2.4G WIFI, 2G, 3G and 4G functions. It is in conformity with the relevant union harmonization legislation: Radio Equipment Directive: 2014/53/EU.
- The full text of the EU declaration of conformity is available at the following internet address: www.solaxpower.com.
- Band specification:
  - » GSM/GPRS/EGPRS900: 35 dBm
  - » GSM/GPRS/EGPRS1800: 32 dBm
  - » WCDMA Band I: 25 dBm
  - » WCDMA Band VIII: 25 dBm
  - » LTE Band 1: 25 dBm
  - » LTE Band 3: 25 dBm
  - » LTE Band 7: 25 dBm
  - » LTE Band 8: 25 dBm
  - » LTE Band 20: 25 dBm
  - » LTE Band 28: 25 dBm
  - » LTE Band 38: 25 dBm
  - » LTE Band 40: 25 dBm

# 2 Product Overview

## 2.1 Introduction

EMS1000 is an all-in-one device for photovoltaic energy management. It integrates multiple functions involving the energy system, such as data acquisition, transmission and storage, and real-time interaction with SolaXCloud. With EMS1000, you can conveniently configure system settings and monitor system operation from anywhere, at any time.

## 2.2 Features

- All-in-one design and flexible installation

  EMS1000 is small in size, and supports multiple installation methods that are suitable for different scenarios. For use with cabinet, one EMS1000 can manage up to 10 cabinets.

- Inclusive functions and easy operation

  The webpage displays both overall and detailed system information, such as real-time and historical system data, system alarms, and supports configuring the energy management strategy and other settings through several clicks.

- Large capacity and quick response

  EMS1000 includes a 128 GB SSD that can store data for up to 1 year, and responds to system requests in seconds.

## 2.3 Appearance

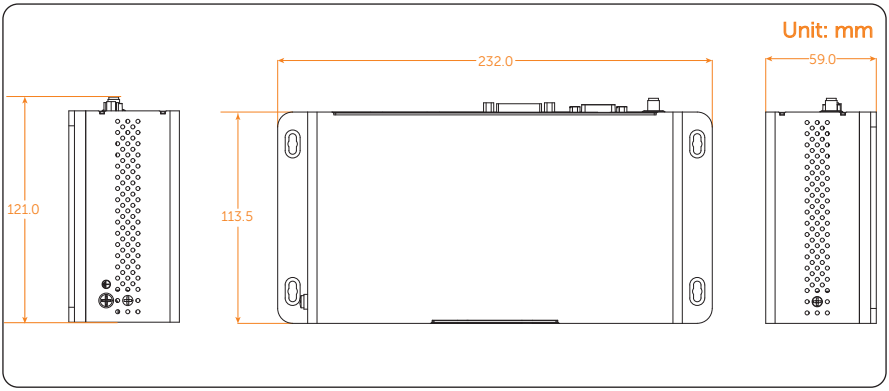



Figure 2-1 Device dimensions

## 2.4 Definition of Indicators

Check for the indicator status against the table for the operation status of the Device.

Table 2-2 Indicator status description

| Indicator | Status | Description |
|---|---|---|
| Power (PWR) | Stead on | Normal power supply |
| | Off | No power supply |
| Running (RUN) | Blinking | The system runs normally. |
| | Stead on<br>Off | The system crashes. |
| ERR (Error) | Stead on | System error occurs. |
| | Off | The system runs normally. |
| SSD | Stead on | Normal SSD |
| | Blinking | Transmitting data |
| | Off | Lack of SSD or abnormal SSD |

# 3 Installation Preparation

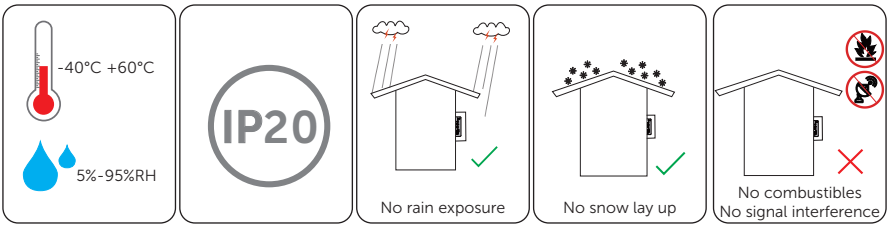
## 3.1 Installation Requirements

Before installing the device, select a proper installation site and prepare the tools based on the following instructions.

### Environment Requirements

Make sure the installation environment meets the following conditions:

- The ambient temperature: -40°C to +60°C.
- The relative humidity shall be between 5-95%RH.
- Avoid rain exposure and snow accumulation.
- Do not install the Device in areas with flammable and explosive materials.
- Avoid signal interference.



## Installation Carrier Requirements

The installation carrier must be made of a non-flammable material, and the Device must be protected against water with a waterproof box or other waterproof measures.

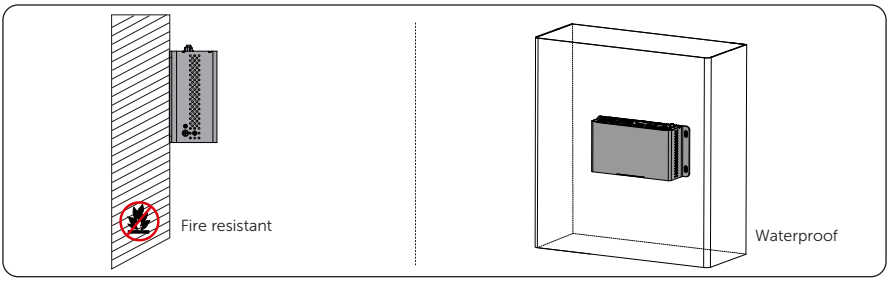



Figure 3-2 Installation carrier requirement

## Clearance Requirements

To guarantee proper heat dissipation and ease of disassembly, the minimum space around EMS1000 must meet the standards below.

For installations with multiple Devices, make sure to leave a minimum space of 300 mm between each Device.

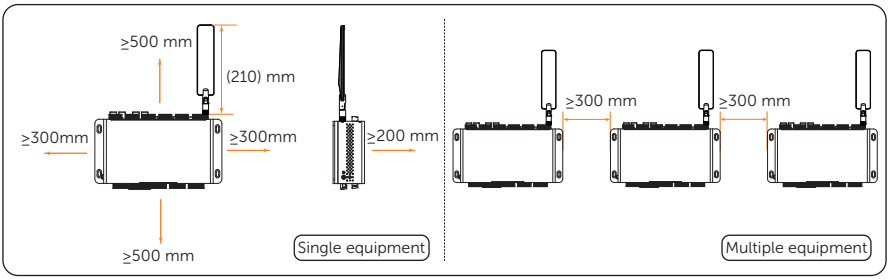



Figure 3-3 Clearance requirements

**NOTICE!**

Multiple models of antenna are available, and the antenna dimensions vary with the model.

## 3.2 Scope of Delivery

Before acceptance, check whether the Device and all accessories listed below are included in the package and are in good condition. If there is anything missing or damaged, please return it to us.

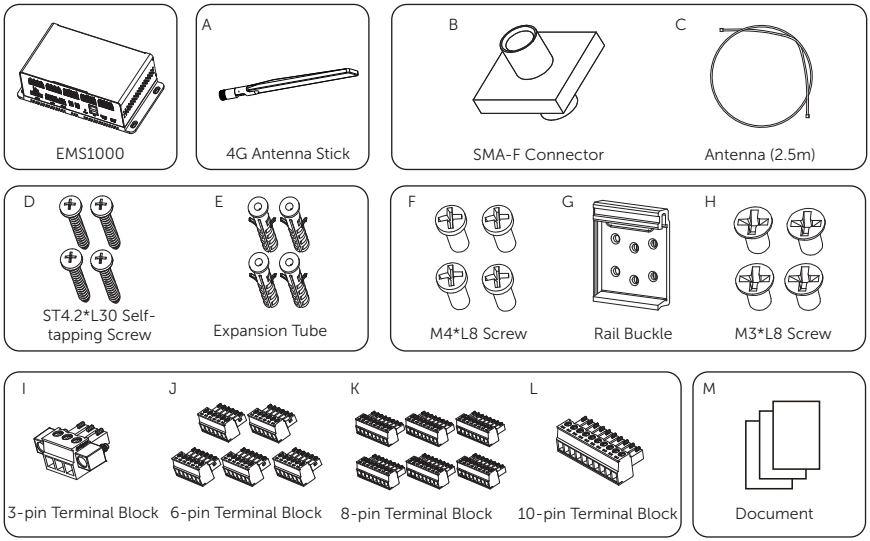



Table 3-1 Scope of delivery

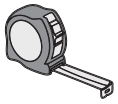
| Item | Description | Quantity | Remarks |
|---|---|---|---|
| / | EMS1000 | 1 | |
| A | 4G Antenna Stick | 1 | |
| B | SMA-F Connector | 1 | For connecting the antenna |
| C | Antenna (2.5m) | 1 | |
| D | ST4.2*L30 Self-tapping Screw | 4 | For device wall mounting |
| E | Expansion Tube | 4 | |
| F | M4*L8 Screw | 4 | Reserved |
| G | Rail Buckle | 1 | For device rail mounting |
| H | M3*L8 Screw | 4 | |
| I | 3-pin Terminal Block | 1 | For power connection |
| J | 6-pin Terminal Block | 5 | For RS485 connection |
| K | 8-pin Terminal Block | 6 | Reserved |
| L | 10-pin Terminal Block | 1 | Reserved |
| M | Document | / | |

*Note: Accessories in the same box are packed together in one bag.

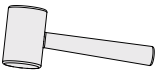
## 3.3 Tool Requirements

Installation tools include but are not limited to the followings. If necessary, use other auxiliary tools on site. Please note that the tools used must comply with local regulations.

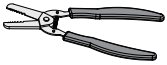

Hammer drill
(Drill bit: 6 mm)

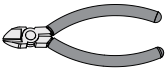

Measuring tape

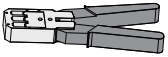

Marker

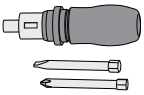

Rubber mallet


Spirit level


Wire stripper


Marker


Crimping tool for RJ45


Torque screwdriver
(Flat-head: M2)
(Phillips head: M4)


Safety gloves


Safety boots


Safety goggles


Anti-dust mask

# 4 Installation Procedure

EMS1000 supports 3 installation modes: cabinet installation, DIN-rail installation and wall mounting. Select an installation mode according to the on-site conditions.

**WARNING!**

Only qualified personnel are allowed to perform the mechanical installation in accordance with local laws and regulations.

## 4.1 Cabinet Installation

EMS1000 can work with multiple cabinet models for energy system management, and is already properly installed and connected before the cabinet is delivered. For specific information, see the user manual of the cabinet.

## 4.2 Din-rail Installation

**Step 1:** Align the four holes of the DIN rail buckle (Part G) to the installation holes at the rear of EMS1000, and then use four M3*L8 screws (Part H) to secure them.

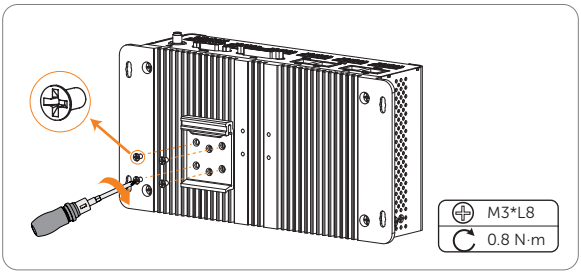



Figure 4-1 Attaching the rail buckle

**Step 2:** Clasp the combined rail buckle from top to bottom onto the rail.

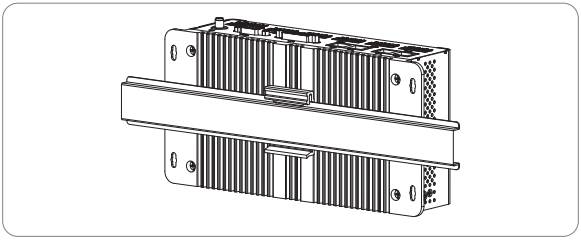


Figure 4-2 Clasping the DIN rail buckle to rail

## 4.3 Wall-mounting Installation

| NOTICE! |
| --- |
| For this installation method, ensure that there are enough waterproof measures for the Device. |

**Step 1:** Place EMS1000 onto the wall at a proper height from the ground, use a spirit level to ensure that the Device is horizontal and level, and then mark holes.

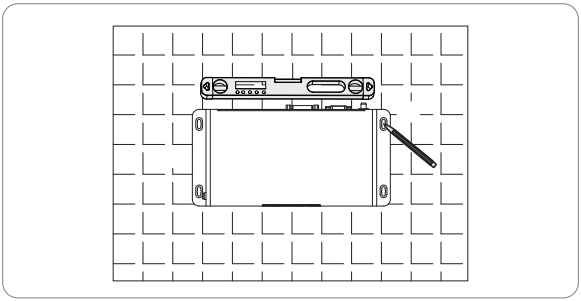


Figure 4-3 Determining the installation position

**Step 2:** Drill holes into the wall according to the hole marks.

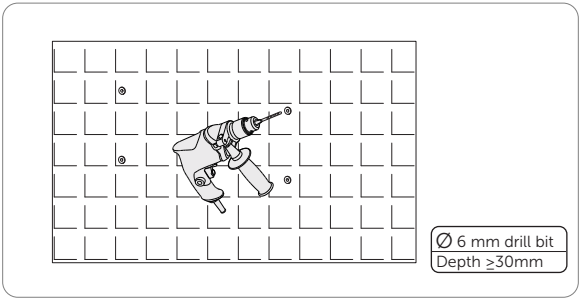



Figure 4-4 Drilling holes

**Step 3:** Hammer in the expansion tubes (part E).

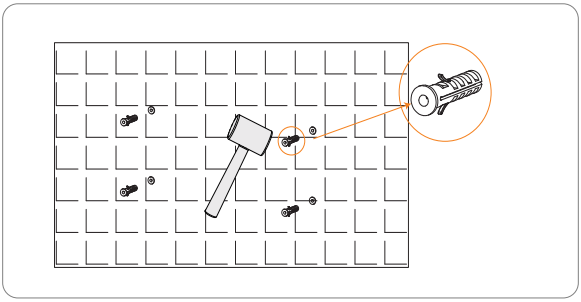


Figure 4-5 Hammering in expansion tubes

**Step 4:** Use four ST4.2*L30 (part D) self-tapping screws to secure the Device to the wall.

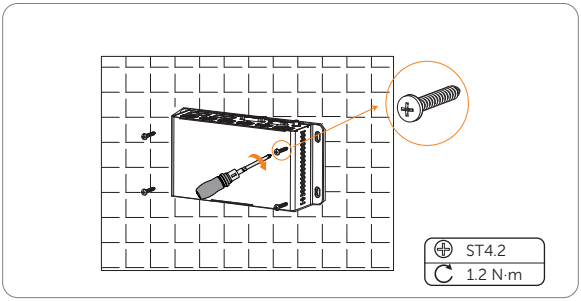



Figure 4-6 Securing the Device

# 5 Electrical Connection

## 5.1 Device Terminals

EMS1000 features abundant terminals that can be used to connect different device. You can also develop customized functions for idle terminals.

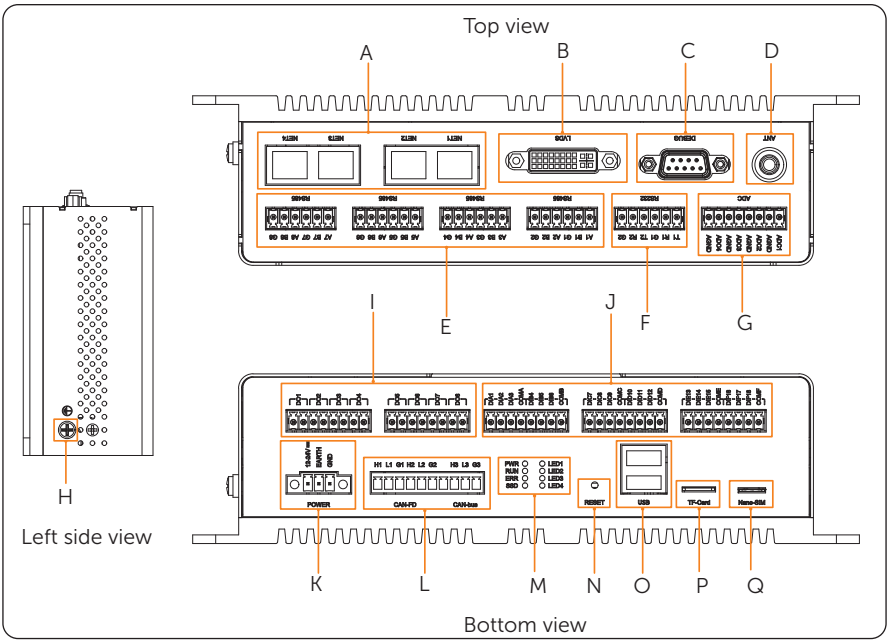



Figure 5-1 EMS1000 appearance

Table 5-1 Description of appearance

| Position | Area | Item | QTY | Description |
|---|---|---|---|---|
| Top | A | Ethernet terminal (NET) | 4 | • NET1: Connected to the switch in the cabinet<br>• NET2: Connected to EMS1000 PRO<br>• NET3: Reserved<br>• NET4: Connected to the router for network |
| | B | LVDS terminal | 1 | Reserved |
| | C | Debug terminal (DEBUG) | 1 | Reserved |

| Position | Area | Item | QTY | Description |
|---|---|---|---|---|
| Top | D | Antenna socket (ANT) | 1 | For expanding signal transmission |
| | E | RS485 terminal | 8 | • 1-6: Connected to MODBUS RTU devices, such as cabinet meter, and grid-connected inverters<br>• 7: Only connected to the inverter in AELIO system<br>• 8: Only connected to the gird meter |
| | F | RS232 terminal | 2 | Reserved |
| | G | ADC terminal | 4 | Reserved |
| Left side | H | Earthing terminal | 1 | For device earthing |
| Bottom | I | DO terminal | 8 | Reserved |
| | J | DI terminal | 18 | DIA1-DIA3 and COMA, DIB4 and COMB: Dry contact<br>DIB5-COMF: Reserved |
| | K | Power supply (POWER) | 1 | 12 Vdc-24 Vdc |
| | L | CAN terminal | 3 | 2 × CAN-FD, and 1 × CAN-bus |
| | M | Indicators | 8 | • Power status (PWR)<br>• Running status (RUN)<br>• Error (ERR)<br>• SSD status (SSD)<br>• LED 1-LED4: Reserved |
| | N | Reset button (RESET) | 1 | For device resetting |
| | O | USB socket (USB) | 2 | For device update |
| | P | TF card socket (TF Card) | 1 | For firmware programming |
| | Q | Nano-SIM card socket (Nano-SIM) | 1 | For 4G communication |

## 5.2 Cable Requirements

Cables are not in the scope of delivery of EMS1000. Please prepare the cables and materials in advance as required below.

Table 5-2 Cable specification

| No. | Item | Type | Specification |
|---|---|---|---|
| 1 | Power adapter | / | 24 VDC, 2 A |
| 2 | RS485 cable | Three-core or multi-core cables | Cross-sectional area: 0.2 $mm^2$ – 2.5$mm^2$ (24AWG ~14 AWG) |
| 3 | DI cable | Dual-core or multi-core cables | Cross-sectional area: 0.2 $mm^2$ – 1.5$mm^2$ (24AWG ~16 AWG) |
| 4 | Network cable | CAT 5E | / |
| 5 | RJ45 terminal | Standard RJ45 terminal | / |

## 5.3 Network Cable Connection

**Step 1:** Strip the insulation layer of the network cable to an appropriate length.

**Step 2:** Attach the RJ45 connector to the stripped cable, and then use a crimping tool to crimp them.

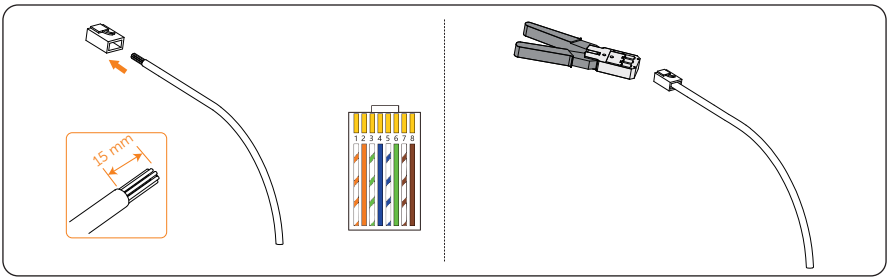



Figure 5-2 Strpping and crimping network cable

Table 5-3 Pin number and color

| PIN No. | Color | PIN No. | Color |
|---|---|---|---|
| 1 | Orange-White | 5 | Blue-White |
| 2 | Orange | 6 | Green |
| 3 | Green-White | 7 | Brown-White |
| 4 | Blue | 8 | Brown |

**Step 3:** Insert the assembled network cable into the corresponding slot.

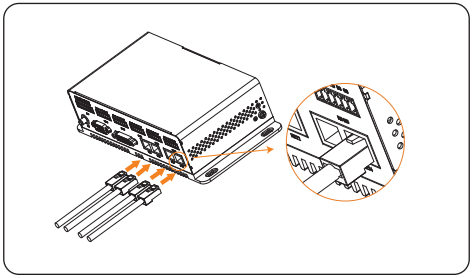


Figure 5-3 Connecting the cable

## 5.4 4G SIM Card Installation

4G SIM card is not in the scope of delivery. Please prepare a 4G SIM card in advance.

Keep the chip downside, and then insert the SIM card into the Nano-SIM slot.

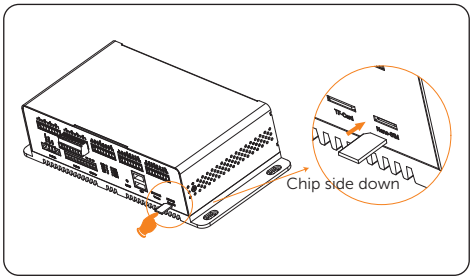



Figure 5-4 Inserting the 4G SIM card

## 5.5 RS485 Cable Connection

| NOTICE |
| --- |
| • Please perform proper insulating measures for wires that are not connected. |

**Step 1:** Strip the insulation layer of the cable and wires to an appropriate length.

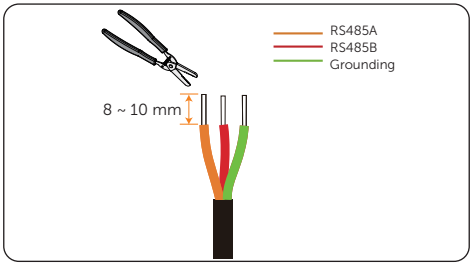



Figure 5-5 Striping the cable

**Step 2:** Insert the RS485A, RS485B and grounding wire into the 6-pin terminal block in order, and then use a wrench to secure them.

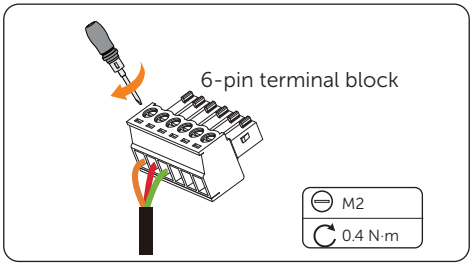



Figure 5-6 Securing wires

**Step 3:** Insert the terminal block into the RS485 slot based on the device markings.

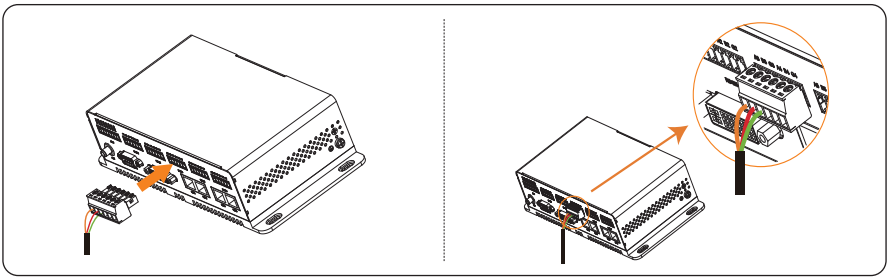


Table 5-4 Inserting the terminal block

Table 5-5 RS485 port description

| Port | Marking | Description |
|---|---|---|
| RS485 1-8 | A | RS485A |
| | B | RS485B |
| | G | Ground wire |

## 5.6 DI Port Connection

**Step 1:** Strip the insulation layer of the cable and wires to an appropriate length.

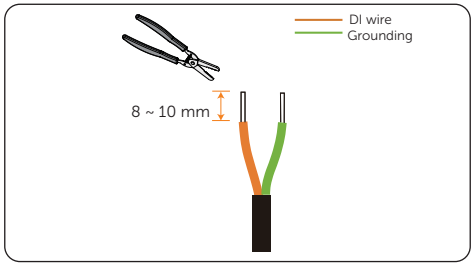



Figure 5-7 Striping the cable

**Step 2:** Insert the DI and grounding wire into the 8-pin terminal block in order, and then use a wrench to secure them.

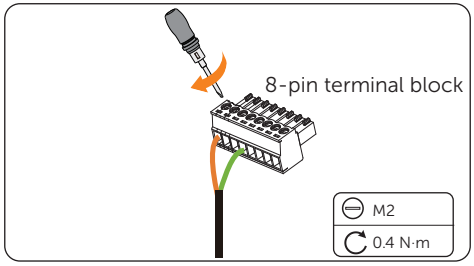



Figure 5-8 Securing wires

**Step 3:** Insert the terminal block into the DI slot in order based on the device markings.

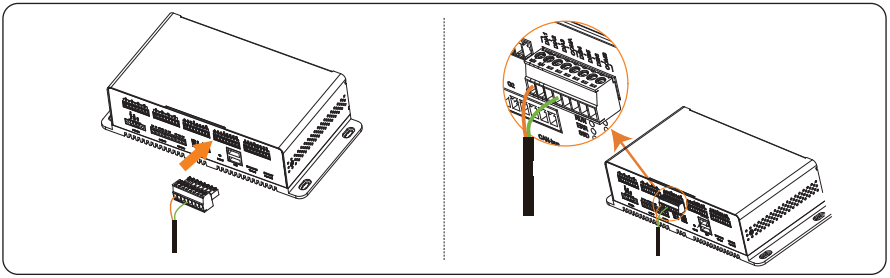


Table 5-7 Inserting the terminal block

Table 5-8 DI port description

| Port | Marking | Description | Remark |
|---|---|---|---|
| DI | • DIA1-DIA3<br>• DIB4-DIB6<br>• DIC7-DIC9<br>• DID10-DID12<br>• DIE13-DIE15<br>• DIF16-DIF18 | Connected to the DI cable | While connecting the DI cables, make sure that the grounding cable is connected to the corresponding COM terminal. |
| | • COMA<br>• COMB<br>• COMC<br>• COMD<br>• COME<br>• COMF | Connected to the grounding cable | |

## 5.7 Antenna Connection

The antenna stick can be directly inserted into the antenna slot, or connected through the SMA-F connector. The latter is only applicable to cabinet installation.

### Quick Insertion

Insert the antenna stick into the antenna slot, and then swirl it clockwise to fix it.

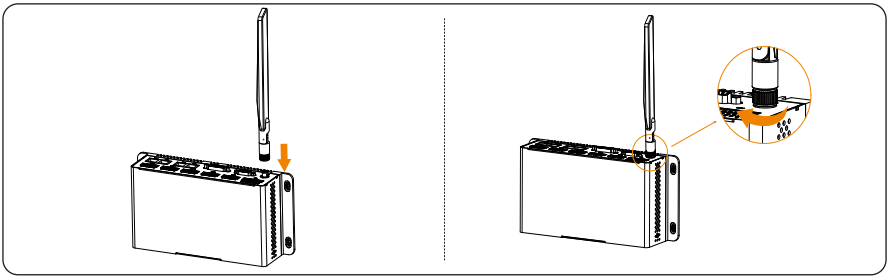


Figure 5-9 Fixing the antenna stick

### Connection through SMA-F Connector

**Step 1:** Connect one end of the antenna to the SMA-F connector, and then fix the other end of the antenna to EMS1000.

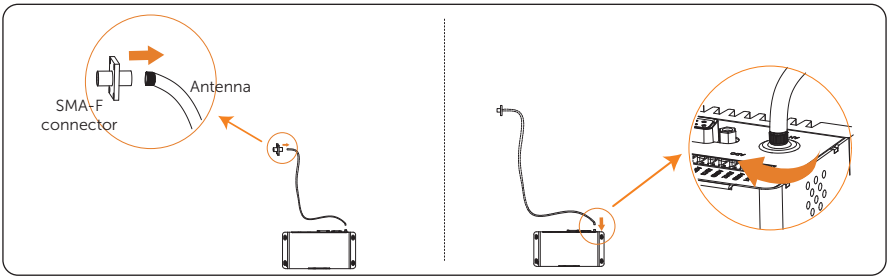



Figure 5-10 Connecting the antenna

**Step 2:** Swirl the antenna stick clockwise to fix it to the SMA-F connector.

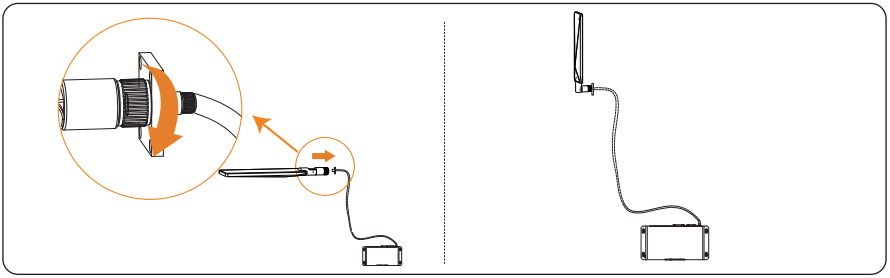


Figure 5-11 Fixing the antenna stick

# 6 Webpage Operations

View the system information, and manage the power system through EMS1000 webpage.

| NOTICE! |
| --- |
| Screenshots of V003 software are used for example in this chapter, and the actual page details might vary. |

## 6.1 Logging in

| NOTICE! |
| --- |
| IE browser is not supported currently, and we recommend logging in to the webpage through Chrome. |

**Step 1:** Connect the computer to the switch in the energy storage cabinet with a network cable, or connect the computer to EMS1000 hotspot named WiFi_SN, and then go to the defined IP address based on the connection mode.

» For wired connection: 192.168.11.10

» For hotspot connection: 192.168.10.10

**Step 2:** On the login page, select the language, enter the username and password, and then click **Login**.

The default username and password for the user account are user and 123456.


Figure 6-12 Login page

## 6.2 Webpage Layout

EMS1000 webpage offers a wide range of functions that are logically divided into multiple modules, such as overview, device list, system management, alarm information and more.

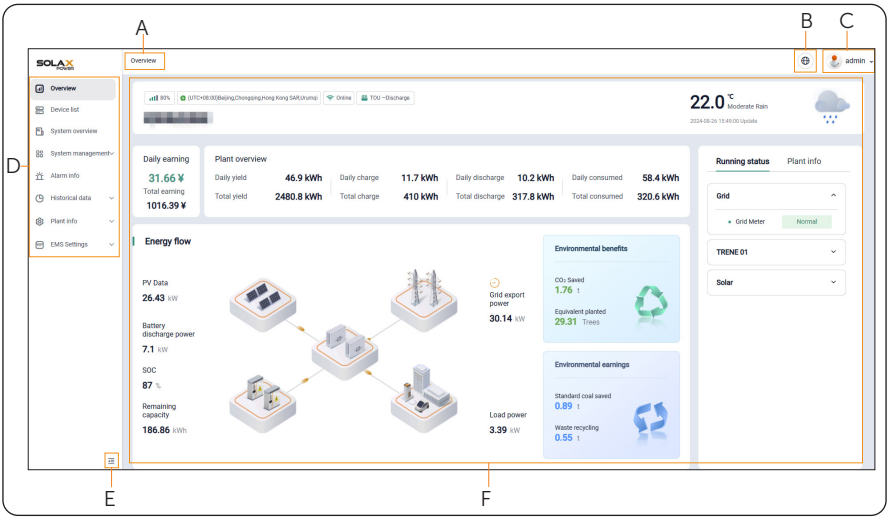



Figure 6-1 Page layout

Table 6-1 Page description

| No. | Item | Description |
|---|---|---|
| A | Page path | Path of the current page. You can click the main or sub menu in the path to directly go to the defined menu. |
| B | | Click the icon to switch the system language without logging out |
| C | user | The current login account, either user or admin. You can click the icon to change password (available only for user account) or log out. |
| D | Navigation bar | Function items that the Device offers |
| E | Hiding icon | Click the icon to hide the navigation bar |
| F | Content area | Detailed information of the selected function item |

## 6.3 Changing Password

We recommend changing the password immediately after logging in to the webpage for the first time.

**Step 1:** Click **User** on the upper-right corner, and then select **Change Password**.

**Step 2:** On the **Change Your Password** pop-up, enter the original password, enter and confirm the new password, and then click **Ok**.

The password should be at least 6-32 characters long, including numbers, uppercase and lowercase letters, and symbols.

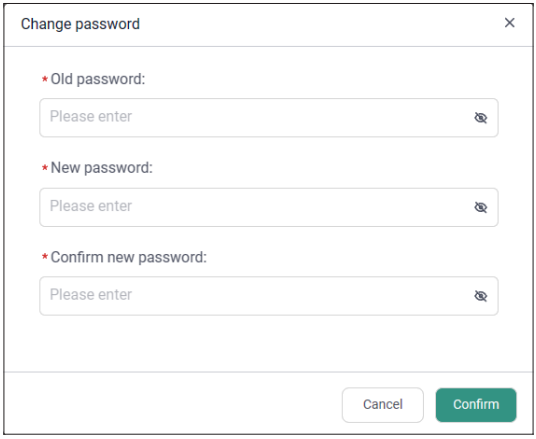



Figure 6-2 Changing password

**NOTICE!**

If you forget your password, restore the system to default settings or contact us for technical support.

## 6.4 Overview

In this menu, you can have an overview of the entire system, including the system information, daily and total revenue and energy details, real-time energy data and power line chart.

Log in to the webpage, and the **Overview** page is displayed by default.

### Basic System Information

View the time zone and local weather of the plant, and system information including 4G signal strength, connection status of EMS1000 and SolaXCloud platform and system operation mode.


Figure 6-3 Basic station information

Table 6-2 Information description

| No. | Description |
|---|---|
| A | Work mode of the system |
| B | Ripple control or DRM control mode that the system is currently in if the function is enable |
| C | Connection status of EMS1000 and the SolaXCloud platform |
| D | 4G signal strength. The icon is displayed only when a 4G SIM card is installed. |
| E | Name of the plant |
| F | Time zone of the plant |
| G | Weather condition of the plant and data refreshing time |

## Energy Statistics

View the revenue brought by and the key energy data of the system.

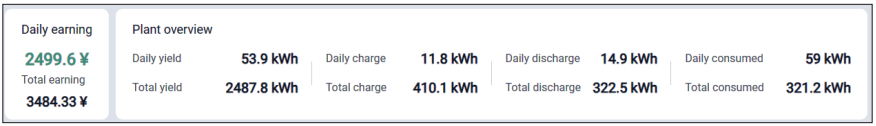



Figure 6-4 Energy data

Table 6-3 Energy data parameter description

| Parameter | Description |
|---|---|
| Daily Earning | Revenue that the system has generated on the day |
| Total earning | Total revenue that the system has generated. It is the sum of revenue that all devices generate since they are connected to EMS1000. |
| Daily yield | Amount of energy that PV panels have generated on the day |
| Total yield | Total amount of energy that PV panels have generated |

| Parameter | Description |
| --- | --- |
| Daily charge | Amount of energy that has been charged into the battery on the day |
| Total charge | Total amount of energy that has been charged into the battery cluster |
| Daily discharge | Amount of energy that the battery has discharged on the day |
| Total discharge | Total amount of energy that the battery has discharged |
| Daily consumed | Amount of energy that the load in the system has consumed on the day |
| Total consumed | Total amount of energy that the load in the system has consumed |

## Energy Flow

View the energy flow among the four major components of the system, and the specific real-time energy data of each component.

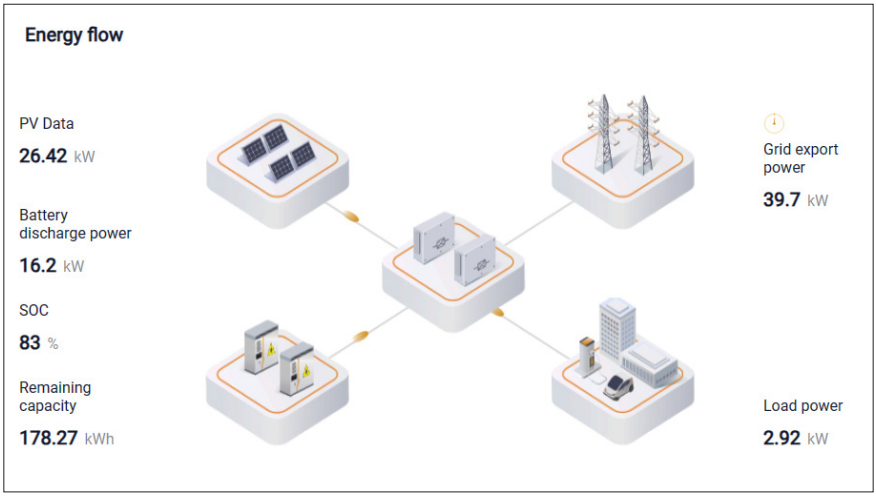



Figure 6-5 Energy flow

Table 6-4 Energy flow parameter description

| Component | Parameter | Description |
|---|---|---|
| PV | PV Data | Amount of power that the PV panels generate in real time |
| Battery | • Battery charge power<br>• Battery discharge power | Amount of power that is charged into or discharges from the battery in real time |
| | SOC | Battery SOC, in % |
| | Remaining capacity | Available energy of the battery |
| Grid | • Grid export power<br>• Grid import power | Displays the supplied power or feed-in power of the grid side in the system |
| Load | Load power | Amount of power that the load is consuming in real time |

## Environmental Contribution

The environmental profits of the system is also displayed based on the amount of solar energy that has been utilized.

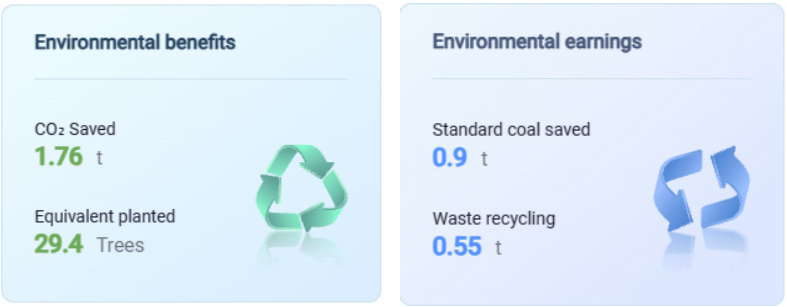



Figure 6-6 Environmental value and profit

Table 6-5 Environmental value parameter description

| Parameter | Description |
|---|---|
| $CO_2$ saved | Amount of $CO_2$ that will be generated if the energy is produced by fuels |
| Equivalent planted | Number of trees that will be used to absorb the reduced amount of $CO_2$ emitted |

| Parameter | Description |
| --- | --- |
| Standard coal saved | Amount of coals that will be used to generate the energy |
| Waste recycling | Amount of waste that will be reused to generate the energy |

## Running Status and Plant Information

- **Running Status**

Quickly view the running status of the grid-connected meter and devices in each cabinet that EMS1000 manages. This helps you to grasp the overall operation of the entire system the moment you log in to the webpage.

- **Plant Information**

Plant information includes the address, composition, scale and time of establishment of the plant.

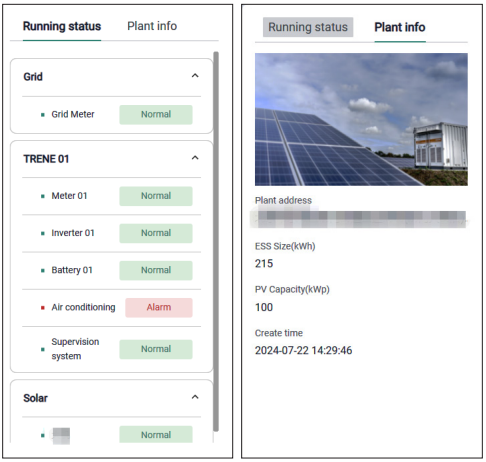



Figure 6-7 Station information and running status

Table 6-6 Station information parameter description

| Parameter | Description |
| --- | --- |
| ESS power | Maximum charging and discharging power of the battery |
| PV capacity | Maximum power output of the PV |

### Running Line Chart

View the running data of the grid power, battery power, PV power, load power and Battery SOC in line chart so that you can understand the changes in the energy of each component more easily and conveniently.

You can also hover the mouse on the line chart to view the data on a specific moment.

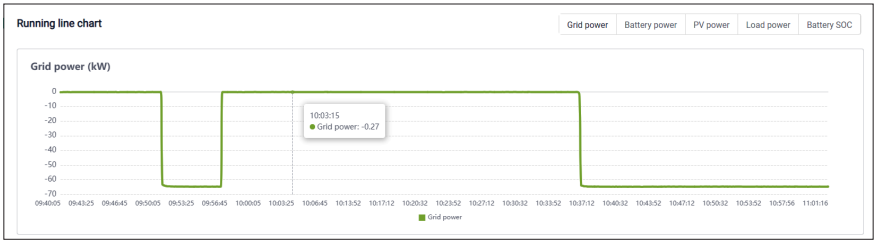



Figure 6-8 Running line

## 6.5 Device List

Devices that are connected to EMS1000 are displayed here in hierarchy. The grid-connected meter and cabinets are displayed on the first tier, and the sub devices of these cabinets are displayed on the second tier under each cabinet.

### 6.5.1 Adding Devices

Currently, EMS1000 only supports adding inverters manually on the webpage. You can add inverters through Modbus RTU or Modbus TCP.

The procedure and communication protocol of TRENE and AELIO systems are different. Inverter in the TRENE system can be indentified automatically once it is connected to EMS1000, while inverter in the AELIO system needs to be added manually.

| NOTICE! |
| --- |
| Adding device is only available for Admin account. |

**Step 1:** Select **Device list** > **+ Device addtion**.

**Step 2:** On **Add device** pop-up, select the **device type** and **COM method**, enter the required parameters, and then click **Confirm**.

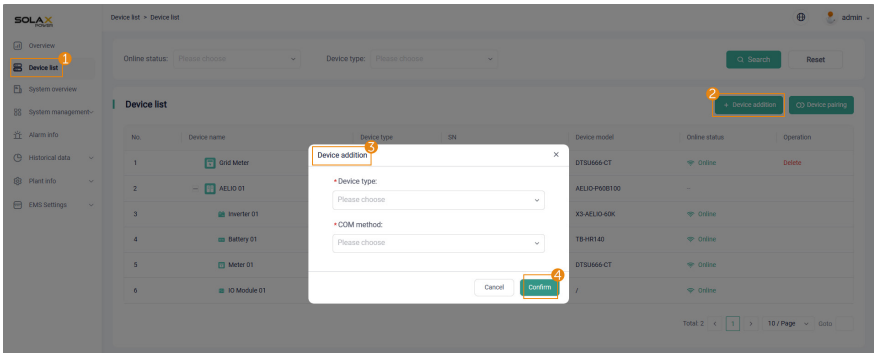



Figure 6-9 Adding devices

- Adding inverter to TRENE system through Modbus TCP

  Generally, inverters that support Modbus TCP can be automatically added to EMS1000 once they are connected to it. However, for inverters that do not support DHCP, you will have to manually enter the IP address.

  Only one inverter can be added through this communication method each time.

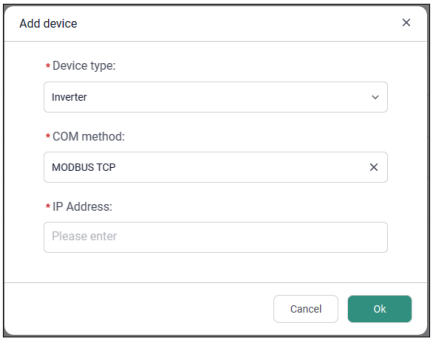



Figure 6-10 Adding through Modbus TCP

- Adding inverter to AELIO system through Modbus RTU

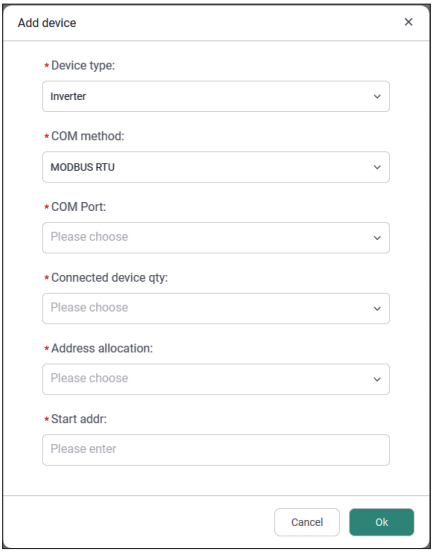



Figure 6-11 Adding through Modbus RTU

Table 6-7 Adding device parameter description

| Parameter | Value Range | Description |
|---|---|---|
| COM port | 1-8 | Number of RS485 terminal of EMS1000 that the inverter is connected to. For example, if the inverter is connected to the 8th RS485 terminal of the Device, the Serial Num is 8. |
| Connected device qty | 1-20 | Number of inverters that EMS1000 will be connected to. Up to 20 inverters can be connected. |
| Address allocation | • Manual<br>• Auto | • Auto: Select this method when the inverter supports Modbus RTU automatic address allocation. EMS1000 will automatcially asssign and recognize an RTU address for your inverter.<br>• Manual: Select this method when the inverter does not support Modbus RTU automatic address allocation. In this case, you will need to manually modify the Modbus address. |
| Start addr | / | The minimal Modbus address<br>For manual address allocation, enter the minimal address that is configured for the inverter; For auto address allocation, enter 1.. |

### 6.5.2 Pairing Devices

Device pairing is to bind the cabinet and its sub devices based on the SN. Such sub devices include inverter, battery and IO module. When one or more cabinets are connected to EMS1000, the device pairing function can automatically sort out the sub devices and display these devices under the corresponding cabinet in **Device list**.

This is ideal for use after you add, delete or modify the sub devices in the cabinet so that the Device list is updated in time.

| NOTICE! |
| --- |
| Pairing device is only available for Admin account. |

Log in to the webpage, and then select **Device list** > **Device pairing**.

The pairing results will be displayed in **Paired device** and **Unpaired device**.

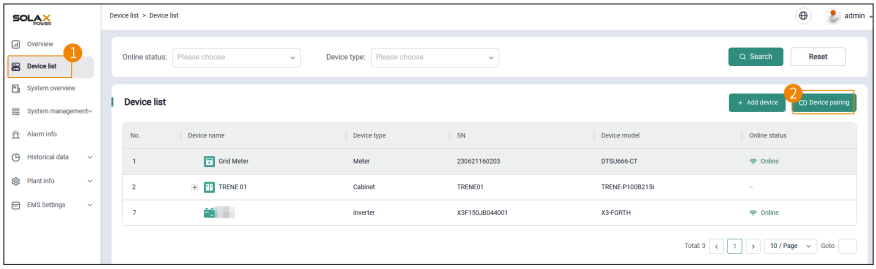



Figure 6-12 Paring device

- **Paired devices**

Cabinets and sub devices that have been successfully paired will be displayed under **Paired device**. You can view the cabinet image, name, model and SN of the inverter, battery and IO module.


Figure 6-13 Device pairing succeeded

- **Unpaired device**

Inverters, batteries and IO modules that fail to be bound to a cabinet will be displayed here along with their type, SN, associated device SN, and device model.

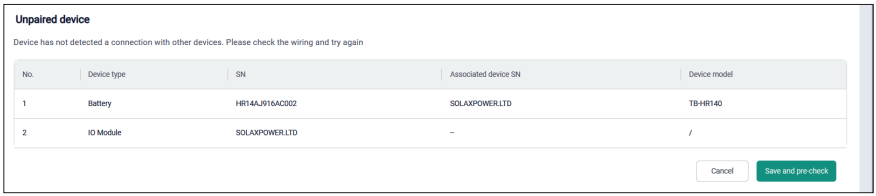



Figure 6-14 Devices failed to pair

Related operation:

- Click **Repair** under **Paired device** to pair cabinets and their devices again.
- Click **Save and pre-check** to save the current device list and update the **Device List**.

### 6.5.3 Viewing Devices

Log in to the webpage, and then click **Device list**.

The paired devices will be displayed here in hierarchy. The grid-connected meter and cabinets will be displayed under **Device list**, and you can click ⊞ and ⊟ to unfold and fold the sub devices under the cabinet.

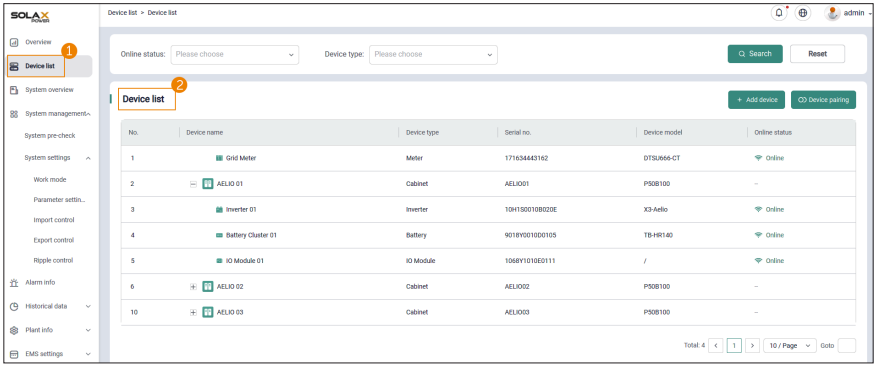



Figure 6-15 Viewing device information

Device information includes device name, device type, serial No., device model and online/offline status. You can set the number of devices to be displayed per page to 10, 20, 30, 40 and 50, and directly enter the page number to go to a defined page.

### 6.5.4 Searching for Devices

Search for devices by online/offline status and device type.

**Step 1:** Log in to the webpage, and then click **Device list.**

**Step 2:** Set the search condition, and then click **Search.**

The search results will be displayed on **Device list** below.

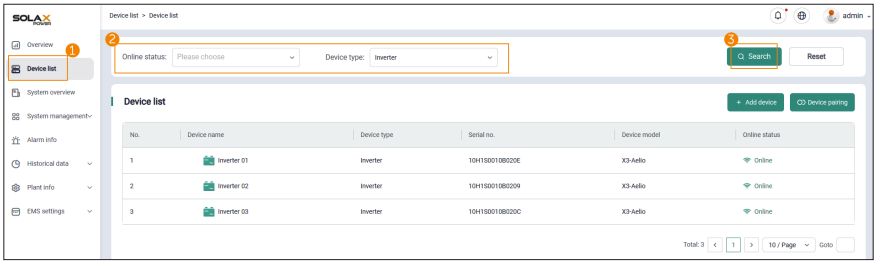



Figure 6-16 Searching for devices

Related operation:

Click **Reset** to clear all search conditions.

### 6.5.5 Deleting Devices

Devices added through RS485 terminals 1 to 6 can be deleted, such as meter, inverters and more.

| NOTICE! |
| --- |
| This function is available only for the admin account. |

**Step 1:** Log in to the webpage, and then click **Device list.**

**Step 2:** On **Device list**, click **Delete** on the line of the device that you want to delete, and then click **Delete** on the confirmation pop-up.

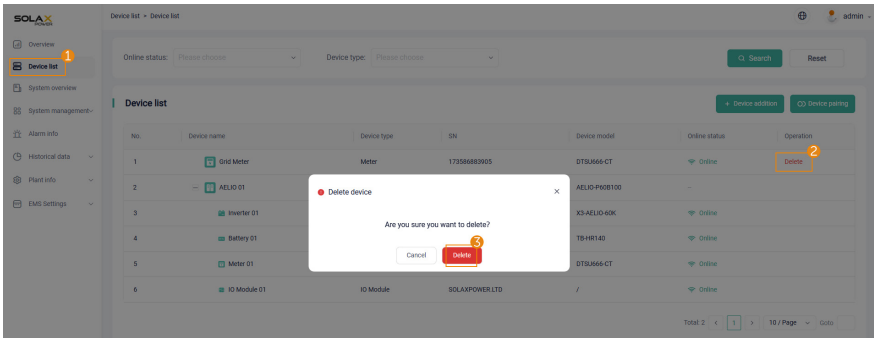



Figure 6-17 Deleting devices

## 6.6 System Overview

In this menu, devices in the system are arranged into a device tree. You can view the detailed information, historical data and other information of each device, and edit the device information.

| NOTICE! |
| --- |
| The system structure and its affiliated devices mentioned in this manual are for reference only. |

### System Architecture

EMS1000 is on the first tier, managing all devices that are connected to it. These devices are further divided into the grid side, energy storage photovoltaic or energy storage, and solar. You can click ▸ or ▾ to unfold or fold the sub devices, and enter the device name in the search box to search for a certain device.

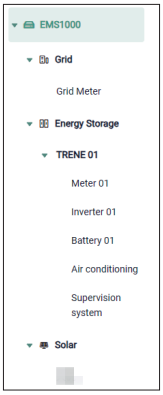



Figure 6-18 System architecture

## Refreshing Data

The system data is refreshed every 1 minute by default. You can set the data refreshing interval to 1, 3 or 5 minutes as needed, or click **Refresh** to manually update the system data at any time. The latest data refreshing time will displayed.

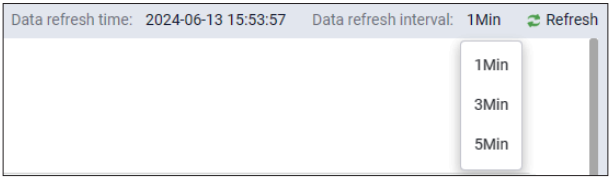



Figure 6-19 Refreshing data

### 6.6.1 EMS1000

EMS1000 is at the top of the device tree, managing all devices that are listed under it. In the menu of EMS1000, you can view the information on the Device, the system data and wiring diagram.

## Real-time Data

View the image, information and terminal status of EMS1000, and its communication status with SolaXCloud platform.

Log in to the webpage, and then select **System overview** > **EMS1000** > **Real-time data**.

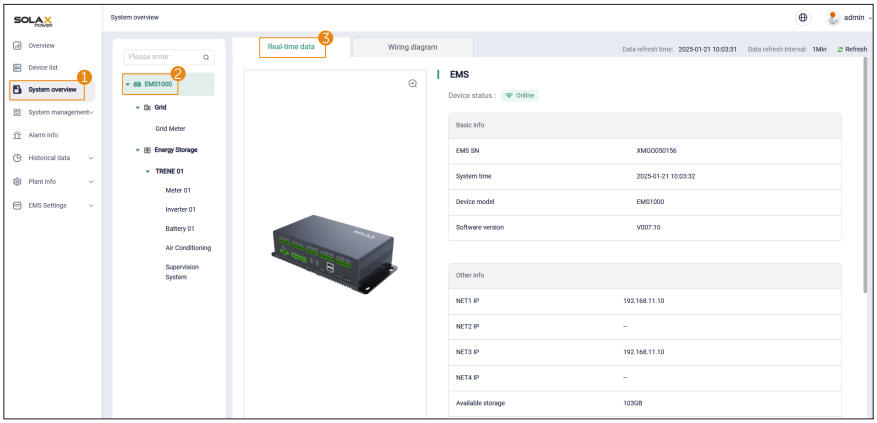



Figure 6-20 Device detailed information

Table 6-8 EMS1000 parameter description

| Parameter | Description |
|---|---|
| Device status | The connection status between EMS1000 and SolaXCloud platform<br>• Online: EMS1000 is connected to SolaXCloud platform<br>• Offline: EMS1000 is disconnected from SolaXCloud platform |
| NET IP | The connection status of the 4 NET ports of EMS1000. If the NET port is connected, the IP address will be displayed. |
| Hotspot ID | Name of EMS1000 hotspot |
| Hotspot IP Address | IP address that is used to access EMS1000 webpage when EMS1000 is connected to the computer through its hotspot. It is 192.168.10.10 by default. |
| DI status | The connection status of each DI and DO port |
| DO status | |

## System Architecture

View the core power data of the system, and the system wiring diagram involving the grid-connected meter, cabinet, external inverter and load, and their power consumption data.

Log in to the webpage, and then select **System overview** > **EMS1000** > **Wiring diagram**.

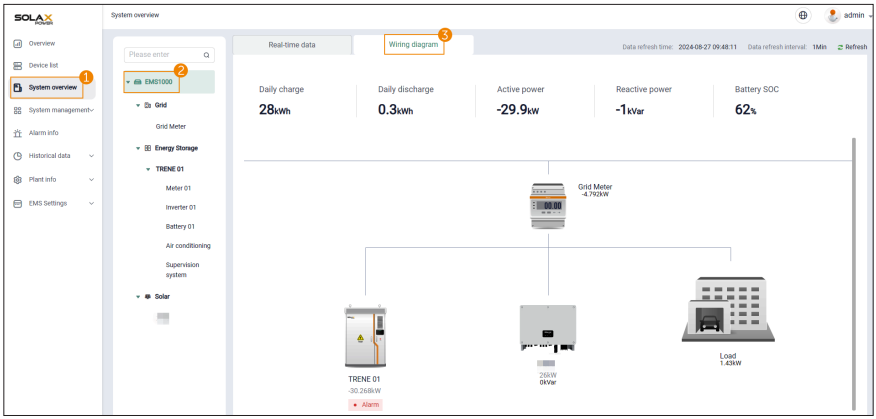



Figure 6-21 System wiring diagram

Table 6-9 System architecture description

| Parameter | Description |
|---|---|
| Daily charge | Amount of power that has been charged into the battery on the day |
| Daily discharge | Amount of power that the battery has discharged on the day |
| Active power | Total amount of output active power from the system |
| Reactive power | Total amount of output reactive power from the system |
| Battery SOC | Battery SOC in real time |

## Viewing Cabinet Information

You can also click the cabinet image to view more details on the it, including its sub devices and related device data.

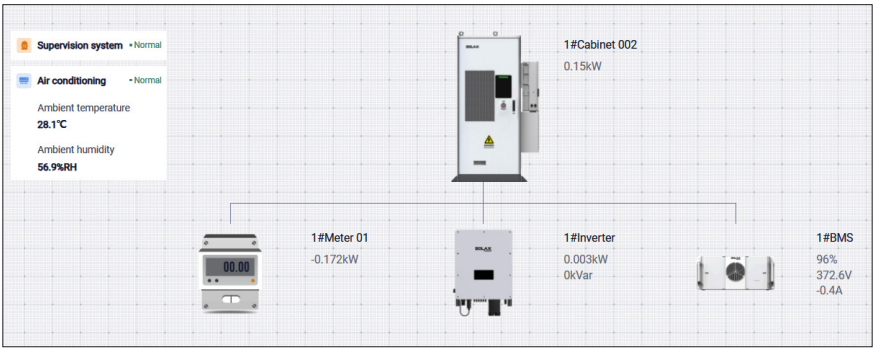



Figure 6-22 Cabinet architecture

Table 6-10 Cabinet information description

| Parameter | Description |
|---|---|
| Supervision system | Operation status of the supervision system inside the cabinet |
| Air Conditioning | Operation status of the air conditioner, and the temperature and relative humidity data inside the cabinet |
| Cabinet | Displays the output power of the inverter in the cabinet |
| Inverter | Displays the active and reactive power of the inverter |
| BMS | Displays the battery SOC, battery voltage and current |

## Viewing Battery Information

On the information page of a single cabinet, you can continue to click the BMS image to view key cell information on the battery cluster. This helps you keep the battery status in control for the long-term stable operation of the system.

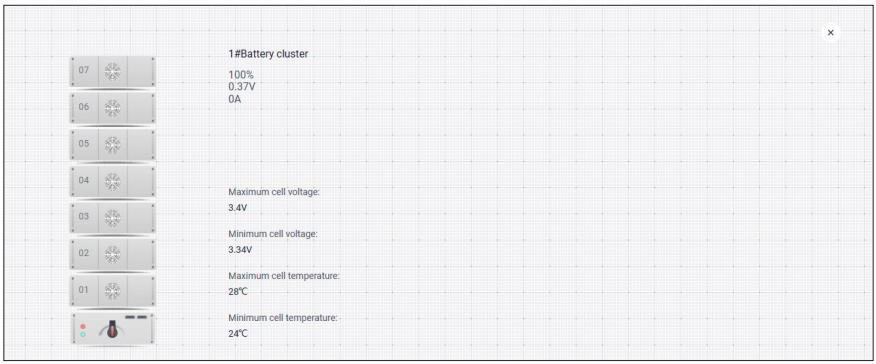



Figure 6-23 Viewing battery cluster information

Table 6-11 Battery cluster parameter description

| Item | Description |
|---|---|
| Maximum cell voltage | The highest cell voltage among all cells of the battery packs |
| Minimum cell voltage | The lowest cell voltage among all cells of the battery packs |
| Maximum cell temperature | The highest cell temperature among all cells of the battery packs |
| Minimum cell temperature | The lowest cell temperature among all cells of the battery packs |

### 6.6.2 Grid Meter

The grid meter refers to the gird-connected metering device that is connected to EMS1000 for monitoring the power flow of the system. Currently, three types of metering devices are supported: DTSU666-CT meter, Wi-BR DTSU666-CT meter, and CT.

## Viewing Real-time Data

View the running status and basic information of the metering device, and the real-time power-related data of the entire system that the device detects.

Log in to the webpage, and then select **System overview** > **Grid** > **Grid meter** > **Real-time data**.

- DTSU666-CT

View the online/offline status, SN and model of the meter, and the system power data collected by the meter, including the energy imported from and exporting to the grid, and other data on each phase.

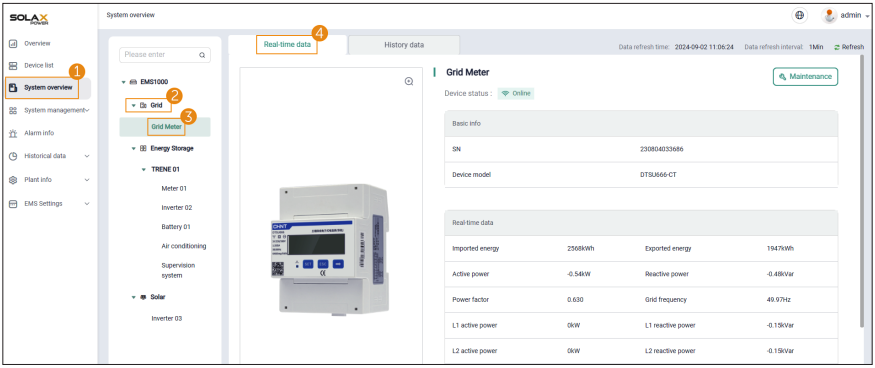



Figure 6-24 Viewing real-time data of DTSU666-CT

- Wi-BR DTSU666-CT

View the SN and model of the meter, the SN of the AP and STA models of Wi-BR, and the system power data collected by the meter.

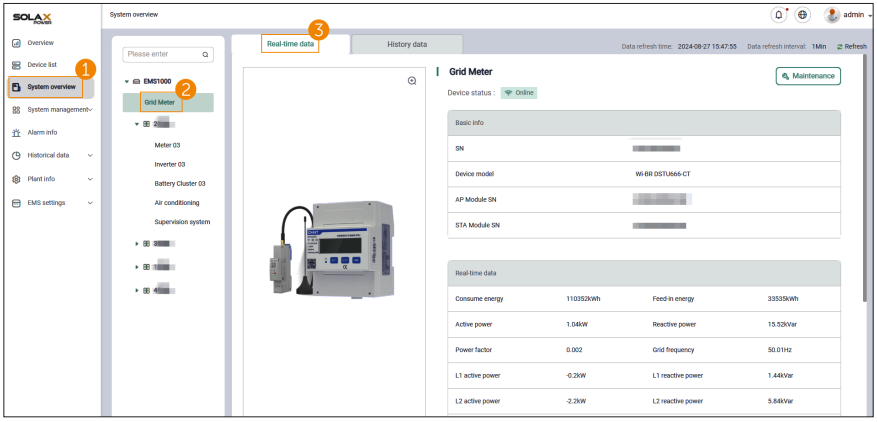



Figure 6-25 Viewing real-time data of Wi-BR DTSU666-CT

- CT

View the online/offline status of CT and the system power data collected by the CT.

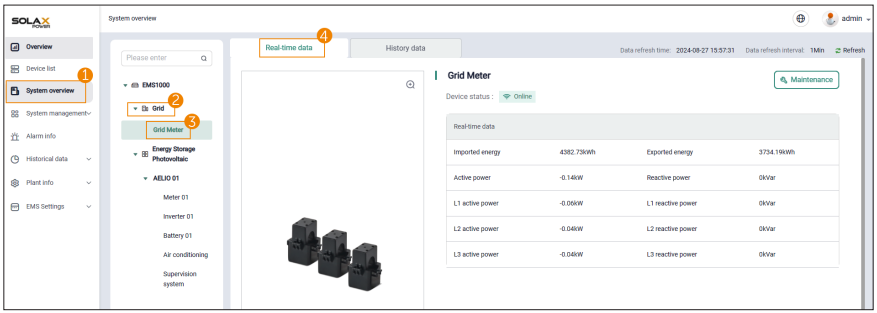



Figure 6-26 Viewing real-time data of CT

You can also click **Maintenance** on the upper-right corner to view more details on the gird-connected metering device.

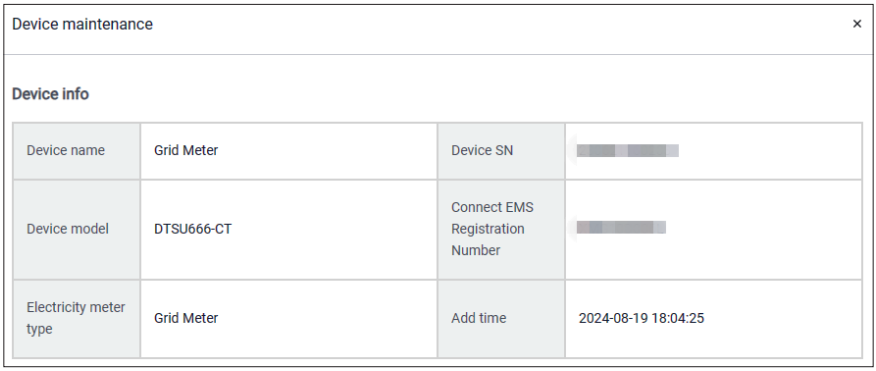



Figure 6-27 Meter information on the Maintenance page

Table 6-12 Meter information on the Maintenance page

| Data Type | Description | Remarks |
|---|---|---|
| Device SN | SN of the meter | Available only when the meter type is DTSU666-CT or Wi-BR DTSU666-CT |
| Device model | Model of the meter | |
| Connect EMS registration number | Registration No. of the EMS1000 that the meter is connected to | / |
| Electricity meter type | Grid-tied meter | / |
| Add time | Time that the meter establishes communication with EMS1000 | / |

## Maintaining Grid Meter

You can edit the name of the meter, perform Meter/CT check and enable communication loss shutdown if needed.

Log in to the webpage, and then select **System overview** > **Grid** > **Grid meter** > **Real-time data** > **Maintenance**.

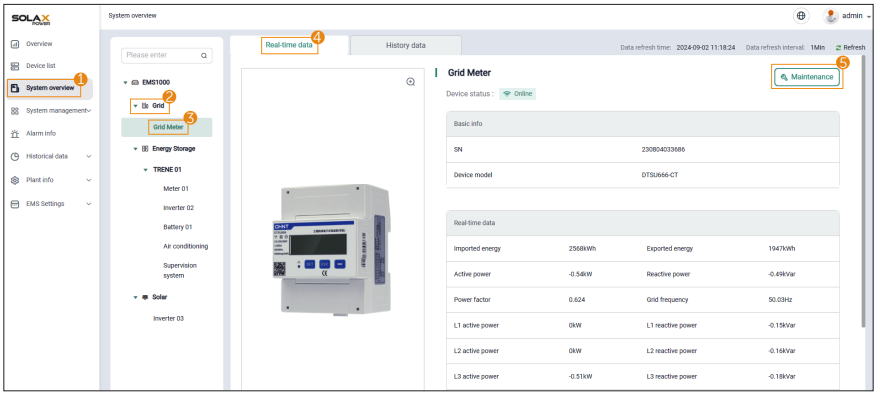



Figure 6-28 Maintaining the grid meter

- Editing the Device Name

Under **Device operation**, click **Edit device**, enter a new name on the pop-up for the meter, and then click **Confirm**.


Figure 6-29 Editing the meter name

- Performing Meter/CT Check

This is for checking whether the meter/CT on the grid side has been correctly connected. If not, there will be a notice for the specific problem so that you can adjust the meter/CT connection in time. The whole checking process takes around 2 minute.

| NOTICE! |
| --- |
| Currently, Meter/CT check function is only available in AELIO system. |

Under **Device operation**, click **Meter/CT check**, and then click **Check** to start the process.

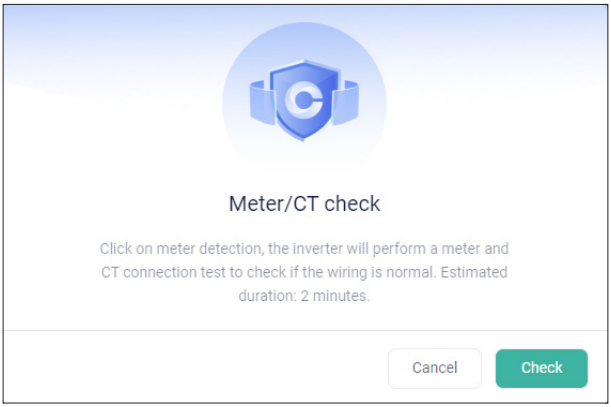



Figure 6-30 Performing Meter/CT check

- **Reverse Setting**

Enable the function when the system power data is reverse to the actual power flow. This feature allows the meter to automatically rectify the system power data without need for physcial rewiring. It is disabled by default.

| NOTICE! |
| --- |
| This function is only available for meter models. |

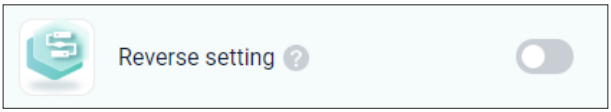



Figure 6-31 Enabling reverse setting

- **Communication Shutdown Loss**

Enable this function to automatically shut down the system when EMS1000 loses communication with the grid meter. This is to ensure that the system power flow is kept in control, especially in the on-grid mode. The function is enabled by default.

If you manually disable it, the system can remain normal operation, but certain functions might be affected, such as zero output, demand control, data statistics and more.

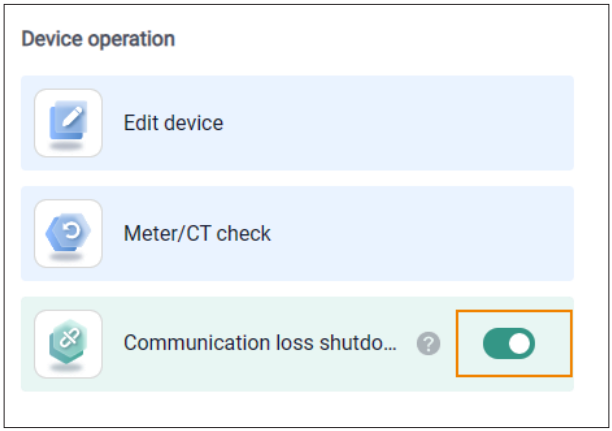



Figure 6-32 Enabling communication loss shutdown

- Wi-BR Power Control

| NOTICE! |
| --- |
| This function is available only when Wi-BR DTSU666-CT is connected as the meter. |

Adjust Wi-BR to a low or high power rate mode to suit different scenarios. Higher power rate can provide enhanced signal strength and longer communication distance.

**Step 1:** Under **Device operation**, click **Wi-BR power control**.

**Step 2:** Select **High power mode** or **Low power mode** from the drop-down list, and then click **Ok**.

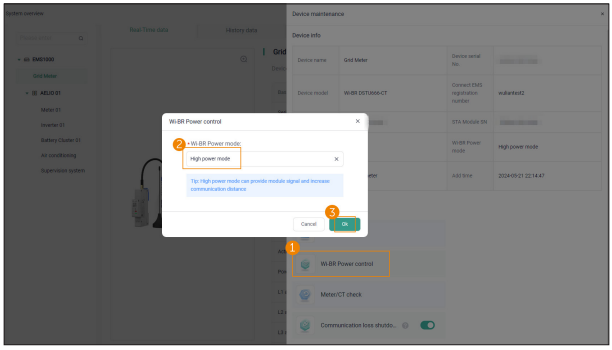



Figure 6-33 Setting power mode for Wi-BR

## Viewing History Data

You can search for multiple types of data that the meter collected, including the voltage, current, and active power of each phase, and the total active, reactive and apparent power of the three phases, gird frequency, and the imported and exporting power of the entire system. The search results will be displayed in the line chart.

**Step 1:** Log in to the webpage, and then select **System overview** > **Grid** > **Grid meter** > **History data**.

**Step 2:** Set the **Time**, select the **Indicators**, and then click **Check**.

Up to 4 search indicators can be selected at one time, and the results will be displayed in lines of different colors in the line chart.


Figure 6-34 Searching for history data

## 6.6.3 Cabinet

NOTICE!

The cabinet system name might be Energy Storage or Energy Storage Photovoltaic depending on the inverter type. For AELIO system, the cabinet system name is Energy Storage Photovoltaic; For TRENE system, the cabinet system name is Energy Storage.

## Viewing Cabinet Information

View the running status and basic information of the cabinet, information on the embedded IO module, and real-time data of the battery system.

Log in to the webpage, and then select **System overview** > > **Energy Storage Photovoltaic/ Energy Storage** > **Cabinet**.

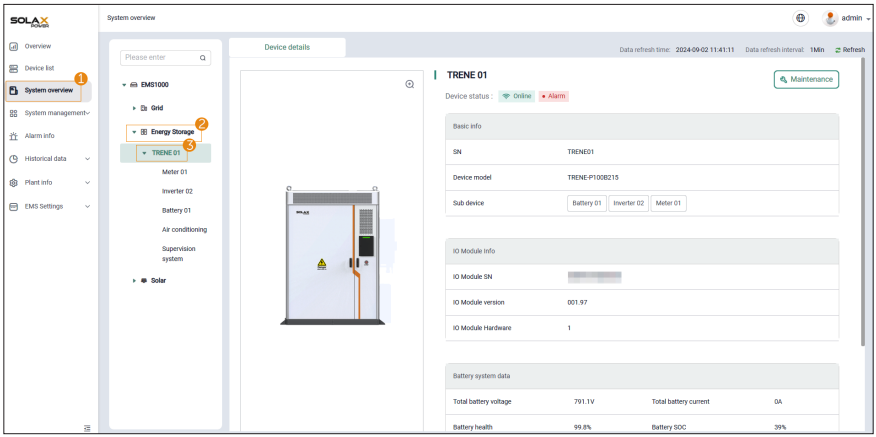



Figure 6-35 Cabinet information

Table 6-13 Real-time data description

| Data Type | Parameter | Description |
|---|---|---|
| Device status | / | Displays the online/offline status of the battery, and the operation status of devices in the cabinet. |
| Basic info | Sub device | Devices that are included in the cabinet for management |
| Battery system data | Total battery voltage | Total voltage of the battery cluster that is connected to cabinet |
| | Total battery current | Total voltage of the battery cluster that is connected to cabinet |
| Battery system data | Battery health | Health status of the battery cluster that is connected to cabinet |
| | Battery SOC | SOC of the battery cluster at the time |
| | Chargeable Capacity | Amount of power that can be charged into the battery cluster before it is fully-loaded |
| | Remaining Capacity | Amount of power that the battery cluster can discharge |
| | Total charge | Total amount of power that has been charged into the battery cluster by the time |
| | Total discharge | Total amount of power that the battery cluster has discharged by the time |

| Data Type | Parameter | Description |
|---|---|---|
| Battery system data | Cycle time | Number of times that the battery cluster has been fully charged and discharged. A full charge and discharge make a cycle. |
| | Insulation Resistance | Equivalent impedance between the battery cluster and PE point of the device enclosure |

You can also click **Maintenance** on the upper-right corner to view more information on the cabinet.

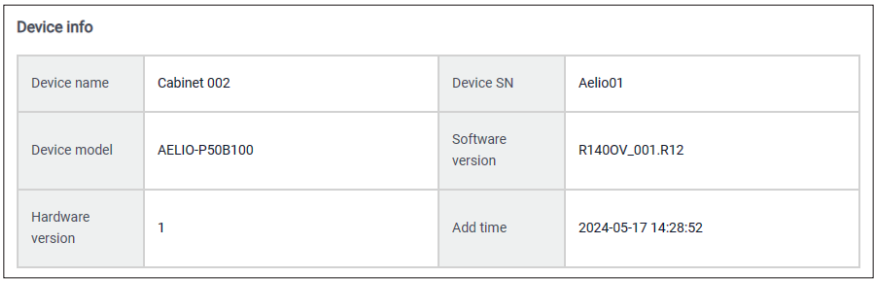



Figure 6-36 Cabinet information on the Maintenance page

Table 6-14 Meter information on the Maintenance page

| Data Type | Description |
|---|---|
| Add time | Time that the sub devices in the cabinet complete pairing |

## Maintaining Cabinet

Edit the cabinet name and upgrade the firmware of the IO module in the cabinet.

Log in to the webpage, and then select **System overview** > **Energy Storage Photovoltaic/ Energy Storage** > **Cabinet** > **Device details**.

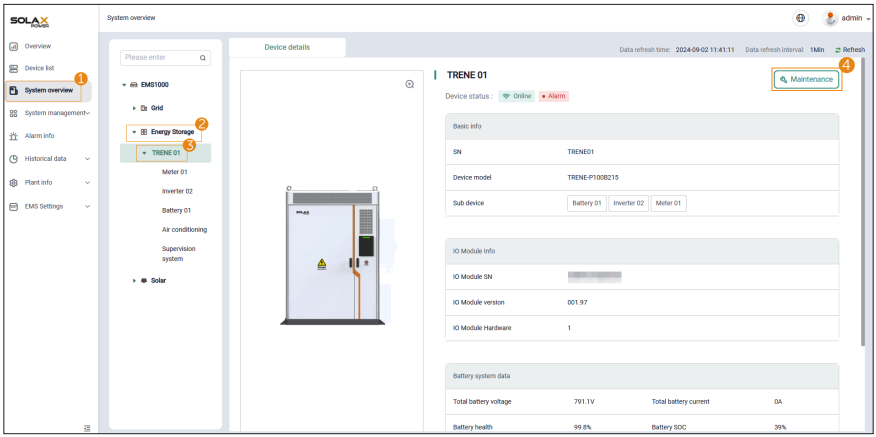



Figure 6-37 Maintaining the cabinet

- Editing the Cabinet Name

Click **Maintenance** > **Edit device**, enter a new name for the cabinet, and then click **Confirm**.


Figure 6-38 Editing cabinet name

- Upgrading the IO Firmware

| NOTICE! |
| --- |
| The IO firmware upgrade function is only available for the admin account. |

Click **Maintenance** > **Firmware upgrade**, click **Choose file**, import the update firmware file, and then click **Upgrade**.

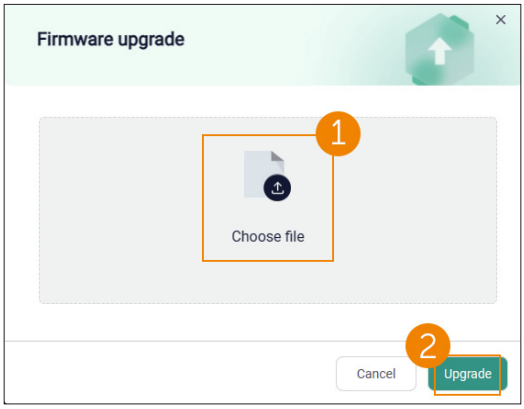



Figure 6-39 Upgrading IO firmware

### 6.6.4 Cabinet Meter

View the real-time data and historical data of the cabinet system collected by the cabinet meter.

#### Viewing Real-time Data

View the online/offline status, SN and model of the meter, and the real-time power data of the cabinet system.

Log in to the webpage, and then select **System overview** > **Energy Storage Photovoltaic/ Energy Storage** > **Cabinet** > **Cabinet meter > Real-time data**.

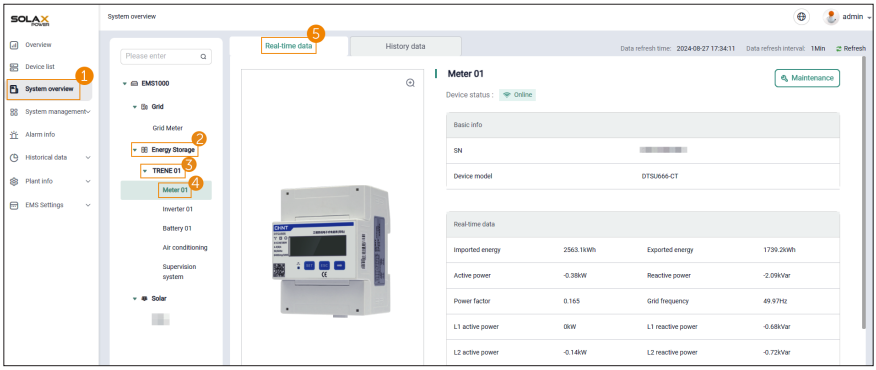



Figure 6-40 Detailed information of the cabinet meter

Table 6-15 Real-time data description

| Parameter | Description |
|---|---|
| Imported energy | Amount of power that the system in the cabinet imports from the grid |
| Exported energy | Amount of power that the system in the cabinet exports to the grid |
| Reactive Power | Total amount of reactive power that the system in the cabinet generates |
| Active Power | Total amount of active power that the system in the cabinet generates |

You can also click **Maintenance** on the upper-right corner to view more information on the cabinet.

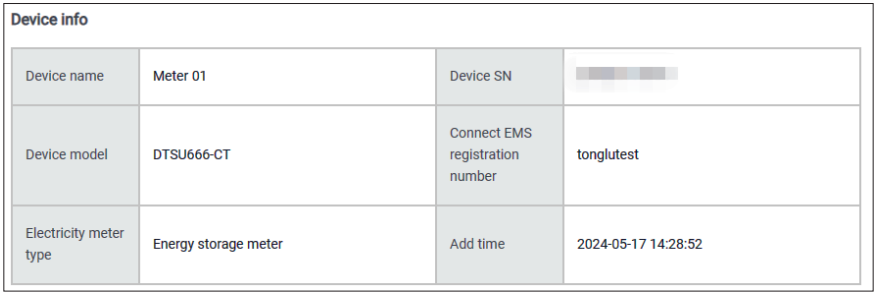



Figure 6-41 Cabinet meter information on Maintenance page

Table 6-16 Meter information on the Maintenance page

| Data Type | Description |
|---|---|
| Electricity meter type | Energy storage meter |
| Connect EMS registration number | Registration No. of the EMS1000 that the meter is connected to |
| Add time | Time that the meter establishes communication with EMS1000 |

## Maintaining the Cabinet Meter

- Editing the Meter Name

**Step 1:** Log in to the webpage, and then select **System overview** > **Energy Storage Photovoltaic/Energy Storage** > **Cabinet** > **Cabinet meter** > **Real-time data.**

**Step 2:** Click **Maintenance**, click **Edit device**, enter a new name for the meter, and then click **Confirm**.


Figure 6-42 Editing cabinet meter name

- Reverse Setting

Enable the function when the system power data is reverse to the actual power flow. This feature allows the meter to automatically correct the system power data without need for physcial rewiring.It is disabled by default.

| NOTICE! |
| --- |
| This function is only available for meter models. |

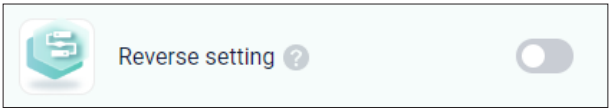



Figure 6-43 Enabling reverse setting

## Viewing History Data

You can search for multiple types of data that the meter collected, including the voltage, current, and active power of each phase, total active, reactive and apparent power of the three phases, gird frequency, and import and export power of the entire system. The search results will be displayed in the line chart.

**Step 1:** Log in to the webpage, and then select **System overview** > > **Energy Storage Photovoltaic/Energy Storage** > **Cabinet** > **Cabinet meter** > **History data**.

**Step 2:** Set the **Time**, select the **Indicators**, and then click **Check**.

Up to 4 search indicators can be selected at one time, and the results will be displayed in lines of different colors in the line chart.

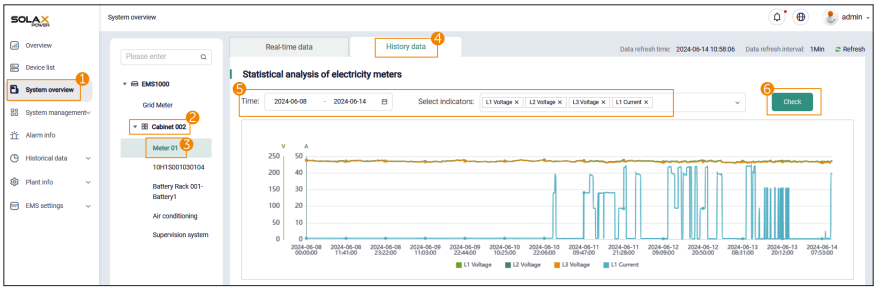



Figure 6-44 Searching for history data

## 6.6.5 Inverter

View the information, real-time data and historical data of the inverter.

### Viewing Real-time Data

View the working status of the inverter, basic information on the inverter, and the related power data of the PV system.

Log in to the webpage, and then select **System overview** > **Energy Storage Photovoltaic/ Energy Storage > Cabinet** > **Inverter > Real-time data**.

**NOTICE!**

The **Real-time data** page of the inverter might vary depending on the model of the inverter. X3-AELIO, X3-TRENE-100KI and X3-TRENE-100KI models are used for example to demonstrate the different page layout.

- X3-AELIO

You can view the online/offline status, system switch on/off status, and working condition of the inverter. The real-time power data of the system is divided into multiple dimensions, such as PV data, AC data, EPS data, battery data and more. You can click the data type to view specific statistics.

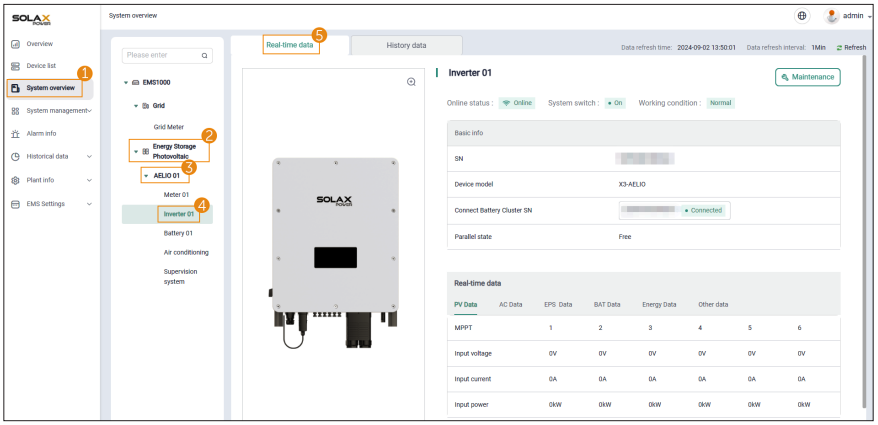



Figure 6-45 Viewing real-time data of the X3-AELIO inverter

Table 6-17 Inverter data description

| Data Type | Parameter | Description |
|---|---|---|
| Working status | Online status | Communication status of the inverter and EMS1000 |
| | System switch | On/off status of the inverter system switch |
| | Working condition | Whether the inverter is running normally |
| Basic info | Connect Battery cluster SN | SN of the battery cluster that the inverter is connected to |
| | Parallel state | Whether the inverter is connected to other inverters or not; if yes, the role of the inverter in the connection will be displayed, which can be master or slave. If not, the inverter is free. |
| Real-time data | PV data | The input voltage, current and power of each MPPT |
| | AC data | The power data from the grid into the inverter, such as total power, voltage, current and more of each phase |
| | EPS data | The power data of the inverter EPS side, such as the different types of power, voltage, frequency of each phase |
| | BAT data | The voltage, current and power of each battery cluster that has been connected to the inverter |
| | Energy data | Daily and total inverter input and output, and daily and total yield power of the inverter and EPS |
| | Other data | Includes inverter radiator temperature, internal temperature and bus voltage |

You can also click **Maintenance** on the upper-right corner to view more details on the inverter.

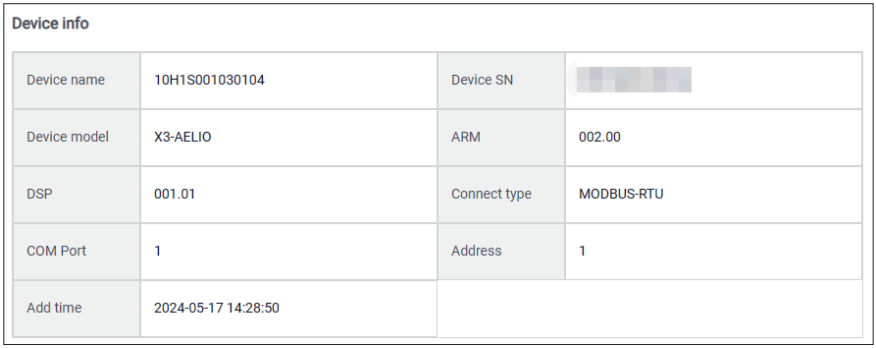



Figure 6-46 X3-AELIO information on Maintenance page

Table 6-18 X3-AELIO information on the Maintenance page

| Data Type | Description |
|---|---|
| Connect type | Communication protocol through which the inverter is connected to EMS1000: MODBUS-RTU. |
| COM port | No. of the COM port |
| Address | Modbus address of the inverter for communication |
| Add time | Time that the inverter establishes communication with EMS1000 |

- X3-TRENE-100KI

You can view the online/offline and operation status of the inveter, its basic information and related power data.

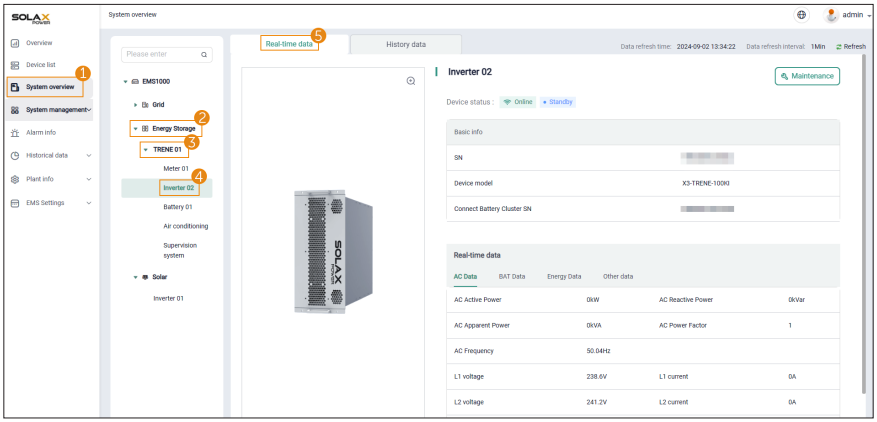



Figure 6-47 Viewing real-time data of X3-TRENE-100KI

Table 6-19 Inverter data description

| Data Type | Parameter | Description |
|---|---|---|
| Status | Device status | Includes the online/offline status and operation status of the inverter |
| Basic Info | Connect battery cluster SN | SN of the battery cluster |
| Real-time data | AC active power | Active power from the inverter AC terminal |
| | AC reactive power | Reactive power from the inverter AC terminal |
| | AC apparent power | Apparent power from the inverter AC terminal |
| | AC frequency | Frequency of the inverter AC terminal |
| | Module temperature | Temperature of the inverter |
| | DC voltage | Voltage of the inverter DC terminal |
| | DC current | Current of the inverter DC terminal |
| | DC power | Power from the inverter DC terminal |
| | Charge today | Amount of power that has been charged into the battery on the day |

| Data Type | Parameter | Description |
|---|---|---|
| Real-time data | Discharge today | Amount of power that the battery cluster has discharged on the day |
| | Total charge | Total amount of power that has been charged into the battery cluster |
| | Total discharge | Total amount of power that the battery cluster has discharged |

You can also click **Maintenance** on the upper-right corner to view more details on the inverter.

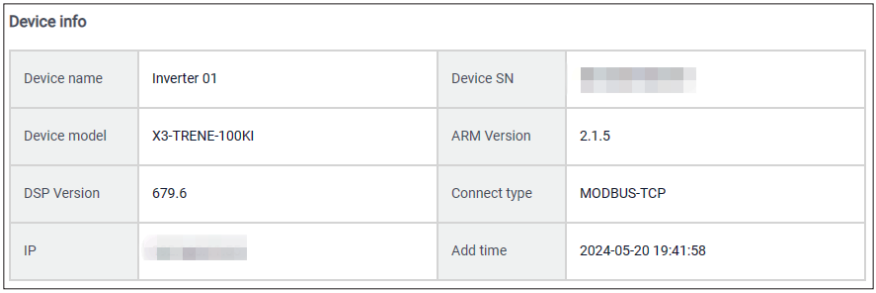



Figure 6-48 X3-TRENE-100KI information on Maintenance page

Table 6-20 X3-TRENE-100KI information on the Maintenance page

| Data Type | Description |
|---|---|
| Connect type | Communication protocol through which the inverter is connected to EMS1000: MODBUS-TCP. |
| IP | IP address of the inverter |
| Add time | Time that the inverter establishes communication with EMS1000 |

- X3-TRENE-100K

View the online/offline and operation status of the inveter, its basic information and related power data.

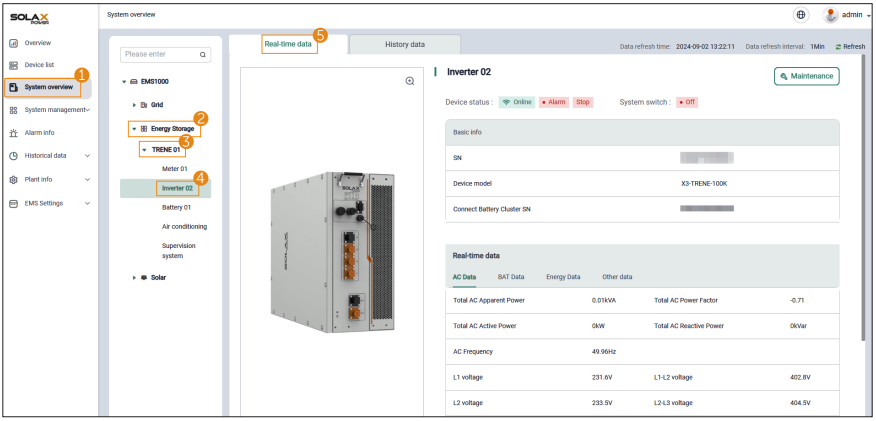



Figure 6-49 Viewing real-time data of X3-TRENE-100K

Table 6-21 Inverter data description

| Data Type | Parameter | Description |
|---|---|---|
| Status | Device status | Includes the online/offline status and operation status of the inverter |
| | System switch | On/off status of the inverter system switch |
| Basic Info | Connect battery cluster SN | SN of the battery cluster |
| Real-time data | AC data | Displays the data from the grid into the inverter, such as apparent power, active and reactive power, and voltage, current of each phase |
| | BAT data | Includes inverter BAT voltage, current and power |
| | Energy data | Includes daily AC active power, total discharge, daily AC charge and total charge |
| | Other data | Includes inverter internal temperature, balance bridge temperature, inverter module temperature, fa speed and more. |

You can also click **Maintenance** on the upper-right corner to view more details on the inverter.

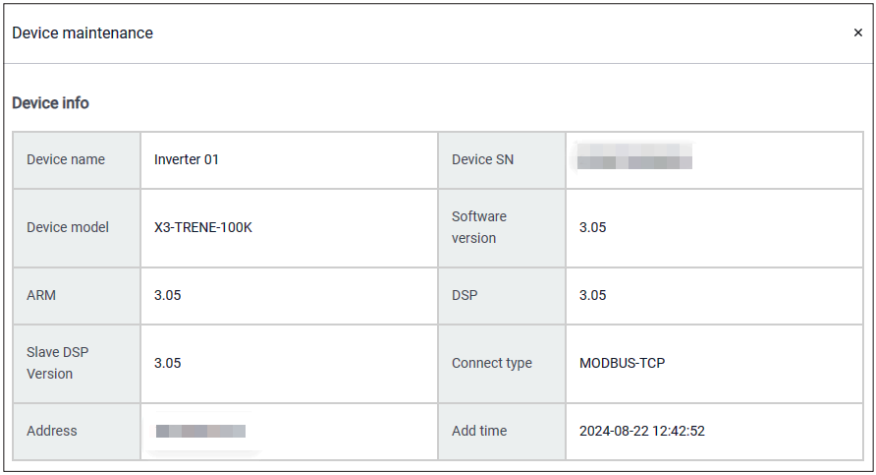



Figure 6-50 X3-TRENE-100K information on Maintenance page

Table 6-22 X3-TRENE-100K information on the Maintenance page

| Data Type | Description |
|---|---|
| Connect type | Communication protocol through which the inverter is connected to EMS1000: MODBUS-TCP. |
| IP | IP address of the inverter |
| Add time | Time that the inverter establishes communication with EMS1000 |

## Maintaining the Inverter

Edit the inverter name and upgrade the firmware for it.

Log in to the webpage, and then select **System overview** > **Energy Storage Photovoltaic/ Energy Storage** > **Cabinet** > **Inverter** > **Real-time data > Maintenance**.

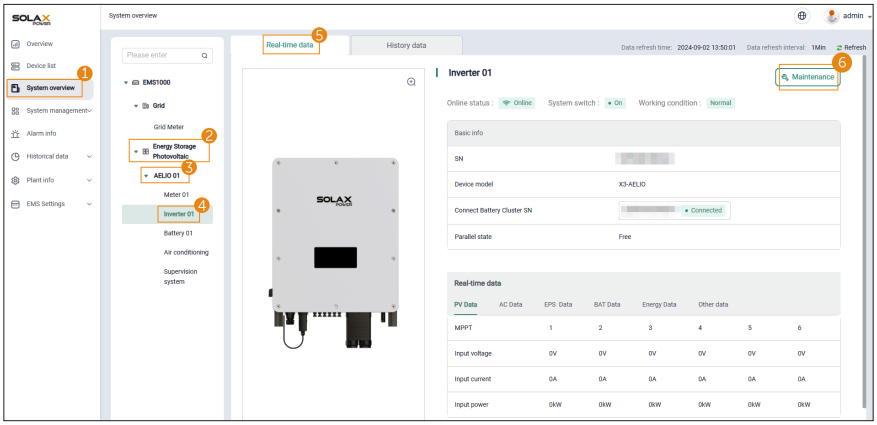



Figure 6-52 Maintaining the inverter

- Editing the Inverter Name

On the **Device maintenance** page, click **Edit device**, enter a new name for the inverter, and then click **Confirm**.

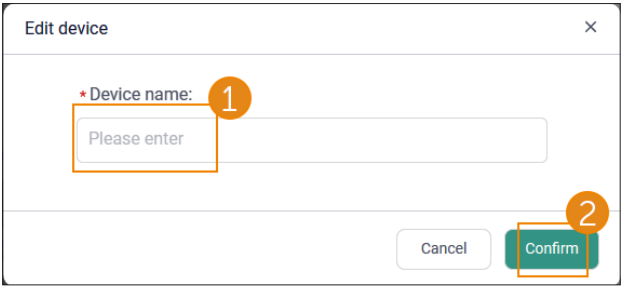



Figure 6-53 Editing the inverter name

- Upgrading the Inverter Firmware

| NOTICE! |
| --- |
| • The inverter firmware upgrade function is only available for the admin account.<br>• For X3-TRENE-100K, only one type of update file is supported. |

**Step 1:** On **Device maintenance** page, click **Firmware upgrade**.

**Step 2:** (Optional) On the **Firmware Upgrade** pop-up, select **ARM** or **DSP** for **Upgrade module**.

**Step 3:** Click **Choose file** to import the update firmware file, and then click **Upgrade**.

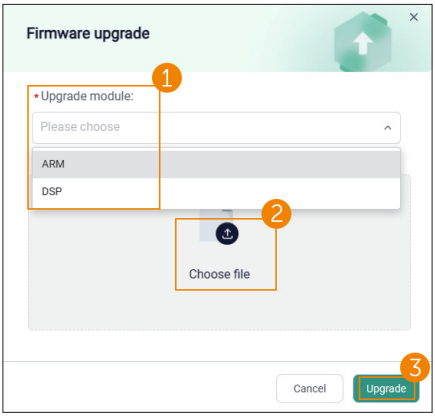



Figure 6-54 Upgrading the inverter firmware

- Turning on or off the Inverter

Select **Maintenance > System ON/System OFF**, and then click **Ok** on the confirmation pop-up.

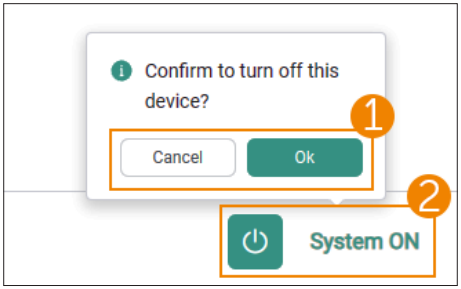



Figure 6-55 Turning on or off the inverter

## Viewing History Data

View one or more types of inverter-related power data in the line chart.

- Inverter Analysis

You can view multiple types of data of the inverter, such as the voltage and current of each phase, frequency, and radiator temperature. The search results are displayed in line chart.

**Step 1:** Log in to the webpage, and then select **System overview** > **Energy Storage Photovoltaic/Energy Storage** > **Cabinet** > **Inverter** > **History data**.

**Step 2:** In the **Inverter analysis** section, Set the search duration, select the search indicators from the drop-down list, and then click **Check**.

The maximum time interval is 7 days, and up to 4 items can be selected at one time. The search results will be displayed in lines of different colors in the line chart.


Figure 6-56 Viewing inverter statistics

- Coulometric Analysis

The charging and discharging data of the inverter can be displayed in bar chart by day, month and year.

**Step 1:** Select **System Overview** > **Inverter** > **History Data**.

**Step 2:** In the **Coulometric analysis** section, select **Day**, **Month** or **Year**, set the specific day, month or year, and then click **Check**.


Figure 6-57 Viewing coulometric data

You can also hover the mouse on any time node in the bar chart to view the specific charging, discharging and yielding data.

### 6.6.6 Battery

View information on the battery cluster, battery packs and battery cells.

## Viewing Real-time Data

View the status, basic information and real-time data of the battery cluster, and key data on the battery packs and cells.

Log in to the webpage, and then select **System overview** > **Energy Storage Photovoltaic/ Energy Storage** > **Cabinet** > **Battery** > **Real-time data**.

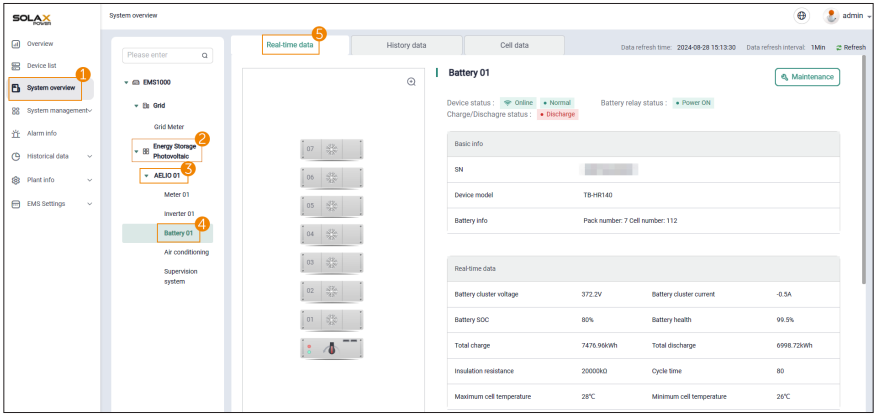



Figure 6-58 Viewing real-time data of the battery cluster

Table 6-23 Battery real-time data description

| Data Type | Parameter | Description |
|---|---|---|
| Status | Device status | Includes the online/offline status and operation status of the inverter |
| | Battery relay status | Whether the battery cluster is powered on or off |
| | Charge/Discharge status | Whether the battery cluster is charging, discharging or idle |
| Basic info | Battery info | Displays the number of the battery packs and cells of the battery cluster |
| Real-time data | Total charge | Total amount of power that has been charged into the battery cluster |
| Real-time data | Total discharge | Total amount of power that the battery cluster has discharged |

There is a list of battery pack information, in which you can view the key parameters of each battery pack of the battery cluster. You can draw the bar horizontally on the bottom of the list to view different information.

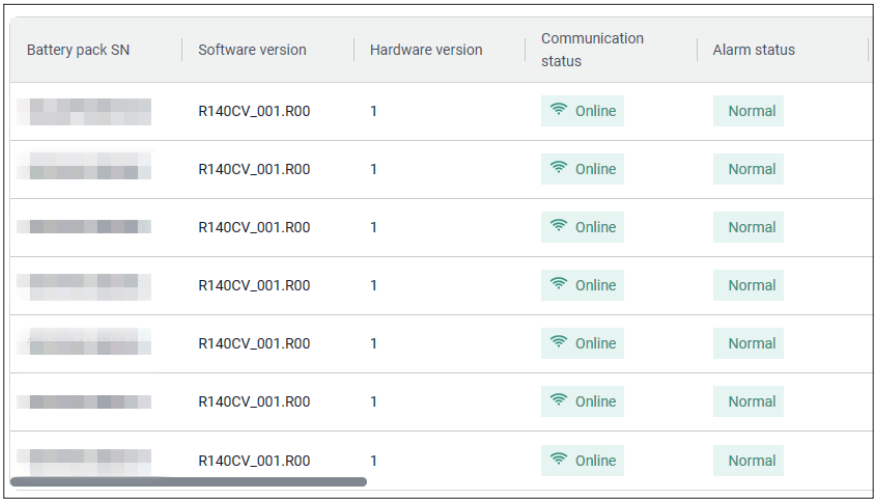



Figure 6-59 Viewing real-time data of battery packs

Table 6-24 Battery pack information description

| Parameter | Description |
|---|---|
| Battery Pack SN | SN of the battery pack in the battery cluster |
| Communication Status | Communication status between the battery pack and battery cluster |
| Maximum cell temperature | Maximum cell temperature in the battery pack |
| Minimum cell temperature | Minimum cell temperature in the battery pack |
| Anode temperature | The anode temperature of the battery pack |
| Cathode temperature | The cathode temperature of the battery pack |

You can also click **Maintenance** on the upper-right corner to view more details on the battery.

**Device info**

| | | | |
|---|---|---|---|
| Device name | Battery 01 | Device SN | 20D8YOA0000001 |
| Device model | TB-HR140 | HVU SN | SOLAXPOWER.LTD |
| Battery software version | 002.01 | Battery hardware version | 0 |
| HvU Software Version | 001.00 | HvU Hardware Version | 0 |
| Add time | 2024-07-31 17:03:07 | | |

Figure 6-60 Battery information on the Maintenance page

Table 6-25 Battery information on the Maintenance page

| Parameter | Description |
|---|---|
| Add time | Time that the battery establishes communication with EMS1000 |

## Maintaining the Battery

Edit the battery name and upgrade the firmware of the battery cluster.

Log in to the webpage, and then select **System overview** > **Energy Storage Photovoltaic/ Energy Storage** > **Cabinet** > **Battery** > **Real-time data**.

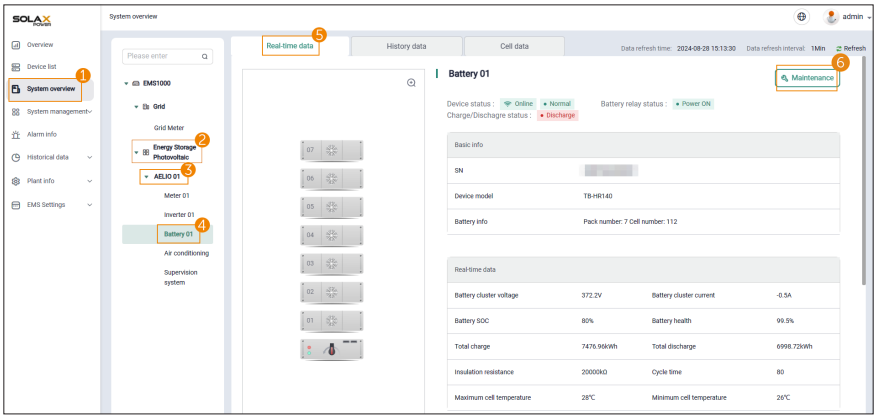



Figure 6-61 Maintaining the battery

- **Editing the Battery Name**

Click **Maintenance** > **Edit device**, enter a new name for the cabinet, and then click **Confirm**.


Figure 6-62 Editing the battery name

- **Upgrading the Battery Firmware**

| NOTICE! |
| --- |
| The battery firmware upgrade function is only available for the admin account. |

Click **Maintenance** > **Firmware upgrade**, click **Choose file**, import the update firmware file, and then click **Upgrade**.

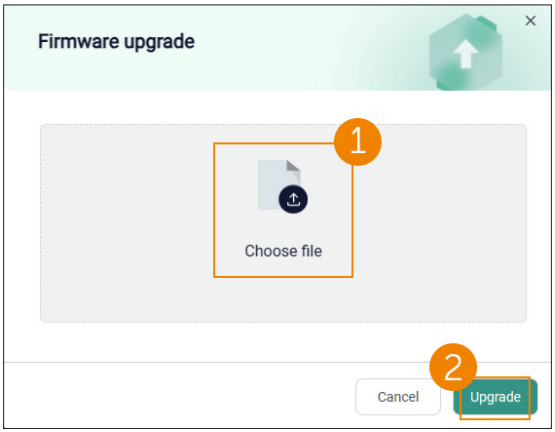



Figure 6-63 Upgrading the battery firmware

## Viewing History Data

View information on the battery cluster such as the voltage, current, SOC and more.

**Step 1:** Log in to the webpage, and then select **System overview** > **Energy Storage**

**Photovoltaic/Energy Storage** > **Cabinet** > **Battery** > **History Data**.

**Step 2:** Set the **Time**, select the **Indicators**, and then click **Check**.

The maximum time interval is 7 days, and up to 4 search indicators can be selected at one time. The search results will be displayed in lines of different colors in the line chart.

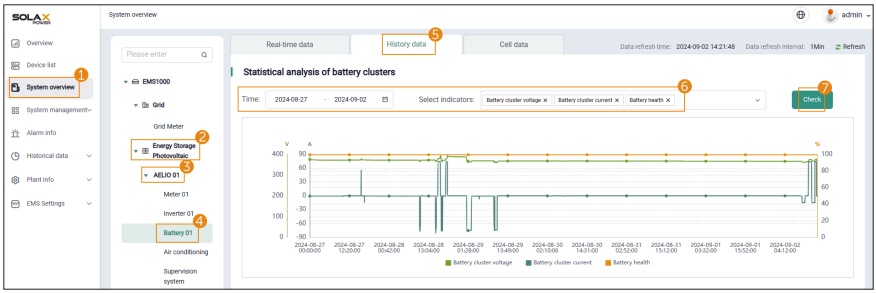



Figure 6-64 Searching for the battery history data

## Viewing Cell Data

View the cell number, voltage and temperature of the each cell. These data can be displayed in three modes: overview, histogram and sheet.

Log in to the webpage, select **System overview** > **Energy Storage Photovoltaic/Energy Storage** > **Cabinet** > **Battery** > **Cell data**, and then select the display mode.

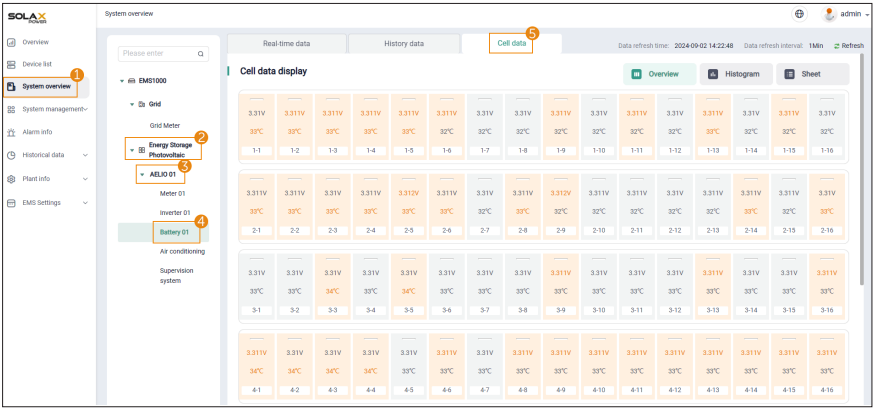



Figure 6-65 Viewing cell data

- **Overview**

In this mode, the voltage, temperature and number of each cell is arranged in a spread-out manner. You can scroll up and down to view these data.


Figure 6-66 Cell data displayed in overview

- **Histogram**

In this mode, the cell voltage and temperature are displayed separately. You need to select a parameter, and then the search results will be displayed in bar chart.

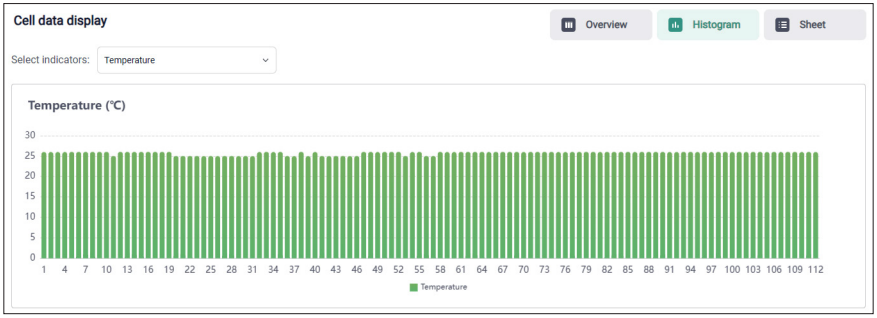



Figure 6-67 Cell data displayed in histogram

- **Sheet**

In this mode, the cell number, voltage, and temperature are displayed in a list. Information of 10 cells are displayed by default, and you can set the number of cells to be displayed per page to 10, 20, 30, 40 and 50, or directly enter the page number to go to a defined page.

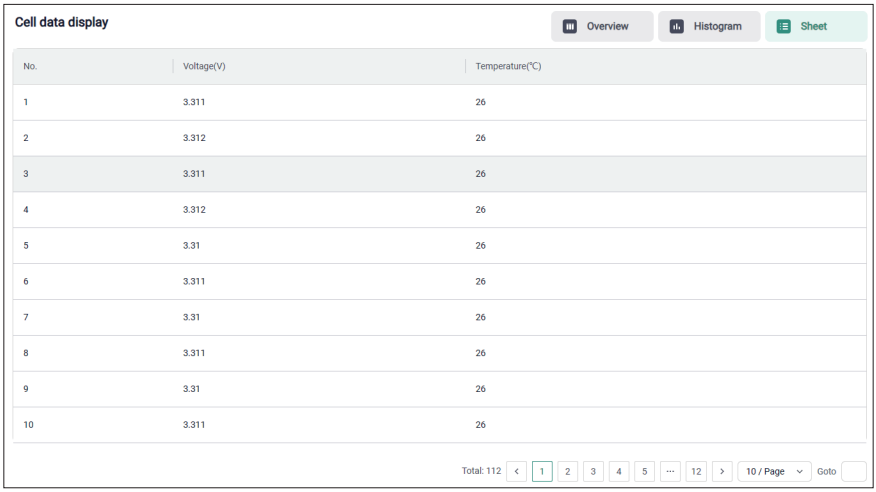



Figure 6-68 Cell data displayed in sheet

### 6.6.7 Air Conditioning

View information on the air conditioner, and manually turn on or off it.

**NOTICE!**

Currently, there are two air conditioner models (LZXD-3.5GE and 2000KP) that are installed in different cabinet models, and their parameters are different.

#### Viewing Information

Log in to the webpage, and then select **System overview** > **Energy Storage Photovoltaic/ Energy Storage** > **Cabinet** > **Air conditioning** > **Device details**.

- LZXD-3.5GE

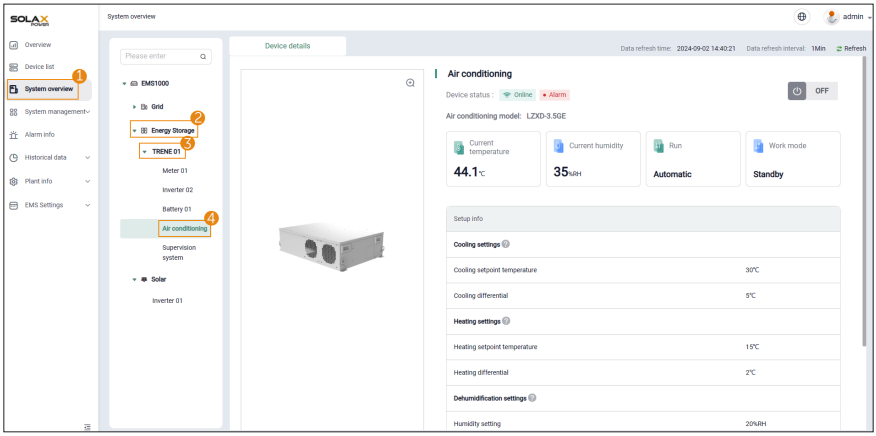



Figure 6-69 Information on LZXD-3.5GE air conditioner

Table 6-26 Parameter description on LZXD-3.5GE air conditioner

| Data Type | Parameter | Description |
|---|---|---|
| Device info | Device status | Includes the online/offline status and operation status of the air conditioner |
| | Air conditioning model | Model of the air conditioner |
| Real-time info | Current temperature | Real-time ambient temperature inside the cabinet |
| | Current humidity | Real-time humidity inside the cabinet |
| Real-time info | Run | Operation mode of the air conditioner, including automatic, forced cooling, forced heating, forced air supply and forced standby |
| | Work mode | Real-time running status of the air confitioner, including cooling, heating, air supply and standby |

| Data Type | Parameter | Description |
|---|---|---|
| Setup info (Available only when the Run mode is Automatic) | Cooling settings | Includes the cooling point temperature and cooling return difference. The air conditioner will turn on cooling when the cabinet temperature exceeds their sum, and turn off cooling when the temperature falls below their difference.<br>For example, you can set the cooling point temperature to 26°C, and the cooling return difference to 2°C, and then the air conditioner will turn on cooling when the cabinet temperature exceeds 28°C (26°C+2°C), and turn off cooling when the temperature falls below 24°C (26°C-2°C). |
| | Heating settings | Includes the heating point temperature and heating return difference. The air conditioner will turn on heating when the cabinet temperature falls below the their difference, and turn off heating when the temperature exceeds their sum.<br>For example, you can set the heating point temperature to 15°C, and the heating return difference to 2°C, and then the air conditioner will turn on heating when the cabinet temperature falls below 13°C (15°C-2°C), and turn off heating when the temperature exceeds 17°C (15°C+2°C). |
| | Dehumidification settings | Includes humidity setting, humidity difference, humidity dead zone and dehumidification temperature. Dehumidification starts when both conditions are met: the cabinet temperature is at least 2°C higher than the dehumidification temperature, and the cabinet humidity is higher than the sum of the humidity setting value and humidity difference. Dehumidification stops when any of the conditions are met: The cabinet temperature is lower than the dehumidification temperature, or the cabinet humidity is lower then the sum of humidity setting value and humidity dead zone.<br>For example, if you set these values respectively to 50%RH, 10%RH, 5%RH and 20°C, then humidification starts when the cabinet temperature exceeds 22°C (20°C+2°C) and humidity exceeds 60%RH (50%+10%), and humidification stops when the cabinet temperature is lower than 20°C, or the humidity is lower than 55%RH (50%+5%). |

- 2000KP

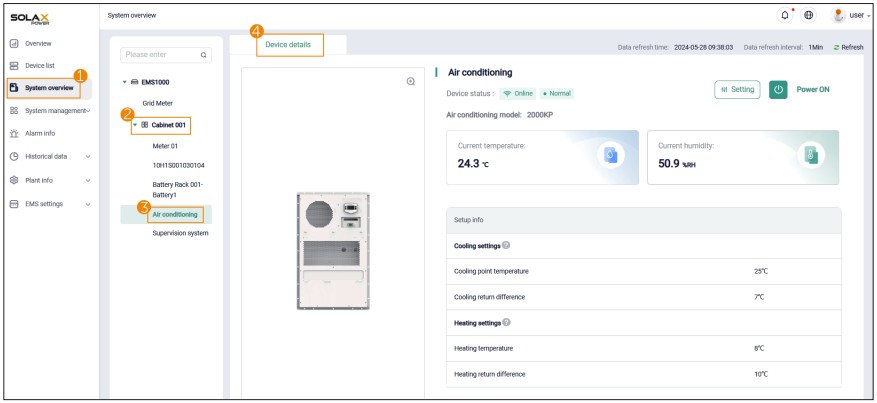



Figure 6-70 Information on 2000KP air conditioner

Table 6-27 Parameter description on 2000KP air conditioner

| Data Type | Parameter | Description |
|---|---|---|
| Device info | Device status | Includes the online/offline status and operation status of the air conditioner |
| | Air conditioning model | Model of the air conditioner |
| Real-time info | Current temperature | Real-time ambient temperature inside the cabinet |
| | Current humidity | Real-time humidity inside the cabinet |
| Setup info | Cooling settings | Includes the cooling point temperature and cooling return difference. The air conditioner will turn on cooling when the cabinet temperature exceeds their sum, and turn off cooling when the temperature falls below their difference. For example, you can set the cooling point temperature to 25°C, and the cooling return difference to 7°C, and then the air conditioner will turn on cooling when the cabinet temperature exceeds 32°C (25°C+7°C), and turn off cooling when the temperature falls below 18°C (25°C-7°C). |
| | Heating settings | Includes the heating point temperature and heating return difference. The air conditioner will turn on heating when the cabinet temperature falls below the heating point temperature, and turn off heating when the temperature exceeds their sum. For example, you can set the heating point temperature to 8°C, and the heating return difference to 10°C, and then the air conditioner will turn on heating when the cabinet temperature falls below 8°C, and turn off heating when the temperature exceeds 18°C (8°C+10°C). |

## Turning on or off Air Conditioner

**Step 1:** Log in to the webpage, and then select **System overview** > **Energy Storage Photovoltaic/Energy Storage** > **Cabinet** > **Air Conditioner > Device details**.

**Step 2:** Click **Power ON** or **Power OFF** to turn on or off the air conditioner, and then click **Ok** on the confirmation pop-up.

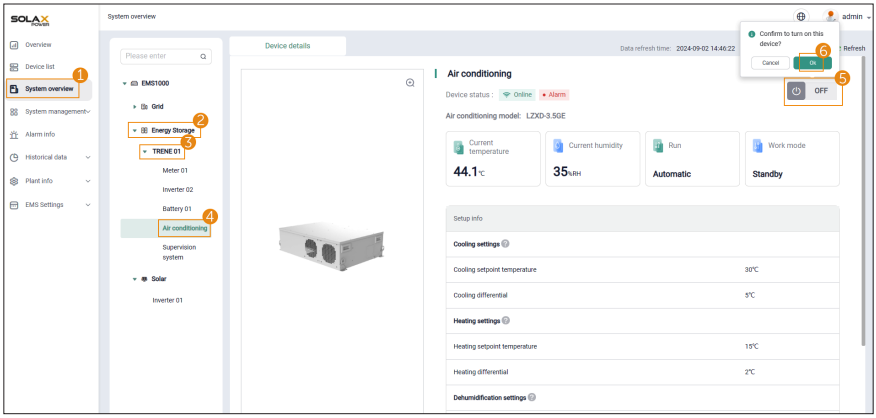



Figure 6-71 Turing on or off the air conditioner

## 6.6.8 Supervision System

You can check the status of the multiple monitoring devices in the cabinet, such as the water sensor, SPD, temperature sensor and more, and turn on or turn off the cabinet control devices. The supervision system ensures the entire energy system operates in a safe and normal environment.

### Viewing Supervision System Information

Log in to the webpage, and then select **System overview** > **Energy Storage Photovoltaic/ Energy Storage** > **Cabinet > Supervision system > Device details**.

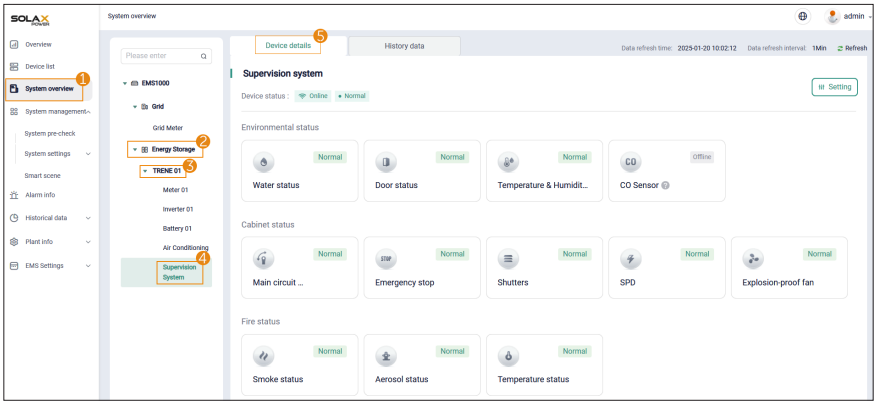



Figure 6-72 Viewing supervision system information

| Parameter | Description |
|---|---|
| Device status | Includes the communication status of the supervision system with EMS1000, and the operation status of the entire system. Whatever component in the cabinet is abnormal, the system status displays **Alarm**. |
| Environmental status | Whether the environmental status of the cabinet is normal, including water, door, temperature and humidity, and CO.<br>• Normal: No exception is detected<br>• Alarm: An exception occurs |
| Cabinet status | Includes the status of the main circuit breaker, emergency stop, shutters, SPD and explosion-proof fan. When the emergency stop is turned on, its status displays as **Alarm**; if it remains turned off, the status displays as **Normal**.<br>• Normal: The component is normal<br>• Alarm: The component is abnormal |
| Fire status | Includes the status of the smoke sensor, aerosol sensor and temperature sensor.<br>• Normal: The density of smoke and aerosol, and the temperature inside the cabinet remain in a normal range.<br>• Alarm: The density of smoke and aerosol, and temperature inside the cabinet are abnormal. |

## Setting Access Control Protection

Enable the function and set the duration that the cabinet door can be kept open to protect the system against potential risks. When the function is enabled, once the door is opened, the system will initiate a countdown warning, and then automatically shut down when the opening duration threshold is met.

| NOTICE! |
| --- |
| This function is available only for the admin account. |

**Step 1:** Log in to the webpage, and then select **System overview > Energy Storage Photovoltaic/Energy Storage** > **Cabinet > Supervision system > Setting**.

**Step 1:** On the setting pop-up, select **Yes**, set the **Time** duration, and then click **Confirm**.

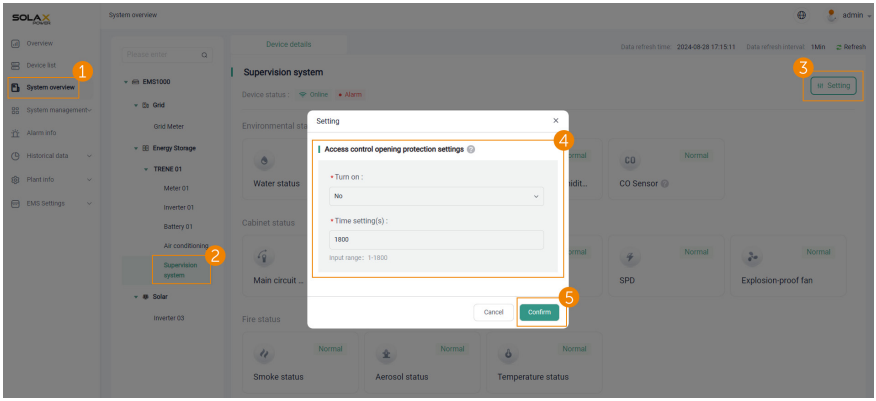



Figure 6-73 Setting access control protection

## Viewing History Data

View the historical temperature and humidity data inside the cabinet.

**Step 1:** Log in to the webpage, and then select **System overview > Energy Storage Photovoltaic/Energy Storage** > **Cabinet > Supervision system> History data**.

**Step 2:** Set the **Time**,and then click **Check**.


Figure 6-74 Viewing historical environmental data

Related Operation

Click **Export data** to export the historical power data to an Excel file.

### 6.6.9 External inverter

You can view the real-time data and history data of the external inverter. Operations are similar to those on the inverter in the cabinet. For details, see "6.6.5 Inverter".

## 6.7 System Management

Perform pre-check and set operation configurations for the system.

### 6.7.1 System Pre-check

System pre-check is to automatically check the online/offline and alarm status of all components in the system before putting it into use. This function can ensure the system be at an ideal status for use and reduce potential risks during operation.

**Step 1:** Log in to the webpage, and then select **System management > System pre-check.**

**Step 2:** Select the checkbox of one or more cabinets, and then click **Check**.

The check results will be displayed on the upper-right corner after pre-check completes. The pre-check result displays as **Pre-check succeeded** only when all components of the system are online or normal. Otherwise, the result displays **Pre-check failed.**

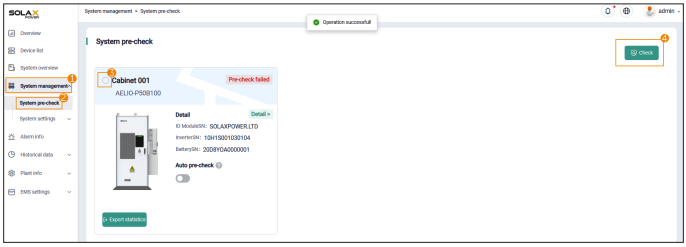



Figure 6-75 Performing system pre-check

Related Operations

- Viewing pre-check details

Click **Detail** to view the online/offline and alarm status of all components.

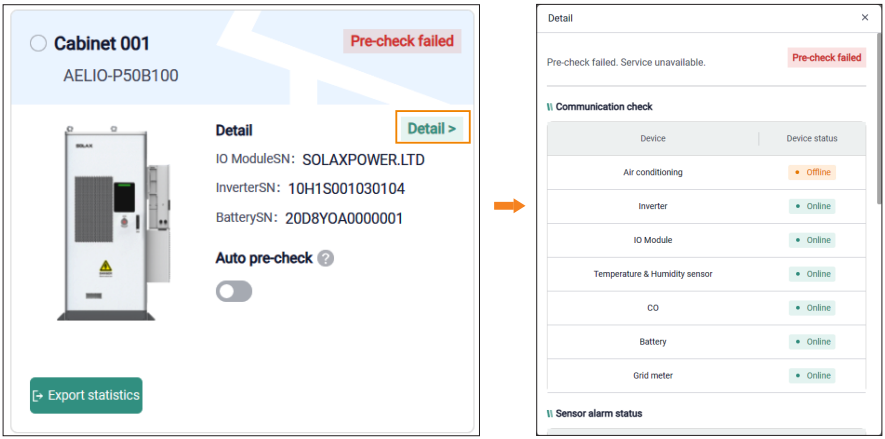



Figure 6-76 Viewing pre-check details

- Auto pre-check

After it is enabled, the system will automatically check the status of all its components each time you power on EMS1000. If pre-check failed, the system will not operate and will remain standby to avoid operation exception. If it is disabled, the system will not perform pre-check automatically, and can continue operation even manual check failed.

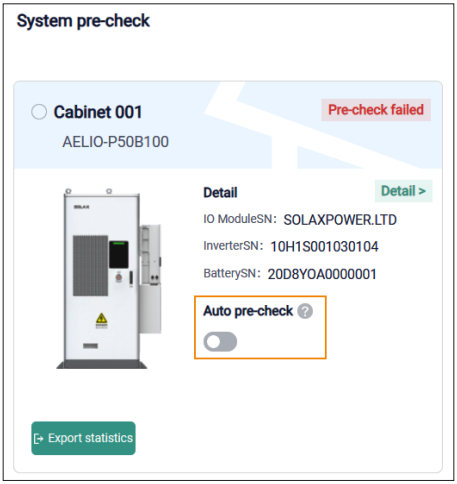



Figure 6-77 Enabling auto pre-check

### 6.7.2 System Settings

Set the work mode, import settings, export settings and external control for the system.

#### 6.7.2.1 Work Mode

For AELIO system, 6 work modes are supported, namely self-use, feed-in priority, back up mode, manual mode, peak shaving and TOU. For TRENE system, self-use, manual mode, peak shaving and TOU are available.

You can adjust the work mode of the system based on local situations to make full use of the PV energy and maximize the revenue.

#### Self Use Mode

Select self-use mode where the feed-in subsidies are low and electricity price is high. You need to set a minimal battery SOC, select whether to charge form grid, and configure the periods for battery charging and discharging.

**Step 1:** Log in to the webpage, and then select **System management** > **System settings** > **Work mode**.

**Step 2:** Under **System work mode**, select **self use** from the drop-down list, and then click **Run**.

**Step 3:** Set the parameters, and then click **Save** for the parameter to take effect.

Enable **Charge&Discharge period 2** for it to take effect.

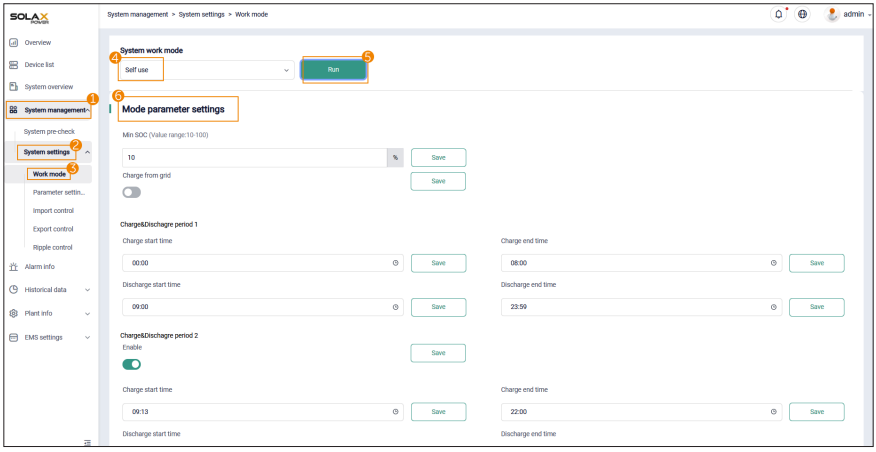



Figure 6-78 Setting self-use mode

Table 6-28 Self Use mode parameter description

| Parameter | Description |
|---|---|
| Min SOC | Minimal SOC for the battery to discharge. |
| Charge from grid | Whether to allow charging the battery from power grid when PV energy is not sufficient |
| Charge start time | Time that the battery starts charging |
| Charge end time | Time that the battery stops charging |
| Discharge start time | Time that the battery starts discharging |
| Discharge end time | Time that the battery stops discharging |

## Feed-in Priority

Select feed-in mode where the feed-in subsidies are high. You need to set a minimal battery SOC and a charge cutoff SOC, and configure the periods for battery charging and discharging.

**Step 1:** Log in to the webpage, and then select **System management** > **System settings** > **Work mode**.

**Step 2:** Under **System work mode**, select **Feedin priority** from the drop-down list, and then click **Run**.

**Step 3:** Set the parameters, and then click **Save** for the parameter to take effect.

Enable **Charge&Discharge period 2** for it to take effect.

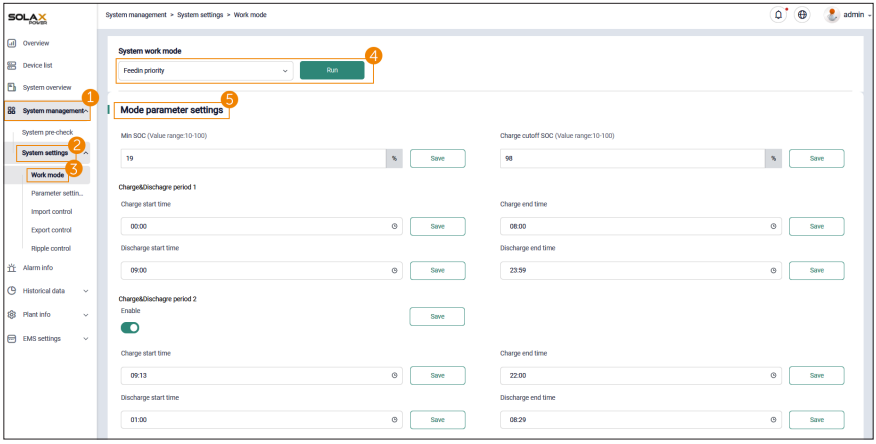



Figure 6-79 Setting feed-in priority mode

Table 6-29 Feed-in Priority mode parameter description

| Parameter | Description |
|---|---|
| Min SOC | Minimal SOC for the battery to discharge |
| Charge cutoff SOC | Battery SOC that can be charged from grid |
| Charge start time | Time that the battery starts charging |
| Charge end time | Time that the battery stops charging |
| Discharge start time | Time that the battery starts discharging |
| Discharge end time | Time that the battery stops discharging |

## Backup Mode

Select backup mode where power outage occurs frequently. Under this mode, the battery SOC remains at a relatively high level. You need to set a minimal battery SOC and a charge cutoff SOC, and configure the periods for battery charging and discharging.

**Step 1:** Log in to the webpage, and then select **System management** > **System settings** > **Work mode**.

**Step 2:** Under **System work mode**, select **Back up mode** from the drop-down list, and then click **Run**.

**Step 3:** Set the parameters, and then click **Save** for the parameter to take effect.

Enable **Charge&Discharge period 2** for it to take effect.

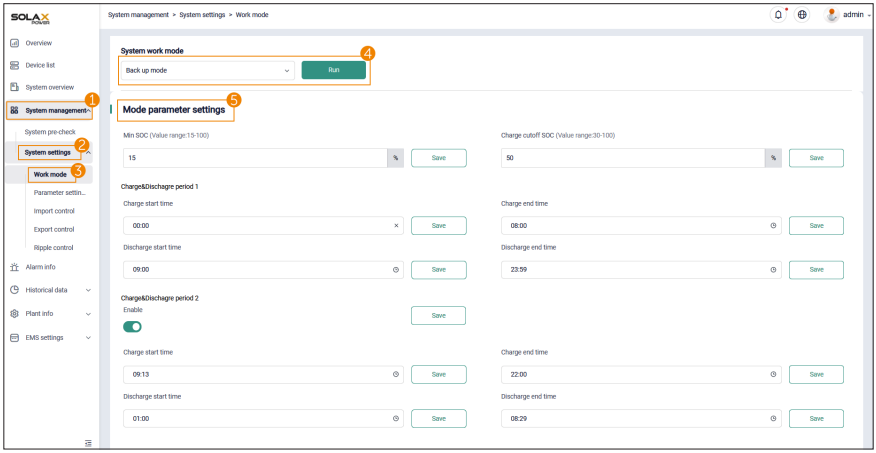



Figure 6-80 Setting backup mode

Table 6-30 Backup mode parameter description

| Parameter | Description |
|---|---|
| Min SOC | Minimal SOC for the battery to discharge |
| Charge cutoff SOC | Battery SOC that can be charged from grid |
| Charge start time | Time that the battery starts charging |
| Charge end time | Time that the battery stops charging |
| Discharge start time | Time that the battery starts discharging |
| Discharge end time | Time that the battery stops discharging |

### Peak Shaving Mode

Select peak shaving mode when you need to level out peaks in electricity use. You need to set the periods and threshold for discharging, and select whether to allow charge from gird, and other parameters.

**NOTICE!**

For TRENE system, the parameter value shall meet the requirement: Import limit (set in "Import Settings") > peak shaving threshold > peaking shaving grid power limit.

**Step 1:** Log in to the webpage, and then select **System management** > **System settings** > **Work mode**.

**Step 2:** Under **System work mode**, select **Peak Shaving** from the drop-down list, and then click **Run**.

**Step 3:** Set the parameters, and then click **Save** for the parameter to take effect.

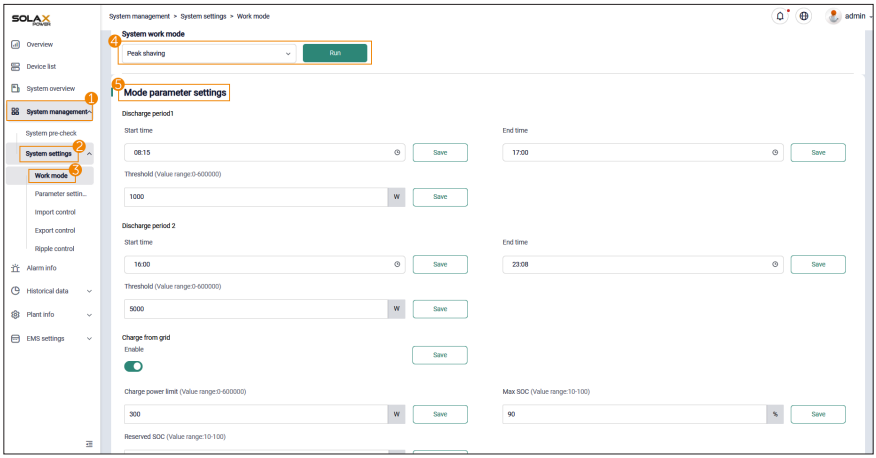



Figure 6-81 Setting peak shaving mode

Table 6-31 Peak shaving mode parameter description

| Parameter | Description |
|---|---|
| Start time | Time that the battery starts discharging |
| End time | Time that the battery stops discharging |
| Threshold | Max amount of power that the battery can discharge |
| Charge from grid | Whether to allow charging the battery from grid |
| Charge power limit | Max power that can be charged into the battery |
| Max SOC | Max battery SOC |
| Reserved SOC | The lower limit of battery SOC required for later peak shaving period. |

### Manual Mode

Under manual mode, you can force the system to charge the battery, force the battery to discharge or stop charging and discharging.

**Step 1:** Log in to the webpage, and then select **System management** > **System settings** > **Work mode**.

**Step 2:** Under **System work mode**, select **Manual mode** from the drop-down list, and then click **Run**.

**Step 3:** Select the operation from the drop-down list for the system, and then click **Save**.

For **Forced charging** and **Forced discharging**, **Charge/Discharge power** and **Target SOC** are required.

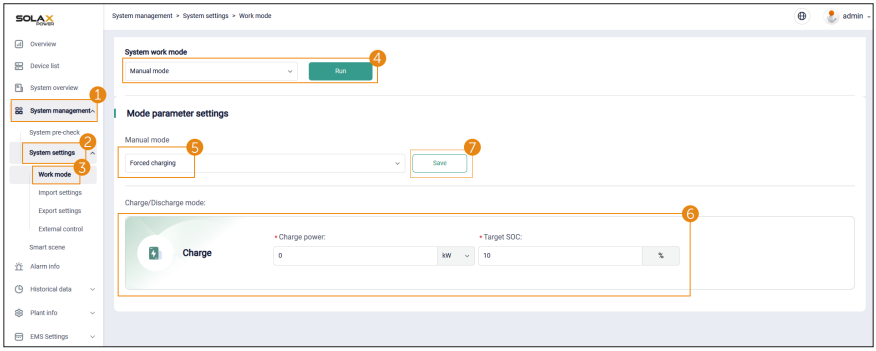



Figure 6-82 Setting Manual mode

## TOU

Configure strategies and templates for the system to automatically perform operations based on preset schedules.

**Step 1:** Log in to the webpage, and then select **System management > System settings > Work mode**.

**Step 2:** Under **System work mode**, select **Manual mode** from the drop-down list, and then click **Run**.

**Step 3:** Set **Template configuration** and **Strategy configuration**.

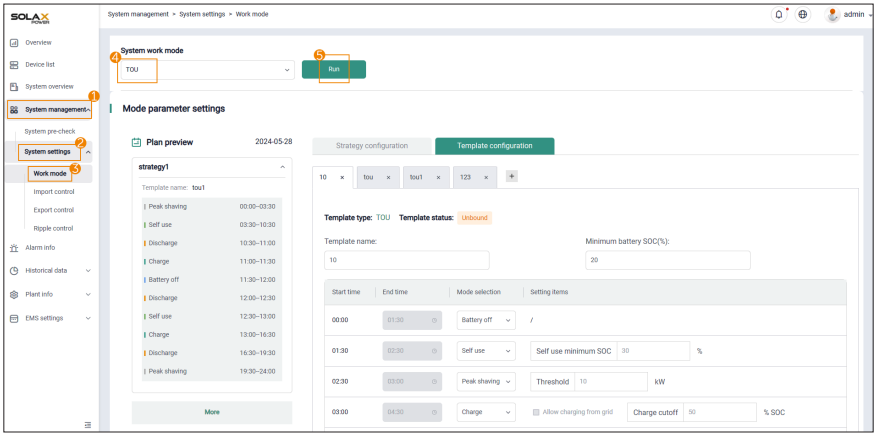



Figure 6-83 Setting TOU mode

- Setting Template Configuration

A template defines the specific working mode that the system should follow within a specific period, and the related parameters in the working modes.

**Step 1:** Under **Mode parameter settings**, click **Template configuration**.

**Step 2:** Configure parameters for the template, and then click **Confirm**.

There is a default template format for you to enter specific information, and you can click + to configure more templates.

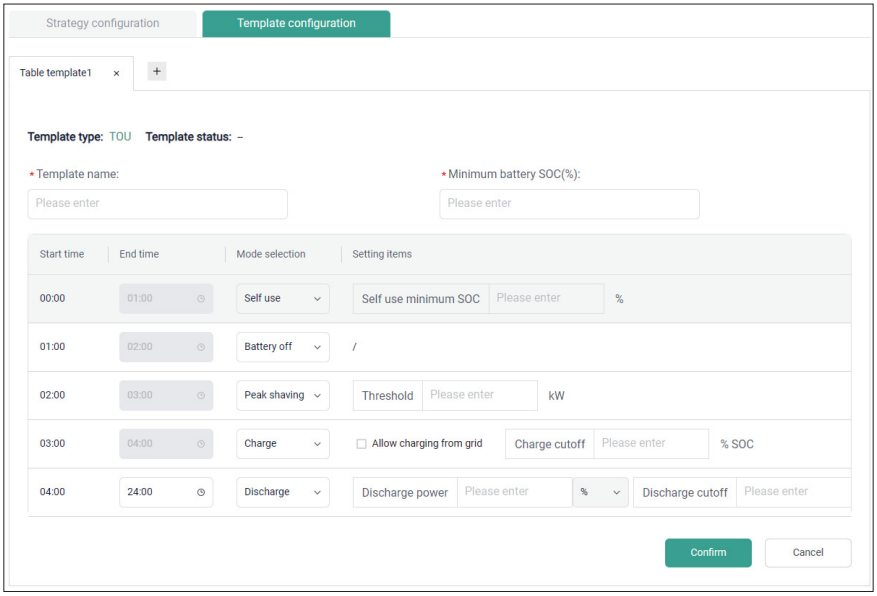



Figure 6-84 Configuring templates

Table 6-32 Template parameter description

| Parameter | Value Range | Description |
|---|---|---|
| Template type | TOU | Currently, only TOU template is available. |
| Template status | -- | Default value when a template is being created |
| | Unbound | The template is created but not bound to any strategy. |
| | Bound Up | The template is bound to one or more strategies. |
| Template Name | / | Set a name for the template. |

| Parameter | Value Range | Description |
|---|---|---|
| Minimum battery SOC | 10~100 | Lowest battery SOC for the template to take effect. |
| Start time | / | Time duration that the battery cluster charges, discharges or remains standby. The minimal time interval is 30 minutes. |
| End time | / | |
| Mode selection | Self-use | See "Self Use Mode" |
| | Battery off | Keep the battery standby |
| | Peak shaving | See "Peak Shaving Mode" |
| Mode selection | Charge | Charge the battery |
| | Discharge | The battery discharges to supply power for the system |

- Setting Strategy Configuration

**Step 1:** Under **Mode parameter settings**, click **Strategy configuration**.

**Step 2:** Configure parameters for the strategy, and then click **Confirm**.

There is a default strategy format for you to enter specific information, and you can click + to configure more strategies. Up to 20 strategies can be added.

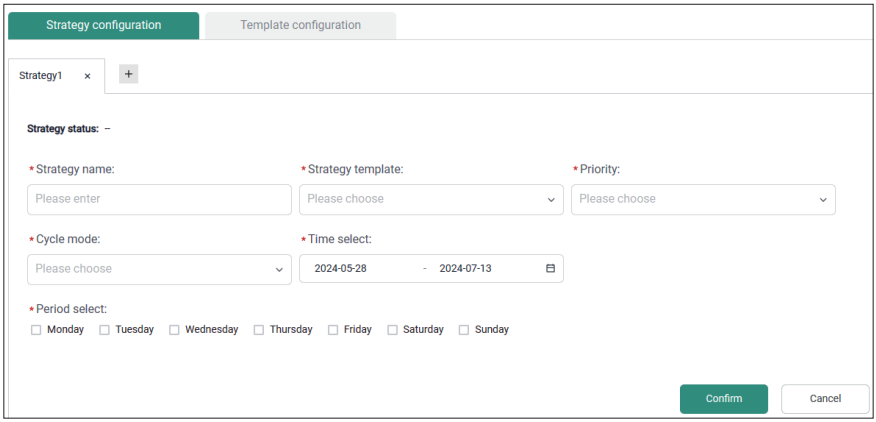



Figure 6-85 Configuring strategy

Table 6-33 Strategy parameters

| Parameter | Value Range | Description |
|---|---|---|
| Strategy State | -- | Default value when a new strategy is being created |
| | Not Applied | The strategy is created but not applied. |
| | Applied | The strategy has been applied. |
| Strategy name | / | Set a name for the strategy |
| Strategy template | / | Select a template that you created in the previous step for the strategy. |
| Priority | 1-20 | Priority of the current strategy when the execution time of multiple strategies overlaps. 1 stands for top priority, and 20 the least priority. |
| Cycle Mode | Repeat Weekly | Repeat the strategy by week |
| | Repeat Daily | Repeat the strategy by day |
| Time Select | / | Start date and end date that the strategy takes effect after being applied. |
| Period Select | | This parameter is required only when **Cycle Mode** is set to **Repeat Weekly**. You can select the specific data in a week that the strategy will take effect. |

Related Operation

Click **Editing** to modify the strategy that has been created.

**Step 3:** Click **Apply**.

The strategy will be applied to the plan, and the **Strategy status** changes from **Not Applied** to **Applied**. You can click **Stop** to cancel the application.

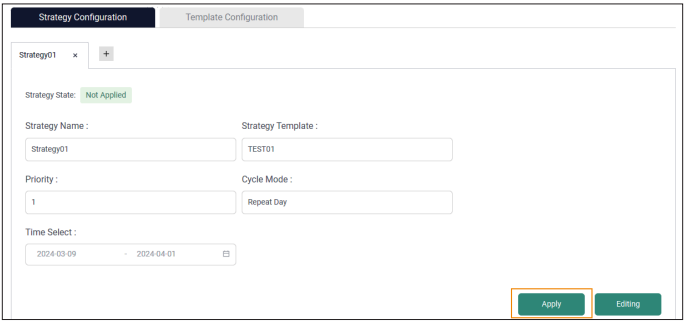



Figure 6-86 Applying the strategy

### Viewing Plans

The strategy that takes effect on the day will be displayed on **Plan preview**, including the strategy and template that are carried out and the specific operation to be performed in each period. You can click **More** to view the plans on a monthly basis, and check the details of settings for the periods.

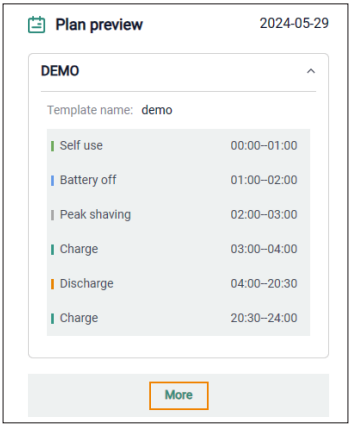



Figure 6-87 Viewing plans

#### 6.7.2.2 Remote Settings

Set parameters for the inverter remotely on EMS1000 webpage.

| NOTICE! |
| --- |
| This function is available only for AELIO inverters and X3-TRENE-100K. |

**Step 1:** Log in to the webpage, and then select **System management** > **System settings** > **Remote settings.**

**Step 2:** Select the inverter SN, and then click **Confirm**.

**Step 3:** Enter the password, click **Ok**, and then continue the configurations.

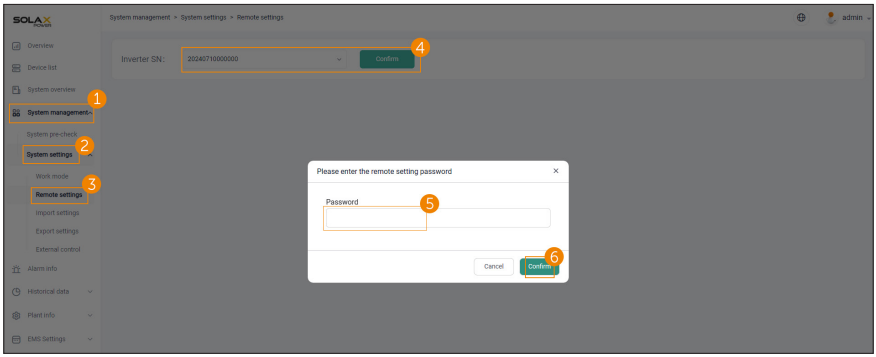



Figure 6-88 Configuring parameter setting

### 6.7.2.3 Import Settings

Set a maximum power value that the system can import from the grid to keep the expenses on power in control. When the total power that the system consumed from the grid reaches the value, the system cut off power supply from the grid.

- AELIO system

**Step 1:** Log in to the webpage, and then select **System management > System settings > Import settings**.

**Step 2:** Enable the function, set **Import limit**, and then click **Save**.

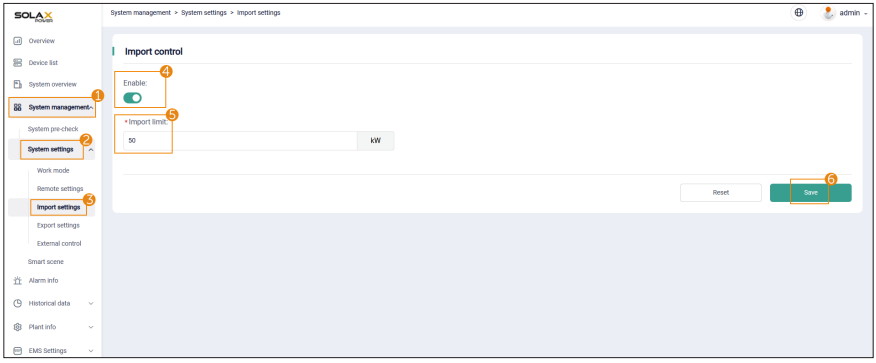



Figure 6-89 Setting import control for AELIO system

- TRENE system

**Step 1:** Log in to the webpage, and then select **System management > System settings > Import settings**.

**Step 2:** Enable the function, set the **Control mode** and **Import limit**, and then click **Save**.

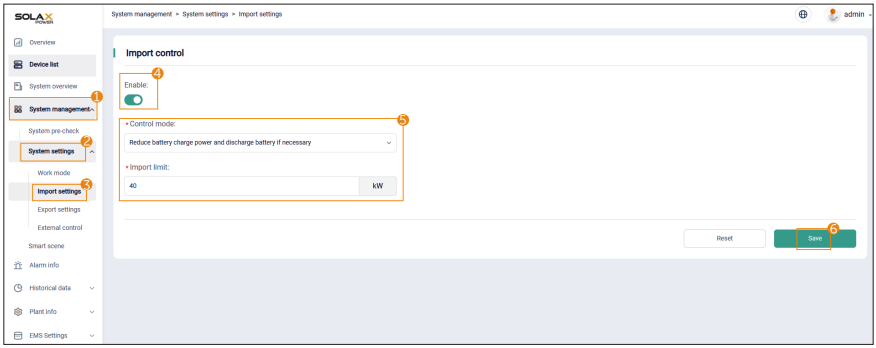



Figure 6-90 Setting import control for TRENE system

Related Operation

Click **Reset** to clear the settings.

### 6.7.2.4 Export Settings

Set a maximum power value that the system can export to the grid. When the total power or power per phase that the system delivers to the grid reaches the limit value, the system stops exporting power to the gird. This is ideal for use in countries and regions with gird-connection export control.

**Step 1:** Log in to the webpage, and then select **System management > System settings > Export settings**.

**Step 2:** Enable the function, select the control mode, set the export limit value, and then click **Save**.

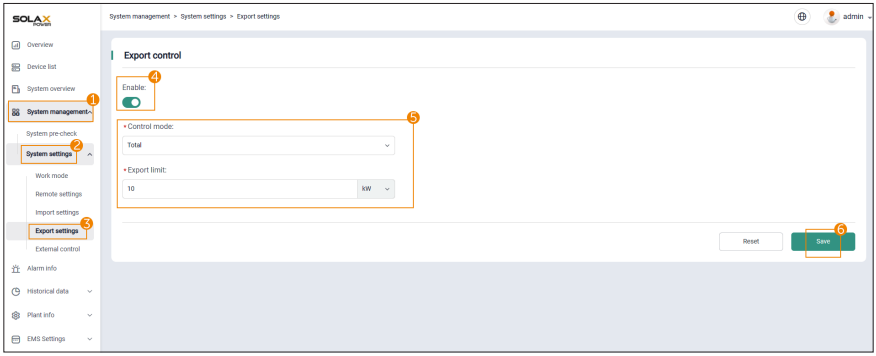



Figure 6-91 Setting export control

Table 6-34 Export control parameter description

| Parameter | Value Range | Description |
|---|---|---|
| Control mode | Total | The sum of power exported to the gird from all phases cannot exceed the limit |
| | Per phase | The power exported to the grid from each phase cannot exceed the limit |
| Export limit | % | Control the export power value by the percentage of the inverter power rate |
| | kW | Control the export power value by specific power amount |

Related Operation

Click **Reset** to clear the settings.

#### 6.7.2.5 External Control

EMS1000 offers 4 DI channels and 16 combination options for ripple control. You can enable the combinations and set control items for the system, such as shutting down the inverter, setting input and output power limit and more. Ripple control takes effect for the entire system, and has priority over other system settings.

**NOTICE!**

The setting items take effect only when the system receives corresponding ripple control signals.

**Step 1:** Log in to the webpage, and then select **System management > System settings > External control**.

**Step 2:** Click 

, and then click **Ok** on the confirmation pop-up.

**Step 3:** Enable the DI combination option, select the control item, and then set the related parameters.

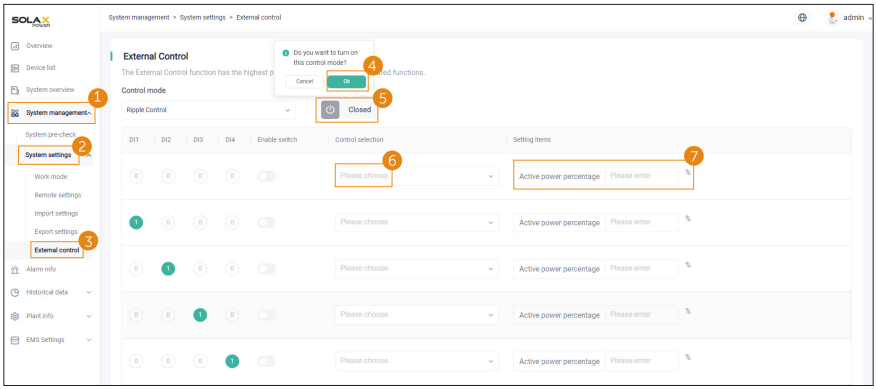



Figure 6-92 Setting ripple control

Table 6-36 Alarm information description

| Parameter | Description |
|---|---|
| Inverter output active power limitation | Ratio of the inverter active power that can feed in to the grid |
| Inverter input active power limitation | Ratio of the inverter active power that can be imported from the grid |
| Inverter output reactive power limitation | Set the power factor, and the reactive mode, either leading or lagging. |
| Inverter grid-tied power limitation | Ratio of grid-tied power output; used for zero output |
| Inverter shutdown | Shut down the inverter |

### 6.7.3 Smart Scene

Set conditions and actions relating to time, weather and electricity price for the system to automatically execute defined operations under certain circumstances, or directly apply the recommended scenes that we have already configured in the system to maximize your revenue.

#### 6.7.3.1 Recommended Scenes

Currently, we have configured 1 recommended smart scene for TRENE system, and 2 recommended smart scenes for AELIO system. The recommended smart scenes offer optimized revenue solutions when the electricity is negative.

- TRENE

When the selling price of electricity is negative, the system stops feeding in power to the gird. In this scene, export control mode is on, and the power limit is set to 0% for each phase.

**Step 1:** Log in to the webpage, and then select **System management > Smart scene**.

**Step 2:** Click **Recommendation**, and then click **Apply**.

After applying the recommended, scene, it will be automatically added to **My scene**, and you can continue to edit the scene as needed.

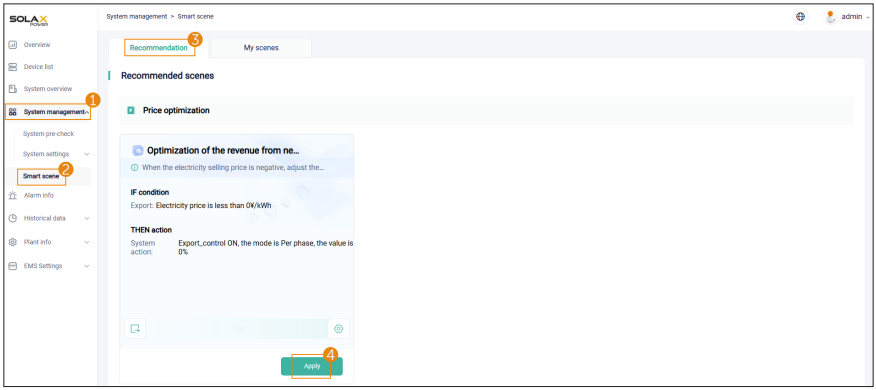



Figure 6-93 Applying recommended scene for TRENE

- AELIO

Two solutions are available, respectively suitable for negative sale price and negative purchase price. When the purchase price is negative, the PV power is set to 0, and the system buys electricity from the gird to charge the battery; when the sale price is negative, the system stops feeding power to the grid.

**Step 1:** Log in to the webpage, and then select **System management > Smart scene**.

**Step 2:** Click **Recommendation**, and then click **Apply**.

After applying the recommended, scene, it will be automatically added to **My scene**, and you can continue to edit the scene as needed.

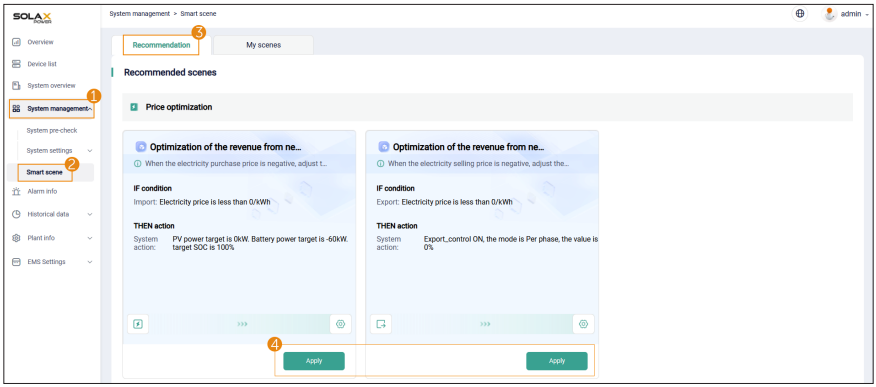



Figure 6-94 Applying recommended scene for AELIO

### 6.7.3.2 My Scenes

Create and view smart scenes. Up to 20 smarts scenes can be created.

**Step 1:** Log in to the webpage, and then select **System management > Smart scene > My Scenes**.

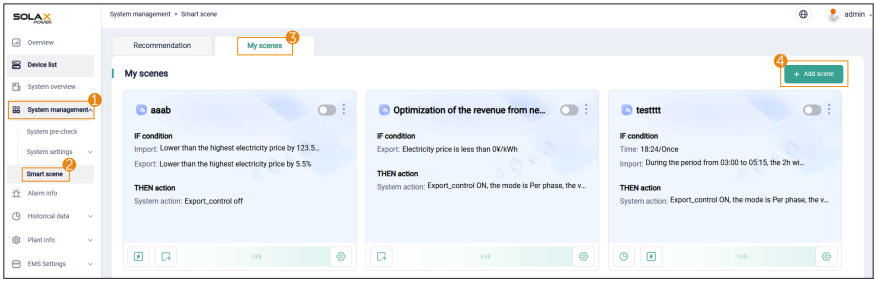



Figure 6-95 Creating a smart scene

**Step 2:** Click **+ Add Scene**, and then enter the scene name.

**Step 3:** On **IF condition**, select **Meet all conditions** or **Meet any of the conditions**,set the detailed parameters for selling and buying electricity price, and then click **Save**.

Table 6-37 If condition parameters description

| Category | Parameter | Description |
|---|---|---|
| / | Meet all conditions | Only when all conditions specified in IF condition are met will the smart scene take effect. |
| | Meet any of the conditions | As long as any of the conditions specified in IF condition is met, the smart scene will take effect. |

| Category | Parameter | Description |
|---|---|---|
| Trigger time | / | Set the specific time and frequency for the smart scene to take effect. |
| Weather | / | Set the amount and duration of irradiance, temperature, humidity, wind speed, air pressure, raining or not, and expected raining or not.<br>The weather data will be displayed in a line graph. |
| Electricity price | Import | Set the electricity price threshold, difference from the highest electricity price, and the time and duration with the highest electricity price.<br>The electricity price data will be displayed in a line graph. |
| | Export | |

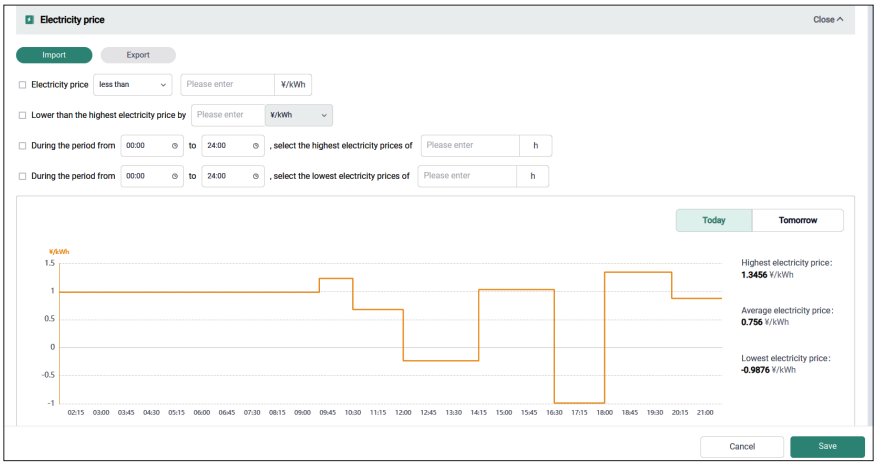



Figure 6-96 Setting IF condition for smart scene

**Step 4:** Click **THEN action**, set **System action** and **EMS1000** parameters, and then click **Save**.

Table 6-38 Then action parameters description

| Category | Description |
|---|---|
| System action | Includes export settings, import settings and work mode. For AELIO system, system switch on/off is also available. |
| EMS1000 | Select DO No. and output level for EMS1000 to perform related operations. |


Figure 6-97 Setting Then action for smart scene

## 6.8 Alarm Information

Alarms from all devices that EMS1000 manages are displayed here in a reverse order by the time that the alarm occurred. 10 alarms are displayed per page by default, and you can set this number to 20, 30, 40 and 50, or directly enter the page number to go to a specific page.

### 6.8.1 Viewing Alarms

Alarm information includes the device type and SN, alarm name, error code, alarm level, time that the alarm occurs and ends, alarm status and more.

Log in to the webpage, and then select **Alarm info**.

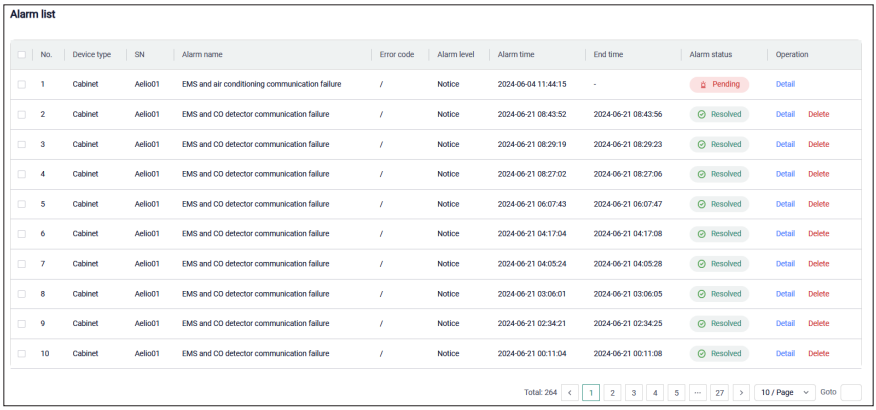



Figure 6-98 Viewing alarm information

Table 6-39 Alarm information description

| Parameter | Description |
|---|---|
| Device type | The device with which the alarm occurs |
| SN | SN of the alarm device |
| Alarm name | Brief description of the alarm |
| Error code | Only available for inverter errors |
| Alarm level | Emergency urgency level of the alarm, divided into critical, warning and notice |
| Alarm time | Time that the alarm occurs |
| End time | Time that the alarm is resolved |
| Alarm status | • Pending: Alarms that are not resolved yet<br>• Resolved: Alarms that have been resolved |

You can click **Detail** under **Operation** on each alarm to view more details on the alarm, and the possible causes and suggestions that we offer for each type of alarm. This helps you to solve the problem quickly and efficiently.

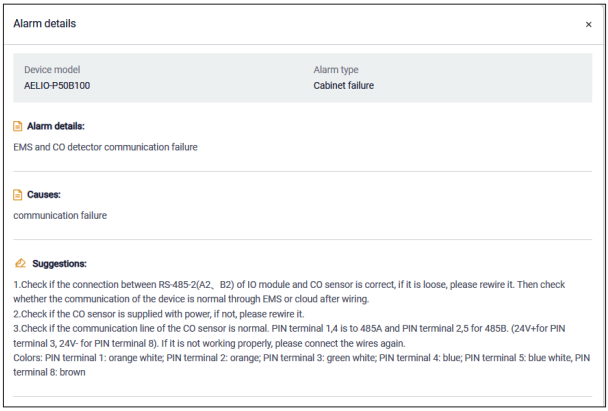



Figure 6-99 Alarm details

### 6.8.2 Deleting Alarms

Resolved alarms can be deleted one by one or in batches.

- **Deleting alarms one by one**

**Step 1:** Log in to the webpage, and then click **Alarm info**.

**Step 2:** Under **Alarm list**, click **Delete** on the alarm that you want to delete, and then click **Delete** on the confirmation pop-up.

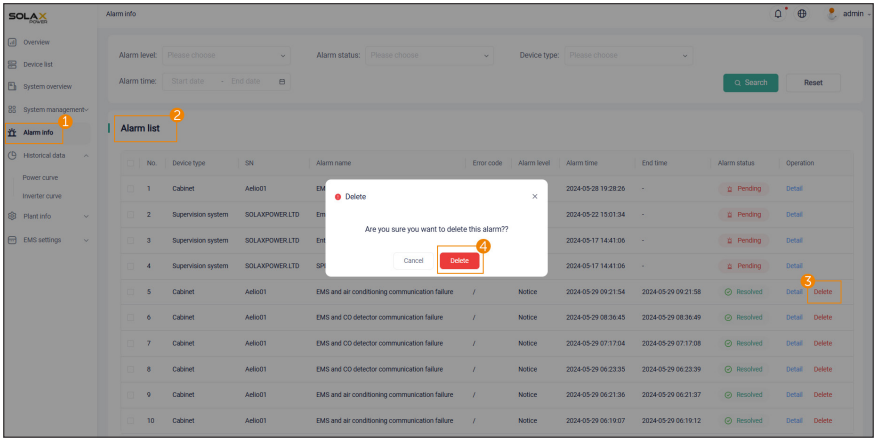



Figure 6-100 Deleting an alarm

- Deleting alarms in batches

**Step 1:** Log in to the webpage, and then click **Alarm info**.

**Step 2:** Select the checkbox in the front of the resolved alarms that you want to delete, click **Batch delete**, and then click **Delete** on the confirmation pop-up.

You can also select the checkbox on the head of the alarm list to select all resolved alarms, and then delete all these resolved alarms in batches.

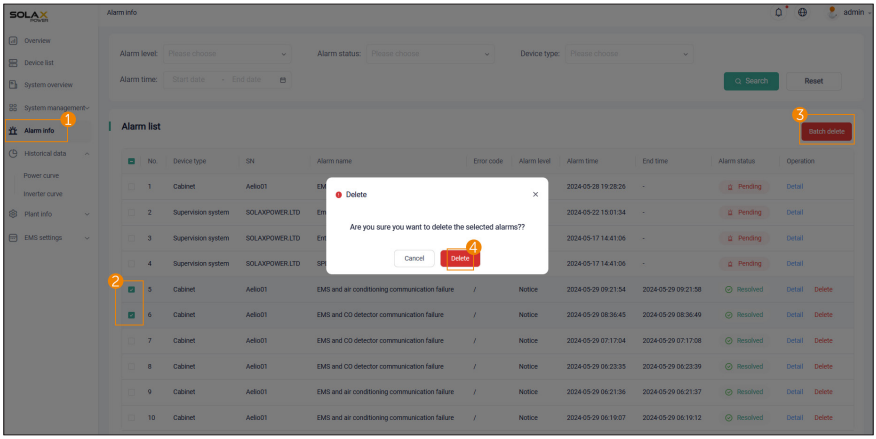



Figure 6-101 Deleting alarms in batches

### 6.8.3 Searching for Alarms

You can search for alarms by alarm level, alarm status, device type and alarm time. The search results will be displayed in the list below.

Log in to the webpage, click **Alarm info**, set the search conditions, and then click **Search**.

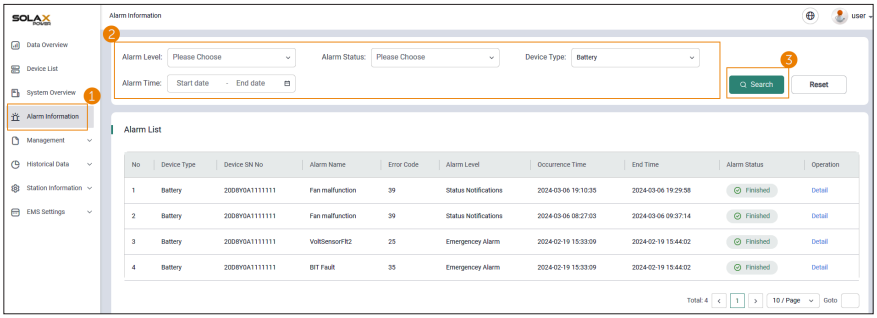



Figure 6-102 Searching for alarms

Related Operation

Click **Reset** to clear the search conditions.

## 6.9 Historical Data

View the system operation data of a specific time in the past in line chart, including the power curve of the entire system, and the phase voltage, current, active power and more of the inverter.

### 6.9.1 Power Curve

The line chart displays 4 types of system power data in 4 lines of different colors, namely grid power, load power, energy power and PV power. You can view the data globally through the line chart, and hover the mouse on the chart to view the detailed information of a moment.

**Step 1:** Log in to the webpage, and then select **Historical data** > **Power curve**.

**Step 2:** Set the **Time**, and then click **Check**.

The maximum time interval is 7 days.

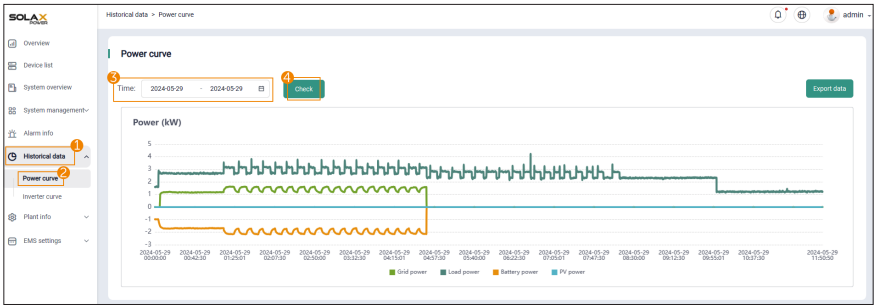



Figure 6-103 Viewing power curve

Related Operation

Click **Export data** to export the historical power data to an Excel file, in which these data will be displayed in a list with an interval of 10 seconds.

## 6.9.2 Inverter Curve

The system displays 4 types of data on the inverter: AC phase voltage, AC phase current, temperature and active power. You can select to simply view these data of a day in line chart, or compare these data between the selected day and its previous day.

**Step 1:** Log in to the webpage, and then select **Historical data** > **Inverter curve**.

**Step 2:** Select **Contrast** or **Overview** as the display mode, set the **Time**, select **SN** from the drop-down list, and then click **Check**.

» Contrast mode

Only 1 day can be selected, and the system will display the related data of this day and its previous day in the line chart.

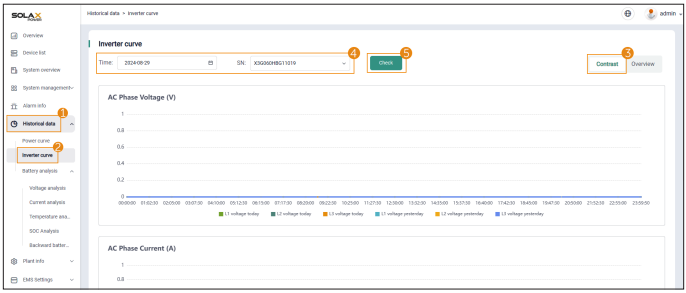



Figure 6-104 Viewing inverter curve in contrast mode

» Overview mode

A time period can be selected, and the system will display the data within the period in the line chart. You can click **Export data** to export the data to an Excel file.

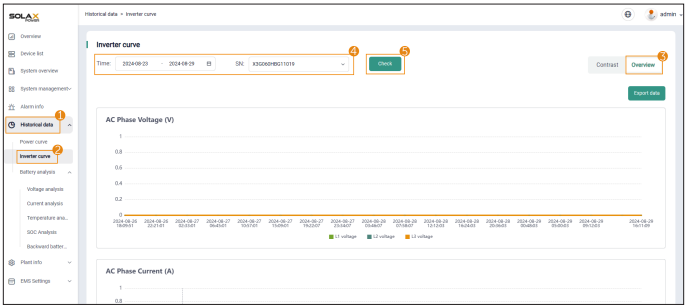



Figure 6-105 Viewing inverter curve in overview mode

## 6.9.3 Battery Analysis

View the status and data on the battery cluster and cells, and identify cells with least performance for precautions and countermeasures in advance.

### 6.9.3.1 Voltage Analysis

View the voltage details of the battery system and battery clusters in **Voltage analysis**, and voltage distribution and curve of cells in **Voltage cell analysis**.

Voltage Analysis

**Step 1:** Select **Historical data > Battery analysis > Voltage analysis** > **Voltage analysis.**

**Step 2:** Set the **Time**, select **Cabinet SN** or **Battery Cluster SN**, and then click **Check**.

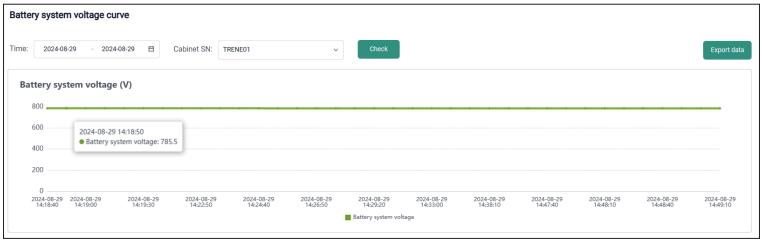



Figure 6-106 Viewing battery system voltage curve


Figure 6-107 Viewing battery cluster voltage curve

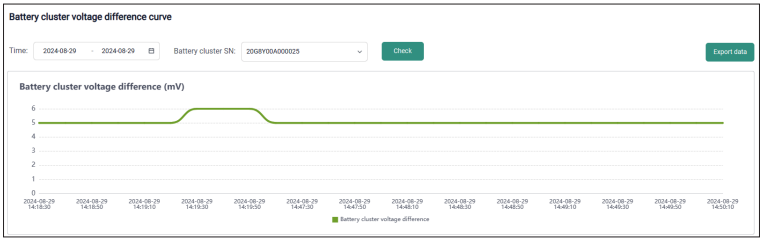



Figure 6-108 Viewing battery cluster voltage difference curve

Related Operation

Click **Export data** to export the data to an Excel file.

## Cell Voltage Analysis

**Step 1:** Select **Historical data** > **Battery analysis** > **Voltage analysis** > **Cell voltage analysis**.

**Step 2:** Set the **Time**, select the **Battery Cluster SN No** and **indicator** as needed, and then click **Check**.

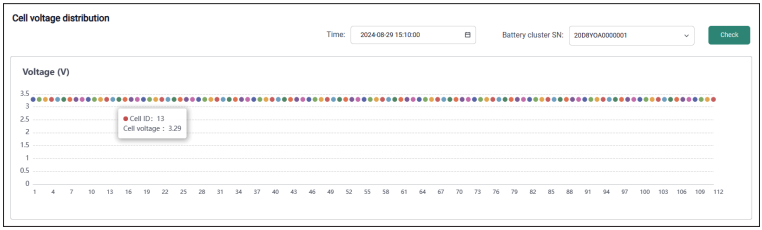



Figure 6-109 Viewing voltage distribution

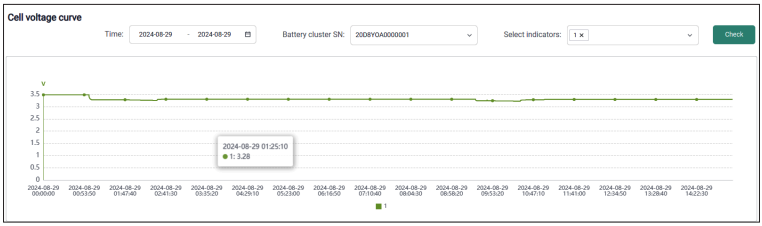



Figure 6-110 Viewing cell voltage

Related Operation

Click **Export data** to export the data to an Excel file.

### 6.9.3.2 Current Analysis

**Step 1:** Select **Historical data** > **Battery analysis** > **Current analysis**.

**Step 2:** Set the **Time**, select the **Cabinet SN** or **Battery cluster SN**, and then click **Check**.

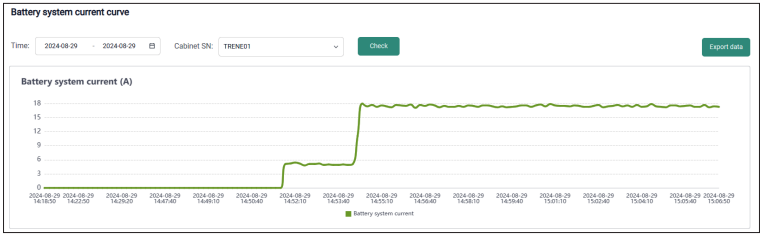



Figure 6-111 Viewing battery system current curve

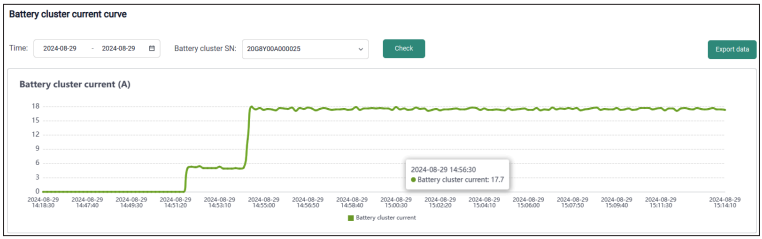



Figure 6-112 Viewing of battery cluster current curve

Related Operation

Click **Export data** to export the data to an Excel file.

### 6.9.3.3 Temperature Analysis

View the temperature status of the battery cluster and battery cells respectively.

#### Battery Temperature Analysis

**Step 1:** Select **Historical data** > **Battery analysis** > **Temperature analysis** > **Battery temperature analysis**.

**Step 2:** Set the **Time**, select the **Battery cluster SN**, and then click **Check**.

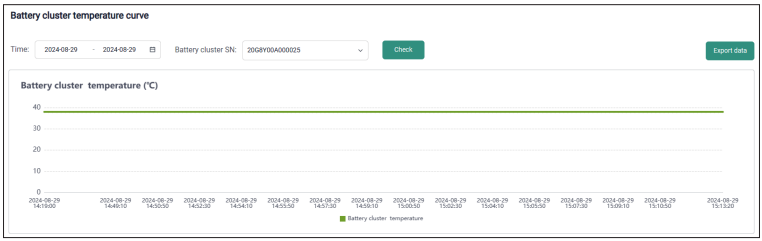



Figure 6-113 Viewing battery cluster temperature curve

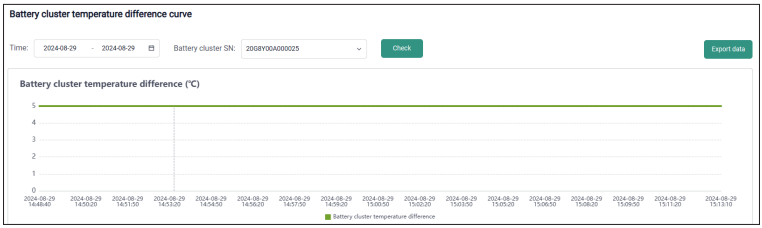



Figure 6-114 Viewing temperature difference curve of battery cluster

Related Operation

Click **Export data** to export the data to an Excel file.

#### Cell Temperature Analysis

**Step 1:** Select **Historical data** > **Battery analysis** > **Temperature analysis** > **Cell temperature analysis**.

**Step 2:** Set the **Time**, select the **Battery cluster SN**, and then click **Check**.

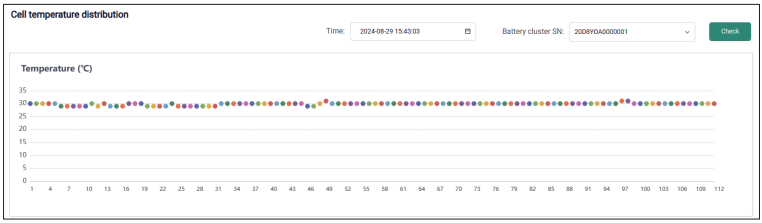



Figure 6-115 Viewing battery cell temperature

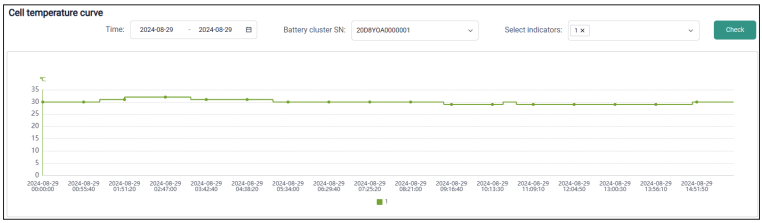



Figure 6-116 Viewing battery cell temperature curve

### 6.9.3.4 SOC Analysis

View the changes in battery SOC through the time.

**Step 1:** Select **Historical data** > **Battery analysis** > **SOC analysis**.

**Step 2:** Set the **Time**, select the **Battery cluster SN**, and then click **Check**.

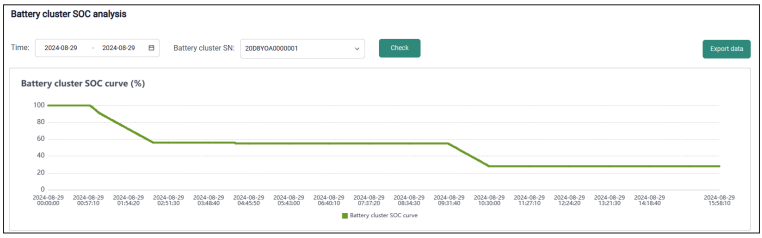



Figure 6-117 Viewing battery cluster SOC curve

### 6.9.3.5 Backward Battery Cell Analysis

The five cells with the least performance of each battery cluster on the day are displayed. This helps you identify the backward cells and take prompt measures to ensure the stable performance of the system.

**Step 1:** Select **Historical data** > **Battery analysis** > **Backward battery analysis**.

**Step 2:** Select the **Battery cluster SN**, set the **Time**, and then click **Check**.

The maximum time interval is 7 days. The search result is displayed in the order of cell number, lowest voltage of the cell, and the report time.

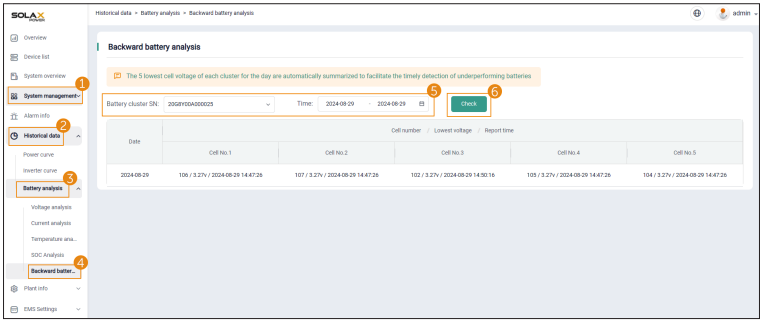



Figure 6-118 Viewing backward battery cells

## 6.10 Plant Information

View the basic information on the plant. The displayed plant information includes its name, location, system type, PV and energy storage data and more.

**NOTICE!**

Basic plant information displayed here is synchronized from SolaXCloud platform. The plant information cannot be modified on the webpage when EMS1000 is online, and you will have to modify the plant information on SolaXCloud platform if needed.

Log in to the webpage, and then select **Plant info** > **Basic info**.

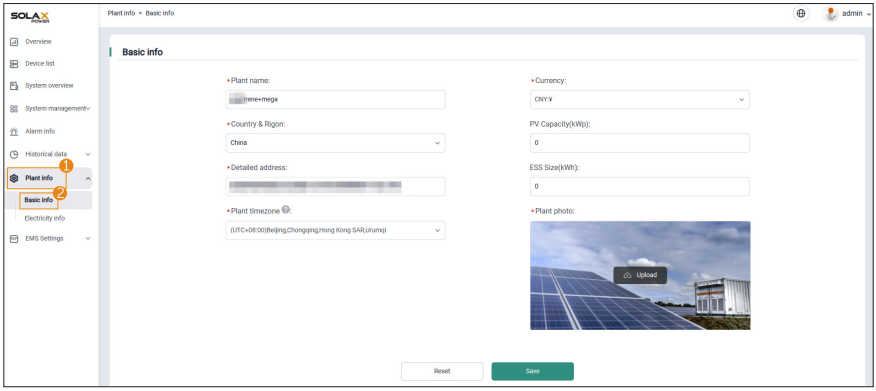



Figure 6-119 Viewing basic information of the station

Related Operation

Click **Reset** to modify the station information, which is available only when EMS1000 is offline.

### 6.10.1 EMS Settings

Set parameters for the eight RS485 channels of EMS1000, perform related operations on EMS1000 such as system resetting, system upgrade and data clearance, and configure network settings for it.

### 6.10.2 RS485 Settings

Configure parameters for the eight RS485 channels that EMS1000 offers to suit the connection requirements of multiple devices.

**Step 1:** Log in to the webpage, and then select **EMS settings** > **RS-485 settings**.

**Step 2:** For each channel, set the **Baud rate**, **Parity** and **Stop bit** as needed, and then click **Save**.

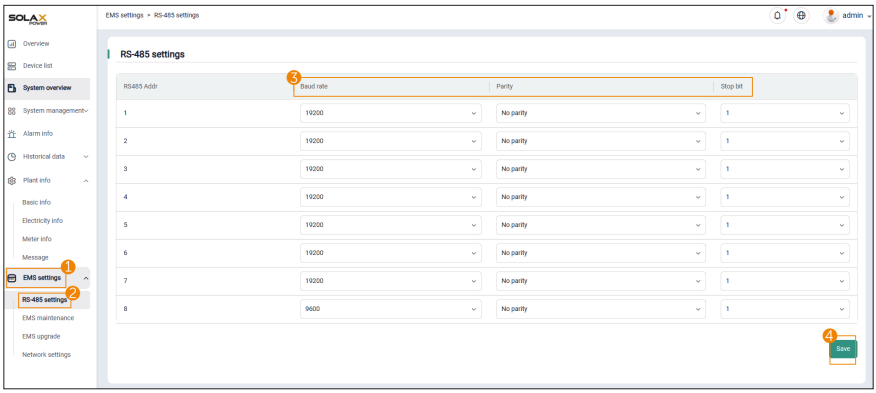



Figure 6-120 Configuring RS485 settings

Table 6-40 RS485 setting parameter description

| Parameter | Description |
|---|---|
| Baud rate | Data transmission rate of the channel, includes 9600, 19200, 38400, 57600 and 115200 |
| Parity | Currently, only **No Parity** is supported. |
| Stop Bit | 1 stop bit and 2 stop bits are supported. |

### 6.10.3 EMS Maintenance

Restart EMS1000, clear cache and data, restore it to factory settings if you need to, and enable or disable remote setting for remote access to the webpage through SolaXCloud platform.

#### 6.10.3.1 Resetting System

This is to simply restart EMS1000, and the system data will not be impacted.

**Step 1:** Log in to the webpage, and then select **EMS settings** > **EMS Maint**.

**Step 2:** On **System reset**, click **Execute**, and then click **Confirm** on the confirmation pop-up.

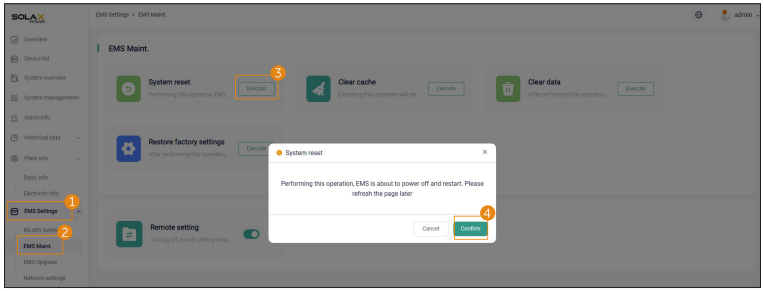



Figure 6-121 Resetting the system

#### 6.10.3.2 Clearing Cache

This is to clear the data stored during network breakpoint.

**Step 1:** Log in to the webpage, and then select **EMS settings** > **EMS Maint**.

**Step 2:** On **Clear cache**, click **Execute**, and then click **Confirm** on the confirmation pop-up.

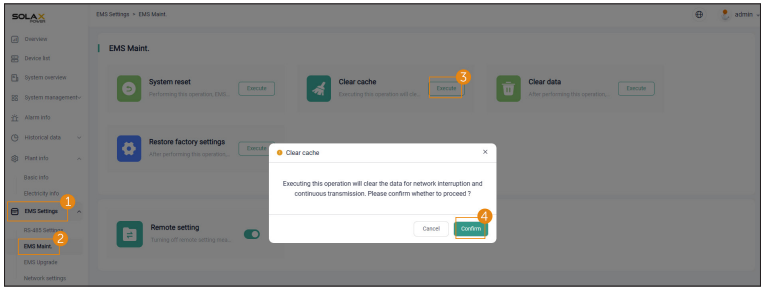



Figure 6-122 Clearing system cache

### 6.10.3.3 Clearing Data

This is to clear all history data stored in EMS1000 SSD.

**Step 1:** Log in to the webpage, and then select **EMS settings** > **EMS Maint**.

**Step 2:** On **Clear data**, click **Execute**, and then click **Confirm** on the confirmation pop-up.

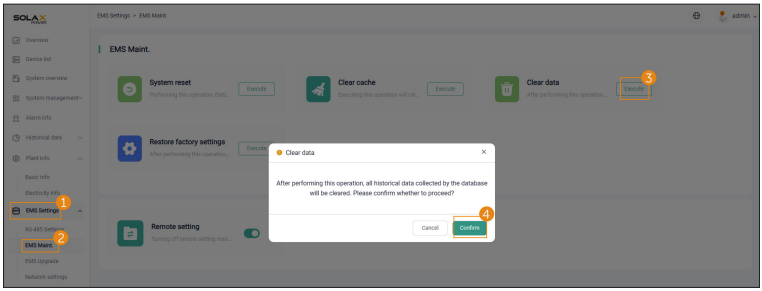



Figure 6-123 Clearing system data

### 6.10.3.4 Restoring Factory Settings

**NOTICE!**

EMS1000 will restore to factory settings and restart after you perform this function, and you need to unplug and plug the network cable again before you can continue to use the Device normally.

**Step 1:** Log in to the webpage, and then select **EMS settings** > **EMS Maint**.

**Step 2:** On **Restore factory settings**, click **Execute**, and then click **Confirm** on the confirmation pop-up.

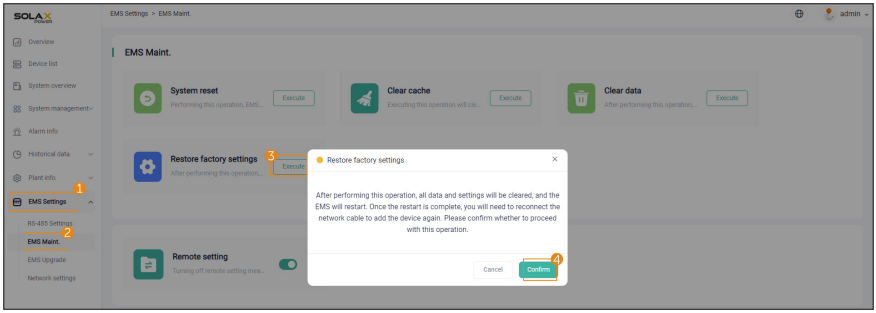



Figure 6-124 Restoring EMS1000 to factory settings

#### 6.10.3.5 Remote Setting

Turn on or off remote setting on the webpage to allow or prevent SolaXCloud platform accessing the webpage remotely. The function is enabled by default.

**Step 1:** Log in to the webpage, and then select **EMS settings** > **EMS maintenance**.

**Step 2:** On **Remote setting**, click the enable and disable toggle, and then click **Confirm** on the confirmation pop-up.

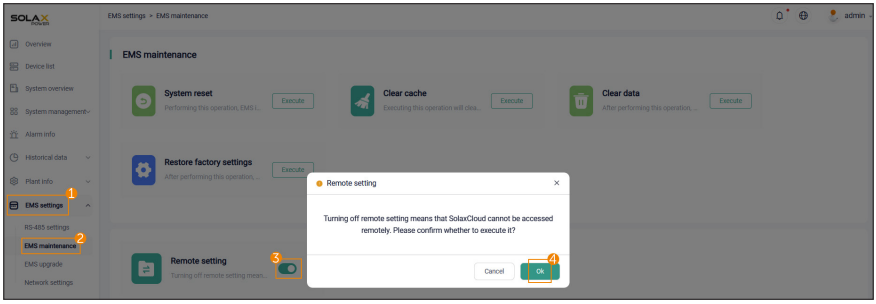



Figure 6-125 Disabling remote setting

### 6.10.4 EMS System Upgrade

**NOTICE!**

- System upgrade is available only for Admin account.
- Operations on EMS1000 are not available during upgrade.

**Step 1:** Log in to the webpage, and then select **EMS settings** > **EMS upgrade**.

**Step 2:** Click **Choose file** on the page, select and import the upgrade file, and then click **Upgrade** to start upgrading.

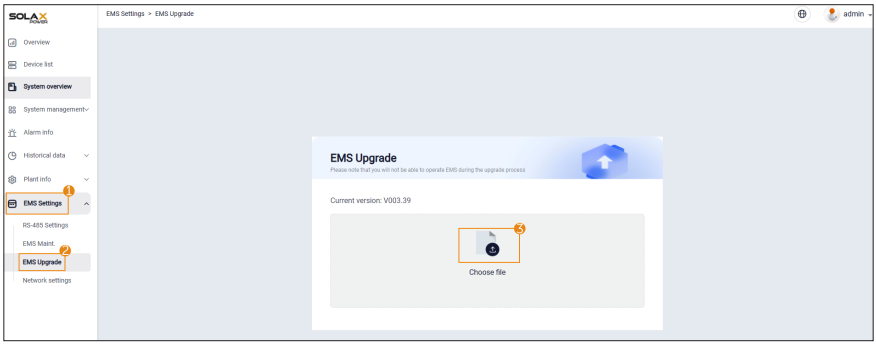



Figure 6-126 Upgrading EMS1000

### 6.10.5 Network Settings

Configure network parameters for EMS1000 under 4G and LAN mode.

**Step 1:** Log in to the webpage, and then select **EMS settings** > **Network settings**.

**Step 2:** Set **Communication method** to **LAN** or **4G**, set the corresponding parameters, and then click **Save**.

**NOTICE!**

The external network segment cannot be 192.168.11.X or 192.168.10.X in case of IP address conflict.

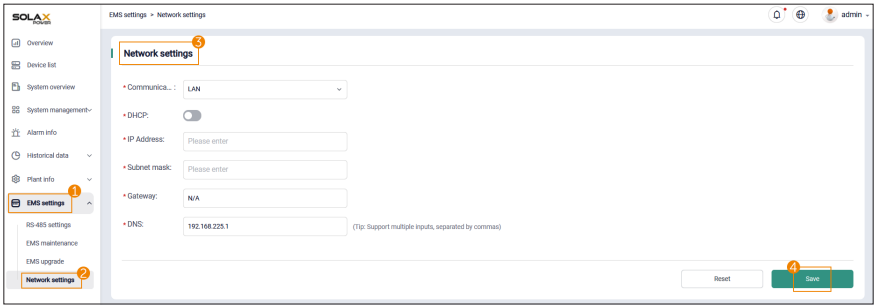



Figure 6-127 Setting network parameters

Related Operation

Click **Reset** to clear all existing parameters.

# 7 Maintenance and Troubleshooting

## 7.1 Maintenance

Maintain EMS1000 regularly to ensure its long-term stable performance.

Table 7-1 Maintenance routine

| No. | Maintenance Item | Cycle |
|---|---|---|
| 1 | Check and update the software of EMS1000 when new software versions are released. | Subject to the official release of a new version |
| 2 | Modify the password regularly, and keep the password at a relatively high security level. | Subject to the maintenance of the system |
| 3 | Check the hardware status of EMS1000, including the terminals, the LED indicators and more. | |
| 4 | Check the connection and arrangement of the cables. | |

## 7.2 Troubleshooting

When an exception occurs, check the troubleshooting list below for possible reasons and solutions. For problems that cannot be solved or not specified in the list, contact our technical support. By then, prepare your device SN and problem.

Table 7-2 Possible problems, reasons and solutions

| No. | Problem | Possible Reason | Solution |
|---|---|---|---|
| 1 | EMS1000 cannot be powered on. | • The power cable connection is incorrect. For example, the + and – poles are reversely connected.<br>• The power supply terminal is not inserted into, or is loose from the main part of EMS1000.<br>• The cabinet where EMS1000 is installed in has no power supply.<br>• EMS1000 exception | • Check the wiring of the power supply terminal, and secure the screw for it.<br>• Supply power for the cabinet.<br>• Contact the installer or SolaX technical support. |

| No. | Problem | Possible Reason | Solution |
|---|---|---|---|
| 2 | Connected devices cannot be found. | • The wiring sequence of the communication cables is incorrect.<br>• The communication cables are not properly connected to the correct terminals of EMS1000.<br>• The parameters set for RS485 communication on the webpage are inconsistent with the actual situation. | • Check the connection status of the communication cables, and reconnect them if necessary.<br>• Check the parameters for RS485 communication, and ensure that the baud rate, parity and stop bit are set correctly. If multiple devices are connected through RS485 terminals, the address cannot be repeated. |
| 3 | The device connected to EMS1000 displays offline on the webpgae. | • The communication cable between EMS1000 and the device is not properly connected.<br>• The device is powered off or is abnormal.<br>• The device communication parameters have been modified.<br>• The device has been replaced. | • Check the communication cable connection, and reconnect it if necessary.<br>• Check if the device is powered off or fails to operate due to exception. In this case, troubleshoot the device and power on it again.<br>• Check the RS485 communication parameters of the device, and set these parameters to be compatible with EMS1000.<br>• If the device has been replaced, search for it or manually add it to EMS1000 again. |
| 4 | EMS1000 Wi-Fi cannot be found. | The Wi-Fi signal is weak. | Open the cabinet door and try again. |
| 5 | Communication between EMS1000 and SolaXCloud platform fails. | • EMS1000 fails to bind a plant on SolaXCloud platform.<br>• 4G communication fails.<br>• LAN communication fails. | • Create a new plant and bind EMS1000 to it, or directly bind EMS1000 to an existing plant.<br>• See solutions for 4G communication failure below.<br>• See solutions for LAN communication failure below. |

| No. | Problem | Possible Reason | Solution |
|---|---|---|---|
| 6 | 4G communication fails. | • SIM card is not inserted, is damaged or runs out of credit.<br>• 4G communication parameters are set incorrectly.<br>• 4G signal strength is weak. | • Check the SIM card slot, and make sure the SIM card is in good condition and properly inserted.<br>• Contact the mobile service provider or solax technical support to recharge.<br>• Check the 4G communication parameters, and make sure the APN infomation are correct.<br>• Fasten or replace the antenna.<br>• Check the 4G singal on EMS1000 webpage. |
| 7 | LAN communication fails. | • The network cable of EMS1000 is connected to the wrong NET terminal.<br>• Abnormal network on the site<br>• The communication is blocked by the network firewall<br>• LAN communication parameters are set incorrectly. | • Check and make sure that the network cable is connected to NET4 of EMS1000.<br>• Check the availability of local network through a computer or phone.<br>• Check the firewall settings of local network, and release the domain and port that EMS1000 communicates with SolaXCloud platform.<br>• Select the IP acquisition method supported by the local network. For static IP, correctly enter the IP address, subnet mask, DNS and gateway. |
| 8 | Device pairing failed. | The wiring between the cabinet and its devices is abnormal. | Check the wiring, reconnect the cables, and try again. |

# 8 Technical Data

Table 8-1 Specification

| | |
|---|---|
| Power supply | 12 d.c. V-24 d.c. V |
| Ethernet | 10/100/1000 Mbps |
| Dimensions (L × W × H) | 232.0 mm × 113.2 mm × 59.0 mm |
| Weight | 1900g |
| Max. power consumption | 27 W |
| Operating temperature range | -40°C to +60°C |
| Ingress protection | IP20 |

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