EMS for PowerHill (233kWh)

User Manual

V_1.0

Date   2025/05/07

Copyright Declaration

Contents

About This Manual

Overview

This manual introduces the basic features, functional modules, system interface, and operation methods of the Dunext Energy Management System (hereinafter referred to as "EMS"). Please read this manual carefully before operation.

Intended Audience

This manual is intended for technical professionals responsible for monitoring and managing energy storage site systems. Readers are expected to have a basic understanding of electrical engineering and energy storage principles, and be familiar with relevant safety procedures and standards.

Symbol Conventions

The following types of safety instructions and general information appear in this document as described below:

Symbol	Description
⚠️ **WARNING!**	'Warning' indicates a hazard, if not avoided, will result in property damage, personal injury, or even death.
NOTICE **NOTICE!**	'Notice' indicates information that requires special attention.

NOTE!	'Note' provides tips that are valuable for the optimal operation of the product.
⚡	Danger of electric shocks.
	Attention: Electrostatic sensitive devices.

Change History

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

Issue 01 (2025-05-07)

This issue is used for first application

1 Safety Precautions

During the installation and operation of this product, the following safety and operational requirements must be strictly followed. Dunext shall not be held liable for any product damage or personal injury resulting from failure to comply with these requirements.

1.1 Important Safety Instructions

⚠️ **WARNING!**	'Warning' indicates a hazard with a medium level of risk that, if not avoided, will result in death or serious injury.
⚡	Danger of electrical strike. • Do not install the product during thunderstorms or lightning conditions. • Do not touch any conductive parts while the circuit is energized. • Do not touch any conductive parts of the system while it is energized.

2 System Overview

2.1 Development Background

The EMS has been developed by Dunext for better management and control of the energy storage system. Users can monitor various indicators of the energy storage system in real time through the Human-Machine Interface (HMI) and easily manage the entire system. Based on real-time data, users can make informed decisions to ensure stable operation while enhancing the overall performance of the system.

2.2 System Profile

The EMS is equipped with an industrial-grade high-resolution capacitive touch screen. It supports wall-mounted, rack-mounted, and DIN rail-mounted installation methods. Users can operate the energy storage system directly through the touch screen without the need for an external computer.

The EMS adopts the following features:

- Stable performance and durability: The hardware has passed multiple rounds of performance testing, including high/low temperature, electrostatic discharge, EMI, and vibration tests, ensuring reliable quality and long-term durability.

- Real-time monitoring of the energy storage system: The EMS enables real-time monitoring and timely feedback of various parameters of the energy storage system, allowing operators to have a comprehensive understanding of its operational status.

- Support for independent system operation: The EMS allows users to manage the energy storage system directly through its touchscreen interface, without reliance on a cloud platform.

- Support for remote cloud-based commissioning: Users can remotely control and commission the energy storage system via the cloud platform, improving work efficiency and reducing labor costs.

- Support for friendly user interface: The EMS features a high-definition and intuitive interface, enabling users to easily manage the entire energy storage system and adjust parameters or perform operational settings at any time.

2.3 System Components

The EMS consists of the following functional modules:

- Monitoring: Energy, Grid, Alarms, Historical, About, Utilization, Network

- Energy MGT: Parameter, Strategy, Manual, Remote

- Device Data: Internal Power Meter, Energy Meter, Power Conversion System, Battery Management System, Battery Cell, Dry Contacts. The data modules will be displayed based on the configured devices.

- Device MGT: Port, Device, Diagnosis

- System: Basic, Connection, Parameter, Operation

Figure 2-1 System components
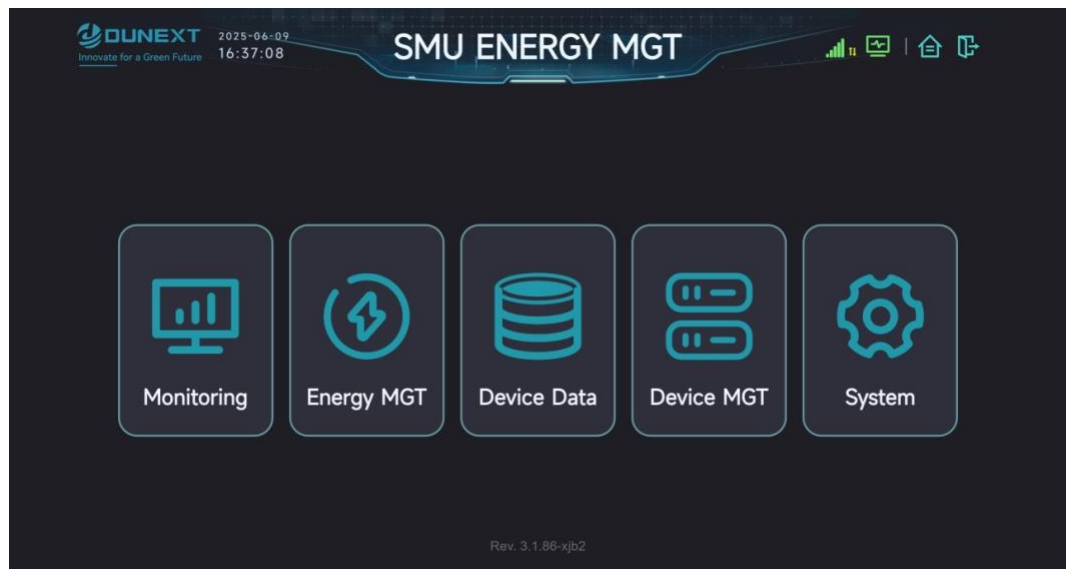
3 Network Structure

The EMS supports local monitoring and operation via web access or its integrated touchscreen.

Figure 3-1 Network structure
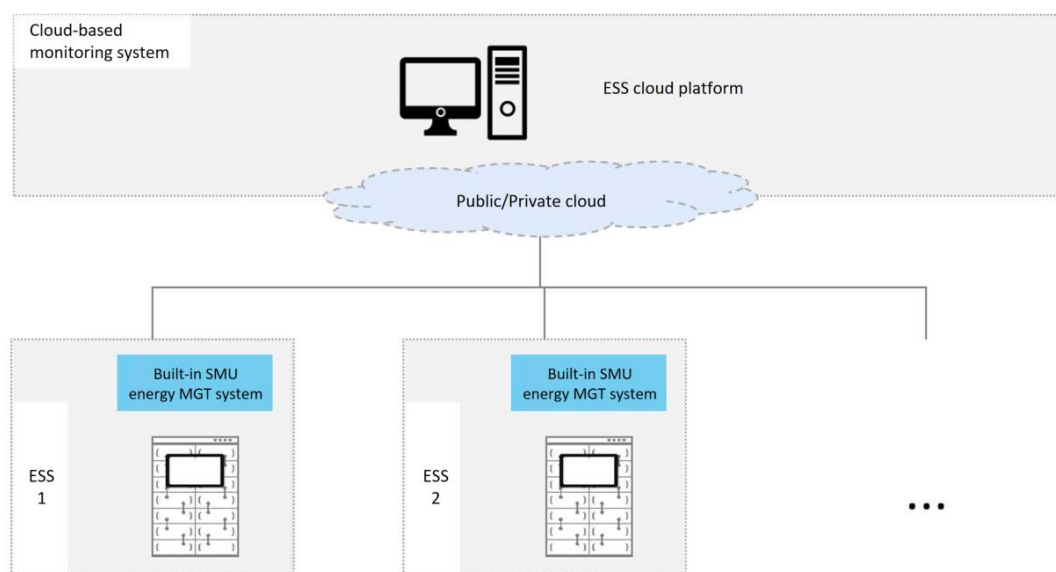
4 System Interface and Settings

4.1 Language Switch Function

The EMS system supports both Chinese and English languages and allows switching between them.

Procedure

Click System > Operation > System

Click the edit button of **Language Switch**, select the desired display language, and then click **Sure**. The change will take effect after the system restarts.

Figure 4-1 Language switch function
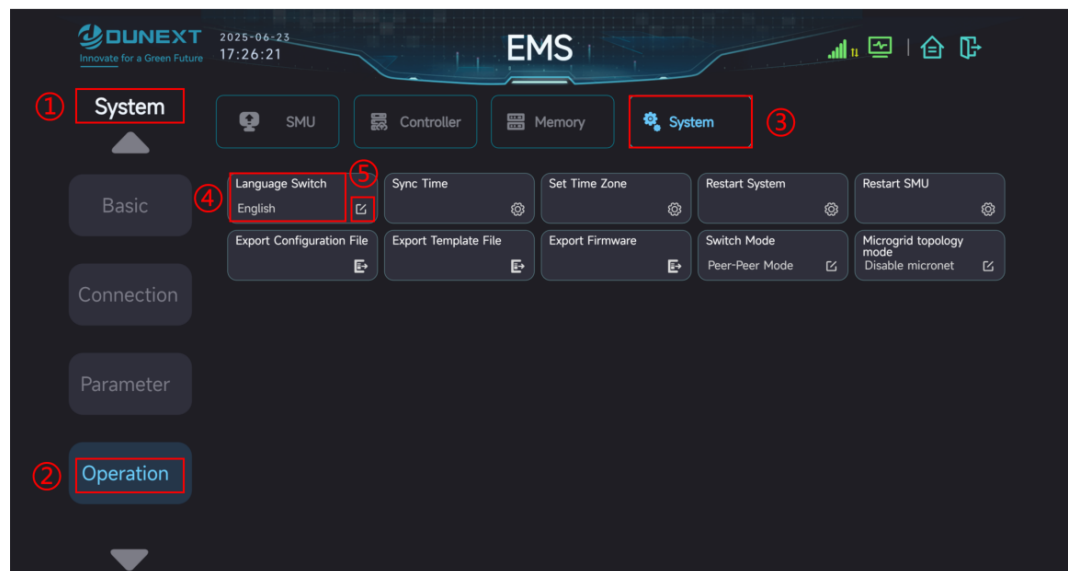
4.2 Home Screen

After the energy storage system is powered on, the EMS will start automatically and display the home screen.

Figure 4-2 EMS home screen for single energy storage cabinet
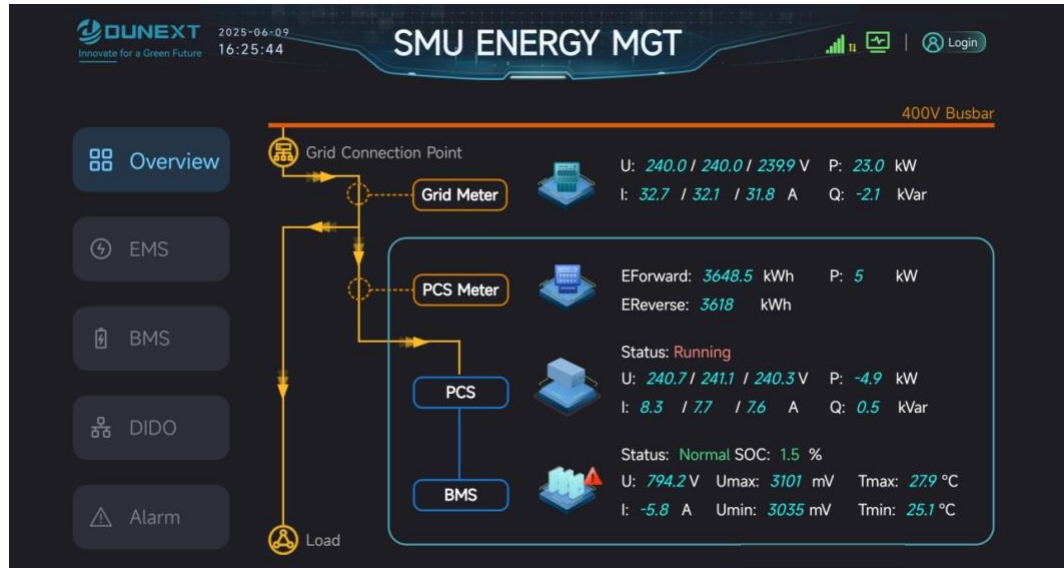
The left section of the homepage displays key status, data, and alarms of the EMS, including the following:

- Overview
- EMS
- BMS
- DIDO
- Alarm

Figure 4-3 EMS microgrid system home screen
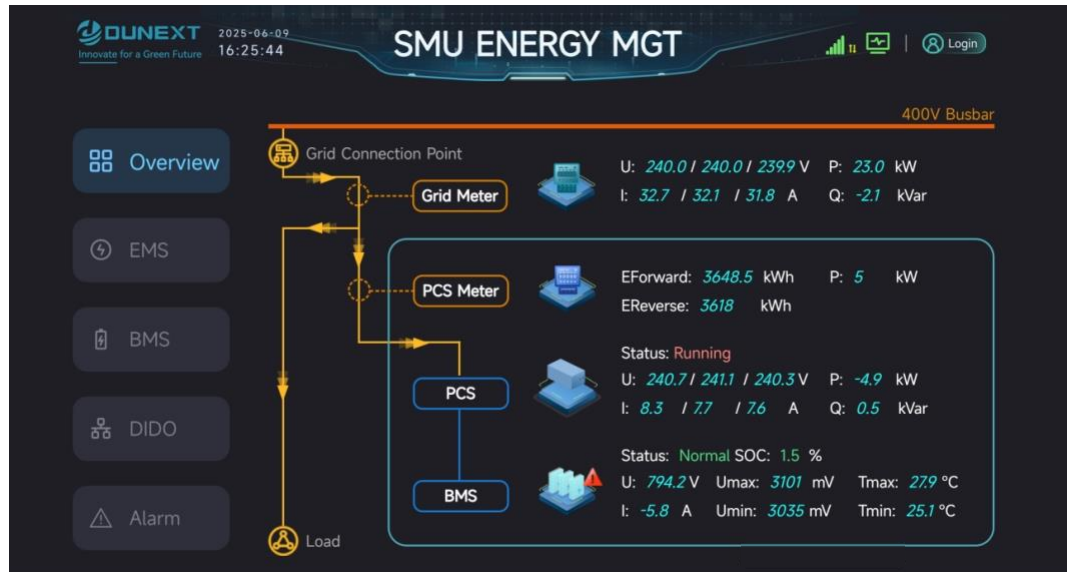
4.2.1 Icons Description

The upper right corner of the home screen displays the wireless network status, backend connection status, and login icon.

Figure 4-4 Home screen icons
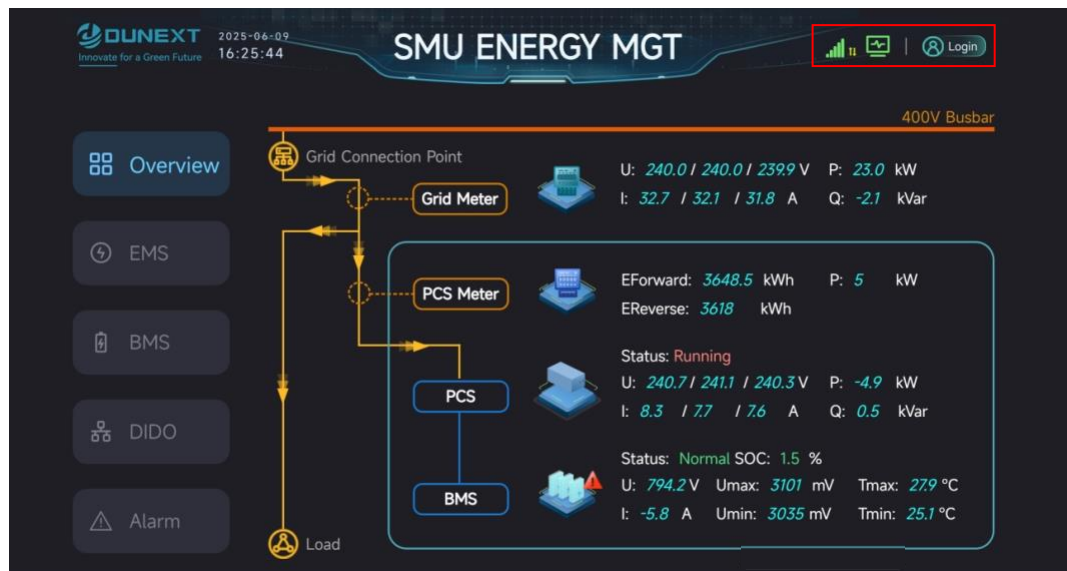
1. Wireless network icon: it indicates the current status and signal strength of the 4G wireless network. Green indicates a good connection, red indicates a poor connection, and grey indicates no network connection. By hovering the cursor over the icon, users can view the current 4G signal strength and network status.

Figure 4-5 Wireless network icon

2. Backend connection icon: it displays the connection status between the EMS interface and the backend system. Green indicates a successful connection, and red indicates a connection failure.

3. Login icon: By clicking the icon, users can log in to the SMU energy management system.

4.2.2 Overview

The Overview panel presents a comprehensive, real-time display of key parameters of the energy storage system, such as voltage, current, power, PCS, battery information, and the direction of current flow—enabling users to stay informed of the system's current state.

Figure 4-6 Overview interface
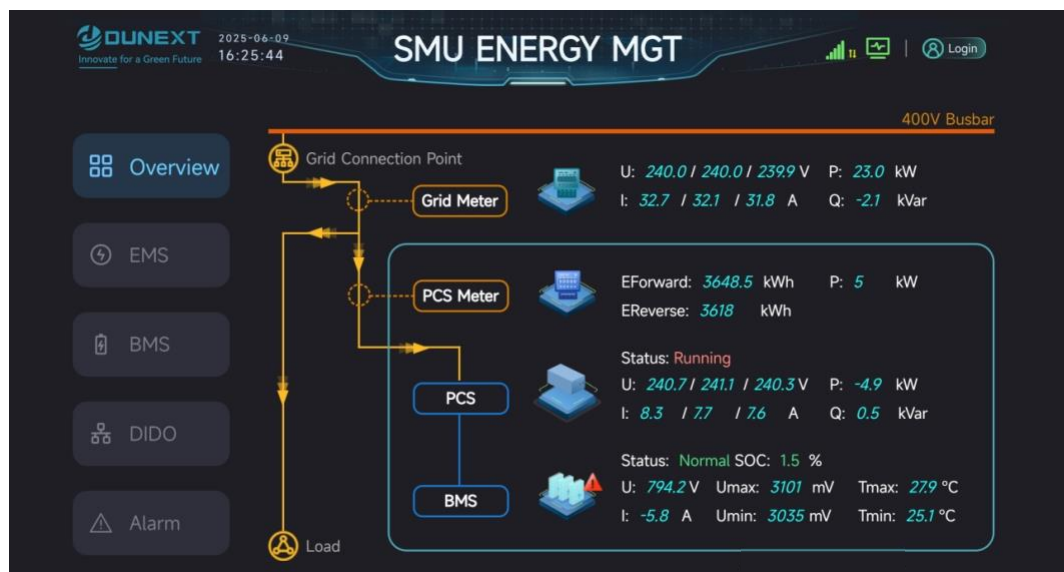
1. Grid meter: Installed at the grid connection point (low-voltage side of the transformer) to measure the net energy consumption and generation of the entire microgrid system to/from the power grid.

● U: Indicates the three-phase voltage at the grid connection point.

● I: Indicates the three-phase current at the grid connection point.

- P: Indicates the amount of active power fed to or purchased from the grid.

- When P is positive, it means the microgrid system is purchasing electricity from the grid.

- When P is negative, it means the microgrid system is feeding to the grid.

- Q: Indicates the reactive power exchanged between the microgrid system and the grid.

2. PCS meter: Installed on the AC side inside the energy storage system to directly measure the charging and discharging operations of the C&I energy storage cabinet.

- E Forward: Represents the total energy charged into the C&I energy storage cabinet.

- E Reverse: Represents the total energy discharged from the C&I energy storage cabinet.

- P: Indicates the active power for charging and discharging of the C&I energy storage cabinet.

- When P is positive, it indicates charging of the C&I energy storage cabinet.

- When P is negative, it indicates discharging of the C&I energy storage cabinet.

Note: The home screen of the SMU Energy Management System may vary slightly depending on pure storage, PV DC coupling, or AC coupling configurations. Please refer to the actual display page for accurate information.

4.2.3 EMS

The EMS panel on the left displays the current key status of the EMS controller, such as prohibited charging protection, prohibited discharging protection, expected active power, system operating status, etc.

Figure 4-7 EMS interface

4.2.4 BMS

The BMS panel on the left displays the BMS management data of the energy storage cabinet.

Users can view information of corresponding energy storage cabinet including cluster SOC, cluster SOH, cluster total voltage, cluster total current, maximum single cell voltage, maximum single cell voltage number, minimum single cell voltage, minimum single cell voltage number, maximum battery temperature, maximum battery temperature number, minimum battery temperature, minimum battery temperature number.

Figure 4-8 BMS interface

Click the number of the energy storage cabinet (e.g. 1#) in the middle of the page to view the BMS information about that specific cabinet.

4.2.5 DIDO

The DIDO panel on the left displays the DI device information of the EMS controller.

Users can view the status of internal components of the corresponding energy storage cabinet, such as water immersion, smoke detector alarm, cabin-level aerosol release, and lighting protection fault, etc.

Figure 4-9 DIDO interface

4.2.6 Alarm

The Alarm panel on the left displays the current alarm information of the current devices.

Figure 4-10 Alarm interface
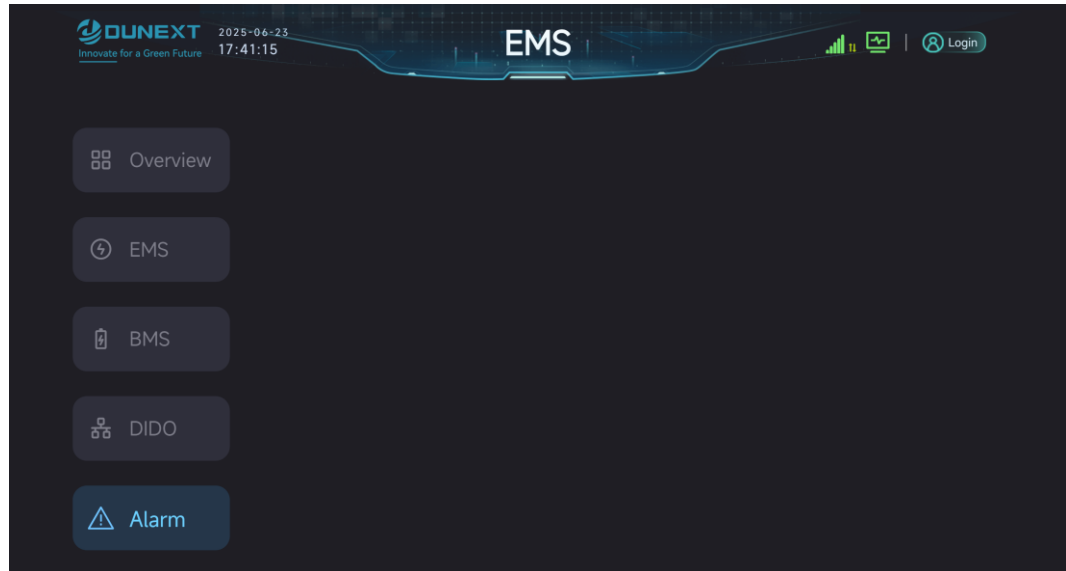
4.3 System Login

Prerequisites

- The energy storage system is powered on.
- It supports Windows 7 and above operating systems.
- Browser: Chrome 52, Firefox 58, IE 9, or higher versions are recommended.

Procedure

1. **Connect the network cable between the computer's Ethernet port and the LAN port on the top-right of the EMS screen.**

Figure 4-11 Connect network cable

2. **Configure the IP addresses of the computer and the EMS LAN port to be on the same subnet.**

Port	EMS Default Value	Computer Settings
IP Address	192.168.10.101	192.168.10.11
Subnet Address	255.255.255.0	255.255.255.0
Default Gateway	192.168.10.1	192.168.10.1

3. **Log in to the EMS web interface.**

Enter https://192.168.10.101 in the browser and press Enter to access the overview page.

4. **Log in to the system**

Click the **Login** icon in the upper right corner of the EMS interface to open the login pop-up window.

Figure 4-12 System login
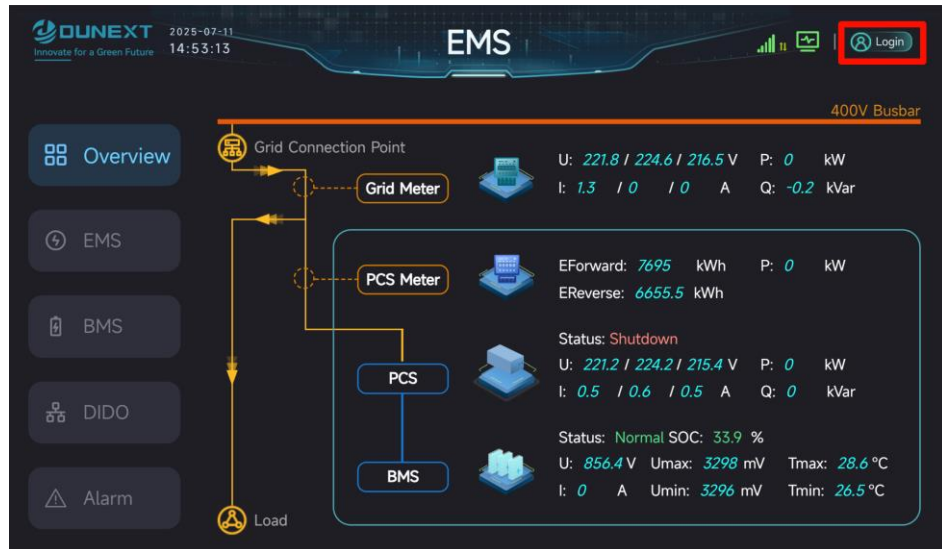
Figure 4-13 Login pop-up window
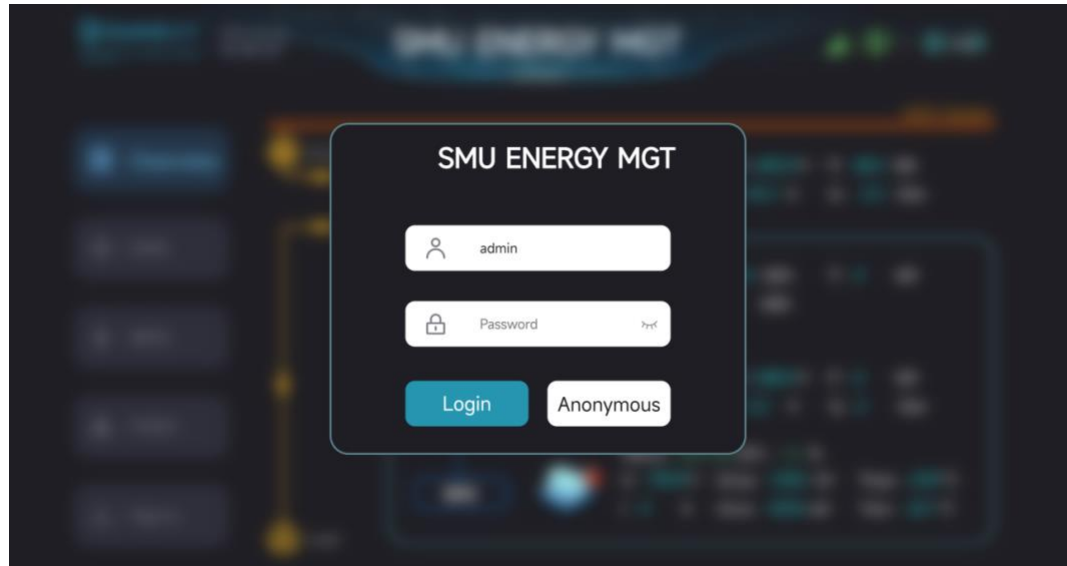
- Method 1: To log in as a registered user, enter your account name and password, then click **Login**. After that, you can check and edit information in the system.

- Method 2: To log in anonymously, click **Anonymous**. Users logging in anonymously have view-only access and cannot perform editing or modification operations.

Note: When logging in to the system as a registered user, avoid modifying parameter values. It is recommended to log in anonymously instead.

After a successful login, the main interface of the EMS will be displayed on the screen.

Figure 4-14 Main interface
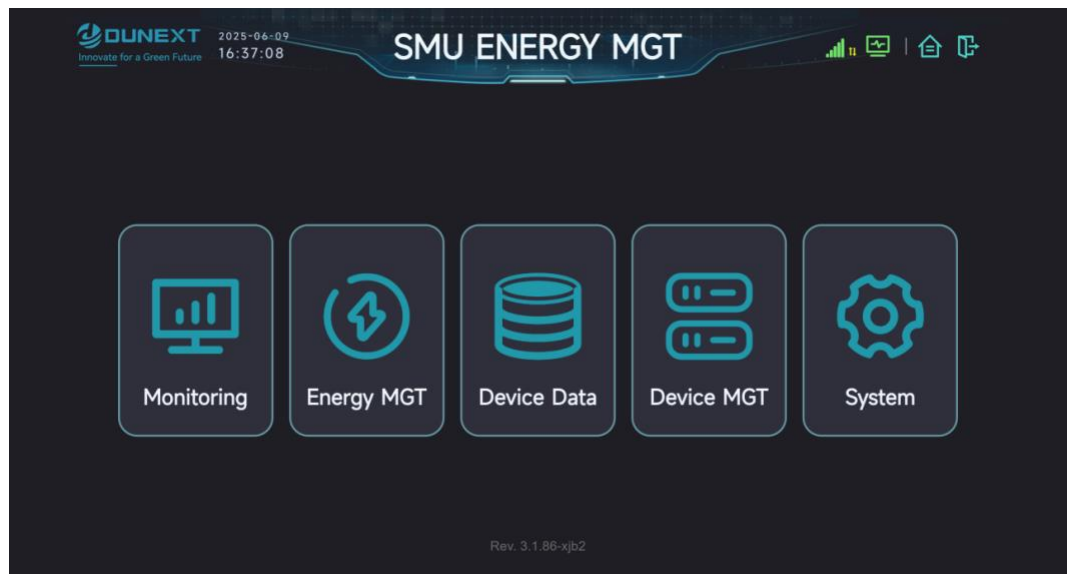
4.4 General Settings

4.4.1 Icons Description

After logging into the EMS, the icons in the upper right corner are shown as below:

Figure 4-15 Interface icons
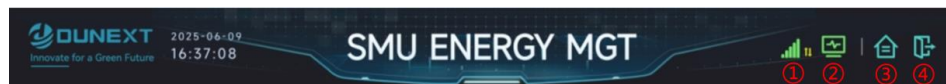
1. Wireless network icon: it indicates the current status and signal strength of the 4G wireless network. For details, please refer to 4.2.1.

2. Backend connection icon: it displays the connection status between the EMS interface and the backend system. For details, please refer to 4.2.1.

   Language switch icon: it allows users to switch between Chinese and English. For details, please refer to 4.2.1.

3. Back to main interface icon: Click this icon to return to the EMS main interface.

4. Logout icon: Click this icon to lout out and return to the homepage of the EMS.

4.4.2 Main Interface Settings

The central area of the EMS main interface displays the following key functional modules:

- Monitoring: It monitors the real-time status and key parameters of the energy storage system, and issues alarms for faults to ensure its safe and stable operation.

- Energy MGT: It optimizes the operational and protection strategies of the energy storage system through intelligent dispatching and control, enabling safe, efficient energy use and improving overall system performance.

- Device Data: It connects all southbound devices. As the entry point for underlying data read/write operations, it provides functions Read Data and Set PARM for each connected southbound device.

- Device MGT: It configures and diagnoses all connected southbound devices, and offers features such as port configuration, device configuration, factory diagnosis, and charge/discharge diagnosis, effectively supporting the operation and maintenance of all devices.

- System: It allows users to modify energy storage system parameters and provides functions such as system upgrade and maintenance, user management, customized configuration, and connection management.

Users can click on a functional module icon to enter its corresponding page and view its submenu and detailed features.

Figure 4-16 Main interface module icons
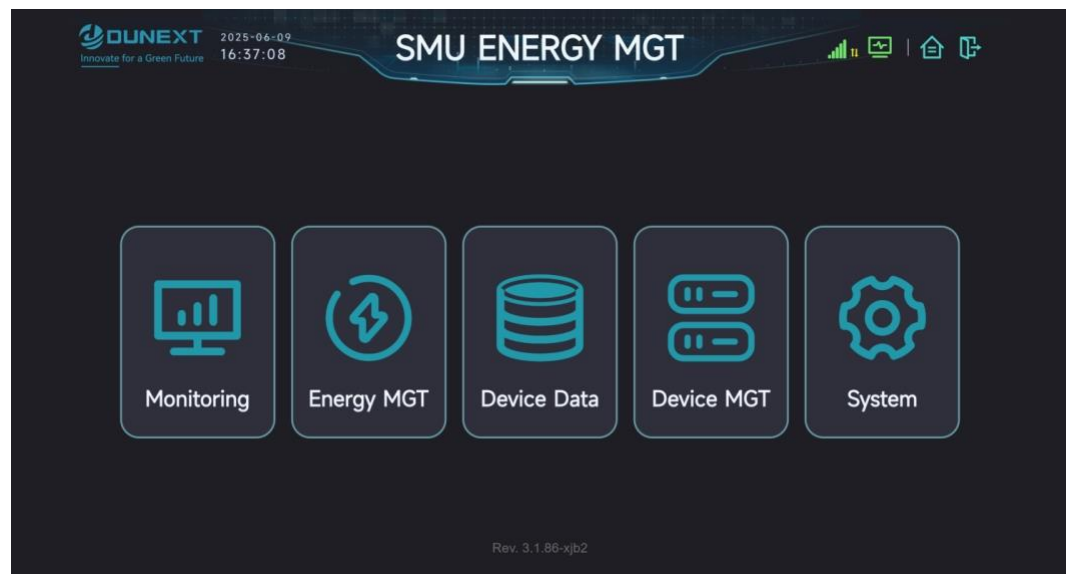
4.4.3 Expandable Page Settings

The historical data statistics chart function is collapsed by default under **Monitoring** > **Energy**, **Monitoring** > **Grid**, and **Device Data** modules. To view the details of the historical data statistics chart, users can click the expand icon in the lower-right corner of the page where this feature is available. Take the operation on the **Energy** page as an example, and the operation in the **Device Data** module follows similar steps:

Procedure

1. Click **Monitoring** > **Energy**

2. Click the expand icon in the lower right corner of the page

Figure 4-17 Expanded data chart icon
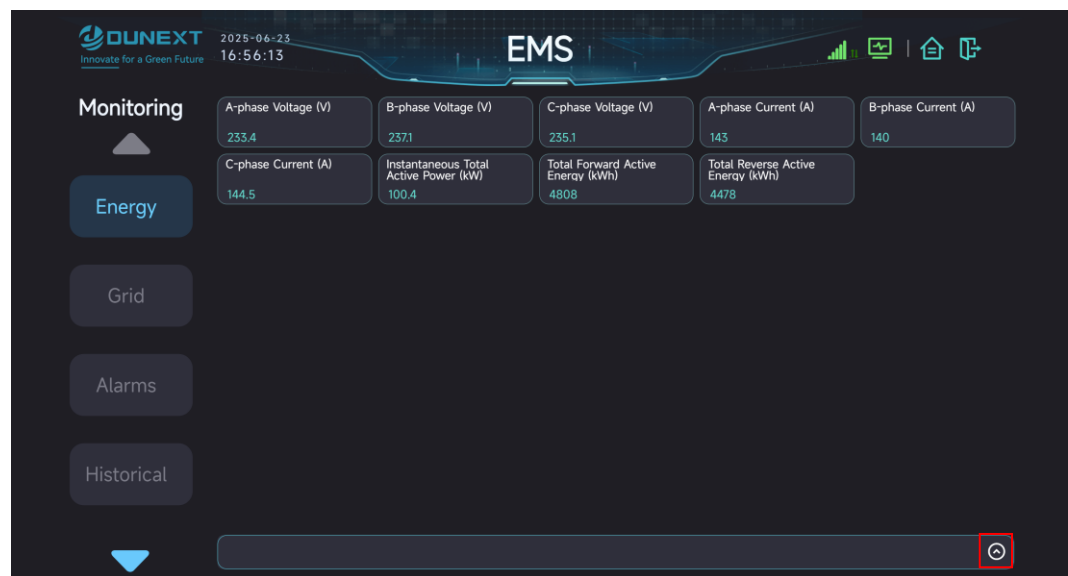
3. Click the dropdown list in the upper left corner of the expanded section.

Figure 4-18 Dropdown list
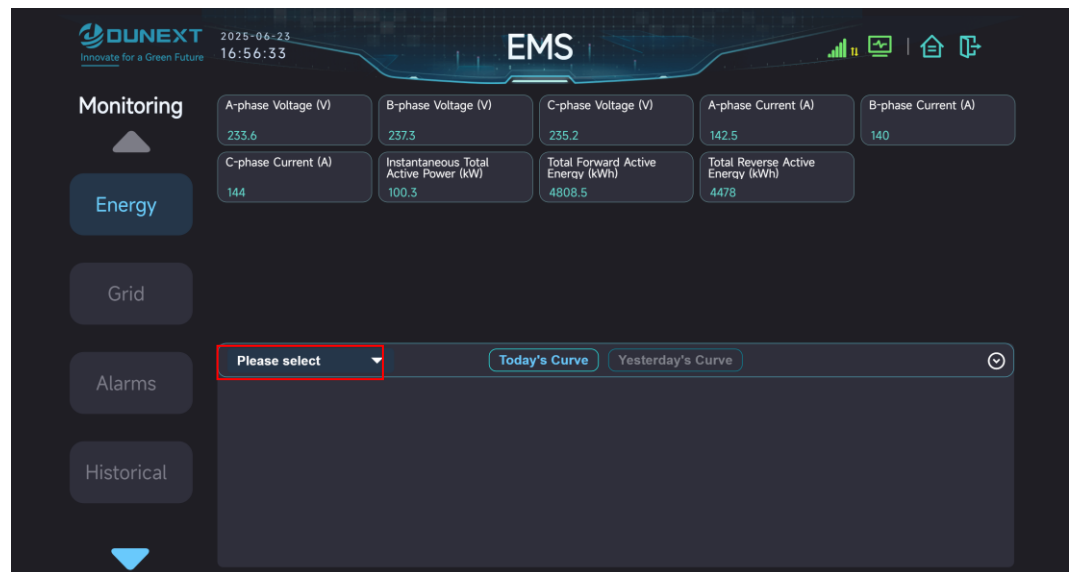
4. In the **Select** pop-up dialogue, click the dropdown list to choose the data to display.

Figure 4-19 Choose the data to display
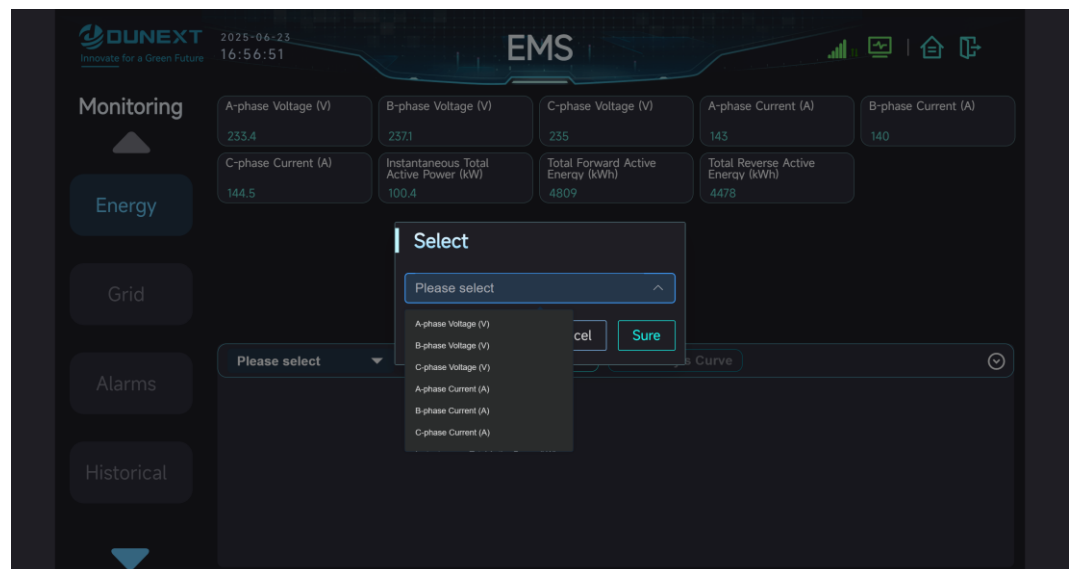
5. Click **Sure**

Result

The corresponding data statistics chart will be displayed.

Figure 4-20 Data statistics chart
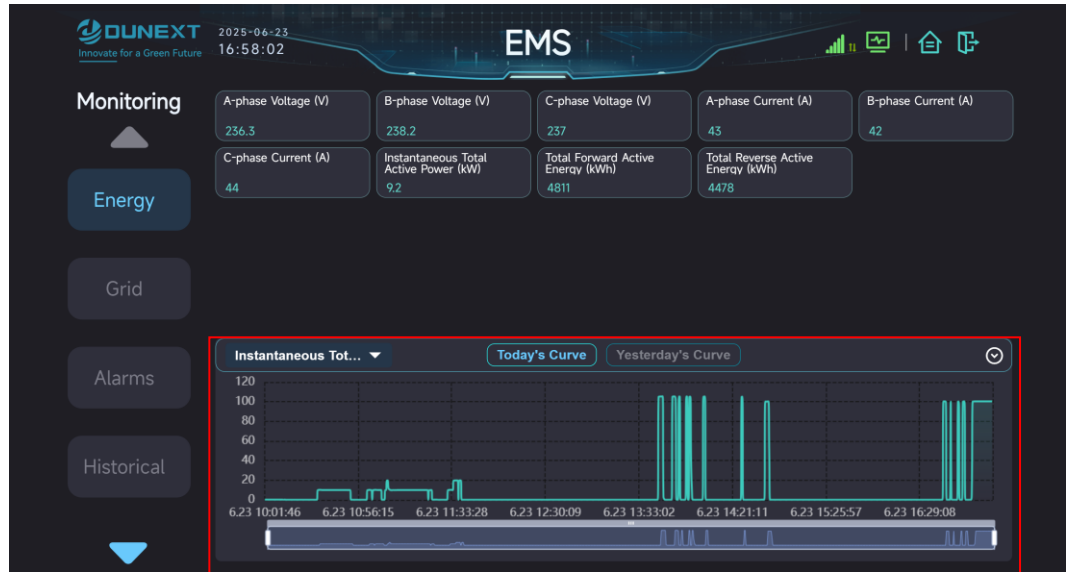
6. Click **Today's Curve** or **Yesterday's Curve**

Result

The corresponding data statistics chart will be displayed.

Figure 4-21 Today's curve and yesterday's curve
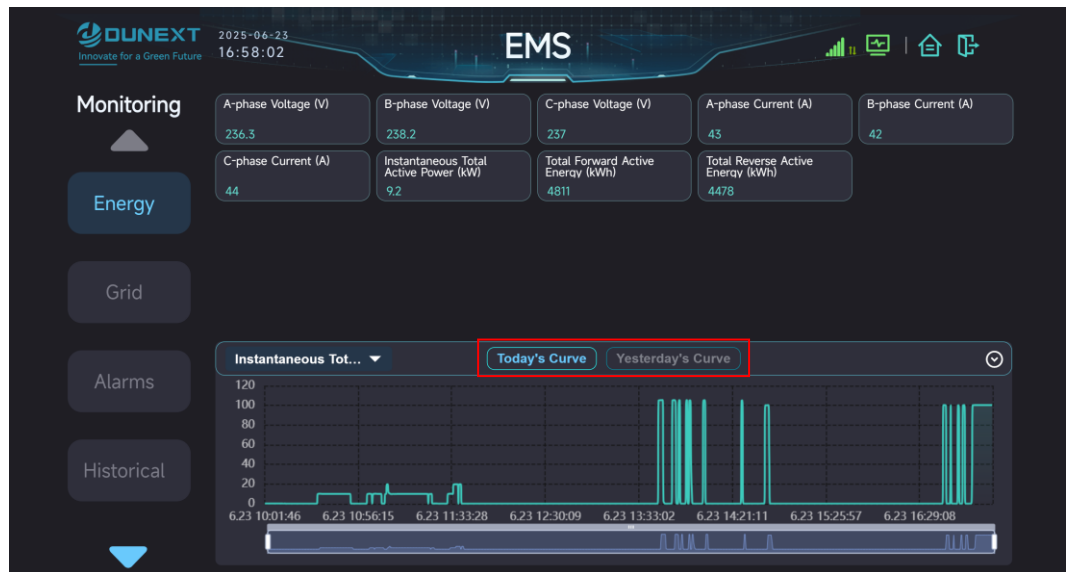
7. (Optional) Click the expand icon again to collapse the data chart.

4.5 System Monitoring

By clicking Monitoring on the main interface, users can view information such as energy data, grid data, and alarms.

Figure 4-22 Monitoring module
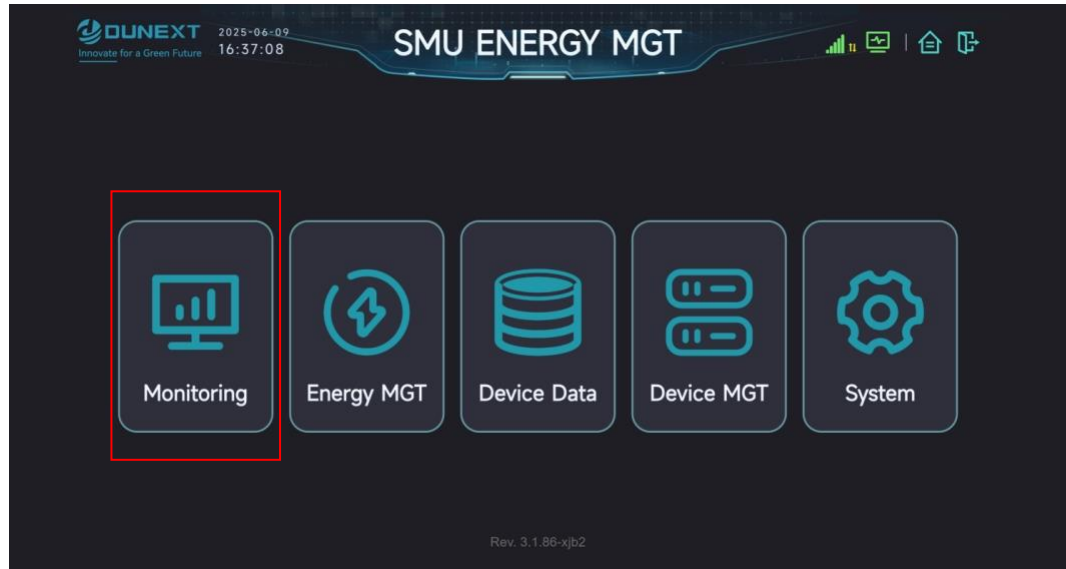
Use the Up or Down button to view all submodules of Monitoring.

Figure 4-23 Scroll Down button on monitoring module

4.5.1 Energy Monitoring

After entering the Monitoring page, click Energy in the left panel.

- Peer-Peer mode site: Users can view the operational data of the energy storage system's power meter, including three-phase voltage and current, total active power, and total active energy. This enables real-time monitoring of the energy storage system, timely issue detection and intervention, and maximizes energy utilization efficiency.

Figure 4-24 Energy monitoring interface in peer-peer mode

- Master-Slave mode site: Users can view the operational data of the energy storage system's power meter, including total apparent power, total active power, total reactive power, total forward active energy, total reverse active energy. This enables real-time monitoring of the energy storage system, timely issue detection and intervention, and maximizes energy utilization efficiency.

4.5.2 Grid Monitoring

By clicking Grid in the left panel, users can check the operating status of the grid, including total apparent power, total active power, and total reactive power. This helps users quickly identify issues such as power backflow and demand control problems in the energy storage system.

Figure 4-25 Grid interface

4.5.3 Current Alarms

By clicking Alarms in the left panel, users can view real-time alarm information in the energy storage system, including alarm time, alarm level, and alarm content. This enables timely detection of system or equipment issues and allows users to take appropriate measures to troubleshoot potential risks and ensure the normal operation of the energy storage system.
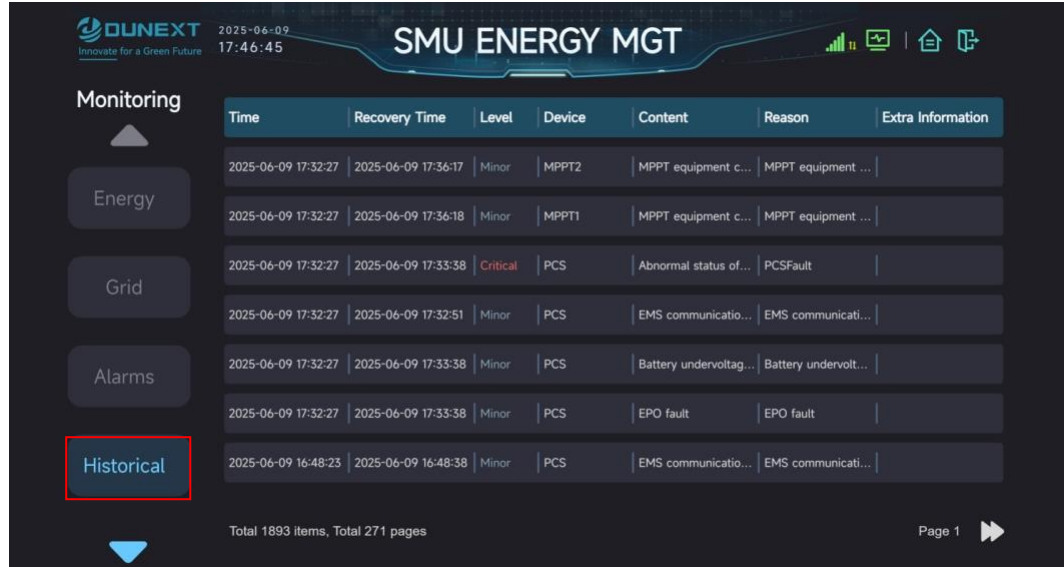
Figure 4-26 Alarms interface

4.5.4 Historical Alarms

By clicking Historical in the left panel, users can view past alarm records that have already been cleared in the energy storage system, including the alarm time, recovery time, alarm level, and alarm content. This helps users diagnose and troubleshoot faults to maintain stable system operation.

Figure 4-27 Historical interface

4.5.5 Site Information

By clicking About in the left panel, users can view information such as SIM card number, site number, controller number, installed capacity, and EMS version.

Figure 4-28 About interface
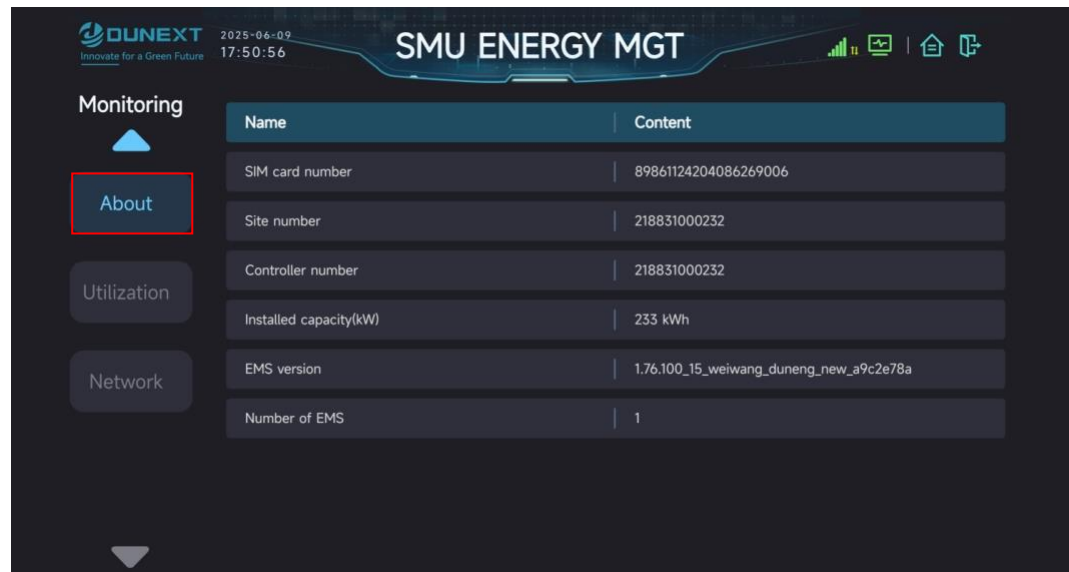
4.5.6 System Utilization

By clicking Utilization in the left panel, users can check the current resource usage of the energy storage system, including CPU, memory, hard disk, and extended disk. This helps identify system performance bottlenecks.

Figure 4-29 Utilization interface
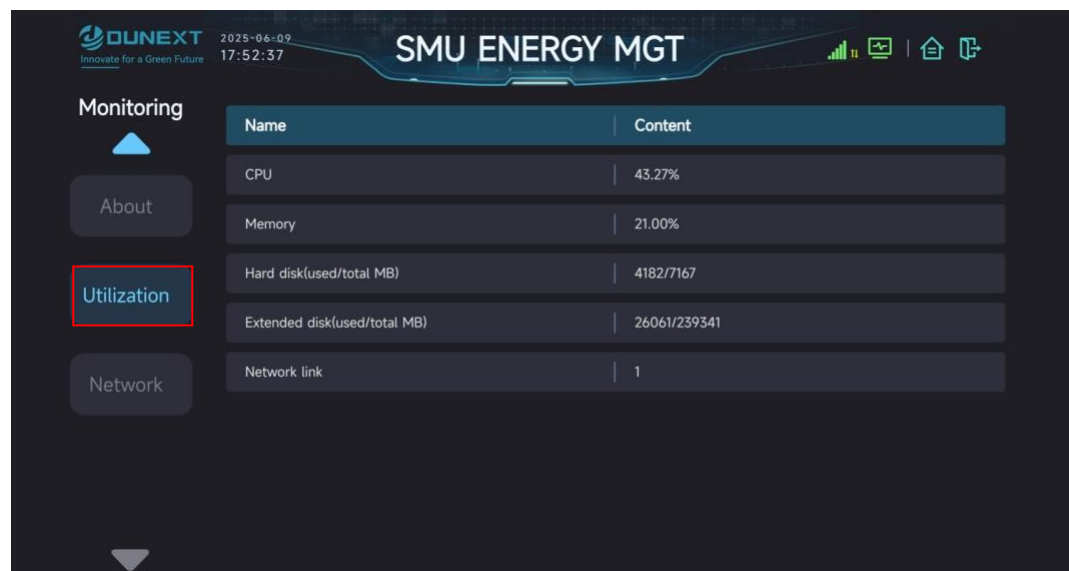
4.5.7 Network Status

By clicking Network in the left panel, users can view the current network status of the energy storage system, including the network card, uplink, and downlink.

Figure 4-30 Network interface
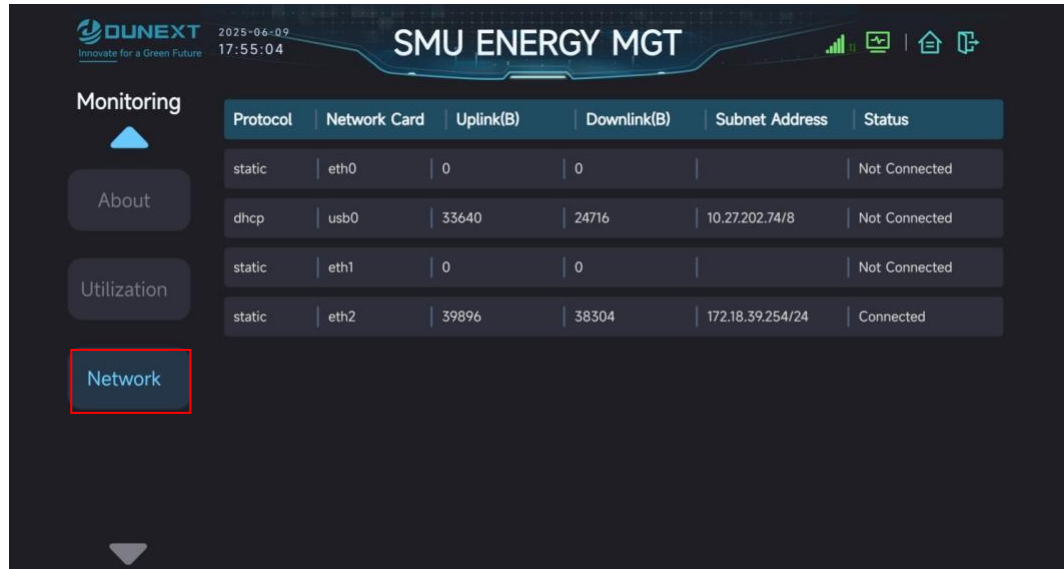
Table 4-1 Network card and network

Network Card	Network
usb0	4G
eth0	WAN1
eth1	WAN2
eth2	LAN

4.6 Energy Management

By clicking Energy MGT on the main interface, users can view and configure information related to strategy protection parameters, automatic strategy management, manual control, and remote management. Energy management is one of the key functions of the EMS, enabling a better balance between energy supply and demand, refined control of charging and discharging strategies, and improved energy utilization efficiency and overall system performance.

Figure 4-31 Energy MGT module
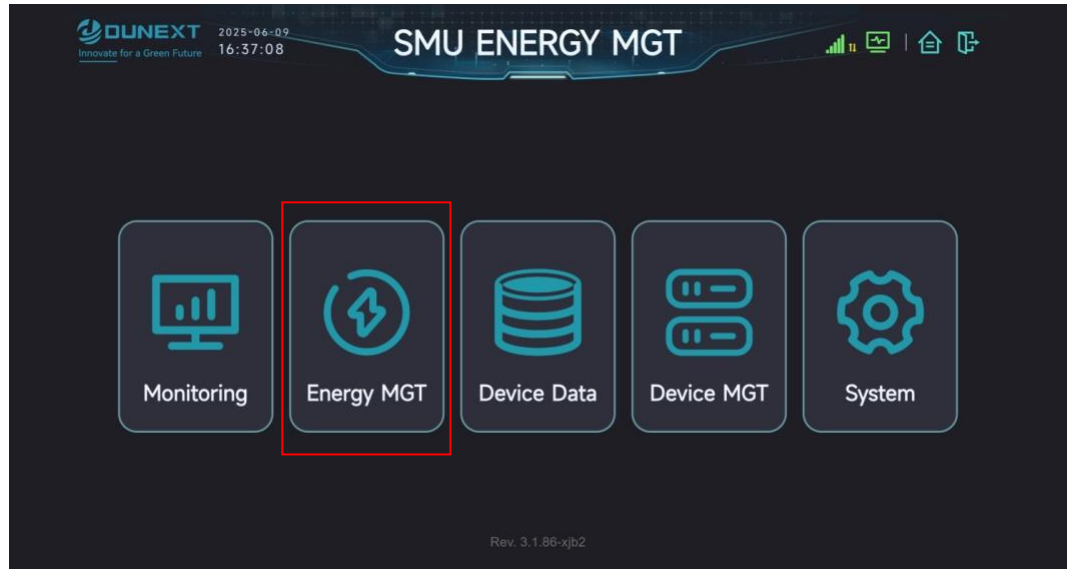
Use the Up or Down button, users can view all submodules of Energy MGT.

Figure 4-32 Scroll Down button on energy MGT module
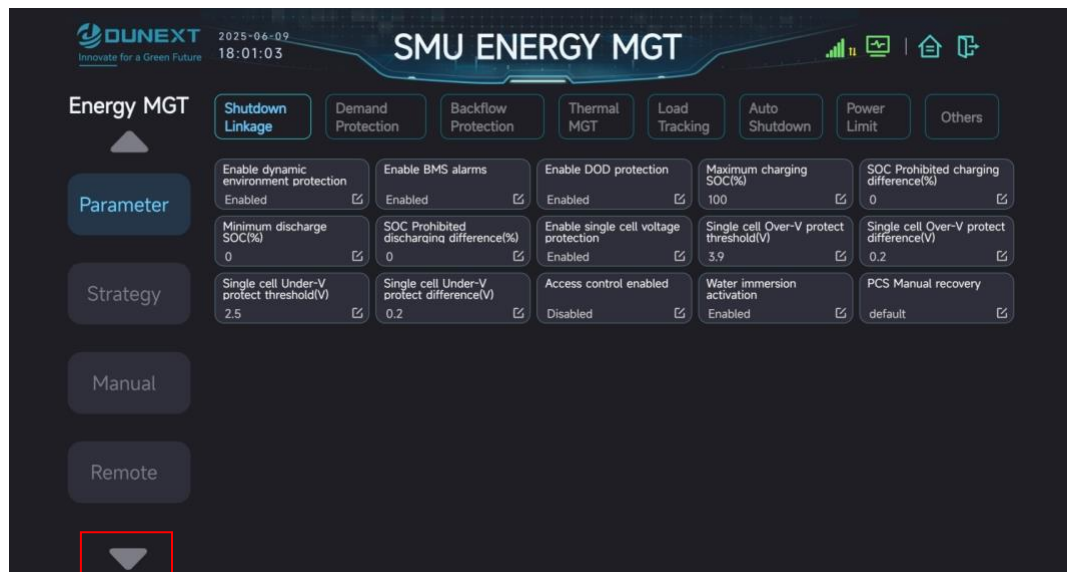
4.6.1 Set EMS Working Mode

EMS working mode is divided into the following four modes:

● Automatic strategy mode

The EMS automatically executes the planned strategy set in the **Energy MGT > Strategy** page.

- Manual control mode

The EMS performs parameter configurations from the **Energy MGT > Manual** page. Manual control strategies are typically used for project testing or debugging.

- Remote management mode

Based on the northbound connection configuration in the **Energy MGT > Remote** page, the EMS connects to the Dunext EMMS Energy Storage Management Cloud Platform, third-party management platforms, or software to execute energy strategies issued by the remote management platform.

Procedure

1. Click Energy MGT > Strategy/Manual/Remote

2. Click the **Switch** button in the upper right corner of the page.

Figure 4-33 Switch button
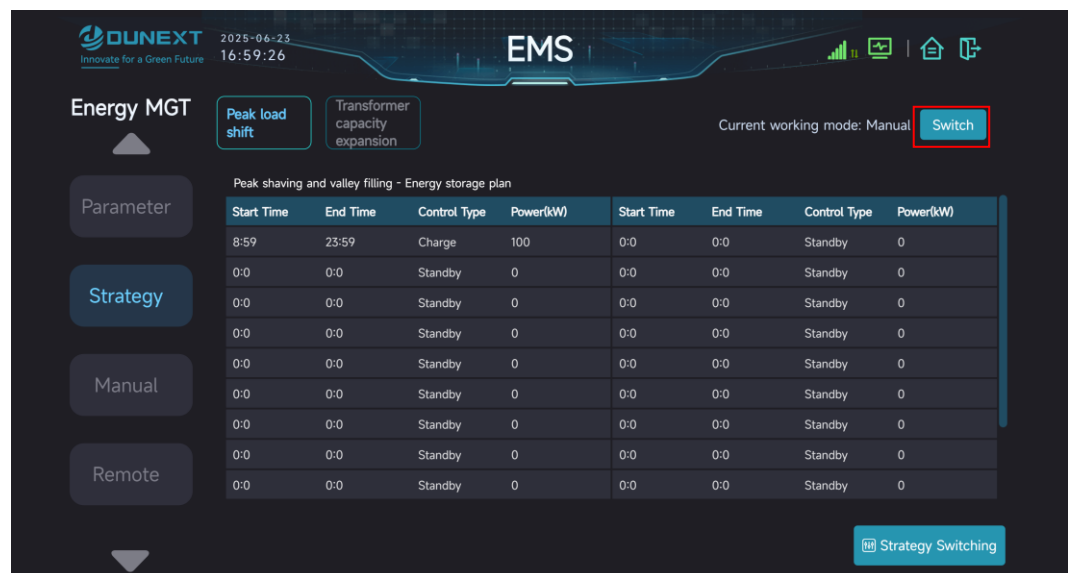
3. In the mode switch pop-up window, click the drop-down arrow to select the desired mode.

Figure 4-34 Switch working mode
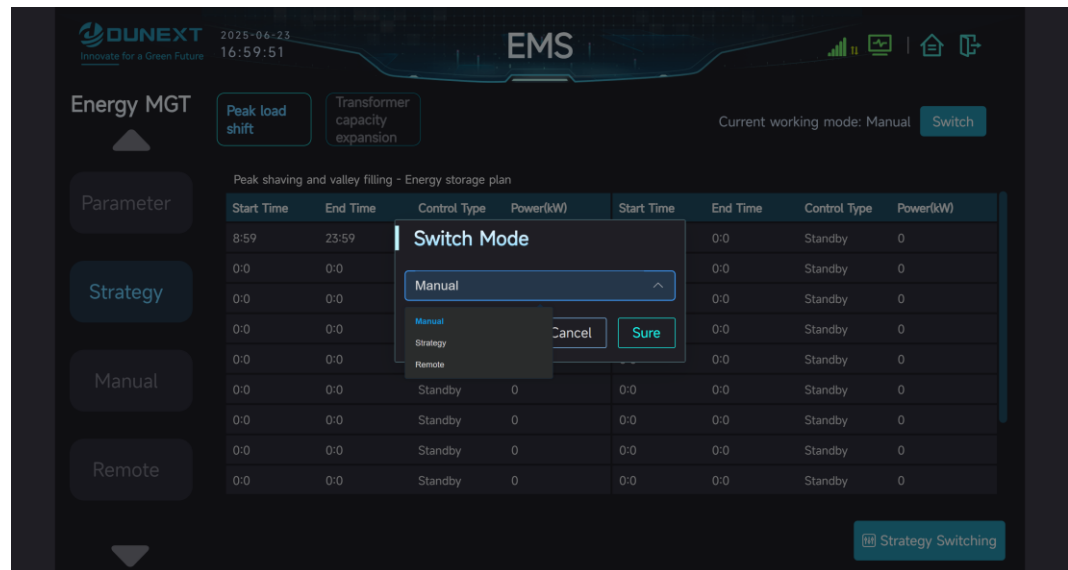
After switching the working mode, the system's current working mode will be displayed in the upper-right corner of the page.

Figure 4-35 View EMS current working mode
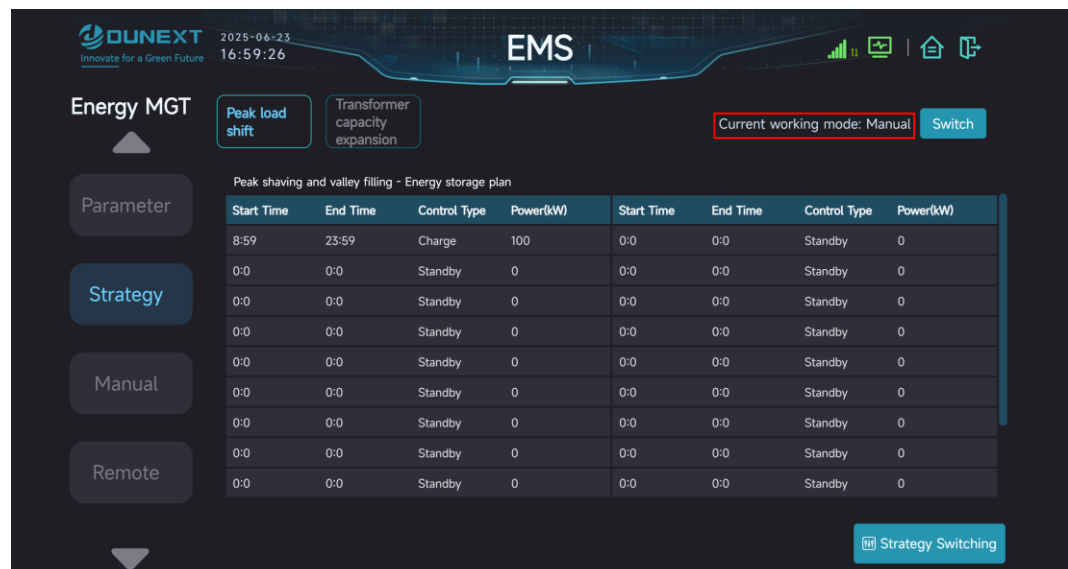
4.6.2 Set Protection Parameters

By clicking Parameter in the left panel, users can view and configure protection parameters such as shutdown linkage, demand protection, backflow protection, thermal MGT, load tracking, auto shutdown, power limit

Figure 4-36 Parameter interface
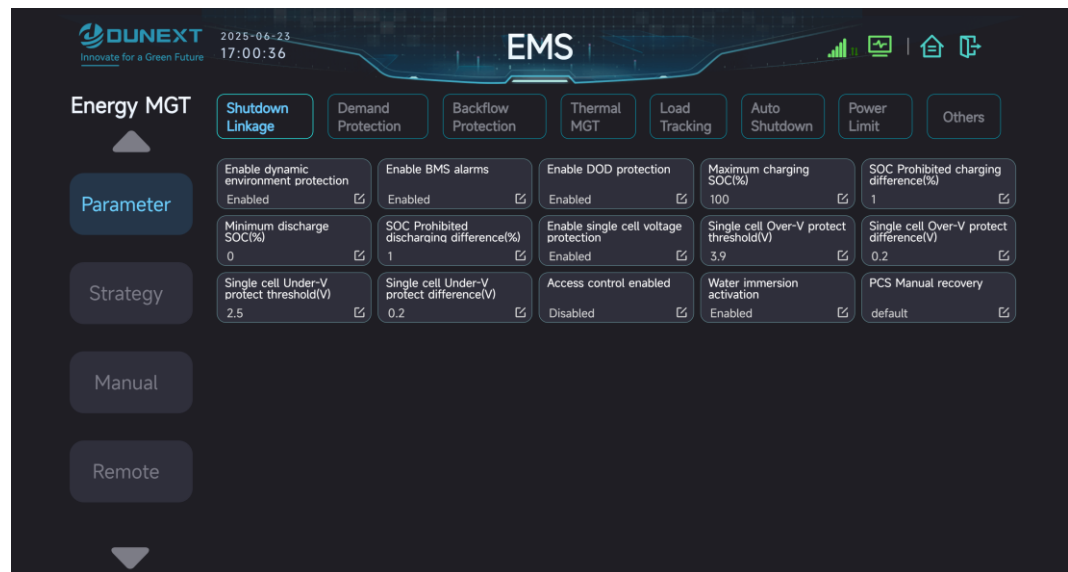
4.6.2.1 Set Shutdown Linkage

When the EMS detects an alarm triggered by device faults or preset conditions, the EMS controller will send a shutdown command to the PCS according to the predefined linkage mechanism, stopping ESS charging/discharging to ensure the safe operation of the entire energy storage system.

Procedure

1. Click **Energy MGT** > **Parameter**

2. Select **Shutdown Linkage**

Figure 4-37 Shutdown linkage tab
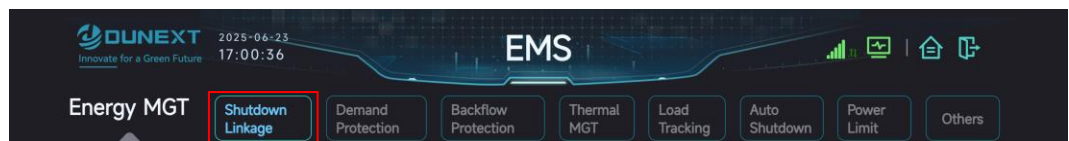
3. Configure the required parameters as needed.

   1) Click the edit button in the lower-right corner of the corresponding parameter field.

   2) Adjust the settings in the pop-up **Edit** dialog.

   3) After completing the parameter configuration, click **Sure**.

Figure 4-38 Set shutdown linkage

Table 4-2 Parameters description

Parameter	Unit	Description	Value
Enable dynamic environment protection	–	**Function**: Switch to enable/disable PCS shutdown in response to environmental alarm signals. **Description**: When the EMS detects a dynamic environmental alarm, it immediately sends a shutdown command to the PCS. **Enabled:** Function is active **Disabled:** Function is inactive	–
Enable BMS alarms	–	**Function:** Switch to enable/disable PCS shutdown in response to BMS alarms. **Description:** When the EMS detects corresponding BMS alarms, it immediately sends a shutdown command to the PCS. **Enabled:** Function is active **Disabled:** Function is inactive	–
Enable DOD protection	–	Function: Switch to enable/disable battery depth-of-discharge protection. Description: EMS continuously monitors battery cluster SOC. Based on	–

Parameter	Unit	Description	Value
		user-set thresholds, it automatically halts charging/discharging and activates Prohibited charging/discharging protection to prevent overcharging or overdischarging, thus extending battery life. Enabled: Function is active Disabled: Function is inactive	
Maximum charging SOC	%	Upper SOC threshold for charging. When the battery cluster SOC is greater than or equal to this value, EMS stops charging and activates Prohibited charging protection.	0<X<=100
SOC prohibited charging difference	%	SOC difference threshold for EMS to cancel prohibited charging protection. When the battery cluster SOC falls below the maximum charging SOC minus this difference, EMS cancels the Prohibited charging protection.	0<X<=100
Minimum discharge SOC	%	Lower SOC threshold for discharging. When the battery cluster SOC is less than or equal to this value, EMS stops discharging and activates Prohibited discharging protection.	0<X<=100
SOC prohibited discharging difference	%	SOC difference threshold for EMS to cancel prohibited discharging protection. When the battery cluster SOC exceeds the minimum discharge SOC plus this difference, EMS cancels the Prohibited discharging protection.	0<X<=100
Enable single cell voltage protection	–	Function: Switch to enable/disable single cell voltage protection. Description: When EMS detects an overvoltage or undervoltage on any individual cell, it immediately stops charging/discharging and activates Prohibited charging/discharging protection. Enabled: Function is active	–

Parameter	Unit	Description	Value
		Disabled: Function is inactive	
Single cell Over–V protect threshold	V	If the highest cell voltage is greater than or equal to this value, EMS immediately sends a shutdown command to PCS and activates Prohibited charging protection.	1.5<=X<=4.5
Single cell Under–V protect threshold	V	If the lowest cell voltage is less than or equal to this value, EMS immediately sends a shutdown command to PCS and activates Prohibited discharging protection.	1.5<=X<=4.5
Single cell Over–V protect difference	V	When the highest cell voltage drops below the overvoltage protection threshold minus this difference, EMS clears the Prohibited charging protection.	1.5<=X<=4.5
Single cell Under–V protect difference	V	When the lowest cell voltage exceeds the undervoltage protection threshold plus this difference, EMS clears the Prohibited discharging protection.	1.5<=X<=4.5

4.6.2.2 Set Demand Protection

The EMS monitors the real-time power of the user's grid meter. When the demand value reaches the preset limit (configurable), protective measures are triggered to correspondingly reduce the ESS charging power. This helps lower the user's peak demand power, smoothens the actual power consumption curve, and ultimately reduces demand–based electricity costs and overall energy expenses. Meanwhile, it ensures the transformer operates within a safe capacity range.

Procedure

1. Click **Energy MGT** > **Parameter**

2. Select **Demand Protection**

Figure 4–39 Demand protection tab
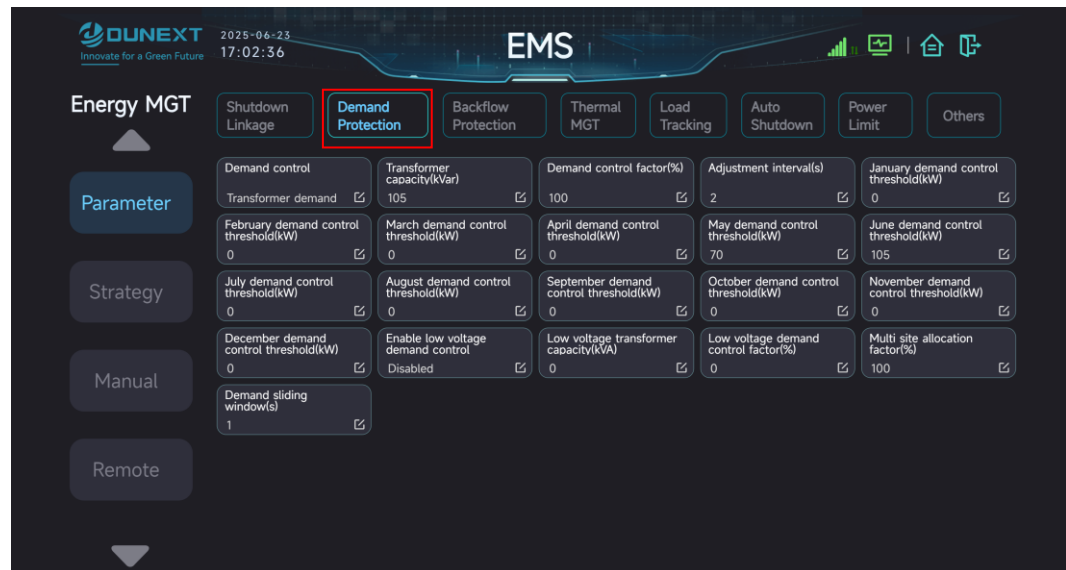
3. Configure the required parameters as needed.

1) Click the edit button in the lower-right corner of the corresponding parameter field.

2) Adjust the settings in the pop-up Edit dialog.

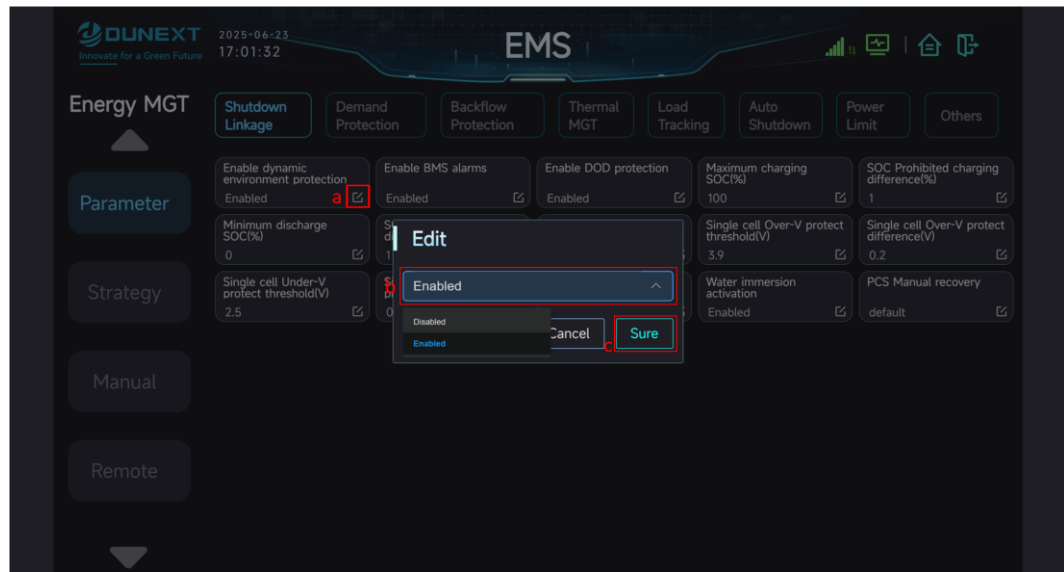3) After completing the parameter configuration, click Sure.

Figure 4-40 Set demand protection
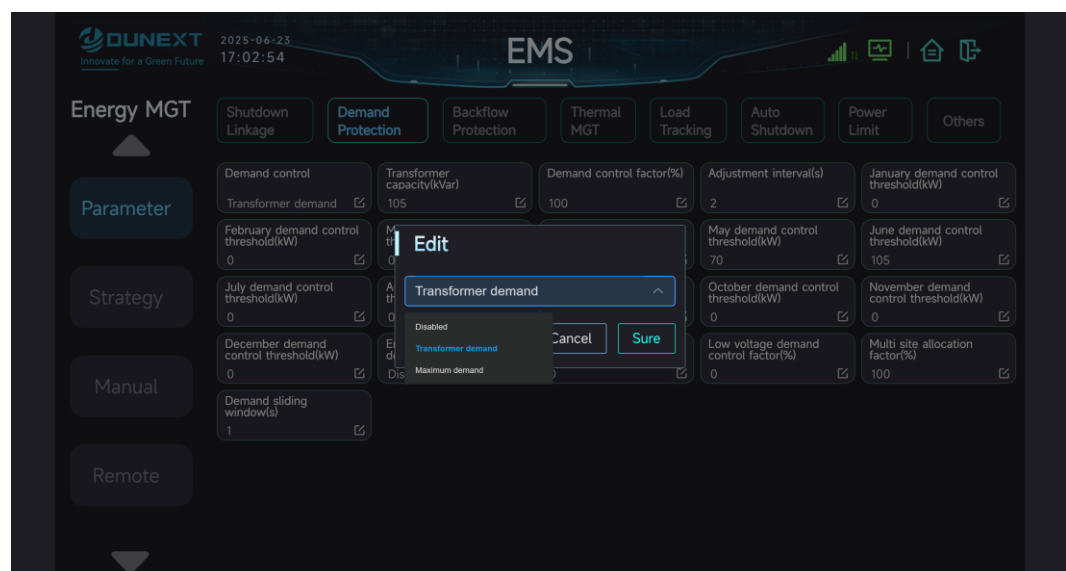
Table 4-3 Demand protection parameters description

Parameter	Unit	Description	Value
Demand control	-	Function: Switch to enable/disable demand control Disabled: Function is inactive Transformer Demand: EMS monitors whether the system's power demand exceeds the value of transformer capacity × demand control factor. If exceeded, EMS will reduce the ESS charging power accordingly to keep system power consumption within the transformer capacity × demand control factor range. Maximum Demand: Also known as dynamic demand adjustment. EMS will take the greater value between the monthly initial demand setting and the user's actual power demand as the demand value, and adjust the ESS charging power accordingly.	-
Transformer capacity	kVA	This parameter defines the maximum capacity of the transformer.	X>0
Demand control factor	%	This parameter defines the demand factor based on transformer capacity or monthly demand control threshold.	0<X<=100
Adjustment interval	s	This parameter defines the time frequency at which EMS adjusts ESS charging power according to demand.	X>0 (integer)
January demand control threshold	kW	This parameter defines the initial demand value for January	X>0
February demand control threshold	kW	This parameter defines the initial demand value for February	X>0
March demand control threshold	kW	This parameter defines the initial demand value for March	X>0
April demand control	kW	This parameter defines the initial demand value for April	X>0

Parameter	Unit	Description	Value
threshold			
May demand control threshold	kW	This parameter defines the initial demand value for May	X>0
June demand control threshold	kW	This parameter defines the initial demand value for June	X>0
July demand control threshold	kW	This parameter defines the initial demand value for July	X>0
August demand control threshold	kW	This parameter defines the initial demand value for August	X>0
September demand control threshold	kW	This parameter defines the initial demand value for September	X>0
October demand control threshold	kW	This parameter defines the initial demand value for October	X>0
November demand control threshold	kW	This parameter defines the initial demand value for November	X>0
December demand control threshold	kW	This parameter defines the initial demand value for December	X>0
Enable low voltage demand control	kVA	This parameter defines the maximum capacity of the low-voltage side transformer.	-
Low voltage demand control factor	%	This parameter defines the demand factor based on the capacity of the low-voltage transformer.	0<X<=100
Multi site allocation	%	This parameter applies to the peer-peer mode in parallel operation and defines the	0<X<=100

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Parameter	Unit	Description	Value
factor		power distribution factor of each energy storage cabinet within the site.	

4.6.2.3 Set Backflow Protection

EMS continuously monitors the data from the grid meter, and based on the backflow protection mechanism, it automatically adjusts the ESS discharge power to prevent power from flowing back into the grid, thereby ensuring stable operation of the power system.

Procedure

1. Click **Energy MGT** > **Parameter**

2. Select **Backflow Protection**

Figure 4-41 Backflow protection tab
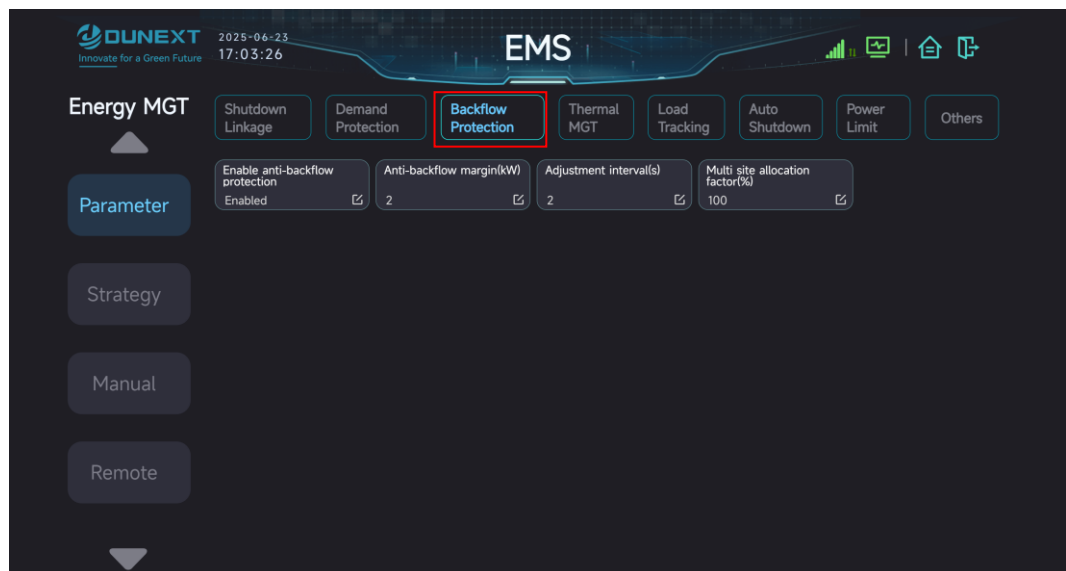
3. Configure the required parameters as needed.

   1) Click the edit button in the lower-right corner of the corresponding parameter field.

   2) Adjust the settings in the pop-up **Edit** dialog.

   3) After completing the parameter configuration, click **Sure**.

Figure 4-42 Set backflow protection
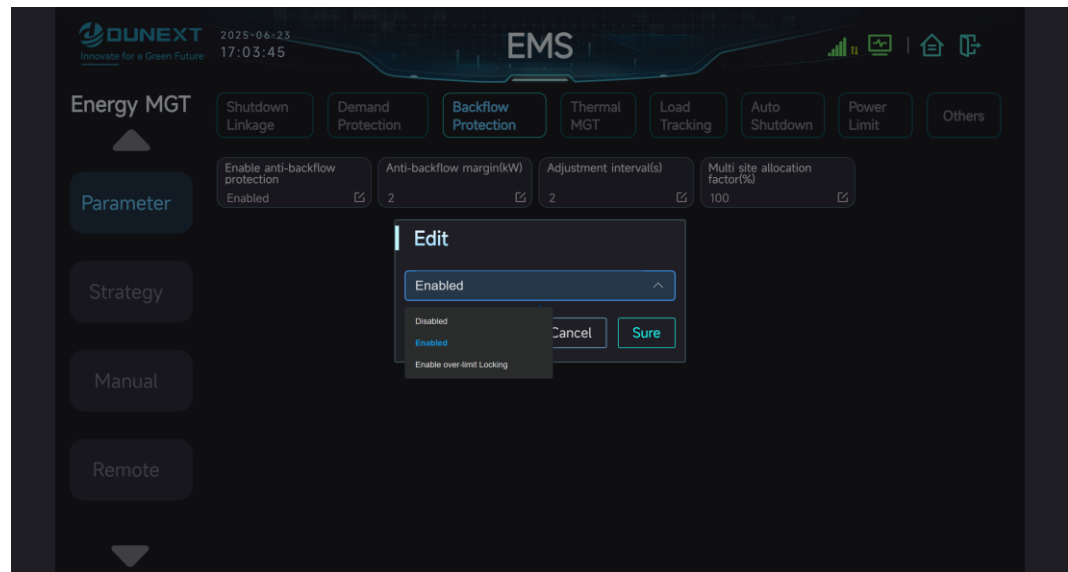
Table 4-4 Backflow protection parameter description

Parameter	Unit	Description	Value
Enable anti-backflow protection	-	Function: Switch to enable/disable anti-backflow protection Enabled: Function is active Disabled: Function is inactive	-
Anti-backflow margin	kW	This parameter defines the threshold for EMS to determine whether a backflow is about to occur. When the total active power at the grid meter is less than this value, EMS determines that backflow is imminent and will reduce the ESS discharge power accordingly, ensuring that the total active power at the grid meter remains above this threshold.	X>=0
Adjustment interval	s	This parameter defines the time frequency at which EMS monitors whether backflow is about to occur.	X>0 (integer)
Multi site allocation factor	%	This parameter applies to the peer-peer mode in parallel operation and defines the power distribution factor among energy storage cabinets within the site.	0<X<=100

4.6.2.4 Set Thermal MGT

The Thermal MGT function enables the EMS to control thermal management devices—such as fans, air conditionings, and liquid cooling unit—based on the temperature or power status of the energy storage system.

Procedure

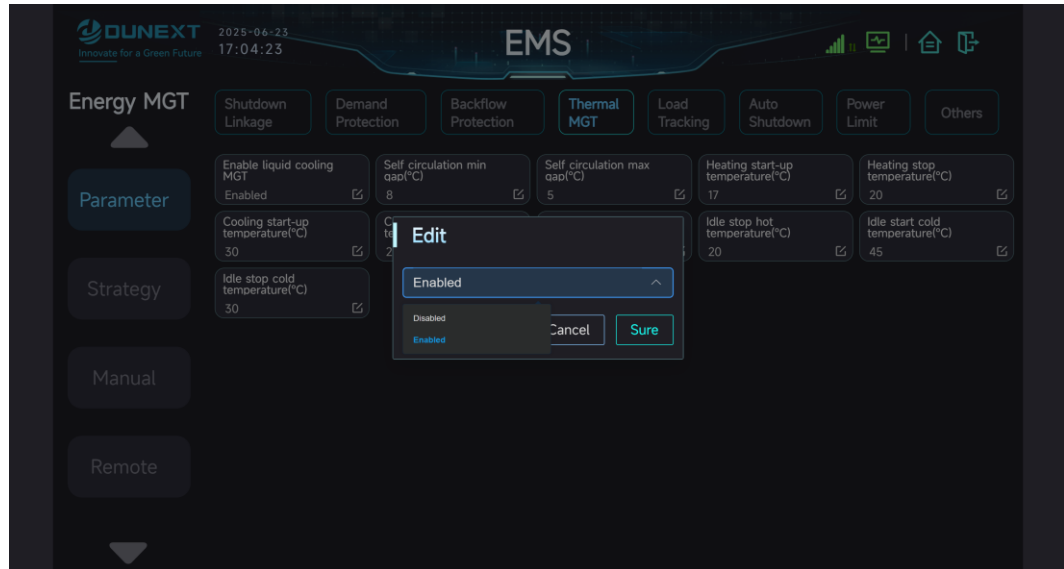1. Click **Energy MGT** > **Parameters**

2. Select **Thermal MGT**

Figure 4-43 Thermal MGT tab

3. Configure the required parameters as needed.

   1) Click the edit button in the lower-right corner of the corresponding parameter field.

   2) Adjust the settings in the pop-up **Edit** dialog.

   3) After completing the parameter configuration, click **Sure**.

Figure 4-44 Set thermal MGT

Table 4-5 Liquid cooling unit parameter description

Parameter	Unit	Description	Value
Enable liquid cooling MGT	-	Function: Switch to enable/disable liquid cooling MGT Description: The EMS automatically starts or stops the liquid cooling unit for heating or cooling based on the configured temperature thresholds. Enabled: Function is active Disabled: Function is inactive	
Self circulation start gap	℃	When the EMS detects that the temperature difference between the highest and lowest single battery cell exceeds the threshold, it activates the liquid cooling unit's self-circulation mode.	X>=0 (integer)
Self circulation stop gap	℃	When the EMS detects that the temperature difference between the highest and lowest single battery cell falls below the threshold, it ends the self-circulation mode.	X>=0 (integer)
Heating start-up temperature	℃	The parameter takes effect only when "Enable liquid cooling MGT" is Enabled. During charging/discharging, if the lowest single battery cell temperature is below the threshold, the EMS activates liquid cooling unit heating.	X>=0 (integer)
Heating stop temperature	℃	The parameter takes effect only when "Enable liquid cooling MGT" is Enabled. During charging/discharging, if the lowest single battery cell temperature rises above the threshold, the EMS stops heating and sets the liquid cooling unit to standby mode.	X>=0 (integer)
Cooling	℃	The parameter takes effect only when "Enable liquid	X>=0

| Parameter	Unit	Description	Value
start-up temperature		cooling MGT" is Enabled. During charging/discharging, if the highest single battery cell temperature exceeds the threshold, the EMS activates liquid cooling unit cooling.	(integer)
Cooling stop temperature	℃	The parameter takes effect only when "Enable liquid cooling MGT" is Enabled. During charging/discharging, if the highest single battery cell temperature drops below the threshold, the EMS stops cooling and sets the liquid cooling unit to standby mode.	X>=0 (integer)
Idle start hot temperature	℃	The parameter takes effect only when "Enable liquid cooling MGT" is Enabled. In standby mode, if the lowest single battery cell temperature is below the threshold, the EMS activates liquid cooling unit heating.	X>=0 (integer)
Idle stop hot temperature	℃	The parameter takes effect only when "Enable liquid cooling MGT" is Enabled. In standby mode, if the lowest single battery cell temperature rises above the threshold, the EMS stops heating and sets the liquid cooling unit to standby mode.	X>=0 (integer)
Idle start cold temperature	℃	The parameter takes effect only when "Enable liquid cooling MGT" is Enabled. In standby mode, if the highest single battery cell temperature exceeds the threshold, the EMS activates liquid cooling unit cooling.	X>=0 (integer)
Idle stop cold temperature	℃	The parameter takes effect only when "Enable liquid cooling MGT" is Enabled. In standby mode, if the highest single battery cell temperature drops below the threshold, the EMS stops cooling and sets the liquid cooling unit to standby mode.	X>=0 (integer)

4.6.2.5 Set Load Tracking

The EMS dynamically adjusts the ESS discharge power according to user's load power.

Procedure

1. Click **Energy MGT** > **Parameters**

2. Select **Load Tracking**

Figure 4-45 Load tracking tab
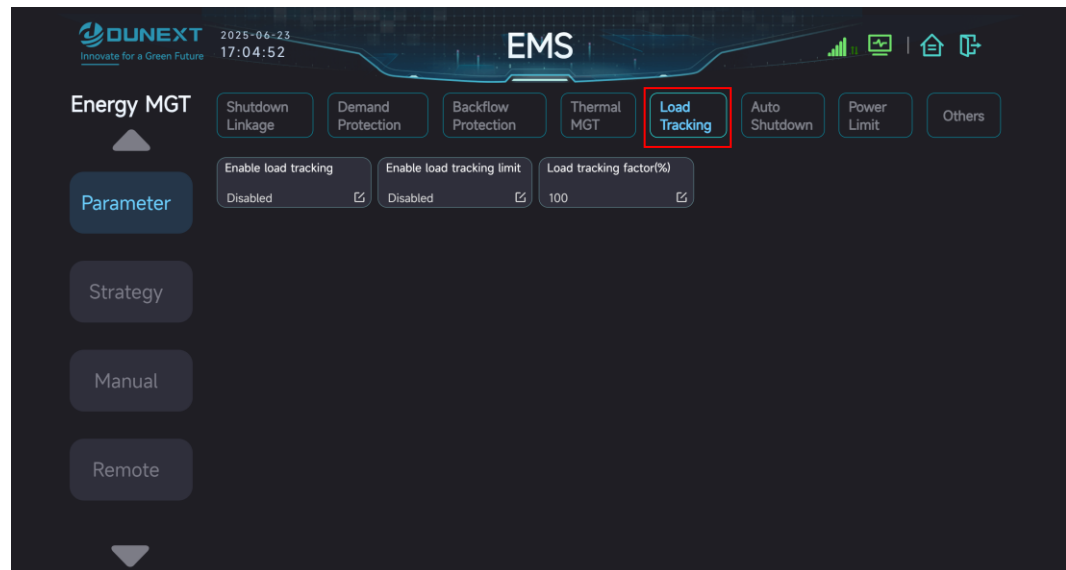
3. Configure the required parameters as needed.

   1) Click the edit button in the lower-right corner of the corresponding parameter field.

   2) Adjust the settings in the pop-up **Edit** dialog.

   3) After completing the parameter configuration, click **Sure**.
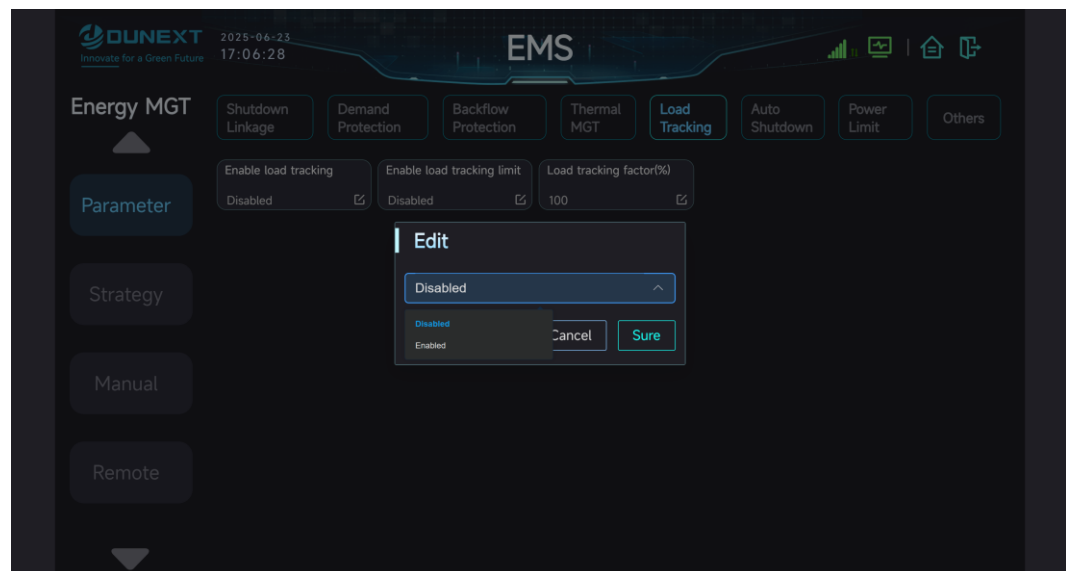
Figure 4-46 Set load tracking

Table 4-6 Load tracking parameter description

| Parameter	Unit	Description	Value
Enable load tracking	–	Function: Switch to enable/disable load tracking The EMS tracks the user's load power and automatically adjusts the ESS discharge power. Enabled: Function is active Disabled: Function is inactive	–
Enable load tracking limit	–	This parameter is only effective when Enable Load Tracking is set to Enabled. This parameter defines whether the EMS uses the scheduled discharge power as the upper limit for discharge. Enabled: Function is active Disabled: Function is inactive	–
Load tracking factor	%	This parameter is only effective when Enable Load Tracking is set to Enabled. This parameter defines the factor for EMS to track the load power.	0<X<=100

4.6.2.6 Set Auto Shutdown

The EMS can be configured to automatically shut down the PCS. When the PCS power is 0 and this condition persists for the duration specified in the system settings, the EMS will automatically shut down the PCS.

Procedure

1. Click **Energy MGT** > **Parameters**

2. Select **Auto Shutdown**

Figure 4-47 Auto shutdown tab
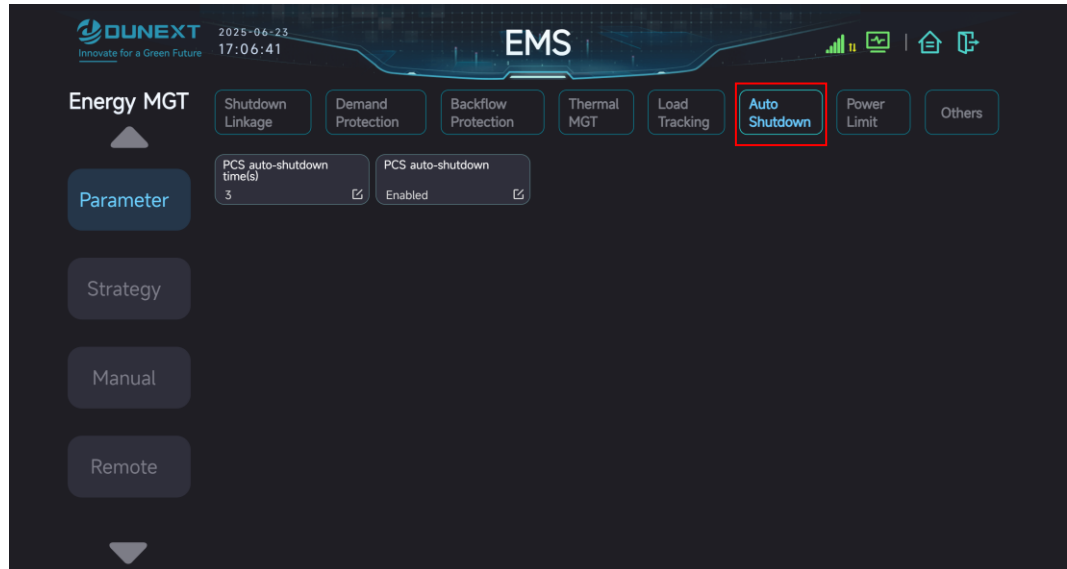
3. Configure the required parameters as needed.

   1) Click the edit button in the lower-right corner of the corresponding parameter field.

   2) Adjust the settings in the pop-up **Edit** dialog.

   3) After completing the parameter configuration, click **Sure**.
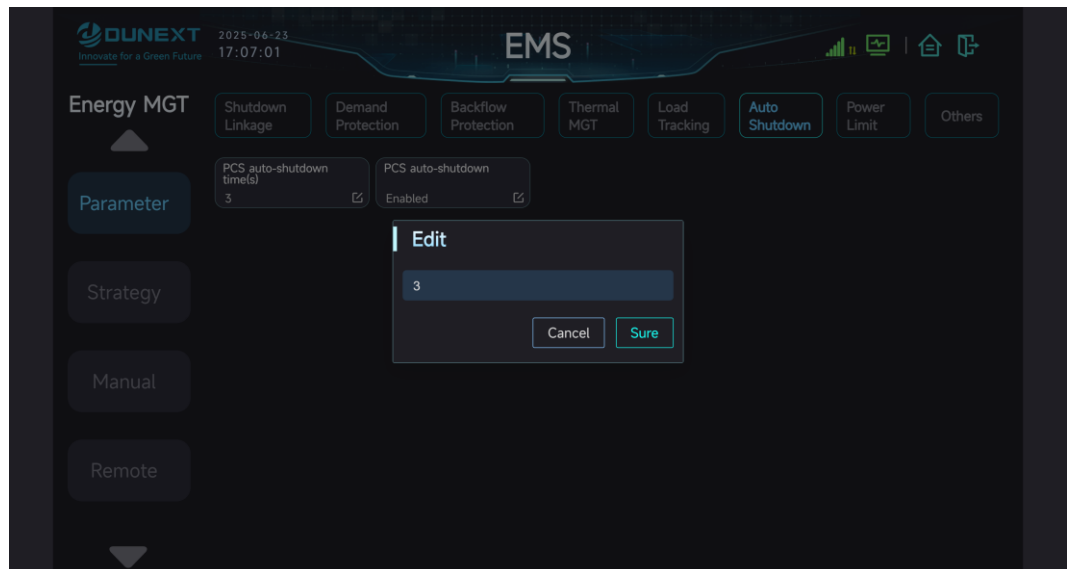
Figure 4-48 Set auto shutdown

Table 4-7 Auto shutdown parameter description

Parameter	Unit	Description	Value
PCS auto-shutdown	–	Function: Switch to enable/disable PCS auto-shutdown Enabled: Function is active Disabled: Function is inactive	–
PCS auto-shutdown time	s	PCS This parameter defines how long the PCS must remain at 0 power before the EMS automatically shuts it down.	X>=0 (integer)

4.6.2.7 Set Power Limit

The EMS monitors the scheduled charging/discharging power and the maximum allowable charging/discharging power set by the BMS in real time. If the scheduled power exceeds the BMS limit, the EMS will limit the energy storage power according to the BMS's maximum allowable values.

Procedure

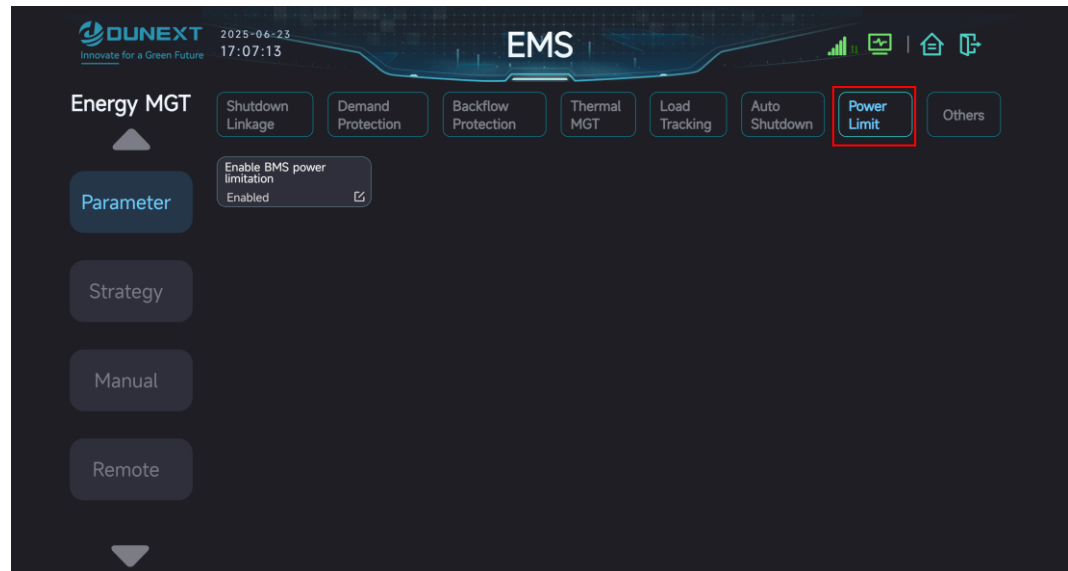1. Click **Energy MGT** > **Parameters**

2. Select **Power Limit**

Figure 4-49 Power limit tab

Table 4-8 Power limit parameter description

Parameter	Unit	Description	Value
Enable BMS power limitation	-	Function: Switch to enable/disable BMS power limitation Enabled: Function is active Disabled: Function is inactive	-

4.6.3 Set Automatic Strategy

In Strategy mode, the EMS automatically executes charge/discharge strategies according to the predefined strategy type.

Automatic strategy types include:

1. **Peak Load Shift**: Store excess energy during low electricity demand periods and release stored energy during peak demand periods to smooth load fluctuations and reduce electricity costs.

2. **Transformer Capacity Expansion**: Discharge during periods of high electricity demand and charge during low demand periods to meet fluctuating load requirements without increasing transformer capacity.

4.6.3.1 Set Peak Load Shift

Procedure

1. Click **Energy MGT** > **Parameters**

2. Select **Peak Load Shift**

Figure 4-50 Peak load shift tab

3. Define the start time, end time, and power of charging and discharging in the energy storage schedule as needed.

Note:

Users do not need to manually configure the control type. The system will automatically determine the control type based on the sign of the power value:

- Positive value = Discharge

- Negative value = Charge

- Zero = Standby

4.6.3.2 Set Transformer Capacity Expansion

Procedure

1. Click **Energy MGT** > **Parameters**

2. Select **Transformer Capacity Expansion**

3. Edit the corresponding parameter
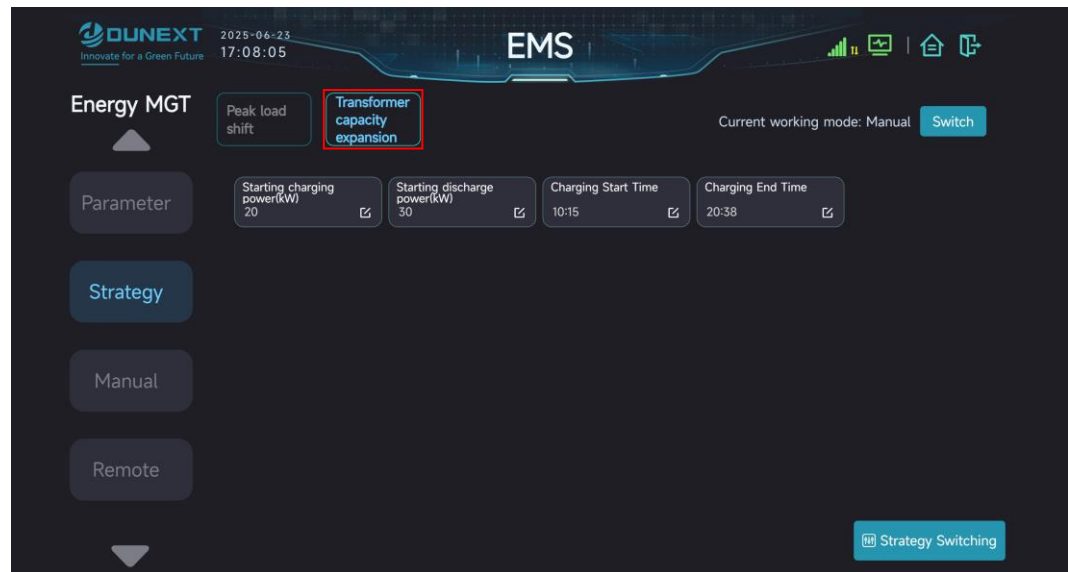
Figure 4-51 Transformer capacity expansion tab

Table 4-9 Transformer capacity expansion parameter description

| Parameter	Unit	Description	Value
Starting charging power	kW	When the total active power at the grid meter is less than or equal to this threshold, the EMS starts ESS charging.	X>=0
Starting discharging power	kW	When the total active power at the grid meter is greater than or equal to this threshold, the EMS starts ESS discharging.	X>=0

4.6.3.3 Switch Strategy

Procedure

1. Click **Energy MGT** > **Strategy**
2. Select **Peak Load Shift**
3. Click the **Strategy Switching** button in the lower right corner of the page

Figure 4-52 Strategy switching button

4. Choose the desired strategy in the **Select** pop-up dialogue

Figure 4-53 Set strategy type
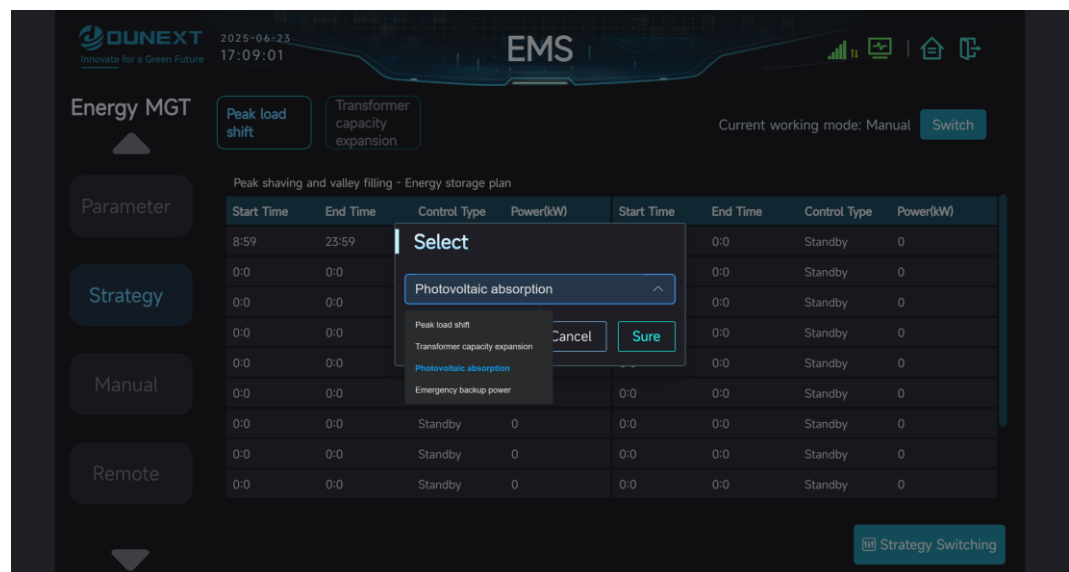
5. Click **Sure**

4.6.4 Set Manual Strategy

Procedure

1. Click **Energy MGT** > **Manual**

2. Click the **Switch** button in the upper right corner of the page

3. Choose **Manual** in the dropdown list in the pop-up window.

4. Click the corresponding parameter tab to configure parameters

Note: Parameters on the Manual page can only be configured when the working mode is set to Manual.
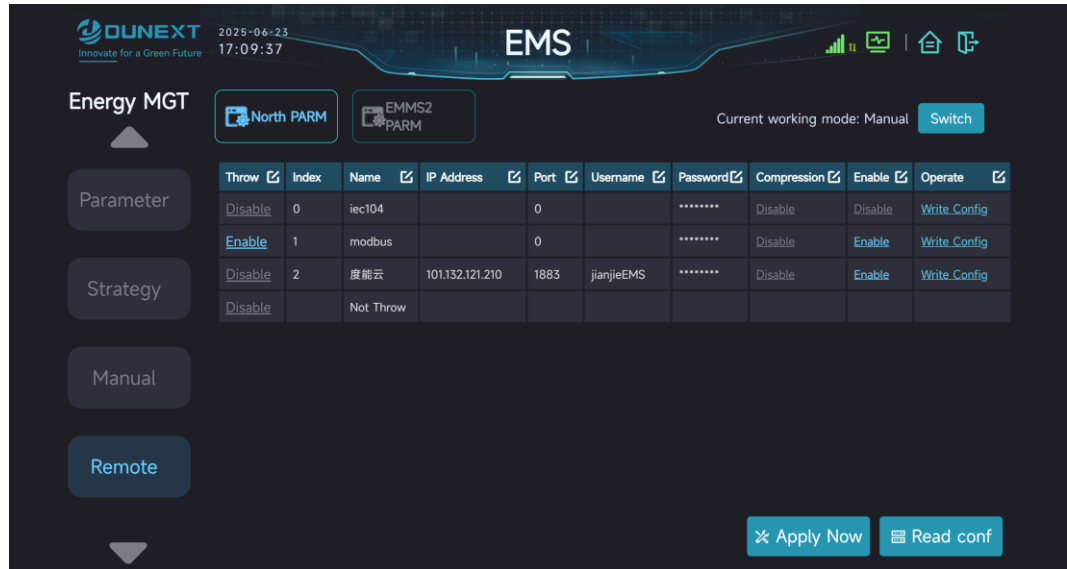
Figure 4-54 Manual interface
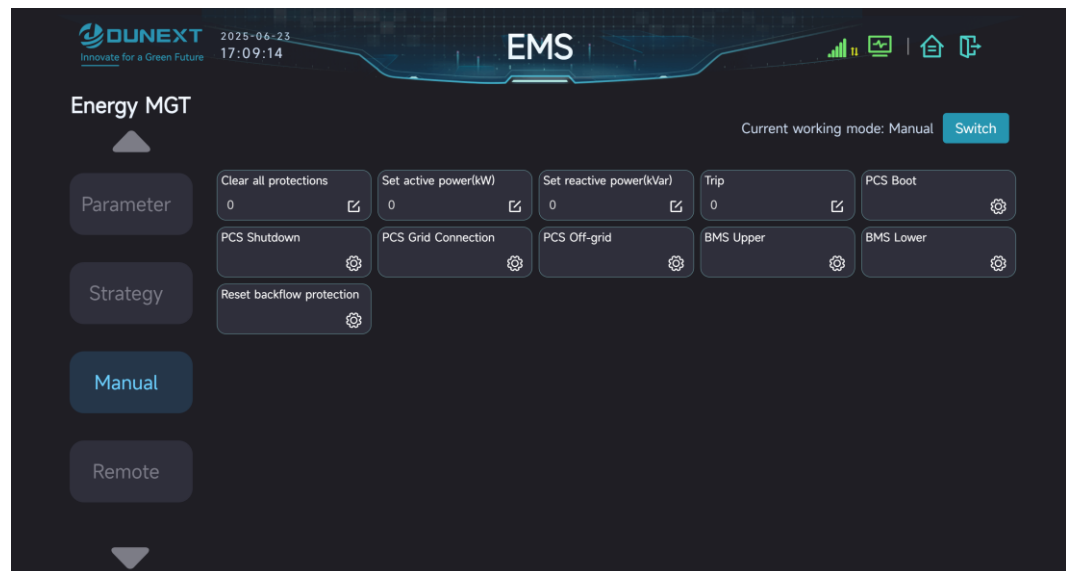
4.6.5 Set Remote Management

Users can select Remote from the left-side panel to enable the configured northbound interface, allowing control of the current energy storage device via Dunext EMMS Energy Storage Management Cloud Platform or a third-party management platform or software.

Figure 4-55 Remote interface

4.6.5.1 Set North PARM

The EMS can be simultaneously connected to both the Dunext EMMS cloud platform and a third-party platform via northbound communication, but it can only accept remote control from one platform at a time.

Procedure

1. Click **Energy MGT** > **Remote**

2. Select **North PARM**

3. Configure the required parameters as needed.

   1) Click the corresponding parameter module, select **Enable** or **Disable**

   2) Click **Write Config**

Figure 4-56 Set north PARM
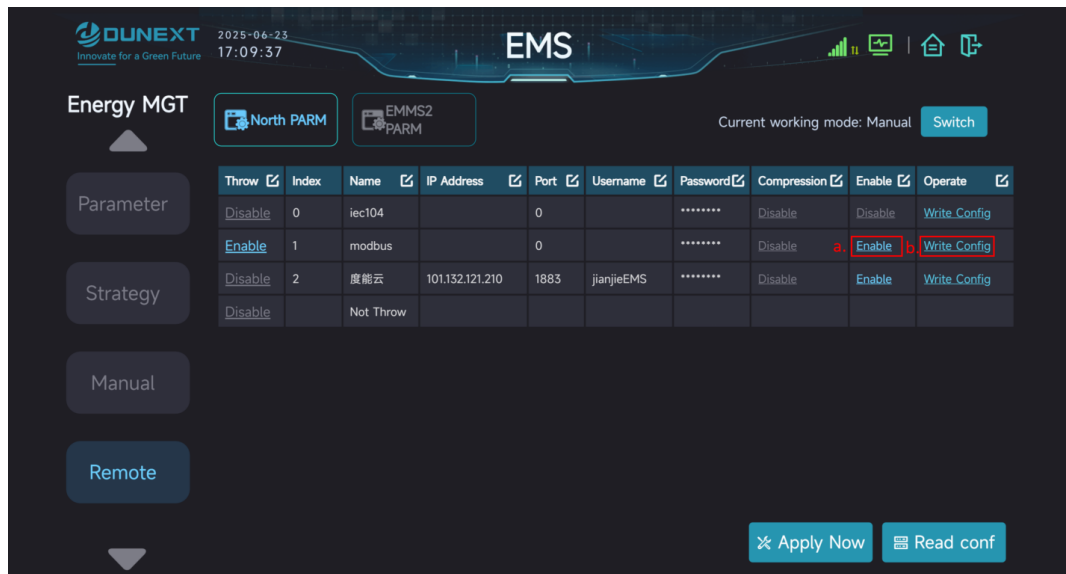
4. After all required parameters are set, click **Apply Now** in the lower right corner of the page.

5. In the pop-up **Operation Confirmation** dialog box, select **Sure**.

4.7 Device Data

By clicking Device Data on the main interface, users can view the status, data, and alarms of each configured device in the system. Users can also set parameters for controllable devices, enabling intuitive monitoring and parameter adjustments, which reduces operational complexity.

Figure 4-57 Device data module
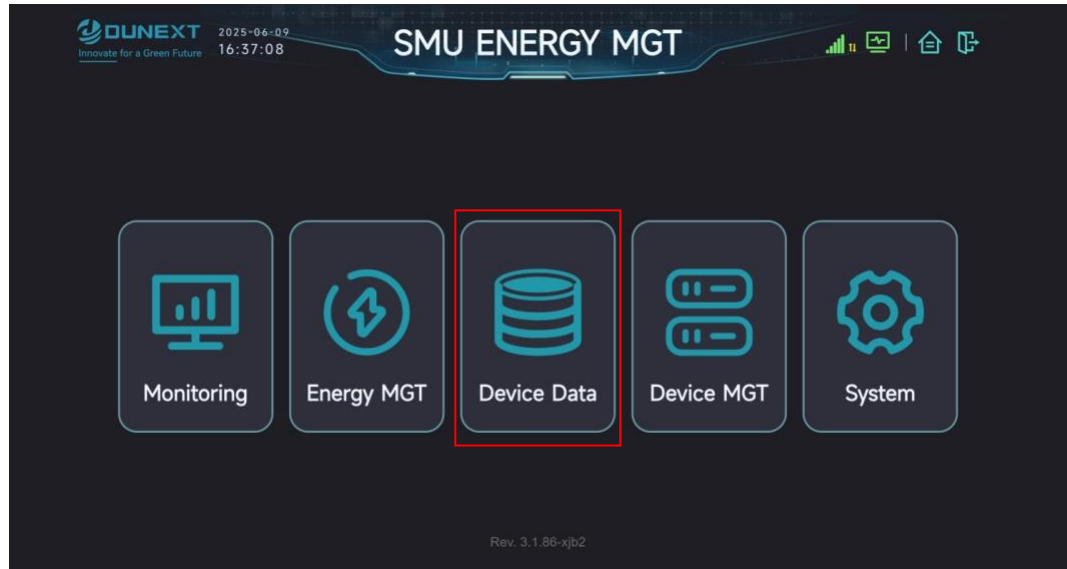
On the **Device Data** page, the device modules on the left panel are dynamically generated based on the types of devices connected to the energy storage system and may vary slightly depending on the project.

Figure 4-58 Device data interface

4.7.1 Check Device Status

Procedure

1. Click the corresponding device module in the left panel of the **Device Data** page.

2. Select **Status**

Figure 4-59 Status interface

- Online indicates that the energy storage system is connected to and communicating properly with the EMS.

- Offline indicates abnormal connection or communication with the EMS. Please check whether the device is correctly connected to the EMS controller and whether the device configuration is correct.

4.7.2 Check Device Data

Procedure

1. Click the corresponding device module in the left panel of the **Device Data** page.

2. Select **Read Data**

Figure 4-60 Read data interface

Note: The data labels displayed on the **Read Data** page are dynamically generated based on the connected devices. Red text indicates a failure to read device data—please check whether the device is online, the connection is normal, and the device configuration is correct. Click the pagination button at the bottom-right corner of the page to view more data from the device.

4.7.3 Set Device Parameters

Whether the parameters of a device can be configured depends on the ESS connected to the EMS. For configurable devices such as the PCS (Power Conversion System), users can follow the procedure below:

Procedure

1. Click **Device Data** > **Power Conversion System**
2. Select **Set PARM**
3. Set the required parameters as needed.

Figure 4-61 Set PARM interface

4.7.4 Check Device Alarms

Taking the PCS as an example, users can view real-time alarm information for the corresponding device following the procedure below.

Procedure

1. Click **Device Data** > **Power Conversion System**
2. Choose **Alarm**

Figure 4-62 Alarm interface

Note: Alarm information may vary depending on the model of the device. Please refer to the actual model connected. Click the pagination button at the bottom-right corner of the page to view more alarm information for the device.

4.8 Device Management

By clicking Device MGT on the main interface, users can view and configure the port and device settings of the current energy storage system. Users can also perform factory diagnostics or charge-discharge diagnostics, which makes device management smarter, more efficient and convenient.
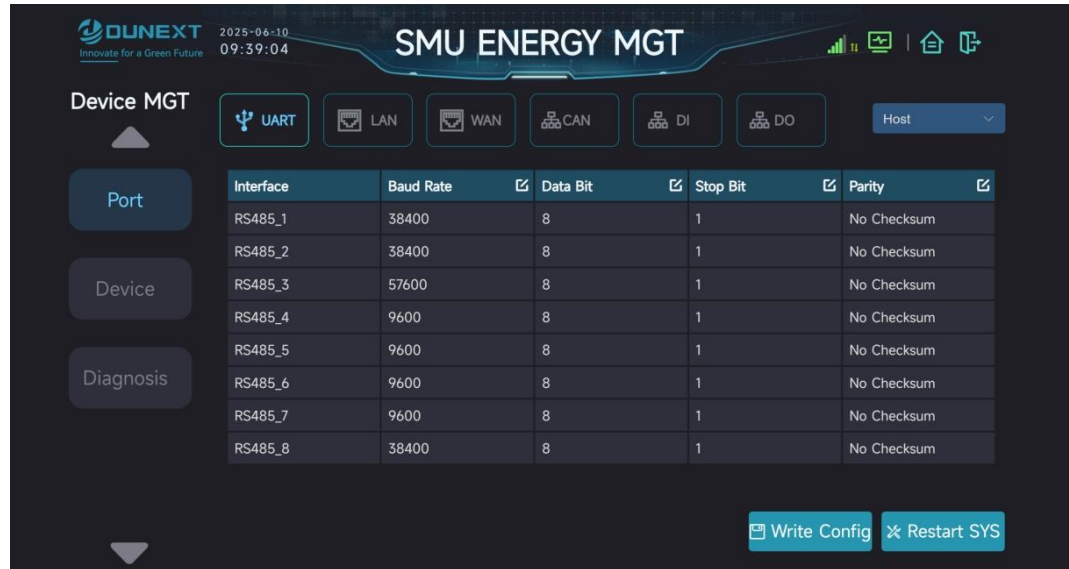
Figure 4-63 Device MGT module
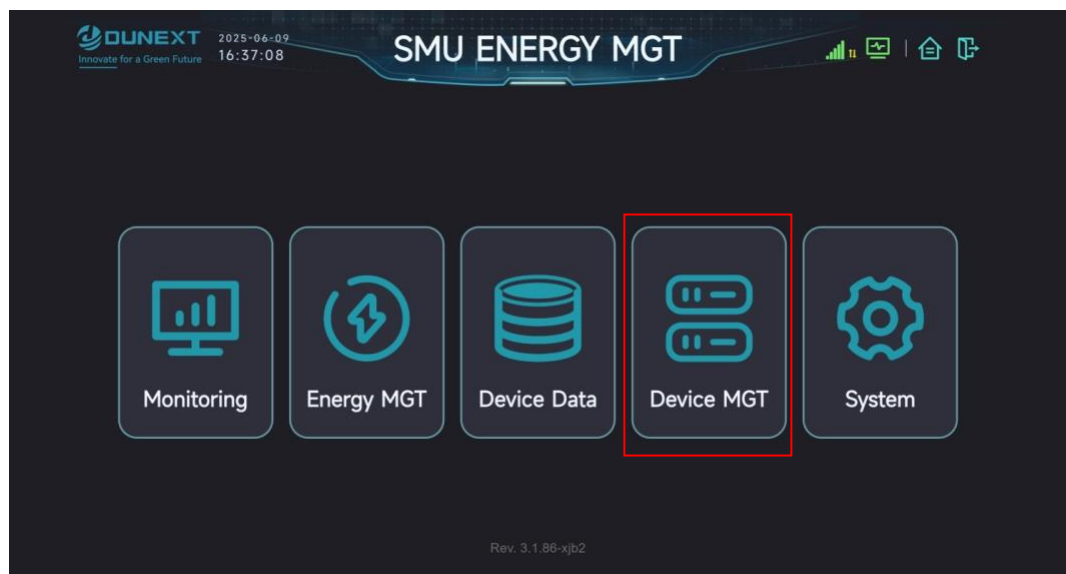
4.8.1 Port Configuration

Users can select Port from the left panel to view and configure ports such as RS485, LAN, WAN, CAN, and DIDO ports.

Figure 4-64 Port interface

4.8.1.1 Configure RS485 Port

Procedure

1. Click **Device MGT** > **Port**

2. Choose **UART**

3. Set the required parameters according to the actual devices connected to each serial port.

Note: If an edit button appears on the right side of a parameter column name, the parameter is configurable.
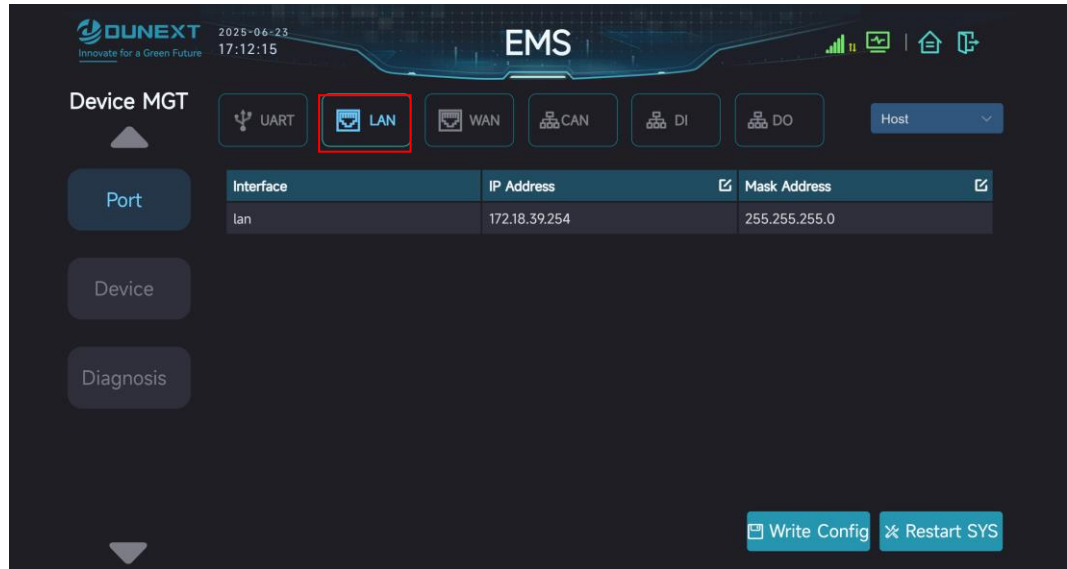
Figure 4-65 RS485 port interface

4. Click the parameter value area to be modified.

5. Configure the parameter in the pop-up Edit dialog.

6. After completing the parameter configuration, click Sure.

7. Click Write Config at the lower right of the page.

8. To immediately apply the latest configuration to the energy storage system, click Restart SYS at the lower right of the page, and in the pop-up Operation Confirmation dialog, click Sure.

4.8.1.2 Configure LAN Port

Procedure

1. Click **Device MGT** > **Port**

2. Choose **LAN**

Figure 4-66 LAN interface

3. Set the required parameters as needed. If an edit button appears on the right side of a parameter column name, the parameter is configurable.

    1) Click the parameter value area to be modified.

    2) Configure the parameter in the pop-up **Edit** dialog.

    3) After completing the parameter configuration, click **Sure**.

    4) Click **Write Config** at the lower right of the page.

    5) To immediately apply the latest configuration to the energy storage system, click **Restart SYS** at the lower right of the page, and in the pop-up **Operation Confirmation** dialog, click **Sure**.

4.8.1.3 Configure WAN Port

Procedure

1. Click **Device MGT** > **Port**

2. Choose **WAN**

Figure 4-67 WAN interface

3. Configure the WAN port IP address, gateway address, mask address, and type according to the on-site environment.

- WAN1 is typically used for communication between controllers within the site. To ensure proper communication, all controllers at the site should be configured with IP addresses in the same mask on WAN1.

- WAN2 is typically used for upstream public network access.

Note: If the type is set to DHCP, the IP address, gateway address, and mask address for the WAN port are automatically assigned by the network and cannot be manually modified.

4. Click the **Write Config** button at the bottom-right corner of the page.

5. To immediately apply the latest configuration to the device, click **Restart SYS** at the bottom-right corner of the page, and click **Sure** in the **Operation Confirmation** pop-up dialog box.

4.8.1.4 Configure CAN Port

Procedure

1. Click Device MGT > Port

2. Choose CAN

3. Configure the CAN port baud rate, CAN ID, and subnet mask according to the actual device connection on site. If an edit button appears next to a parameter column name, that parameter is configurable.

   1) Click the area of the parameter value to modify.

   2) Enter the value in the pop-up **Edit** dialog box.

3)   After setting the parameter, click **Sure**.

4. Click the Write Config button at the bottom-right corner of the page.

5. To immediately apply the latest configuration to the device, click Restart SYS at the bottom-right corner of the page, and click Sure in the Operation Confirmation pop-up dialog box.
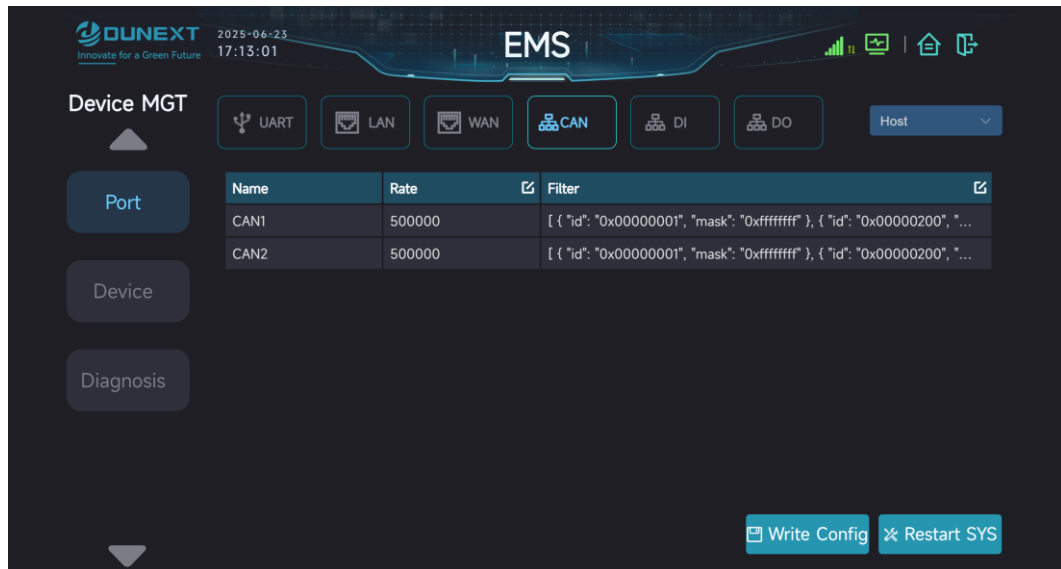

4.8.1.5 Configure DI Port

Procedure

1. Click **Device MGT** > **Port**

2. Choose **DI**

3. Configure parameters such as the display name of the DI ports based on actual device connections. If an edit button appears next to a parameter column name, that parameter is configurable.

    1) Click the area of the parameter value to modify.

    2) Enter the value in the pop-up **Edit** dialog box.

    3) After setting the parameter, click **Sure**.

4. Click the **Write Config** button at the bottom-right corner of the page.

5. To immediately apply the latest configuration to the device, click **Restart SYS** at the bottom-right corner of the page, and click **Sure** in the **Operation Confirmation** pop-up dialog box.

4.8.1.6 Configure DO Port

Procedure

1. Click **Device MGT** > **Port**

2. Choose **DO**

3. Set the display name of the DO ports according to the actual device connections. If an edit button appears next to a parameter column name, that parameter is configurable.

    1) Click the area of the parameter value to modify.

    2) Enter the value in the pop-up **Edit** dialog box.

    3) After setting the parameter, click **Sure**.

4. Click the **Write Config** button at the bottom-right corner of the page.

5. To immediately apply the latest configuration to the device, click **Restart SYS** at the bottom-right corner of the page, and click **Sure** in the **Operation Confirmation** pop-up dialog box.
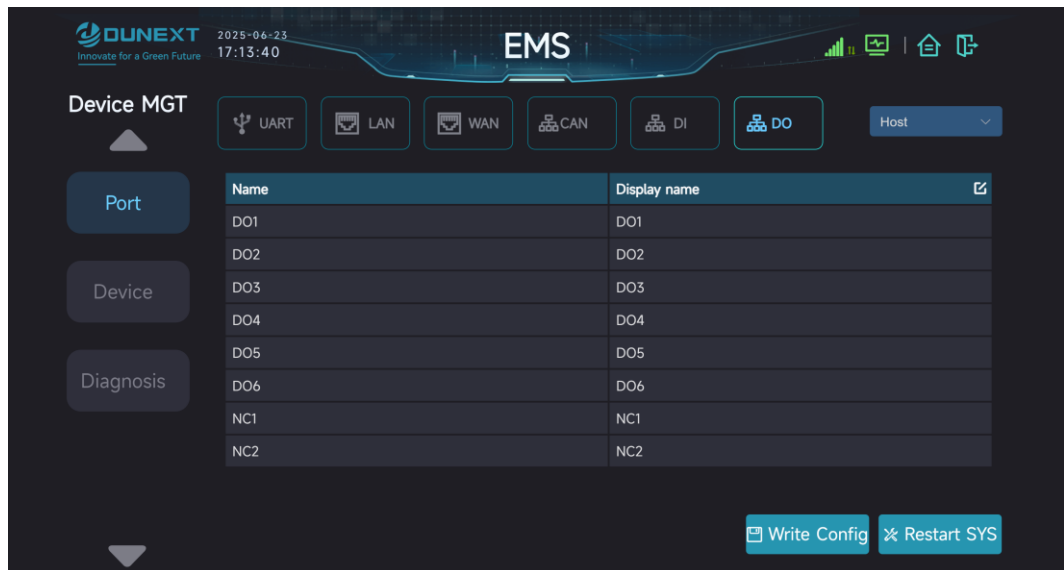
4.8.2 Device Configuration

Select Device from the left panel to view and configure devices such as meters, PCS, and BMS. Energy storage systems must be configured under the corresponding device module.

The EMS includes built-in templates for various types of energy storage systems. For customized templates, please select Controller at the top of the Operation page to import them in advance via Import Template.

Device type, template, and protocol must be selected from the corresponding drop-down lists.

Figure 4-68 Device configuration interface

Example of configuring a meter:

Procedure

1. Click **Device MGT** > **Device**

2. Choose **METER**

3. Set the required parameters as needed. A parameter is configurable if an edit icon appears beside the column name.

   1) Click the value area of the parameter to be modified.

   2) Configure it in the pop-up **Edit** dialog.

   3) After completing the parameter configuration, click **Sure**.

4. Click **Write Config** at the lower right of the page.

5. To immediately apply the latest configuration to the energy storage system, click **Restart SYS** at the lower right of the page, and in the pop-up **Operation Confirmation** Dialog, click **Sure**.

Other device configurations follow similar steps.

4.8.3 Diagnosis

From the left panel, select Diagnostics to perform Factory or Charge–Disch Diagnostics on the current energy storage system.

Figure 4-69 Diagnosis interface
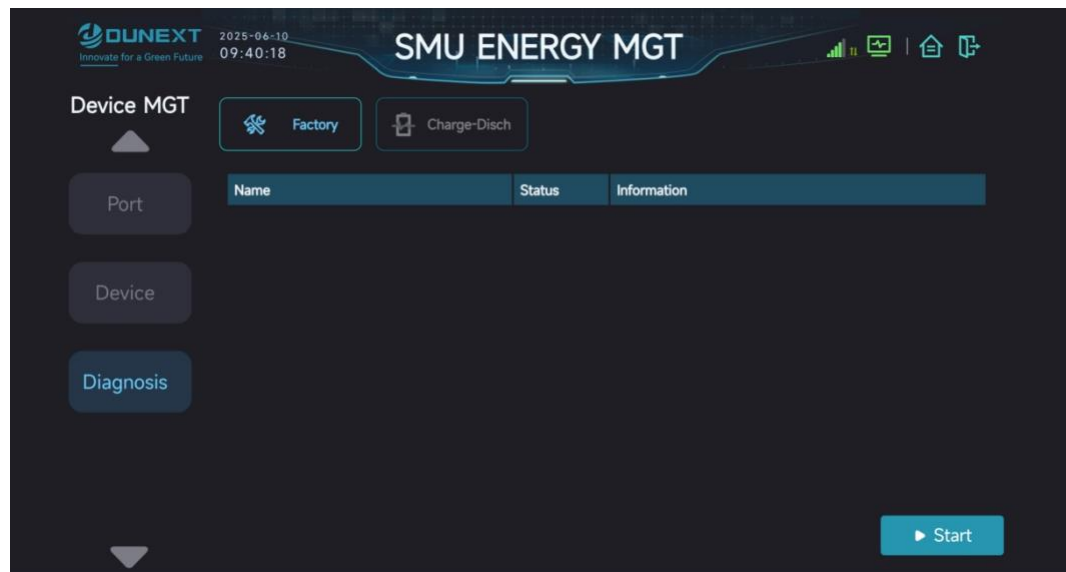
4.8.3.1 Factory Diagnostics

Procedure

1. Click **Device MGT** > **Diagnostics**

2. Choose **Factory**

3. Click **Start** at the lower right of the page.

Result

The screen displays the results of the factory diagnostics.

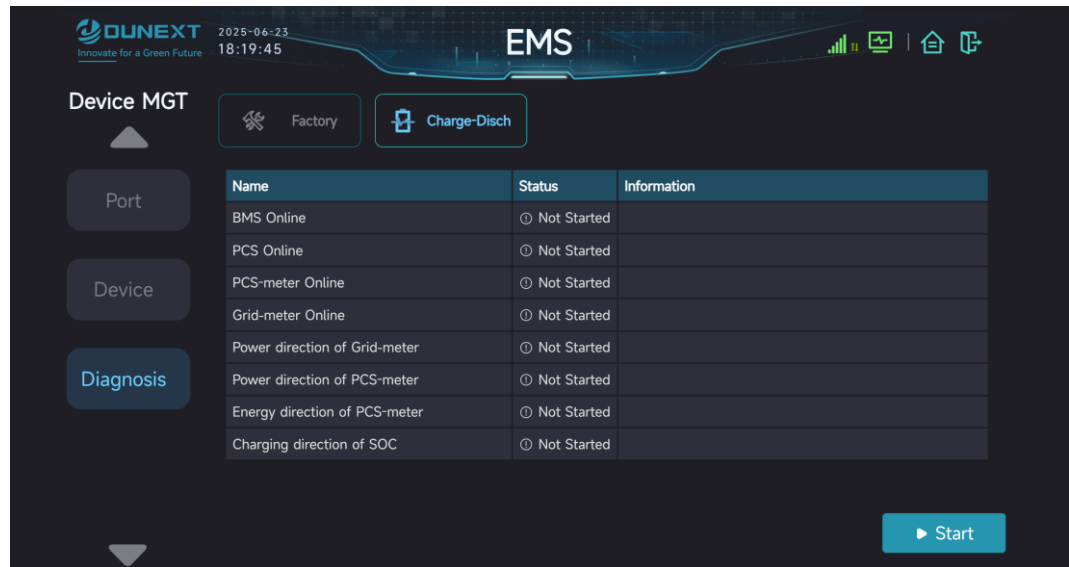**Figure 4-70 Factory interface**
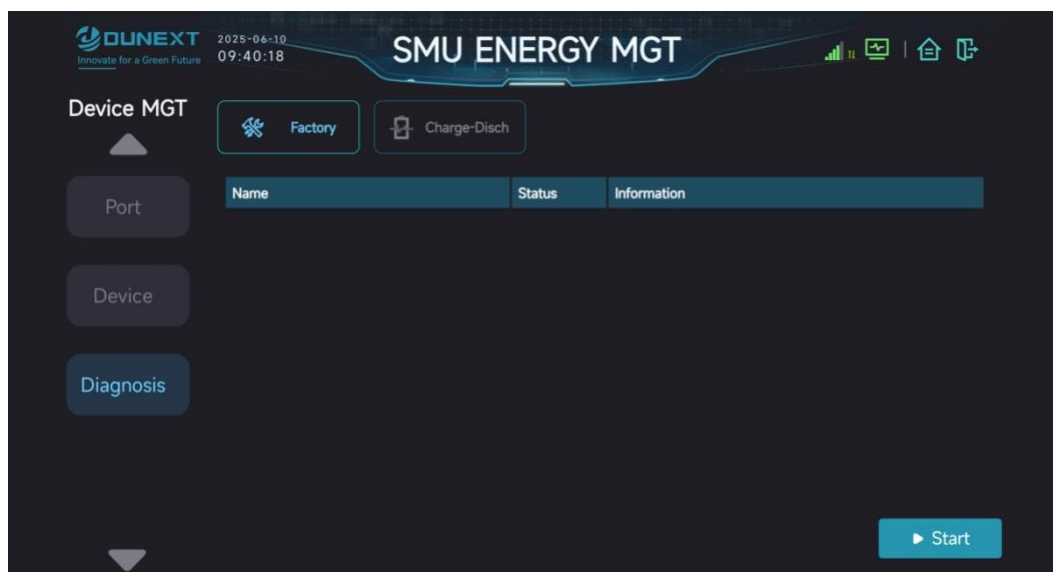
4.8.3.2 Charge–Discharge Diagnostics

Procedure

1. Click **Device MGT** > **Diagnostics**

2. Select **Charge-Disch**

3. Click **Start** at the lower right of the page.

Result

The screen displays the results of the charge–discharge diagnostics.

Figure 4-71 Charge-Disch diagnosis tab

4.9 System Settings

By clicking System on the main interface, users can configure the basic settings, connections, parameters, and operations of the energy storage system. This allows users to flexibly adjust the energy storage system according to their needs and scenarios, while also performing software upgrades to ensure the system stays current with technological advancements.

Figure 4-72 System module
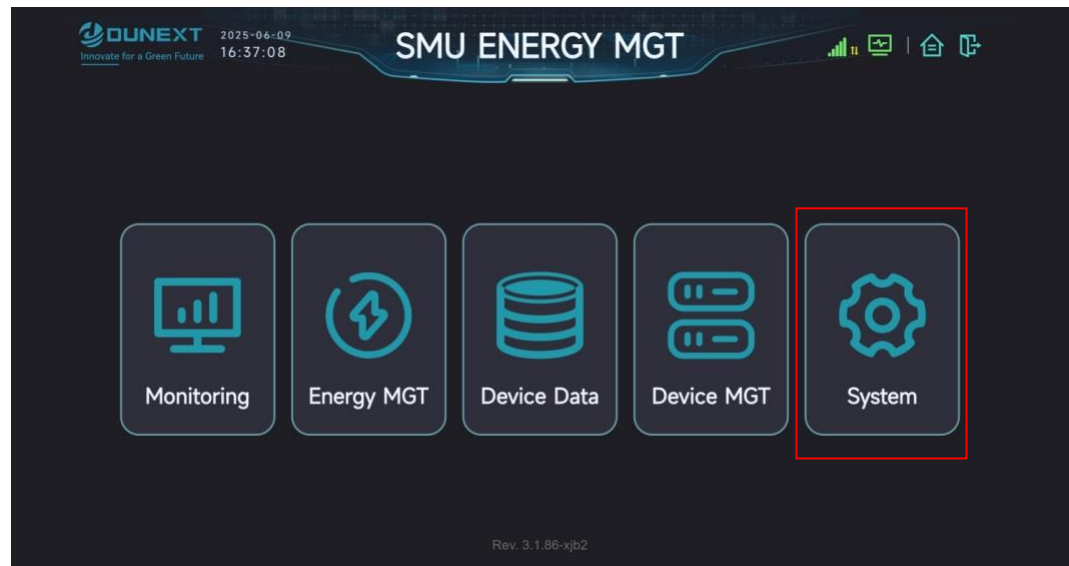
4.9.1 Basic Settings

From the left panel, select Basic to change or reset the login password for the energy storage system, and upload a custom LOGO to personalize the interface.

Figure 4-73 Basic interface

4.9.1.1 Change User Password

Procedure

1. Click **System** > **Basic**

2. Select **Login User**

3. Click **User Password**

4. Enter new password in the Edit dialogue box

Note: The user password supports numbers only. After the password is changed, the system will automatically log out and return to the homepage. Please log in again using the new password.

Figure 4-74 Change user password
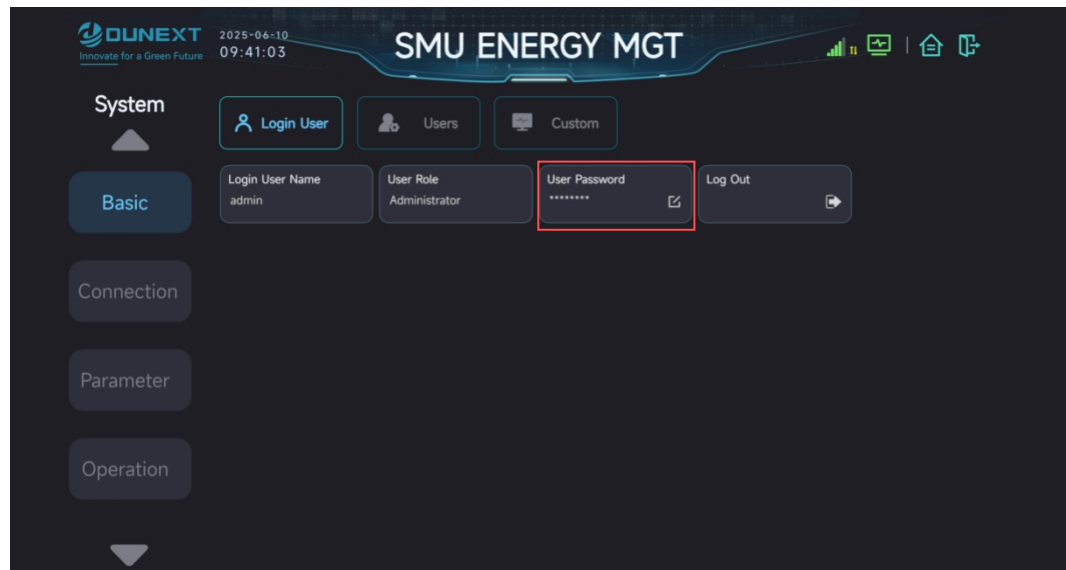
4.9.1.2 Log Out

Procedure

1. Click **System** > **Basic**

2. Select **Login User**

3. Click **Log Out**

4. Click **Sure** in the pop-up **Operation Confirmation** dialog

Note: Users can also click the Logout button in the upper right corner of the page to return to the system homepage.

Figure 4-75 Log out

4.9.1.3 Reset User Password

Users can reset the user password to the default password 123456.

Procedure

1. Click **System** > **Basic**

2. Select **Users**

3. Click **Reset Password** in the Operate column

Figure 4-76 Reset password
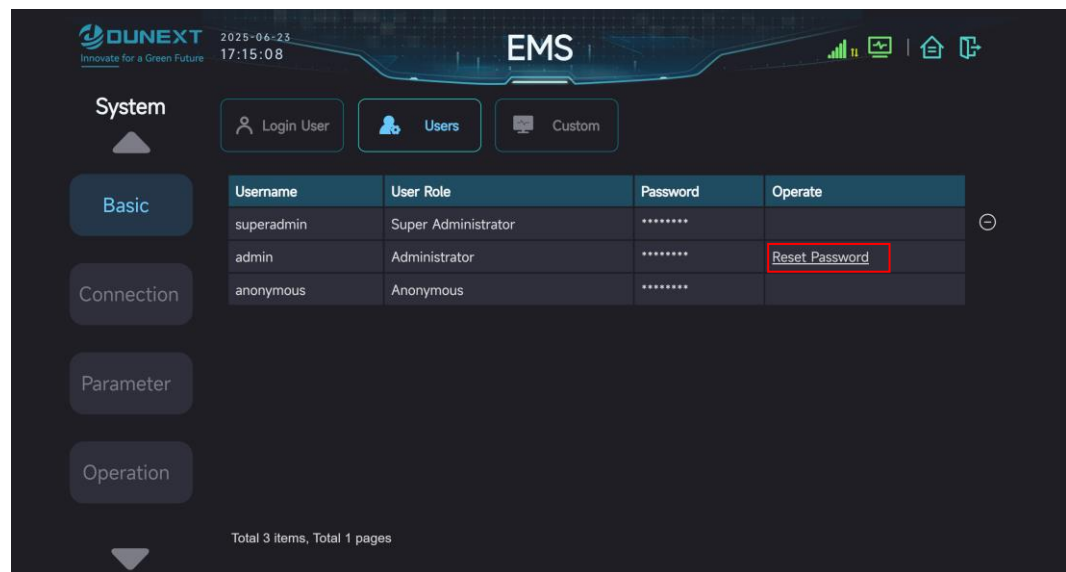
4.9.1.4 Set Custom Logo

Procedure

1. Click **System** > **Basic**

2. Select **Custom**

3. Click the logo upload area to upload a custom logo file

It is recommended to use a transparent background PNG image with dimensions of 150 x 100 pixels to ensure optimal display on the EMS page.

Figure 4-77 Logo upload area
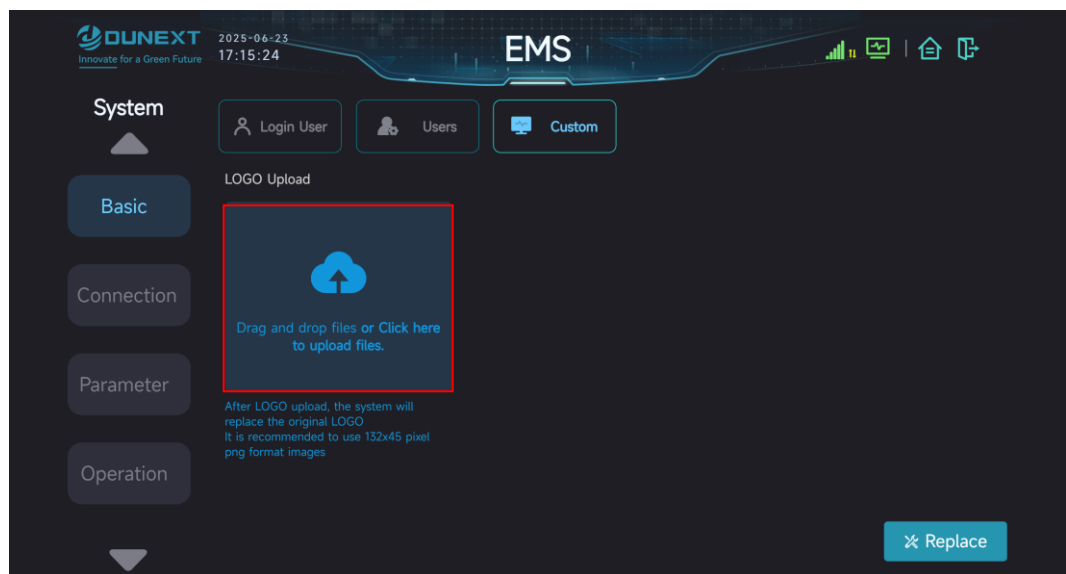
4. In the pop-up **Open** dialog, navigate to the directory where the LOGO file is stored, select the desired PNG file, and then click **Open**.

5. After the file upload is complete, click **Replace** at the bottom right of the page.

6. In the pop-up **Operation Confirmation** dialog, click **Sure**.

4.9.2 Connection Management

From the left panel, select Connection to view information about established network connections, including name, IP address, port, username, etc.

Figure 4-78 Connection interface
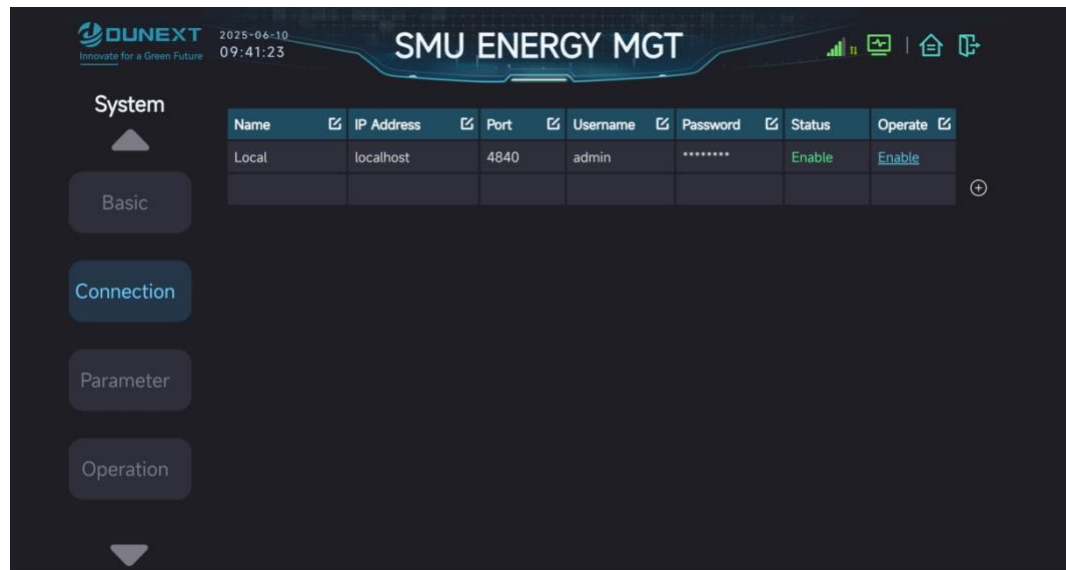
4.9.2.1 Enable Connection

Procedure

1. Click **System** > **Connection**

2. Click **Enable** to activate the corresponding **Operate** column for the connection

3. Click **Sure** in the **Operation Confirmation** pop-up dialogue

Note: Only one connection can be enabled in EMS. Once a connection is enabled, all other connections are automatically disabled.
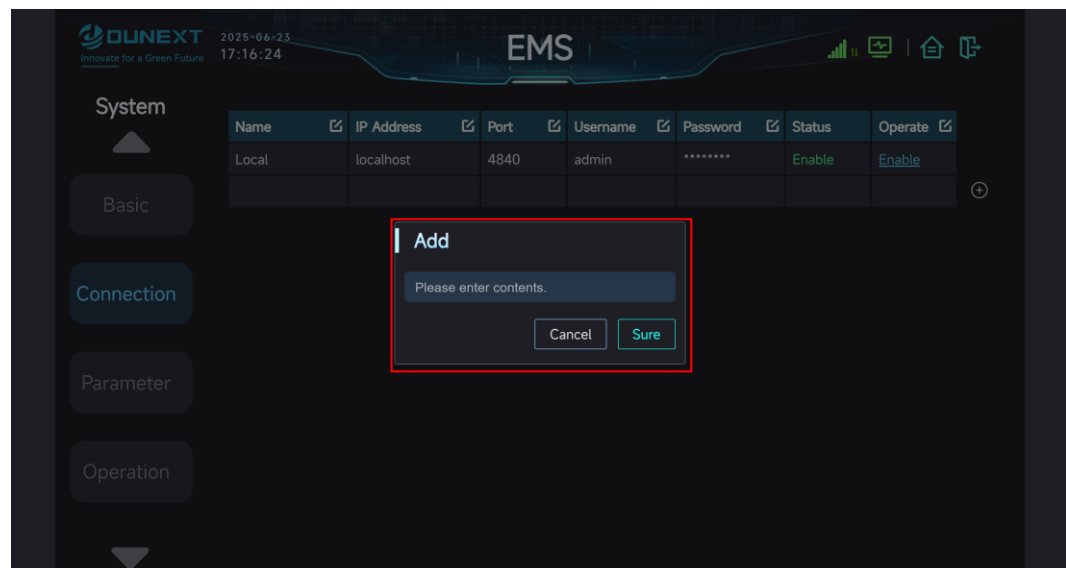
**Figure 4-79 Enable connection**
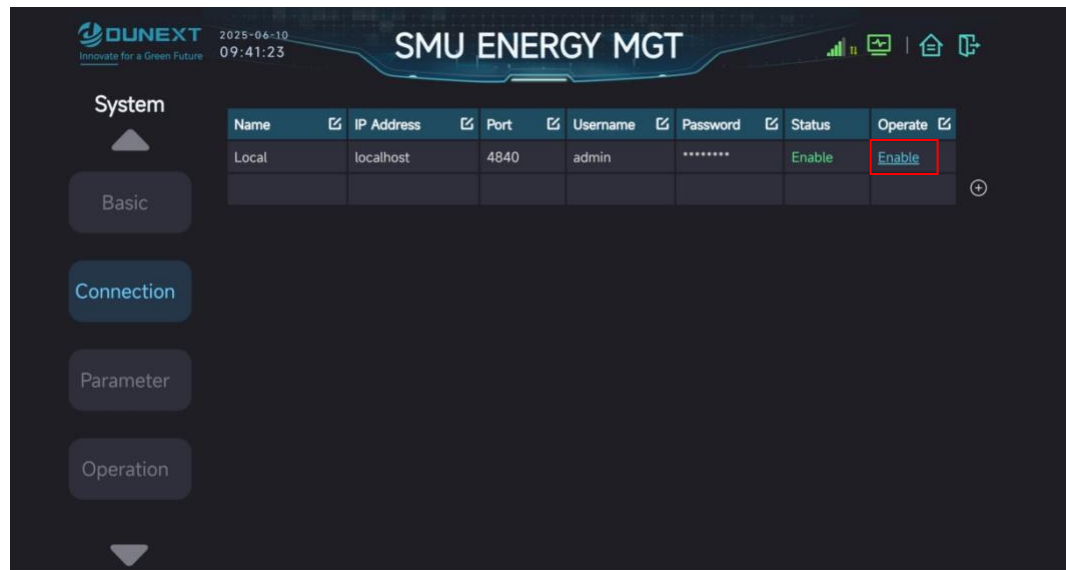
4.9.2.2 Add Connection

Procedure

1. Click **System** > **Connection**

2. In the blank data row, click on the cells corresponding to Name, IP Address, Port, and other information to set the required parameters. Configure each parameter in its respective **Add** dialog box. Once the parameter is set, click **Sure**.

Figure 4-80 Add connection

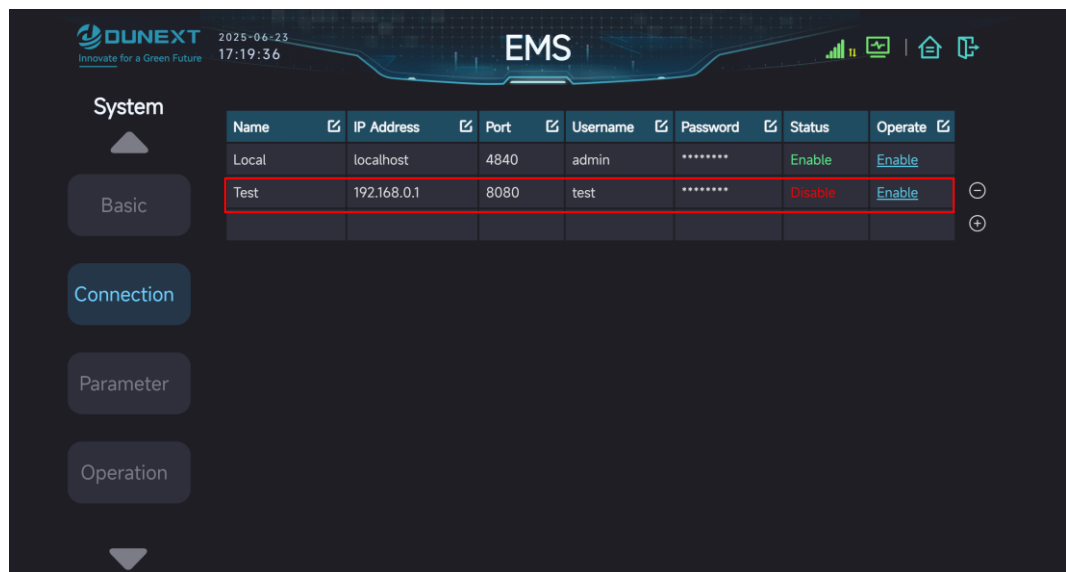3. Click the add button at the bottom-right of the data table

Figure 4-81 Add button
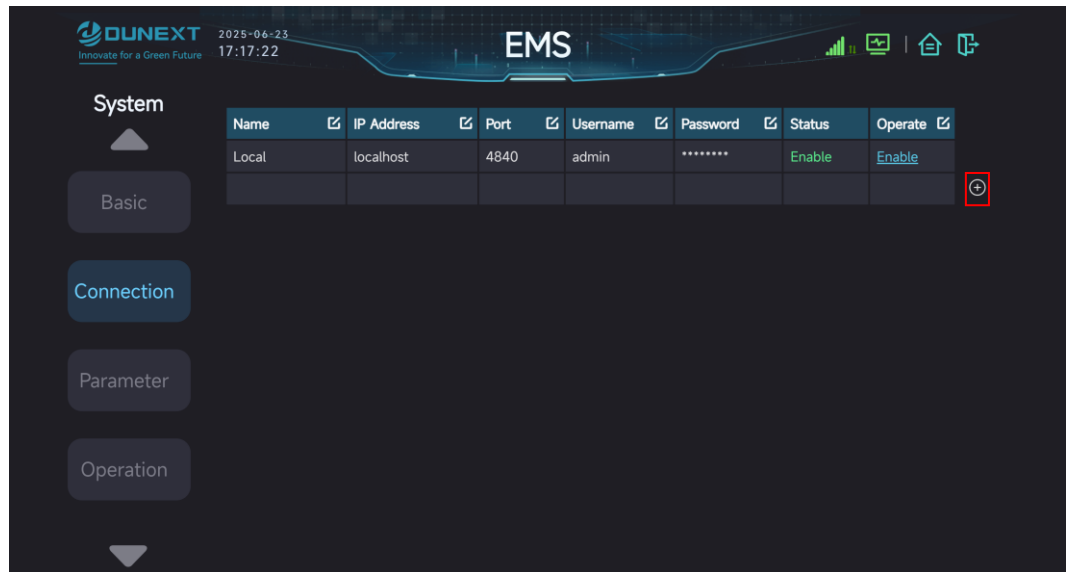
Result

The new connection is added to the connection data table.

Figure 4-82 New connection added
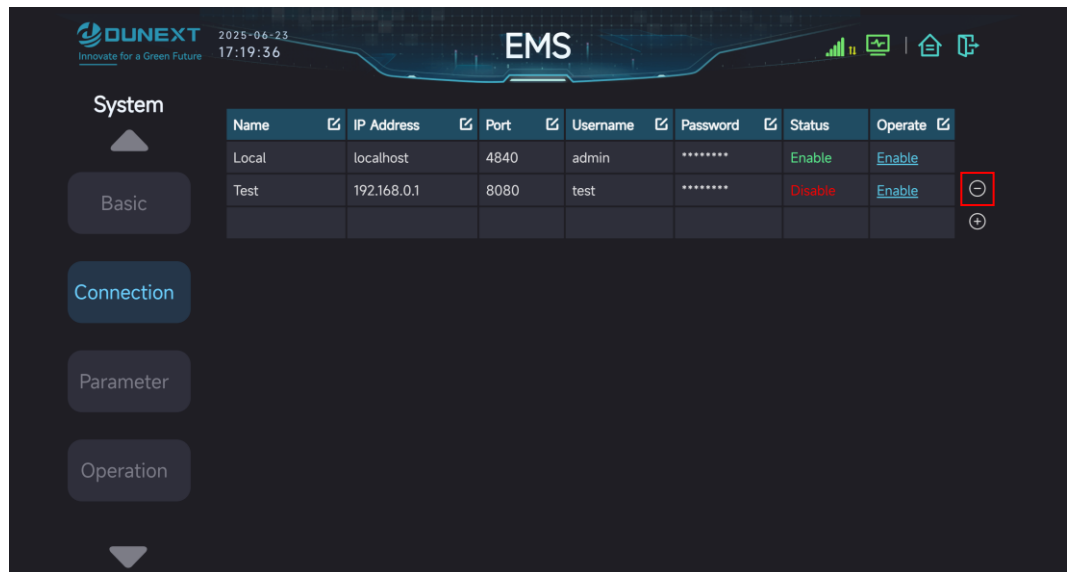

4.9.2.3 Delete Connection

Procedure

1. Click **System** > **Connection**

2. Click the Delete button on the right side of the corresponding data row to remove the connection.

3. Click **Sure** in the **Operation Confirmation** pop-up dialogue

Note: The local connection is enabled by default by the system and cannot be deleted.
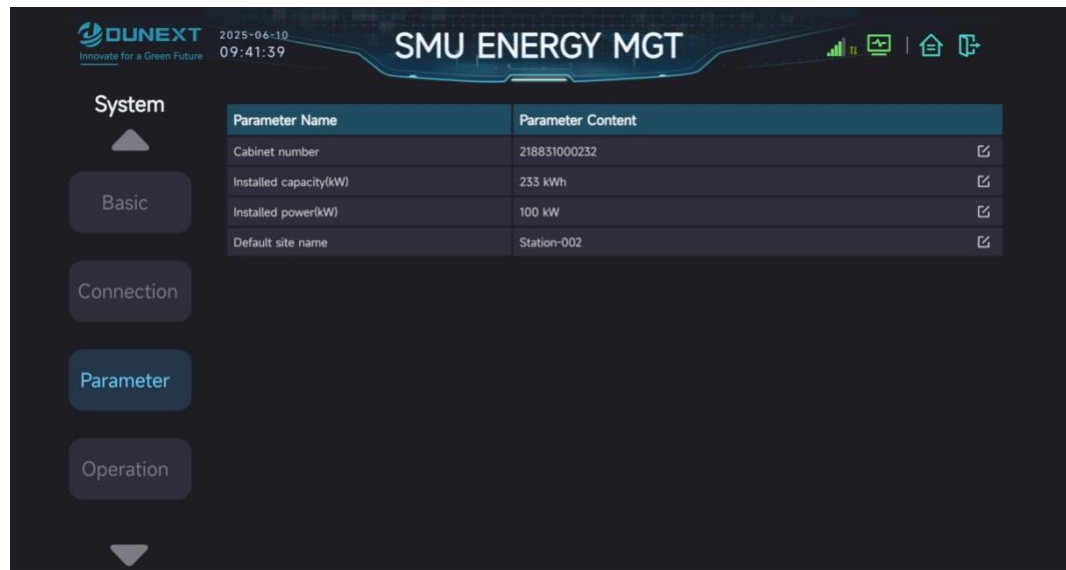
Figure 4-83 Delete connection

4.9.3 System Parameters

From the left panel, select Parameter to view the current system cabinet number, installed capacity, and installed power.
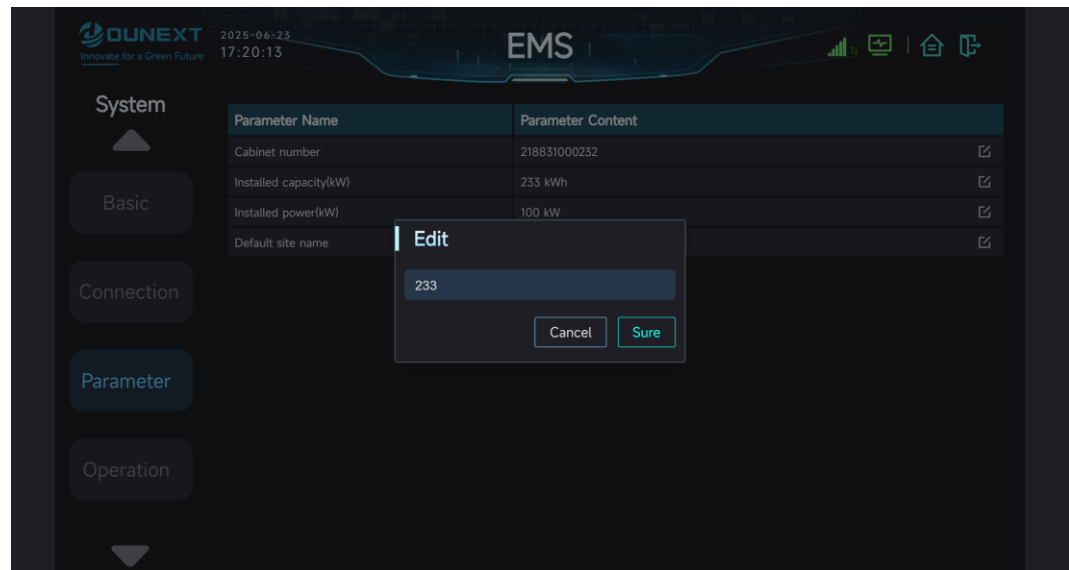
Figure 4-84 Parameter interface

4.9.3.1 Set Parameter

Procedure

1. Click **System** > **Parameter**

2. Configure the required parameters according to your needs.

   1) Click the **Edit** button on the right side of the corresponding parameter value.

   2) Set the parameter in the pop-up **Edit** dialog box.

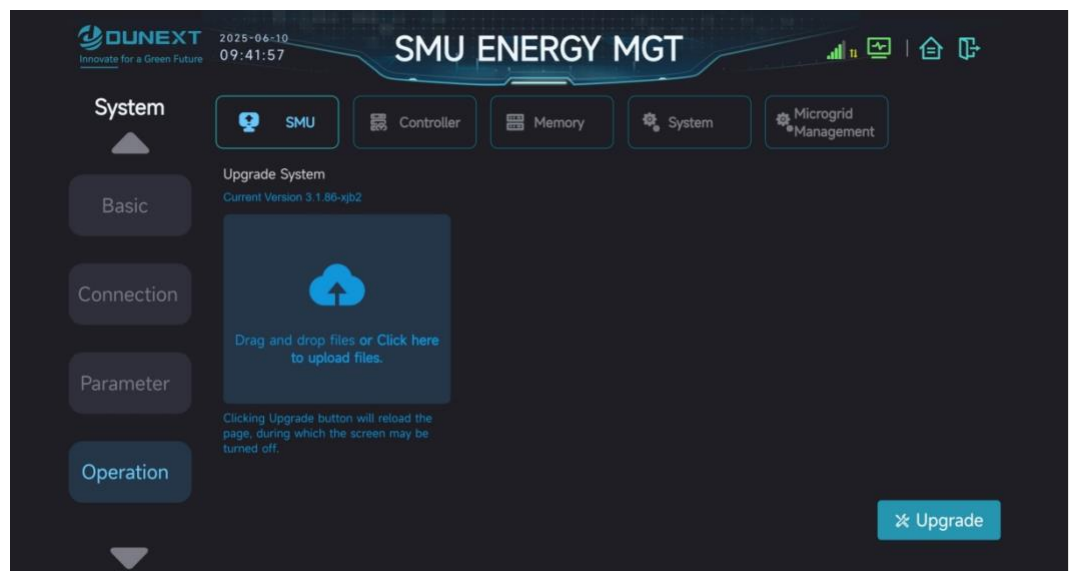   3) After completing the configuration, click **Sure** to confirm.

Figure 4-85 Set parameter

4.9.4 System Operation

From the left panel, select Operation to perform operations such as system upgrades and restart.

Figure 4-86 Operation interface

4.9.4.1 Upgrade SMU

Procedure

1. Click **System** > **Operation**

2. Select **SMU**

3. Click the file upload area to upload files

Figure 4-87 File upload area

4. In the pop-up Open dialog box, navigate to the directory where the upgrade file is stored, select the desired ZIP file, and then click **Open**.

5. Click **Upgrade** in the lower right corner of the page to upgrade EMS.

4.9.4.2 Upgrade Controller System

Procedure

1. Click **System** > **Operation**

2. Select **Controller**

3. Click **Upgrade Controller**

4. Drag and drop the upgrade file or click the file upload area to upload a file.

Figure 4-88 Upgrade controller interface

5. Click the **Upgrade** button at the bottom-right of the page.

Note: Restoring factory settings through **Initialize Upgrade** will reset the controller configuration to its default state. Exercise caution when performing this operation on systems already in operation.
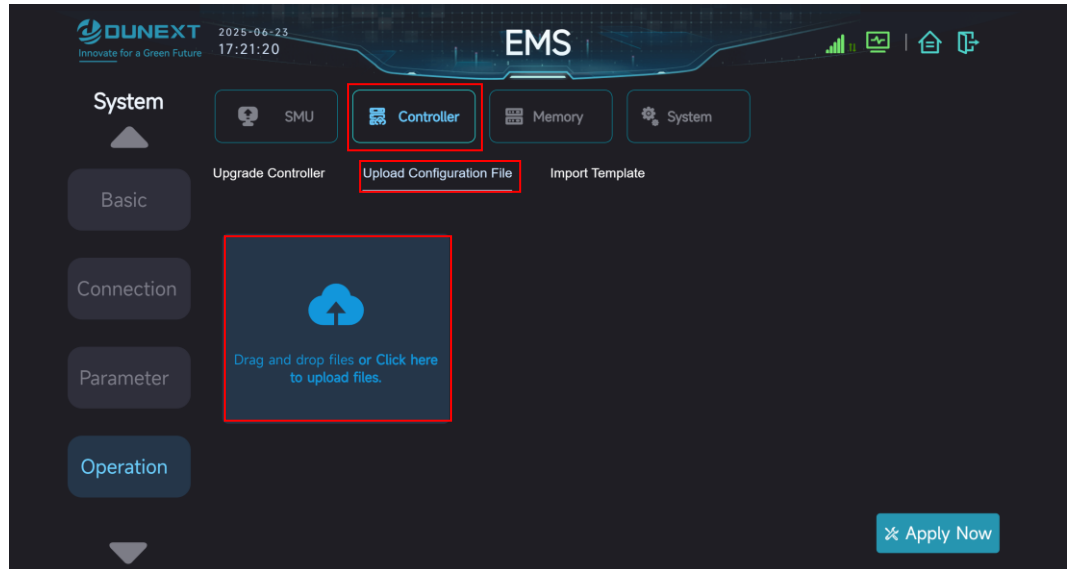
4.9.4.3 Upload Configuration File

This feature only supports uploading via the web page.

Procedure

1. Click **System** > **Operation**

2. Select **Controller**

3. Click **Upload Configuration File**

4. Drag and drop the upgrade file or click the file upload area to upload a file.

Figure 4-89 Upload configuration file

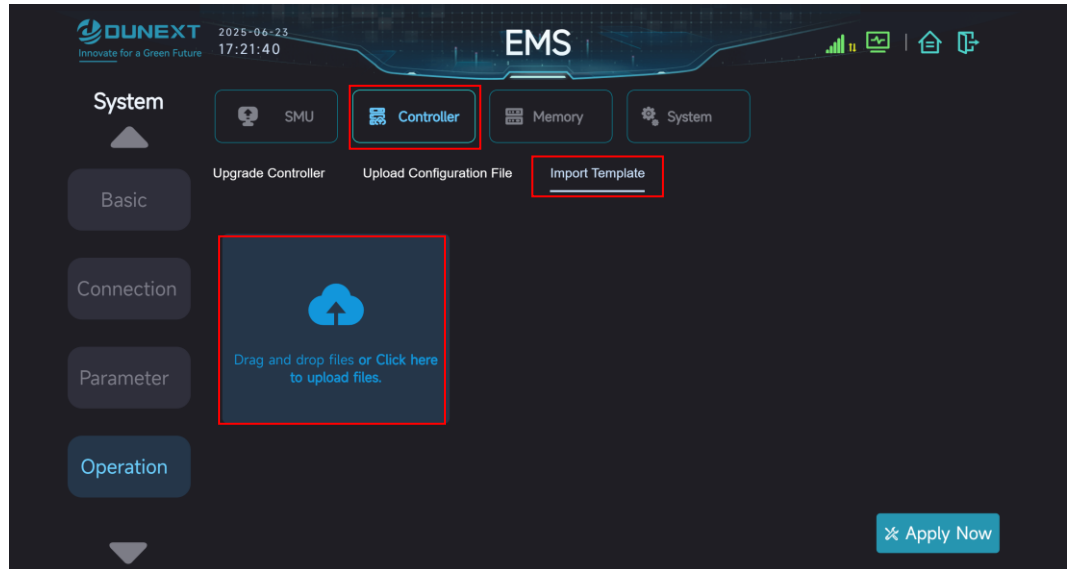5. After the file upload is complete, click **Apply Now** at the bottom-right corner.

4.9.4.4 Import Device Template

This feature only supports uploading via the web page.

Procedure

1. Click **System** > **Operation**

2. Select **Controller**

3. Click **Import Template**

4. Drag and drop the upgrade file or click the file upload area to upload a file.

Figure 4-90 Import template interface

5. After the file upload is complete, click **Apply Now** at the bottom-right corner.
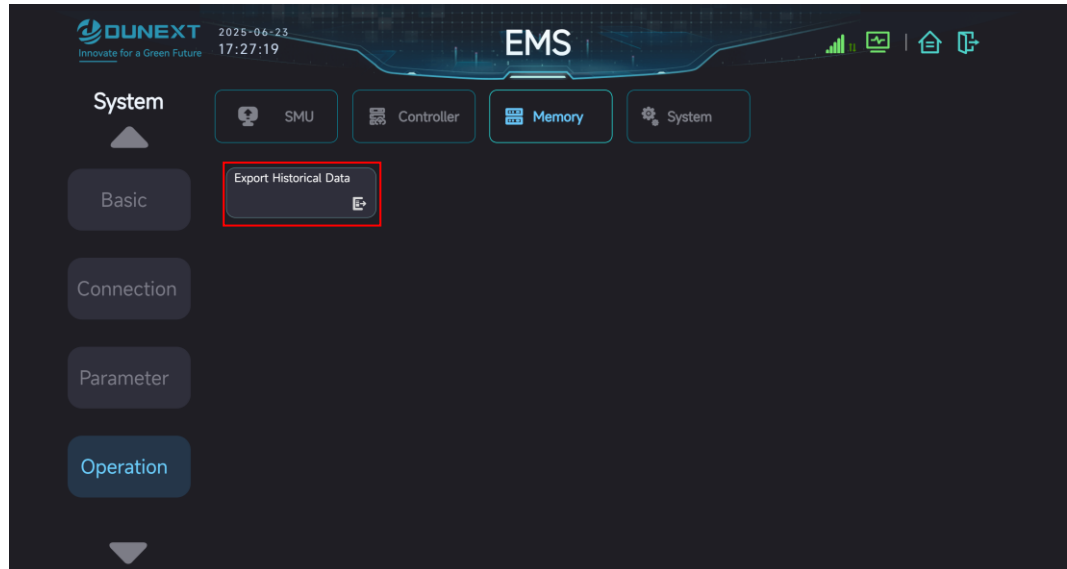
4.9.4.5 Export Historical Data

This feature supports data export via the web interface or through the controller's built-in screen.

Procedure

1. Insert the USB drive into the EMS controller's USB port.

2. On the controller screen, click **System** > **Operation**

3. Select **Controller**

4. Click **Export Historical Data**

**Figure 4-91 Export historical data**

5. Select the historical data to be exported.

6. Click the **Apply Now** button at the bottom-right corner of the page.

4.9.4.6 Sync Time

Procedure

1. Click **System** > **Operation**

2. Select **System**

3. Click the settings button at the bottom-right of **Sync Time**

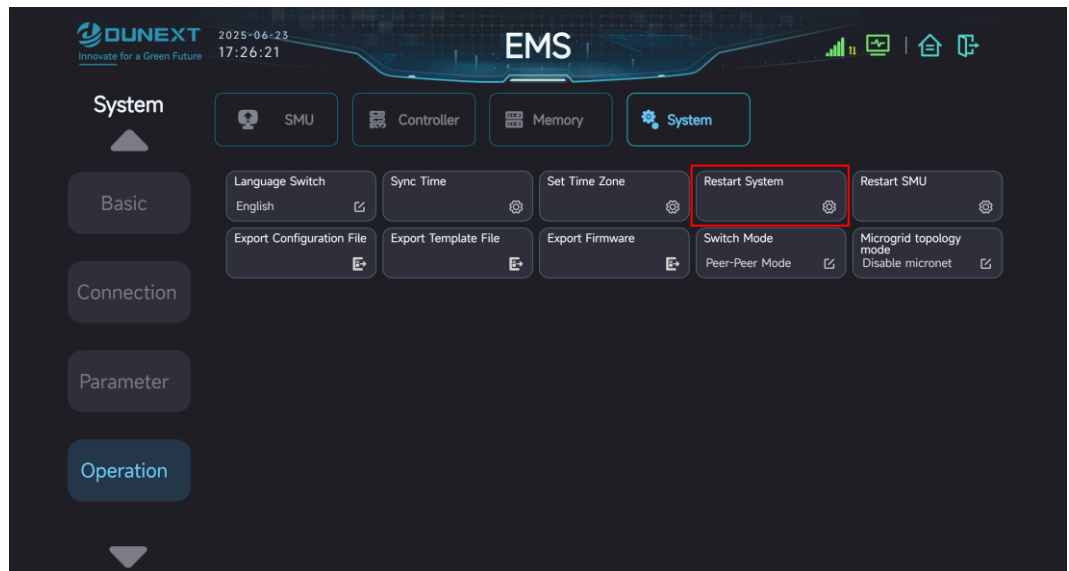4. Set the required time information in the **Sync Time** pop-up dialogue, then click **Sure**

Figure 4-92 Sync time pop-up dialogue
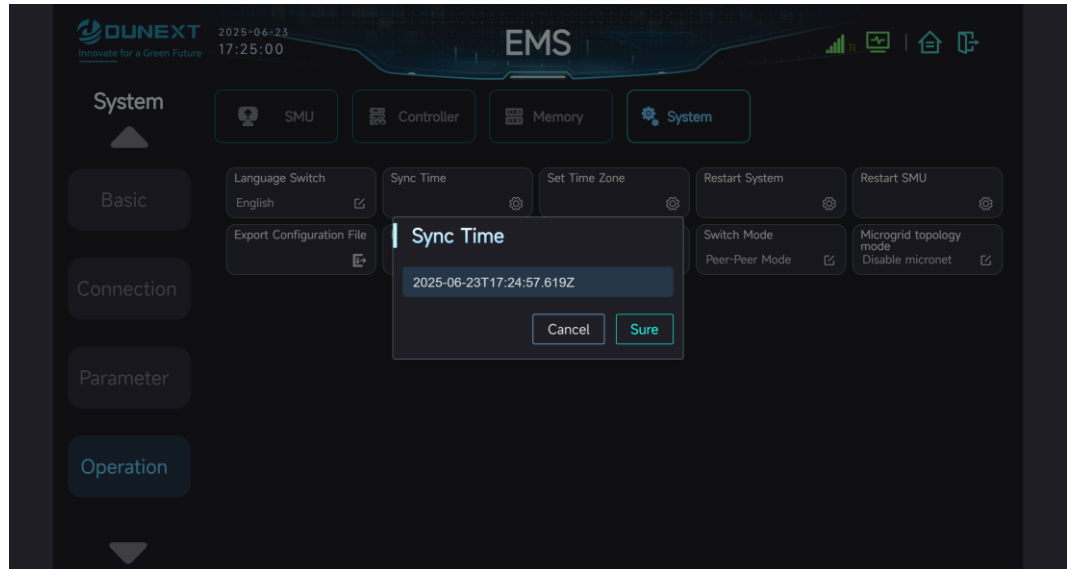
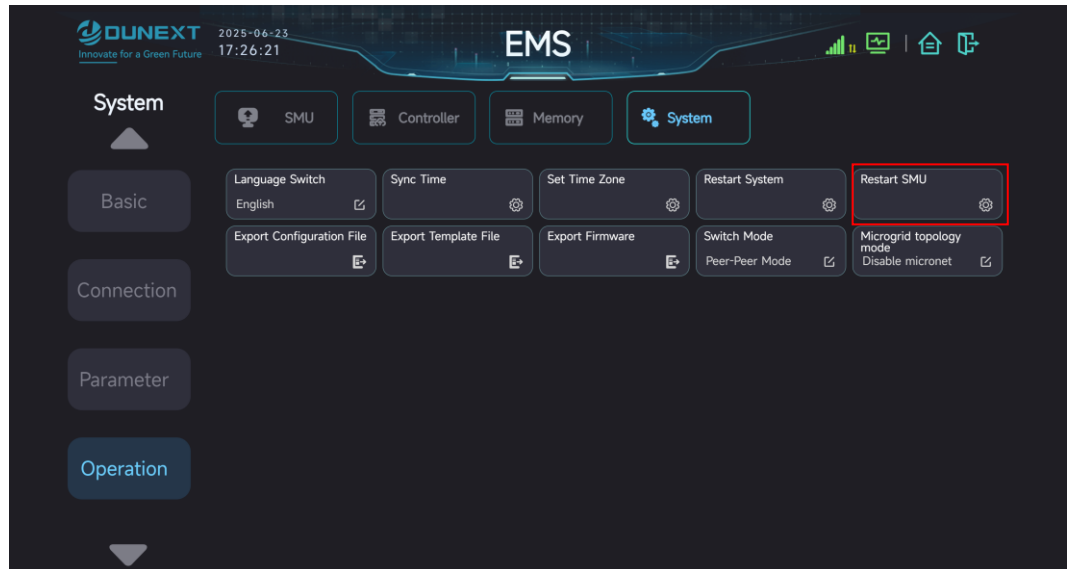## 4.9.4.7 Restart Controller System

Procedure

1. Click **System** > **Operation**

2. Select **System**

3. Click **Restart System**

4. Click **Sure** in the **Operation Confirmation** pop-up dialogue.

4.9.4.8 Restart SMU

Procedure

1.   Click **System** > **Operation**

2.   Select **System**

3.   Click **Restart SMU**

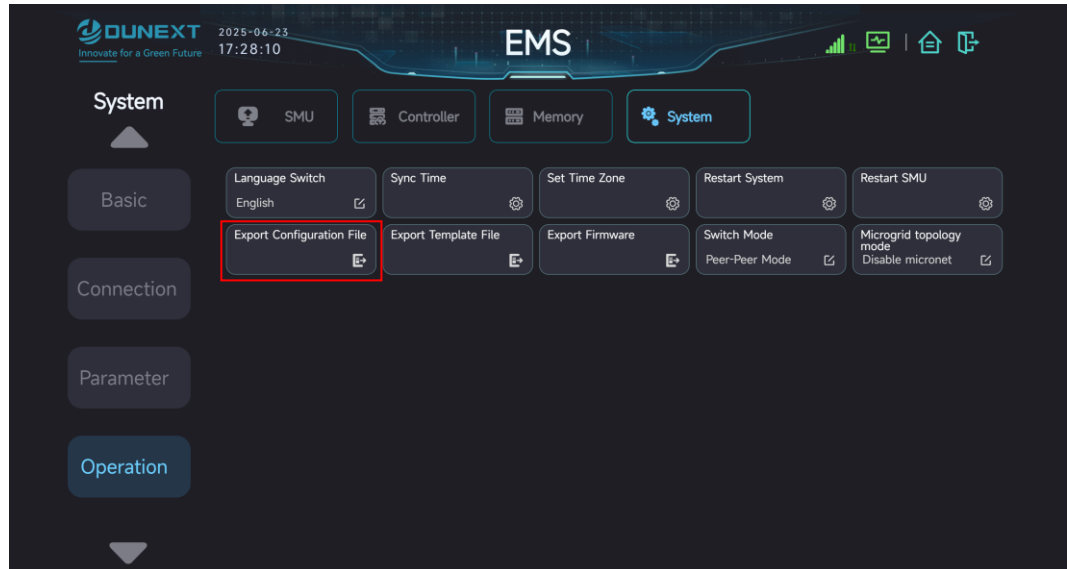4.   Click **Sure** in the **Operation Confirmation** pop-up dialogue.

4.9.4.9 Export Configuration File

This feature only supports exporting via the web page.

Procedure

1.   Click **System** > **Operation**

2.   Select **System**

3.   Click **Export Configuration File**

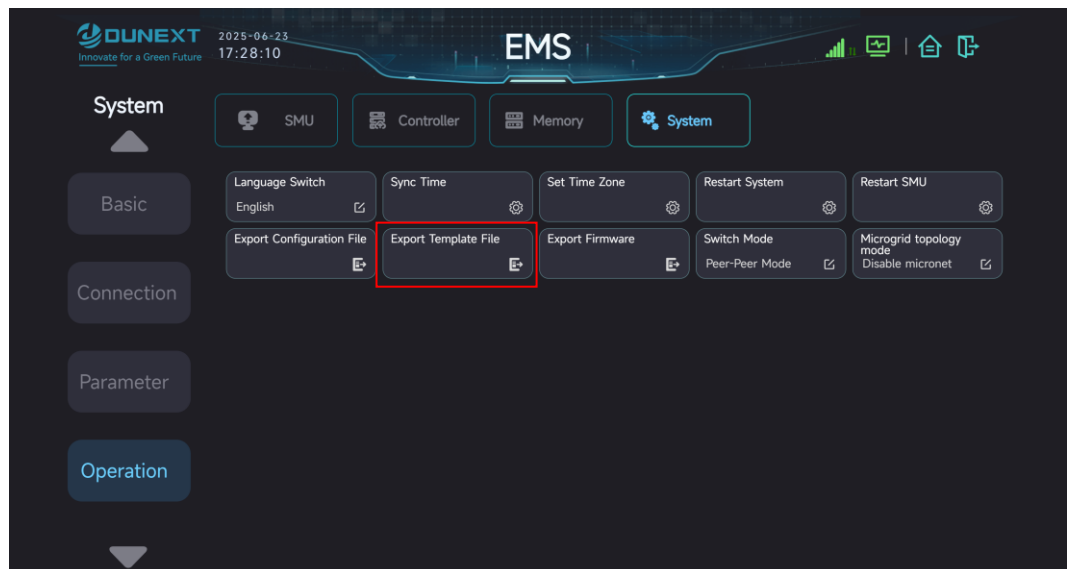4.   Click **Sure** in the **Operation Confirmation** pop-up dialogue.

4.9.4.10 Export Template File

This feature only supports exporting via the web page.

Procedure

1. Click **System** > **Operation**

2. Select **System**

3. Click **Export Template File**

4. Click **Sure** in the **Operation Confirmation** pop-up dialogue.

4.9.4.11 Export Controller Firmware

This feature only supports exporting via the web page.

Procedure

1. Click **System** > **Operation**

2. Select **System**

3. Click **Export Firmware**

4. Click **Sure** in the **Operation Confirmation** pop-up dialogue.

Note: The firmware export process may take several minutes. Do not navigate away from the EMS page during this time, or the export will be terminated.
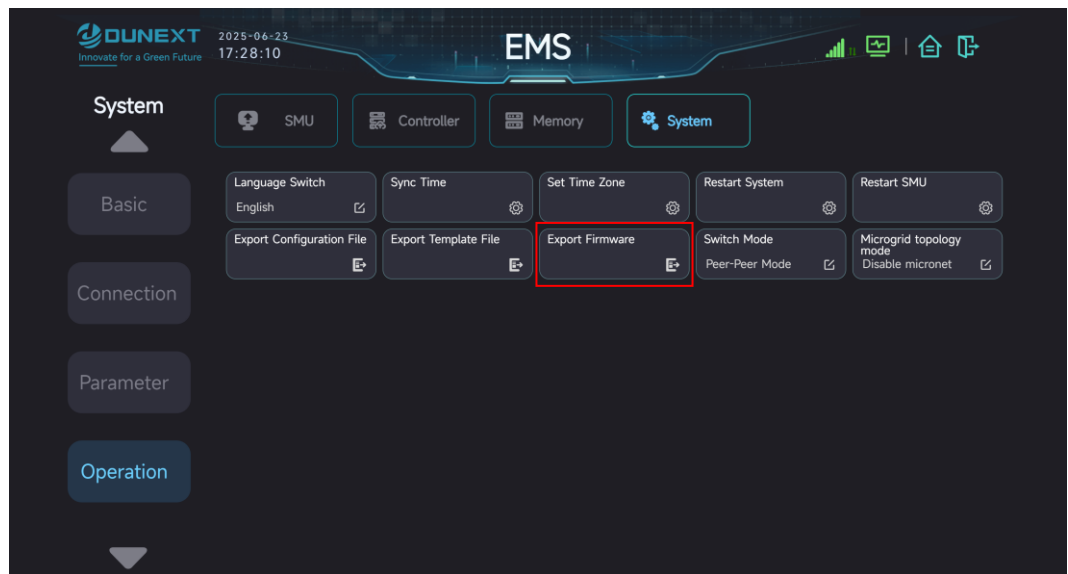
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