User Manual

Energy Management System
MS-EMS (WS-GS2000-2H3)



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Preface

This manual provides information on safety, installation, electrical connection, operation, maintenance, and other relevant aspects of the product.

In this manual, the terms “equipment”, “device”, and “product” refer to the product or its components; the terms “manufacturer”, “producer”, and “the Company” refer to NINGBO DEYE ESS TECHNOLOGY CO., LTD. (hereinafter referred to as the “Company”) or its authorized agents.

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1 System Introduction

1.1 Introduction

Deye Energy Management System (EMS) is a highly integrated and intelligent energy management platform. The **core functions** of Deye EMS system are as follows:

- **User Permission Management**: supports multi-role login and implements refined control of role-based page access permissions and data operation permissions.
- **Comprehensive Device Monitoring**: supports data monitoring, information management, event recording, and remote upgrade of key devices in the power station.
- **Energy Strategy Control**: supports the configuration and execution of typical operation strategies, including peak shaving & valley filling and EV charger priority.

Designed with flexibility, reliability, ease of use, and foresight, it has the following **core features**:

- **Modular and Flexible Configuration**

  The system supports flexible expansion from a single cabinet to multiple cabinets in parallel. Users can freely combine cabinets according to actual needs and easily build energy storage power stations of different scales. This architecture allows smooth capacity expansion of power stations with business growth.
- **Integrated Hardware & Software with Full Autonomy**

  Through the deep coupling of software and hardware, the system achieves comprehensive autonomy and controllability from the underlying devices to the upper-level policies. This design not only improves the safety and stability of system operation but also reduces dependence on external technologies.
- **User-Friendly Interaction**

  The system provides an intuitive and friendly operation interface to lower the usage threshold for users. Even non-professionals can get started quickly. This helps users achieve energy cost saving, energy efficiency improvement, and sustainable energy management.
- **Cloud-Edge Collaborative Architecture**

  Adopting a cloud-edge integrated design, the system balances local real-time control and centralized cloud management. This architecture supports advanced applications such as multi-station joint control and grid interactive response. It also improves O&M efficiency and system availability.

- **Intelligent Strategy Optimization**

  The system is equipped with built-in configurable intelligent operation strategies, including peak shaving & valley filling, demand control and load tracking. It also features learning and optimization capabilities based on historical data, to continuously improve the operational economy and intelligence level of the power station.

With core strengths above-mentioned, Deye EMS provides highly flexible and controllable energy management solutions for energy storage power stations, enabling users to achieve safer, more economical, and more sustainable energy operation.

1.2 Operation Environment

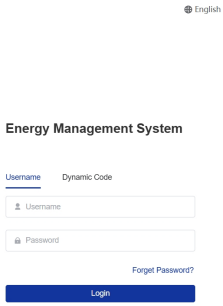
The following requirements shall be met for using the EMS system.

Item	Requirements
System Environment	Ubuntu 20.04 64-bit system
Memory	2 GB or above
Hard Disk	1 TB hard disk free space.

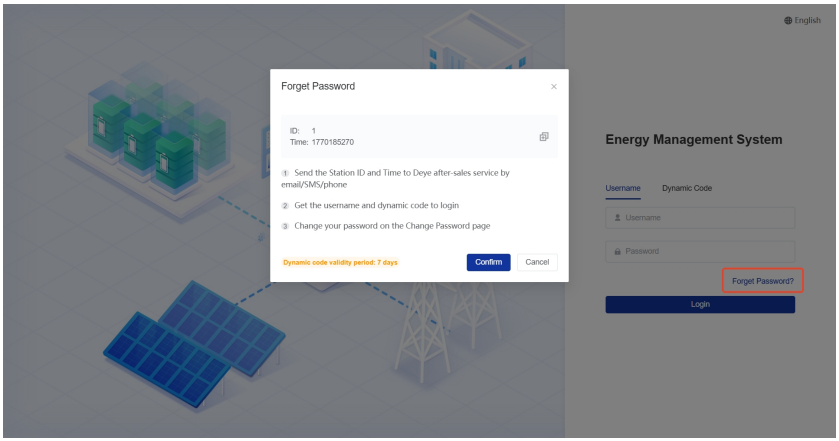
1.3 Login

The system uses a preset account mechanism for site login. The username and initial password are set before delivery, and the user registration function is not available currently.

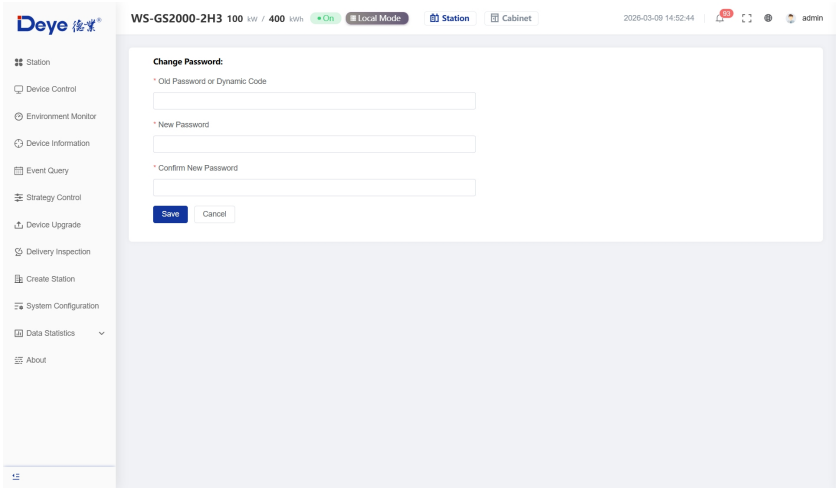




If you forget the password, you can log in with the dynamic verification code sent by the system.



After logging in with the dynamic verification code, you will be automatically redirected to the password change page. Please change the password based on the on-screen prompts.



1.4 Interface Layout

The system mainly includes the following three parts:

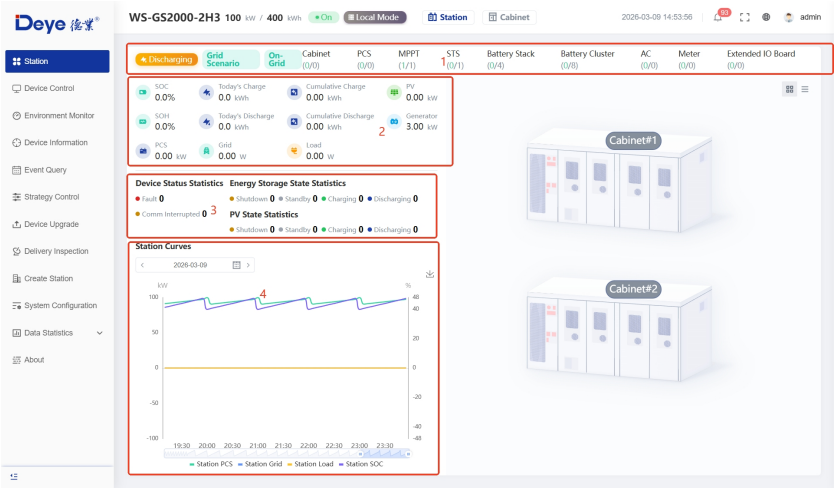
1. **Main Menu** (Left-side bar): Supports expansion and collapse operations and is used to access various function modules of the system.
2. **Top Navigation Bar**: Displays the power station name, rated power, capacity, system time, and provides access to active event notifications, full-screen display, multi-language switching and user information display and modification.
3. **Main Display Area**



2 Power Station

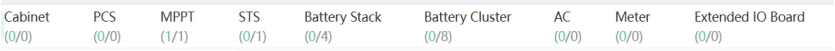
2.1 Main Display Area Overview

This section introduces the power station information on the main display area in detail.



Area 1

This area displays the communication status of all key devices in the power station



The numbers in brackets indicate the "**Current number of online devices/Total number of devices of the corresponding type**". Users can clearly know the integrity of the system structure and promptly discover any abnormal conditions, such as offline device.

For example, 

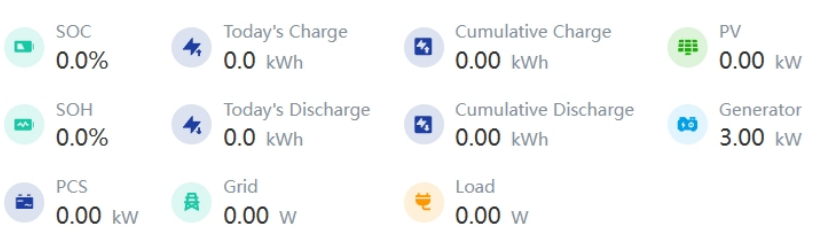
means that all two meters are offline and need to be troubleshooted.

Area 2

The data presented in this area is the core indicator for comprehensive monitoring and evaluation of the system operation state.

SOC and SOH directly reflect the real-time power and long-term health state of the energy storage system, which are basic parameters for assessing the system availability and lifespan. The charging and discharging energy statistics quantify the energy throughput performance of the system in the time dimension, providing a basis for

operational benefit analysis and strategy optimization. Real-time power data is a visual representation of the dynamic balance of energy flow in the power station.



Parameter	Description
SOC	Battery state of charge as a percentage, indicating the remaining available capacity of the battery.
SOH	Battery state of health as a percentage, reflecting the degradation level of the battery's maximum capacity.
Today's Charge	Total energy charged into the battery on the current day.
Today's Discharge	Total energy discharged from the battery on the current day.
Cumulative Charge	Total energy charged into the battery over the entire operation period of the system.
Cumulative Discharge	Total energy discharged from the battery over the entire operation period of the system.
PV	Real-time generation output of the photovoltaic system.
Generator	Real-time generation output of the on-site generator.
PCS	Real-time power of the PCS. Negative value indicates charging; positive value indicates discharging.
Grid	Real-time power exchanged with the grid. Positive value indicates power import from the grid; negative value indicates power export to the grid.
Load	Total power consumption of all loads in the power station.

Area 3

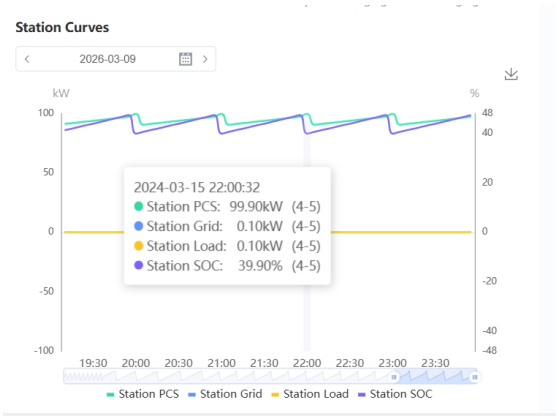
This area provides a centralized monitoring view of the operational reliability of the energy storage power station and the collaborative status of its devices. Its core function is to enable drill-through supervision from the system-level energy management to the device-level health management.



Parameter	Description
Device Status Statistics	Displays the number of faulty and communication-interrupted devices. Applicable device types: PCS, Battery clusters, Meter, Air conditioner, MPPT, and STS.
Energy Storage State Statistics	Displays the number of energy storage devices in the following status: Shutdown/Standby/Charging/Discharging.
PV State Statistics	Displays the number of PV devices in the following status: Shutdown/Standby/Charging/Discharging.

Area 4

The station curve serves as a core analytical tool for the operation analysis and performance evaluation of energy storage power stations. It delivers synchronized, correlated visualization of four key metrics: Station PCS, Station Grid, Station Load and Station SOC, presented in the form of time-series curves.



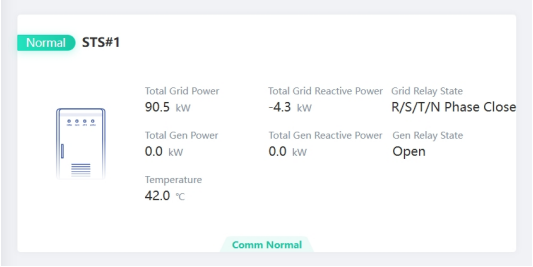
Parameter	Description
Station PCS	Real-time power of the PCS. Negative value indicates charging; positive value indicates discharging.
Station Grid	Real-time power exchanged with the grid. Positive value indicates power import from the grid; negative value indicates power export to the grid.
Station Load	Total power consumption of all loads in the power station.
Station SOC	Battery state of charge as a percentage, indicating the remaining available capacity of the battery.

2.2 Device Control

Click **[Device Control]** on the main menu, and select **[Station]** on the top navigation bar to view the device monitoring information of the power station

2.2.1 STS

The STS interface provides the real-time status monitoring, power quality monitoring, and seamless switch control between grid and generator power supplies.



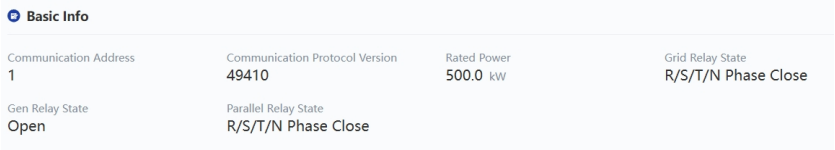
Parameter	Description
Total Grid Power	Current active power imported from or exported to the grid, representing the actual power that delivers useful work.
Total Grid Reactive Power	Current reactive power exchanged with the grid, which is used to establish magnetic fields and does not perform active work.
Grid Relay State	Main circuit breaker connecting the energy storage system to the grid. ● Closed: The grid is connected and available for power supply. ● Open: The grid is isolated from the energy storage system.
Total Gen Power	Current active power output by the backup generator.
Total Gen Reactive	Reactive power output of the generator.

Power	
Gen Relay State	Main circuit breaker connecting the system and the backup generator: ● Closed: The generator is connected and supplying power. ● Open: The generator is disconnected.
Temperature	Real-time temperature of the key components in the STS cabinet.

The STS detail interface enables comprehensive management, device identification, capability assessment, and accurate status monitoring for STS cabinets. It serves as a decision-making basis for O&M personnel to perform device-level configuration, diagnosis, and safe operations.

Click to view the STS operating status, communication status, alarm information, device temperature, and detailed data of the grid, generator, and inverter.

1. STS Basic Information



Parameter	Description
Communication Address	Unique numeric identifier of the STS device in the monitoring network.
Communication Protocol Version	Version number of the communication language and the rule followed by the device for data exchange with the monitoring system.
Rated Power	Maximum power that this STS is designed to transmit energy safely and continuously.
Grid Relay Sate	Real-time physical location of the power supply switch for connecting to the grid.
Gen Relay State	Real-time physical location of the power supply switch for connecting to the backup generator.
Parallel Relay State	State of the dedicated switch for controlling the short-duration parallel connection between the grid and the generator.

2. Grid Information

The grid parameters reflect the electrical status and energy exchange status of the connection point between the energy storage system and the public power grid in real time.



3. Generator Information

This interface displays the output status and energy generation of the generator when it is running. The parameters are the key to evaluating the backup power supply performance and performing O&M management.



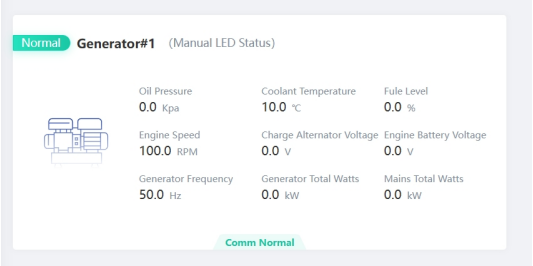
4. Inverter Information

This interface displays the inverter voltage, which is the core basis for determining whether the inverter is operating properly and can be safely connected to the grid or loads.



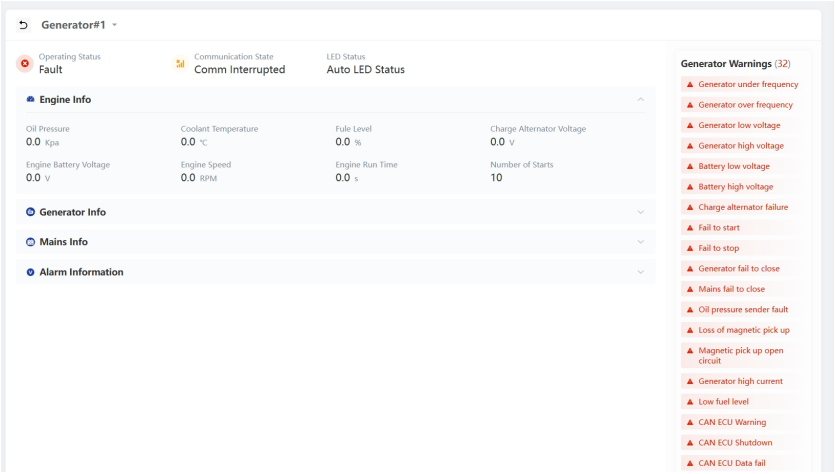
2.2.2 Generator

Click **[Generator]** to view the real-time operating parameters of the generator.



Parameter	Description
Oil Pressure	Engine lubrication system oil pressure. Unit: Kpa.
Coolant Temperature	Engine coolant temperature. Unit: °C. Reflects the thermal state of the engine.
Fuel Level	The remaining fuel level as a percentage in the engine fuel tank; 0% means empty and 100% means full.
Engine Speed	Actual engine crankshaft speed. Unit: RPM. Indicates the generator set's operating status
Charge Alternator Voltage	Output voltage of the generator's built-in charger. Unit: V.
Engine Battery Voltage	Current voltage of the engine starting battery. Unit: V.
Generator Frequency	Generator output AC frequency. Unit: Hz.
Generator Total Watts	Active power currently supplied by the generator to the load. Unit: kW.
Mains Total Watts	Active power currently supplied by the mains to power station loads. Unit: kW.

The detail interface provides comprehensive information of the generator, including its current operating status, communication status, LED indicator status, and fault alarm information. Additionally, engine information, generator information, grid information, mains information and alarm information are displayed, allowing users to fully understand the generator's operating status.



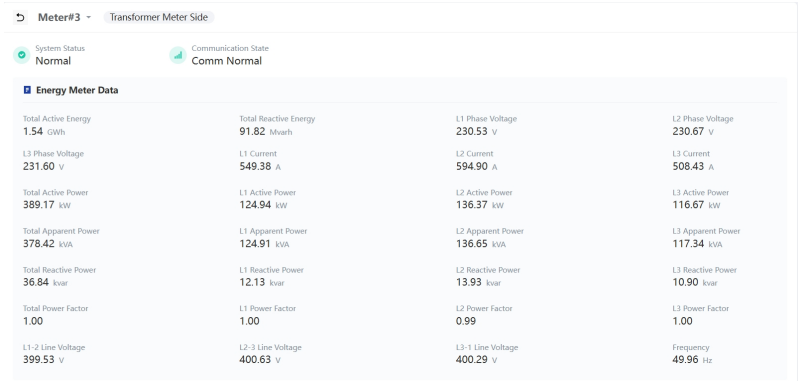
2.2.3 Meter

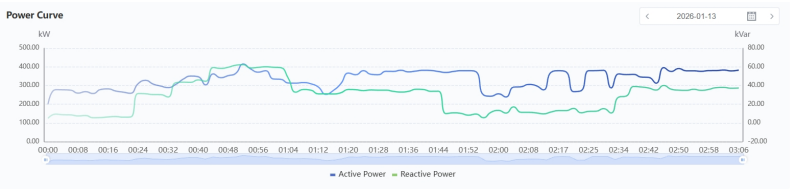
Click **[Meter]** to view the real-time operating parameters and electrical energy data of the meter.



Parameter	Description
Total Active Power	Actual net power consumed at the current site.
Total Apparent Power	Total power supplied by the grid.
Total Reactive Power	Total reactive power currently being exchanged.
Total Power Factor	A core indicator of power consumption efficiency and power quality.
Total Active Energy	Total accumulated active energy consumed.
Total Reactive Energy	Total accumulated reactive energy exchanged.

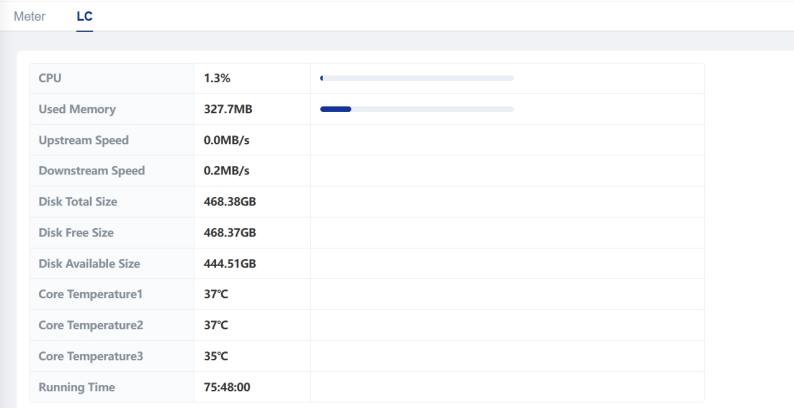
Select a meter to view its detailed information. The comprehensive and high-precision electrical parameter details are divided into total amount and sub-item data. This facilitates users to conduct in-depth power consumption analysis and fault diagnosis.





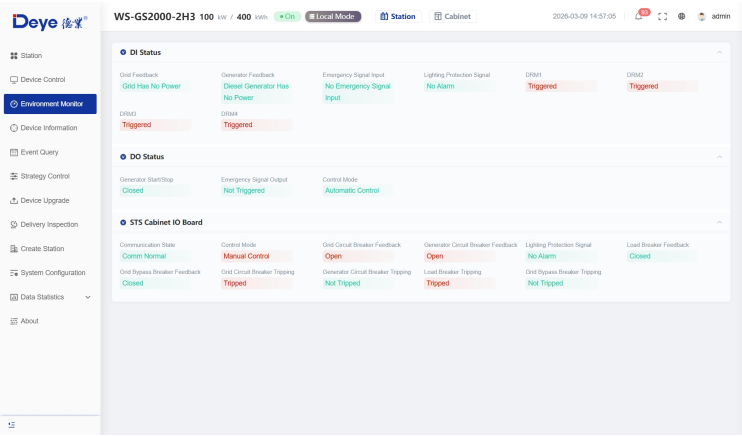
2.2.4 LC (Local Controller)

This interface monitors the hardware operation health of the LC in real time to ensure reliable control, calculation, and communication.



2.3 Environment Monitoring

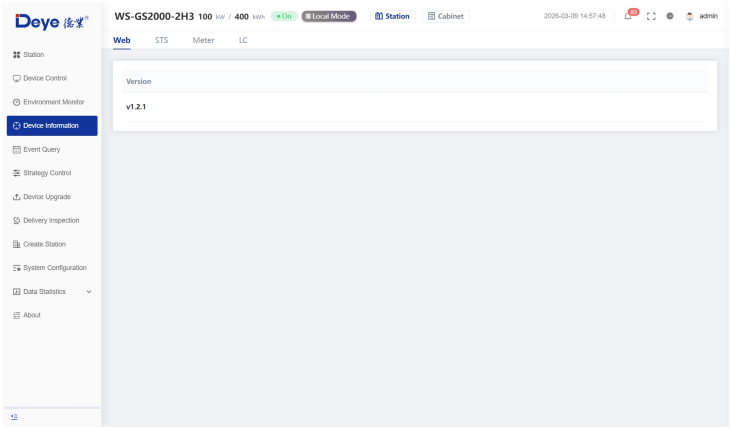
Click **[Environment Monitor]** on the main menu to access the environment monitoring interface. This interface provides real-time monitoring of the power equipment in the power station and environmental conditions, and displays DI status, DO status and IO board information of the STS cabinets.



2.4 Device Information

Click **[Device Information]** on the main menu to access the device information interface. The Device Information interface centrally displays the key identification and version data of all critical intelligent components in the system.

It enables O&M personnel to quickly verify device identities, validate software-hardware version compatibility, and locate network addresses, serving as a critical reference for technical support, software upgrade and system expansion, and guaranteeing reliable system operation and refined management across the full life-cycle.



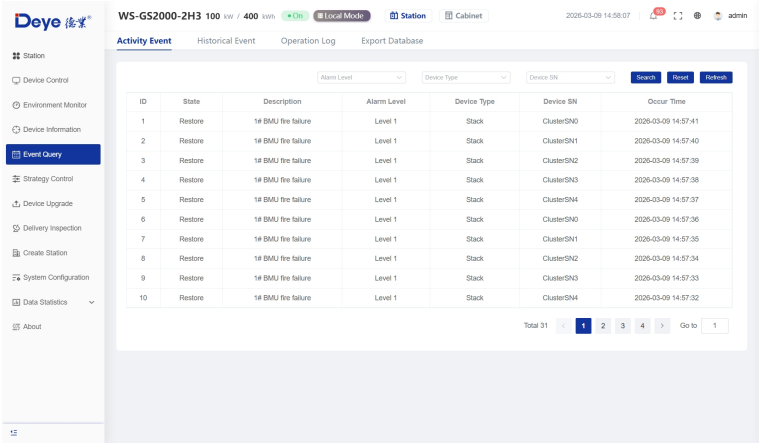
2.5 Event Query

Click **[Event Query]** on the main menu to access the event entry interface.

2.5.1 Activity Event

The Activity Event interface displays all active alarm events, which are consistent with the notification on the top navigation bar. This page provides the following main functions:

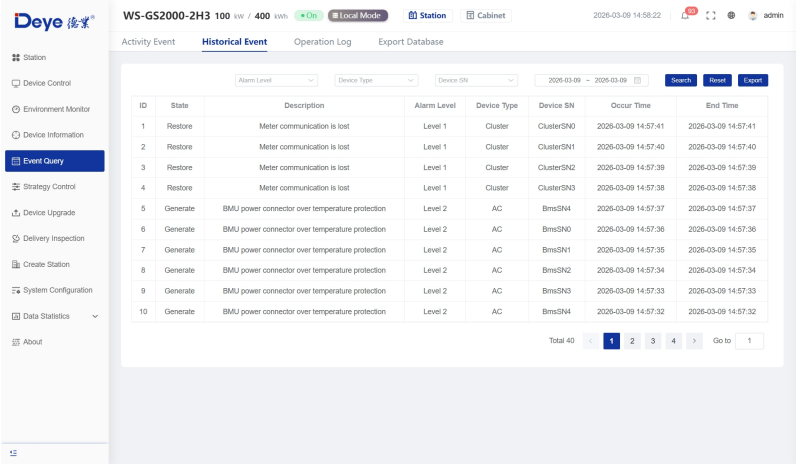
1. View the alarm status, description, alarm level, device type, device SN, abnormal value, and occurrence time of each active alarm event.
2. Search events by alarm level, device type and device SN.
3. Reset the alarm level, device type and device SN in the filter fields.
4. Refresh the list content.



2.5.2 Historical Event

The Historical Event interface displays the alarm events that have occurred. This page provides the following main functions:

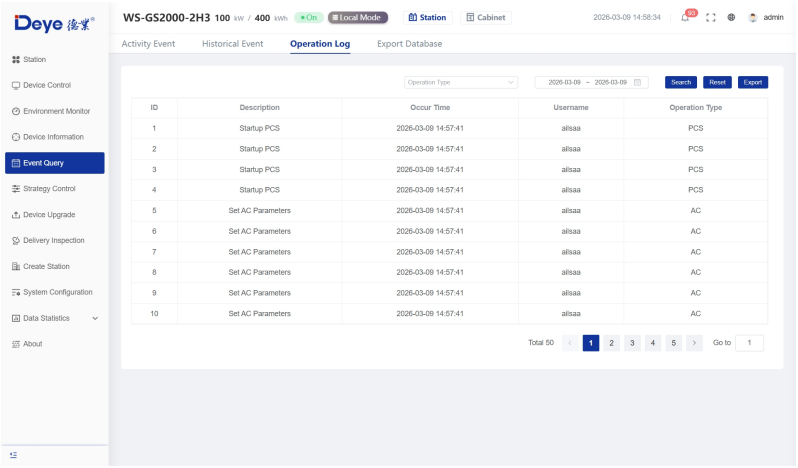
1. View the alarm status, description, alarm level, device type, device SN, abnormal value, and occurrence time of each historical alarm event.
2. Search events by alarm level, device type and device SN.
3. Reset the alarm level, device type and device SN in the filter fields.
4. Export the historical event list to Excel for subsequent tracking and traceability management.



2.5.3 Operation Log

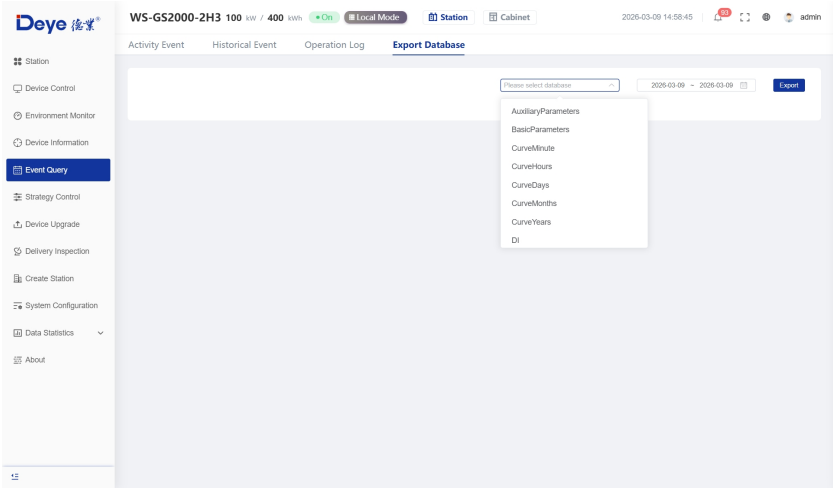
The Operation Log records the operator's specific operation on devices. This page provides the following main functions:

1. View the description, occur time, username, device SN, and operation type of each operation log.
2. Search logs by device type and occur time.
3. Reset the device type and occur time.
4. Export the operation log list to Excel for subsequent tracking and traceability management.



2.5.4 Export Database

users can select the target database and time range to export corresponding event data with one click for offline analysis or long-term archiving.



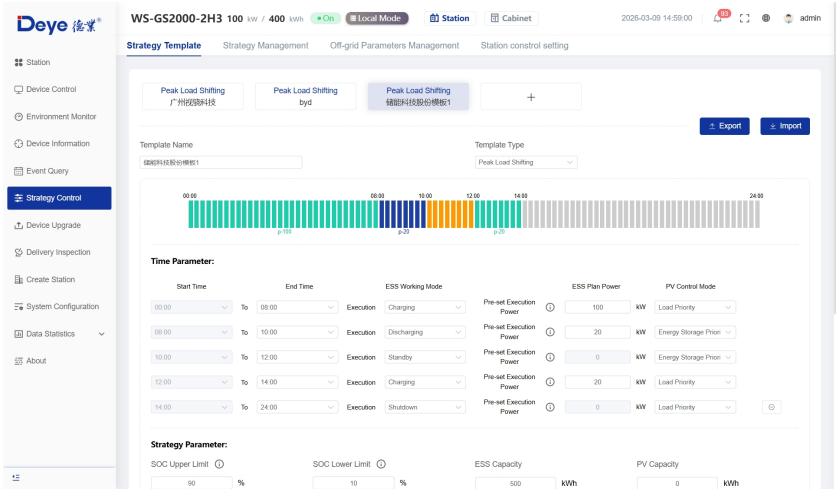
2.6 Strategy Control

Click **[Strategy Control]** on the main menu to access the strategy control interface, which mainly includes 4 parts: Strategy Template, Strategy Management, Off-grid Parameters Management, and Station Control Setting.

2.6.1 Strategy Template

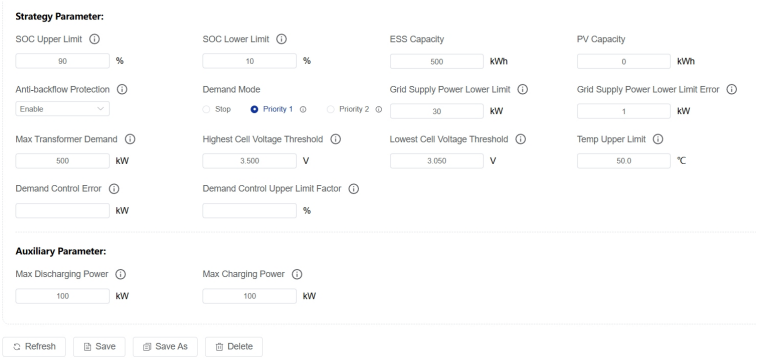
You can view, edit, add, and delete strategy templates. The strategy template needs to be configured with the template name, template type, time parameter, strategy parameter and auxiliary parameter. Click “+” to add strategy templates.

1. Basic Information & Time Parameter



Parameter	Description
Template Name	/
Template Type	Peak Loading Shifting
Start Time	Start time of charging or discharging. The first entry must be set to 00:00.
End Time	End time of charging or discharging. The last entry must be set to 24:00
ESS Working Mode	Charging, Discharging, Standby, Shutdown.
ESS Plan Power	The system operates continuously at the plan power during the set period. It must be a positive value.
PV Control Mode	Load Priority, Energy Storge Priority.

2. Strategy Parameter & Auxiliary Parameter



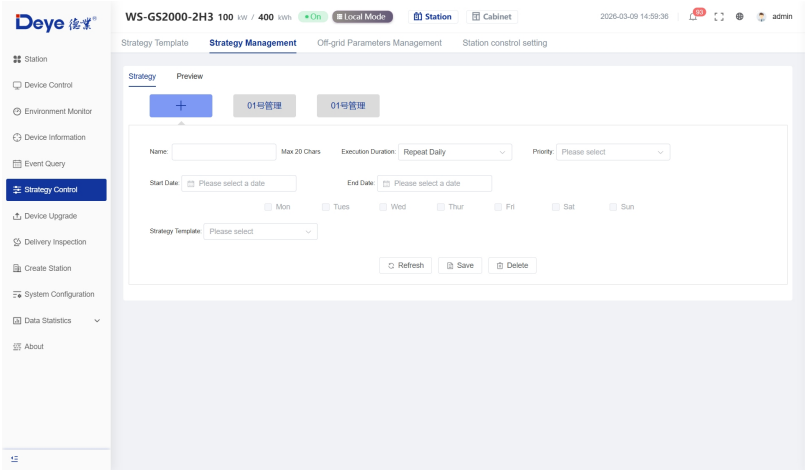
Parameter	Description
Strategy Parameter	
SOC Upper/Lower Limit	Defines the dispatch range for battery SOC. The strategy strives to maintain the battery SOC within the range during operation.
ESS Capacity	Upper limit of the total battery capacity configured in the system.
PV Capacity	Installed PV capacity configured in the system.
Anti-backflow Protection	Defines the grid anti-backflow limit value to prevent power backfeed to the grid.
Demand Mode	Demand control function. When enabled, the system will discharge dynamically to ensure grid-side power never exceeds the maximum transformer demand.
Grid Supply Power Lower Limit	Regulates grid power to maintain it at the lower limit value.
Grid Supply Power Lower Limit Error	Tolerance for the grid anti-backflow limit.
Max Transformer Demand	The maximum power consumption agreed upon with the grid. The system controls total load below this value to avoid penalty charges.
Highest Cell Voltage Threshold	Maximum allowable cell voltage during normal operation.
Lowest Cell Voltage Threshold	Minimum allowable cell voltage during normal operation.
Temp Upper Limit	Maximum allowable cell temperature during normal operation.

Auxiliary Parameter	
Max Discharging Power	Maximum allowable discharge power of the system.
Max Charging Power	Maximum allowable charge power of the system.

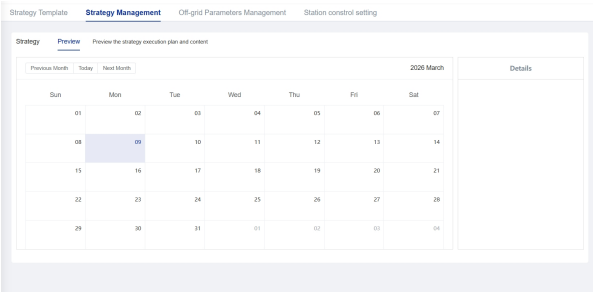
2.6.2 Strategy Management

The system supports creating and managing up to 5 strategies. You can bind the strategy template to specific execution cycles, saving them as executable strategy plans, such as long-term strategies, summer strategies, weekend strategies, holiday strategies, and so on.

The system will automatically execute the currently active strategy with the highest priority each day, based on preset priority rules.

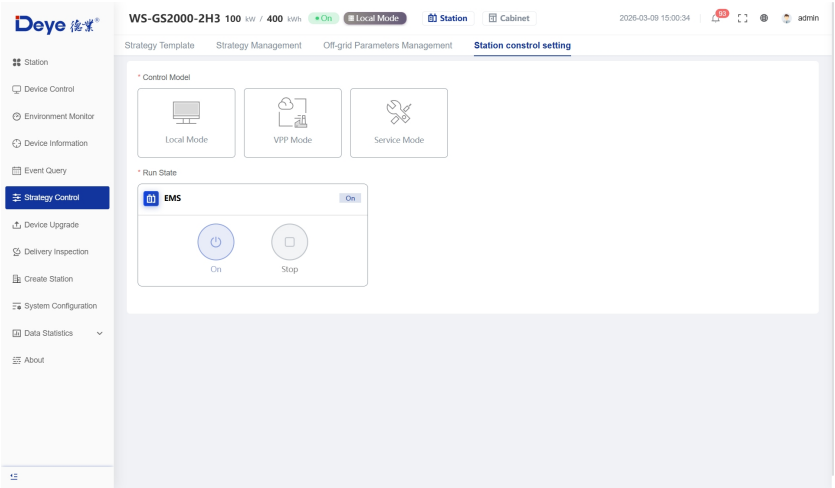


After binding the strategy, you can preview the daily strategy execution plan and detailed content by date in the calendar view. If the preview results do not meet expectations, you can return to modify or rebind the strategy, and preview again to confirm.



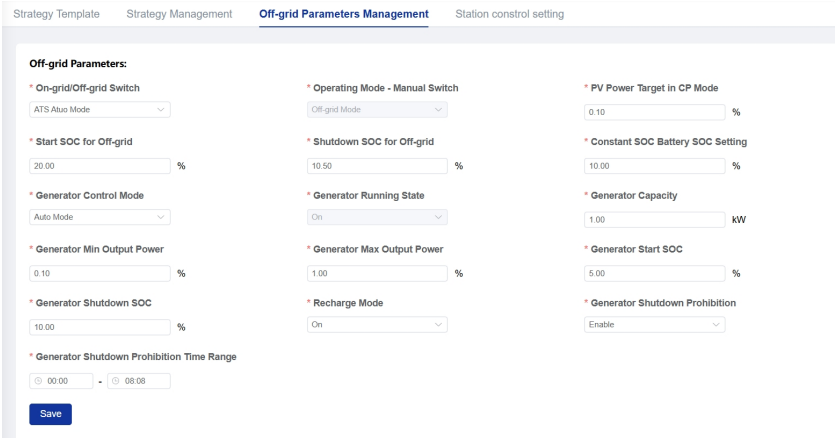
2.6.3 Station Control Setting

Enter the password to set the power station control mode.



1. **Control Mode**
   - Local Mode: Responds to the power dispatching of virtual power plant and allow the command issue from cloud platform.
   - VPP Mode: Operates in accordance with the strategy template of the power station and allow the command issue from cloud platform.
   - Service Mode: Operates in accordance with the strategy template of the power station, and prohibits system response to the power dispatching of virtual power plant and the command issue from the cloud platform.
2. **Run State**: Set it to **On** to enable the operation of the power station.
3. **Cabinet State**: Set it to **On** to enable the operation of the energy storage cabinet.

2.6.4 Off-Grid Parameters Management



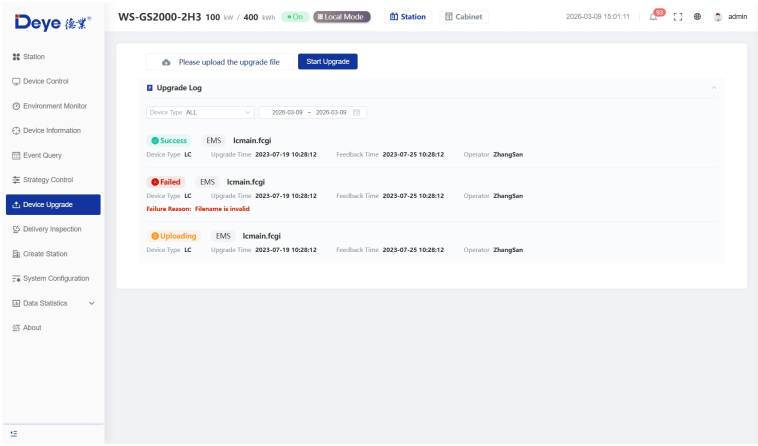
Parameter	Description
On-grid/Off-grid Switch	• ATS Auto Mode: The system detects the grid status automatically. In the event of a grid fault or outage, the ATS will switch to off-grid mode automatically and immediately. Under this condition, the battery or generator supplies power to the loads to ensure uninterrupted power supply. Upon grid recovery, the system automatically switches back to on-grid mode. • ATS Manual Mode: ATS switching requires manual confirmation and operation. • Manual Mode without ATS: The system has no auto-switching capability. Any switching between grid-connected and off-grid modes must be performed by manually opening and closing multiple circuit breakers. The process is slow and carries a risk of power interruption.
Operating Mode – Manual Switch	On-grid Mode, Off-grid Mode
Start SOC for Off-grid	In the off-grid mode, when the battery SOC is below this value, the system will charge the battery to protect the battery from being exhausted.
Shutdown SOC for Off-grid	In the off-grid mode, when the battery SOC is below this value, the system will cut off the battery output to protect itself from over-discharge and damage.

Constant SOC Battery SOC Setting	The expected target battery SOC that needs to be maintained.
Generator Control Mode	• Auto Mode: The generator starts/stops automatically in accordance with the preset parameters without manual intervention. • Manual Mode: The generator must be started or stopped manually.
Generator Running State	Displays the current status of the generator (On/Off).
Generator Capacity	Rated maximum power of the generator. The system uses this to determine its load capacity.
Generator Min Output Power	The lowest power at which the generator can operate stably.
Generator Max Output Power	The upper limit power that the generator is allowed to output during current operation.
Generator Start SOC	In the off-grid mode, the generator will be started automatically when the battery SOC is below this value.
Generator Shutdown SOC	The generator will be shut down automatically when the battery SOC is equal to or beyond this value.
Recharge Mode	• On: The generator is started only to charge the battery when the battery SOC is low. • Off: after the generator starts, its power is prioritized for the load, and the remaining power is used to charge the battery.
Generator Shutdown Prohibition	• Enable: Once the generator starts, the system will prohibit automatic shutdown until it is set to "Disable" manually. • Disable: Allows the system to automatically shut down the generator based on conditions such as "Generator Shutdown SOC". Normally set to "Disable" during normal operation.

2.7 Device Upgrade

Follow the steps below to upgrade your devices.

1. Click **[Device Upgrade]** on the main menu to access the device upgrade interface.
2. Upload the upgrade file, and click **[Start Upgrade]** to start the upgrade process. The file name must conform to the name convention.
3. After the upgrade is completed, the system will prompt whether this upgrade was successful or failed. Users can filter and view historical upgrade records by date range and upgrade type.



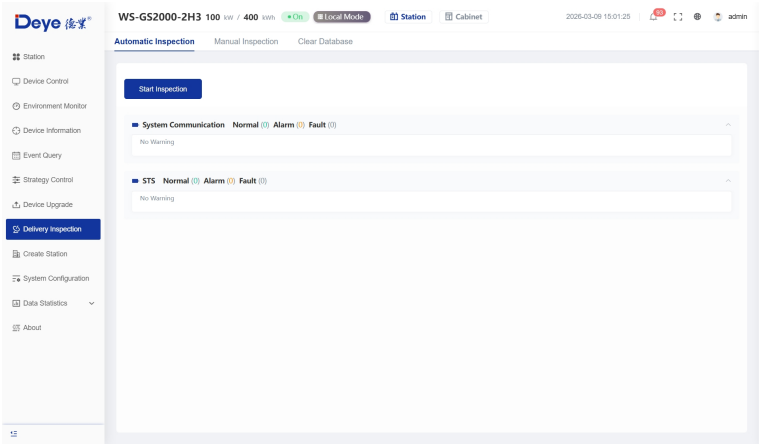
2.8 Delivery Inspection

2.8.1 Automatic Inspection

The pre-delivery inspection interface displays the fast self-inspection status of the core modules of the energy storage system, such as system communication module and STS cabinet. Inspection results are divided into 3 categories: Normal, Alarm, and Fault, with the corresponding quantities shown after each category.

After an inspection starts, the interface will automatically summarize the health state of each module. If all modules are displayed as "normal" and no warning is prompted, it means that the system has passed the self-inspection and can be put into operation.

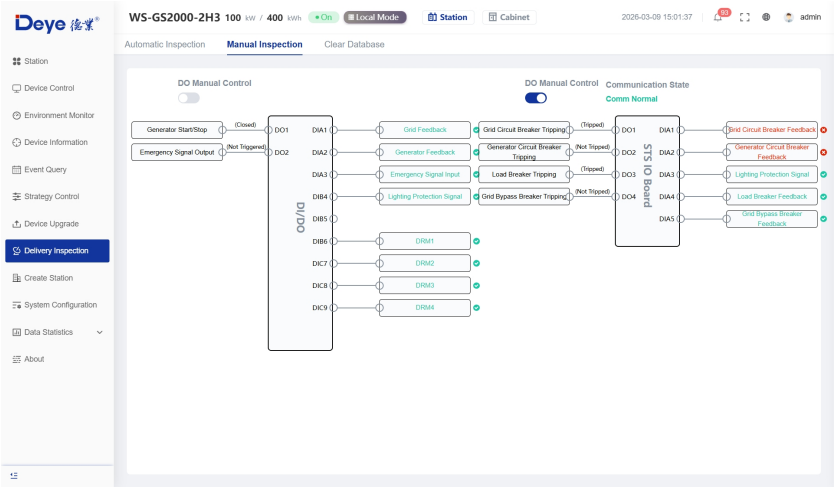
If any warning or fault is found, users need to further view the detailed logs according to the corresponding entries and contact maintenance personnel.



2.8.2 Manual Inspection

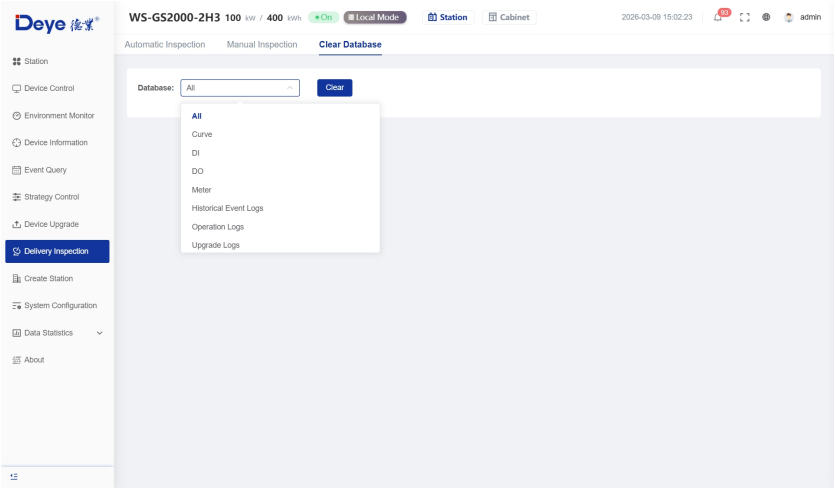
The Manual Inspection interface displays the DI inspection results and DO status of the current system.

The DO control mode is set to Auto Control by default. Once set to Manual Control, the DO status can be controlled to check normal DO operation.



2.8.3 Clear Database

This interface supports historical data management of the current system. Users can filter data records of specific types and then clear them.



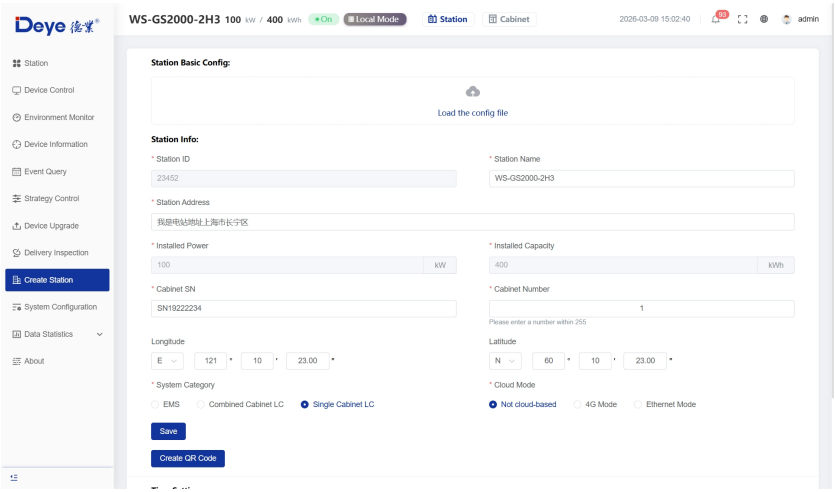
2.9 Create Station

This is a configuration and management interface for the power station of the energy storage system, which supports the entire power station creation process from basic information setup to system parameter configuration.

The power station creation process generally refers to a series of operations completed via the software interface at the initial stage of power station deployment, including power station creation, device configuration, network settings, and function enabling. These operations enable the system to operate normally and integrate with the monitoring platform.

To create the power station:

1. Click **[Create Station]** on the main menu to access the power station creation interface.
2. Fill in the required information, including Station Name, Station Address, Longitude, and Latitude. Station ID, Installed Power, Installed Capacity, and Cabinet SN are preset before delivery and cannot be modified.
3. Set the network information, such as Cloud Mode, and system time.



2.10 Data Statistics

The data statistics function converts raw operational data into valuable business insights and O&M knowledge, enabling users to assess the past performance, optimize the current dispatch strategies, and predict the future revenue and battery health. It is a core tool for achieving refined and intelligent operation of power stations.

Click **[Data Statistics]** on the main menu to access the data statistics interface. On this interface, users can view historical operational data curve analysis, historical charge and discharge energy analysis, and historical fault/event analysis records.



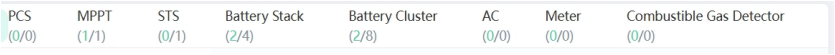
3 ESS Cabinet

Click **[Cabinet]** on the top navigation bar to display the cabinet information interface.

3.1 Main Display Area Overview



Area 1

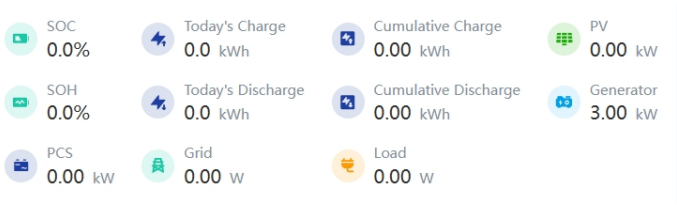


This area displays the quantities of online devices and total devices for each device type, including PCS, MPPT, STS, Battery Stack, Battery Cluster, AC, Meter, and Combustible Gas Detector.

The numbers in brackets indicate the "**Current number of online devices/Total number of devices of the corresponding type**". Users can clearly know the integrity of the system structure and promptly discover any abnormal conditions, such as offline devices.

Area 2

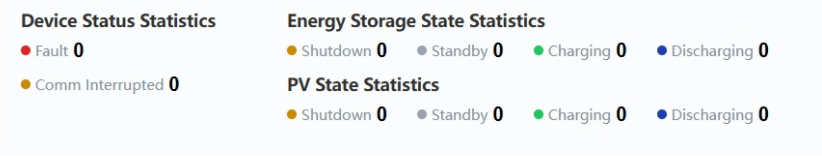
This area supports monitoring and quantitative evaluation for the energy storage batteries throughout their life-cycle and centrally presents the core operational status and key energy metrics of the energy storage system.



Parameter	Description
SOC	Battery state of charge as a percentage, indicating the remaining available capacity of the battery.
SOH	Battery state of health as a percentage, reflecting the degradation level of the battery's maximum capacity.
Today's Charge	Total energy charged into the battery on the current day.
Today's Discharge	Total energy discharged from the battery on the current day.
Cumulative Charge	Total energy charged into the battery over the entire operation period of the system.
Cumulative Discharge	Total energy discharged from the battery over the entire operation period of the system.

Area 3

This area centrally monitors the health state and operation mode of all devices in the system.

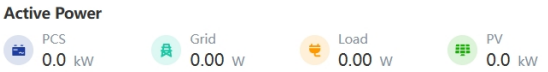


Parameter	Status	Description
Device Status Statistics	Fault	Displays the number of faulty devices. It should be 0 under normal conditions. Any value greater than 0 requires immediate attention.
	Comm Interrupted	Number of devices that cannot establish communication with the system. It should

		be 0 under normal conditions. A value greater than 0 indicates that a line or device disconnection issue exists.
Energy Storage State Statistics	Shutdown/Standby/ Charging/Discharging	Displays the number of energy storage devices in each operating status. For example, "Standby 2" indicates that 2 devices are currently in standby mode.
PV State Statistics	Shutdown/Standby/ Charging/Discharging	Displays the number of MPPT devices in each operating status. For example, "Shutdown 2" indicates that 2 MPPT devices shut down.

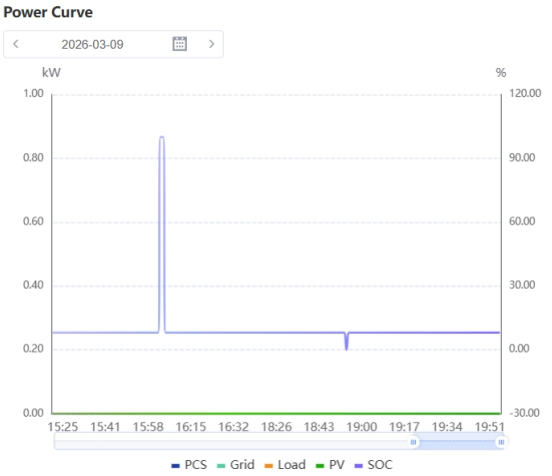
Area 4

This area displays the real-time active power data of the four key nodes in the system: PCS, Grid, Load, and PV. By monitoring the values and changes, you can grasp the system's operating mode, energy flow, and system status in real time.



Area 5

The Power Curve below dynamically displays the historical change trends of key operating parameters within a specified date in the form of curves.



Axis Description

- Left Y-axis (kW): indicates the readings of PCS, Grid, and PV power.
- Right Y-axis (%): indicates the state of charge as a percentage.
- X-axis: indicates the time range for data viewing.

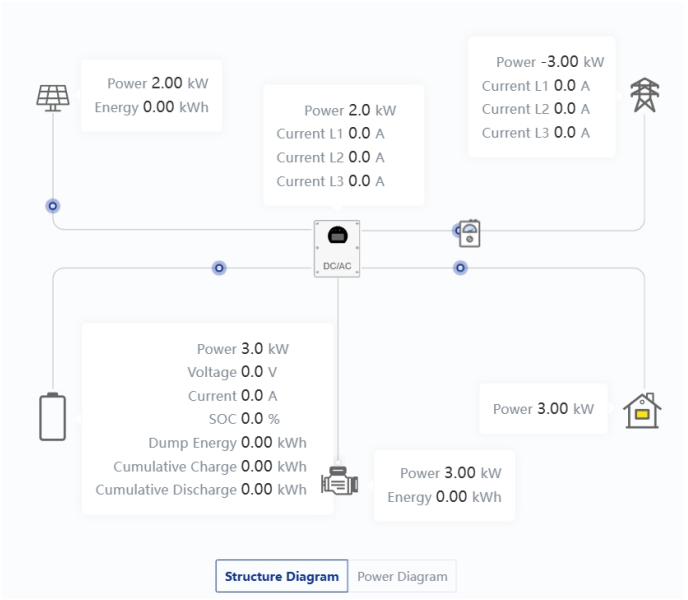
Curve Description

- PCS: power of the power conversion system
  - ➢ Curve above the zero line: battery discharging.
  - ➢ Curve below the zero line: battery charging.
- Grid: power exchange with the grid
  - ➢ Positive value: power is drawn from the grid.
  - ➢ Negative value: power is fed back to the grid.
- PV: PV generation power. Always be positive or zero.
- SOC: battery state of charge as a percentage.

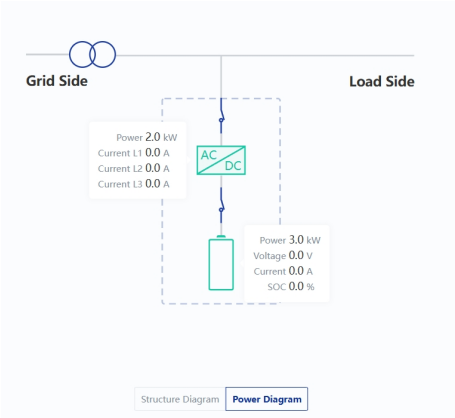
Area 6

This area displays the system topology diagram and real-time data.

Click **[Structure Diagram]** to display grid, PCS, PV, and battery information as shown below.



Click **[Power Diagram]** to display the most basic electrical connection architecture of the system as shown below.

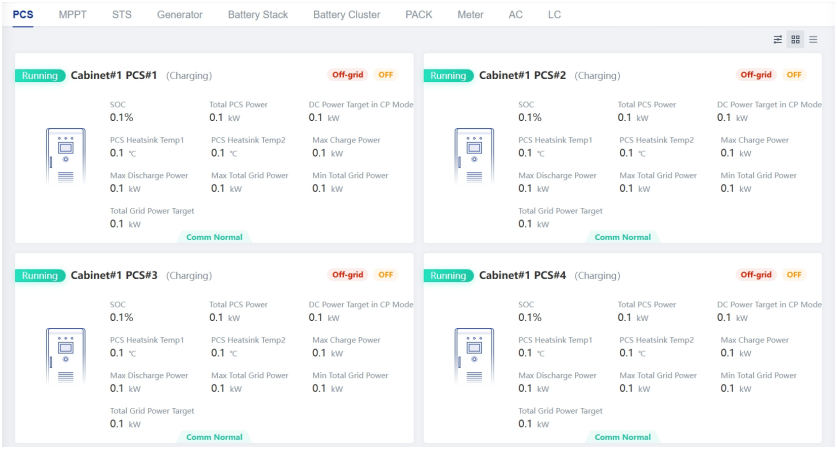


3.2 Device Control

3.2.1 PCS

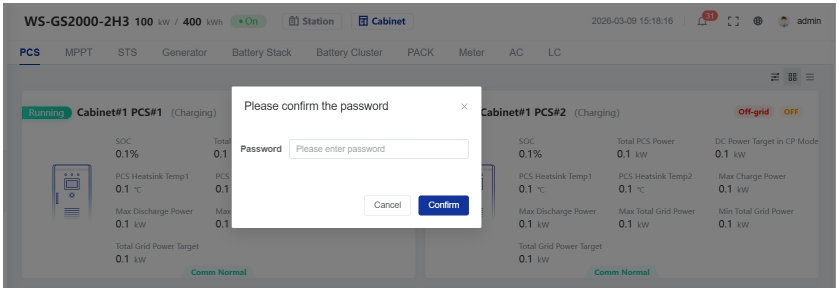
Click **[Device Control]** on the main menu, and then select **[PCS]** to access the key parameters of the PCS.

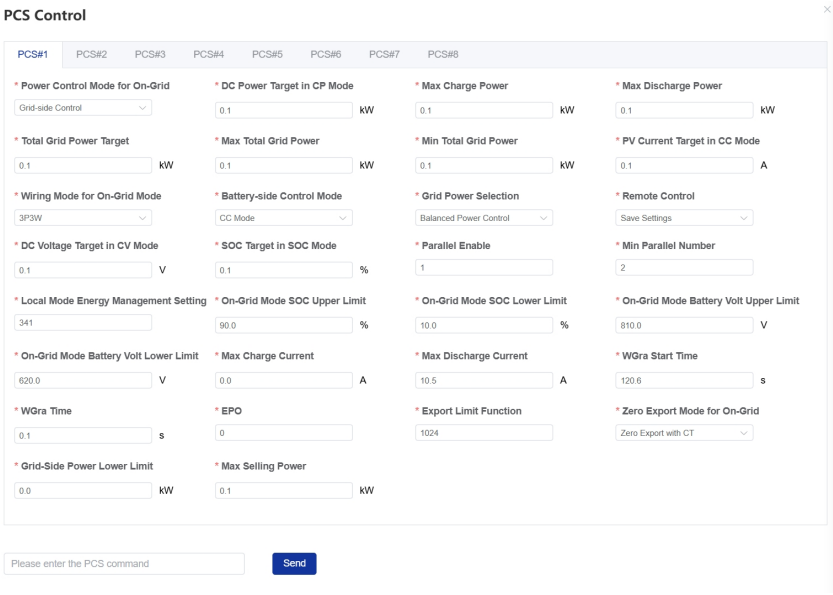
If the PCS Card displays Running, On-grid, On, and Comm Normal, it indicates that the PCS is fully activated, connected to the grid, operating in grid-tied mode, and maintaining stable internal communication. Under this condition, the PCS works normally and is ready for receiving charging and discharging commands.



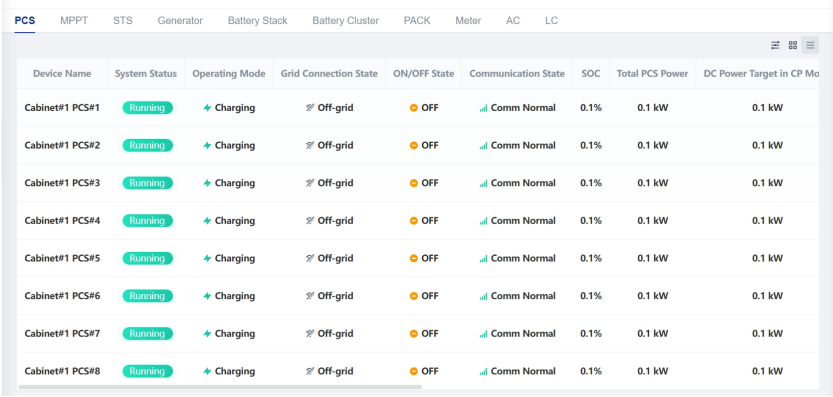
Parameter	Description
SOC	Battery state of charge as a percentage, indicating the remaining available capacity of the battery. Users can check the current energy reserve of the ESS vis this parameter.
Total PCS Power	Current total output power of the PCS. Positive values indicate discharging, and negative values indicate charging. Users can identify whether the system is charging, discharging, or in standby status. Compared with the preset power, users can determine whether the PCS is operating as the command.
DC Power Target in CP Mode	Set target power of battery charging and discharging in CP (Constant-power) mode. The system operates as per the set target power.
PCS Heatsink Temp1	Real-time temperature of the PCS heatsink temperature sensor 1.
PCS Heatsink Temp2	Real-time temperature of the PCS heatsink temperature sensor 2.
Max Charge Power	Maximum allowable charge power of the system.
Max Discharge Power	Maximum allowable discharge power of the system.
Max Total Grid Power	Maximum output power limit set by the system.
Min Total Grid Power	Minimum output power limit set by the system.
Total Grid Power Target	Set target total active power on the AC side in CP mode.

Click the interface switch button , and enter the password to control the PCS, performing operations such as grid connection, off-grid switching and fault clearing.



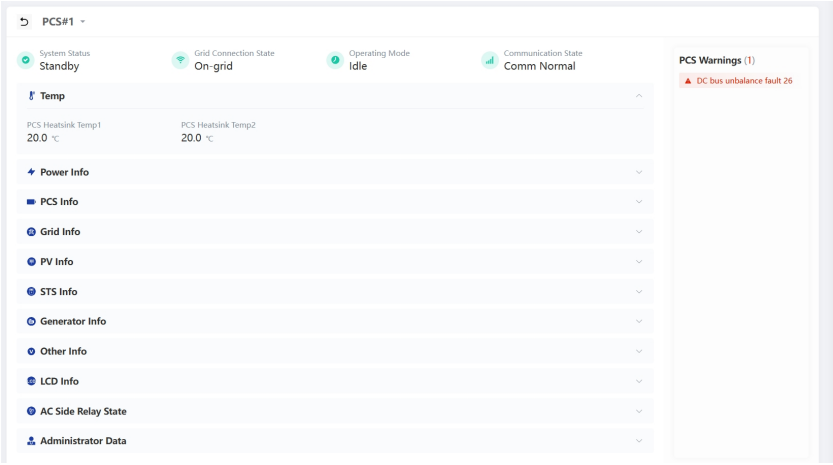


Click  to switch the display layout between card mode and list mode. The system defaults to the card mode.



The PCS detail interface integrate PCS and other critical configuration parameters, real-time operating data, and device statuses of all sub-systems related to PCS. It serves as a comprehensive management platform integrating monitoring, diagnosis, commissioning, and strategy configuration for O&M personnel to achieve in-depth and refined control of the PCS and its system.

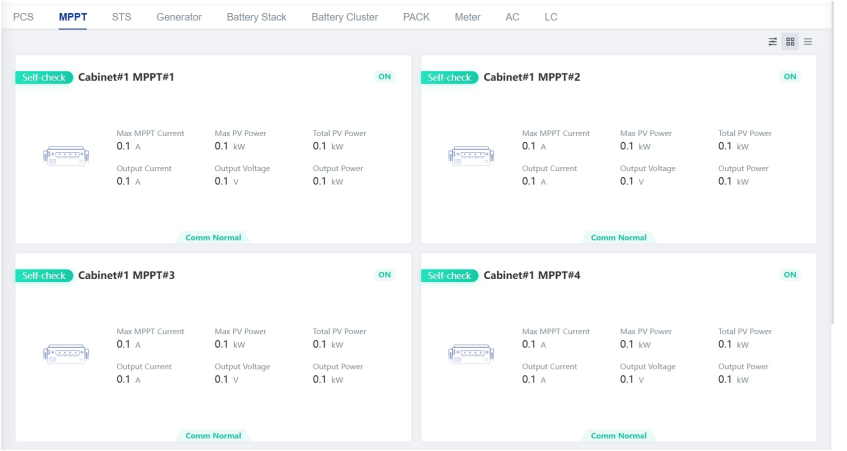
Select any PCS entry to access its detailed information. The detail interface mainly displays the PCS status information, such as system status, warnings and faults, operating status, grid connection status and so on. Click the sub-headers, such as Power Info, PCS Info, and Grid Info, to view the corresponding detailed information.



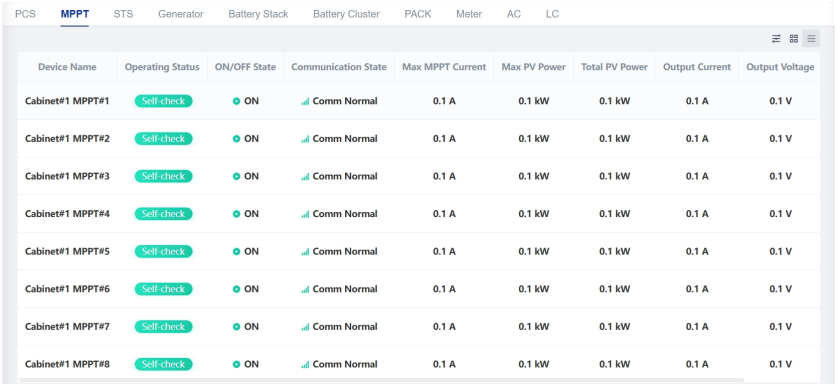
3.2.2 MPPT

The parameters shown on the MPPT interface support the real-time performance monitoring, operating status diagnosis, power output capability evaluation for the PV maximum power point tracking. These are the key monitoring points to ensure the PV power is captured and fed securely and efficiently into the ESS and loads.

Select **[MPPT]** to view the MPPT information.

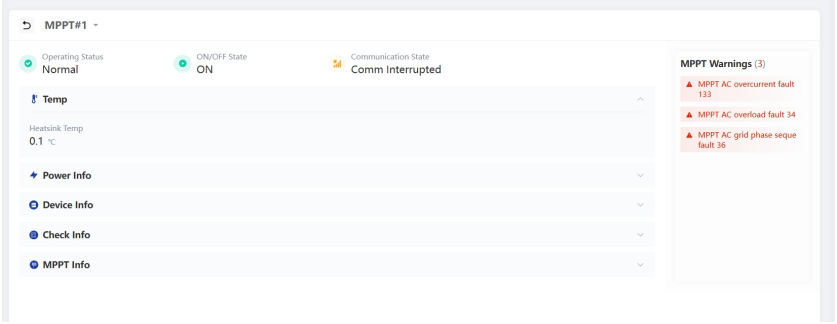


Click  to switch the display layout between card mode and list mode. The system defaults to the card mode.



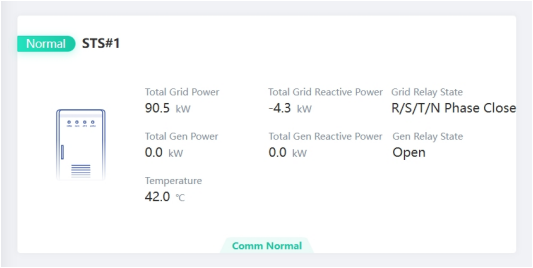
Select any MPPT entry to access its detailed information. The detail interface mainly displays the MPPT operating status, ON/OFF status, communication status, temperature, and warning and faults of the MPPT.

Click the sub-headers, such as Power Info, Device Info, Check Info, and MPPT Info to view the corresponding detailed information.



3.2.3 STS

The STS interface provides the real-time status monitoring, power quality monitoring, and seamless switch control between grid and generator power supplies.

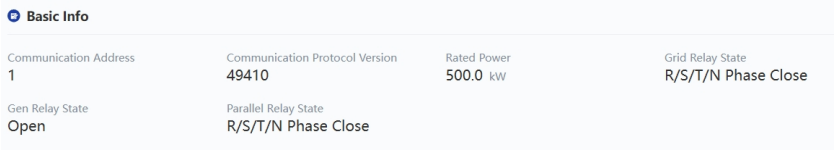


Parameter	Description
Total Grid Power	Current active power imported from or exported to the grid, representing the actual power that delivers useful work.
Total Grid Reactive Power	Current reactive power exchanged with the grid, which is used to establish magnetic fields and does not perform active work.
Grid Relay State	Main circuit breaker connecting the energy storage system to the grid. ● Closed: The grid is connected and available for power supply. ● Open: The grid is isolated from the energy storage system.
Total Gen Power	Current active power output by the backup generator.
Total Gen Reactive Power	Reactive power output of the generator.
Gen Relay State	Main circuit breaker connecting the system and the backup generator: ● Closed: The generator is connected and supplying power. ● Open: The generator is disconnected.
Temperature	Real-time temperature of the key components in the STS cabinet.

The STS detail interface enables comprehensive management, device identification, capability assessment, and accurate status monitoring for STS cabinets. It serves as a decision-making basis for O&M personnel to perform device-level configuration, diagnosis, and safe operations.

Click to view the STS operating status, communication status, alarm information, device temperature, and detailed data of the grid, generator, and inverter.

1. STS Basic Information



Parameter	Description
Communication Address	Unique numeric identifier of the STS device in the monitoring network.
Communication Protocol Version	Version number of the communication language and the rule followed by the device for data exchange with the monitoring system.
Rated Power	Maximum power that this STS is designed to transmit energy safely and continuously.
Grid Relay Sate	Real-time physical location of the power supply switch for connecting to the grid.
Gen Relay State	Real-time physical location of the power supply switch for connecting to the backup generator.
Parallel Relay State	State of the dedicated switch for controlling the short-duration parallel connection between the grid and the generator.

2. Grid Information

The grid parameters reflect the electrical status and energy exchange status of the connection point between the energy storage system and the public power grid in real time.



3. Generator Information

This interface displays the output status and energy generation of the generator when it is running. The parameters are the key to evaluating the backup power supply performance and performing O&M management.



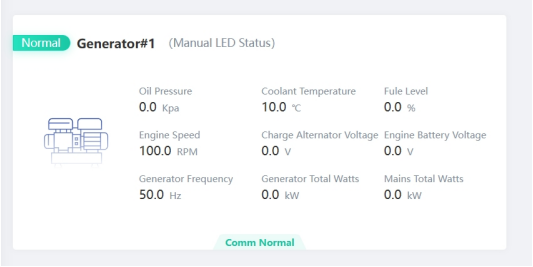
4. Inverter Information

This interface displays the inverter voltage, which is the core basis for determining whether the inverter is operating properly and can be safely connected to the grid or loads.



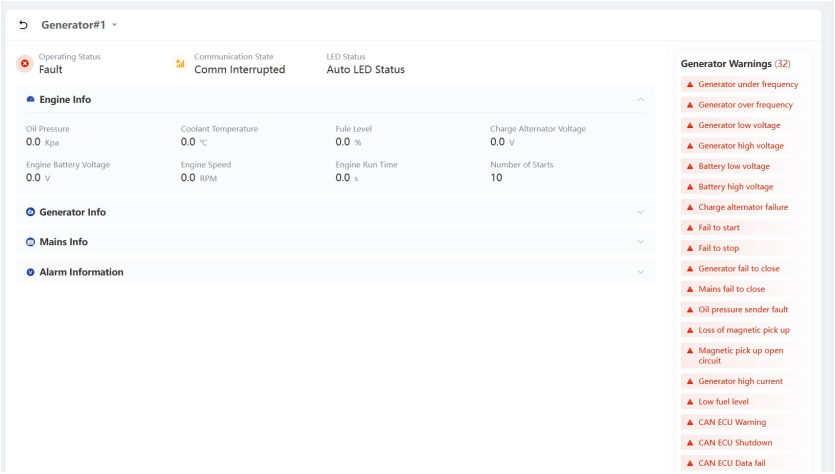
3.2.4 Generator

Click **[Generator]** to view the real-time operating parameters of the generator.



Parameter	Description
Oil Pressure	Engine lubrication system oil pressure. Unit: Kpa.
Coolant Temperature	Engine coolant temperature. Unit: °C. Reflects the thermal state of the engine.
Fuel Level	The remaining fuel level as a percentage in the engine fuel tank; 0% means empty and 100% means full.
Engine Speed	Actual engine crankshaft speed. Unit: RPM. Indicates the generator set's operating status
Charge Alternator Voltage	Output voltage of the generator's built-in charger. Unit: V.
Engine Battery Voltage	Current voltage of the engine starting battery. Unit: V.
Generator Frequency	Generator output AC frequency. Unit: Hz.
Generator Total Watts	Active power currently supplied by the generator to the load. Unit: kW.
Mains Total Watts	Active power currently supplied by the mains to power station loads. Unit: kW.

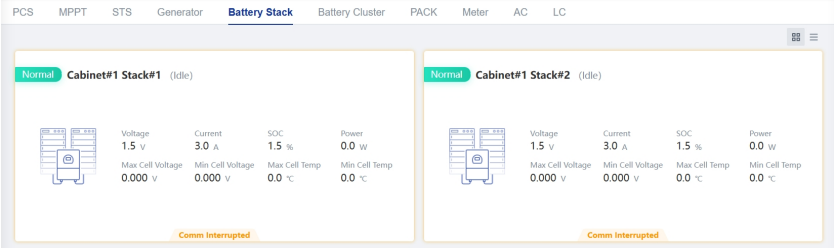
The generator detail interface provides comprehensive information of the generator, including its current operating status, communication status, LED indicator status, and fault alarm information. Additionally, engine information, generator information, grid information, mains information and alarm information are displayed, allowing users to fully understand the generator's operating status.



3.2.5 Battery Stack

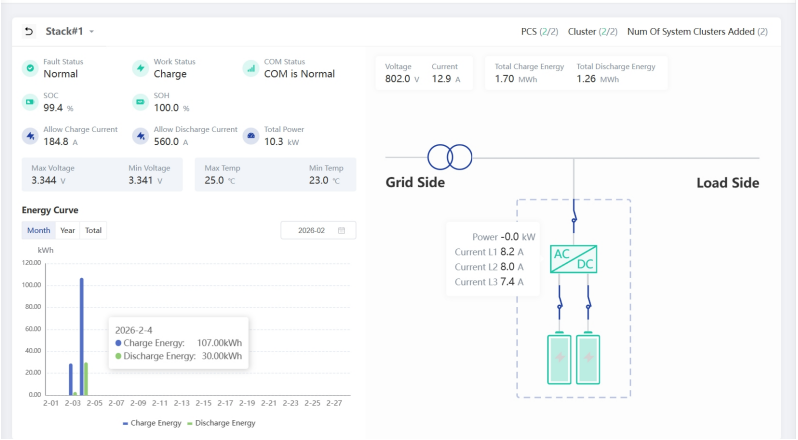
Click **[Battery Stack]** to view the real-time operating parameters of battery stacks.

This interface provides multi-dimensional safety monitoring, performance evaluation, and refined management for ESS battery stacks, serving as the data foundation for ensuring battery safety, extending battery life cycle, and optimizing system operation.

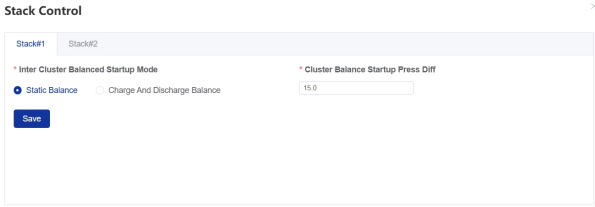


Parameter	Description
Voltage	Total direct current voltage of the battery stack.
Current	Total current flowing into (charging) or flowing out (discharging) of the battery stack.
SOC	Battery state of charge as a percentage.
Power	Instantaneous charging or discharging power of the battery stack.
Max Cell Voltage	Voltage of the cell with the highest voltage among all battery cells.
Min Cell Voltage	Voltage of the cell with the lowest voltage among all battery cells.
Max Cell Temp	Highest temperature among all battery cells or sampling points.
Min Cell Temp	Lowest temperature among all battery cells or sampling points.

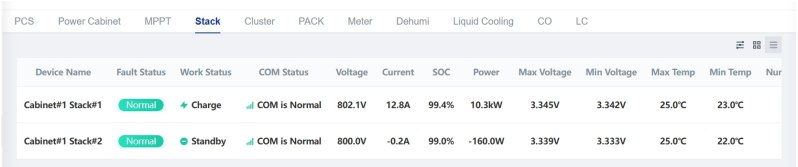
Select any battery pack card to display the battery stack status, power curve, power diagram and other information.



Click the interface switch button  and enter the password to modify the battery stack configuration.



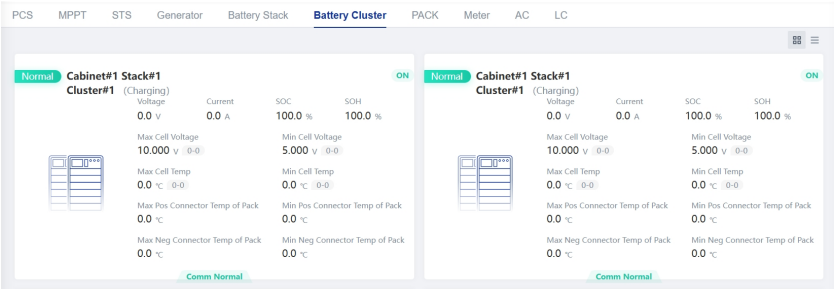
Click  to switch the display layout between card mode and list mode. The system defaults to the card mode.



3.2.6 Battery Cluster

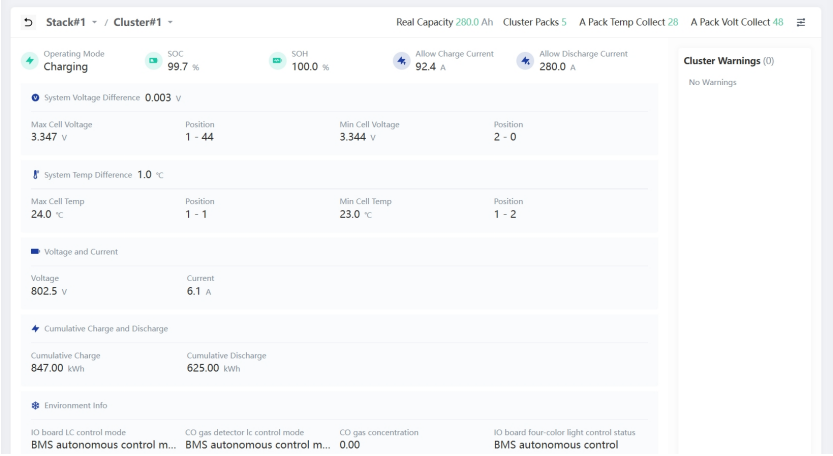
Click **[Cluster]** to view the real-time operating parameters of battery clusters.

This interface displays the detailed information of battery clusters, such as battery voltage, current, and temperature.



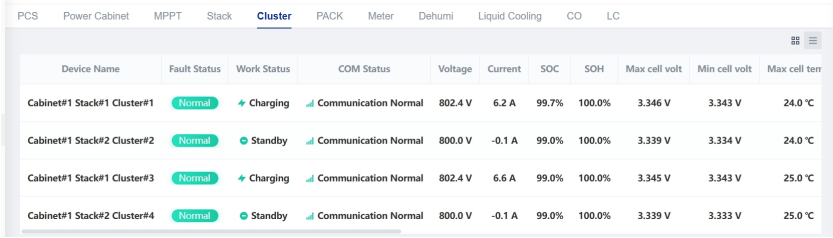
Parameter	Description
Voltage	Total voltage of the battery cluster.
Current	Total current flowing into (charging) or flowing out (discharging) of the battery cluster.
SOC	Battery state of charge.
SOH	Battery state of health.
Max Cell Voltage	Voltage of the cell with the highest voltage among all battery cells.
Min Cell Voltage	Voltage of the cell with the lowest voltage among all battery cells.
Max Cell Temp	Highest temperature among all battery cells or sampling points.
Min Cell Temp	Lowest temperature among all battery cells or sampling points.
Max Pos Connector Temp of Pack	Measured highest temperature on the positive high-voltage connector of the battery cluster.
Min Pos Connector Temp of Pack	Measured lowest temperature on the positive high-voltage connector of the battery cluster,
Max Neg Connector Temp of Pack	Measured highest temperature on the negative high-voltage connector of the battery cluster.
Min Neg Connector Temp of Pack	Measured lowest temperature on the negative high-voltage connector of the battery cluster.

Select any battery cluster card to display its status, detailed operational data, historical curves, and alarms and faults.



Parameter	Description
Real Capacity	Number of battery packs in the battery cluster.
Cluster Packs	Current total available capacity of the battery cluster.
A Pack Temp Collect	Number of cells monitored for voltage inside each battery pack.
A Pack Volt Collect	Number of temperature sensors inside each battery pack.

Click  to switch the display layout between card mode and list mode. The system defaults to the card mode.

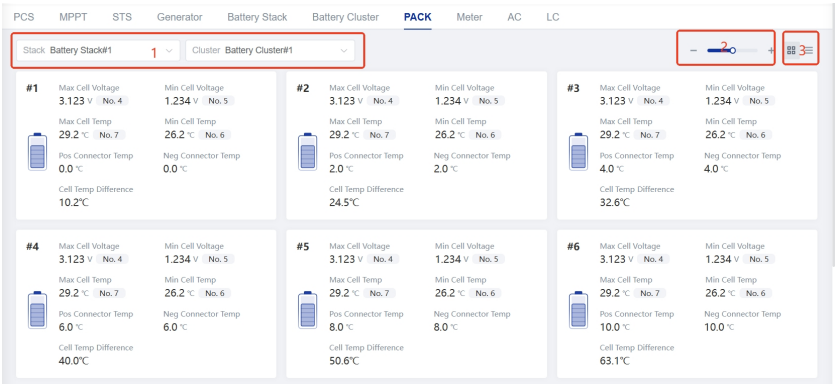


3.2.7 Battery Pack

Click **[PACK]** to view the detailed information of all battery packs.

The battery pack interface supports refined monitoring and early fault localization of battery internal status by displaying the accurate cell-level data including voltage, temperature, and physical location. This help upgrade the safety management from system-level alarms to cell-level handling with accurate localization, serving as the critical data layer for the power station to realize intrinsic safety and proactive operation and maintenance.

The battery pack card displays the maximum cell voltage, minimum cell voltage, maximum cell temperature, minimum cell temperature of all cells within the battery stack/cluster, as well as the physical location of the cells where these extreme values occur.



Area 1

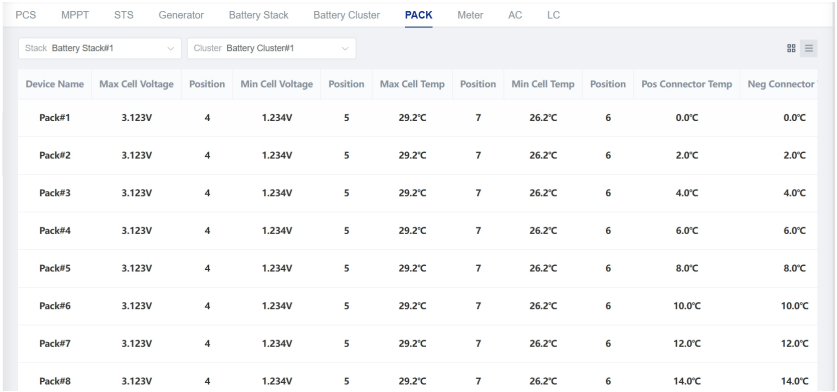
Select the target battery stack and battery cluster to view all battery packs under it.

Area 2

Adjust the battery pack layout in the main display area among 2-column, 3-column, and 4 column modes.

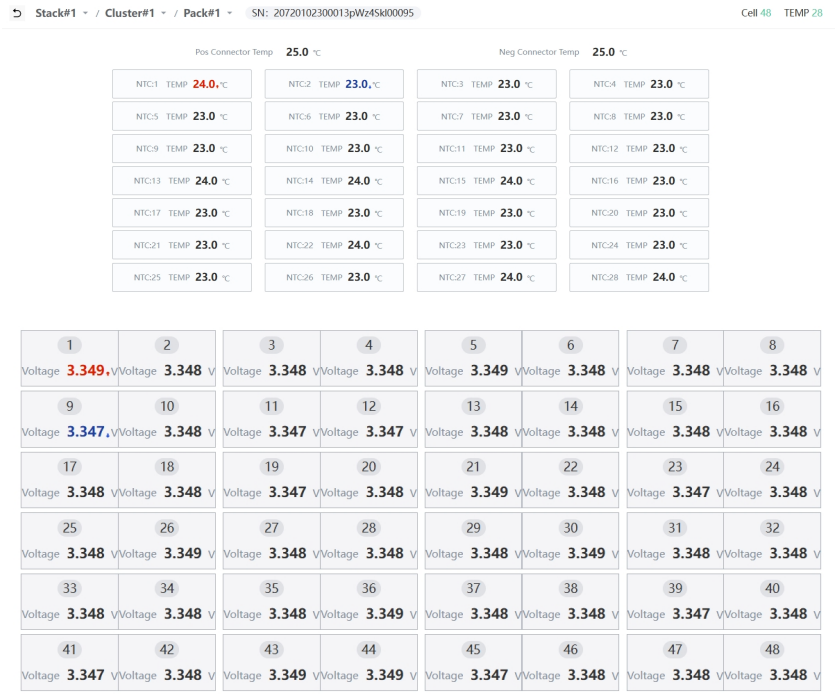
Area 3

Click  to switch the display layout between card mode and list mode. The system defaults to the card mode.



Device Name	Max Cell Voltage	Position	Min Cell Voltage	Position	Max Cell Temp	Position	Min Cell Temp	Position	Pos Connector Temp	Neg Connector
Pack#1	3.123V	4	1.234V	5	29.2℃	7	26.2℃	6	0.0℃	0.0℃
Pack#2	3.123V	4	1.234V	5	29.2℃	7	26.2℃	6	2.0℃	2.0℃
Pack#3	3.123V	4	1.234V	5	29.2℃	7	26.2℃	6	4.0℃	4.0℃
Pack#4	3.123V	4	1.234V	5	29.2℃	7	26.2℃	6	6.0℃	6.0℃
Pack#5	3.123V	4	1.234V	5	29.2℃	7	26.2℃	6	8.0℃	8.0℃
Pack#6	3.123V	4	1.234V	5	29.2℃	7	26.2℃	6	10.0℃	10.0℃
Pack#7	3.123V	4	1.234V	5	29.2℃	7	26.2℃	6	12.0℃	12.0℃
Pack#8	3.123V	4	1.234V	5	29.2℃	7	26.2℃	6	14.0℃	14.0℃

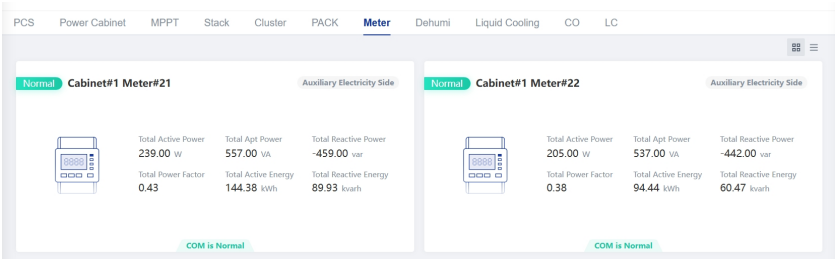
Select any battery pack to display the real-time readings of all distributed temperature sensors and voltage values of each cell inside the battery pack.



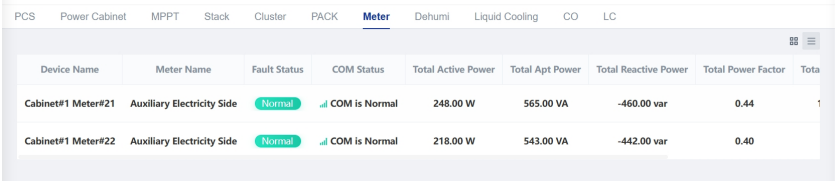
3.2.8 Meter

Click **[Meter]** to view the detailed information of meters.

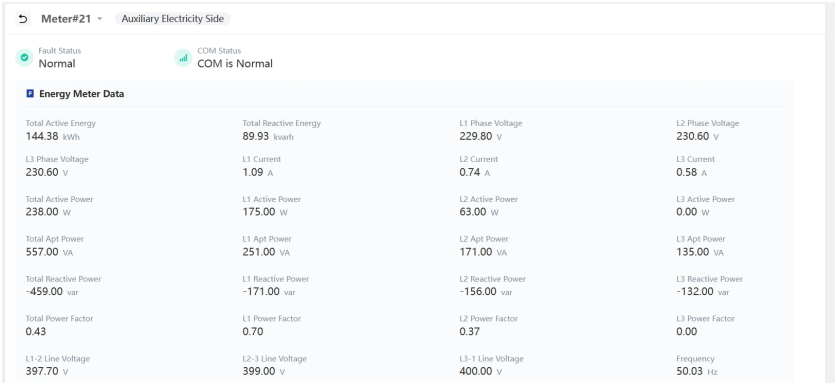
This interface displays the total active power, total apparent power, total reactive power, total power factor, total active energy, and total reactive energy of the ESS cabinet.

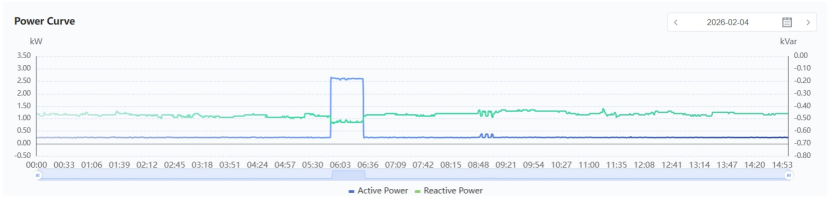


Click  to switch the display layout between card mode and list mode. The system defaults to the card mode.



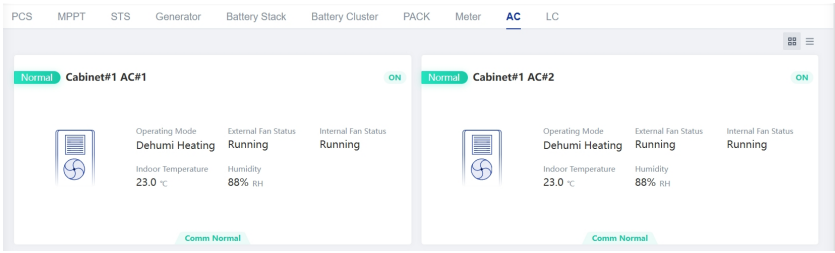
Select any meter entry to display the meter status, detailed meter data, and power curves. These detailed information enables phase-separated power quality diagnosis, load characteristics analysis, and operational anomaly localization, providing refined data support for in-depth system troubleshooting and energy efficiency optimization.





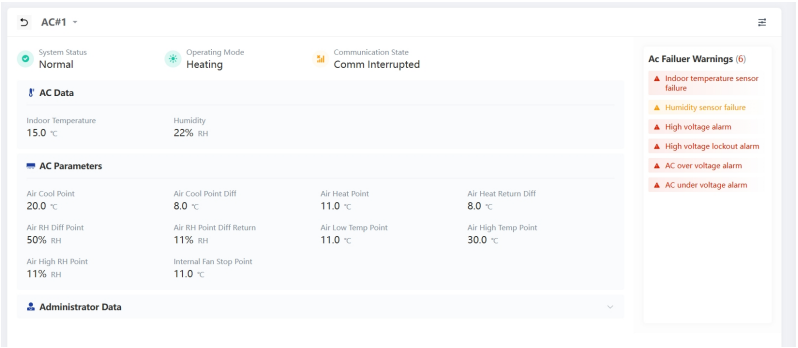
3.2.9 Air Conditioner

Click **[AC]** to view the detailed information of air conditioners.



Parameter	Description
Operating Mode	Current operating mode of the air conditioner. For example, “Dehumi Heating” means that the air conditioner performs dehumidification together with heating to adjust temperature and humidity within the cabinet.
External Fan Status	Operating status of the external fan.
Internal Fan Status	Operating status of the internal fan.
Indoor Temperature	Current temperature inside the cabinet where the AC is installed.
Humidity	Current relative humidity inside the cabinet where the AC is installed.

Select any air conditioner card to display the system status, operation mode, communication status, parameter setup, and current warnings and faults of the air conditioner. These data allow users to fully grasp the operating status of the air conditioner and handle abnormalities promptly.



3.2.10 LC

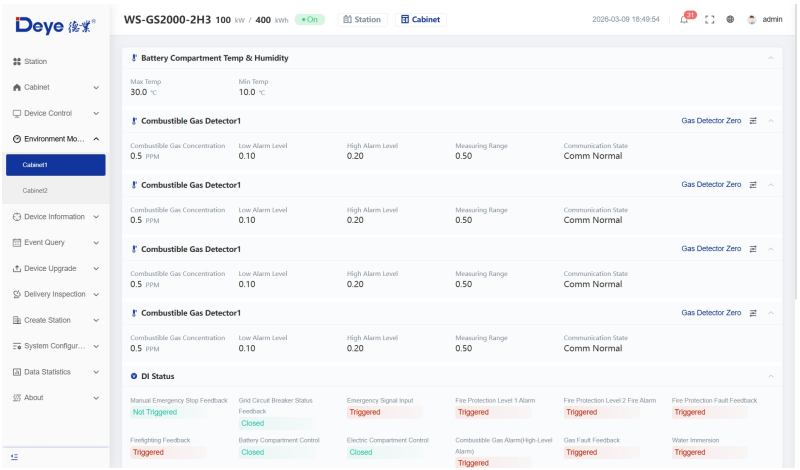
Click **[LC]** to view its hardware resources and operational health status, including performance resource status, storage and hardware status, system reliability and so on. The corresponding trend curves are shown below.



3.3 Environment Monitoring

Click **[Environment Monitor]** on the main menu to access the environment monitoring interface.

This interface displays the digital input/output status of the ESS in real time, including DI status, DO status, and IO board information of the STS cabinet. Based on these data, users can monitor the emergency stop signal, circuit breaker status, fire alarms, access control status, environmental monitoring alarms, and various equipment control outputs. It helps users grasp the digital signals at key nodes, facilitating rapid anomaly localization and prompt handling.



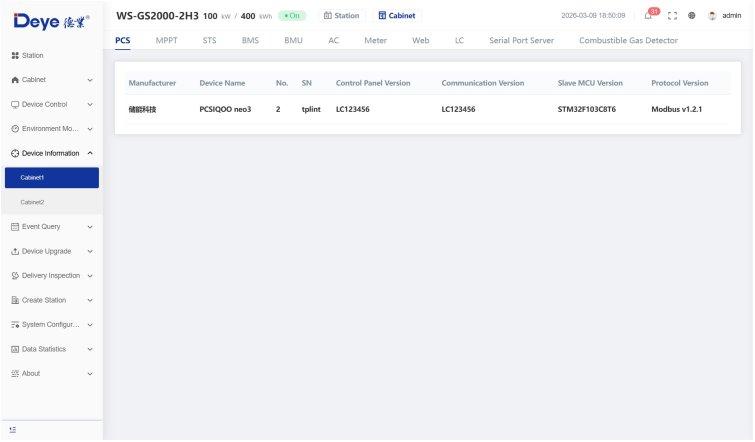
3.4 Device Information

Click **[Device Information]** on the main menu to access the device information interface.

The Device Information interface centrally displays the key identification and version data of all critical intelligent components in the system.

It enables O&M personnel to quickly verify device identities, validate software-hardware version compatibility, and locate network addresses, serving as a critical reference for technical support, software upgrade and system expansion, and guaranteeing reliable system operation and refined management across the full life-cycle.

Select any cabinet under Device Information to view the detailed device information of the corresponding cabinet, including PCS, MPPT. STS, BMS, BMU, AC, Meter, Web, LC, Serial Port Server, and Combustible Gas Detector.



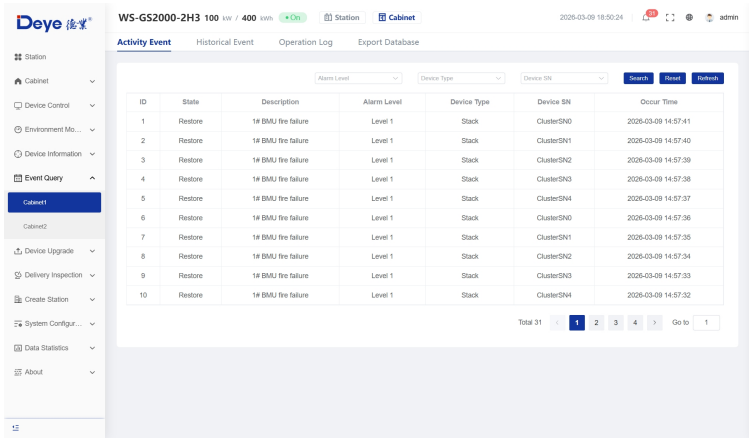
3.5 Event Query

Click **[Event Query]** on the main menu to access the event entry interface.

3.5.1 Activity Event

The Activity Event interface displays all active alarm events, which are consistent with the notification on the top navigation bar. This page provides the following main functions:

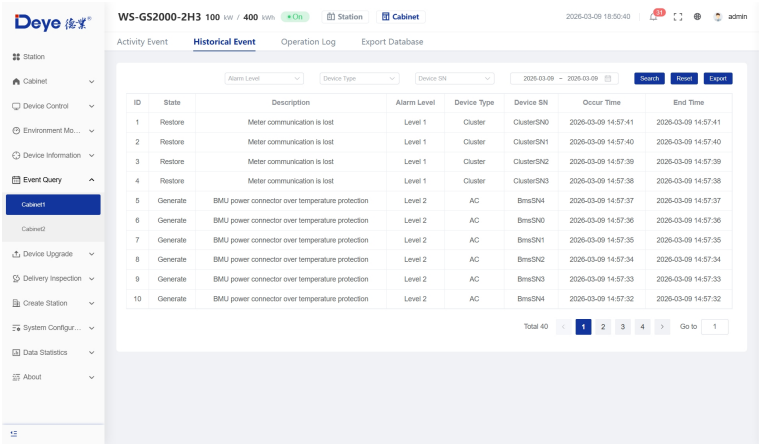
1. View the alarm status, description, alarm level, device type, device SN, abnormal value, and occurrence time of each active alarm event.
2. Search events by alarm level, device type and device SN.
3. Reset the alarm level, device type and device SN in the filter fields.
4. Refresh the list content.



3.5.2 Historical Event

The Historical Event interface displays the alarm events that have occurred. This page provides the following main functions:

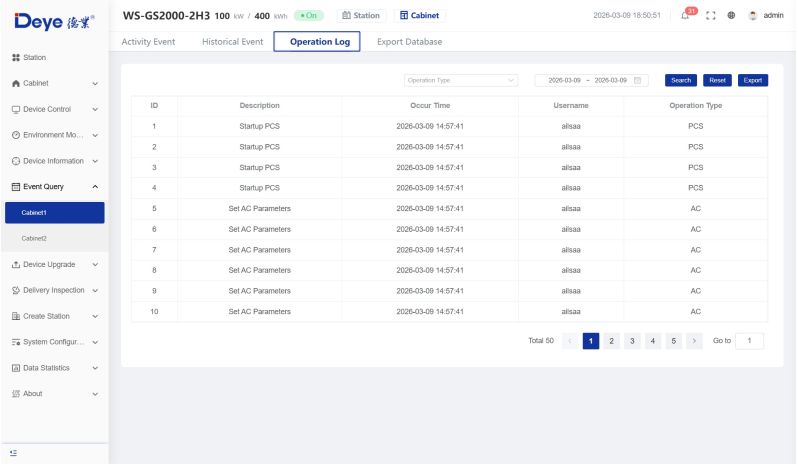
1. View the alarm status, description, alarm level, device type, device SN, abnormal value, and occurrence time of each historical alarm event.
2. Search events by alarm level, device type and device SN.
3. Reset the alarm level, device type and device SN in the filter fields.
4. Export the historical event list to Excel for subsequent tracking and traceability.



3.5.3 Operation Log

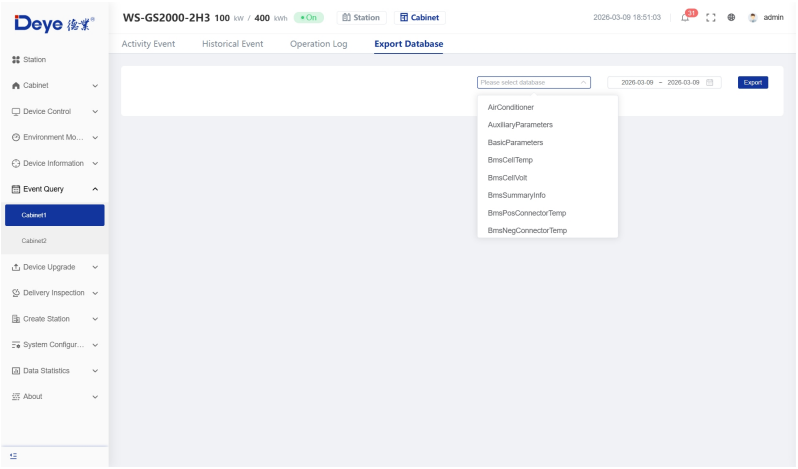
The Operation Log records the operator's specific operation on devices. This page provides the following main functions:

1. View the description, occur time, username, device SN, and operation type of each operation log.
2. Search logs by device type and occur time.
3. Reset the device type and occur time.
4. Export the operation log list to Excel for subsequent tracking and traceability.



3.5.4 Export Database

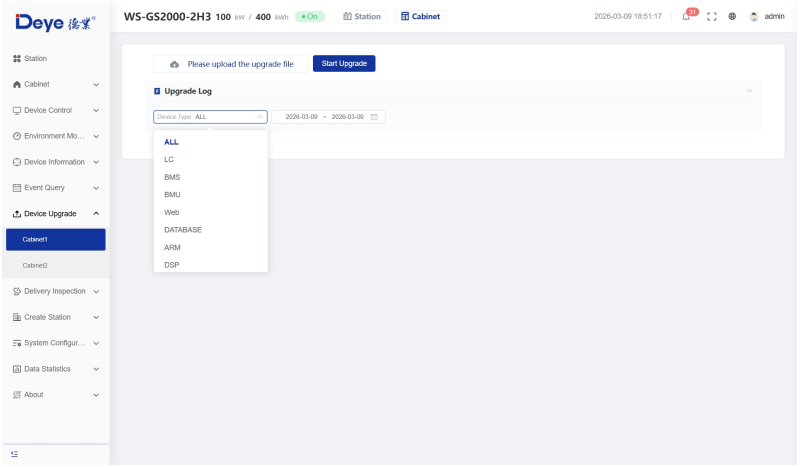
users can select the target database and time range to export corresponding event data with one click for offline analysis or long-term archiving.



3.6 Device Upgrade

Follow the steps below to upgrade your devices.

4. Click **[Device Upgrade]** on the main menu to access the device upgrade interface.
5. Upload the upgrade file, and click **[Start Upgrade]** to start the upgrade process. The file name must conform to the name convention.
6. After the upgrade is completed, the system will prompt whether this upgrade was successful or failed. Users can filter and view historical upgrade records by date range and upgrade type.

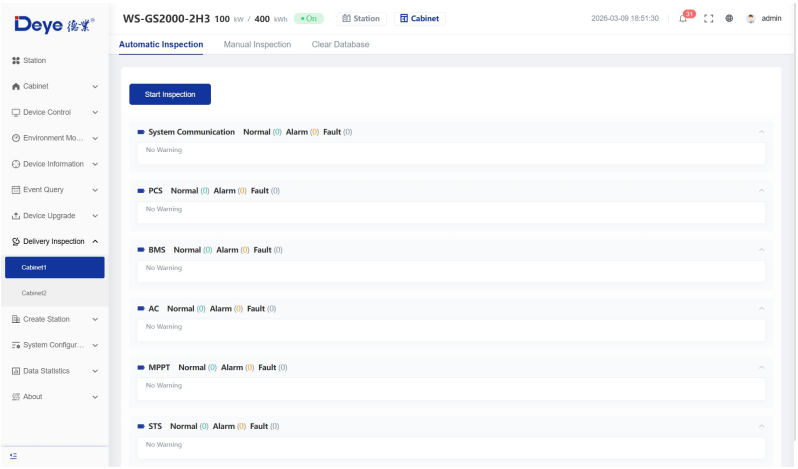


3.7 Delivery Inspection

3.7.1 Automatic Inspection

The pre-delivery inspection interface displays the fast self-inspection status of the core modules of the energy storage system, such as system communication, PCS, BMS, AC, MPPT, and STS. Inspection results are divided into 3 categories: Normal, Alarm, and Fault, with the corresponding quantities shown after each category.

After an inspection starts, the interface will automatically summarize the health state of each module. If all modules are displayed as "normal" and no warning is prompted, it means that the system has passed the self-inspection and can be put into operation. If any warning or fault is found, users need to further view the detailed logs according to the corresponding entries and contact maintenance personnel.



3.7.2 Manual Inspection

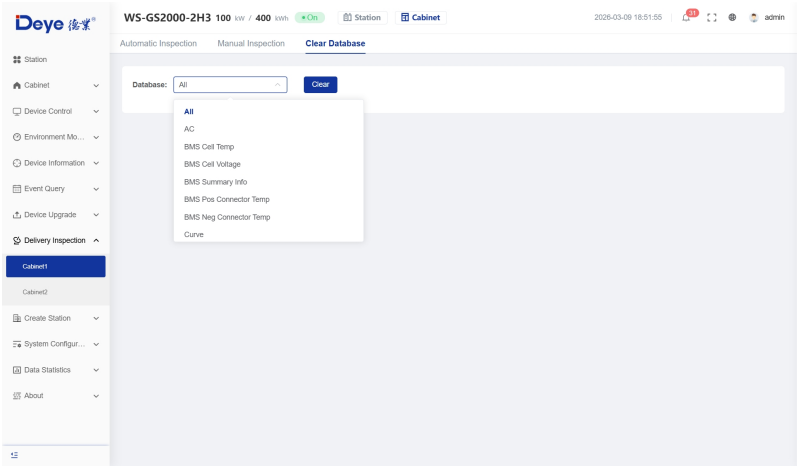
The Manual Inspection interface displays the DI inspection results and DO status of the current system.

The DO control mode is set to Auto Control by default. Once set to Manual Control, the DO status can be controlled to check normal DO operation.



3.7.3 Clear Database

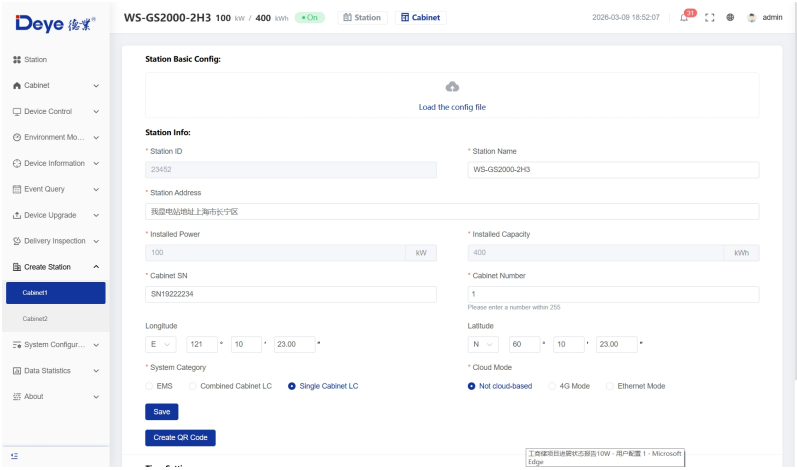
This interface supports historical data management of the current system. Users can filter data records of specific types and then clear them.



3.8 Creation Station

Click **[Create Station]** on the main menu to access the power station creation interface. Fill in the required information, including Station Name, Station Address, Longitude, and Latitude. Station ID, Installed Power, Installed Capacity, and Cabinet SN are preset before delivery and cannot be modified.

Set the network information, such as Cloud Mode, and system time.



3.9 Data Statistics

The data statistics function converts raw operational data into valuable business insights and O&M knowledge, enabling users to assess the past performance, optimize the current dispatch strategies, and predict the future revenue and battery health. It is a core tool for achieving refined and intelligent operation of power stations.

Click **[Data Statistics]** on the main menu to access the data statistics interface, and select any cabinet to view its data statistics. On this interface, users can view historical operational data curve analysis, historical charge and discharge energy analysis, and historical fault/event analysis records.

