

Energy Management System MS-EMS (WS-L5000-BC-2)



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 such as battery cabinet, battery stack, battery cluster, meter.

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.

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.



English

Energy Management System

Username Dynamic Code

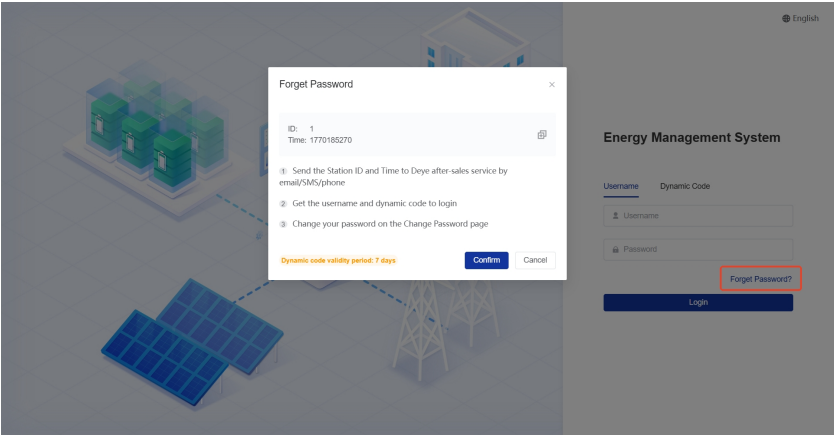
Username

Password

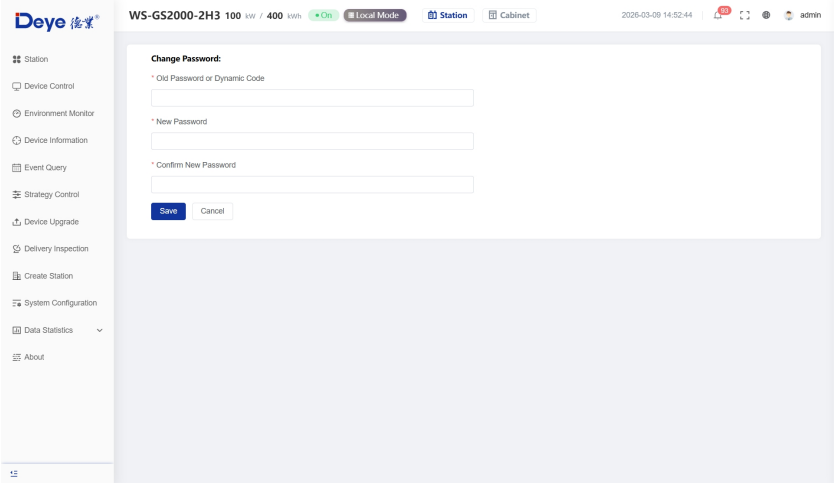
[Forget Password?](#)

Login

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



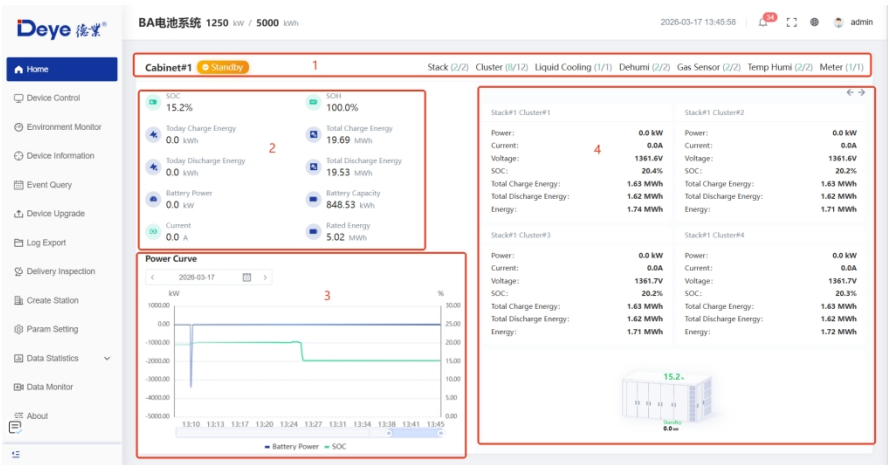
After logging in with the dynamic verification code, you will be automatically redirected to the password change page. Please change the password based on the on-screen prompts.



1.4 Interface Layout

The system mainly includes the following three parts:

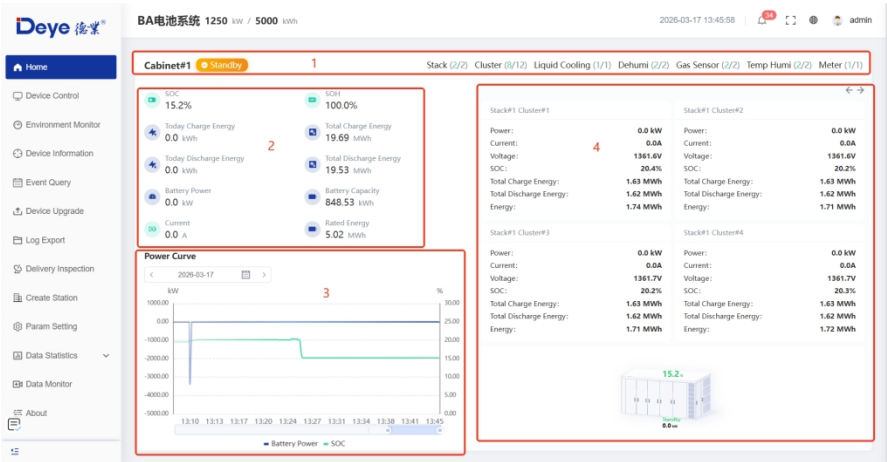
- 1. **Main Menu** (Left-side bar): Supports expansion and collapse operations and is used to access various function modules of the system.
- 2. **Navigation Bar** (Top bar): Displays the power station name, rated power, capacity, system time, and provides access to active event notifications, full-screen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



2 Battery Cabinet Introduction

2.1 Main Display Area Overview

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



Area 1

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

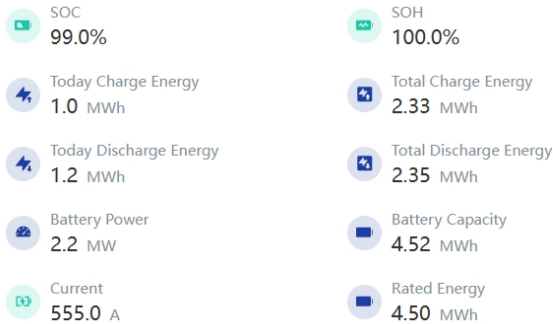
Stack (1/2) Cluster (11/12) Liquid Cooling (1/2) Dehumi (2/3) Gas Sensor (1/1) Temp Humi (2/2) Meter (1/1)

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, Dehumi (2/3) means that one of three meters is offline and need to be troubleshooted.

Area 2

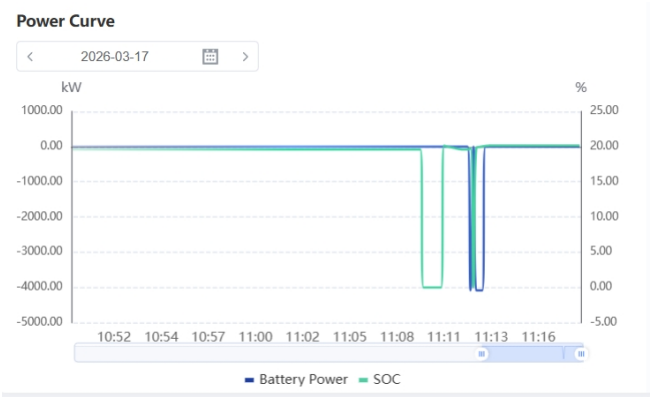
This area displays the core operating data and status of the battery cabinet.



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 Charge Energy	Total energy charged into the battery on the current day.
Total Charge Energy	Total energy charged into the battery over the entire operation period of the system.
Today Discharge Energy	Total energy discharged from the battery on the current day.
Total Discharge Energy	Total energy discharged from the battery over the entire operation period of the system.
Battery Power	Current actual charge/discharge power of the battery currently. Positive values indicate charging, and negative values indicate discharging.
Battery Capacity	Remaining capacity of single battery cabinet.
Current	Real-time operating current of the battery.
Rated Energy	Rated capacity of the battery cabinet.

Area 3

This area visually displays historical synchronous variations of battery power and SOC over time in graphical form. It supports daily query and timeline zoom, facilitating users to analyze historical data and evaluate operating status.



Area 4

This area displays the information of 12 battery clusters in card view, including battery SOC, charge/discharge status, and charge/discharge power. Click the arrow to view detailed information of each battery cluster.

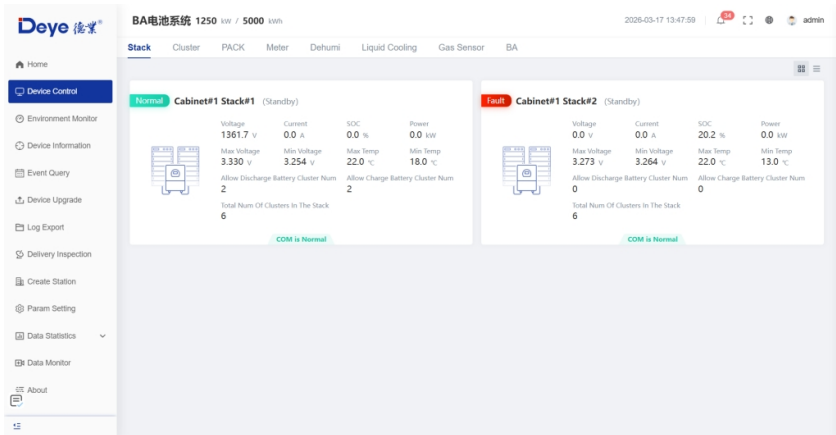
Stack#1 Cluster#1		Stack#1 Cluster#2	
Power:	0.0 kW	Power:	0.0 kW
Current:	0.0A	Current:	0.0A
Voltage:	1361.6V	Voltage:	1361.6V
SOC:	20.4%	SOC:	20.2%
Total Charge Energy:	1.63 MWh	Total Charge Energy:	1.63 MWh
Total Discharge Energy:	1.62 MWh	Total Discharge Energy:	1.62 MWh
Energy:	1.74 MWh	Energy:	1.71 MWh
Stack#1 Cluster#3		Stack#1 Cluster#4	
Power:	0.0 kW	Power:	0.0 kW
Current:	0.0A	Current:	0.0A
Voltage:	1361.7V	Voltage:	1361.7V
SOC:	20.2%	SOC:	20.3%
Total Charge Energy:	1.63 MWh	Total Charge Energy:	1.63 MWh
Total Discharge Energy:	1.62 MWh	Total Discharge Energy:	1.62 MWh
Energy:	1.71 MWh	Energy:	1.72 MWh

2.2 Device Control

Click **[Device Control]** on the main menu to view the device monitoring information of the power station

2.2.1 Battery Stack

Select **[Stack]** on the top navigation bar to view the real-time operational data of the battery stack.

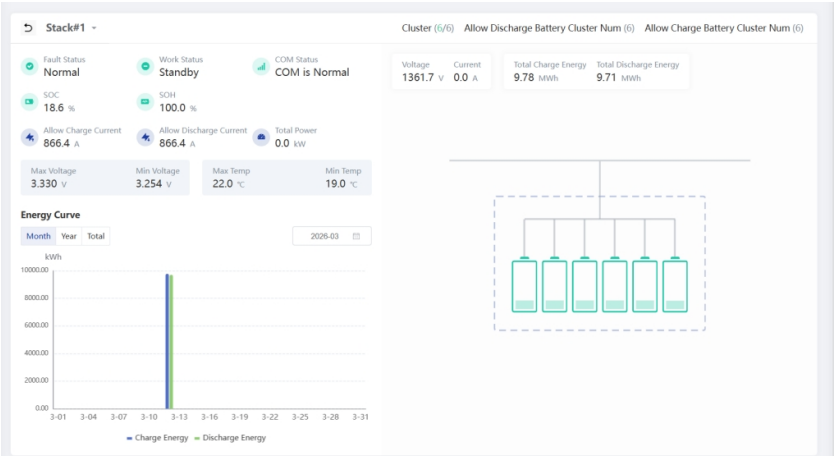


Parameter	Description
Voltage	Total DC voltage of the battery stack.
Current	Total current flowing into (charging) or flowing out (discharging) of the battery stack.
SOC	Battery state of charge as a percentage.
Power	Total charging or discharging power of the battery stack.
Max Voltage	Highest voltage among all battery cells.
Min Voltage	Lowest voltage among all battery cells.
Max Temp	Highest temperature among all battery cells or sampling points.
Min Temp	Lowest temperature among all battery cells or sampling points.
Allow Discharge Battery Cluster Num	Number of battery clusters that are verified by the system for safe discharging at the current moment.
Allow Charge Battery Cluster Num	Number of battery clusters that are verified by the system for safe charging at the current moment.

Total Num of Clusters In The Stack	Number of battery clusters in the battery stack.
---	--

Users can click  to switch the display layout between card mode and list mode. The system defaults to the card mode.

Select any battery stack card/entry to view its detailed information. This interface provides refined operational data and historical trend analysis, enabling O&M personnel to fully understand the operating status, health status, and historical performance of the corresponding battery stack.

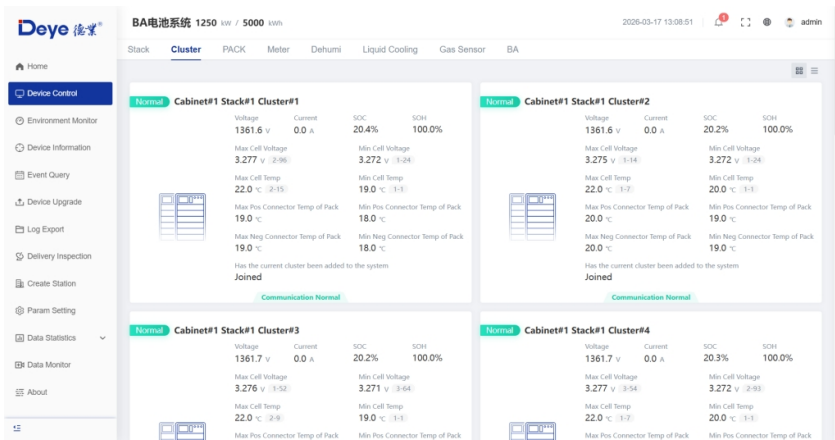


The detailed information mainly includes:

- 1) **Battery Cluster Overview:** displays the number of battery clusters currently in operation and the number of battery clusters that are verified by the system for safe charging and discharging.
- 2) **Key Data Monitoring:** displays the highest/lowest voltage and highest/lowest temperature within the stack, facilitating evaluation of battery consistency and thermal management status.
- 3) **Energy Trend Analysis:** illustrate the historical operation pattern of the battery stack by using the charge/discharge energy curves.
- 4) **Cluster Distribution Visualization:** graphically presents the operating status of each battery cluster within the stack.

2.2.2 Battery Cluster

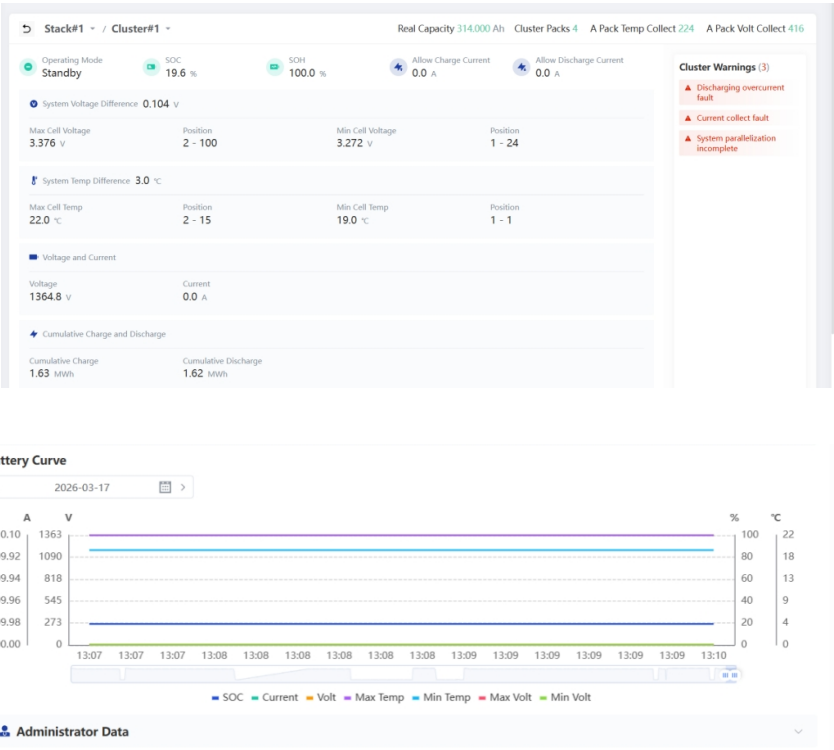
Select **[Stack]** on the top navigation bar to view the real-time operational data of the battery stack.



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	Highest voltage among all battery cells.
Min Cell Voltage	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.
Has the current cluster been added to the system	Indicates whether this battery cluster has been connected to the DC bus and ready for operation.

Users can click  to switch the display layout between card mode and list mode. The system defaults to the card mode.

Select any battery stack card/entry to view its detailed information. This interface integrates the battery status, detailed operating data, and battery curves of the corresponding battery cluster, and presents all related alarms and faults on the right-side panel.

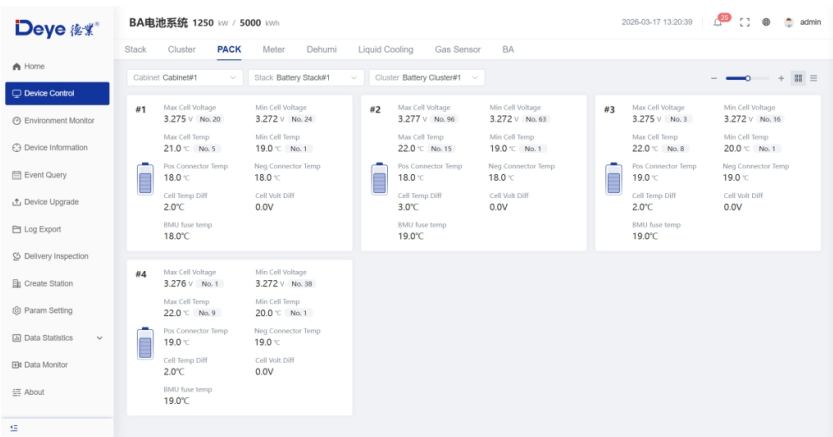


2.2.3 Battery Pack

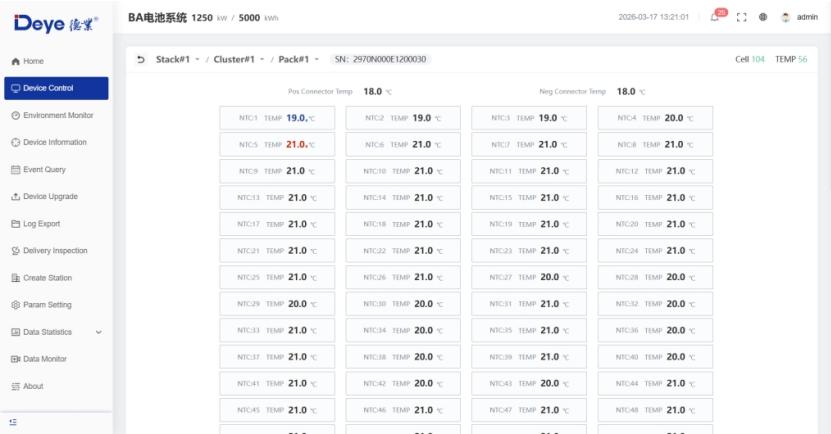
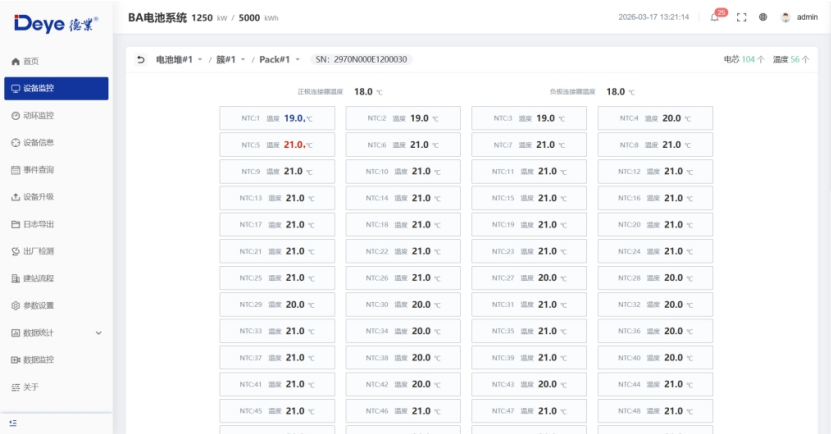
Select **[PACK]** on the top navigation bar to view the real-time operational data of all battery packs.

This interface mainly supports the following functions:

- 1) Select the target battery stack and battery cluster to view all battery packs under it.
- 2) Adjust the battery pack layout in the main display area among 2-column, 3-column, and 4 column modes.
- 3) 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.
- 4) Click  to switch the display layout between card mode and list mode. The system defaults to the card mode.

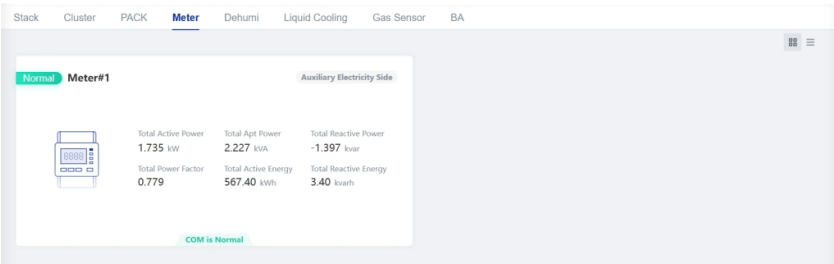


Select any battery pack to display the real-time readings of all distributed temperature sensors and voltage values of each cell inside the battery pack.



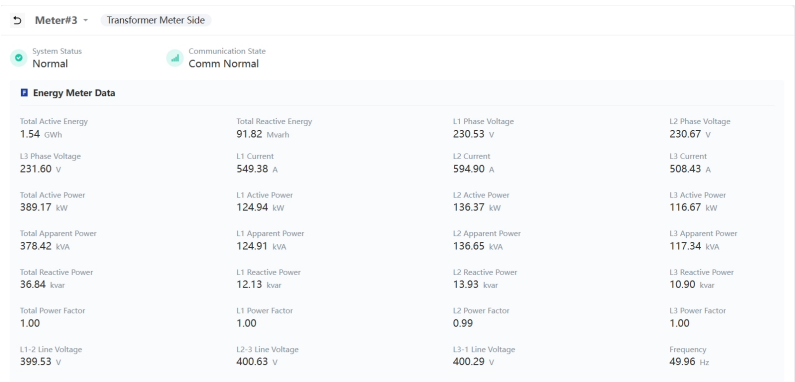
2.2.4 Meter

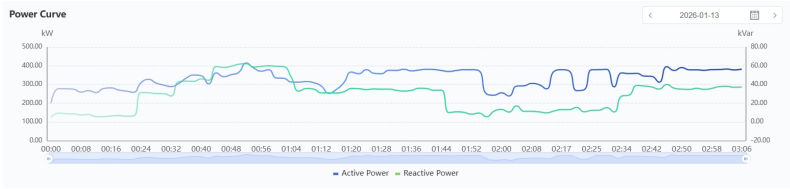
Select **[Meter]** on the top navigation bar to view the real-time operating parameters and electrical energy data of the meter.



Parameter	Description
Total Active Power	Actual net power consumed at the current site.
Total Ap 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.

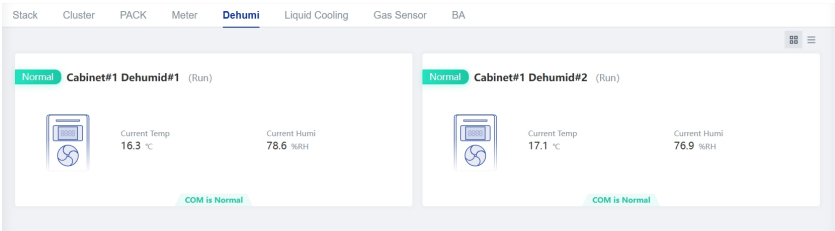
Select a meter to view its detailed information. The comprehensive electrical parameter details are divided into total amount and sub-item data, enabling users to conduct in-depth power consumption analysis and fault diagnosis.





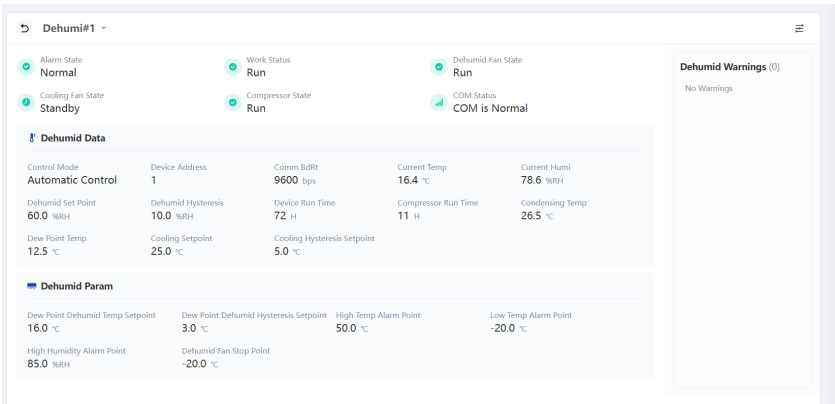
2.2.5 Dehumidifier

Select **[Dehumi]** (Dehumidifier) on the top navigation bar to view current humidity and temperature in the cabinet.



Select any dehumidifier card to display its operating status, alarms and faults, and data and parameters.

This detail interface provides the comprehensive operation monitoring and parameter configuration of the corresponding dehumidifier, enabling the O&M personnel to understand its real-time operating status and alarm information, as well as the key environmental data of the cabinet, to ensure the humidity and temperature inside the cabinet within safe ranges.

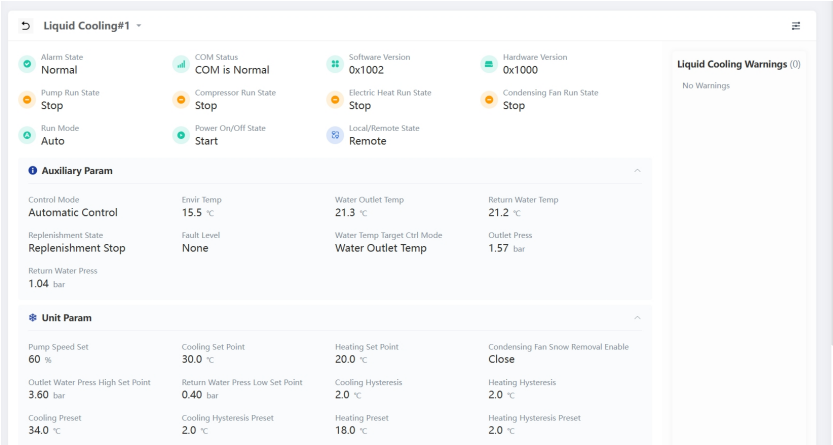


2.2.6 Liquid Cooling Unit

Select **[Liquid Cooling]** on the top navigation bar to view the environmental temperature, water outlet temperature, water return temperature, water outlet pressure, and water return pressure of the liquid cooling unit.

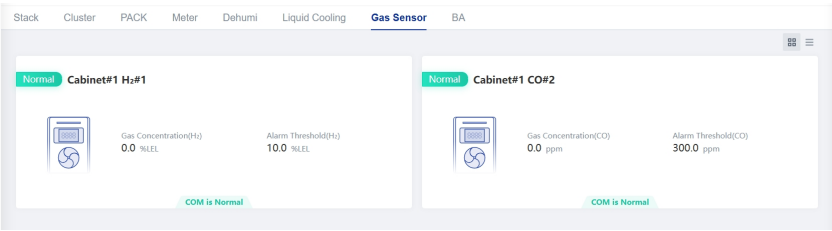


Select any liquid cooling unit card to view the detailed information, including the unit status, operation mode, core parameters, and current alarms. These data allow users to fully grasp the operating status of the liquid cooling unit and conduct fault diagnosis promptly.



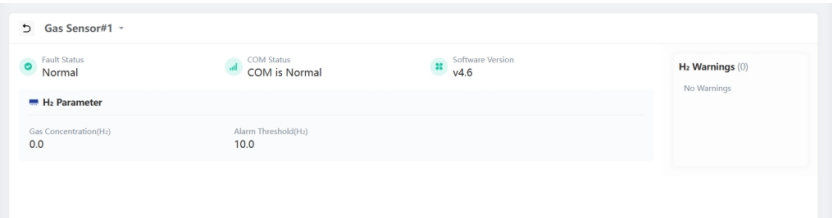
2.2.7 Gas Sensor

Select **[Gas Sensor]** on the top navigation bar to view the hydrogen concentration monitored by the gas sensor in the battery cabinet.



Parameter	Description
Gas Concentration	Hydrogen concentration monitored by the gas sensor in real time.
Alarm Threshold (H₂)	Preset hydrogen concentration threshold. When the hydrogen concentration reaches or exceeds this set value, the system will automatically trigger an alarm.

Select any gas sensor card to view its detailed information. This detail interface provides a refined monitoring view for a single gas sensor, tracks the gas concentration in real time, and displays the gas sensor's operating status.



The top area centrally displays the gas sensor's operating status, including fault conditions and communication status, enabling you to quickly determine whether the device is online and functioning properly. The middle area presents the real-time monitored value of the hydrogen concentration, including the current concentration value and preset alarm threshold. When the concentration reaches or exceeds the preset threshold, the system will trigger an alarm, indicating a safety risk.

2.2.8 BA Controller

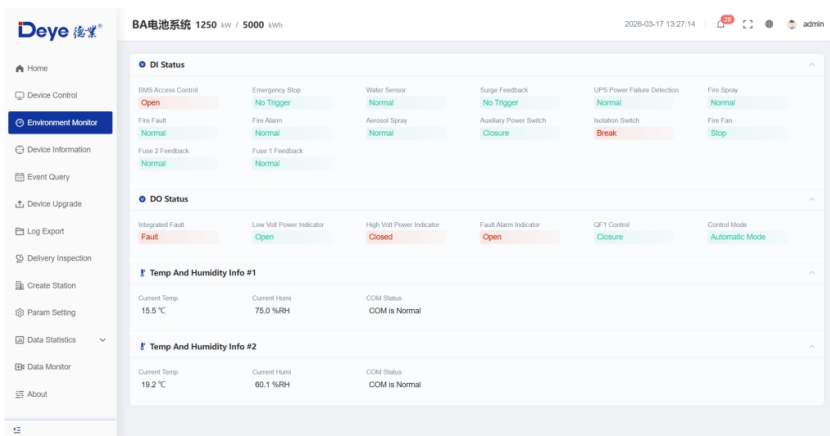
Select **[BA]** on the top navigation bar to view the hardware resources and operational health status of the battery controller, including performance resource status, storage and hardware status, system reliability and so on. The corresponding trend curves are shown below.



2.3 Environment Monitoring

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

The environment monitoring system serves as the centralized platform for hardware status and safety monitoring of the battery cabinet. This interface displays the digital input/output status, collecting and presenting the core status information in real time, including fire alarm detection, emergency stop, access control, and emergency power supply.



2.4 Device Information

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

This interface serves as a centralized platform for identity and version information of the battery management system. It displays the detailed identification label and software & hardware version of the BMS, slave unit, and environmental support devices. These data is the fundamental basis for refined device management, effective technical support acquisition, and targeted maintenance and upgrades.

The screenshot displays the Deye BA Battery System 1250 kWh / 5000 kWh interface, specifically the **Device Information** section. The left sidebar is the same as the previous screenshot. The main content area shows a table with the following columns: Device Name, No, SN, IP Address, Hardware Version, and Software Version. The table lists 10 BMS units.

Device Name	No	SN	IP Address	Hardware Version	Software Version
BMS	1	20720102300062260107rwC6C1800055	172.168.2.101	HVCU12_V1.1	WLS500026316N02
BMS	2	20720102300062260107rwC6C1800030	172.168.2.102	HVCU12_V1.1	WLS500026316N02
BMS	3	20720102300062260107rwC6C1800011	172.168.2.103	HVCU12_V1.1	WLS500026316N02
BMS	4	20720102300062260107rwC6C1800051	172.168.2.104	HVCU12_V1.1	WLS500026316N02
BMS	5	20720102300062260107rwC6C1800043	172.168.2.105	HVCU12_V1.1	WLS500026316N02
BMS	6	20720102300062260107rwC6C1800022	172.168.2.106	HVCU12_V1.1	WLS500026316N02
BMS	7	20720102300062260107rwC6C1800016	172.168.2.107	HVCU12_V1.1	WLS500026316N02
BMS	8	20720102300062260107rwC6C1800038	172.168.2.108	HVCU12_V1.1	WLS500026316N02
BMS	9	20720102300062260107rwC6C1800056	172.168.2.109	HVCU12_V1.1	WLS500026316N02
BMS	10	20720102300062260107rwC6C1800021	172.168.2.110	HVCU12_V1.1	WLS500026316N02

2.5 Event Query

Click **[Event Query]** on the main menu to access the event entry interface. This interface is the core information traceability platform for recording, querying, and exporting all the alarm events generated by the system and manual operation records.

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 filter fields.
4. Refresh the list content.

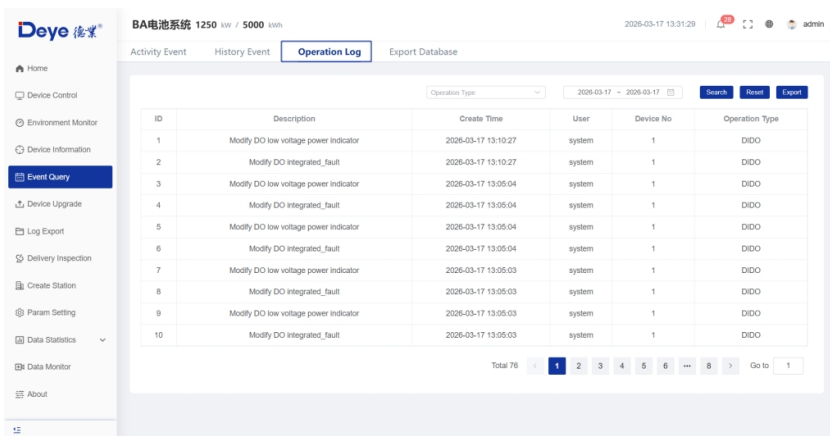
The screenshot shows the Deye Event Query interface. The top header includes the Deye logo, system name 'BA电池系统 1250 kW / 5000 kWh', and a timestamp '2026-03-17 13:30:37'. Below the header, there are tabs for 'Activity Event', 'Historical Event', 'Operation Log', and 'Export Database'. The 'Activity Event' tab is selected. The main area contains a table with 10 rows of active alarm events. The table has columns for ID, State, Description, Alarm Level, Device Type, Device No, Abnormal Value, Start Time, and End Time. The events are all 'Restore' status. The left sidebar contains a navigation menu with options like Home, Device Control, Environment Monitor, Device Information, Event Query (highlighted), Device Upgrade, Log Export, Delivery Inspection, Create Station, Param Setting, Data Statistics, Data Monitor, and About. At the bottom of the table, there is a pagination bar showing 'Total 511' and a set of page numbers (1, 2, 3, 4, 5, 6, ..., 52, 1) with 'Go to' and '1' buttons.

ID	State	Description	Alarm Level	Device Type	Device No	Abnormal Value	Start Time	End Time
1	Restore	System power-on insulation self-checking	Level 2	Cluster	6	1	2026-03-17 13:25:44	2026-03-17 13:25:52
2	Restore	System power-on self-checking	Level 2	Cluster	6	1	2026-03-17 13:25:44	2026-03-17 13:25:44
3	Restore	BA communication lost	Level 1	Cluster	6	1	2026-03-17 13:25:44	2026-03-17 13:25:44
4	Restore	System power-on insulation self-checking	Level 2	Cluster	5	1	2026-03-17 13:25:43	2026-03-17 13:25:52
5	Restore	System power-on self-checking	Level 2	Cluster	5	1	2026-03-17 13:25:43	2026-03-17 13:25:43
6	Restore	BA communication lost	Level 1	Cluster	5	1	2026-03-17 13:25:43	2026-03-17 13:25:43
7	Restore	BMS cluster5 communication lost	Level 2	BA	1	0	2026-03-17 13:24:36	2026-03-17 13:25:43
8	Restore	BMS cluster6 communication lost	Level 2	BA	1	0	2026-03-17 13:24:36	2026-03-17 13:25:44
9	Restore	Circuit breaker tripping fault	Level 2	Cluster	5	1	2026-03-17 13:24:30	2026-03-17 13:25:43
10	Restore	Circuit breaker tripping fault	Level 2	Cluster	6	1	2026-03-17 13:24:28	2026-03-17 13:25:44

2.5.2 Historical Event

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

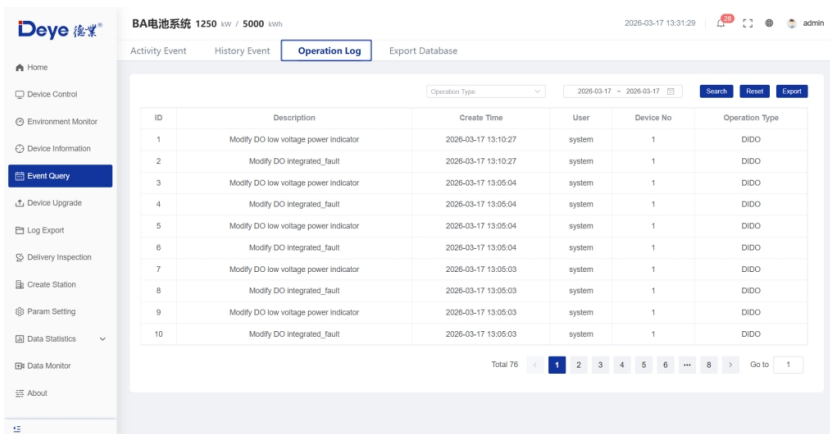
1. View the alarm status, description, alarm level, device type, device SN, abnormal value, and occurrence time of each historical alarm event.
2. Search events by alarm level, device type and device SN.
3. Reset the alarm level, device type and device SN in the filter fields.
4. Export the historical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



2.5.3 Operation Log

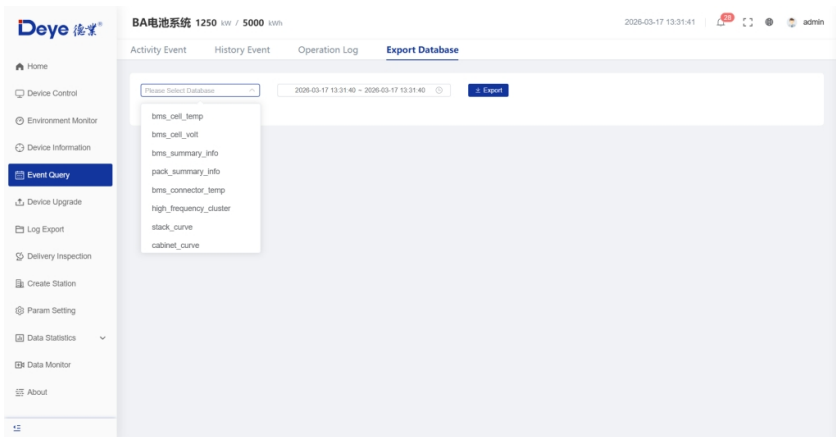
The Operation Log records the operator's specific operation on devices. This page provides the following main functions:

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.



2.5.4 Export Database

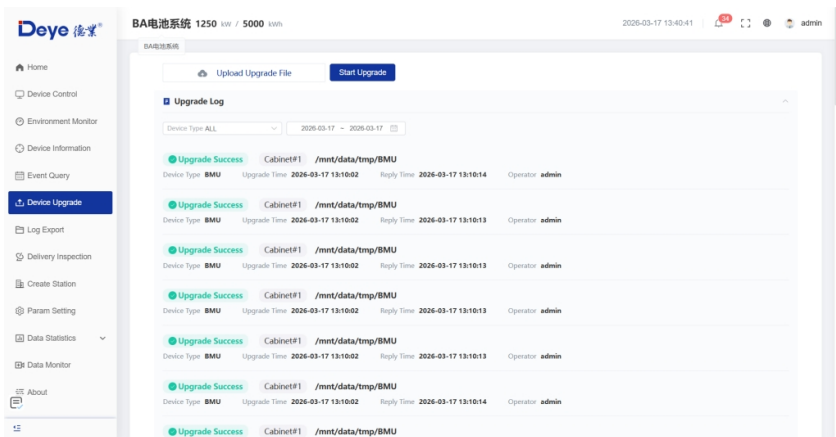
Users can select the target database and time range to export corresponding event data with one click for offline analysis or long-term archiving.



2.6 Device Upgrade

Follow the steps below to upgrade your devices.

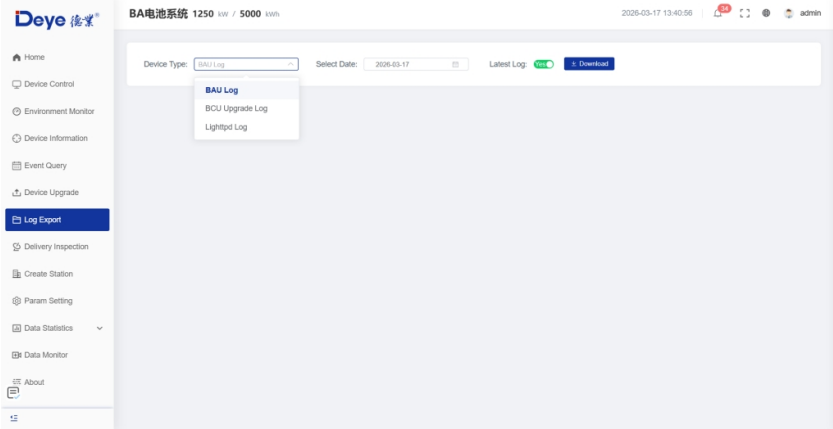
1. Click **[Device Upgrade]** on the main menu to access the device upgrade interface.
2. Upload the upgrade file, and click **[Start Upgrade]** to start the upgrade process. The file name must conform to the name convention.
3. After the upgrade is completed, the system will prompt whether this upgrade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



2.7 Log Export

Click **[Log Export]** on the main menu to access the log export interface.

- 1) Select the device log type in the drop-down menu, including BAU Log, BCU Upgrade Log, and Lighttpd Log (Web Server Log).
- 2) Select the date of logs to be exported. You can select any historical date as required.
- 3) Click **[Download]** to export the corresponding log files.

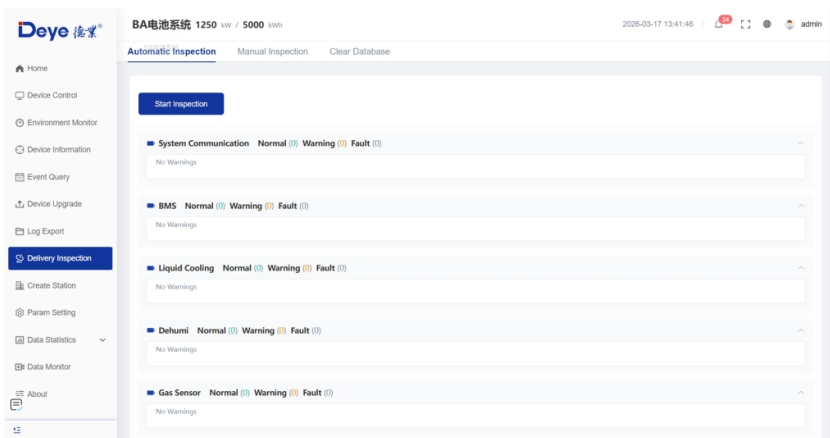


2.8 Delivery Inspection

Click **[Delivery Inspection]** on the main menu to access the delivery inspection interface. Delivery inspection mainly includes automatic inspection, manual inspection, and database clearing.

2.8.1 Automatic Inspection

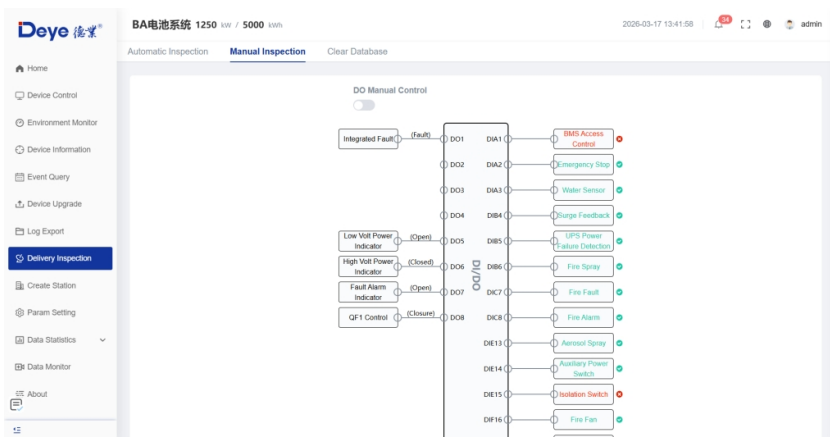
Click **[Start Inspection]** button to start the automatic inspection for system communication, battery management system, liquid cooling unit, dehumidifier, and gas sensor modules. After inspection, the interface displays inspection results, categorized as Normal, Alarm, and Fault, with the corresponding quantities shown after each category.



2.8.2 Manual Inspection

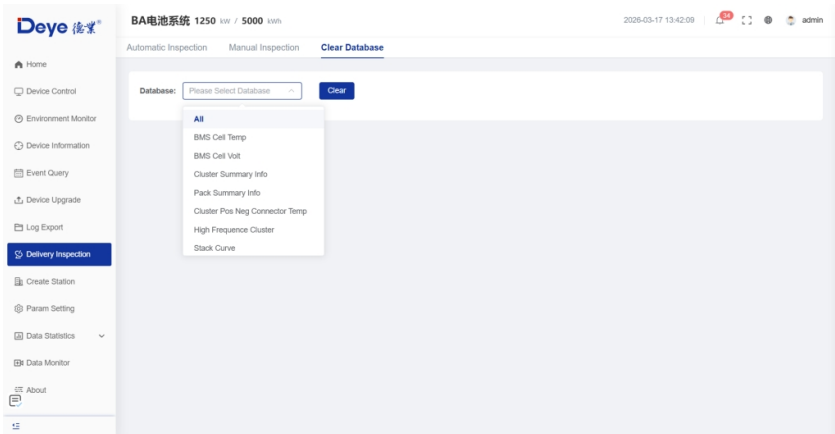
The Manual Inspection interface displays the DI inspection results and DO status of the system.

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



2.8.3 Clear Database

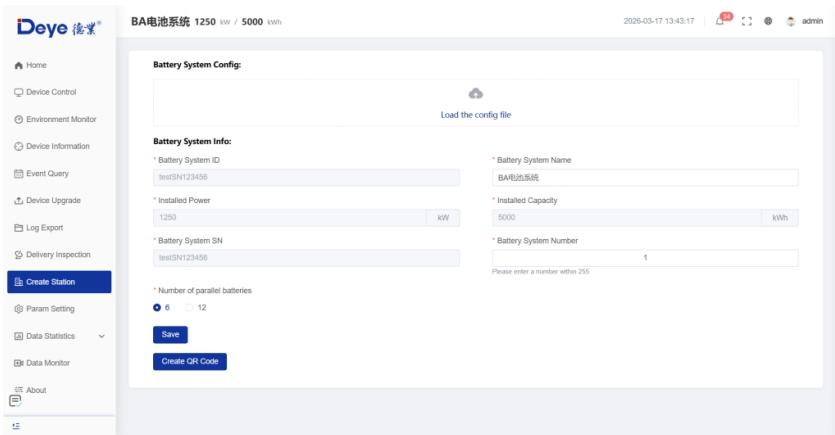
This interface supports historical data management of the system. Users can filter data records of specific types and then clear them to free up storage space and maintain system performance.



2.9 Create Station

To create a power station:

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



2.10 Parameter Setting

Click **[Param Setting]** on the main menu to access the parameter setting interface.

This interface is used to configure the basic operating parameters of the battery system, including the system time and network connection, to ensure the device synchronizes with external clocks and can access the network normally.

1. Time Setting

You can select **[Custom Time]** to enter the current date and time manually, or select **[Synchronize the current Computer Time]** to keep the system time consistent with your computer. Once selected, the system will update the device's internal clock according to your settings.

Timeset:

Time setting Method

☐ Custom Time ☒ Synchronize the current computer time

Save

2. Ethernet Setting

This area is used to configure the network connection parameters. You can select the **[Network Port Name]**, set the **[Address Allocation Method]** to static IP or dynamic IP (DHCP), and then fill in the corresponding gateway, IP address, subnet mask, and DNS server. Proper network configuration is the basis for remote device access, data reporting and system upgrades.

Click **[Save]** after parameter setting to activate the new configuration.

Ethernet Setting:

* Network Port Name: net1

* Address Allocation Method: Static IP

Gateway: 192 . 168 . 1 . 1

* IP Address: 192 . 168 . 1 . 100

* Subnet Mask: 255 . 255 . 255 . 0

DNS Server 1: 8 . 8 . 8 . 8

DNS Server 2: . . .

Save

* Network Port Name: net2

* Address Allocation Method: Dynamic Address(DHCP)

Save

3. Time Sync Config

This area is used to configure the automatic time synchronization function of the device. After enabling **[Auto Time Sync]**, the system will periodically synchronize time with the specified NTP server to ensure time accuracy. You may set **[Time Sync Method]** to NTP, and enter the addresses of the primary and standby NTP servers.

Time Sync Config:

* Auto Time Sync: ☐ Closed ☒ Open

* Time Sync Method:

* NTP Server:

* NTP Server:

2.11 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 performance, 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.

