EMS USE INSTRUCTION

ESC-R100-211-CE

Pack-Energie

Note: This draft is for informational purposes only. Final content is contingent upon final review and confirmation of certifications.

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1 TOUCH SCREEN OPERATION

1.1 Introduction

The monitoring and management system of the all-in-one BESS adopts the screen of serial port, as shown in Figure 1.1. and Table 1 for the specific information.

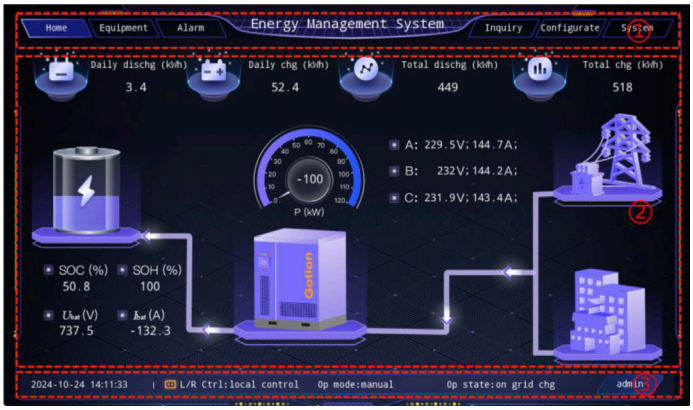


Figure 1.1 Touch screen Home interface

Table 1 Touch screen Home interface information

No.	Name	Description
1	Menu	Home, Equipment, Alarm, Inquiry, Configuration and System
2	Content display area	According to the selected menu, the corresponding content is displayed in the interface.
3	Below area	Time, L/R ctrl (local control and remote control), OP mode (peak&valley, backup power, manual), Op state (stop, fault, off grid dischg, on grid chg and on grid dischg) and login state (admin and unlogin)

1.2 Log in

Click “Login Status” in the lower area of each page to jump to the login page, which is shown in Figure 1.2, including the account and password, and controlling such as log in, log off and language selection.

Enter the correct account and password and click “log in”. If the login is successful, you will automatically jump to the system homepage. The login account is displayed in the lower bar of all pages; if you enter an incorrect account or password, click “Login” and the “Account or password incorrect prompt!” message will appear on the login page.

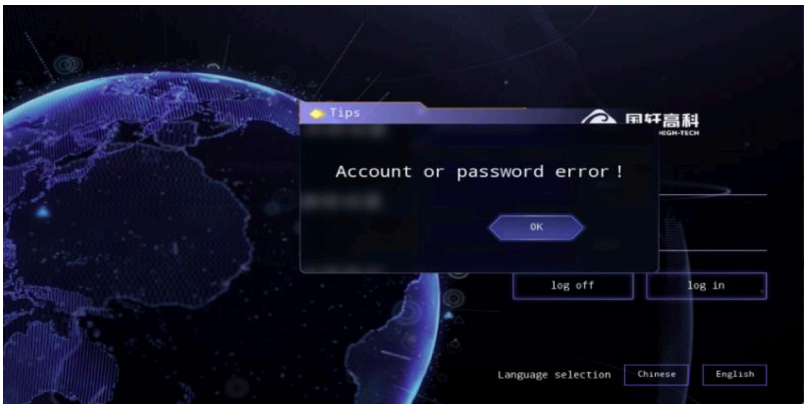
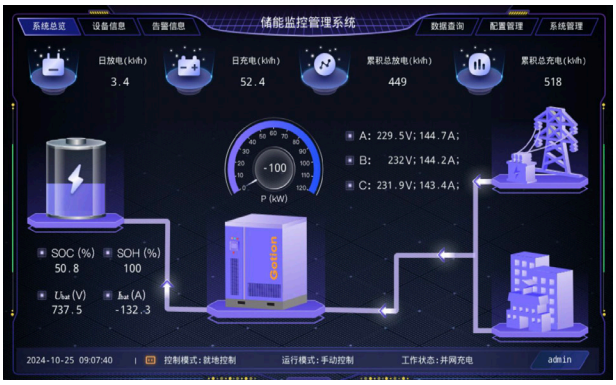


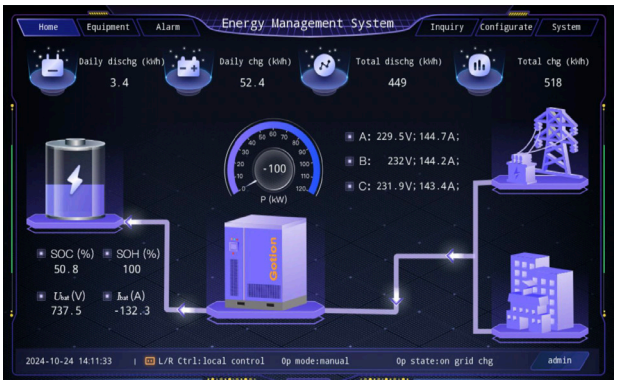
Figure 1.2 Login information interface

You can choose between two languages: Chinese and English. Click the “Chinese” button, and all pages will be switched to Chinese display, as shown in Figure 1.3(a); click the “English” button, all pages will be switched to English display, as shown in Figure 1.3(b).

Figure 1.3 Comparison of Chinese and English interfaces



(a) Chinese interface



(b) English interface

1.3 System overview

The system overview is shown in Figure 1.1 above, which displays daily charge/discharge, cumulative total charge/discharge, the basic topology of the system and the corresponding basic information, which include the remaining power of the battery (State of Charge, SOC), the battery's state of health (State of Health, SOH), voltage, current and the operation parameter of the PCS such as Power, voltage and current. The system topology is shown in Figure 1.4.

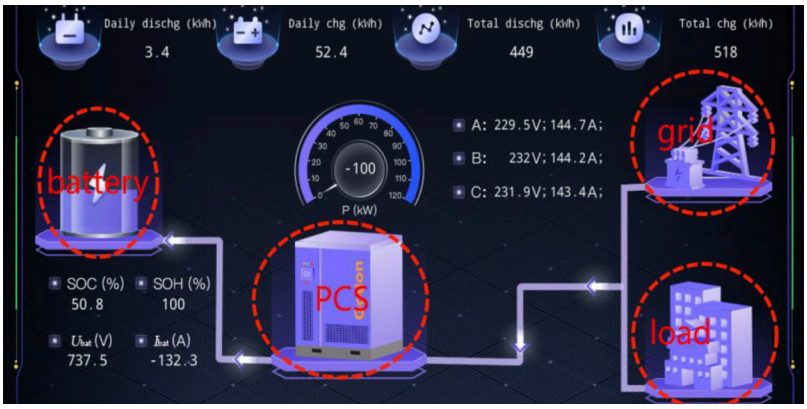


Figure 1.4 System charging topology diagram

Battery system charging: arrow points from the grid to the battery;
Battery system discharge: arrow points from battery to grid;

1.4 Device information

In the Device Information interface you can view the real-time status of each units of BESS, including 5 systems: battery, PCS, liquid cooling, fire protection and electricity meter.

1.4.1 Battery

The battery information page is shown in Figure 1.5, including: status, operation and alarm of the battery. The battery status information is shown in Table 2.

Figure 1.5 Battery information

Table 2 Battery status

Name	Description
Running state	Normal, charging prohibited, discharging prohibited,standby, shutdown
Isolating switch status	Closed, open
Charge/discharge status	Standstill, discharge, charge
Communication status	Disconnected, normal

Battery operating information: Fault code (click to view specific battery fault information), Charge/discharge available capacity, Charge/discharge limit current, Maximum/low cell voltage and location (click the “Next” to view specific cell voltage), Maximum /minimum cell temperature and location (click the “Next” for specific cell temperature), Total battery racks voltage, Total battery racks current, and SOC.

Battery level 1/2/3 real-time alarm information: charge/discharge overcurrent, entire group over/under voltage, single unit over/under voltage, single unit over/under temperature, single unit temperature/pressure difference, low SOC, insulation Fault, communication/slave control fault (click on “Alarm information” to view more).

1.4.2 PCS

The PCS information page is shown in Figure 1.6, which includes PCS status, PCS operation and PCS fault. The status of PCS is shown in Table 3.

Figure 1.6 PCS information interface

Table 3 PCS status information

Name	Description
Operating status	Shutdown, standby, fault, discharge, charge, charge derating, discharge derating
Operating mode	Constant power, current and voltage
On / off-grid status	On-grid, off-grid, VSG
Communication status	Normal, disconnected
Overload shedding status	Occurred, not occurred
Surge protection status	Occurred, not occurred

PCS operating information: A/B/C phase current and voltage, PCS temperature, frequency. PCS fault information: faults 1, 2, 3, 4, 5, DCDC fault (click the fault code to view the specific fault content).

1.4.3 Liquid cooling system

The liquid cooling system interface, which displays liquid cooling and dehumidification information, is shown in Figure 1.7. The liquid cooling status information is shown in Table 4. The dehumidification status information is shown in Table 5.

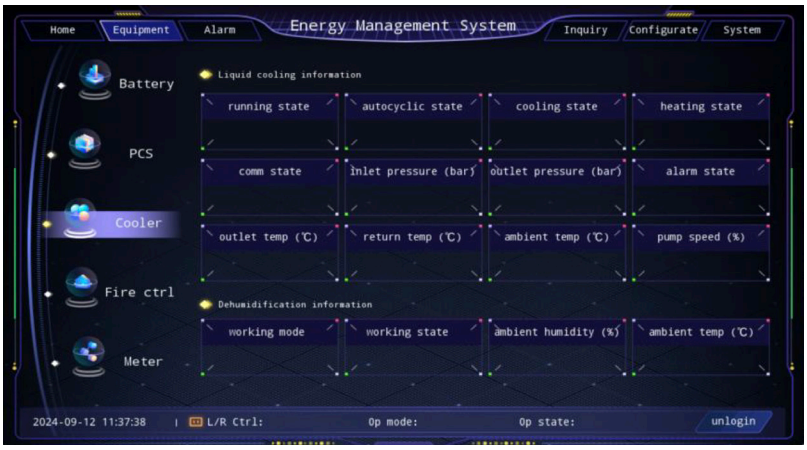


Figure 1.7 Liquid cooling information page

Table 4 Liquid cooling system status information

Item	Description
Running state	Run and stop
Cooling State	Run and stop
Heating State	Run and stop
Water circulation status	Run and stop
Alarm status	With alarm or without alarm
Communication status	Normal, disconnected

The displayed operating information of the liquid cooling system: Outlet/Return water temperature, Ambient temperature, Inlet/outlet water pressure value and Water pump speed.

Table 5 Dehumidification system status information

Item	Description
Operating mode	Heating mode and cooling mode
Operating state	Automatic mode, manual mode, Setting mode, operating mode, dehumidifier operating status, heater operating status, fan operating status, defrosting status

The operating information of the dehumidification system includes: ambient humidity and ambient temperature.

1.4.4 Fire Fighting System

The fire protection system interface is shown in Figure 1.8. Activation status of fire protection: triggered, not triggered; Current alarm status: no alarm, first-level alarm and second-level alarm.

Figure 1.8 Fire information interface

1.4.5 Power meter

The meter information interface is shown in Figure 1.9, including communication status and related meter information.

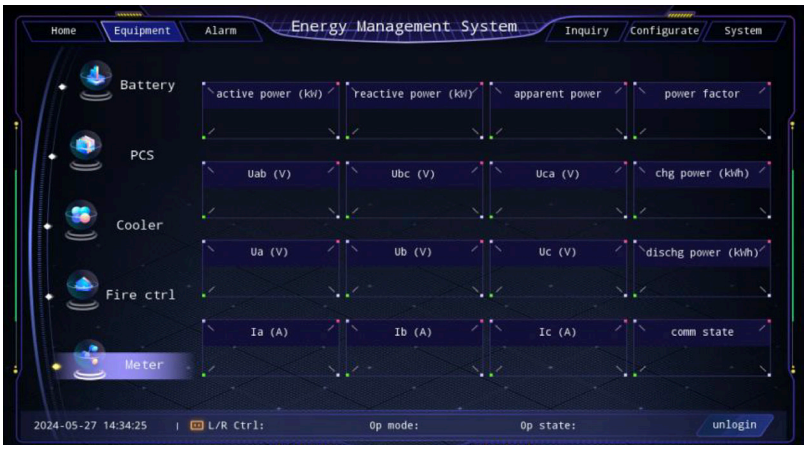


Figure 1.9 Meter Information Interface

Meter information: Active power, Reactive power, Apparent power, Power factor, Charge/discharge energy, A/B/C line voltage, A/B/C phase voltage, A/B/C phase current.

1.5 Alarm

There are real-time alarms and historical alarms. When alarms or failures occur in BMS, PCS, liquid cooling system, fire protection system, and power meters, the alarm information will be updated immediately.

1.5.1 Real-time alarm

The real-time alarm information interface is shown in Figure 1.10, which contains fault information and trigger time.

Figure 1.10 Real-time alarm information Interface

1.5.2 Historical alarm information

The historical alarm information Interface is shown in Figure 1.11 which contains trigger time, trigger device and fault code; and controls such as clear historical alarms and export.

Figure 1.11 Historical alarm information Interface

Clear historical alarms: When you click the Clear Historical Alarms control, a secondary confirmation sub-interface will appear to prevent accidental deletion. The Clear Historical Alarms confirmation interface is shown in Figure 1.12. Click the “OK” button to clear all data of the actual interface .

Figure 1.12 Sub-interface of confirm clearing historical alarms

Export: When you click the export control, historical alarm information will be automatically exported to a USB flash drive or SD card.

1.6 Data inquiry

Data inquiry: operation logs and historical energy data.

1.6.1 Operation log

The operation log information interface is shown in Figure 1.13 which contains operation time, operator and operation as well as controls such as export.

Figure 1.13 Operation log information Interface

1.6.2 Historical energy data

The historical energy data information interface is shown in Figure 1.14 which contains recording time, charge/discharge and electricity (kWh); as well as controls such as clearing historical data and exporting (a secondary confirmation sub-interface appears in case of clearing historical data).

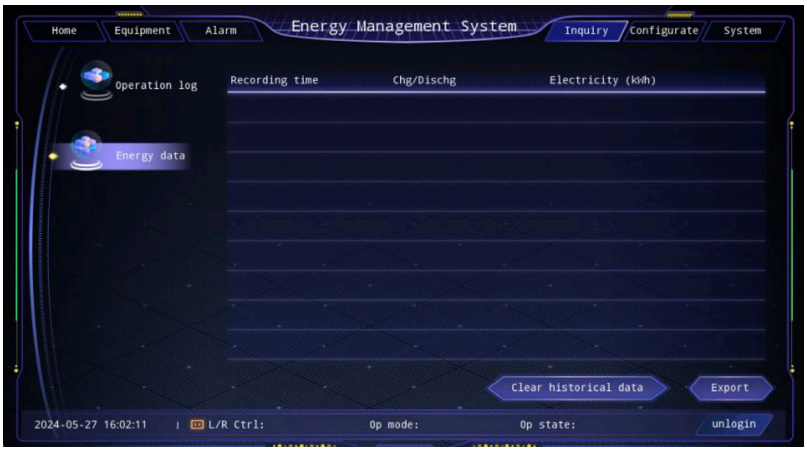


Figure 1.14 Historical data information interface

1.7 Configuration management

Configuration management functions: basic settings, time period settings, communication settings and fault recovery.

1.7.1 Basic settings

The basic setting information interface is shown in Figure 1.15 which contains the basic system running and status information as well as controls such as reading and saving.

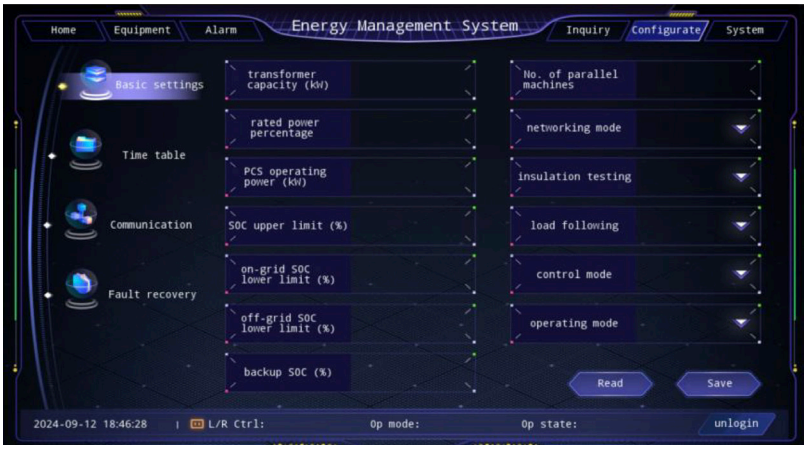


Figure 1.15 Basic setting information Interface

Basic settings and operation information: transformer capacity, rated power percentage, PCS operating power, SOC upper limit, on-grid SOC lower limit, off-grid SOC lower limit, backup SOC and number of parallel unities. Specific instructions are shown in Table 6.

Table 6 System customization

Item	Description
Transformer capacity	The maximum power load that a transformer can withstand.
Rated power percentage	The maximum available incoming line power rating of the system in percent. Example: the rated power of the transformer incoming line is 100kW, the system must maintain 80% of the incoming line power from the transformer, and this coefficient is set to 80.
PCS operating power	The operating power of PCS in manual operation mode, positive value for discharge power, negative value for charging power.
SOC upper limit	Set the SOC upper limit for battery system charging. When the SOC upper limit is reached, the system prohibits charging, but the discharge of the system is normal.
On-grid SOC lower limit	Set the SOC lower limit for battery system discharge under On-grid conditions. After reaching this lower limit, the system is prohibited from discharging, but the charging of the system is normal.
Off-grid SOC lower limit	Set the SOC inferior limit for battery system discharge under off-grid. conditions. The PCS will shut down after reaching the SOC lower limit.
Backup SOC	In backup mode, the battery is automatically charged when its SOC is lower than the backup SOC.
Number of parallel unities	Number of parallel unities.

The status information of the system is shown in Table 7.The networking mode is set to disabled by default, and the master/slave mode is only involved when operating in parallel.The insulation detection is set to enabled by default. The load following function means monitoring the real-time power changes of the electric meter and adjusting the industrial and commercial storage operating power according to real-time needs, and it is set to disabled by default. In the control method, remote control means that the Energy Management System (EMS) receives remote control instructions, and local control means that the EMS does not receive remote control instructions.

Table 7 Status information

Item	Description
Networking mode	Disable, master,slave
Insulation detection	Disable, enable
Load following	Disable, enable
Control method	Local control, remote control
Operating mode	Automatic - peak and valley, Automatic backup, Manual -charging, Manual - on-grid discharge, Manual - off-grid discharge and Manual - shutdown.

Save: When you click the save control, a secondary confirmation sub-interface will appear to prevent you from accidentally touching save. Click the “OK” button on the sub-interface to send the set command data to EMS.

Read: When clicking the read control, you can read the basic operating information and status information of the real-time system.

Start: Set the system information in the basic settings, then select “Control Mode”- “Operation Mode”, set the “PCS Operation Power”, click the “Save” button, in this moment the secondary confirmation sub-interface pops up, click “OK” “. For example: Select “Local Control” in the drop-down menu of the control mode, then select “Manual - Charging” in the drop-down menu of the operating mode, enter the PCS operating power value: -100, and click “Save”, then click the “OK” button in the pop-up window prompt. At this moment, the set charging command data is sent to the EMS and waits for taking effect.

Shut down: Select “Manual- Stop” in the drop-down menu of the operating mode, click the button “Save”, and then click the “Confirm” button in the pop-up prompt. At this moment, the shutdown command is set and sent to the EMS, waiting for taking effect.

1.7.2 Time period setting

The time period setting is used to set the time period and power price for peak shaving and valley filling, which include the reading of the configuration of the time period and power cost in the EMS, with the accuracy of the power price about 3 decimal. The time period setting interface is shown in Figure 1.16, and the relevant instructions for time period setting and power price are shown in Table 8 with the Controls such as read and save (there is a secondary confirmation subinterface for saving).

Figure 1.16 Time period setting Interface

Table 8 Time period setting and power price

Item	Description
Time period setting	There are 12 periods in total.
Time period of different electricity price	5 categories: Spike, Peak, Off-Peak, Valley and stop, select them from the drop-down menu.
Power (kW)	Manual input to set different power levels
Starting time	You can set the start time of each period, accurate to the minute, in the time format of “Hour: minute”. The whole day starts at 0:00 and ends at 24:00. The start time of the one period is the end time of the previous period. When there is no other time period set after a certain time period, the system is considered to start timing from this time period until 24:00 that day. For example, if the electricity price corresponding to the eighth period is normal, the start time is 22:00, and the eighth period is the last set, then in the period of 22:00 to 24:00 the price is normal.
Power price	You can set electricity prices for four periods: Maximum price, peak price, normal price and off-peak price.

1.7.3 Communication settings

The communication setting information Interface is shown in Figure 1.17, which contains local ID, PCS ID, BMS ID, liquid cooling ID, dehumidifier ID, meter ID, device number, grid code, platform IP, platform port, upgrade server IP, and upgrade server port with controls such as read and save (secondary confirmation sub-interface will appear in case of saving).

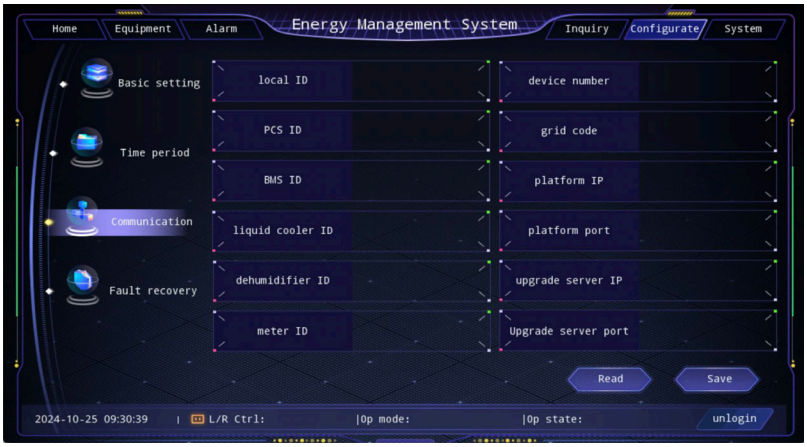


Figure 1.17 Communication setting Interface

1.7.4 Fault recovery

The fault recovery interface is shown in Figure 1.18 which contains PCS fault status, BMS fault status, BMS alarm status, liquid cooling system alarm status and FFS alarm status with the control such as PCS fault recovery, BMS fault recovery, liquid cooling fault recovery and fire fault recovery (secondary confirmation sub-interface will appear in case of controls of fault recovery).

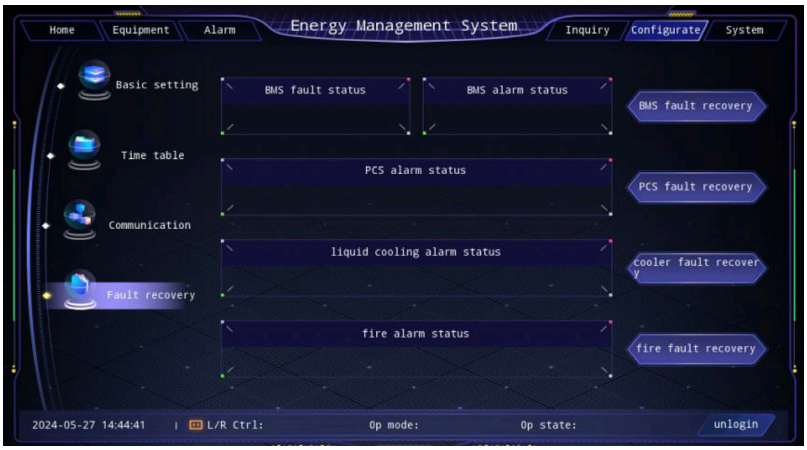


Figure 1.18 Fault recovery Interface

1.8 System Management

The system management information interface is shown in Figure 1.19, which contains device model, hardware and software version, BESS serial number, HMI software version, BMS and PCS software version.

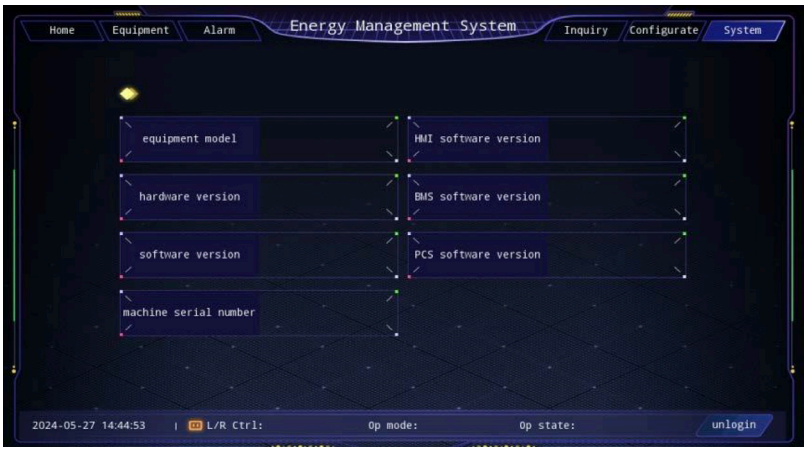


Figure 1.19 System Management Interface