LFP 16kWh/LV

51.2V 314Ah

RECHARGEABLE LITHIUM BATTERY

User Manual

v1.1

Content

Statement of Law

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This product complies with the design requirements of environmental protection and personal safety. The storageuse and disposal of the products shall be carried out in accordance with the product manual, relevant contract or relevant laws and regulations.

Customer can check the related information on the website when the product technology is updated.

Please note that the product can be modified without prior notice.

Manual Version: V1.1

Manual NO.

Revision History

Revision NO.	Revision Date	Revision Reason
1.0	2024.12.12	First Published

Safety Precautions

⚠ Warning

- Please do not put the battery into water or fire, in case of explosion or any other situation that might endanger your life.
- Please connect wires properly while installation, do not reverse connect.
- To avoid short circuit, please do not connect positive and negative poles with conductor (Wires for instance).
- Please do not stab, hit, trample or strike the battery in any other way.
- Please shut off the power completely when removing the device or reconnecting wires during the daily use or it could cause the danger of electric shock.
- Please use dry powder extinguisher to put out the flame when encountering a fire hazard, liquid extinguisher could result in the risk of secondary disaster.
- For your safety, please do not arbitrarily dismantle any component in any circumstances unless a specialist or an authorized one from our company, device breakdown due to improper operation will not be covered under warranty.

⚠ Caution

- We have strict inspection to ensure the quality when products are shipped out, however, please contact us if case bulging or another abnormal phenomenon.
- For your safety, device shall be ground connected properly before normal use.
- To assure the proper use please make sure parameters among the relevant device are compatible.
- Please do not mixed-use batteries from different manufacturers, different types and models,as well as old and new together.
- Ambient and storage method could impact the life span and product reliability, please consider the operation environment abundantly to make sure device works in proper condition.
- For long-term storage, the battery should be recharged once every 6 months, and the amount of electric charge shall exceed 80% of the rated capacity.
- Please charge the battery in 18 hours after it discharges fully and starts over - discharging protection.
- Formula of theoretical standby time: T=C/I (T is standby time, C is battery capacity, I is total current of all loads).

Preface

Manual declaration

LFP 16kWh/ LV user manual lithium iron phosphate battery is external battery module which can storage the power for home use. When the grid is on, it supplies the home loads and charges the battery meantime. When grid off, the battery discharges to power up the home loads.

LFP 16kWh/ LV user manual systematically elaborates device structure, parameters, basic procedure and method of installation, operation, maintenance.

Safety Statement

- Only qualified trained professionals are allowed to install, operate, maintain the device.
- Please comply with local safety regulations and operational rules when installation, operation and maintenance, or it could lead to human injury or device damage.
- Mentioned attentions are only as a supplement to local safety regulations.
- The seller does not undertake any responsibility for device operations or usage violating general safety requirements and safety standards.

Sign explanation

Attention should be paid when configuring or operating LFP 16kWh/ LV products, which follows below format to explain.

△ Caution

Neglecting the warnings might cause malfunction.

1 Introduction

1.1 Brief Introduction

LFP 16kWh/ LV user manual lithium iron phosphate battery is newly power storage products designed according to market demands, supplies reliable power for all kinds of home equipment.It is especially suitable for situations with higher temperatures, less space, higher demand of weight and life span.

LFP 16kWh/ LV lithium battery carries self-developed battery management system. When the grid is on, it supplies the home loads and charges the battery meantime. When grid off, the battery discharges to power up the home loads.

Batteries can be paralleled to build a module with more capacity to satisfy the longtime energy storage demand.

1.2 Product Properties

LFP 16kWh/ LV energy storage product's anode materials are lithium iron phosphate, battery cells are managed effectively by BMS with better performance, the systems feature as below:

- Anode materials are lithium iron phosphate ($LiFePO_4$), safer with longer life span.
- Carries battery management system with better performance, possesses protection function like over-discharge, over-charge, over current, abnormal temperature.
- Self-management on charging and discharging, single core balancing function.
- Intelligent design configures integrated inspection module, with 3 remote functions (remote-measuring, remote-communicating and remote-controlling).
- Flexible configurations allow parallel of multi battery for longer stand by time.
- Self-ventilation with lower system noise.
- Less battery self-discharge, then recharging period can be up to 10 months during the storage.
- No memory effect: The battery can be charged and discharged shallowly without the risk of memory effect.

2 Product Specification

2.1 Size and Weight

Table 2-1 LFP 16kWh/ LV Device Model

Product Series	Specification Model	Model	Model	Model	Model	Model
LFP	16kWh/LV	51.2V	314Ah	530×900×245	120	IP65

2.2 Performance Parameter

Table 2-2 LFP 16kWh/ LV performance parameter

Module Type	LFP 16kWh/ LV
Total Energy	16kWh
Usable Energy (DC)	14.4kWh
Nominal Dis-charge Power	8kW
Peak Power (Only Discharge)	9.2kW for 3 seconds
Constant Current (Only Discharge)	157A
Voltage	43.2~58.4Vd.c
Nominal Voltage	51.2Vd.c
Nominal Current	157A
Max. Charge Voltage	58.4Vd.c
Max. Charge Current	157A
Max. Discharge Current	157A
Safety	UN38.3

2.3 Interface

This section elaborates on interface functions of the front panel of the device.

2 Product Specification

Figure2-1 LFP 16kWh/LV the sketch of front interface

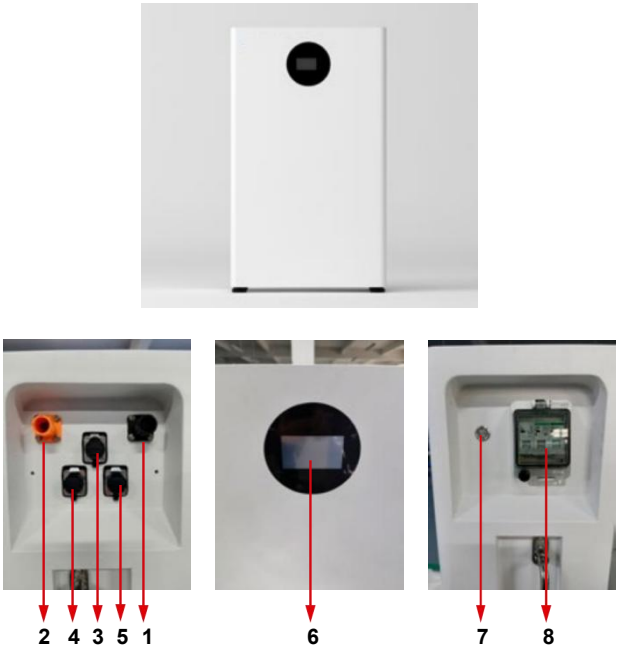


Table 2-3 Interface Definition

Item	Name	Definition
1	Negative socket	The battery DC output negative pole, which is connected to the negative pole often inverter via a cable.
2	Positive socket	The battery DC output Positive electrode，which is connected to the Positive electrode often inverter via a cable.
3	CAN	CAN communication interface is used for communication between battery and inverter.
4	RS485 A	The RS485 communication interface is used for parallel communication between batteries.
5	RS485 B	The RS485 communication interface is used for parallel communication between batteries.
6	Display screen	Display battery operating status.

7	Reset switch	Press the switch and the battery system turn on. When the battery is in the non use state such as storage, transportation etc., it need to be turn off by switch button, and the battery system will automatically sleep after the device without external load power.
8	Main switch	Open or cut off the main circuit, and ensure transportation safety after cutting off.

2.4 Battery Management System (BMS)

2.4.1 Voltage Protection

Discharging Low Voltage Protection

When the voltage of any battery cell falls below the rated protection value or the total voltage drops below 40V during discharging,the over-discharging protection is triggered, and the battery buzzer sounds an alarm. The battery system then stops supplying power to the outside. Once the voltage of eachcell recovers to the rated value and the totalvoltage rises above 43.2V, the protection is released.

Charging Over Voltage Protection

When charging, the system stops charging when the total voltage of the battery pack is higher than 57.6V or the voltage of any single cell reaches the protection value. When the total voltage returns to below 56.8V and the cell voltage returns to below the rated protection value, the protection is released.

Safety Precautions

2.4.2 Current Protection

Over Current Protection in Charging:

When the charging current is greater than the protection value, the battery buzzer alarms and the system stops charging. After the system delays the rated me for 1 min, the protection is released.

Over Current Protection in Discharging:

When the discharging current is greater than the protection value, the battery buzzer alarms and the system stops discharging. After the system delays the rated me for 1 min, the protection is released.

⚠ Note

The buzzer sound alarm setting can be manually turned off on the background software, and the factory default is on.

2.4.3 Temperature Protection

Less/Over Temperature protection during charging:

When the battery temperature exceeds the range of 0°C to +60°C during charging, temperature protection starts, device stops charging. The protection is released when it recovers to rated return range.

Less/Over Temperature protection in discharging:

When the battery temperature exceeds the range of -30°C to +60°C during discharging, temperature protection starts, device stops supplying power to the outside. The protection is released when it recovers to rated return range.

2.4.4 Other Protection

Short Circuit Protection:

When the battery is activated from the off state, if a short circuit occurs, the DC circuit breaker will act first. If the DC circuit breaker does not operate, the BMS will start the short circuit protection function and cut off the external voltage output.

Self Shutdown:

When device connects no external loads for over 72 hours, device will dormant standby automatically.

⚠ Caution

The maximum working current of the load which needs to be powered should be less than the maximum discharge current capacity of the battery system.

3 Installation and Configuration

3.1 Preparations for installation

Safety Requirement

This system can only be installed by personnel who have been trained in the power supply system and have sufficient knowledge of the power system.

The safety regulations and local safety regulations listed below should always be followed during the installation.

- All circuits connected to this power system with an external voltage of less than 48V must meet the SELV requirements defined in the IEC60950 standard.

- If operating within the power system cabinet, make sure the power system is not charged. Battery devices should also be switched off.

- Distribution cable wiring should be reasonable and has the protective measures to avoid touching these cables while operation power equipment.

- When installing the battery system, must wear the protective items below:


The isolation gloves


Safety goggles


Safety shoe

3.1.1 Environmental requirements

Working temperature: -30°C~+60°C

- Charging temperature range is 0°C~+60°C

- Discharging temperature range is -30°C ~+60°C

Humidity: UP to 90% (non-condensing)

Elevation: no more than 4000m

Operating environment: Indoor or outdoor installation, sites avoid the sun and no wind, no conductive dust and corrosive gas.

And the following conditions are met:

- Installation location should be away from the sea to avoid brine and high humidity environment.

- The ground is flat and level.

- There is no flammable explosive near to the installation places.

- The optimal ambient temperature is +15°C~+30°C.

- Keep away from dust and messy zones.

3 Installation and Configuration

3.1.2 Tools and data

Hardware tool
Tools and meters that may be used are shown in table 3-1.

Table 3-1 Tool instrument

Name	
Screwdriver (word, cross)	AVO meter
Wrench	Clamp meter
Inclined pliers	Insulating tape
Needle nose pliers	The thermometer
Clip forceps	Wrist strap
Wire stripper	AVO meter
Electric drill	Tape

3.1.3 Technical preparation

Electrical interface check

Devices that can be connected directly to the battery can be user equipment, power supplies, or other power supplies.

· Confirm whether the user equipment, the PV equipment or other power supply equipment has the DC standby interface, and measure whether the output voltage of the standby interface meets the requirements of the voltage range of table 2-2.

· Verify that the maximum discharge current capacity of the user equipment, the PV equipment or other power supplies, the DC standby interface, and the maximum discharge current shall be greater than the maximum charging current of the products used in table 2-2.

· If the user equipment DC prepared interface maximum discharge capacity is less than the maximum charging current products using table 2-2, the user interface should have the power equipment of DC current limiting function, give priority to ensuring the normal work of user equipment.

The security check

· Firefighting equipment should be provided near the equipment, such as portable dry powder fire extinguisher.

· Automatic fire fighting system shall be provided for the case where necessary.

· No flammable, explosive and other dangerous articles and placed beside the battery.

3.1.4 Technical preparation

· When the equipment arrivals at the installation site, loading and unloading should be carried out according to the rules and regulations, so as to prevent from being exposed to sun and rain.

3 Installation and Configuration

- Before unpacking, the total number of packages shall be indicated according to the shipping list attached to each package, and the case shall be checked for good condition.
- In the process of unpacking, handle with care and protect the surface coating of the object.
- Open the package, the professional installation person should read the technical documents, verify the list, according to the configuration table and packing list, ensure objects are complete and intact. If the internal packaging is damaged, it must be inspected and recorded in detail.

Packing list is as follows:

		
Battery ×1	Power cable ×2	Communication cable
		
Protective cover ×1	M6×1	M4×2
		
User manual ×1	ground wire×1	

3 Installation and Configuration

3.1.5 Engineering coordination

Attention should be paid to the following items before construction:

· Powerline specification.

· The power line specification shall meet the requirements of maximum discharge current for each product.

· Mounting space and bearing capacity.

· Make sure that the battery has enough room to install, and that the battery rack and bracket have enough load capacity.

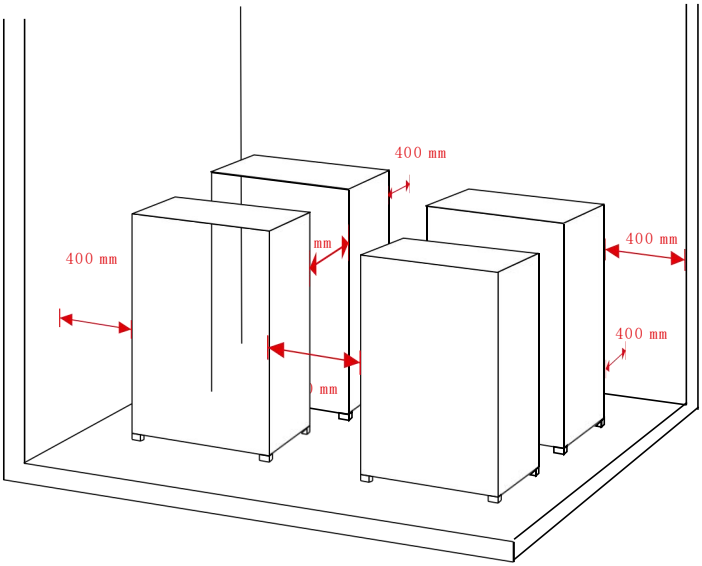
· Wiring.

· Make sure the power line and ground wire are reasonable. Not easy to short-circuit, water and corrosion.

3.2 Equipment installation

Δ Strongly recommended: floor installation;

Mounting space requirements:



3 Installation and Configuration

Table 3-2 Installation steps

Step 1	System outage	Ensure that the battery is in a shutdown state
Step 2	Electrical installation	1. Connect the ground cable
		2. Electrical installation
		3. Connect inverter
		4. Communication interface connection
Step 2	Mechanical installation	Install protective cover

3.3 Installation

1.Use an M6 screw to fix one end of the ground Cable.

2.Connect the battery to the communication cable and power cable.

3 Installation and Configuration

3. Use M4 screws to fix both sides of the protective cover.

3 Installation and Configuration

3.3.1 Electrical installation

Before connecting the power cables, using multi meter to measure cable continuity, short circuit, confirm positive and negative, and mark well the cable labels.

Measuring methods:

· Switch off cables: select the buzzer and use the probe to measure the ends of the same color cable. If the buzzer calls, it means the cable is available.

· Short circuit judgment: choose multi meter resistor file, probe the same end of positive and negative pole, if the resistor shows infinity, means that the cable is available.

· After visual testing of power line is connected well, the positive and negative poles of the battery shall be connected respectively to the positive and negative poles of another device.

Connected inverter

⚠ Note

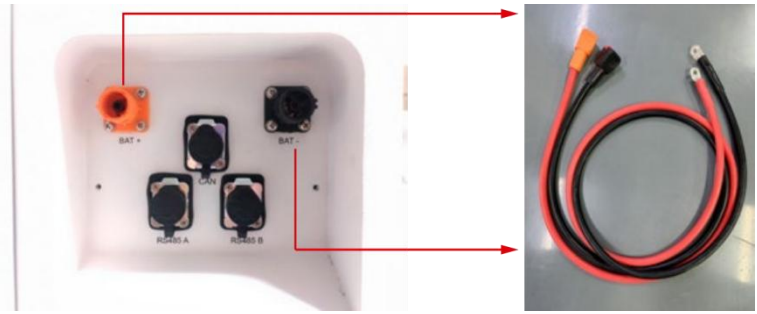
If there is any question during installation, please contact your dealer to avoid damage to the equipment.

· The battery is connected to the inverter, and it is required to use the dedicated power cable and communication cable (as accessories shipped with the cargo, the standard communication cable is a standard network cable. The applicable inverter is marked on the label of the network cable. If the inverter used by the customer is not covered by the standard communication cable, please contact us for the correct PIN Sequence).

· Keep the battery system at power off state, connect the power cable to the interface on the input side of the inverter first, and then connect the power cable to the interface on the battery side.

· The battery output interface is a quick connector, and the power cable (Positive, Negative) plug can be directly inserted into the battery socket. The power cable has a cross section of 50mm².

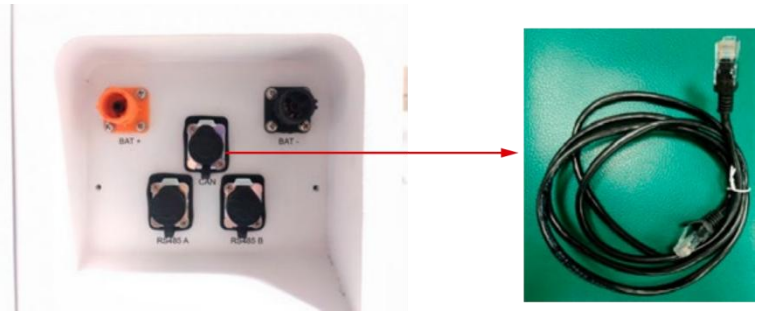
3 Installation and Configuration



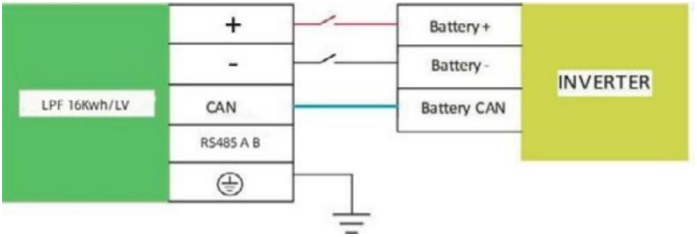
Communication port interface

Connect the CAN Cable of the battery to the CAN communication interface of the inverter using the RJ45 cable.

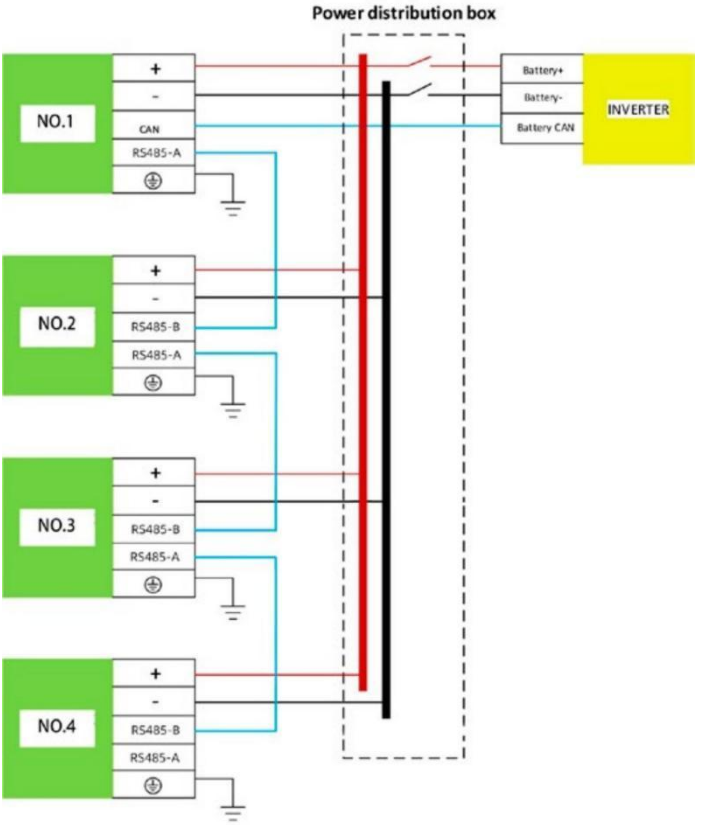
Factory default CAN communication mode.



3 Installation and Configuration



Wiring diagram



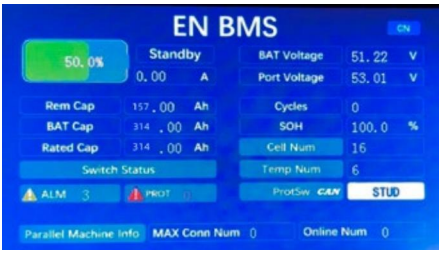
Parallel Connection Diagram of Batteries
A maximum of four batteries can be connected in parallel.

4 Use, maintenance and troubleshooting

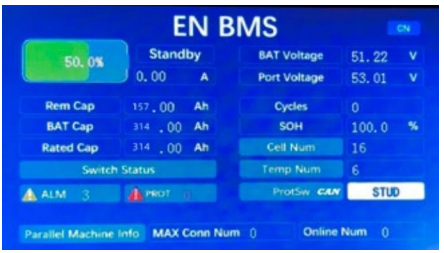
4.1 Battery system usage and operation instructions

After completing the electrical installation, follow these steps to start the battery.

- Press the switch, and the screen will light up (4.1.1).
- If the battery is not connected to the inverter, the screen will display 0A (4.1.2).
- If the battery is connected to the inverter, the screen will display the current (4.1.3).



4.1.1



4.1.2

4.1.3

4 Use, maintenance and troubleshooting

· close the circuit breaker switch. Use a voltmeter tomeasure whether the voltage across the BAT+/ BAT - terminals of the inverter is greater than 42V, and check whether the voltage polarity is consistent with the input polarity of the inverter. If the voltage across the terminals BAT+ /BAT- of the inverter is greater than 42V, at this time the battery has begun to work normally.

· After confirming that the battery output voltage and polarity are correct, turn on the inverter.

· Check whether the indicator light of the inverter and the battery connection (The communication indicator and the battery access status indicator.) is in normal condition. If normal, the connection between the battery and the inverter is completed. If there is an abnormity in the indicator light, please check the reason or contact the local dealer with the inverter manual.

4.2 Display screen operation

4.2.1 Main Page

After powering on and activation, the battery management interface will be displayed, as shown in the figure below:

After powering on and activation, the battery management interface will be displayed, as shown in the figure below:

1) Touch 

Switch to Chinese,Touch 

Switch to English

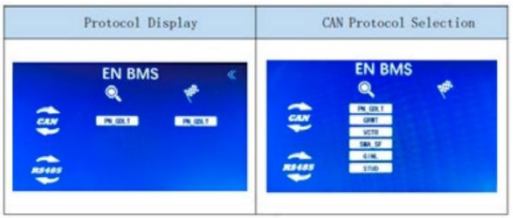
4 Use, maintenance and troubleshooting

4.2.2 Protocol Switching Page

1) Touch on the main page 

2) Touch 

to enter the protocol switching, As shown in the figure below:



3) Select the corresponding CAN protocol to automatically return to the previous interface.

4.2.3, Battery Status Interface

Touch on the main page  / 

Enter the Alarm and Protection Details page, as shown in the figure below:

4 Use, maintenance and troubleshooting

4.3 Alarm description and processing

4.3.1 After starting the battery, The following Alarms and protections that may appear on the lithium battery screen:

4.3.1Main Alarms and Protections

Alarm	
Total Volt H-Volt ALM	CHG H-TempALM
CHG L-TempALM	DSG H-TempALM
DSG L-TempALM	AMB H-TempALM
AMB L-TempALM	Power H-TempALM
CHG OC ALM	DSG OC ALM
Rem CapALM	Cell LV Charging Ban
Current Cal NotD	Zero Cal NotD
Calendar Not Syn	
Protection	
Tempe Sensing Fail	Key switch Fail
Diff cell Volt Fail	Individual cell high voltage alarm
Mon OV PROT	Total OV PROT
Total UV PROT	CHG OT ALM
CHG UT PROT	DSG OT PROT
DSG UT PROT	AMB OT PROT
AMB UT PROT	Power OT PROT
Cell Low Temp Heat	Secondary Trip PROT
Transient OC PROT	Out Shorts PROT
Transient OC Lockout	Transient OC Lockout
CHG HV PROT	Reserve Cap PROT
Diff cell Volt Fail	Out connection Fail

4 Use, maintenance and troubleshooting

4.3.2 Alarm and countermeasure without affecting the output of the system

If the battery experiences issues such as overvoltage protection, undervoltage protection, overcurrent protection, overtemperature protection, short circuit protection, and cell balancing protection, please refer to the 4.3.2 table for troubleshooting.

4.3.2 Problem Analysis and Solution

Problem	Cause	Countermeasure
Over voltage Protection	The battery voltage exceeds the preset maximum safe voltage.	· Check if the charger is working properly and if there is any overcharging. · Ensure that the charging voltage matches the battery's rated voltage. · Stop charging, check if there is any fault with the battery or BMS (Battery Management System), and replace the battery if necessary.
Under voltage Protection	The battery voltage is below the preset minimum safe voltage.	· Check if the charger is working properly and if there is any overcharging. · Ensure that the charging voltage matches the battery's rated voltage. · Stop charging, check if there is any fault with the battery or BMS (Battery Management System), and replace the battery if necessary.
Over current Protection	The battery output current exceeds the preset safe current limit.	· Ensure that the load device does not exceed the battery's rated output capacity. · Check the battery connections and device interfaces for any short circuit or poor contact. · Stop using the battery, recheck the connections between the battery and the device, and fix any issues.
Over temperature Protection	The battery or its management system temperature is too high.	· Immediately stop charging or discharging, and ensure the battery is in a cool environment. · ensure there are no external heat sources Check the battery's heat dissipation and affecting the battery. · If the temperature remains too high, check if the battery is damaged, and it may need to be replaced.
Short Circuit Protection	The battery experiences a short circuit, causing excessive current.	· Disconnect the battery from the device to prevent further damage. · Check the battery and circuit wiring to ensure there is no short circuit. · If the battery is damaged, it should be replaced promptly.

Cell Balancing Protection	There is a large voltage difference between individual cells in the battery pack.	· This protection is usually automatically adjusted by the BMS and does not require manual intervention. · If cell balancing protection occurs frequently, it may indicate that some cells in the battery pack are aging faster. Check the health of individual cells or consider replacing them.

General Recommendations:

Regular Maintenance: Regularly check the battery's health and charging status to ensure that the device is not damaged due to over-discharge or overcharging.

Use Certified Equipment: Ensure that you use the original or certified chargers and equipment to avoid battery damage caused by unstable voltage or overload.

Environmental Temperature Management: Avoid using the battery in high or extremely low-temperature environments, as this can affect the battery's performance and lifespan.

5 Bluetooth APP connection guide

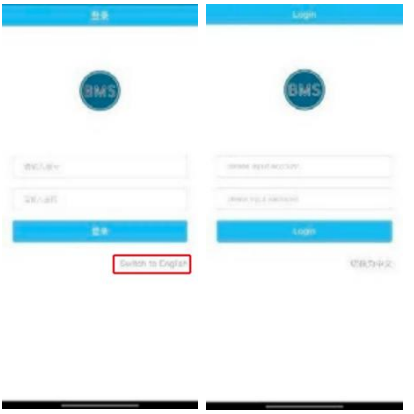
5.1 Android and iOS software download and installation

Android system	https://www.pgyer.com/1a8ce42e6c1a9f2d37dcaa6a790e40c2 Open the webpage using WeChat or a browser, scan the QR code on the webpage for download and installation.
QR code	After downloading the APK file, click on 'Install'
Latest version	V1.0.17
iOS system	Search for "EN BMS" in the Apple Store (note the space in the middle)
Search interface	

5.2 User login

illustrate	1. Click on the app icon to open the app, click "English" to directly switch to the English interface, as shown in Figure 5.2.1 2. Enter username and password (default username: admin, default password: 111111) 3. Click on 'Login' Steps 1-3 are detailed in Figure 5.2.2

5 Bluetooth APP connection guide

Login interface	

5.3 Device Connection

illustrate	1. As shown in Figure 2.3.1, after the user logs in, the "Device" interface will display the device name found. -Single machine: BP00 is displayed due to all dialed addresses of the single machine being 0 -Parallel connection: To avoid user connection errors, only the host address BP00 is displayed; The parallel switching operation can be switched on the main page -status bar 6 after entering the app system 2. As shown in Figure 2.3.2, click on "Device BP00" to connect the phone to the battery Bluetooth module. 3. In some cases, due to the possibility of the on-site signal being blocked and the Bluetooth signal being unstable, please click on "Re search for devices" to refresh the "Devices" list.
Connection interface	 5.3.1 5.3.2

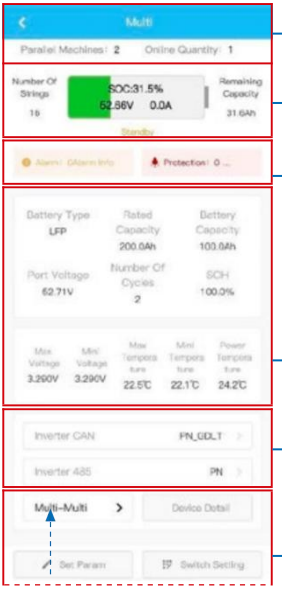
5 Bluetooth APP connection guide

5.4 Display of APP main interface

illustrate	1. Display the main interface, which can be used to display single machine and parallel machine information. 2. Single machine mode can be selected: BP00 (host), BP01~BP15 (slave); Status bar 6 displays "Parallel BPxx" 3. When in parallel mode, status bar 6 displays "Parallel Parallel" 4. In parallel mode, status bars 1-4 display summary data for parallel operation; The protocol type displayed in status bar 5 is the connection between the host BP00 and the inverter; Status bar 6 is grayed out for "Device Details"/"Configuration Parameters"/"Switch Settings", and cannot be displayed or configured except for the parallel status. 5. In single machine mode, the status bars 2-5 are all selected single machine data; Status bar 6 displays the selected single machine number, "Device Details", "Configuration Parameters", and "Switch Settings"; Its "configuration parameters" and "switch settings" can be viewed and modified.

5 Bluetooth APP connection guide

main interface



5.4.1

5.4.4

Status bar 1:
Single machine/parallel machine status display; Bluetooth connection status display

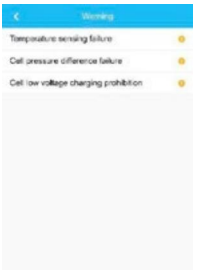
Status bar 2:
Battery string number, SOC, battery voltage, charging and discharging current, remaining capacity display, battery working status (charging, discharging, standby)

Status bar 3:
Alarm and protection item statistics, click to view details. The alarm details are shown in Figure 5.4.2; For protection details, see 5.4.3; Click on the specific alarm/protection entry to display information such as the occurrence time

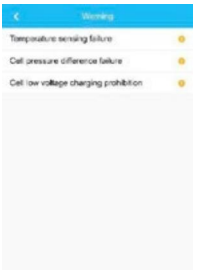
Status bar 4:
Display of basic battery information; Display single machine information during single machine operation and parallel machine statistics during parallel machine operation

Status bar 5:
Inverter Connection Protocol Display and Settings
-CAN: Supports 6 mainstream options and 10 protocols
-485: Supports 5 different RS485 protocols

Status bar 6:
Parallel/single machine display and master-slave switching, as shown in Figure 5.4.4
Device details: Single machine mode (highlighted) can display battery pack details Click to view the details, as shown in Figure 5.4.5
Configuration parameters: Single machine mode (highlighted) can display/configure battery pack parameters Click to view the details, as shown in Figure 5.4.6
Switch setting: Single machine mode (highlighted) can set the battery pack switch Click to view the details, as shown in Figure 5.4.7

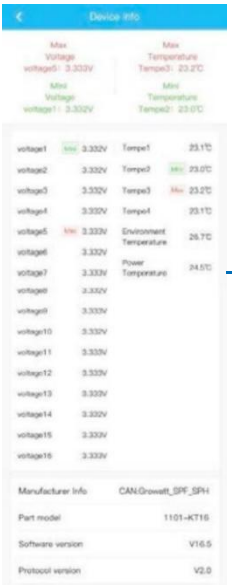


5.4.2



5.4.3

5 Bluetooth APP connection guide



5.4.5

1. Display the highest/lowest voltage of the battery cell, and all battery cell voltages

2. Display maximum/minimum temperature, all temperatures

3. Display Manufacturer information:
   CAN or RS485 communication, protocol name with inverter Component model: Customer board model Software version: BMS software version Protocol version: Communication protocol version between BMS and APP

5.4.6-1

1. In single machine mode (see Figure 5.4.4 for details of parallel/single machine mode switching), click "Edit" (Figure 5.4.6-1), enter password 111111 (Figure 5.4.6-2) to set configuration parameters, and click Save (Figure 5.4.6-3)

2. After clicking "Save", the system will prompt "Confirm modification". After confirmation, the newly modified parameters will be automatically issued to the BMS board for

5.4.6-2

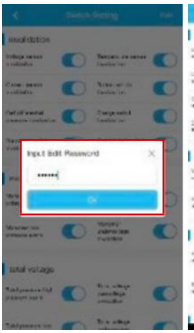
5.4.6-3

5 Bluetooth APP connection guide

1. In single mode (see Figure 5.4.4 for details of parallel/single mode switching), click "Edit" (Figure 5.4.7-1), enter password 111111 (Figure 5.4.7-2) to modify the function switch, and click Save (Figure 5.4.7-3)

2. After clicking "Save", the system will prompt "Confirm modification". After confirmation, the newly modified parameters will be automatically issued to the BMS board for execution

5.4.7-1

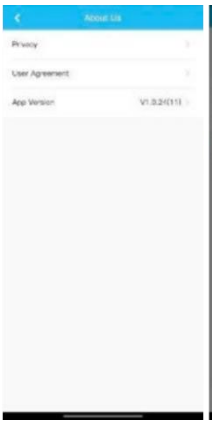
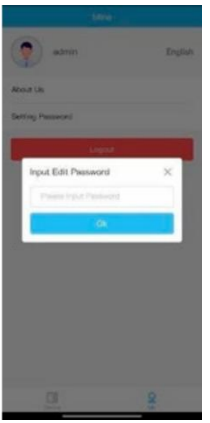


5.4.7-2

5.4.7-3

5 Bluetooth APP connection guide

5.5 Other interface displays

illustrate	1. Display "About Us" and "Change Password" and log out, as shown in Figure 5.5.1 2. Click on 'About Us', as shown in Figure 5.5.2 3. Click on "Change Password" to modify the login password. Clicking 'Finish' will automatically complete the modifications
screenshot	   5.5.1 5.5.2 5.5.3