AF5000W-LP Series Operation Manual



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The material furnished in this manual is believed to be accurate and reliable. The information and recommendations in this manual do not constitute commitments or warranties in the form of assignments. The information in this document is subject to change without notice.

This manual mainly describes the product information, guidelines for installation, operation, maintenance and troubleshooting. And this manual applies to the AF5000W-LP system, including the hybrid inverter. Please keep the Manual properly and operate in strict accordance with all safety and operating instructions in this manual. Please do not operate the product before reading through the manual.

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This manual introduces AF5000W-LP system and hybrid inverter manufactured by our company. Please read this manual before you install the product and follow the instructions carefully during the installation process. Our company shall not be liable for any consequences resulting from the violation of the storage, transportation, installation, and operation regulations outlined in this document. Should you have any confusion, please contact our company for advice and clarification.

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1 Introduction

1.1 Content and Structure of this Manual

This manual is valid for AF5000W-LP Series Energy Storage System.

This manual describes the product information, and guidance for installation, as well as Inverter operation.

Observe all manual that accompanies the product, keep them in a convenient place and available at all times.

Illustrations in this manual are reduced to the essential information and may deviate from the real product.

1.2 Target Group

This manual is intended for qualified persons and end users. Only qualified persons are allowed to perform the operations marked with a warning symbol in this manual. Tasks that do not require any specific qualifications will not be marked and can be performed by the end user. Qualified persons must have:

- ➤ Knowledge of working principle of Li-ion battery.
- Knowledge of how to deal with the dangers and risks associated with installing and using electrical devices, batteries and systems.
- > Knowledge of the installation and commissioning of electrical devices and systems.
- ➤ Knowledge of the applicable standards and directives.
- ➤ Understood and complied with this document, including all safety precautions.
- ➤ Understood and complied with the documents of the battery and inverter manufacturer, all safety precautions included.

1.3 Levels of Warning Messages



DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



NOTICE indicates a situation which, if not avoided, can result in property damage.

1.4 Marks

1	Warning electric shock.	A Contract	Do not operate until 10 minutes after discharge
	Warning Fire		Read the product and operation manual before operating the battery system!
	Do not reverse connect the positive and negative	CE	CE mark
	Do not place near open flame	3	Recyclable
	Do not place at the children or pet touchable area	(Grounding

1.5 Definition of Abbreviations and Nouns

Abbreviation	Noun
AC	alternating current
BAT	battery
BMS	battery management system
DC	direct current
INV	inverter
PV	photovoltaic
SOC	state of charge
SOH	state of health

2 Safety Instruction

This product is designed and tested in accordance with international safety requirements CE and UN38.3, but as with all electrical and electronic equipment, certain precautions must be observed when installing and operating the product. To reduce the risk of personal injury and ensure the safe installation and operation of the product, more attention should be paid on following all instructions, cautions and warnings in this Manual.

2.1 Battery precautions



It is important and necessary to read the user manual carefully before installing or using battery. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death, or can damage battery, potentially rendering it inoperable.

- When the storage time is less than three months, it is recommended to store at a temperature of 0-45 °C, ≤ 90% RH, and an SOC range of 20%-50% SOC. When the storage time is more than three months, it is recommended to store at a temperature of 15-30 °C, ≤ 90% RH, and an SOC range of 20%-50% SOC. When the storage time exceeds 6 months, it is necessary to adjust the SOC of the battery cell to 20- 50% SOC, ≤ 90% RH, and the recommended storage temperature is 5°C-25 °C.
- ➤ High SOC (>50% SOC) storage is not allowed during storage, and full charge storage is prohibited.
- ▶ Battery needs to be recharged within 12 hours after being fully discharged.
- ➤ Do not have the product installed in any environment that falls outside the range of temperature or humidity set out in the Manual.
- All the power terminals must be disconnected for maintenance.
- Please contact the supplier within 24 hours in case of anything abnormal.
- ➤ Do not use cleaning solvents to clean battery.
- Do not expose battery to flammable or harsh chemicals or vapors.
- Do not paint any part of battery, include any internal or external components.

- > Do not connect battery with PV solar wiring directly.
- Any foreign object is prohibited to insert into any part of battery.
- The warranty claims are excluded for direct or indirect damage due to above reasons.
- Recycle batteries in accordance with local regulations.

2.2 Emergency situation



This product is designed with multiple safety strategies to prevent hazards resulting from failure. However, hazards and dangers could emerge in few uncertain situations.

Fire

The battery PACK may catch fire when heated over 150°C.

Ensure an ABC or carbon dioxide extinguisher nearby the battery, and do not use water to extinguish the fire.

If a fire breaks out where the battery is installed, perform the following actions:

- Extinguish the fire before the battery catches fire.
- ➤ If the battery has caught fire, do not try to extinguish the fire. The fired battery will produce poisonous gases, please evacuate people immediately.

Leaking

If the battery PACK leaks, avoid contact with the leaking liquid or gas.

Electrolyte is corrosive and contact may cause skin irritation and chemical burns. If one is exposed to the leaked substance, perform the following actions:

Inhalation: Evacuate the contaminated area and seek medical attention immediately.

Eyes contact: Rinse eyes with flowing water for 15 minutes and seek medical attention immediately.

Skin contact: Wash the affected area thoroughly with soap and water and seek medical attention immediately.

Ingestion: Induce vomiting as soon as possible and seek medical attention immediately.

Wet battery

If the battery is wet or submerged in water, do not try to access it. Contact customer service for technical assistance.

Damaged battery

Damaged battery may emit toxic gas or/and flammable gas, which could cause hazards to lives or property. If the battery is damaged, please keep away from the battery and contact

customer service for help as soon as possible.

3 System Introduction

3.1 Parameters of energy storage system

Product Name	Rechargeable Li-ion Battery System				
Battery Module	AF5000W-LP				
Total Energy (kWh)	5.22				
Usable Energy (kWh)*	4.96				
Voltage Range (Vd.c)	44.8~57.6				
Rated Capacity (Ah)	102				
Nominal Voltage (V)	51.2				
Charging Voltage Declared by Manufacturer (V)	57.6				
Nominal Charging Current (A)	60				
Nominal Discharge Current (A)	60				
V _{trip} : The Trip Voltage of Overcharge Protection Voltage Control (V)	58				
V _{trip} : The Trip Voltage of Over-discharge Protect (V)	44				
T _{trip} : The Trip Temperature of Overheating Protection(°C)	57				
DOD (%)	95%				
Communication Interface	CAN/RS485				
Max Parallel Quantity	6				
Power Heating Film(Optional) (W)	130				
Display Screen	LED				
Dimension(L*W*H) (mm)	(680±2)*(480±2)*(180±2)				
Net Weight (kg)	(45±3)				
Operating Condition	Indoor				
L					

Storag	ge Temperature Range	0°C∼35°C				
Operating	Charging	0~55 °C				
Temperature	Discharging	-15~55 °C				
	Humidity	15% ~ 85%RH(No Condensation)				
	Cooling Type	Natural Cooling				
IP I	Rating of Enclosure	IP66				
Heating F	Film Power(W)(Optional)	130				
	Configuration	16S				
C	lass of Protection	Class I				
In	stallation Method	Wall-mounted or floor-standing				
Si	upply Connection	Fixed power cord				
Au	nthentication Level	IEC62619/IEC63056/IEC62040 /ENICE61000-6-1/ENICE61000-6-3 /UN38.3/MSDS				

^{*}Testing conditions based on temperature 25°C at the beginning of life. Total Energy/Usable Energy are measured with a standard test method: 0.2C Charge and Discharge. As per the characteristics of lithium batteries, such parameters as the charge/ discharge current and efficiency listed above are subject to change. The final right of interpretation is reserved our company.

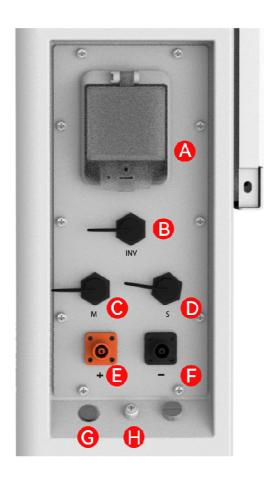
3.2 Product Appearance





3.3 Battery Interface Instruction

All the ports and indicators are shown in the Fig. below and detailed in the following table.



Object	Name	Description
A	Breaker	Breaker switch
В	INV	Communication port to inverter
С	M	Parallel signal output port/Upper computer port
D	S	Parallel signal input port
Е	P+	Battery output anode
F	P-	Battery output cathode
G	ON/OFF	The switch of the battery
Н	GND	Ground protection

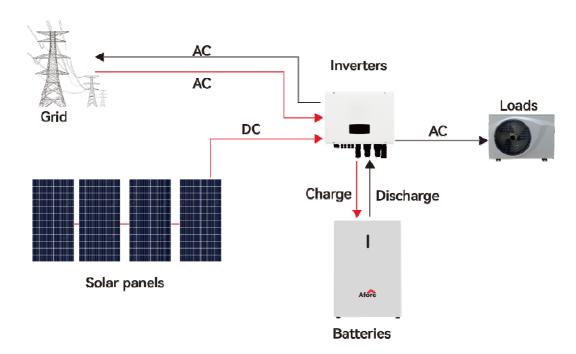
^{1:} Open the circuit breaker waterproof cover A, switch the circuit breaker to ON, and then press the button switch B to light it up, the battery system successfully started.

^{2:} Switch the circuit breaker to OFF, the battery system is closed.

- 3: The red light keeps flashing when fault occurs, such as overcharge, over-discharge, over-current, as well as over high/low temperature, etc.
- 4: The green light flashes slowly when the battery runs normally. The green light flashes quickly when turning on or off.

3.4 Application scenario

The AF5000W-LP series energy storage system(includes inverter and battery AF5000W-LP) are designed to increase energy independence for homeowners. Energy management is based on time-of-use and demand charge rate structures, significantly reduce the amount of energy purchased from the public grid and optimize self-consumption. The system can be applied in DC-coupled systems and Off-grid (with Generator) systems.



3.5 Features

- •The battery is non-toxic, pollution-free and environmental-friendly.
- •Anode material is made from LiFePO₄ with safety performance and long cycle life.
- •BMS has protection functions including over-discharge, over-charge, over-current and high/low temperature.
- •Flexible configuration, multiple battery modules can be connected in parallel to increase storage energy.

4 Installation

4.1 Tools and safety gear

The displayed tools are recommended and could be used in the installation of batteries and hybrid inverter. And the safety gear should be worn correctly during installation.

During operation, consider that the noise emitted based on the environment could possibly exceed the legal thresholds (less than 70 dB), therefore, suitable ear protection must be worn.



4.2 Package Items

Unpacking

On receiving the products, please check to make sure the packing and all components are not missing or damaged. Please contact your dealer directly for supports if there is any damage or missing components.

A. Battery pack



B. Wall-mounting brackets*2



C. Mounting plate*1



D. Mounting bolts



E. Power cables to inverter *2 - (Optional; used to be connected Master battery to Inverter or parallel connection)



F. RJ45 communication cable to inverter *1- (Optional; used to be connected Master battery to Inverter)



G. Ground wire *1 - (Optional; used for earthing of Master battery or parallel connection)



H. User Manual and Warranty Card



4.3 Installation Locations

Make sure that the installation location meets the following conditions:

- The area is completely waterproof;
- The floor is flat and level;
- There are no flammable or explosive materials nearby;
- The ambient temperature is within the range from 0°C to 50°C;
- The temperature and humidity are maintained at a constant level (15%-85% (RH) no

condensed water);

• There is minimal dust and dirt in the area;

• The distance from heat source is more than 2 meters;

• The distance from air outlet of inverter is more than 0.5 meters;

• The installation areas shall avoid of direct sunlight;

• There are no mandatory ventilation requirements for battery module, but please avoid of

installation in confined area. The aeration shall avoid of high salinity, humidity or

temperature.

• According to the on-site situation, the equipment should be fixed to the wall during

installation against the wall.



If the ambient temperature is out of the operating range, the battery stops operating to protect itself. The optimal temperature for the battery pack ranges from 10°C to 40°C. Frequent

exposures to harsh temperatures may deteriorate the performance and life of the batter

4.4 Requirements on Batter Supporter

1)The supporter shall be made from noncombustible materials and must be fire resistant;

2)The supporter shall be solid and strong enough to withstand the weight of batter system;

3)During installation, the batter shall be close to wall. Wall-mounting bracket shall be used

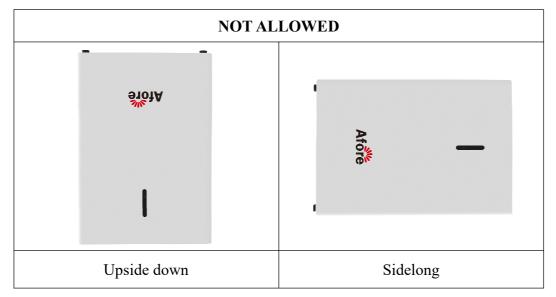
to keep the batter from falling down.

4.5 Installation Direction

Recommended:







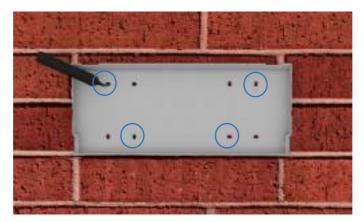
4.6 Single Batter Installation

4.6.1 Wall Mount

Step 1: Fix the wall-mounting bracket to the back side of the batter with 6 cross recessed outer-hexagonal combination screws (M6*12); torque requirement: 12N·m.



Step 2: Place the mounting plate tightly against the wall and mark the drilling locations with marker. The holes marked in blue circles are recommended.



Step 3: Put away the wall-mounting plate and drill holes (bore diameter: 8mm, depth: 60mm) with impact drill on the marked locations.



Note: In case that the wall is made of hollow blocks, when the 4 holes as recommended in Step 2 are chosen, while one or two holes are right in hollow block(s), the user may drill new holes around these abandoned ones with the help of the mounting plate.

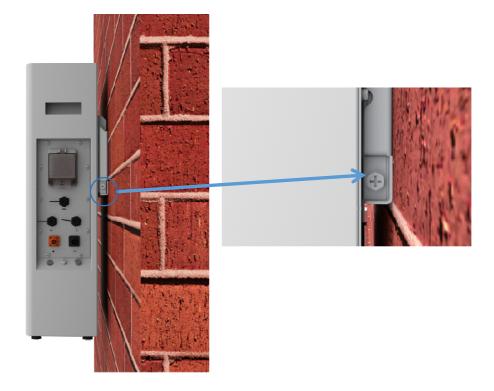
Step 4: Tightly screw the M6 expansion bolts, torque requirement: 8N·m.



Step 5: Hang the batter installed with wall-mounting brackets to the mounting plate fixed on wall.



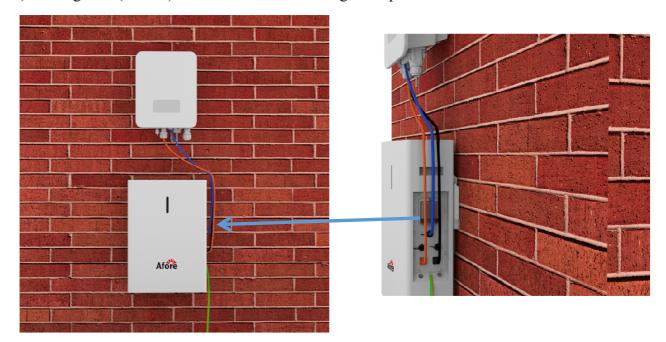
Step 6: Tightly screw the wall-mounting brackets on the mounting plate with 2 cross recessed outer-hexagonal combination screws M6*16. Torque requirement: 12N·m.



4.6.2 System Wiring

- 1)Connect the orange power cable(4AWG) of the batter to the corresponding port of inverter;
- 2)Connect the black power cable(4AWG) of the batter to the corresponding port of inverter;

- 3)Connect the communication cable from INV port to the corresponding port of inverter;
- 4)Earthing wire (6AWG) shall be connected to the ground point of each batter.



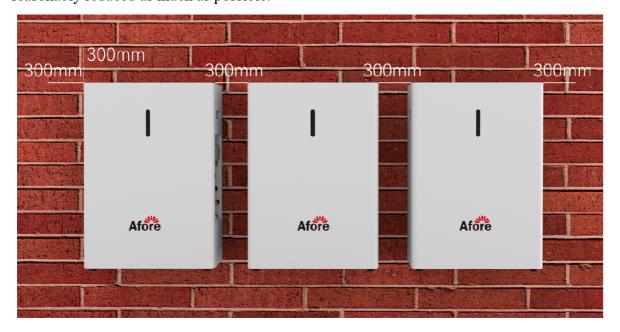
4.7 Parallel Connection

4.7.1 Wall Mount

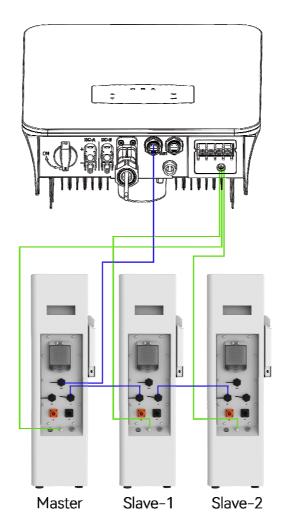
Step 1: Please check the voltage of each batter and make sure the voltage difference is less than 2V.

Step 2: Refer to Steps 1-6 for single batter installation

Step 3: The internal distance between adjacent batteries is a recommended one and shall be reasonably reduced as much as possible.



- 4.7.2 The Connection of Signal Wires for Parallel Connection
- 1) According to the blue line shown in the following figure, connect the communication cable to the M/S communication terminals of adjacent batteries. Connect the RJ45 port marked with S of Master with a communication cable to the RJ45 port marked with M of Slave 1#;Connect the RJ45 port marked with S of Slave1# with a communication cable to the RJ45 port marked with M of Slave 2#. Finally, connect the INV port of the mastert and the communication port of the inverter with a communication cable.
- 2) According to the yellow-green line shown in the following figure, connect the grounding protection points of each PACK with the grounding protection point of the inverter using the yellow green grounding wire.



The Connection of Power Wires for Parallel Connection

1) Connect the positive terminals of each battery to the positive (+) copper busbar of cable junction box using orange cable.

2) Connect the negative terminals of each battery to the negative (-) copper busbar of cable junction box using black cable.





- I. For Australian market, an overcurrent and disconnection device that isolates all live conductors (positive and negative) is required between the battery system and the inverter.
- II. In Australia installations should be conducted in accordance with AS/NZS 3000 and AS/NZS 5139.

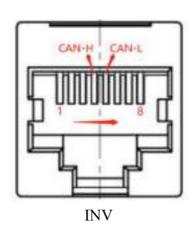
4.8 Definition of communication Port Pin



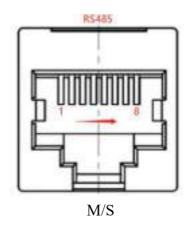
The AF5000W-LP battery is designed to support both CAN and RS485 communication with the inverter. Please verify the communication mode of the inverter and select the corresponding mode of the battery.

Definition of RJ45 Port Pin

Inverter commu	Inverter communication ports-RJ45								
INV									
PIN Number	Definition								
1, 3, 6, 7, 8	NC								
4	CAN-H								
5	CAN-L								
2	GND								



	Parallel communication ports-RJ45										
	M	S									
PIN Number	Definition	PIN Number	Definition								
1	UP_IN	1	DN_OP+								
2	IN_GND	2	OP_GND								
3	RS232_TX	3	NC								
4	RS232_RX	4	NC								
5	RS232_GND	5	NC								
6	NC	6	NC								
7	RS485-A	7	RS485-A								
8	RS485-B	8	RS485-B								





4.9 Power off

Working status indication:

	Normal/		.1		SOC Indicators								
Status	Alarm/	Run	Alm	L6	L5	L4	L3	L2	L1	State			
	Protection	•	•	•	•	•	•	•	•				
Power Off	Hibernate	OFF	OFF	OFF	Total Indicator Runout								
Standby	Normal	Blink 1	OFF According to Battery Indicator				According to Battery Indicator						
	Alarm	Blink 1	Blink 3				Low Voltage						
	Normal	ON	OFF										
Charging	Alarm	ON	Blink 3		According to Battery Indicator (Battery indicator Maximum LED Blink 2)								

	Overcharge Protection	ON	OFF	ON	ON	ON	ON	ON	ON	If Disconnected to City Grid, the Indicator shall turn to Standby Mode		
	Temperature, Over Current, Failure Protection	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Stop Charging		
	Normal	Blink 3	OFF		According to Battery Indicator							
	Alarm	Blink 3	Blink 3									
	Under- voltage protection	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Stop Discharging		
Discharging	Temperature, over current, short circuit, reverse connection, failure protection	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Stop Stop Charging		
Failure		OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Stop Charging and Discharging		

SOC Indicators

Status	Charging						Charging Discharging					
SOC indicators	L6	L5	L4	L3	L2	L1	L6	L5	L4	L3 •	L2	L1
0%~17%	OFF	OFF	OFF	OFF	OFF	Blink 2	OFF	OFF	OFF	OFF	OFF	ON

	18%~ 33%	OFF	OFF	OFF	Off	Blink 2	ON	OFF	OFF	OFF	OFF	ON	ON
SOC (%)	34%~ 50%	OFF	OFF	OFF	Blink 2	ON	ON	OFF	OFF	OFF	ON	ON	ON
	51%~ 66%	OFF	OFF	Blink 2	ON	ON	ON	OFF	OFF	ON	ON	ON	ON
	67%~ 83%	OFF	Blink 2	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON
	84%~ 100%	Blink 2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Running indicator ON							Blink (l	Blink 3)					

Blinking LED Indicators:

Blink Mode	ON	OFF
Blink 1	0.25S	3.75S
Blink 2	0.5S	0.5S
Blink 3	0.5S	1.5S

Switch the circuit breaker to ON, and then press the button switch K to ON, the battery system successfully started.

Press button switch K to OFF, then switch the circuit breaker to OFF, the battery system is closed.

4.10 Maintenance

Annual Inspection

Ever year after installation. The connection of power connectors, grounding points, power cables and screws are to be checked. Make sure there is no loosening, fracture or corrosion at any connection point. Check the installation environment such as dust, water, insect etc. and make sure it is suitable for IP20 batter system.

5.APP configuration and commissioning

5.1 Download our APP

Scan the QR code below to downloads in the App Store.



5.2 APP dynamic permission

Install the APP, click the start button and start smoothly. For the first start, you will request the user to confirm and authorize the following authority: Camera permission: Add WIFI devices in remote control Location permission: search for nearby Bluetooth devices in local control and identify current network information in remote control Equipment status information: to detect the operation status of the equipment Photos and audio: The code scanning interface in the remote control system can directly identify the local photo album.

5.3 Control method

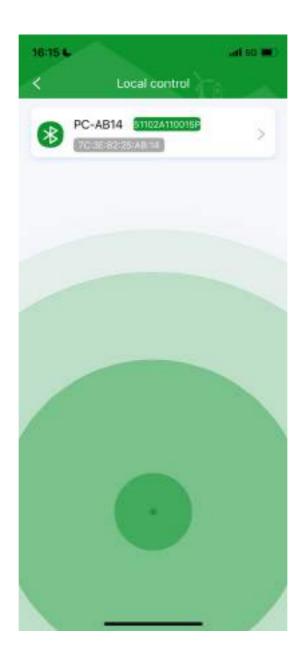
You can select the Local control mode or Remote control mode after the page is displayed.



Local control: BLE Bluetooth communication, directly search for the nearby Bluetooth signal, a pair of continuous connection, control devices, no account login, do not do binding records, that is, ready to use Remote control: WIFI communication, which realizes the purpose of controlling the device rather than in the same geographical location. It requires account registration and login, records the binding between the account and the device, and requires distribution network operation.

5.4 Local Control (BLE)

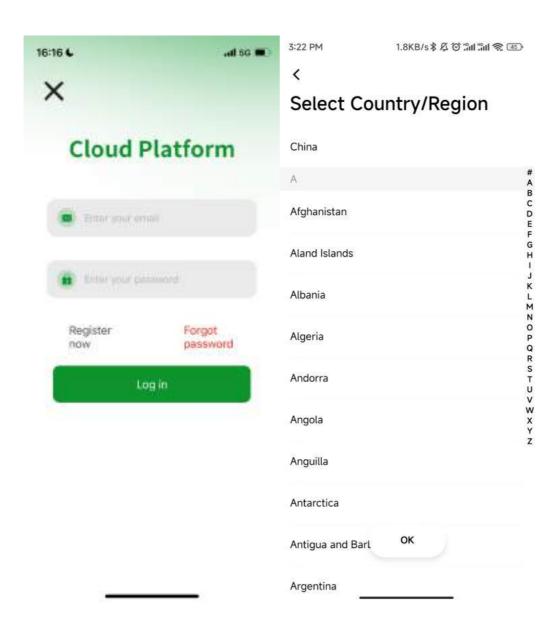
When the device is in the distribution network state, click the local control button to search the device on the local control page, and click the device to enter the device control page.

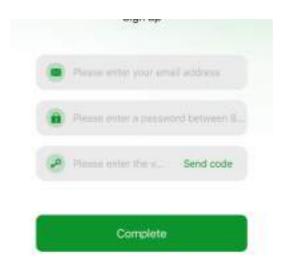


5.5 Telecontrol

5.5.1.Account registration and login

Registration: Create the new account by means of email account, password and verification code. Note: Please select the real country and region according to the actual situation. This is very important. Once selected and created successfully, the devices added through the account distribution network will automatically connect to the server node with the same account Login: Log in with the registered account number and password Forget your password: You can reset your password through your email number.





5.5.2.List of equipment



5.5.3. Equipment added

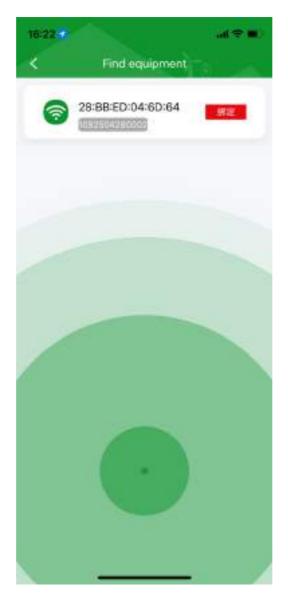
The WIFI module is put back in the factory:

The WIFI module restores the factory so that the device is in a discoverable state:

Long press the reset button 10-13 s, the specific operation of the LED lamp is shown as: long press the button to make the water lamp run one.

5.5.4. Click "Add" and "+" to enter the search page and search for the device

Note: This step requires the phone to open the "Bluetooth", "Positioning" and "WIFI" functions, otherwise the search and subsequent distribution network operation cannot be completed.



5.5.5. Fill in the distribution network information

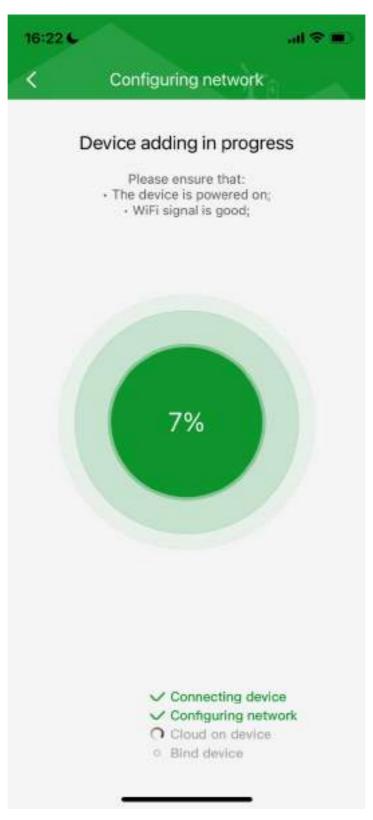
Click the device found in 5.3.2, jump to the distribution network information page, fill in the WiFi account and password of the device to be connected, or change the WiFi. After confirming that the password is correct, click "Next" to enter the distribution network waiting page.

Note: The mobile phone should be connected to the WiFi first, and the module only supports 2.4G WiFi, please identify it by yourself.



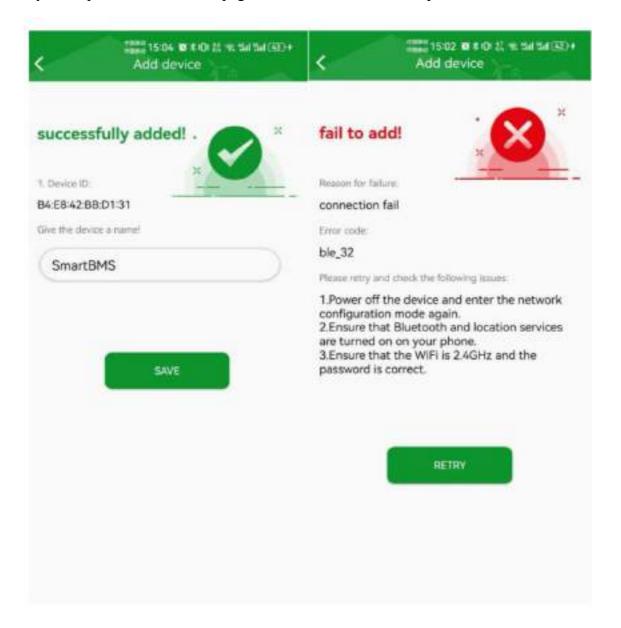
5.5.6. Execute distribution network operation

APP and device will automatically perform "Connect device", "Configure network", "device cloud" and "bind device" operations. Please wait patiently.



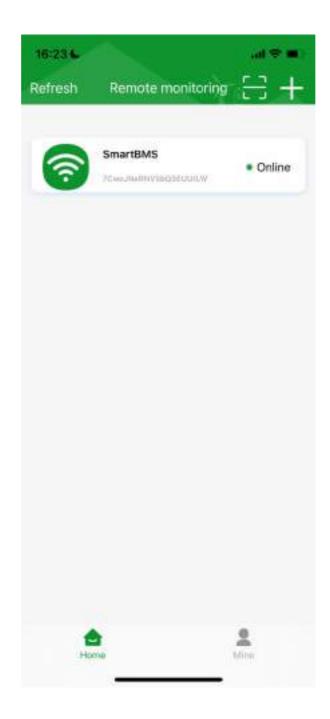
5.5.7. Distribution network results

When the distribution network is over, it will jump to the page, click Save to successfully add and automatically jump back to the device list page; If the network fails, please follow the prompts of the APP, and start from step 5.3.1 after inspection. If the network still fails for many times, please save the error page and contact the after-sales personnel!



5.6.Device editor

Long press the device item, and the edit menu will pop up at the bottom Rename: Modify device nickname to use Delete: unbinding with the device, the next use need to scan the code or add the network.



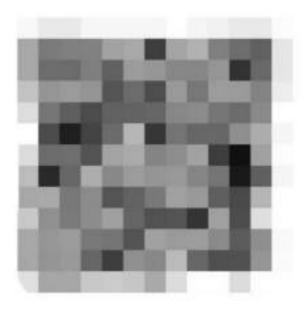
5.7. Device sharing

Long press the device item, when you are the device administrator (the first account bound to the first distribution network), the device can generate a QR code for other users to scan the code to add.

Note: Non-administrators cannot share twice. The QR code generated each time can only be scanned once, and the time of scanning the code is limited (30 minutes).



6iMhoieCoTd04uirodqX

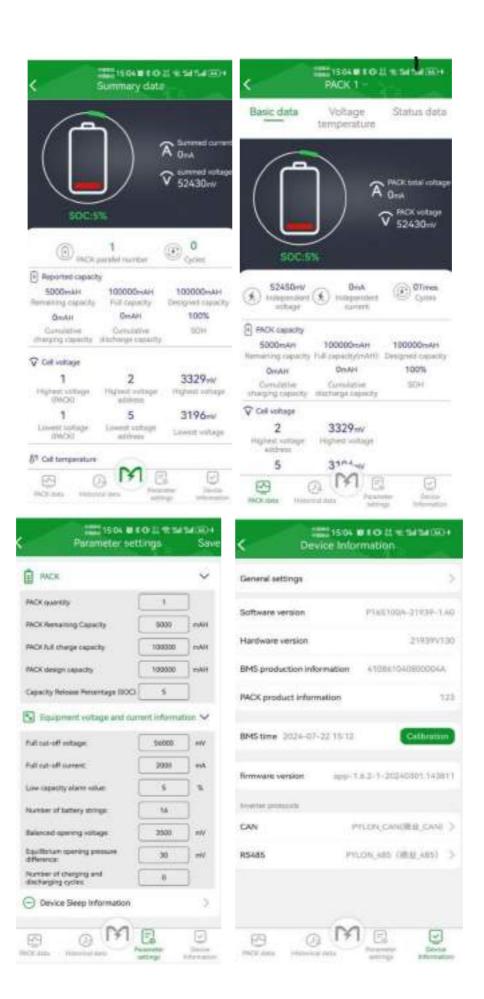


nder. Please ensure that the shared person is in the same r as the account

Save to album

5.8. Device control

According to the functions supported by serial port protocol 0.0.9, except for the protocol itself, the summary interface, basic data, voltage and temperature, state data, historical data, parameter setting, equipment information, general setting, etc.



5.9.OTA upgrade

When there is an updated version of firmware in the background, the APP clicks on a device to pop up the upgrade popup, click upgrade immediately, and the firmware will be upgraded. Click the next time to enter the device parameters display, Settings and other pages.





5.10.Account exit and logout

Account exit: after exit, you can switch to other accounts for login Account cancellation: Once cancelled, all the information and binding relationship of the account will be cleared, and you need to be re-registered next time.

