Man Yi

NEW ENERGY

# LiFePo4 Battery Pack Specification

## MODEL：12.8V560AH(2P4S)

200A JK BMS with Bluetooth

Official Website: https://www.manyinewenergy.com/

https://www.facebook.com/manyinewenergy/

Studio https://www.youtube.com/@manyinewenergy

Instagram https://www.instagram.com/manyinewenergy/

# Preface

Please read this manual carefully and place it in a place where you can easily install, operate, and access it. The safety precautions mentioned in the manual do not represent all safety hazards that can be observed upon arrival, but they are only supplements to the safety precautions. Installation and operation should comply with maintenance equipment, local safety regulations and norms. Only well-trained professionals can install, operate, and maintain equipment.

Our company does not assume any responsibility for the following situations:

1. The design, production, and use of equipment that results in losses due to violations of general safety operation requirements or safety standards.

2. Installation and maintenance personnel must possess high voltage and AC power operation skills. When installing, operating, and maintaining equipment, they must not wear any conductive items such as watches, bracelets, bracelets, and rings, as well as prevent moisture from entering the equipment

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## 1. Links to Our Video；

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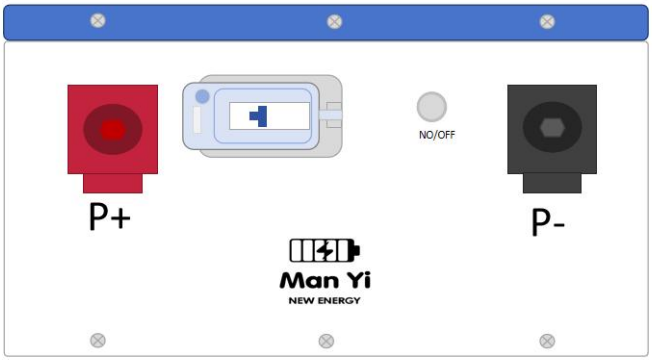
## 2. Product Description

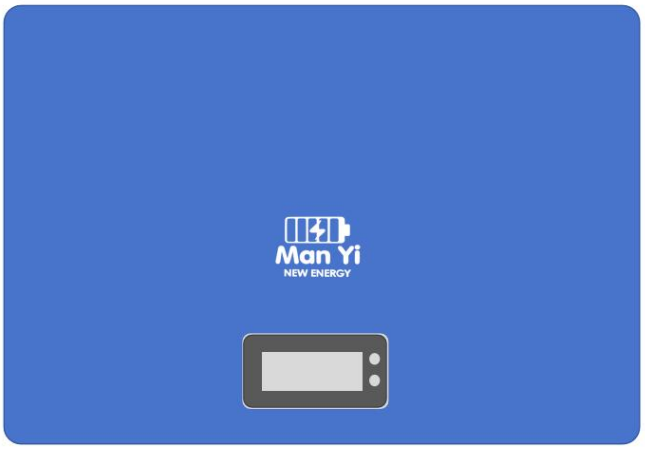
This product is composed of lithium iron phosphate batteries connected in series. Suitable for household energy storage systems. Customizable to meet diverse application scenarios according to customer needs, providing stable electricity for various devices of users.

## 3. Product Advantages

- Built in Battery Management System (BMS): protection functions for overcharging, over discharging, over current, temperature control, short circuit, etc.
- Active balancing function: The battery pack has a built-in voltage balancing function.
- High cost-effectiveness: High safety performance, long service life, stable and reliable quality.
- Wide working temperature: -20 ℃ to 60 ℃, excellent high-temperature discharge performance.
- Convenient: Modular design, easy installation and maintenance.

# 4. Product Rendering



## 5. Product Specifications and Parameters

| Project | specifications |
|---|---|
| Type | LiiFePo4 Battery |
| Model | 12.8V560AH |
| Nominal Voltage | 12.8V |
| Operating Voltage | 10V-14.6VV |
| Nominal Capacity | 560AH |
| Connection Method | 2P4S |
| Charging Cut-off Voltage | 14.6V |
| Discharge Cut-off Voltage | 10V |
| Operation Temperature | 10℃~50℃ |
| Weight | 45KG±1KG |
| Size | 400*410*240mm±1mm |
| Standard Charge Current（A） | 0.2C |
| Maximum Continuous Charging Current（A） | 0.5C |
| Standard Discharge Current（A） | 100A |
| Maximum Continuous Discharge Current（A） | 200A |
| Storage Temperature | 10℃~50℃ |
| Storage Humidity | 10%~90% RH |
| Charge Temperature | 0~55℃ |
| Discharge Temperature | 12.8V560AH |
| Standard Environmental Conditions | Natural cooling |
| | Temperature：23±5℃ |
| | Humidity：45-75%RH |

## 6. BMS Functional Configuration

| Function | Configuration |
|---|---|
| Cell Voltage | 3.2V |
| Number of Battery cell Strings | 2 in parallel and 4 in series |
| Nominal Capacity | 280AH |
| Storage Function | ⩽10000 |

## 7. APP Operation Instructions

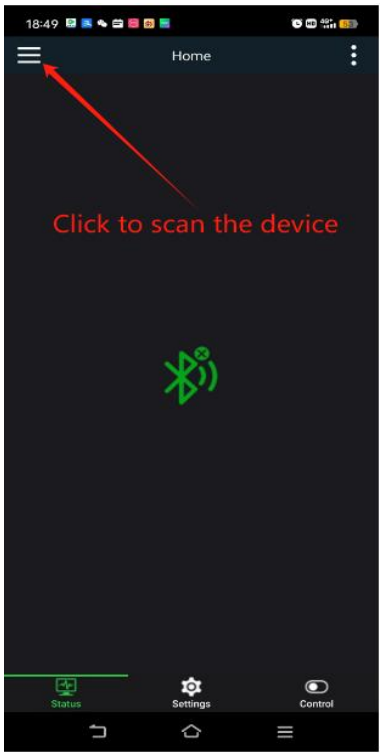
### 7.1 APP Download

By scanning the QR code shown in the figure below, you can obtain the mobile app that matches the product.

## 7.2 Bluetooth Connection

First, turn on your phone's Bluetooth, then open the app and click on the icon in the upper left corner to scan the device. Wait for the scan to complete, then click on the name of the device you want to connect to, such as "JK - B1A24S".

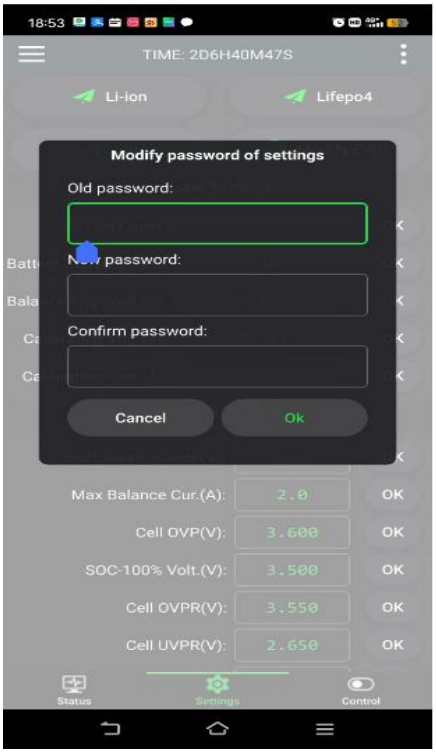
When connecting for the first time, the APP will prompt for a password. The default password for the device is "1234". After the device is connected, the APP will automatically record the password. There is no need to enter a password for the next connection. After opening the APP, click on the device in the device list to automatically connect. The password input interface is shown in the figure;





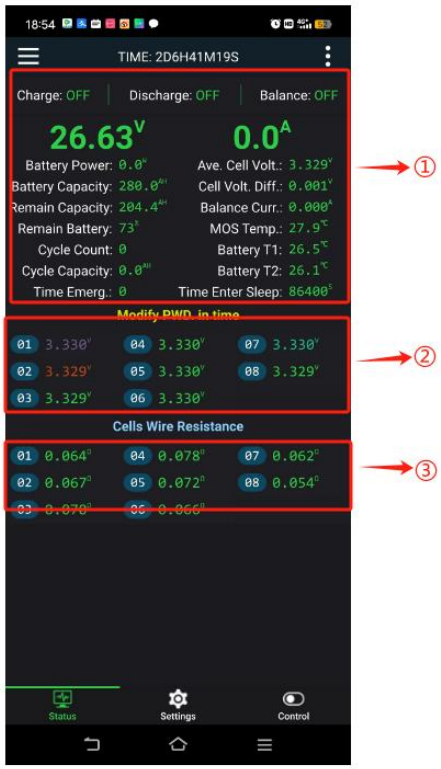
## 7.3 Changing Passwords and Names

After connecting the device, click on the "Pen Type" icon on the right side of the device list to modify the device name and password. The interface for modifying device names is shown in the following figure. Please note that device names only support English or numbers, and do not support Chinese names or Chinese characters. The password modification interface is shown in the figure. To change the device password, you must first enter the old password of the device. Only when the current password is correct can you enter the option for entering the new password. After entering the new password twice, click "OK" to complete the device password modification.


## 7.4 Status Viewing

Real time status viewing interface is shown in the figure. The real-time status page is divided into three areas. Zone 1 in the figure is the comprehensive battery information column. The definitions of each parameter are as follows:



7.4.1 Running time: represents the total running time from the first startup of the protection board to the present.

7.4.2 Charging: Indicates the switch status of the current protection board charging MOS. When "on" is displayed, it indicates that the current protection board charging MOS is on and the battery is allowed to charge; When "off" is displayed, it indicates that the charging MOS of the current protection board is turned off and the battery is not allowed to charge.

7.4.3 Discharge: Indicates the switch status of the current protection board discharge MOS. When "on" is displayed, it indicates that the current protection board discharge MOS is open and the battery is allowed to discharge; When "off" is displayed, it indicates that the current protection board discharge MOS is turned off and the battery is not allowed to discharge.

7.4.4 Balance: Indicates the on/off state of the current protection board balance switch. When "on" is displayed, the protection board will automatically balance when the balance triggering condition is reached; When "off" is displayed, it indicates that the balance is off and the protection board will not balance the battery.

7.4.5 Voltage: The voltage area displays the total voltage of the current battery in real-time, which is the sum of all individual voltages.

7.4.6 Current: The current area displays the total current of the current battery in real-time. When the battery is charged, the current is positive, and when the battery is discharged, the current is negative.

7.4.7 Battery power: represents the total power output or input of the current battery, which is the absolute product of the current battery voltage and battery current.

7.4.8 Remaining power: represents the percentage of remaining power in the current battery.

7.4.9 Battery capacity: represents the actual capacity of the battery calculated by the current protection board through high-precision SOC, in AH. (This value needs to be updated after the battery undergoes a complete discharge and charging cycle.).

7.4.10 Remaining capacity: represents the remaining capacity of the current battery, in AH.

Cycle capacity: represents the cumulative discharge capacity of the battery, in AH.

7.4.11 Number of cycles: represents the number of times the current battery has reached saturation during charging, in units of times.

7.4.12 Single cell average: represents the average single cell voltage of the current battery, in volts.

7.4.13 Maximum voltage difference: represents the difference between the highest and lowest cell voltages of the current battery group, in volts.

7.4.14 Balanced current: When the protection board enables the balancing function and reaches the balancing condition, the balanced current display area displays the balanced current in real time, unit: A When balancing is in progress, the real-time status of the individual voltage display area, where blue represents the discharged battery and red represents the charged battery. The negative current of the balanced current indicates that the battery is discharging, with blue flashing. The positive current of the balanced current indicates that the battery is charging, with red flashing. The protection board adopts active balancing technology, and the principle of balancing is to take electricity from high voltage cells, store it in the protection board, and then discharge it to low voltage cells.

7.4.15 MOS temperature (power temperature): Real time display of the current protection board power MOS temperature, unit: ℃.

7.4.16 Battery Temperature 1: Display "NA" when temperature sensor 1 is not installed, and display the temperature of temperature sensor 1 in real-time in ℃ when temperature sensor 1 is installed.

7.4.17 Battery Temperature 2: Display "NA" when temperature sensor 2 is not installed, and display the temperature of temperature sensor 2 in real-time in ℃ when temperature sensor 2 is installed.

7.4.18 Heating status (if supported): Under the condition that the protection board supports heating, the current heating switch status of the protection board is displayed in real time, with the display content being "on" or "off".

7.4.19 Heating current (if supported): Under the condition that the protection board supports heating, when the heating of the protection board is turned on, the current heating current is displayed in real time, unit: A;

7.4.20 ACC (if supported): If the protection board supports ACC recognition function, the current status of ACC is displayed here, with the display content being "On" or "Off". When the protection board supports ACC recognition, the discharge output of the protection board can only be turned on when the ACC status is "on".

7.4.21 Charger (if supported): If the protection board supports charger recognition function, the current status of the charger will be displayed at this location, with the display indicating "inserted" or "not inserted",

At this time, the charging can only be turned on when the charger status is "inserted".

7.4.22 Precharge state (if supported): Indicates the current state of the discharge pre charge switch. When the displayed content is "On", the discharge pre charge switch is opened, and the battery passes through the pre charge switch and flows through the pre charge resistor to pre charge the controller. The pre charging time is the value set in the parameter settings for "discharge pre charging time". After the pre charging is completed, the protection board will automatically turn on the discharge switch.

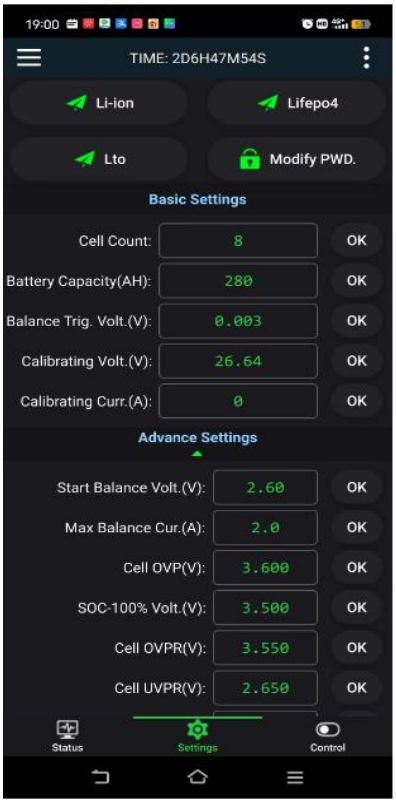
7.4.23 SOH valuation (if supported): represents the estimated battery health status of the current protection board.

7.4.24 Emergency time (if supported): With the emergency switch turned on, the remaining emergency time will be displayed here. Unit: seconds (S).

Zone 2 in the figure represents the individual voltage region. Real time display of voltage data for each individual cell in the battery pack, where red represents the cell with the lowest voltage and blue represents the cell with the highest voltage.

Zone 3 in the figure represents the balanced line resistance area. The balance line resistance is the balance line resistance obtained by the self check of the protection board. This value is only a rough calculation, aimed at preventing incorrect wiring or poor contact. When the balance line resistance exceeds a certain value, it will be displayed in yellow, and balance cannot be turned on at this time.

## 7.5 Parameter Settings




If you need to modify the working parameters of the protection board, you must first click the "Authorization Settings" button, enter the parameter setting password, and verify the parameter setting permissions. The factory default password for parameter settings is "123456". Only after correctly entering the parameter setting password can the parameters of the protection board be modified. The parameter setting password and device Bluetooth connection password are independent of each other. On the parameter settings page, various working parameters of the protection board can be modified, and the definitions of each parameter are as follows.

7.5.1 One click lithium iron: Clicking this button can modify all working parameters of the protection board to lithium iron battery parameters. The default values of lithium iron parameters are shown in the appendix.

7.5.2 One click ternary: Clicking this button can modify all working parameters of the protection board to ternary battery parameters. The default values of ternary lithium parameters are shown in the appendix.

7.5.3 One click lithium titanate: This button can modify all working parameters of the protection board to lithium titanate battery parameters. The default values of lithium titanate parameters are shown in the appendix.

7.5.4 Number of Cells: The number of cells represents the current number of cells in the battery. Before use, please accurately set this value, otherwise the protection board cannot function properly.

7.5.5 Battery capacity: This value is the design capacity of the battery.

7.5.6 Triggering Equalization Pressure Difference: With the equalization switch open, when the maximum voltage difference of the battery pack exceeds this value and the current single cell voltage exceeds the equilibrium starting voltage, equalization occurs

Start until the differential pressure drops below this value or the individual voltage drops below the equilibrium starting voltage, and the equilibrium ends. For example, setting the triggering voltage difference for equalization to 0.01V, equalization starts when the voltage difference of the battery pack is greater than 0.01V, and ends when it is lower than 0.01V. (It is recommended to set the balanced triggering voltage difference to 0.005V for batteries with a capacity of 50AH or above, and 0.01V for batteries with a capacity of less than 50AH.).

7.5.7 Voltage calibration: The voltage calibration function can be used to calibrate the accuracy of voltage acquisition on the protection board.

When there is an error between the total voltage collected by the protection board and the total voltage of the battery, the voltage calibration function can be used to calibrate the protection board. The calibration method is to fill in the current measured total voltage of the battery, and then click the "Set" button after voltage calibration to complete the calibration.

7.5.8 Current calibration: The current calibration function can be used to calibrate the accuracy of current collection on the protection board.

When there is an error between the total current collected by the protection board and the actual current of the battery, the current calibration function can be used to calibrate the protection board. The calibration method is to fill in the current measured total battery current, and then click the "Settings" button after current calibration to complete the calibration.

7.5.9 "Single cell overcharge voltage", "Single cell overcharge recovery", and "Single cell overcharge voltage" refer to the saturation voltage of the battery cell. As long as the voltage of any single cell in the battery pack exceeds this value, a "Single cell overcharge alarm" will be generated, and the charging MOS will be turned off by the protection board. At this time, the battery cannot be charged and can only be discharged. After the alarm is triggered, only when the voltage value of all cells is lower than the value of "cell overcharge recovery", the protection board will release

the "cell overcharge alarm" and turn on the charging switch.

7.5.10 "Single cell undervoltage protection", "Single cell undervoltage recovery", and "Single cell undervoltage protection" refer to the cut-off voltage of the battery cell. As long as the voltage of any single cell in the battery pack is lower than this value, a "Single cell undervoltage alarm" is generated, and the protection board closes the discharge MOS. At this time, the battery cannot discharge and can only be charged. After the alarm is triggered, only when all individual voltage values exceed the "individual voltage recovery" value, the protection board will release the "individual undervoltage alarm" and turn on the discharge MOS.

7.5.11 Automatic shutdown voltage: The automatic shutdown voltage represents the minimum voltage at which the protection board operates. When the voltage of the highest individual cell in the battery pack is lower than this value, the protection board closes.

This value must be lower than the "single unit undervoltage protection".

7.5.12 Equilibrium starting voltage: Equilibrium starting voltage is used to control the voltage stage of equilibrium. Only when the individual voltage exceeds this value and the maximum voltage difference of the battery pack exceeds the equilibrium triggering voltage difference, equilibrium will be triggered.

7.5.13 Maximum Balanced Current: Balanced current refers to the continuous current during energy transfer between the discharge of high-voltage batteries and the charging of low-voltage batteries. The maximum equilibrium current represents the maximum current during the energy transfer process, and the maximum equilibrium current should not exceed 0.1C.

7.5.14 Short circuit protection delay: When the protection board detects a current exceeding 600A and the duration exceeds the "short circuit protection delay" time, the protection board generates a "short circuit alarm" and the corresponding charging and discharging switch. After the alarm is triggered, after the "short circuit protection is released" time, the protection board will release the "short circuit protection alarm" and restart the charging and discharging switch.

7.5.15 Short circuit protection release: After the short circuit protection occurs, after the time set for "short circuit protection release", the short circuit protection is released.

7.5.16 "Charging Over Temperature Protection" and "Charging Over Temperature Recovery" During the charging process, when the battery temperature exceeds the value of "Charging Over Temperature Protection", the protection board will generate a "Charging Over Temperature Protection" warning, and at the same

time, the protection board will turn off the charging MOS. After the alarm is triggered, when the temperature drops below "charging over temperature recovery", the protection board will release the "charging over temperature protection" warning and restart the charging MOS.

7.5.17 "Discharge over temperature protection" and "Discharge over temperature recovery" During the discharge process, when the battery temperature exceeds the value of "discharge over temperature protection", the protection board will generate a "discharge over temperature protection" warning, and at the same time, the protection board will turn off the discharge switch. After the alarm is triggered, when the temperature drops below the "discharge over temperature recovery" level, the protection board will release the "discharge over temperature protection" warning and restart the discharge switch.

7.5.18 "Charging Low Temperature Protection" and "Charging Low Temperature Recovery" During the charging process, when the battery temperature is lower than the value of "Charging Low Temperature Protection", the protection board will generate a "Charging Low Temperature Protection" warning, and at the same time, the protection board will turn off the charging MOS. After the alarm is triggered, when the temperature exceeds the "charging low temperature recovery" level, the protection board will release the "charging low temperature protection" warning and restart the charging MOS. When the protection board supports heating, after entering the "charging low temperature protection" mode, the protection board will turn on the heating function to heat the battery. After the "charging low temperature protection" is released, the heating will be turned off.

7.5.19 "MOS over temperature protection" and "MOS over temperature recovery" When the MOS temperature exceeds the value of "MOS over temperature protection", the protection board generates a "MOS over temperature alarm" and closes the charging and discharging

MOS, the battery cannot be charged or discharged. After the alarm is generated, if the MOS temperature is lower than the value of "MOS over temperature recovery", the protection board will release the "MOS over temperature alarm" and restart the charging and discharging MOS (the MOS over temperature protection value is 75 ℃, and the MOS over temperature recovery value is 65 ℃),

These two values are factory default values and cannot be modified.

7.5.20 Device Address (if supported): Used to configure the device slave address for the protection board.

7.5.21 Discharge pre charge time (if supported): When the protection board supports the discharge pre charge function, this value is used to control the closing time of the discharge pre charge switch, in seconds. The discharge pre charge ends

with

Afterwards, the discharge switch is automatically turned on to start discharging.

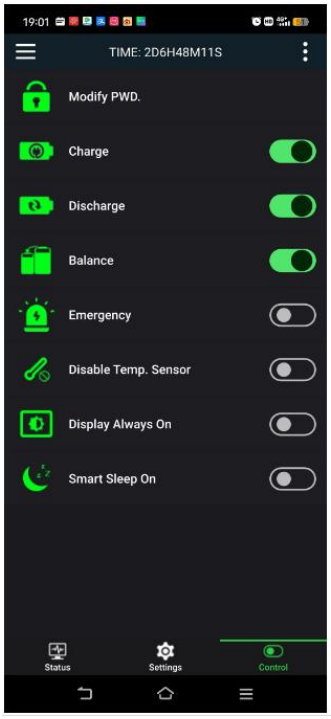
7.5.22 Connection line resistance: Connection line resistance is used for multi box batteries, not for single box batteries. Please consult the supplier for specific usage methods (note that the connection line resistance is not substantially related to the balancing line resistance on the real-time data page).

Attention:

Please refer to the manual for any parameter modifications. Improper parameters may cause the protection board to malfunction or even burn out. After modifying any parameter, you need to click the "Settings" button after the parameter to complete the parameter distribution. After the protection board successfully receives the parameter, it will emit a "beep" sound.

## 7.6 Control

The BMS control page is shown in the figure. Through BMS control, the protection board can be switched on and off for charging, discharging, and balancing functions, as well as emergency switches.




The charging switch is green when turned on and gray when turned off.

Discharge switch, green on and gray off.

Balance switch, green on and gray off.

Emergency switch, green on and gray off

7.6.1 Charging switch: used to control the charging switch of the protection board to turn on or off.

7.6.2 Discharge switch: used to control the opening or closing of the discharge switch on the protective board.

7.6.3 Balance switch: used to control the balance function of the protection board on or off.

7.6.4 Emergency switch: Regardless of any battery failure, opening the emergency switch can turn on charging and discharging, allowing users to use the battery in emergency situations. After the emergency switch is turned on,

30 minute automatic shutdown, no need for users to turn it off on their own (after turning on the emergency switch, the battery loses any protective function, do not turn on this switch unless necessary).

7.6.5 Heating switch: Under the condition that the protection board supports heating, when the heating conditions are met, the charger can only be detected or the heating switch can be turned on for heating.

7.6.6 Temperature sensor shielding: Turn on the temperature sensor shielding switch, and the protection board will ignore temperature related alarms (this function is commonly used in cases where the temperature sensor is damaged for some reason).

7.6.7 GPS heartbeat detection: After turning on the GPS heartbeat detection function, the protection board will detect the connection status of the GPS. When the GPS is disconnected from the protection board for more than 24 hours, the protection board will turn off the charging and discharging switch, and at the same time generate an alarm "GPS disconnected" (this function is usually used for GPS anti disassembly detection).

7.6.8 Reuse Port Switching: This function can switch the output function of the protection board's reuse port, with the switching options being "RS485" or "CAN" (corresponding functions need to be supported by the protection board hardware).

## 8. Cell Specifications

| Serial Number | project | Parameter values | notes | |
|---|---|---|---|---|
| 1 | Nominal Capacity | 280Ah | 0.2C standard discharge | |
| 2 | nominal voltage | 3.2V | Average working voltage | |
| 3 | Delivery voltage | ⩾3.2V | Within 10 days after leaving the factory | |
| 4 | Charging | 3.65±0.03V | Charging | |

| | | | | |
|---|---|---|---|---|
| | Voltage | | according to standard methods | |
| 5 | Standard charging method | 23 ± 3 ℃, 0.2C constant current, 3.65V constant voltage charge to 3.65V, continue charging until the current drops to ≤ 0.02C | | 23 ± 3 ℃, 0.2C constant current 3.65V constant voltage charging to current ≤ 0.02C, time approximately 7 hours (reference) |
| 6 | Charging current | 0.2C | 40A | Standard charging, charging time approximately 7 hours (reference) |
| | | 0.5C | 100A | Fast charging, charging time approximately 2 hours (reference) |
| 7 | Standard discharge method | 0.2C constant current discharge to 2.0V | | 0.2C constant discharge to 2.0V |
| 8 | Internal resistance of battery cells | ≤ 0.4mΩ | | Internal resistance measured at AC 1KHZ after 50% charging |
| 9 | Maximum charging current | 0.5C | 100A | Used for continuous charging mode |
| 10 | maximum discharge current | 1C | 200A | For continuous discharge mode |
| 11 | Operating temperature and relative humidity range | charge | 0.2C(0-10℃)<br>1C(10-45℃)<br>60±25%RH | Charging at extremely low temperatures, such as blowing in 0 ℃, will result in lower capacity and shortened battery cycle life |
| | | discharge | 0.5C(-20-10℃)<br>2C(10-55℃)<br>60±25%RH | |
| 13 | Long term storage temperature | 0-45℃60±25%RH | | If the storage time exceeds six months, it must be charged once. When stored for three months, batteries with protective circuits must be charged. |

## 9. Battery precautions

- Do not short-circuit the battery, reverse the positive and negative poles to use the battery;
- It is prohibited to use metal to directly connect the positive and negative poles of the battery;
- It is prohibited to transport or store batteries together with metals, such as hair clips, necklaces, etc;
- It is prohibited to strike, throw, step on batteries or other sharp objects to puncture batteries;
- If the electrode is dirty, it should be wiped with a dry cloth before use;
- Unauthorized disassembly and replacement of battery cells are strictly prohibited
- Burning or placing batteries in flames is strictly prohibited;

## 10. Storage of Batteries

The system should be stored in a dry warehouse, with a storage temperature of -20 ℃ -45 ℃, a storage humidity of ≤ 95%, and no condensation. Keep away from flammable, explosive, corrosive chemicals, heat sources, and water sources, and avoid exposure to sunlight, rainwater, and water. If the expected storage time of the battery exceeds 30 days, it is recommended to adjust the SOC to around 50%. The longest charging cycle for batteries at -10 ℃ -30 ℃ is every 6 months, the longest charging cycle at 30 ℃ -45 ℃ is every 3 months, and the longest charging cycle at 45 ℃ -65 ℃ is every 1 month; The above charging cycle is the recommended value, and the actual stored SOC is not less than 8%, which is not affected by BMS or other self consumption power except for individual batteries. We recommend charging the battery every six months to prevent excessive discharge.

## 11. Other Chemical Reactions

Due to the fact that batteries are chemicals, even if stored for a long time without use, their performance will deteriorate over time. In addition, if various usage conditions (such as charging, discharging, ambient temperature, etc.) are not maintained within the specified range, the expected life of the battery may be shortened; Or devices using batteries may be damaged due to electrolyte leakage. When it is found that the battery is easily fully charged and will be discharged in a short period of time, it may indicate that the battery needs to be replaced.