



# Lithium battery active balancing protection plate

## Parameter specification of JK PBB2A16S-10P-15P-20P BMS

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## 1.APP installation

Download the mobile APP by scanning the QR code in the figure below.



Figure 1 QR code linked by mobile APP

## 2.APP operation instructions

### 2.1. Equipment operation

#### 2.1.1. Equipment connection

First turn on the Bluetooth of the mobile phone, and then open the APP, as shown in Figure 32.

Click the upper left corner icon to scan the device, wait for the scan to complete, and click the name of the device needed to be connected, such as "JK-B 1A 24S". During the first connection, the APP will prompt for a password.

The default password of the device is "1234", and the device is connected. After the APP will automatically record the password, eliminating the need to enter the password for the next connection. After opening the APP, click the device automatic connection in the device list, page 3 is 15

The password entry interface is shown in Figure Figure 18.



Figure 18. Password entry

### 2.1.2. Change the password and name

After the device connection, click the "Pen Type" icon on the right side of the device list to modify the device name and password.

The modified device name interface is shown in Figure 19. Note that the device name only supports English or numbers, not Chinese name and Chinese characters.

The password modification interface is shown in Figure Figure 35. To modify the device password, you must first enter the old password of the device, and only if the current password is correct. After entering a new password twice, click 'OK' to complete the device password modification.



Figure 19 Name modification



Figure 20 Password modification

## 2.2. Status viewing

The real-time state interface is shown in the 21.

Figure Figure 21 shows for the real-time status display



Into 3 areas on the live status page.

Area 1 in the figure is the battery comprehensive information bar. The parameters are defined as follows:

### a) performance period

The running time represents the total running time from the first startup of the protection board.

### b) charge

Indicates the switch status of the current protection board charging MOS. Display "On", indicating that the current protection board charging MOS is on, Charging is allowed; when "off" is displayed, the current protective board charging MOS is off and the battery is not allowed to charge.

### c) discharge

Indicates the switch status of the current protection board discharge MOS. When On the current protective board discharge MOS is on and the battery is

allowed to discharge; when Off, the current protective board discharge MOS is off and the battery is not allowed to discharge.

### d) balanced

Indicates the switching state of the current protection board equalization switch. When playing On, protect the protection plate when the equilibrium trigger condition is reached Automatic equalization; when "off" is displayed, the equalization is off and the protection board is not equalizing the battery.

#### e) voltage

The voltage area displays the total voltage of the current battery in real time, and the total voltage is the sum of all single voltages.

#### f) current

The current area displays the total current of the current battery in real time. The current is positive when the battery is charged and negative when the battery is discharged.

#### g) power of battery

It represents the total output power of the current battery or input, whose value is the absolute product of the current battery voltage and battery current.

#### h) dump energy

Represents the percentage of the current battery.

#### I) Battery capacity

It represents the actual capacity of the battery calculated by the current protection board through the high-precision SOC, in unit: AH. **(This value requires electricity The pool is updated after a complete discharge and charging cycle).**

#### j) residual capacity

The remaining capacity represents the remaining capacity of the current battery in AH

#### k) circulation volume

The cycle capacity represents the cumulative discharge capacity of the battery in AH.

#### l) cycle index

The number of cycles represents the number of times the current battery. And m) of the monomer average It represents the average voltage of the current cell in V.

#### N) Maximum pressure difference

The maximum pressure difference represents the difference between the highest cell voltage and the lowest cell voltage of the current battery, unit: V.

#### O) equalizing current

When the protection plate opens the equalization function and reaches the equilibrium condition, the equilibrium current display area displays the equilibrium current in real time, unit: A.

When equalization proceeds, the single voltage of the real-time state displays the area, blue represents the discharged battery and red represents the charged battery. Equilibrium current negative current means that the battery is discharging, the blue is flashing, the positive current indicates that the battery is charging, and the red is flashing.

The protection plate adopts active balancing technology. The principle of equalization is to take power from the high voltage cell, store it to the protection plate, and then release it again Low-voltage electrical cell.

#### P) MOS temperature (power temperature)

Display the temperature of the current protection board power MOS in °C.

And q) Battery temperature 1 Display "NAwithout installing the temperature sensor 1 , and display in real time when the temperature sensor is installed.

Shows the temperature of the temperature sensor 1 in the °C.

#### **R) Battery temperature 2**

Display "NA" without installing the temperature sensor 2, and display in real time when the temperature sensor is installed. Show the temperature of the temperature sensor 2 in °C.

#### **S) Heating state (if supported)**

Under the condition that the protective plate supports heating, display the current protective plate heating switch status in real time as "On" or "off".

#### **T) Heating current (if supported)**

Under the condition that the protection plate supports heating, when the protection plate heating is turned on, the current heating current is displayed in real time, in unit: A;

#### **U) ACC (if supported)**

If the protection board supports ACC recognition, the current ACC status is displayed as ON or Off. When the protection board supports ACC identification, the ACC state is "On" for the protection board to turn on the discharge output.

#### **V.) Charger (if supported)**

If the protection board supports the charger identification function, the current status of the charger, the content is "inserted" or "not inserted", and the charger status is "insert" to turn on the charge.

#### **W) Pre-charge state (if supported)**

Represents the state of the current discharge precharge switch. When the display content is "on", the discharge precharge switch is opened, and the battery flows through the pre-charge resistance through the pre-charge switch to pre-charge the controller. The precharge time is the value set by the "discharge precharge time" in the parameter setting. After the pre-charge ends, the protection plate will automatically open the discharge switch.

#### **The x) SOH valuation (if supported)**

Indicates the battery health status estimated by the current protection board.

#### **And y) Emergency time (if supported)**

Under the condition of opening the emergency switch, the current remaining emergency time is displayed here. Unit: seconds (S).

The monomer voltage region in the 2nd area of Fig. The voltage data for each monomer in the cell pack are displayed in real time, where red indicates the monomer with the lowest voltage and blue indicates the monomer with the highest voltage.

Area 3 is the resistance area of the equilibrium line. The resistance of the equilibrium line is the equilibrium line resistance obtained by the self-inspection of the protection plate. This value is only the initial calculation. The purpose is to prevent wrong line connection or bad contact. When the resistance of the equilibrium line exceeds a certain value, it is displayed as yellow, and the equilibrium cannot be opened at this time.

## 2.3. Parameter setting



Figure Figure 22 The parameter setting page is shown

If you need to modify the working parameters of the protection board, you must first click the "authorization setting" button, enter the parameter setting password,

To verify that the parameter sets the permissions. Parameter setting password factory default is "123456". The parameters of the protection board can only be modified after the parameter setting password is entered correctly. Parameter settings password and the device Bluetooth connection password are independent of each other.

The working parameters of the protection board can be modified on the parameter setting page. The definition of each parameter is as follows.

### Z) One-key lithium iron

Click this button to modify all the working parameters of the protection board to the parameters of lithium iron battery. The default value of lithium iron parameters is shown in the appendix.

### Aa) t e r n a r y for one key

Click this button to modify all the working parameters of the protection board to ternary battery parameters. The default value of ternary lithium parameters is shown in the appendix.

### A b) One-click lithium titanate

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



#### **Ac) number of monomer**

The number of cells indicates the number of cells of the current battery. Please set the value accurately before use, otherwise the protection plate will not work normally.

#### **Ad) battery capacity**

This value is the design capacity of the battery.

A e) triggers the equilibrium pressure difference

In the case that the equilibrium switch is on, when the maximum pressure difference of the battery pack exceeds the value and the current unit voltage exceeds the equilibrium starting voltage, the equilibrium starts until the pressure difference is below the value or the unit voltage is below the equilibrium starting voltage. For example, the equilibrium trigger pressure difference is set to 0.01V, and the equilibrium starts when the battery pack pressure difference is greater than 0.01V, and ends when it is lower than 0.01V.

(It is recommended that the equilibrium trigger pressure difference of batteries above 50 AH is 0.005V and the battery below 50 AH is 0.01V).

#### **A f) voltage calibration**

The voltage calibration function can be used to calibrate the accuracy of the voltage acquisition of the protective plate.

When there is found between the total voltage collected by the protection plate and the total voltage of the battery, the voltage calibration function can be used to calibrate the protection plate. The calibration method is to fill in the current measured total battery voltage, and then click the 'Set' button behind the voltage calibration to complete calibration.

#### **Ag) of the current calibration**

The current calibration function can be used to calibrate the accuracy of the current acquisition of the protective plate.

When there is found between the total current collected by the protection plate and the actual current of the battery, the current calibration function can be used to calibrate the protection plate. The calibration method is to fill in the current measured total battery current, and then click the 'Set' button behind the current calibration

#### **A h) "monomer overcharge voltage", "monomer overcharge recovery"**

"Single overcharge voltage" refers to the saturation voltage of the cell. As long as the voltage of any unit in the battery pack exceeds this value, a "single overcharge alarm" is generated. At the same time, the protection plate closes the charging MOS, and at this time, the battery cannot be charged, only discharged. When

the alarm is generated, only the voltage value of all units is lower than the value of "single overcharge recovery", the protection board removes the "single overcharge alarm" and opens the charging switch at the same time.

**A i) "monomer undervoltage protection" and "monomer undervoltage recovery"**

"Single undervoltage protection" refers to the cut-off voltage of the cell. As long as the single voltage in the battery pack is lower than this value, the 'single undervoltage alarm' is generated. At the same time, the protection plate turns off the discharge MOS, and at this time the battery cannot be discharged and can only be charged. When the alarm is generated, only after all the single voltage value exceeds the value of "single voltage recovery", the protection plate removes the "single undervoltage alarm" and opens the discharge MOS at the same time.

**A j) automatic shutdown voltage**

The automatic shutdown voltage represents the lowest voltage of the protection plate working and protects when the voltage of the highest unit in the battery pack is below this value The board closed. This value must be lower than the "monomer undervoltage protection".

**Ak) Equalized starting voltage**

The equilibrium starting voltage is used to control the voltage phase of the equilibrium, and the equilibrium is only triggered when the single voltage exceeds this value and the maximum pressure difference of the battery pack exceeds the equilibrium trigger pressure difference.

**A, al) maximum equilibrium current**

Equilibrium current represents the continuous current of high voltage battery discharge and low voltage battery charging during energy transfer.

Maximum equilibrium

The current represents the maximum current in the energy transfer process, and the maximum equilibrium current should not exceed 0. 1C.

For example: 20 AH, the battery shall not exceed  $20 * 0. 1=2A$ .

**A m) "Continuous charging current", "charge current delay", "charge current release"**

When charging the battery pack, the current exceeds the "maximum charging current" and the duration exceeds the "charging overcurrent delay" time, and the protection board generates a "charging overcurrent alarm" and closes the charging switch at the same time. After the alarm is generated, after the time of "charging overcurrent discharge", the protection board removes the charging overcurrent discharge alarm, and the charging switch is restarted.

For example: set the "maximum charging current" to 10A, "charge overcurrent delay" to 10 seconds, and "charge overcurrent release" to 50 seconds. During the charging process, if the charging current exceeds 10 A for 10 seconds, the protection board will generate a "charging overcurrent alarm", and close the charging switch at the same time. 50 seconds after the alarm generation, remove the "charging overcurrent alarm", and the protection plate will restart the charging switch.

**An) "Continuous discharge current", "discharge overcurrent delay", "discharge overcurrent release"**

When the battery pack is discharged, the current exceeds the "maximum discharge current" and the duration exceeds the "discharge overcurrent delay", the protection plate generates a "discharge overcurrent alarm" and turns off the discharge MOS. After the alarm is generated, after the time of "discharge overdischarge", the protection board removes the "discharge overdischarge alarm" and the discharge switch is restarted.

Example: set the "maximum discharge current" to 100A, "discharge overcurrent delay" to 10 seconds, and "discharge overcurrent release" to 50 seconds. During the discharge process, if the discharge current exceeds 100 A for 10 seconds, the protection board will generate the "discharge overcurrent alarm", and close the discharge MOS. 50 seconds after the alarm, the "discharge overcurrent alarm" is removed, and the protection board will restart the discharge MOS.

**A o) Short-circuit protection delay**

When the protection plate detects that the current exceeds 600A and the duration exceeds the "short circuit protection delay" time, the protection plate produces a 'short circuit

Alarm' and the corresponding charge and discharge switch. After the alarm is generated, after the time of "short circuit protection removal", the protection board removes the "short circuit protection alarm" and restart the charge and discharge switch.

Example: Set "short circuit protection delay" to 1000 microseconds and "short circuit protection removed" to 50 seconds. In the charge and discharge process, the current is continuously 1000 microseconds 600A, the protection board will produce "short circuit protection alarm", and the corresponding charge and discharge switch. 50 seconds after the alarm is generated, the "short circuit protection alarm" will be removed, and the charge and discharge switch will be reopened.

**(It is recommended to use the factory default setting without necessity; the short circuit protection is set to '0', indicating that the short circuit protection is off).**

**Ap) The short-circuit protection is lifted**

When the short circuit protection occurs, after the 'short circuit protection removed " after the set time, remove the short circuit protection.

**Aq) "Charging over temperature protection", "over temperature recovery"**

During the charging process, when the battery temperature exceeds the value of "charging over temperature protection", the protection plate generates a "charging over temperature protection" warning, and the protection plate turns off the charging MOS. After the alarm is generated, when the temperature is lower than "charging overtemperature recovery", the protection board removes the "charging over temperature protection" warning and resumes the charging MOS at the same time.

**A r) "discharge overtemperature protection", "discharge overtemperature recovery"**

During the discharge process, when the battery temperature exceeds the value of "discharge over temperature protection", the protection plate generates a warning of "discharge over temperature protection", and the protection plate turns off the discharge switch. After the alarm is generated, when the temperature is lower than "discharge over temperature recovery", the protection board removes the "discharge over temperature protection" warning and restart the discharge switch.

**AS) "charging low temperature protection", "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 generates a "charging low temperature protection" warning, and the protection plate turns off the charging MOS. After the alarm is generated, when the temperature is higher than the "charging low temperature recovery", the protection board removes the "charging low temperature protection" warning and restart the charging MOS at the same time.

Under the condition that the protection plate supports heating, after entering the "charging low temperature protection", the protection plate turns on the heating function to heat the battery. After the "charging low temperature protection" is removed, the heating is turned off.

**At) "MOS overtemperature protection", "MOS overtemperature recovery"**

When the MOS temperature exceeds the value of "MOS over temperature protection", the protection plate generates "MOS over temperature alarm" and turns off the Mdischarge MOS, and the battery cannot be charged or discharged. After the alarm is generated, the MOS temperature is lower than the value of "MOS over temperature recovery", the protection board removes the "MOS over temperature alarm", and the charge and discharge MOS is restarted (the MOS over temperature protection value is 75°C, and the MOS over temperature recovery value is 65°C. These two values are the factory default value and cannot be modified).

**Au) Device address (if supported)**

Devices used to configure the protective plate from the address.

**Av) discharge precharge time (if supported)**

When the protection plate supports the discharge precharge function, this value is used to control the closing time of the discharge precharge switch, in unit: seconds. After the discharge precharging ends, the discharge switch is automatically opened and starts to discharge.

**Aw) User private data (user data)**

In the application of iron switching, fill in the top 12 BT code. In the switching protocol, there are 24 bits of BT code, and the last 12 digits are the Bluetooth name.

For example, the battery BT code is BT 207204012YMLD 220815001; the first 12 BT 207204012Y fills the user private data, and the last 12 MLD 220815001 fills the Bluetooth name.

**Ax) connecting cable resistance**

The cable resistance is used for the multi-box battery, and the single box battery is not used. Please consult the supplier for the specific use method (note that the cable resistance and the balance line resistance of the real-time data page are not substantially related).

**Attention:**

For any parameter modification, please refer to the instruction manual. Improper parameters may make the protective plate not working properly, or even burn the protective plate. After any parameter is modified, you need to click the "Set" button behind the parameter to complete the parameter distribution. After the protection board successfully receives the parameter, it will make a "drop" sound.

## 2.4. BMS control

The BMS control page is shown in Figure Figure 23. Through BMS control, the protection plate can be charged function, discharge function, balance function and emergency switch



Figure 23 BMS, control page

### Ay) Charging switch

Used to control the protection plate charging switch on or off. A z)

### discharge switch

Used to control the protection plate discharge switch on or off.

### ba) equalizer switch

Used to control the protection protection function on or off.

### bb) emergency switch

Regardless of any failure of the battery, opening the emergency switch can open the charge and discharge, allowing the user to use the battery in an emergency. After the emergency switch is opened, it will automatically turn off for 30 minutes without the user to close it itself (after opening the emergency switch, the battery loses any protection function, do not open this switch unless necessary).

### And bc) the heating switch

When the protection plate supports heating conditions, heating on only if the charger is detected or the heating switch is opened.

#### **The bd) temperature sensor shield**

Open the temperature sensor shield switch and the protection plate ignores the temperature-related alarm (this function is often used and the temperature sensor is damaged for some reason).

#### **Be) GPS heartbeat detection**

After the GPS heartbeat detection function is turned on, the protection board will detect the connection status of GPS. When the GPS is disconnected from the protection plate for more than 24 hours, the protection board turns off the charging and discharge switch and generates a "GPS disconnection" alarm (this function is usually used for GPS disassembly detection).

#### **And bf) Multiplex port switching**

This function can switch the output function of the protection board multiplexing port, and the switch options are "RS 485" or "CAN" (which requires the protection board hardware to support the corresponding function).

### **3. Safety and protection measures and matters needing attention**

Before use, please read the instruction manual carefully. According to the corresponding wiring diagram, connect from the negative electrode to the positive electrode. After the balance line is connected, the multimeter is required to insert the protective board again.

The default password of the protection board is "1234", and the default authorization password is "123456". After the mobile phone APP is connected to the protection board, please change the connection password in time to prevent malicious connection by others.

**The default parameters of "one key lithium iron", "one key three yuan" and "one key lithium titanate"**

<b>order number</b>	<b>parameter</b>	<b>Three default</b>	<b>Lithium iron default</b>	<b>Lithium titanate default</b>	<b>unit</b>
1	Single under-pressure protection	2.9	2.6	1.8	V
2	The monomer interception and undervoltage protection was restored	3.2	3.0	2.0	V
3	Single overcharge voltage	4.2	3.6	2.7	V
4	Single-body overcharge protection and recovery	4.1	3.4	2.4	V
5	Trigger the equilibrium pressure difference	0.01	0.01	0.01	V
6	Automatic shutdown voltage	2.8	2.5	1.7	V
7	Charge overcurrent protection delay	30	30	30	second
8	Release time of charging and overcurrent protection	60	60	60	second
9	Overcurrent discharge protection delay	30	30	30	second
10	Release time of discharge overcurrent protection	60	60	60	second
11	Short-circuit protection release time	60	60	60	second



12	Charging at the overtemperature protection temperature	60	60	60	°C
13	Return to the temperature after charging with overtemperature	55	55	55	°C
14	Discharge to the overtemperature protection temperature	60	60	60	°C
15	Discharge overtemperature recovery temperature	55	55	55	°C
16	Charging for the low-temperature protection temperature	-20	-20	-20	°C
17	Charge at a low-temperature recovery temperature	- 10	- 10	- 10	°C
18	The MOS over-temperature protection temperature	75	75	75	°C
19	MOS over-temperature protection for recovery temperature	70	70	70	°C