

Smart BMS bluetooth Manual



EELBATTERY

1.1 Main technical indicators

The main technical indicators of the BMS are shown in Table 1.

Table 1 Main technical indicators of BMS

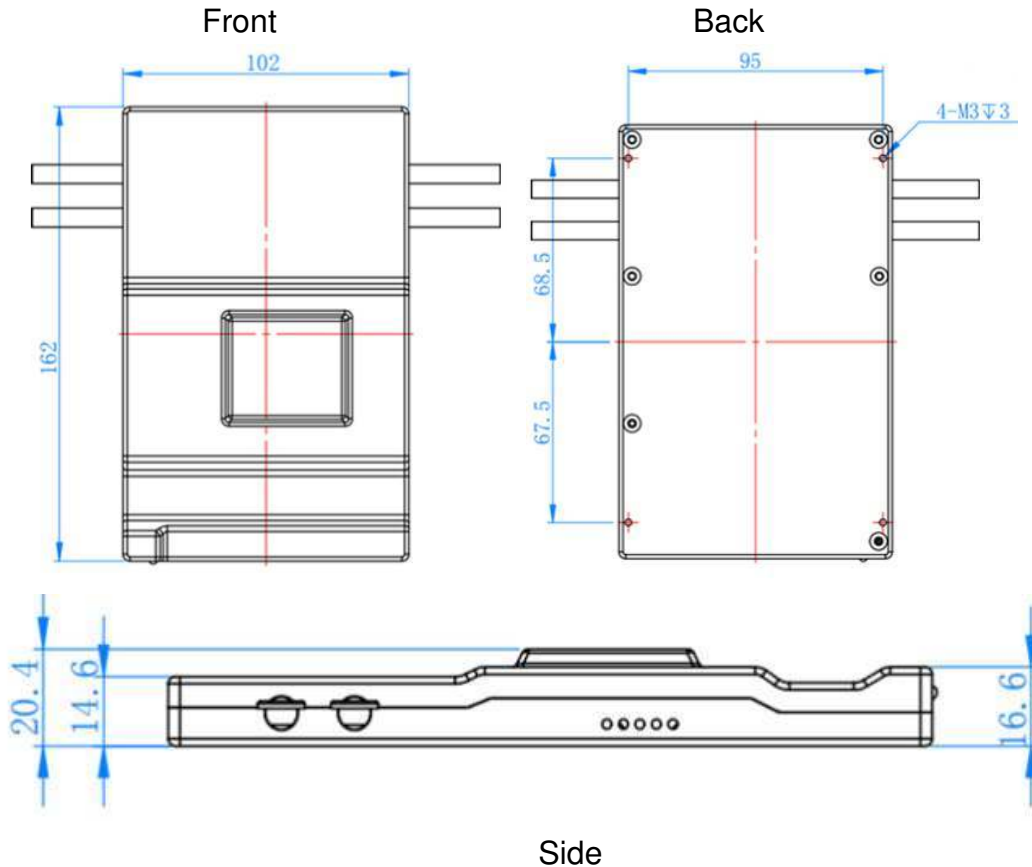
| Spec | Model | | | | | | |
|----------------------------------------|--------------------------------|---------------|----------------|----------------|---------------|---------------|---------------|
| | BD6A17S 6P | BD6A20S 6P | BD6A20S1 0P | BD6A24S1 0P | B1A24S1 5P | B2A24S1 5P | B2A24S2 0P |
| li-ion battery | 13~17s | 13~20s | 13~20s | 13~24s | 13~24s | 13~24s | 13~24s |
| Lifepo4 battery | 15~17s | 15~20s | 15~20s | 15~24s | 15~24s | 15~24s | 15~24s |
| LTO battery series | 17s | 17~20s | 17~20s | 17~24s | 17~24s | 17~24s | 17~24s |
| Wrie output | Charge and discharge same port | | | | | | |
| Single cell voltage | 1~5 V | | | | | | |
| Voltage acquisition accuracy | ±5 mV | | | | | | |
| Continuou s discharge current | 60A | 60A | 100A | 100A | 150A | 150A | 200A |
| Maximum discharge current | 100A | 100A | 200A | 200A | 300A | 300A | 350A |
| Balanced way | Active | | | | | | |
| Balance current | 0.6 A | 0.6 A | 0.6 A | 0.6 A | 1 A | 2 A | 2 A |
| internal resistance | 1.3 mΩ | 1.3 mΩ | 0.8 mΩ | 0.8mΩ | 0.5mΩ | 0.5mΩ | 0.3mΩ |

| | | | | | | | |
|------------------------------------------------|--------------------------------------|--------|---------|----------|---------|---------|---------|
| Overcharge protection voltage | 1.2~4.35 V adjustable | | | | | | |
| Overcharge release voltage | 1.2~4.35 V adjustable | | | | | | |
| Charging over current protection (adjustable) | 10~60A | 10~60A | 10~100A | 10~100 A | 10~150A | 10~150A | 10~200A |
| Charge over current release time | 2~120S adjustable | | | | | | |
| Over discharge protection voltage | 1.2~4.35 V adjustable | | | | | | |
| Over discharge recovery voltage | 1.2~4.35 V adjustable | | | | | | |
| Discharge over current protection (adjustable) | 10~60A | 10~60A | 10~100A | 10~100 A | 10~150A | 10~150A | 10~200A |
| Discharge overcurrent release time | 2~120S adjustable | | | | | | |
| Number of temperature detection | 3pcs | | | | | | |
| Temperature protection | have | | | | | | |
| Short circuit protection | have | | | | | | |
| Coulomb counter | have | | | | | | |
| Bluetooth | Support Android IOS | | | | | | |
| GPS (Optional) | Support (GPS or 485 just choose one) | | | | | | |
| Other interfaces (customized) | RS485/CAN | | | | | | |

1.2 Environmental conditions

- a) Operating temperature range: $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$;
- b) Power requirements: 40~100V.
- c) Power consumption: 10mA@100V in balanced state, 6mA@100V in unbalanced state.

1.3 Size



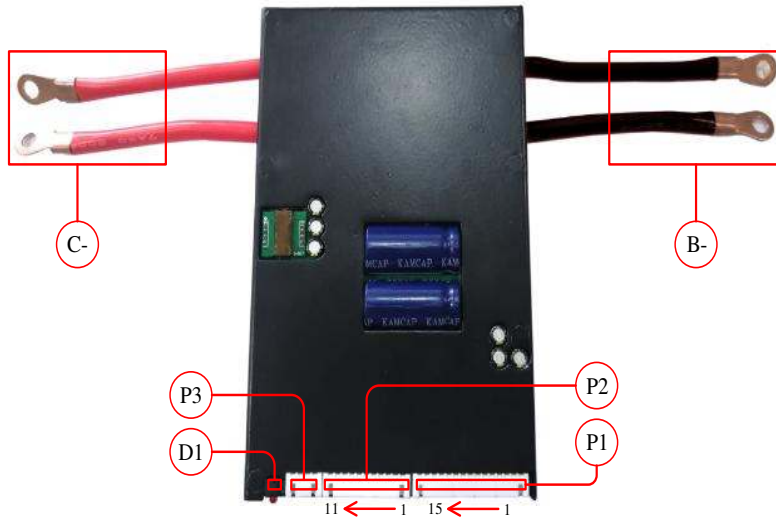
1.4 Quick use guide

- a. Download the APP and manual
- b. Hardware connection
- c. Turn on
- d. Open the APP to connect the device
- e. Set the number and type of battery strings
- f. Check the battery status

2.Connector and interface description

2.1 Connector and LED light position description

The position of the connector and LED light is shown in Figure



| Connector | Pin number | K-BD6A17S | | JK-BD6A20S-10P | JK-B1A24S-15P/JK-B2A24S-15P/JK-B2A24S-20P | |
|-----------|------------|-----------|-------------------------|-------------------------|-------------------------------------------|-------------------------|
| | | Name | 17S | Definition 20S | name | definition |
| P1 | 1 | B- | Battery pack negative | Battery pack negative | B- | Battery pack negative |
| | 2 | B1 | 1 st cell + | 1 st cell + | B1 | 1 st cell + |
| | 3 | B2 | 2 nd cell + | 2 nd cell + | B2 | 2 nd cell + |
| | 4 | B3 | 3 rd cell + | 3 rd cell + | B3 | 3 rd cell + |
| | 5 | B4 | 4 th cell + | 4 th cell + | B4 | 4 th cell + |
| | 6 | B5 | 5 th cell + | 5 th cell + | B5 | 5 th cell + |
| | 7 | B6 | 6 th cell + | 6 th cell + | B6 | 6 th cell + |
| | 8 | B7 | 7 th cell + | 7 th cell + | B7 | 7 th cell + |
| | 9 | B8 | 8 th cell + | 8 th cell + | B8 | 8 th cell + |
| | 10 | B9 | 9 th cell + | 9 th cell + | B9 | 9 th cell + |
| | 11 | B10 | 10 th cell + | 10 th cell + | B10 | 10 th cell + |
| | 12 | B11 | 11 th cell + | 11 th cell + | B11 | 11 th cell + |
| | 13 | B12 | 12 th cell + | 12 th cell + | B12 | 12 th cell + |
| | 14 | B13 | 13 th cell + | 13 th cell + | B13 | 13 th cell + |
| | 15 | B14 | 14 th cell + | 14 th cell + | B14 | 14 th cell + |
| P2 | 1 | B15 | 15 th cell + | 15 th cell + | B15 | 15 th cell + |
| | 2 | B16 | 16 th cell + | 16 th cell + | B16 | 16 th cell + |
| | 3 | B17 | 17 th cell + | 17 th cell + | B17 | 17 th cell + |
| | 4 | B18 | | 18 th cell + | B18 | 18 th cell + |
| | 5 | B19 | | 19 th cell + | B19 | 19 th cell + |
| | 6 | B20 | | 20 th cell + | B20 | 20 th cell + |
| | 7 | B+ | BMS power | BMS power | B21 | 21 st cell + |

| Connector | Pin number | K-BD6A17S | | JK-BD6A20S-10P | JK-B1A24S-15P/JK-B2A24S-15P/JK-B2A24S-20P | |
|-----------|------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------|-------------------------|
| | | Name | 17S | Definition 20S | name | definition |
| | 8 | - | | - | B22 | 22 th cell + |
| | 9 | - | | - | B23 | 23 rd cell + |
| | 10 | - | | - | B24 | 24 th cell + |
| | 11 | - | | - | B+ | BMS power |
| P3 | 1 | T1A | | The first temperature sensor A pin | | |
| | 2 | T1B | | The first temperature sensor B pin | | |
| | 3 | T2A | | The second temperature sensor A pin | | |
| | 4 | T2B | | The second temperature sensor B pin | | |
| D1 | | | Bluetooth connection indicator, the indicator light is always on when the Bluetooth is connected to the BMS, and the indicator light flashes when the connection is disconnected. | | | |
| C- | | | Connect to external load or negative pole of charger | | | |
| B- | | | Connect the negative pole of the battery | | | |

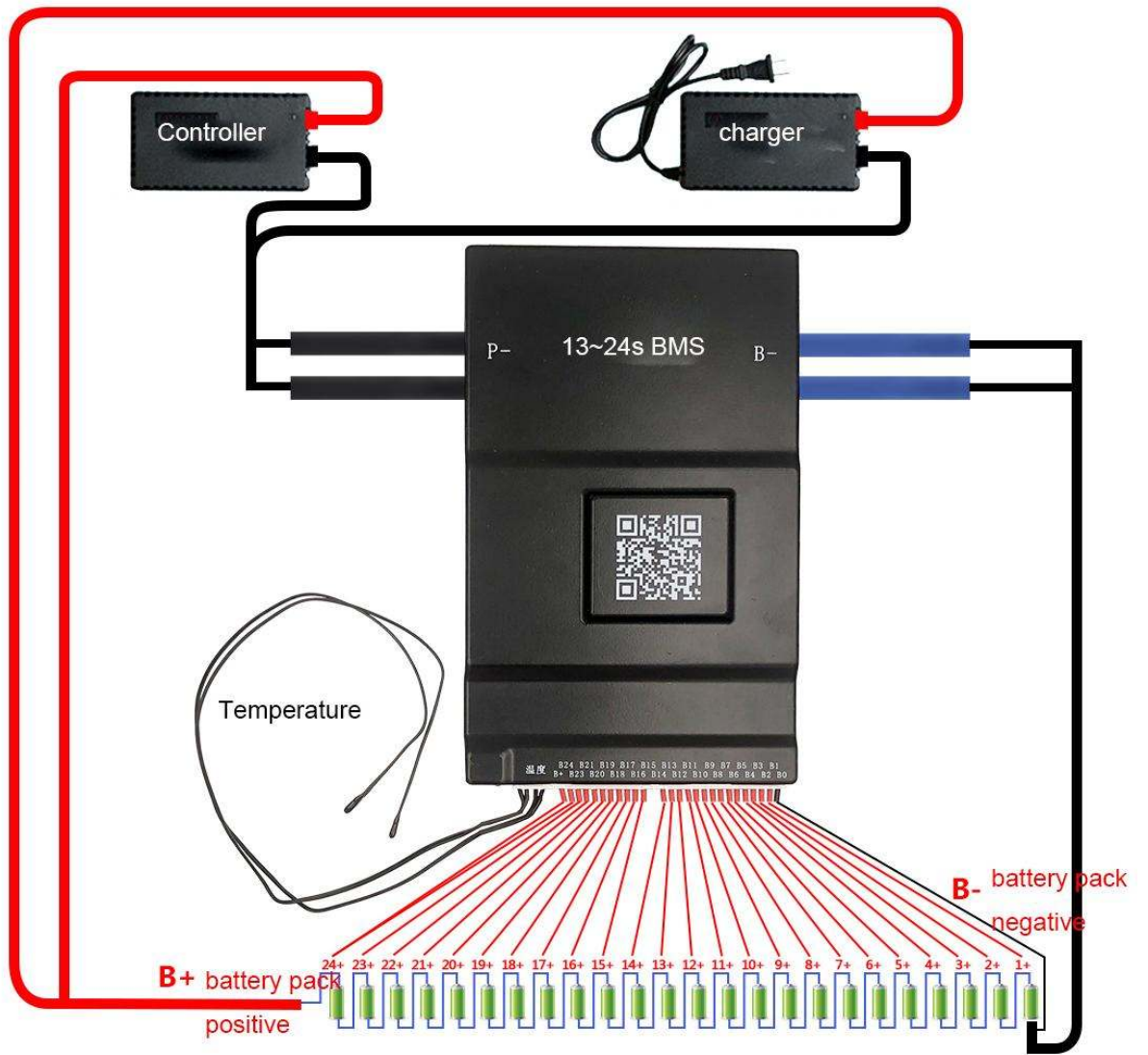
3.1 Wiring diagram

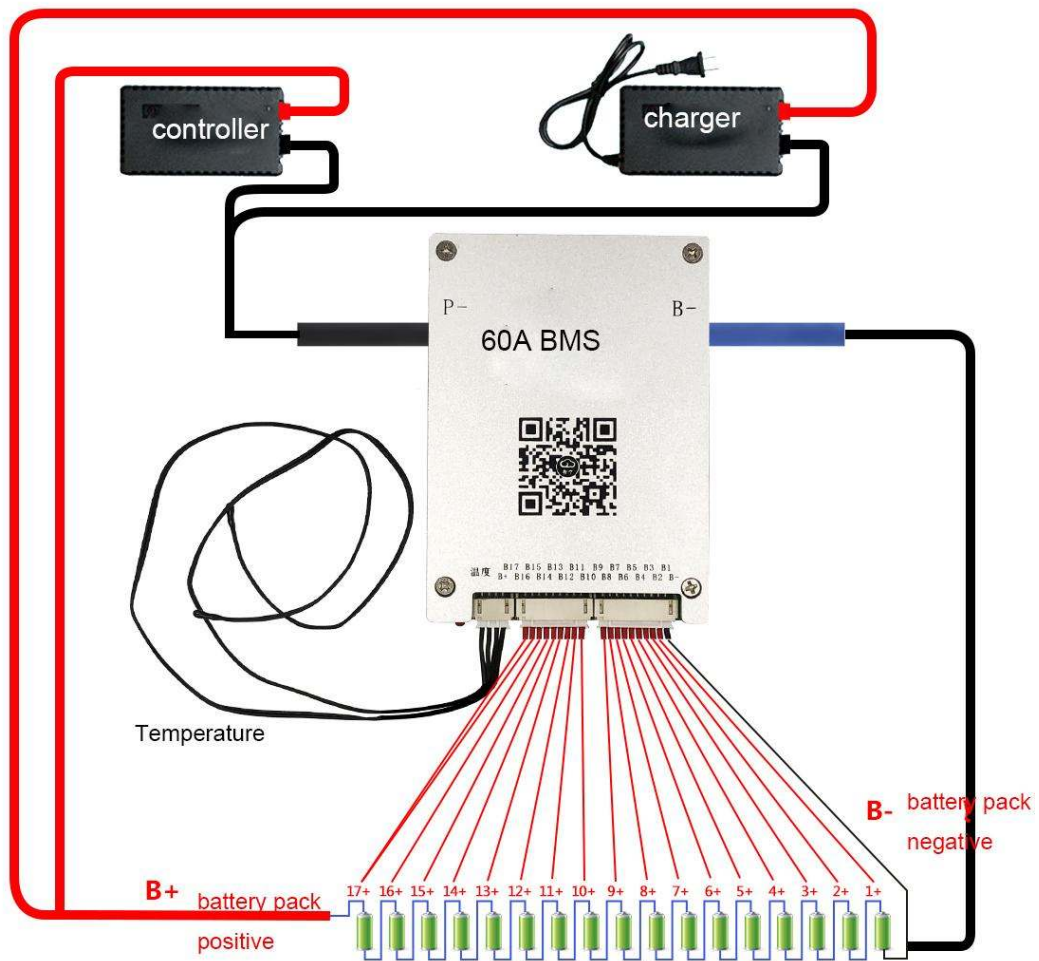
The intelligent lithium battery BMS is suitable for lithium battery packs with 14-24 strings of cells. The wiring method of battery packs with different numbers of cells is different.

For the battery pack with 24 strings of cells in series, the installation and wiring method is shown in the figure.

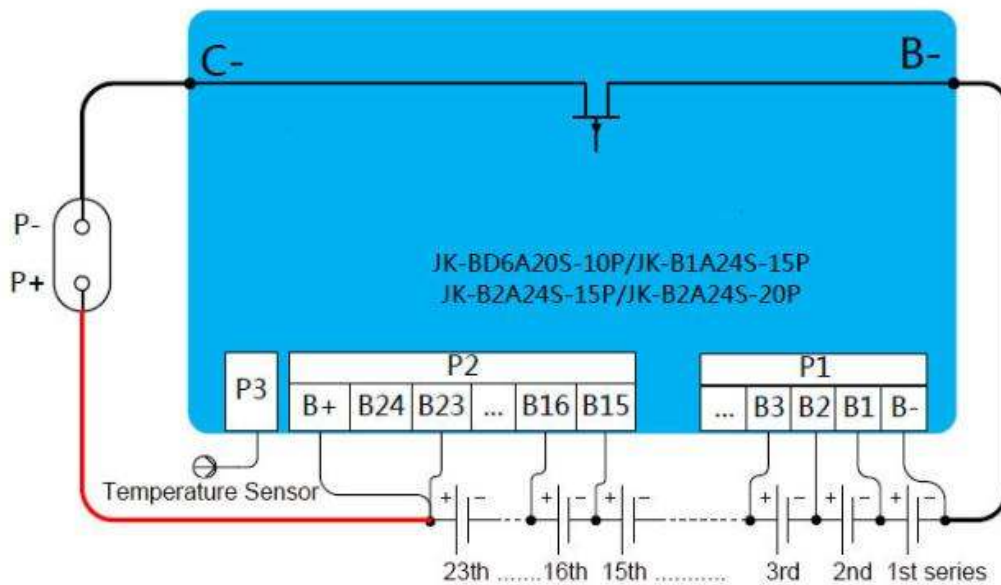
Note: connect as below pics

Pls make sure the last Bms wire B+ need connect to battery pack +, the battery pack voltage need higher than 40V, then can start up the bms

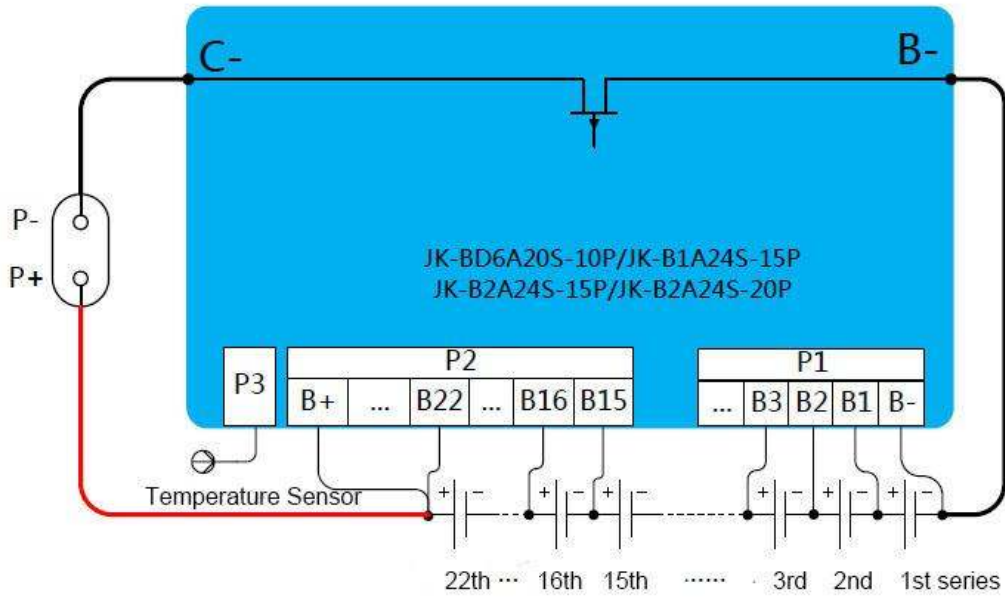




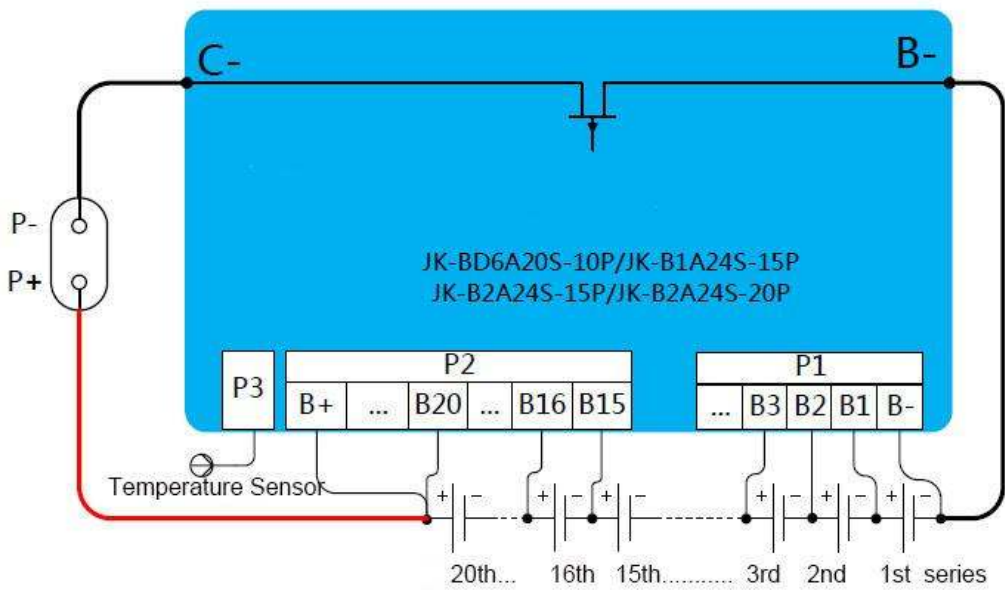
23s bms



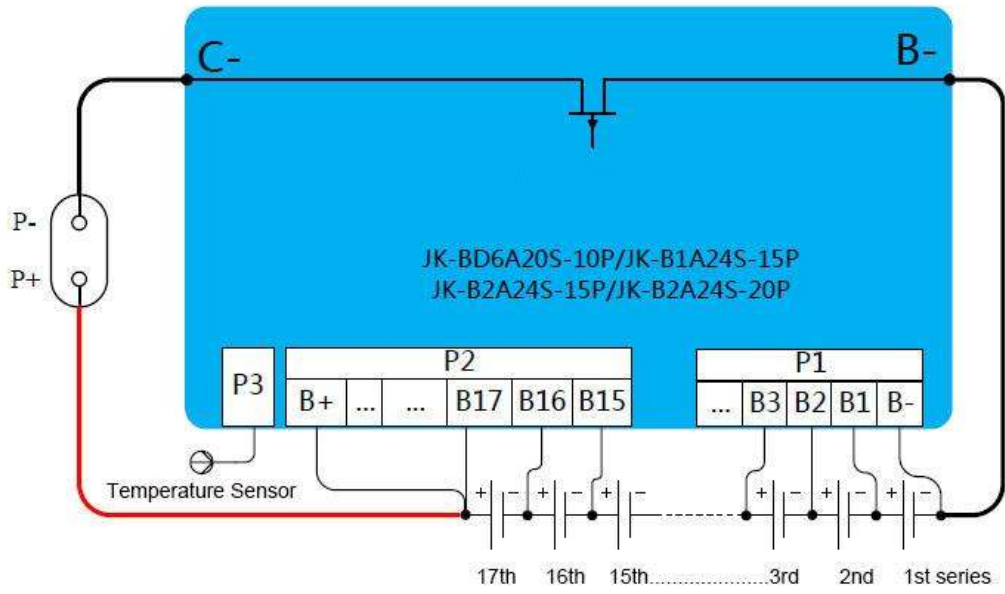
22s bms



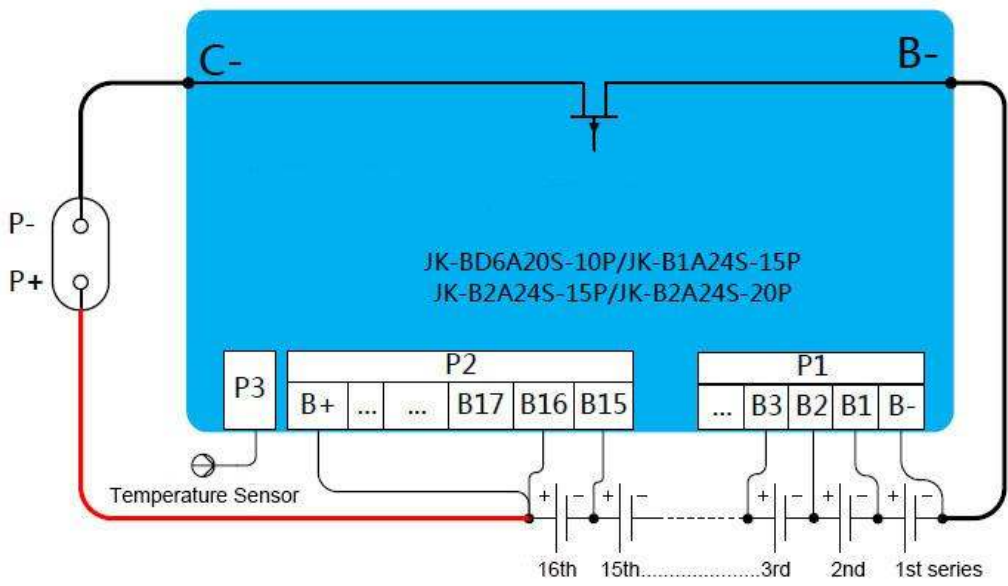
20s bms



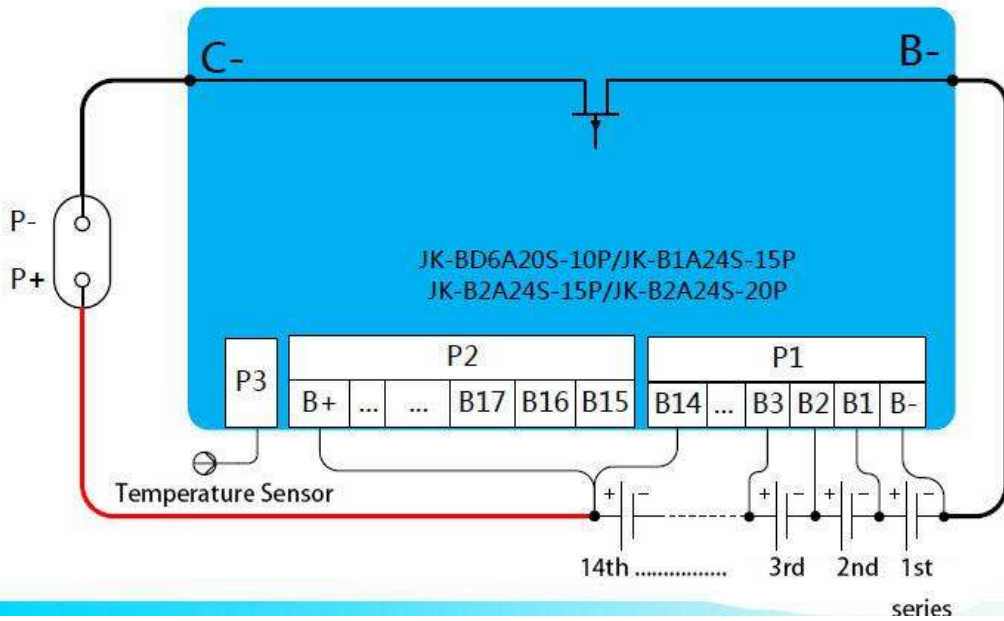
17s bms



16s bms

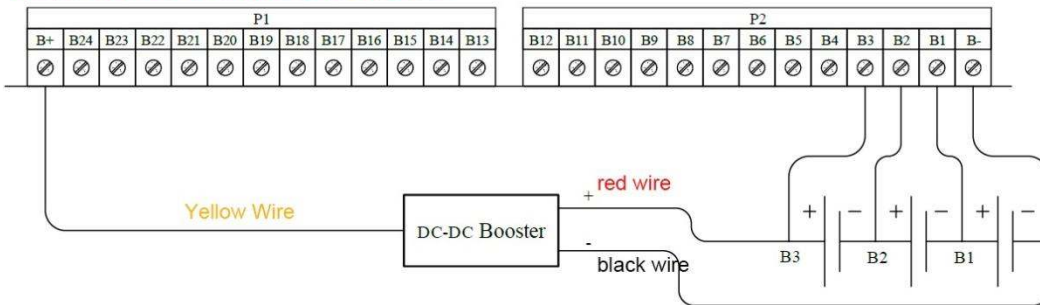


14S BMS connect

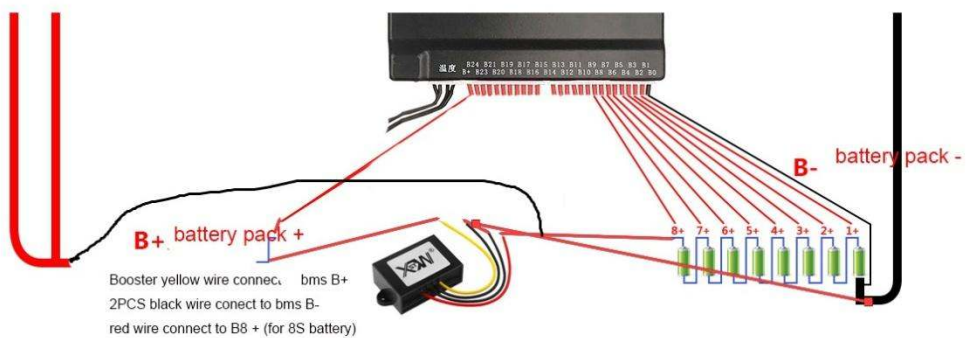


If use the BMS for lower voltage than 36V, pls use the booster together.

This pic show 3 cells with booster modules case



This pic show 8 cells with booster modules case



- yellow wire connect B+
- Black wire connect B-
- Red wire connect to B4+ (For 4s battery)
- Red wire connect to B8+ (For 8s battery)



12v battery,use 12v to 48v booster, 24v battery use 24v to 48v booster.

Booster Yellow wire connect to BMS B+

Booster Black wire connect to BMS B-

Booster Red wire connect to BMS B4+ (for 4s battery)

Booster Red wire connect to BMS B8+ (for 8s battery)

3.2 Install APP, Scan this QR to download app



Check whether the BMS has been securely fixed with the battery cell, and only after confirming that it is correct, can the BMS be connected to power, otherwise it may cause serious consequences such as abnormal operation or even burnout.

4.1 BMS start Power

After confirming that the above operations are correct, you can power on the BMS.

The BMS does not have a power-on control switch, and it is designed as a **charging activation mode**, that is,

A .after the battery is assembled, **a charger needs to be connected to make the BMS work.**

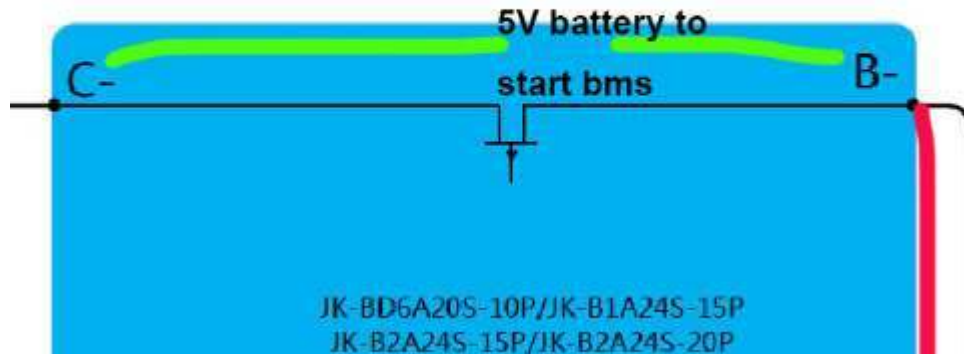
Pls note: the charger voltage must more 4V higher than battery packs, then can make bms power on.

Like,your battery is 50v, then your charger must min 54v.

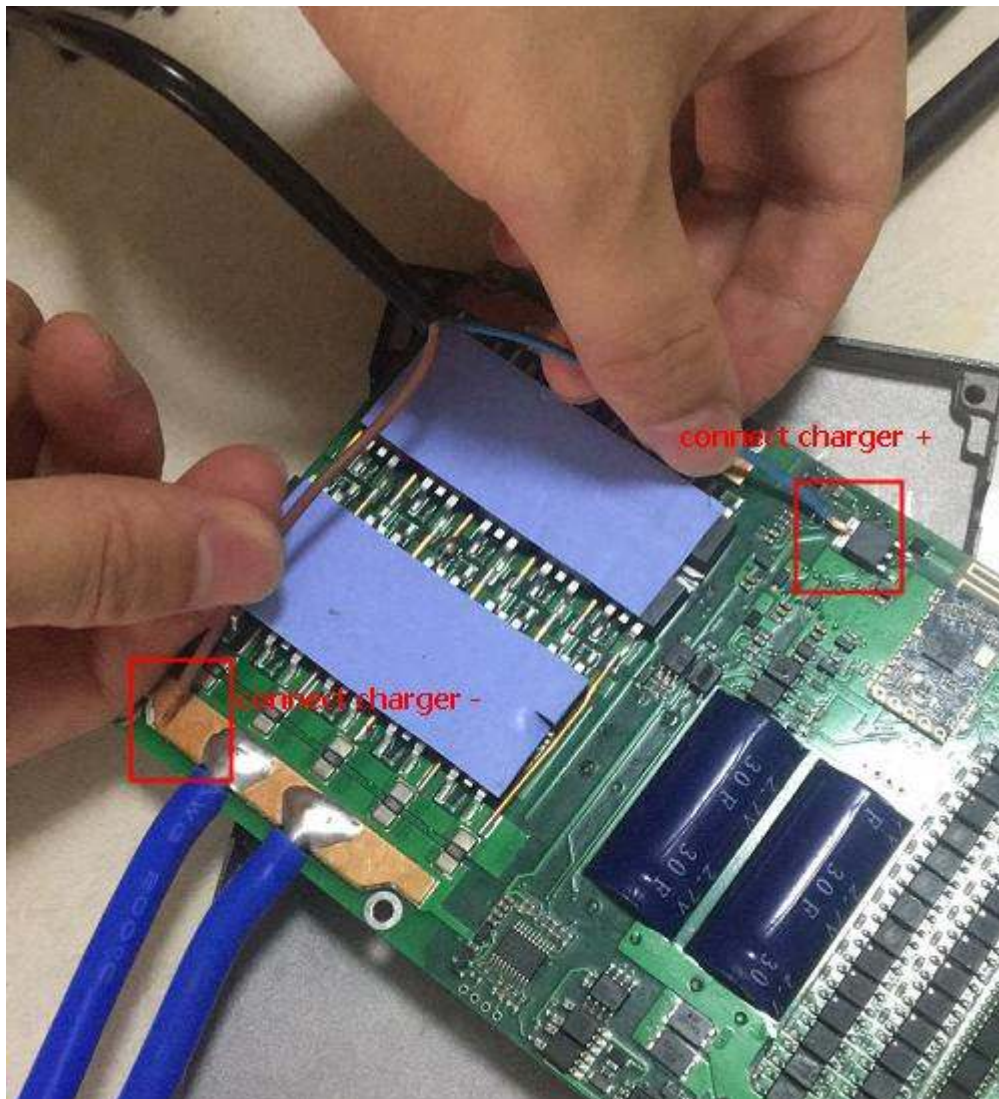
B.Or you can use one 5V battery, to make bms power on.

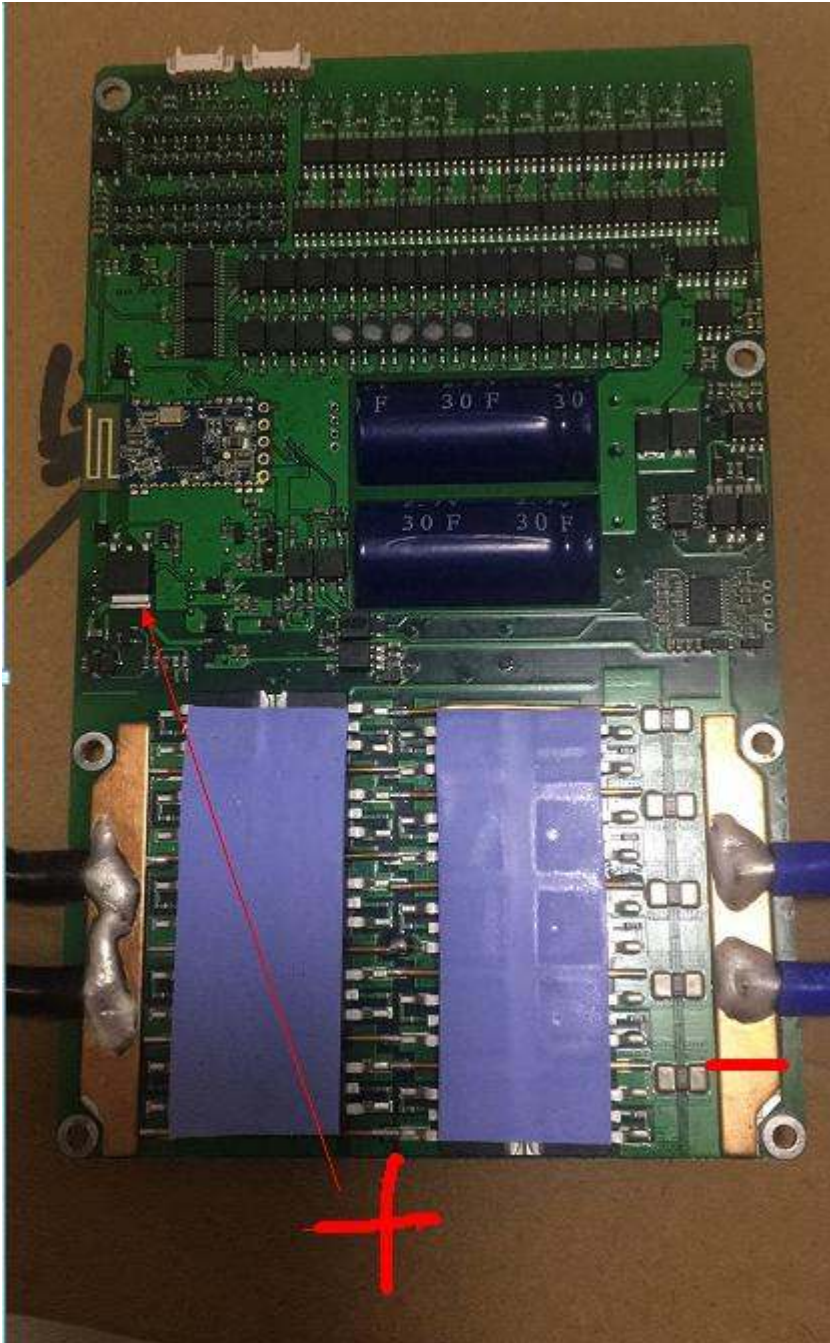
C- or P- connect 5V battery -

B- connect 5v battery +



C. open the bms case, then use the charger to start the bms as below pic show
This way no need battery, use the charger positive and negative wire connect to bms + and - as pic show (donot advise this way for safe reason)





4.2 APP operation instructions

4.2.1 Equipment operation

a) Device connection

First turn on the mobile phone's Bluetooth, then open the APP, as shown in Figure .

Click the icon in the upper left corner to scan the device.

After the scan is completed, click the name of the device to be connected, such as "JK-B1A24S".

The APP will prompt to enter the password when connecting for the first time.

The default password of the device is "1234". (When change the data, password is 123456)

After the device is connected, the APP will automatically record the password.

You do not need to enter the password for the next connection.

The APP will automatically connect after opening the APP.

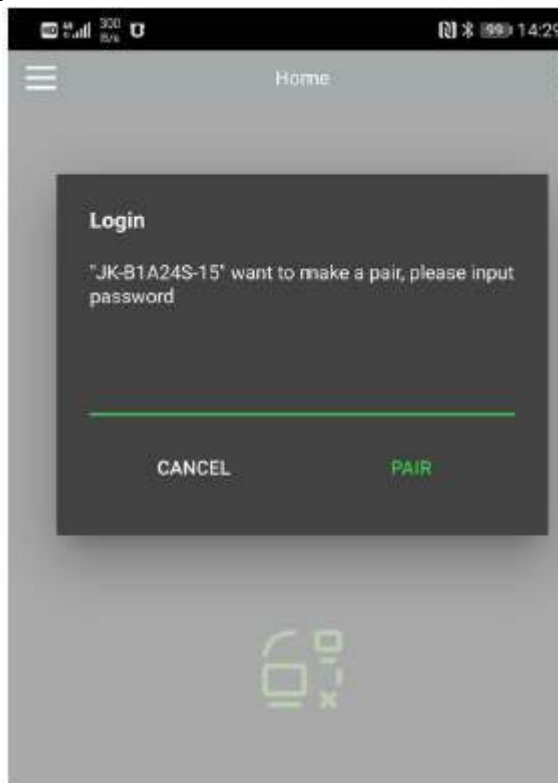
The password input interface is shown in the figure.

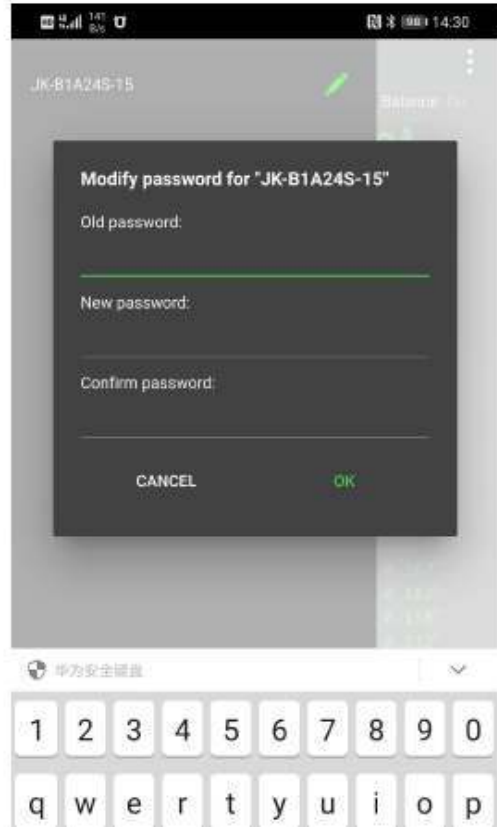
b) Modify password and name

After the device is connected, click the "pen" icon on the right side of the device list to modify the device name and password.

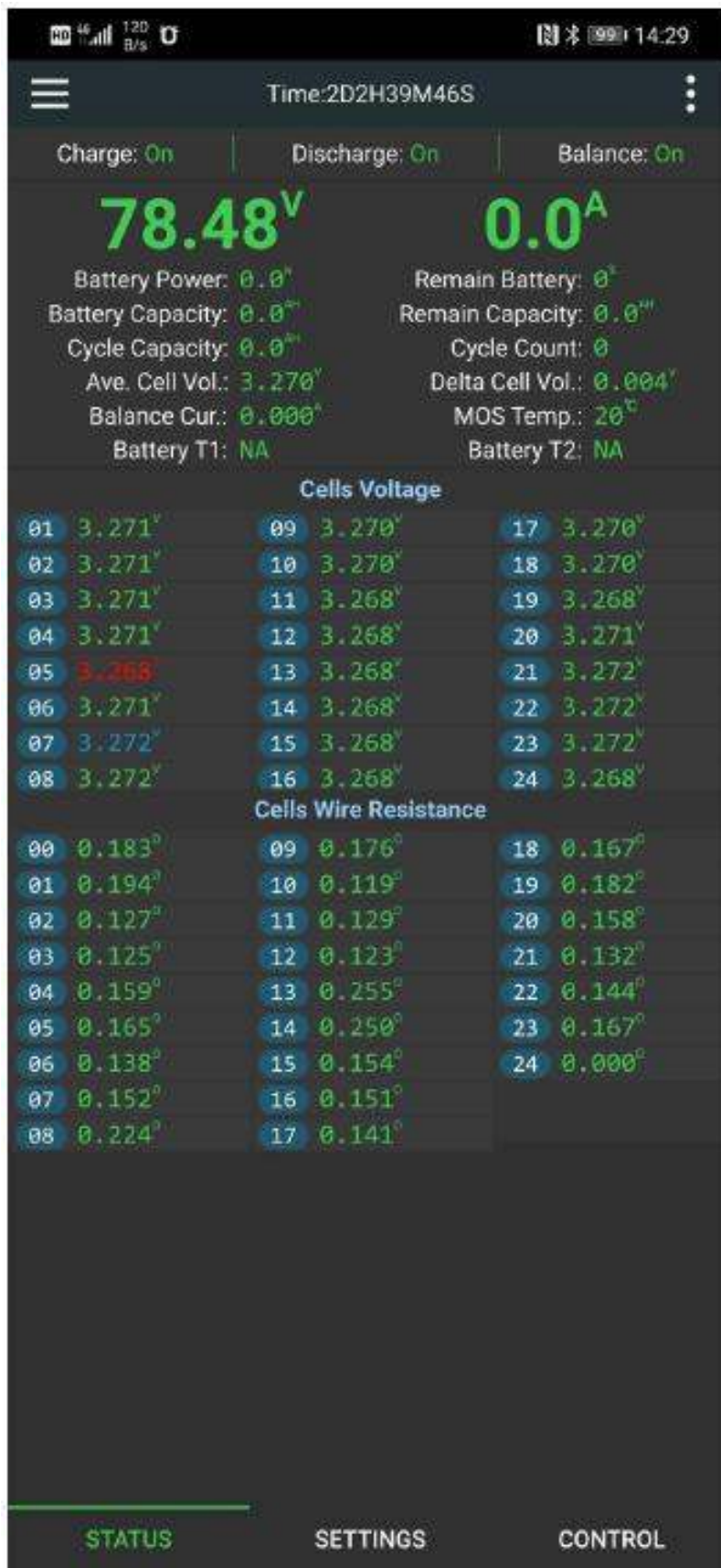
The interface for modifying the device name is shown in Figure 15. Note that the device name only supports English or numbers, not Chinese names and Chinese characters.

The password modification interface is shown in Figure 16. To modify the device password, you must first enter the device's old password. Only when the current password is correct, can you enter the new password input option. After entering the new password twice, click "OK" to complete the device password modification.





4.3. Status View



The real-time status page is divided into 3 areas.

Area 1 in the figure is the battery comprehensive information column. The definition of each parameter is as follows:

a) Running time

The running time represents the total running time since the BMS was turned on the first time.

b) Charging

Indicates the current on state of the charging MOS of the BMS. When it displays "on", it means that the current BMS charging MOS is on and the battery is allowed to charge; when it displays "off", it means the current BMS charging MOS is off and the battery is not allowed to charge.

c) Discharge

Indicates the on state of the current BMS discharge MOS. When it displays "on", it means that the current BMS discharge MOS is open and the battery is allowed to discharge; when it displays "off", it means the current BMS discharge MOS is off and the battery is not allowed to discharge.

d) Balance

Indicates the current on state of the equalization switch of the BMS. When "ON" is displayed, the BMS will automatically balance when the equilibrium starting condition is reached; when "OFF" is displayed, the balance is off, and the BMS will not balance the battery.

e) Voltage

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

f) Current

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

g) Battery power

Represents the total power output or input of the current battery, and its value is the product of the current battery voltage and the absolute value of the battery current.

h) Remaining battery

Indicates the current percentage of battery power remaining.

i) Battery capacity

Represents the actual battery capacity calculated by the high-precision SOC of the current BMS, and the unit is AH. (This value needs to be updated after the battery has completed a complete discharge and charge cycle).

j) Remaining capacity

The remaining capacity represents the remaining capacity of the current battery, unit: AH.

k) Cycle capacity

Cycle capacity represents the cumulative discharge capacity of the battery,

unit: AH.

l) Cycle count

The number of cycles indicates the number of times that the current battery is fully charged, and the unit is: times.

m) Ave.cell Voltage

Indicates the average voltage of the current battery cell, unit: V.

n) Della Cell Vol.

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

o) Balance current

When the BMS turns on the equalization function and the equalization condition is reached, the equalization current is displayed in real time, in A. When the balance is in progress, the real-time status status display area, blue represents the discharged battery, red represents the charged battery. The negative current of the equalization current indicates that the battery is discharging, and the blue flashes at this time, and the positive current of the equalization current indicates that the battery is charging, and the red flashes at this time.

The BMS uses active equalization technology. The principle of balance is to take electricity from the high-voltage cell, store it in the BMS, and then put it on the low-voltage cell.

p) MOS temperature

Real-time display the current temperature of the BMS power MOS, unit: °C.

q) Battery temperature 1

When the temperature sensor 1 is not installed, "NA" is displayed. When the temperature sensor is installed, the temperature of the temperature sensor 1 is displayed in real time, in °C.

r) Battery temperature 2

When the temperature sensor 2 is not installed, "NA" is displayed. When the temperature sensor is installed, the temperature of the temperature sensor 2 is displayed in real time, in °C.

In the figure, area 2 is the cell voltage area. Real-time display of the voltage data of each cell in the battery pack, where red represents the cell with the lowest voltage and blue represents the cell with the highest voltage.

Area 3 in the figure is the equalizing line resistance area. The equalizing line resistance is the equalizing line resistance obtained by the self-check of the BMS. This value is only a rough calculation. The purpose is to prevent wrong wiring or poor contact. When the equalizing line resistance exceeds a certain value, it will be displayed in yellow. Cannot turn on equalization.

4.3.1 Parameter setting

The parameter setting page is shown in Figure 18.

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

a) One key iron lithium

Function This button can modify all the working parameters of the BMS to iron-lithium battery parameters. The default values of the parameters are shown in Appendix 1.

b) One key triple

Function This button can modify all the working parameters of the BMS to the iron-lithium battery parameters. The default values of the parameters are shown in Appendix II.

c) Number of individual battery cells

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

d) Battery capacity

This value is the design capacity of the battery.

e) Trigger equalizing pressure difference

The trigger equalization pressure difference is the only parameter that controls the equalization. When the equalization switch is turned on, when the maximum pressure difference of the battery pack exceeds this value, the equalization starts and ends when the pressure difference falls below this value. For example, set the equalization trigger voltage difference to 0.01V, when the battery pack voltage difference is greater than 0.01V, the equalization will begin, and the equalization will end when the voltage drop is below 0.01V. (It is recommended to set the equalized trigger pressure difference for batteries above 50AH to 0.005V, and set the equalized trigger pressure difference for batteries below 50AH to 0.01V).

f) Voltage calibration

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

When it is found that there is an error between the total voltage collected by the BMS and the total voltage of the battery, you can use the voltage calibration function to calibrate the BMS. The method of calibration is to fill in the total battery voltage currently measured, and then click on the "small plane" behind the voltage calibration to complete the calibration.

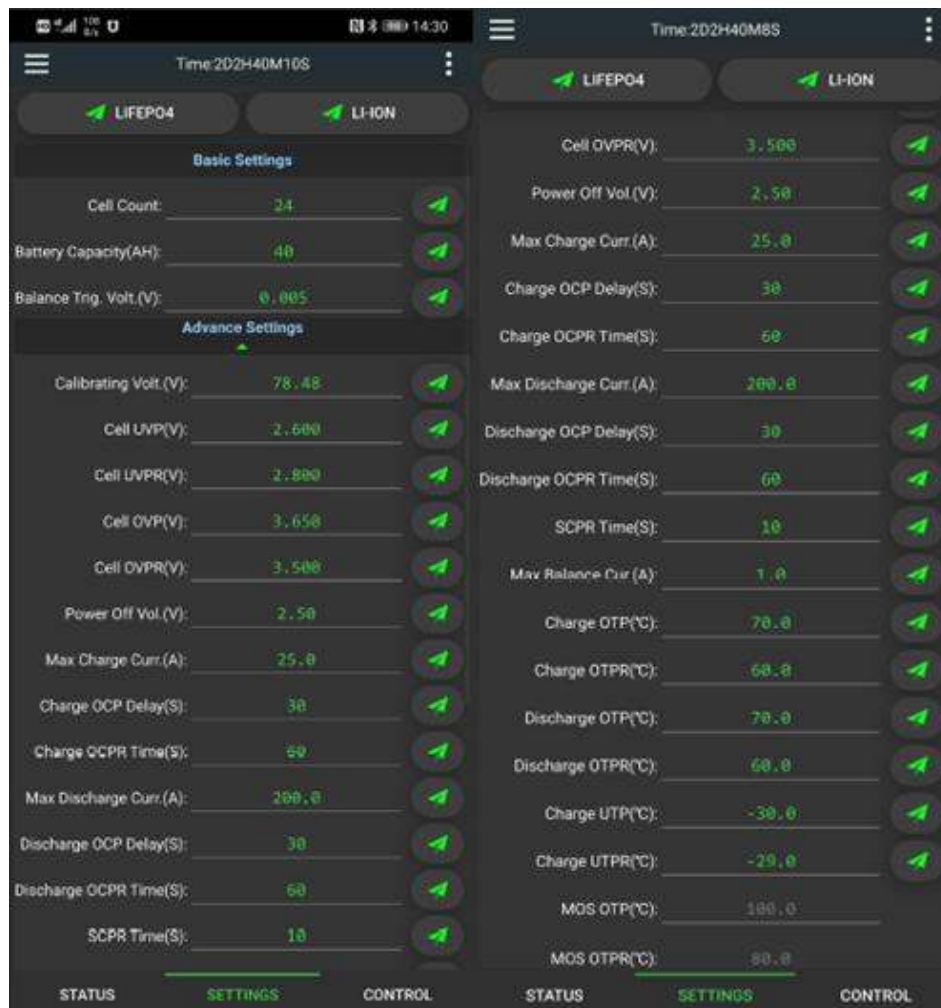
g." individual battery cell undervoltage protection", " individual battery cell undervoltage recovery"

"Single undervoltage protection" refers to the cut-off voltage of the cell. As long as the voltage of any cell in the battery pack is lower than this value, a "cell undervoltage alarm" is generated, and the BMS turns off the discharge MOS. At this time, the battery cannot Discharge, only charge. When the alarm is generated, only after the voltage values of all cells exceed the value of "cell

voltage recovery", the BMS releases the "cell undervoltage alarm" and turns on the discharge MOS at the same time.

h) "Cell overcharge voltage", "cell overcharge recovery"

"Cell overcharge voltage" refers to the saturation voltage of the battery cell. As long as the voltage of any cell in the battery pack exceeds this value, a "cell overcharge alarm" will be generated, and the BMS will turn off the charging MOS, and the battery cannot be charged at this time, Can only discharge. When the alarm is generated, only after the voltage values of all cells are lower than the value of "cell overcharge recovery", the BMS will release the "cell overcharge alarm" and turn on the charging MOS at the same time.



i) Automatic shutdown voltage

The automatic shutdown voltage represents the lowest voltage at which the BMS works. When the voltage of the highest cell in the battery pack is lower than this value, the BMS is turned off. This value must be lower than "Single undervoltage protection".

j) "Maximum charge current", "charge overcurrent delay", "charge

overcurrent release"

When charging the battery pack, if the current exceeds the "maximum charging current" and the duration exceeds the "charging overcurrent delay" time, the BMS generates a "charging overcurrent alarm" and turns off the charging MOS. After the alarm is generated, after the "charge overcurrent release" time has elapsed, the BMS releases the charge overcurrent alarm and restarts the charging MOS.

Example: Set "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 10A continuously for 10 seconds, the BMS will generate a 'charging overcurrent alarm' and at the same time turn off the charging MOS. 50 seconds after the alarm is generated, the 'charging overcurrent alarm' will be released and the BMS will restart the charging MOS.

k) "Maximum discharge current", "Discharge overcurrent delay", "Discharge overcurrent release"

When discharging the battery pack, if the current exceeds the "maximum discharge current" and the duration exceeds the "discharge overcurrent delay" time, the BMS will generate a "discharge overcurrent alarm" and turn off the discharge MOS. After the alarm is generated, after the "discharge overcurrent release" time, the BMS releases the "discharge overcurrent alarm" and restarts the discharge MOS.

Example: Set "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 100A for 10 seconds, the BMS will generate a 'discharge overcurrent alarm' and turn off the discharge MOS. 50 seconds after the alarm is generated, the 'discharge overcurrent alarm' will be released and the BMS will restart the discharge MOS.

l) Short circuit protection released

When the short-circuit protection occurs, the short-circuit protection will be released after the time set by the "short-circuit protection release".

m) Maximum balance current

The equalization current represents the continuous current of high-voltage battery discharge and low-voltage battery charging in the process of energy transfer.

The maximum balance current represents the maximum current in the energy

transfer process, and the maximum balance current should not exceed 0.1C. For example: 20AH battery does not exceed $20 \times 0.1 = 2A$.

n) "Charging over temperature protection", "charging over temperature recovery"

During the charging process, when the battery temperature exceeds the value of "charging over-temperature protection", the BMS will generate a warning of "charging over-temperature protection" and the BMS will turn off the charging MOS. After the alarm is generated, when the temperature is lower than the "charging over temperature recovery", the BMS will release the "charging over temperature protection" warning, and at the same time restart the charging MOS.

o) "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 BMS will generate a "charging low temperature protection" warning, and the BMS will close the charging MOS. After the alarm is generated, when the temperature is higher than the "charging low temperature recovery", the BMS releases the "charging low temperature protection" warning, and at the same time restarts the charging MOS.

p) "MOS over temperature protection", "MOS over temperature recovery"

When the MOS temperature exceeds the value of "MOS over temperature protection", the BMS generates a "MOS over temperature alarm" and closes the charge and discharge MOS, and the battery cannot be charged or discharged. After the alarm is generated, after the MOS temperature is lower than the value of "MOS over temperature recovery", the BMS will release the "MOS over temperature alarm", and at the same time re-open the charge and discharge MOS (MOS over temperature protection value is 75 °C, MOS over temperature recovery value 65°C, these two values are factory default values and cannot be modified).

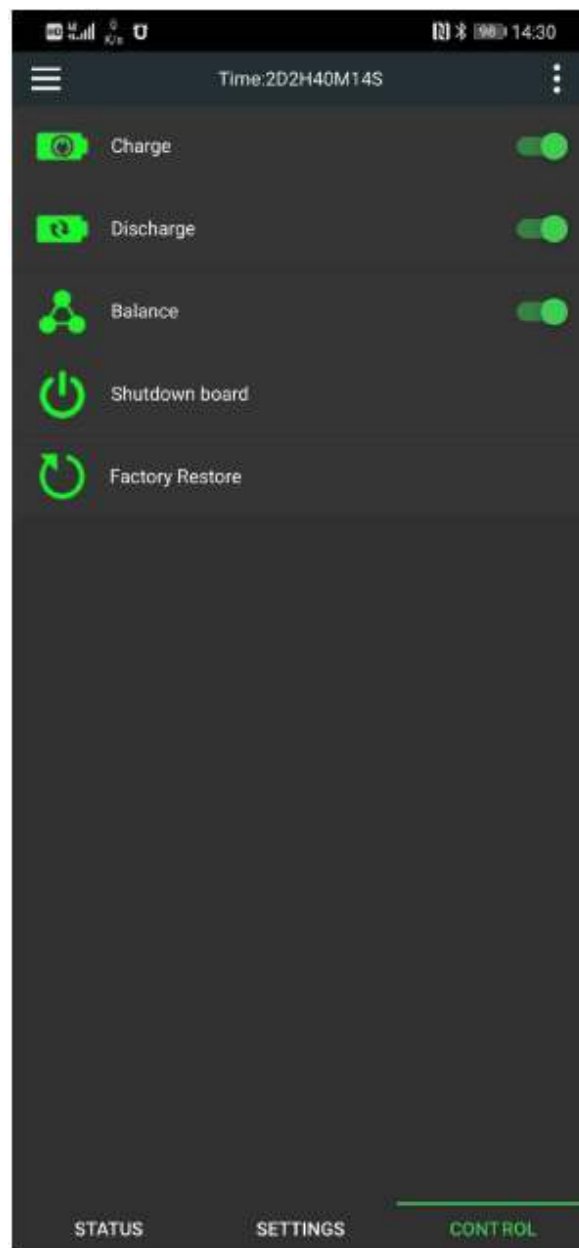
note:

For any parameter modification, please refer to the manual. Inappropriate parameters may cause the BMS to not work properly or even burn the BMS. After any parameter is modified, you need to click the "little plane" behind the parameter to complete the parameter delivery. After the equalizer successfully receives the parameter, it will make a beep.

4.4 BMS control

The BMS control page is shown in the figure. Through BMS control, the charging function, discharging function, and equalizing function of the BMS can be switched, and the power supply of the BMS can be turned off, and the

factory settings can be restored.



5 Safety protection measures and precautions

There is no high voltage in the BMS itself, which will not cause electric shock to the body.

Please read the instruction manual carefully before use, and connect the wires according to the correct wiring diagram with different numbers of strings.

Connect from the negative pole to the positive pole. After the equalization line is connected, use a multimeter to confirm again, and then insert the BMS after confirming that it is correct.

It is not allowed to modify the power line of the BMS without authorization.

Modifying the power line without authorization will cause uneven overcurrent of the BMS and burn the BMS.

6 Transportation and storage

6.1 Transportation

The packed products are not directly affected by rain and snow, and can be transported by usual means of transportation. It is not allowed to put it together with corrosive substances such as acid and alkali during transportation.

6.2 Storage

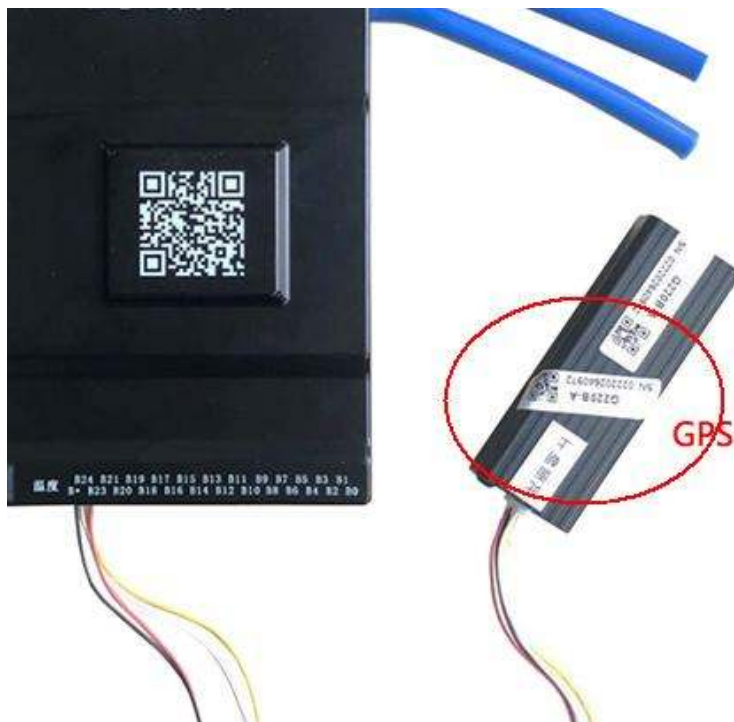
The packaged products should be stored in a permanent warehouse. The temperature of the warehouse is 0°C~35°C, the relative humidity is not more than 80%. There should be no acid, alkali, corrosive gas, strong mechanism vibration and impact, and no strong magnetic field in the warehouse. The role of.

7.About CAN

When plug CAN module, pls take off the power of BMS. Pls note, plug CAN at first, then power on the BMS.

8. About GPS

Account is SN number in the module, password 123456,use GPRS



General fault analysis and elimination

1. BMS can not start up
 - a. Make sure the bms last wire B+, connect to battery pack +
 - b. Charging activate boot, make sure the charger voltage more higher 4V than battery pack
 - c. Check charger if have voltage output

2. Inaccurate Voltage
 - a. Use a millimeter to measure the actual battery pack voltage, and fill in the actual total voltage in the "Voltage Calibration" on the parameter setting page

3. Inaccurate current
 - a. The B- and P- of the BMS are two 7AWG wires, both of which need to be connected in parallel, otherwise it will cause current errors
 - b. Use a clamp meter to measure the actual current of the battery pack, and fill in the actual current in the "Current Calibration" on the parameter setting page. The larger the actual current, the higher the calibration accuracy.

4. Inaccurate capacity
 - a. When the BMS is powered on for the first time, an initial capacity estimated based on the cell voltage, which is not accurate
 - b. After the BMS is discharged to the cut-off voltage, the capacity is calibrated when it is fully charged, and the charging process cannot be interrupted.

5. The design series does not match the actual battery series
 - a. Check whether the "number of monomers" in the parameter setting is set correctly
 - b. If there is no voltage in two or more strings in the middle, check whether the collection cable is off

Appendix Default parameters of "One-key Lithium Iron", "One-key Ternary" and "One-key Lithium Titanate"

| Item | Spec | li-ion | Lifepo4 | LTO | unit |
|-------------|--------------------------------------------------------|---------------|----------------|------------|-------------|
| 1 | Single undervoltage protection | 2.9 | 2.6 | 1.8 | V |
| 2 | Single-unit undervoltage protection recovery | 3.2 | 3.0 | 2.0 | V |
| 3 | Single overcharge voltage | 4.2 | 3.6 | 2.7 | V |
| 4 | individual battery cell overcharge protection recovery | 4.1 | 3.4 | 2.4 | V |
| 5 | Trigger equalizing 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 | seconds |
| 8 | Charge overcurrent protection release time | 60 | 60 | 60 | seconds |
| 9 | Discharge overcurrent protection delay | 30 | 30 | 30 | seconds |
| 10 | Discharge overcurrent protection release time | 60 | 60 | 60 | seconds |
| 11 | Short circuit protection release time | 60 | 60 | 60 | seconds |
| 12 | Charging over temperature protection temperature | 60 | 60 | 60 | °C |
| 13 | Charging over temperature recovery temperature | 55 | 55 | 55 | °C |
| 14 | Discharge over temperature protection temperature | 60 | 60 | 60 | °C |
| 15 | Discharge over temperature recovery temperature | 55 | 55 | 55 | °C |
| 16 | Charging low temperature protection temperature | -20 | -20 | -20 | °C |
| 17 | Charging low temperature recovery temperature | -10 | -10 | -10 | °C |
| 18 | MOS over temperature protection temperature | 75 | 75 | 75 | °C |
| 19 | MOS over temperature protection recovery temperature | 70 | 70 | 70 | °C |