

# **Smart Battery Management System with Active Balance**

**JK-BD6AxxS-6P/ JK-BD6AxxS-8P**

**JK-BD6AxxS-10P / JK-B1AxxS-15P**

**JK-B2AxxS-15P/ JK-B2AxxS-20P**

## **Operation and Maintenance Manual**

## Product warranty terms

**Product name: Smart BMS**

**Warranty: 1 year**

First of all, thank you for purchasing the BMS product launched by Hunan XiaoLi Technology Co., Ltd.

Hunan Xiaoli Technology Co., Ltd. provides quality warranty for the hardware products and accessories sold by our company. The warranty period is as shown above. During the warranty period, if there is a failure due to quality reasons, after receiving the claim about the product failure and checking and verifying. The company has the right to decide to repair or replace the product as a whole. A complete set of replacement products may be new or nearly new.

1. Hunan Xiaoli Technology Co., Ltd. guarantees that the product has been fully tested.
2. Hunan Xiaoli Technology Co., Ltd. does not guarantee that the product can be used without interruption during the product repair process. However, the company shall ensure that the malfunctioning product is repaired within a reasonable period of time.
3. The product warranty period starts from the date of shipment.
4. Hunan Xiaoli Technology Co., Ltd. does not provide free warranty for product failure and damage caused by any of the following situations:
  - (a) Incorrect use or improper maintenance;
  - (b) Software and accessories parts or other items that not provided by Hunan Xiaoli Technology Co., Ltd.
  - (c) Unauthorized disassembly, modification and misuse;
  - (d) Use beyond the scope specified in the product specifications;
  - (e) Improper transportation, handling and storage;
  - (f) Other Failure or damage caused by the irresistible force (such as earthquake, war, traffic accident, etc.).

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## **1. Overview**

The BMS for lithium battery is a management system tailored for large-capacity series-connected lithium battery packs. It has functions such as voltage acquisition, high current active equalization, overcharge, over-discharge, over-current and over-temperature protection, coulomb counter, Bluetooth communication, and GPS remote. Applicable to lithium iron phosphate, ternary lithium and other battery types.

The BMS relies on the energy transfer active equalization technology with independent intellectual property rights, which can achieve a maximum continuous 2A equalizing current. The high-current active equalization technology can ensure the consistency of the battery to the greatest extent, improve the battery cruising range, and delay the aging of the battery.

The BMS has a mobile APP, which supports Android and IOS operating systems. The APP can connect to the BMS through the mobile phone Bluetooth to check the working status of the battery, modify various working parameters of the BMS, control the charge and discharge switch, etc. The BMS is small in size, simple operation with full function, and can be widely used in battery packs for small sightseeing cars, scooters, shared cars, high-power energy storage, base station backup power, solar power plants and other products.

## BMS for lithium battery Operation and maintenance instructions

### 2. Main technical parameter

#### 2.1. Main technical specification

Specification of 6P/8P/10P/15P series BMS

Sheet 1 Specification of 6P/8P series BMS

Specification	Product Model					
	BD6A17S6P	BD6A20S6P	BD6A24S6P	BD6A17S8P	BD6A20S8P	BD6A24S8P
Li-ion	7~17	7~20	7~24	7~17	7~20	7~24
LiFePo4	8~17	8~20	8~24	8~17	8~20	8~24
LOT	14~17	14~20	14~24	14~17	14~20	14~24
Balance mode	Active balance					
Equalizing current	0.6A					
Main circuit conduction internal	1.53 mΩ			1.2 mΩ		
Continuous discharge current	60A	60A	60A	80A	80A	80A
Maximum discharge current	100A	100A	100A	150A	150A	150A
Charging overcurrent	10~60 A	10~60 A	10~60 A	10~80 A	10~80 A	10~80 A
Other interfaces (customized)	RS485 / CAN					
Display port	Yes					
Entry cable	Same port					
Single voltage range	1~5V					
Voltage acquisition	±3mV					
Overcharge protection voltage	1.2~4.35V adjustable					
Overcharge release voltage	1.2~4.35V adjustable					
Discharge time of charging	2~120S adjustable					
Over discharge protection voltage	1.2~4.35V adjustable					
Over discharge recovery voltage	1.2~4.35V adjustable					
Qty. of NTC	3pcs					
Temperature protection	Yes					
Short circuit protection	Yes					
Coulomb meter	Yes					
Bluetooth	Support Android & IOS					
GPS (optional)	RS485 or GPS					

**BMS for lithium battery Operation and maintenance instructions**

Sheet 1 Specification of 10P/15P series BMS

Specification	Product Model					
	BD6A20S10P	BD6A24S10P	B1A20S15P	B1A24S15P	B2A24S15P	B2A24S20P
Li-ion	7~20	7~24	7~20	7~24	7~24	7~24
LiFePo4	8~20	8~24	8~20	8~24	8~24	8~24
LOT	14	14~20	14~20	14~24	14~24	14~24
Balance mode	Active balance					
Equalizing current	0.6A		1A		2A	
Main circuit conduction internal	1 mΩ		0.65 mΩ		0.47 mΩ	
Continuous discharge current	100A		150A			200A
Maximum discharge current	200A		300A			350A
Charging overcurrent	10~100A		10~150A			10~200A
Other interfaces (customized)	RS485 / CAN					
Display port	Yes					
Entry cable	Same port					
Single voltage range	1~5V					
Voltage acquisition	±3mV					
Overcharge protection voltage	1.2~4.35V adjustable					
Overcharge release voltage	1.2~4.35V adjustable					
Discharge time of charging	2~120S adjustable					
Over discharge protection voltage	1.2~4.35V adjustable					
Over discharge recovery voltage	1.2~4.35V adjustable					
Qty. of NTC	3pcs					
Temperature protection	Yes					
Short circuit protection	Yes					
Coulomb meter	Yes					
Bluetooth	Support Android & IOS					
GPS (optional)	RS485 or GPS					

## **2.2. Application**

- Operation temperature range:  $-30^{\circ}\text{C}\sim 70^{\circ}\text{C}$ ;
- Power requirement: 20~100V。
- Power consumption: 8mA@100V in balanced state,  
7mA@100V in unbalanced state.

### 3. Description of connector and interface

#### 3.1. Connector and LED position

The positions of two types of BMS connectors and LED lights are shown in Figure 1 and Figure 2.

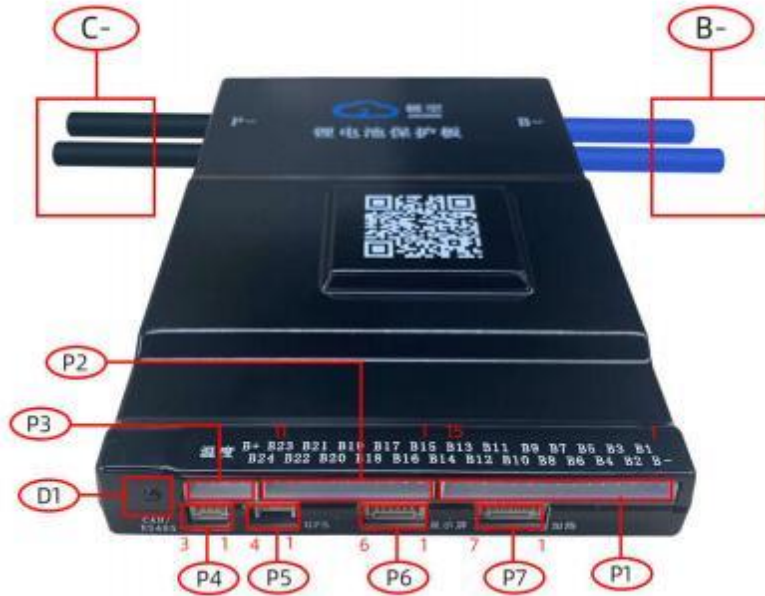


Figure 1 BD6AxxS- 10P/ B1AxxS- 15P/B2AxxS- 15P/B2AxxS20P Connector Diagram

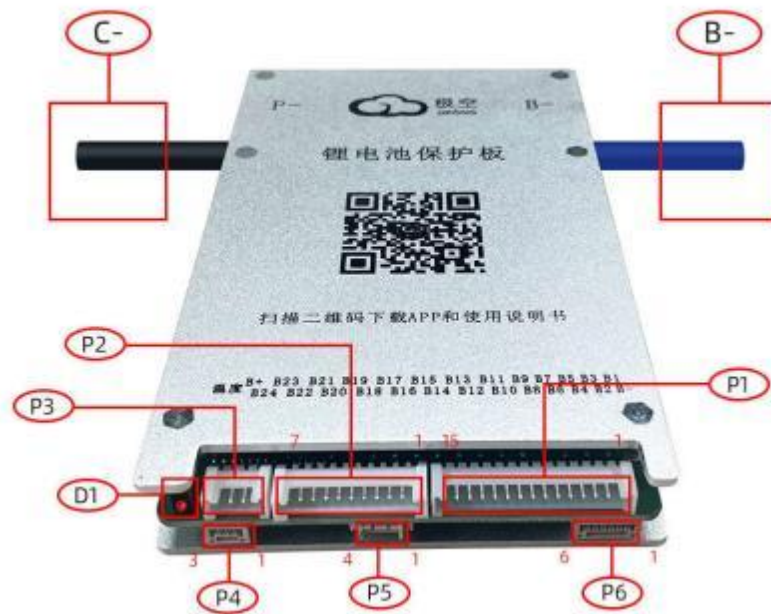


Figure 2 BD6AxxS-6P Connector diagram



## BMS for lithium battery Operation and maintenance instructions

### 3.2. Connector and LED Definition

BD6AxxS-6P/BD6AxxS-8P/BD6AxxS- 10PB1AxxS- 15P/B2AxxS- 15P/B2AxxS20Pfor connector definition and LED light definition are shown in sheet 3 and sheet 4.

**Figure 3. P1~P4 connector and definition**

Connector	Port name	Pin No.	BD6AxxS-6P/BD6AxxS-8P/BD6AxxS- 10P B1AxxS- 15P/B2AxxS- 15P/B2AxxS20P	
			Name	Definition
P1	Equalization and Acquisition port	1	B-	Total battery negative
		2	B1	Cell 1 Positive
		3	B2	Cell 2 Positive
		4	B3	Cell 3 Positive
		5	B4	Cell 4 Positive
		6	B5	Cell 5 Positive
		7	B6	Cell 6 Positive
		8	B7	Cell 7 Positive
		9	B8	Cell 8 Positive
		10	B9	Cell 9 Positive
		11	B10	Cell 10 Positive
		12	B11	Cell 11 Positive
		13	B12	Cell 12 Positive
		14	B13	Cell 13 Positive
		15	B14	Cell 14 Positive
P2		1	B15	Cell 15 Positive
		2	B16	Cell 16 Positive
		3	B17	Cell 17 Positive
		4	B18	Cell 18 Positive
		5	B19	Cell 19 Positive
		6	B20	Cell 20 Positive
		7	B21	Cell 21 Positive
		8	B22	Cell 22 Positive
		9	B23	Cell 23 Positive
		10	B24	Cell 24 Positive(Total battery positive)
		11	B+	BMS Power, Total battery positive
P3	Temperature sensor port	1	T1A	1 <sup>st</sup> temperature sensor A pin
		2	T1B	1 <sup>st</sup> temperature sensor B pin
		3	T2A	2 <sup>nd</sup> temperature sensor A pin
		4	T2B	2 <sup>nd</sup> temperature sensor B pin
P4	Communication	1	D_P	CAN_L/RS485-P Signal positive (Optional, CAN or RS485)
		2	D_N	CAN_H/RS485-N Signal negative (Optional, CAN or RS485)
		3	GND	Signal Ground

**BMS for lithium battery Operation and maintenance instructions**

**Figure 4. P5~P7 connector and definition**

Connector	Port name	Pin No.	BD6AxxS-6P/BD6AxxS-8P/BD6AxxS- 10P B1AxxS- 15P/B2AxxS- 15P/B2AxxS20P	
			Name	Definition
P5	GPS port	1	VGPS	Power output, the voltage is close to B+
		2	TX	UART_TX,3.3V
		3	RX	UART_RX,3.3V
		4	GND	Power/Signal Ground
P6	Display port	1	VCC	Display power output
		2	A	Display RS485 Signal Positive
		3	B	Display RS485 Signal Negative
		4	GND	Power Supply Negative
		5	K+	Active signal positive
		6	K <sub>-</sub>	Active signal positive
P7	Heat Port (Optional)	1	HT-	Heating the negative electrode—— (BD6AxxS-6P/BD6AxxS-8P without this function)
		2	HT-	Heating the negative electrode—— (BD6AxxS-6P/BD6AxxS-8P without this function)
		3	HT-	Heating the negative electrode—— (BD6AxxS-6P/BD6AxxS-8P without this function)
		4	HT-	Heating the negative electrode—— (BD6AxxS-6P/BD6AxxS-8P without this function)
		5	HT-	Heating the negative electrode—— (BD6AxxS-6P/BD6AxxS-8P without this function)
		6	CD+	Charge indication input positive—— (BD6AxxS-6P/BD6AxxS-8P without this function)
		7	CD-	Charge indication input negative—— (BD6AxxS-6P/BD6AxxS-8P without this function)
D1	Bluetooth connection indicator, the indicator is always on when the Bluetooth is connected to the protective board, and the indicator flashes when the connection is disconnected.			
C-	Connect external load or charger negative			
B-	Connected to electric core negative			

## BMS for lithium battery Operation and maintenance instructions

### 3.3. Product appearance

The appearance of JK-BD6AxxS- 10P 、JK-B1AxxS- 15P 、JK-B2AxxS- 15P 、JK-B2AxxS-20P smart BMS are shown as figure 3.



Figure 3. JK-BD6AxxS- 10P 、JK-B1AxxS- 15P 、JK-B2AxxS- 15P 、JK-B2AxxS-20P

The appearance of JK-BD6AxxS-6P 、JK-BD6AxxS-8P smart BMS are shown as figure 4.



Figure 4. JK-BD6AxxS-6P 、JK-BD6AxxS-8P

### 3.4. Dimension

The dimension of JK-BD6AXXS- 10P/JK-B1AXXS- 15P/JK-B2AXXS- 15P/JK-B2AXXS-20P series smart BMS are 162mm×102mm×20.4mm, shown as figure 5.

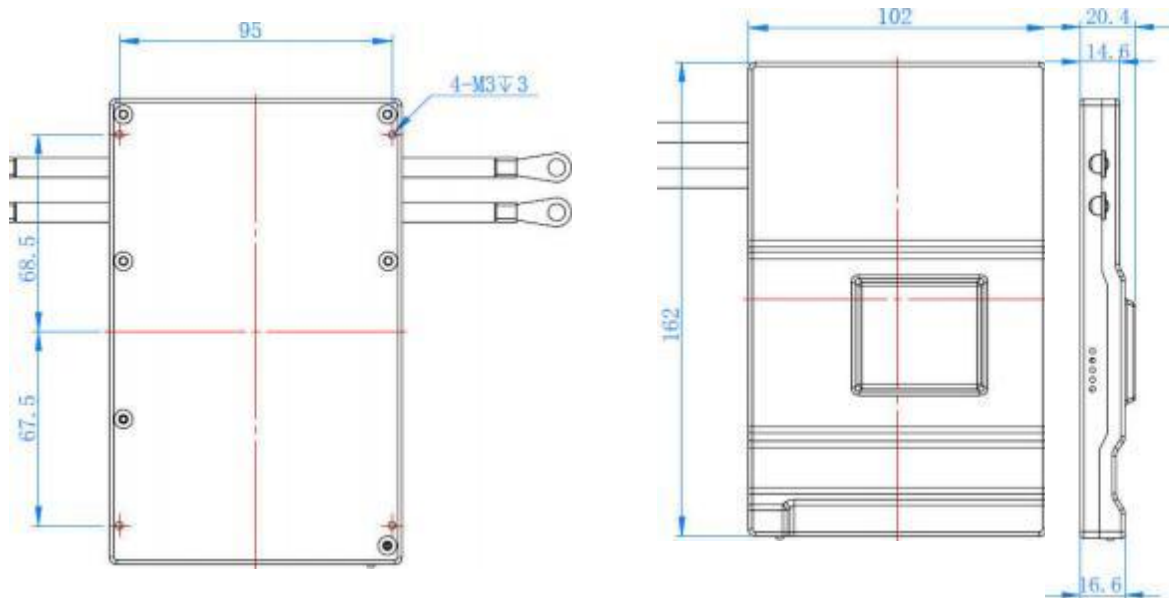


Figure. 5 BD6A20S10P/B2A24S10P/ B1A24S15P/B2A24S15P/B2A24S20P

The dimension of JK-BD6AXXS-6P 、 JK-BD6AXXS-8P series smart BMS are 136mm×83mm× 17.6mm, shown as figure 6.

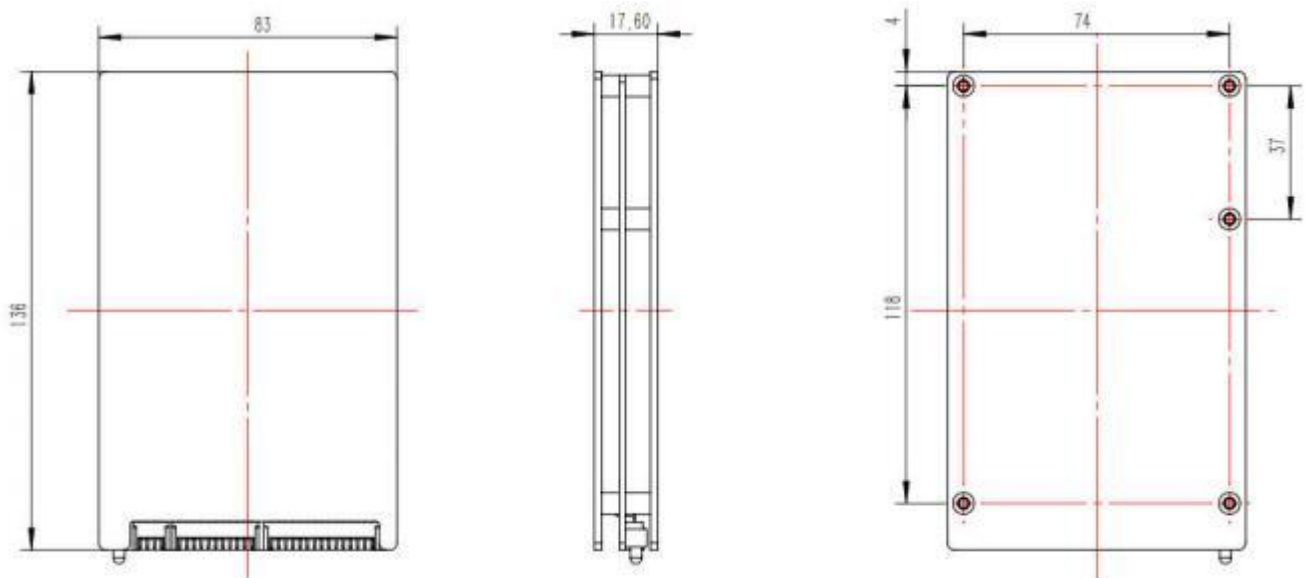


Figure 6. JJK-BD6AXXS-6P 、 JK-BD6AXXS-8P

### 3.5. Weight

- The weight of JK-BD6AXXS-6P 、 JK-BD6AXXS-8P series is approx. 257g .
- The weight of JK-BD6AXXS- 10P series is approx. 360g .
- The weight of JK-B1AXXS- 15P/JK-B2AXXS- 15P/JK-B2AXXS-20P series is approx. 430g .

## 4. Installation methods and precautions

### 4.1. Unpacking inspection and precautions

Unpacking inspection and precautions are as follows:

- a) Handling with care of the packing box, protective plate, etc, and try not to be inverted.
- b) Pay attention to the packaging if it is in good condition before unpacking, checking if there is a impact or damage on it.

### 4.2. Wiring diagram

JK-BD6AxxS- 10P 、 JK-B1AxxS- 15P、 JK-B2AxxS- 15P 、 JK-B2AxxS-20P series

is suitable for 7s-24s Lithium battery pack, different series of battery pack will be connecting in different way, the installation and wiring method is shown as below.

### 24串连接图

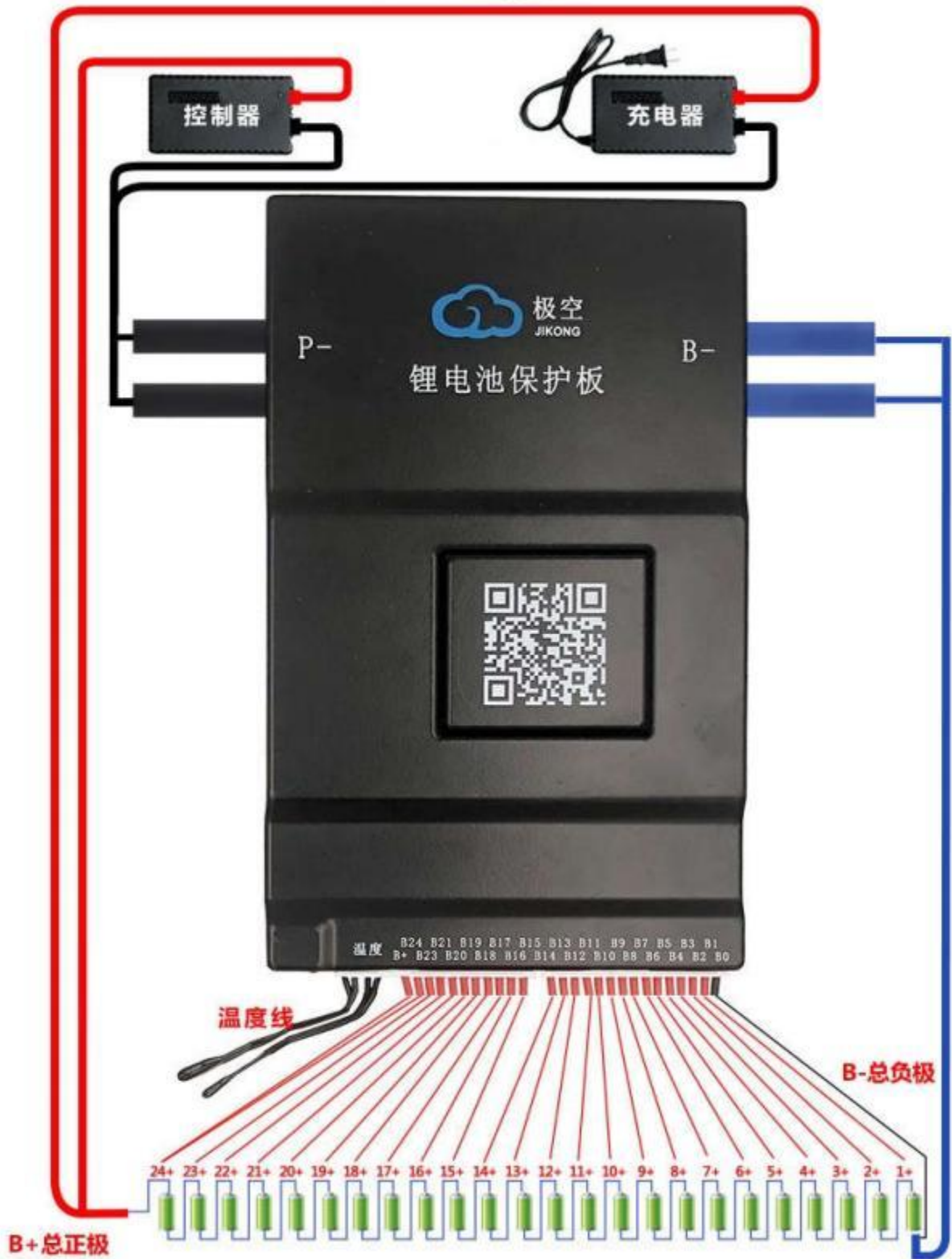


Figure 7. 24S wiring diagram

### 23串连接图

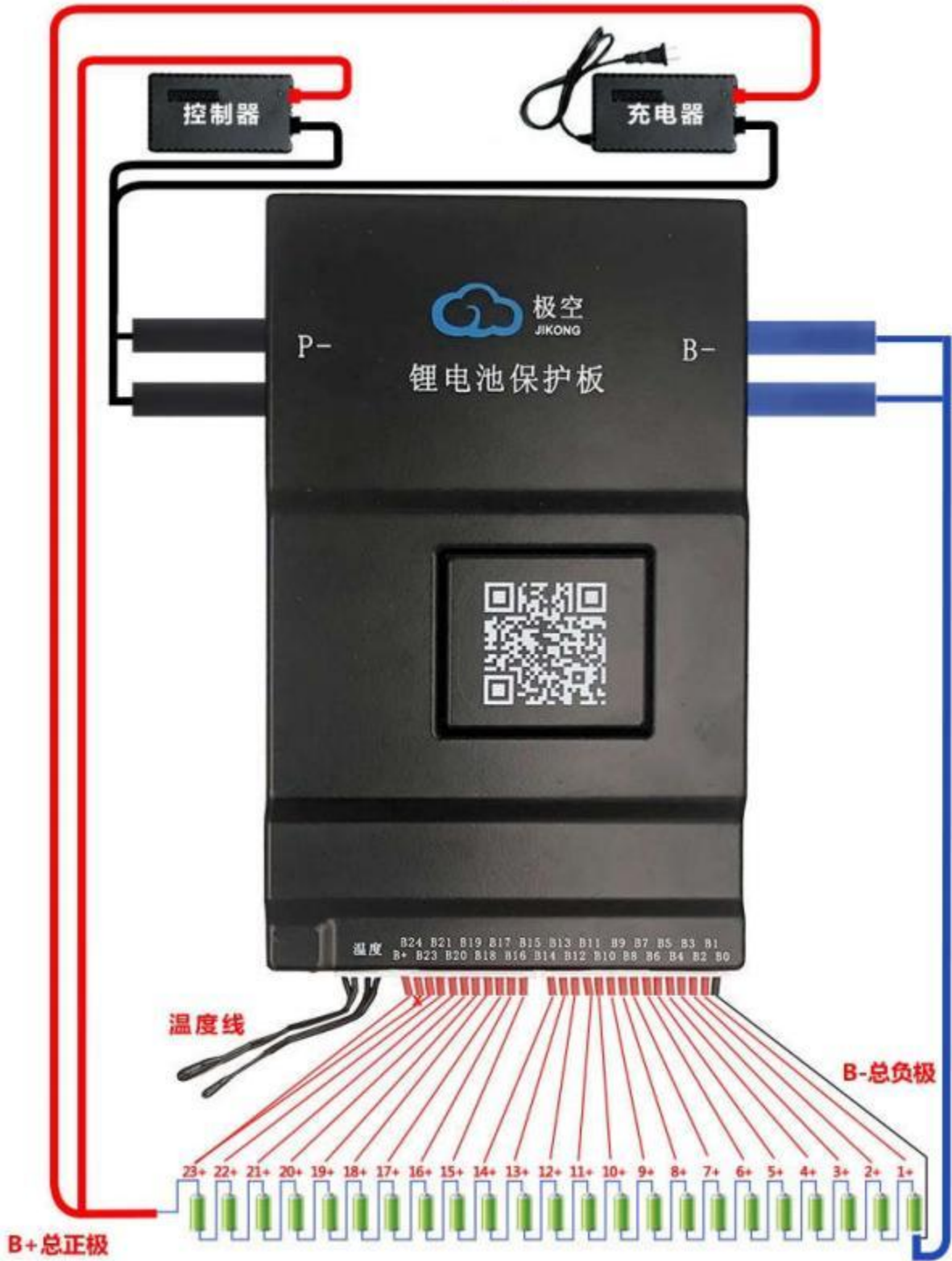


Figure 8. 23S wiring diagram

### 22串连接图

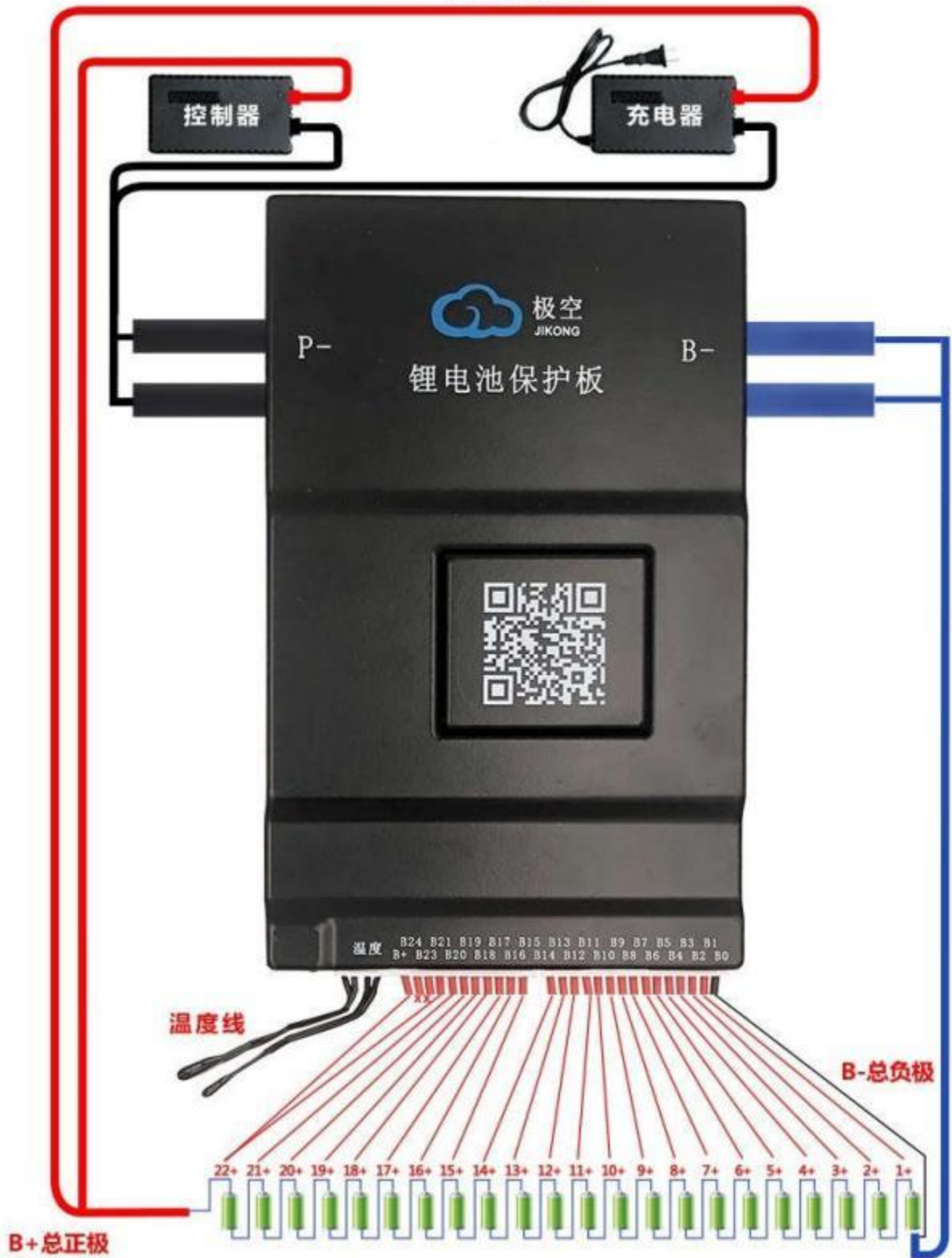


Figure 9. 22S wiring diagram



### 21串连接图

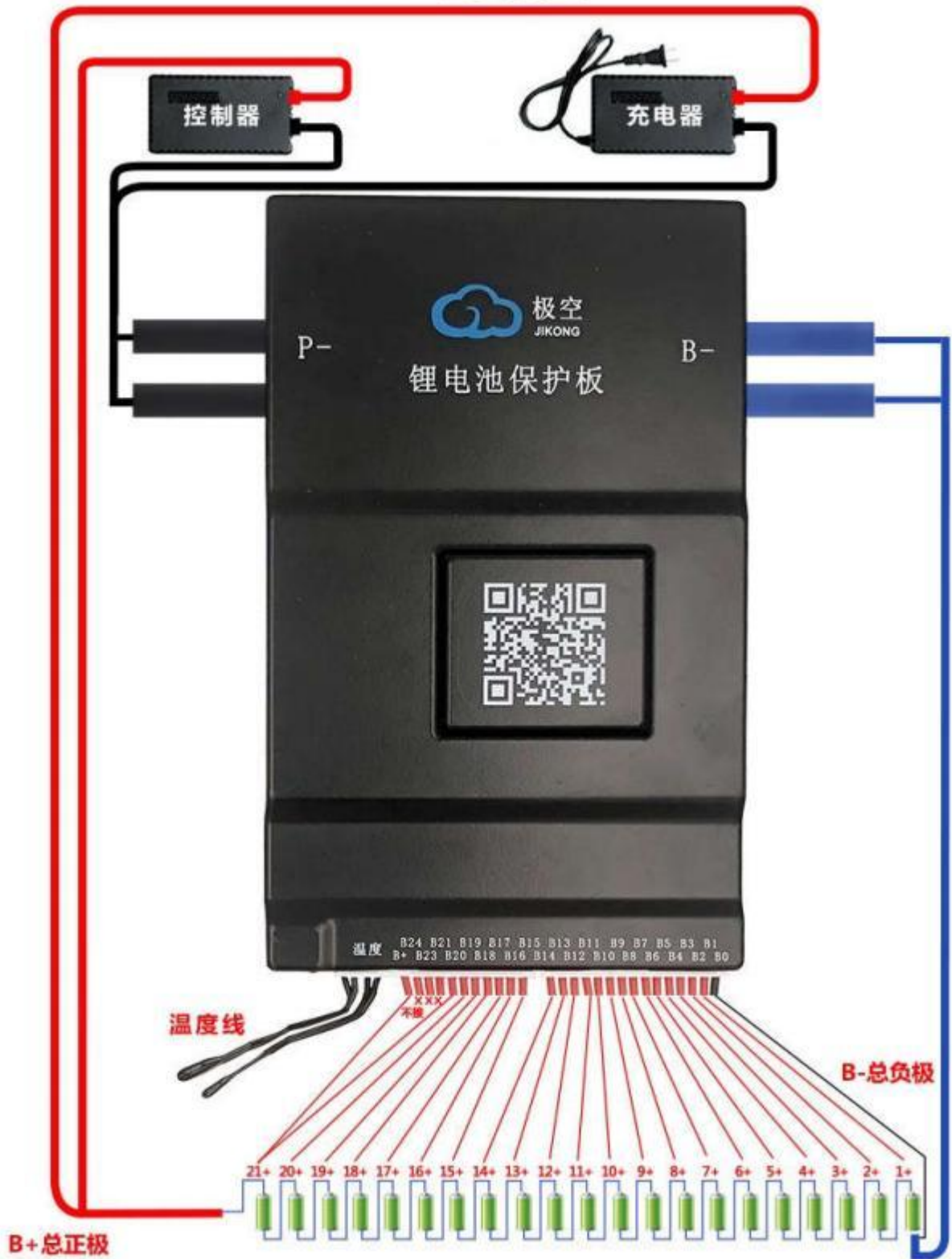


Figure 10. 21S wiring diagram

### 20串连接图

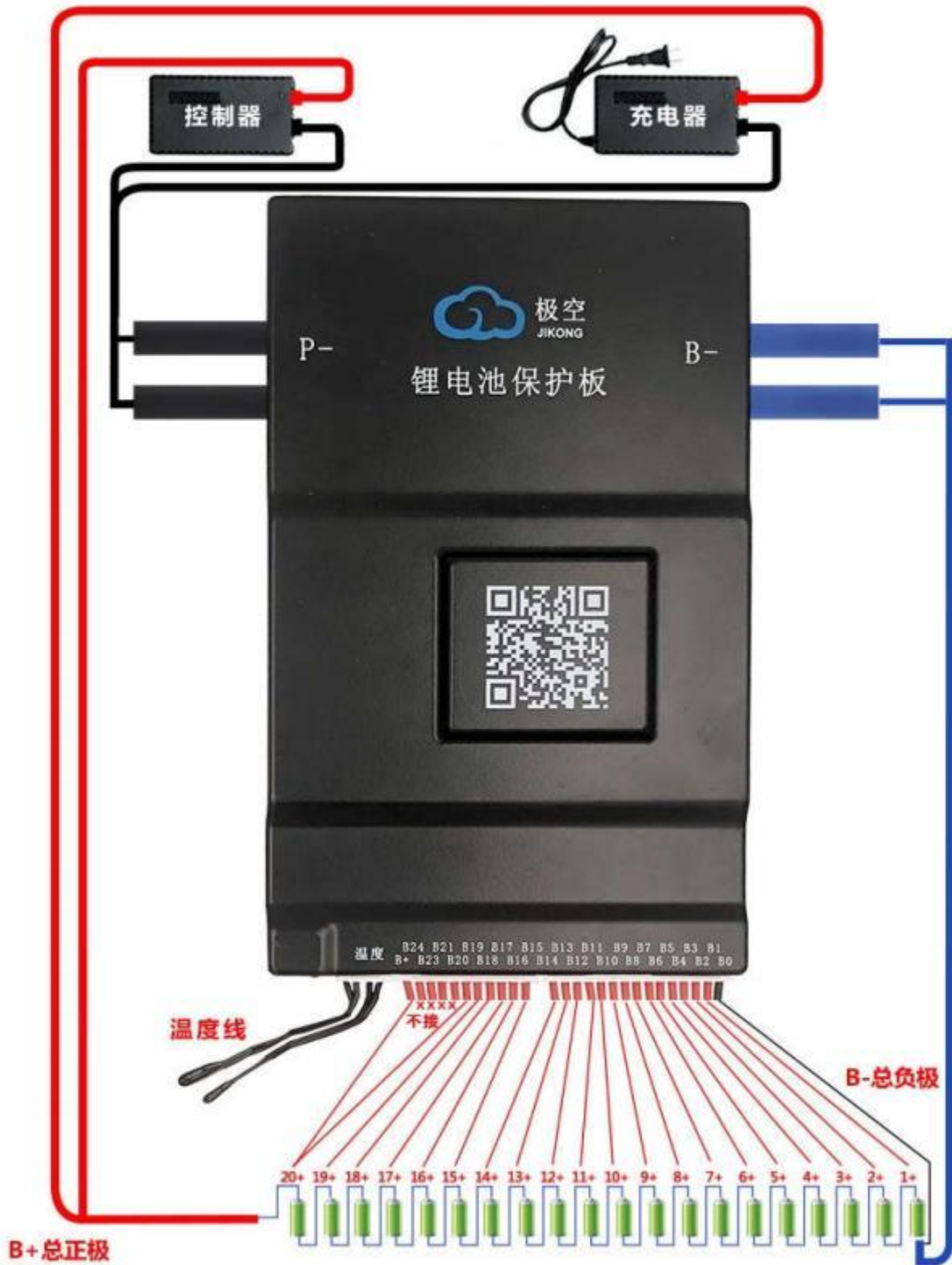


Figure 11. 20S wiring diagram

### 19串连接图

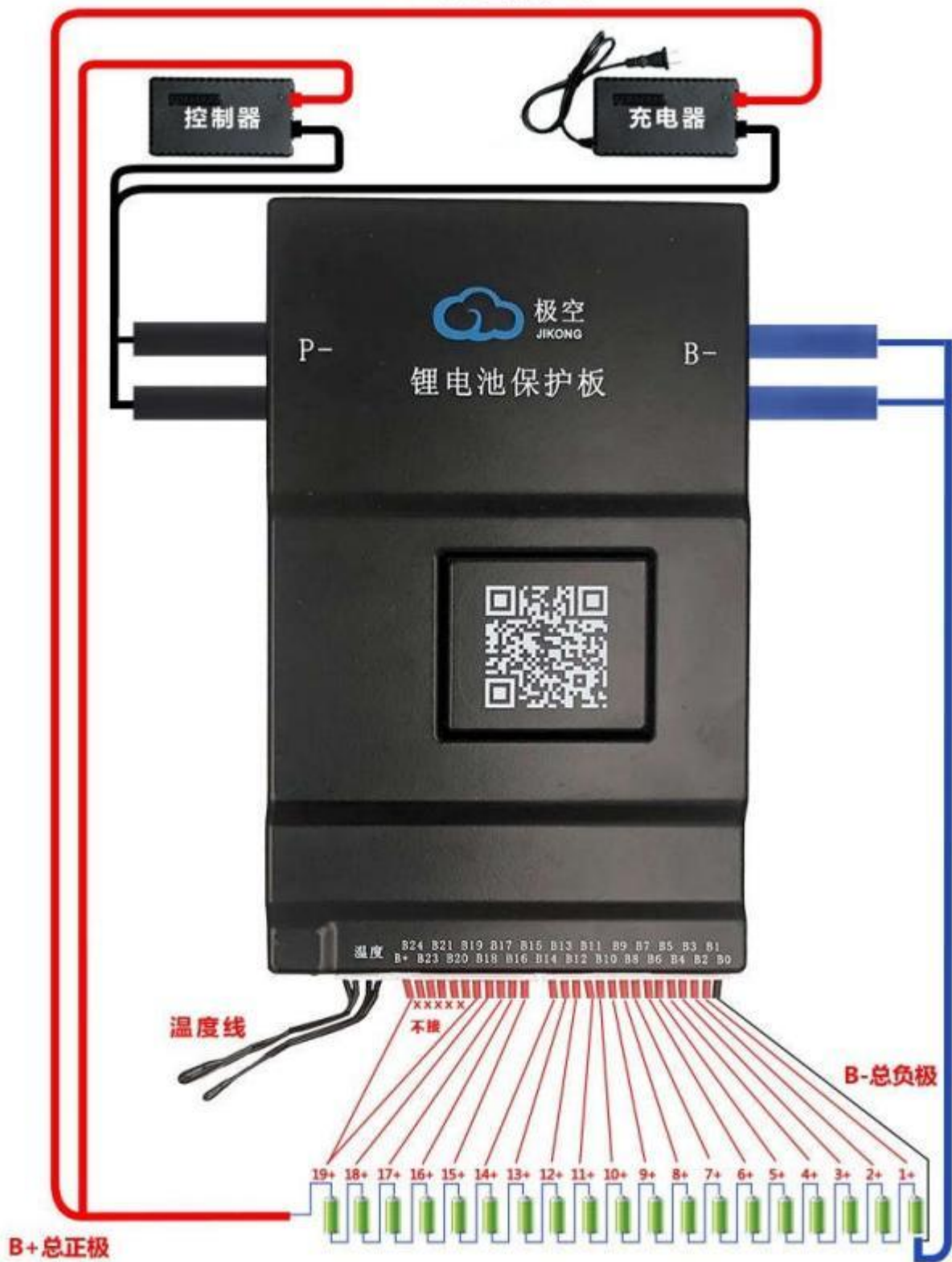


Figure 12. 19S wiring diagram

### 18串连接图

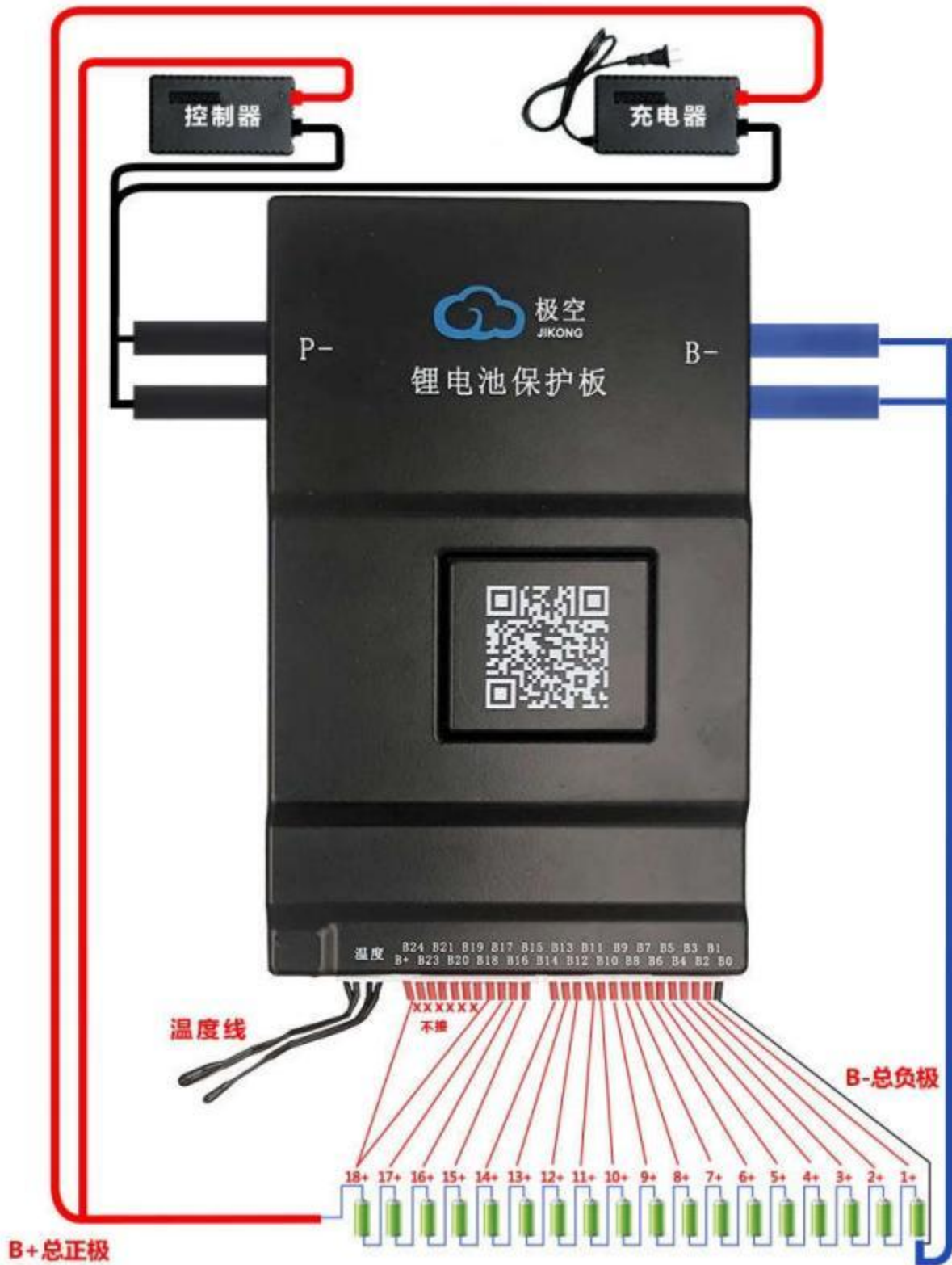


Figure 13. 18S wiring diagram

### 17串连接图

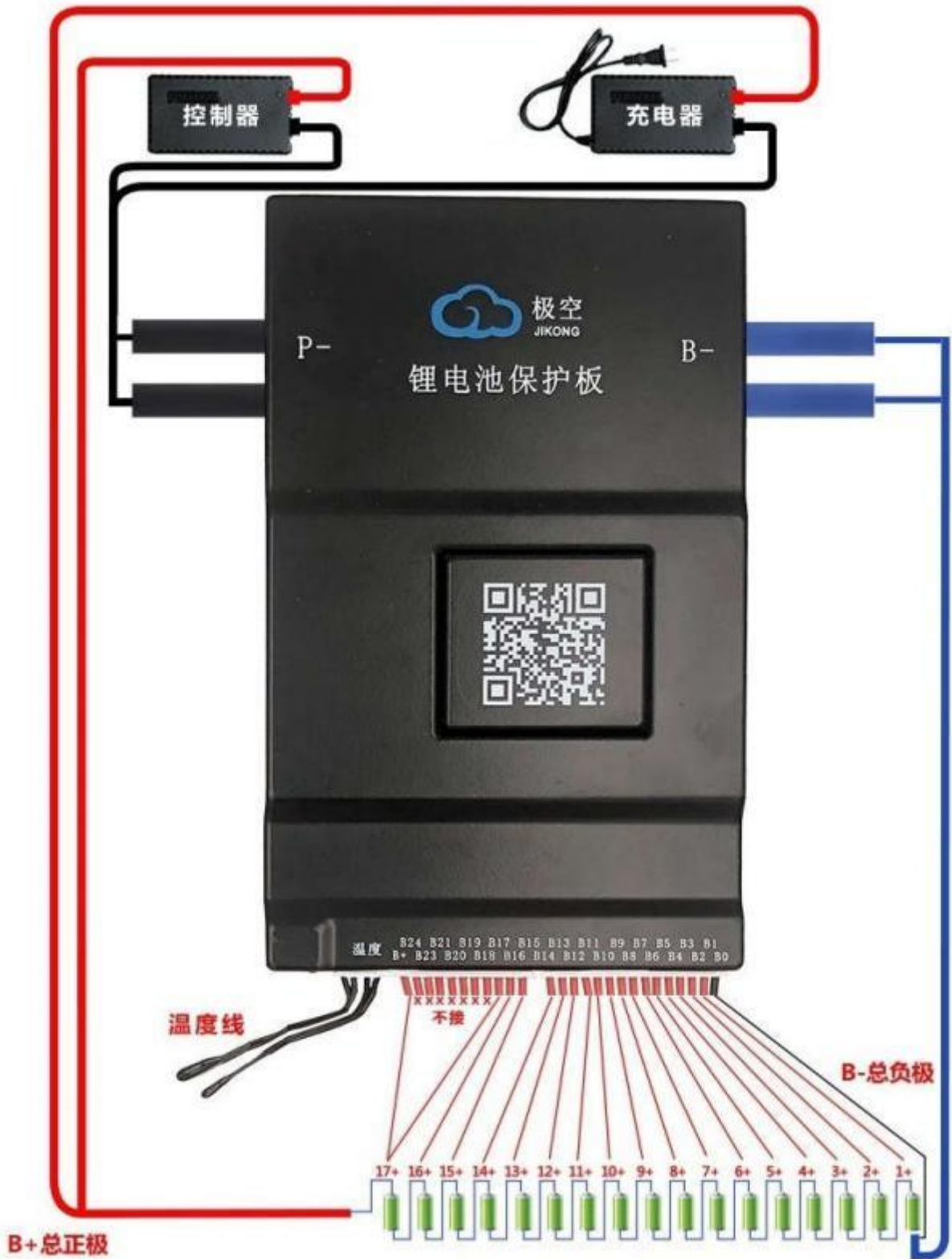


Figure 14. 17S wiring diagram

### 16串连接图

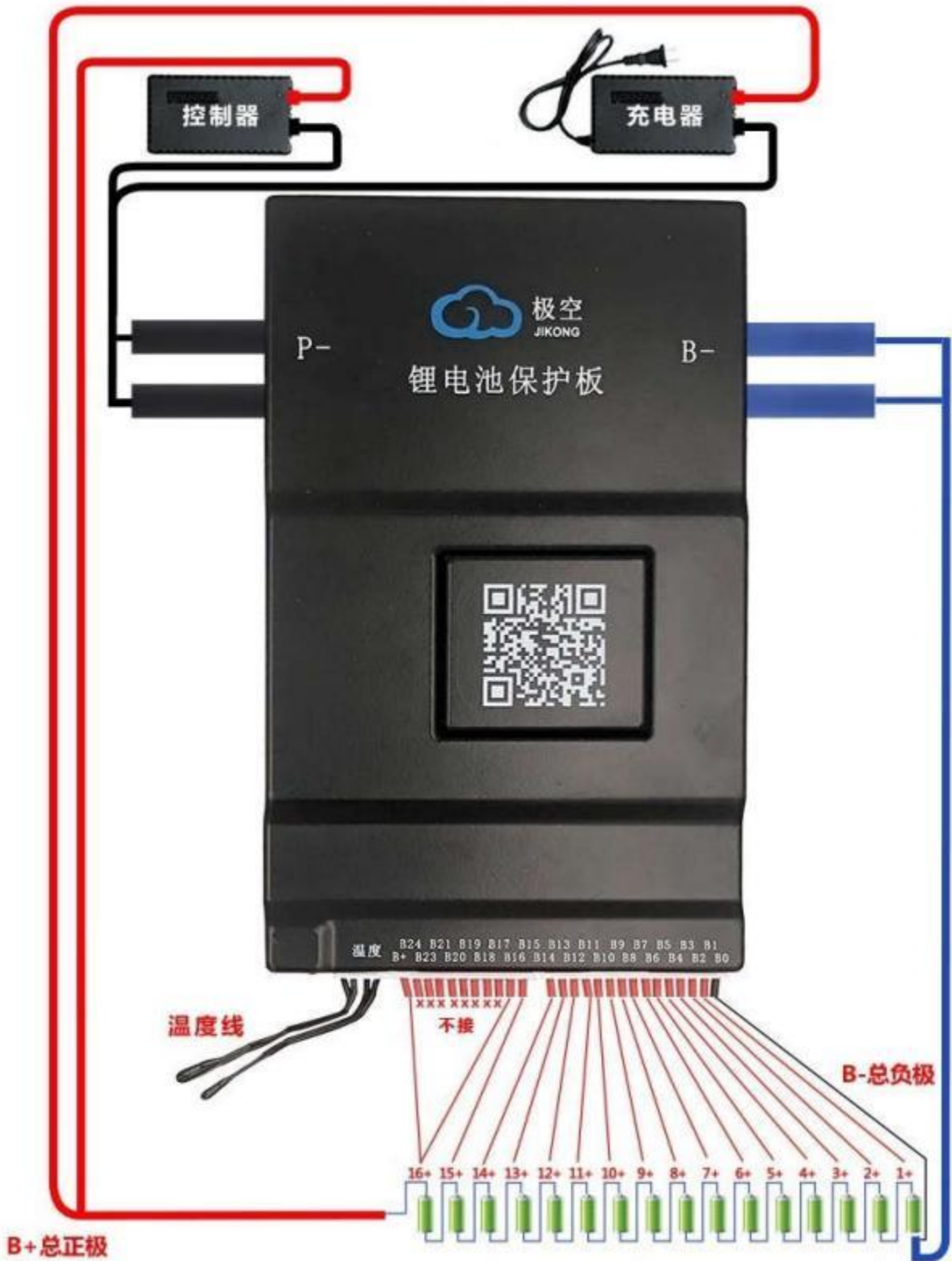


Figure 15. 16S wiring diagram

### 15串连接图

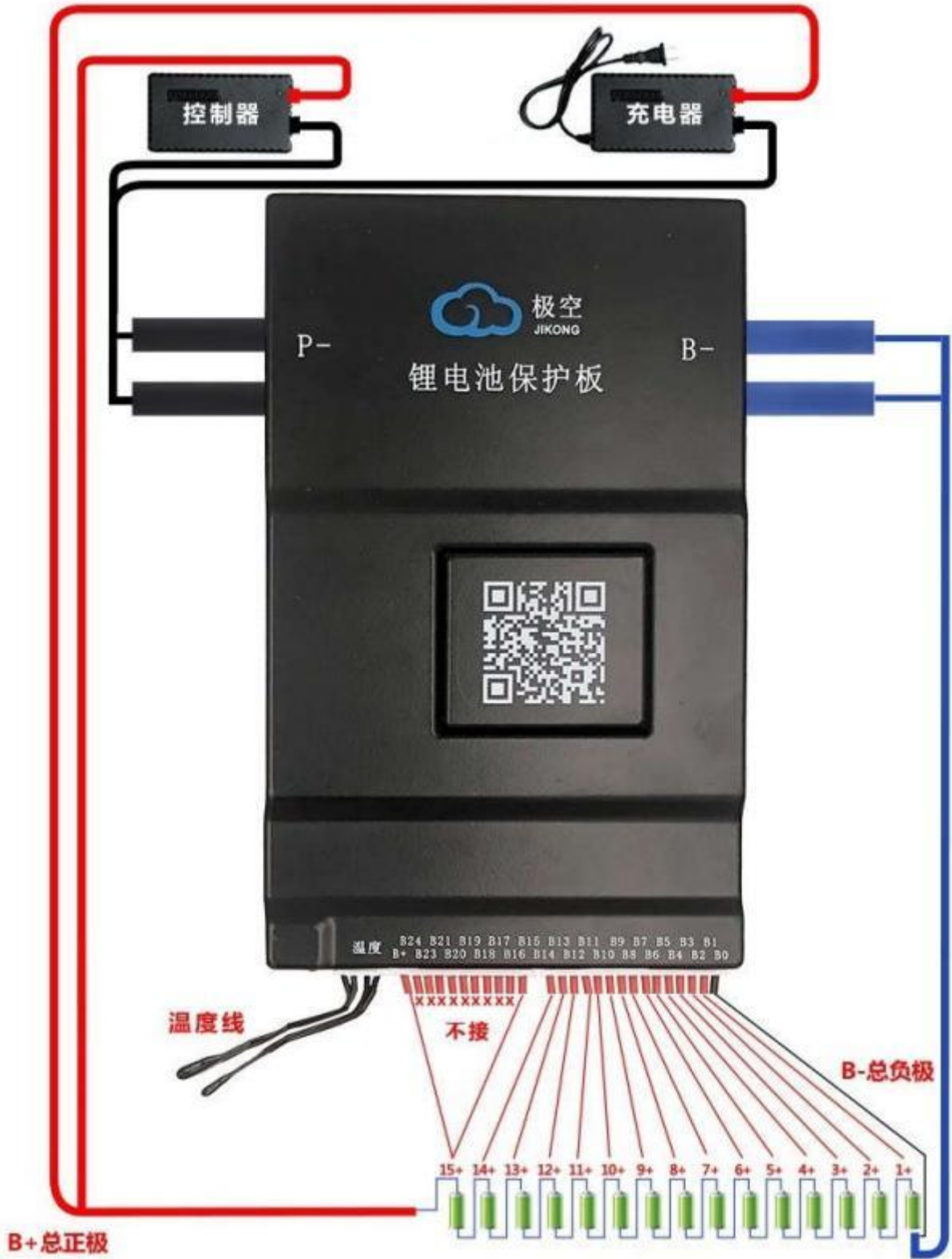


Figure 16. 15S wiring diagram

### 14串连接图

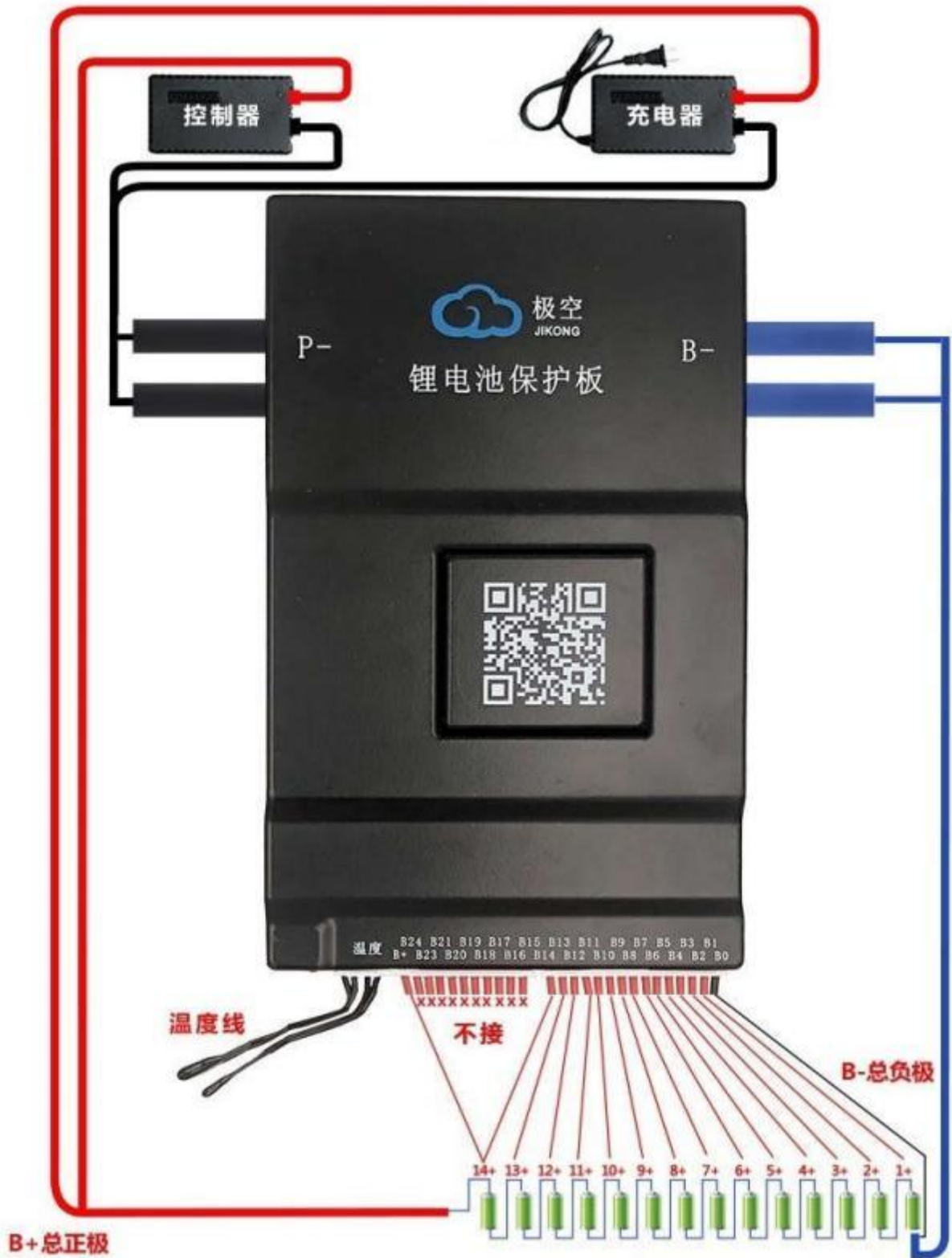


Figure 17. 14S wiring diagram



### 13串连接图

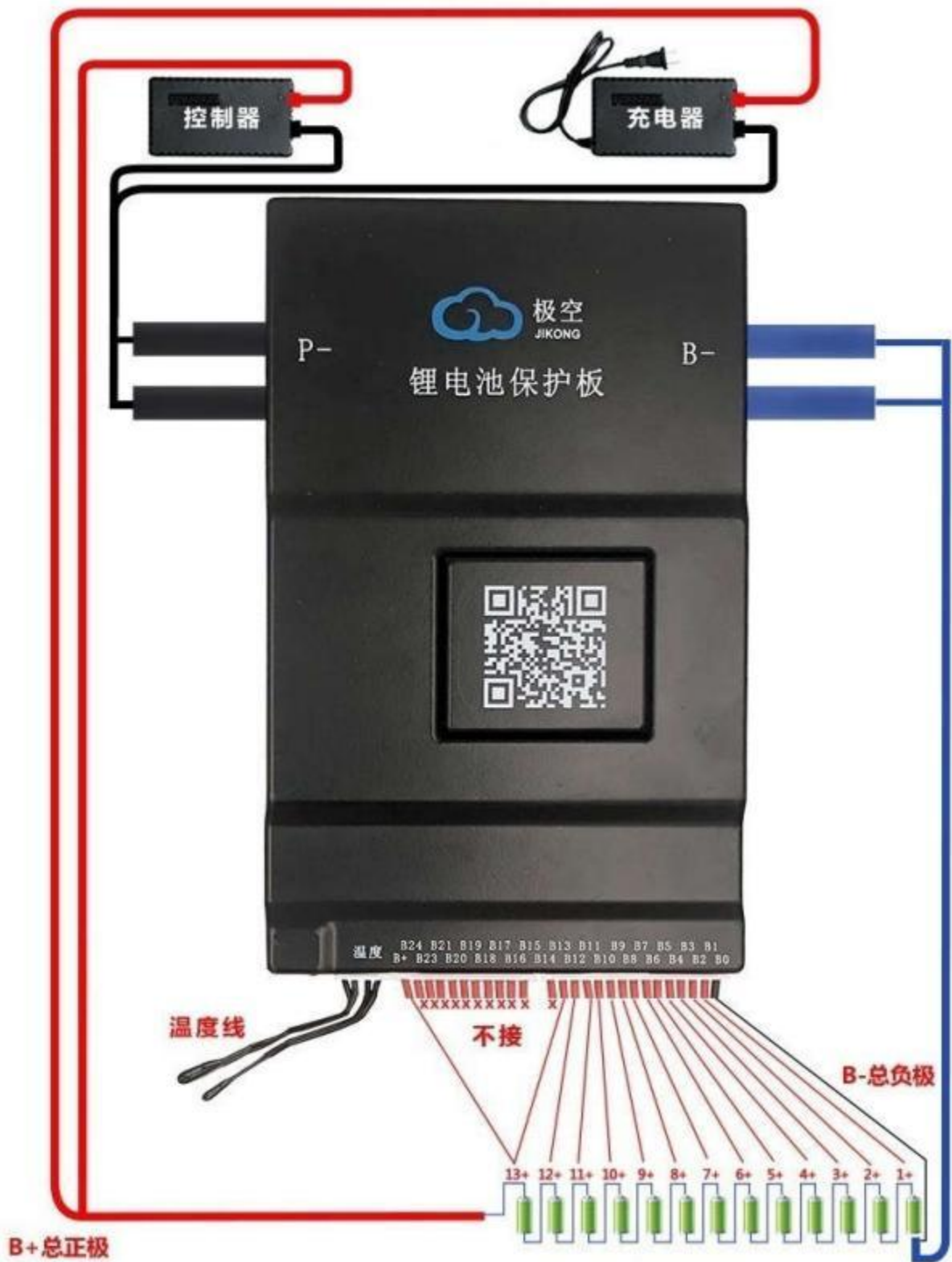


Figure 18. 13S wiring diagram

## BMS for lithium battery Operation and maintenance instructions

JK-BD6AxxS-6P、JK-BD6AxxS-8P is suitable for 7s-24s Lithium battery pack, different series of battery pack will be connecting in different way, the installation and wiring method is shown as below.

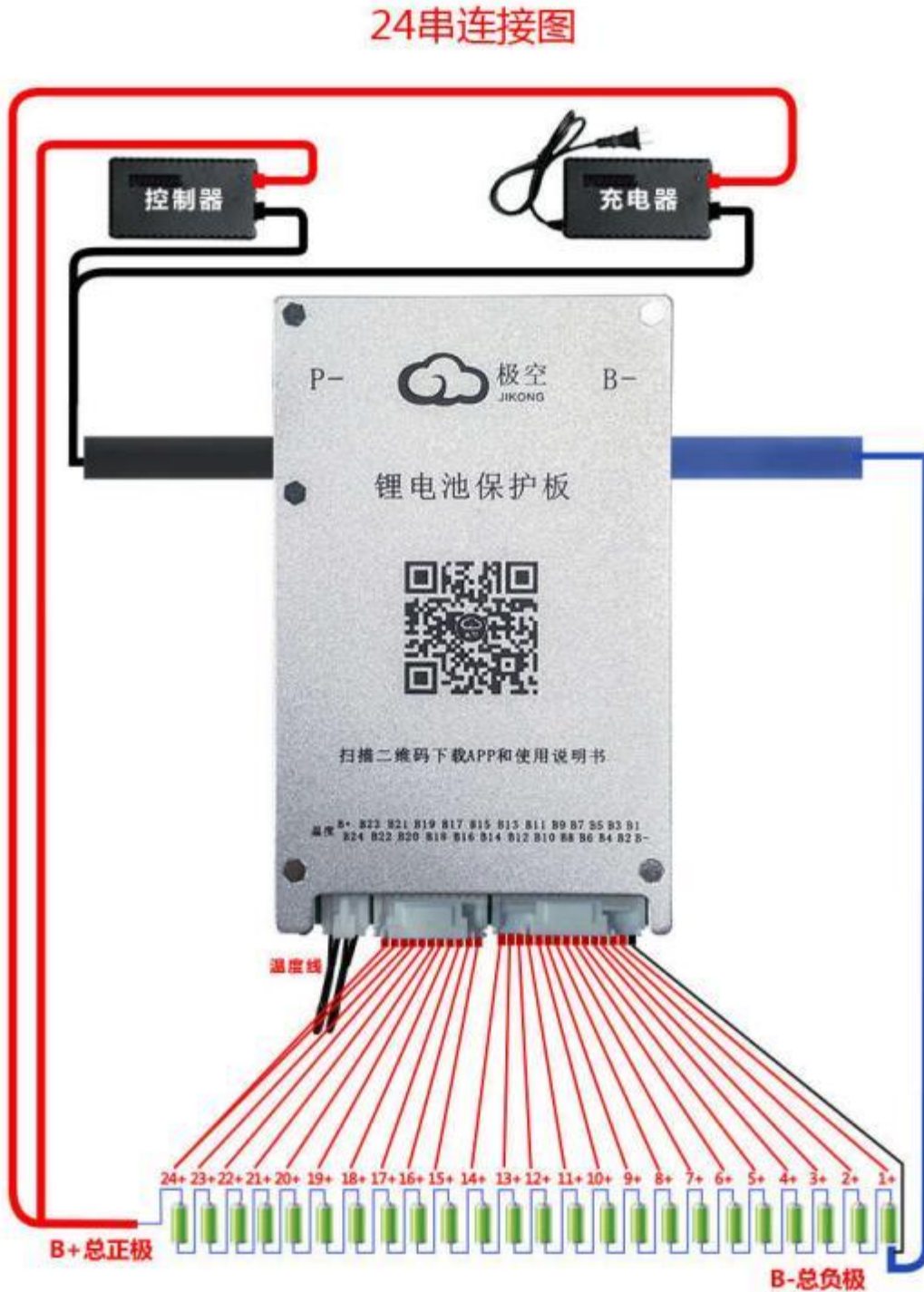


Figure 19. 24S wiring diagram

## 23串连接图

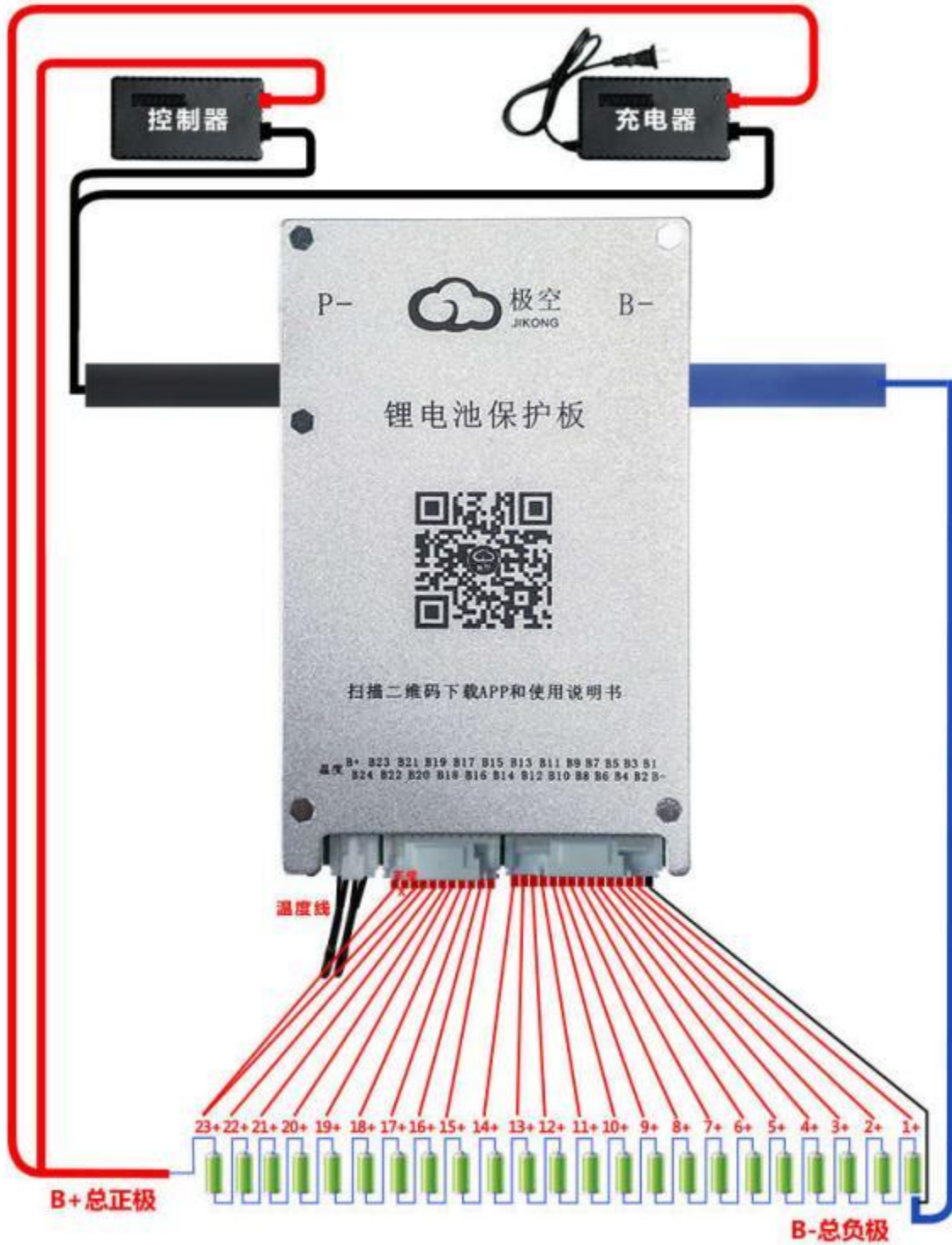


Figure 20. 23S wiring diagram

## 22串连接图

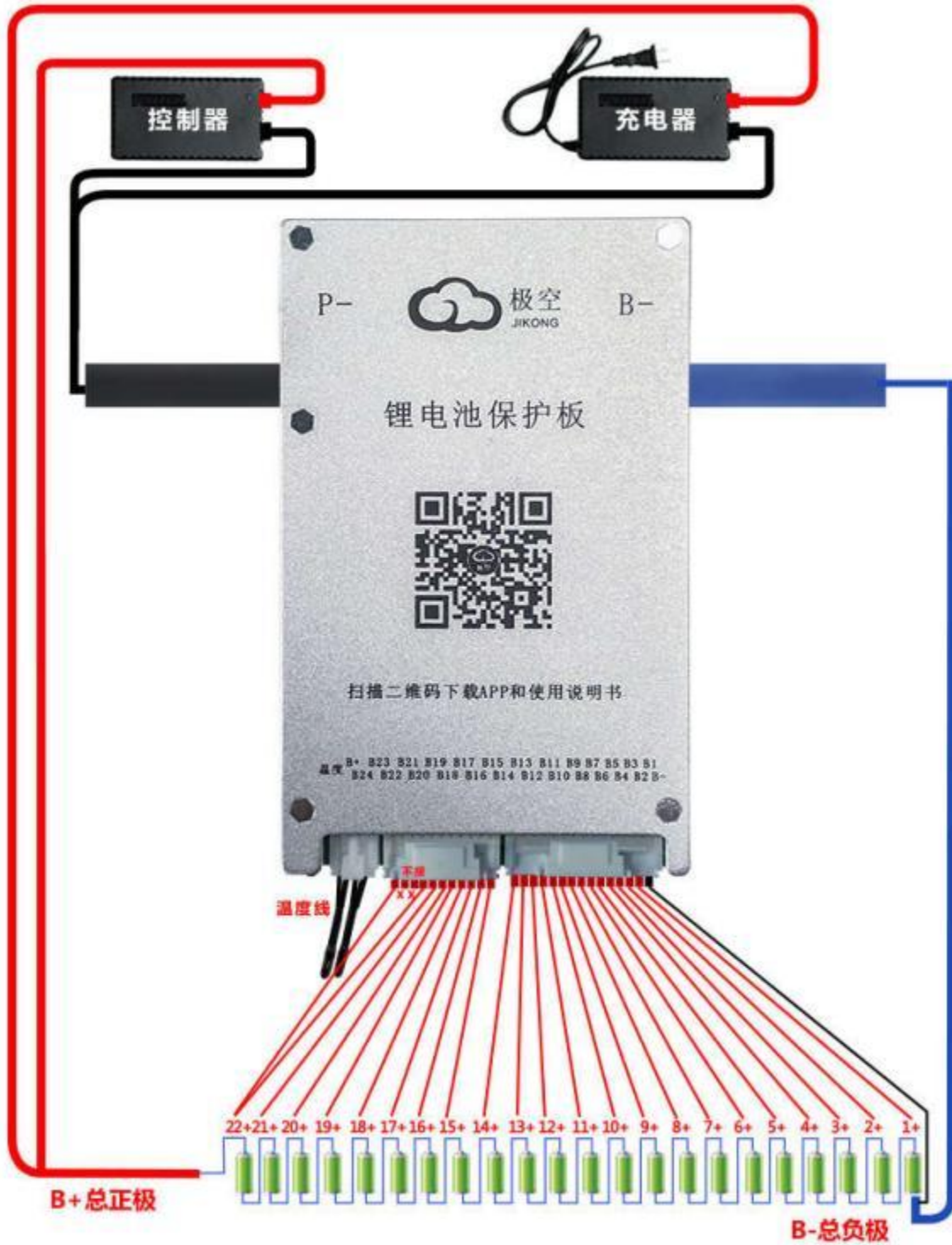


Figure 21. 22S wiring diagram

## 21串连接图

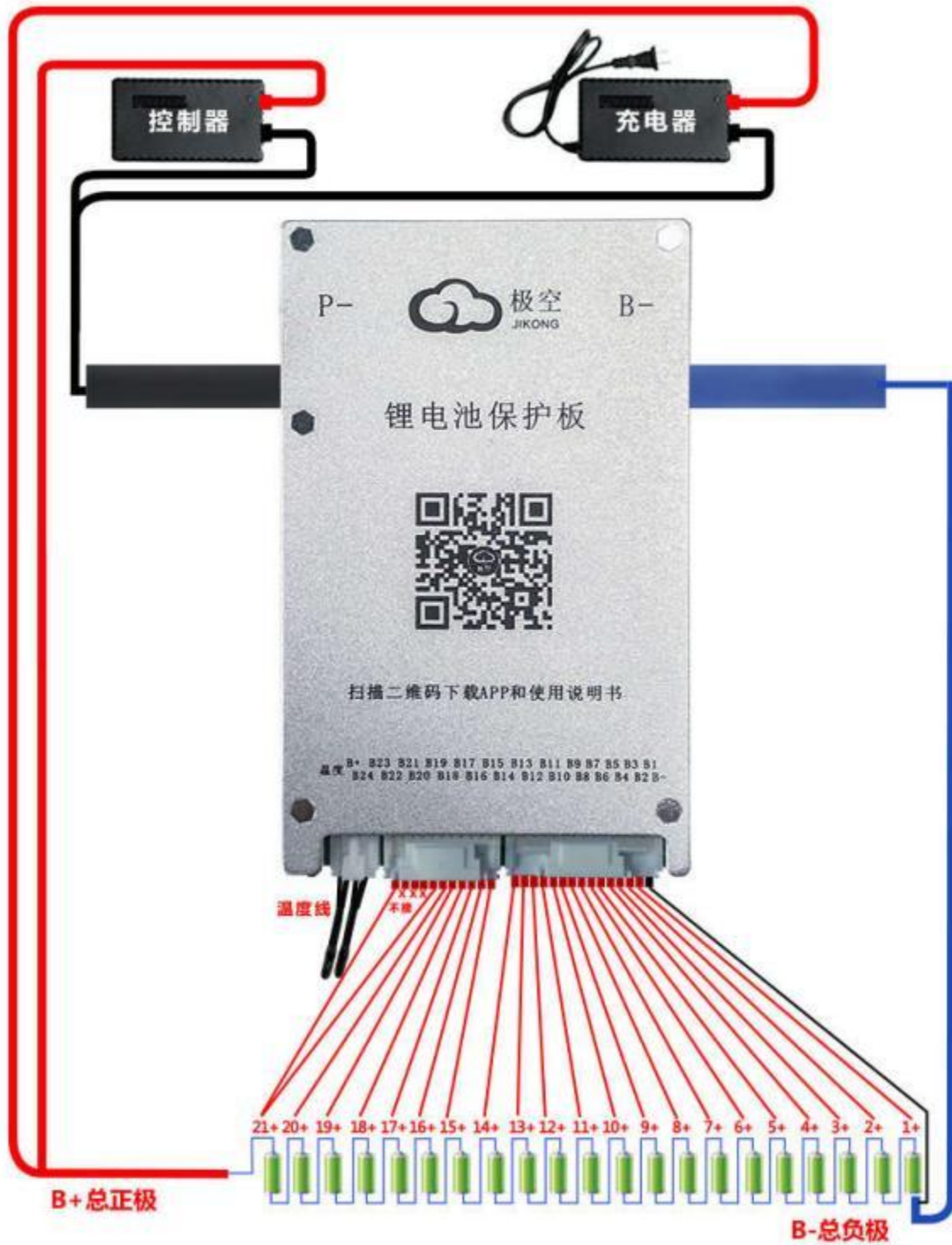


Figure 22. 21S wiring diagram

## 20串连接图

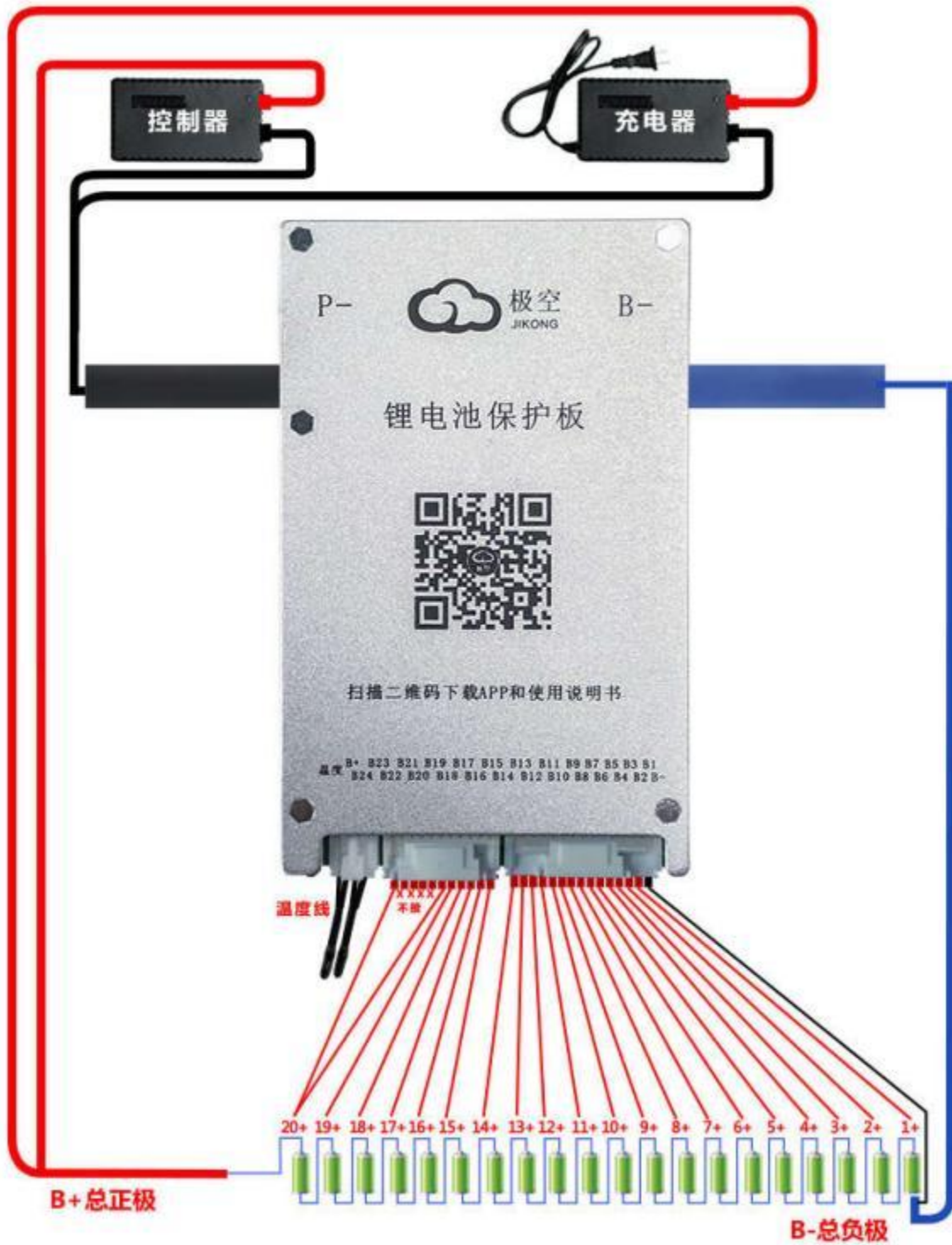


Figure 23. 20S wiring diagram

### 19串连接图

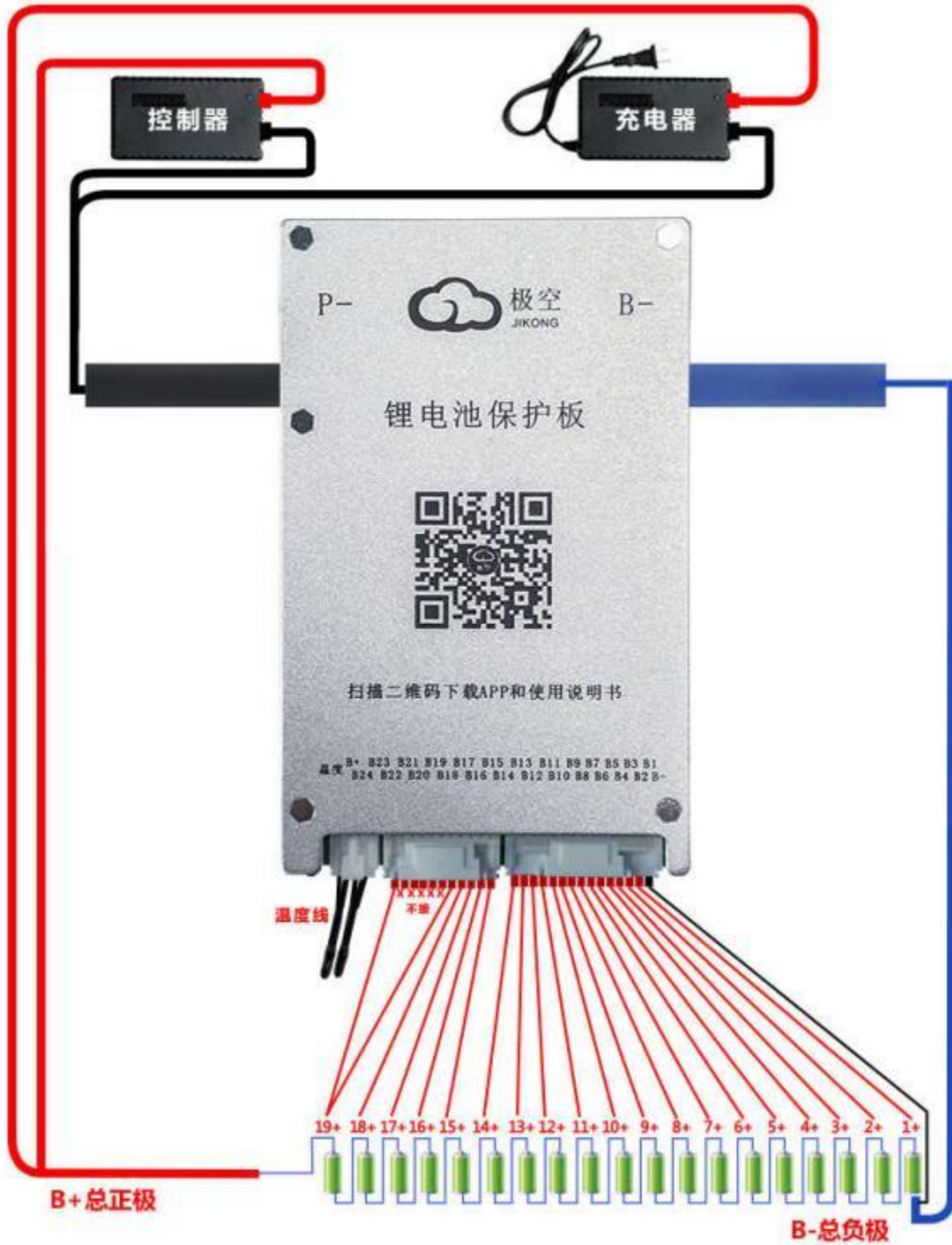


Figure 24. 19S wiring diagram

### 18串连接图

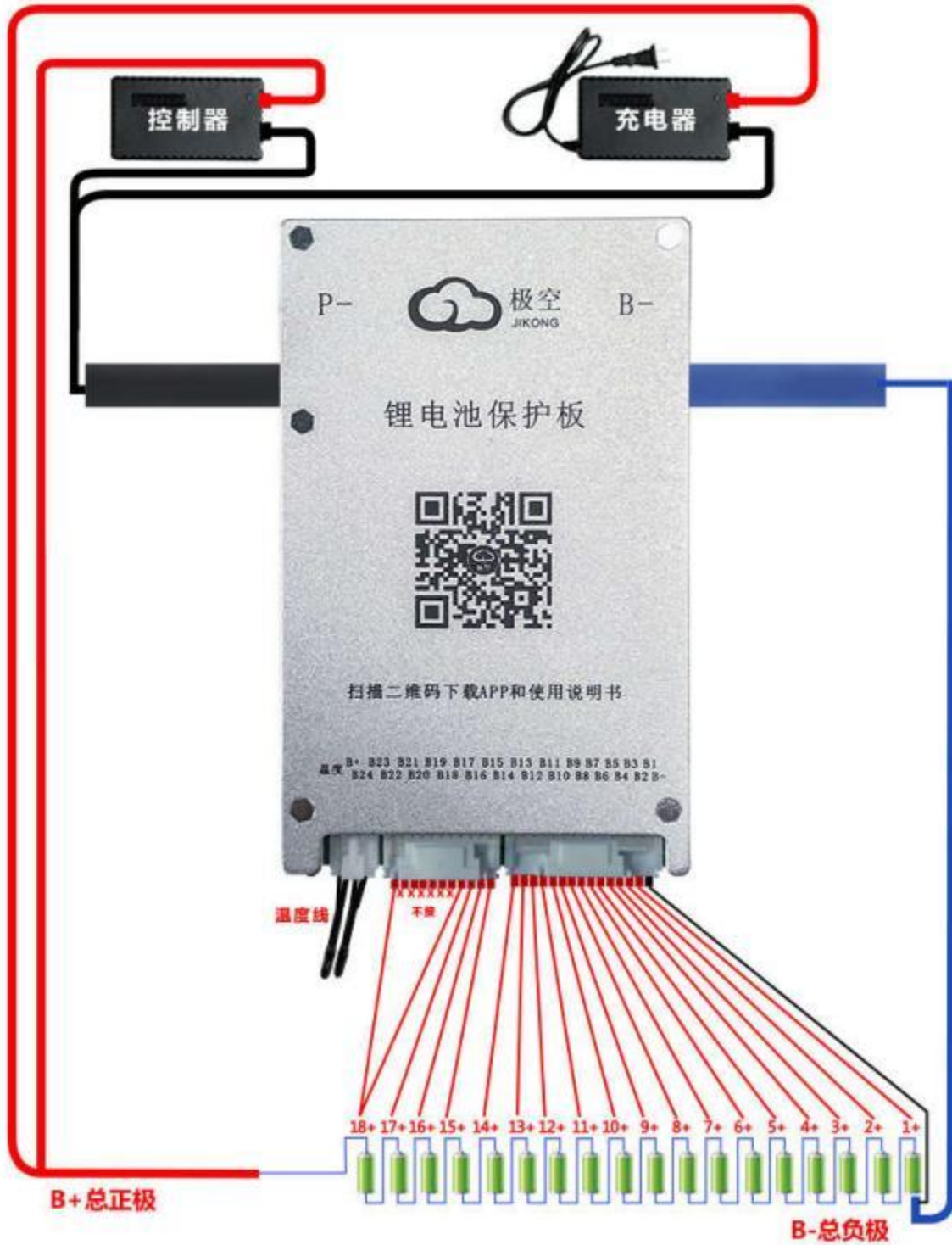


Figure 25. 18S wiring diagram



### 17串连接图

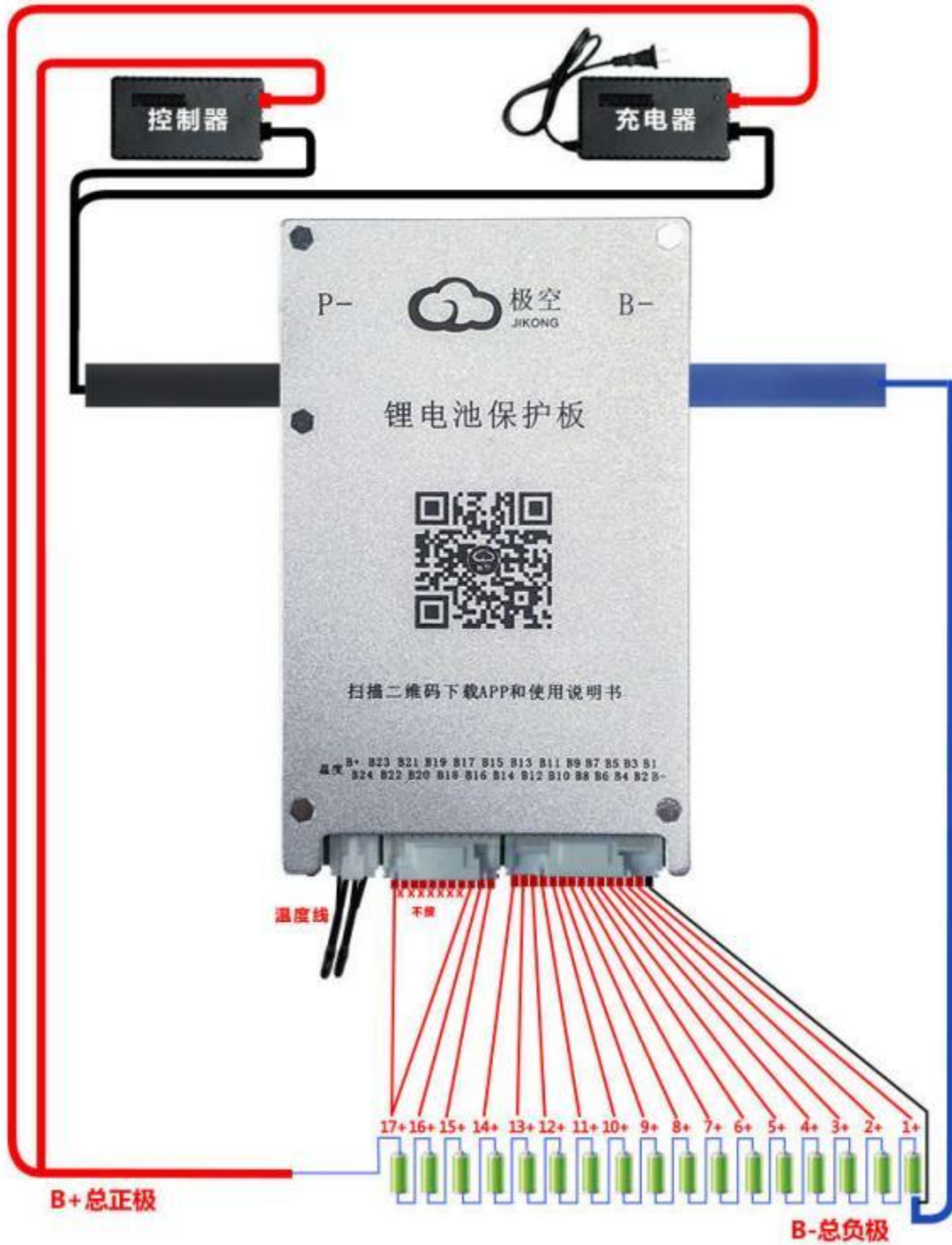


Figure 26. 17S wiring diagram

### 16串连接图

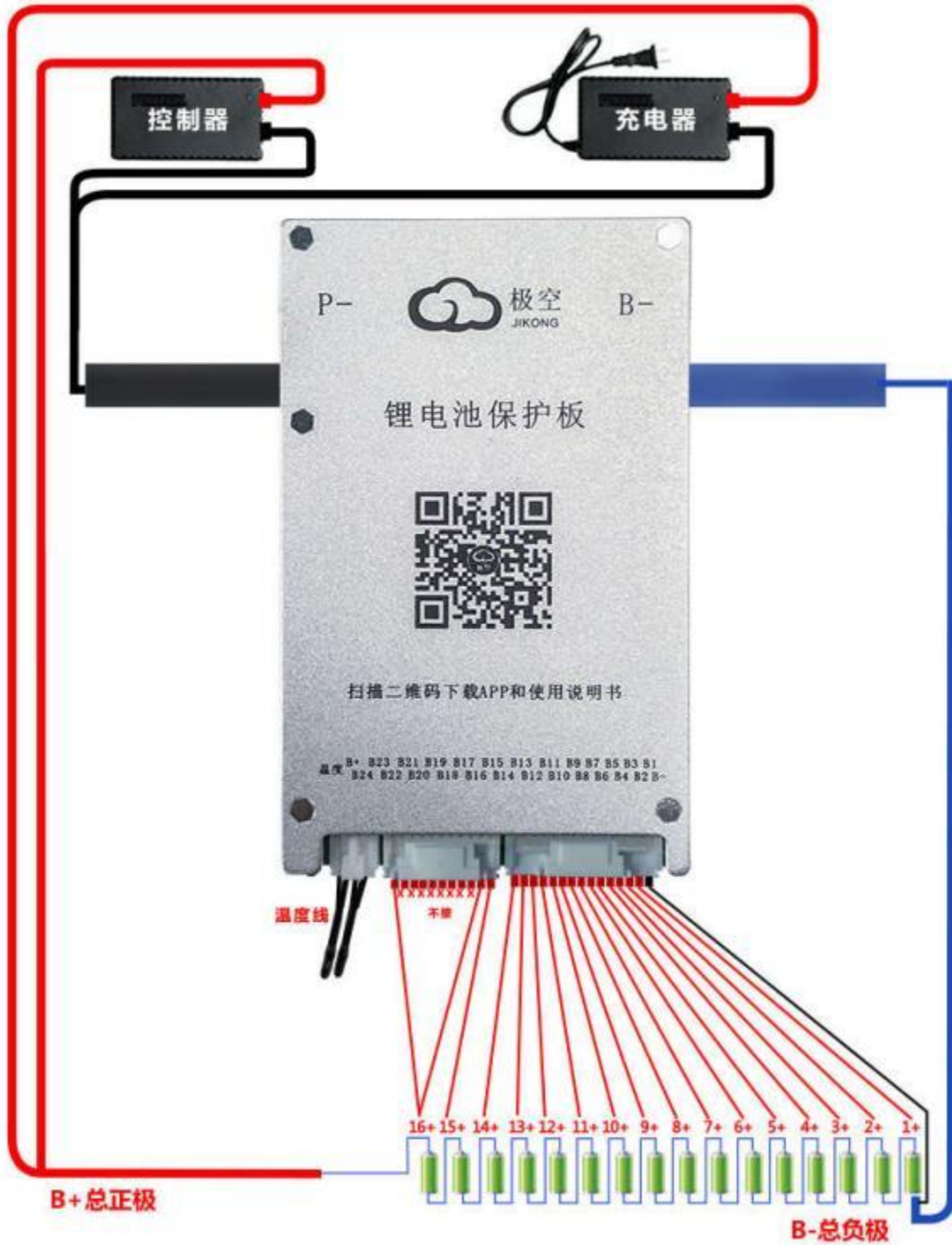


Figure 27. 16S wiring diagram

### 15串连接图

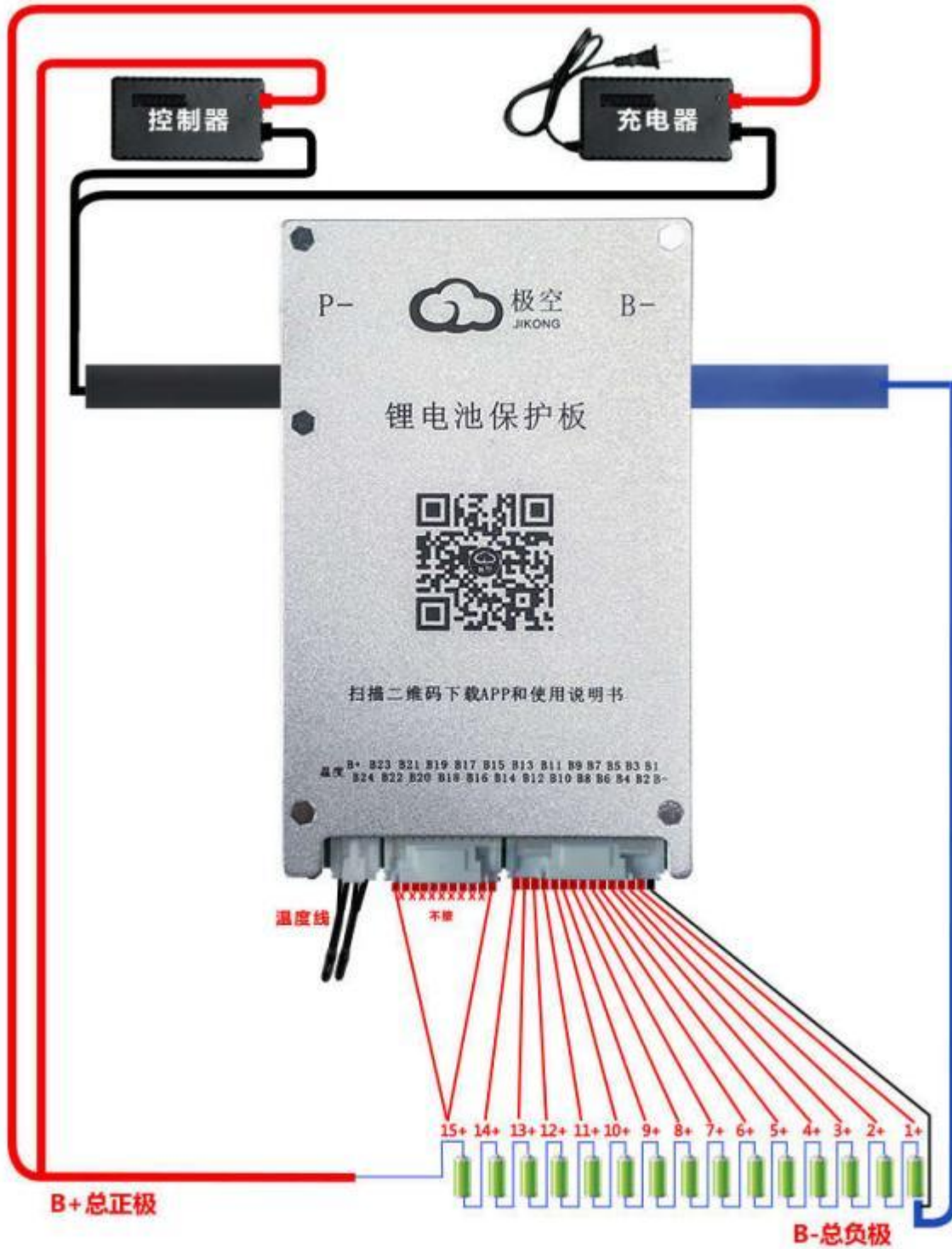


Figure 28. 15S wiring diagram

### 14串连接图

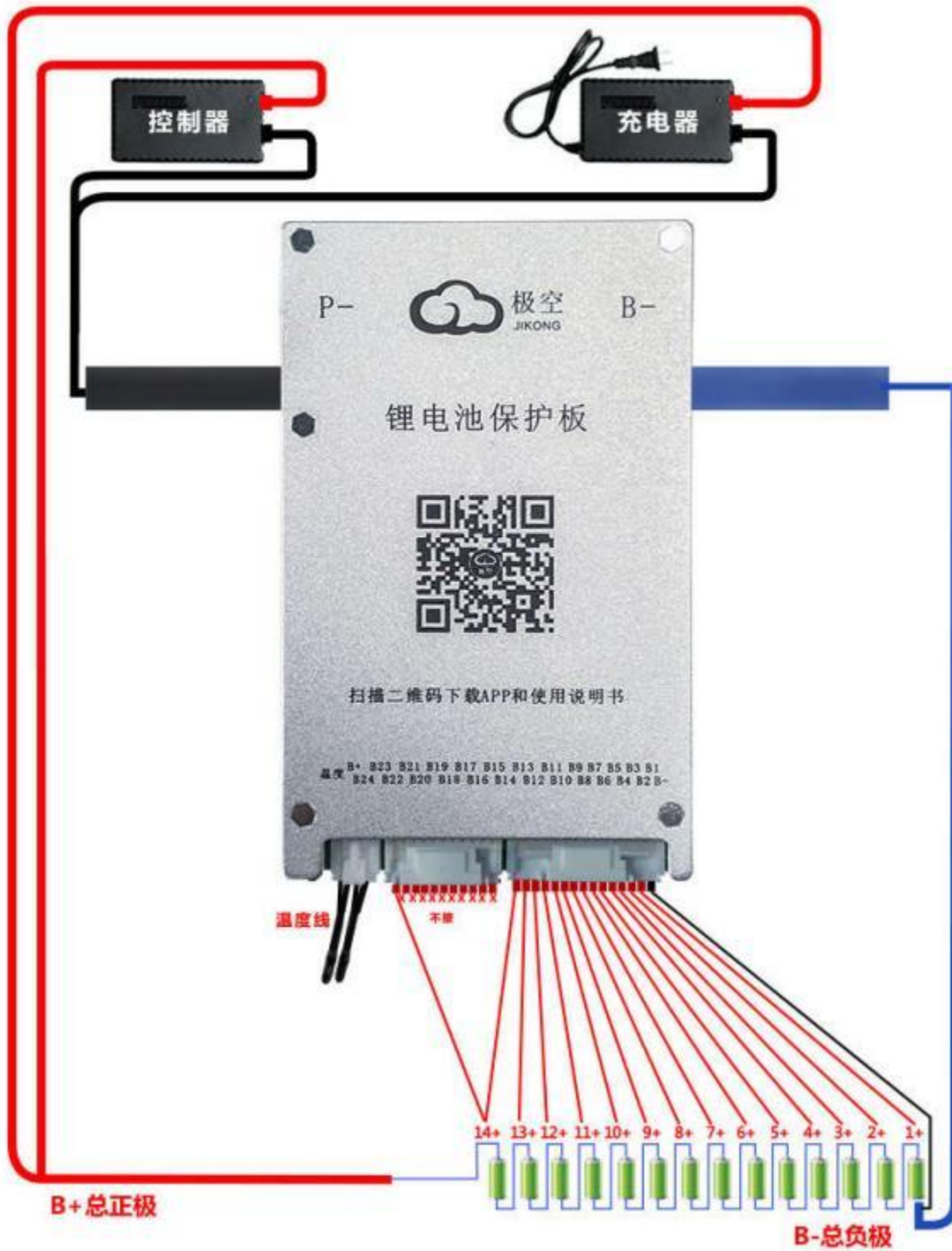


Figure 29. 14S wiring diagram

### 13串连接图

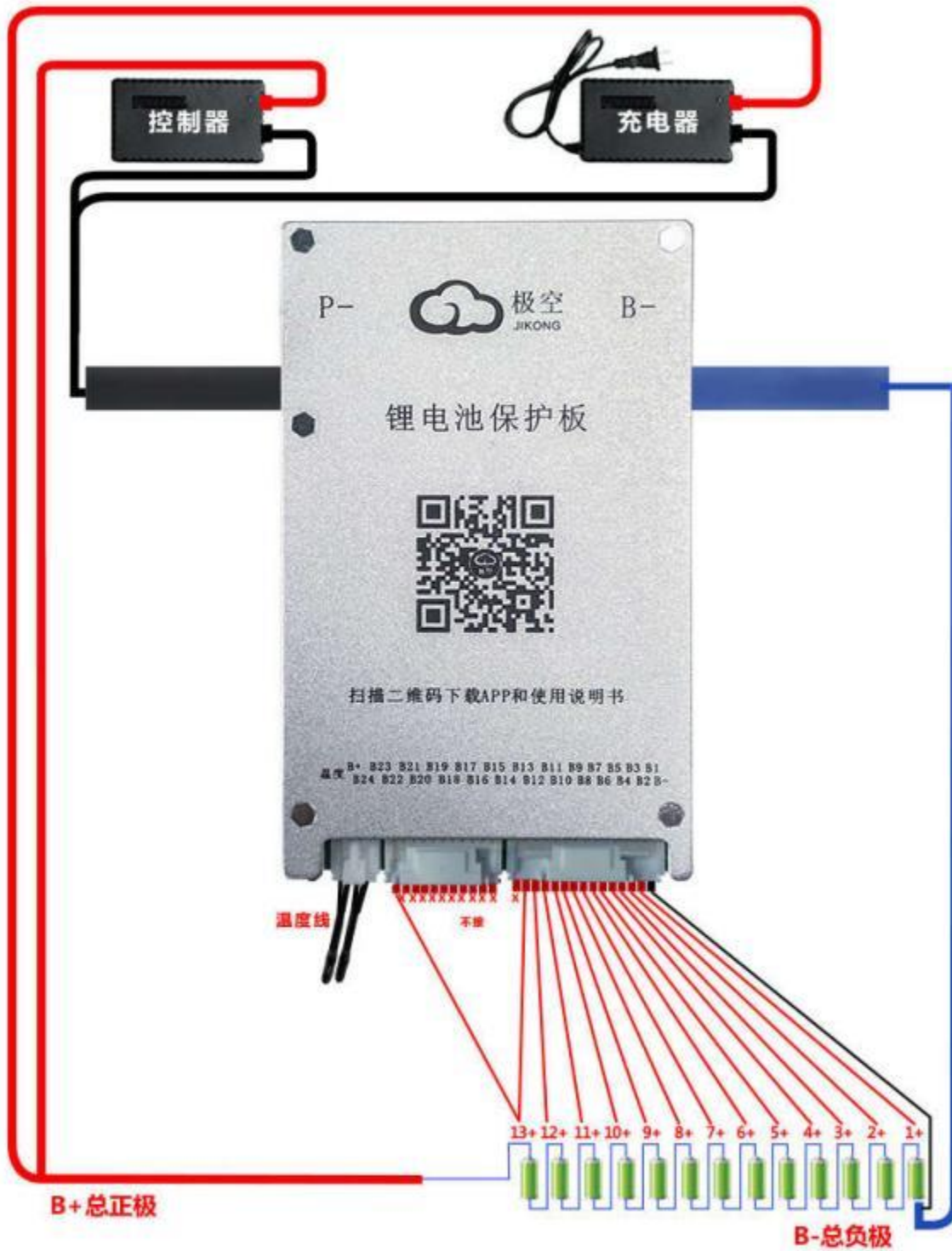


Figure 30. 13S wiring diagram

### 4.3. APP installation

By scanning the QR code shown in Figure 31, you can obtain the mobile app that matches the product.



Figure. 31 QR code of mobile app link

## 5. Using and operation

### 5.1. Preparation and inspection before use

Before turning on the BMS, please confirm whether the balance line is connected normally and the "C-" and "B-" are connected correctly. Make sure the BMS is securely fixed to the battery core, and then you can switch on the BMS. Otherwise, it may cause serious consequences such as abnormal operation and even burnout.

### 5.2. Power on

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 is designed to be in a charging activation mode. **(meet the condition: the voltage of the charger is 5V higher than that of the battery)** That is, after the battery is assembled, a charger needs to be connected to start the BMS.

### 5.3. APP Operating Instruction

#### 5.3.1 Device operation

##### 5.3.1.1. Device connection

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

B. 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 for a password when connecting for the first time. The default password of the device is "1234". The APP will automatically record the password after the device is connected. There is no need to enter the password next time. It will automatically connect after starting the APP, the password input interface is shown in Figure 33.



Figure 32. Scan device



Figure 33. Enter password

### 5.3.1.2. Change name and password

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

B. The interface for modifying the device name is shown in Figure 34. The device name only supports English or numbers.

C. The password change interface is shown in Figure 35. To change the device password, you must first enter the old password of the device. Only when the current password is correct you can enter the new password entry option. After entering the new password twice, click 'OK' to complete the device password modification.



Figure 34. Name modification



Figure 35. Password modification



### 5.3.1 Status view

The real-time status interface is shown as the figure 36.



The real-time status page is divided into 3 area:

Area 1 The area is the battery comprehensive information bar. The explanation of each parameter is as follows:

**a) operation hours**

The running time represents the total running time from the first boot of the BMS to the present.

**b) Charging**

Indicates the on/off status of MOS while charging the BMS. When "On" is displayed, it means that the BMS is charging and the MOS is turned on, the battery is allowed to charge; When "Off" is displayed, it means that the BMS is charging and the MOS is turned off, the battery is not allowed to charge Electricity.

**c) Discharging**

Indicates the on/off status of MOS while discharging the BMS. When "On" is displayed, it means that the BMS is discharging and the MOS is turned on, the battery is allowed to discharge; When "Off" is displayed, it means that the BMS is discharged MOS is turned off, the battery is not allowed to discharge Electricity.

**d) Balance**

Indicates the on/off state of the equalization switch of BMS. When "On" is displayed, when the equilibrium trigger condition is reached, The BMS is automatically balanced; When "Off" is displayed, it means that the equalization is closed, and the BMS will not equalize the battery.

**e) Voltage**

The voltage area displays the 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 total current of the battery in real time. The current is positive when the battery is charging. The current is negative when the battery is discharging.

**g) Battery Power**

Represents the total power of the battery output or input in real time. Its value is the product of the current battery voltage and the absolute value of the battery current.

**h) Remain Battery**

Represents the percentage of current battery power remaining.

**i) Battery Capacity**

Represents the actual battery capacity calculated by the BMS based on the high-precision SOC. The unit is AH. **(The value can only be updated after the battery has completed a full discharge and charge cycle)**

**j) Remain Capacity**

Indicates the remaining capacity of the battery in real time, unit: AH.

**k) Cycle Capacity**

Indicates the cumulative discharge capacity of the battery, unit: AH.

**l) Cycle Count**

Indicates the number of charge saturation times of the battery in real time, unit: times.

**m) Ave. Cell Vol.**

Indicates the average voltage of each battery cell in real time, unit: V.

**n) Delta Cell Vol.**

Indicates the difference between the highest battery voltage and the lowest battery voltage of the entire battery pack, unit: V.

**o) Balance Cur.**

When the BMS turns on the balance function and reaches the balance condition, it displays the balance current in real time, unit: A.

### **BMS for lithium battery Operation and maintenance instructions**

When the balance is working, the status display the area of the voltage of each battery in real time, blue represents a discharging battery, and red represents a charged battery.

The negative current of balance current indicates that the battery is discharging, the blue light flashes at the this time. The positive current of balance current indicates that the battery is charged, the red light flashes at this time.

Active balance technology is used in the BMS. The principle of balance is to take the power from the high-voltage core and store it in the BMS, then put it into the low-voltage core.

#### **p) MOS Temp**

Display the temperature of MOS for BMS in real time, unit: °C.

#### **q) Battery T1**

Display "Na" when the temperature sensor 1 is not installed, and display the temperature of the temperature sensor 1 in real time when the temperature sensor is installed, unit: °C.

#### **r) Battery T2**

Display "NA" when the temperature sensor 2 is not installed, and display the temperature of the temperature sensor 2 in real time when the temperature sensor is installed, unit: °C.

In the figure 37, area 2 is the voltage area of single cell. The voltage data of each cell in the battery pack is displayed in real time, in which red represents the cell with the lowest voltage and blue represents the cell with the highest voltage.

Area 3 in the figure is the area of cells wire resistance. The cells wire resistance is obtained by the self inspection of the BMS. The value is only a preliminary calculation to prevent wrong connection or poor contact. When the cells wire resistance exceeds a certain value, it will be displayed in yellow, and the balance cannot be turned on at this time.

### 5.3.1 Parameter setting

The parameter setting page is shown as the figure 37.



Figure 37. Parameters Setting

If you need to modify the working parameters of the BMS, you must first click the " Authorization Settings " button, enter the parameter setting password, to verify the parameter setting permissions. The factory default password for parameter setting is "123456" . Only enter the parameter setting password correctly then you can modify the parameters of the BMS. The parameter setting password and the device Bluetooth connection password are independent of each other.

On the parameter setting page, various working parameters of the BMS can be modified. The explanation of each parameter is as follows:

#### a) LIFEP04

This function button can modify all the working parameters of the BMS into the parameters of the iron-lithium battery. For the default values of the parameters, see Appendix I.

#### b) LI-ION

This function button can modify all the working parameters of the BMS into the parameters of the ternary lithium battery. For the default values of the parameters, see Appendix II.

#### c) LTO

This function button can modify all the working parameters of the BMS into the parameters of the lithium titanate battery. For the default values of the parameters, see Appendix III.

**d) Cells Count**

The cells count represents the number of cells in the battery. Before use, please set this value accurately, otherwise the BMS will not work properly.

**e) Battery Capacity**

This value is the design capacity of the battery.

**f) Trigger Different Volt.**

Triggered balance difference Voltage is the only parameter that controls balance. With the balance switch on, when the maximum difference voltage of the battery pack exceeds this value, the balance starts, and the balance ends when the difference voltage is lower than this value. For example, the balance trigger voltage difference is set to 0.01V. When the battery pack voltage difference is higher than 0.01V, balance is started, and when the battery pack voltage difference is lower than 0.01V, the balance is finished.

**(It is recommended that the balance trigger difference voltage of the battery above 50AH sets as 0.005V, and the balance trigger difference voltage of the battery below 50AH sets as 0.01V)**

**g) Voltage Calibration**

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

When 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 calibration way is to fill in the total battery voltage that is currently measured, and then click "setting" behind the voltage calibration to complete the calibration.

**h) Current Calibration**

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

When there is an error between the total current collected by the BMS and the actual current of the battery, The current calibration function can be used to calibrate the BMS. The calibration way is to fill in the current measured total battery current , then click 'Settings' behind Current Calibration to complete the calibration.

**i) "Cell UVP" and "Cell UVPR"**

"Cell Low-voltage Protection" refers to the cut-off voltage of the battery cell. As long as the voltage of any cell in the battery pack is lower than this value, the "Cell Low-voltage Alarm" will be generated. At the same time, the BMS will turned off the MOS for discharging, the battery can not discharge and can only charge at this time. When the alarm occurs, only after the voltage of all the cells exceeds the value of "Cell Voltage Recovery" the will the BMS releases the "Cell Low-voltage Alarm" and turns on the discharge MOS at the same time.

**j) "Cell OVP", "Cell OVPR"**

"Cell OVP" refers to the saturation voltage of the cell. As long as the voltage of any single cell in the battery pack exceeds this value, a "single overcharge alarm" will be generated. At the same time, the BMS will turn off the MOS for charging. At this time, the battery cannot be charged and can only be discharged. After the alarm is generated, only when the voltage value of all cell is lower than the value of "Cell OVPR", the BMS will release the "cell overcharge alarm" and open the charging MOS at the same time.

**k) Power Off Vol.**

The Power Off Vol. indicates the lowest working voltage of the BMS. When the highest voltage of the cell in the battery pack is lower than this value, the BMS is closed. The value must be lower than "unit low-voltage protection".

**l) "Max Charge Cur.", "Charge OCP Delay", "Charge OCPR Time"**

When charging the battery pack, if the current exceeds the "Max Charge Cur" and the duration exceeds the time of "Charge OCP Delay", the BMS will generate "charging over-current alarm" and turn off the charging MOS at the same time. After the alarm is generated, passing the time of "Charge OCPR Time", the BMS will release the charging over-current alarm and restart to charging MOS.

For example, set "Max Charge Cur." as 10A, "Charge OCP Delay" as 10s, "Charge OCPR Time" as 50s. In the charging process, if the charging current exceeds 10A continuously for 10s, the BMS will generate "charging over-current alarm" and close the charging MOS for 50s. After that, the "charging over-current alarm" will be released and the BMS will restart charging MOS.

**m) "Max Discharge Cur.", "Discharge OCP Delay", "Discharge OCPR Time"**

When the battery pack is discharged, and the current exceeds the "Max Discharge Curr." and the duration exceeds the time of "Discharge OCP Delay", the BMS will generate a "discharge over-current alarm" and close the discharge MOS at the same time. After the alarm is generated, passing the time of "Discharge OCPR Time", the BMS releases the "discharge over-current alarm" and turns on the discharge MOS again.

For example, set "Max Discharge Cur" as 100A, "Discharge OCP Delay" as 10s, "Discharge OCPR Time" as 50s. During the discharge process, if the discharge current exceeds 100A continuously for 10s, the BMS will generate a "discharge over-current alarm" and turn off the discharge MOS. For 50s. After that the "discharge over-current alarm" will be released, and the BMS will restart discharging MOS.

**n) SCPR Time**

When the short-circuit protection occurs, the short-circuit protection will be released after the "SCPR Time" has been set.

**o) Equilibrium starting voltage**

The equalization starting voltage is used to control the voltage phase of equalization, Only when the cell voltage exceeds this value, and the maximum voltage difference of the battery pack exceeding the equilibrium trigger voltage difference , the equilibrium will be generated.

**p) Max Balance Cur.**

The balance 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 is the maximum current in the process of energy transfer, and the maximum balance current should not exceed 0.1C.

For example: 20Ah battery shall not exceed  $20 * 0.1 = 2A$ .

**q) "Charge OTP", "Charge OTPR"**

During the charging process, when the battery temperature exceeds the value of "Charge OTP", the BMS will generate a "charging over temperature protection alarm", and the BMS will turn off charging MOS. After the alarm is generated, when the temperature is lower than "Charge OTPR", the "charging over temperature protection alarm" will be released, and the BMS restart charging MOS.

**r) "Charge UTP", "charge UTPR"**

During the charging process, when the battery temperature is lower than the value of "Charge UTP", the BMS will generate a "low temperature protection for charging alarm" , and the BMS will turn off the MOS for charging. After the alarm is generated, when the temperature is higher than "charge UTPR", the BMS will release the "low temperature protection of charging alarm" and restart charging MOS.

**s) "MOS OTP", "MOS OTPR"**

When the MOS temperature exceeds the value of "MOS OTP", the BMS will generate "MOS over temperature alarm" and close the charge discharge MOS at the same time. The battery cannot be charged or discharged. After the alarm is generated and the MOS temperature is lower than the value of "MOS OTPR", the BMS will release the "MOS over temperature alarm" and restart the charge and discharge MOS (the MOS over temperature protection value is 75°C, the MOS over temperature recovery value is 65°C, these two values are factory default values and cannot be modified).

**Attention:**

**Any parameter modification, please refer to the manual, improper parameters may make the BMS work improperly, or even burn the BMS.**

**After any parameter is modified, you need to click "setting" behind the parameter to complete parameter modification. After the equalizer successfully receives the parameter, it will send out a "drip" sound.**

### 5.3.3 BMS Control

The BMS control page is shown as the figure 38. Through BMS control, the charging function, discharging function and balancing function of the BMS can be switched on and off, also the power supply of the BMS can be closed and factory Settings can be restored.



Figure 38 BMS control page

## 6. Safety Protection Measures and Precautions

The BMS itself does not have high voltage, which will not cause electric shock to the body.

Please read the instruction manual carefully before use, connect according to the correct wiring diagram of different strings, and connect from the negative pole to the positive pole. After the balanced wire is connected, confirm it with a multi-meter again, and insert the BMS after everything is correct.

The default password of the BMS is "1234". After the mobile APP is connected to the BMS, please modify the connection password in time to prevent others from connecting.

It is not allowed to modify the power line of the BMS without permission, unauthorized modification of the power line will cause the BMS to overcurrent and burn the BMS.



## **7 Transportation and Storage**

### **7.1 Transportation**

The packed products can be transported by normal ways of transportation without directly affected by the rain, snow and violent bump. It is not allowed to put the products together with acid, alkali and other corrosive substances during transportation.

### **7.2 Storage**

The packed products shall be stored in a permanent warehouse with a temperature of 0°C ~ 35°C and a relative humidity not more than 80%. There should be no acid, alkali and corrosive gas in the warehouse, also no strong mechanism vibration and shock, and no strong magnetic field in the storeroom.

#### **Appendix. Default parameters of "lithium iron", "ternary" and "lithium titanate".**

<b>S. No</b>	<b>Parameter</b>	<b>Ternary default</b>	<b>Iron lithium default</b>	<b>Lithium titanate default</b>	<b>unit</b>
1	Cell low-voltage protection	2.9	2.6	1.8	V
2	Cell low-voltage protection recovery	3.2	3.0	2.0	V
3	Cell overcharge voltage	4.2	3.6	2.7	V
4	Cell overcharge protection recovery	4.1	3.4	2.4	V
5	Trigger balance differential voltage	0.01	0.01	0.01	V
6	Power off voltage	2.8	2.5	1.7	V
7	Charge overcurrent protection	30	30	30	S
8	Charging overcurrent protection release time	60	60	60	S
9	Discharge overcurrent protection delay	30	30	30	S
10	Discharge overcurrent protection release time	60	60	60	S
11	Short circuit protection release time	60	60	60	S
12	Charging over temperature protection	60	60	60	°C
13	Charging over temperature protection recovery	55	55	55	°C
14	Discharge over temperature protection	60	60	60	°C
15	Discharge over temperature protection recovery	55	55	55	°C
16	Charging low temperature protection	-20	-20	-20	°C
17	Charging low temperature protection recovery	-10	-10	-10	°C
18	MOS Over temperature protection	75	75	75	°C
19	MOS Over temperature protection recovery	70	70	70	°C