Active balance BMS

主动均衡保护板

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

JK-BD6AxxS-10P / JK-BD6AxxS-15P

JK-BD6AxxS-20P/ JK-B1AxxS-15P

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

Operation and maintenance instructions

使用维护说明书

Chengdu Jikong Technology Co., Ltd

成都极空科技有限公司

Product warranty terms

Product name: lithium battery intelligent protection board
产品名称：锂电池智能护板
Warranty period: one year 保修期限：壹年

First of all, thank you for purchasing the lithium battery intelligent protection board products launched by Chengdu Jikong Technology Co., Ltd.

Chengdu Jikong Technology Co., Ltd. provides quality warranty for the hardware products and accessories sold by the company. The warranty period is as shown above. 首先，感谢您购买成都极空科技有限公司推出的锂电池智能保护板产品。 成都极空科技有限公司对由本公司出售的硬件产品和附件提供质量保修，保修期限如上所示。

During the warranty period, if there is a failure due to quality reasons, the company has the right to choose to repair or replace the whole set of products after receiving the notice of product failure and checking and verifying. The whole set of replaced products can be new or near new.
在保修期内如果出现因质量原因而产生故障，公司在收到关于产品故障的通知并经查验核实后，有权选择维修或整套更换产品。整套更换的产品可是新件或接近新件。

1. Chengdu Jikong Technology Co., Ltd. guarantees that the products have been fully tested.成都极空科技有限公司保证产品经过充分测试

2. Chengdu Jikong Technology Co., Ltd. does not guarantee that the products can be used without interruption during the process of product repair. However, the company shall guarantee to repair the faulty products within a reasonable period. 成都极空科技有限公司不保证在产品修理过程中产品可不中断地使用。但公司应保证在合理的期限内修理好发生故障的产品。

3. The warranty period of the product shall be calculated from the date of shipment of the product or the date of installation by Chengdu Jikong Technology Co., Ltd. If the company's products are not installed within 30 days after the date of shipment due to the user's schedule or delay, the product warranty period shall be calculated from the 31st day after the date of shipment. 产品保修期从产品发运之日或由成都极空科技有限公司开始安装之日开始计算。 如果因用户的进度安排或延后使公司产品在发运之日后的 30 天内仍未开始安装，产品 保修期从发运之日后的第 31 天开始计算。

4. Chengdu Jikong Technology Co., Ltd. does not provide free warranty for product failure and damage caused by any of the follow in circumstances: 成都极空科技有限公司对任何下列情况而导致的产品故障和损坏不提供免费保修：

a:wrong use or improper maintenance; 错误地使用或不适当的维护
b:Software, accessories, parts or other items not provided by Chengdu Jikong Technology Co., Ltd; 非成都极空科技有限公司提供的软件、附件、部件或其它物品；
c:Unauthorized disassembly, modification and wrong use; 未经许可的拆卸、修改和错误使用；
d:Use beyond the scope specified in the product technical specifications; 超过产品技术规格指明的范围使用
e:Improper transportation, handling and storage; 不适当的运输、搬运和存贮
f:Failure or damage caused by other non quality reasons (such as earthquake, war, traffic accident, etc.). 其它非质量原因造成的故障或损坏（如地 震、战争、交通事故等）

To the extent permitted by law, the above warranty terms are only clear, and there are no other warranty terms, whether written or oral. Expressly disclaims any implied warranty and commercial terms. 在法律允许的范围内，上述保修条款是唯一明确的，同时没有任何其他的保修条款,不论是书面的或口头的。明确表示拒绝承认任何隐含的保修条款和商业条款。

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1.Overview 概述

Lithium battery intelligent BMS is a management system tailored for high-capacity series lithium battery packs. It has the functions of voltage collection, large current active equalization, overcharge and discharge over current temperature protection, coulomb meter, Bluetooth communication, GPS remote, etc. It can be applied to lithium iron phosphate, ternary lithium and other battery types.

锂电池智能保护板是为大容量串联锂电池组量身打造的管理系统，具备电压采集、大电流主动均衡、过充过放过流过温保护、库仑计、蓝牙通信、GPS 远程等功能。可 适用于磷酸铁锂、三元锂等电池种类。

Relying on the energy transfer active balancing technology with independent intellectual property rights, BMS can achieve a maximum continuous 2A balance current. High current active balancing technology can ensure battery consistency, improve battery life and delay battery aging to the maximum extent.

保护板依托具备自主知识产权的能量转移式主动均衡技术，可以实现最大持续 2A 的均衡电流。大电流主动均衡技术可以最大程度的保证电池一致性、提高电池续航里程、 延缓电池衰老。

BMS has a supporting mobile app that supports Android and IOS operating systems. The app can be connected to the protection board through the Bluetooth of the mobile phone to view the working status of the battery, modify various working parameters of the BMS, control the charging and discharging switch, and so on. BMS is small in size, simple in operation and full in functions. It can be widely used in battery packs of small sightseeing cars, scooters, shared cars, high-power energy storage, backup power supply of base stations, solar power stations and other products

保护板有配套的手机 APP，支持 Android 和 IOS 操作系统。APP 可以通过手机蓝牙连接到保护板以查看电池工作状态、修改保护板的各项工作参数、控制充放电开关等等。保护板体积小、操作简单、功能全，可广泛应用于小型观光车、代步车、共享汽 车、大功率储能、基站备用电源、太阳能电站等产品的电池 PACK。

2.Main technical parameters 主要技术参数

2.1. Main technical indicators 主要技术指标

The main technical indexes of 6P/8P/10P/15P /20P series BMS are shown in Table 1 and table 2. 6P/8P/10P/15P/20P 系列保护板的主要技术指标如表 1 、表 2 所示。

Table 1 main technical indexes of 6P / 8P series BMS

表 1　6P/8P 系列保护板主要技术指标

Technical indicators 技术指标	**Product model** 产品型号					
	BD6A17S6P	**BD6A20S6P**	**BD6A24S6P**	**BD6A17S8P**	**BD6A20S8P**	**BD6A17S8P**

Number of NCM strings 三元串数	7～17	7～20	7～24	7～17	7～20	7～24
Number of LFP strings 铁锂串数	8～17	8～20	8～24	8～17	8～20	8～24
Number of LTO strings 钛锂串数	14~17	14～20	14～24	14～17	14～20	14～24
Balance mode 均衡方式	**Active balancing** 主动均衡					
Balance current 均衡电流	0.6A					
Internal resistance of main circuit 主回路内阻	1.53 mΩ			1.2 mΩ		
Continuous discharge current 持续放电电流	60A	60A	60A	80A	80A	80A
Maximum discharge current 最大放电电流	100A	100A	100A	150A	150A	150A
Over current protection (adjustable) 过流保护(可调)	10～60 A	10～60 A	10～60 A	10～80 A	10～80 A	10～80 A
RS485 communication interface RS485 通信接口	Support, optional (can / RS485 can only be one of two) 支持，需选配（CAN/RS485 只能二选一）					
Can communication interface CAN 通信接口	Support, optional (can / RS485 can only be one of two) 支持，需选配（CAN/RS485 只能二选一）					
Display interface 显示屏接口	Yes 有					
Entry cable 出线方式	One port 同口					
Single voltage range 单体电压范围	1-5v					
Voltage acquisition accuracy 电压采集精度	±3mV					
Overcharge protection voltage 过充保护电压	1.2～4.35V adjustable（可调）					
Overcharge release voltage 过充解除电压	1.2～4.35V adjustable（可调）					
Over current release time 过流解除时间	2～120S adjustable（可调）					
Over discharge protection voltage 过放保护电压	1.2～4.35V adjustable（可调）					
Over discharge recovery voltage 过放恢复电压	1.2～4.35V adjustable（可调）					
Temperature detection quantity 温度检测数量	3 个					
Temperature protection 温度保护	Yes 有					
Short circuit protection 短路保护	Yes 有					
SOC 库仑计	Yes 有					
Bluetooth function 蓝牙功能	Support Android and IOS 蓝牙功能					
GPS (optional) GPS(选配)	Support (one of RS485 and GPS) 支持（RS485 和 GPS 二选一）					

Table 2 main technical indexes of 10P / 15P/20P series BMS

表 2　10P/15P/20P 系列保护板主要技术指标

Technical indicators 技术指标	**Product model** 产品型号					
	BD6A20S10P	**BD6A24S10P**	**B1A20S15P**	**B1A24S15P**	**B2A24S15P**	**B2A24S20P**
Number of NCM strings 三元串数	7～20	7～20	7～20	7～24	7～24	7～24
Number of LFP strings 铁锂串数	8～20	8～20	8～20	8～24	8～24	8～24
Number of LTO strings 钛锂串数	14	14～20	14～20	14～24	14～24	14～24
Balance mode 均衡方式	**Active balancing** 主动均衡					
Balance current 均衡电流	0.6A		1A		2A	
Internal resistance of main circuit 主回路内阻	1 mΩ		0.65 mΩ		0.47 mΩ	
Continuous discharge current 持续放电电流	100A		150A		200A	
Maximum discharge current 最大放电电流	200A		300A		350A	
Over current protection (adjustable) 过流保护(可调)	10～100A		10～150A		10～200A	
RS485 communication interface RS485 通信接口	Support, optional (can / RS485 can only be one of two) 支持，需选配（CAN/RS485 只能二选一）					
Can communication interface CAN 通信接口	Support, optional (can / RS485 can only be one of two) 支持，需选配（CAN/RS485 只能二选一）					
Display interface 显示屏接口	Yes 有					
Entry cable 出线方式	One port 同口					
Single voltage range 单体电压范围	1-5v					
Voltage acquisition accuracy 电压采集精度	±3mV					
Overcharge protection voltage 过充保护电压	1.2～4.35V adjustable（可调）					
Overcharge release voltage 过充解除电压	1.2～4.35V adjustable（可调）					
Over current release time 过流解除时间	2～120S adjustable（可调）					
Over discharge protection voltage 过放保护电压	1.2～4.35V adjustable（可调）					
Over discharge recovery voltage 过放恢复电压	1.2～4.35V adjustable（可调）					
Temperature detection quantity 温度检测数量	3 个					

Temperature protection 温度保护	Yes 有
Short circuit protection 短路保护	Yes 有
SOC 库仑计	Yes 有
Bluetooth function 蓝牙功能	Support Android and IOS 蓝牙功能
GPS (optional) GPS(选配)	Support (one of RS485 and GPS) 支持（RS485 和 GPS 二选一）

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2.2. Service environment conditions 使用环境条件

- **Operating temperature range: - 20 ℃ ~ 70 ℃；工作温度范围：-40℃～70℃**
- **Power requirement: 20 ~ 100V.电源要求：16~100V，**
- Power consumption: balanced state 10mA@100V , unbalanced state 6mA@100V **功耗：均衡状态 10mA@100V，非均衡状态 6mA@100V**

3.Connector and interface description 连接器及接口描述

3.1. Front panel connector, LED lamp position description 前面板连接器、LED 灯位置描述

The positions of front connector and light switch are shown in Fig. 1,2（前连接器、带灯开关位置如图 1, 2 所示）

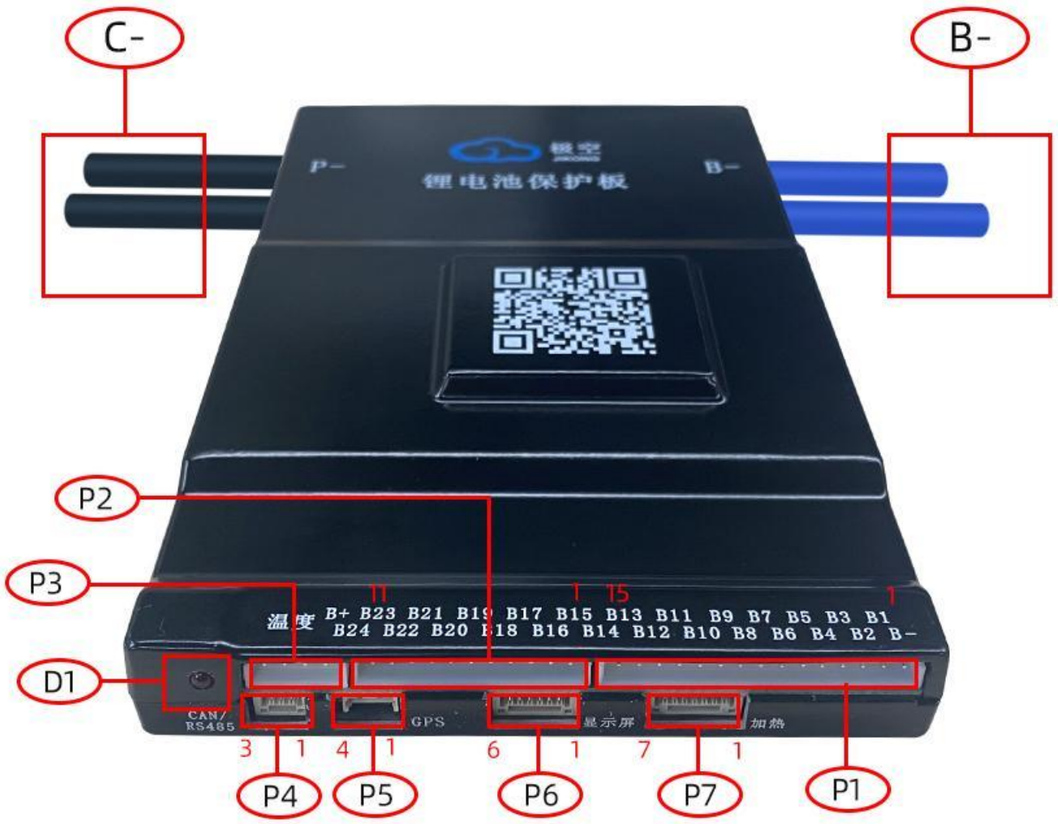

Fig. 1 Schematic diagram of BD6AxxS-10P/ B1AxxS-15P/B2AxxS-15P/B2AxxS20P connector

图 1 BD6AxxS-10P/ B1AxxS-15P/B2AxxS-15P/B2AxxS20P 连接器示意图

3.2. Definition and description of front panel connector and light switch 前面板连接器、带灯开关定义描述

See Table 3 and table 4 for definitions of BD6AxxS-6P/BD6AxxS-8P/BD6AxxS-10P/B1AxxS-15P/B2AxxS-15P/B2AxxS20P protection board connector and LED lamp.

BD6AxxS-6P/BD6AxxS-8P/BD6AxxS-10P/B1AxxS-15P/B2AxxS-15P/B2AxxS20P 保护板连接器定义、LED 灯定义见表 3 表 4

Table 3 P1-P4 interface definition 表 3　P1~P4 接口定义

Connector 连接器	Interface name 接口名称	Pin Number 管脚号	BD6AxxS-6P/BD6AxxS-8P/BD6AxxS-10P B1AxxS-15P/B2AxxS-15P/B2AxxS20P	
			Name 名称	Definition 定义
P1	Balance and acquisition interface 均衡与采集接口	1	B-	Total negative electrode of battery 电池总负极
		2	B1	Positive electrode of the 1st string battery 第 1 串电池正极
		3	B2	Positive electrode of the 2nd string battery 第 2 串电池正极
		4	B3	Positive electrode of the 3st string battery 第 3 串电池正极
		5	B4	Positive electrode of the 4st string battery 第 4 串电池正极
		6	B5	Positive electrode of the 5st string battery 第 5 串电池正极
		7	B6	Positive electrode of the 6st string battery 第 6 串电池正极
		8	B7	Positive electrode of the 7st string battery 第 7 串电池正极
		9	B8	Positive electrode of the 8st string battery 第 8 串电池正极
		10	B9	Positive electrode of the 9st string battery 第 9 串电池正极
		11	B10	Positive electrode of the 10st string battery 第 10 串电池正极
		12	B11	Positive electrode of the 11st string battery 第 11 串电池正极
		13	B12	Positive electrode of the 12st string battery 第 12 串电池正极
		14	B13	Positive electrode of the 13st string battery 第 13 串电池正极
		15	B14	Positive electrode of the 14st string battery 第 14 串电池正极
		1	B15	Positive electrode of the 15st string battery 第 15 串电池正极
		2	B16	Positive electrode of the 16st string battery 第 16 串电池正极

P2		3	B17	Positive electrode of the 17st string battery 第 17 串电池正极
		4	B18	Positive electrode of the 18st string battery 第 18 串电池正极
		5	B19	Positive electrode of the 19st string battery 第 19 串电池正极
		6	B20	Positive electrode of the 20st string battery 第 20 串电池正极
		7	B21	Positive electrode of the 21st string battery 第 21 串电池正极
		8	B22	Positive electrode of the 22st string battery 第 22 串电池正极
		9	B23	Positive electrode of the 23st string battery 第 23 串电池正极
		10	B24	Positive electrode of the 24st string battery 第 24 串电池正极
		12	B+	Total positive electrode of battery 电池总正极
P3	Temperature Interface 温度接口	1	T1A	Pin A of the first temperature sensor 第 1 个温度传感器 A 管脚
		2	T1B	Pin B of the first temperature sensor 第 1 个温度传感器 B 管脚
		3	T2A	Pin A of the second temperature sensor 第 2 个温度传感器 A 管脚
		4	T2B	Pin B of the second temperature sensor 第 2 个温度传感器 B 管脚
P4	Communication interface 通讯接口	1	D_N	CAN_ L / rs485-n signal positive (optional function, CAN or RS485 can be selected) CAN_L/RS485-N 信号正极（选配功能，可选择 CAN 或 RS485）
		2	D_P	CAN_ L / rs485-n signal positive (optional function, CAN or RS485 can be selected) CAN_L/RS485-N 信号正极（选配功能，可选择 CAN 或 RS485）
		3	GND	Power / signal ground 电源/信号地
P5	GPS interface GPS 接口	1	VGPS	Power output, voltage close to B + 电源输出，电压与 B+接近
		2	TX	UART_TX,3.3V
		3	RX	UART_RX,3.3V

		4	**GND**	**Power / signal ground** 电源/信号地
P6	**LCD interface** **显示屏接口**	**1**	**VCC**	**LCD power output** 显示屏电源输出
		2	**A**	**LCD RS485 signal positive pole** 显示屏 RS485 信号正极
		3	**B**	**LCD RS485 signal negative pole** 显示屏 RS485 信号负极
		4	**GND**	**Negative pole of power supply** 电源负极
		5	**K+**	**Active signal positive** 激活信号正极
		6	**K-**	**Active signal negative** 激活信号负极
P7	**Heating interface (optional function)** **加热接口(选配功能)**	**1**	**HT-**	**Heating negative electrode - (BD6AxxS-6P/BD6AxxS-8P do not have this function)**加热负极——(BD6AxxS-6P/BD6AxxS-8P 无此功能)
		2	**HT-**	**Heating negative electrode - (BD6AxxS-6P/BD6AxxS-8P do not have this function)**加热负极——(BD6AxxS-6P/BD6AxxS-8P 无此功能)
		3	**HT-**	**Heating negative electrode - (BD6AxxS-6P/BD6AxxS-8P do not have this function)**加热负极——(BD6AxxS-6P/BD6AxxS-8P 无此功能)
		4	**HT-**	**Heating negative electrode - (BD6AxxS-6P/BD6AxxS-8P do not have this function)**加热负极——(BD6AxxS-6P/BD6AxxS-8P 无此功能)
		5	**HT-**	**Heating negative electrode - (BD6AxxS-6P/BD6AxxS-8P do not have this function)**加热负极——(BD6AxxS-6P/BD6AxxS-8P 无此功能)
		6	**CD+**	**Charging indication input positive - (BD6AxxS-6P/BD6AxxS-8P do not have this function)** 充电指示输入正极——(BD6AxxS-6P/BD6AxxS-8P 无此功能)
		7	**CD-**	**Charging indication input negative - (BD6AxxS-6P/BD6AxxS-8P do not have this function)** 充电指示输入负极——(BD6AxxS-6P/BD6AxxS-8P 无此功能)
D1	**Bluetooth connection indicator: the indicator is always on when the Bluetooth is connected to the protection board, and flashes when the Bluetooth is disconnected.** 蓝牙连接指示灯，当蓝牙连接上保护板时指示灯常亮，断开连接时指示灯闪烁。			
C-	**Connected to external load or charger negative pole** 接外部负载或者充电器负极			
B-	**Connected to battery negative electrode** 接电池负极			

3.3. Product appearance 产品外型

The outline of JK-BD6AxxS-10P/JK-B1AxxS-15P/JK-B2AxxS-15P、 and JK-B2AxxS-20P protection boards is shown in Figure 3

JK-BD6AxxS-10P、JK-B1AxxS-15P、JK-B2AxxS-15P、JK-B2AxxS-20P 保护板外 型如图 3 所示。

Fig. 3 effect diagram ofJK-BD6AxxS-10P、JK-B1AxxS-15P、JK-B2AxxS-15P and JK-B2AxxS-20P

图 3 JK-BD6AxxS-10P、JK-B1AxxS-15P、JK-B2AxxS-15P、JK-B2AxxS-20P 效果图

The appearance of JK-BD6AxxS-6P and JK-BD6AxxS-8P protection plates is shown in Fig. 4.

JK-BD6AxxS-6P、JK-BD6AxxS-8P 保护板外型如图 4 所示。

Figure 4 effect diagram ofJK-BD6AxxS-6P and JK-BD6AxxS-8P

图 4 JK-BD6AxxS-6P、JK-BD6AxxS-8P 效果图

3.4. Size 尺寸

JK-BD6AXXS-10P/JK-B1AXXS-15P/JK-B2AXXS-15P and JK-B2AXXS-20P series BMS size is 162mm × 102mm × 20.4mm, and the overall dimensions are shown in Fig. 5

JK-BD6AXXS-10P/JK-B1AXXS-15P/JK-B2AXXS-15P/JK-B2AXXS-20P 系列 保护板尺寸为 162mm×102mm×20.4mm，外形尺寸如图 5 所示。

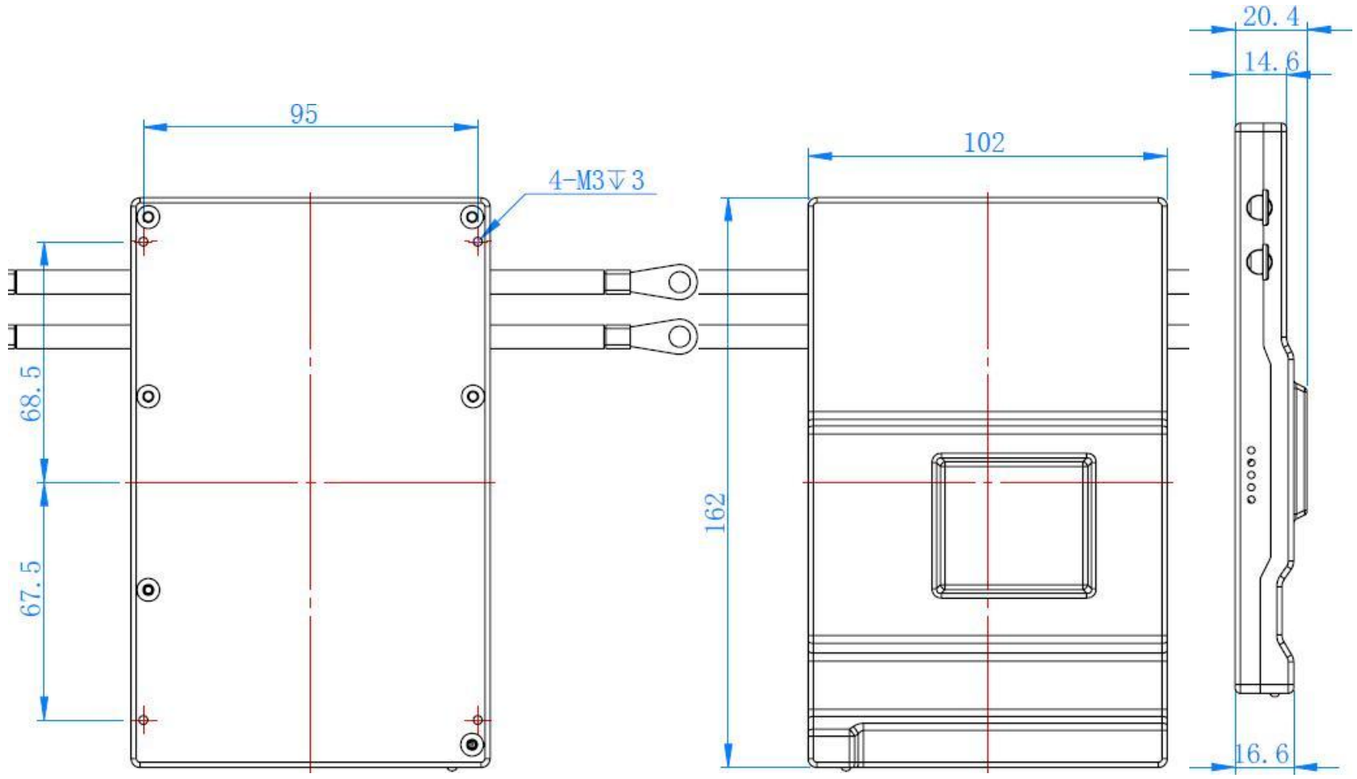

Figure 5 outline dimension drawing of BD6A20S10P/B2A24S10P/ B1A24S15P/B2A24S15P and B2A24S20P

图 5 BD6A20S10P/B2A24S10P/ B1A24S15P/B2A24S15P/B2A24S20P 外形尺寸图

BD6AXXS-6P and BD6AXXS-8P series BMS are 136mm in size × 83mm × 17.6mm, and the overall dimensions are shown in Fig. 6.

BD6AXXS-6P、BD6AXXS-8P 系列保护板尺寸为 136mm×83mm× 17.6mm，外形尺寸如图 6 所示。

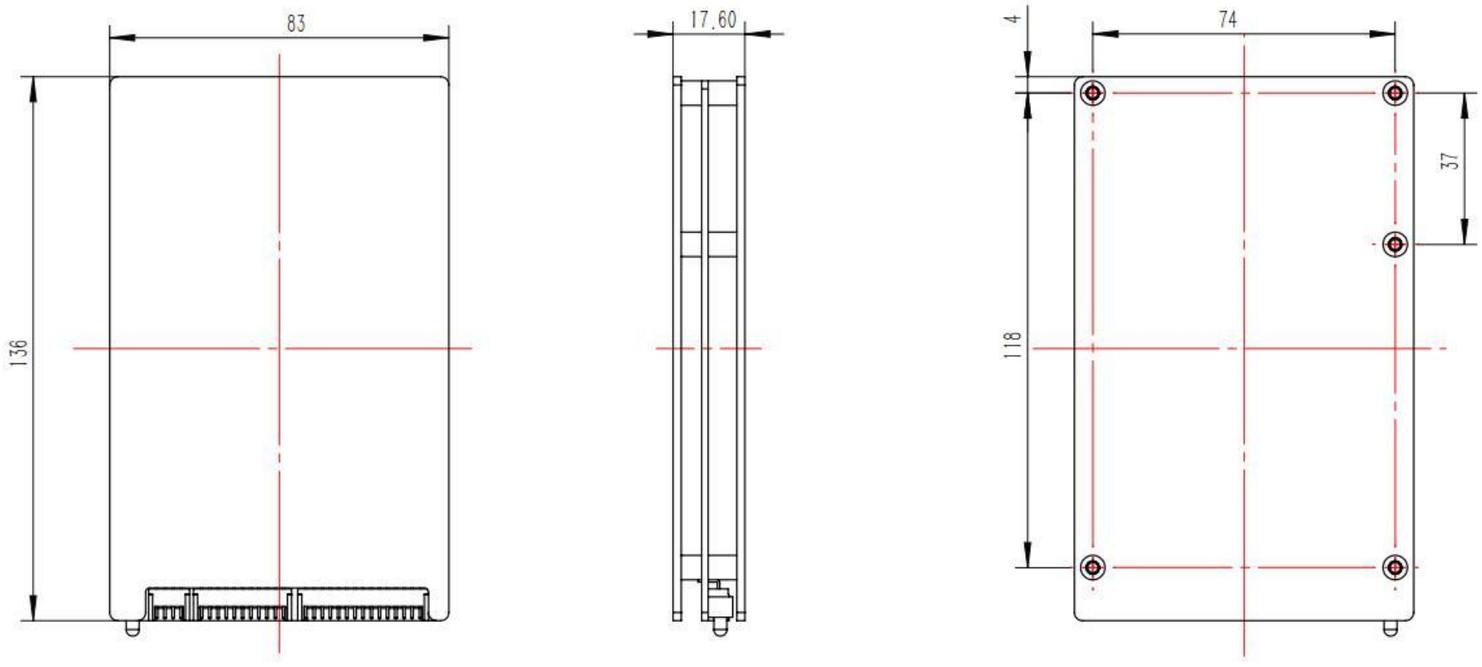

Figure 6 outline dimension drawing of BD6AXXS-6P and BD6AXXS-8P series BMS

图 6 BD6AXXS-6P、BD6AXXS-8P 系列保护板外形尺寸图

3.5. Weight 重量

- **The weight of BD6AxS-6P and BD6AxS-8P series BMS is about 257g.** BD6AXXS-6P、BD6AXXS-8P 系列 保护板重量约为 257g
- **The weight of BD6AXXS-10P series BMS is about 360g.** BD6AXXS-10P 系列 保护板重量约为 360g
- **The weight ofB1AXXS-15P/B2AXXS-15P and B2AXXS-20P series BMS is about 360g.** B1AXXS-15P/B2AXXS-15P/B2AXXS-20P 系列 保护板重量约为 430g

4. Installation method and precautions 安装方法及注意事项

4.1. Unpacking inspection and precautions 开箱检查及注意事项

Unpacking inspection and precautions are as follows:开箱检查及注意事项如下：

A)The packaging box and protective plate shall be handled with care and shall not be inverted as far as possible；对包装箱、保护板等需要轻拿轻放、尽量不要倒置；

B）Before unpacking, pay attention to whether the package is in good condition, such as whether there are impact marks and damages；开箱前注意包装是否完好，如有无撞击痕迹、有无破损等；

4.2.Line connection 线路连接

BD6AxxS-10P / BD6AxxS-15P / BD6AxxS-20P / B1AxxS-15P / B2AxxS-15P and B2AxxS-20P BMS protection board is applicable to lithium battery pack with 7-24 strings of cells. The wiring method of battery pack with different number of cells is different. The specific wiring method is shown in the following figure.

BD6AxxS-10P 、BD6AxxS-15P 、BD6AxxS-20P 、 B1AxxS-15P、B2AxxS-15P、B2AxxS-20P 保护板适用于 7-24 串电芯的锂电池组，不同电芯数量的电池组接线方法不同，具体接线方式如下图所示。

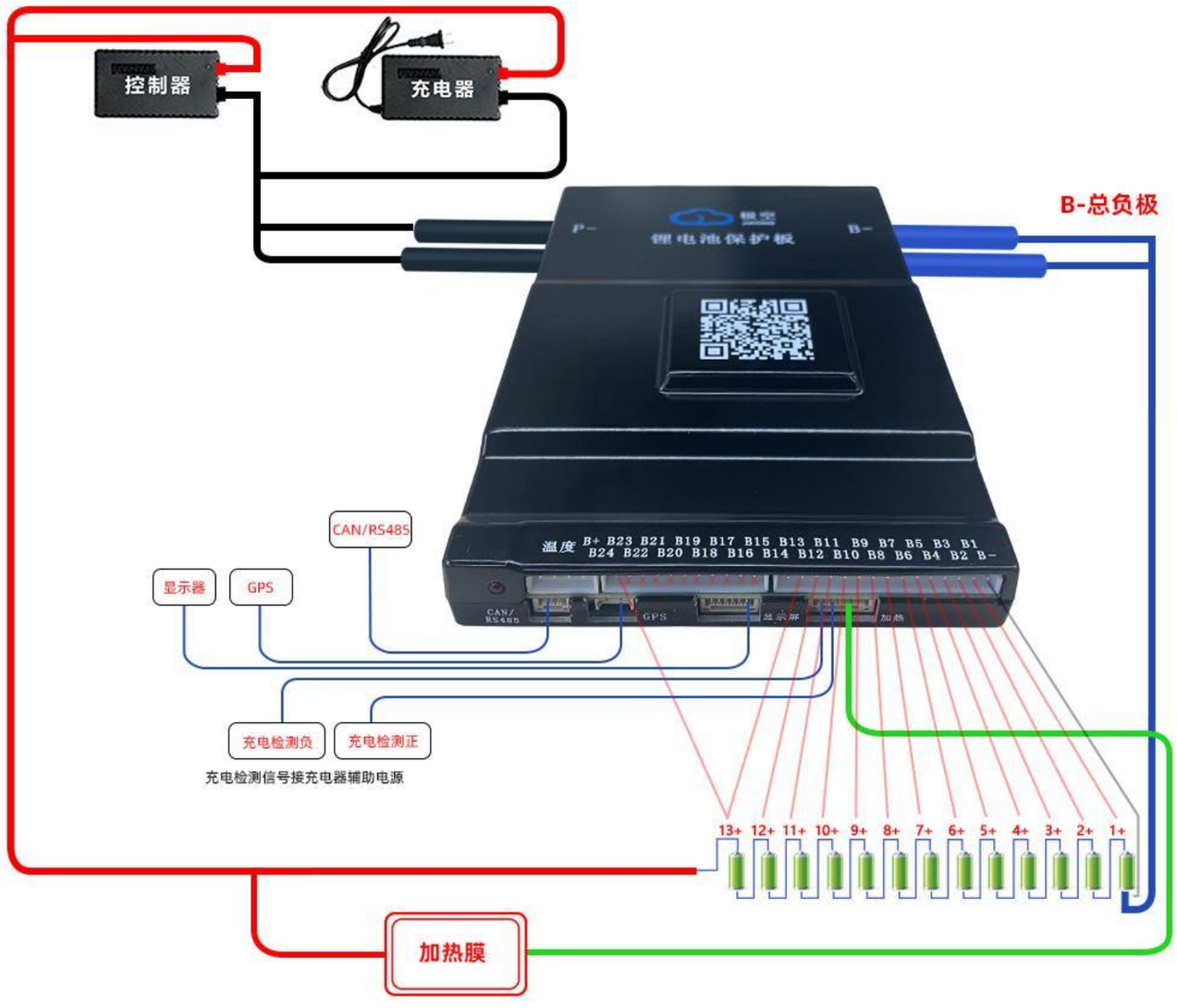

Fig. 7 wiring diagram of heating function 图 7 加热功能接线图示

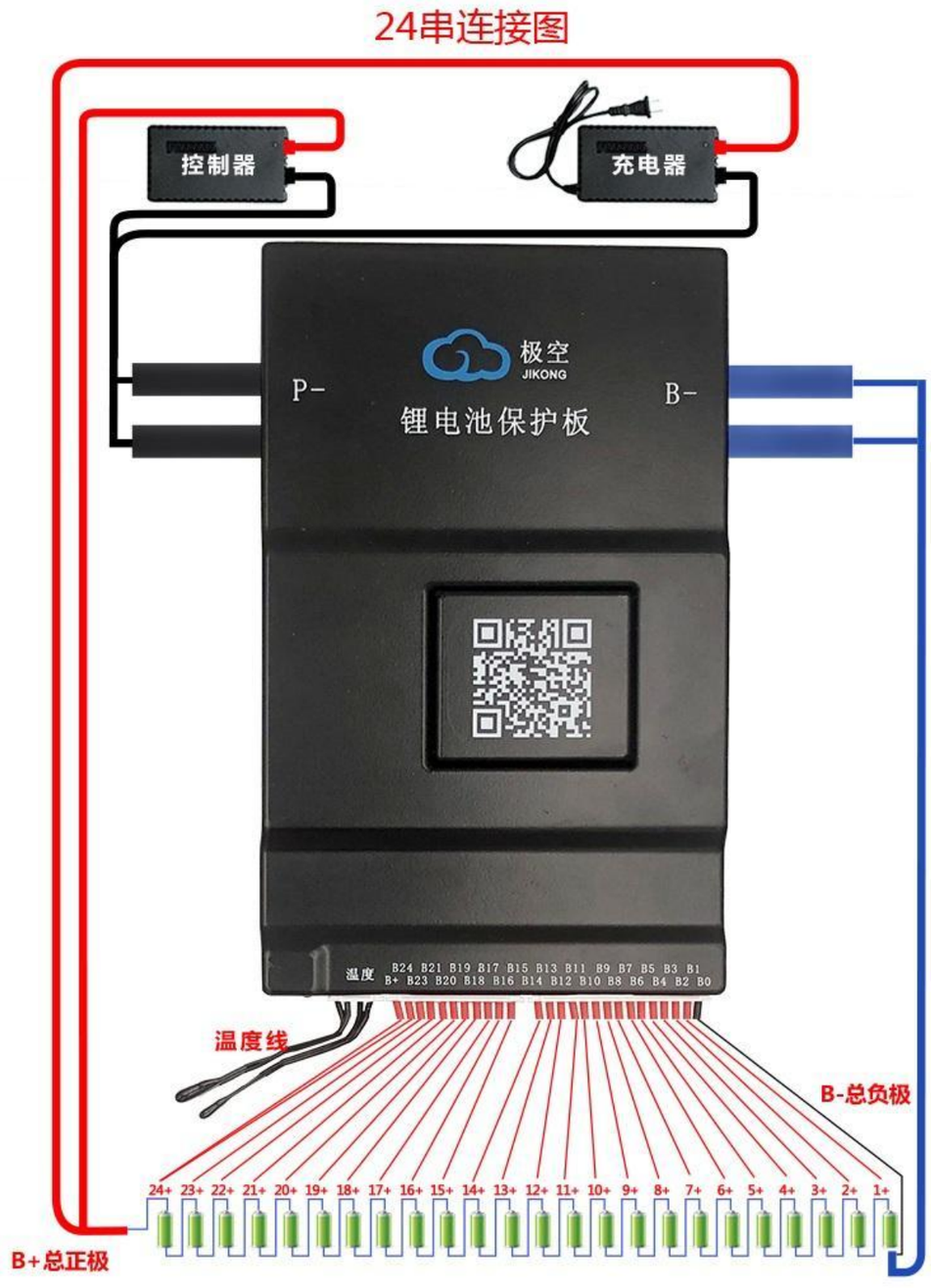

Figure 8 wiring diagram of 24 string batteries 图 8 24 串电池接线图示

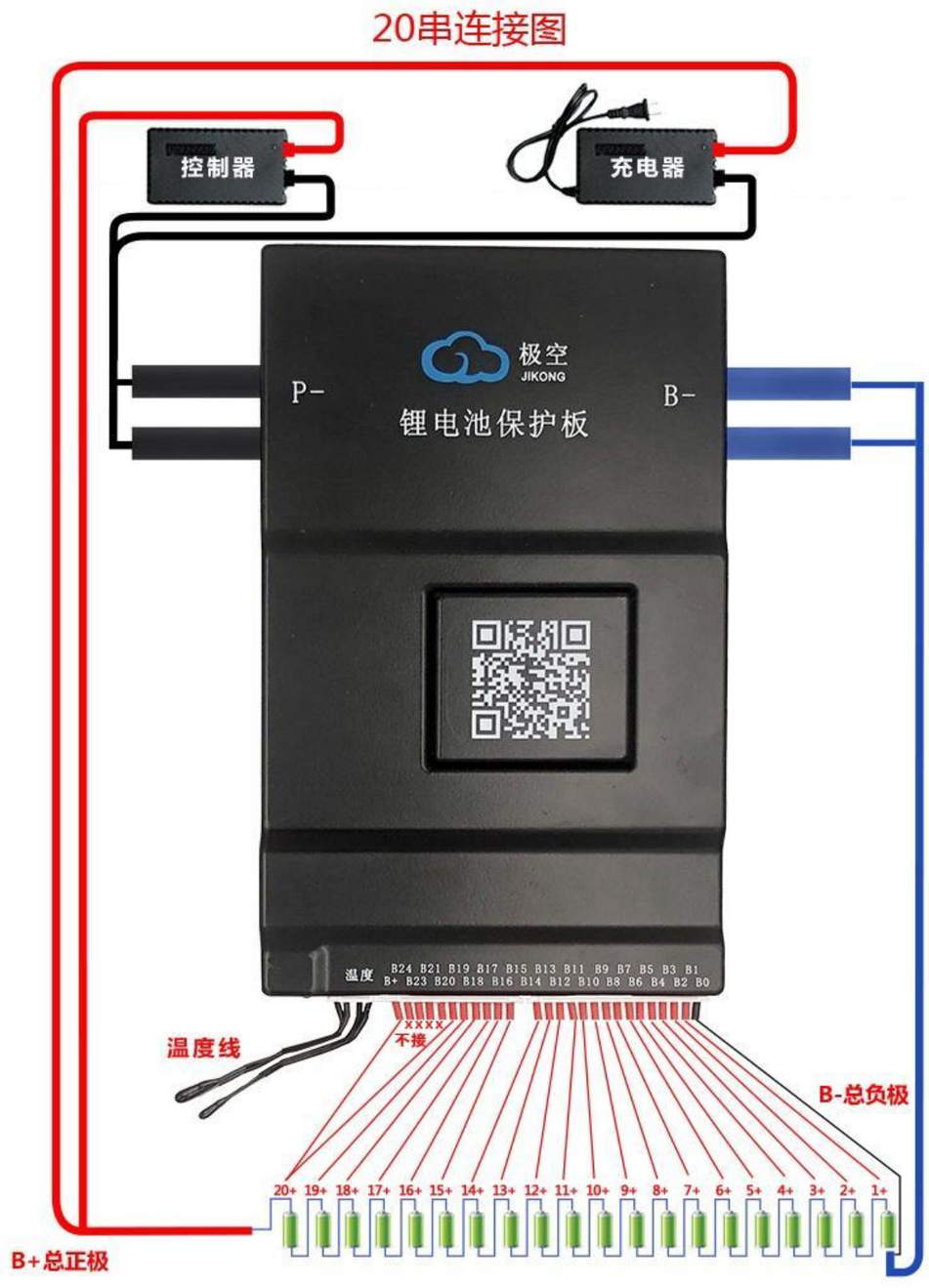

Figure 9 wiring diagram of 20 string batteries 图 9 20 串电池接线图示

Figure 10 wiring diagram of 17 string batteries 图 10 17 串电池接线图示

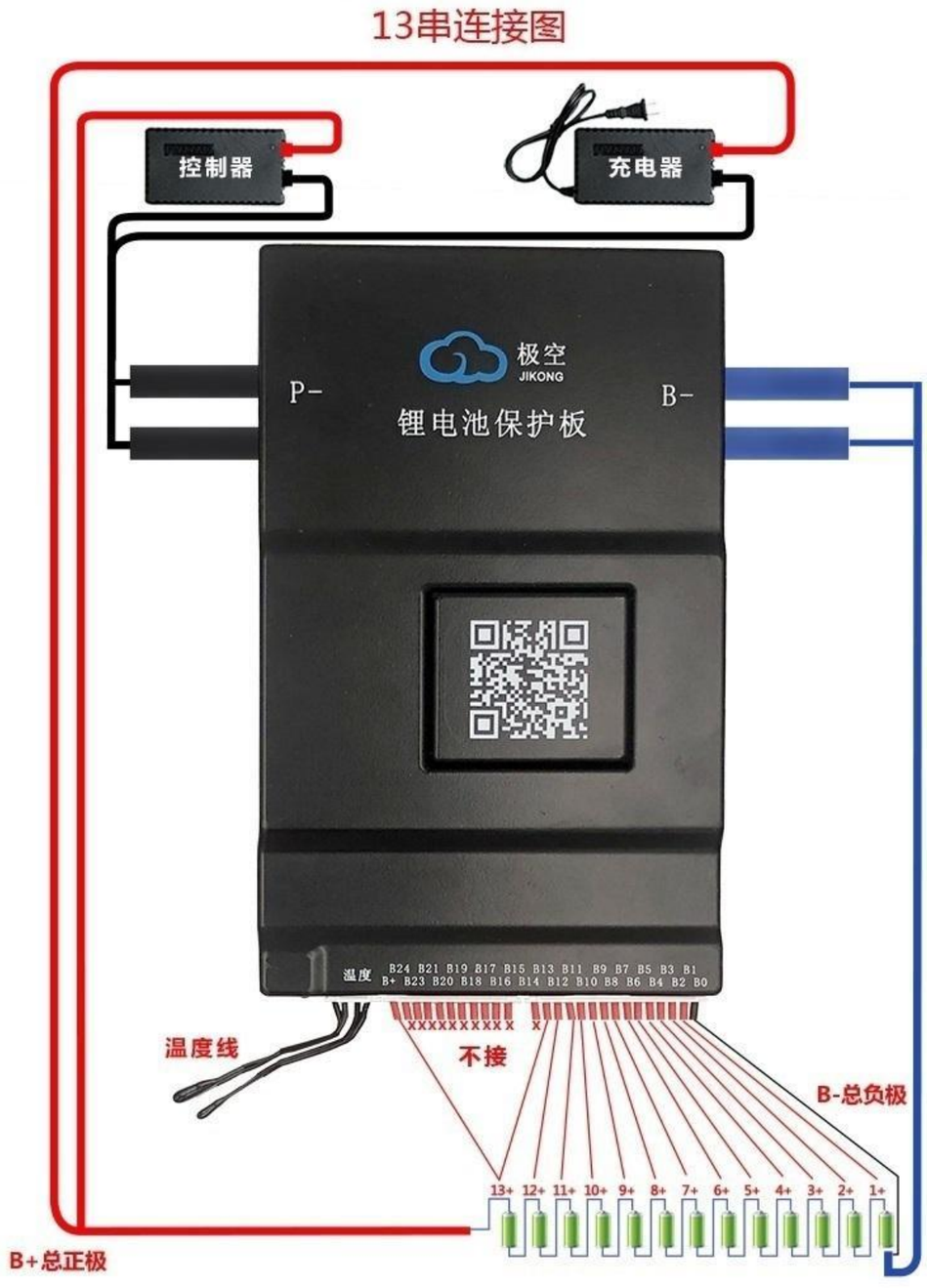

Figure 11 wiring diagram of 13 string batteries 图 11 13 串电池接线图示

BD6AxxS-6P and BD6AxxS-8P protection boards are applicable to lithium battery packs with 7-24 strings of cells. The wiring methods of battery packs with different cell numbers are different. The specific wiring methods are shown in the following figure.

BD6AxxS-6P、BD6AxxS-8P 保护板适用 7-24 串电芯的锂电池组，不同电芯数量的电池组接线方法不同，具体接线方式如下图所示。

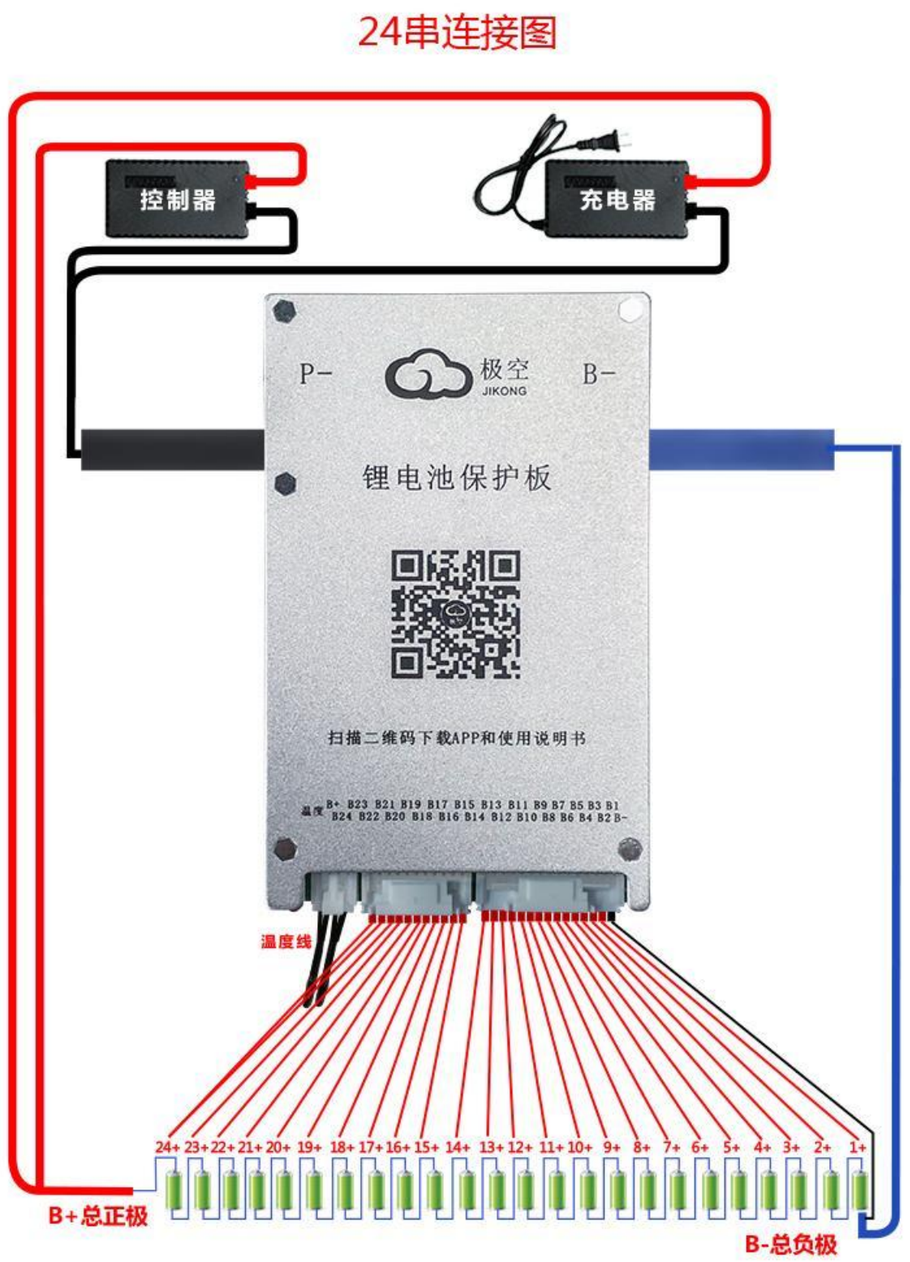

Figure 12 wiring diagram of 24 string batteries 图 12 24 串电池接线图示

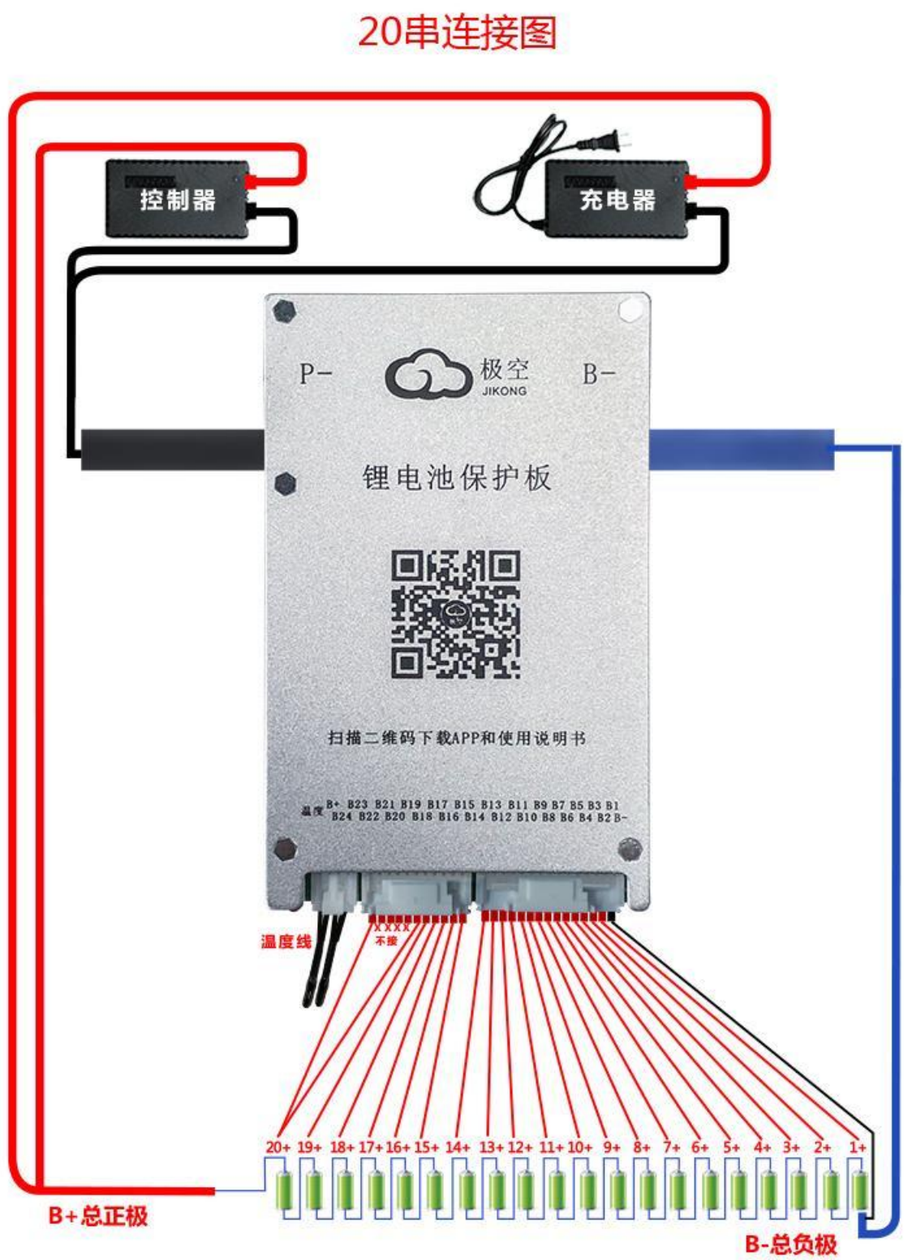

Figure 13 wiring diagram of 20 string batteries 图 13 20 串电池接线图示

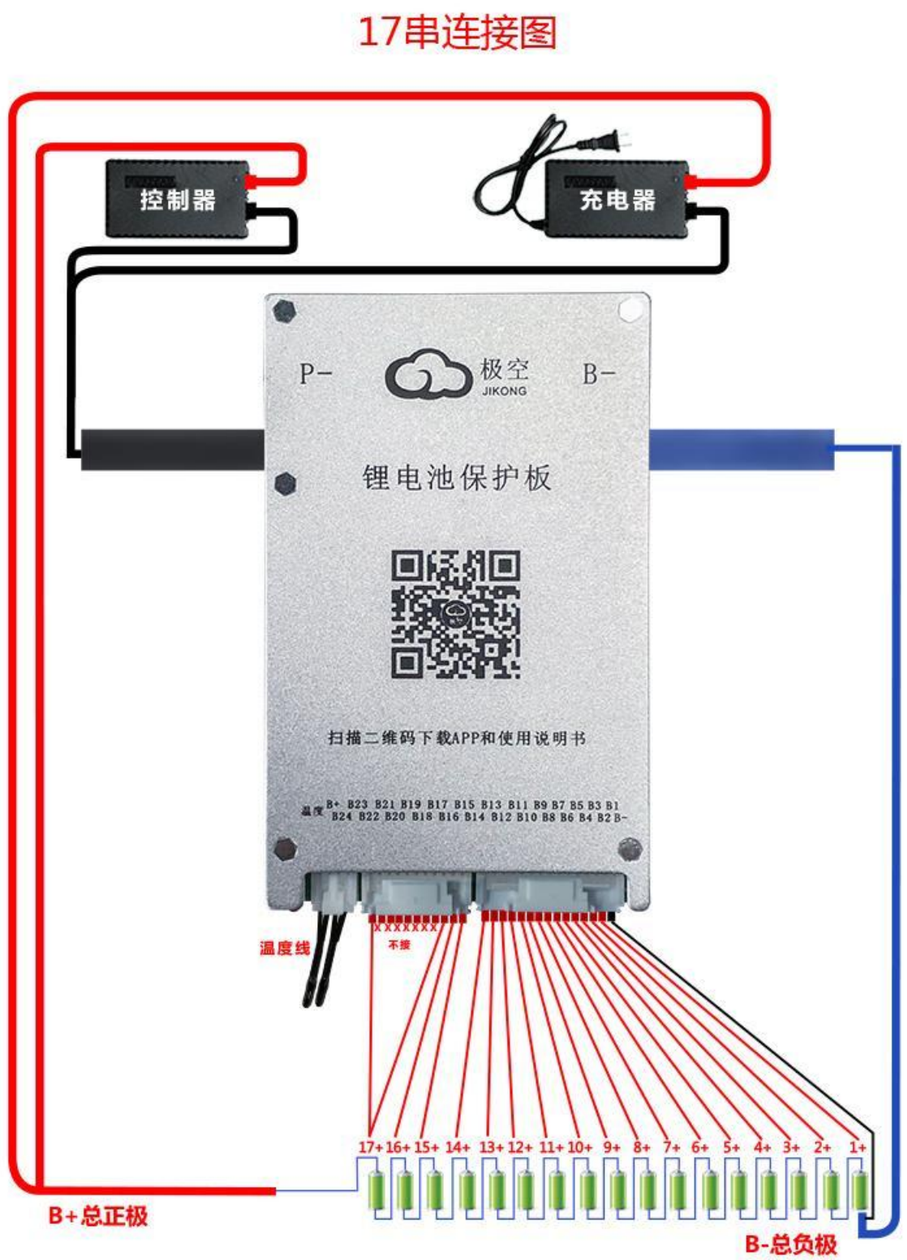

Figure 14 wiring diagram of 17 string batteries 图 14 17 串电池接线图示

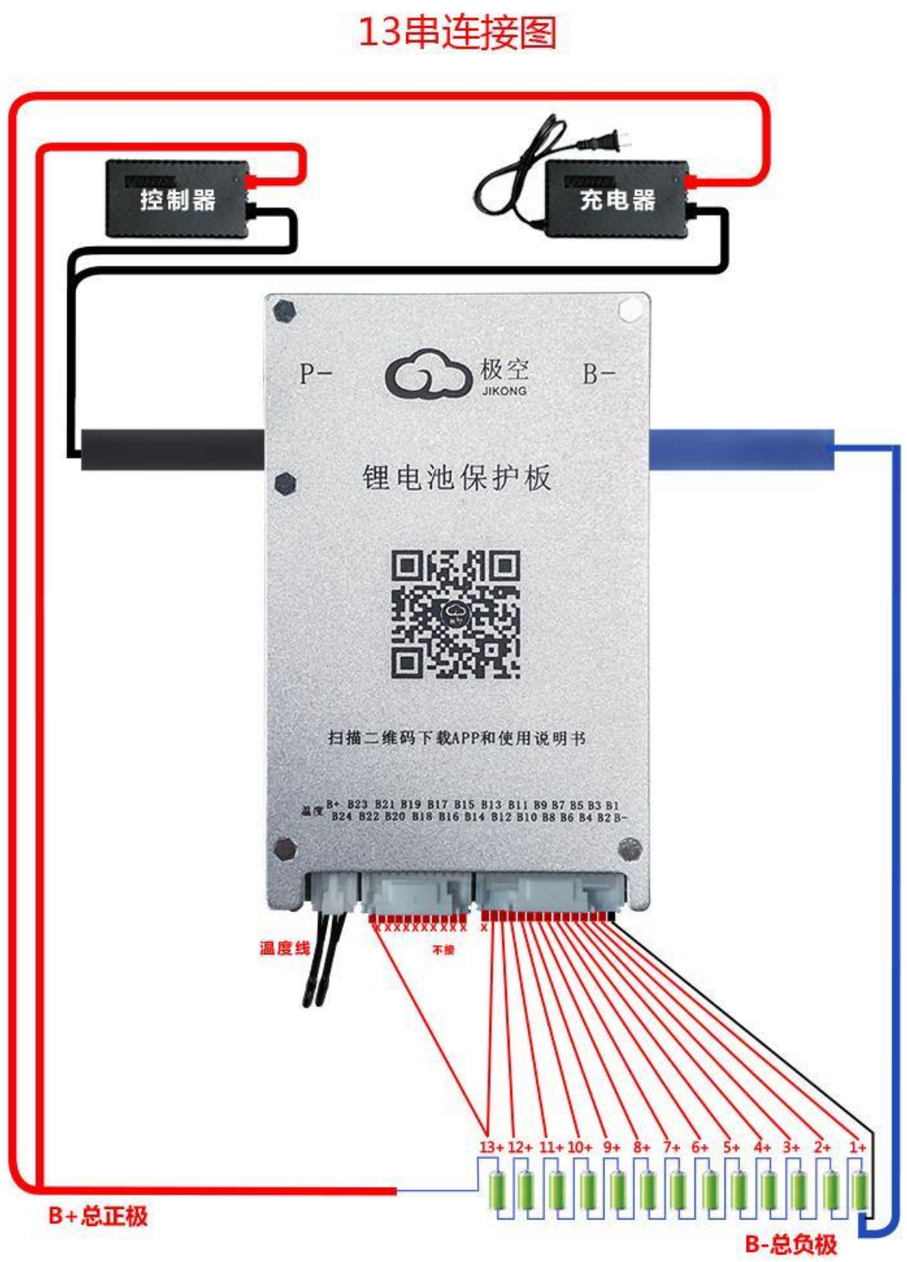

Figure 15 wiring diagram of 13 string batteries 图 15 13 串电池接线图示

Figure 6 wiring diagram of 20 string batteries 图 6 20 串电池接线图示

Figure 7 wiring diagram of 16 string batteries 图 7 16 串电池接线图示

4.3. APP installation APP 安装

By scanning the two-dimensional code shown in Figure 31, you can obtain the mobile phone app matching the product. 通过扫描图 8 所示的二维码可以获取与产品配套的手机 APP。

Figure 16 mobile app link QR code 图 8 手机 APP 链接二维码

5.Use and operation 使用与操作

5.1. Preparation and inspection before use 使用前的准备和检查

Before turning on the power supply for use, please reconfirm whether the cable connection is correct, whether the power supply provided to the battery management system is within the required range, check whether the equipment has been placed properly, and confirm whether the circuit board is short circuited. Only after confirmation can the power supply of the battery management system be turned on, otherwise serious consequences such as abnormal operation or even burning may be caused.

打开电源使用之前，请再次确认线缆连接是否正确，给电池管理系统提供的电源 是否在要求范围之内，检查设备是否已经稳妥的放置，确认电路板有无短路等情况， 确认无误后才可以接通电池管理系统电源，否则可能造成工作异常甚至烧毁等严重后果。

5.2.Power on of battery management system　电池管理系统上电工作

After confirming that the above operations are correct, the equipment can be powered on. Plug the matching activation switch plug into the display interface,Press the activation switch to turn on the protection board.
确认上述操作无误以后，可以给设备上电。将配套的激活开关插头插到显示屏接口，按下激活开关开启保护板。

5.3.　APP operating instructions APP 操作说明

5.3.1.　Equipment operation 设备操作

5.3.1.1.　Device connection 设备连接

First, turn on the Bluetooth of the mobile phone, and then turn on the app, as shown in Figure 9. 首先开启手机蓝牙，然后打开 APP 后，如图 9 所示。
Click the icon in the upper left corner to scan the device. When connecting the device for the first time, the app will prompt you to enter the password. The default password of the device is "1234". After connecting the device, the app will automatically record the password. The next connection does not need to enter the password. After opening the app, click the device in the device list to automatically connect. The password input interface is shown in Figure 10. 点击左上角图标扫描设备,第一次连接时 APP 会提示输入密码，设备的默认密码 为“1234”，设备连接后 APP 会自动记录密码，下次连接无需输入密码，开启 APP 后点击设备列表中的设备自动连接，密码输入界面如图 10 所示。

图 9　Figure 9 device scanning 设备扫描

图 10 密码输入 Figure 10 password input

5.3.1.2. Change password and name 修改密码和名称

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. 设备连接上后点击设备列表右侧的“笔型”图标可修改设备名称和密码。

The interface for modifying the equipment name is shown in Figure 11. Note that the equipment name only supports English or numbers, and does not support Chinese names and Chinese characters. The password modification interface is shown in Figure 12. To modify the device password,you must first enter the old password of the device. Only when the current password is correct can you enter the new password. After entering the new password twice, click "OK" to complete the modification of the device password.

修改设备名称界面如图 11 所示，注意，设备名称仅支持英文或者数字，不支持中文名称和汉字。修改密码界面如图 12 所示。要修改设备密码必须先输入设备的旧密码，只有在当前密码正确的前提下，才能进入到新密码输入的选项。输入两次新密码后，点击‘确定’ 可以完成设备密码修改。

Figure 11 name modification 图 11 名称修改

Figure 12 password modification 图 12 密码修改

5.3.2. Status viewing 状态查看

The real-time status interface is shown in Figure 13 实时状态界面如 13 所示。

Figure 21 real time status display **图 21 实时状态显示**

On the real-time status page, you can view the switch status, charge current, discharge current, temperature display, protection alarm, cell voltage, total battery voltage, maximum voltage difference, average cell voltage, equilibrium state, equilibrium current, equilibrium line resistance and other information. 在实时状态页面可以查看开关状态、充电电流、放电电流、温度显示、保护告警、单体电压、电池总电压、最大压差、单体平均电压、均衡状态、均衡电流、均衡 线电阻等信息。

5.3.3. Parameter setting 参数设置

If you need to modify the working parameters of the protection board, you must first,click the "Authorization setting" button and enter the parameter setting password to verify the parameter setting authority. The parameter setting password is "123456" by default. Only after the parameter setting password is correctly entered can the parameters of the protection board be modified. The parameter setting password and the device Bluetooth connection password are independent of each other.

如果需要修改保护板的工作参数，必须先点击“授权设置”按钮，输入参数设置密 码，以验证参数设置权限。参数设置密码出厂默认为“123456”。只有正确输入参数设置密码以后才能修改保护板的参数。参数设置密码和设备蓝牙连接密码是相互独立的。

The working parameters of the protection board can be modified on the parameter setting page. The definitions of the parameters are as follows.

在参数设置页面可对保护板的各项工作参数进行修改，各个参数的释义如下。

A) 一键铁锂 One key LFP

Click this button to modify all working parameters of the protection board to LFP battery parameters. See the appendix for the default values of LFP parameters. 点击该按钮可以将保护板的所有工作参数修改为铁锂电池参数，铁锂参数默认值见 附录。

B) One key NCM 一键三元

Click this button to modify all working parameters of the protection board to NCM battery parameters. See the appendix for the default values of NCM parameters.

点击该按钮可以将保护板的所有工作参数修改为三元电池参数，三元锂参数默认值 见附录。

C) One key LTO 一键钛酸锂

Function this button can modify all working parameters of the protection board to LTO battery parameters. See the appendix for the default values of LTO parameters. 功能该按钮可以将保护板的所有工作参数修改为钛酸锂电池参数，钛酸锂参数默认 值见附录

D) Monomer quantity 单体数量

The number of cells indicates the number of cells of the current battery. Please set this value accurately before use, otherwise the protection board will not work properly 单体数量表示当前电池的电芯数量，在使用之前，请准确的设定该值，否则保护板 不能正常工作。

E) Battery capacity 电池容量

This value is the design capacity of the battery. 该值为电池的设计容量。

F) Trigger equalizing differential pressure 触发均衡压差

The trigger equalization pressure difference is the only parameter that controls equalization,When the equalizing switch is on, when the maximum differential pressure of the battery pack exceeds this value, equalizing starts until the differential pressure is lower than this value. For example, set the equalization trigger pressure difference to 0.01V, start equalization when the battery pack pressure difference is greater than 0.01V, and end equalization when it is lower than 0.01V.

触发均衡压差是唯一的控制均衡的参数，在均衡开关打开的情况下，当电池组最大 压差超过该值时，均衡开始，直到压差低于该值时均衡结束。比如设定均衡触发压差为 0.01V，当电池组压差大于 0.01V 时开始均衡，低于 0.01V 时结束均衡。

(it is recommended to set the equalizing trigger pressure difference to 0.005v for batteries above 50ah and 0.01V for batteries below 50ah).（建议 50AH 以上的电池设定均衡触发压差为 0.005V，50AH 以下的电池设定触 发均衡压差为 0.01V）。

G) Voltage calibration 电压校准

The voltage calibration function can be used to calibrate the accuracy of the protection board voltage acquisition. 电压校准功能可以用来校准保护板电压采集的精度。

When it is found that there is an error between the total voltage collected by the protection board and the total voltage of the battery, the voltage calibration function can be used to calibrate the protection board. The calibration method isto fill in the currently measured total battery voltage, and then click the "OK" button behind the voltage calibration to complete the calibration.

当发现保护板采集的总电压和电池的总电压有误差的时候，可以使用电压校准功能 来校准保护板。校准的方法是填入当前测量到的电池总电压，然后点击电压校准后面的 ‘设置’按钮，完成校准。

H) Current calibration 电流校准

The current calibration function can be used to calibrate the accuracy of the current collection of the protection board.电流校准功能可以用来校准保护板电流采集的精度。

When it is found that there is an error between the total current collected by the protection board and the actual current of the battery,the current calibration function can be used to calibrate the protection board. The calibration method is to fill in the current measured total battery current, and then click the "set" Button behind the current calibration to complete the calibration 当发现保护板采集的总电流和电池的实际电流有误差的时候，可以使用电流校准功能来校准保护板。校准的方法是填入当前测量到的电池总电流，然后点击电流校准后面的‘设置’按钮，完成校准。

I) "Single under voltage protection", "single under voltage recovery" “单体欠压保护”、“单体欠压恢复”

"Cell under 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, a "cell under voltage alarm" will be generated. At the same time, the protection board will turn off the discharge MOS. At this time, the battery cannot be discharged and can only be charged. After the alarm is generated, only when all the individual voltage values exceed the value of "individual voltage recovery", the protection board releases the "individual under voltage alarm" and turns on the discharge MOS.

“单体欠压保护”是指电芯的截止电压，只要电池组中任一单体电压低于该值时，产生‘单体欠压报警’，同时保护板关闭放电 MOS，此时电池不能放电，只能充电。当报警 产生以后，只有全部单体电压值超过“单体电压恢复”的值以后，保护板解除‘单体欠压 报警’，同时开启放电 MOS。

J) "Single overcharge voltage", "single overcharge recovery" “单体过充电压”、“单体过充恢复”

"Single overcharge voltage" refers to the saturation voltage of the battery cell. As long as the voltage of any single cell in the battery pack exceeds this value, a "single overcharge alarm" will be generated. At the same time, the protection board closes the charging MOS. 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 the cells is lower than the value of "cell overcharge recovery", the protection board releases the "cell overcharge alarm" and turns on the charging MOS.

“单体过充电压”是指电芯的饱和电压，只要电池组中任一单体电压超过该值时，产生‘单体过充报警’，同时保护板关闭充电 MOS，此时电池不能充电，只能放电。当报警 产生以后，只有全部单体电压值低于“单体过充恢复”的值以后，保护板解除‘单体过充报警’，同时开启充电 MOS。

K) 自动关机电压 Automatic shutdown voltage

The automatic shutdown voltage indicates the lowest voltage of the protection board. When the voltage of the highest cell in the battery pack is lower than this value, the protection board is closed. This value must be lower than "single under voltage protection".

自动关机电压表示保护板工作的最低电压，当电池组中最高单体的电压低于该值时，保护板关闭。该值必须低于“单体欠压保护”。

L） Maximum balance current 最大均衡电流

The equalizing current represents the continuous current of the high-voltage battery discharging and the low-voltage battery charging in the process of energy transfer. The maximum equalizing current refers to the maximum current in the energy transfer process, and the maximum equalizing current should not exceed 0.1C. For example, 20AH battery shall not exceed 20 * 0.1 = 2A.

均衡电流表示在能量转移的过程中高电压电池放电和低电压电池充电的持续电流。最大均衡电流表示能量转移过程中的最大电流，最大均衡电流以不超过 0.1C 为宜。如：20AH 电池不超过 20*0.1=2A。

N） "Maximum charging current", "Charging over current delay", "Charging over current release" “最大充电电流”、“充电过流延时”、“充电过流解除”

When charging the battery pack, if the current exceeds the "maximum charging current" and the duration exceeds the "charging over current delay", BMS will generate a "charging over current alarm" and turn off the charging switch. After the alarm is generated, after the time of "charging over current release", BMS releases the charging over current alarm and turns on the charging switch again.

当给电池包充电时，电流超过“最大充电电流”且持续时间超过“充电过流延时”的时间，保护板产生‘充电过流报警’，同时关闭充电开关。报警产生以后，经过“充电过流解除”的时间后，保护板解除充电过流报警，重新开启充电开关。

For example, set "maximum charging current" as 10a, "charging over current delay" as 10s, "charging over current release" as 50s. During charging, if the charging current exceeds 10A for 10 consecutive seconds, BMS will generate a 'charging over current alarm' and turn off the charging switch. 50 seconds after the alarm is generated, BMS will release the charging over current alarm' and turn on the charging switch again.

举例：设定“最大充电电流”为 10A、“充电过流延时”为 10 秒、“充电过流解除”为 50 秒。在充电过程中充电电流连续 10 秒超过 10A，保护板将产生‘充电过流报警’，同时关 闭充电开关，报警产生后 50 秒，解除‘充电过流报警’，同时保护板重新开启充电开关。

O）"Maximum discharge current", "discharge over current delay", "discharge over current release" “最大放电电流”、“放电过流延时”、“放电过流解除”

When discharging the battery pack, if the current exceeds the "maximum discharge current" and the duration exceeds the "discharge over current delay", the BMS will generate a "discharge over current alarm" and turn off the discharge MOS. After the alarm is generated, after the "discharge over current release" time, BMS releases the "discharge Over current alarm" and turns on the discharge switch again.

举例：设定“最大放电电流”为 100A、“放电过流延时”为 10 秒、“放电过流解除”为 50 秒。在放电过程中放电电流连续 10 秒超过 100A，保护板将产生‘放电过流报警’，同时关闭放电 MOS，报警产生后 50 秒，解除‘放电过流报警’，同时保护板重新开启放电 MOS。

For example, set "maximum discharge current" as 100A, "discharge over current delay" as 10s, "discharge over current release" as50s.During the discharge process,if the discharge current exceeds 100Afor 10 consecutive seconds,BMS will generate a "discharge over current alarm" and turn off the discharge MOS. 50seconds after the alarm is generated,the "discharge over current alarm"will be released, and BMS will turn On the discharge MOS again

举例：设定“最大放电电流”为 100A、“放电过流延时”为 10 秒、“放电过流解除”为 50 秒。在放电过程中放电电流连续 10 秒超过 100A，保护板将产生‘放电过流报警’，同时关闭放电 MOS，报警产生后 50 秒，解除‘放电过流报警’，同时保护板重新开启放电 MOS。

P） Short circuit protection delay 短路保护延时

When BMS detects that the current exceeds 600A and the duration exceeds the time of "short circuit protection delay", BMS will generate "short circuit alarm" and corresponding charge / discharge switch. After the alarm is generated, after the "short circuit protection is released" time, BMS will release the "short circuit protection alarm" and turn on the charge and discharge switch again.

当保护板检测到电流超过 600A 且持续时间超过“短路保护延时”的时间，保护板产生‘短路报警’，同时相应充放电开关。报警产生以后，经过“短路保护解除”的时间后， 保护板解除‘短路保护报警’，重新开启充放电开关。

For example, set "short circuit protection delay" to 1000 microseconds and "short circuit protection release" to 50 seconds. During the charging and discharging process, if the current is 600A for 1000 microseconds continuously, BMS will generate "short circuit protection alarm", and the corresponding charging and discharging switch will be set. 50 seconds after the alarm is generated, the "short

circuit protection alarm" will be released, and BMS will turn on the charging and discharging switch again. (It is recommended to use the factory default setting unnecessarily; if the short-circuit protection is set to '0', it means that the short-circuit protection is turned off.).
举例：设定 “短路保护延时”为 1000 微秒、“短路保护解除” 为 50 秒。在充放电过程中电流连续 1000 微秒 600A，保护板将产生‘短路保护报警’， 同时相应充放电开关，报警产生后 50 秒，解除‘短路保护报警’，同时保护板重新开启充放电开关。（建议非必要使用出厂默认设置；短路保护设置为‘0’，表示关闭短路保护）。

Q) Release of short circuit protection 短路保护解除

After the short-circuit protection occurs, the short-circuit protection is released after the time set by "short-circuit protection release". 当短路保护发生以后，经过‘短路保护解除’所设定的时间以后，解除短路保护

R) "Charging over temperature protection", "charging over temperature recovery" “充电过温保护”、“充电过温恢复”

During charging, when the battery temperature exceeds the value of "charging over temperature protection", the BMS will generate a warning of "charging over temperature protection" and turn off the charging MOS. After the alarm is generated, when the temperature is lower than "charging over temperature recovery", BMS will release the warning of "charging over temperature protection" and restart the charging MOS.
在充电过程中，电池温度超过“充电过温保护”的值时，保护板产生‘充电过温保护’警告，同时保护板关闭充电 MOS。报警产生以后，当温度低于“充电过温恢复”时，保护板解除‘充电过温保护’警告，同时重新开启充电 MOS。

S) "Discharge over temperature protection", "Discharge over temperature recovery"“ 放 电 过 温 保 护 ”、“ 放 电 过 温 恢 复 ”

During discharge, when the battery temperature exceeds the value of "discharge over temperature protection", BMS will generate a warning of "discharge over temperature protection" and BMS will close the discharge switch. After the alarm is generated, when the temperature is lower than "discharge over temperature recovery", the protection board will release the warning of "discharge over temperature protection" and restart the discharge switch.
在放电过程中，电池温度超过“放电过温保护”的值时，保护板产生‘放电过温保护’警告，同时保护板关闭放电开关。报警产生以后，当温度低于“放电过温恢复”时，保护板解除‘放电过温保护’警告，同时重新开启放电开关。

T) "Low temperature charging protection", "Low temperature charging recovery" “充电低温保护”、“充电低温恢复”

During charging, when the battery temperature is lower than the value of "charging low temperature protection", the BMS will generate a warning of "charging low temperature protection" and turn off the charging MOS. After the alarm is generated, when the temperature is higher than "charging low temperature recovery", the protection board will release the warning of "charging low temperature protection" and restart the charging MOS.
在充电过程中，电池温度低于“充电低温保护”的值时，保护板产生‘充电低温保护’警 告，同时保护板关闭充电 MOS。报警产生以后，当温度高于“充电低温恢复”时，保护板 解除‘充电低温保护’警告，同时重新开启充电 MOS。

Under the condition that BMS supports heating, after entering "charging low temperature protection", BMS turns on the heating function to heat the battery. After "charging low temperature protection" is released, the heating is turned off.
在保护板支持加热的条件下，进入“充电低温保护”以后，保护板打开加热功能给 电池加热，‘充电低温保护’解除以后，加热关闭。

U) "MOS over temperature protection", "MOS over temperature recovery" “MOS 过温保护”、“MOS 过温恢复”

When the MOS temperature exceeds the value of "MOS over temperature protection", the BMS will generate "MOS over temperature alarm" and turn off the charge and discharge MOS at the same time. 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 restart the charging and discharging MOS (The MOS over temperature protection value is 75 ℃, and the MOS over temperature recovery value is 65 ℃. These two values are factory default values and cannot be modified).
当 MOS 温度超过“MOS 过温保护”的值以后，保护板产生‘MOS 过温报警’同时关闭充放电 MOS，电池不能充电也不能放电。报警产生以后，MOS 温度低于“MOS 过温恢复”的值以后，保护板解除‘MOS 过温报警’，同时重新开启充放电 MOS（MOS 过温保护值为 75℃，MOS 过温恢复值为 65℃，这两个值为出厂默认值，不能修改）。

V) Device address (if supported) 设备地址（如果支持）

The device slave address used to configure the protection board. 用来配置保护板的设备从地址。

W) Discharge precharge time (if supported) 放电预充时间（如果支持）

When the protection board supports the discharge pre-charge function, this value is used to control the closing time of the discharge pre-charge switch, unit: s. After the discharge pre-charge is completed, the discharge switch is automatically turned on to start the discharge.当保护板支持放电预充功能，该值用来控制放电预充开关的闭合时间，单位：秒。放电预充结束以后，自动打开放电开关，开始放电。

X) User private data (user data) 用户私有数据(用户数据)

In the application of grounding and power exchange, the first 12 bits of BT code are filled in here. The BT code in the grounding power exchange protocol has 24 bits in total, and the last 12 bits are the Bluetooth name. 在铁搭换电的应用中，该处填入 BT 码的前 12 位。铁搭换电协议中 BT 码共计 24 位，后 12 位是蓝牙名称。

For example, the battery BT code is BT207204012YMLD220815001; The first 12 bits BT207204012Y fill in the user's private data and the last 12 bits MLD220815001 fill in the Bluetooth name.

举例，电池 BT 码为 BT207204012YMLD220815001；则前 12 位 BT207204012Y 填入用户私有数据，后 12 位 MLD220815001 填入蓝牙名称。

Y) Connecting wire resistance 连接线电阻

The connection line resistance is used for multi box batteries, and single box batteries are not used. Please consult the supplier for the specific use method (Note that the connection line resistance has no substantive relationship with the balance line resistance on the real-time data page).

连接线电阻用于多箱体电池，单箱体电池不使用，具体使用方法请咨询供货商 (注意连接线电阻与实时数据页面的均衡线电阻没有实质性的关联)。

Be careful 注意：

For any parameter modification, please refer to the manual. Improper parameters may make the BMS unable to work normally or even burn the BMS. After any parameter is modified, you need to click the "Set" button behind the parameter to complete the parameter distribution. After the BMS successfully receives the parameter, it will make a "Drip" sound.

任何参数的修改，请参考说明书，不恰当的参数可能会使保护板不能正常工作，甚至烧毁保护板。任何一项参数修改以后，均需要点击参数后面的 “设置”按钮完成参数下 发，保护板成功接收到参数以后，会发出“滴”的响声。

5.3.4. BMS control BMS 控制

The BMS control page isshown in Figure 23. Through BMS control, the protection board can be charged, discharged, balanced,switched and emergency switched

BMS 控制页面如图 23 所示。通过 BMS 控制可以对保护板进行充电功能、放电功能、均衡功能进行开关和应急开关等。

充电控制开关，开启为绿色，关闭为灰色

放电控制开关，开启为绿色，关闭为灰色

均衡控制开关，开启为绿色，关闭为灰色

应急控制开关，开启为绿色，关闭为灰色。用于特定故障场景下，开启充放电应急使用

Figure 23 BMS control page 图 23 BMS 控制页

Z) Charging switch 充电开关

It is used to control the opening or closing of the charging switch of the protection board. 用来控制保护板充电开关打开或者关闭

AA) Discharge switch 放电开关

It is used to control the opening or closing of the discharge switch of the protection board. 用来控制保护板放电开关打开或者关闭。

AB) Balance switch 均衡开关

It is used to control the opening or closing of BMS balance function. 用来控制保护板均衡功能打开或者关闭。

AC) Emergency switch 应急开关

Regardless of any failure of the battery, opening the emergency switch can turn on charging and discharging, allowing users to use the battery in emergency. After the emergency switch is turned on, it will automatically turn off within 30 minutes without the user turning it off by himself (after the emergency switch is turned on, the battery will lose any protection function, and do not turn on the switch unless necessary).
无论电池出现任何故障，打开应急开关都可以打开充放电，允许用户应急使用电池。应急开关打开后，30 分钟自动关闭，无需用户自行关闭(打开应急开关以后，电池失去任何保护功能，非必要请勿打开此开关)。

AD) Heating switch 加热开关

Under the condition that BMS supports heating, when the heating conditions are met, this heating switch can be turned on only when the charger is detected or turned on.
保护板支持加热的条件下，在满足加热的条件时，只有检测到充电器或者打开此加热开关加热才能打开。

AE) Temperature sensor shield 温度传感器屏蔽

Turn on the temperature sensor shield switch. At this time, BMS ignores the temperature related alarm (this function is often used when the temperature sensor is damaged for some reason).
打开温度传感器屏蔽开关，此时保护板忽略跟温度相关的报警(此功能常用与温度传感器由于某种原因损坏的情况)。

AF) GPS heartbeat detection GPS 心跳检测

After the GPS heartbeat detection function is turned on, the BMS will detect the connection status of the GPS. When the GPS is disconnected from the BMS for more than 24 hours, the BMS will turn off the charge / discharge switch and generate an alarm of "GPS disconnected" (this function is usually used for GPS anti disassembly detection).
打开 GPS 心跳检测功能以后，保护板会检测 GPS 的连接状态，当 GPS 断开与保护板连接超过 24 小时以后，保护板关闭充放电开关，同时产生“GPS 断开连接”的报警(该 功能通常用于 GPS 防拆检测)。

AG) Multiplexing port switching 复用端口切换

This function can switch the output function of the BMS multiplex port. The switching options are "RS485" or "CAN" (the BMS hardware is required to support the corresponding functions).
该功能可以切换保护板复用端口的输出功能，切换选项为“RS485”或者“CAN” (需要保护板硬件支持相应的功能)。

6. General fault analysis and troubleshooting 一般故障分析与排除

No. 序号	Fault phenomenon 故障现象	Cause analysis 原因分析	Exclusion method 排除方法	Remarks 备注
1	Power indicator does not light 电源指示灯不亮	Abnormal power supply of equipment 设备给供电不正常	Check whether the power pin of P2 connector is connected to the power supply. 检查 P2 连接器上电源管脚是否接入了电源。	
2	App prompts that the number of individual settings does not match the set value APP 提示单体设置数量与设置值不符合	Wrong number of unit settings or abnormal connection of equalizing line 单体设置数量错误或者均衡 线连接异常	Check whether the number of unit settings is the same as the number of connected batteries. 检查单体设置数量是否与接入电池数量相同。	
3	App prompts that the resistance of equalizing line is too large APP 提示均衡线电阻过大	The wire resistance from the battery to the connector is too large 电池到连接器的线阻过大	Check whether the wiring from the battery cell to the connector has poor contact, otherwise, replace the wire. 检查电池单体到连接器的连线是否存在接 触不良，否则请更换线材。	
4	Inaccurate voltage collection 电压采集不准	Wiring error or parameter setting error 接线错误或者参数设置错误	Check the connection one by one to eliminate the connection error. Fine tune the voltage acquisition reference until the acquisition is accurate. 逐一检查连线排除连线错误。通过电压采集基准进行微调，直到采集精准。	

5	**Device does not start** **设备不开机**	**The equipment does not meet the working conditions** **设备不满足工作条件**	**Check whether the charging cable is connected properly** **检查充电线是否接好**	

The above are common faults, possible causes and solutions. If the faults are still not eliminated, please contact Chengdu Jikong Technology Co., Ltd. for solutions.
如上所列为一般常见故障，可能的原因和解决方案，如果仍未排除故障，请联系成都极空科技有限公司解决。

7. Safety protection measures and precautions 安全保护措施及注意事项

There is no high voltage in the battery management system, which will not cause electric shock injury to the body. 电池管理系统本身不存在高压，对身体不会造成电击伤害。
The battery management system has static sensitive devices and needs to be protected against static electricity. Improper operation will easily damage the battery management system. If you need to operate the battery management system, please pay close attention to the following instructions:电池管理系统有静电敏感器件，需进行防静电保护。如果操作不当，易造成电池管 理系统损坏。如果需要对电池管理系统操作，请仔细关注以下说明:

a) Before touching PCB, operators must discharge static electricity and take anti-static measures; 在触摸 PCB 之前，执行操作的人员必须自身放掉静电，做好防静电措施；

b) The equipment is not allowed to contact with electrically insulating materials- plastic film, insulated desktop or clothes made of artificial fiber; 设备不允许与电绝缘材料一塑料薄膜，绝缘桌面或人造纤维做的衣服接触；

c) When welding on the equipment, ensure that the electric iron head is grounded; 当在设备上从事焊接工作时，应确保电烙铁头已接地；

d) If it is unavoidable to use non-conductive containers, the PCB must be packed with conductive materials before placement,such as conductive foam rubber or ordinary aluminum foil..
如果不可避免要使用非导电的容器，在放置 PCB 之前必须用导电材料包装，这 些材料包括如：导电泡沫橡胶或普通的铝箔。

8. Transportation and storage 运输与贮存

8.1. Transport 运输

The packed products are not directly affected by rain and snow, and can be transported by normal means of transportation. It is not allowed to put it together with acid, alkali and other corrosive substances during transportation.装箱后的产品不受雨雪直接影响和剧烈碰撞颠簸下，可用通常的运输工具运输。在 运输过程中不允许与酸碱等腐蚀物放在一起。

8.2. Keep in storage 贮存

The packaged products shall be stored in a permanent warehouse with a temperature of 0 ℃ ~ 35 ℃ and a relative humidity of no more than 80%. The warehouse shall be free of acid, alkali and corrosive gases, strong mechanism vibration and impact, and strong magnetic field.
包装好的产品应放置在永久性的库房内贮存，库房温度为 0℃～35℃，相对湿度不超过 80%，库房内应无酸碱及腐蚀性气体、无强烈机构振动和冲击、无强磁场的作用。
Appendix "one bond iron lithium", "one bond ternary", "one bond lithium titanate" default parameters

附录 “一键铁锂”、“一键三元”、“一键钛酸锂”默认参数