



12V 电池保护板规格书

Specification for 12V Battery Protection Board

产品型号: ZB12V-0001 V1.0

Product Model: ZB12V-0001 V1.0

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Fujian Geekey Technology LTD



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1. 应用范围 Application Scope

本产品为 3~5 串锂电池组保护板，适用于 12V 启动电源场景，为车载设备供电，支持磷酸铁锂和三元锂电芯。具备电芯电压主动均衡功能，限流充电功能、通过智能云平台实现实时数据监控与预警。可预留定制扩展接口。

This product is a protection board for 3-5 series lithium battery packs, suitable for 12V startup power scenarios, providing power to car devices, and supporting lithium iron phosphate and ternary lithium batteries. Equipped with active cell voltage balancing function, current limiting charging function, and real-time data monitoring and warning through intelligent cloud platform. Customized extension interfaces can be reserved..

2. 功能特性 Functional Features

2.1 电芯均衡功能 Cell balancing function

本产品采用主动均衡技术，实时监测电池组中各个单体电池的电压和电量状态，智能搬运电量分布，确保电池组整体电量均衡，提高电池使用效率和使用寿命。

可通过平台开关主动均衡功能、设置均衡功能开启电压。

This product employs active balancing technology to monitor the voltage and charge status of each individual cell in the battery pack in real time. It intelligently redistributes energy to ensure overall battery balance, thereby improving battery efficiency and extending its lifespan. The active balancing feature and its activation voltage can be controlled through the platform.

2.2 限流充电功能 Current-limited charging function

BMS 充电过流开启限流充电，可手动开启该功能。

BMS 充电状态下开启限流功能可将充电电流大小限制在 10A 电流充电。

The BMS activates current-limited charging during overcurrent situations and this feature can be manually enabled.

When the BMS is in charging mode, enabling the current-limiting function can restrict the charging current to a maximum of 10A.

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2.3 电压检测与保护功能 Voltage monitoring and protection function

BMS 可对电芯单体电压，电池组总体电压进行检测，过压、欠压保护及告警可通过云平台发送告警信息以及查看与设置保护参数与告警参数。

The BMS can monitor the voltage of individual cells as well as the overall battery pack voltage. Over-voltage and under-voltage protection, as well as alerts, can be managed through the cloud platform, where users can view and configure protection and alarm parameters.

2.4 电流检测与保护功能 Current monitoring and protection function

具有电池组充电过流，放电过流检测、告警、保护功能，可通过云平台查看告警信息以及设置告警与保护参数。

It features over-current detection, alarm, and protection for both charging and discharging of the battery pack. Users can view alarm information and configure alarm and protection parameters through the cloud platform.

2.5 温度检测与保护功能 Temperature monitoring and protection function

具有 2 路电芯温度采样，1 路 MOSFET 温度采样，充放电过温与低温警告与保护，可通过云平台进行告警保护参数设置。

Equipped with 2 channels of cell temperature sampling, 1 channel of MOSFET temperature sampling, charge and discharge over temperature and low temperature warning and protection, and can set alarm protection parameters through the cloud platform.

2.6 放电短路保护功能 Discharge short-circuit protection function

电池组正负极短接 BMS 立刻切断电源并发出告警，检测无短路信息后可通过云平台解除短路保护。

If a short circuit occurs at the battery pack's positive or negative terminals, the BMS immediately disconnects the power and issues an alert. Once the short circuit is resolved, protection can be cleared through the cloud platform.

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2.7 电池组容量计算功能 Battery pack capacity calculation function

可以利用电流和时间的积分来准确地计算电池组的 SOC 与 SOH，电池组的总容量和当前容量可以通过云平台进行设定，完成完整的充放电循环后，系统会自动更新容量信息。

It uses the integration of current and time to accurately calculate the SOC and SOH of the battery pack. The total capacity and current capacity of the battery pack can be set through the cloud platform. After completing a full charge-discharge cycle, the system automatically updates the capacity information.

2.8 云平台远程控制 Remote control via cloud platform

用户可登录个人微信小程序（臻格科技）绑定电池，通过云平台对 BMS 板实现远程监控和控制功能，使用小程序随时查看电池状态、修改 BMS 板保护参数、控制 BMS 充放电开关，远程锁定，方便进行远程管理和维护，提高管理效率。

Users can log in to the WeChat mini-program (Geekey Technology) to bind the battery and remotely monitor and control the BMS board through the cloud platform. The mini-program allows users to check battery status at any time, modify BMS protection parameters, control BMS charge and discharge switches, and lock the system remotely, facilitating efficient remote management and maintenance.

2.9 云服务数据储存 Cloud data storage

BMS 支持云服务数据储存，能够将电池使用数据、充电数据、告警记录等信息实时上传至云端服务器，实现数据的云端保存和远程访问。

The BMS supports cloud data storage, allowing battery usage data, charging data, alarm records, and other information to be uploaded in real time to a cloud server for remote access and data preservation.

2.10 远程 OTA 软件升级 Remote OTA (Over-The-Air) software updates

BMS 可通过云平台进行远程软件升级。

The BMS can undergo remote software upgrades via the cloud platform.

2.11 远程休眠及唤醒功能 Remote sleep and wake-up functions

用户可通过云平台控制 BMS 进入休眠状态也可远程激活 BMS。

Users can control the BMS to enter sleep mode or remotely activate it via the cloud platform.

2.12 按键激活及复位功能 Button activation and reset functions

通过按键可激活/复位 BMS，BMS 休眠状态下按下按键激活 BMS，开机状态下长按按键 5S 可重启 BMS。

The BMS can be activated or reset using a button. Pressing the button while the BMS is in sleep mode activates it, and holding the button for 5 seconds while it is powered on will restart the BMS.

2.13 电池租赁功能 Battery leasing function

BMS 支持电池租赁，用户登录微信小程序“臻格科技”注册成为大客户，可以通过平台进行电池的租赁、管理和调度，实现电池的共享和循环利用，降低使用成本，推动绿色出行和可持续发展。

The BMS supports battery leasing. Users can register as major clients by logging into the WeChat Mini Program 'Geekey Technology,' where they can lease, manage, and schedule batteries through the platform. This enables battery sharing and recycling, reduces usage costs, and promotes green transportation and sustainable development.



“臻格科技”微信小程序二维码

"Geekey Technology" WeChat Mini Program QR code

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3.参数设置 Parameters setting

3.1 额定参数 Rated parameters

项目 project	规格 specification	单位 unit	备注 remark
充电电流 charging current	100	A	持续电流 Sustained current
放电电流 discharge current	100	A	持续电流 Sustained current
工作温度 operating temperature	-20~65	℃	
工作湿度 operating humidity	0%~90%	RH	
电流采样误差 current sampling error	≤5%		
4G 物联网/GPS 定位 4G IoT/GPS positioning.	支持微信小程序远程查询电池数据，控制 电池开关状态；GPS 实时定位 Supports WeChat Mini Program for remote battery data querying and control of battery switch status; real-time GPS positioning."		
单体电芯电压采样 cell voltage sampling	0~5.1	V	
总体电压采样范围 overall voltage sampling range	0~21	V	
电池组组合 battery pack	3~5 串		
电池类型 battery type	3.7V 三元锂 3.7V ternary lithium battery 3.2V 磷酸铁锂 3.2V lithium iron phosphate battery		

3.2 基础保护参数

(注：以下参数无特殊注明均为 25℃环境下磷酸铁锂 8 串电芯测试)

项目 project	默认状态	是否可设	工况描述 operating conditions description	默认设定值（磷酸铁锂） default setting	执行动作 execute action	恢复条件 restoration conditions
电压保护 Voltage protection	开启	不可设	一级过充保护 primary overcharge protection.	最高节电压>3.4V Maximum cell voltage > 3.4V,	关闭主路充电 Mos ，开启限流充电功能。 Deactivate the main-path charging MOSFET。Enable current-limited charging function	最高单节低于 3.3V 即打开主路充电 MOS Immediately enable the main charging MOSFET if the maximum cell voltage is below 3.3V
	开启	可设	过充保护 overcharge protection.	最高节电压>3.6V，持续 1000ms Maximum cell voltage > 3.6V, sustained for 1000ms	关闭主路充电 Mos ，关闭限流充电开关。 Disable main charging MOSFET	最高单节低于 3.5V 即打开主路充电 MOS Immediately enable the main charging MOSFET if the maximum cell voltage is below 3.5V
	开启	可设	备电保护 Standby Power Protection	最低节电压< 3.0V，持续 3 秒。 Minimum under-voltage threshold < 2.85V, sustained for 3 seconds.	关闭放电 Mos，3min 后进入休眠状态 Disable the discharge MOSFET, enter sleep mode after 3minutes.	1. 单节电压>3.2V 打开放电 MOS。 2. 休眠后可充电激活与按键激活。 1."Turn on the discharge MOSFET when the single-cell voltage is >3.2V." 2.Charging activation and button activation are possible after entering sleep mode.

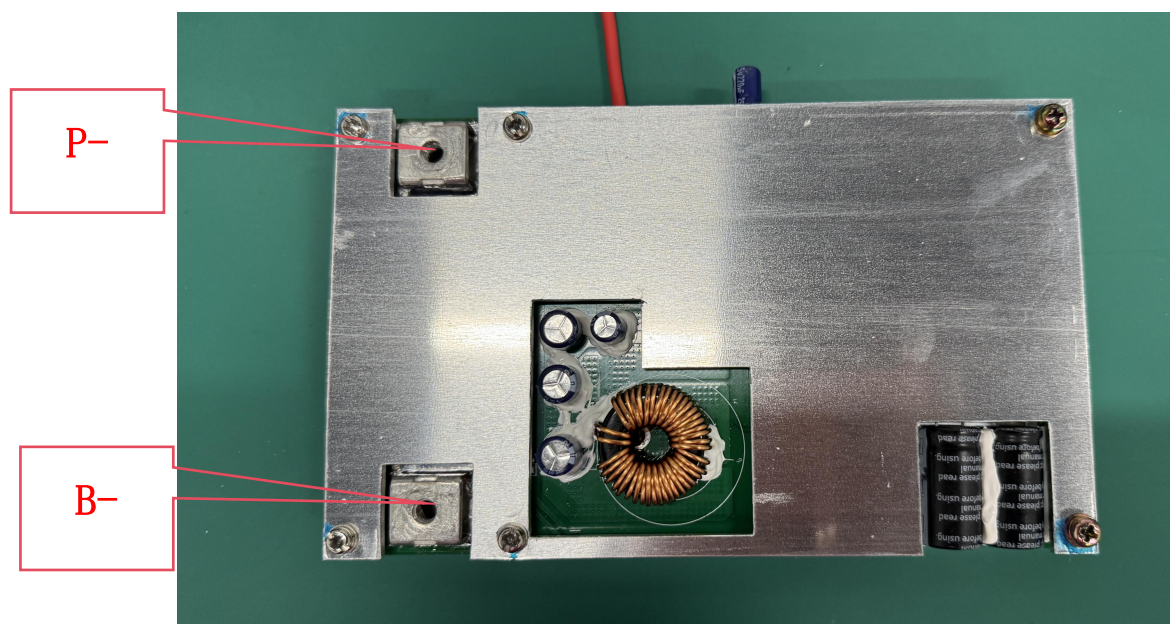
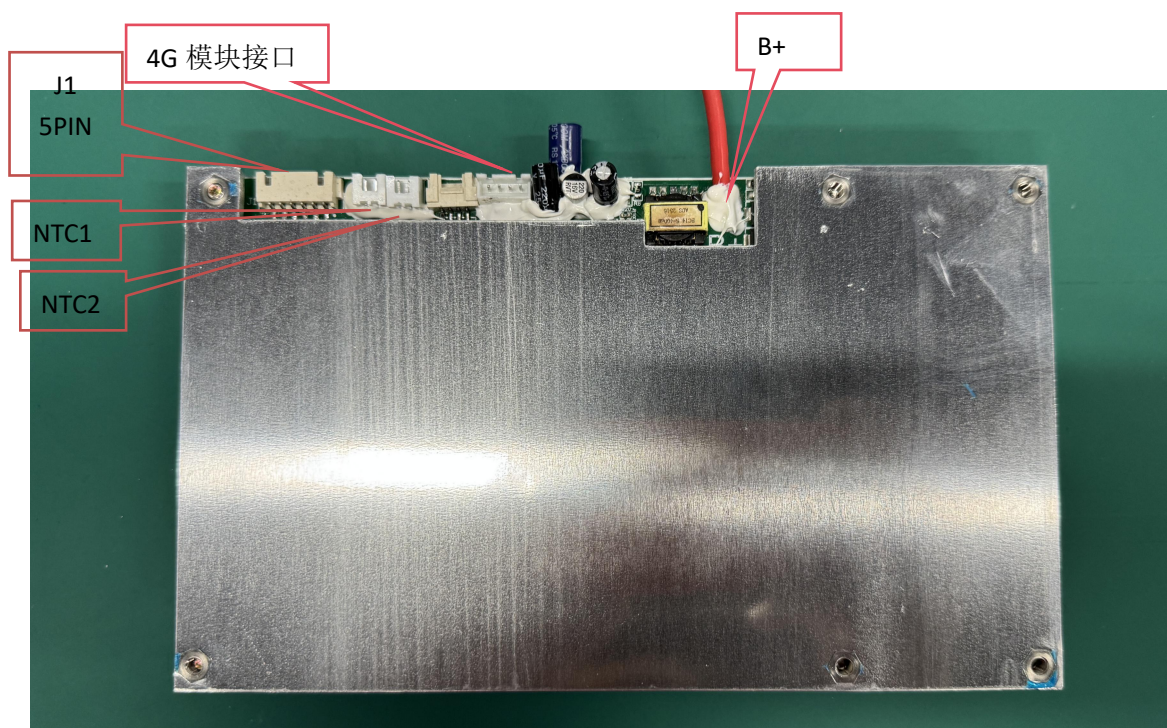
	开启	可设	欠压保护 Under-voltage protection	最低节电压 < 2.85V, 持续 3 秒。 Minimum under-voltage threshold < 2.85V, sustained for 3 seconds.	关闭放电 Mos, 3min 后进入休眠状态 Disable the discharge MOSFET, enter sleep mode after 3minutes.	1. 单节电压 > 3.0V 打开放电 MOS. 2. 休眠后可充电激活与按键激活。 3. 休眠后每天凌晨 3 点唤醒发送一条信息后继续休眠。 1."Turn on the discharge MOSFET when the single-cell voltage is >3.0V." 2.Charging activation and button activation are possible after entering sleep mode. 3.After entering sleep mode, wake up at 3 AM daily, send a message, and then continue sleeping.3.
	开启	可设	报废 Scrap	最低分压最低单节电压 < 1.8V, 持续 4 秒 Minimum cell voltage < 1.8V, sustained for 4 seconds	永久性关闭充放电 MOS, 禁止充放电, 进入深度休眠 Permanently disable charge and discharge MOSFET, prohibit charging and discharging, and enter deep sleep mode.	永久性关闭充放电 MOS, 禁止充放电 Permanently disable the charge and discharge MOSFETs; charging and discharging are prohibited.
电流保护 Current protection	开启	可设	一级放电过流保护 Primary over-current protection	放电电流 > 120A, 持续 2 秒 Discharge current > 120A, sustained for 2 seconds.	关闭放电 MOS, 禁止放电 Disable the discharge MOSFET; discharging is prohibited.	充电激活, 或手机小程序清除标志位激活 Charging activation, or activation via clearing flag through mobile app.
	开启	可设	二级放电过流保护 Secondary over-current protection	放电电流大于 200A, 持续 32ms Discharge current greater than 200A, sustained for 32ms.	关闭放电 MOS, 禁止放电 Disable the discharge MOSFET, prohibiting discharge.	充电激活, 或手机小程序清除标志位激活 Charging activation, or activation via clearing flag through mobile app.

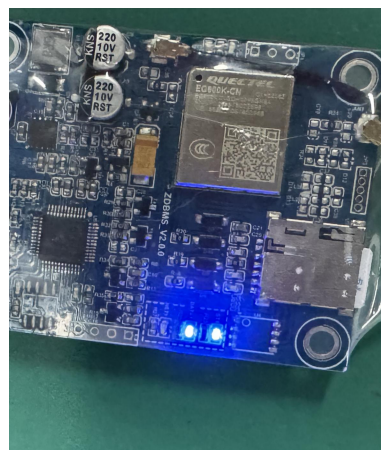
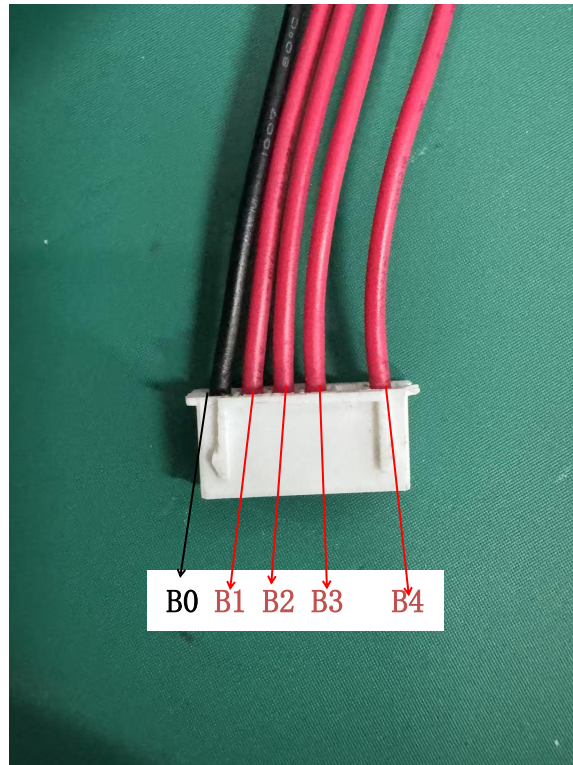
	开启	可设	充电过流保护电流 Charging overcurrent protection current	充电电流>120A, 持续过流 2s Charging current > 150A, sustained over-current for 2 seconds.	关闭主路充电 Mos, 开启限流充电 Disable the main charging MOSFET, enable current-limited charging.	3 分钟后恢复主路充电 MOS 开启 Restore the main charging MOSFET after 3 minutes.
	开启	可设	短路保护 Short circuit protection	放电电流大于 1500A, 持续 1000us Discharge current greater than 2500A, sustained for 1000 μ s.	关闭放电 MOS Disable discharge MOS.	1. 充电激活 2. 小程序清除标志位 1.Charging activation 2.Clear flag via mobile app
温度保护 Temperature protection	开启	可设	充电电芯高温保护 Charging cell high-temperature protection	>45°C, 持续 3 秒 >45° C, sustained for 3 seconds	关闭主路充电 Mos 和放电 Mos Disable the main charging MOSFET and discharge MOSFET	当电芯温度 $T_1 \leq 38^\circ\text{C}$ 时, 同时打开主充 MOS, 放电 MOS hen cell temperature $T_1 \leq 38^\circ\text{C}$, enable both the main charging MOSFET and discharge MOSFET
	开启	可设	充电电芯过温保护 Charging cell over-temperature protection	>55°C, 持续 3 秒 >55° C, sustained for 3 seconds	关闭主路充电 Mos 和放电 Mos Disable the main charging MOSFET and discharge MOSFET.	当电芯温度 $\leq 50^\circ\text{C}$ 时, 同时打开主充 MOS, 放电 MOS When the cell temperature $\leq 50^\circ\text{C}$, simultaneously enable the main charge MOSFET, auxiliary charge MOSFET, and discharge MOSFET.

	开启	可设	充放电 MOS 过温 Charging and discharging MOSFET over-temperature	充放电 MOS 温度 > 65°C Charging and discharging MOSFET temperature > 65° C	持续 3 秒，关闭充放电 Sustained for 3 seconds, disable charging and discharging	< 55°C，打开主路充电 MOS 和放电 MOS When < 55° C, enable the main charge MOSFET and discharge MOSFET.
压差保护 Voltage differential protection	开启	可设	主动均衡 Active balancing	单体电池电压高于 3V 或最高压差大于 30mV, 持续 3 秒 Voltage difference greater than 30mV, sustained for 3 seconds	开启主动均衡，平衡电 池压 Enable active balancing to equalize battery voltage	压差小于均衡关闭电压 If the voltage difference is less than the equilibrium shutdown voltage
	开启	可设	电芯压差过大保护 Cell voltage differential protection	电芯最大压差大于 0.4V Maximum cell voltage differential greater than 0.4V	关闭主动均衡，关闭充 放电 MOS Disable active balancing, disable charging and discharging MOSFETs	电芯最大压差小于 0.4V 开启主动均衡与充放电 MOS Enable active balancing and charging/discharging MOSFETs when the maximum cell voltage differential is less than 0.4V

4 接口定义 Interface Definition

4.1 接口示意图 Diagram of an Interface





上电完成后 BMS 蓝灯闪烁，DTU 亮起两颗灯就为正常工作模式

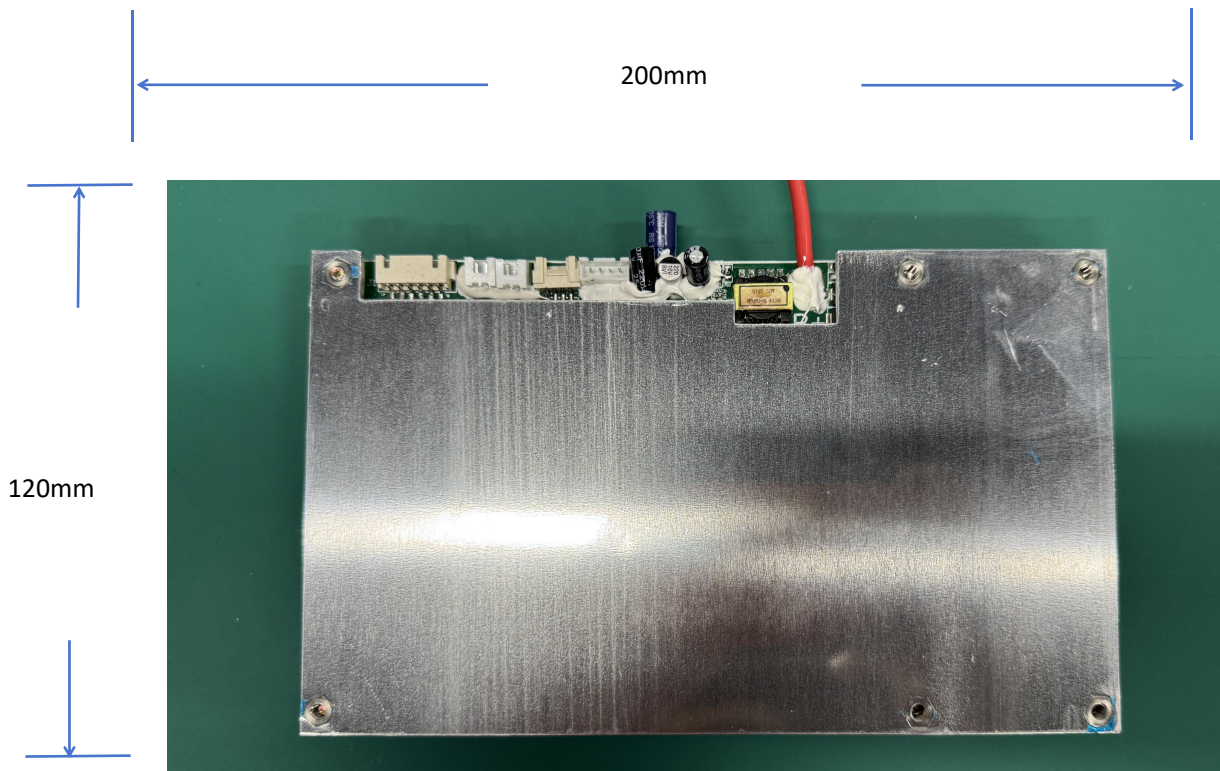
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5 BMS 保护板尺寸 BMS protection board size



BMS 尺寸：200*120（mm）

6 安装连接顺序 Installation and Connection Sequence

6.1 保护板连接上电顺序: The correct sequence for connecting and powering up the protection board

- (1) 连接电池组负极 B-;
- (1) Connect the negative terminal B- of the battery pack;
- (2) 连接电池组采样线;
- (2) Connect the battery pack sampling line;
- (3) 连接电池组 B+端;
- (3) Connect the B+ terminal of the battery pack;
- (4) 连接 4G 模组;
- (5) Connect the DTU;

6.2 保护板下电顺序: The power-down sequence for the protection board.

- (1) 断开负载充电器;
- (1) Disconnect the load and charger.
- (2) 断开电池正极连线;
- (2) Disconnect the battery positive connection
- (3) 拔下电池采样线;
- (3) Unplug the battery sampling line
- (4) 断开负载充电器端 P-;
- (4) Disconnect the load terminal P- from the charger.
- (5) 断开电池组负极 B-;
- (5) Disconnect the negative terminal B- of the battery pack

注: 安装过程中注意静电防护。

Note: Pay attention to electrostatic protection during installation.

7 注意事项 Precautions

1. 严格按照接口定义接线，不可反接电路，以免接线错误导致系统损坏。
1. Strictly follow the interface definition for wiring and avoid reverse connection of circuits to prevent system damage caused by wiring errors.
2. 装配与使用过程中避免将 BMS 与电芯表面电极部分接触，以免导致电芯损坏。
2. Avoid contact between the BMS and the surface electrodes of the battery cells during assembly and use to prevent damage to the battery cells.
3. 装配与使用过程中避免线头，锡块和一些导电物品掉落至 BMS 表面与接插口中，上电前检查系统表面与接插口中是否有异物，确认无误后才可上电。
3. Avoid dropping wire ends, tin blocks, and other conductive objects onto the BMS surface and connectors during assembly and use. Before powering on, check the system surface and connectors for any foreign objects, and ensure they are clear before powering on.
4. 使用过程需要注意防潮，防水，防静电
4. Pay attention to moisture, water, and static electricity prevention during use.
5. 系统所设置参数严格按照使用范围内的数值设置。
5. Set the system parameters strictly according to the values within the specified range.
6. 上电后如果系统异常无法正常使用，排除接线原因与外力所导致的原因仍旧无法使用，请及时下电联系我们。
6. If the system operates abnormally and cannot be used normally after power-on, and the problem persists even after ruling out wiring issues and external forces as the cause, please power off immediately and contact us.