产品说明书

Product Manual

高端锂电池均衡保护板

Premium Lithium Battery Balancing Protection Board

适用3-9S强起继电器版BMS产品

3-9S Strong Start Relay Version BMS

目录

一、产品概述（Product Overview）

（一）产品综述Product Overview

本公司主要产品是各类智能BMS，产品线包括适用于3-24串各类锂电池的高端均衡保护板、适用于汽车及特种车辆启动的强起板、适用于大电流场景（300A及以上）的继电器保护板、适用于高压高串数储能场景的级联保护板（继电器模块）。Our company specializes in intelligent Battery Management Systems (BMS), offering a comprehensive product portfolio. This includes high-performance balancing protection boards for 3-24-cell lithium battery strings, high-current starting protection boards for automotive and specialized vehicles, relay protection boards for high-current applications (300A+), and cascade protection boards (relay modules) designed for high-voltage, high-cell-count energy storage systems

同时，公司为适配不同场景，所有保护板均带双485通讯接口（支持显示屏可选、上位机通信、专用充电器）；可选CAN通信（与整车控制器/仪表等定制交互）；支持GPS/GPRS远程通信（实现平台对接和远程收费系统）。To accommodate diverse scenarios, all protection boards feature dual 485 communication interfaces (supporting optional display modules, host computer communication, and dedicated chargers), optional CAN communication (for customized interaction with vehicle controllers/instrument clusters), and GPS/GPRS remote communication (enabling platform integration and remote billing systems).

（二）产品核心卖点Core Selling Points of the Product

2.1、超高电流工作Ultra-high current

BMS电流控制部分可以使用自复位继电器，支持最高1000A电流监测；同时继电器作为面向高压大功率场景（如电动汽车）的专用器件，具有无与伦比的安全隔离性和故障切断能力；The BMS current control module utilizes relays to monitor currents up to 900A. As specialized components for high-voltage, high-power applications (e.g., electric vehicles)；

2.2、预留电功能reserve electrical function

BMS配置有预留电功能。指在特殊环境，如遇到长时间下坡，通过内置预留电功能就不会使整个系统突然断电或烧控制器；The BMS features a built-in power reserve function. This ensures the system won't experience sudden power loss or controller burnout during prolonged downhill operation in extreme conditions.

2.3、低容量报警low capacity alarm

开启低容量报警模式，通过强制保留5%～10%电量（如三元锂保留至5% SOC，磷酸铁锂保留至5%），彻底阻断锂电池长期存放损坏的风险；损坏风险主要是指单体电压低于截止值（如三元锂2.5V、磷酸铁锂2.0V）时，负极锂脱出过度会导致活性物质脱落、内阻激增，甚至引发内部短路和热失控。The low-capacity alarm mode activates by maintaining 5% to 10% battery capacity (e.g., 5% SOC for ternary lithium or 5% SOC for lithium iron phosphate), effectively preventing long-term storage damage. This protection mechanism addresses the risk of cell voltage dropping below critical thresholds (2.5V for ternary lithium, 2.0V for lithium iron phosphate), which may cause excessive lithium anode dissolution, resulting in active material shedding, internal resistance spikes, and potentially triggering internal short circuits or thermal runaway.

2.4、防短接/打火功能short circuit protection and spark protection

本BMS已配置防短接及防打火功能。实际使用中，首次直接插上负载后，不会出现"打火"现象；电池无充电放电10分钟后自动进入防打火模式，正负极碰一起没有火花，以防止电池正负极误触短接造成使用人伤害；This battery management system (BMS) is equipped with short-circuit and spark prevention features. During actual operation, the system prevents spark generation when a load is first connected. After 10 minutes of continuous operation without charging or discharging, the battery automatically activates its spark prevention mode, ensuring no sparks occur when the positive and negative terminals come into contact. This mechanism effectively prevents user injuries caused by accidental short circuits between the battery's electrodes.

2.5、多通讯接口，扩展丰富Multiple communication interfaces for rich expansion

BMS搭配双485接口+URT模块（TTL模块转换模块），支持连接电脑上位机、LED显示屏、断码屏等，实现对电池实时状态的管理；The battery management system (BMS) features dual 485 interfaces and an URT module (TTL module converter), supporting connections to computer-based host systems, LED displays, and code-breaking screens to enable real-time battery status monitoring.

2.6、可选配加热功能Heating function is optional

BMS预留弱电加热功能模块，通过温控感应电池环境温度，启动外部加热板，从而确保BMS在低温环境下正常工作。客户可依据需求定制该功能；The BMS features a built-in low-voltage heating module that detects ambient temperature and activates an external heating plate, ensuring stable operation in cold environments. This function can be customized to meet specific requirements.

2.7、可搭配专用充电器Compatible with dedicated charger

BMS搭配有专用充电器，可确保任何场景下（高温低温极端环境）都能使电池快速恢复满电状态；The battery management system (BMS) is paired with a dedicated charger, ensuring rapid full charging in any scenario, including extreme temperatures.

（三）产品选择指引Product Selection Guide

3.1、电芯类型确定Determination of cell type

电池类型确认：钛酸锂电池标称电压是2.4V，满电电压是2.8V；

磷酸铁锂的标称电压是3.2V，满电电压为3.7V；

三元锂电池标称电压是3.7V，满电电压是4.2V;

Battery type verification: The nominal voltage of lithium titanate batteries is 2.4V with a full charge voltage of 2.8V; lithium iron phosphate batteries have a nominal voltage of 3.2V and a full charge voltage of 3.7V; ternary lithium batteries feature a nominal voltage of 3.7V and a full charge voltage of 4.2V.

3.2、电池串数确认：Battery string confirmation

电池总电压范围（电压向下兼容），一般需求总电压或者电池总电压 / 电池标称≈电池串联数量=需求BMS串数；The battery's total voltage range (with backward compatibility) is determined by the following relationship: the total voltage or the ratio of the battery's total voltage to its nominal voltage equals the number of series-connected batteries, which corresponds to the required number of BMS series.

3.3、电流确认：Current confirmation

3.3.1 功率确认法：正常工作功率/电池总电压=正常工作电流*1.2=持续电流（建议预留一定冗余量）；Power confirmation method: Normal operating power divided by the total battery voltage equals the normal operating current multiplied by 1.2, yielding the continuous current (it is recommended to reserve a certain amount of redundancy).

3.3.2、电池组容量确认法：建议电池组容量多少安时，就选用持续放电电流为多少安的保护板。

Battery pack capacity verification method: Select a protection board with a continuous discharge current matching the recommended battery pack capacity in ampere-hours.

（例如：50AH的电 池组要选择持续放电电流至少为50A的保护板）。

注：长时间的超电流工作，会损坏保护板的。 Note: Prolonged overcurrent operation may damage the protection board.

二、使用注意事项Usage Notes。

（一）安装前注意事项Pre-installation Notes

1.1、安装保护板之前， 电池一定要匹配好，每节电池电压相差低于0.05V， 内阻相差低于 5mΩ，容量相差低于30mAh。Before installing the protective board, ensure the batteries are properly matched: voltage difference per cell below 0.05V, internal resistance difference below 5mΩ, and capacity difference below 30mAh.

1.2、初次连接保护板， 电池电压不要太高也不要太低，铁锂电池在2.8到3.4V之间，聚合物 电池在3V到4V之间。 When connecting the protection board for the first time, ensure the battery voltage is neither too high nor too low. Lithium iron phosphate batteries typically operate between 2.8V and 3.4V, while polymer batteries range from 3V to 4V.

1.3、电池电压太高会触发保护，导致保护板无法正常工作。如果电池已经充满，请放低至要求电压后再连接保护板。The battery voltage is too high, triggering the protection and causing the protection board to fail. If the battery is fully charged, lower it to the required voltage before connecting the protection board.

（二）电压采集线接线注意事项**Precautions for wiring voltage acquisition lines**

2.1、保护板B0对应的那条排线为接线的第一条排线（线材为黑色，接B-），第2根线（线材为白色）连接第1串电池正极，后面依次连接每一串电池的正极，直到最后一串B+（线材为红色，接B+）。The wire corresponding to the B-protection board serves as the first connection wire. The second wire is also designated as B-. Starting from the third pin, connect the positive terminals of the first battery string, then sequentially connect the positive terminals of each subsequent battery string until the final B+ string (connected to B16+).

==焊排线时排线切不可插在保护板上面去焊接。接线一定要按照顺序去接，排线接错，可能会导致保护板烧坏和无法正常工作。Never insert the wire harness into the protective panel for welding. Always connect the wires in the correct sequence, as incorrect wiring may cause the protective panel to burn out or malfunction.==

2.2、排线接好后，插头不要直接插入，要测试插头背面每2个相邻金属端子间的电压，注意确认每串电池电压相差要低于0.05V。**After wiring, avoid direct insertion of the plug. Instead, test the**

voltage between every two adjacent metal terminals on the back of the plug, ensuring the voltage difference between each battery string is less than 0.05V.

2.3、保护板接好线之后，**电池总电压与保护板输出电压相等**，才代表接线正确，此时才可以进行充放电使用。For protection boards with 15 or more strings, ensure the two wiring connectors are never inserted in reverse after completing the wiring. Reversed insertion will directly burn the board. The wiring should first connect the low-voltage string with B-black wire, followed by the high-voltage string with B+ red wire. 2.4. Only after the battery's total voltage matches the protection board's output voltage can the wiring be confirmed correct, at which point charging and discharging operations may proceed.

2.4、使用中注意引线头、电烙铁、锡渣等不要碰到电路板上的元器件，否则易损坏保护板。**When using, avoid letting the lead end, soldering iron, or solder residue touch the components on the circuit board, as this may damage the protective board.**

（三）外部接线注意事项

3.1、B－接口应接电池总负极（一般为粗黑线）；The B-port connects to the battery's main negative terminal (typically a thick black wire),.

3.2、焊接电池引线时，一定不可有错接或反接。如果确认已接错，这块电路板可能已损坏，需要重新测试合格后才可使用。When soldering battery leads, avoid incorrect or reversed connections. If a connection is found to be wrong, the circuit board may be damaged and must be retested before reuse.

3.3、装配时保护板不要直接接触电芯表面，以免损坏电芯。装配要牢固可靠。During assembly, avoid direct contact between the protective plate and the battery cell surface to prevent damage. Ensure the assembly is secure and reliable.

3.4、保护板和电池组组装作业时，勿将散热铝板靠近电芯表面，否则热量会传递给电芯，影响电池组安全。During the assembly of the protective plate and battery pack, avoid placing the aluminum heat sink near the cell surface, as this may cause heat transfer to the cell and compromise the battery pack's safety.

3.5、故障排除：电池组和保护板组合好以后，首次上电如发现无电压输出或充不进电，请检查接线是否正确。Troubleshooting: After assembling the battery pack and protection board, if no voltage output or charging fails during the first power-up, check the wiring for accuracy.

（四）安装连接说明注意事项Installation and connection instructions

4.1、警告warning

把保护板连接至电芯，或从电池组拆下保护板时，必须遵守以下连接顺序与规定。如果不按要求的顺序作业，会损坏保护板的元器件，从而导致保护板不能保护电芯，造成严重的后果。When connecting the protection board to the cell or removing it from the battery pack, you must follow the specified connection sequence. Failure to follow the required sequence may damage the protection board's components, rendering it ineffective and causing serious consequences.

4.2、连接保护板的步骤 The steps to connect the protective board

1）焊接电池组的负极B-；Weld the battery pack's negative terminal B-;

2）焊接输出负载的负极P-；The welding output load is negative electrode P-;

3）连接电池组的采样排线，先插低压排线－带黑色线材的，再插高压排线－带红色线材的；Connect the battery pack's sampling harness by first inserting the low-voltage harness (with black wire) and then the high-voltage harness (with red wire).

4）所有连接线安装好，保护板开机，确认电池总电压与保护板输出电压相等；After all connection cables are installed, power on the protection board and verify that the battery's total voltage matches its output voltage.

4.3、断开保护板的步骤 The steps to disconnect the protective board

1）断开负载或者充电器； Disconnect the load or charger;

2）拔下电池组的采样排线，与插入顺序相反，即先拔高压排线-带红色线材的，再拔低压排线-带黑色线材的；Remove the battery pack's sampling bus in reverse order: first disconnect the high-voltage bus (with red wire), then the low-voltage bus (with black wire).

3）断开输出负载负极的P-连接线；Disconnect the P-wire from the negative output load terminal;

4）断开电池组负极的B－连接线；Disconnect the B-connector from the battery pack's negative terminal;

特别说明：在此环节中要注意静电的防护，特别要注意生产用的烙铁漏电问题。

Special note: During this process, special attention must be paid to electrostatic protection, particularly to potential leakage issues in production-grade soldering irons.

（五）使用中注意事项Precautions during use

5.1、在测试、安装、使用、接触该保护板时，需做好相应的防静电措施。When testing, installing, using, or handling the protective panel, appropriate anti-static measures must be taken.

5.2、在对装好保护板的电池组进行充放电测试时，请不要使用电池老化柜对电池组各节电池电压进行测量，否则有可能损坏保护板和电池。When performing charge-discharge tests on battery packs with protective panels installed, avoid using battery aging chambers to measure individual cell voltages, as this may damage both the protective panels and the batteries.

5.3、本保护板没有0V充电功能，电池一旦出现0V的情况下，电池将严重退化直至损坏，为了不损坏电池，用户在长期（电池组容量大于2AH，储存超过3个月）不使用时请定期充电补充电量，在使用过程中放电保护后，须在12小时内及时充电，防止电池因自耗电而放电至0V。This protection board lacks 0V charging capability. If the battery reaches 0V, it will degrade severely and eventually fail. To prevent battery damage, users should recharge the battery periodically when not in use for extended periods (battery pack capacity>2AH, storage over 3 months). After discharge protection during use, recharge the battery within 12 hours to prevent self-discharge to 0V.

5.4、本保护板未配置反充电保护功能，使用时不可将充电输入反接，否则可能损坏保护板和电池。This protection board does not have reverse charging protection. Do not reverse the charging input during use, as it may damage the board and battery.

5.5、请使用符合本规格书规定的充电器，如使用高于充电口最高可承受的直流电压的充电器，易造成保护板损坏，充电器应优先选择具备充电电流末端涓流关闭功能的产品（双保险）。Use chargers compliant with this specification. Employing chargers exceeding the charging port's maximum DC voltage may damage the protection board. Prioritize chargers with trickle-cutoff functionality at the charging current terminal (double protection).

特别说明：注意不具备涓流关闭功能的充电器是为铅酸电池设计的，不适合锂电池使用。
Important note: Note that chargers without trickle shut-off function are designed for lead-acid batteries and are not suitable for lithium batteries.

5.6、产品使用过程中一定要遵循设计参数及使用条件，不得超过本规格书中的值；如违反规格书，易损坏保护板，进而损坏电池组。During operation, strictly adhere to the design parameters and

specified conditions. Exceeding these values may damage the protective panel, potentially causing battery pack failure.

5.7、使用过程中如出现异常情况，请立即停止使用，送回原厂或请专业维修人员进行维修。If any abnormal situation occurs during use, stop using immediately and return it to the original manufacturer or have it repaired by a professional.
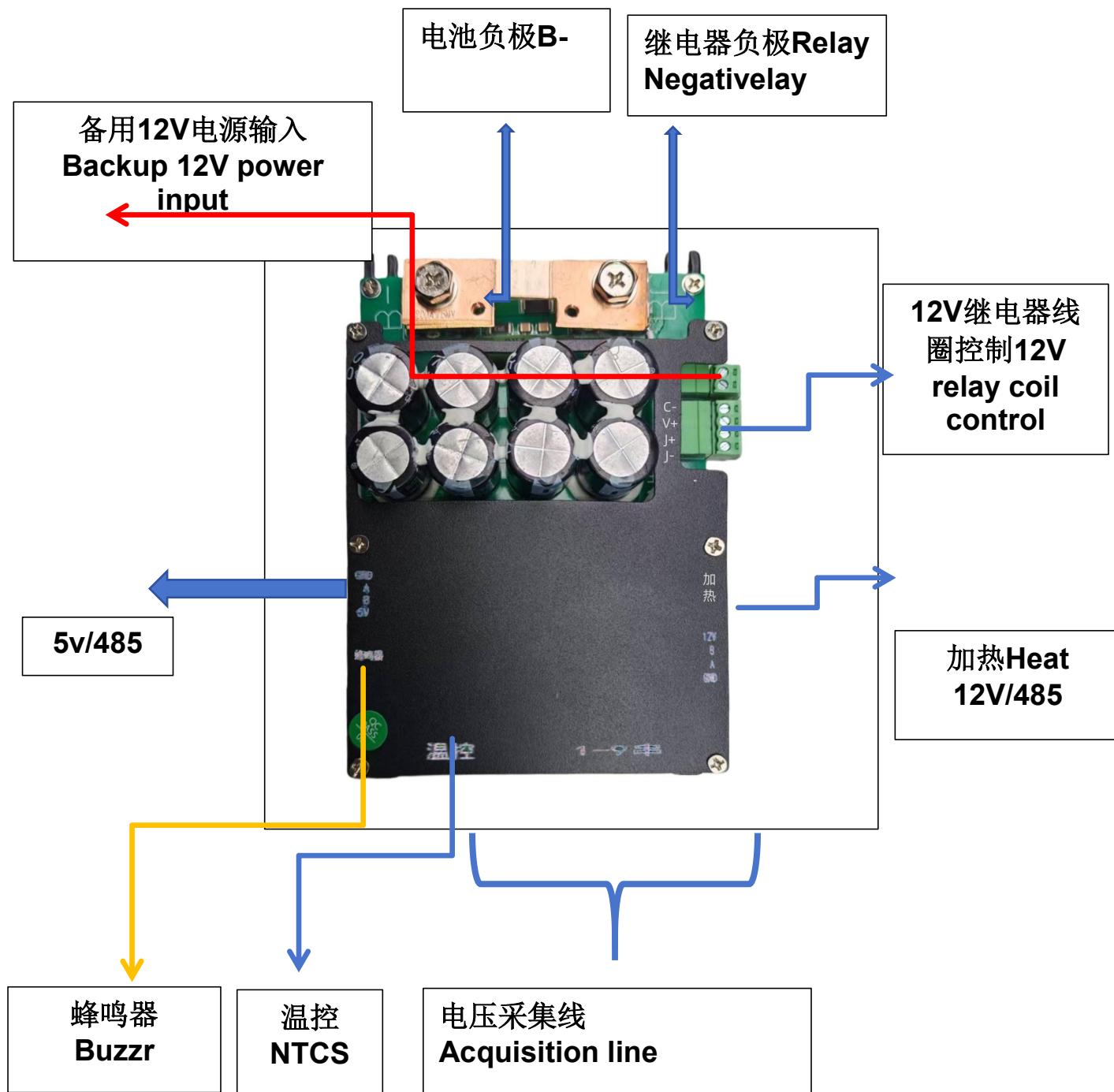
5.8、禁止将两个及两个以上的非级联保护板串联或并联使用。**It is prohibited to connect two or more non-cascaded protection boards in series or parallel.**

本保护板已经做了大量的可靠性试验，可靠性远远高于市面上的一般保护板，为尽可能地减少事故的发生，请使用合格的电芯。**This protection board has undergone extensive reliability testing, demonstrating significantly higher reliability than standard market products. To minimize potential incidents, we recommend using certified battery cells.**

三、产品功能综述Product Feature Overview

（一）产品功能特性Product Features and Functions

1.接口说明interface specification

备用12V电源输入
Backup 12V power input

电池负极**B-**

继电器负极**Relay Negativelay**

12V继电器线圈控制12V relay coil control

5v/485

加热**Heat 12V/485**

蜂鸣器
Buzzr

温控
NTCS

电压采集线
Acquisition line

1.1、支持定制CAN通讯：用于与整车控制器/电机控制器/仪表/充电机（支持客户自定义）；Supports customized CAN communication for integration with vehicle controllers, motor controllers, instrument clusters, and chargers (with customizable configurations).

①RS485—1通讯（左侧）：自带隔离，接专用充电器，支持RS485通讯，2500V隔离。波特率标准9600（接上位机/显示屏/外部通信）。RS485—1 communication (left): Built-in isolation, compatible with dedicated chargers, supports RS485 communication with 2500V isolation. Standard baud rate is 9600 (for connection to host computer, display, or external communication).

②RS485—1通讯（右侧）：RS485通讯，波特率标准9600（带12V供电/接GPS/显示屏）；RS485—1 communication (right side): RS485 communication with a baud rate of 9600 (powered by 12V, compatible with GPS and display).

1.2、外接GPS/GPRS远程通讯：可以连接平台、公众号，实现远程收费系统。External GPS/GPRS connectivity: Enables platform and official account integration for remote billing system.
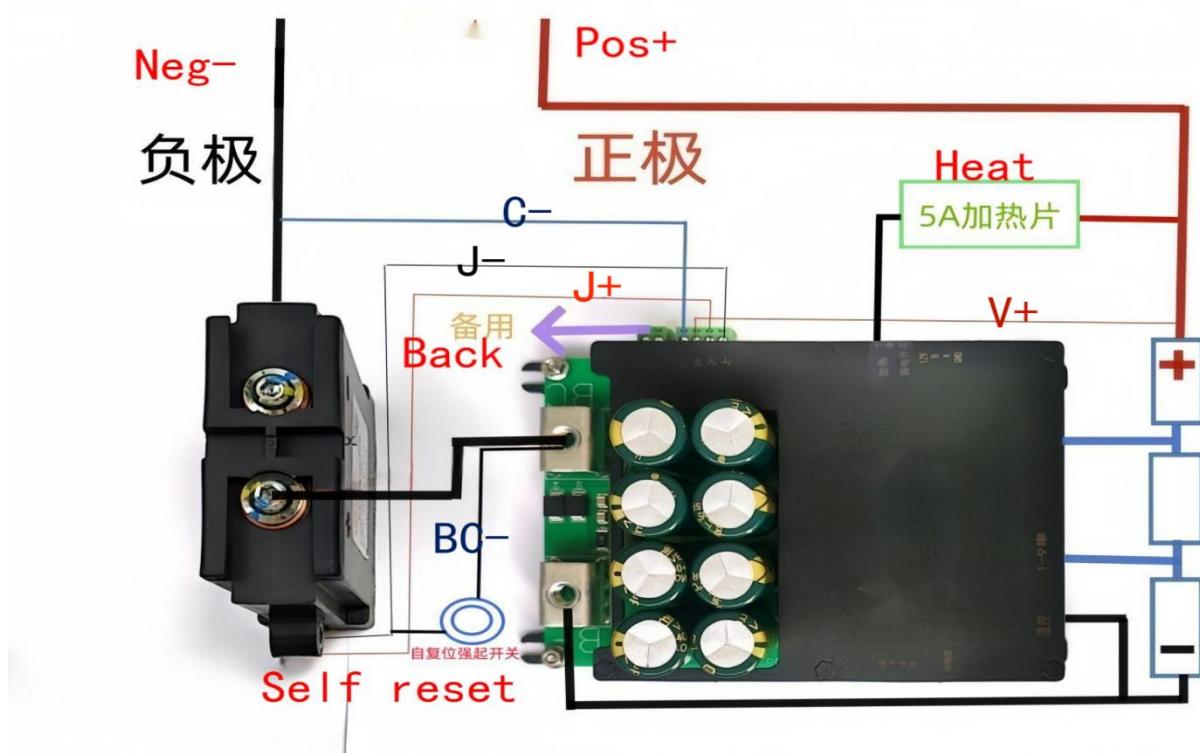
1.3、蜂鸣器接口：可开启蜂鸣器；如遇电池设置错误，或触发保护状态，则会长鸣；正常状态下启动蜂鸣器，则以固定频率短鸣，以提示位置；Buzzer interface: Enables the buzzer. If the battery is misconfigured or a protection state is triggered, the buzzer will sound continuously. Under normal conditions, the buzzer will sound at a fixed frequency to indicate the location.

1.4、预留加热模块接口：可外加锂电池加热片，确保低温环境下的锂电池正常使用；Reserve heating module interface: Allows external lithium battery heating elements to ensure proper operation of lithium batteries in low-temperature environments.

1.5、预留弱电管理模块接口：可以手动关闭放电MOS；Reserve the low-voltage management module interface to manually deactivate the discharge MOS.
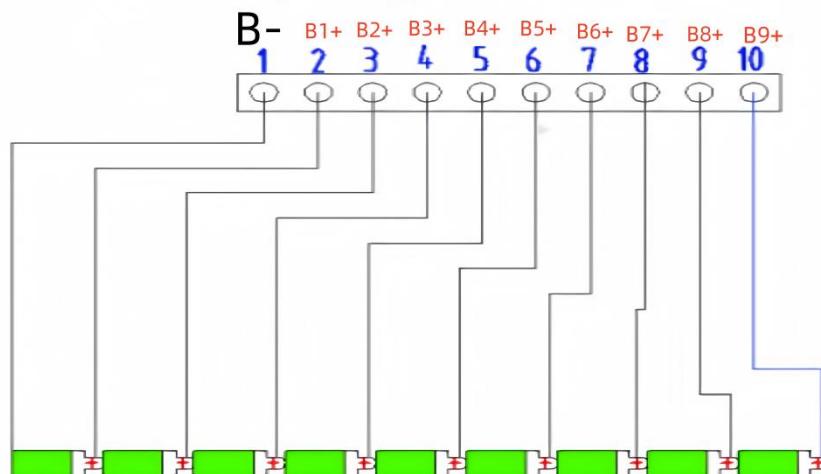
2、接线说明

2.1、BMS外部接线示意图

2.2、BMS电压采集线示意图

9串接线图

B-	B1+	B2+	B3+	B4+	B5+	B6+	B7+	B8+	B9+
1	2	3	4	5	6	7	8	9	10

8串接线图

B-	B1+	B2+	B3+	B4+	B5+	B6+	B7+	B8+	B8+
1	2	3	4	5	6	7	8	9	10

7串接线图

B- B1+ B2+ B3+ B4+ B5+ B6+ B7+   B7+
1   2   3   4   5   6   7   8   9   10

6串接线图

B- B1+ B2+ B3+ B4+ B5+ B6+   B6+
1   2   3   4   5   6   7   8   9   10

5串接线图

B-	B1+	B2+	B3+	B4+	B5+				B5+
1	2	3	4	5	6	7	8	9	10

4串接线图

B-	B1+	B2+	B3+	B4+	B4+				B4+
1	2	3	4	5	6	7	8	9	10
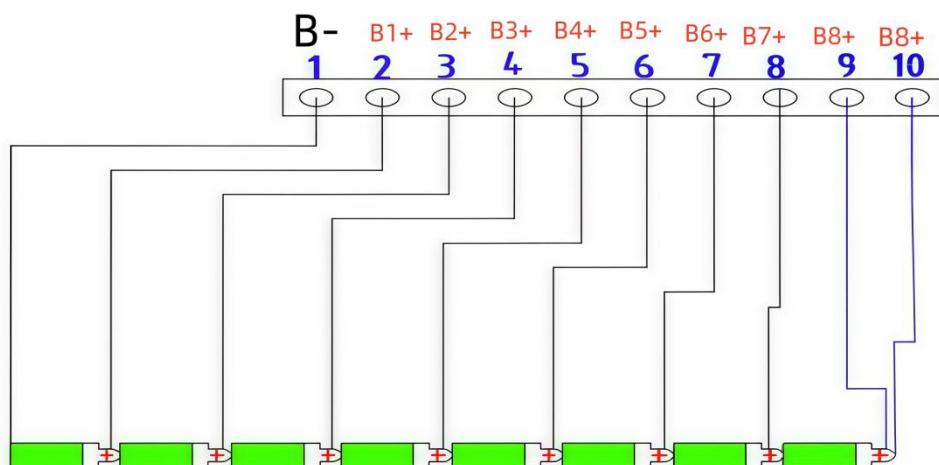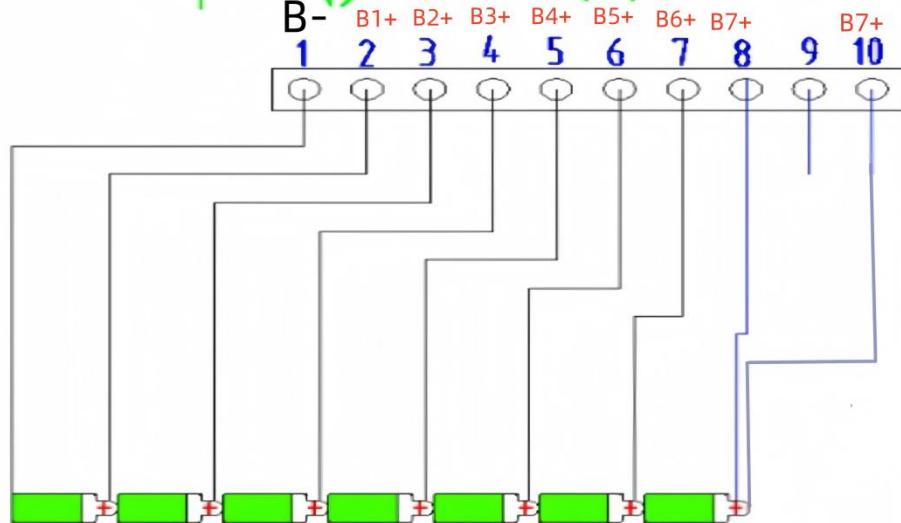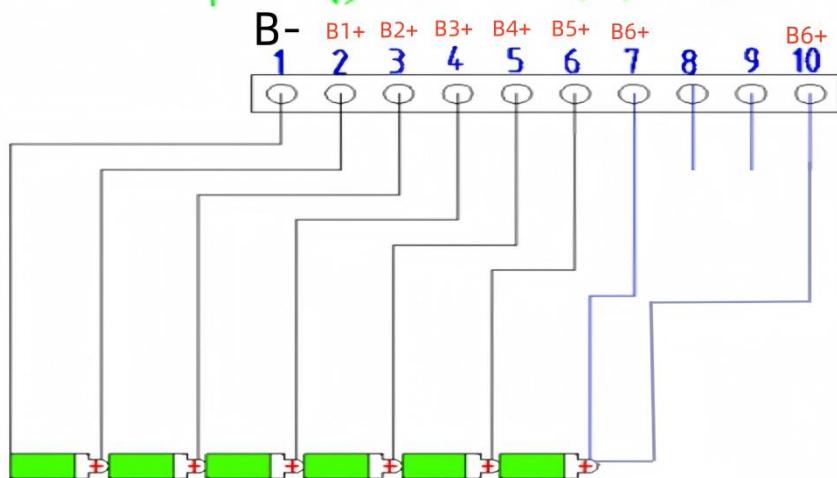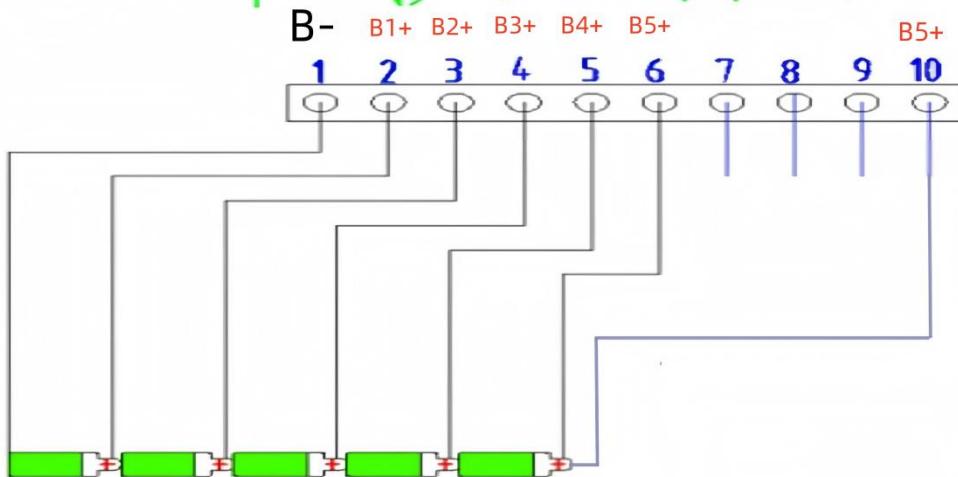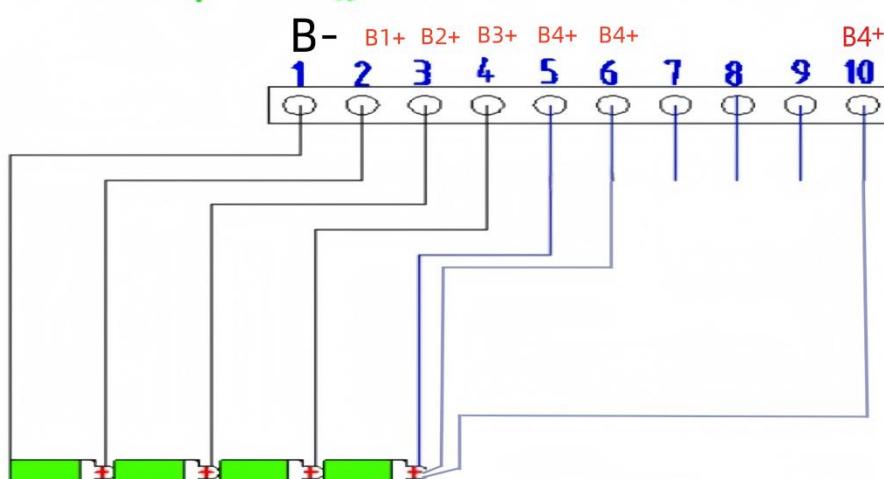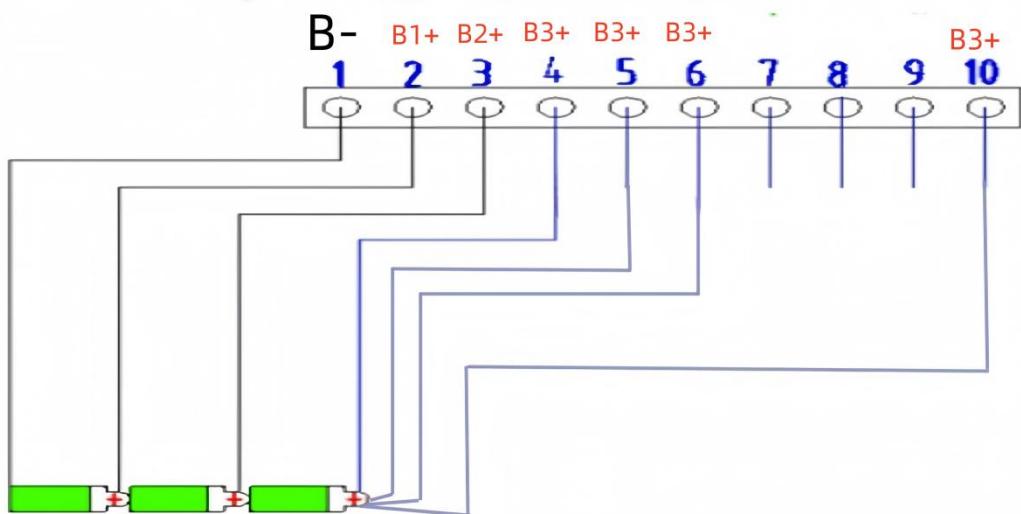
3.基本功能说明Basic Function Description

功能指标项目Functional items		出厂默认数值Default value	备注remarks
电压保护说明Voltage Protection Instructions			
过充保护	过充保护电压overcharge protection voltage	三元 4.25V/ 铁锂 3.65V/ 钛锂 2.8VTernary 4.25V / Lithium iron phosphate 3.65V / Lithium titanate 2.8V	2.8～4.5V，可设置Settable
	过充保护延时时间 Overcharge protection delay time	1.0S，可设置Settable	软件控制 ，可设置Settable
	过充保护解除电压 Overcharge protection release voltage	三元 4.15V/ 铁锂 3.5V/ 钛锂 2.7VTernary 4.15V / Lithium iron phosphate 3.5V / Lithium titanate 2.7V	3.0～4.5V，可设置Settable
	过充保护解除Overcharge protection is disabled	单体电压下降到恢复点，自动恢复The voltage of the single unit drops to the recovery point and automatically recovers	
过放保护over discharge protection	过放保护电压 over discharge protection voltage	三元 2.75V/ 铁锂 2.3V/ 钛锂 1.6VTernary 2.75V / Lithium iron phosphate 2.3V / Lithium titanate 1.6V	可设置，过放保护后，单体电压低于放电失效保压值后进入低功耗模式；You can set the voltage to drop below the discharge level after over-discharge protection.
	过放保护延时时间 Overcharge protection delay time	1.0S，可设置Settable	
	过放保护解除电压 over discharge protection release voltage	三元3.0V/铁锂2.9V/钛锂1.8V3.0V NMC / 2.9V LiFePO4 / 1.8V LiTiO2	

功能指标项目Functional items		出厂默认数值Default value	备注remarks
	过放保护恢复方式 Overcharge protection recovery method	接入充电器connect to charger	
总体过充保护 overcharge protection	总体过充保护电压overall overcharge protection voltage	串数＊过充保护电压charge series*overcharge protection voltage	软件控制，可设置Settable
	总体过充保护延时时间 Overall overcharge protection delay time	1.0S，可设置Settable	软件控制，可设置Settable
总体过充保护解除 Overall overcharge protection is lifted.	总体过充保护解除电压 Total Overcharge Protection Release Voltage	串数＊过充保护解除电压Serial number * Overcharge protection release voltage	软件控制，可设置Settable
	总体过充保护解除 Overall overcharge protection is lifted.	总体电压下降到恢复点，自动恢复The total voltage drops to the recovery point and automatically recovers	
总体过放保护 over discharge protection	总体过放保护电压 Overall over-discharge protection voltage	串数*单体过放保护电压Number of series * Over-discharge protection voltage for monomers	可设置，过放保护后，单体电压低于放电失效保护电压值后进入低功耗模式；After the over-discharge protection, the voltage of the cell is lower than the discharge failure protection voltage, and the low power mode is entered.
	总体过放保护延时时间 Overall over-discharge protection delay time	1.0S，可设置可设置	
总体过放保护解除 Overall over-discharge protection is now released.	总体过放保护解除电压 over discharge protection release voltage	串数*过放保护解除电压Series number * Over-discharge protection release voltage	
	充电解除Release charge	接入充电器connect to charger	
电流保护说明Current Protection Instructions			

功能指标项目Functional items		出厂默认数值Default value		备注remarks
放电过流保护 overcurrent protection	电流值Current value	持续时间 duration	恢复延时 recovery delay	备注remarks
	10～1000A	5S	5S	型号电流为上限，可设置The model current is the upper limit and can be set.
放电过流保护解除 Discharge overcurrent protection is released.	自动解除，延时后自动恢复；Auto-unlock, auto-recover after delay			
充电过流保护 overcurrent protection	电流值current value	持续时间 duration	恢复延时 recovery delay	备注remarks
过流保护 overcurrent protection	10～1000A	120S	10S	型号电流为上限，可设置The model current is the upper limit and can be set.
峰值过流保护 peak overcurrent protection	2000A	100mS	10S	可设置，一般默The model current is the upper limit and can be set.认为持续工作电流的1.5-2倍
放电过流保护解除 Discharge overcurrent protection is released.	自动解除，延时后自动恢复；Auto-unlock, auto-recover after delay			
温度保护说明Temperature Protection Instructions				

功能指标项目Functional items		出厂默认数值Default value	备注remarks
MOS 高温保护 MOS high temperature protection	MOS 高温保护温度MOS high temperature protection temperature	90°C，可设置Settable	在软件/设置/温度设置模块/进行设置和调整软 Go to Software> Settings> Temperature Settings to adjust the settings.
	MOS 高温保护解除温度 MOS high temperature protection release temperature	85°C，可设置Settable	
电芯温度保护 Cell temperature protection	充电低温保护温度 Charging low-temperature protection temperature	-39°C，可设置Settable	
	充电低温保护解除温度 Thermal protection release temperature for charging	-35°C，可设置Settable	
	充电高温保护温度 High-temperature protection temperature for charging	65°C，可设置Settable	
	充电高温保护解除温度 temperature at which the protection against overheating is lifted	55°C，可设置Settable	
	放电低温保护 discharge low temperature protection	-39°C，可设置	
	放电低温保护解除温度 Discharge low-temperature protection release temperature	-35°C，可设置	

功能指标项目Functional items		出厂默认数值Default value	备注remarks
	放电高温保护温度 High-temperature protection temperature for discharge	65°C，可设置	
	放电高温保护解除温度 Discharge high-temperature protection release temperature	55°C，可设置	
均衡功能说明Equilibrium Function Description			
均衡功能 equilibrium function	均衡开启电压 balanced turn-on voltage	三元3.9V/铁锂 3.3V，可设置 Ternary 3.9V / Lithium iron phosphate 3.3V, configurable	在软件/设置/均衡设置模块/进行设置和调整软 Go to Software> Settings> Equalization Settings to adjust the software settings.
	均衡开启压差 balanced differential pressure opening	50mV，可设置Settable	
	均衡电流[电] equalizing current	30~80 mA	
内阻说明 internal resistance explanation	放电回路内阻 internal resistance of discharge circuit	<40 m Ω	
其他功能说明Other features			
低电量警告 Low battery warning	SOC< 10%，可设置，充电时不告警 SOC <10% (adjustable), no alarm during charging	可通过软件设置Set via software	
满容量设置	依据真实电池容量设置Set according to	可通过软件设置Set via software	

功能指标项目Functional items	出厂默认数值Default value	备注remarks
Full capacity setting	the actual battery capacity	

4.其余功能说明Other features

4.1、均衡 :balanced

（1）均衡开关：开启和关闭的情况下，任意一串超过启控电压、充电自动开启均衡直到设置压差电压停止均 衡，均衡温度到了和电池掉线会停止均衡。The balance switch operates in two modes: when either condition is met, the system automatically initiates battery balancing until the preset voltage difference is reached. The process halts when either the temperature threshold is exceeded or the battery disconnects.

（2）均衡开启：任意一串超过均衡启控电压，超过设置压差电压，开启均衡、 自动均衡到启控电压和设置压 差电压，停止均衡，有电流和电池掉线。When the voltage exceeds the preset threshold, the system activates equalization. It automatically adjusts to the target voltage and differential voltage, then stops the process. During this phase, the current and battery may disconnect.

4.2、电流校正：current correction

放电情况下，用仪表读取正确电流、APP和上位机，输入实际电流值单位是mA，直接按校正按 键校正，再到主页看看显示的是输入电流就可以了。During discharge, use the instrument to measure the correct current. Enter the actual current value (in mA) into the APP and host computer, then press the correction button to adjust. Finally, check the main interface to verify the displayed input current.

4.3、剩余电量校正：Battery remaining correction:

先把电池组实际容量填到容量设置里面去，设置好充放电保护电压，再把电池充电/放电到BMS保护，SOC就可以校正好。First, input the battery pack's actual capacity into the capacity settings, then configure the charge/discharge protection voltage. After charging or discharging the battery to the BMS protection level, the SOC will be accurately calibrated.

4.4、实际容量校正：Actual capacity correction:

先把电池充满到保护电压（最高电压不能低于充电恢复电压），再把电放完（放电到设定的保护电压）实际APP里边校准容量就会出来了。First, charge the battery to the protection voltage (the maximum voltage must not fall below the charging recovery voltage), then discharge it to the preset protection voltage. The actual calibrated capacity will then be displayed in the app.

4.5、低功耗及唤醒Low power consumption and wake-up

①休眠模式：BMS检测到电芯电压已经低于放电失效保护电压时，BMS会进入休眠状态，防止电量耗尽损坏电池。Sleep mode: When the BMS detects that the cell voltage falls below the

discharge failure protection threshold, it enters sleep mode to prevent battery damage from complete discharge.

②开启BMS：通过接通充电器或者选择485隔离口5V激活；To activate BMS: Connect the charger or select the 5V power supply on the 485 isolation port.

4.6、显示屏功能Display function

本智能软件板使用RS485接口来支持屏幕显示电池组状态，电池电压、电流、单体电压、温度等相关信息。This intelligent software board uses the RS485 interface to display battery pack status, including voltage, current, cell voltage, and temperature.

4.7、通讯说明Communication Notice

本产品支持RS485通信接口功能，可支持显示屏功能。This product supports RS485 communication interface and display functions.

可以通过RS485接口与上位机进行通讯，从而在上位机端查看电池的各种信息。

默认波BMS特率为19600lbp。The device can communicate with the host computer via RS485 interface, allowing the host to monitor various battery parameters.

The default BMS rate is 19600 lbp.

（二）电气参数electrical parameters

额定规格参数Rated specifications and parameters（适用于全部型号BMS）

详细项目Detailed items		规格specifications			单位 unit	其他说明Other notes
		最小值 MIN	典型值 Typical value	最大值 MAX		
可持续工作电流sustainable operating current		1	-	1000	A	与BMS持续电流一致 Consistent with BMS continuous current
低功耗模式电流low power mode current		-	-	<100	μA	休眠模式下In hibernation mode
工作自耗电电流Current of the work's own power consumption		-	20	-	mA	整机待机状态下The entire system is in standby mode.
工作环境working condition	工作温度[电] working temperature	-20	-	+70	°C	正常工作温度范围 Normal operating temperature range
	工作湿度 working humidity	0%	-	90%	RH	湿度低于90%，无凝结 Humidity below 90% with no condensation
存储环境Storage environment	存储温度 storage temperature	- 40	-	+85	°C	正常存储温度范围 Normal storage temperature range
	存储湿度 storage humidity	0%	-	90%	RH	湿度低于90%，无凝结 Humidity below 90% with no condensation
SOC估算精度SOC estimation accuracy		<5%				
电流检测current detection		采样频率<250mS，精度5%Sampling frequency <250 mS, accuracy 5%				
RS485接口RS485 interface		左右双侧路485口485 ports on both the left and right sides				
蓝牙/ GPRS/ GPS定位 Bluetooth/GPRS/GPS positioning		蓝牙专用APP可快速检测分析电池健康状况； Bluetooth-enabled apps can quickly assess battery health.				GPS实时定位；远程实时查询电池相关信息； GPS real-time location; remote real-time battery information query
单位电压掉线检测unit voltage		支持support,				

dropout detection		
单体电压检测monomer voltage detection	支持，检测范围1.0V～4.35VSupport, detection range 1.0V～4.35V	
总电压检测total voltage detection	检测范围0-120VDetection range: 0-120V	参数可设置 电池串数由BMS型号及APP设置确定The number of battery strings can be configured according to the BMS model and APP settings.
电池类型Battery type	三元锂/磷酸铁锂/钛酸锂电池 Lithium ternary / Lithium iron phosphate / Lithium titanate batteries	
电池组组合方式	3-32串3-32 strings	