



无人机专用智能电池管理系统

Smart Battery Management System for Drones

PRODUCT SPECIFICATION

产品名称: *Product Name :*

18S 240A UAV BMS

产品型号: *Product Model :*

EF-002

版本编号: *Version No.:*

AYEF002-M000

尺寸: *Dimensions:*

201mm*155.3mm*25mm

重量: *Weight:*

300g

规格 : *Configuration:*

三元锂电 18 串、同口、充 120A 放 240A、CAN

18S NMC Li-ion, Common Port, 120A Charge 240A Discharge, CAN

客户确认		
Customer Confirmation		
审核/日期 <i>Reviewed by / Date</i>	批准/日期 <i>Approved by / Date</i>	公司印章 <i>Company Seal</i>
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Revision History

[illegible]



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1、简介

1、 Introduction

1.1 产品简介

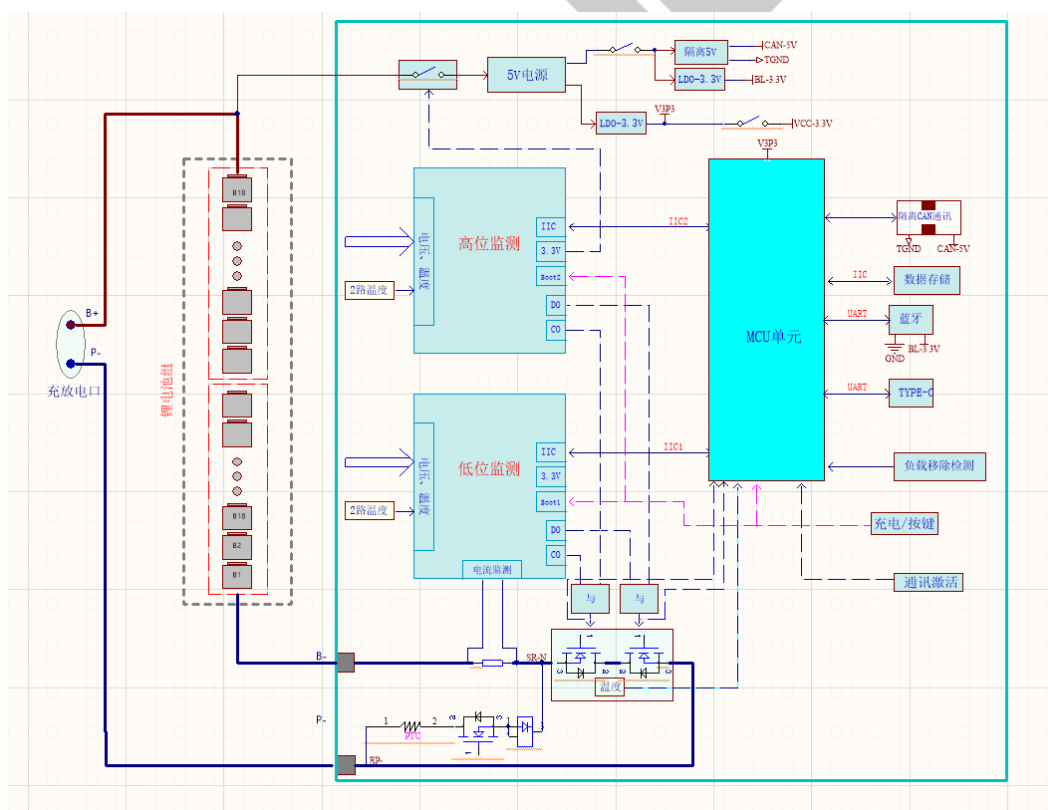
1.1 Product Overview

本产品是一款面向无人机锂电池组开发的 18S 240A 专用电池管理系统（BMS），适用于标称电压 3.7V 的锂离子电池。系统采用主控板与功率输出板一体式或分体式设计，可适配不同无人机机型的空间布局与安装需求，并兼容 DroneCAN 等开源飞控协议及非开源飞控协议。BMS 支持额定 240A 放电能力（10 分钟），集成单体电压采集与均衡、单体过充与过放保护、电池组温度监测、充放电控制、热管理及数据通信等核心功能，可实时监测电池运行状态，并在异常工况下及时实施保护。系统内置高精度 SOC、SOH 估算算法，可提升剩余电量和电池健康状态的评估准确性；同时具备适用于无人机应用的预充预放、热插拔防打火、过流延时及飞行模式保护功能，为无人机电池组提供安全、可靠的供电与寿命管理支持。

This product is a dedicated 18S 240A Battery Management System (BMS) developed for drone lithium-ion battery packs, suitable for lithium-ion cells with a nominal voltage of 3.7V. The system features an integrated or modular design for the main control board and power output board, allowing it to adapt to the spatial layout and installation requirements of different drone models. It is compatible with open-source flight control protocols such as DroneCAN, as well as proprietary flight control protocols. The BMS supports a rated discharge capacity of 240A (for 10 minutes) and integrates core functions such as cell voltage sensing and balancing, cell overcharge and over-discharge protection, battery pack temperature monitoring, charge/discharge control, thermal management, and data communication. It monitors the battery's operating status in real time and promptly activates protective measures under abnormal conditions. The system features built-in high-precision SOC and SOH estimation algorithms, which enhance the accuracy of remaining charge and battery health assessments. It also includes pre-charge and pre-discharge functions, hot-swap spark prevention, overcurrent delay, and flight mode protection features tailored for drone applications, providing safe and reliable power supply and lifespan management for drone battery packs.

1.2 功能示意图

1.2 Function Block Diagram





1.3 功能配置

1.3 Configuration

功能 Function	配置 Configuration	功能 Function	配置 Configuration
支持串数 Number of Strings Supported	18S	485 隔离 485 Communication Isolated	/
放电持续电流 Continuous Discharge Current	240A10min	TYPE-C TYPE-C Communication	标配 不带 120Ω 电阻 Standard option
充电持续电流 Continuous Charging Current	120A	CAN 通讯隔离 CAN Communication Isolated	标配隔离 不带 120Ω 电阻 Standard option
NTC 数量 Number of NTCs	4 路电池 + 1 路 MOS 4 battery temperature probes + 1 MOS temperature sensor	加热功能 Heating Function	/
均衡功能 Balance Function	被动均衡 Passive balance	蓝牙模块 Bluetooth Module	标配 Standard option
开关功能 Switch Function	标配 Standard Configuration	电池组串联 Battery Cells in Series	/
充电限流功能 Charging current limit	/	二次保护功能 Secondary Protection Function	/
电池组并联 Battery packs in parallel	支持 supported	LCD 显示屏 LCD Display	/
履历 History storage	标配 Standard option	LED 指示灯 LED indicator	标配 Standard option
预放电功能 Pre-discharge function	标配 Standard option	GPS 接口 GPS interface	/
RTC 功能 RTC Function	标配 Standard option		

备注：1.非隔离通信不支持与充电器或负载通讯

Note:1.Non-isolated communication with charger or loads is not supported.

1.4 软件功能说明

1.4 Software Function Description

1.4.1 应用场景说明

1.4.1 Application Scenario Description

适用于行业无人机，植保无人机等场景。

Applicable to industrial drones, agricultural plant-protection drones, and similar applications.



1.4.2 充放电检测

1.4.2 Charge and Discharge Detection

检测到充电电流大于 500mA 时，判定为充电状态；检测到放电电流大于 500mA 时，判定为放电状态；检测到电流小于 500mA 时，判定为静置状态。

When the detected charging current exceeds 500 mA, the system is deemed to be charging; when the detected discharge current exceeds 500 mA, it is deemed to be discharging; when the detected current is below 500 mA, it is deemed to be idle.

客户应用说明：为满足大电流和散热要求，采样电阻一般设置比较小，在小电流时采样值会不准确，通常将其滤除。

Customer application note: To meet high-current and heat-dissipation requirements, the shunt resistor is generally set to a low value. Its reading may be inaccurate at low current and is normally filtered out.

1.4.3 与上位机通讯功能

1.4.3 Host Computer Communication Function

可通过上位机读取 BMS 参数，并可进行保护参数配置。

BMS parameters can be read through the host computer, and protection parameters can be configured.

CAN 通讯：客户协议 ID=1，波特率=1M；

CAN communication: customer protocol, ID = 1, baud rate = 1 Mbit/s.

TYPE C：波特率=115200 ID=1（升级）

Type-C: baud rate = 115200, ID = 1 (firmware update).

BLE：波特率=115200 ID=1(百瑞)

BLE: baud rate = 115200, ID = 1 (Bairui).

客户应用说明：通过连接通讯接口，可以实时了解 BMS 的数据和状态。常规应用可以使用我司开发的蓝牙 APP 或上位机直接查看数据。专业应用可通过我司《BMS(电池管理系统)MODBUS_RTU 通讯协议 V2.30》或《BMS(电池管理系统)CAN 通讯协议 V1.3》进行数据读取。在应用中应注意设备 ID 和通信速率设置准确。

Customer application note: By connecting to the communication interface, BMS data and status can be viewed in real time. For ordinary applications, use our Bluetooth app or host computer software to view data directly. For professional applications, read data through the BMS MODBUS_RTU Communication Protocol V2.30 or BMS CAN Communication Protocol V1.3. Ensure that the device ID and communication rate are configured correctly.

1.4.4 保护功能

1.4.4 Protection Function

检测到满足电压，电流或温度保护条件时断开充电 MOS，当发生放电保护时只预警不关放电 MOS。当满足保护恢复条件时（参见附表 A），BMS 解除保护。在导通放电 MOS BMS 会先导通预载电路，延时 200MS 后再导通放电 MOS。

When voltage, current, or temperature protection conditions are met, the charge MOS is disconnected. During discharge protection, the system issues a warning only and does not turn off the discharge MOS. When the protection recovery conditions are met (see Appendix A), the BMS clears the protection. Before turning on the discharge MOS, the BMS first turns on the preload circuit and then turns on the discharge MOS after a 200 ms delay.

客户应用说明：当检测到超出电池安全使用条件时，BMS 按本规格书设定的保护策略控制充、放电 MOS，保护电芯。由于负载端的电容效应，直接导通放电 MOS 可能导致瞬间放电电流过大触发短路保护功能，影响客户使用，所以在满足恢复条件时先导通旁路给负载电容充电，然后再导通放电 MOS，避免误触发短路保护功能。

Customer application note: When unsafe battery conditions are detected, the BMS controls the charge and discharge MOS according to the protection strategy specified in this document. Because of the load-side capacitive effect, directly turning on the discharge MOS may cause an excessive instantaneous discharge current and trigger short-circuit protection. When recovery conditions are met, the bypass is therefore turned on first to charge the load capacitor, after which the discharge MOS is turned on to avoid a false short-circuit trigger.



1.4.5 正常休眠功能

1.4.5 Normal Sleep Function

BMS 在静置状态且无通讯时，延时 1200s 进入正常休眠。在正常休眠状态下，BMS 可以被充电、CAN 通讯、按键唤醒。在正常休眠状态下，BMS 每隔 10s 会自动唤醒一次采集电压和电流，当检测到电压小于欠压时进入深度休眠状态，当检测到有充放电电流时，退出正常休眠进入工作状态。

When the BMS is idle and has no communication activity, it enters normal sleep after 1200 s. In normal sleep, it can be awakened by charging, CAN communication, or a button press. Every 10 s, it wakes automatically to sample voltage and current. If an undervoltage condition is detected, it enters deep sleep; if charge or discharge current is detected, it exits normal sleep and enters operating mode.

客户应用说明：当检测到电池处于闲置状态时，为延长电池待机时间，BMS 会关闭暂时不需要使用的功能模块，降低设备功耗，进入正常休眠状态。当检测到客户再次使用（如接入充电器、使用负载放电）电池时，BMS 会退出休眠进入工作状态。休眠时仍旧定时检测电芯电压，当电芯电压过低时关闭所有功能模块，这时的 BMS 功耗降至最低。

Customer application note: When the battery is idle, the BMS turns off temporarily unnecessary modules to reduce power consumption and extend standby time, then enters normal sleep. When battery use is detected again, such as connecting a charger or discharging through a load, the BMS exits sleep and enters operating mode. Cell voltage is still checked periodically during sleep; when cell voltage is too low, all functional modules are turned off and BMS power consumption is minimized.

备注：在特定场景中，当客户不需要正常休眠功能时，用上位机或蓝牙 APP 把休眠静置时间设置为-1，即可关闭正常休眠功能。

Note: In applications where normal sleep is not required, set the sleep idle time to -1 through the host computer or Bluetooth app to disable normal sleep.

1.4.6 深度休眠功能：(Type C 不能测此功能)

1.4.6 Deep Sleep Function (This function cannot be tested through Type-C)

当同时满足以下条件时，进入深度休眠：

The BMS enters deep sleep when the following condition is met:

- a. 检测到单体电芯电压小于 2.6V 且无电流时，持续时间超过 60s；
- a. The cell voltage is below 2.6 V with no current for more than 60 s.

此时，只能通过充电或按键唤醒。

At this point, the system can be awakened only by charging or by pressing the button.

客户应用说明：当电芯电压过低时，由于电芯的化学特性，会给电芯造成不可逆的伤害，可能造成电池报废。所以当检测到电芯电压过低时，BMS 会关闭所有功能模块，把功耗降至最低，延长电池的储运时间。这时 BMS 只能通过接入充电器或按键激活。

Customer application note: Due to cell chemistry, excessively low cell voltage can cause irreversible damage and may render the battery unusable. When low cell voltage is detected, the BMS turns off all functional modules and reduces consumption to a minimum to extend storage and transport time. In this state, the BMS can be activated only by connecting a charger or pressing the button.



1.4.7 被动均衡功能

1.4.7 Passive Balancing Function

当同时满足以下条件时，开启均衡：

Balancing is enabled when all of the following conditions are met:

1. 某串电压与最低电压之间压差大于均衡开启压差；
2. *The voltage difference between a cell group and the lowest cell group exceeds the balancing-enable voltage difference.*
3. 最低电压大于均衡开启电压；
4. *The lowest cell voltage is higher than the balancing-enable voltage.*
5. 最高电压小于均衡关闭电压；
6. *The highest cell voltage is lower than the balancing-disable voltage.*
7. 在充电或静置状态。
8. *The battery is charging or idle.*

当满足以下任一条件时，均衡关闭：

Balancing is disabled when any of the following conditions is met:

1. 某串电压与最低电压之间压差小于均衡关闭压差；
2. *The voltage difference between a cell group and the lowest cell group is below the balancing-disable voltage difference.*
3. 最低电压小于均衡开启电压；
4. *The lowest cell voltage is lower than the balancing-enable voltage.*
5. 最高电压大于均衡关闭电压；
6. *The highest cell voltage is higher than the balancing-disable voltage.*
7. 检测到在放电。
8. *Discharge is detected.*

均衡开启过程中，均衡以开启 8s 关闭 2s 的方式循环进行。

While balancing is active, it cycles with 8 s on and 2 s off.

客户应用说明：电池是一个整体，容量取决于单体电芯最低的那一个，只有使所有电芯容量处于同一水平，才能最大程度利用电池。在充电或静置时，对满足均衡要求的电芯，开启均衡电阻，以发热的形式消除电芯之间的容量差异。

Customer application note: A battery pack operates as a whole, and its capacity is determined by the cell with the lowest capacity. Keeping all cell capacities at the same level maximizes usable battery capacity. During charging or idle periods, balancing resistors are enabled for cells that meet the balancing conditions to dissipate the capacity difference as heat.

1.4.8 运行状态指示灯和灯板显示

1.4.8 Operating Status Indicator and LED Board Display

运行状态指示灯在没保护，没故障时，2s 闪烁一次；在发生保护或故障时，400ms 闪烁一次。正常休眠状态时，运行状态指示灯 10s 闪烁一次。深度休眠状态下，运行状态指示灯不闪烁。

When there is no protection event or fault, the operating-status indicator flashes once every 2 s. During a protection event or fault, it flashes once every 400 ms. In normal sleep, it flashes once every 10 s. In deep sleep, it does not flash.

客户应用说明：在排查问题缺乏专业工具时，可以通过指示灯判断 BMS 当前的运行状态，辅助问题分析定位。

Customer application note: When professional troubleshooting tools are unavailable, the indicator can be used to identify the BMS operating state and assist fault analysis and location.



1.4.9 弱电开关

1.4.9 Low-Voltage Switch Function

单按一下按键显示当前电量,3S 后熄灭，短按加长按不松开关 MOS。

Press the button once to display the current battery level; the display turns off after 3 s. A short press followed by a long press without releasing switches the MOS on or off.

充电延时 2S 后自动打开充放电 MOS,当充电时有错误急闪 LED 灯，具体参考以下说明。

After 2 s of charging, the charge and discharge MOS turn on automatically. If an error occurs during charging, the LED flashes rapidly; see the following description.

(1) 查看电量 ,单按按键一次，LED 可显示电池当前电量，3 秒后熄灭，如下图：

(1) Checking the battery level: Press the button once and the LED displays the current battery level, then turns off after 3 s, as shown below.

LED5	LED1	LED2	LED3	LED4	当前电量 Current Battery Level
灭 OFF	亮 ON	亮 ON	亮 ON	亮 ON	88%~100%
灭 OFF	亮 ON	亮 ON	亮 ON	闪 FLASH	75%~87%
灭 OFF	亮 ON	亮 ON	亮 ON	灭 OFF	63%~74%
灭 OFF	亮 ON	亮 ON	闪 FLASH	灭 OFF	50%~62%
灭 OFF	亮 ON	亮 ON	灭 OFF	灭 OFF	38%~49%
灭 OFF	亮 ON	闪 FLASH	灭 OFF	灭 OFF	25%~37%
灭 OFF	亮 ON	灭 OFF	灭 OFF	灭 OFF	13%~24%
闪 FLASH	闪 FLASH	灭 OFF	灭 OFF	灭 OFF	0%~12%

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(2) 充电状态显示

(2) Charging Status Display

充电时，自动显示当前前电量如下（每秒闪 1 次）：

During charging, the current battery level is displayed automatically as follows (flashing once per second):

LED1 LED2 LED3 LED4 SOC

○ ○ ○ ○ 0-25%

● ○ ○ ○ 26-50%

● ● ○ ○ 51%-75%

● ● ● ○ 76%-95%

● ● ● ● 96%-100%

(3) 异常指示表

(3) Fault Indication Table

当异常发生时，电池 LED 灯将会触发相关灯语：

When a fault occurs, the battery LED triggers the corresponding indication pattern:

LED1	LED2	LED3	LED4	显示规则 Display Rule	保护项目 Protection Item
灭 OFF	闪 FLASH	灭 OFF	灭 OFF	LED2 每秒闪 2 次 LED2 flashes twice per second	充电过流 Overcurrent during charging
灭 OFF	灭 OFF	闪 FLASH	灭 OFF	LED3 每秒闪 3 次 LED3 flashes 3 times per second	充电过压 Overvoltage during charging
灭 OFF	灭 OFF	闪 FLASH	灭 OFF	LED3 每秒闪 2 次 LED3 flashes twice per second	放电欠压 Undervoltage during discharge
灭 OFF	灭 OFF	灭 OFF	闪 FLASH	LED4 每秒闪 2 次 LED4 flashes twice per second	充电低温 Low temperature during charging
灭 OFF	灭 OFF	灭 OFF	闪 FLASH	LED4 每秒闪 3 次 LED4 flashes 3 times per second	充电高温 High temperature during charging
闪 FLASH	灭 OFF	灭 OFF	灭 OFF	LED1 每秒闪 3 次 LED1 flashes 3 times per second	电芯损坏 Damaged cell ($<2V \parallel v_{min} > 3.2v$ &&vdiff>1v)

客户应用说明：方便用户在特定情况下能快速排查故障，提高用户操作体验。

Customer application note: This helps users quickly troubleshoot faults in specific situations and improves the operating experience.



1.4.10 并机功能

1.4.10 Parallel Operation Function

- (1) 最大支持五并,当任一节点电池通过按键打开 MOS 时总线上所用电池均开机。
- (1) Up to five battery packs are supported in parallel. When any node battery turns on its MOS through the button, all batteries on the bus power on.
- (2) 并机时检测总压小于 5V 开始并机,并机成功后飞控节点自动识别并机数量并单个上报到飞控遥控器。
- (2) During parallel operation, packs begin paralleling when the detected total-voltage difference is below 5 V. After successful paralleling, the flight-controller node automatically identifies the number of parallel packs and reports each pack to the flight controller or remote controller.
- (3) 并机成功任一有保护不影响其它节点。
- (3) After parallel operation succeeds, protection on any individual pack does not affect the other nodes.

1.4.11 过流保护和短路保护恢复条件

1.4.11 Recovery Conditions for Overcurrent and Short-Circuit Protection

- 当发生充电过流保护时，延时 30s 恢复。
- When charge overcurrent protection occurs, recovery is delayed for 30 s.
- 当发生放电过流或短路保护时(软件过流只预警不保护,硬件过流关断 MOS)，延时 30s 恢复。
- When discharge overcurrent or short-circuit protection occurs (software overcurrent gives a warning only, while hardware overcurrent turns off the MOS), recovery is delayed for 30 s.

1.4.12 恢复条件

1.4.12 Recovery Conditions

- 放电时过流，低温，高温，MOS 高温欠压只预警不保护
- During discharge, overcurrent, low temperature, high temperature, MOS high temperature, and undervoltage conditions generate warnings only and do not enable protection.
- (* 所有放电低于 10A 时有相应保护，电流大于 10A 只产生告警不保护，防止空中掉电。)
- (* When all discharge currents are below 10 A, the corresponding protection is active. When current exceeds 10 A, an alarm is generated only and protection is not applied, to prevent in-flight power loss.)

序号 No.	保护类型 Protection Type	恢复条件 Recovery Condition	备注 Remarks
1	单体过压保护 Individual Cell Overvoltage Protection	电压恢复 Voltage Recovery	*
2	总压过压保护 Total Voltage Overvoltage Protection	电压恢复 Voltage Recovery	*
3	单体欠压保护 Individual Cell Undervoltage Protection	电压恢复 Voltage Recovery	*
4	总压欠压保护 Total Voltage Undervoltage Protection	电压恢复 Voltage Recovery	*
5	MOS 高温保护 MOS High-Temperature Protection	温度恢复 Temperature Recovery	*
6	充电高温保护 Charging High-Temperature Protection	温度恢复 Temperature Recovery	
7	充电低温保护 Charging Low-Temperature Protection	温度恢复 Temperature Recovery	
8	放电高温保护 Discharging High-Temperature Protection	温度恢复 Temperature Recovery	*
9	放电低温保护 Discharging Low-Temperature Protection	温度恢复 Temperature Recovery	*
10	放电过流保护 Discharging Overcurrent Protection	延时恢复 Delayed Recovery	*



11	短路保护 Short-Circuit Protection	延时恢复 Delayed Recovery	*
12	充电过流保护 Charging Overcurrent Protection	延时恢复 Delayed Recovery	

注：未检测到充电器输出信号，则认为充电器移除；检测到充电器输出信号，则认为充电器接入。

Note: If no charger output signal is detected, the charger is deemed removed; if a charger output signal is detected, the charger is deemed connected.

1.5 参数设置

1.5 Parameter settings

1.5.1 基本参数

1.5.1 Basic parameter

电池包规格 battery pack Specifications	18 串三元 18 Strings of Ternary Lithium Battery
接口类型 Interface type	充放电同口 Charge and discharge are both at the same port
充电电压 Charging voltage	4.37V*串数 4.37V*Number of Strings
单体电压范围 Cell voltage range	3.2~4.37V
持续充电电流 Continuous charging current	120A
持续放电电流 Continuous discharging current	240A(10min)
通信接口 Communication Interface 连接上位机波特率，ID Connected upper computer Baud Rate and ID	CAN Baud Rate: 1M ID:1 TYPE-C Baud Rate: 115200 ID:1 BLE Baud Rate: 115200 ID:1
动行功耗 Consumption of running	≤30mA
休眠功耗 Consumption of sleep	≤5mA
休眠条件 Sleep conditions	无电流、通讯、保护状态下 No current、communication、protection state
深度休眠功耗 Consumption of deep sleep	≤100uA
深度休眠条件 Deep sleep conditions	单体欠压状态下 In cell under voltage state
工作温度 Operating temperature	-30℃~70℃



板子结构尺寸 Size	(L*W*H)201mm*155.3mm*25mm±1mm
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1.5.2 主要参数

1.5.2 Main Parameters

项目 Project		规格 (Specification)			
		最小 MIN	典型 TYP	最大 MAX	单位 Unit
单节过充保护 Single Cell Over-Charge Protection	过充保护 Over-Charge Voltage Protection	4.35	4.37	4.39	V
	过充保护延时时间 Over-Charge voltage Protection Delay Time	/	1000	2000	mS
	过充保护恢复电压 Over-Charge voltage Protection Release	4.35	4.37	4.39	V
单节过放保护 Single Cell Over-Discharge Protection	过放保护 Over-Discharge Voltage Protection	3.0 (电流大于 10A 只预警不保护)	3.2 (电流大于 10A 只预警不保护)	3.4 (电流大于 10A 只预警不保护)	V
	过放保护延时时间 Over-Discharge voltage Protection Delay Time	/	1000	2000	mS
	过放恢复电压 Over-Discharge voltage Protection Release	3.28	3.3	3.32	V
均衡电压 Balanced Voltage	均衡开启电压 Balanced Opening Voltage	3.78	3.8	3.82	V
	均衡开启压差 Balanced Opening Voltage Different	0.03	0.05	0.07	V
	均衡电流 Balanced Opening Current	30	50	70	mA
	均衡方式 Balanced Opening Mode	被动均衡(Passive Balancing)			\
充电过流保护 Over Charge Current Protection	充电过流保护电流 Over-Current Charge Protection	120	130	140	A
	充电过流保护延时 Over-Current Charge Protection Delay Time	2000	3000	4000	mS
	充电过流保护解除 Over-Current Charge Protection is lifted	延时 30S 自动恢复 Delay 30S Self-recovery			
放电过流保护 Over Discharge Current Protection	一级放电过流保护电流 1th Ove Protection Current	590 (只预警不保护)	600 (只预警不保护)	610 (只预警不保护)	A
	一级放电过流保护延时 1th Over Protection Delay Time	2000	3000	4000	mS
	二级放电过流保护电流 2nd Level Over Protection Current	700	720	740	A
	二级放电过流保护延时 2nd Level Over Protection Current Delay Time	100	200	300	mS
	放电过流保护解除 Over-Current Discharge Protection Release	延时 30S 自动恢复 Delay 30S Self-recover			
	短路保护电流 Short-Circuit Protection Current	1000	1065	1200	A



短路保护 Shor-Circuit Protection	短路保护延时 Short-Circuit Protection Delay Time	/	70	400	uS
	短路保护解除 Short-Circuit Protection is lifted	延时 30S 自动恢复 Delay 30S Self-recovery			
	短路说明：表中的短路电流最小值与最大值是短路保护功能的有效作用范围，电流低于最小值或高于最大值，都会可能导致短路保护功能失效。请充分评估实际的短路电流值，或者串联电阻，再进行短路测试！ Short-Circuit Description: The minimum and maximum values of the short-circuit current listed in the table define the effective range of the short-circuit protection function. If the current is lower than the minimum value or higher than the maximum value, it may cause the short-circuit protection to fail. Please thoroughly assess the actual short-circuit current value or series resistance before conducting short-circuit tests.				
充电温度保护 Charging Temperature Protection	充电高温保护 Charging High Temperature Protection	63	68	73	℃
	充电高温恢复 Charging High Temperature Protection Release	60	65	70	℃
	充电低温保护 Charging Low Temperature Protection	0	5	10	℃
	充电低温恢复 Charging Low Temperature Protection Release	5	10	15	℃
放电温度保护 Discharging Temperature Protection	放电高温保护 Discharging High Temperature Protection	85 (只预警不保护)	90 (只预警不保护)	95 (只预警不保护)	℃
	放电高温恢复 Discharging High Temperature Protection Release	75	80	85	℃
	放电低温保护 Discharging Low Temperature Protection	-25 (只预警不保护)	-20 (只预警不保护)	-15 (只预警不保护)	℃
	放电低温恢复 Discharging Low Temperature Protection Release	-15	-10	-5	℃
MOS 高温保护 High Temperature Protection of MOS	MOS 温度保护值 Temperature Protection Value	85 (只预警不保护)	90 (只预警不保护)	95 (只预警不保护)	℃
	MOS 温度保护解除值 Temperature Protection Release Value	75	80	85	℃
总压过充保护 Total Voltage Over charge Protection	总压过充保护电压 Overall Overcharge Protection Voltage	78.51	78.66	78.81	V
	总压过充保护延时 Overall Overcharge Protection Delay	/	1000	2000	mS
	总压过充保护解除电压 Overall Overcharge Protection Release Voltage	78.51	78.66	78.81	V
总压过放保护 Total Voltage Over discharge Protection	总压过放保护电压 Overall Over discharge Protection Voltage	57.40 (电流大于 10A 只预警不保护)	57.60 (电流大于 10A 只预警不保护)	57.80 (电流大于 10A 只预警不保护)	V
	总压过放保护延时 Overall Over discharge Protection Delay	/	1000	2000	mS
	总压过放保护解除电压 Overall Over discharge Protection Release Voltage	59.20	59.40	59.60	V
加热管理 Heating Manage	加热开启温度 Heating Opening temperature	-	-	-	℃
	加热停止温度 Heating Stop temperature	-	-	-	℃



	加热电流 Heating Current	-	A
	加热方式 Type Of Heating	-	

2、关键物料清单

2 / Bill Of Critical Materials

物料名称 Name of Material	生产厂家 Manufacturer	封装 Packaging	数量 Quantity
GD32F103RCT6	兆易	LQFP-64	1
BQ7693003DBTR	TI	TSSOP44	2

重点说明：为保障供应链的安全，所有 BMS 物料，尤其是关键器件我司都会有同品质同规格的替代方案，如有认证需求不允许更换或需经客户端确认才能更换物料，需通知我司业务重新送样方案，并确认规格书。

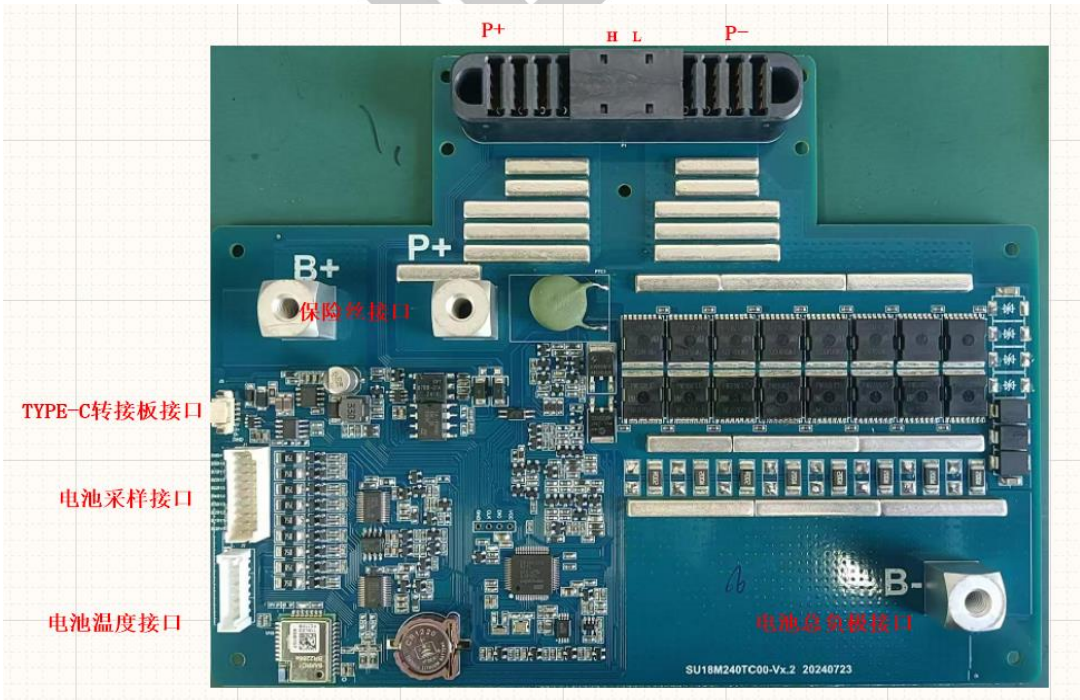
Note: To ensure the safety of the supply chain, we have alternative materials of the same quality and specifications for all Battery Management System (BMS) materials, particularly the key components. If there are certification requirements where replacement is not allowed, or if a client's approval is required for replacement, please notify our sales representatives to resend sample proposals and confirm the product specification.

3、产品构成

3 / Product Diagram and Dimensions

3.1 产品实物图及接口

3.1 Product Photos and Interface





3.2 电压采样接口定义

3.2 Cell Voltage Sampling Interface

J1 电池采样线束接口定义 Cell Voltage Sampling Interface					
NO	PIN	PIN 功能定义 Pin Function	NO	PIN	PIN 功能定义 Pin Function
1	B9	第 9 串电池正极 Connect to Positive side of cell 9	2	B+	接电池包总正极 (与第 18 串 正极同点) Connect to pack positive (same potential as cell 18 positive)
3	B8	第 8 串电池正极 Connect to Positive side of cell 8	4	B18	第 18 串电池正极 (采样) Connect to positive side of cell 18 (sampling)
5	B7	第 7 串电池正极 Connect to Positive side of cell 7	6	B17	第 17 串电池正极 Connect to Positive side of cell 17
7	B6	第 6 串电池正极 Connect to Positive side of cell 6	8	B16	第 16 串电池正极 Connect to Positive side of cell 16
9	B5	第 5 串电池正极 Connect to Positive side of cell 5	10	B15	第 15 串电池正极 Connect to Positive side of cell 15
11	B4	第 4 串电池正极 Connect to Positive side of cell 4	12	B14	第 14 串电池正极 Connect to Positive side of cell 14
13	B3	第 3 串电池正极 Connect to Positive side of cell 3	14	B13	第 13 串电池正极 Connect to Positive side of cell 13
15	B2	第 2 串电池正极 Connect to Positive side of cell 2	16	B12	第 12 串电池正极 Connect to Positive side of cell 12
17	B1	第 1 串电池正极 Connect to Positive side of cell 1	18	B11	第 11 串电池正极 Connect to Positive side of cell 11
19	B0	接 1 串电池负极 Connect to Negative side of cell 1	20	B10	第 10 串电池正极 Connect to Positive side of cell 10



3.3 温度采样接口定义

3.3 Temperature Sampling Interface

J2 温度线束接口定义 Temperature Sampling Interface					
NO	PIN	PIN 功能定义 Pin Function	NO	PIN	PIN 功能定义 Pin Function
1	T4-	温度传感器 4 负极 Negative side of temperature sensor4	2	T4+	温度传感器 4 正极 Positive side of temperature sensor4
3	T3-	温度传感器 3 负极 Negative side of temperature sensor3	4	T3+	温度传感器 3 正极 Positive side of temperature sensor3
5	T2-	温度传感器 2 负极 Negative side of temperature sensor2	6	T2+	温度传感器 2 正极 Positive side of temperature sensor2
7	T1-	温度传感器 1 负极 Negative side of temperature sensor1	8	T1+	温度传感器 1 正极 Positive side of temperature sensor1

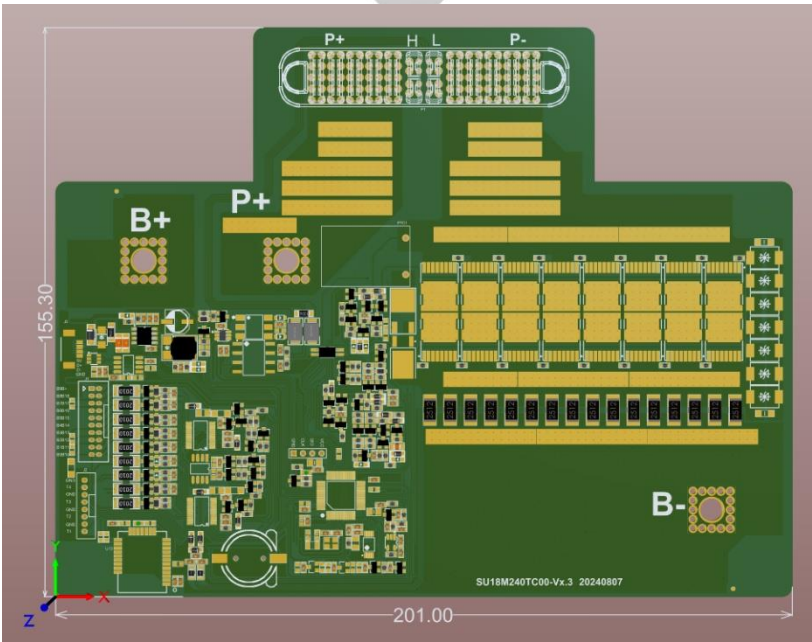
3.4 通信接口定义

3.4 Communication Interface

通信线束接口定义					
NO	PIN	PIN 功能定义 Pin Function	NO	PIN	PIN 功能定义 Pin Function
1	GND	TYPE-C GND	3	D+	TYPE-C D+
2	D-	TYPE-C D-	4	5V	TYPE-C 5V

3.5 产品结构尺寸图

3.5 Product Dimensions



注：尺寸图中的 PCB 丝印版本仅作结构示意，外形尺寸以本章标注为准。

Note: The PCB silkscreen revision in the dimension image is illustrative. The dimensions stated in this section govern.



3.6 线束

3.6 Wiring Harness

3.6.1 电池电压采样线 PHSD-2x10Y/UL3266-24AWG/700mm/HZSW03

3.6.1 Cell Voltage Sampling Harness PHSD-2x10Y/UL3266-24AWG/700mm/HZSW03

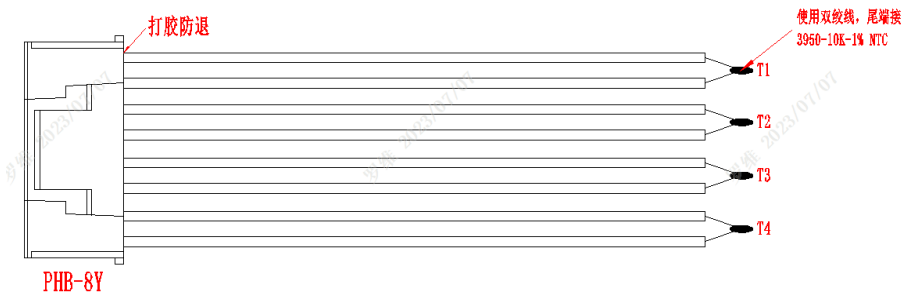


(电池电压采样线定义)

(Cell Voltage Sampling Harness Definition)

3.6.2 温度线 PHB-8Y/UL3266-24AWG/700mm/HZSW03/带 3950-10K-1%NTC

3.6.2 Temperature Harness PHB-8Y/UL3266-24AWG/700mm/HZSW03/with 3950-10K-1% NTC

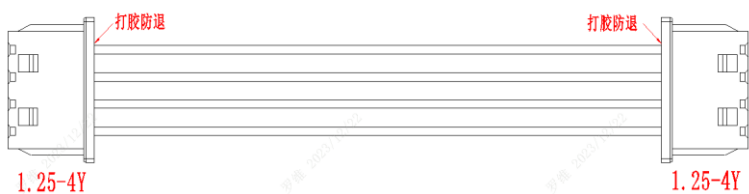


(温度采样线定义)

(Temperature Sampling Harness Definition)

3.6.3 TYPE-C 模块连接线 1.25-4Y 双头/UL3266-28AWG/500mm/DGHY03

3.6.3 Type-C Module Connection Harness 1.25-4Y Double-Ended/UL3266-28AWG/500mm/DGHY03



(TYPE-C 通讯线定义)

(Type-C Communication Harness Definition)

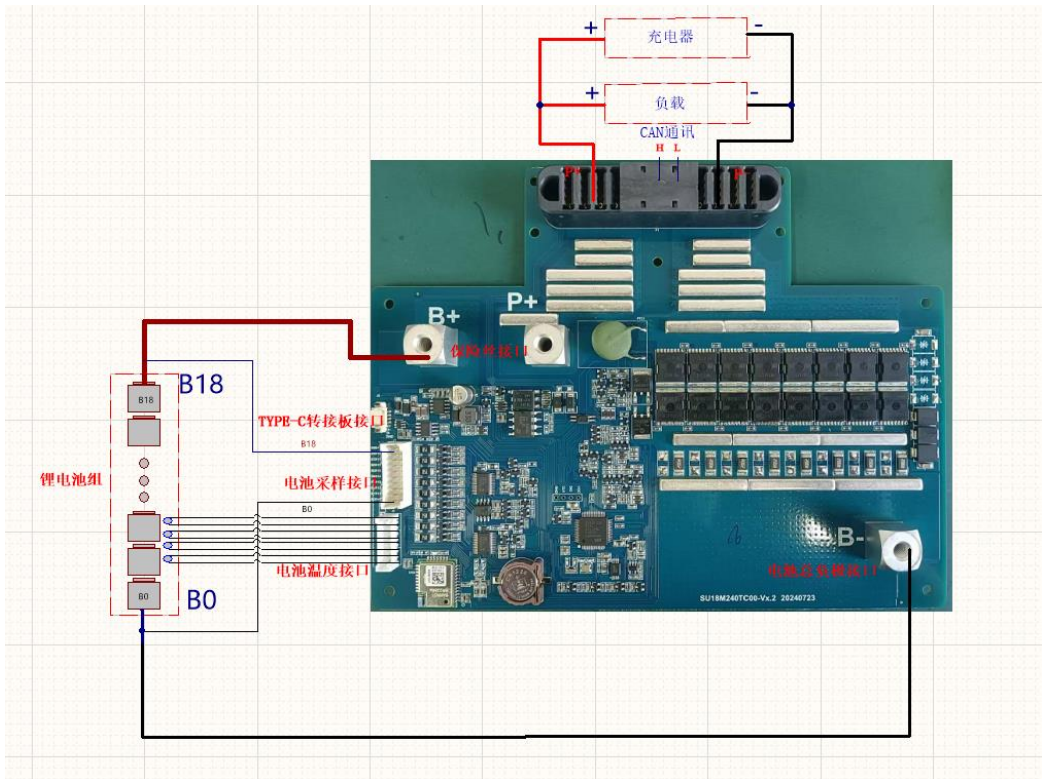


4、 产品安装说明

4 / Product Setup Instructions

4.1 充放电接线示意图

4.1 Charge and Discharge Wiring Diagram



4.2 电气接线顺序

4.2 Order of Connection

4.2.1 上电顺序

4.2.1 Power Up Sequence

- 第一步：连接主板 B-到电池包的负极；
Step 1: Connect the main board "B-" to the negative terminal of the battery pack.
- 第二步：接入温度传感器线束、TYPE-C 模块连接线及所需 CAN 通讯线；
Step 2: Connect the temperature-sensor harness, Type-C module cable, and required CAN communication wires.
- 第三步：连接电池采集线束；
Step 3: Connect the cell voltage sensing cable.
- 第四步：连接 "P-" 动力线到负载负极和充电器负极；
Step 4: Connect the P- power terminal to the negative terminals of both the load and the charger.
- 第五步：确保以上连接正确后，短接 K+与 K-信号 1 秒钟后断开，此时 BMS 板上电开始自检，系统自检正常时，板上状态指示灯每 2 秒闪烁一次；自检异常时（如有过压、欠压或过温时），板上状态指示灯每 400ms 闪烁一次，提示报警。
Step 5: After ensuring all the above connections are correct, short-circuit the "K+" and "K-" signals for 1 second. The BMS will then power up and undergo a self-test. If the LED on the board blinks once every 2 seconds, it indicates that the BMS system is operating normally. If the LED blinks once every 400 ms, it indicates an abnormal operation and triggers an alarm.

4.2.2 下电顺序

4.2.2 Power Down Sequence

- 第一步：断开充电器和负载；
Step 1: Disconnect the charger and load.
- 第二步：断开电压采集线；
Step 2: Disconnect the voltage sensing cable.
- 第三步：断开所有通讯线；
Step 3: Disconnect all communication cables.



第四步：断开主板 B-。

Step 4: Disconnect the main board B-.

注：如果电压采集线为焊接方式的：

Note: If the voltage sensing line is welded:

- (1) 提前加工：将 BMS 放置在防静电桌面上，操作员手持烙铁在待焊接焊盘上加锡，待焊接物料如来料时未加锡处理，也需提前进行加锡，以减少带电焊接时的焊接时间。
(1) A: Pre-processing: Place the BMS on an anti-static desktop, with the operator using a soldering iron to tin the solder pad that's to be welded. If the materials to be soldered weren't tinned upon arrival, it is also necessary to tin them in advance to reduce the welding time during live soldering.
- (2) 焊接顺序：电池采集线焊接顺序为 B1→B2...B+，确认焊接无误后，才能上电。
(2) Welding sequence: The welding sequence for the battery sensing line is B1 → B2 ... B+. Only after confirming that the welding is correct should you power on.
- (3) 焊接过程中避免碰到周边元件及周边的 PCB 线路。
(3) Avoid contacting surrounding components and PCB circuits during the welding process.

4.3 温度传感器安装

4.3 Temperature Sensor Installation

主板上温度传感器用于监测电池包温度，安装时，请将探头紧贴在位于电池组中间位置的单体电池上，确保测量到电池组温度最集中的地方。

The temperature sensor on the main board is used to monitor the temperature of the battery pack. During installation, please place the sensor probe closely against a single cell located in the middle of the battery pack, ensuring it measures at the most concentrated heat area of the pack.

4.3.1 电气接线说明

4.3.1 Electrical Wiring Instructions

- (1) 将 BMS 连接到电池组时，首先应将电池组总负极连接到 BMS 的 B-，确保系统可靠接地。同时，电池组总负极到 BMS 板 B-端动力线阻抗应尽量低，控制在 0.1mΩ 以内，以确保在大电流充、放电时的电流检测精度；
(1) When connecting the BMS to the battery pack, first connect the overall negative terminal of the battery pack to the B- terminal of the BMS, ensuring a reliable grounding of the system. At the same time, the impedance of the power line from the overall negative terminal of the battery pack to the B- terminal on the BMS board should be kept as low as possible, ideally within 0.1mΩ, to ensure accurate current detection during high-current charging and discharging.
- (2) 在做充放电大于 50A 电流测试时，主板上的 B-和 P-动力线必须全部接上，以确保过电流能力，并保证功率器件均流。
(2) When conducting tests with charge and discharge currents greater than 50A, both the B- and P- power lines on the main board must be fully connected to ensure overcurrent capability and to guarantee even current distribution across power devices.



5、通信说明

5 / Communication

5.1 CAN 通信

5.1 CAN Communication

波特率：1000 Kbps，BMS ID：1

Baud Rate: 1000 Kbps, BMS ID: 1

5.2 上位机 CAN 通讯

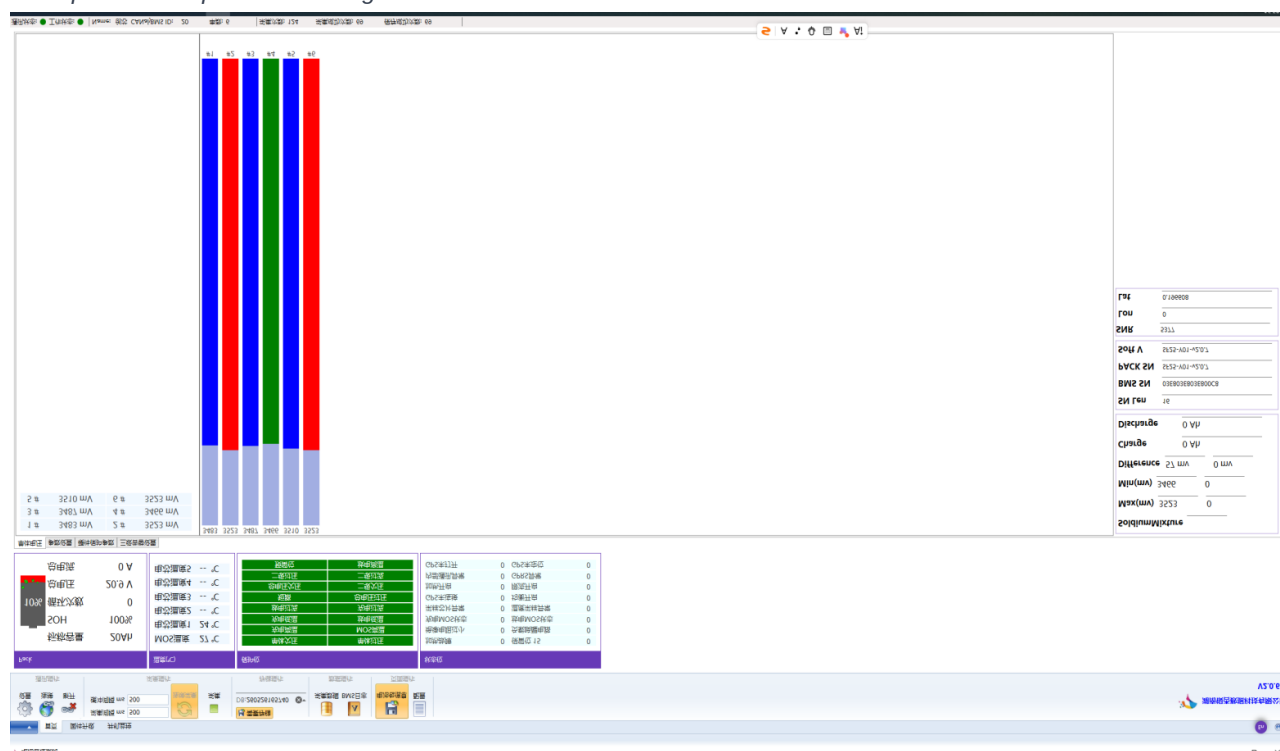
5.2 Host Computer CAN Communication

5.2.1 调试上位机说明

5.2.1 Commissioning Software Instructions

调试上位机使用 CAN 接口，以下截图为通用软件界面示例，图中数据不代表本产品参数。

The commissioning software uses the CAN interface. The screenshots below are generic software examples; the displayed data do not represent this product's settings.



上位机主界面分为单体电芯电压显示，单体 1 电压为第一串电压（最低串，靠近总负极 B-），温度显示，电池信息显示（包括电池总压、SOC，剩余容量，充放电电流，充电电流为正，放电电流为负），MOS 状态包括充电 MOS、放电 MOS、和加热 MOS，导通即 MOS 管打开。

The main host-computer interface includes individual cell-voltage display (Cell 1 is the first series cell, nearest the pack negative terminal B-), temperature display, and battery information (including total pack voltage, SOC, remaining capacity, and charge/discharge current; charging current is positive and discharging current is negative). MOSFET status includes the charge, discharge, and heating MOSFETs; "on" indicates that the corresponding MOSFET is enabled.

(1) 单体电压可显示每串的电池电压，以及最高电压和最低电压，最高电压为红色背景框，最低电压为绿色背景框。

The cell-voltage panel displays the voltage of each series cell together with the maximum and minimum values. The maximum voltage is highlighted in red and the minimum voltage in green.

(2) 电池工作状态可显示各种保护标志以及单串电池状态，若变红且显示故障，则表示有相应的故障触发。

The battery operating-status panel displays protection indicators and individual-cell status. A red fault indication means that the corresponding fault has been triggered.

(3) 通讯状态可显示通讯状态，若没有数据显示，则通讯异常。

The communication-status panel indicates the communication state. If no data is displayed, communication is abnormal.

(4) 打开串口后，需要点击‘采集’才会开始通讯，打开后部分功能才会使能。

After opening the communication port, click "Acquire" to start communication. Some functions are enabled only after acquisition begins.



5.2.2 参数设置

5.2.2 Parameter Settings

- (1) 参数设置分为系统信息、保护阈值、恢复阈值、延时和其它。

Parameter settings are divided into system information, protection thresholds, recovery thresholds, delays, and other settings.

- (2) 系统信息包括了板子的一些基本信息。（警告参数仅用于客户特定需求，若不需要，则忽略不影响使用）

System information contains basic board information. (Warning parameters are intended only for customer-specific requirements; if not required, they may be ignored without affecting operation.)

- (3) 保护阈值包括过冲过放电压、高低温保护、以及充放电过流阈值。

Protection thresholds include overcharge/overdischarge voltage, high/low-temperature protection, and charge/discharge overcurrent thresholds.

- (4) 恢复阈值包括过冲过放、高低温恢复阈值。

Recovery thresholds include overcharge/overdischarge and high/low-temperature recovery thresholds.

- (5) 延时包括过冲过放电压、高低温保护、以及充放电过流延时。

Delay settings include overcharge/overdischarge voltage, high/low-temperature protection, and charge/discharge overcurrent delays.

5.2.3 程序更新

5.2.3 Firmware Update

BMS 支持固件在线升级，在保证 BMS 通讯正常的情况下，可以通过 CAN 或者 UART 下载固件更新程序。

The BMS supports online firmware upgrades. When BMS communication is operating normally, firmware updates can be downloaded through CAN or UART.

5.2.4 历史数据

5.2.4 Historical Data

- (1) BMS 具有历史故障和数据记录功能，可通过上位机查看故障记录和电池历史工作状态；

The BMS records historical faults and operating data. Fault records and historical battery operating status can be viewed using the host-computer software.

- (2) 点击读取故障后，会出现相应的故障触发次数以及循环次数；

After clicking "Read Faults," the number of occurrences of each fault and the cycle count are displayed.

实时数据可实时显示上位机读取的电池状态信息，并可以表格的形式导出到上位机根目录下。

The real-time data view displays battery-status information read by the host computer and can export the data as a table to the host-computer root directory.

告警数据										
Addr: 20		Cell count: 6		读取告警数据	读取充放电运行数据	读取充放电运行数据 Flash	导出			
Index	Time	Alarm flag bit	Protection flag bit	SOC	Electric current (A)	#1 Voltage(mv)	#2 Voltage(mv)	#3 Voltage(mv)	#4 Voltage(mv)	#5 Voltage(mv)
1	2021-1-2 0:2:51	1[OCWDSG]	33280-3072[UV;OC_DSG;CHG;DSG]	0	-105.7	2380	2534	2536	2565	
2	2021-1-2 0:0:11	1[OCWDSG]	512-3072[OC_DSG;CHG;DSG]	3	-30.1	2897	2937	2946	2950	
3	2021-1-2 0:0:10	0	512-3072[OC_DSG;CHG;DSG]	3	-27.3	2906	2947	2956	2959	
4	2021-1-2 0:8:13	0	512-3072[OC_DSG;CHG;DSG]	3	-62.4	2735	2853	2865	2882	
5	2021-1-2 0:7:59	1[OCWDSG]	0-3072[CHG;DSG]	5	-96.4	2768	2875	2887	2903	
6	2021-1-2 0:3:51	8192	32768-3072[UV;CHG;DSG]	10	0	2265	3450	3444	3450	
7	2021-1-2 0:3:32	8192	0-3072[CHG;DSG]	10	0	2382	3450	3444	3450	
8	2021-1-2 0:0:1	8[OTWBDSG]	1-3072[OT_DSG;CHG;DSG]	12	-0.9	3298	3298	3297	3298	
9	2021-1-1 23:59:58	8[OTWBDSG]	0-3072[CHG;DSG]	12	-0.9	3299	3300	3299	3299	
10	2021-1-1 23:59:34	4[OTWBCHG]	8192-1024[OT_Bat;DSG]	0	1.6	3321	3321	3322	3319	
11	2021-1-1 23:59:30	4[OTWBCHG]	0-3072[CHG;DSG]	0	1.6	3320	3318	3320	3318	



5.2.5 历史放电数据

5.2.5 Historical Discharge Data

- (1) BMS 具有历史充放电数据记录功能，当开启充电或者开机放电后，每秒记录一次，可记录运行时间、电池电压、电流、温度、状态标志、容量等；

The BMS records historical charge and discharge data. Once charging is enabled or power-on discharge begins, data is recorded once per second, including operating time, battery voltage, current, temperature, status flags, and capacity.

- (2) 每次从静置状态进入充电或者放电状态，都会重新开始记录；

Recording restarts whenever the battery transitions from idle to charging or discharging.

- (3) 点击‘历史信息’，则会显示 BMS 存储的历史数据记录；

Click “Historical Information” to display the historical data records stored in the BMS.

- (4) 点击导出数据可将历史数据以表格的形式保存到上位机目录下；

Click “Export Data” to save the historical data in table format to the host-computer directory.

时间	标志位	总电压	总电流	SOC	SOH	循环次数	cell1	cell2	cell3	cell4	cell5	cell6	温度1	温度2	温度3	温度4	温度5	温度6
2026-07-24 09:53:39 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3515	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:40 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:41 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3514	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:42 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:43 0-3072		20.8	0	10	100	0	3458	3450	3445	3450	3515	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:44 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:45 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3514	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:46 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3515	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:47 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3515	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:48 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3515	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:49 0-3072		20.8	0	10	100	0	3458	3450	3444	3450	3515	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:50 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3514	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:51 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3515	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:52 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3515	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:53 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:54 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3514	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:55 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	22	1000	1000	1000	1000
2026-07-24 09:53:56 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:53:57 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:53:58 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:53:59 0-3072		20.8	0	10	100	0	3458	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:00 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3515	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:01 0-3072		20.8	0	10	100	0	3458	3450	3444	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:02 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:03 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3515	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:04 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:05 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:06 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:07 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:08 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:09 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:10 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:11 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:12 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:13 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:14 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:15 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:16 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:17 0-3072		20.8	0	10	100	0	3458	3450	3445	3450	3515	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:18 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:19 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3515	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:20 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:21 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:22 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:23 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:24 0-3072		20.8	0	10	100	0	3457	3450	3445	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:25 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3514	3527	26	23	1000	1000	1000	1000
2026-07-24 09:54:26 0-3072		20.8	0	10	100	0	3457	3450	3444	3450	3514	3527	26	23	1000	1000	1000	1000

6、常见故障诊断

6 / Fault Diagnosis

NO	故障现象 Fault Phenomenon	故障排查 Troubleshooting
1	插上电压采集线束冒烟或有烧焦味 Smoke or burnt smell when plugging in the voltage collection harness	①.立即拔下电压采集线束，排查电芯端的接线是否按照 B0,B1,B2,---到最后一串的顺序焊接的，不允许串序和空焊； ①.Immediately unplug the voltage collection harness and check whether the wiring on the cell end is soldered in the order of B0, B1, B2, ... to the last string, and no sequence errors or cold solder joints are allowed; ②.有多个电压采集接口的 BMS 板，接入时是否先接低位，再接高位采集线束；拔掉时，是否先拔高位，再拔低位； ②. For BMS boards with multiple voltage collection interfaces, check if the low-position collection harness is connected first, then the high-position; and if the high-position is unplugged first, then the low-position;



		③.是否有裸露的线短接或者有焊接的锡珠掉落在板子上。 ③. Check for any exposed wires short-circuiting or solder beads falling on the board.
2	BMS 板子不上电 BMS board does not power on	①.观察 BMS 板上是否有指示灯亮,若无指示灯亮,请尝试按键开关或充电激活 BMS 板,2 秒钟闪烁表示正常工作状态,说明 BMS 基本功能正常,通讯正常等,400ms 快闪表示有告警或异常保护,此时可连通讯,如上位机或蓝牙查看 BMS 异常状态。10 秒钟亮一下表示 BMS 板进入休眠模式,需要充或放电激活进入正常工作; ①. Check if there is an indicator light on the BMS board. If no light is on, try pressing the switch or charging to activate the BMS board. A 2-second flash indicates normal operation, meaning basic BMS functions and communication are normal. A 400 ms fast flash indicates an alarm or abnormal protection; in this case, connect the communication interface or Bluetooth to check the BMS abnormal state. A flash every 10 seconds indicates the BMS board has entered sleep mode and needs charging or discharging to activate into normal operation; ②.灯常亮一般为误操作进入升级界面,重新升级即可。 ②. If the light is constantly on, it generally indicates an accidental entry into the upgrade interface. Re-upgrade to solve this issue.
3	电池包不放电 Battery pack does not discharge	①.在正常工作模式下无输出时,排查是否配置了外部弱电开关,尝试按下外部开关。另外可连接蓝牙或上位机查看放电 MOS 状态是否置“1”,1 表示放电 MOS 导通,允许放电,0 表示放电 MOS 断开,不能放电; ①. In normal operation mode, if there is no output, check if an external weak current switch is configured. Try pressing the external switch. You can also connect Bluetooth or the upper computer to check whether the discharge MOS status is set to "1", which means the discharge MOS is on and allows discharge, "0" means the discharge MOS is off and discharge is not allowed; ②.休眠模式下无输出属于正常现象,休眠模式是为了省电会关闭输出,需排查是否带弱电开关功能,可尝试开关唤醒,或充电、放电唤醒 BMS 进入正常工作模式; ②. No output in sleep mode is normal as sleep mode saves power by shutting off output. Check if there is a weak current switch function; try the switch to wake up, or charge/discharge to wake up the BMS into normal operation mode; ③.看指示灯是否是 400ms 快闪,快闪说明有电池有异常,BMS 有保护动作关闭输出,需要连接通讯或蓝牙 APP 排查问题,可优先查是否出现电压,电流,温度异常等相关保护; ③. Check if the indicator light is flashing at 400 ms. If fast flashing, it indicates a battery abnormality, and the BMS protection action shuts off output. Connect communication or the Bluetooth APP to troubleshoot. Prioritize checking for voltage, current, or temperature abnormalities and related protections; ④.需要排查是否出现过异常保护后,还未达到恢复条件。 ④. Check if abnormal protection has occurred without meeting recovery conditions.
4	电池包不充电 Battery pack does not charge	①.排查充电器是否匹配,通常接市电就有输出电压的为盲充充电器,需确认输出电压大于或等于电池包满充的电压,充电器电压低于电池包电压是无法充电; ②.使用充放电老化柜,部分充电器要求先识别电池电压,充电器为协议充电器存在不匹配的情况,无法充电; ③.充电器输出电压是否大于电池包当前电压 1.2V 左右。当电池包比较满电时,存在不充电不识别充电器的型号,属正常情况; ④.部分 BMS 板带有弱电开关,充电受弱电开关控制,可尝试按下外部开关,进行充电。 ①. Check if the charger matches. Normally, blind charging chargers connected to mains power have output voltage; confirm the output voltage is greater than or equal to the fully charged voltage of the battery pack. The charger voltage lower than the battery pack voltage cannot charge; ②. When using charge-discharge aging cabinets, some chargers require first identifying battery voltage. Protocol chargers may not match and fail to charge; ③. Check if the charger output voltage is about 1.2V higher than the current battery pack voltage. When the battery pack is nearly full, it might not charge or recognize the charger model, which is normal;



		④. Some BMS boards have weak current switches, with charging controlled by the weak current switch. Try pressing the external switch to charge.
5	电压采集线束发热 Heating in the Voltage Sensing Harness	①. 排查电压采集线束末端与电芯相连顺序是否正确，高低顺序是否接反，连接错误会造成发热，甚至烧坏板内线路和器件； ②. 排查线束串数与 BMS 板出厂串数是否匹配。线束不匹配，线束和 BMS 板短接串数使用错误，会造成线束发热，甚至烧坏板内线路和器件。 ①. Check if the end of the voltage collection harness is correctly connected to the cells, and if the high and low orders are reversed. Incorrect connections cause heating, and may damage the board's internal circuits and components; ②. Check if the number of harness strings matches the BMS board's factory strings. Mismatched harnesses and BMS board short-circuited strings cause heating and may damage the board's internal circuits and components.
6	其中一串电压随着充或放电电流越大电压变化越大，导致与相邻串的压差越大 In one of the voltage strings, the voltage fluctuates more significantly as the charging or discharging current increases, resulting in a larger voltage difference compared to the adjacent string.	①. 排查电压变化大的电芯与相邻电芯的连接片焊接是否牢固； ②. 排查电压变化大的电芯电压采集线焊接是否牢固； ③. 排查电压变化大的电芯与相邻电芯的连接片内阻是否比较大，电池组与电池组之间的连接线强烈推荐采用软紫铜排连接，不要使用动力线连接。 ①. Check if the soldering of the connecting pieces between the cell with large voltage changes and adjacent cells is firm; ②. Check if the soldering of the voltage collection wire of the cell with large voltage changes is firm; ③. Check if the internal resistance of the connecting piece between the cell with large voltage changes and adjacent cells is relatively large. Strongly recommend using soft copper bars for connections between battery groups instead of power cables.
7	接负载或逆变器断电 Power loss to the load or inverter	①. 排查电池电压是否过低，触发了 BMS 板的过放保护，建议连接上位机或蓝牙 APP 排查问题； ②. 排查负载或逆变器功率是否过大，触发了 BMS 板的过流保护，建议连接上位机或蓝牙 APP 排查问题； ③. 设备是否有大电容，触发了 BMS 板过流或短路保护，建议连接通讯或蓝牙 APP 排查问题。 ①. Check if the battery voltage is too low, triggering the BMS board's over-discharge protection. Connect the upper computer or Bluetooth APP to troubleshoot; ②. Check if the load or inverter power is too large, triggering the BMS board's overcurrent protection. Connect the upper computer or Bluetooth APP to troubleshoot; ③. Check if the device has large capacitors, triggering the BMS board's overcurrent or short-circuit protection. Connect communication or Bluetooth APP to troubleshoot.
8	加速或者爬坡断电 Power Cuts During Acceleration or When Climbing a Hill	①. 检查是否触发了 BMS 板的过流保护，可连接上位机或蓝牙 APP 读取告警和运行数据排查，修改优化保护参数； ②. 检查电量是否充足，是否触发了欠压保护； ③. 检查动力线是否焊接牢固。 ①. Check if the BMS board's overcurrent protection is triggered. Connect the upper computer or Bluetooth APP to read alarms and operational data for troubleshooting, and optimize protection parameters; ②. Check if the battery power is sufficient and if under-voltage protection is triggered; ③. Check if the power cables are soldered firmly.
9	蓝牙连接不上 Bluetooth won't connect	①. 蓝牙 APP 搜索界面是否能搜到蓝牙模块的名称，能搜到，说明 BMS 板工作正常。搜索不到，可能为 BMS 板进入休眠或欠压保护状态； ②. 排查蓝牙模块指示灯是否有绿色指示灯闪烁，有说明蓝牙模块供电正常，否则需要排查接口接线是否正确； ③. 当蓝牙模块的指示灯常亮时，说明手机已经与蓝牙模块配对上，界面有数据说明蓝牙连接正常；常亮但无数据可能为设置错误，请在手机界面将 BMS ID 设置为 1； ④. 排查手机蓝牙功能是否打开，蓝牙搜寻界面尝试触摸下滑多刷新几次，安卓手机还需打开定位服务。 ①. Check if the Bluetooth APP search interface can find the Bluetooth module's name. If found, the BMS board is working normally. If not found, the BMS board may be in sleep or under-voltage protection state; ②. Check if the Bluetooth module's indicator light is flashing green, indicating normal power supply to the Bluetooth module. Otherwise, check if the interface wiring is correct;



		③. When the Bluetooth module indicator light is constantly on, the phone has paired with the module. Data on the interface indicates a normal connection; if the light is constantly on but no data are shown, set the BMS ID to 1 in the app. ④. Check if the phone's Bluetooth function is turned on. In the Bluetooth search interface, try swiping down several times to refresh. Android phones also need to turn on location services.
10	CAN 通讯连接不上 Unable to connect via CAN communication	①.排查 CAN 通讯盒的品牌，建议选用品牌为创芯科技，其它品牌存在通讯连接不上或不畅的情况； ②.排查电脑端是否已安装驱动，可通过插拔 CAN 设备的 USB 接口，观察电脑设备管理器，插上 USB 接口，出现设备说明驱动正常，此时拔掉 USB 接口，设备会消失。设备驱动显示告警叹号说明驱动安装异常； ③.CAN 通讯盒的拨码开关是否打下，一般推荐一上一下； ④.排查 BMS 板接线信号定义 H 和 L 是否与通讯盒对应正确，避免接线槽锁螺丝时只接触到了线皮； ⑤.优先连线到 CAN 盒的 CAN1 接口，CAN2 的上位机设置会有差异； ⑥. 排查电脑端是否打开多个上位机软件，其它 CAN 软件或调试助手需要关闭，避免占用 CAN 设备； ⑦. 排查 CAN 设置界面是否正确：设备选 CANalyst-II,波特率:参考规格书，BMSID：参考规格书，其它为默认值即可。设置正确后点击连接和采集按钮 本规格产品通信参数：1000 Kbps，BMS ID：1。 ①. Check the brand of the CAN communication box. Recommended brand is Chuangxin Technology. Other brands may have connection issues; ②. Check if the driver is installed on the computer. Plug and unplug the CAN device's USB interface and observe the computer's device manager. If the device appears when the USB is plugged in, the driver is normal. If the device disappears when unplugged, the driver installation is abnormal; ③. Check if the dip switch of the CAN communication box is set correctly. Generally, one up and one down is recommended; ④. Check if the BMS board's signal definitions H and L match the communication box to avoid only contacting the wire skin when locking the wiring slot screws; ⑤. Prioritize connecting to the CAN1 interface of the CAN box. The upper computer settings of CAN2 vary; ⑥. Check if multiple upper computer software are open on the computer. Close other CAN software or debugging assistants to avoid occupying the CAN device; ⑦. Check if the CAN setting interface is correct: device selection CANalyst-II, baud rate: refer to the specification, BMSID: refer to the specification, other default values are acceptable. After setting correctly, click the connect and collect buttons. For this product, set the baud rate to 1000 Kbps and the BMS ID to 1.
11	RS-485 通讯 (本规格型号未配置) RS-485 Communication (not configured for this model)	本规格型号未配置 RS-485 接口。若为定制版本，请向厂家确认接口定义和通信参数。 This model is not configured with an RS-485 interface. For a customized version, confirm the pinout and communication settings with the manufacturer.
12	TYPE-C/串口通讯连接不上 Unable to Connect via Type-C/Serial Communication	①检查电脑驱动及 TYPE-C 线缆和接口；②确认没有其他软件占用通讯端口；③将波特率设置为 115200、BMS ID 设置为 1；④连接后点击“采集”。 1. Check the computer driver, Type-C cable, and interface. 2. Confirm that no other software is using the communication port. 3. Set the baud rate to 115200 and the BMS ID to 1. 4. Click Acquire after connecting.



ISO 9001:2015



7、保修条款

7 / Warranty Terms

7.1 保修条款

7.1 Warranty Terms

本产品的保修期为 12 个月，在这期间正常使用下损坏的由爱雅科技有限公司提供服务，以下任——种情况损坏的，不在保修范围：

This product is covered by a 12-month warranty. AYA Technology Co., Ltd. will provide service for failures occurring under normal use during this period. Damage resulting from any of the following is excluded from warranty coverage:

(1) 不正确的操作或使用

Incorrect operation or use

(2) 使用环境条件超过了规格

Operating conditions exceeding the specification

(3) 擅自拆装和维修

Unauthorized disassembly or repair

(4) 人为蓄意之破坏

Intentional human damage

(5) 进水或受潮

Water ingress or moisture exposure

(6) 不可抗拒的自然因素

Force majeure or natural causes

(7) PCB 条码损坏或撕毁

PCB barcode damaged or removed

7.2 重要通知

7.2 Important Notice

此规格书只有深圳市爱雅科技有限公司有权更改和更新,更改、更新新版本时不会告知客户，客户应在订单之前获取最新的相关信息，应当确认最新信息是否能满足当前使用。

Only Shenzhen AYAA Technology Co., Ltd. is authorized to revise and update this specification. Customers will not be notified when a revised or updated version is issued.

Before placing an order, customers shall obtain the latest relevant information and confirm that it meets the requirements of the intended application.

7.3 重要说明

7.3 Important Notice

客户签字或盖章确认本产品规格书，即表示客户已充分阅读、理解并认可本规格书所载全部产品技术参数、配置要求、质量标准及其他约定内容，并确认其符合客户的采购及使用需求。

深圳市爱雅科技有限公司将以经客户确认的本产品规格书作为本订单生产、检验及交付的技术依据，严格按照本规格书约定的产品参数和要求组织生产并完成订单履行。

本产品规格书经双方签字及/或盖章确认后，将作为《合同书》的组成部分，与合同书一并回传、留存，并与合同书具有同等法律效力。如本规格书与合同书约定存在不一致，以双方书面确认的补充协议或合同中约定的优先适用条款为准。

By signing or affixing a seal to confirm this Product Specification Sheet, the Customer acknowledges that it has fully read, understood, and accepted all product technical parameters, configuration requirements, quality standards, and other agreed-upon terms set forth herein, and confirms that they meet the Customer's procurement and usage requirements.

SHENZHEN AYAA TECHNOLOGY CO., LTD. will use this Product Specification Sheet, as confirmed by the Customer, as the technical basis for the production, inspection, and delivery of this order, and will organize production and fulfill the order in strict accordance with the product parameters and requirements specified herein.

Upon confirmation by the signatures and/or seals of both parties, this Product Specification Sheet shall constitute an integral part of the "Contract," be returned and retained together with the Contract, and have the same legal effect as the Contract. In the event of any inconsistency between this Specification Sheet and the Contract, the terms of any supplementary agreement confirmed in writing by both parties or the priority provisions stipulated in the Contract shall prevail.