Specification For Approval
产品承认书

Customer 客户名称：	
Customer Model 客户型号:	注：客户若有自己的型号编码 回签时可在此栏备注说明
DR Model DR 型号:	DR48200JC-28-66（16S200A300Ah） 拨码地址
File.No 文件编号：	
Version 版本：	A1
Date 日期：	2026-04-20

Draft 制定	Checked 审核	Approval 批准
庞荣艳	王冠	王伟员
Customer Approval 客户回签		

本品符合环保：■ROHS □REACH □无卤

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产品修订记录表（Product revision record form）

序号 No.	版本 Version	日期 Date	修订记录 Revision Records	责任人 principal	审核人 Reviewer
1	A0	2026-04-17	初次拟定 Initial draft	王冠	王伟员
2	A1	2026-04-20	更正为 10A 限流	王冠	王伟员

配置表（configuration table）

配置表 configuration table			
功能 functional zone	串数 cell	■16cell □15cell □14cell □12cell □8cell	
	充电限流 Current-limiting	□No ■10A □20A □___A ■ 被动限流 Passive current limiting □ 主动限流 Active current limiting	
	蜂鸣器 Buzzer	□No ■Yes	
	二次保护接口 Secondary protection	■No □ Yes（可选配 **optional**）	
	加热膜接口 Heating membrane	■No □Yes（可选配 **optional**）	
	预充功能 Pre-charge	□No ■Yes	
	存储 Storage	□No □ 500 条 □1000 条 ■10000 条	
	拨码开关 Dip switch address	□No □4 位 ■6 位	
	LED 灯 Lights	■RUN ■ALARM ■SOC 4 个	
	采集插座 CONS	■立式 □卧式 ■6+7+6+7	
	弱电开关（自锁） Low voltage switch	功能：□No ■Yes	■端子线 □端子线+自锁开关 Harness Harness + switch
	干接点（2 路） Dry contact	接口：□No ■Yes	功能：□NO ■Yes
	显示屏（可选配） LCD（optional）	□3.5 寸按键蓝白屏 3.5-inch blue and white button screen	□定制按键膜 Key film □按键帽 Key cap
		■触摸屏 touch screen	□4.3 inch ■5 inch（WiFi+蓝牙） □7 inch
	均衡 equilibrium	■主动均衡 Active balancing □被动均衡 Passive balancing	
	通讯接口 communication port	■RS485 ■并机双 RS485 ■CAN ■RS232	
	外挂通讯 External communication	□蓝牙 Bluetooth □外挂 WIFI □4G 模块 4G module	

	升级方式 Upgrade mode	■RS485 □蓝牙 □WIFI
	匹配逆变器 Inverter	固德威 派能 德业 Victron SMA 鹏城 首航 古瑞瓦特 锦浪 硕日 日月元等 Goodwe\ Pylon\ Deye \Victron\SMA\Luxpower\Slfar\ Growatt\Solis\SRNE\Voltronic etc. **逆变器协议支持上位机、显示屏、拨码进行选择** The inverter protocol supports the selection of host computer, display screen and dip switch

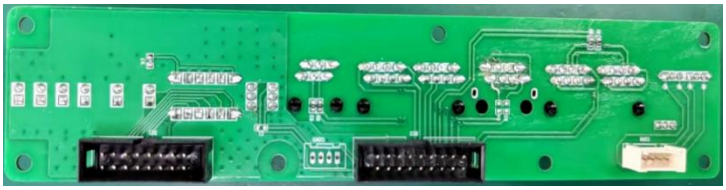
目录

一、产品实物图（Product picture）

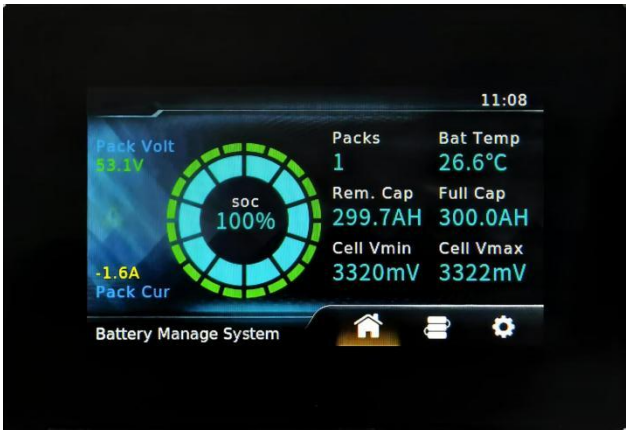
1.1、主板正面实物图（Positive product physical picture）

1.2、主板反面实物图（Reverse product physical picture）

1.3、转接通讯板正面实物图（Switch communication board physical positive and negative picture）



1.4、5 英寸触摸屏实物图（Physical image of 5-inch touch screen）



备注：实物图仅供参考，以实物为准

Note: The physical picture is for reference only, subject to the actual.

二、适用范围（Scope of application）

本产品适用于 16 串锂电池管理系统，对电池组提供过压、欠压、过流、高温、低温及短路等保护与恢复功能。实现充放电过程中的 SOC 精确计量,SOH 健康状态统计。实现充电过程电压均衡。通过上位机软件人机交互，显示及设置电压、电流、温度等告警保护参数，存储及显示电池的运行状态实时数据和历史数据。具有多种休眠及唤醒方式。通过 RS485 进行并机通讯。通过 RS485、CAN 与 PC 端进行数据通讯，经由上位机软件人机交互进行参数配置和数据监控。可广泛应用在家庭储能逆变器、室内室外基站等。

This product is suitable for 16-string lithium battery management system, which provides overvoltage, undervoltage, overcurrent, high temperature, low temperature and short circuit protection and recovery functions for battery pack. To achieve accurate SOC measurement and SOH health status statistics in the process of charge and discharge. Realize voltage balance in charging process. Display and set alarm protection parameters, such as voltage, current and temperature, and store and display real-time and historical data of battery running status through human-computer interaction of the upper computer software. Has a variety of sleep and wake up modes. Parallel communication via RS485. Through RS485, CAN and PC data communication, through the PC software human-computer interaction for parameter configuration and data monitoring. It can be widely used in home energy storage inverter, indoor and outdoor base station, etc.

三、功能描述（Function description）

3.1 电压检测与保护功能（Voltage detection and protection function）

具有单体电芯、电池包的过压、低压告警及过压、欠压保护功能。

It has the functions of overvoltage, low voltage alarm and overvoltage and undervoltage protection for single cell and battery pack.

3.2 电流检测与保护功能（Current detection and protection function）

具有充放电电流检测、告警、保护功能，上位机显示负电流为放电，显示正电流为充电。

It has the functions of charge and discharge current detection, alarm and protection. The upper computer displays negative current for discharge and positive current for charging.

3.3 短路保护功能（Short-circuit protection function）

具有输出短路的检测以及保护功能。

It has the function of detection and protection of output short circuit.

3.4 温度检测功能（Temperature detection function）

具有对电芯、环境、功率 MOS 温度检测，并能在高温、低温充放电时告警与保护。4 路电芯温度检测，1 路环境温度检测，1 路功率 MOS 温度器检测，共 6 路 NTC。

With cell, environment, power MOS temperature detection, and can be charged and discharged in high temperature, low temperature alarm and protection. There are 4 channels of cell temperature detection, 1

channel of ambient temperature detection, 1 channel of power MOS temperature detector detection, and a total of 6 channels of NTCS.

3.5 电池容量计算及循环次数功能（Temperature detection function）

实时对电池 SOC 的计算，电池组满容量、当前容量可以通过上位机设置，进行完整充放电循环一次，能自动配置循环后容量。

具有充放电循环次数计算功能，当电池组累积放电容量达到 80%以上，循环次数增加一次。

The battery SOC can be calculated in real time. The full capacity and current capacity of the battery pack can be set by the upper computer for a complete charging and discharging cycle, and the post-cycle capacity can be automatically configured.

It has the function of calculating the number of charge and discharge cycles. When the cumulative discharge capacity of the battery pack reaches more than 80%, the number of cycles is increased once.

3.6 充放电 MOSFET 开关功能（Charge/discharge MOSFET switch function）

低内阻、大电流，针对后备电源应用的大容性负载开机、零切换、高充电耐压的优化设计。

Low internal resistance, high current, for the backup power supply application of large capacity load boot, zero switching, high charging voltage resistance optimization design.

3.7 电池充电均衡功能（Battery charging balancing function）

充电均衡策略可灵活设置（开启电压、均衡电压），能够有效提高电池的使用时间和循环寿命。

The charging balancing policy can be flexibly set (starting voltage and balancing voltage), which can effectively improve the battery life and cycle life.

3.8 LED 灯状态指示功能（LED status indicator function）

具有 6 个 LED 指示，4 个电池剩余容量指示灯、1 个运行指示灯以及 1 个告警保护状态指示灯。

It has 6 LED indicators, 4 remaining battery capacity indicators, 1 running indicator and 1 alarm protection status indicator.

3.9 按键开关功能（Key switch function）

一键开关设计，关机状态时可手动开机启动系统，非备电状态下时可手动关机。

One-button switch design, the system can be manually started when the shutdown state, when the standby state can be manually shut down.

3.10 RS485、CAN 通信功能（RS485 and CAN communication functions）

具有 RS485、CAN 通信功能，可以实现 PC 机或智能前端可通过遥测、遥信、遥调、遥控等命令实现电池的数据监控、运行控制和参数设定，来实时监控 BMS 和和电池包状态。

With RS485, CAN communication function, can realize the PC or intelligent front end through telemetry, remote communication, remote control, remote control and other commands to achieve battery data monitoring, operation control and parameter setting, to real-time monitoring BMS and battery pack status.

3.11 上位机控制功能（Upper computer control function）

具有对单体电池过欠压、电池总压过欠压、充电过流、放电过流、电芯高低温、环境高低温、均衡策略、电池串联节数、电池容量等各项电池管理参数进行设定，可打开和关闭放电 MOS,充电 MOS，限流功能开关，蜂鸣器告警开关，强制休眠开关以及实现系统软件的在线升级功能等。

It can set various battery management parameters such as over and under voltage of single battery, over and under voltage of total battery, over current of charge, over current of discharge, over current of discharge, high and low temperature of battery cell, high and low temperature of environment, balancing strategy, number of battery series, and battery capacity. It can open and close discharge MOS, charge MOS, current limiting function switch, and buzzer alarm switch. Forced sleep switch and realize the system software online upgrade function.

3.12 历史数据存储功能（Historical data storage function）

具有历史记录存储功能，存储容量不小于 500 条记录，方便系统的监控、分析与维护。

The storage capacity of historical records is not less than 500 records, facilitating system monitoring, analysis, and maintenance.

3.13 并联通信功能（Parallel communication function）

可以通过 RS485 接口实现并联通信功能，具有拨码开关，用于并联通信时地址的设定。

It can realize the function of parallel communication through RS485 interface, with dip switch, which is used to set the address in parallel communication.

3.14 充电限流功能（Charging current limiting function）

具有 10A 限流功能，限流模式有被动限流模式以及主动限流模式，本产品默认被动限流。充电电流大于 220A 启动限流。

It has 10A current limiting function. The current limiting mode includes passive current limiting mode and active current limiting mode. The default passive current limiting mode of this product is passive current limiting. Charging current greater than 220A start current limit.

3.15 防反接功能（Anti reverse connection function）

具有防反接电路，当外接电源的正负极性与 BMS 的正负极性接反时，BMS 不损坏且告警并进入切断保护状态。

Equipped with anti reverse connection circuit, when the positive and negative polarity of the external power supply is reversed with the positive and negative polarity of the BMS, the BMS is not damaged and alarms and enters a cut-off protection state.

3.16 干接点功能（matching）

干接点定义：（默认常开）

(1)当有保护与告警时，干接点 1 动作闭合；

(2)当有告警时，干接点 2 动作。

Dry contact definition: (Normally open by default)
（1）When a protection or alarm is generated, dry contact 1 closes;
（2）When an alarm is generated, dry contact 2 acts.

3.17 加热功能（无，选配）（Heating function）

1、加热开启条件：（当次低节电芯温度低于 0 度时，满足以下任意一条启动加热）
1）充电电流＞6A；
2）充电机在线且充电低温保护；
3）单节最高电压＞单体过压告警恢复值-110mV。
2、加热关闭条件：（任意满足以下条件关闭加热）
1）任意一路电芯温度高于 20℃；
2）次高节电芯温度高于 15℃；
3）最高单体电压＜单体过压告警恢复值-130mV，且非充电。

注意：加热最大支持 300W，最大电流 5A，推荐加热膜电阻为 12Ω。

1. Heating on condition: (When the temperature of the battery cell is below 0 degrees, any of the following conditions must be met to start heating)
1) Charging current>6A;
2) The charger is online and has low-temperature protection during charging.
3)Single section maximum voltage>Single unit overvoltage alarm recovery value -110mV.
2. Heating off condition: (Turn off heating if any of the following conditions are met)
1) The temperature of any battery cell is higher than 20 ℃;
2) The temperature of the second highest energy-saving core is higher than 15 ℃;
3) The highest single cell voltage is less than the single cell overvoltage alarm recovery value of -130mV, and it is not charging.

Attention: The maximum heating capacity is 300W, the maximum current is 5A, and the recommended heating film resistance is 12 Ω.

3.18 主动均衡功能（Active balancing function）

主动均衡模块采用 BAT-、BAT+供电，采用高效单向隔离 DCDC 方案，对最低单体电芯进行充电，通过与 BMS 实时交互，实现对单节电芯的精确均衡，均衡电流最大可达 2A。有效解决电池包的电压一致性问题（木桶效应），充分发挥锂电池包的性能，使其可以保证满容量的充放，延长使用寿命。

The active balancing module is powered by BAT- and BAT+, and adopts an efficient unidirectional isolation DCDC solution to charge the lowest individual cell. Through real-time interaction with the BMS, it achieves precise balancing of individual cells, with the maximum balancing current reaching 2A. Effectively solve the voltage consistency problem of battery packs (bucket effect), fully leverage the performance of lithium battery packs, ensure full-capacity charging and discharging, and extend their service life.

1、基本功能：
均衡电流：2A±0.3A
输入电压范围：40V~60V
均衡类型：主动均衡
2、开启主动均衡条件：（所有条件均要满足）
①主动均衡使能开启
②不存在故障（AFE 故障，采样故障，NTC 故障，MOS 故障）
③最高电芯温度低于充放电高温保护值
④最高单体电压小于单体过压保护值 - 50mV、最低单体电压大于均衡开启电压（默认 2800mV）

⑤实际压差大于均衡开启压差（默认均衡开启压差为 20mV，当处于空闲时，实际压差需要大于均衡开启压差；当处于充电状态时，实际压差需要大于均衡开启压差 +10mV）

不满足开启均衡条件后关闭均衡并进入空闲阶段。

1. Basic functions:

Equilibrium current: 2A±0.3A

Input voltage range: 40V to 60V

Equilibrium type: Active equilibrium

2. Activate the active equilibrium conditions: (All conditions must be met

① Active balance enable is activated

② There are no faults (AFE faults, sampling faults, NTC faults, MOS faults).

③ The maximum cell temperature is lower than the high-temperature protection value for charging and discharging

④ The maximum single-cell voltage is less than the single-cell overvoltage protection value of -50mV, and the minimum single-cell voltage is greater than the equalization opening voltage (default 2800mV).

⑤ The actual pressure difference is greater than the equalization activation pressure difference (The default equalization activation pressure difference is 20mV. When idle, the actual pressure difference needs to be greater than the equalization activation pressure difference; When in the charging state, the actual voltage difference needs to be greater than the equalization opening voltage difference +10mV.

When the conditions for enabling equalization are not met, the equalization is turned off and the idle phase is entered.

附：可靠性参数（Attached: Reliability parameters）

序号 **No.**	项目 **Test items**	规格/条件 **Specifications/conditions**
1	检测精度 accuracy	电流精度：±2%　电压精度：±20mV Specifications/conditions：±2%　Voltage accuracy:：±20mV 温度精度：±2℃ Temperature accuracy：±2℃ SOC 平均精度：≤±5% SOC average accuracy：≤±5%
2	电流阀值 Current threshold	充电电流：0.5A Charging current：0.5A 放电电流：0.5A Discharge current：0.5A
3	失效类型 Failure type	1 充放电 MOS 管失效；charge and discharge MOS tube failure; 2、电流检测失效；current detection failure; 3、温度检测失效；Temperature detection failure; 4、电压检测失效（电压低于 1.0V 禁止充电） voltage detection failure (voltage is lower than 1.0V, no charging)
4	信息存在 Information storage	不少于存储 500 条历史数据信息，包括当前总电压、电流、温度、SOC、SOH、循环次数以及运行状态等 Store at least 500 pieces of historical data information, including the current total voltage, current, temperature, SOC, SOH, cycle times and running status
5	通信接口 Communication interface	1、逆变器支持 CAN 或 RS485 通信 The inverter supports CAN or RS485 communication 2、支持 RS485 通信（通信口可实现程序升级） support RS485 communication and upgrade 3、支持 RS485 并机通信 support RS485 parallel communication

6	开机 Turn on	关机模式下，打开弱电开关，可开机，实时 SOC 对应的 LED 灯同时点亮 Under the shutdown mode, Turn on the weak current switch to start the machine, and the LED light corresponding to the real-time SOC will be on at the same time
7	关机 Turn off	开机模式下，断开弱电开关 3~6S，直到 6 个 LED 顺次熄灭 In startup mode, turn off the weak current switch for 3~6S until 6 leds are turned off successively
8	短路 Short circuit	电池包和短路回路内阻不低于 40mΩ，短路电流不超过 1000A,使用空气开关短路 50 次 The internal resistance of the battery pack and short circuit circuit shall not be less than 40 M ω , and the short circuit current shall not exceed 1000A. Use the air switch to short circuit 50 times

四、 电气特性（Electrical characteristics）

4.1 电气属性（Electrical property）

项目 Item	最小 min	最大 max	常规 nomal	单位 unit
工作电压 Operating voltage	35	60	52	V
充电电压 Charging voltage	42	60	56	V
工作温度范围 Operating temperature range	-20	70	25	℃
工作湿度范围 Operating humidity range	10	85	/	%
持续充放电电流 Continuous charge and discharge current		200		A
放电输出内阻 Discharge output internal resistance	<10			mΩ
正常运行功耗 Normal operating power consumption	≤40（Without display）			mA
	≤60（With display）			mA
休眠功耗 Sleep power consumption		200	100	uA

4.2 基本参数设定（Basic parameter setting）

告警值 Alarm value					
功能名称 Function name	功能设置 Function setting	是否可设 Whether to set	指标项目 Index item	出厂默认值 Factory default	备注 Notes
单体电压告警 Cell voltage warning	开启 ON	是 Yes	过压告警 Over voltage warning	3580mV	±20mV
		是 Yes	过压延时 Over voltage delay	3000mS	1000-5000mS
		是 Yes	过压恢复 Over voltage release	3450mV	±20mV

		是 Yes	欠压告警 Under voltage warning	2700mV	±20mV
		是 Yes	欠压延时 Under voltage delay	3000mS	1000-5000mS
		是 Yes	欠压恢复 Over voltage release	3000mV	±20mV
总体电压告警 Pack voltage warning	开启 ON	是 Yes	过压告警 Over voltage warning	57.0V	±50mV
		是 Yes	过压延时 Over voltage delay	3000mS	1000-5000mS
		是 Yes	过压恢复 Over voltage release	55.0V	±50mV
		是 Yes	欠压告警 Under voltage warning	44.0V	±50mV
		是 Yes	欠压延时 Under voltage delay	3000mS	1000-5000mS
		是 Yes	欠压恢复 Under voltage release	48.0V	±50mV
电芯温度禁充告警 Charging Cells temperature warning	开启 ON	是 Yes	高温告警 Over temperature warning	50℃	±2℃
		是 Yes	高温延时 Over temperature delay	3000ms	1000-5000mS
		是 Yes	高温恢复 Over temperature release	45℃	±2℃
		是 Yes	低温告警 Under temperature warning	0℃	±2℃
		是 Yes	低温延时 Under temperature delay	3000ms	1000-5000mS
		是 Yes	低温恢复 Under temperature release	5℃	±3℃
电芯温度禁放告警 Discharging Cells temperature warning	开启 ON	是 Yes	高温告警 Over temperature warning	55℃	±3℃
		是 Yes	高温延时 Over temperature delay	3000ms	1000-5000mS

		是 Yes	高温恢复 Over temperature release	50℃	±3℃
		是 Yes	低温告警 Under temperature warning	-15℃	±3℃
		是 Yes	低温延时 Under temperature delay	3000ms	1000-5000mS
		是 Yes	低温恢复 Under temperature release	-5℃	±3℃
环境温度告警 ENV temperature warning	开启 ON	是 Yes	环境高温告警 ENV Over temperature warning	55℃	±3℃
		是 Yes	环境高温延时 ENV Over temperature delay	3000ms	1000-5000mS
		是 Yes	环境高温恢复 ENV Over temperature release	50℃	±3℃
		是 Yes	环境低温告警 ENV Under temperature warning	-15℃	±3℃
		是 Yes	环境低温延时 ENV Under temperature delay	3000ms	1000-5000mS
		是 Yes	环境低温恢复 ENV Under temperature release	-10℃	±3℃
充电过流告警 Charging over current warning	开启 ON	是 Yes	充电过流告警 Charging over current warning	205A	±2A
		是 Yes	充电过流延时 Charging over current delay	2000ms	1000-4000mS
		是 Yes	充电过流恢复 Charging over current release	200A	±2A
放电过流告警 Discharging over current warning	开启 ON	是 Yes	放电告警电流 Discharging over current warning	205A	±2A
		是 Yes	放电过流延时 Discharging over current delay	2000ms	1000-4000mS
		是 Yes	放电恢复电流 Discharging over current release	200A	±2A
MOS 高温告警 MOS over temperature warning	开启 ON	是 Yes	MOS 高温告警 MOS over temperature warning	90℃	±3℃

		是 Yes	MOS 高温延时 MOS over temperature delay	3000ms	1000-5000mS
		是 Yes	MOS 高温告警恢复 MOS over temperature release	80℃	±3℃
压差告警 Voltage difference warning	开启 ON	是 Yes	压差过大告警 Big voltage difference warning	500mV	±50mV
		是 Yes	压差过大告警恢复 Big voltage difference release	300mV	±50mV
SOC 告警 SOC warning	开启 ON	是 Yes	SOC 低告警 Low SOC warning	15%	
		是 Yes	SOC 低告警恢复 Low SOC warning release	20%	
保护值 Protection value					
功能名称 Function name	**功能设置 Function setting**	**是否可设 Whether to set**	**指标项目 Index item**	**出厂默认值 Factory default**	**备注 Notes**
单体保护 Cell protection	开启 ON	是 Yes	单体过压保护 Over voltage protection	3650 mV	±20mV
		是 Yes	单体过压延时 Over voltage delay	3S	±2000mS
		是 Yes	单体过压恢复 Over voltage release	3400mV	±20mV
		是 Yes	单体欠压保护 Under voltage protection	2500mV	±20mV
		是 Yes	单体欠压延时 Under voltage delay	3 S	±2000mS
		是 Yes	单体欠压恢复 Under voltage release	3000 mV	±20mV
总体保护 Pack protection	开启 ON	是 Yes	总体过压保护 Pack Over voltage protection	58.4V	±50mV
		是 Yes	总体过压延时 Pack Over voltage delay	3S	±2000mS
		是 Yes	总体过压恢复 Pack Over voltage release	54V	±50mV
		是 Yes	总体欠压保护 Pack Under voltage protection	42V	±50mV

		是 Yes	总体欠压延时 Pack Under voltage delay	3S	±2000mS
		是 Yes	总体欠压恢复 Pack Under voltage release	48.0V	±50mV
电芯温度禁充 Cells charging temperature protection	开启 ON	是 Yes	充电高温保护 Charging Over temperature protection	55 ℃	±3℃
		是 Yes	充电高温延时 Charging Over temperature delay	3000mS	±1000mS
		是 Yes	充电高温恢复 Charging Over temperature release	50 ℃	±3℃
		是 Yes	充电低温保护 Charging Under temperature protection	-5 ℃	±3℃
		是 Yes	充电低温延时 Charging Under temperature delay	3000mS	±1000mS
		是 Yes	充电低温恢复 Charging Under temperature release	0 ℃	±3℃
电芯温度禁放 Cells discharging temperature protection	开启 ON	是 Yes	放电高温保护 Discharging Under temperature protection	60℃	±3℃
		是 Yes	放电高温延时 Discharging Under temperature delay	3000mS	±1000mS
		是 Yes	放电高温恢复 Discharging Under temperature release	55℃	±3℃
		是 Yes	放电低温保护 Discharging Under temperature protection	-20℃	±3℃
		是 Yes	放电低温延时 Discharging Under temperature delay	3000mS	±1000mS
		是 Yes	放电低温恢复 Discharging Under temperature release	-15℃	±3℃
环境温度保护 ENV Temperature protection	开启 ON	是 Yes	环境低温保护 ENV Under temperature warning	-25℃	±3℃
		是 Yes	环境低温恢复 ENV Under temperature release	-15℃	±3℃

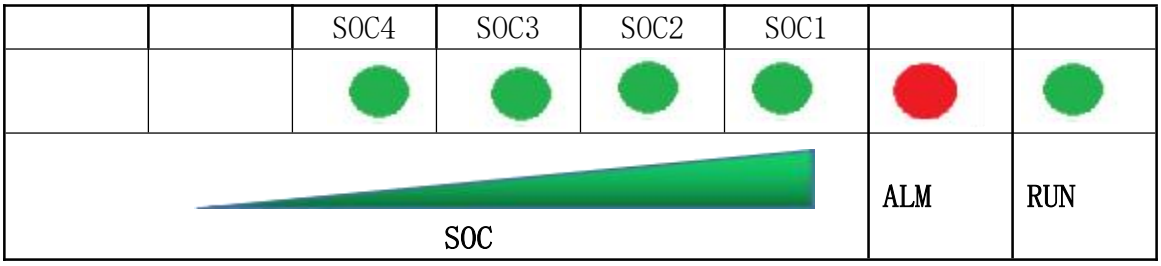
		是 Yes	环境高温保护 ENV Over temperature warning	65℃	±3℃
		是 Yes	环境高温恢复 Over temperature release	55℃	±3℃
		是 Yes	环境保护延时 Environmental protection delay	4000mS	±1000mS
MOS 管高温保护 MOS Over Temperature protection	开启 ON	是 Yes	MOS 高温保护 MOS Over temperature protection	110℃	±3℃
		是 Yes	MOS 高温延时 MOS Over temperature delay	3000mS	±1000mS
		是 Yes	MOS 高温恢复 MOS Over temperature release	90℃	±3℃
压差保护 Voltage difference protection	开启 ON	是 Yes	压差过大保护 Voltage differenceb protection	800mV	±50mV
		是 Yes	压差过大恢复 Voltage difference release	500mV	±50mV
充电过流保护 Charging over current protection	开启 ON	是 Yes	充电过流 1 保护 Charging over current 1 Protection	220A	±2A
		是 Yes	充电过流 1 延时 Charging over current 1 Delay	10000mS	8000-12000mS
		是 Yes	充电过流 2 保护 Charging over current 2 Protection	240A	±2.0A
		是 Yes	充电过流 2 延时 Charging over current 2 Delay	500mS	100-2000mS
		否 No	充电过流自动恢复 charging over current Release	10min	10min 自动尝试恢复，可通过手动恢复或放电电流＞0.7A
放电过流保护 Discharging over current protection	开启 ON	是 Yes	放电过流 1 保护 Discharging over current 1 protection	220A	±2A
		是 Yes	放电过流 1 延时 Discharging over current 1 delay	10000mS	8000-12000mS

		是 Yes	放电过流 2 保护 Discharging over current 2 Protection	240A	±5.0A
		是 Yes	放电过流 2 延时 Discharging over current 2 delay	500mS	100-2000mS
		否 No	放电过流自动恢复 Discharging over current Release	1min	1min 自动尝试恢复，连续 3 次后锁定，可通过手动或充电电流＞0.7A
短路保护 Short circuit protection	开启 ON	否 No	短路保护电流 Short circuit protection	400A±100A	升级程序可改变 It can be modified after the program is upgraded
		否 No	短路保护延时 Short circuit delay	450uS ± 100uS	升级程序可改变 It can be modified after the program is upgraded
		短路保护解除 Short circuit Release	1、检测到有效充电电流（detected a valid charging current） 2、每隔 1min 进行重新检测，连续 3 次尝试后锁定 （Re-detect every mins and lock after 3 consecutive attempts）		
基本参数设置 Basic parameter setting					
功能名称 Function name	**功能设置 Function setting**	**是否可设 Whether to set**	**指标项目 Index item**	**出厂默认值 Factory default**	**备注 Notes**
电芯均衡功能 Cells balancing function	开启 ON	是 Yes	电芯充电均衡 Cells charging balance	主动均衡	
		是 Yes	均衡开启电压 Balancing turn- on voltage	2800mV	
		是 Yes	均衡开启压差 Balancing turn-on voltage difference	20mV	
		否 NO	均衡电流 Balancing current	2A	±0.3A
电池容量设置 Battery capacity setting	开启 ON	是 Yes	电池额定容量 Battery design capacity	300AH	
		是 Yes	电池剩余容量 Battery remaining capacity	150AH	

BMS 功耗管理 BMS power Management	开启 ON	是 Yes	休眠电压 Sleep voltage	3.3V	±50mV
		是 Yes	休眠延时 Sleep delay	1440min ± 10min	无充放电电流，无通信，无外部充电电压 No charging and discharging current, no communication, no external charging voltage
满充设置 Full charge settings	开启 ON	是 Yes	恒压值 Constant voltage value	56.0±0.5V	当总体电压大于恒压值并且电流小于恒流值，BMS 会认为电池容量已经充满，达到自学习条件，充电 MOSFET 断开。 When the overall voltage is greater than the constant voltage value and the current is less than the constant current value, the BMS will consider that the battery capacity is full and the self-learning condition
		是 Yes	恒流值 Constant current value	1.5A±0.5A	
		否 NO	延时 delay	10S±2S	

4.3 LED 指示灯定义（LED indicator definition）

LED 灯：4 个绿色容量指示灯，一个红色告警指示灯，一个绿色运行指示灯
LED lights: 4 green capacity indicators, one red alarm indicator, and one green running indicator



4.3.1 容量指示（Capacity indication）

状态 state		充电 charge				放电 discharge			
容量指示灯 Capacity indicato		SOC4●	SOC3●	SOC2●	SOC1●	SOC4●	SOC3●	SOC2●	SOC1●
	0～25%	Blink2	Off	Off	Off	On	Off	Off	Off

	25～50%	On	Blink2	Off	Off	On	On	Off	Off
	50～75%	On	On	Blink2	Off	On	On	On	Off
	75～100%	On	On	On	Blink2	On	On	On	On
运行指示灯● Running indicator light		常亮 Stady light				闪烁 3 Blink 3 tims			

4.3.2 状态指示（Status indication）

系统状态 System state	异常事件 Abnormal event	电量 SOC LED	ALM	RUN	说明 description
		● ● ● ●	●	●	
关机 Shut down	**关机/休眠** Shut down/sleep mode	**全灭** All shut down			
待机 standby	正常 normal	依据电量指示 Indicator by SOC	off	blink1	待机时只有正常和告警，保护和故障按充放电状态上报；告警包含以下几类，压差大告警，容量低告警，单体电压高、低，总体电压高、低，所有的温度告警(电芯温度高、低，环境温度高、低、MOS 温度高） Standby only normal and alarm, protection and fault reported according to the charge and discharge status: Alarms include the following types: large pressure difference alarm, low capacity alarm high and low voltage of a single unit, high and low overall voltage, all temperature alarms (high and low cell temperature, high and low ambient temperature, high and low MOS temperatur
	告警 alarm		blink2	blink1	
充电 charge	正常 normal	依据电量指示 Indicator by SOC （电量最高指示 LED 闪烁 2） Highest indication with blink	off	on	
	告警 normal		blink2	on	告警包含以下几类，压差大告警，容量低告警，单体电压高、低，总体电压高、低，所有的温度告警(电芯温度高、低环境温度高、低，MOS 温度高;过流告警） Alarms are classified into the following types: large pressure difference alarm, low capacity alarm, low voltage of a single unit, low voltage of the whole unit, and all temperature alarms (high and low cell temperature, high and low ambient temperature, high and low MOS temperature; Overcurrent alarm)
	单体/整体过压保护/满充保护 Unit \ overall overvoltage protection \ full charge protection	依据电量指示 Indicator by SOC	off	on	
	过流保护 （进入限流充） Overcurrent protection (Enter current limiting charge)	依据电量指示 （有充电电流时电量指示最高 LED 闪 2） Indicator by power(When there is charging current, the LED with the highest power indicator flashes 2)	off	on	充过流保护后进入限流充电且有充电电流按正常状态显示;充过流保护后进入限流充电且无充电电流按故障状态显示，ALM 常亮其它都灭。 After charging over current protection, it enters current limiting charging and the charging current is displayed in normal state; After overcurrent protection, it enters current limiting charging and no charging current is displayed according to fault state, ALM steady on and all others are off
	温度保护	全灭	on	off	电芯、MOS、环境

	Temperature protection	off			Cell, MOS, environment
放电 discharge	正常 normal	依据电量指示 Indicator by SOC	off	blink3	
	告警 alarm	依据电量指示 Indicator by SOC	blink2	blink3	告警包含以下几类，压差大告警，容量低告警，单体电压高、低，总体电压高、低，所有的温度告警(电芯温度高、低，环境温度高、低 MOS 温度高;过流告警） Alarms include the following types: large pressure difference alarm, low capacity alarm, high and low voltage of a single unit, high and low voltage of the whole system, and all temperature alarms (high and low cell temperature, high and low ambient temperature, high and low MOS temperature; Overcurrent alarm)
	单体/整体欠压保护 Monomer/whole Undervoltage protection	依据电量指示 Indicator by SOC	blink2	off	
	过流、短路保护 Overcurrent, short circuit protection	off	on	off	
	温度保护 Temperature protection	off	on	off	电芯，MOS，环境 Cell, MOS, environment
故障 failure	NTC 故障、MOS 故障、反接、压差保护、超低压保护 NTC fault, MOS fault, reverse connection, differential pressure protection, ultra-low voltage protection	off	on	off	

4.3.3 闪烁说明（Blink indication）

闪动方式 Blink indication	亮 on	灭 off
blink1	0.25 S	3.75 S
Blink2	0.5 S	0.5 S
Blink3	0.5 S	1.5 S

五、工作模式（Working mode）

5.1 基本模式（Basic mode）

5.1.1 充电模式（Charging mode）

BMS 在检测到外部有充电电压，同时电芯电压及温度均在可充电范围内时，开启充电 MOSFET 进行充电。充电电流达到有效充电流时，进入充电模式。充电模式下充、放电 MOSFET 都导通。

When the BMS detects that there is an external charging voltage and the voltage and temperature of the cell are within the rechargeable range, the charging MOSFET is turned on for charging. When the charging current reaches the effective charging current, the charging mode is entered. In charging mode, both charging and discharging MOSFETs are switched on.

5.1.2 放电模式（Discharge mode）

BMS 在检测到负载连接且电芯电压及温度在可放电范围内，放电电流达到有效放电电流时进入放电模式。放电模式下充、放电 MOSFET 都导通。

The BMS enters discharge mode when it detects that the load is connected, the voltage and temperature of the cell are within the discharge range, and the discharge current reaches the effective discharge current. In discharge mode, both charge and discharge MOSFETs are switched on.

5.1.3 休眠及唤醒模式（Sleep and wake modes）

1、当满足以下条件时，系统进入休眠模式：

The system enters hibernation mode when the following conditions are met:

①单体欠压保护或者总体欠压保护 15 分钟内仍未解除；

Single undervoltage protection or total undervoltage protection is not removed within 15 minutes;

②按下按键达 3 秒钟后松开按键；

Press the key for 3 seconds and release the key;

③最低单体电压低于休眠设定电压（默认值 3300mV），并且持续时间达到延时时间（默认值为 1440min 同时满足无通信、无充放电电流）；

The minimum cell voltage is lower than the set voltage of sleep (default: 3300mV), and the duration reaches the delay time (default: 1440min) without communication and charge-discharge current;

④通过上位机软件进行强制关机。

Forced shutdown through the upper computer software.

进入休眠前，需确保 P-端未接入外部电压，否则将无法进入低功耗模式。

Before hibernation, ensure that no external voltage is connected to the P-terminal. Otherwise, the low-power mode cannot be entered.

2、休眠模式的唤醒条件：

Wake up conditions for sleep mode:

1)接入充电器，充电器输入电压需大于 48V；

The input voltage of the charger should be greater than 48V.

2)通过按下按键 1S 松开按键后唤醒。

Press the button for 1S to release the button and wake up.

5.2 按键说明（Key description）

BMS 处于休眠状态时，按下按键 1S 后松开，保护板被激活,LED 指示灯从“RUN”开始依次点亮 0.5 秒。
When the BMS is in hibernation state, press the button for 1S and release it. The protection board is activated, and the LED indicator lights up successively for 0.5 seconds from RUN.
BMS 处于工作状态时，按下按键 3S-6S 后松开，保护板被休眠，LED 指示灯从最低电量灯开始依次点亮 0.5 秒。
When the BMS is in the working state, press the key for 3S-6S and release it. The protection board is put to sleep,The LED indicator lights up successively for 0.5 seconds from the lowest power lamp.
BMS 处于工作状态时，按下按键≥6S 后松开，保护板被复位，LED 指示灯依据当前电量显示。
When the BMS is in working state, press the button for more than 6S and release it. The protection board will be reset, and the LED indicator will be displayed according to the current power.

六、通讯（communication）

6.1 RS485 通信（RS485 communication）

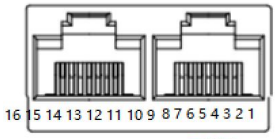
BMS 可以通过 RS485 通信接口与上位机进行通信，通过上位机查看电池的各种信息，如电压、电流、温度、SOC、SOH、工作状态、电池生产信息以及可以进行参数设置等。
BMS can communicate with the upper computer through the RS485 communication interface, through the upper computer to view various information of the battery, such as voltage, current, temperature, SOC, SOH, working state, battery production information and can be set parameters.
具有 RS485 并机接口，可最大支持 16 组电池组并机，默认波特率为 9600bps。
The RS485 parallel port supports a maximum of 16 battery strings simultaneously. The default baud rate is 9600bps.
具有上位机/逆变器通信 RS485 接口，默认波特率为 9600bps；
With upper computer/inverter communication RS485 interface, the default baud rate is 9600bps;

6.2 CAN 通信 （CAN communication）

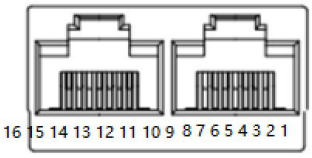
BMS 可以通过 CAN 接口与逆变器通信，可以把电池的各种信息，如电压、电流、温度、SOC、SOH、工作状态、电池生产等信息上传。默认波特率为 500Kbps。
The BMS CAN communicate with the inverter through the CAN interface, and upload various information of the battery, such as voltage, current, temperature, SOC, SOH, working status, and battery production. The default baud rate is 500Kbps.

6.3 通信接口定义（Communication interface definition）

6.3.1 接口图示（Interface diagram）



RS485 和 CAN 接口



并机通信接口

6.3.2 通信接口定义（Communication interface definition）

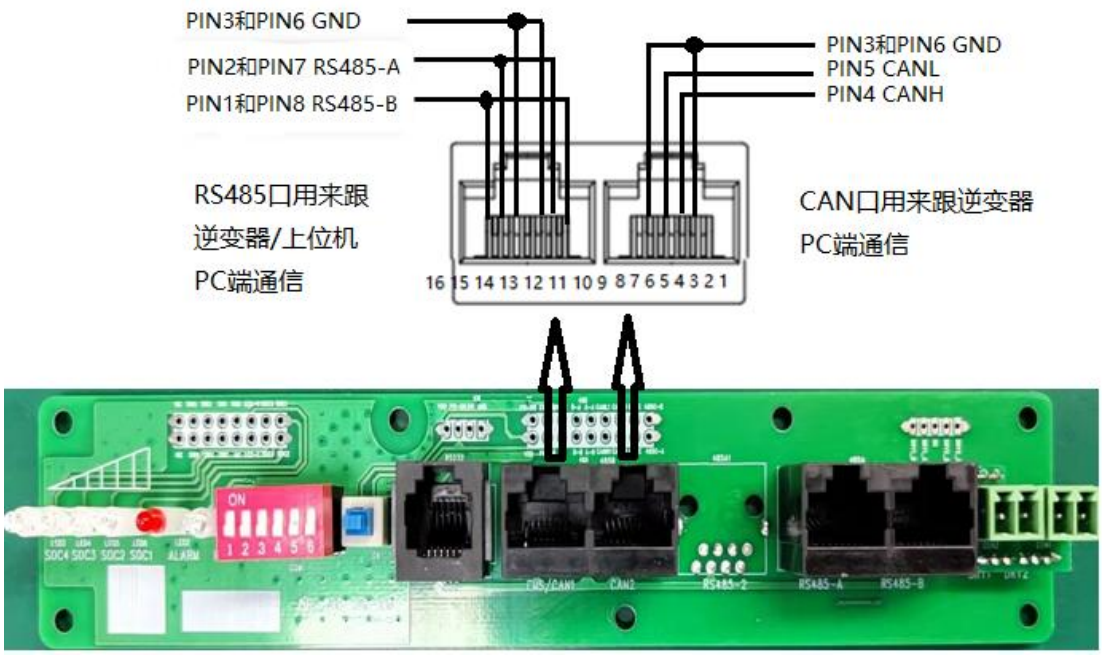
RS485 接口（与上位机或逆变器通信） RS485 interface (communication with host computer or inverter) 支持硕日、日月元、古瑞瓦特逆变器协议--通过拨码来选择不同地址 Support for SRNE、Voltronic and Geowatt inverter protocol--Select different addresses using DIP switches		CAN 通信接口（只与逆变器通信） CAN communication interface (only inverter communication) 支持 Victron、Pylon、古瑞瓦特逆变器协议——通过拨码来选择不同协议 Support for Victron、Pylon and Geowatt inverter protocol--Use DIP switches to select different protocols	
RS485—采用 8P8C 立式 RJ45 插座 RS485—Use 8P8C vertical RJ45 socket		CAN—采用 8P8C 立式 RJ45 插座 CAN—Use 8P8C vertical RJ45 socket	
RJ45 引脚 RJ45 pin	定义说明 defined declaration	RJ45 引脚 RJ45 pin	定义说明 defined declaration
9、16	RS485A-B	4	CANH
10、15	RS485A-A	5	CANL
11、14	GND	3、6	GND
12、13	NC	1、2、7、8	NC

并机通信端口（只用来并机） Parallel communication port (for parallel only)			
RS485-A—采用 8P8C 立式 RJ45 插座 RS485-A—Use 8P8C vertical RJ45 socket		RS485-B—采用 8P8C 立式 RJ45 插座 RS485-B—Use 8P8C vertical RJ45 socket	
RJ45 引脚 RJ45 pin	定义说明 defined declaration	RJ45 引脚 RJ45 pin	定义说明 defined declaration
9、16	RS485B-B	1、8	RS485B-B
10、15	RS485B-A	2、7	RS485B-A
11、14	GND	3、6	GND
12、13	NC	4、5	NC

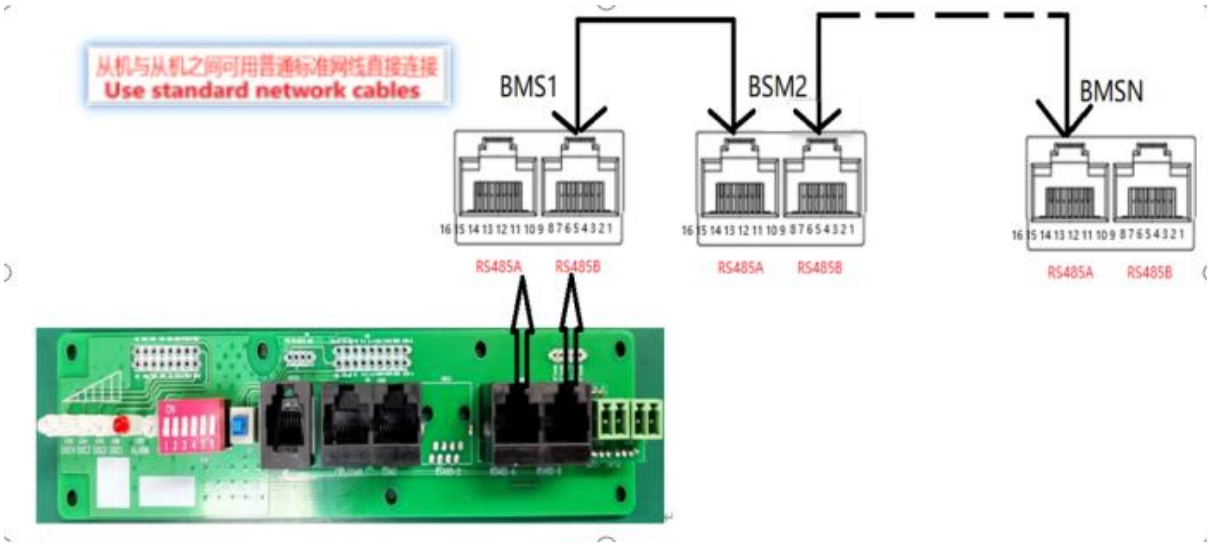
6.3.3 BMS 与逆变器/上位机 PC 端通信连接方式（Communication connection between BMS and inverter/upper computer PC）

主机与逆变器通信接口连接方式定义，与逆变器连接采用的网线是要注意匹配，按照如下定义来连接，不可直接用标准网线

The connection mode of the communication interface between the host and the inverter should be defined. The network cable used for connecting the host and the inverter should be matched according to the following definition. The standard network cable should not be used directly



6.3.4 BMS 板并机连接方式（BMS board parallel connection mode）



6.4 拨码开关设置（支持并机和协议选择）（Dip switch setup (supports parallel and protocol selection)）

地址 address	拨码开关位置 Dip switch position	预留 reserved	主机 host	说明 declaration

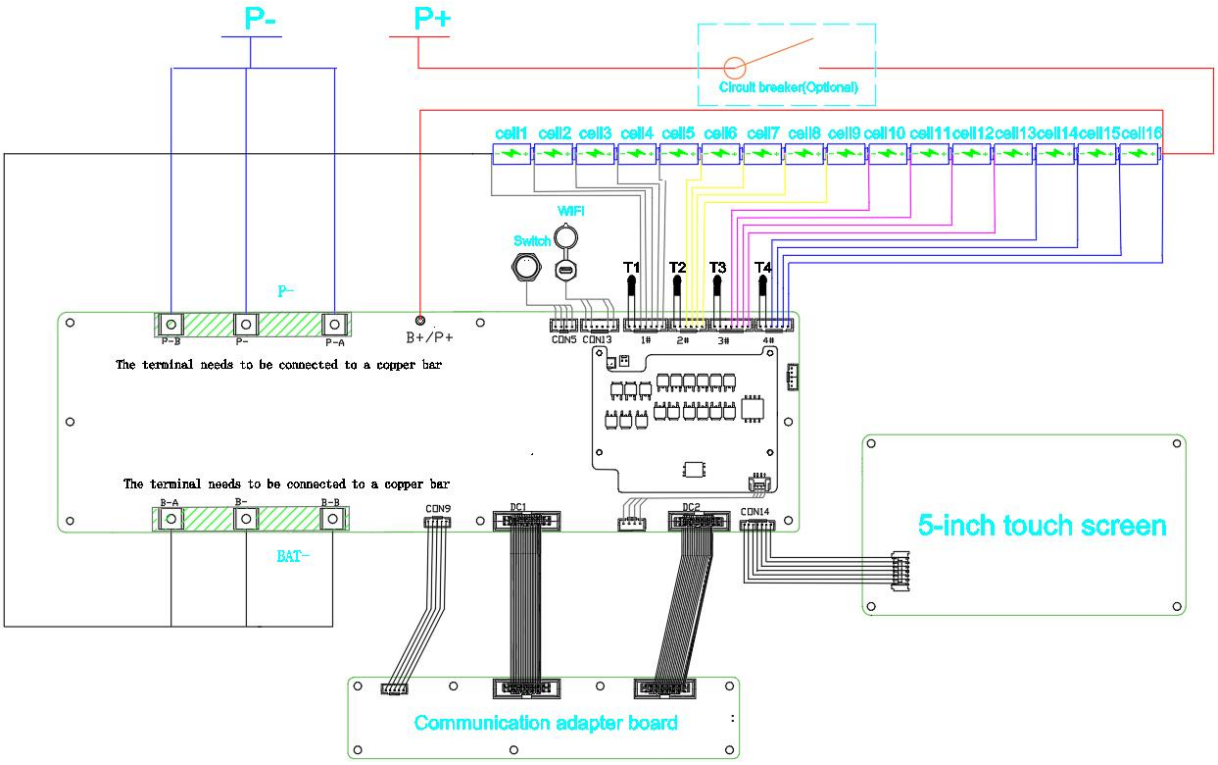
	#1	#2	#3	#4	#5	#6	
0	OFF	OFF	OFF	OFF	OFF	OFF	(主机) Pack1
1	ON	OFF	OFF	OFF	OFF	OFF	(从机) Pack2
2	OFF	ON	OFF	OFF	OFF	OFF	(从机) Pack3
3	ON	ON	OFF	OFF	OFF	OFF	(从机) Pack4
4	OFF	OFF	ON	OFF	OFF	OFF	(从机) Pack5
5	ON	OFF	ON	OFF	OFF	OFF	(从机) Pack6
6	OFF	ON	ON	OFF	OFF	OFF	(从机) Pack7
7	ON	ON	ON	OFF	OFF	OFF	(从机) Pack8
8	OFF	OFF	OFF	ON	OFF	OFF	(从机) Pack9
9	ON	OFF	OFF	ON	OFF	OFF	(从机) Pack10
10	OFF	ON	OFF	ON	OFF	OFF	(从机) Pack11
11	ON	ON	OFF	ON	OFF	OFF	(从机) Pack12
12	OFF	OFF	ON	ON	OFF	OFF	(从机) Pack13
13	ON	OFF	ON	ON	OFF	OFF	(从机) Pack14
14	OFF	ON	ON	ON	OFF	OFF	(从机) Pack15
15	ON	ON	ON	ON	OFF	OFF	(从机) Pack16
逆变器通信协议选择 CAN 通信(在主机模式下通过拨码 5 和 6 选择) Inverter communication protocol Select CAN communication (select by DIP 5 and 6 in host mode)							
1	OFF	OFF	OFF	OFF	OFF	OFF	**支持上位机/显示屏对逆变器协议选择 Supports host computer/display Select the inverter protocol**
17	OFF	OFF	OFF	OFF	ON	OFF	Victron
33	OFF	OFF	OFF	OFF	OFF	ON	派能 Pylon
49	OFF	OFF	OFF	OFF	ON	ON	古瑞瓦特 Geowatt
逆变器通信协议选择 RS485 通信(在主机模式下通过拨码 5 和 6 选择) Inverter communication protocol RS485 communication (Select DIP 5 and 6 in host mode)							
1	OFF	OFF	OFF	OFF	OFF	OFF	**支持上位机/显示屏对逆变器协议选择 Supports host computer/display Select the inverter protocol**
17	OFF	OFF	OFF	OFF	ON	OFF	硕日 SRNE
33	OFF	OFF	OFF	OFF	OFF	ON	日月元 Voltronic
49	OFF	OFF	OFF	OFF	ON	ON	古瑞瓦特 Geowatt

备注：通过上位机或者显示屏进行选择协议拨码地址 5 和 6 必须为 OFF

Note: Protocol dialing addresses 5 and 6 must be OFF when selected through the upper computer or display screen.

七、电气接口定义（Electrical interface definition）

7.1 BMS 板接口定义（BMS interface definition）



7.2 接线定义（Connection definition）

B+:电芯 PACK 正极，用来给 BMS 供电，功率正极 P+直接接到电芯正极；

B+: the positive electrode of PACK, which is used to supply power to BMS. The power positive electrode P+ is directly connected to the positive electrode of the cell;

B-:电芯 PACK 负极（采用 M5 端子）

B-:Cell PACK negative (using M5 terminal)

P-:电池 PACK 负极，充电负极也是放电负极（充放电同口）

P-:Battery PACK negative electrode, the charging negative

备注：B- P-采用 M5 接线端子

Note: B-P - uses M5 wiring terminals

使用 7+6+7+6P 采样排线时：

When using 7+6+7+6P sampling line:

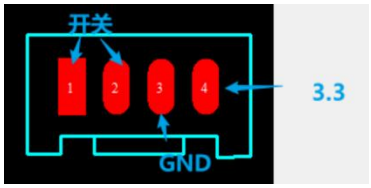
1#(PHS-2.0-7P)从 PIN1→PIN7：

NTC1+，NTC1-，CELL0，CELL1，CELL2，CELL3，CELL4

2#(PHS-2.0-6P)从 PIN1→PIN6：
NTC2+，NTC2-，CELL5，CELL6，CELL7，CELL8
3#(PHS-2.0-7P)从 PIN1→PIN7：
NTC3+，NTC3-，CELL8，CELL9，CELL10，CELL11，CELL12
4#(PHS-2.0-6P)从 PIN1→PIN6：
NTC4+，NTC4-，CELL13，CELL14，CELL15，CELL16

备注：
CELL0 为 B-端电芯，CELL16 为 B+端电芯
NTC 型号：NTC 蝌蚪，B 值 3950，10K±1,%@25℃
Notes:
CELL0 is the B-terminal cell, CELL16 is the B+ terminal cell
NTC Model: NTC tadpole, B value 3950,10 K±1,%@25℃
注意点：
若要改为 15S，则应该把 CELL15 和 CELL16 一起接到 B+端电芯或者提前通知 BMS 厂家把 CELL15 和 CELL16 短接电阻去掉，更新软件，本次出货为 16 串。
Points to note:
If you want to change to 15S, CELL15 and CELL16 should be connected to the B+ end cell together or notify the BMS manufacturer in advance to remove the short resistor of CELL15 and CELL16. This shipment is 16 strings.

7.3 弱电开关说明（常开常闭开关，自锁开关）（Description of weak current switch (normally open normally closed switch, self-locking switch)）



备注：弱电开关接到主板 BMS 板 CON5 端口上，必须接弱电开关才可以正常通信
Note: The weak current switch is connected to the CON5 port of the BMS board on the main board. Only the weak current switch can be connected to the normal communication

7.4 BMS 供电线说明（Description of the BMS power cable）

BMS 的 B+供电线务必得单独引线接在电池总正极上，不能接在断路器开关（空开）或者 B+功率线后面，否则会存在影响 BMS 正常工作，PACK 接线时候请务必遵守。
The B+ power supply line of the BMS must be connected to the main positive terminal of the battery independently, and cannot be connected behind the circuit breaker switch (circuit breaker) or the B+ power line, otherwise the normal operation of the BMS will be affected. Please comply with this when connecting PACK.

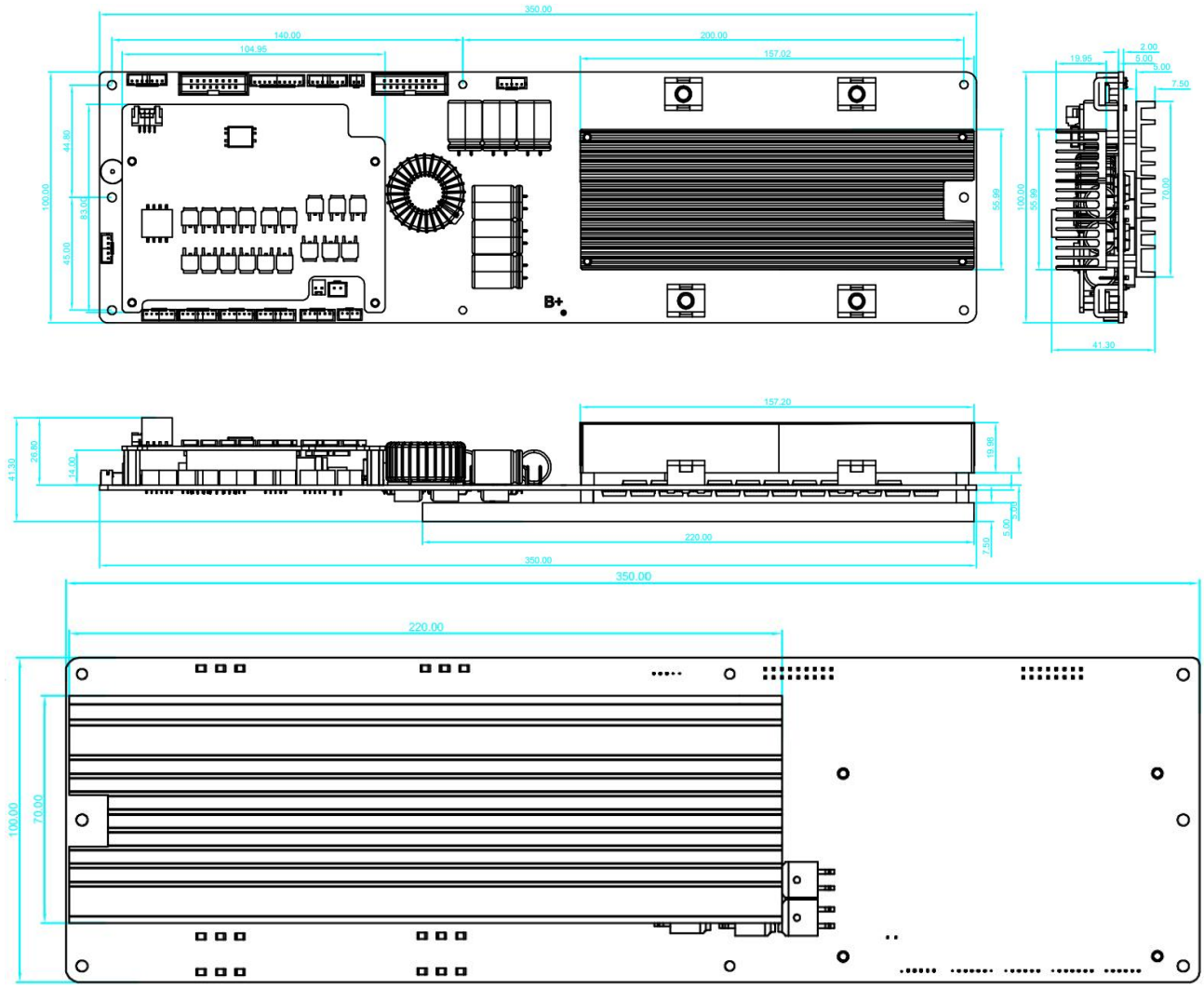
7.5 上、下电顺序（Power on/off sequence）

上电须按照以下顺序：先连接主板 B-，其次接采样线，然后再接 B+，最后再连接 P-， P+到负载或充电器。
Power on the mainboard in the following order: Connect the mainboard B-, then the sampling cable, then the B+, then the P-, and then the P+ to the negative Load or charger.
下电顺序则完全相反：先断开充电器和负载，再断开 B+,然后端口采样线，最后断开 B-。

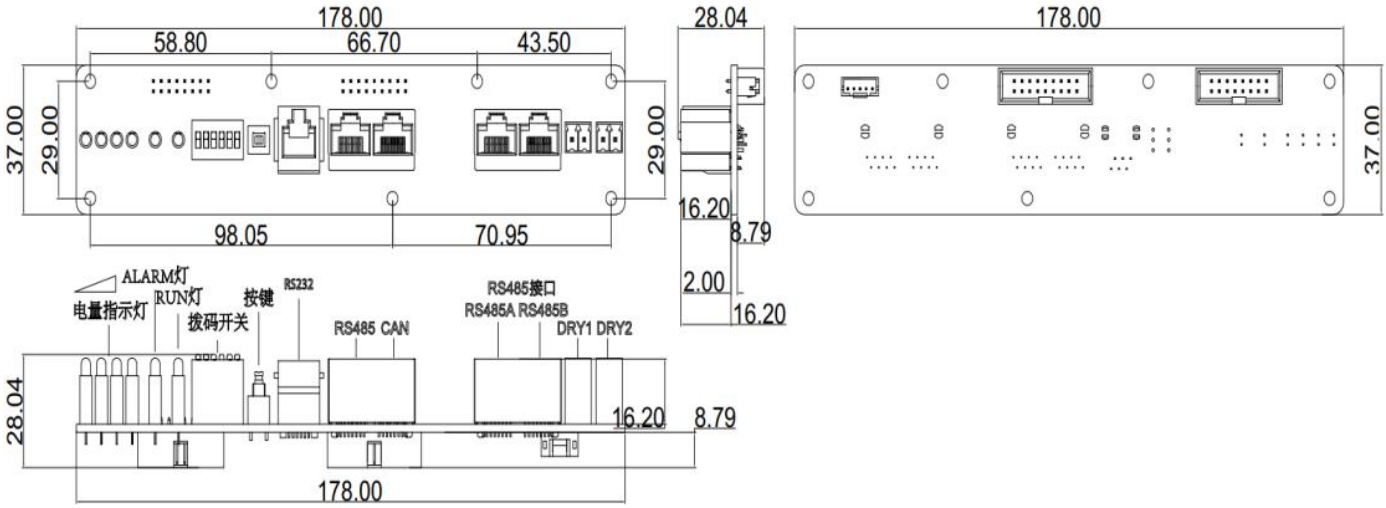
The power-off sequence is reversed: disconnect the charger and load first, then the B+, then the port sampling line, and finally the B-.

八、结构尺寸图 （Dimensional drawing）

8.1 主板尺寸图（Motherboard size diagram）



8.2 转接板尺寸图（Adapter board dimensions）



注意：

1、RS232 口，若没有要求通信功能，面板上可以不要开对应的孔；

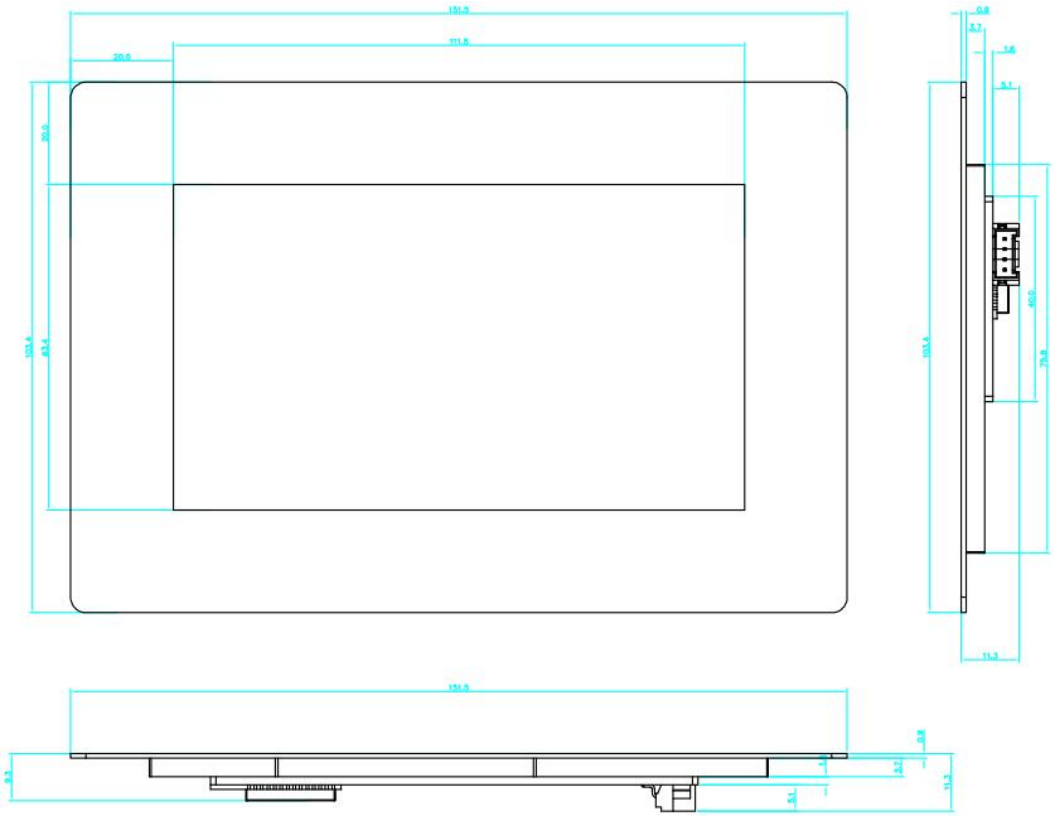
2、2 路干接点口，若没有要求该功能，面板上可以不要开对应的孔。

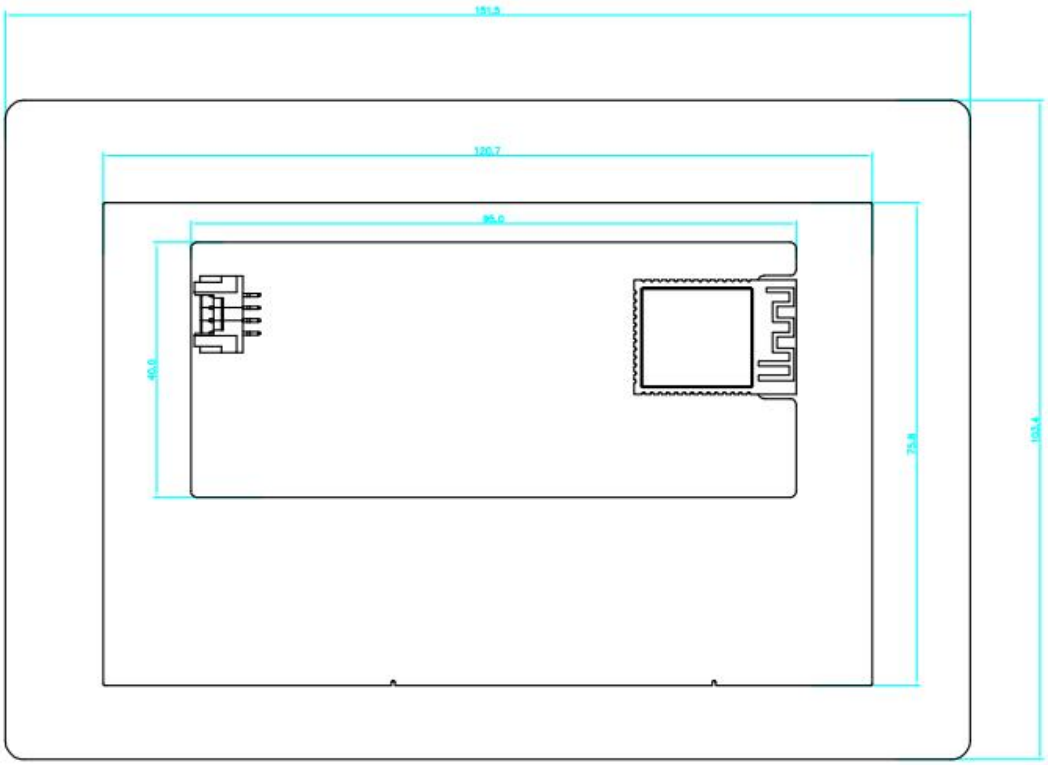
Note：

1、RS232 port, if no communication function is required, the corresponding hole can not be opened on the panel.

2、2 dry contact ports. If this function is not required, do not open corresponding holes on the panel.

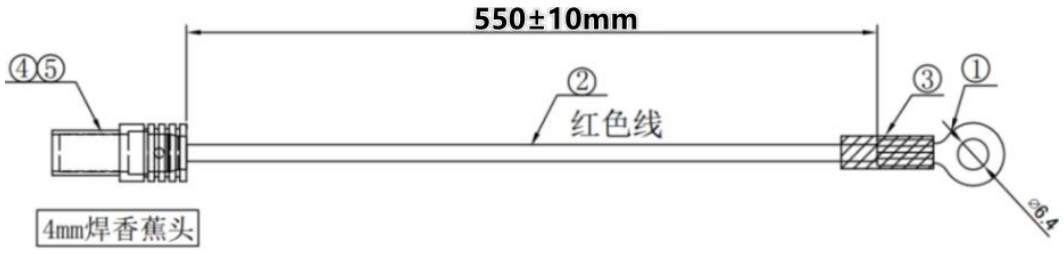
8.3 触摸屏尺寸图（Touch screen size diagram）



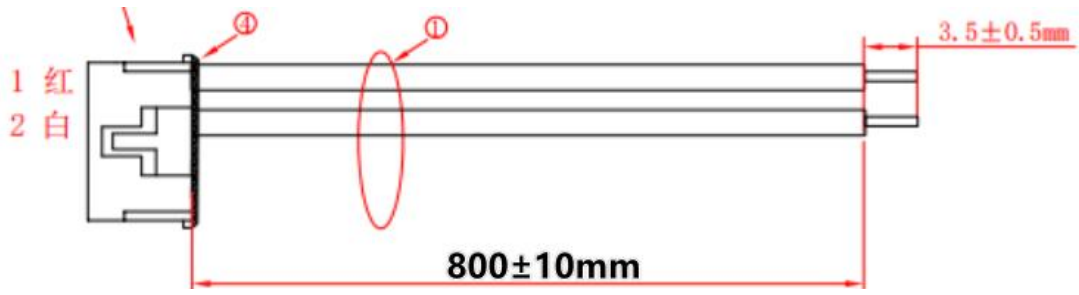


九、线束图（line pattern）

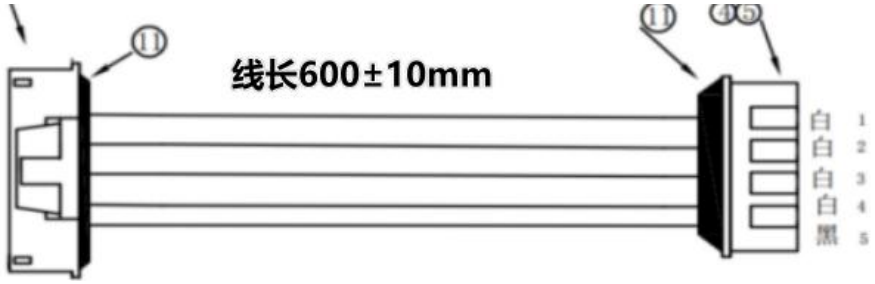
9.1 BMS 板 B+与电芯 B+连接线（BMS board B+ is connected to battery cell B+）



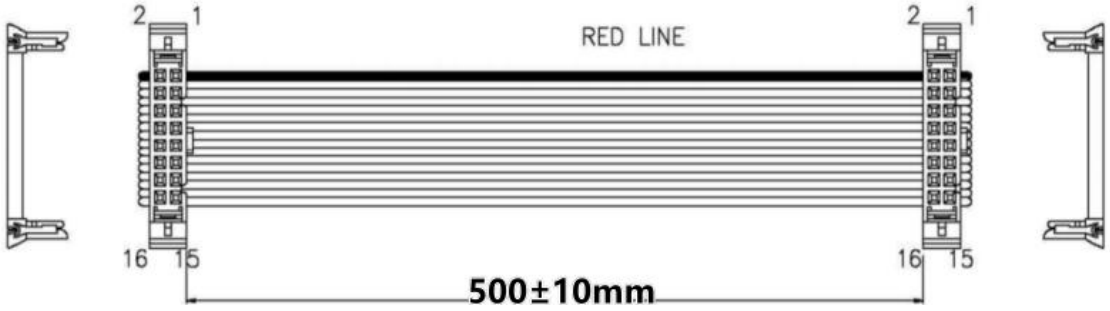
9.2 弱电开关连接线（Weak current switch connection cable）



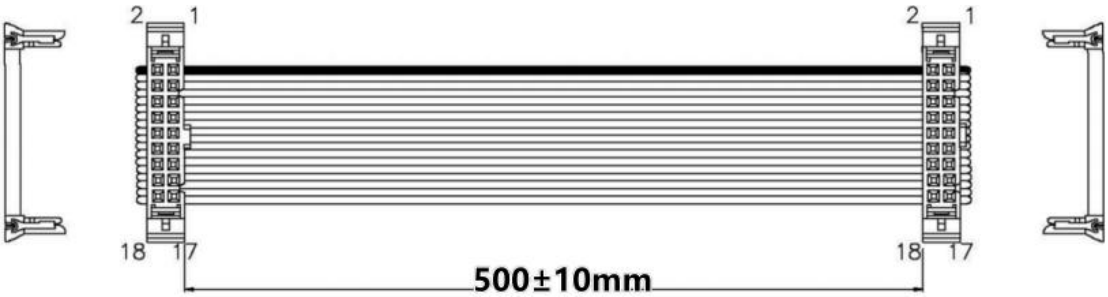
9.3 干接点连接线（Dry contact harness）



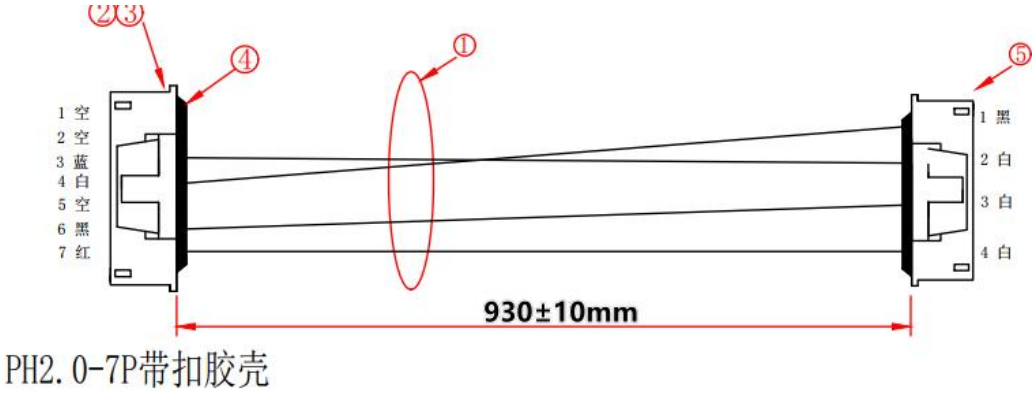
9.4 牛角座 1 连接线（Bull Horn 1 Connection Line）



9.5 牛角座 2 连接线（Bull Horn 2 connecting cable）



9.6 显示屏连接线（Display harness）



PH2.0-7P带扣胶壳

十、组装及使用注意事项（Assembly and use precautions）

本软件使用于 Windows 系列平台的 PC 机。
This software is used for Windows series platform PC.

使用前，请先确保 USB 线材是否具备数据传输功能，通信工具正确连接在保护板通通信口与 PC 端 USB 接口。打开专用的 PC 客户端专用上位机软件，设置好 BMS 对应的通信方式。成功连接后上位机首页界面左下角方显示“通信：已连机”。若通讯连机不上，请查看上位机通信方式是否设置正确，以及接线是否良好。

Before using the device, ensure that the USB cable has the data transmission function, and that the communication tool is properly connected to the USB port on the protection board and the PC. Open the dedicated PC client dedicated upper computer software and set the communication mode corresponding to the BMS. After the connection is successful, "Communication: Connected" is displayed in the lower left corner of the home page of the upper computer. If the communication is not connected, check whether the communication mode of the upper computer is set correctly and whether the connection is good.

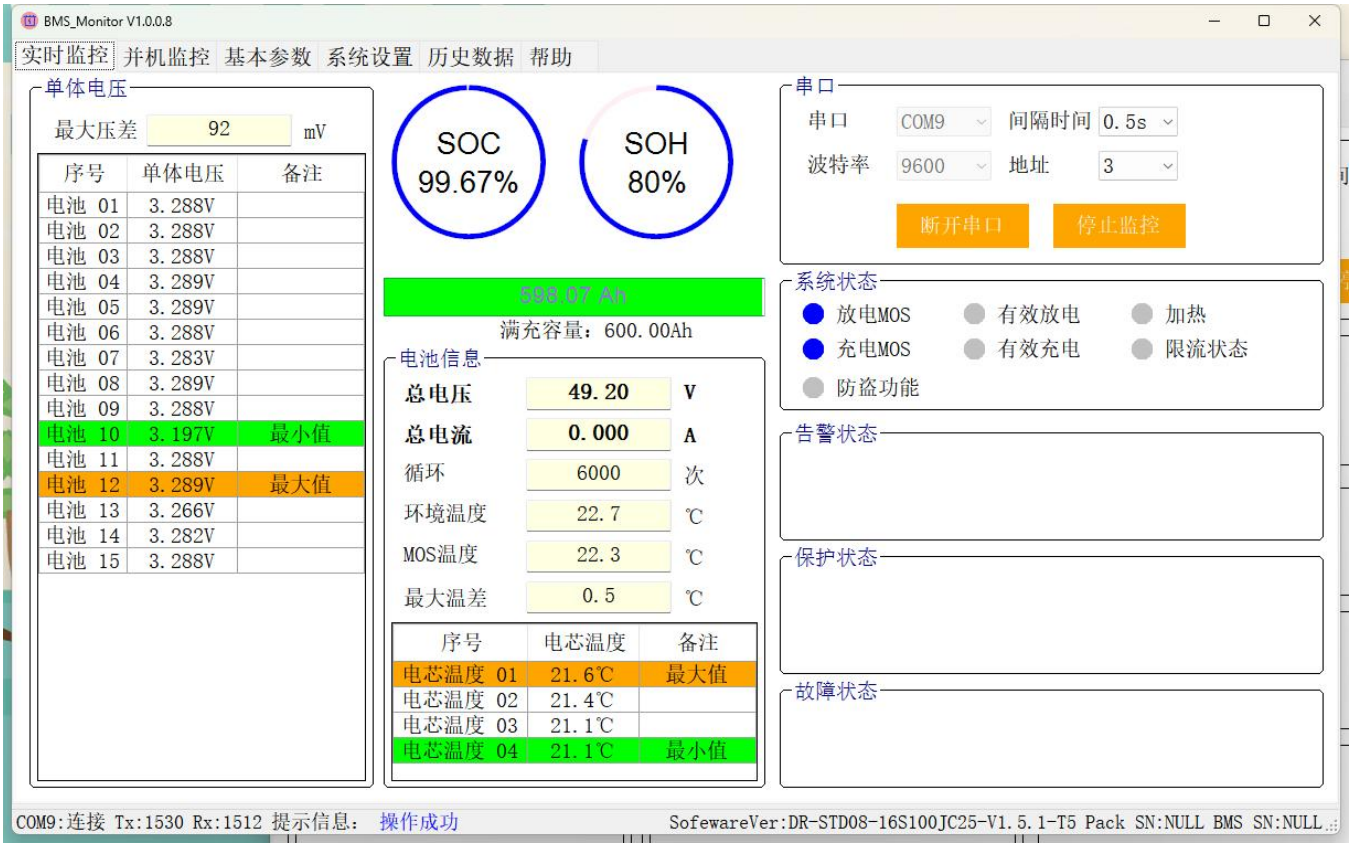
上位机可支持中英文两种语音切换，在首页左列下“帮助”出去切换语言。

The host computer can switch between English and Chinese. In the left column of the home page, go to "Help" to switch the language.

以下参数截图仅供参考，请以 BMS 的实际参数为准。

The following parameter snapshots are for reference only. The actual parameters of the BMS prevail.

10.1 实时监控界面（Real-time monitoring interface）



10.2 基本参数 1（Basic parameter 1）

十一、组装及使用注意事项（Assembly and use precautions）

1、接电下电，必须按上下电顺序操作。

2、连接电池包时，切勿接错甚至反接，连接不上上位机，或者线路板上主要芯片发热明显，请迅速下电，此时线路板可能已经不良，需更换维修。

3、组装时严禁线头、焊锡等碰触线路板元件，万一碰触有可能损伤线路元件，造成不良。

4、严格遵循规格书要求的设计参数要求，否则可能损坏线路板。

5、使用中注意防潮、防水、防静电。

6、在对装好管理系统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，否则有可能损坏管理系统和电池。

7、组装成电池包以后应当进行完整的充电和放电循环，触发过充和过放保护，使线路板学习到电池的初始容量。

8、管理系统无 0V 电池充电功能，电池一旦出现 0V 的情况，电池性能将严重退化，甚至有可能损坏，为了不损坏电池，用户在长期（储存超出 3 个月）不使用时需定期充电以补充电量；而在使用时放完电后需在 12 小时内及时充电，防止电池因自耗电而放电至 0V。

1、Power-on and power-off operations must be performed in sequence.

2、When connecting the battery pack, do not misconnect or even reverse connect the battery pack. If the battery pack cannot be connected to the upper computer, or the main chip of the circuit board heats up obviously, power off the circuit board quickly. In this case, the circuit board may be faulty and needs to be replaced or maintained.

3、During assembly, do not touch the circuit board components, such as wire, solder, etc., in case of contact, it may damage the circuit components, resulting in bad.

4、Strictly follow the design parameters specified in the specification, otherwise the circuit board may be damaged.

5、Keep away from moisture, water and static electricity.

6、Do not use the battery aging cabinet to measure the voltage of each battery string when testing the battery string installed with the management system. Otherwise, the management system and batteries may be damaged.

7、After assembling the battery pack, complete charging and discharging cycles should be carried out to trigger the overcharge and overdischarge protection, so that the circuit board can learn the initial capacity of the battery.

8、The management system has no 0V battery charging function. Once the battery is 0V, the battery performance will be seriously degraded or even damaged. In order not to damage the battery, users should charge regularly to supplement the power when they are not in use for a long time (storage exceeds 3 months). When in use, it is necessary to charge in time within 12 hours after discharge, to prevent the battery from discharging to 0V due to self-consumption.