Product Specification

Product Name:24V20A Lithium Battery Management System

Product Model:48100-2000-10B

Configuration	Parameter	Function
Single voltage platform	3.2V	
PCS	16S	Optional
Capacity	100AH	Can be set
External switch	ON	Optional
Current limiting	ON	Optional
LCD	ON	Optional
Storage	ON	Contained
Heating	ON	Optional
Precharge	ON	Contained
Communication	RS485	Optional

Patent Name	Patent Number	Patent Name	Patent Number
SHenergy Backup Battery Management Software V1.0	2020SR0665527	A BMS Switch Topology Circuit	CN211377659U
SHenergy Upper Computer Monitoring System	2020SR1053191	A Shock Resistant Circuit For Multiple Batteries	CN211377658U
SHenergy Intelligent Inspection System Software	2020SR1041767	A Multiple Power Supply Circuit	CN212518427U

Signature and seal of supplier	Signature and seal of client

Executed By	Lin Jialei	Checked By	Wei Qi	Approved By	Huang Bin
Date		Date		Date	

Version	Date	Draw up/amend	Version Revision Note
V1.0	2021.03.05	Lin Jialei	Create draft

目录

1、Application scope

This product is a fully functional management system that supports 8 series lithium-ion battery packs, with protection and recovery functions such as individual overvoltage/undervoltage, total voltage undervoltage/overvoltage, charging/discharging overcurrent, high temperature, low temperature, and short circuit. Accurate measurement of SOC during charging and discharging processes, and statistical analysis of SOH health status. Realize voltage balance during the charging process. Data communication is carried out with the host through RS485 communication, and parameter configuration and data monitoring are carried out through human-machine interaction with the upper computer software.

Note: The baud rate of the upper computer is 9600

2、Normative citation documents

The following documents are essential for the application of this document. The date-only version of the reference file is applicable to this file. The latest version of any undated reference file (including all modifications) applies to this file.

GB/T 191	Marking of Packaging Storage and Transportation
GB/T 2408-2008	plastic Determination of combustion properties Horizontal and vertical test
YD/T 983-2013	Electromagnetic Compatibility Limit and Measurement Method for Communication Power Equipment
GB/T 17626.5-2008	Electromagnetic compatibility test and surge (shock) immunity test for measuring technology
GB/T 17626.2-2006	Electromagnetic Compatibility Test and Measurement Technology
YD/T 2344.1—2011	Lithium iron phosphate battery pack for communications - Part 1: integrated battery pack
YD/T 2344.2—2015	Lithium iron phosphate battery pack for communications - Part 2: discrete batteries
YD/T 1363.3	Communications Bureau (Station) Power, Air Conditioning and Environmental Centralized Monitoring Management System Part 3:Front-end Intelligent Equipment Protocol
YD/T 1058-2015	High Frequency Switching Power Supply System for Communication

3、Functional characteristics

3.1、Cell and battery voltage detection

Real time collection and monitoring of the voltage of four single group battery cells to achieve

overvoltage and undervoltage alarm and protection of battery cells. The detection accuracy of individual voltage is ≤ ± 20mV under conditions of -20~70 ℃, and the detection accuracy of PACK voltage is ≤ ± 0.5% under conditions of -20~55 ℃.

Alarm and protection parameter settings can be changed through the upper computer.

3.2、Cell, environment, and power temperature detection

Real time collection and monitoring of 4 cell temperatures, 1 ambient temperature, and 1 power temperature through NTC to achieve high and low temperature alarms and protection. The temperature detection accuracy is ± 2 ℃.

Real time collection and monitoring of 4 cell temperatures, 1 ambient temperature, and 1 power temperature through NTC to achieve high and low temperature alarms and protection. The temperature detection accuracy is ± 2 ℃.

The cell temperature sensor uses 10K, with a B value of 3435

Alarm and protection parameter settings can be changed through the upper computer.

3.3、Battery charging and discharging current detection

By connecting the current detection resistor in the main charging and discharging circuit, the real-time collection and monitoring of the charging and discharging current of the battery pack is achieved to achieve charging and discharging current alarm and protection, with current accuracy better than ± 1%.

Alarm and protection parameter settings can be changed through the upper computer.

3.4、Short circuit protection function

Has the function of detecting and protecting the output short circuit.

3.5、Battery capacity and cycle times

Real-time calculation of battery residual capacity, complete the learning of total charging and discharging capacity at one time, SOC estimation accuracy is better than ±5%.

It has the function of counting the number of charge and discharge cycles. When the accumulative discharge capacity of the battery pack reaches 80% of the set full capacity, the number of cycles will increase once.

Alarm, protection parameter setting can be changed by the upper computer.

3.6、Charge, Discharge MOSFET switch

Low internal resistance, high current, high capacitance for backup power applications load startup, zero switching, double charging voltage optimization design.

3.7、Balance of intelligent single cell

Unbalanced cells can be balanced when charging or standby, which can effectively improve the service time and cycle life of the battery.

Equalizing open voltage and equalizing differential voltage can be set by upper computer.

3.8、LED indication function

It has 6 LED lights for indication, 4 white LED lights for battery level indicator lights for current

battery pack SOC, 1 red LED light for fault indication during alarm and protection, and 1 white LED light for battery standby, charging, and discharging status.

3.9、Dormant function

BMS has manual and automatic sleep functions;

Automatic sleep function: The battery will automatically sleep for 48 hours when there is no external charging or discharging. When the battery pack is over-discharged, the communication is maintained for 1 minute, and the BMS enters the dormant state.

Remote sleep function: When using the upper computer and communication is normal, click the "shutdown" button to enter sleep without a charger connected for charging.

Button shutdown function: When working, turn off the button switch, execute shutdown without charging, and there is no communication activation function after shutdown.。

The standby and hibernation can be set through the host computer.

3.10、RS232 and RS485 communication interfaces

PC or intelligent front-end can achieve data monitoring, operation control, and parameter setting of batteries through RS232 or RS485 communication telemetry, remote signaling, remote adjustment, remote control, and other commands.

3.11、Parallel communication

The address can be set through four dialed addresses through RS485 serial connection.

Parallel machine viewing data: connect to the upper computer through RS485 integrated connection.

3.12、Historical data records are stored and read

Historical data is stored based on the state transition of the BMS; Real time storage of measurement data for various alarms, protection triggers, and elimination; The storage of measurement data for a certain period of time can be achieved by setting the recording start time, recording end time, and recording interval time. At present, it can store no less than 300 historical data records, which can be read from the upper computer and saved as an Excel file to the computer.

3.13、Battery Management Parameters

Various battery management parameters such as individual battery overvoltage/undervoltage,total battery voltage overvoltage/undervoltage, charging/discharging overcurrent, cell high/low temperature, environmental high/low temperature, balancing strategy, battery capacity, etc. can be reset through the upper computer.

3.14、Battery management functions

Voltage related functions, temperature related functions, current related functions (note: output short circuit function does not support shutdown setting), capacity related functions, etc. can be turned on or off through the upper computer settings.

3.15、Precharge function

The precharge function can be activated immediately upon startup or when the discharge tube is turned on. The pre charging time can be set (1mS to 5000mS) to cope with various capacitive load

scenarios and avoid BMS output short circuit protection.

3.16、Connection compensation

To prevent excessive pressure difference between cells or modules, two compensation points can be provided. When wires or long copper bars are used between the battery cells for overcurrent, there will be a voltage difference, which requires impedance compensation. You can check whether the voltage difference between the battery cells is too large through the upper computer.

Measure the pressure difference between the wire and the long copper bar at both ends during discharge; If the pressure difference is too large, manually fill in the calculated impedance into the upper computer parameters based on the pressure difference/current=impedance. The default compensation impedance in the upper computer parameters is the connection of wires in sections 9 and 13, and the 2-way compensation impedance can be set according to the actual cell module.

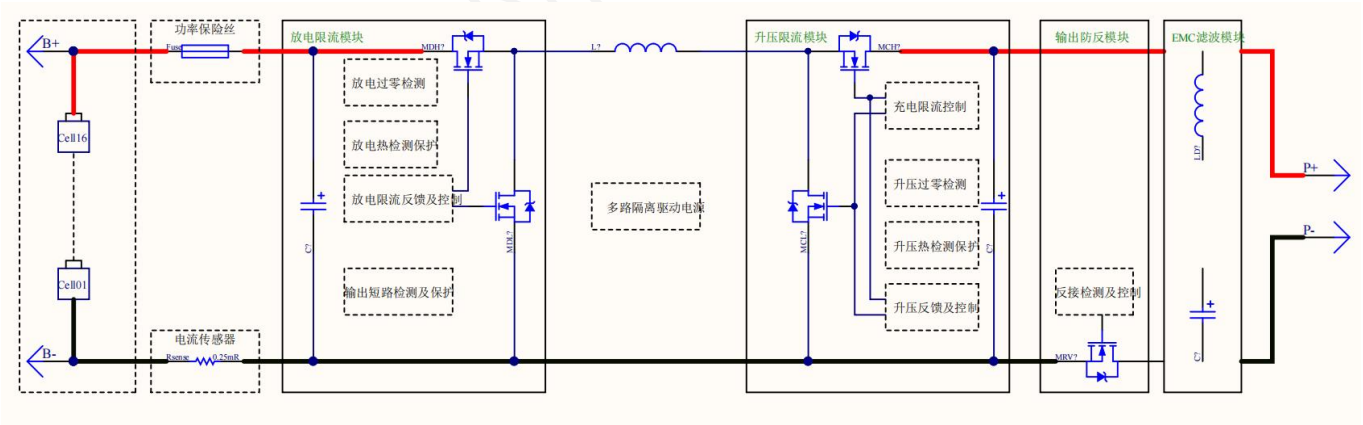
Note: If the battery cell module is assembled in the form of ON long wires and long copper bars, it must be communicated with the BMS manufacturer for impedance compensation. Otherwise, it will affect the consistency of the battery cells.

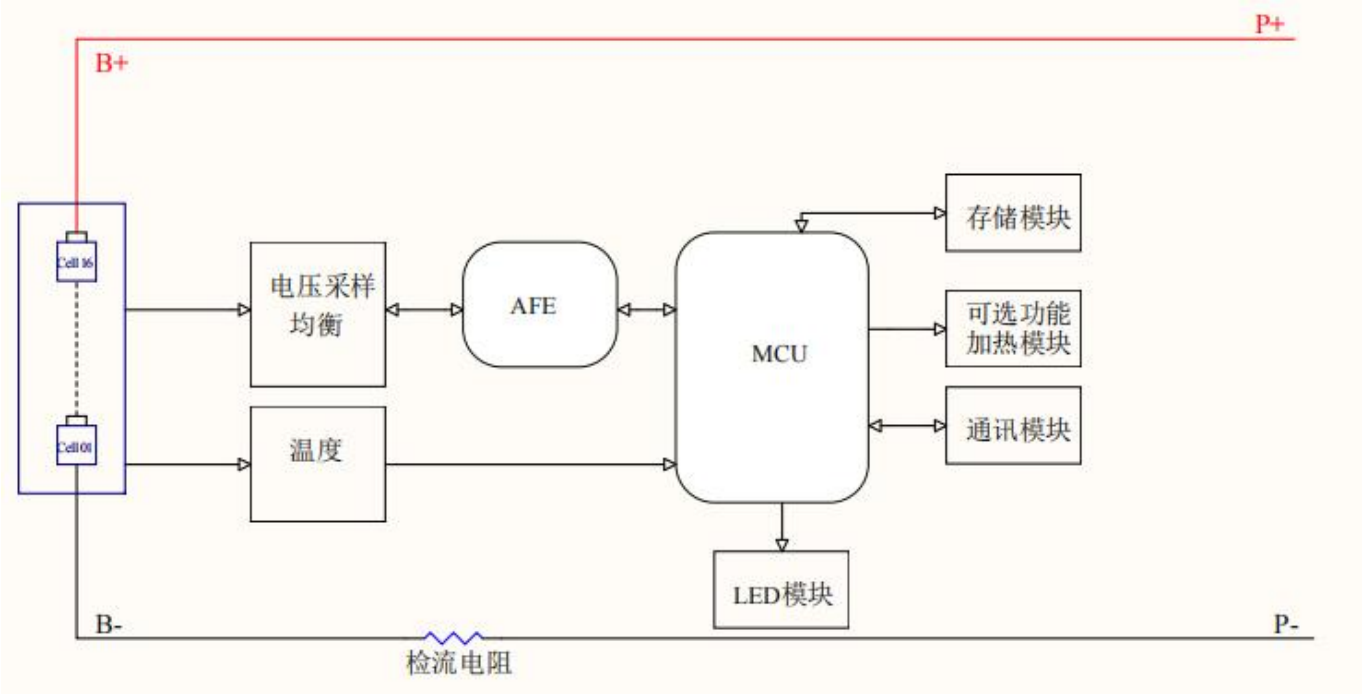
3.17、Current limiting function

Charging current limiting is divided into two modes: active current limiting and passive current limiting, which can be selected based on demand. (Note: Customers choose passive current limiting)

1. Active current limiting: When the BMS is in a charging state, the BMS continuously opens the MOS transistor of the current limiting module, actively limiting the charging current to 10A.

2. Passive current limiting: When the BMS is in the charging state, the BMS opens the charging module MOS tube. If the charging current reaches the charging overcurrent alarm value (note: the current setting is 20A), the current limiting module MOS tube is opened for 10A current limiting. After 5 minutes of current limiting, the charger current is retested to see if it meets the passive current limiting condition. (The passive current limit value can be set when activated)





3.18、Upper computer

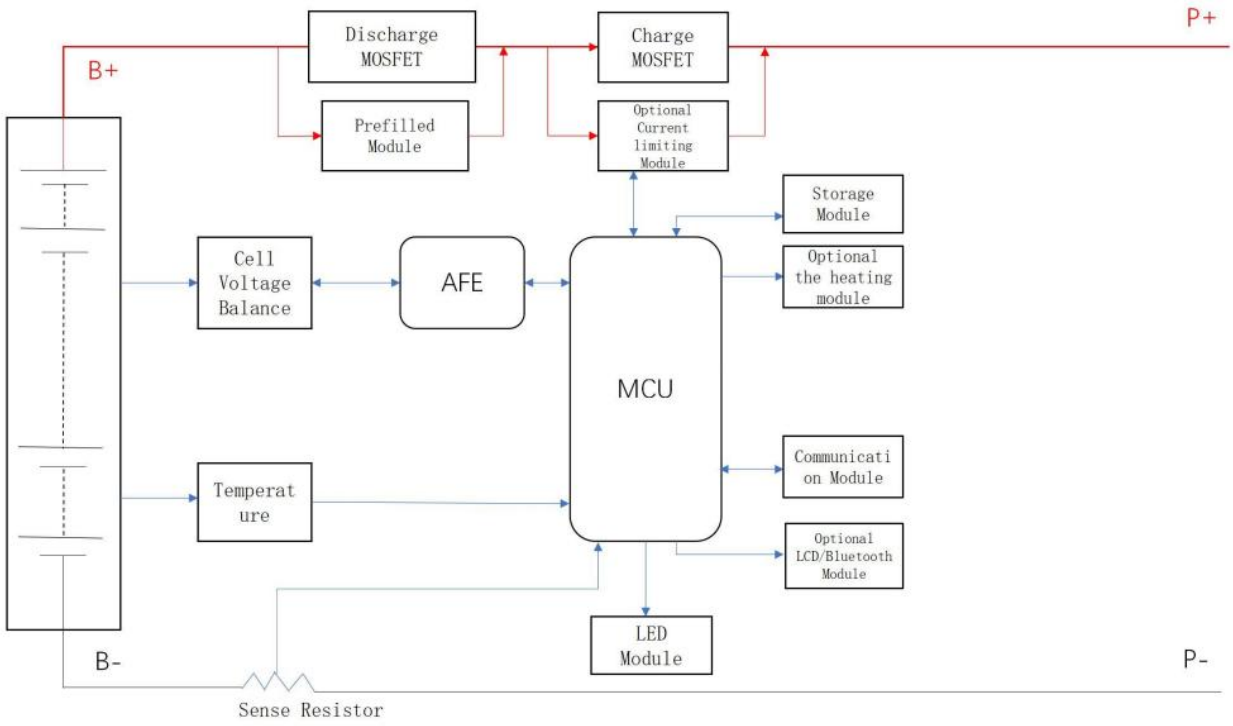
The upper computer uses BatteryMonitor V2.1.8 version, which can switch between Chinese and English (loading the English protocol when switching between English), and load the protocol (Chinese file name: 16Sv20_ADDR, English protocol name: 16Sv20_ADDR-EN). Please refer to the operating instructions in the upper computer file for instructions.

3.19、Program upgrades

The main program version can be upgraded through firmware updates in the upper computer software.

The upper computer is connected to the BMS through RS485.

4、Functional framework



5、Electrical characteristics

Project	Min	Max	Type	Unit
Normal operating voltage	40	59	48	V
Normal charging voltage	/	60	54	V
Operating temperature range	-20	70	25	℃
Storage temperature	-40	85	25	℃
Use environment humidity	10	85	/	%
Continuous charging current	/	120	20	A
Continuous discharge current	/	120	20	A
Discharge output resistance	<2			mΩ
Normal operating power	<100			mA
Dormancy power consumption		50	0	uA

6、Basic parameters

6.1、Basic parameter settings

Function name	Function settings	Item list	Set value	Setting range
Single voltage alarm	Open	Single voltage alarm	3500mV	Can be set
		High voltage recovery of monomer	3400mV	Can be set
	Open	Single low voltage alarm	2900mV	Can be set
		Low voltage recovery of monomer	3100mV	Can be set
Monomer overvoltage protection	Open	Monomer voltage protection	3650mV	Can be set
		Recovery of monomeric overvoltage	3400mV	Can be set
		Overvoltage recovery conditions	1.monomer voltage drop overvoltage recovery point 2.residual capacity below intermittent recharge capacity 96% **Note: Two conditions must be met to recover**	
			It is detected that the battery has a discharge current≥3A	
Monomer undervoltage protection	Open	Under voltage protection voltage	2700mV	Can be set
		Under voltage recovery voltage	3100mV	Can be set
		Single under voltage shutdown	Shut down after undervoltage protection and maintain 1 minute communication	
		Under voltage recovery conditions	Charging current detected ≥1 A	
Battery total voltage alarm	Open	Total voltage high voltage alarm	56.0V	Can be set

		Total voltage recovery	54.0V	Can be set
	Open	Total voltage Low voltage Alarm	46.4V	Can be set
		Total voltage and low voltage recovery	48.0V	Can be set
Total voltage overvoltage protection	Open	Total voltage overvoltage protection	57.6V	Can be set
		Total voltage relief	54.0V	Can be set
		Overvoltage recovery conditions	1.monomer voltage drop overvoltage recovery point 2.residual capacity below intermittent recharge capacity 96% **Note: Two conditions must be met to recover**	
			Discharging current detected ≥3 A	
Total voltage undervoltage protection	Open	Total voltage undervoltage protection	41.6V	Can be set
		Total undervoltage recovery	46.4V	Can be set
		Total undervoltage shutdown	Shut down after undervoltage protection and maintain 1 minute communication	
		Undervoltage recovery conditions	Charging current detected ≥1A	
Cell temperature forbidden to charge	Open	Charge High Temperature Alarm	50℃	Can be set
		Charging High Temperature Recovery	47℃	Can be set
		Overcharge protection	55℃	Can be set

		Overcharge recovery	50℃	Can be set
		Charge Low Temperature Alarm	2℃	Can be set
		Low temperature charging recovery	5℃	Can be set
		Undercharge protection	-10℃	Can be set
		Recovery of undercharging	0℃	Can be set
Cell temperature forbidden to discharge	Open	High Temperature Discharge Alarm	52℃	Can be set
		High temperature discharge recovery	47℃	Can be set
		Discharge overtemperature protection	55℃	Can be set
		Discharge overtemperature recovery	50℃	Can be set
		Low temperature discharge alarm	-10℃	Can be set
		Low temperature discharge recovery	3℃	Can be set
		Discharge undertemperature protection	-15℃	Can be set
		Discharge undertemperature recovery	0℃	Can be set

Environmental temperature protection	Open	Environmental High Temperature Alarm	50℃	Can be set
		Environmental High Temperature Recovery	47℃	Can be set
		Environmental Over-temperature Protection	60℃	Can be set
		Environmental Overheating Recovery	55℃	Can be set
		Environmental Low Temperature Warning	0℃	Can be set
		Environmental Low Temperature Recovery	3℃	Can be set
		Environmental under-temperature protection	-10℃	Can be set
		Environmental undertemperature recovery	0℃	Can be set
Power temperature protection	Open	Power High Temperature Alarm	90℃	Can be set
		Power High Temperature Recovery	85℃	Can be set
		Overpower protection	100℃	Can be set
		Power overtemperature recovery	85℃	Can be set

Charge Overcurrent Alarm	Open	Charge Overcurrent Alarm	110A	Can be s
		Charging Overcurrent Recovery	90A	Can be s
Charging Overcurrent Protection	Open	Charging Overcurrent Protection	120A	Can be s
		Charging Overcurrent Protection	10S	Can be s
		Overcurrent recovery conditions	Discharge recovered immediately or automatically after 60	
Effective charging current	Charge into curren		1000mA	
	Charge into curren		800mA	
Charge Overcurrent Alarm	Open	Discharge Overflow Warning	-110A	Can be set
		Discharge overcurrent recovery	-90A	Can be set
Charging Overcurrent Protection	Open	Discharge over-current protection	-120A	Can be set
		Discharge over-current protection	10S	0S~10S
		Overcurrent recovery conditions	Discharge recovered immediately or automatically after 60 S	
Boost remote supply mode	Close	Charging voltage setting	56.4V	Boost voltage setting ~60V
		Boost voltage setting	55.0V	48V～57V

Lithium main mode	Close	The intelligent lithium enters the constant voltage discharge state according to the voltage change of the bus of the power system, which can realize the priority discharge of the intelligent lithium main use.		
Effective discharge current	Discharge into current		-1000mA	
	Discharge withdrawal current		-800mA	
Core equalization function	Open	Standby balance	Uncharged/discharge state open equilibrium	
		Standby equalization time	10 hours	Can be set
	Open	Charge Balance	Open equalization in charging state and floating state	
	On voltage condition	Balanced on voltage	3400mV	Can be set
		Equilibrium Open Pressure	30mV	
		Equilibrium end differential pressure	20mV	
	Open	Equilibrium temperature limits	Close the temperature range evenly according to the (**ambient alarm temperature**)	
		Equilibrium High Temperature Ban	50℃	Can be set
		Equilibrium cryogenic prohibition	0℃	
Core Failure Alarm	Open	Failure Pressure Differential	500mV	Can be set
		Core recovery pressure differential	300mV	
Battery	Battery rated capacity		100Ah	5Ah~200Ah

capacity setting	Battery residual capacity		Estimation of core voltage	Can be set
	Accumulated cycle capacity		80%	Can be set
	Open	Residual capacity alarm	10%	
	Close	Residual capacity protection	5%	
BMS Power Management	Open	Maximum standby time	48h（Charger is not present and no effective discharge current）	
Low temperature heating of core	Open	Low temperature heating of core	0℃	Can be set
		Heating on logic	10℃	
		Heating on logic	The charger is on line and the temperature of the cell reaches the opening condition. Turn on and heat up.No heating in standby state and discharge state	
External switches	Open	BMS in standby state can operate external switch off and turn on BMS.		
LCD screen	Open	Simple monitoring software, can view the core,temperature, current and other data.		
Compensation impedance	Compensation point 1	0mΩ	9	Can be set

6.2、Basic mode of work

6.2.1、Charging mode

BMS enters charging mode when it detects that the charger is connected and the external charging voltage is greater than the internal battery voltage by more than 0.5V, and the charging current reaches the effective charging current.

6.2.2、Discharge mode

BMS enters discharge mode when it detects a load connection and the discharge current reaches the effective discharge current

6.2.3、Standby mode

When neither of the above two modes is met, enter standby mode.

6.2.4、Shutdown mode

Normal standby for 24 hours, battery triggered undervoltage protection, execution of button shutdown or external switch shutdown, BMS enters shutdown mode.

Wake up conditions for shutdown mode: 1. Charging activation; 2. 48V voltage activation; 3. Press the button to start the machine; 4. External switch.

6.3、LED indicator instructions

6.3.1、LED light sequence

1 running light, 1 alarm light, 4 capacity indicator lights

●	●	●	●	●	●
SOC				ALARM	RUN

6.3.2、Capacity indication

Status		Charging				Discharging			
Capacity indicator light		L4●	L3●	L2●	L1●	L4●	L3●	L2●	L1●
Remaining capacity	0～25%	Extinguished	Extinguished	Extinguished	Twinkling	Extinguished	Extinguished	Extinguished	Light
	25～50%	Extinguished	Extinguished	Twinkling	Light	Extinguished	Extinguished	Light	Light
	50～75%	Extinguished	Twinkling	Light	Light	Extinguished	Light	Light	Light
	≥75%	Twinkling	Light	Light	Light	Light	Light	Light	Light
Operation indicator ●		Light				Twinkling			

6.3.3、Twinkling Description

Twinkling pattern	Light	Extinguished
Twinkling1	0.25s	3.75s
Twinkling2	0.5s	0.5s
Twinkling3	0.5s	1.5s

6.3.4、Status indicator

System	Running	RUN	ALM	SOC	Illustration

status	state	●	●	●	●	●	●	
Shutdown	Hibernate	Extinguished	Extinguished	Extinguished	Extinguished	Extinguished	Extinguished	All Extinguished
Standby	Normal	Light	Extinguished	Based on battery indicator				Position in readiness
Charging	Normal	Light	Extinguished	Based on battery indicator				The Highest LED Twinkling2
	Overcurrent alarm	Light	Twinkling2	Based on battery indicator				The Highest LED Twinkling2
	Overvoltage protection	Light	Extinguished	Based on battery indicator				
	Temperature and overcurrent protection	Light	Twinkling1	Based on battery indicator				
Discharging	Normal	Twinkling3	Extinguished	Based on battery indicator				According to the constant light indication of the battery level
	Alarm	Twinkling3	Twinkling3					
	Protection against temperature, overcurrent, short circuit, etc	Extinguished	Light	Extinguished	Extinguished	Extinguished	Extinguished	Stop discharging, no action required to force sleep after 24 hours when the mains power is offline
	Under voltage protection	Extinguished	Extinguished	Extinguished	Extinguished	Extinguished	Extinguished	Stop discharging

7、Functional description

7.1、Standby state

After the BMS is properly connected and powered on, without overvoltage, undervoltage, overcurrent, short circuit, over temperature, under temperature or other protective states, press the button to turn on the BMS, and it will be in standby mode.

In BMS standby mode, the running light flashes and the battery can be charged and discharged.

7.2.Over-protection and rehabilitation

7.2.1、Monomer overcharge protection and recovery

If any section of the battery core is higher than the set value of the monomer overcharge protection, the BMS enters the overcharge protection state, and the charging equipment can not charge the battery.

After the monomer overvoltage protection, when the maximum monomer voltage drops below the monomer overcharge recovery value and the SOC is below 96%, the overcharge protection state is relieved. can also discharge release.

7.2.2、Total voltage overcharge protection and recovery

If the battery voltage is higher than the set value of the total voltage overcharge protection, the BMS enters the overcharge protection state, and the charging equipment can not charge the battery. If the total voltage drops below the recovery value and SOC below 96%, the overcharge protection is relieved. It can also be released Except.

7.3、Protection and rehabilitation

7.3.1、Protection and restoration of monomers

If any section of the battery core is lower than the set value of the monomer over-discharge protection, the BMS enters the over-discharge protection state, and the load can not discharge the battery. Hold 1 minute communication after BMS shutdown.

After over-discharge protection occurs, charging the battery pack can release the over-discharge protection state. or press the reset button, BMS will boot to re- detect whether the battery pack voltage reaches the recovery value.

7.3.2、Total pressure protection and recovery

When the battery voltage is lower than the total voltage over-discharge protection set value, the BMS enters the over-discharge protection state, and the load can not discharge the battery. Hold 1 minute communication after BMS shutdown.

After over-discharge protection occurs, charging the battery pack can release the over-discharge protection state. or press the reset button, BMS will boot to re- detect whether the battery pack voltage reaches the recovery value.

7.4、Charging overcurrent protection and recovery

Charging overcurrent protection can be triggered when there is no charging current limiting function.when the charging current exceeds the charging overcurrent protection setting value and reaches the delay time. BMS access charging overcurrent protection, charging equipment can not charge the battery.

After charging overcurrent protection occurs, the BMS automatically delays recovery and re-detects the external charger current. discharge can also remove the charging overcurrent protection.

7.5、Discharge overcurrent protection and recovery

When the discharge current exceeds the discharge overcurrent protection setting value and reaches the delay time. BMS into the discharge overcurrent protection, the load can not charge the battery.

After the discharge overcurrent protection occurs, the BMS automatically delays recovery and re-detects the external load current. charging can also release the discharge overcurrent protection.

Discharge over-current protection has two-stage protection to achieve transient over-current protection and discharge over-current protection recovery. Transient protection occurs when the number of times the condition will be locked, recovery must be turned off in the boot or charge release.

7.6、Temperature protection and recovery

BMS has 6 temperature detection ports to monitor temperature changes and achieve protection measures.

7.6.1、High temperature protection and recovery during charging and discharging

When the NTC of any of the four battery cells is higher than the set value for high temperature protection during charging and discharging, the BMS enters high temperature protection. BMS stops charging or discharging.

When the temperature of the battery cell is lower than the high temperature recovery value, the BMS resumes charging or discharging.

7.6.2、Low temperature protection and recovery during charging and discharging

When the NTC of any of the four battery cells is lower than the set value for low-temperature protection during charging and discharging, the BMS enters low-temperature protection. BMS stops charging or discharging.

When the temperature of the battery cell is higher than the low-temperature recovery value, the BMS resumes charging or discharging.

7.6.3、Environmental temperature protection, power temperature protection

When NTC detects that the ambient temperature is higher than the set value for high ambient temperature, the BMS enters environmental high temperature protection. BMS stops charging and discharging.

When NTC detects that the power temperature is higher than the power protection setting value, BMS enters power high temperature protection. BMS stops charging and discharging.

7.7、Balancing function

he BMS should have standby and charging equalization functions. The BMS system adopts an energy consuming equalization circuit, and the equalization open voltage software is adjustable. Any section of the equalization open condition is higher than the equalization open voltage and the voltage difference reaches the condition together.

When the charging is stopped or the cell pressure difference is less than the set value, the equalization stops.

7.8、Turn on/off

Serial Number	Function	Definition
1	Boot/Start	When the BMS is in a sleep state, pressing the reset button will activate the BMS, After the LED indicators turn on Twinkling in sequence, they will switch to Normal working mode.
2	Shutdown	When the BMS is in standby or discharge mode, press

	/Hibernate	this button for 6 seconds, and the BMS will be hibernated. After the LED indicators turn on Twinkling in sequence, the BMS will enter sleep mode. BMS has no power consumption after sleep.
3	External switch	External switches can control BMS on/off, with priority given to external switches.

7.9、Storage function

The storage content includes: protection and alarm categories, recovery time of protection and alarm, individual battery voltage, total battery pack voltage, charging/discharging capacity, charging/discharging current, temperature, etc.

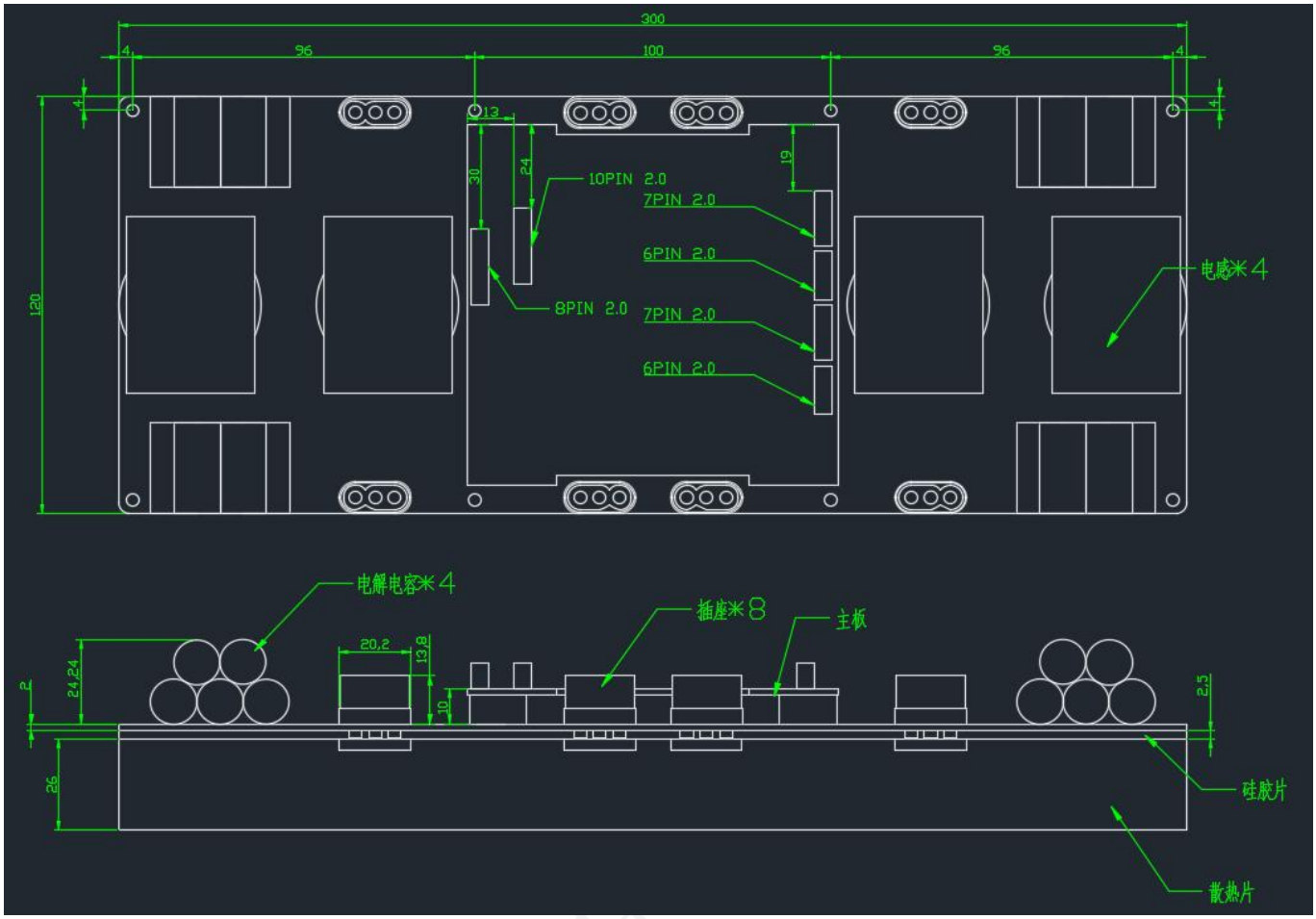
Record in year/month/day/hour/minute/second, or record the information content within a certain time period through settings.

The information storage capacity shall not be less than 300 pieces.

Historical data can be read from the upper computer and saved as an Excel file to the computer.

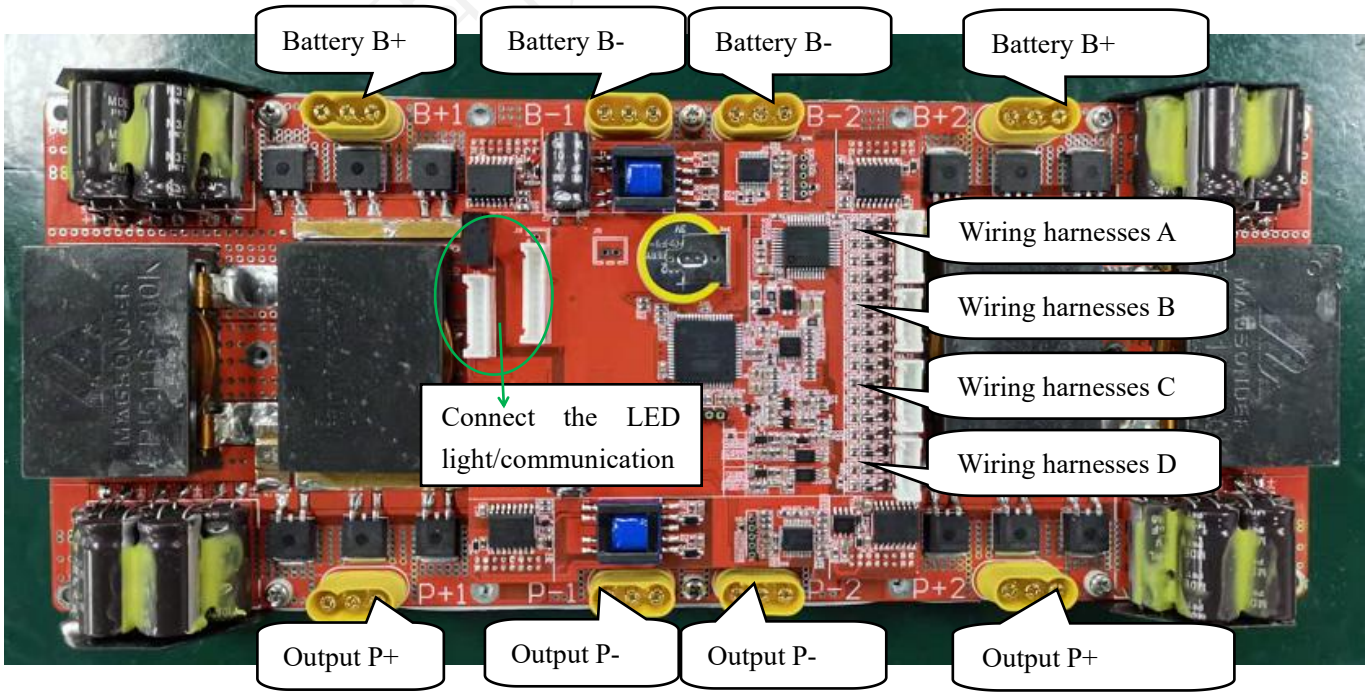
8、Dimensional positioning diagram

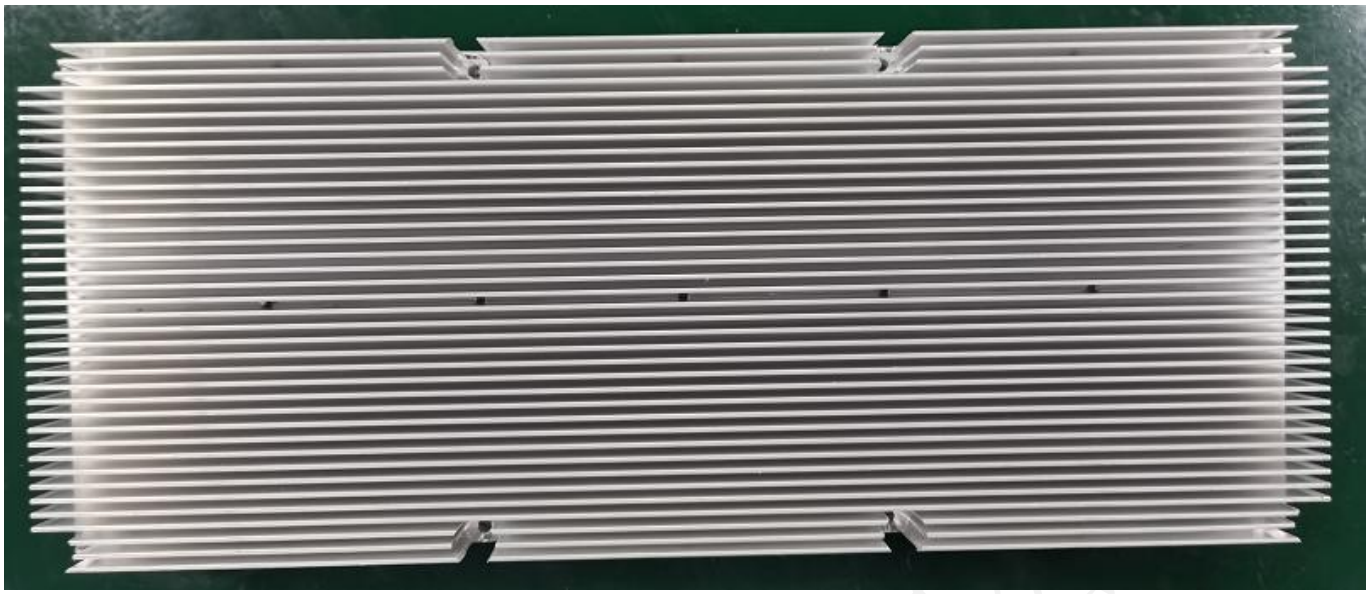
Motherboard size drawing

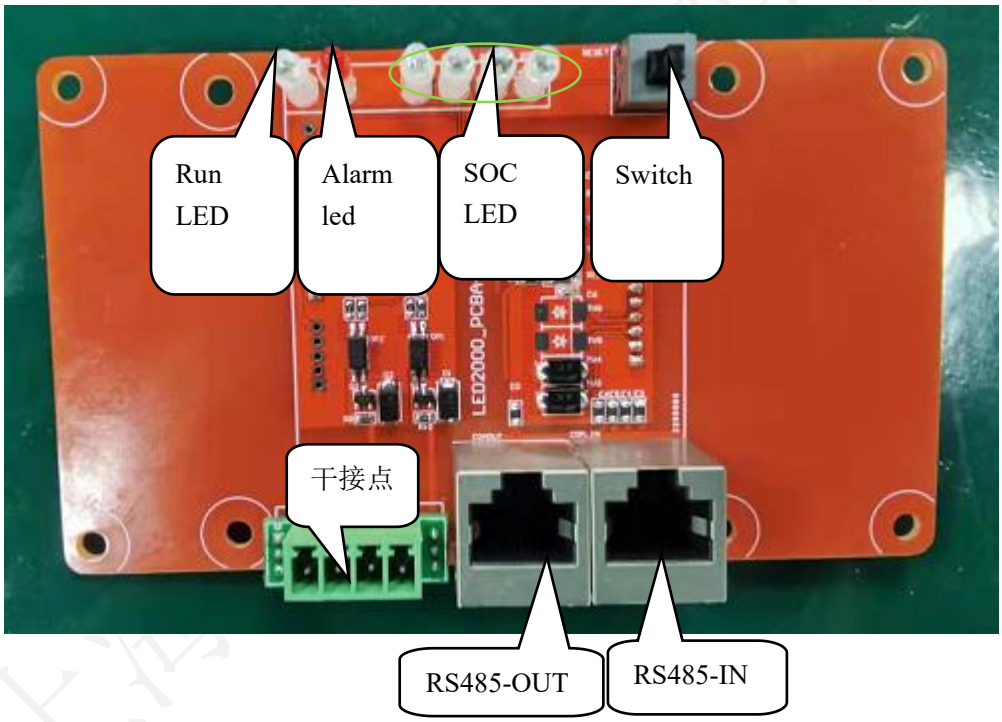


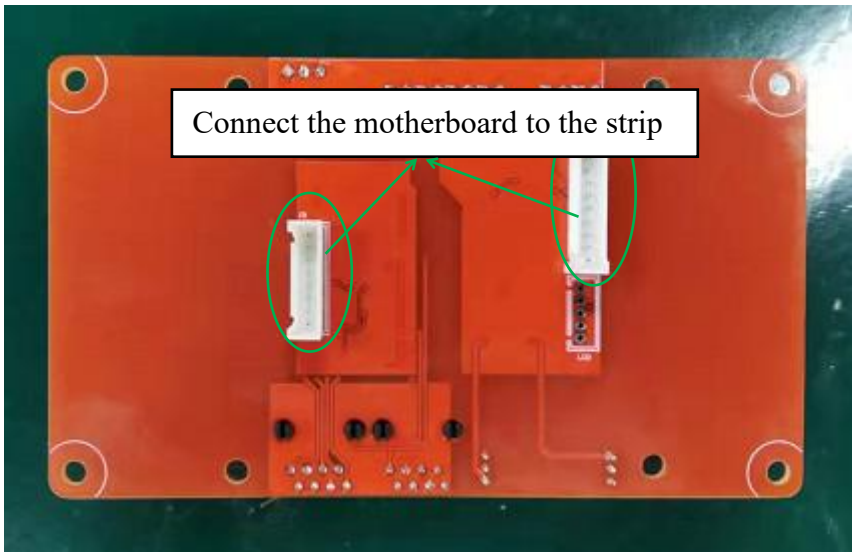
LED light/communication size drawing

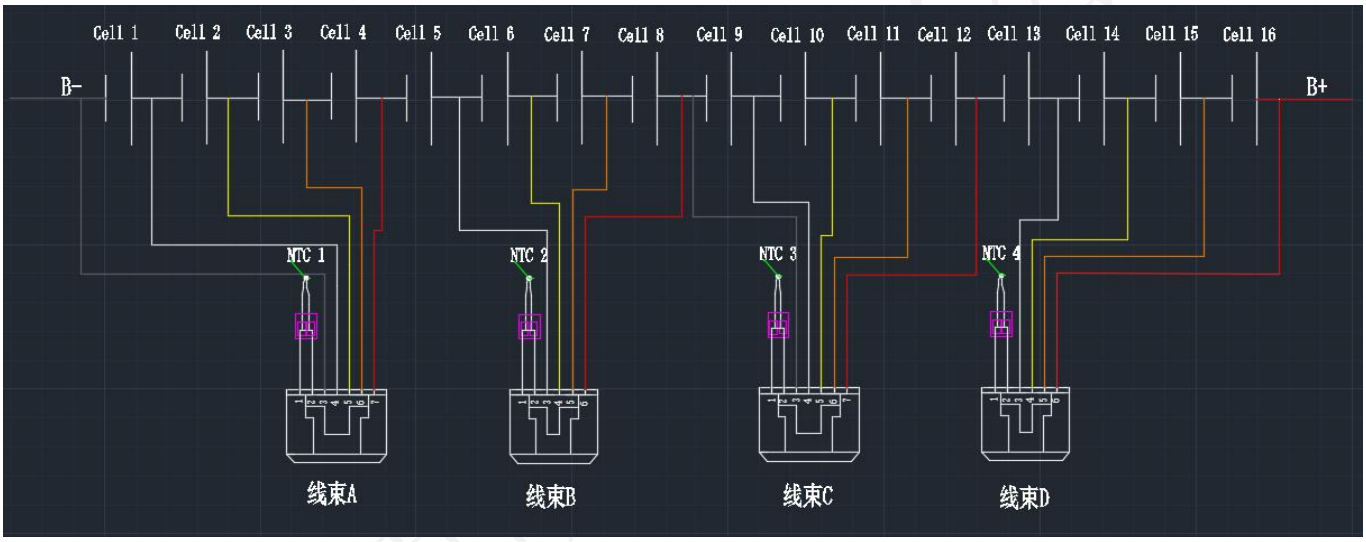
9、Reference diagram and connection instructions





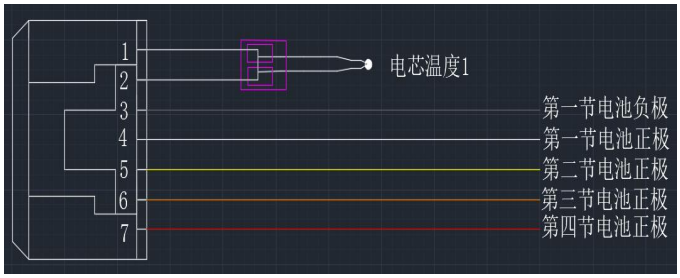

Run
LED
Alarm
led
SOC
LED
Switch
干接点
RS485-OUT
RS485-IN

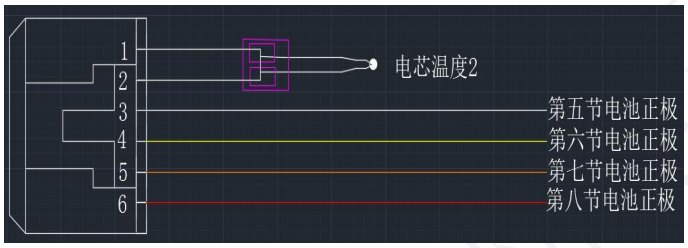


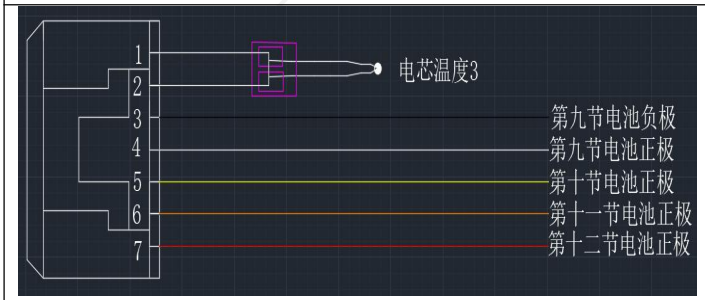


Note: There may be some differences between the actual product and the physical image of the above products

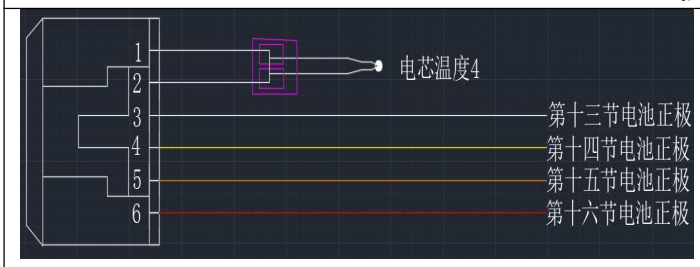
9.1、Wiring definition

线束 A		
	NTC1+	Connect the temperature sensor NTC1
	NTC1−	Connect the temperature sensor NTC1
	CELL1−	Connect the negative terminal of the first battery
	CELL1+	Connect the positive terminal of the first battery
	CELL2+	Connect the positive terminal of the second battery
	CELL3+	Connect the positive terminal of the third battery
	CELL4+	Connect the positive terminal of the fourth battery

线束 B		
	NTC2+	Connect the temperature sensor NTC2
	NTC2−	Connect the temperature sensor NTC2
	CELL5+	Connect the positive terminal of the fifth battery
	CELL6+	Connect the positive pole of the sixth battery
	CELL7+	Connect the positive terminal of the seventh battery
	CELL8+	Connect the positive terminal of the eighth battery

线束 C		
	NTC3+	Connect the temperature sensor NTC3
	NTC3−	Connect the temperature sensor NTC3
	CELL9−	Connect the negative pole of the ninth battery
	CELL9+	Connect the positive pole of the ninth battery
	CELL10+	Connect the positive terminal of the tenth battery

	CELL11+	Connect the positive terminal of the eleventh battery
	CELL12+	Connect the positive terminal of the twelfth battery

线束 D		
	NTC4+	Connect the temperature sensor NTC4
	NTC4−	Connect the temperature sensor NTC4
	CELL13+	Connect the positive pole of the thirteenth battery
	CELL14+	Connect the positive terminal of the fourteenth battery
	CELL15+	Connect the positive terminal of the fifteenth battery
	CELL16+	Connect the positive terminal of the sixteenth battery

9.2、 Power on/off sequence

1）Power on in the following order: first connect the motherboard B-, connect the wiring harness A, harness B, harness C, harness D, connect the motherboard B+, and finally connect P+ and P- to the charger or load (Note: the motherboard is connected to the power off state after the wire, press the reset button to turn on or close the external switch, charging can also activate BMS).

2） The power-down sequence is completely reversed: first disconnect the charger or load (Note: press the 6S reset button or disconnect the external switch, the flow light turns off and shuts down the machine once), after disconnecting B+, disconnect harness D, harness C, harness B, harness A, and finally disconnect B-.

3）输入输出

When charging: the positive terminal of the charger is connected to the "P+" of the protection board, and the negative terminal of the charger is connected to the "P-" of the protection board.

When discharging: the positive terminal of the load is connected to the "P+" of the protection plate, and the negative terminal of the load is connected to the "P-" of the protection plate.

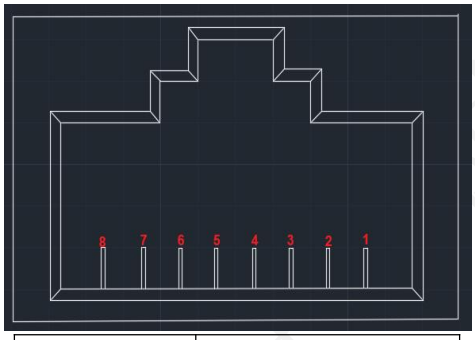
Note: The positive/negative power lines on the BMS must be combined together (terminal model: MR60PB-M). As shown in the following figure

10、Communication instructions

10.1、RS485-IN communication

BMS has battery pack RJ45 communication interface, through RS485-IN interface can be connected to the host computer, baud rate 9600bps.

RS485-IN Communication instructions:

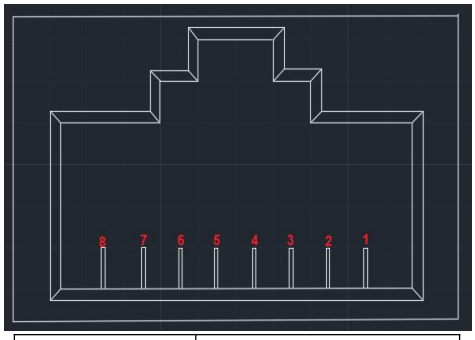


PING	Define a description
1	RS485-B
2	RS485-A
3	GND
4	RS232-TX
5	RS232-RX
6	GND
7	CANH
8	CANL

10.2、RS485-OUT communication

BMS has battery pack RJ45 communication interface, which can be used in parallel through RS485-OUT interface. When paralleled, the RS485-OUT interface is connected to the second RS485-IN interface.

RS485-OUT Communication instructions:

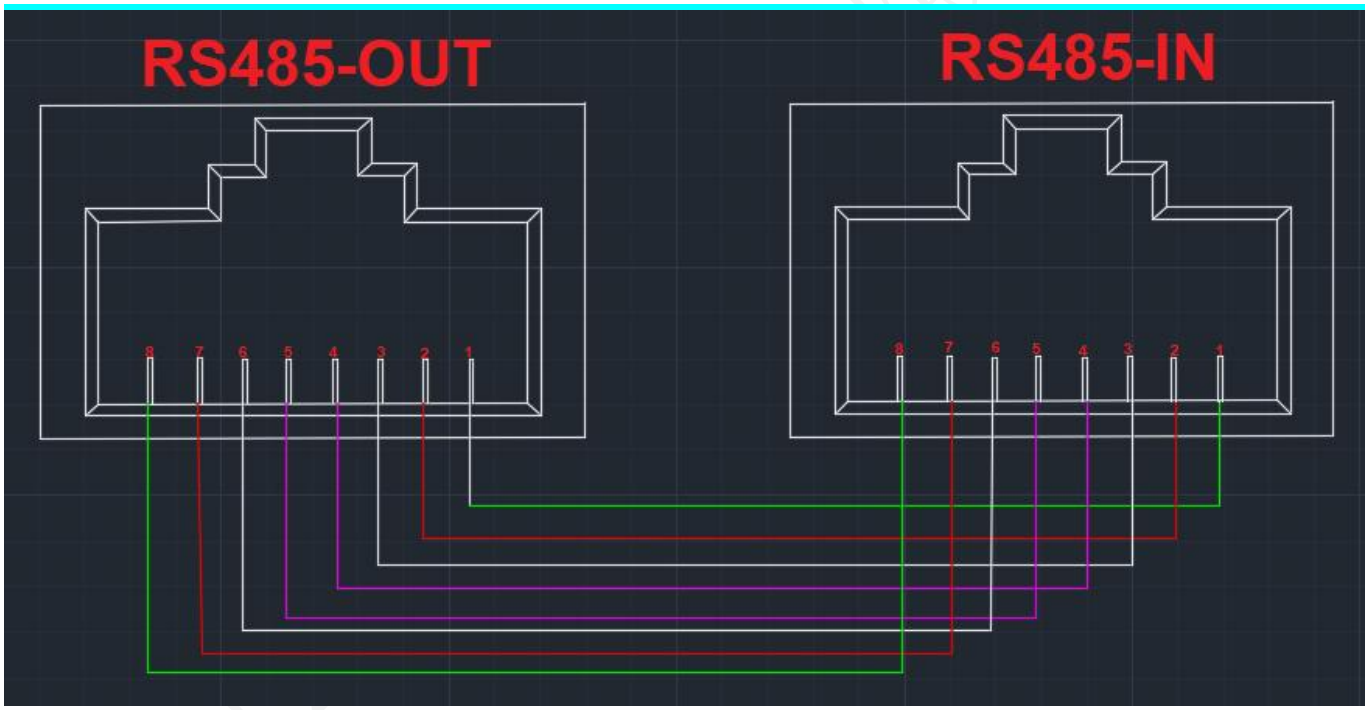


PING	Define a

	description
1	RS485-B
2	RS485-A
3	GND
4	NC
5	NC
6	GND
7	NC
8	NC

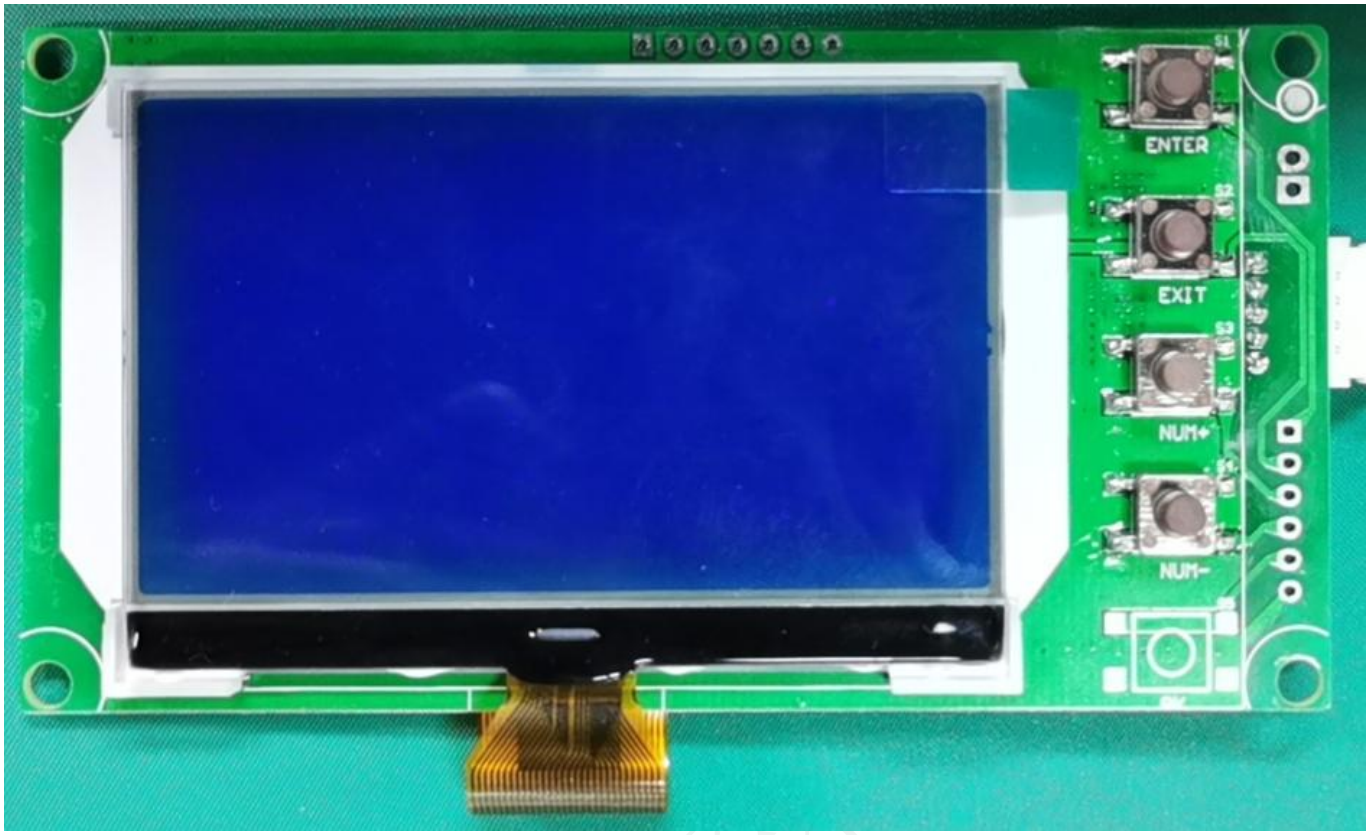
10.3、Parallel communication

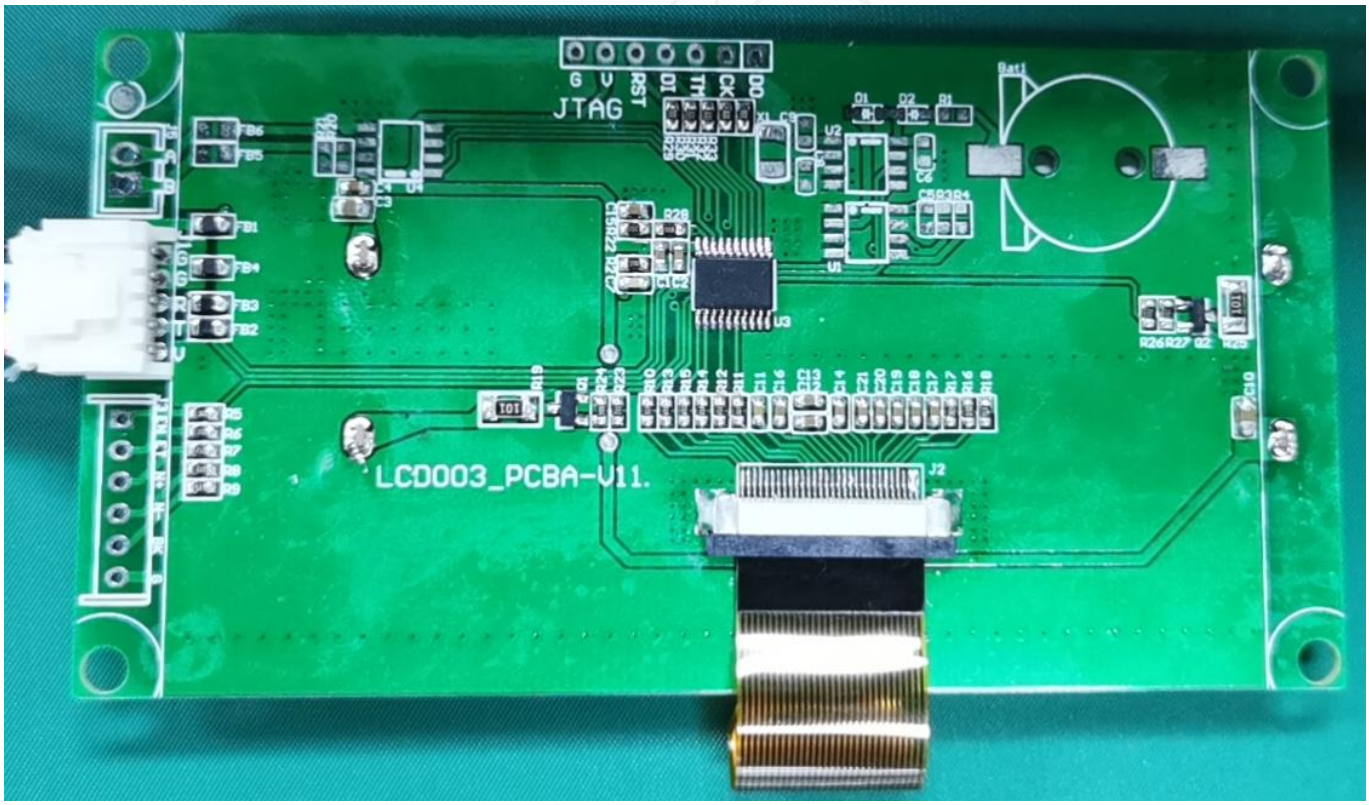
When multiple machines are connected in parallel, the previous group of RS485-OUT interfaces is connected to the next group of RS485-IN interfaces. The terminal device can read the battery data of all parallel packs through the RS485-IN interface. The BMS address is automatically assigned, and when multiple machines are connected in parallel, the RS485 interface connection is shown in the figure below:

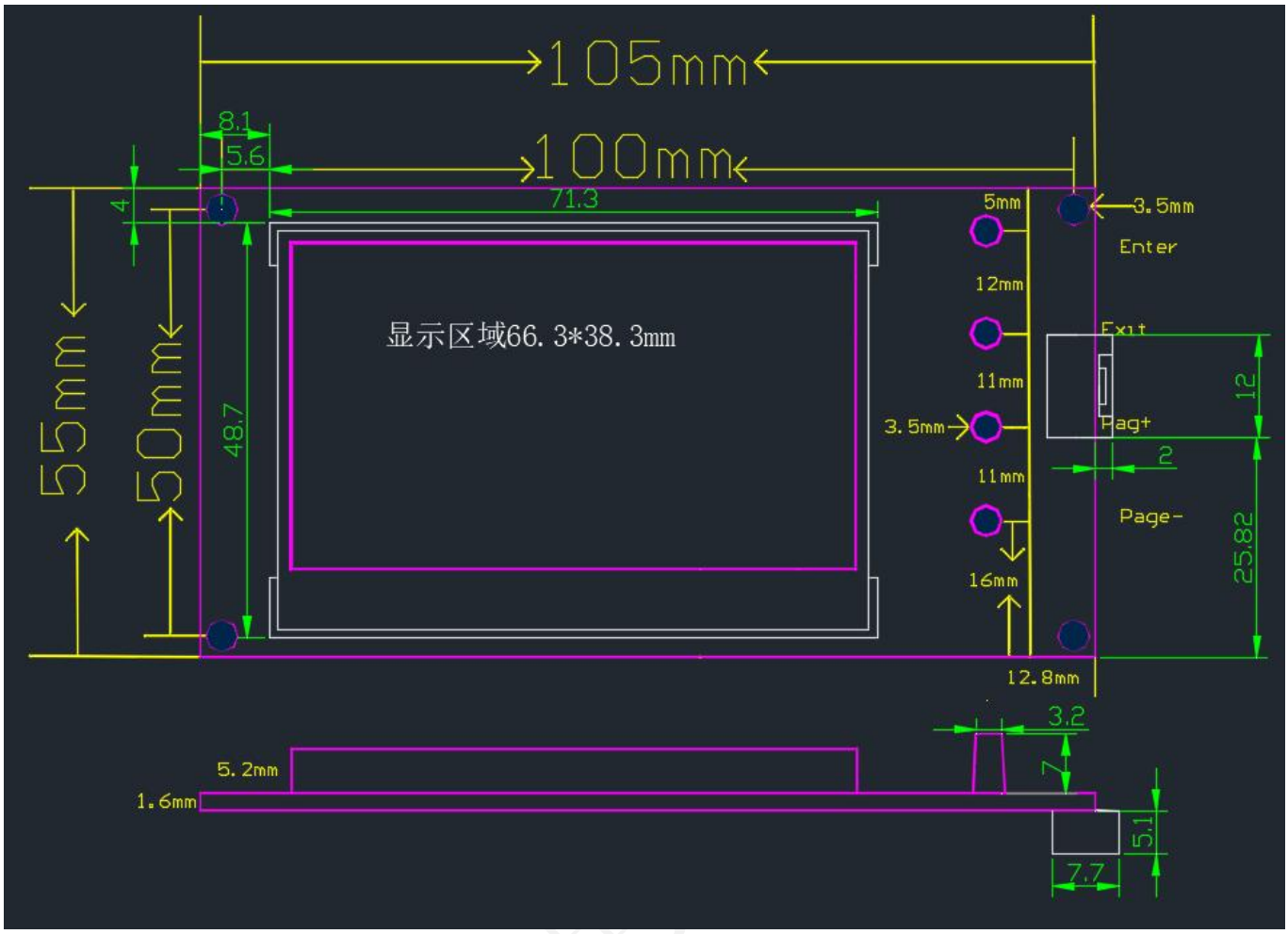


11、LCD screen

Please refer to the LCD screen specification for detailed operating instructionstions 。


ENTER
EXIT
NUM+
NUM-


JTAG
LCD003_PCBA-V11.



Note: Based on the actual shipment of the display screen, our company has two types of display screens: LCD002 and LCD003. The functions and fixing holes of the two display screens are the same.

12、Points for attention

- Battery management systems can not be used in series.
- BMS power components withstand voltage 100 V.
- If the battery module is assembled in the form of long wire and long copper bar, it must communicate with the BMS manufacturer for impedance compensation.Otherwise, it will affect the consistency of the cell.
- The external switch on BMS is prohibited to connect with other equipment. If necessary, please confirm with the technology for docking. Otherwise, BMS will not bear any responsibility for damage.

- Do not touch the surface of the core directly when assembling, so as not to damage the core. The assembly should be firm and reliable.
- In use pay attention to lead wire head, soldering iron, solder and so on do not touch the components on the circuit board, otherwise it may damage the circuit board.
- Use process should pay attention to anti-static, moisture-proof, waterproof and so on.
- Please follow the design parameters and use conditions during use, must not exceed the value in this specification, otherwise it may damage the protection board.
- After combining the battery pack and the protection plate, if you find no voltage output or charge, please check the wiring is correct.
- The final interpretation right is owned by our company.