Class of Secret: Class C - Secret ★

Shenzhen JiabaidaElectronicTechnologyCo., Ltd.

Product Specifications

Customer name:	
Customer product name:	4~24 strings of iron lithium 200A active
Sample Name	equalization software board
Product number:	
Model Name	JBD-DP24S002
Submission date:	
Date	2022-04-18
Version:	
Version	A01
Customer signature and seal:	
SIGNATURES	

change log

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version number	Page/Chapter	Revised by	revision date	modify the content	Remark
A01	full text	Yi Yuanbing	2022.04.18 _ _ _ _	new fiction	

change log

1. Product introduction

JBD-DP24S002 is a software protection board solution specially designed for 4-24 strings of battery packs such as electric forklifts, three-wheelers, and small four-wheelers. It can be applied to lithium batteries of different chemical properties, such as lithium ion, lithium polymer, lithium iron phosphate Wait.

The whole system adopts the active balanced voltage detection method + relay switch, which **can automatically identify the current number of battery strings, connect an** external communication port, and some parameters can be flexibly adjusted through the host computer according to customer needs.

2. Functional configuration

Function	configure	Function	configure
Number of strings supported	4~24S optional	485 communication (isolation)	Optional
Support continuous current	200A max	UART interface (isolated)	none
Number of NTCs	1 built-in, 2 external	CAN communication	Optional
Equalization function	Yes, Active Balance	232 Communication	none
UART interface (non-isolated)	Optional	GPS module	Optional
switch function	Optional	Heating function	Optional
Charging current limit function	none	Bluetooth module	Optional
Parallel use of battery packs	none	Battery packs used in series	not support
History storage function	none	Secondary protection function	none
Pre-discharge function	none	LCD display	Optional
buzzer	Have	LED interface	none

3. Technical parameter

3.1. Basic parameters

Cell Specifications	4~24 strings of iron lithium
Interface Type	Charge and discharge at the same port
Recommended	Iron Lithium: 3.6V*Number of strings
Cell voltage range	Iron Lithium: 2.2~3.75V
Continuous charge	200A max
Continuous discharge	200A max
Running power	≤50mA
Sleep power	≤3mA (including Bluetooth)
Protection board	≤10mR
Operating temperature	-30 ℃ ~75 ℃
Protective plate size	203 ± 2 mm * 116 ± 2 mm * 52 ±2mm (length*width*height)

Note: The test should be performed in an environment with a temperature of 25±2 ℃ and a relative humidity of 65±20%

3.2. The main parameters

	project	Specification			unit
		minimum	Typical value	maximum value	
Function	Iron Lithium Overvoltage Protection Voltage	3.700	3.750	3.800	V
	Overcharge protection delay time	1000	2000	3000	mS
	Iron Lithium Overcharge Protection Recovery Voltage	3.550	3.600	3.650	V
	Iron-lithium over-discharge	2.100	2.200	2.300	V

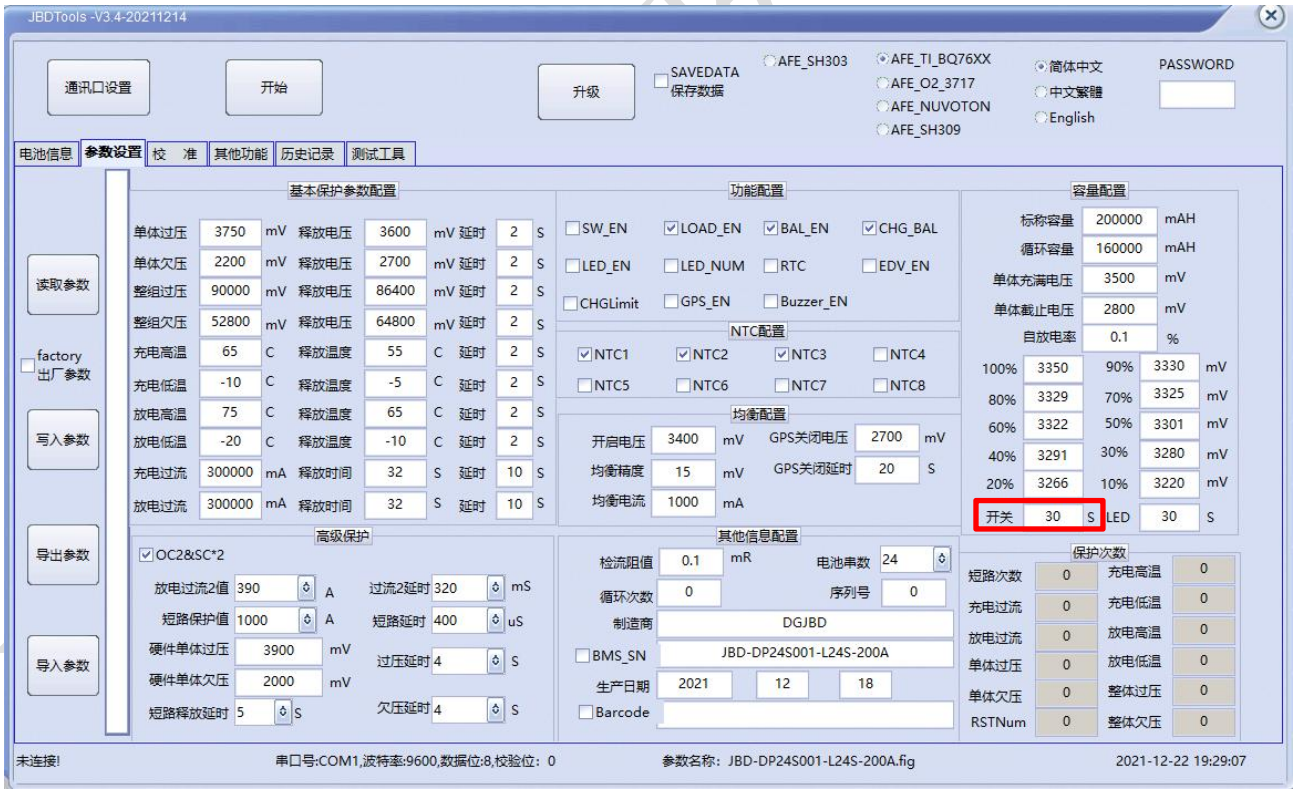
	protection voltage				
	Over-discharge protection delay time	1000	2000	3000	mS
	Iron-lithium over-discharge protection recovery voltage	2. 6 0	2. 7 0	2. 8 0	V
	Over-discharge protection recovery conditions	Voltage recovery\charging recovery			
Charge overcurrent protection	Charge overcurrent protection value	210	220	230	A
	Charge overcurrent delay	7	10	13	S
	Charge Overcurrent Release Condition	Automatic recovery after a delay of 32S			
Discharge overcurrent protection	Discharge overcurrent 1 protection value	210	220	230	A
	Discharge overcurrent 1 protection delay	7	10	13	S
	Secondary discharge overcurrent protection current value	750		850	A
	Secondary discharge overcurrent 2 protection delay	320	640	1280	mS
	Discharge overcurrent protection recovery condition	Automatic recovery after a delay of 32S			
Short circuit protection	Short circuit protection current			2000	A
	Short circuit protection			400	uS

	delay time				
	Short circuit description	Short-circuit description: Short-circuit current less than the minimum value or higher than the maximum value may cause the short-circuit protection to fail. If the short-circuit current exceeds **20 00A** , short-circuit protection is not guaranteed, and short-circuit protection testing is not recommended. The relay switch is delayed and cannot be turned off quickly.			
Discharge high temperature protection (external)	temperature protection value	72	75	78	° C
	Temperature protection release value	62	65	68	° C
Discharge low temperature protection (external)	temperature protection value	-twenty three	-20	-17	° C
	Temperature protection release value	-13	-10	-7	° C
Charging high temperature protection (external)	temperature protection value	62	65	68	° C
	Temperature protection release value	52	55	58	° C
Charging low temperature protection (external)	temperature protection value	-13	-10	-7	° C
	Temperature protection release value	-8	-5	-2	° C
FET discharge high temperature protection Protection (built-in curing)	temperature protection value	85	90	95	° C
	Temperature protection release value	65	70	75	° C

Equalization function	Fe-Li equilibrium turn-on voltage	3.370	3.400	3.430	V
	Lithium iron opening pressure difference		15		mV
	Balance current			1000	mA
		The balance current can be set by the host computer.			
	Balanced way	Charge equalization			
	Balance type	Active equalization			

Note: The test should be performed in an environment with a temperature of 25±2 ℃ and a relative humidity of 65±20%

3.3. Software parameter description:



3.3.1. The host computer needs to use JBDTools V3.4 and above to set the balanced current. You need to select AFE_TI_BQ76XX in the upper right corner, otherwise the hardware protection parameters in the lower left corner will display an error.

3.3.2. The parameters in the red box in the above figure are used to delay the closing of the relay

when there is no charge and discharge current, which can reduce the self-consumption of the protection board, and the unit is S.

3.3.3. Since the protection board has the function of automatically identifying the number of strings, the number of strings cannot be changed by the host computer when the protection board is already working. If you need to change the number of strings, after connecting the detection line, power on again to identify the current number of strings.

3.3.4. Regarding the overvoltage and undervoltage protection values of the entire group , after the protection board automatically recognizes the number of strings , it will calculate the overvoltage and undervoltage protection values of the entire group according to the currently set individual overvoltage and undervoltage protection. The calculation method is : Voltage , undervoltage * number of strings.

4. Function Description

4.1. Overcharge Protection and Recovery

4.1.1. Cell overcharge protection and recovery

When the voltage of any cell is higher than the set value of the overcharge voltage of the cell, and the duration reaches the overcharge delay of the cell, the system enters the overcharge protection state, the relay is turned off, and the battery cannot be charged.

the cell overcharge protection , when the voltage of all cells drops below the cell overcharge recovery value , the overcharge protection state is released. It can also be discharged by discharge.

4.1.2. Overall overcharge protection and recovery

When the overall voltage is higher than the overall overvoltage set value, and the duration reaches the overall overcharge delay, the system enters the overcharge protection state, closes the relay , and cannot charge the battery. When the overall voltage drops below the recovery value of the overall voltage overvoltage protection, the overcharge protection state is released, and it can also be released by discharge.

4.2. Overdischarge protection and recovery

4.2.1. Monomer overdischarge protection and recovery

4.2.1.1. When the minimum cell voltage is lower than the set value of the over-discharge voltage of the cell, and the duration reaches the over-discharge delay of the cell, the system enters the over-discharge protection state, closes the relay , and cannot discharge the battery.

After the cell over-discharge protection occurs, charging the battery pack can release the over-discharge protection state.

4.2.2. Overall overdischarge protection and recovery

When the overall voltage is lower than the overall over-discharge voltage set value, and the duration reaches the overall over-discharge delay, the system enters the over-discharge protection state, closes the relay , and cannot discharge the battery.

After the overall over-discharge protection occurs, charging the battery pack can release the over-discharge protection state.

4.3. Charge Overcurrent Protection and Recovery

When the charging current exceeds the charging overcurrent protection current and the duration reaches the overcurrent detection delay time, the system enters the charging overcurrent protection state and cannot charge the battery. After the charging overcurrent protection occurs, it will automatically recover after a delay. If you want to automatically recover or not, you can set the corresponding release time to be longer; the charging overcurrent state can also be released by discharging.

4.4. Discharge overcurrent protection and recovery

When the discharge current exceeds the discharge overcurrent protection current and the duration reaches the overcurrent detection delay time, the system enters the charging overcurrent protection state and turns off the relay . The system will automatically recover within 32 seconds after the discharge overcurrent occurs, and the corresponding release time can be set longer if automatic recovery is required. Charging can also release the discharge overcurrent condition. Discharge has two-level overcurrent protection function, which has different response speeds for different current values, and protects the battery more reliably.

4.5. Thermal Protection and Recovery

4.5.1. Charge and discharge high temperature protection and recovery

When the NTC detects that the temperature of the battery cell surface is higher than the set high temperature protection temperature during charging and discharging, the management system enters the high temperature protection state, the charging or discharging MOSFET is turned off, and the battery pack cannot be charged or discharged in this state.

When the temperature of the surface of the cell drops to the high temperature recovery set value, the management system recovers from the high temperature state and turns on the charge and discharge MOS again.

4.5.2. Charge and discharge low temperature protection and recovery

When the NTC detects that the temperature of the cell surface is lower than the set low temperature protection temperature during charging and discharging, the management system enters the low temperature protection state, the charging or discharging MOSFET is turned off, and the battery pack cannot be charged or discharged in this state.

When the temperature of the cell surface rises to the low temperature recovery set value, the management system recovers from the low temperature state and turns on the charge and discharge MOS again.

4.5.3. In static state (no charge and discharge), if the temperature rises or falls to the protection board, the protection board will not make any protection action until the system detects that there is current, and then makes the corresponding protection action.

4.6. Equalization function

The management system actively balances the cells by means of energy transfer . When the minimum voltage is higher than the balance switch-on voltage and the voltage difference is above the balance switch-on voltage difference, the system automatically charges the minimum voltage with the highest voltage through DC-DC. The energy of the voltage string is transferred to the low voltage string, reducing energy loss .

The equalization stops when the cell voltage difference is less than the set value or the cell voltage is less than the equalization turn-on voltage. Charge balance mode and static balance mode can be set .

The balance current can be set by the host computer. The system limits the maximum balance current within 1A. It is recommended to set it between 600-800mA.

4.7. Capacity calculation

The SOC calculation of the battery pack can be accurately performed by integrating current and time. The full capacity and cycle capacity of the battery pack can be set through the host computer, and the capacity can be automatically updated after a complete charge and discharge cycle. It has the function of calculating the number of charge and discharge cycles. When the cumulative discharge capacity of the battery pack reaches the set cycle capacity, the number of cycles increases once.

Note: For newly installed batteries, please set the nominal capacity and cycle capacity according to the battery capacity, and conduct a capacity study, otherwise the capacity inaccuracy may occur. Capacity learning operation: first fully charge to overvoltage protection , then discharge to undervoltage protection , and then charge it again .

4.8. Sleep function

protection board is in static state (no communication, no current, no balance and overvoltage protection.) After a delay of 1 minute, it will enter the sleep state. After entering this state, the protection board will only reduce the frequency of detecting voltage and current and its own power consumption. Communication, dial switch, charging and discharging can automatically exit the sleep mode and turn on the relay.

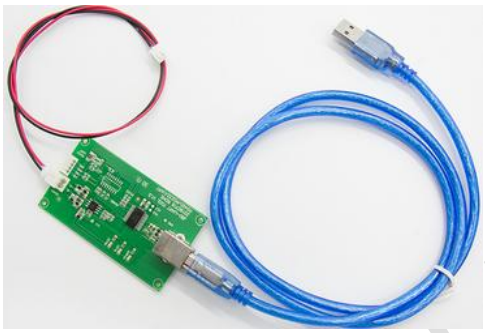
4.9. Automatically identify the number of strings

the cables according to the number of strings required by the customer in Table 7.2, check that the voltage is correct. After connecting the protection board, the protection board can automatically identify the current number of battery strings and automatically change the overvoltage/undervoltage value of the entire group. (A power cycle is required every time the number of strings is changed.)

4.10. Communication function

The protection board can be connected to the computer through the communication box.

The communication format is 9600,8,N,1. The upper computer receives the protection board data:




UART communication box RS485 communication box Bluetooth module

Note: The above three tools need to be purchased separately.

The connection method is: after installing the special driver for our communication box on the computer, insert the USB end of the communication box into the USB port of the computer, and connect the other end to the corresponding interface of the protection board that has been connected to the battery. Open the host computer, click the communication port settings, select the CMO port corresponding to the communication box, and do not change other options. After confirming, click Start to read the data in the protection. **If you need to change the parameters of the protection board, you must first click on the parameter page to read the parameters, and then change the parameters.**

5. main material

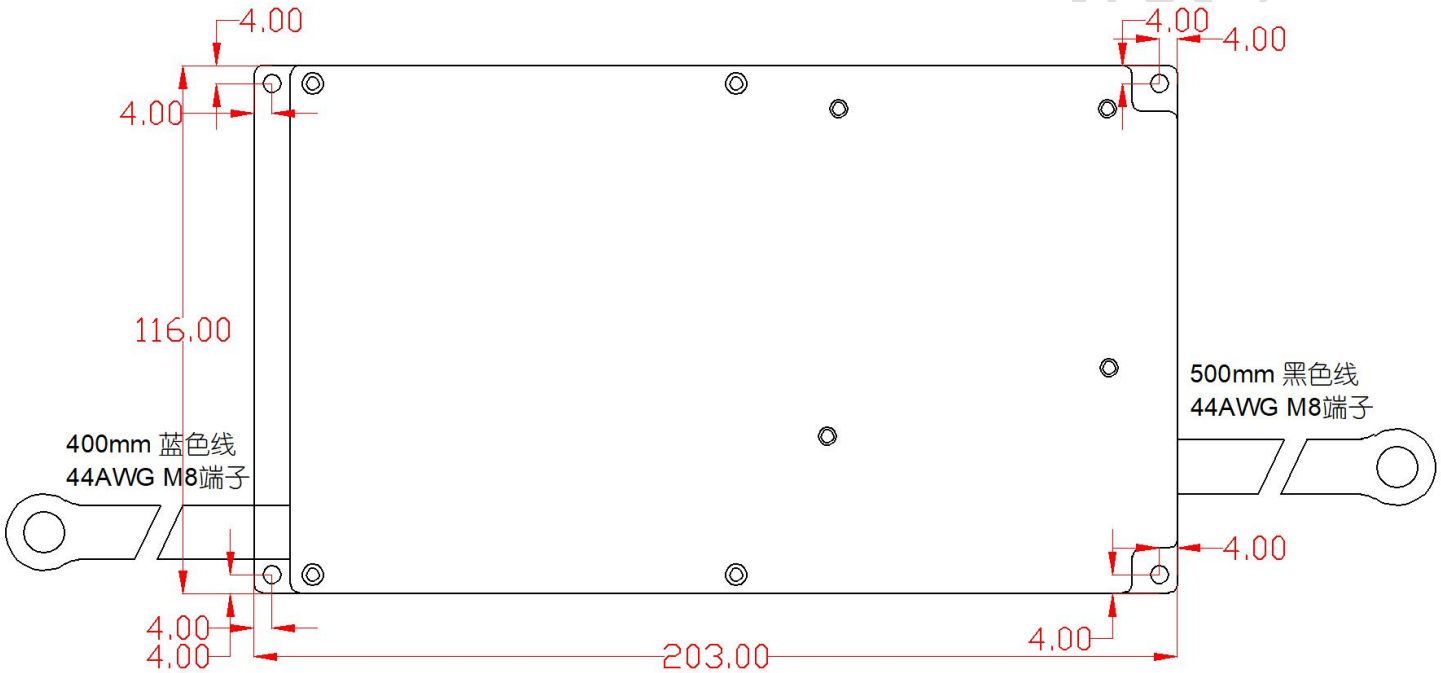
serial number	Material name	Manufacturer
1	NANO100SD3BN	Nuvoton
2	HC32L072KATA	BGI
3	NCEP15T14D	NCE
4	PCB-JBD- D P2 4 S00 2 V1. 2	JBD

Note: The above materials may be replaced by materials with the same specifications or better specifications. If the materials are not allowed to be replaced if there is a certification requirement,

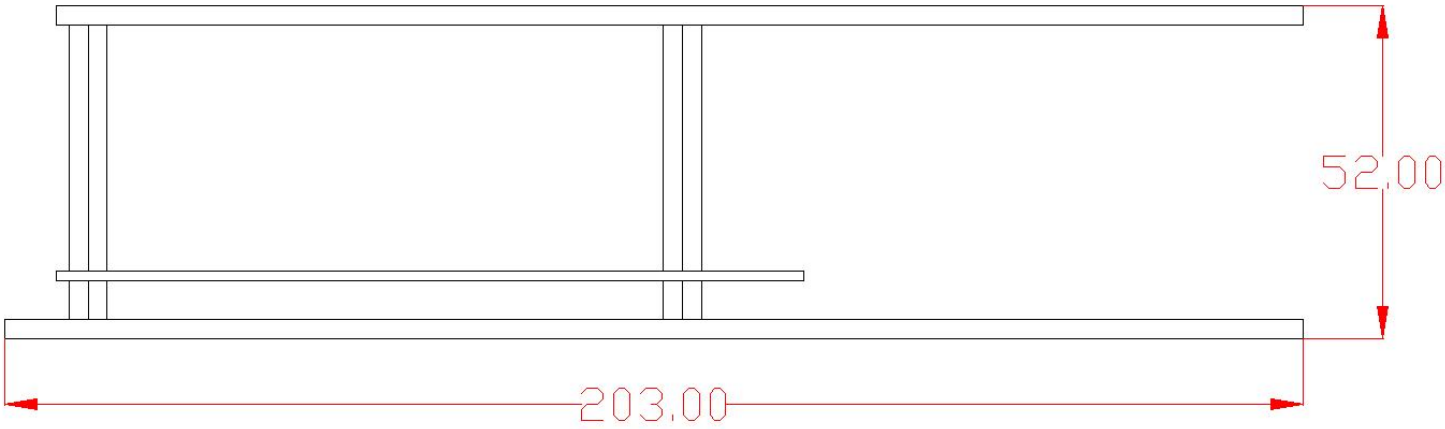
you need to notify our business to send samples again. The controlled specifications, the final interpretation right belongs to Jiabaida .

6. Schematic and Dimensions

6.1. Mark the dimensions and installation point drawing



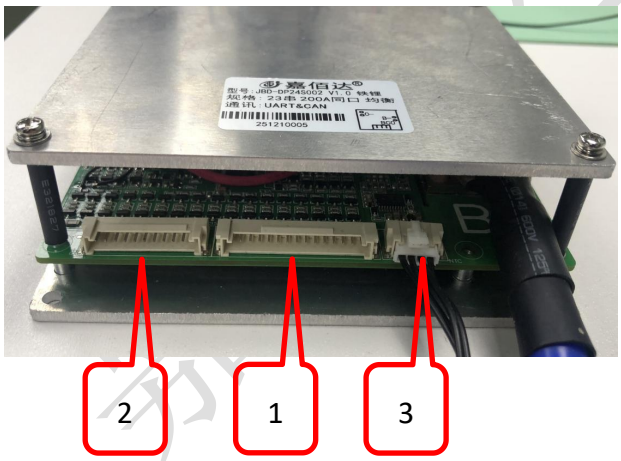
top view

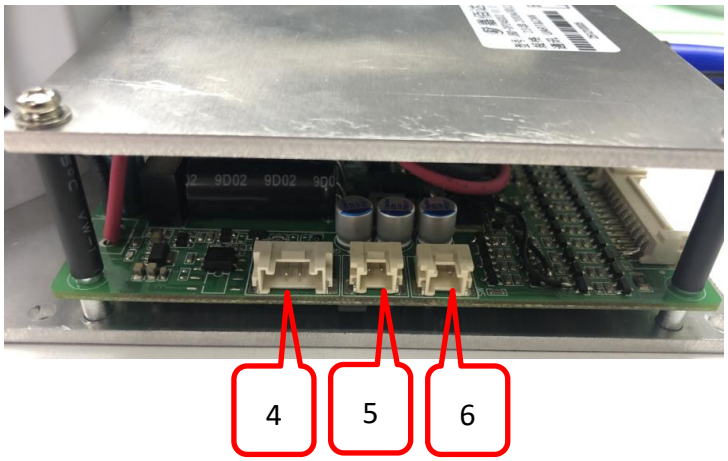


side view

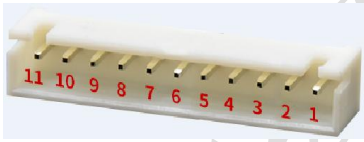
7. Signal port definition

7.1. Schematic marking the interface label (refer to the following figure)





label	Tag number	Function	Schematic diagram of connector	Pin Definition	PIN function definition	illustrate
1	J9	Voltage detection socket	 HY2.0-15PIN	1	Connect to the negative pole of the first cell	
				2	of the first cell	
				3	of the second battery cell	
				4	of the third cell	
				5	of the fourth cell	
				6	of the fifth cell	
				7	of the 6th battery cell	
				8	of the 7th battery cell	
				9	of the 8th battery cell	
				10	of the 9th battery cell	
				11	of the 10th battery cell	
				12	of the 11th battery cell	
				13	of the 12th battery cell	
				14	of the 13th battery cell	

				15	of the 14th battery cell	
2	J8	Voltage detection socket	 H Y2.0-11PIN	1	of the 15th battery cell	
				2	of the 16th battery cell	
				3	of the 17th battery cell	
				4	of the 18th battery cell	
				5	of the 19th battery cell	
				6	of the 20th battery cell	
				7	of the 21st battery cell	
				8	of the 22nd cell	
				9	of the 23rd cell	
				10	of the 24th battery cell	
				11	Connect to the positive pole of the battery pack	BMS power supply positive
3	J10	NTC socket	 HY2.0-4PIN	1	NTC2	
				2		
				3	NTC3	
				4		

4	J5	UART	 HY2.0-4PIN	4	The positive pole of the battery is high voltage , please wire it carefully .	
				3	TXD	
				2	RXD	
				1	GND	
5	J1	CAN RS485	 HY2.0-2PIN	2	RS485-A\CAN-H	
				1	RS485-B\CAN-L	
6	J2	switch	 HY2.0-2PIN	2	K-	
				1	K+	
		B-	M 8 terminal wire 400mm		Connect to the negative pole of the battery pack	
		C-	M 8 terminal wire 500mm		Connect to charge and discharge negative	

7.2. Other serial wiring methods

2 4 strings	Wiring according to the above table	13 strings	BC14-24 no answer
23 strings	BC24 not connected	12 strings	BC13-24 no answer
22 strings	BC23-24 no answer	11 strings	BC12-24 no answer
21	BC22-24 do not answer	10	BC1124 does not answer

strings		strings	
20 strings	BC21-24 no answer	9 strings	BC10-24 no answer
19 strings	BC20-24 no answer	8 strings	BC9-24 no answer
18 strings	BC19-24 no answer	7 strings	BC8-24 does not answer
1 7 strings	BC18-24 no answer	6 strings	BC7-24 no answer
1 6 strings	BC17-24 no answer	5 strings	BC6-24 no answer
1 5 strings	BC16-24 no answer	4 strings	BC5-24 does not answer
1 4 strings	BC15-24 does not answer		

If the customer needs to change the number of strings by themselves, please empty the excess wires in the table and insulate them well, and connect the cable corresponding to the highest number of strings of the cells to the positive pole of the battery pack together with B+.

8. Environmental suitability

8.1. Working conditions:

BMS protection board allows normal operation under the following conditions:

Ambient temperature: -30 ℃ ~+75 ℃ ;

Relative humidity: 5% ~ 90%;

Atmospheric pressure: 86kPa~106 kPa ;

8.2. storage environment

The BMS protection board should be stored in a clean and well-ventilated warehouse with an ambient temperature of -5°C~+40°C, a relative humidity of not more than 70%, and the air must not contain corrosive gases and media that affect electrical insulation, and must not be

affected by any Mechanical shock or heavy pressure. Not subject to direct sunlight, and the distance from the heat source (heating equipment, etc.) should not be less than 2m. Under the above storage conditions, the BMS protection board can be stored for one year.

9. Packing and shipping

9.1. Logo:

The BMS protective plate shall have the following clear and durable marks:

1) Product name and model
2) Cell model
3) Date of manufacture and serial number

9.2. Package

1) The packaging should meet the requirements of moisture-proof and anti-vibration, the packing box should be firm and reliable, the inside of the box should be lined with moisture-proof material, and the product should not move in the box.
2) External carton box, veneer anti- static bag plus bubble bag packaging;

9.3. transportation

1) During transportation, the product shall not be subject to severe mechanical impact, exposure to the sun, rain, chemical corrosive substances and harmful gases; 5.3.2 During the loading and unloading process, the product should be handled with care, and it is strictly forbidden to throw or press it.
2) The height of the packing boxes shall be less than 5 layers.

10. Precautions

1) This management system cannot be used in series.

2) When multiple battery packs using this management system are connected in parallel, make sure that the maximum voltage difference of each battery pack is lower than 3V before parallel connection.
3) When multiple battery packs using this management system are used in parallel, the total charging inrush current of the adapter may be applied to a single battery pack. It should be ensured that the total charging inrush current of the adapter does not exceed the maximum charging inrush current of a single management system.
4) The short-circuit protection function of this management system is suitable for a variety of application scenarios, but it does not guarantee that it can be short-circuited under any conditions. When the total internal resistance of the battery pack and the short-circuit loop is less than 40mΩ, the capacity of the battery pack exceeds the rated value by 20%, the short-circuit current exceeds 1800A, the inductance of the short- circuit loop is very large, or the total length of the short-circuit wire is very long, please test and determine by yourself. Whether this management system can be used.
5) When soldering the battery leads, there must be no wrong or reverse connection. If it is indeed connected incorrectly, the circuit board may be damaged and needs to be re-tested before it can be used.
6) When assembling, the management system should not directly touch the surface of the cell to avoid damage to the circuit board. Assembly should be firm and reliable.
7) During use, be careful not to touch the components on the circuit board such as lead tips, soldering iron, solder, etc., otherwise the circuit board may be damaged.
8) During use, pay attention to anti-static, moisture-proof, waterproof, etc.
9) During use, please follow the design parameters and conditions of use, and must not exceed the values in this specification, otherwise the management system may be damaged.
10) After the battery pack and the management system are combined , please check whether the wiring is correct if you find that there is no voltage output or charging fails when the battery is powered on for the first time .