BMS 16S100A stack

Item Name	BMS16S-100A-LFP			
Version	1.0			
Date	2022-10-01			
Components List	**No**	**Name**	**Model**	**Qty** (pcs)
	1	BMS	BMS16S100	1
	2	16100-HLB restrictor board		1
	3	Interface board	16100-JKB	1
	4	LED indicator board	16100-LED	1
	5	LCD	Optional	
	6	B+ wire	3135_300mm_14#_ Banana head (female)	1
	7	Screw	M 5*10 screw	4
	8	Dry contact terminal	2 EDG 381-4K	1
	9	On/off switch cable	XH2.54_2P_550mm_UL1007_24#Forward	1
	10	LCD cable	Optional	1
	11	Patch cable	XH2.54-HY2.0_10P_300mm_UL1007_24#Double head reverse	1
	12	Main board cable	FC2.54_20P(2*10)_300mm_grey cable_double terminal_with sleeve	1
	13	Patch cable	XH2.54_6P_300mm_UL1007_24# reverse_double reverse_belt buckle	1
	14	LED indicator board cable	XH-10P_XH-11P_500mm_UL1007_24#Double head reverse - buckle	1
	15	Signal cable	HY2.0_800mm_7P_UL1007_reverse_buckle_with NTC	1
	16	Signal cable	HY2.0_800mm_6P_UL1007_reverse_buckle_with NTC	1
	17	Signal cable	HY2.0_800mm_6P_UL1007_reverse_buckle_with NTC (7P shell)	1
	18	Signal cable	HY2.0_800mm_6P_UL1007_reverse_buckle_with NTC (6P shell)	1

Configuration Table

Function		☐None ☑storage 400 strips ☐storage___strip			
	Charging current limiting	☐None ☐5A ☑10A ☐20A ☐___A			
		Definition: When charge current higher than 100A, it will turn on			
	Display	☐none ☐chinese smart ☐english smart ☑<u>optional</u>			
	Dry contatct	☐No		☑Have	
		Definition: Dry contact 1- pin 1 to pin 2: Normally open, low power closed Dry contact 2- pin 3 to pin 4: Normally open, fault protection closed			
	Heating film	☑None		☐Have	
		Definition :			
	Anti-reverse protection	☑None		☐Have	
	Fire extinguisher detection	☑None		☐Have	
		Definition :			
	On/off switch	☐None		☑Have	
	buzzer	☐None		☑Have	
	Locate function	☑None		☐Have	
	Sampling socket	☑Vertical		☐Horizontal	
	Dial switch	☐None ☐2 ☑4 ☐6 ☐___			
	Led light	☐None ☑ALM ☑RUN ☑ON / OFF ☑SOC <u>6 PCS</u>			
	Current sense resistor	<u>10</u> Pcs			
	Cell capacity	☐50AH ☑100AH ☐150AH ☐200AH ☐___AH			
	Bar code	☐XDZN		☑NEUTRAL	
	Special function	1 With independent light board			
		2 Neutral bar code, neutral carton and label			
Communication	communication interface	☐RS232 ☑RS485 ☑parallel biaxial RS485 ☑CAN			
	Upgrade way	☐RS232 ☐RS485			
	communication protocol	☑Telecom RS 232 communication protocol (XDZN – RS 232 – 0.1 ☑Telecom RS 485 communication protocol (XDZN – RS 485-0.1) ☑Telecom CAN communication protocol (XDZN – CAN – 0.1)			

Content

1. Brief Introduction

With the wide application of lithium batteries in the home-energy storage industry, 16100 BMS stands out in the home-energy storage BMS industry because of its excellent performance, high reliability, and cost-effective characteristics.

2. Functional Performance

Y	High integration simulation front end	Y	Adjustable over-current Protection
Y	Isolation power supply circuit	Y	Multiple ways of dormancy and arousal
Y	Integrated serial port IC	Y	Low power consumption
Y	High voltage accuracy	Y	Twin channel RS485 Communication
Y	High current accuracy	Y	Adjustable parameters settings
Y	4 ways for temperature detection	Y	Buzzer alarm function
Y	SOC estimative function	Y	LED indicator function
Y	SOH estimative function	Y	Charging balance function
Y	Short-Circuit Protection	Y	Bluetooth communication

3. Functional Schematic Block Diagram
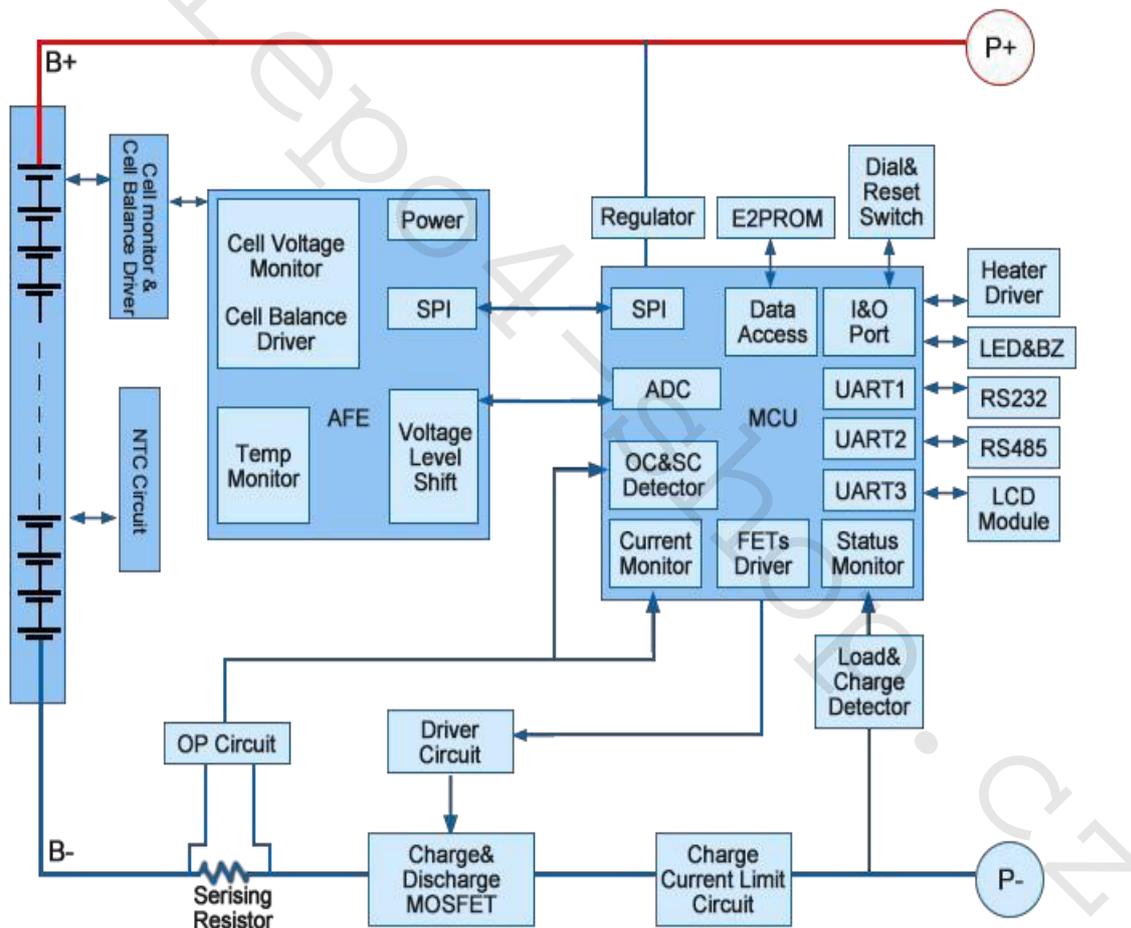
4. Environmental requirements

Item	Parameters	Unit
Working temperature	- 20 ~ 55	℃
Storage temperature	- 20 ~ 55	℃
Working Humidity	10 ~ 85	%RH
Storage Humidity	10 ~ 85	%RH

5. Electrical specification

5.1 Basic parameter Settings

(**Note**: The following parameters are tested at 25°C ambient temperature unless otherwise noted)

		Item	Default parameters	Adjustable or not	Remark
1	Monomer over-charge protection	Monomer over-charge alarm voltage	3600mV	YES	
		Monomer over-charge protection voltage	3650mV	YES	
		Monomer over-charge protection delay	1.0S	YES	
	Monomer overcharge protection release	Capacity release	Soc<96%	YES	
		Monomer overcharge protection release voltage	3350mv	YES	
		Discharge release	Discharging current > 5A		
2	Monomer over-discharge protection	Monomer over-discharge Alarm voltage	2800mV	YES	If the over-release protection cannot be recovered after 5 minutes, the system enters the low-power mode
		Monomer over-discharge protection voltage	2500mV	YES	
		Monomer over-discharge protection delay	1.0S	YES	
	Monomer over-discharge protection release	Monomer over-discharge protection release voltage	2950mV	YES	
		Release when charging	Activating when connected with charger		
3	Overall over-charge protection	Overall over-charge Alarm voltage	57.6V	YES	
		Overall over-charge protection voltage	58.4V	YES	
		Overall over-charge protection delay	1.0S	YES	

	Overall over-charge protection release	Capacity release	53.60V	YES	
		Overall overcharge protection release voltage	Soc<96%	YES	
		Discharge release	Discharge Current > 5A		
4	Overall over-discharge protection	Overall over-discharge Alarm voltage	44.8V	YES	If the over-release protection cannot be recovered after 5 minutes, the system enters the low-power mode
		Overall over-discharge protection voltage	40V	YES	
		Overall over-discharge protection delay	1.0S	YES	
	Overall over-discharge protection release	Overall over-discharge release voltage	47.2V	YES	
		Release when charging	Activating when connected with the charger		
5	Charge overcurrent protection	Charge overcurrent alarm current	105A	YES	10 consecutive occurrences will lock the state and will no longer be automatically released
		Charge overcurrent protection current	110A	YES	
		Charge overcurrent protection delay	1.0S	YES	
	Charge overcurrent protection released	Automatic release	Automatically cancel after 1 minute		
		Discharge release	Discharge current > 2 A		
6	Discharge overcurrent 1 protection	Discharge overcurrent 1 alarm current	105A	YES	10 consecutive occurrences will lock the state and will no longer be automatically released
		Discharge overcurrent 1 protection current	110A	YES	
		Discharge overcurrent 1 protection delay	1.0S	YES	
		The charger current must be less than the charge overcurrent warning value			
	Discharge overcurrent 1 Protection released	Automatic release	Automatically cancel after 1 minute		
		Charge release	Charge current > 2 A		
7	Discharge overcurrent 2 protection	Discharge overcurrent 2 protection current	≥ 150A	YES	10 consecutive occurrences will lock the state and will no longer be automatically released
		Discharge overcurrent 2 protection delay	100 mS	YES	
	Discharge Overcurrent 2 protection released	Automatic release	Automatically released after 1 minute		
		Charge release	Charge current > 2 A		

8	Short circuit protection	Short circuit protection current	≥ 1100A	
		Short circuit protection delay	≤ 200μS	
		Short circuit protection release	When there is charging, the short circuit protection is released	
			After the load is removed, it will automatically released	
9	MOS high-temperature protection	Mos over-temperature alarm temperature	90℃	YES
		Mos over-temperature protection temperature	95℃	YES
		Mos protection release temperature	85℃	YES
10	Cell temperature protection	Charging low-temperature alarm temperature	0℃	YES
		Charging low-temperature protection temperature	-5℃	YES
		Charging low-temperature protection release temperature	0℃	YES
		Charging high temperature alarm temperature	50℃	YES
		Charging high temperature protection temperature	55℃	YES
		Charging high temperature protection release temperature	50℃	YES
		Discharge low temperature alarm temperature	-15℃	YES
		Discharge low temperature protection temperature	-20℃	YES
		Discharge low temperature protection release temperature	-15℃	YES
		Discharge high temperature alarm temperature	55℃	YES
		Discharge high temperature protection temperature	60℃	YES
		Discharge high temperature protection release temperature	55℃	YES

11	Ambient temperature alarm	Ambient low temperature alarm temperature	-15℃	YES	
		Ambient low temperature protection temperature	-20℃	YES	
		Ambient cryogenic protection release temperature	-15℃	YES	
		Ambient high temperature alarm temperature	65℃	YES	
		Ambient high temperature protection temperature	70℃	YES	
		Ambient high temperature protection release temperature	65℃	YES	

12	Consumption current	Self-consumption current during operation	≤ 45 ma (with display)		
			≤ 35 ma (without display)		
		Low power mode current	≤ 200μa (with bluetooth)		
			≤ 150μa (without bluetooth)		
13	Balance function	Balance opening voltage	3400 mv	YES	
		Opening voltage difference	30 mv	YES	
14	Dormancy function	Dormancy voltage	3150 mv	YES	
		Delay time	5 min	YES	
15	Cell failure protection	Monomer differential pressure	Voltage difference> 1V	NO	Charge and discharge are not allowed
16	The judge of full charge	Full charge voltage	> 58.4V	YES	Stopping after meeting at the same time, updating SOC to 100%
		Cut-off current	< 5 A	YES	
17	Current-limiting	Passive current-limiting	Consistent with the overcurrent alarm	No	
		Active current-limiting	Consistent with the overcurrent alarm	YES	
		Low voltage current-limiting	Consistent with the total voltage undervoltage protection value	YES	

5.2 led Instructions

Table 1 LED light Working Status Indication

State	Normal/ Alert/ Protect	ON / OFF 🟢	RUN 🟢	ALM 🔴	Power Indicator LED 🟢	🟢	🟢	🟢	🟢	🟢	Description
Shutdown	Dormancy	Off	Off	Off	Off	Off	Off	Off	Off	Off	Total blackout
Standby	Normal	On	Flash 1	Off	According to the power indicator						Standby state
	Alert	On	Flash 1	Flash3							Module low voltage
Charge	Normal	On	On	Off	According to the power indicator (when the power indicator is the highest/led flashes 2)						The highest power led flashes (flash 2) , and the alarm does not flash when overcharging alarmed
	Alert	On	On	Flash 3							
	Over-charge protection	On	On	Off	On	On	On	On	On	On	If there is no utility power, the indicator turns to standby status
	Temperature, Overcurrent, Inefficiency protection	On	Off	On	Off	Off	Off	Off	Off	Off	Stop charging
Discharge	Normal	On	Flash 3	Off	According to the power indicator						
	Alert	On	Flash 3	Flash 3							
	Undervoltage protection	On	Off	Off	Off	Off	Off	Off	Off	Off	Stop discharge
	Temperature, Overcurrent, Short circuit, Reverse connection, Inefficiency protection	On	Off	On	Off	Off	Off	Off	Off	Off	Stop discharge
Invalid		Off	Off	On	Off	Off	Off	Off	Off	Off	Stop charging and discharging

Table 2 Capacity indication

State		Charge						Discharge					
Capacity indicator		L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●	L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●
Power (%)	0~16.6 %	Off	Off	Off	Off	Off	Flash 2	Off	Off	Off	Off	Off	On
	16.6~33.2 %	Off	Off	Off	Off	Flash 2	On	Off	Off	Off	Off	On	On
	33.2~49.8 %	Off	Off	Off	Flash 2	On	On	Off	Off	Off	On	On	On
	49.8~66.4%	Off	Off	Flash 2	On	On	On	Off	Off	On	On	On	On
	66.4~83.0%	Off	Flash 2	On	On	On	On	Off	On	On	On	On	On
	83.0~100%	Flash 2	On	On	On	On	On	On	On	On	On	On	On
Running indicator ●		On						Flash (flash 3)					

Table 3 led flashing description

Flashing method	On	Off
Flash 1	0.25S	3.75S
Flash 2	0.5S	0.5S
Flash 3	0.5S	1.5S

Note : The LED indicator alarm can be enabled or disabled through the upper computer , and the factory default is enabled.

5.3 Buzzer action instructions

➢ When failed, it will beep for 0.25S every 1S ;

➢ When protected, it will beep 0.25S every 2S ;

➢ When alarming, it will beep for 0.25S every 3S ;

➢ The buzzer function can be enabled or disabled through the upper computer , and the factory default is enabled.

5.4 Button instruction

➢ When the BMS is activated, please press the button (3~6S) and release it. The BMS will enter dormancy mode. The LED indicators will light up for 0.5 seconds from the lowest battery indicator in order.

➢ When the BMS is activated, please press the button (6~10S) and release it. The BMS will enter reset mode. All the LED lights will light up in order until the reset is over.

➢ After the BMS enter reset mode, you can use the "restore default value" of the upper computer to restore the initial parameters. However, the relevant operation records and stored data remain unchanged (such as power, cycle times, protection records, etc.).

5.5 Dormancy and wake up

5.5.1 Dormancy

When meet any of the following conditions, the system enters a low-power consumption mode :
1) The monomer or overall over-discharge protection is not released after 5 minutes.

2) Press the button (3~6S), and release the button.

3) The minimum cell voltage is lower than the dormancy voltage; the duration time reaches the dormancy delay time (No communication, no protection, no balance, and no current at the same time).

4) The standby time is more than 24 hours (no communication, no charge and discharge, no city power).

5) Forced shutdown through the upper computer software.
Before entering the dormancy mode, pls ensures that no external voltage connects to the input terminal. Otherwise, it will not be able to enter the low power consumption mode.

5.5.2 Wake up

When the system is in low power consumption mode and meets any of the following conditions, the system will exit the low power consumption mode and enter the normal operation mode :

1) When connected to a charger, the output voltage of the charger must be greater than 48 V.

2) RS232 communication activated

Note: After Monomer or overall over-discharge protection, it will enter the low power consumption mode and wake up every 4 hours amd turn on the charge and discharge MOS. If it can charge , it will exit the dormancy mode and charge normaly; If 10 consecutive auto-wake times fail to charge, the auto-wake will no longer be available.

6. Communication Description

6.1 RS232 communication

BMS can communicate with the upper computer through the RS 232 interface and monitor various battery information, including battery voltage, current, temperature, status, and production information. The default baud rate is 9600 bps.

6.2 CAN communication

CAN Communication, the default communication rate is 500K.

6.3 RS485 communication

You can view PACK information through the dual RS 485 interface. The default baud rate is 9600 bps. If you need to communicate with a monitoring device via RS485, you can use the monitoring device as the host and polls data based on the address.

6.4 Dail Switch

When the using the PACKs in parallel, you can distinguish different PACKs by setting the address through the Dail switch on the BMS. It is necessary to avoid setting the same address .Following is the Dail switch definition.
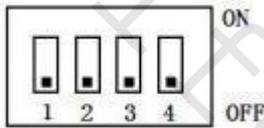
| Address	Dail switch position			
	# 1	# 2	#3	#4
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

7 . Interface definition

7.1 interface Diagram
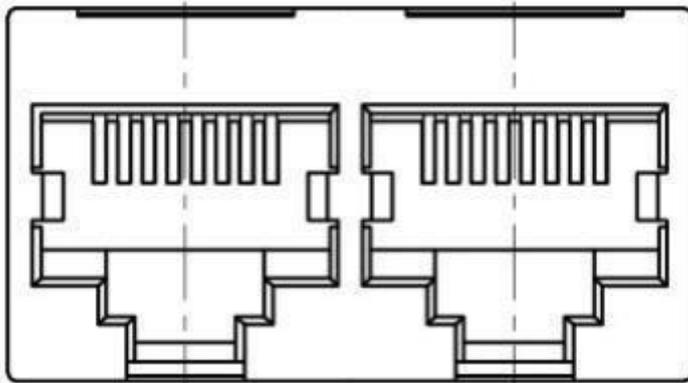
CAN and RS485 Interface

Dry Contact
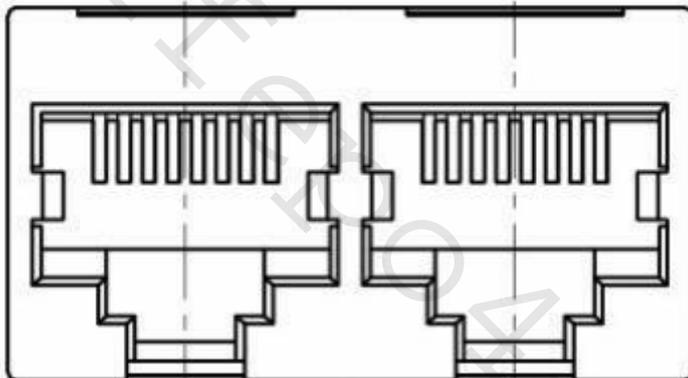
Parallel Communication Port
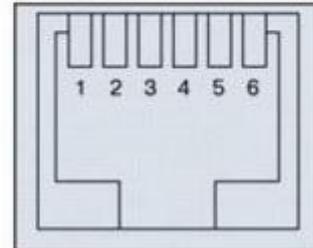
RS232 Communication Port

7.2 Electrical Interface Diagram

RS232 -- using 6P6C vertical RJ11 sockets	
RJ11 pin	Definition Description
2	NC
3	TX (v e n e e r)
4	RX (v e n e e r)
5	GND

RS485--Using 8P8C vertical RJ45 sockets		CAN -- using 8P8C vertical RJ45 sockets	
RJ45 pin	Definition Description	RJ 45 pin	Definition Description
1, 8	RS485-B1	1 , 2, 3, 6, 8	NC
2, 7	RS485-A1	4	CANH
3, 6	GN	5	CANL
4 , 5	NC	7	GND

RS 485 and CAN interface

RS485--Using 8P8C vertical RJ45 sockets		RS485 -- using 8P8C vertical RJ45 sockets	
RJ45 pin	Definition Description	RJ45 pin	Definition Description
1, 8	RS485-B	9 , 16	RS485-B
2, 7	RS485-A	1 0, 15	RS485-A
3, 6	GND	1 1, 14	GND
4 , 5	NC	1 2, 13	NC

Parallel communication port

Interface	Description			
B +	The positive pole of the battery pack; to supply power to the BMS ; P+ is directly connected to B+			
B -	The negative pole of the cell pack ;			
P-	The negative pole of the cell pack ; Negative pole for charging and discharging (the same port for charging and discharging)			
Cell & Temperature	P19	NTC1	P18	NTC2
	P19	NTC	P18	NTC
	P19	CELL1-	P18	CELL5+
	P19	CELL1+	P18	CELL6+
	P19	CELL2+	P18	CELL7+
	P19	CELL3+	P18	CELL8+
	P19	CELL4+		
	P17	NTC3	P16	NTC4
	P17	NTC	P16	NTC
	P17	NC	P16	CELL13+
	P17	CELL9+	P16	CELL14+
	P17	CELL10+	P16	CELL15+
	P17	CELL11+	P16	CELL16+
	P17	CELL12+		
	P15	NC		
	P15	NC		
	P15	NC		
	P15	NC		

## 7.3 Installation and Connection Instructions

There are strict order requirements for the power-on of the BMS.

1. connect all the BMS external wires according to 8 (not including collection wires)
2. connect B- to the total negative pole of the battery pack,
3. insert the collection wires to the battery pack in sequence from low to high,
4. connect B+ (red wire) to the total positive pole of the battery pack,
5. connect P+ to the main positive pole of the battery pack, then
6. press the button to do the activation.
7. After confirming that all cables are connected, connect p- to the charger load.

When dismantling, unplug the charger or load first. P +, P -, B + (red wire) remove the battery sampling line connector in order from high to low, and finally remove B -.

8. Real drawing and size drawing
Real picture for reference： （Subject to real objects）

Signal cables

1-4 5-8 9-12 13-16

P7

B-

P9 P8

P-

485 CAN 232 485 485

TB48100-20A_CONNECT_V02
2022.06.22
94V-0
E474219
SC-D 2238

202209304F01

RS485-1 CAN P3 RS485-2A RS485-2B

SW1 ON DIP J11 J12 J14
1 2 3 4 5 6

LED7 LED5 LED4 LED3 LED2 LED1

P8 P9
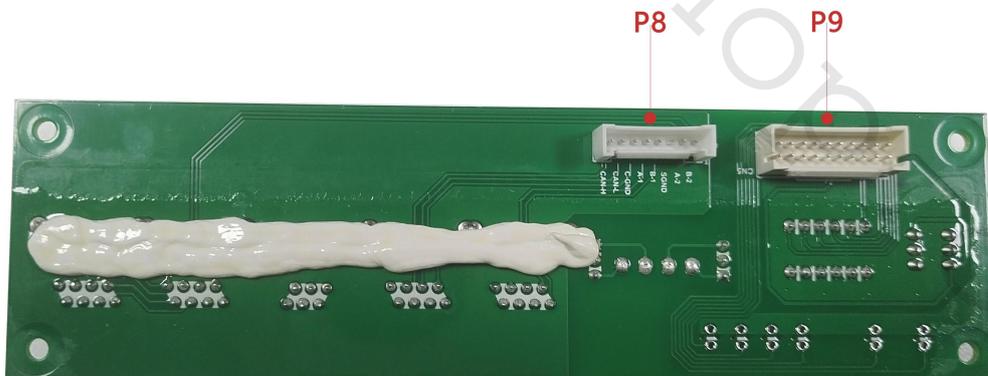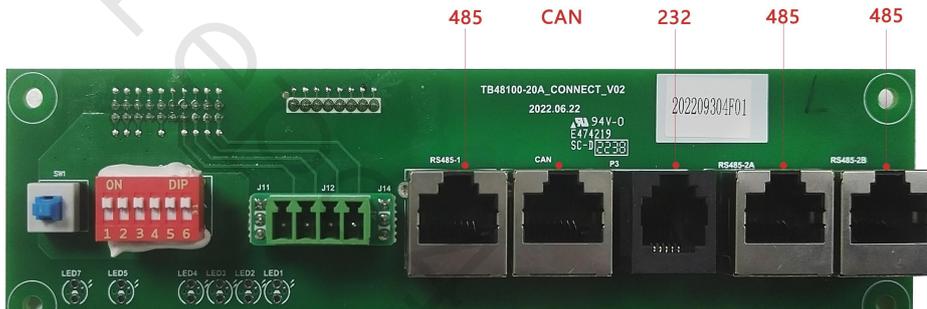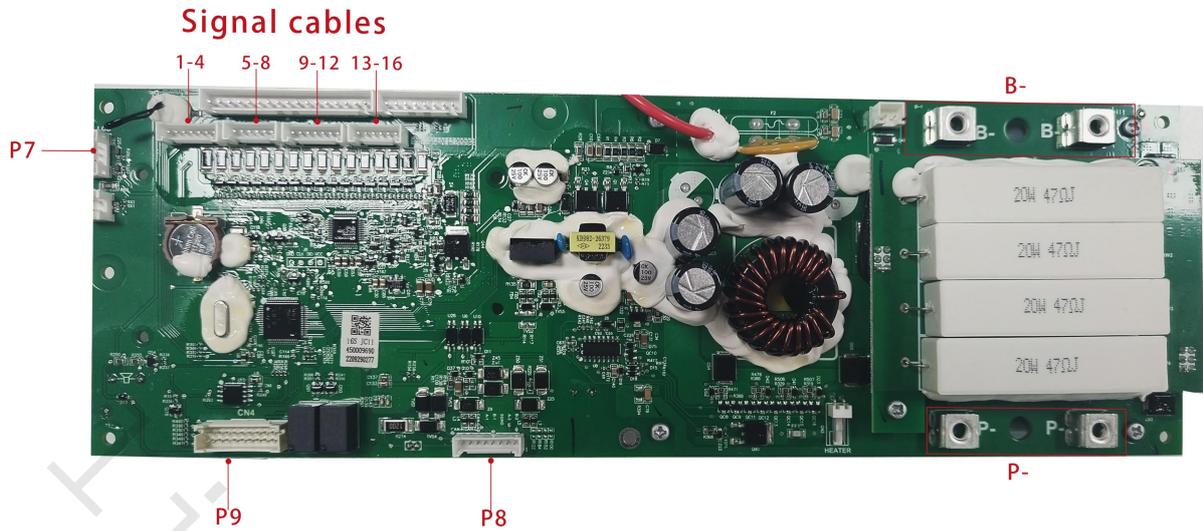
Packing list

LED Indicator board*1

LCD*1

Interface board*1
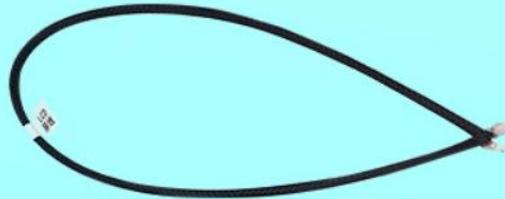
Cable for LCD*1 P7

Screw*4

Patch cable*1 P9
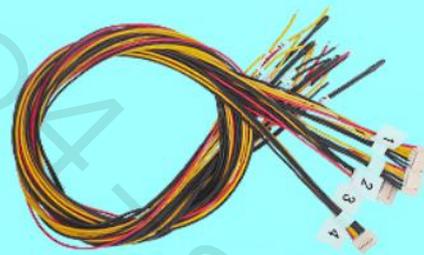
Signal cable*4

Wire*1

Main board cable*1 P8

Main board Size drawing： (subject to structure drawing)
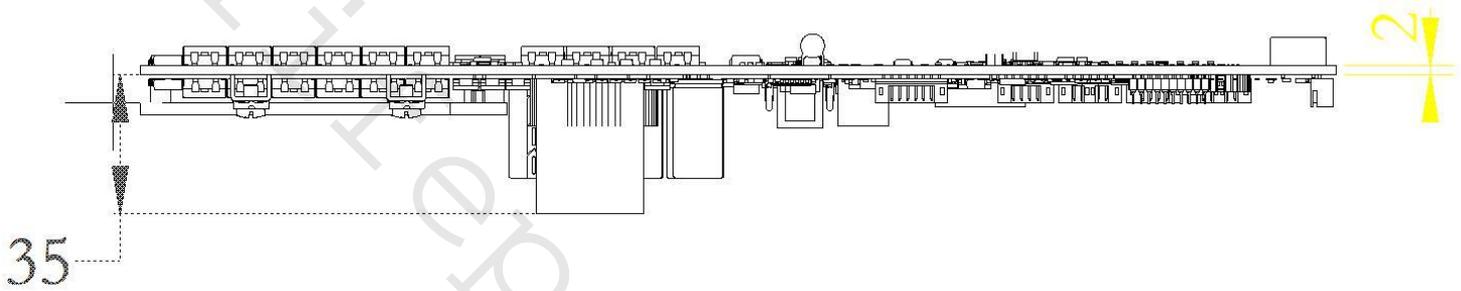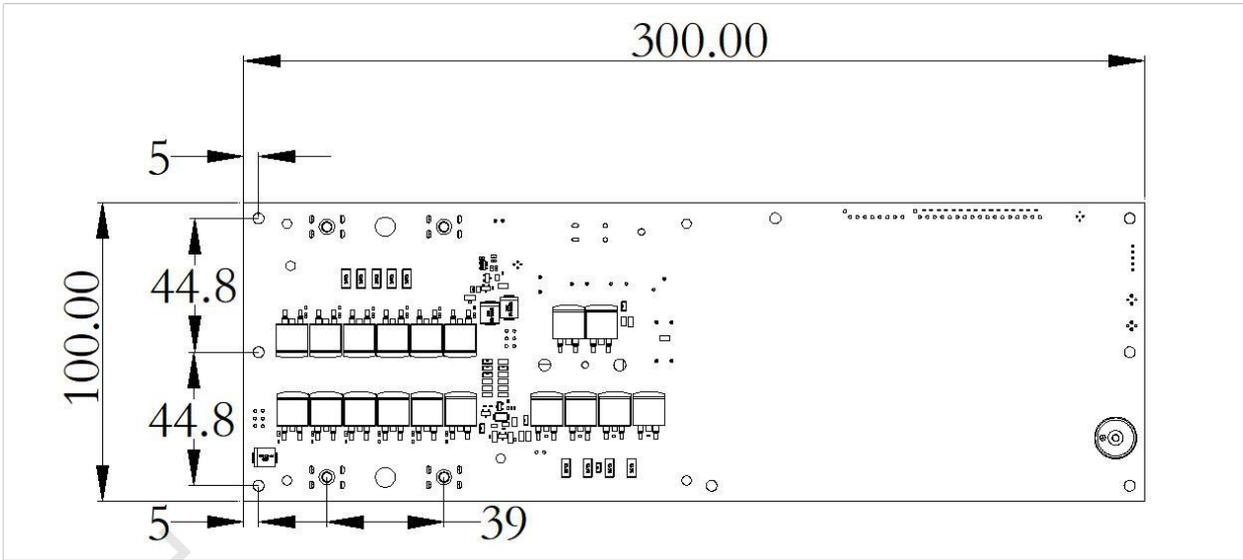
Interface board size drawing: (Subject to the structure diagram)

RST　　ADD　　Dry　　485-1　CAN　　232　　485-2A　485-2B

RUN ALM　　SOC
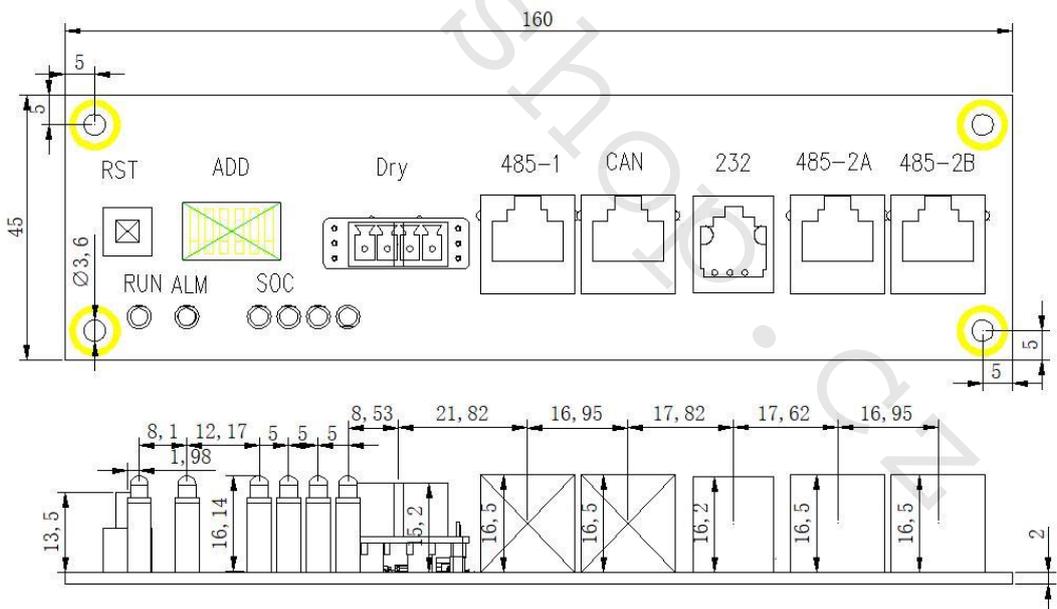
9.Attention

● When welding battery cables, do not connect them incorrectly or inversely. If it has been incorrectly connected, the circuit board may be damaged and needs to be retested before using it.

● When assembling, the BMS should not touch the cell's surface directly so as not to damage the cell. Assembly should be firm and reliable.

● Pay attention to not letting the cables, soldering iron, solder, etc. touch the components on the circuit board. Otherwise, it may damage the circuit board.

● Pay attention to anti-static, moisture-proof, waterproof protection when using the BMS.

● Please follow the designed parameters and working conditions, and do not exceed the range in this specification. Otherwise, it may damage the protection board.

● After connecting the BMS with the battery pack well, if there is no voltage output or charge for the first time, please check whether the cable connection is correct.

10. Packing