

Suitable for 48V and below:

- ✧ Frame type communication lithium battery
- ✧ Communication station
- ✧ Micro network storage
- ✧ UPS, etc

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# Lithium battery management board

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**BMB01-16S16T2A /BPB01-10A/BPB01-50A**

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**Before use this product, please be sure to pay attention to the following items:**

- 1, installation and before use, please read the corresponding instructions and instruction manual;
- 2, the installation of the product battery can be parallel to use, but not series use, there are damage danger!

**Preface:**

As lithium battery application industry development, for lithium battery management system needs more and more high. BMB02-16S16T2A and switching board is specially for sixteen series and under static lithium battery equipment development management board, in addition to basic voltage acquisition, temperature acquisition, current collection and the corresponding protection outside, also provides maximum 500mA active equilibrium, intelligent communication interface and display, etc. Widely used in the following situations.



Micro network storage



Communication station



Frame type communication lithium battery



UPS

**1, collection equilibrium board specification parameter specification**

## 1.1 acquisition equilibrium board BMB02-16S16T2A function parameters description

Project	parameters	default value	note
Monomer voltage acquisition function	collection series	number 16	series 8 ~ 16 series can be set
	acquisition error	<5mV	typical value under 25 °C
Monomer battery overcharge protection value	protection value	3600mV (after protection stop charging)	3300~4200mV can be set
	protection time delay	0.5S	0.1~60.0S can be set
	recovery value	3450mV	2900~4000mV can be set
	recovery time delay value	5S(support reverse current immediately reset)	0.1~3000.0S can be set
Monomer battery under-voltage protection value	protection value	2800mV (after protection stop discharging)	2400~3700mV can be set
	protection time delay value	0.1S	0.1~60.0S can be set
	recovery value	2950mV	2900~3800mV can be set
	recovery time delay value	5S(support reverse current immediately reset)	0.1~3000.0S can be set
	voltage differential alarm	150mV (transfinite alarm not only cut off)	20~2000mV can be set
Monomer voltage balance function	equilibrium principle	Energy transfer type active equilibrium	Whole process
	equilibrium start threshold	±10mV	10~500mV can be set
	maximum equilibrium current	500mA	
Monomer temperature acquisition	detection points	4	0~16 points can be set
	collection error	<1.5°C	
Monomer thermal protection value	protection value	65°C(after protection stop charging& discharging)	10~70°C can be set
	time delay value	0.5S	0.1~60.0S can be set
	recovery value	56°C	10~65°C can be set
	recovery time delay value	5S	0.1~3000.0S can be set
Monomer low	protection value	-10°C (after protection stop charging)	-35~0°C can be set

temperature	time delay value	2.0S	0.1~60.0S can be set
	recovery value	0℃	-5~30℃ can be set
	recovery time delay value	2.0S(support reverse current immediately reset)	0.1~3000.0S can be set
Battery current sampling shunt	interface number	1	
	accuracy	0.5%	
	resistance	500uΩ	10~5000 uΩ can be set
	signal range	-100~100mV	
Battery charging current sampling and protection function	protection value	25A (after protection stop charging)	1~900A can be set
	time delay value	0.5 S	0.1~60.0S can be set
	recovery value	15A	1~900A can be set
	recovery time delay value	10S(support reverse current immediately reset)	0.1~3000.0S can be set
Battery discharging current protection function	protection value	-50A (after protection stop discharging)	-1500~0A can be set
	time delay value	0.5S	0.1~60.0S can be set
	recovery value	-25A	-1500~0A can be set
	recovery time delay value	10S(support reverse current immediately reset)	0.1~3000.0S can be set
Battery short circuit protection function	protection value	100A(stop discharging after the short circuit current more than 100A protection,)	1~2400A can be set
	time delay value	10mS	Fixed value
	recovery value	10S(after recovery if still a short circuit will be automatically extended for the next recovery time)	0.1~600.0S can be set
Battery total voltage acquisition	acquisition error	<0.1V	Collection scope 10~80V
Battery total over-voltage protection function	protection value	57.6V (after protection stop charging)	15.0~65.0V can be set
	time delay value	1.5S	0.5~60.0S can be set
	recovery value	55.0V	15.0~65.0V can be set
	recovery time delay value	10S(support reverse current immediately reset)	0.1~3000.0S can be set
Battery total under-voltage protection function	protection value	43.2V (after protection stop discharging)	15.0~65.0V can be set
	time delay value	1.5S	0.5~60.0S can be set
	recovery value	46.0V	15.0~65.0V can be set
	recovery time delay value	10S(support reverse current immediately reset)	0.1~3000S can be set
Battery SOC protection function	protection value	10% (transfinite alarm not only cut off)	1%~100% can be set
	time delay value	1.0S	0.1~60.0S can be set
	recovery value	15%	1%~100% can be set
	recovery time delay value	1.0S	0.1~3000S can be set
Sleep function	time delay value	60S	1~3000S can be set, Battery discharge protection will delay into dormancy mode
Other function	Batch charging function	Support four phase intermittent charging	
	Failure self-check function	Can be online automatic detection protection switch failure, the current collection wire failure,	

		temperature acquisition wire failure, the battery voltage acquisition line wire failure	
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### 1.2 acquisition equilibrium board BMB02-16S16T2A hardware interface description

Project	interface name	interface specification	note
The user interface	BMB board communication interface	RJ45 interface (including RS485, CAN, fault dry contact interface)	Through the RS485 interface can external display, communication protocol conform to the YD_T1363. 3 standard requirement, the default baud rate 9600 BPS, the default address 244
	Run , error lamp	The green operation, red light said hardware fault	
	SOC lamp	indication battery SOC (points 4 level display)	
	switch	start-up, shutdown and awakening sleep switch	
monomer voltage and temperature acquisition interface	16 series collection equilibrium line interface	consists of two terminal composition	9 pin terminal for low end, 8 pin terminal for high end
	16 channel temperature interface	consists of two terminal composition	each terminal acquisition no.8 temperature
protection switch board interface	charge relay dry contact	Normally open	2A/30V or 0.5A/60V
	Discharge relay dry contact	Normally open	2A/30V or 0.5A/60V
	protection switching board drive voltage interface	12V drive power	
	total pressure acquisition interface	2 channel	independent 2 channel
	shunt interface	1 channel	
Structure size	system board maximum size	34mm*294mm*30mm(high*wide*deep)	
	system board maximum weight	100g	
	system board placed way	Front panel installation	
working environment requirements	Working environment temperature range	-20℃~+55℃	
	maximum working temperature rise	<30℃	

## 2, the protection switching board specification parameters description

### 2.1 protection switching board

interface specification	BPB01-48V10A	BPB01-48V50A	48V200A relay
Shunt interface	1	1	1
total voltage testing interface	1	1	1
MOS tube driving interface	2	2	2
rated discharge work current value	10A	50A	200A
maximum discharge work current value	10A	50A	200A
allow maximum charging work current value	10A	50A	200A
Over current protection value (can be made of superior machine Settings)	10A	50A	200A
size	82mm*34mm	68mm*115mm	see chart

### 3, system installation instructions

#### 3.1, system principle

Shunt need to be close the battery cathode installation, system in maximum current when V0 CB to the maximum pressure drop will be no greater than 10 mv, otherwise, it will cause current collection error increases, will lead to serious hardware damage!

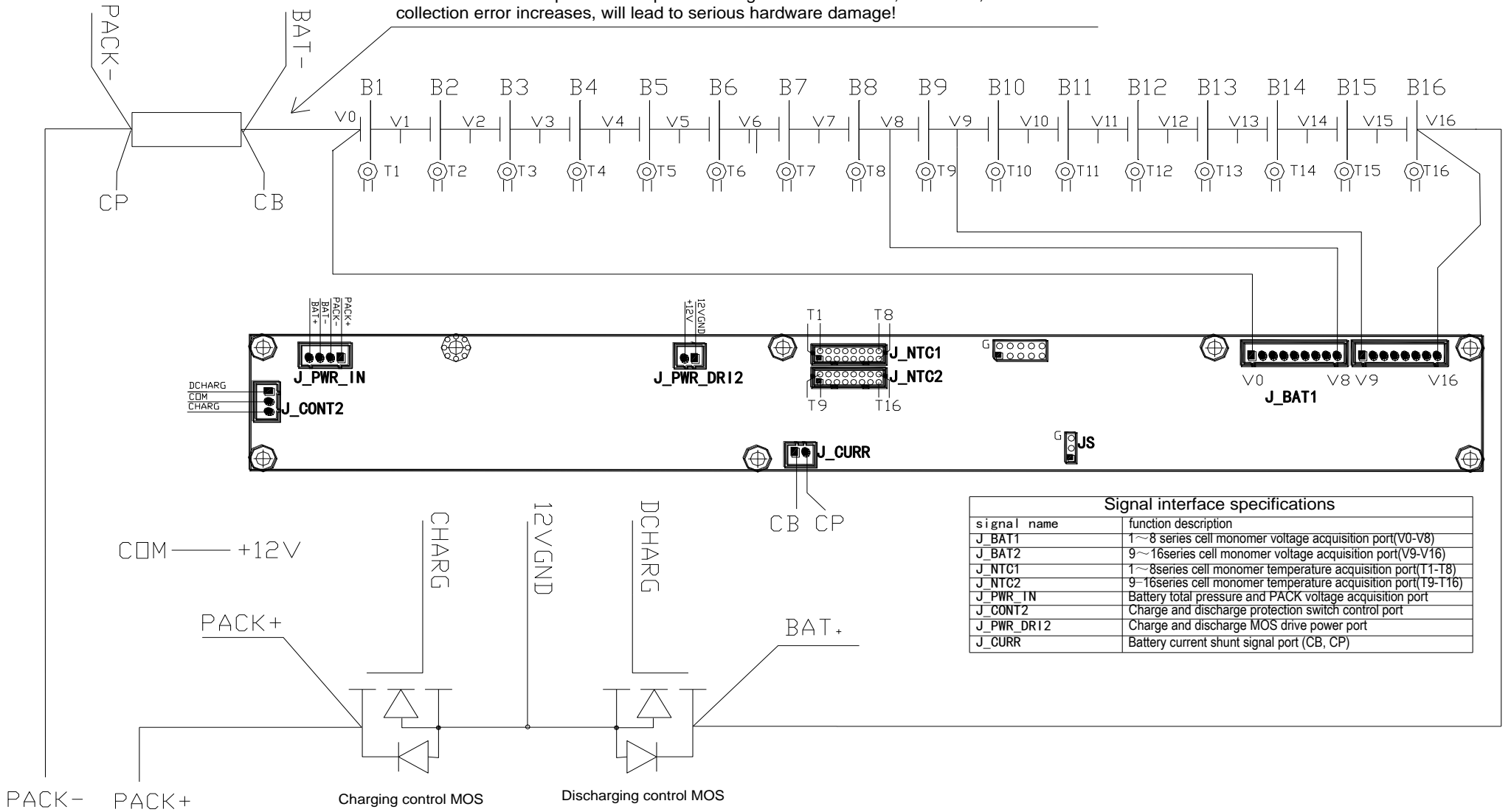


Figure 1 System diagram

Note: BMS board for electrostatic sensitive products, assembly site must be equipped with necessary electrostatic protective equipment, such as electrostatic floor, electrostatic clothing, electrostatic wrist equipment!

### 3.2, collection equilibrium board installation instructions :

acquisition equilibrium board (hereinafter referred to as BMS board) internal use high precision active equilibrium chip, the user terminal order have strict requirements, in the connection, startup, shutdown and take out stitches process must be in strict accordance with the standard operation, otherwise it may cause permanent damage to the hardware. The correct operation steps are as follows:

3.2.1 this BMS board are not supplied with a shell, in installation and debugging BMS board must be first will set in battery PACK on the front panel, prevent the debugging process BMS board and metal conductor short-circuit and board device stress damage, take put BMS board must be hands master BMS board ends, it is strictly prohibited to single hand fibrillation BMS board! Fixed BMS board first preloaded screw, upon confirmation of light, button, RJ485 is correct para after the matter all screw.

3.2.2 will J\_BAT1 and J\_BAT2 plug on 17 root monomer voltage acquisition line and battery connection, in the connection monomer voltage acquisition line must be disconnected before collecting line and BMS board J\_BAT1 and J\_BAT2 socket connection, according to the diagram 1 and battery connection, connection after the completion of using a multimeter to check plug the voltage is correct, when confirmed to the next step.

Note: there were still not to be J\_BAT1 and J\_BAT2 plug to BMS board!

### 3.3, protection switching board installation instructions

3.3.1 will protect switch board (hereinafter referred to as switching board) and battery connection, namely connection PACK, PACK -, BAT, BAT -, when confirmed to the next step.

3.3.2 will figure 2, the J\_PWR\_IN J\_PWR\_DR12, J\_CONT2, J\_CURR plug according to graphic connection, when confirmed to the next step.

### 4, system debugging steps

4.1 test connection in figure 2 shows connection mode, check the terminal on the signal wire connection is correct, special inspection cell monomer voltage acquisition line and shunt connecting line is correct, correct, according to the following sequence connection: insert J\_CURR shunt acquisition line plug 1 → insert 8 pin of the J\_BAT2 monomer voltage acquisition line plug 2 → insert 9 pin of the J\_BAT1 monomer voltage acquisition line plug → into other connecting wire, as below:

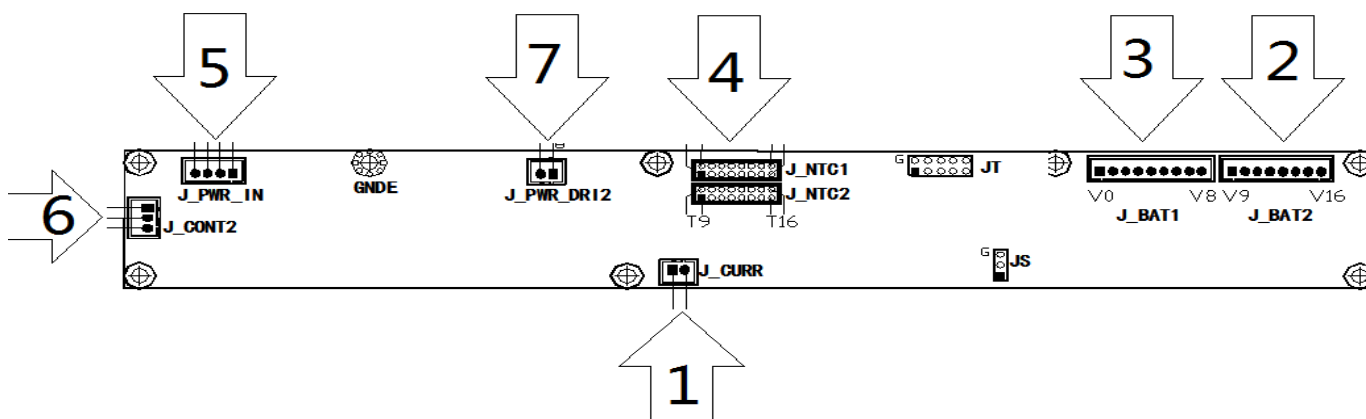


Figure 2 BMS board connection sequence diagram

Note: J\_PWR\_DR12 terminal and J\_CURR terminal appearance the same (line mark different), beware of plug wrong, plug will lead to wrong BMS plate damage!

### 4.2 ,on test

4.2.1, if PACK end no power supply (not rechargeable machine), need to manually boot, press the switchmachine button after about 1 s to loosen, the BMS board would immediately power on and start self-checking, display SOC part blink, about 4 s self after completion, BMS into normal operation mode, running lights flickered on, SOC light display the current battery residual capacity.

4.2.2,Use debugging terminal software to check out the battery charging and discharging current is correct, monomer voltage whether display correctly, battery total pressure whether display correctly, battery temperature whether display correctly, when confirmed can charge and discharge test.

4.2.3 Holdings use charger to recharge the battery, when any monomer voltage more than "monomer battery overvoltage protection value", the BMS plate will automatically cut off charging circuit, when all monomer voltage are below the "monomer battery overvoltage protection recovery value" to delay "monomer battery overvoltage protection recovery time delay value", charging circuit will connect, the battery can continue to charge.

4.2.4 use load to the battery discharge, when any monomer voltage is lower than "monomer battery under-voltage protection value", the BMS board will

automatically cut off the discharge circuit, when all monomer voltage is higher than the "monomer battery under-voltage protection recovery value" to delay "monomer battery under-voltage protection recovery time delay value", the discharge circuit will connect, the battery can continue to discharge.

4.2.5 BMS in the operation process of the detected any protection action or failure, through the light hint, the users for troubleshooting, indicating that the information through the SOC light display, in the system trouble-free, SOC lamp always display of the battery SOC, and when something protection action or failure, RUN in light up SOC light display system SOC, RUN in the lights went out, SOC light display system alarm code, detailed definition are shown below:

● LED light, LED ○ said put out, ★LED blink (namely LED light out in between alternate change)

System status	SOC 10%	SOC 30%	SOC 60%	SOC 90%	ERR status	RUN status	Information definition
Normal	○	○	○	○	○	★	System battery residual capacity <10%
Normal	●	○	○	○	○	★	System battery residual capacity ≥ 10%
Normal	●	●	○	○	○	★	System battery residual capacity ≥ 30%
Normal	●	●	●	○	○	★	System battery residual capacity ≥ 60%
Normal	●	●	●	●	○	★	System battery residual capacity ≥ 90%
Protection	○	○	○	○	○	●	System battery residual capacity <10%
Protection	●	○	○	○	○	●	System battery residual capacity ≥ 10%
Protection	●	●	○	○	○	●	System battery residual capacity ≥ 30%
Protection	●	●	●	○	○	●	System battery residual capacity ≥ 60%
Protection	●	●	●	●	○	●	System battery residual capacity ≥ 90%
Protection	○	○	○	★	○	○	System in monomer overvoltage protection state
Protection	○	○	★	○	○	○	System in monomer undervoltage protection state
Normal	○	○	★	★	○	○	System in cell monomer pressure differential transfinite alarm state
Protection	○	★	○	○	○	○	System in battery total pressure overvoltage protection state
Protection	○	★	○	★	○	○	System in battery total pressure undervoltage protection state
Protection	○	★	★	○	○	○	system in monomer thermal protection state
Protection	○	★	★	★	○	○	System in monomer low temperature protection condition
Protection	★	○	○	○	○	○	System is in charge over current protection condition
Protection	★	○	○	★	○	○	System in the discharge over-current protection state
Protection	★	○	★	○	●	○	System is in short circuit protection state
Protection	★	○	★	★	●	○	System appear internal communication error
Protection	★	★	○	○	●	○	system MOS fault
Protection	★	★	○	★	●	○	system temperature gathering line break fault
Protection	★	★	★	○	●	○	system current gathering line break fault
Protection	★	★	★	★	●	○	system cell monomer voltage acquisition line break fault
Protection	●	●	●	★	●	○	system MOS switching state anomaly
Protection	●	●	★	★	●	○	system current sensor anomaly
Normal	●	★	●	●	●	○	SOC system low

### 4.3 closed system

in battery transportation or the need to be closed before the BMS board, in order to reduce the storage system power consumption, press the switch machine button about 3 seconds, panel four SOC light and RUN lamp also began to fast scintillation (cycle about 0.2 S), now can loosen the button, the BMS into the shutdown process, in the shutdown process, the BMS board first will close charging and discharging protection switch, and then will internal circuit set to low power consumption mode, the process will be closed after the completion of their own power, all instructions will put out, thus complete shutdown process.

### 4.4 pull plug signal wire operation

any time need to pull plug BMS plate when the signal wire must, in accordance with 4.3 steps shutdown operation, only to correct shutdown operation, pull plug BMS signal wire is safe, otherwise it may cause BMS plate serious damage, it is strictly prohibited to pull through direct signal power off! If the signal lines drawn before the BMS cannot confirm whether a correct shutdown operation, please first according to 4.2 process boot, and then according to 4.3, the shutdown operation, the BMS plate after shutdown order take out stitches as below.

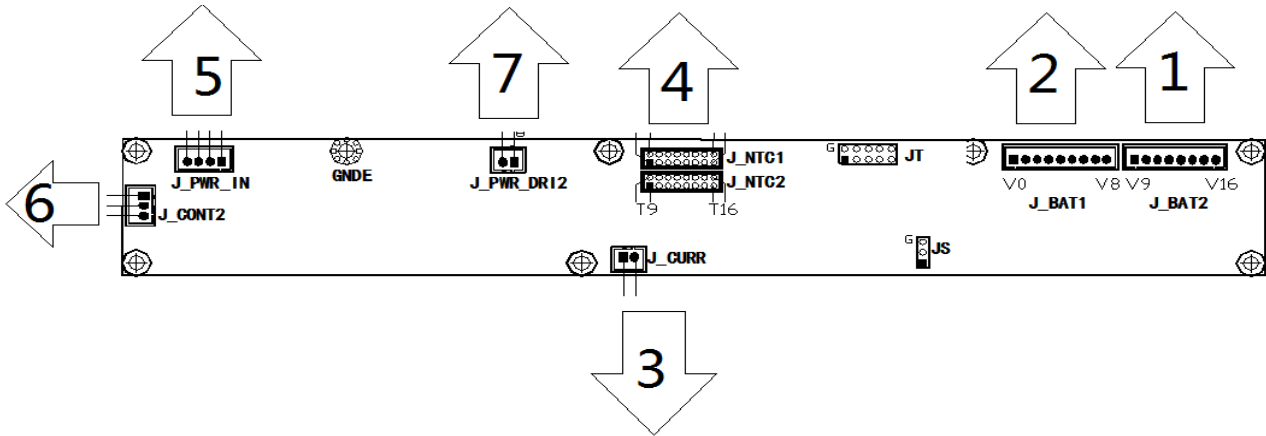


Figure 3 BMS board take out stitches sequence diagram

## 5, system list

### 5.1 10A and the following current

code	description	type	number	note
01021001	BMS acquisition equilibrium board	BMB01-16S16T2A	1	Active equilibrium
01021002	BMS 10A protection switching board	BPB01-10A	1	
	current signal wire - 2 pin / 300 mm/AWG22	CUUR	1	
	drive power wire - 2 pin / 200 mm/AWG22	PWR-DRI	1	
	voltage signal wire - 4 pin / 200 mm/AWG22	JPWR	1	
	drive signal wire - 3 pin / 300 mm/AWG22	CONT	1	
	acquisition equilibrium line - 9pin /1000mm/AWG22 /OT6.0	JBAT1	1	To your pressure OT terminal
	acquisition equilibrium line - 8pin /1000mm/AWG22 /OT6.0	JBAT2	1	
	Temperature gathering line - 4pin /1000 mm/AWG22 /OT6.0	JNTC1	1	The default four point
handbook	Handbook for BMB02-16S16T2A	V3.1	1	PDF

### 5.2 50A and the following current

code	description	type	number	note
01021001	BMS acquisition equilibrium board	BMB01-16S16T2A	1	Active equilibrium
01021002	BMS 10A protection switching board	BPB01-10A	1	
	current signal wire - 2 pin / 300 mm/AWG22	CUUR	1	
	drive power wire - 2 pin / 200 mm/AWG22	PWR-DRI	1	
	voltage signal wire - 4 pin / 200 mm/AWG22	JPWR	1	
	drive signal wire - 3 pin / 300 mm/AWG22	CONT	1	
	acquisition equilibrium line - 9pin /1000mm/AWG22 /OT6.0	JBAT1	1	To your pressure OT



	acquisition equilibrium line - 8pin /1000mm/AWG22 /OT6.0	JBAT2	1	terminal
	Temperature gathering line - 4pin /1000 mm/AWG22 /OT6.0	JNTC1	1	The default four point
handbook	Handbook for BMB02-16S16T2A	V3.1	1	PDF

### 5.3 200A and the following current

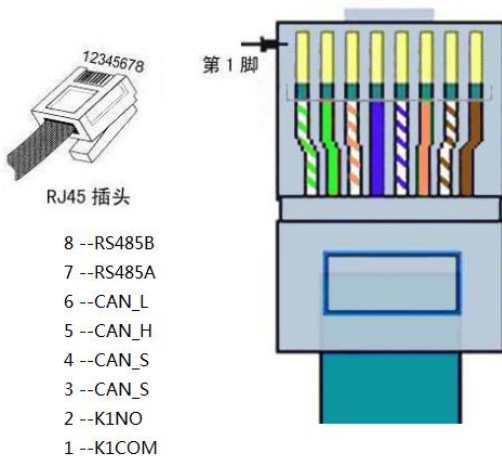
code	description	type	number	note
01021001	BMS acquisition equilibrium board	BMB01-16S16T2A	1	Active equilibrium
11010034	Dc contactor - normally open	24VDC-200A	1	
17030001	fuse	660-315A	1	
03040003	shunt	FL2-200A-75mV	1	
	case B and connecting wire harness	BMB-ZB	1	
	acquisition equilibrium line - 9pin /1000mm/AWG22 /OT6.0	JBAT1	1	To your pressure OT
	acquisition equilibrium line - 8pin /1000mm/AWG22 /OT6.0	JBAT2	1	terminal
	Temperature gathering line - 4pin /1000 mm/AWG22 /OT6.0	JNTC1	1	The default four point
handbook	Handbook for BMB02-16S16T2A	V3.1	1	PDF

## 6 appendix

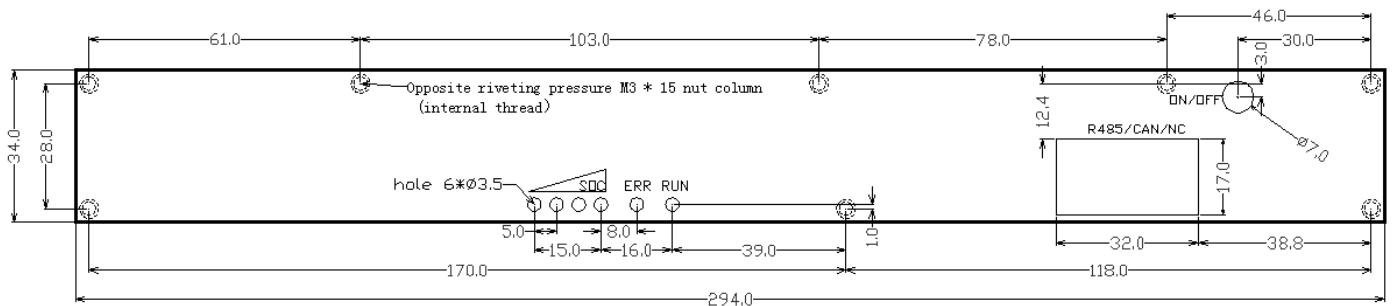
### 6.1 RJ45 interface definition

RS485A/RS485B for 485 communication mouth, can cascade; CAN\_L/CAN\_H/CAN\_S to reserve the interface, can be extended display。

K1NO/K1COM for normally closed dry contact alarm interface, can cascade.



### 6.2 acquisition equilibrium board detailed size drawing



Note 1: open hole diagram AUTOCAD format file, please refer to section listed company for

note 2: it is recommended that the panel is installed BMS plate thickness of 1.5 mm above the steel manufacturing, or use the bending process increase strength, prevent the transportation process panel deformation cause BMS plate stress damage.

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