

# 4-192S BMS operation manual

## 1、 Performance and Parameters:

1. Real time monitoring of 4-192 series single unit voltage , Accumulated total voltage is within 1000V. Single module management is a maximum of 12 strings and a minimum of 4 strings ( Due to the fact that the power supply for module operation is taken from the battery, the total voltage of a single module must not be less than 9V. Any excess unused channels must be connected to the positive pole of the highest battery in a single module ), the total input voltage of a single module shall not exceed 75V, the monitoring voltage range of a single section shall be 0-5V, and the total input voltage of the host shall not exceed 60V;
2. Real time monitoring of total voltage, charging and discharging current, power, temperature, and statistics of actual charging and discharging ampere hours, and display with a graphical progress bar. Each module is equipped with 1 temperature detection channel;
3. The system has functions such as single overcharge protection, single over discharge protection, overcurrent protection, high temperature protection, low temperature protection, differential pressure protection, and battery failure protection;
4. The host is equipped with various running lights to indicate the system running status without using the screen;
5. 3.5 inch IPS color screen display, ultra wide viewing angle, and clear working status at a glance;
6. Supports three ranges of Hall current sensors, with a default standard range of up to 400A. It has a manual calibration function for Hall current sensors, a self calibration function for the collection module, and a total measurement error of 1.2MV for individual voltage collection;
7. There are two types of relay schemes: same port and split port, with different control software. The interface type needs to be determined before procurement;
8. The acquisition module adopts a two way cascading structure, each of which can connect 1 to 8 arbitrary number of acquisition modules. The host automatically

recognizes the number of acquisition modules, and the two way acquisition modules support a total of 16. The acquisition module is connected with two core CAT5 twisted pairs, with a length of up to 40 meters;

9. The power outage module of the host will enter a sleep state while releasing all relays. The power consumption of the module is only 4UA, which will not cause the loss of battery power;
10. The module has an automatic battery balancing function, which balances the voltage drop of the battery and stops when the drop is 0.001V. The balanced discharge current is 200MA;
11. The system is designed with full isolation, and the collection modules are isolated from the host. All interfaces can be hot swapped, and temperature sensors, display screens, and Bluetooth external devices that are not used can not be installed;
12. Actively dissipate heat and heat, automatically start the fan when the temperature reaches the set value, and automatically start PTC heating when the temperature drops below the set value;
13. Supports RS232 TTL communication and CAN communication, with an Android mobile app that monitors and controls the status and parameter settings of the host through Bluetooth. The app has the ability to query protection history records and can query the last protection record;
14. The same port connection method automatically controls the charging and discharging relay. In the split port connection method, the charging and discharging relay is automatically restored according to the charging and discharging recovery set value. When there is overcurrent protection, over temperature protection, battery string error, low temperature protection, and differential pressure protection, which are related to safety, the charging and discharging relay is closed at the same time. At this time, the channel must be manually opened;

*system performance parameters:*

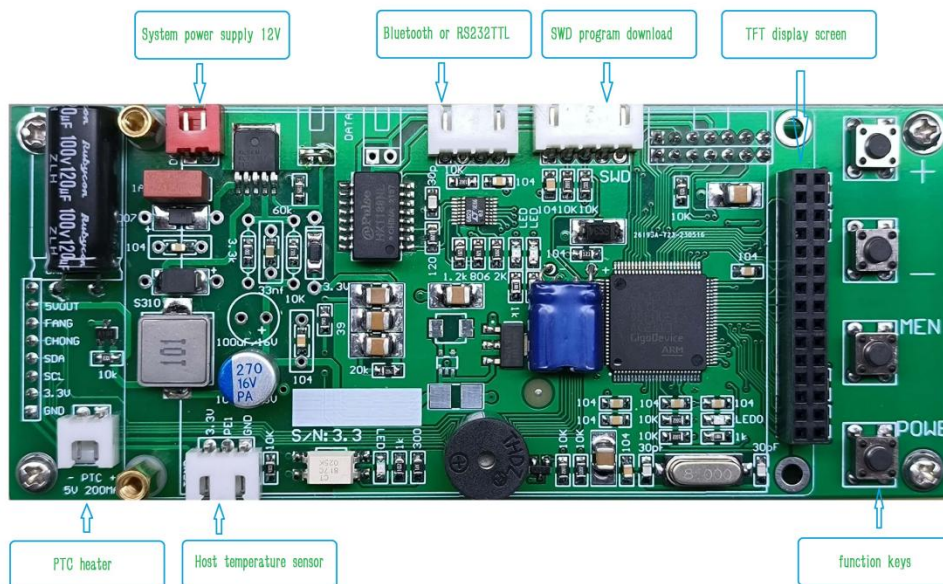
S	items	value	unit	note
1	current range	0.5--999.9	A	Matching range sensor
2	capacity range	0--6500	AH	
3	power range	0--650	KW	
4	string number range	4--192	S	
5	temperature range	-99.9--99.9	℃	
6	Voltage difference	0--5	V	Channel closed
7	Low temp range	-99.9--0	℃	Channel closed
8	Fan start range	0--99.9	℃	
9	PTC heating range	0-99.9	℃	
10	Bluetooth distance	0--60	米	
11	Relay voltage range	0--100	V	Reference relay
12	Battery pack total	0--1000	V	
13	Number of modules	1--16	个	
14	equalizing current	200	MA	Passive equilibrium
15	PTC drive voltage	5	V	
16	PTC drive current	200	MA	
17	Relay drive current	5	A	
18	Pre relay drive current	5	A	
19	Fan drive current	5	A	
20	Module collects voltage	0--5	V	
21	Module standby current	4	UA	
22	Module running current	1	MA	
23	Voltage accuracy	1.2	MV	+3...-3
24	Host current	130	MA	screen off
25	Same port current	500	MA	
26	Shielding current	500	MA	
27	Pre delay time	0-6500	S	
28	Max strings of module	12	S	
29	Min strings of module	4	S	
30	Hot voltage	9--60	V	
31	Hall power voltage	9--36	V	
32	Hall sensor range	0--400	A	
33	Pre resistor	100	Ω	
34	Pre resistance power	100	W	

## 2、 Port Description

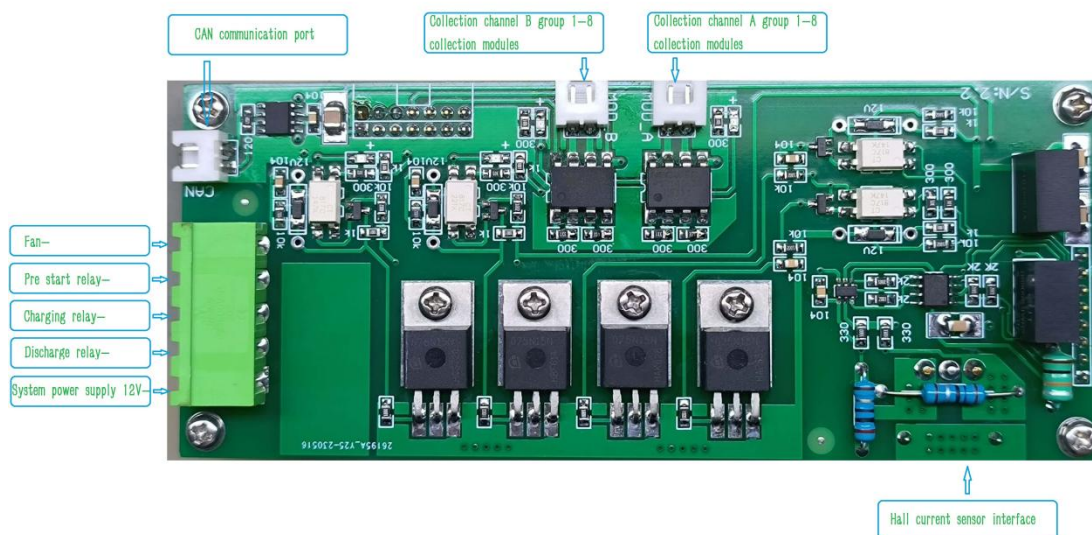
Two main boards, board size: 135X57mm

3 layers with a thickness of 45MM;

### 1.system control board



### 2.system power board

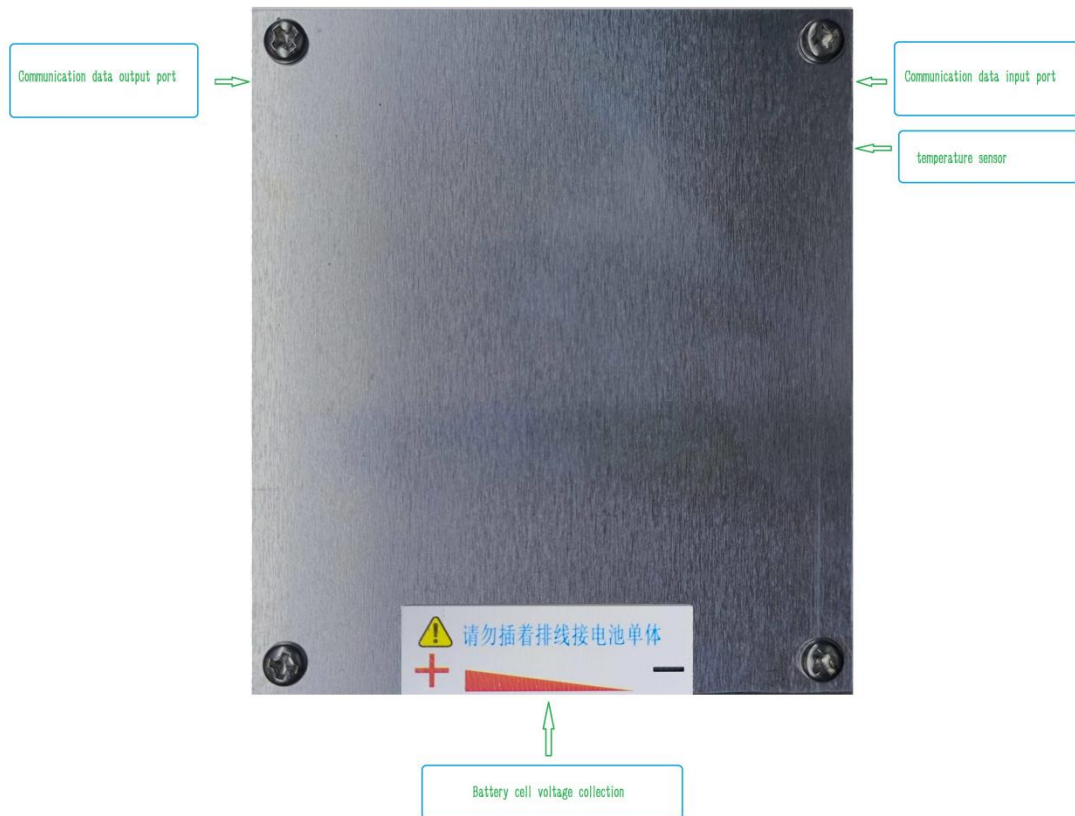


*Note: The host temperature sensor model DS18B20 is not included as standard in the relay scheme*

Module size: 82X72mm

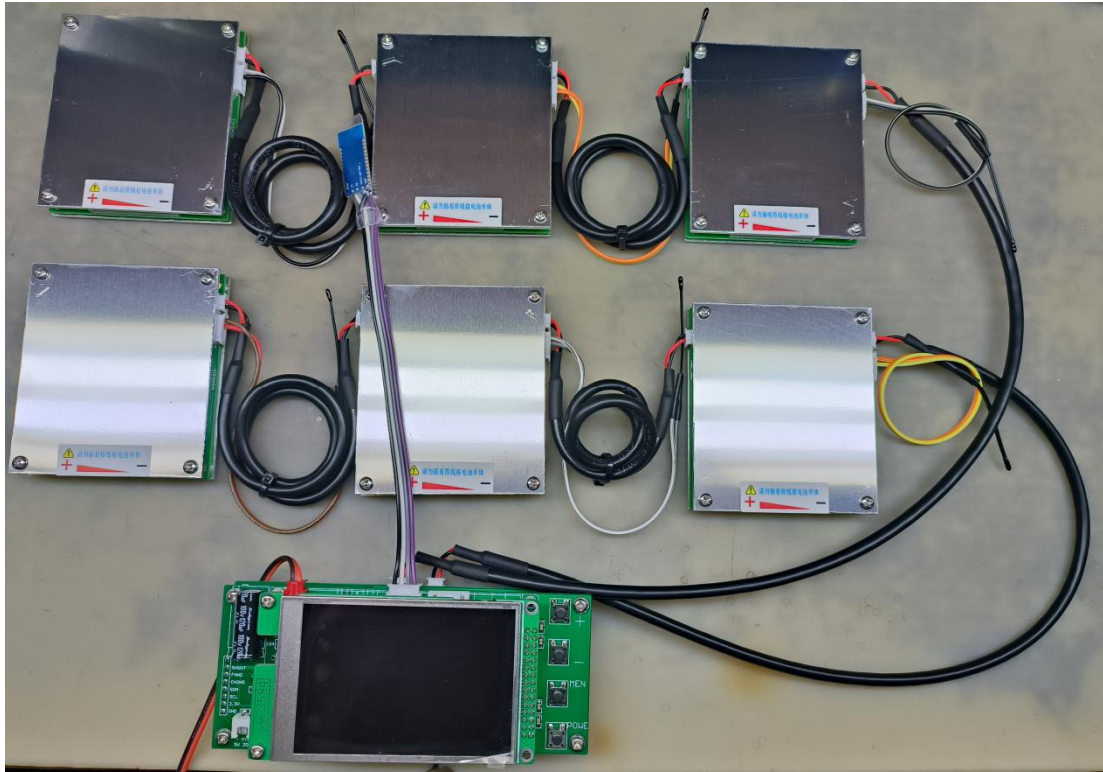
Thickness: 17mm

### 3. Module

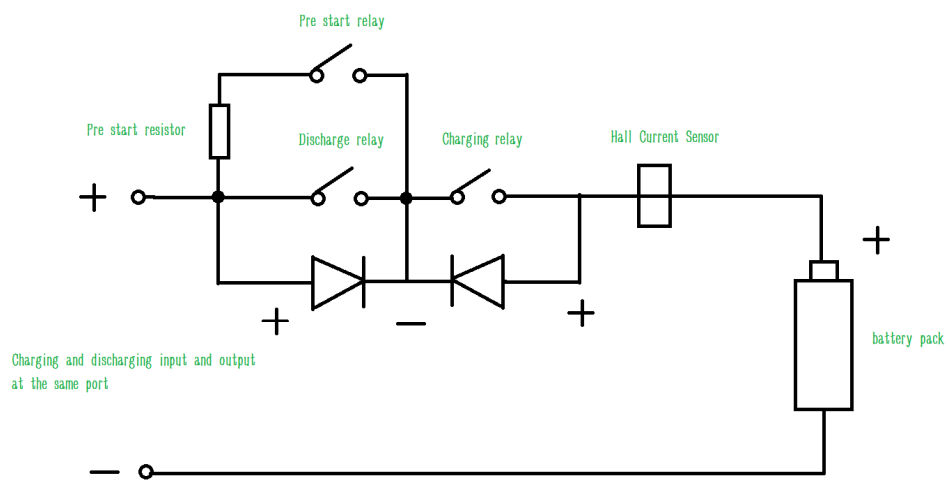


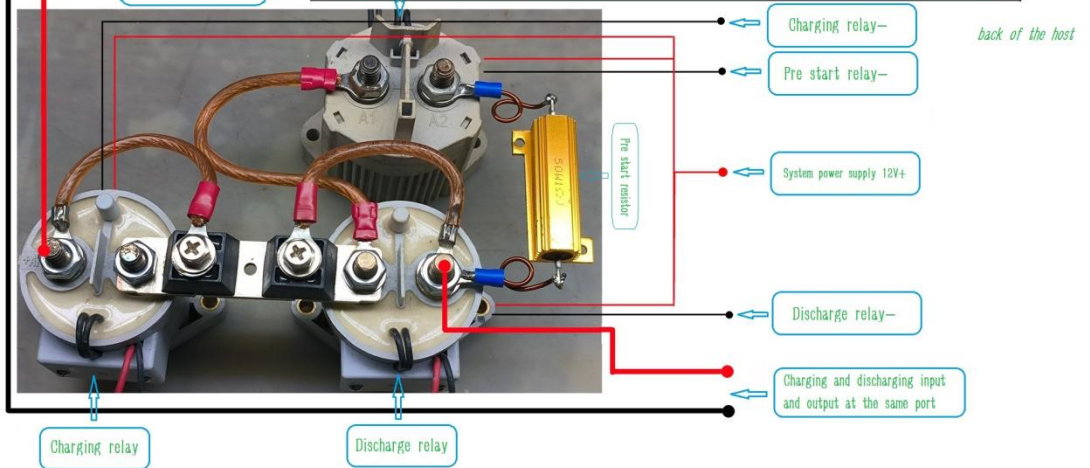
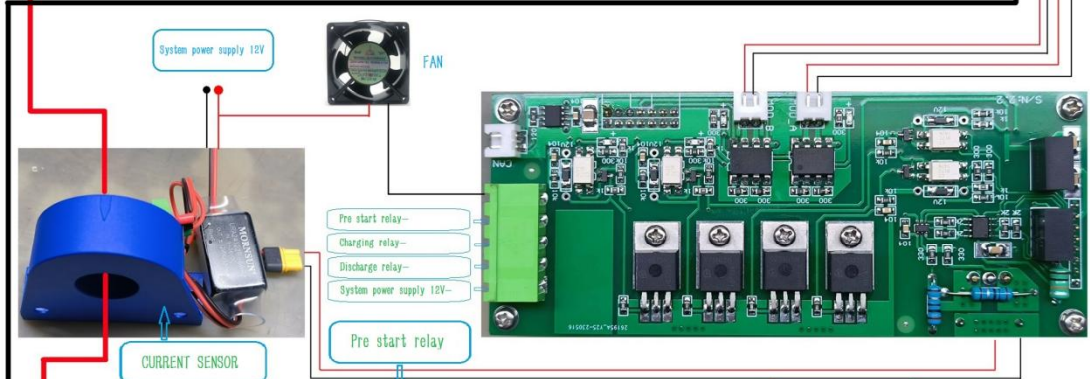
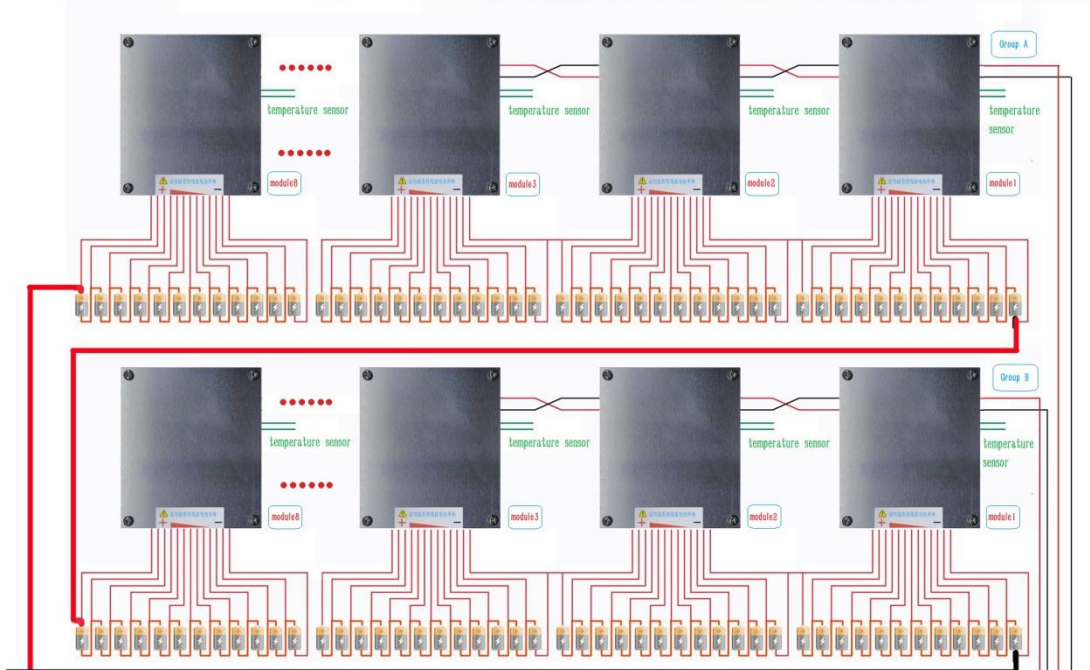
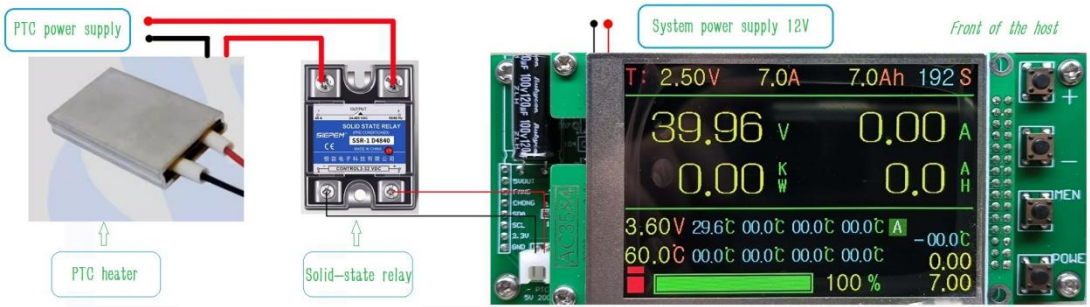
### 3、Wiring diagram

#### 1. Module communication line connection

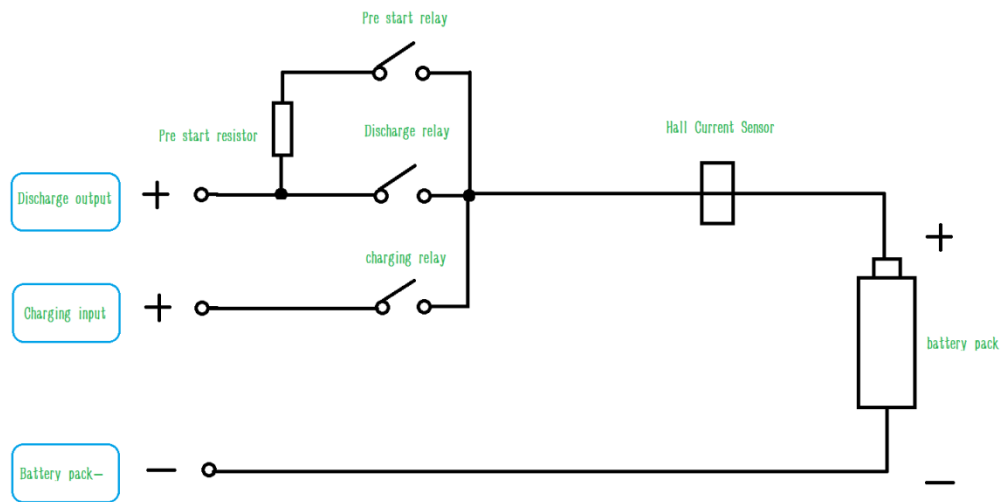


#### 2. Wiring diagram of the same port relay



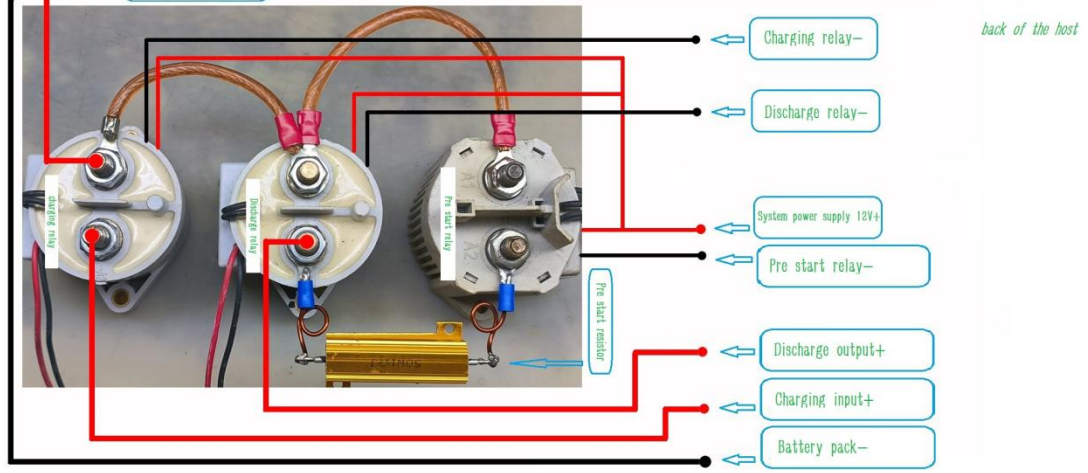
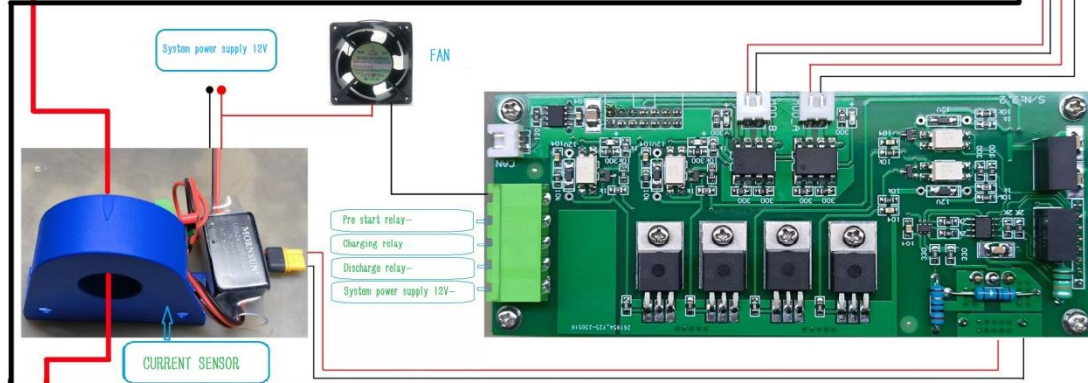
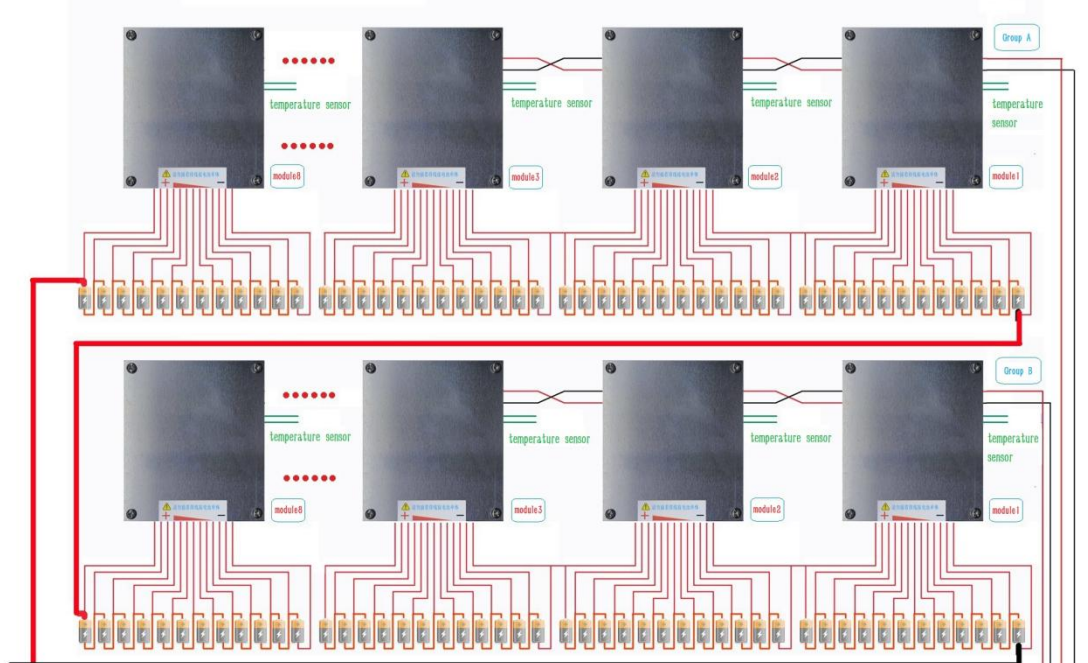
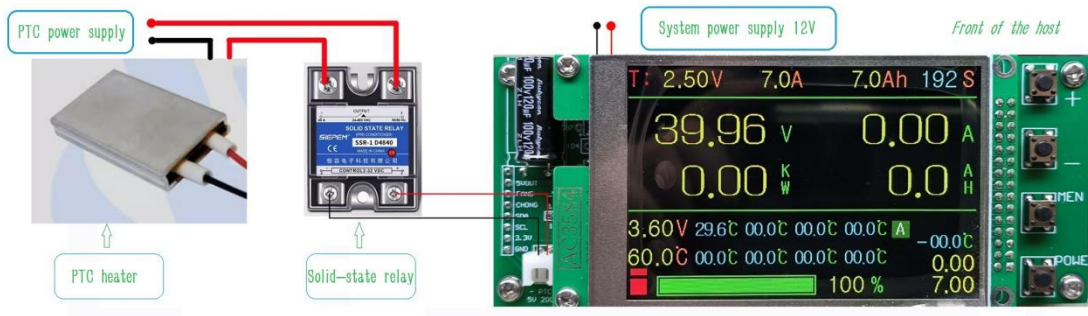


### 3.Wiring diagram of split relay



Note: For the same port connection method and split port connection method, the recommended pre start resistance value is 100 ohms, which can be calculated and adjusted based on the required pre start current, formula:  $\text{Voltage (V)}/\text{Current (I)} = \text{Resistance Ohms}$ , power above 100W, select power margin based on calculation;





## 4、 Introduction to Display Interface

### 1. Main display interface



Note: The relay status is displayed in three sections, from top to bottom, which are pre-start relay, charging relay, and discharge relay. Green indicates open, and red indicates closed.

### 2. Auxiliary display interface



### 3. Refer to the attached table for the information prompt column

*Information prompt details:*

S	info	information explanation	note
1	CHARG	charging reminder information	
2	LOWBT	low voltage protection	
3	END	overvoltage protection	
4	BATES	wrong number of battery strings	
5	HICUR	overcurrent protection	
6	HITEM	Over Temperature Protection	
7	LOTEM	low temperature protection	
8	FMOS	discharge relay fault	
9	CMOS	charge relay fault	
10	VIDIF	voltage difference protection	

## 5、Function and key operation instructions

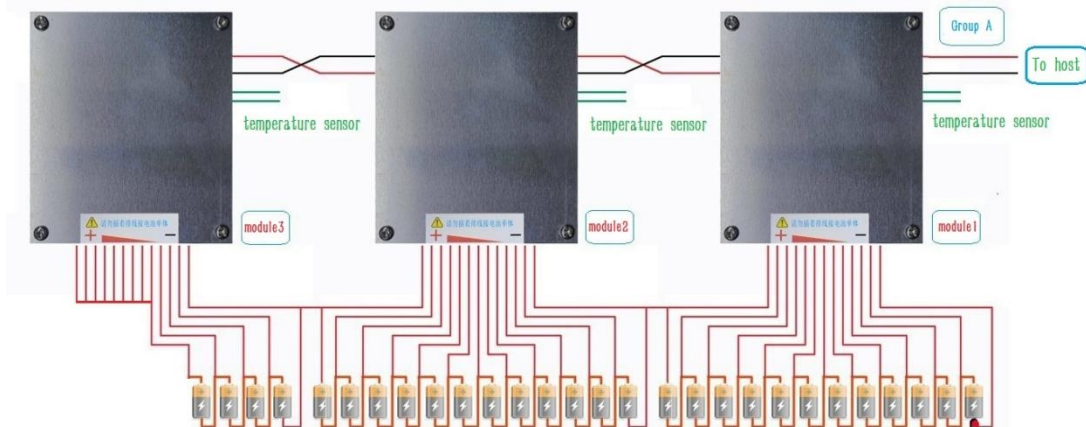
1. This module has a total of 4 function buttons, namely POW MEN - +;
2. POW is the key for channel input and output, controlling opening and closing;
3. MEN is the setting key, used in conjunction with the plus or minus keys for setting six basic parameters. It must be set in the closed state of the input and output channels to be effective. After setting the six parameters in sequence, save the set values after hearing two beeps. To operate normally, you must exit the setting page, otherwise the system will not execute the protection project;
4. On the individual voltage display page, pressing MEN can turn off the screen, and after turning off the screen, pressing any key can wake up the screen;
5. In addition to the settings of voltage and battery sections, the protection current setting and the total capacitance setting can be accelerated by pressing the "add" or "subtract" button while pressing the "POW" button to accelerate the increase and decrease;
6. When the input and output channels are closed, press “ - ” without releasing it,

- and simultaneously press “ + ” to reset the real-time capacity detection;
7. In any non setting state, press the "+" key to switch between the Home screen and the single voltage display interface;
  8. Press and hold the "-" key for more than 3 seconds while the input and output channels are closed to turn equalization on or off;

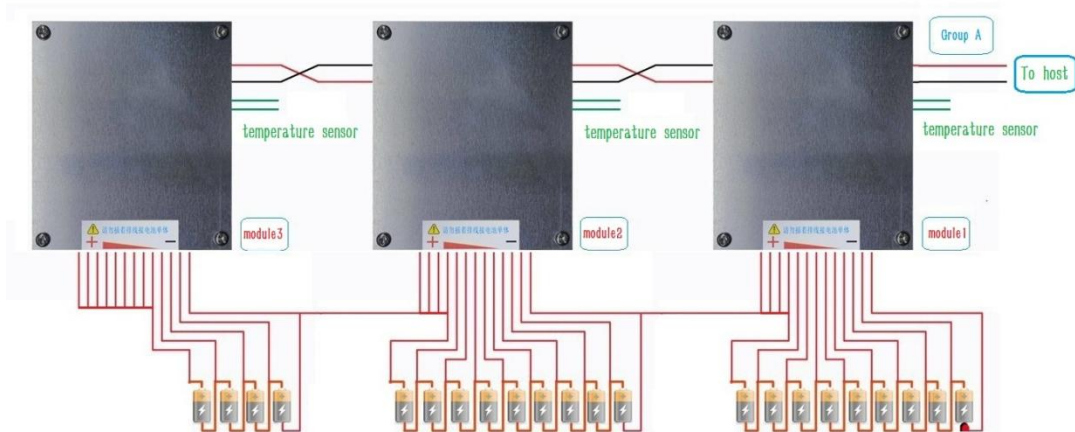
## 6、 Special application of modules

Each module is an independent working unit. When the module is not fully connected, all the spare ports of the module must be short circuited to the positive pole of the last battery of the module, and must meet the requirements of the power supply voltage of a single module, which is at least 9V. For Lithium iron phosphate and lithium ternary, at least 4 are required, and for Lithium titanate, at least 5 are required;

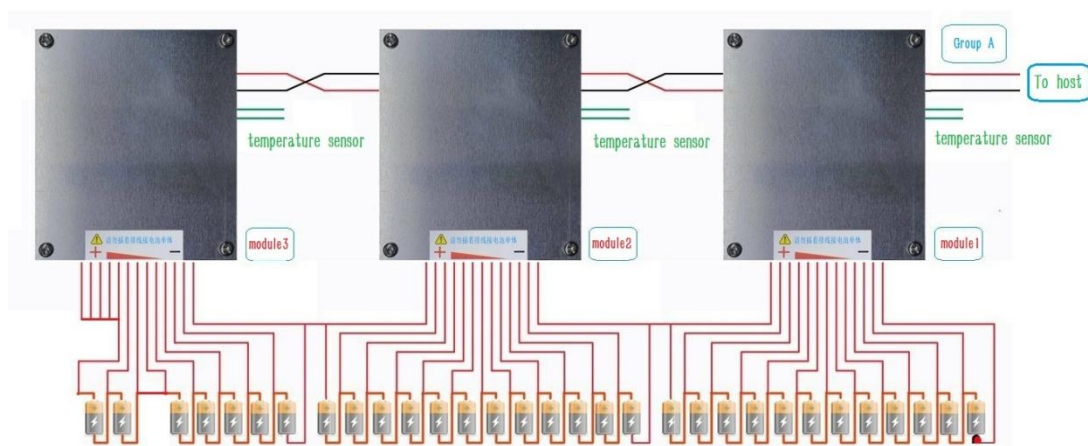
### *Case 1 Example: The last collection module is not fully connected*



### *Case 2 Example: Multiple acquisition modules not fully connected*



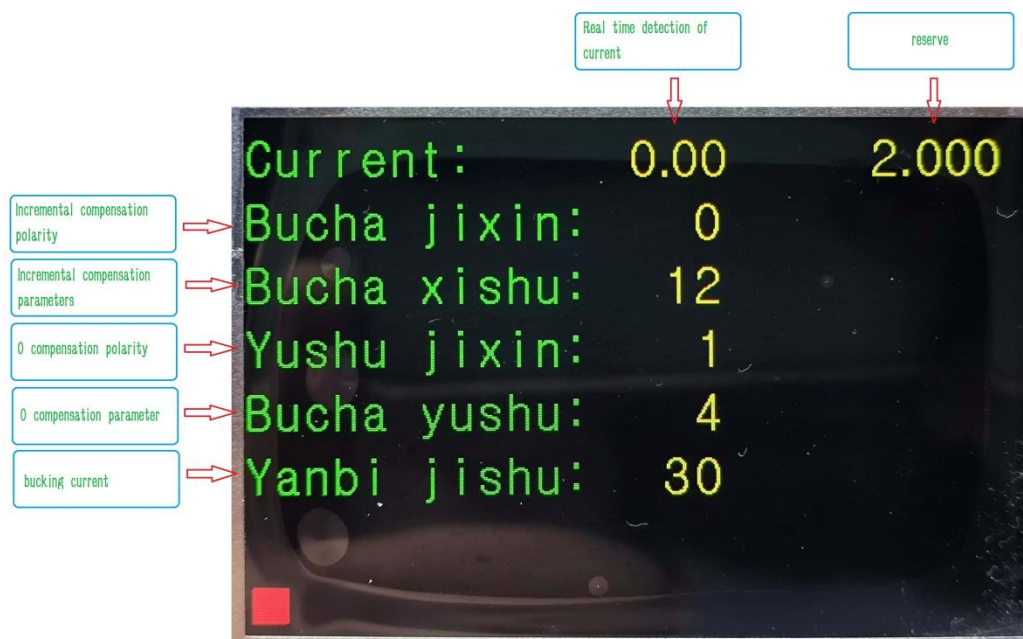
### Case 3 Example: Special 7-string wiring requirements



Each single module has a collection unit every 6 strings, which must meet the requirement of 2 strings per collection unit

## 7、Hall current sensor calibration function

1. To enter the calibration program, first disconnect the power supply, then press and hold the POW key while powering on the host. After hearing two beeps, release the POW key to enter the calibration interface and simultaneously engage the charging and discharging relay. Every time you press the MEN key, a short blue line will appear under different calibration item values, indicating that the item is in an adjustment state. Press the plus or minus keys to adjust the correction value;
2. Firstly, calibrate the zero position of the Hall current sensor and adjust the 'zero position compensation item' without charging or discharging, so that the real-time detection current is zero;
3. Connect the load and measure the current with a multimeter, adjust the 'incremental error compensation' to ensure that the actual detected current value is consistent with the multimeter value;
4. Adjust the 'masking current value', which is multiplied by 10 to obtain the actual current value. If it is less than this value, it will not be displayed;
5. After calibration, you must press the MEN key until the calibration data is saved. At the same time, you can hear two beeps. Then press the POW key to enter the Home screen of the system;



*Note: The Hall current sensor has been calibrated before shipment, so calibration is generally not required;*

## 8、Bluetooth and CAN communication

1. The specification of Bluetooth is Bluetooth 4.0, so it can only support operating systems above Android 4.3. You need to first turn on the Bluetooth function and location information function of your phone, and do not pair them in the mobile operating system. Click on the scan device using the APP, and the scanned device will be displayed in the list. After the prompt is displayed, click on the name of the device you want to connect to. After connecting, you can enter the settings window and real-time parameter monitoring window, The standard Bluetooth device name is JDY18, and the Bluetooth interface is at RS232 TTL level. If used for external device communication, Bluetooth and external devices can only choose one from the other. Please refer to the communication document for protocol details;

2. Each Bluetooth transceiver has an independent Address geocoding, which can be used to distinguish different hosts;
3. The CAN communication hardware is a non isolated structure and can communicate in parallel with multiple hosts. If you need to change the ID, please contact us with a password. Please refer to the CAN communication document for protocol details;

If the phone is too far away from Bluetooth or is interfered with, Bluetooth will be interrupted. If the software does not exit, the phone will automatically connect after detecting the Bluetooth device. If it cannot be connected, the software needs to be restarted and the host needs to be connected. After each use of Bluetooth, please exit the APP software to release Bluetooth. When Bluetooth is not connected, the Bluetooth module light will flash, and the Bluetooth light will remain on after connection, If the Bluetooth light does not light up, it indicates that the Bluetooth transceiver is damaged or there is a power failure;

### *Android mobile app usage*

1. All functional buttons in the app are valid by long pressing;
2. The parameter input set must be in a standard format, including numbers and decimals;
3. Automatic equalization is divided into charging equalization and discharging equalization. Please control the current at the end of charging to be near the equilibrium discharge current. Automatic discharge equalization must be effective when the channel is closed, and the opening of the charging and discharging channel must also be effective when the automatic equalization is closed;
4. The original password of the app is blank. If you forget the password and reinstall it, you can restore it to blank;





*Detailed explanation of setting parameters*

S	Set Project	values	Parameter Meaning
1	Discharge end voltage	li-ion2.5V LiFePO42.5V li-titanate1.7V	Discharge protection voltage value
2	ProtectCurrent	Set by load	current protection value
3	Max Capacity	Set by BATTE	Cap and percentage calculation
4	Battery string	Set by BATTE	Actual number of strings
5	Charge end voltage	li-ion4.2V LiFePO43.6V li-titanate2.7V	Charging voltage protection value
6	Protect temp	60℃	High tempe protection value
7	ChargeRecovery	1V	Charging relay recovery
8	Discharge Recovery	2.5V	Discharge relay recovery
9	DefaultChannel	2.off 1.on	Host power on relay status
1	Lowvoltage off	2V	Host power off
1	Shutdown Delay	600S	Host power off delay time
1	Charge Equalization	5V off	Charging equalization start value
1	PrechargeDelay	3S	Duration of pre charging relay
1	Differential protection	5V off	Relay OFF
1	Used capacity	Set by need	Custom Used Capacity
1	Auto clear Cap	2.off 1.on	Auto empty used capacity
1	Lowtemp protection	-50℃	Low tempe protection value
1	Hall Type	2	Require Password
1	Fan Start	40℃	Starting fan temperature
2	Heating Start	0℃	Start heating temperature
2	CAN SEND ID	245	Require Password
2	CAN RECEIVE ID	244	Require Password

## **NOTE:**

1. If not used for a long time, please cut off the power supply of this host;
2. The communication line must use two core twisted pair cables, which have positive and negative connections and cannot communicate after being wrongly connected;
3. The battery balance wire must be connected from the low position to the high position in sequence, and cannot be connected incorrectly. First, connect the battery to the balance wire, and then use a multimeter to measure the voltage between each pin of the plug to ensure it is within 5V. After confirming that there are no errors, insert the plug into the module. It is strictly prohibited to insert the balance wire plug into the module before connecting the battery;
4. If the equalization function is activated, a heat sink must be installed on the acquisition module;
5. It is recommended to use low voltage 12V for the power supply of the host, with a current reserve of over 6A. DC-DC can be used to reduce the battery voltage and supply it to the host;
6. There are multiple two-position sockets on the motherboard, please pay attention to distinguishing colors and not connecting them incorrectly, as it may cause the board to burn out;
7. The relay control line has a positive and negative distinction, and attention should be paid when wiring;
8. The relay scheme requires a high-power dual diode module with a common cathode structure for the same port connection method. When selecting, attention should be paid to the diode's withstand voltage and current;
9. The wire of the Hall current sensor has a directional requirement for threading, and there is a directional arrow at the top. If the wire is threaded backwards, discharge will display charging, and the protection project cannot be effectively executed;
10. PTC heating control port has no large current drive capability, and external equipment must use Solid-state relay to expand current;
11. Pay attention to the insulation of the two rows of welding points on the right side of the screen during installation;
12. After the host is powered off and turned off, the parameters used will be automatically saved, and there will be a storage prompt tone. You must wait for the prompt tone to stop storing the usage data before you can power on again;

## ***Disclaimers:***

- 1 、 As customized products are sold without return, there is no free warranty, and only round-trip shipping and repair parts are provided for repair. The fees here are limited to high-value accessories;
- 2 、 The assembly of batteries must have a technical foundation, otherwise it will be very dangerous. As this product requires secondary on-site installation, we are not responsible for any accidents or losses that occur during installation, debugging, and use;