

User Manual of 4-96 series BMS

A>.Performance and parameters:

- 1、 Real time monitoring of 4-96 series single cell voltage, total voltage is 403v, maximum 12 strings and minimum 4 strings are managed by a single module (The power supply of the module is from the battery, so the total voltage of a single module shall not be less than 9V, redundant unused channels must all be connected to the positive pole of the highest battery of a single module), the total input voltage of a single module shall not exceed 75V, single section monitoring voltage range is 0-5V, the total input voltage of the master shall not exceed 60V.
- 2、 Real time monitoring of total voltage, charge and discharge current, power, temperature and statistics of actual discharge ah, the host has a way to detect the real-time temperature of MOS tube, Each module is provided with 1 channel of temperature detection, totaling 9 channels of temperature detection.
- 3、 The voltage of single battery is lower than the protection set value, the total current is higher than the protection set value, and the output is cut off to protect the battery pack from over discharge. When charging, any section of voltage is higher than the protection set value, and the charging current is higher than the protection set value to cut off the input. When the temperature of battery or MOS tube exceeds the set value, cut off the charge discharge channel.

4、Real time display of capacity remaining percentage and remaining capacity, and display with graph progress bar.

5、Operation light indicates the system operation status.

6、Under high-voltage control, the rated output current is within 30a, and the maximum instantaneous output current is 70a; under low voltage control, the rated output current is within 120a, and the maximum instantaneous output current is 250a (the specific current parameters are determined according to the selected MOS model, and heat dissipation is required for long-time constant high current operation) .

7、3.5-inch IPS color screen display, ultra wide viewing angle, clear working status.

8、The master has the function of current calibration, the total voltage error is 1.2MV, so there is no need to calibrate.

9、The same port design of charge and discharge avoids connecting many wires.

10、The whole system adopts module cascade structure, with two core CAT5 twisted pair connection, communication distance is up to 40 meters (the distance is measured by CAT5 network line in laboratory environment, the actual communication distance should be reduced if there is a large interference or the wire selection is not appropriate) .In this way, the master and module, module and module can be placed

over a long distance;

11、 When the host is shut down, the module will go to sleep state, and the power consumption of the module is only 4 μ A, which will not cause the loss of battery power. The acquisition module can be installed close to the battery, which reduces the length of the balance line and acquisition interference. After the host is powered off, the parameters used will be saved automatically.

12、 The collection module has the function of automatic battery balance, which balances the voltage drop of the battery until the drop is 0.001V. This function must be automatically balanced when the battery is full. The balanced discharge current is 200mA, and a large amount of heat will be emitted during the balance. It is necessary to pay attention to the heat dissipation of the heat sink attached to the collection module.

13、 Module and host, module and module are designed in full isolation, all interfaces can be hot swapped, and those not used by temperature sensor can not be plugged.

14、 The host has the function of active heat dissipation. When the temperature of the host's MOS tube exceeds 50 degrees, the fan will be started automatically to cool it with strong wind, so as to prevent the MOS tube from bursting due to high temperature;

15、 After the input terminal is connected to the charger, it will automatically enter the charging state, and count the actual capacity, and display the charging current and power at the same time. With the increase of the charging capacity, the originally used capacity will gradually reduce, and the progress bar will act synchronously with the change of capacity.

16、 The BMS supports mobile app, which monitors and controls any status and parameters of the host through Bluetooth. When protection occurs, the mobile phone has the query of protection history, and the reason for the last protection can be queried.

17、 At present, the host has 14 tube version, 28 tube version and relay version. The relay version supports two connection methods of the same port and the separate port, and supports the use of Hall current sensor。

18、 The BMS has automatic control function of charge and discharge.

After charging protection, as long as the discharge current is detected to be greater than 200mA, the charging port will be opened automatically to prepare for the next charging. After discharging protection, if the current of charging equipment is detected to be greater than 200mA, the

discharge channel will be opened automatically, and the whole process will be completed automatically. In case of safety problems such as over-current protection, over-temperature protection and wrong number of battery strings, The charge and discharge MOS tube is closed at the same time. At this time, the channel must be opened manually after troubleshooting.

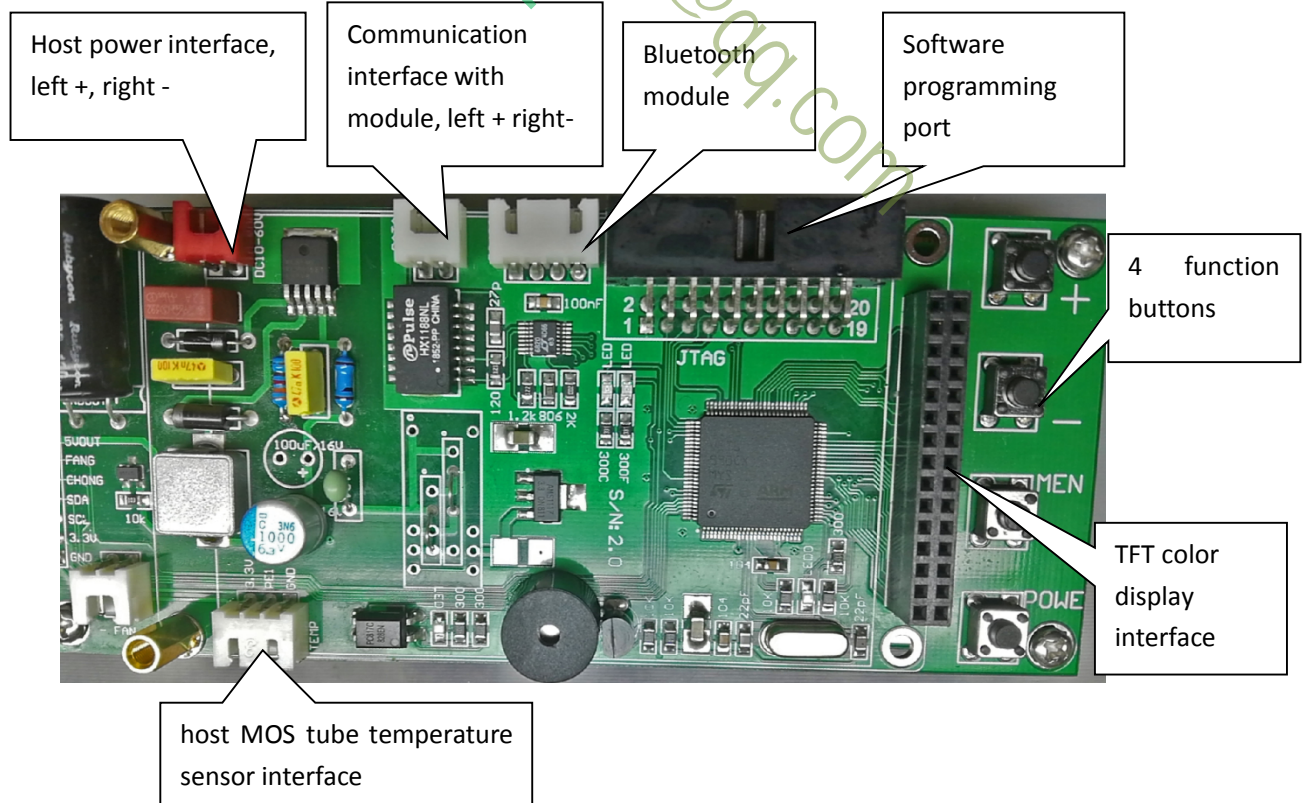
19 、 The host instrument displays the current supported range, the maximum current is 999.9a, the maximum capacity is 6500ah, and the maximum power is 65000w

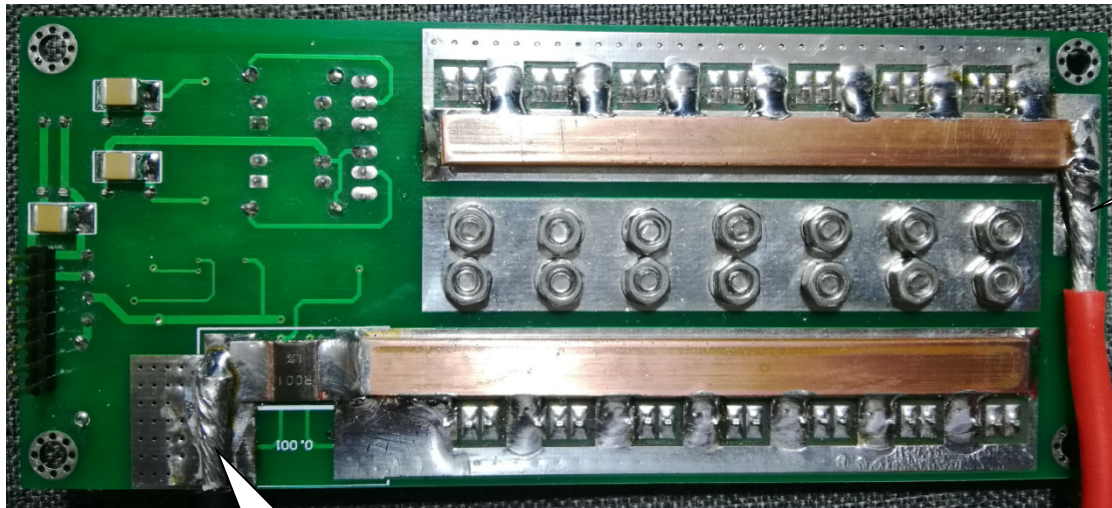
B>.Basic interface description

The host has two boards, 14Mos tube : 135X57mm

28Mos tube : 190*57mm

The total thickness of the host 45mm (without radiator thickness) ;





output -

battery -

Module board size :82x72mm

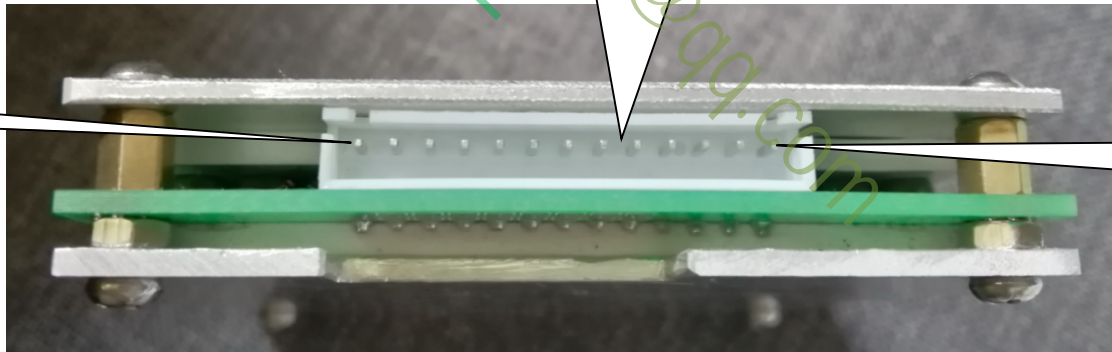
Battery
interface

balance

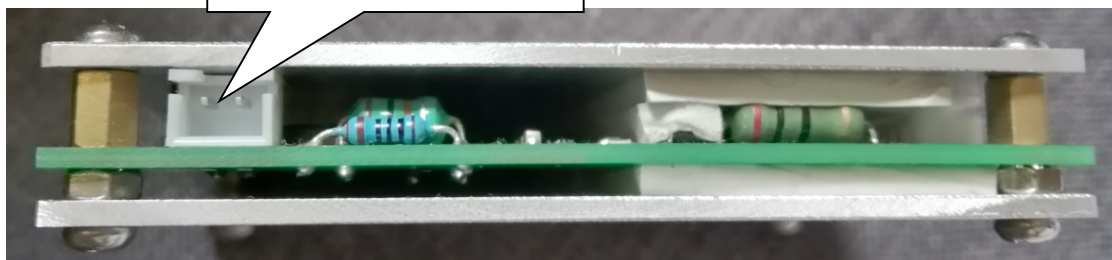
line

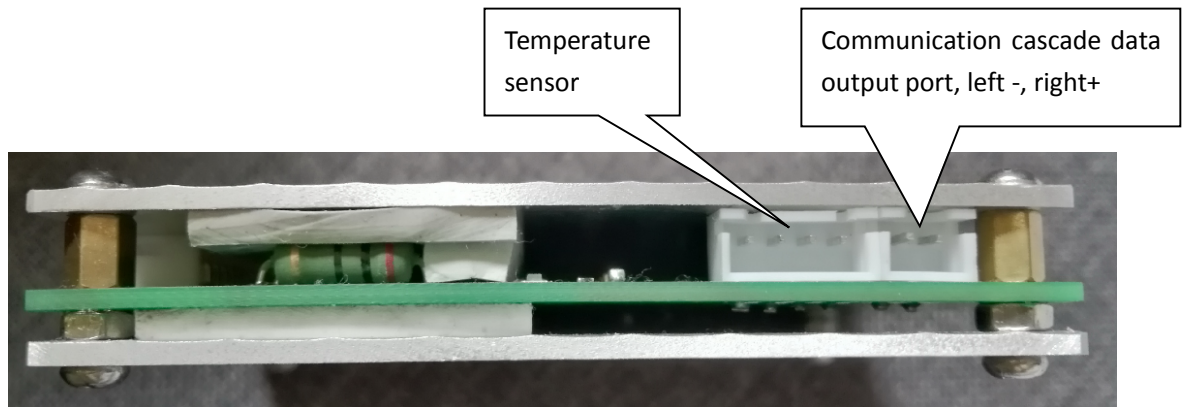
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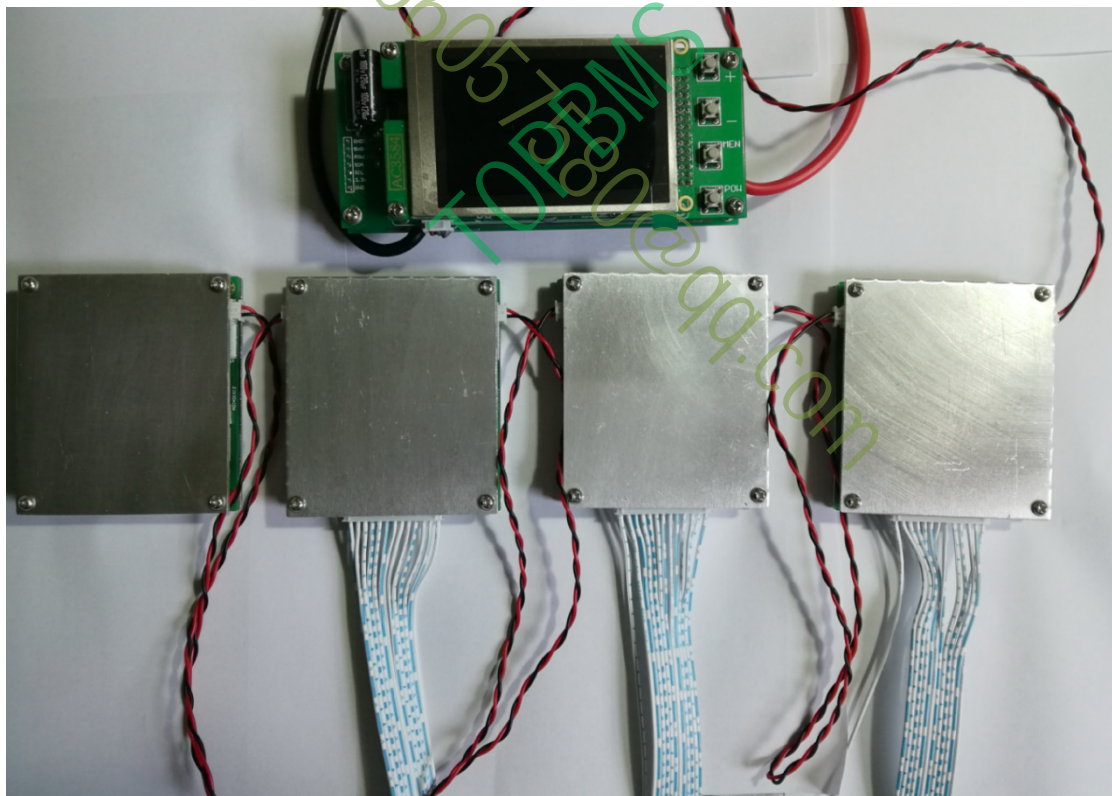


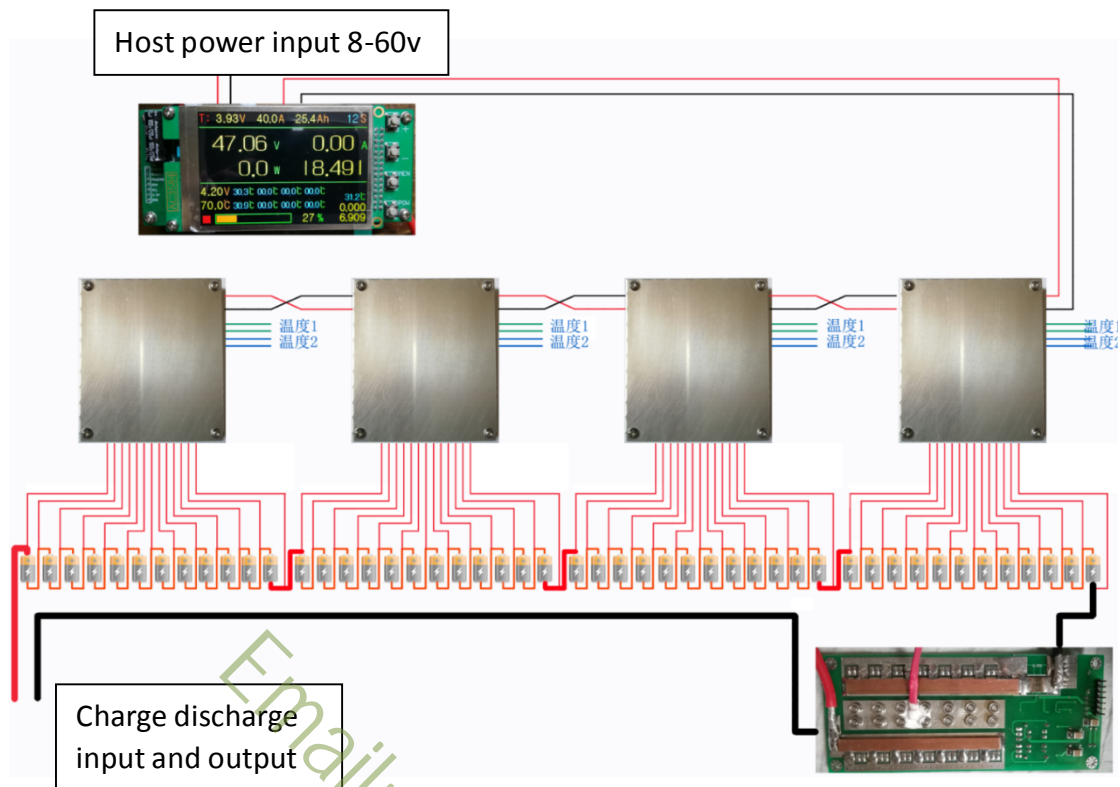
Communication cascade data
output port, left -, right+





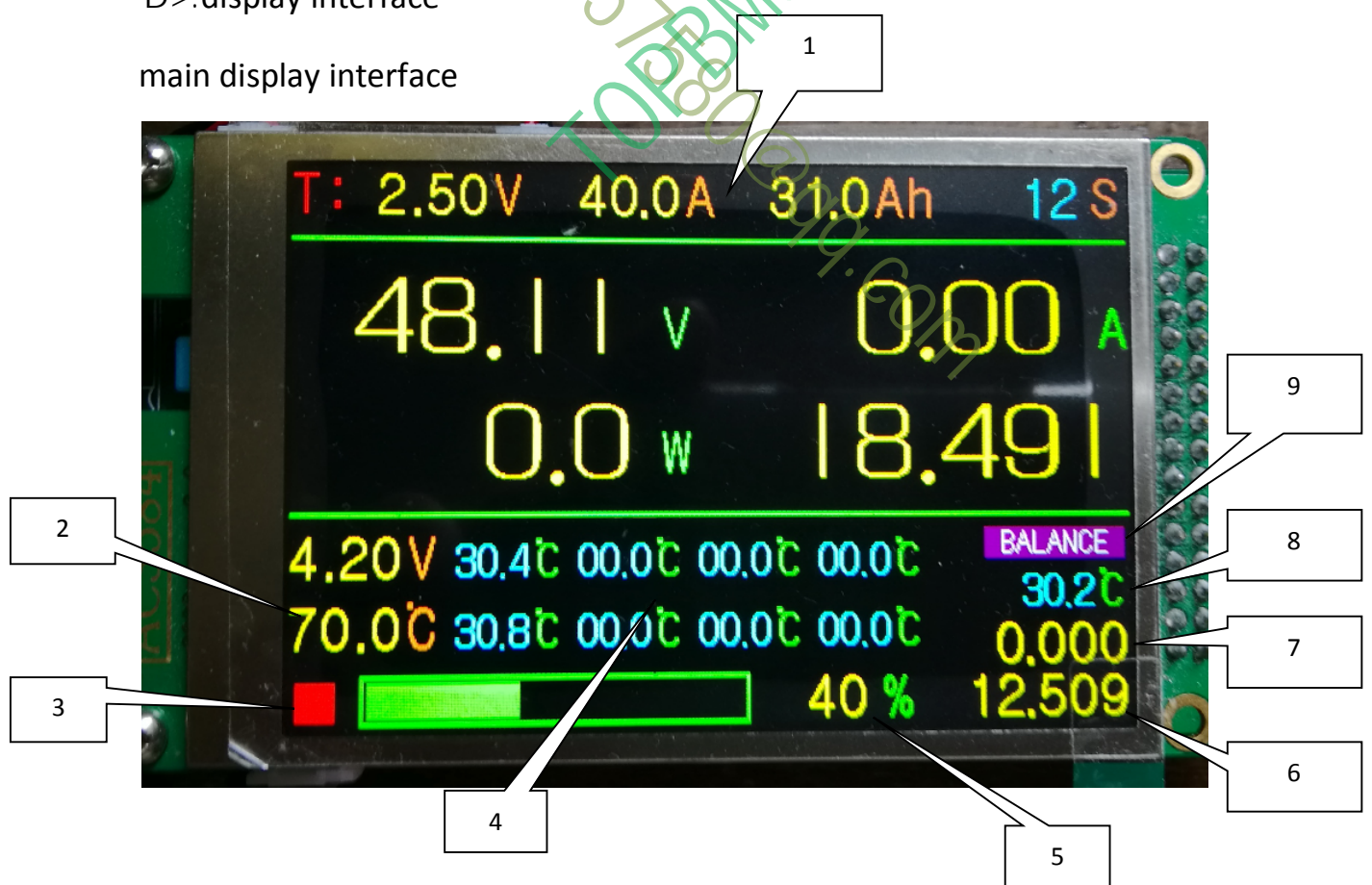
C>.Wiring diagram:





D>.display interface

main display interface



1. Setting column, setting the minimum discharge protection voltage, the maximum charge discharge current, the total capacity of the battery and the number of battery strings
2. Set charging cut-off protection voltage and protection temperature
3. The system operation flashes, and the opening of the charge discharge channel is yellow, and the closing is red
4. Temperature detection of 8 modules
5. Indicator bar and percentage of remaining power
6. Actual remaining capacity
7. Actual charging capacity
8. Host MOS tube temperature
9. Function status and Protection Tips

Auxiliary display interface

Auxiliary display interface



五、Function and key operation:

- 1、 There are 4 function buttons in the module, POW、 MEN、 -、 +;
- 2、 POW is the on-off key of channel input and output, controlling on and off;
- 3、 MEN is the setting key, which is used for the setting of six basic parameters with the addition and subtraction keys. It is valid only when the I / O channel is closed. After the input and output channels are opened, for the sake of safety, the MEN, + and - buttons are invalid. After setting 6 parameters in turn, save the setting value after hearing two beeps.If the parameter is not saved, press POW not to open the channel.

On the single voltage display page, press men to close the screen, and then press any key to wake up the screen.

4、 In addition to the setting of voltage and number of battery cells, the setting of protection current and the setting of total capacity of capacitor can be accelerated by pressing POW at the same time of pressing down plus or minus.

5、 When the I / O channel is closed, first press the down key and then press the up key to clear the real-time capacity detection.

6、 When the actual voltage of the battery decreases to the protection point along with the discharge and the actual total current exceeds the set value, the over-voltage protection and over-current protection will be triggered, and the output power will be cut off automatically, and the red character will be used to prompt the position of the protection for a short time, and the sound will beep at the same time.

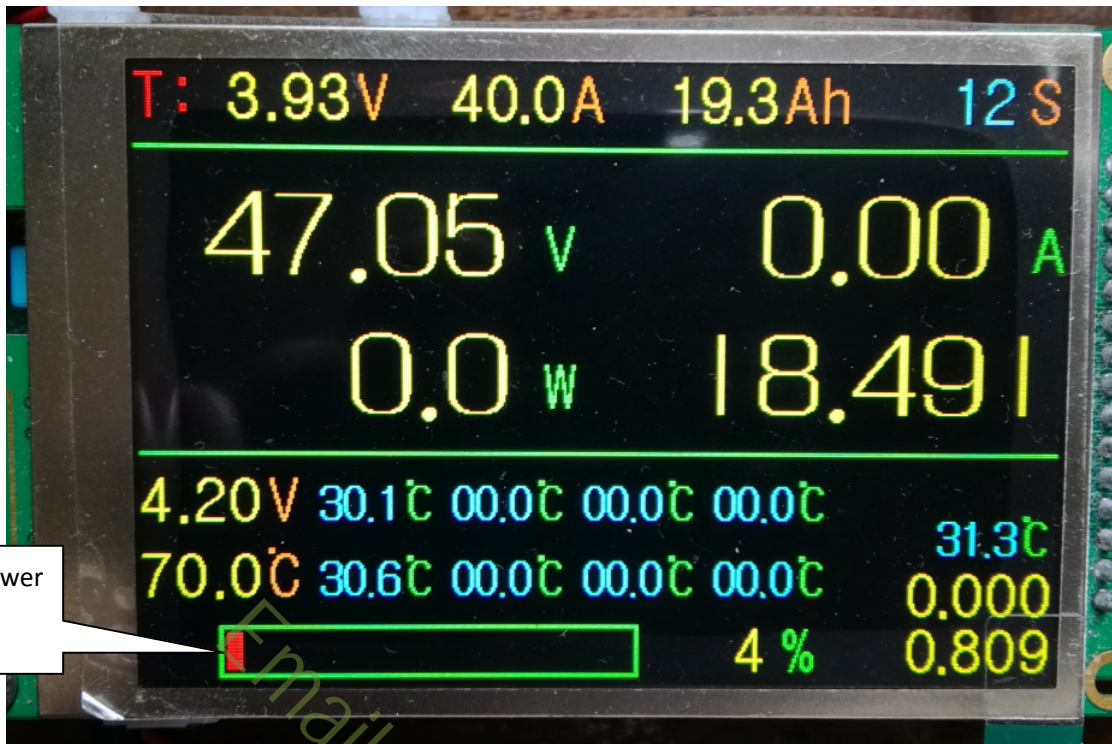
7、 When the actual capacity of the battery cannot be known, the battery can be fully charged first, and then the load can be connected for a complete discharge to accurately detect the actual capacity of the battery.

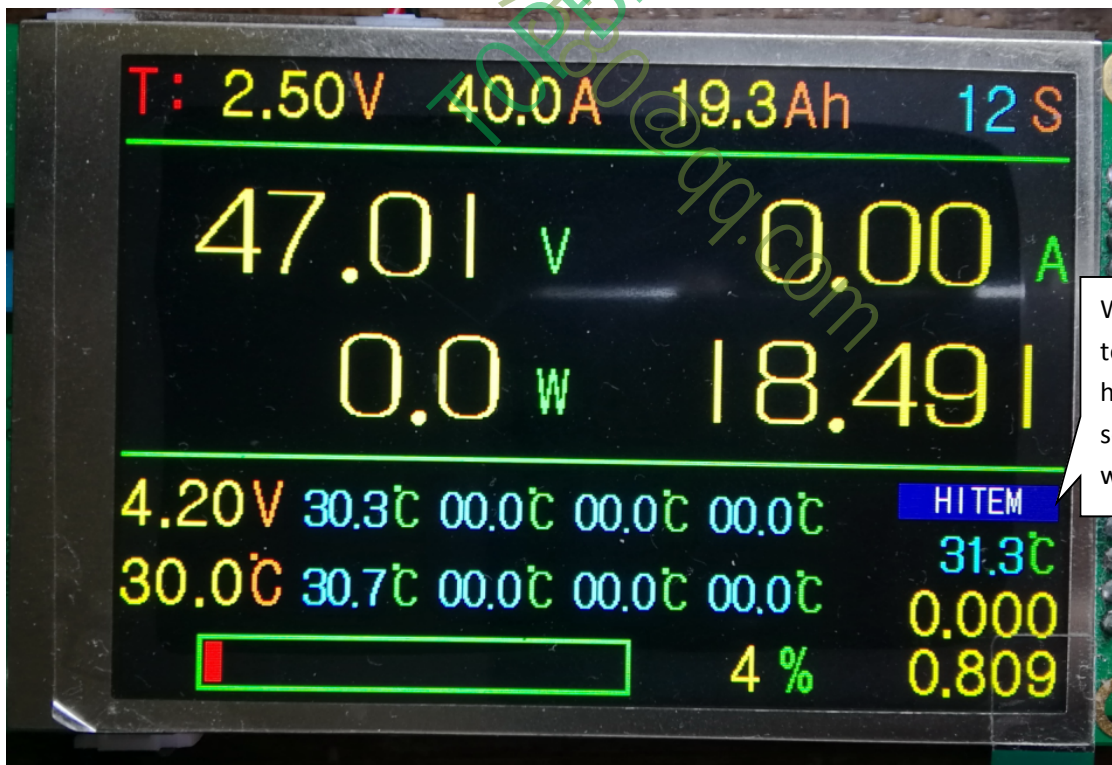
8、 In any non setting state, press the + key to switch between the main interface and the single voltage display interface. At the same time, the error message will be synchronously displayed in the two interfaces for easy observation.

9、 When the I / O channel is closed, press the “-” key for more than 3 seconds to turn on or off equalization。

E>、 Actual legend:









When the current is higher than the set value, the current displays a red prompt.

When the current is higher than the set value, HICUR will be prompted.

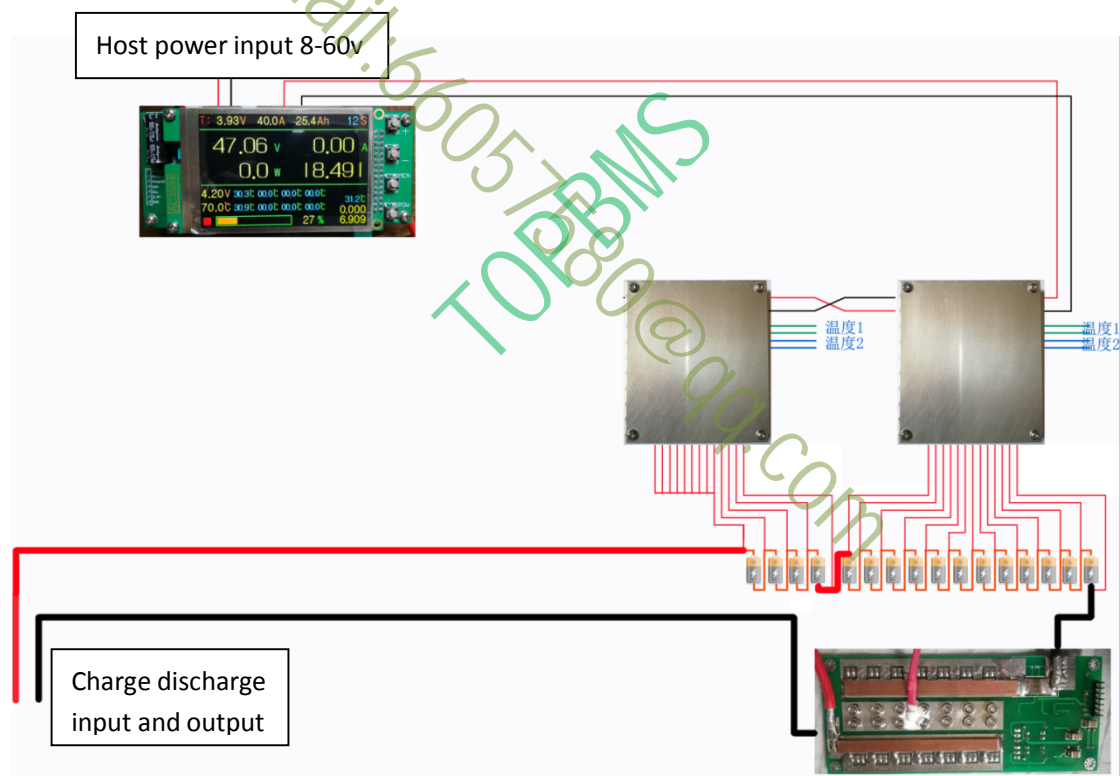


All information prompts will be synchronized in the auxiliary display interface in the same way.

Screen off

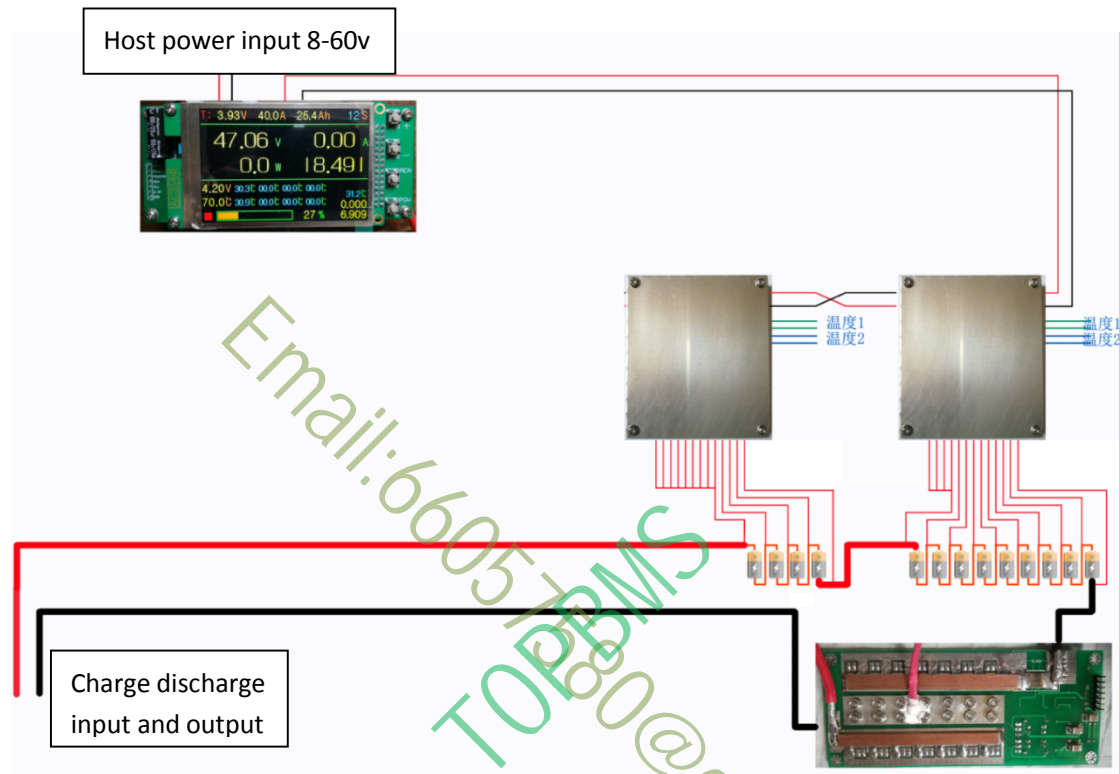
In interface 2 and interface 3, press men key to close and open the screen. close the screen, the host runs normally, press any key to wake up the screen, and after closing the screen, the power consumption of the host can be greatly reduced

Note 1: When the battery pack is 16, the spare ports must all be short circuited to the positive pole of the last battery of the module, the specific connection is as follows:



Note2: When the number of battery cells is 13, 14, 15, 25, 26, 27, 37, 38, 39, the power supply voltage of a single module must be 11V. For lithium iron phosphate and lithium ternary, it must be up to 4 to make the

module work normally, and all channels not used by each module must be parallel connected to the positive pole of the last battery of the module, The wiring diagram is as follows:



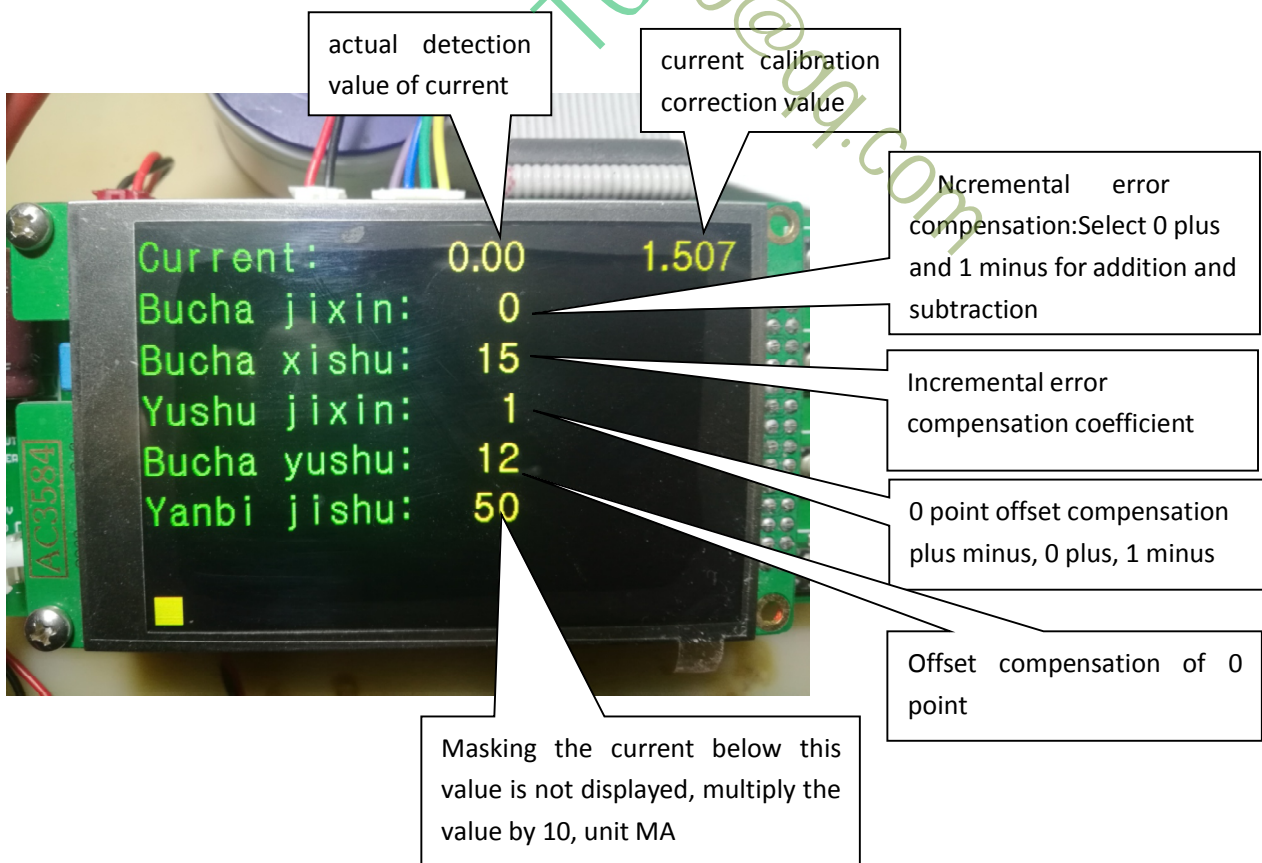
In addition to the above special cases, other combinations can be connected from low position to high position successively

F>、 Calibration function:

1、 Before entering the calibration procedure, first disconnect the power supply, then press and hold the POW key to keep the host unit powered on, and then release the pow key after hearing two prompts of dripping, you can enter the calibration interface and turn on the power output automatically at the same time.

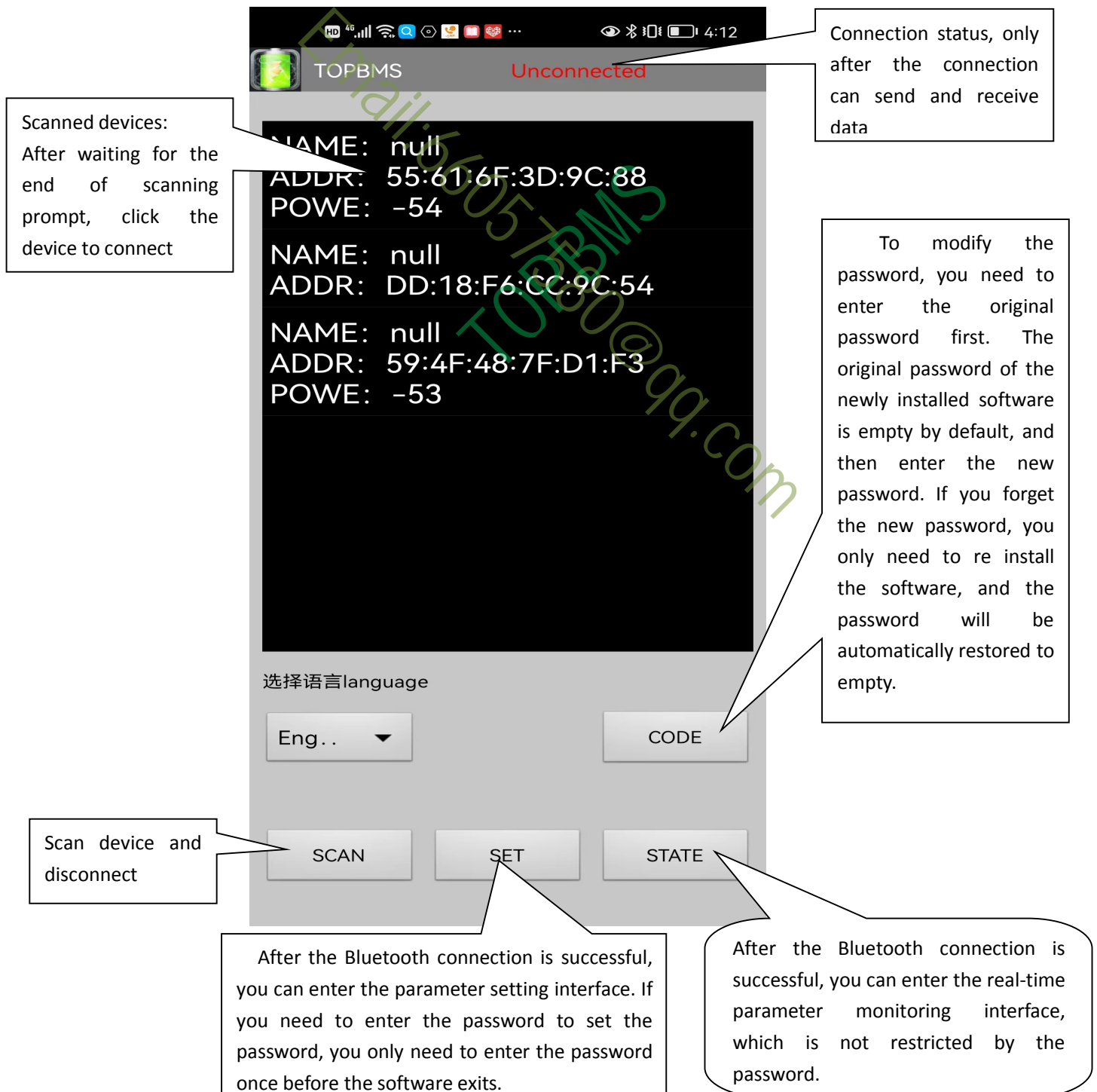
2、 Connect the load and use the multimeter to measure the current. Press the men key once, a short blue line will appear under the calibration value, indicating the adjustment status. Add and subtract the adjustment correction value to make the actual detection current value consistent with the value of the multimeter, and then the calibration can be completed. After the adjustment, press the MEN key once to save and exit, and then hear two drop prompt tones, so the calibration value is completed Save, then press POW to enter the main interface and turn off the power by default.

Note: for common current detector, the first item can be calibrated, and the other items are 0. All options need to be calibrated for Hall current detection



G>、Bluetooth usage

The specification of Bluetooth is Bluetooth 4.0, so it can only support Android 4.3 or above operating system. The old mobile phone does not support it. Before connecting, you need to turn on the Bluetooth of mobile phone first, and then turn on the software. If it has been turned on previously, you'd better turn it off first, and then turn it on once to prevent the Bluetooth of mobile phone from sleeping.



Bluetooth connection steps:

1、 First, turn on the Bluetooth of the mobile phone. If it has been turned on before the software is turned on, turn it off and then turn it on again. Do not use the Bluetooth pairing function in the mobile phone.

The software searches for pairing by itself;

2、 Click the scanning device. The scanning process is about 5 seconds. The scanned device will be displayed in the list. If the device is not scanned, please note whether the mobile phone hand is too far from Bluetooth;

3、 After waiting for the prompt scanning, click the name of the device to be connected to connect. If it is connected, it will show that it has been connected in the top prompt bar. After connecting, you can enter the setting window and real-time parameter monitoring window. By default, the name of the Bluetooth device shipped is bt05. If it is changed to another module, its name will be notified. In different environments, many Bluetooth devices around will be searched, and one can be found. Be sure to see the name of the device to be connected, because the software is one-to-one with the host, and does not support the connection of other devices;

Note: in the process of using, if the hand is too far away from the Bluetooth or interfered, the Bluetooth will be interrupted. At this time, you need to wait about 20 seconds. When the mobile phone detects the

Bluetooth device, it will automatically connect. If the Bluetooth device cannot be detected for a long time, you need to restart the software to connect with the host. After using the Bluetooth every time, please exit the app software to release the Bluetooth. The Bluetooth is not connected Then, the Bluetooth module's light is flashing, and the host's flashing square flashes fast. After connecting, the light is always on, and the host's flashing square flashes slowly.

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TOPMS

User interface of the software:

Setting parameter input field

Set parameter send button

TYPE	DATA	SET DATA
Discharge end voltage	2.50 V	<input type="text"/> SET
Protect Current	40.0 A	<input type="text"/> SET
Max Capacity	80.0 A H	<input type="text"/> SET
Battery String	8 S	<input type="text"/> SET
Charge end voltage	3.60 V	<input type="text"/> SET
Protect Temp	60.0 °C	<input type="text"/> SET
Charge Recovery	1.00 V	<input type="text"/> SET
Discharge Recovery	2.50 V	<input type="text"/> SET
Default Channel	ON	<input type="text"/> SET
Low voltage shutdown	2.49 V	<input type="text"/> SET

Shutdown Delay	120	S	<input type="text"/>	SET
Charge Equalization	3.40	V	<input type="text"/>	SET

History Log: Charge protection

Battery Num:

Shut Time: S

Max Voltage: 3.325 V Difference: 0.044 V

Mini Voltage: 3.281 V Eq Datum: 5.000 V

Cap Total: 1 AH

loop num: C



equalization and charging tips

During equalization, if the front title is red, the channel is discharging.



The charging and discharging channel is open and closed, and it needs to be pressed for a long time

Manual on and off automatic discharge equalization, long press effective.

TOPBMS Connect

TYPE	DATA	SET DATA
Discharge end voltage	2.50 V	<input type="text"/> SET
Protect Current	40.0 A	<input type="text"/> SET
Max Capacity	80.0 AH	<input type="text"/> SET
Battery String	8 S	<input type="text"/> SET
Charge end voltage	3.60 V	<input type="text"/> SET
Protect Temp	60.0 °C	<input type="text"/> SET
Charge Recovery	1.00 V	<input type="text"/> SET
Discharge Recovery	2.50 V	<input type="text"/> SET
Default Channel	ON	<input type="text"/> SET
Low voltage shutdown	2.49 V	<input type="text"/> SET
Low voltage shutdown	2.49 V	<input type="text"/> SET
Shutdown Delay	120 S	<input type="text"/> SET
Charge Equalization	3.40 V	<input type="text"/> SET

History Log: Charge protection

Battery Num: S

Shut Time: S

Max Voltage: 3.325 V Difference: 0.044 V

Mini Voltage: 3.281 V Eq Datum: 5.000 V

Cap Total: 1 AH CL

loop num: 0 C

Display on

CAP CLEAR STATE Return Scan

Automatic recovery channel open state voltage, as long as the battery is between the charging recovery voltage and the discharging recovery voltage, the channel will open automatically. Without this function, the charging recovery voltage will be set within 1V, and the channel will close automatically. If the channel is closed manually, the over-current and the number of battery cells are wrong, the channel will not open automatically.

In the default state of the power on channel of the host, input parameter 1 is on and input parameter 2 is off by default.

Discharge capacity statistical clearing

Return to the device connection and scanning window

Any battery is lower than this value, and the power supply of the host is automatically cut off, and the current consumption is 0. Currently, only MOS version is supported. Relay version set to close function within 1V.

During charging, when any battery voltage reaches the set value, equalization will be automatically turned on to ensure that each battery can be charged to the cut-off voltage, and the equalization efficiency is higher than that of simple discharge equalization. Do not use this function to set the voltage to 5V to turn off automatic charging equalization.

Any battery is lower than the low-voltage host shutdown setting, and the host time is delayed. Leave time for charging the host to restart the start key.

The screenshot shows a mobile application interface for battery management. At the top, there are three settings: 'Low voltage shutdown' set to 2.49 V, 'Shutdown Delay' set to 120 S, and 'Charge Equalization' set to 4.70 V. Each setting has a 'SET' button. Below these is a 'History Log' section showing 'Charge protection'. Further down, 'Battery Num:' is displayed. 'Shut Time:' is set to S. 'Max Voltage:' is 3.325 V and 'Difference:' is 0.044 V. 'Mini Voltage:' is 3.281 V and 'Eq. num:' is 5.000 V. There are buttons for 'Cap Total:', 'AH', 'CL', and 'loop num:'. At the bottom, there are buttons for 'Display on', 'CAP CLEAR', 'STATE', and 'Return Scan'. A large green watermark 'Email: 66051381@qq.com' is overlaid diagonally across the screen.

Record the reason for the last protection.

When overcharge protection or overdischarge protection, the number of batteries triggering protection.

When the host power-off protection is triggered, the time from power-off is shorter.

Note:

1、In the setting window and the real-time parameter monitoring window, the discharge capacity reset button, the channel opening and closing button and the automatic equalization button need to be pressed for a long time to prevent false triggering.

2、 Set the parameter input, must be in accordance with the standard format input, digital and decimal.

3 、 Automatic equalization is divided into charge equalization and discharge equalization. For charge equalization, please control the current at the end of charge to be near the balance discharge current. Automatic discharge equalization must be effective when the channel is closed, and the opening of charge discharge channel must also be effective when the automatic balance is closed.

4 、 The parameters on the mobile app and the control host are synchronized. Whether the mobile phone modifies the parameters or the control host modifies the parameters, both are updated synchronously.

5、 The Bluetooth transceiver of the main controller must be installed in a non-metallic shielding environment, which can not hinder the transmission and reception of signals. For example, it can not be installed in a metal box, so it can not receive signals.

6、 Communication distance of Bluetooth in order to ensure the speed of data, it is recommended that the communication distance should be within 10 meters in open space. If there is occlusion, the communication distance needs to be shortened.

7、 The host computer must be inserted into the Bluetooth device. If the Bluetooth device is not detected, the host computer cannot start to

work.

remarks:

- 1、 It has been calibrated before normal shipment, so generally, it is not necessary to calibrate again.
- 2、 The current of the circuit is very small, and the higher the input voltage is, the smaller the current is. In the case of 45V input, the current consumption is 30mA. In order to ensure the accuracy of the load current, the current is not included in the total current.
- 3、 If it is not used for a long time, the power supply of the module needs to be cut off.
- 4、 It is necessary to strengthen the heat dissipation of MOS transistor for long time constant high current continuous operation.
- 5、 The communication line must use two core twisted pair. The line can be divided into positive and negative, so it can't communicate after wrong connection.
- 6、 The battery connection balance line must be connected from the low to the high level successively, and it is not allowed to be connected wrong. First connect the battery and the balance line well, then measure the voltage between each pin of the plug with a multimeter to ensure that it is within 5V. After confirming that there is no error, insert the plug into the module. It is strictly prohibited to insert the balance line plug into the module and then connect the battery.

7、The power supply of the host can be taken from any group of batteries, and the voltage should not exceed 60V. DC-DC or AC switching power supply can also be used to reduce the battery voltage and then supply it to the host (AC switching power supply can be used for DC, and the input of AC switching power supply is not positive or negative).

8、 There are multiple two position sockets on the main board. Please don't connect them wrong, otherwise the board will burn.

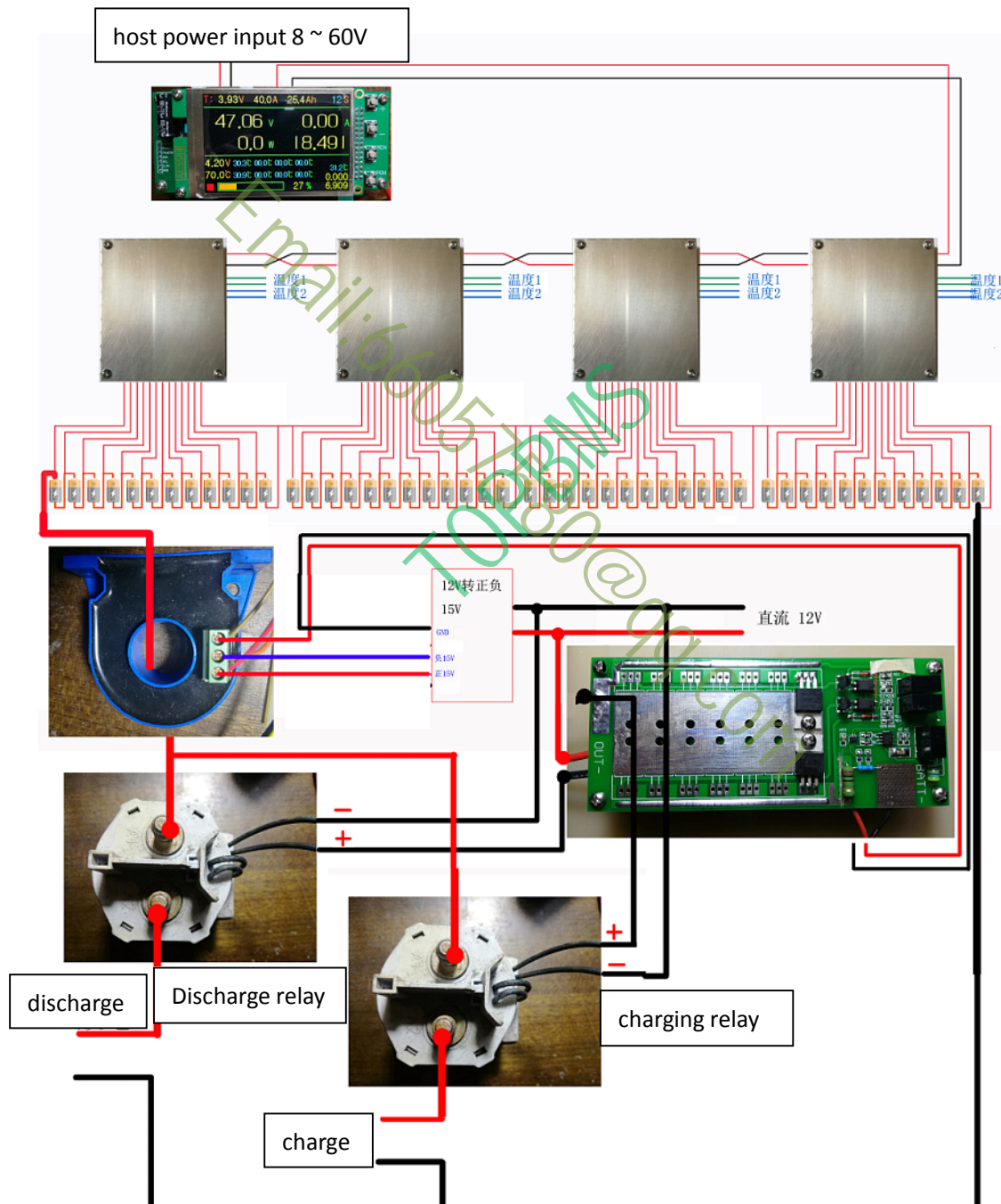
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For high voltage and large current Hall current sensor plus relay application case:

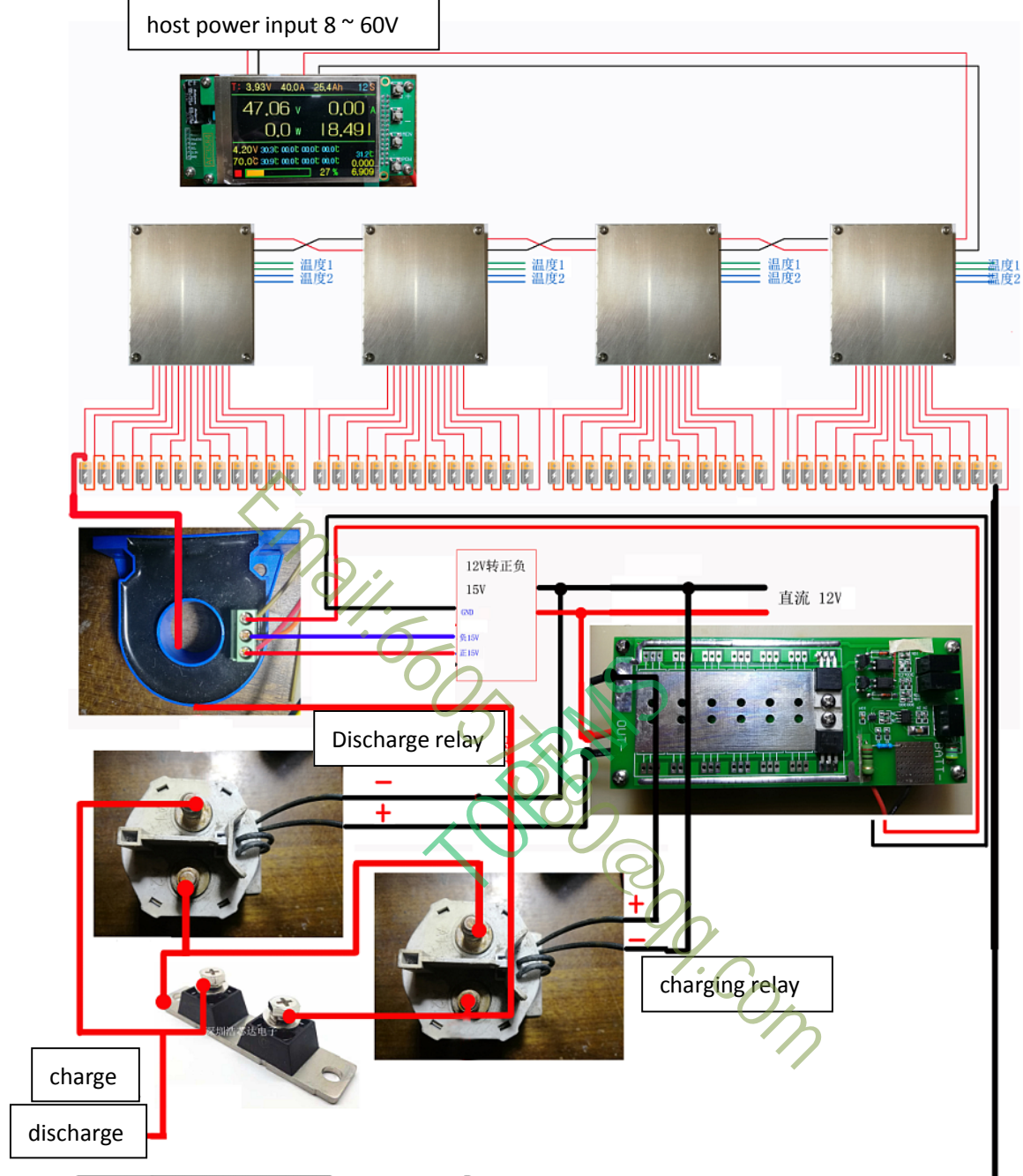
The control line of relay can be divided into positive and negative.

Attention should be paid when wiring.

1、Split connection

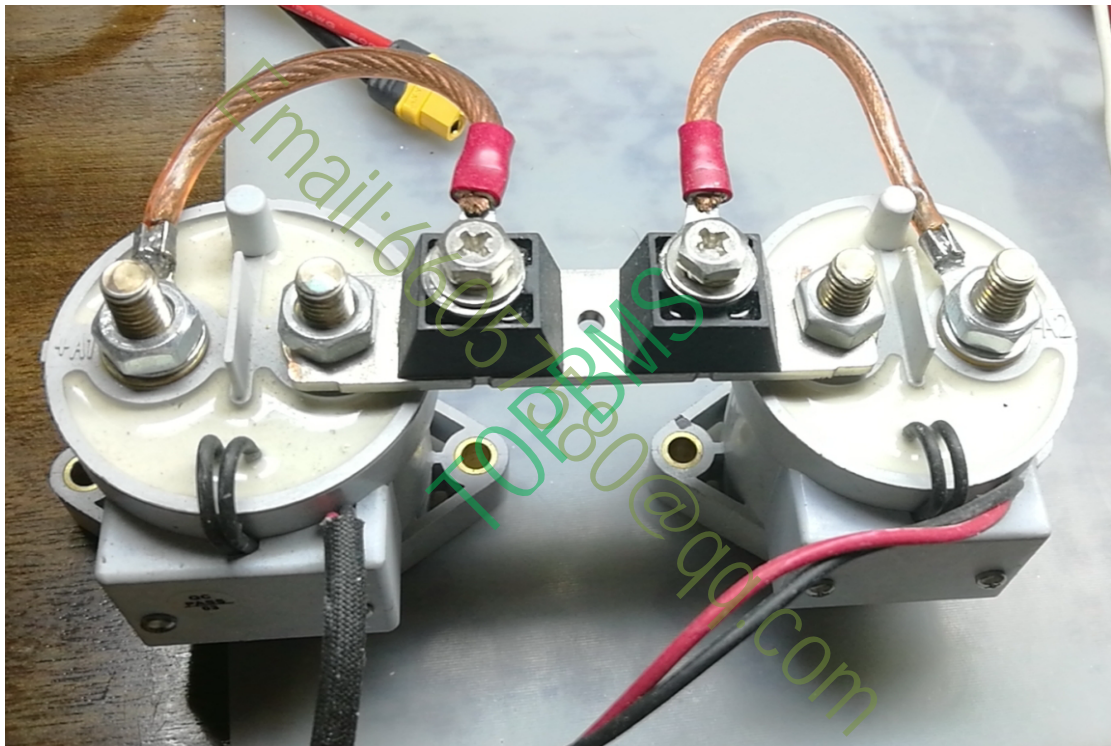
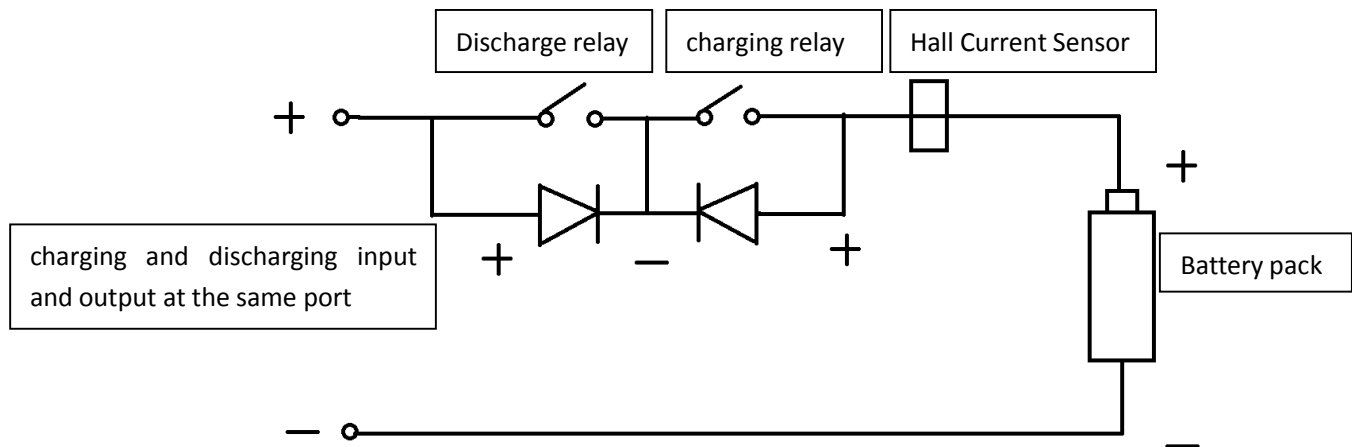


2、 Same port connection



A high-power dual diode module needs to be added to the same port.

The withstand voltage and current of the diode need to be selected. The specific circuit diagram is as follows:



Supplement: if you need more equalizing current, please contact us to provide modification scheme.