CHARGERY

BMS24

for 2S-24S LiPo & LiFe

Low power consumption
High accuracy
2.8" TFT LCD display
Programmable

Thanks for your purchasing the BMS24 for your vehicle.

Read the ENTIRE instruction manual to become familiar with the features/functions of the device before operating.

Feel free to send an email to jasonwang3a@163.com or call at 86 755 2643 6165 should you have any questions and suggestions.

Jason Wang

Chargery BMS24 is designed special for LiPo & LiFe battery pack applied to storage energy system and Electrical Vehicle including E-Motorcycle, E-Scooter and so on. The unit can measure or detect the battery voltage, cell voltage, charge & discharge current, battery temperature, and battery SOC (State of Charge) , displayed with TFT color LCD.

Safety Notes

Please read the entire manual completely before using, to make sure you can use this device better and more safely.

1. Ensure the BMS program and settings match the battery pack, otherwise the battery will be damaged and a dangerous situation may arise, especially for Lithium batteries, which may cause fire.
2. For storage energy system application and for Electrical vehicle application will have many differences, please adjust those key parameters carefully, or contact us for more details.
3. Do not allow water, moisture, metal wires or other conductive material into the device.
4. Never charge or discharge any battery having evidence of leaking, expansion/swelling, damaged outer cover or case, color-change or distortion.
5. Do not try to charge "non-rechargeable" dry cells.
6. Do not mix batteries of different types, different capacities or from different manufacturers.
7. Do not exceed the battery manufacturer's suggested maximum charge and discharge rates.
8. Carefully follow the battery pack manufacturer's recommendations and safety advice.

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Special Features

1. The BMS24 uses advanced ADC measurement technology, high accuracy, high voltage and high current detection circuit. The maximum voltage measurements tolerance is within 5mV at up to 24S LiPo battery (102V)
2. Support regenerative braking, during braking operation can charge the batter pack and the discharge power (Wh) will decrease to response to the braking power.
3. Charge/discharge current up to **600A**. Bigger current can be customized.
4. **1.2A** per cell balance current is very useful for large capacity battery pack, the feature can resume all cell voltage balance status at the shortest time. Over temperature protection make sure the system safety during balance.
5. BMS24 calculate and display the charge and discharge power (Wh), generally the battery rated power is rated voltage multiply rated battery capacity.
6. TFT LCD screen provides rich information including current, voltage, power, capacity, battery status, SOC and temperature and so on.
7. BMS24 features a maximal safety protection, within the range parameters can be setup, BMS24 will alarm and cutoff charge or discharge according to users' setup, out of range of parameters, and trigged absolute

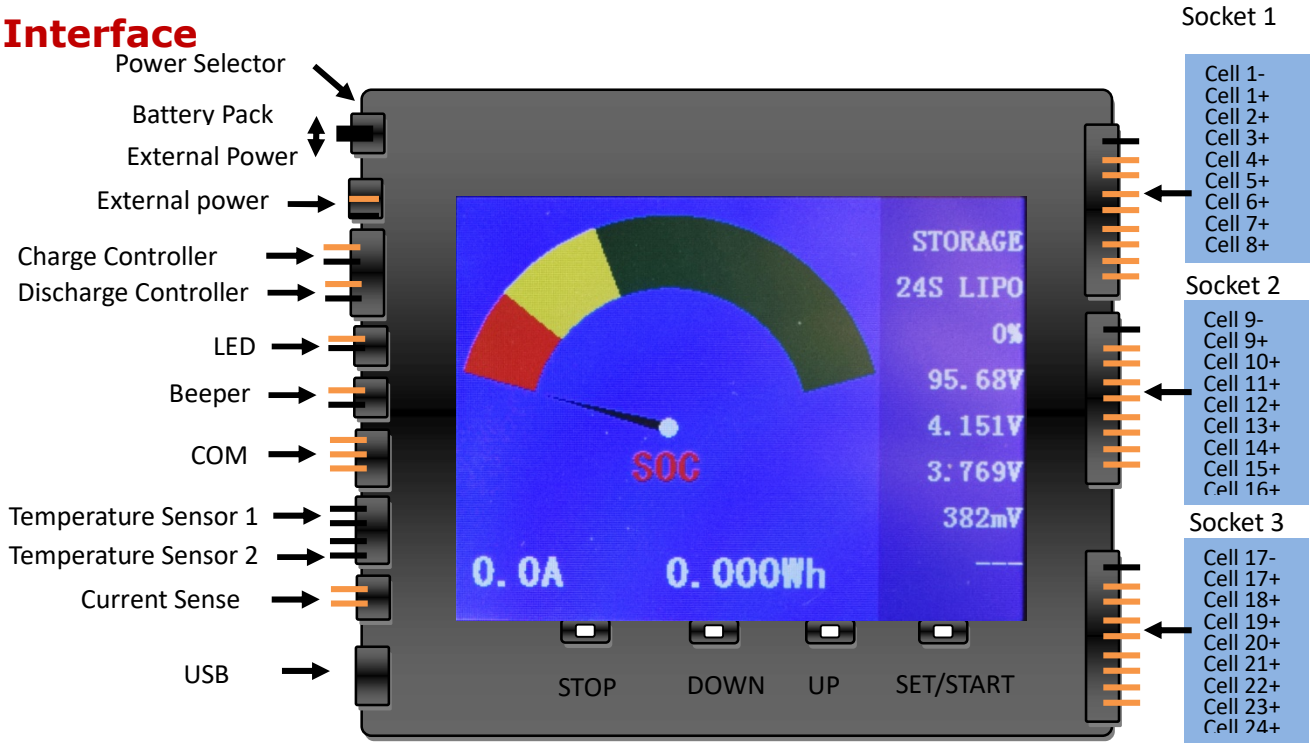
maximum ratings BMS24 will force to cutoff charge or discharge to prevent the battery from fire.

8. Minimize the power consumption by draw current from all cells or external power supply.
9. Dual power design, the unit can be powered by all cells or external power supply.
10. Detect cell count at any time, and compare with the count detected when switch on first time. If it is not uniformity, the device will alarm and cutoff charge or discharge according to users' setup, the feature can prevent any cell connection from loosing.
11. Sound alarm and LED alarm will be triggered when any warning events happened, and then wait several seconds cut off or Don't cut off charge or discharge. The delay time can be programmed.
12. Charge relay and discharge relay are controlled independently.
13. Two temperature sensors monitor battery temperature on different position.
14. Supports upgrading the firmware program by USB port.
15. BMS24 provide users the maximal flexibility, key parameters can be programmed.
16. BMS24 display battery SOC or called battery gauge similar with car dashboard. Cell count, battery pack voltage and battery gauge (%) is displayed simultaneously.
17. In case that the battery pack need not be charged and discharged, Press STOP button enter into sleep mode to save energy consumption, at this mode, Charge and Discharge is forbidden, and LCD back light is off. Press any key to resume normal work mode.
18. LCD back light ON time can be programmed to save energy, when it is OFF, press any key to resume "ON".

Protection functions

1. Cell count error protection
2. Over charge protection
3. Under voltage protection
4. Over current protection when charge or discharge
5. Over temperature protection
6. Over differential cell voltage protection
7. Over differential battery temperature protection
8. Under SOC protection

Interface

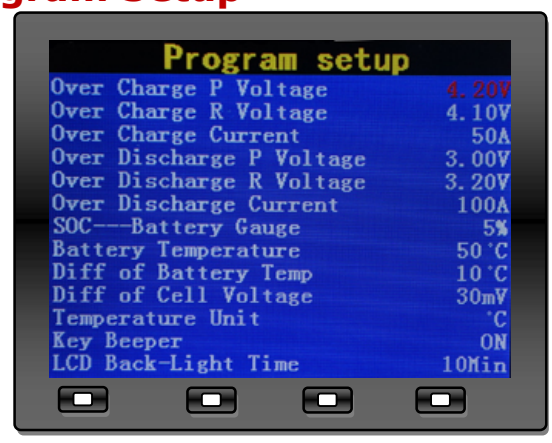


Power Selector	Alternate External or battery pack to power BMS24. If select all cells power the unit, the battery pack must be 8S to 24S LiFe or LiPo. But if power by external power supply, BMS24 can do 2S-24S LiPo or LiFe battery pack. The main input supply Vin voltage range is 15V to 60V
External power port	External power input, the voltage should be 15V to 60V, 1A maximal, the current depends on the external load, the connector is 5.5*2.1 DC jack
Charge controller	Charge controller, turn on or turn off charge circuit, generally connect to relay or DC contactor. When any cell voltage is over setup, it will not power the coil of relay to turn off the charger, otherwise BMS24 will output Vin power the coil to close the relay. The relay must be form OPEN.
Discharge controller	Discharge controller, turn on or turn off discharge circuit, generally connect to relay or DC contactor. When any cell voltage is under setup, it will not power the coil of relay to turn off the motor or other load, otherwise BMS24 will output Vin power the coil to close the relay. The relay must be form OPEN.
COM	The COM port is connected to external device such as Charger. if connect to Chargery charger, BMS24 can control charge current to shorten charge time
Temperature sensor	Two temperature sensor monitor the battery temperature, the sensor must tie to battery surface or gap of cells where the temperature should be the highest during charge or discharge. The temperature range is 0-150℃
LED	Connect to high light LED, the LED will flash when any warning event happened
Beeper	Connect to beeper or others to alarm. It will output 12V 25mA max.
Current sense	Connect to single shunt. Charge current and discharge current can be measured simultaneously.
USB	Connect to PC update the firmware by Chargery UpdateTool.exe
Socket 1	Connect to 2S to 8S battery,
Socket 2	Connect to 9S to 16S battery. for over 8S battery, please connect 8S battery to socket 1 and then connect to socket 2, such as 8S + 2S for 10S and 8S +5S for 13S
Socket 3	Connect to 17S to 24S battery. for over 16S battery, please connect 8S battery to socket 1 and second 8S to socket 2, then connect to socket 3, such as 8S + 8S + 6S for 22S

Absolute maximum or Minimum ratings

Maximal cell voltage	LiPo	4.35V	Larger than the absolute maximum voltage, BMS24 will force to cut off charge
	LiFe	3.90V	
Minimum cell voltage	LiPo	2.50V	Less than the absolute minimum voltage, BMS24 will force to cut off discharge
	LiFe	2.00V	
Battery temperature	LiPo& LiFe	100℃	Over the temperature, BMS24 will force to cutoff the charge and discharge

Program Setup



1. Press SET/START button for 3 seconds enter into Program Setup interface.
2. Press UP or DOWN button select the item, press SET/START shortly make the value flash, and press UP or DOWN change the value. Press SET/START button shortly confirm the change. After finish all setup, press SET/START for 3 seconds quit the setup menu.
3. When quit setup mode, BMS24 Will record all parameters till next change.

NOTE: Please keep the default setup unless for special purpose.

Parameters		Min.	Type	Max.	Step	unit
Charge Protection						
Over Charge Protection(P) Voltage	LiPo	3.90	4.20	4.35	0.01	V
	LiFe	3.40	3.65	3.90	0.01	V
Over Charge Release(R) Voltage	LiPo	3.80	4.10	4.25	0.01	V
	LiFe	3.30	3.55	3.80	0.01	V
Over Charge current		0	**50**	600	1	A
Discharge Protection						
Over Discharge Protection(P) Voltage	LiPo	2.75	3.00	4.00	0.01	V
	LiFe	2.00	3.00	3.50	0.01	V
Over discharge Release(R) Voltage	LiPo	2.75	3.20	4.00	0.01	V
	LiFe	2.00	3.10	3.50	0.01	V
Over Discharge current		0	**300**	600	1	A
SOC--- Battery gauge		5	20	90	1	%
Temperature Protection						
Battery Temperature		30	50	80	1	℃
Difference(Diff) of battery Temperature(Temp)		5	10	30	1	℃
Voltage balance Protection						
Difference(Diff) of cell voltage		5	30	300	1	mV
Others						
Temperature Unit			℃	℉		
Key Beeper			ON	OFF		
LCD Back-Light time(1)		1	10	999	1	min
Cut-Off Delay Time(2)		0	10	60	1	Second
Current Calibration(3)		0	0	255	5	A
Default settings	Press SET/START restore all parameters to default value					
Balance Parameter setup: Press SET/START to setup and press for 3 seconds quit setup						
Balance Start Voltage	LiPo	3.3	3.6	4.1	0.01	V
	LiFe	3.0	3.2	3.4	0.01	V
Balance Stop Diff Voltage(4)			5	10	200	mV
Balance in Charge	ON means Balance start during charge, OFF disable.					
Balance in Discharge	ON means Balance start during discharge, OFF disable.					
Balance(5)	ON enable Balance, and OFF forbid balance					

NOTES:

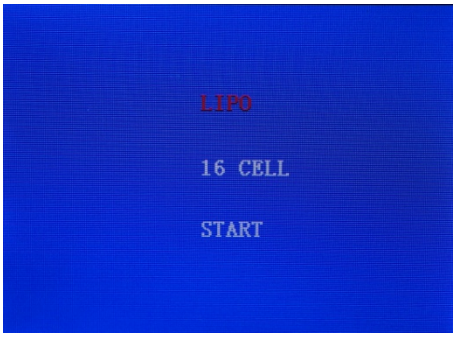
1. **Always on** means the LCD back-light will be ON forever.
2. **NO** means BMS24 will not cut off charge or discharge but alarm by LED flash and Beeper Sound.
3. **Current Calibration** is not recommended, voltage and current is calibrated before delivery. if exchange current shunt, you must calibrate the current again.
4. When difference of cell voltage under setup, stop balance automatically
5. Balance current: 1.2A per cell, default Balance is ON,

please alternate OFF, otherwise the BMS don't balance at any situation.

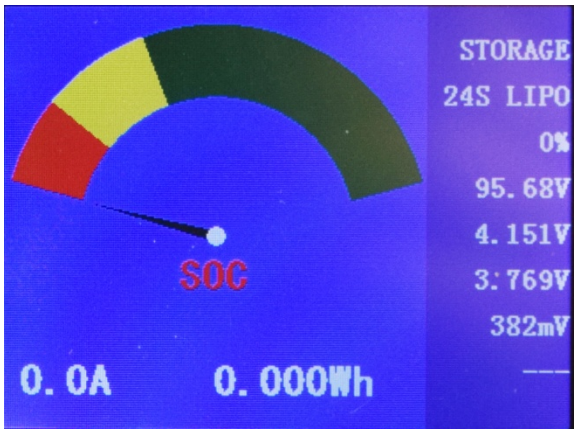
Warning

Cut-Off Delay Time is very important and difference for different battery capacity and application, please carefully test and make a correct decision, for EV, you can select **NO** to control the EV car by manual **NOT** controlled by BMS24, but when cell voltage and temperature trigger the absolute maximum or minimum ratings, the BMS24 will force to cut off charge or discharge to make sure the battery safety, and prevent battery pack from explode or fire.

Operating guideline



1. Connect Beeper, LED, and Current Sensor to BMS24, and then connect relay Controller and temperature sensor too.
2. Connect the battery to BMS24, keep the cell polarity correct. The detailed connection diagram is as the following typical connection drawings. move the power selector power on the device.
3. BMS24 will initialize the beeper and LED, beeper sounds once time, after display BMS24 and version, the battery type and cell count interface is displayed. Two battery type LiPo and LiFe can be selected. Cell count range is 2S to 24S, the cell count will be identified when the battery pack connect to the BMS24. Press DOWN or UP button choose the item and press SET/START blink, then press DOWN or UP button modify, finally press SET/START button to run the BMS24. After started, battery type and cell count will not be changed unless power off BMS24.
4. Press SET/START button for 3 seconds enter into Program Setup interface, modify Over Charge Current (50A default) and Over Discharge Current (300A default) according to your application. If need balance in Charge or in Discharge, please modify the Balance set on Program Menu.
5. SOC—battery gauge dashboard will be displayed first, as following. Press UP/DOWN button alter other interface.



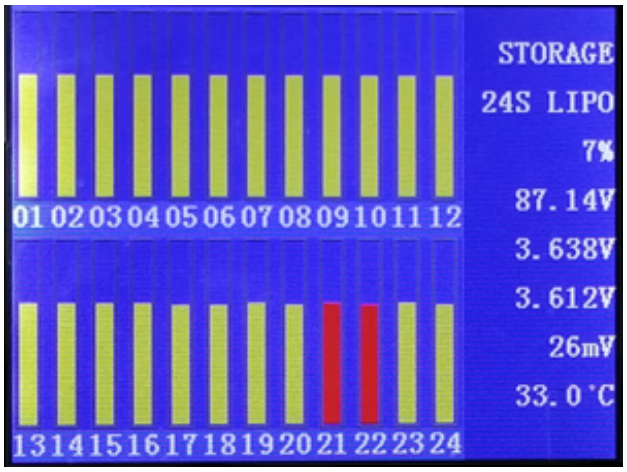
STORAGE is battery status, maybe CHARGE or DISCHARGE (1)
Cell count and battery type
SOC—battery gauge, display 0% lose temperature sensor
Battery pack voltage
Highest cell voltage
Lowest cell voltage
Difference of cell voltage
Battery temperature
Charge or discharge current
Charge or discharge power

Notes

1) When charge or discharge current less than 1.0A, battery status will be STORAGE.

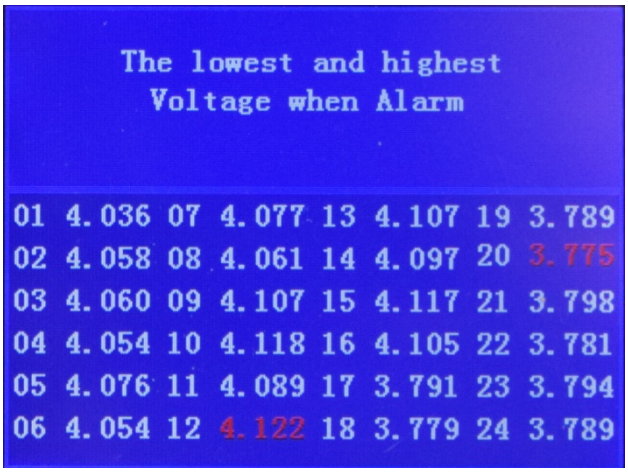
6. The following interface is cell voltage column, the highest and the lowest cell voltage is displayed in RED

column.



7. The third interface display all information including all cell voltage. The highest and the lowest cell voltage is displayed in RED text. Difference of cell voltage and difference of battery temperature is displayed.
   When any warning events triggered, BMS24 will go to the interface and display error information. Such as if the battery connection break down, the cell count and ERROR will be displayed in turn. if the cell voltage over the setup value, the cell voltage and HIGH will be displayed in turn.

8. When any warning events triggered, Press UP or DOWN, you can check the cell voltage triggered warning events (over charger or over discharge), the voltage will be recorded till next warning.



Specifications

1. Battery range: 2S-24S LiPo & LiFe battery pack
2. Accurate scope of the cell voltage: -8mV/+8mV
3. Cell Voltage display range: 0.10~4.99V
4. The voltage of external power：15-60V
5. Balance current:1.2A per cell
6. Temperature display range:0.0℃~150℃,
   - Display 0.0 when under 0.0℃
7. SOC indicator:
   - RED area @ 0~15% of SOC
   - YELLOW area @ 16~35% of SOC
   - GREEN area @ 36~100% of SOC
8. Size: 128×114×33 (L×W×T, mm) or 5.1×4.5×1.3 inch (L×W×T, mm)
9. Weight: 510g with case
10. Warning LED: 11000mCd, @ 2.0V, 20mA
11. Warning beeper: 85dB @ 12V, 25mA
12. Package: AL alloy case

Balancer

BMS24 can resume cell voltage balanced status at the shortest time, it is based on 1.2A balance current per cell, balance accuracy is 8mV. Balance can be operated in charge or in discharge or in both, the feature can be setup

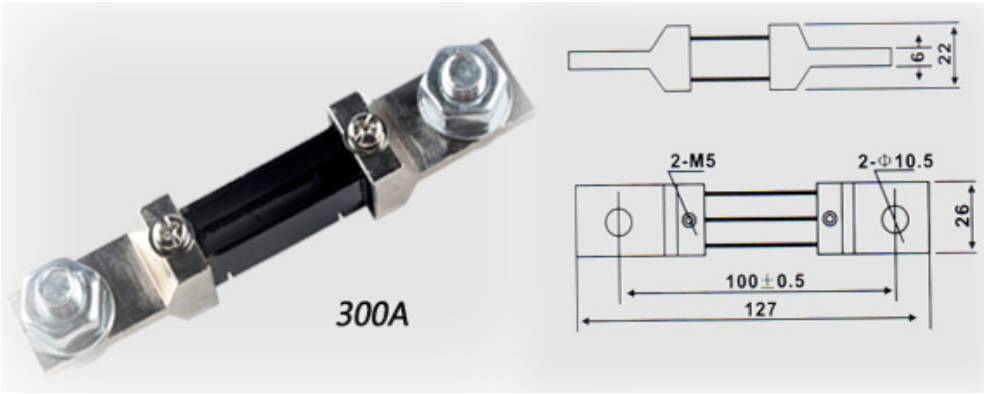
on program setup menu.

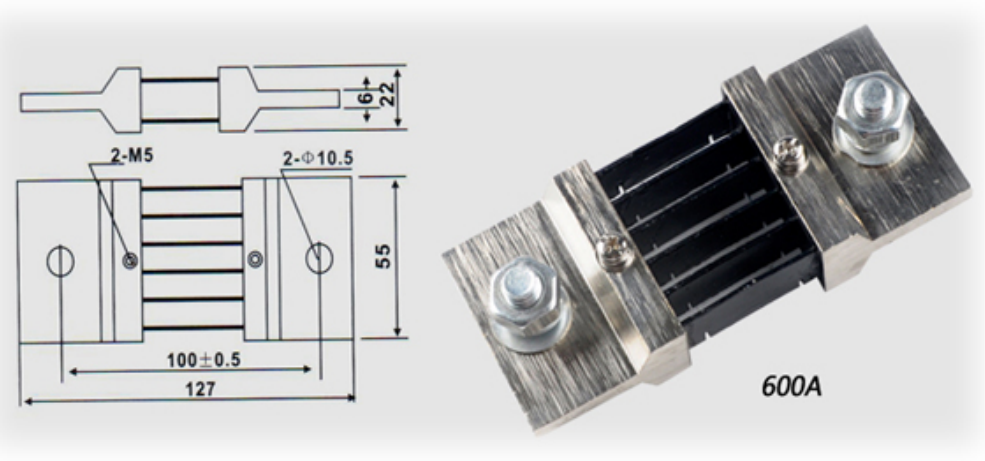
Current Sensor Specifications

Please use correct current shunt according to actual maximal charge and discharge current, singe shunt is enough for BMS24, 75mV or less shunt is suggested.

Chargery can provide all kinds of shunt. we calibrated cell voltage and current before delivery.

The 300A and 600A 75mV specification is as below.





Firmware Upgrades via USB Port

1. Go to http://www.chargery.com/uploadFiles/ChargeryupdateTool.zip to download the ChargeryupdateTool.zip, the zip file include Chargery USB driver, and Chargery Update Tool, extract to any disk on the PC.
2. To install the USB driver, run the program X:\ChargeryupdateTool\ChargeryUSBdriver.exe (where X is the drive letter designator)
3. In the same directory, double click to run the update tool and enter program interface.
4. Connect BMS24 to the PC by the USB data cable. When the port number (such as com5) appears, this shows the update tool identified the BMS24. Click OPEN button lock the port please.

5. Click Open File button open the firmware file. If there is no firmware file on the PC, you can download the file on http://www.chargery.com/uploadFiles/firmwareFiles/ to the PC.
6. Click the Update button, then the update progress bar will appear, update complete will be displayed on PC. BMS24 also display the progress bar simultaneously and enter into cell count setup interface automatically after update is completed..

Current Calibration

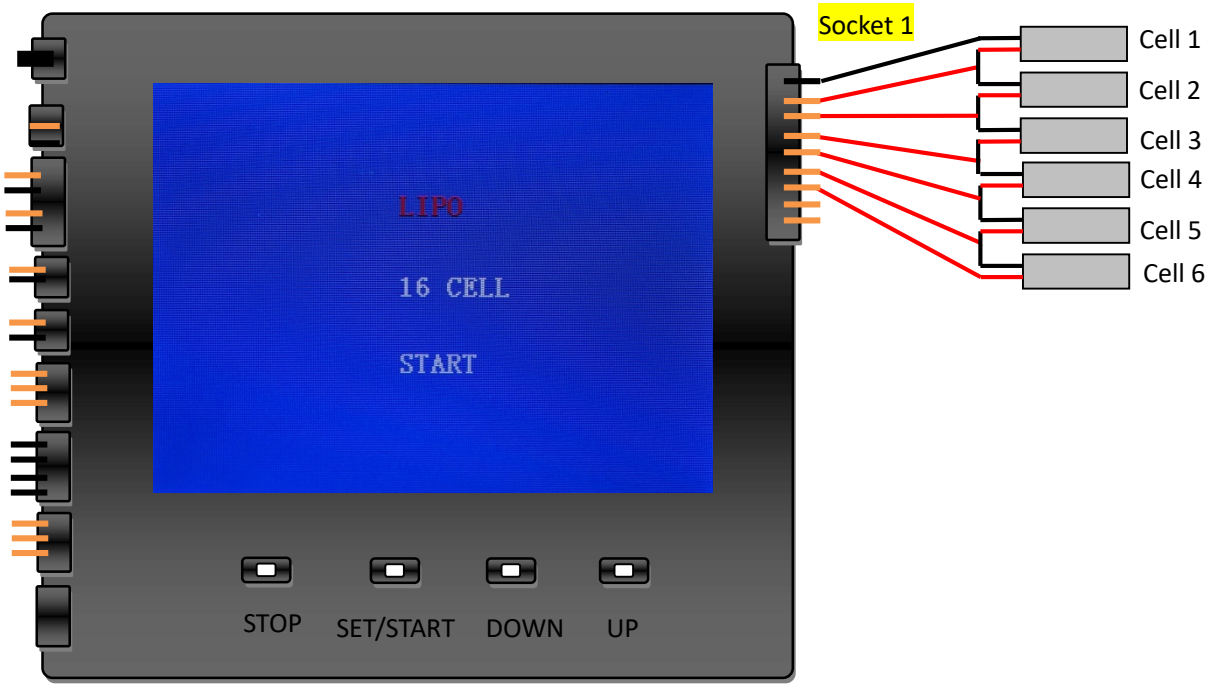
Press SET/START 3 seconds enter into Program Setup and find the Current Calibration, you can calibrate the current to improve the measure accuracy. if exchange the current shunt, you must calibrate current again.

1. Shortly press SET/START make the 0A blink
2. Turn off charge and discharge, and shortly press SET/START button.
3. Press SET/START again and increase the calibration current to another value (up to 255) and charge or discharge battery at the current.
4. Press SET/START save calibration data.
5. Press SET/START for 3 seconds quit Program Setup.

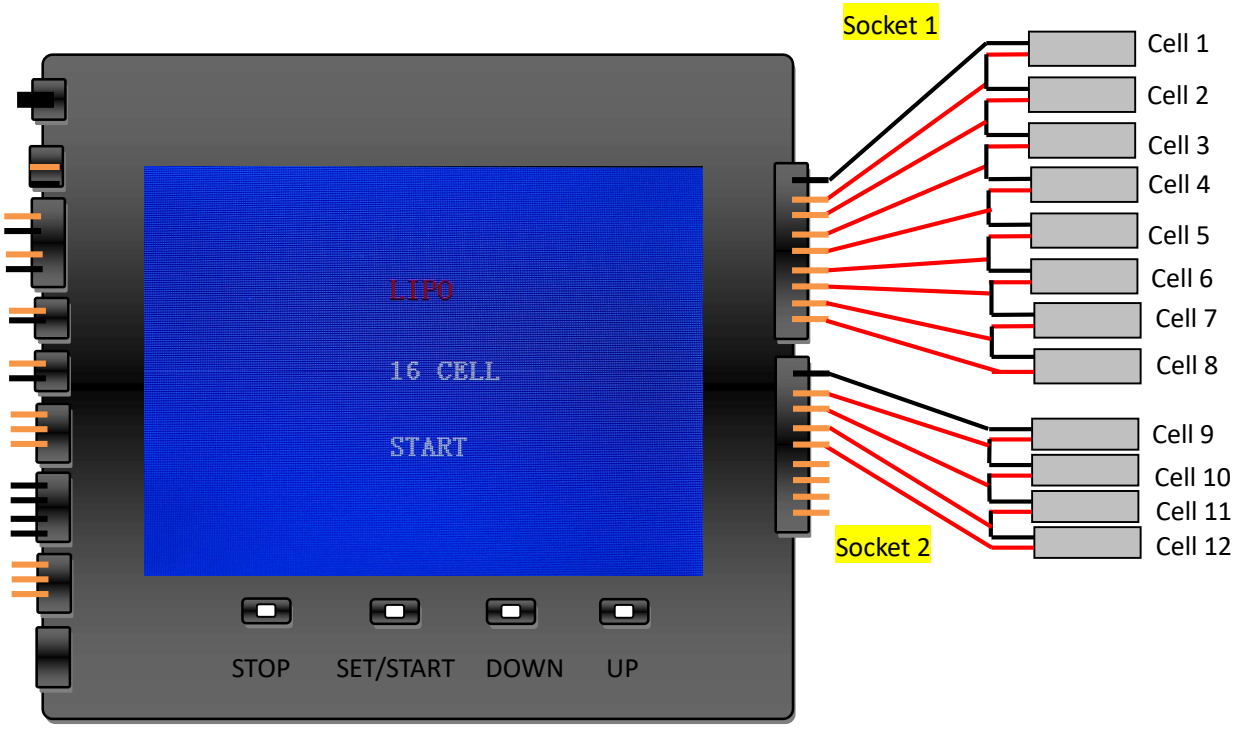
Typical Connection

There are 3 sockets connecting to battery pack, socket 1 is for 2S-8S, socket 2 for 9S~16S, and socket 3 for 17-24S battery.

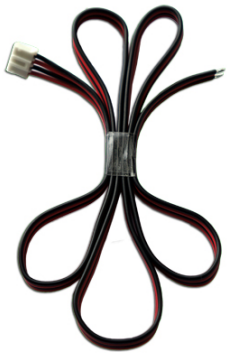
1. 6S battery connect to the socket 1 directly, but external power supply is essential, it is as following.



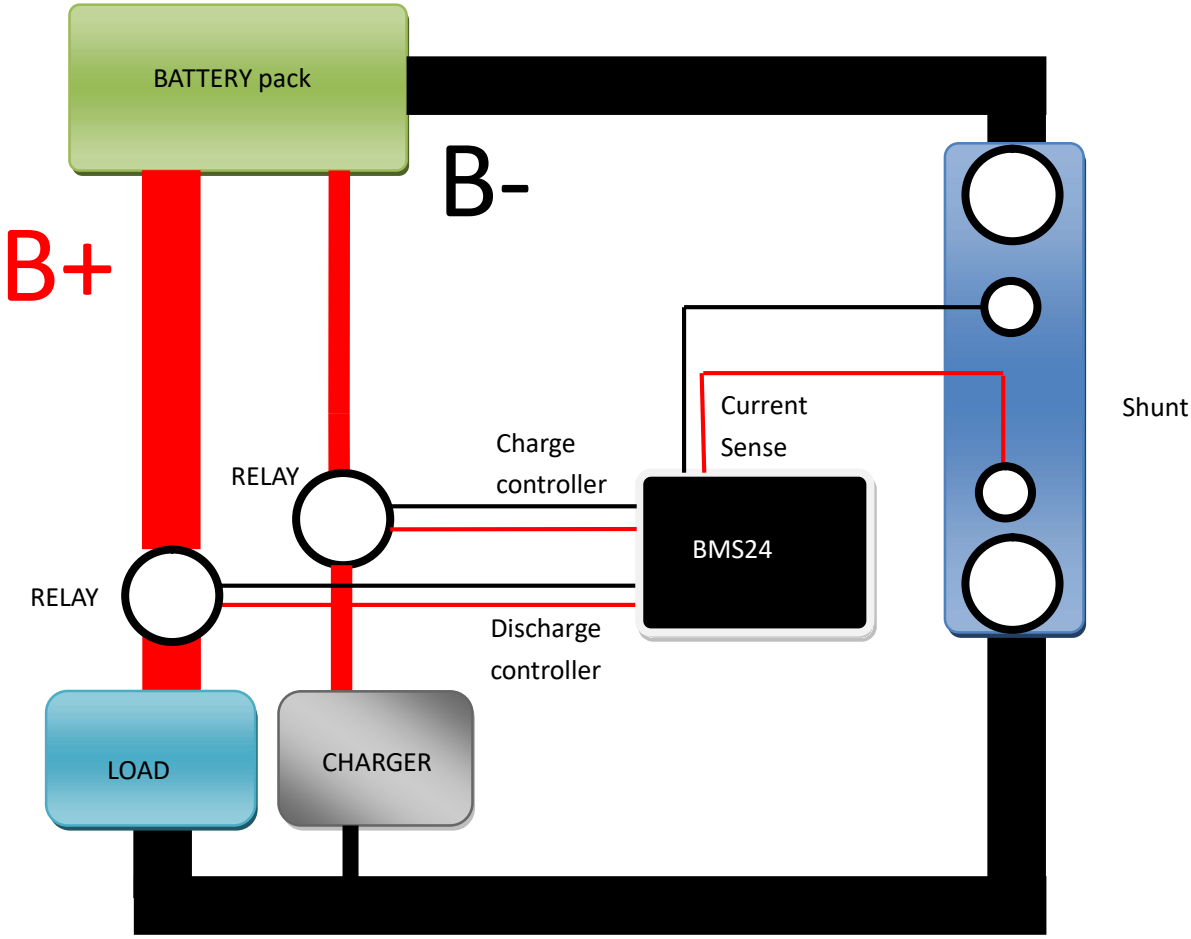
2. For over 8S battery pack, connect 8S to socket 1 and then socket 2 separately. Take 12S battery sample as following:



Accessory

USB data cable	Battery connection XHR-9PIN, 600mm
	
Temperature sensor, 600mm	**Relay controller wire 600mm**
	
Warning LED, 300mm	**Warning Beeper, 300mm**
	
Current sensor wire, 600mm	
	

Current Sensor and Relay Connection



Heavy RED wires are positive of battery pack (B+/B24+), charger and load such as motor, and heavy black wire is negative of battery pack(B-/B1-), charger and load.

Warning

Before connect the relay to charge or discharge controller, please confirm the coil of relay voltage. the BMS controller will output Vin to power the coil, if the BMS24 will be powered by external power supply, Vin is external power supply output voltage, if powered by battery pack, Vin will be battery pack voltage. If the Vin is not correct on driving coil, please use voltage regulator to power coil.

Related parts

The following device is related with BMS24

MODEL	DESCRIPTION	COMMENTS
BMS16	For 2S-16S, balance is not available.	
BMS16Pro	For 2S-16S, 1.2A balance current per cell	

Version History

Version	description
V1.05	Released first time
V1.06	Fix press STOP enter into sleep mode, and Beeper & LED warning.

Warranty and Service

Chargery Power Co., Ltd. as manufacture of power system warrants its BMS24 and current Sensor to be free of defects in material and workmanship. This warranty is effective for 12 months from date of purchase. If within the warranty period the customer is not satisfied with the products performance resulting from a manufacturing defect, the accessory will be replaced or repaired.

Your selling dealer is your first point of contact for warranty issues. Return postage costs are the responsibility of the user in all cases. Please submit copy of original receipt with the return.

Damage due to physical shock (dropping on the floor, etc.), inappropriate power supply (unstable output voltage and insufficient power, etc.), water, moisture, and humidity are specifically NOT covered by warranty.

Charging Expert

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