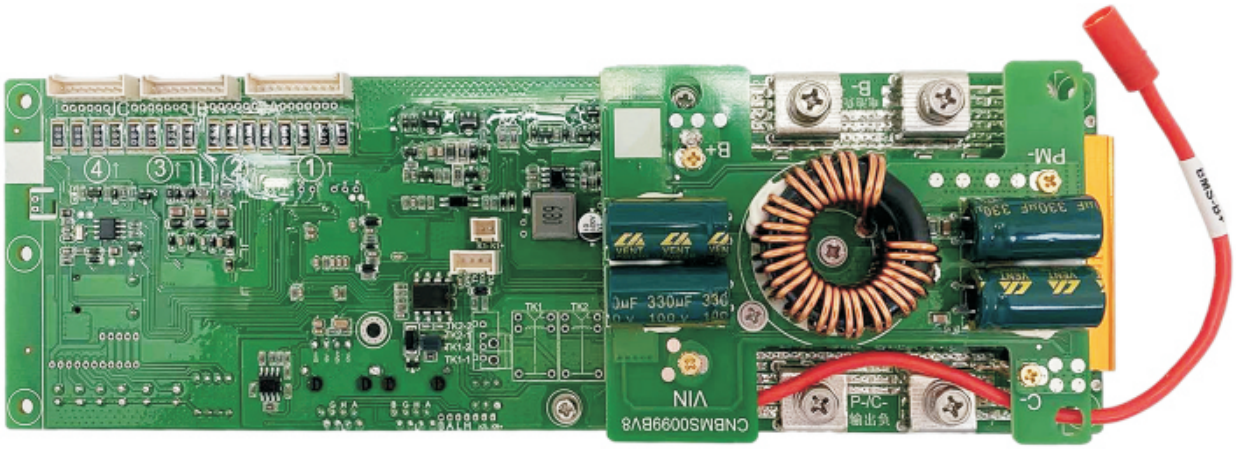
Sonikcell

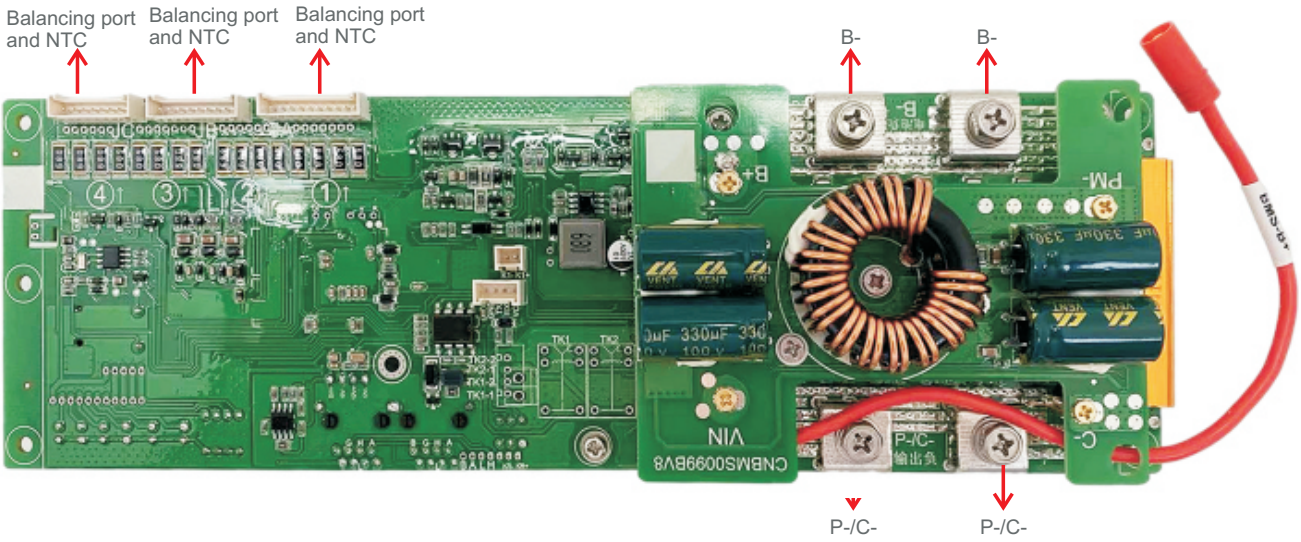


Applications

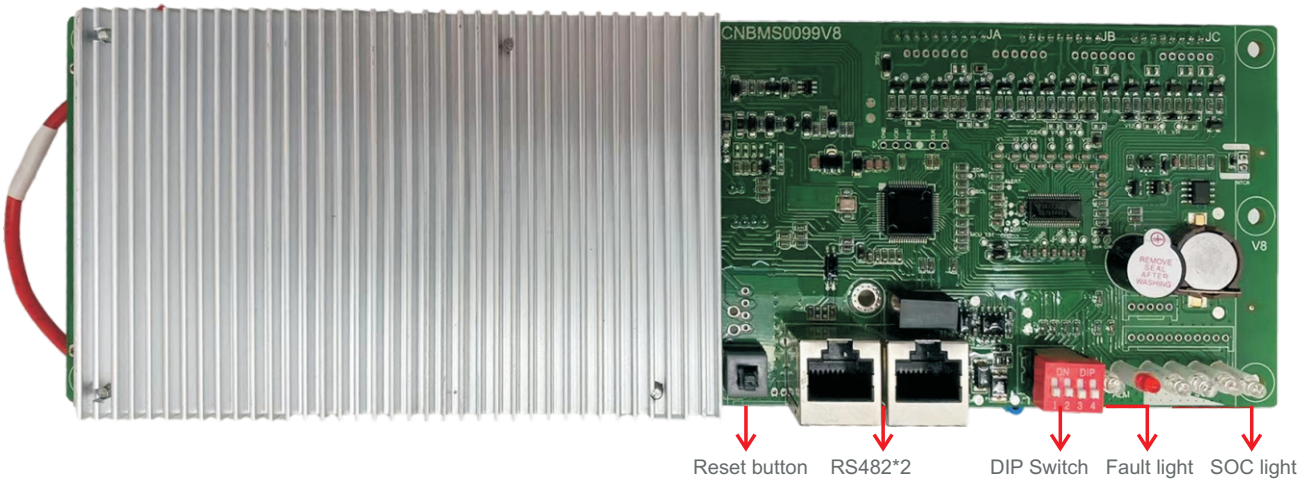
- Indoor and outdoor communication base stations
- Industrial Energy Storage, Home Energy Storage, Telecom Energy, Solar Generator
- Photovoltaic energy storage power stations and household energy storage systems, such as integrated base stations, marginal stations, repeaters, macro base stations, microgrid energy storage and solar base stations, etc.

Features

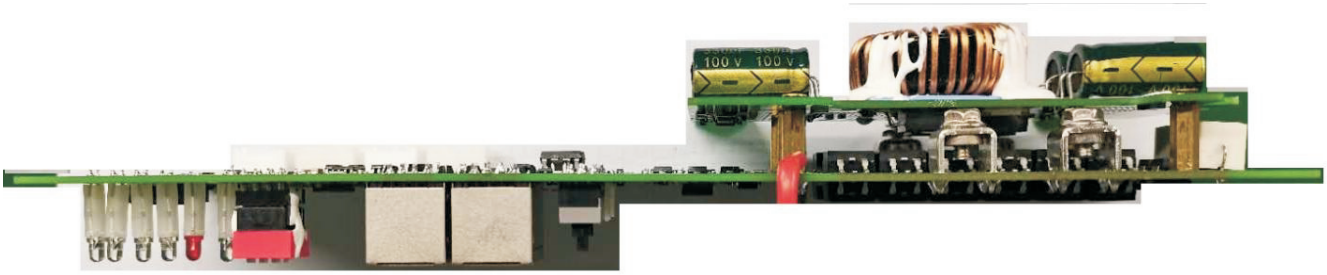
- Support multiple battery chemistries: Li-ion (NCA, NCM), LiFePO4
- Support multiple configurations from 12S to 16S(Default 16S)
- Support high current with 100A on-board Mosfets
- Support advanced algorithms SOC (state of charge) estimation
- Support isolated communication protocols, 1x RS485, 1x UART, 1x CAN
- Support communication with charger if charger need communication command
- Support 4x external temperature sensors for low and high temp. Detection,
- Supports parallel connection upto 15x modules,
- Support high accurate voltage & current detection, V≤30mV, C≤2%
- Support programmable parameters thru software utilities (Windows)
- Support passive balancing function, no power consumption during storage/stand-by
- Support regenerative loads, even when batteries are fully charged
- Support auto-detection on charger plugging in, intelligently wake-up during sleeping/stand-by
- Support: external LCD/LED/Buzz alarm (optional)
- Support Bluetooth APP (ISO and Android) and WIFI protocol
- Support on-site firmware updating (MUST CUT LOAD DURING UPDATING)



Front view



Back view



Side view

Functional characteristics

No	technical parameter	describe	Rated specifications	deviation
1	Single-cell voltage	Collect cell voltage	2.5-4.5V	±8mV
2	Current acquisition accuracy	Collect the charge and discharge current	0≤I≤30A	±0.5A
		Collect the charge and discharge current	30≤I≤50A	±0.5A
		Collect the charge and discharge current	50≤I≤100A	±0.8A
		Min. recognition current when entering the charging state	0.4A	±0.1A
		Min. recognition current when entering the discharging state	0.3A	±0.1A
3	Temperature acquisition accuracy	4-channel cell temperature collection	5℃-70℃	±2℃
		1 channel of ambient temperature collection, 1 channel of MOS temperature collection	5℃-70℃	±3℃
4	Balance	Charge balance function, can effectively improve the battery's use time and cycle life	50mA	±10mA
6	SOC	Real-time estimation of remaining battery capacity	±5%	
7	LED	6 LEDs indicate the remaining battery capacity, working mode and alarm protection status	/	
8	RS485 Communication	Isolated communication	The communication rate (baud rate) is 9600bps	
9	Display screen	Can query various parameters, alarms and protection information	Size:128X64	Optional

Electrical performance parameters

item	Minimum	standard	Max	unit
System working voltage	30	48	60	V
System charging voltage	30	58.4	60	V
continuous charging current	/	80	100	A
continuous discharging current	/	80	100	A
Working temperature	-30	25	70	℃
Inner resistance	1.1	1.3	2	mΩ
System operating power consumption	/	1	1.5	W
System sleep power consumption	90	120	240	uA

Voltage parameter configuration

No	Features	item	standard	deviation	unit	Remark
1	Cell voltage alarm	Single-cell over charge alarm voltage	3600	±13	mV	Adjustable
2		Single-cell over charge alarm voltage release	3500	±13	mV	Adjustable
3		Single-cell over discharge alarm voltage	2650	±13	mV	Adjustable
4		Single-cell over discharge alarm voltage release	2900	±13	mV	Adjustable
5		Alarm delay	1.0	±0.5	S	Adjustable
6	Cell voltage protection	Single-cell over charge protection voltage	3750	±13	mV	Adjustable
7		Single-cell over charge protection voltage release	3500	±13	mV	Adjustable
8		Single-cell over discharge protection voltage	2500	±13	mV	Adjustable
9		Single-cell over discharge protection voltage release	2900	±13	mV	Adjustable
10		protection release delay	1.5	±0.5	S	Adjustable
11	Total battery voltage alarm	Total voltage over charge alarm voltage	57600	±500	mV	Adjustable
12		Total voltage over charge alarm voltage release	56000	±500	mV	Adjustable
13		Total voltage over discharge alarm voltage	42400	±500	mV	Adjustable
14		Total voltage over discharge alarm voltage release	46400	±500	mV	Adjustable
15		Alarm delay	1.5	±0.5	S	Adjustable
16	Total battery voltage protection	Total voltage over charge protection voltage	60000	±500	mV	Adjustable
17		Total voltage over charge protection voltage release	56000	±500	mV	Adjustable
18		Total voltage over discharge protection voltage	40000	±500	mV	Adjustable
19		Total voltage over discharge protection voltage release	46400	±500	mV	Adjustable
20		protection release delay	1.5	±0.5	S	Adjustable

Current parameter configuration

1	Current alarm	Charge over current alarm current	110	±2	A	Adjustable
2		Charge over current alarm current release	90	±2	A	Adjustable
3		Discharge over current alarm current	110	±2	A	Adjustable
4		Discharge over current alarm current release	90	±2	A	Adjustable
5	Charging current protection	Charge over current protection current (1st Protection)	120	±2	A	Adjustable
6		protection delay 1	5	±0.5	S	Adjustable
7		Charge over current protection current (2nd Protection)	200	±5	A	Not adjustable
8		protection delay 2	1	±0.5	S	Not adjustable
9		Automatic recovery time of charging overcurrent protection	30	±2	S	Adjustable
10		Charge overcurrent lock times	10		times	Adjustable
11	Charging current limit	Charging current limit turn-on current	120A	±2	A	Adjustable
12	Discharging current protection	Discharge over current protection current (1st Protection)	120	±2	A	Adjustable
13		protection delay 1	5	±0.5	S	Adjustable
14		Discharge over current protection current (2nd Protection)	200	±5	A	Not adjustable
15		protection delay 2	1.5	±0.5	S	Not adjustable
16		Automatic recovery time of discharging over current protection	30	±2	S	Adjustable
17		Discharge over current lock times	10		times	Adjustable

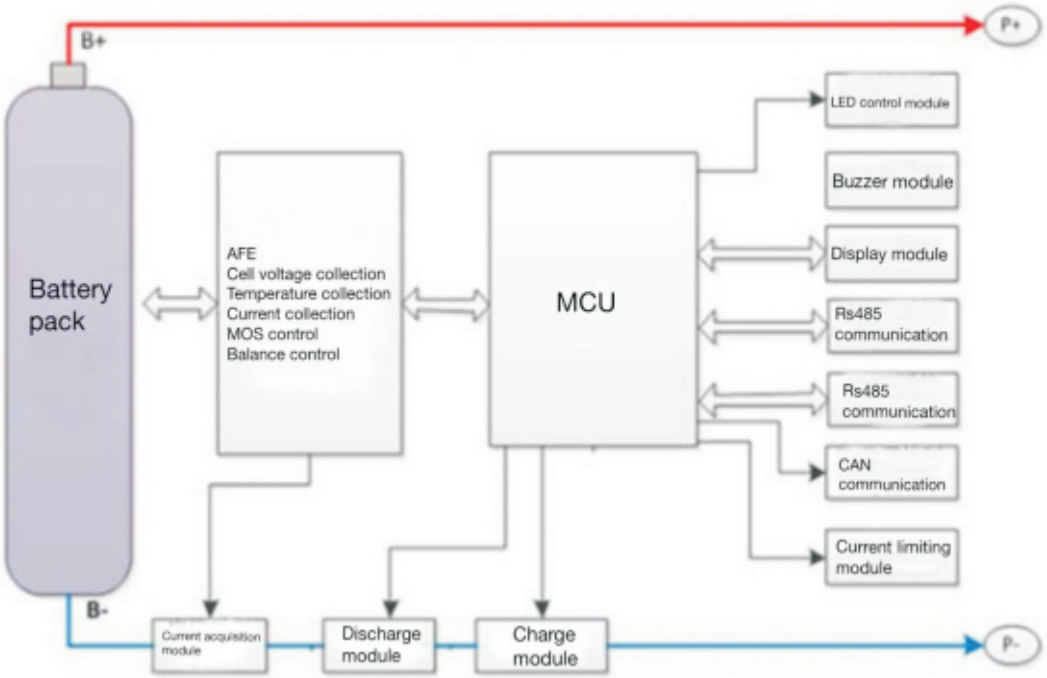
Other protection parameters

1	Short Circuit Protection	Short circuit protection test circuit internal resistance	0.05-0.1			Ω
2		protection delay	300-500			uS
3		Short Circuit Protection release	Automatic release after 30 seconds/Afterthree consecutive short-circuit protections cause lockout, it needs to be charged and released			
4	Charge balance function	Balanced opening voltage	3600	±20	mV	Need to meet both
5		Balanced opening voltage difference	200	±50	mV	
6		Balance current	50	±10	mA	Not adjustable
7	heating	Heating film opening temperature	/	/	℃	No such function by default
8	SOC	SOC too low alarm	10	N/A	%	Adjustable

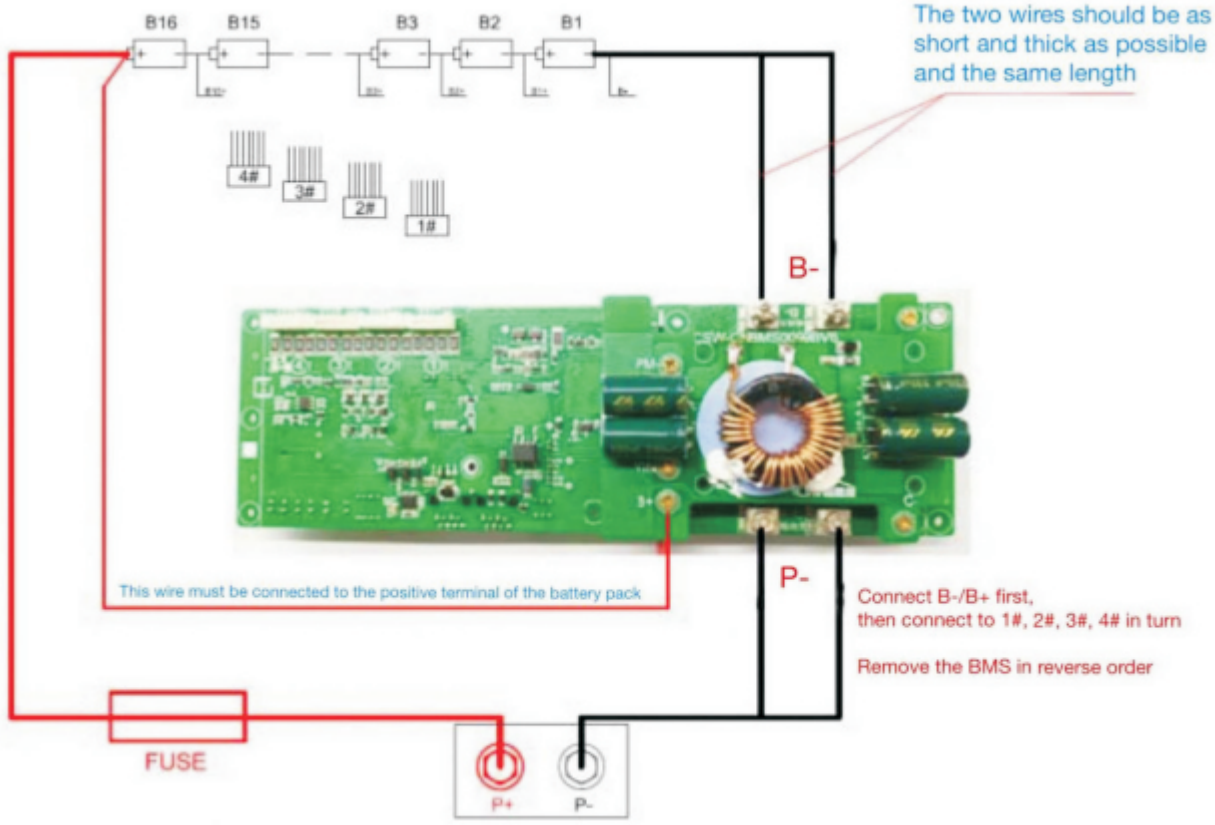
Current parameter configuration

1	Charging temperature alarm	Charge over temperature alarm	50	±3	℃	Adjustable
2		Charge over temperature alarm release	45	±3	℃	Adjustable
3		Charge under temperature alarm temperature	5	±3	℃	Adjustable
4		Charge under temperature alarm temperature release	10	±3	℃	Adjustable
5		Alarm delay	3.0	±0.5	S	Adjustable
6	Charging temperature protection	Charge over temperature protection temperature	65	±3	℃	Adjustable
7		Charge over temperature protection release temperature	50	±3	℃	Adjustable
8		Charge under temperature protection temperature	0	±3	℃	Adjustable
9		Charge under temperature protection release temperature	5	±3	℃	Adjustable
10		protection delay	5.0	±0.5	S	Adjustable
11	Discharge temperature alarm	Discharge over temperature alarm	50	±3	℃	Adjustable
12		Discharge over temperature alarm release	45	±3	℃	Adjustable
13		Discharge under temperature alarm temperature	-10	±3	℃	Adjustable
14		Discharge under temperature alarm temperature release	5	±3	℃	Adjustable
15		Alarm delay	5.0	±0.5	S	Adjustable
16	Discharge temperature protection	Discharge over temperature protection temperature	65	±3	℃	Adjustable
17		Discharge over temperature protection release temperature	50	±3	℃	Adjustable
18		Discharge under temperature protection temperature	-20	±3	℃	Adjustable
19		Discharge under temperature protection release temperature	0	±3	℃	Adjustable
20		protection delay	5.0	±0.5	S	Adjustable
21	Ambient temperature alarm and protection	Over Ambient temperature alarm	50	±3	℃	Adjustable
22		Under Ambient temperature alarm	0	±3	℃	Adjustable
23		Over Ambient temperature protection temperature	70	±3	℃	Adjustable
24		Over Ambient temperature protection temperature release	50	±3	℃	Adjustable
25		Under Ambient temperature protection temperature	-20	±3	℃	Adjustable
26		Under Ambient temperature protection temperature release	0	±3	℃	Adjustable
27		protection delay	2.0	±0.5	S	Adjustable
28		Mosfet over temperature protection temperature	90	±3	℃	Adjustable
29		Mosfet over temperature protection temperature release	60	±3	℃	Adjustable
30		protection delay	2.0	±0.5	S	Adjustable

Product function diagram



Connection Diagram



Product Basic Function

1. Non-latching switch for reset

• Keep pressing the reset switch for 3s and release it, ALM red LED will flash, battery enters sleep mode,

• Press once (1s) the switch, battery will be activated to normal working mode, RUN green LED will flash,

• Keep pressing the rest switch for 7s till all 7 LEDs ON (solid) and release it, battery will be rebooted, all settings back to factory default settings and SOC will be reset too.

• BMS can be wakeup/activated from sleep mode by charging

2. External weak current switch function

• Close the weak current switch, the BMS will be activated to normal working mode and open the charging and discharging circuit, and it can be charged and discharged normally,

• Turn off the weak current switch, BMS closes the charging and discharging circuit, and enters sleep mode,

• The external weak current switch has the highest enable of the device. Even if there is a charger plugged in after shutdown, the BMS cannot be woken up to charge the battery.

3. System total voltage overcharge protection function

• Trigger conditions: during the charging process, when the system voltage reaches the system overvoltage alarm voltage, the system prompts the total voltage high voltage alarm, but does not cut off the charging. When the system voltage reaches the system overvoltage protection voltage, the system total voltage overvoltage protection is triggered and the charging circuit is cut off;

• Release condition: Release when the total system voltage is lower than the system overvoltage release voltage or release after discharge current

4. System total voltage over-discharge protection function

• Trigger conditions: During the discharge process, when the system voltage reaches the system over-discharge alarm point, the system prompts a total voltage low-voltage alarm, but does not cut off the discharge. When the system voltage reaches the system over-discharge protection point, the system total voltage over-discharge protection is triggered and the discharge is stopped. The system will wait for 120 seconds and enter sleep mode (if the system voltage returns to the system over-discharge release point within 120 seconds, the system will release the system over-discharge protection and resume discharge).

• Release condition: Release When the total system voltage is higher than the system low voltage release point, and in non-sleep mode, or release after entering the charging state and charging current

5. Cell overvoltage protection function

• Trigger conditions: During the charging process, when the maximum value of the cell voltage reaches the cell overvoltage alarm point, the systemPrompt battery high voltage alarm, but not, cut off charging. When the maximum value of the cell voltage reaches the cell overvoltage protection point, the cell overvoltage protection is triggered and the charging circuit is cut off

• Release condition: When the voltage of all cells is lower than the overvoltage release point of the cells, the overvoltage protection state of the cells is released and the charge is released. Or in the state of cell overvoltage protection, direct discharge can be released immediately

6. Cell over-discharge protection function

• Trigger conditions: During the discharge process, when the minimum value of the cell voltage reaches the cell over-discharge alarm point, the system prompts the cell low-voltage alarm, but does not cut off the discharge. When the cell voltage minimum reaches the cell over-discharge protection point, the cell over-discharge protection will be triggered, the output will be cut off, and the system will wait for 120 seconds before entering the sleep mode (if all cell voltages return to the cell over-discharge within 120 seconds release point, it will release the over-discharge protection of the cell, release the discharge).

• Release condition: Release When all cell voltages are higher than the system under-voltage release point of the system, and in non-sleep mode, or release after entering the charging state and charging current

7. Charge overcurrent protection function

• Trigger conditions: During the charging process, when the charging current reaches the charging over-current alarm point, the system prompts the charging over-current alarm, but does not cut off the charging; when the charging current reaches the charging over-current protection point, the charging over-current protection is triggered to stop charging.

• Release condition: After 30 seconds, the charging overcurrent protection will be released automatically and charging will resume. During charging over-current protection, direct discharge can release charging over-current protection immediately. If the automatic release is unsuccessful for 10 consecutive times, the automatic release will no longer be performed, and it is necessary to click the system reset button or enter the discharge mode to release the charging overcurrent protection state.

8. Discharge overcurrent protection function

• Trigger conditions: During the discharge process, when the discharge current reaches the discharge over-current alarm point, the system prompts a discharge over-current alarm, but does not cut off the discharge. When the discharge current reaches the discharge overcurrent protection point, the discharge overcurrent protection is triggered and the discharge is stopped.

• Release condition: After 30 seconds, After 30 seconds, the discharge overcurrent protection will be released automatically, and the discharge will resume. During discharge over-current protection, direct charging can release discharge over-current protection immediately. If the automatic release is unsuccessful for 10 consecutive times, the automatic release will no longer be performed, and it is necessary to click the system reset button or enter the charging mode to release the discharge overcurrent protection state.

9. Short circuit protection function

• Trigger conditions: When there is a short circuit between the discharge output P+ and P-, and the short circuit current is greater than 300A, the triggerShort circuit protection, cut off the discharge, the system prompts short circuit protection and reports the fault.

• Release condition: It will be automatically released after 30 seconds. If it is released more than 3 times in a row, it will be locked by a short circuit fault and will no longer be automatically restored. You need to charge the battery pack or click the reset button to release it. When releasing the short-circuit protection by clicking the reset button, the short-circuit load must be disconnected first;

10. Cell temperature protection function

• Trigger conditions: When there is a short circuit between the discharge output P+ and P-, and the short circuit current is greater than 300A, the triggerShort circuit protection, cut off the discharge, the system prompts short circuit protection and reports the fault.

• Release condition: It will be automatically released after 30 seconds. If it is released more than 3 times in a row, it will be locked by a short circuit fault and will no longer be automatically restored. You need to charge the battery pack or click the reset button to release it. When releasing the short-circuit protection by clicking the reset button, the short-circuit load must be disconnected first;

11. Power tube temperature protection function

• Trigger conditions: When the system is running, the BMS monitors the temperature of the power tube. When the temperature of the power tube reaches the high temperature alarm point of the power tube, the system prompts the MOSFET high temperature alarm, but does not cut off the charging and discharging. When the temperature of the power tube reaches the high temperature protection point of the power tube, it will trigger the high temperature protection of the MOSFET and stop charging and discharging.

• Release condition: When the temperature of the power tube returns to the protection recovery value, it will automatically release the MOSFET high temperature protection and resume charging and discharging functions

Product specific functions

1. Charge balance function

• In the charging state, when the cell voltage is greater than the balanced opening voltage, and the voltage difference with the lowest cell is greater than the balanced opening voltage difference, the balance function is turned on. When the voltage difference between the cell voltage and the lowest cell voltage is less than the balance off voltage difference, stop balance

2. Sleep function

In order to reduce the power consumption of the entire system, the system has a sleep function. When one of the following situations occurs, the system will enter the sleep mode

• When the over-discharge protection voltage does not recover to the over-discharge release voltage after 120S

•When the balance harness is disconnected, it will enter sleep mode after a delay of 3 minutes

•According to the operating rules, operate the reset button to enter the sleep mode

3. Wake up function

The system provides a variety of different wake-up methods, please choose the optional function according to the actual needs

•Charging to wake up: BMS wakes up when the input voltage exceeds 40V, (when the external weak current switch function is selected, when the external switch is turned off, charging cannot wake up);

•Reset button to wake up: In non-over-discharge protection state, press and hold the button for 1 second to wake up

•External weak current switch to wake up: In the non-over-discharge protection state, close the weak current switch to wake up; (optional function, inverter users are recommended to choose)

•Communication wake-up: In the non-over-discharge and shutdown state, wake up after receiving the communication frequency; (optional function)

4. SOC Accuracy and Calibration Function

•After the BMS is powered on, the SOC is calibrated to 100% when the cell voltage is greater than the "cell high voltage alarm voltage" in the charging state. In the discharge state, when the cell voltage is lower than the "cell low voltage alarm voltage", the SOC is calibrated to 0%.

•SOC is only used as display data, without overcharge and overdischarge protection functions, that is, when the SOC is 0% or 100%, the protection will not be triggered, and the charge and discharge will not be cut off.

•If no calibration is performed, the SOC can also learn and gradually automatically calibrate! But the first few cycles may not be accurate.

•If the BMS is powered off, the SOC will be recalculated and the last value will not be retained.

5. Pre-charge function (optional function, it is available by default)

•In order to adapt to the high-power inverter, this BMS has specially designed the pre-charging function. It can start the inverter with input capacitance within 20000uF. The starting resistance is 10Ω, and the starting time is 800mS..

•The precharge function is only valid 800mS before the BMS output is turned on, and the precharge function is turned off after the output is turned on. The inverter must be connected when the BMS is turned off, and then wake up and turn on the BMS output. At this time, the inverter can use the pre-charging function to successfully power on. Because there are many types of inverters, and the power and capacity are uncertain, this function must be confirmed by the customer multiple times to verify whether it is possible.

•If the power-on process is violated, first turn on the BMS, and then connect to the inverter. Because the charging current of the inverter capacitor is too large, sparking will occur, and the short-circuit protection of the BMS will be triggered by mistake, and the BMS will turn off the output. At this time, the fault red light is on, and it needs to be charged or reset to unlock.

6. Charging current limiting function (optional function)

•Entry conditions: The default is passive current limiting mode. When the BMS is configured with the current limiting function, when the charging current is greater than the current limiting start identification current, the main charging circuit will be cut off after a delay of 1 second, and enter the state of the charging current limiting circuit;

•Exit condition: When disconnecting the charger or entering the discharge state, exit the charging current limiting mode, that is, the BMS closes the current limiting circuit and opens the charging main circuit.

•In order to prevent the current limiting module from being damaged by high temperature, the current limiting module has an automatic temperature feedback adjustment function. The lower the temperature of the current limiting module, the greater the current, and the higher the temperature, the smaller the current.The actual current limiting value is automatically adjusted according to the temperature between 80%-120% of the rated current value.

7. Charging mode

•Constant current and constant voltage charging mode: In the non-overcharged state, the charging MOS tube is not turned off, and the battery will be charged to the maximum voltage of the charger under constant voltage.

8. Battery heating function (optional function, default none)

•In the charging state, when the battery temperature is lower than -10°C (adjustable), stop charging, turn on the heating function, and the battery temperature reaches 5°C (adjustable). Stop heating and turn on the main circuit charging

•Note: The heating film is controlled by dry contact, the maximum allowable control current is 2A, and the heating film is provided by the customer..

9. Fault Detection Description

•BMS has a fault alarm function, and the corresponding fault display can be viewed through the PC Utility Software. Faults include: analog sampling faults, battery faults, etc.

10. Description of BMS charge and discharge minimum identification current

•The minimum identification current refers to the minimum current that the BMS can detect. When the current is less than this value,The BMS defaults to "0 current" and is judged to be in standby mode. In this state, SOC is not accumulated, but all protection functions in this state can work normally. If the SOC may be inaccurate due to low current for a long time, the SOC can be calibrated again after charging.

LED Status Definition Description

Status	Normal / Warning / Protection	RUN	ALM	SOC LED				Notes
		•	•	•	•	•	•	
Power OFF	Sleep	OFF	OFF	OFF	OFF	OFF	OFF	ALL OFF
Standby	Normal	Flash1	OFF	According to actual SOC				Standyby Mode
	Warning	Flash1	Flash3					Low Voltage Mode
Charge	Normal	ON	OFF	According to actual SOC (Max SOC Flash2)				Warnings except Overcharge Warning Flash 3
	Warning	ON	Flash3					
	Charge OverCurrent Protection	OFF	ON	OFF	OFF	OFF	OFF	Stop Charging
Discharge	Normal	Flash3	OFF	According to actual SOC				
	Warning	Flash3	Flash3					
	Under Voltage Protection	OFF	Flash3	OFF	OFF	OFF	OFF	Stop Discharge
	Discharge OverCurrent, ShortCircuit, Reverse Connection	OFF	ON	OFF	OFF	OFF	OFF	Stop Discharge
Temperature	Protection	OFF	ON	OFF	OFF	OFF	OFF	Stop Charging and Discharge
Failure	Cell Failure, Voltage Detector Failure, Current Sensor Failure, NTC Failure, MOSFET Failure	OFF	ON	OFF	OFF	OFF	OFF	Stop Charging and Discharge

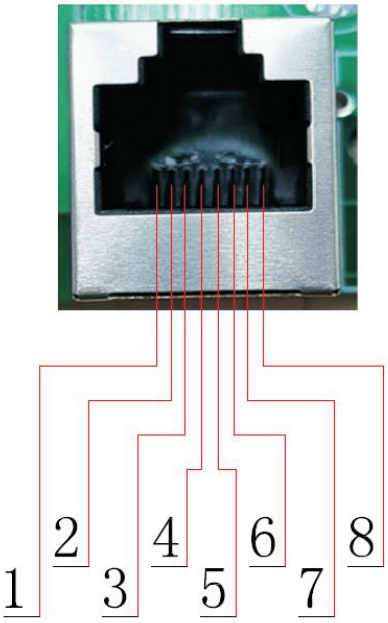
• LED Flash Patterns:

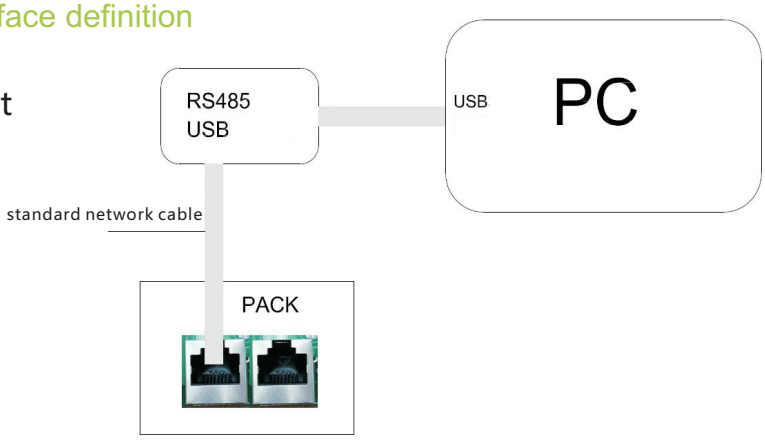
Flash Pattern	ON	OFF
Flash 1	0.25s	3.75s
Flash 2	0.5s	0.5s
Flash 3	0.5s	1.5s

Communication and address selection

1. RS485 communication interface definition

RJ45 communication port



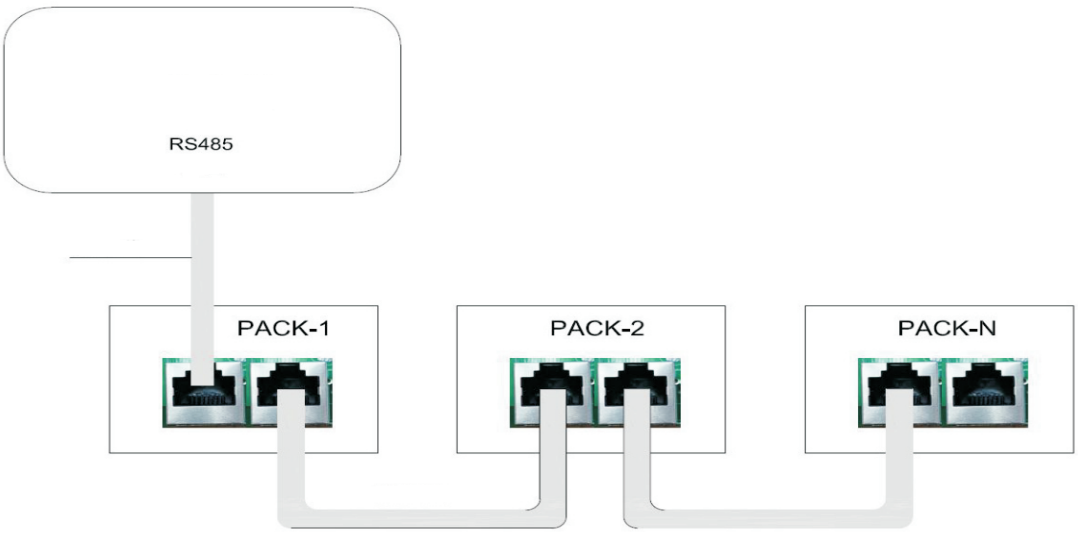


RS485 communication port and

PC USB connection

RJ45 pins	Definition description	Remark
1	RS485-B	
2	Rs485 -A	
3	NC	not connected
4	CANH	
5	CANL	
6	GND	optional
7	RS485-A	
8	RS485-B	
The definitions of the two RJ45 interfaces are exactly the same		

2. When multiple BMSs are connected in parallel, the RS485 interface is used as the parallel communication interface method, see the picture below.



Communication function after multiple battery packs are connected in parallel

1. Parallel operation and setting steps of battery packs

•1 Turn off all battery packs, and connect the output positive and negative poles of all battery packs in parallel;

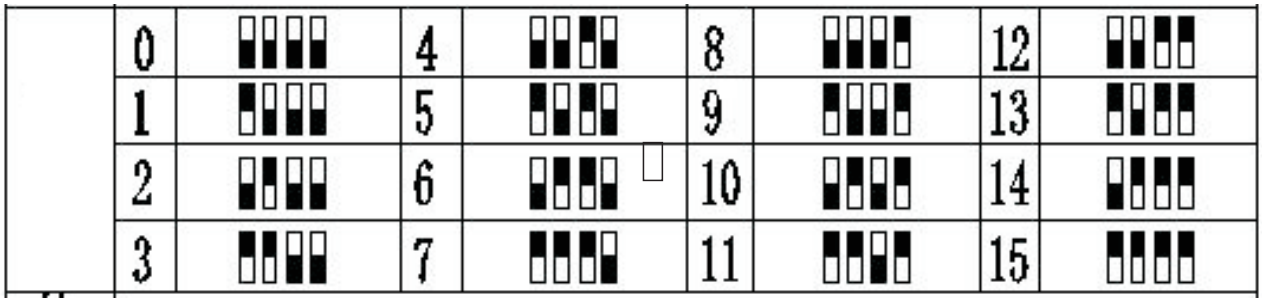
•2 Connected in sequence via standard RS485 network cable(see picture above)

•3 Set the PACK address in turn according to the picture below, and turn on all BMS in turn

•4 View the BMS data of the corresponding address through the PC Utility software or in accordance with the communication protocol.

•5 The battery pack BMS has a four-digit address dial switch, which is numbered according to the address from 0 to 15.

The battery pack BMS should detect the address of the dialer in real time, and the address of the dialer should be in binary mode



2. Single BMS mode

•In single BMS mode, the dip switch must be 0000, and the BMS works independently

3. Multi-slave parallel communication mode

•After the BMS is connected in parallel through RS485 communication, all BMSs are defaulted as slaves,

and the external Master system uses the RS485 bus to query all BMS data based on the system address of each slave.

The external Master system collects and aggregates all data (need an external Master system).

4. Master-slave parallel communication mode

•After the BMS is connected in parallel, the default number 0000 is the Master system, and the 0000 Master system is responsible for external data communication, and is also responsible for collecting and processing the remaining BMS data.

•Note: After parallel connection, due to the different internal resistance of each group of batteries, it is normal that the current and SOC of each group of batteries are different. Generally, it is recommended to take the average value of SOC.

5. matters needing attention

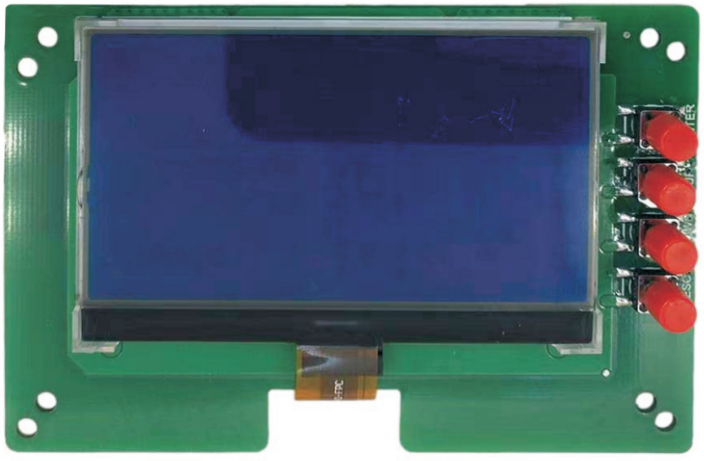
•During the parallel connection of battery packs, it is strictly forbidden to reverse the positive and negative poles of the batteries, otherwise it will damage the BMS and cause serious safety accidents;.

•The internal resistance of the parallel positive and negative wires should be as short and thick as possible, and they should be connected to the output device at equal lengths. Otherwise, the output internal resistance of each battery pack will be inconsistent, resulting in uneven distribution of parallel current under high power.Causes the SOC difference of the single machine to be too large or the large current to exceed the load current.

•The network cable used for parallel connection must be 8P network cable with shielding layer. After more than 10 communication groups are connected in parallel, a 120Ω communication matching resistor needs to be added at the first and last ends of the RS485 according to the situation

•After parallel connection, it is normal that the current and SOC of each group of batteries are different due to the difference in the overall circuit internal resistance of each group of batteries. It is generally recommended to take the average value of SOC

Display picture（Optional function, default none）

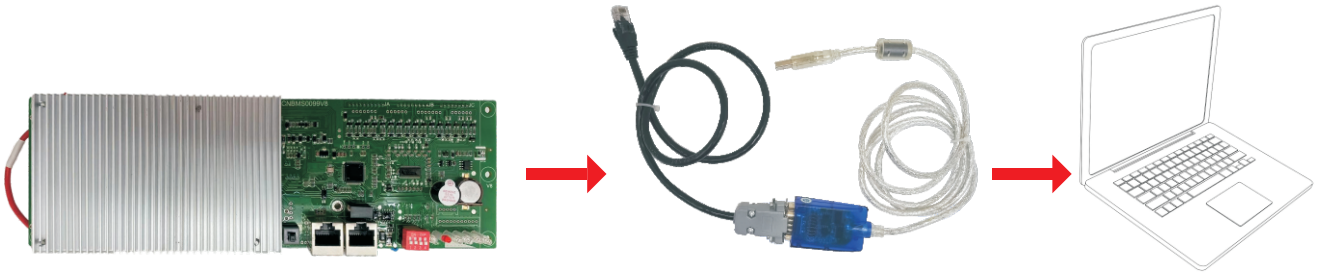


Programming Parameters Settings

Almost all parameters can be logically programmed according to your cells' specs on Software (Supports Windows System only), please be noted the programming setting function is not open for everyone, the software normally is set as display for parameters only SONIKCELL gives the access for programming to customers who really understand BMS/Battery well.

With watchdog embedded in Software, the system is more robust, Battery Pack parameters are real-time displaying on our PC software/Bluetooth APP , the data detection frequency is every 400mS. Any alarm/fault conditions are saved to our EEPROM (Please be noted the special conditions records will be lost if BMS is resetor lost power).

To run Software, Programming Tool is needed (need purchase separately), the tool drive can be download from here. Our programming tool is as below .

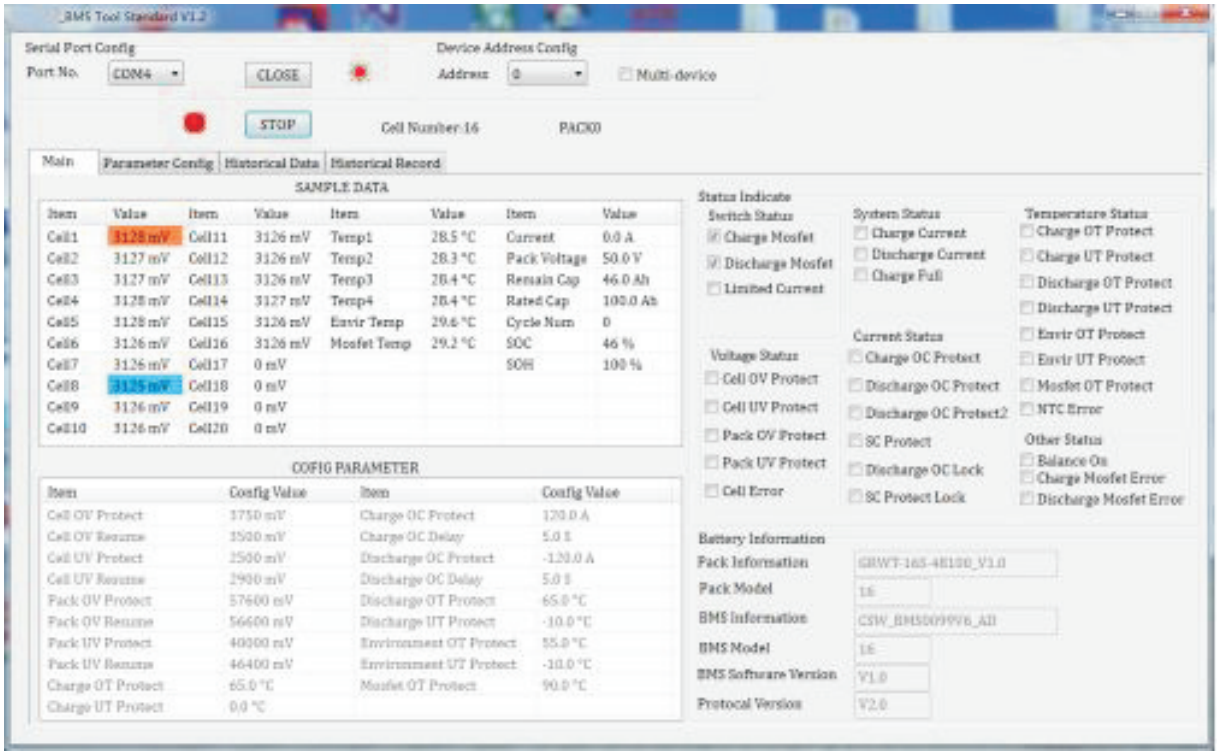


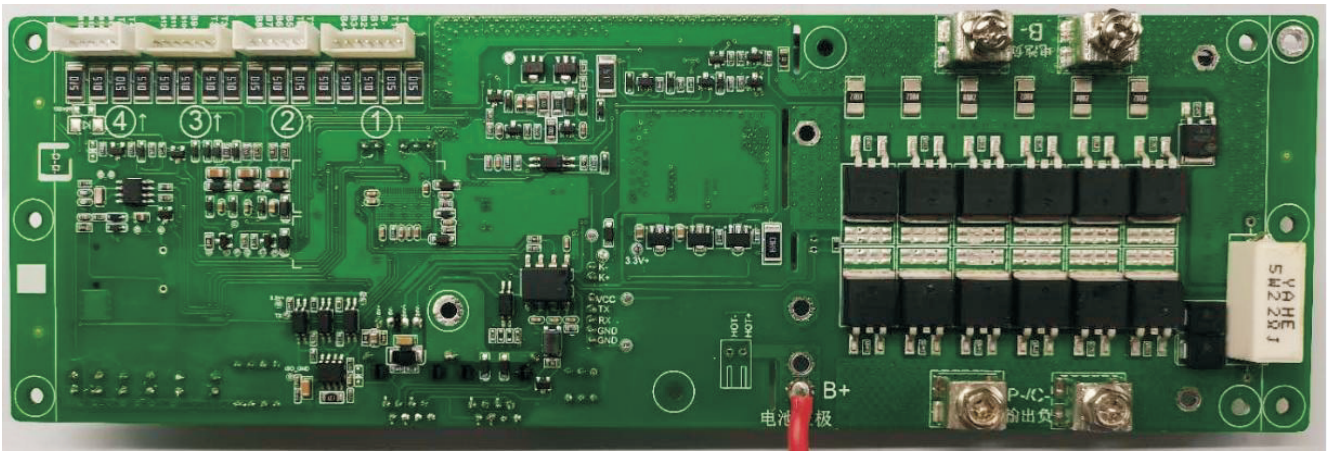
BMS Programming Tool PC

After communicating with the PC Utility software through RS485, you can obtain real-time battery voltage, current, temperature, SOC, system fault status and other information; support system threshold parameter import and export

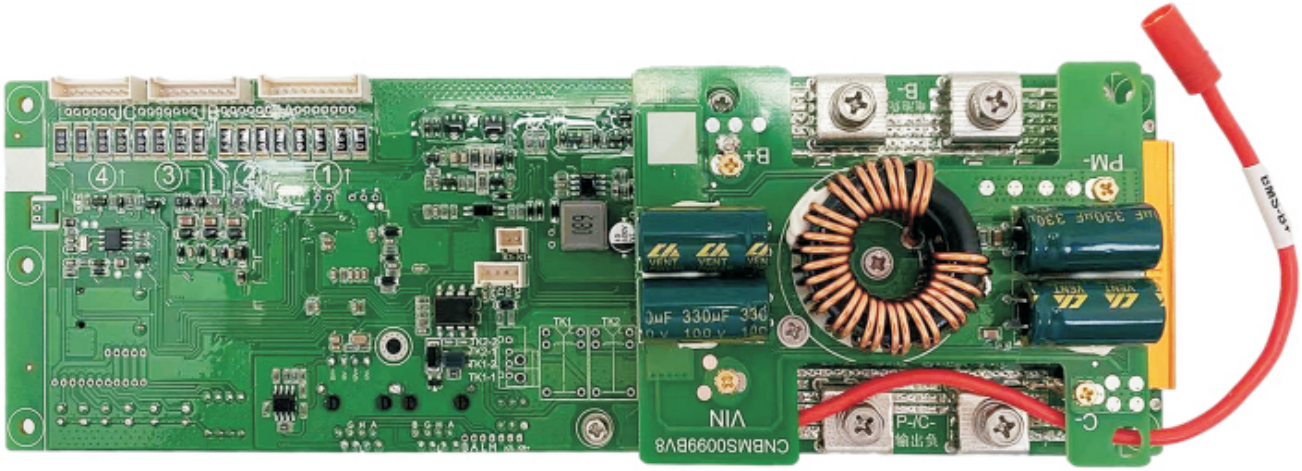
Software PC Utility (Windows only) downloading addressis here. Your windows system probably need another firmware to run smoothly, please download from here.

Here is the screenshot for Software PC utility.

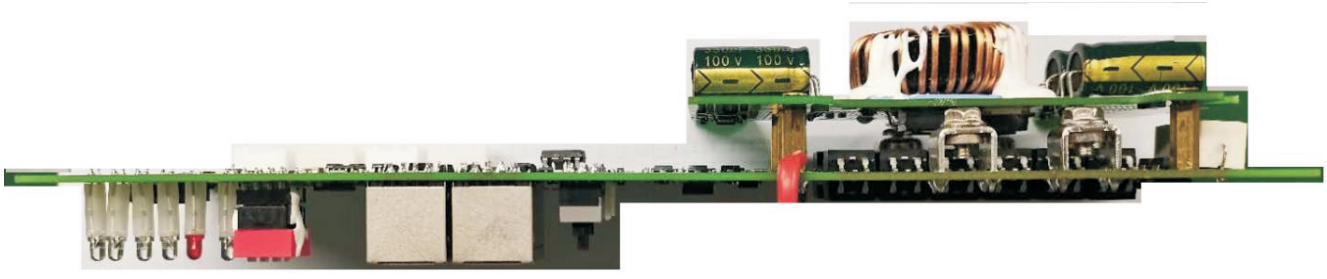




The picture above shows without current limiting module

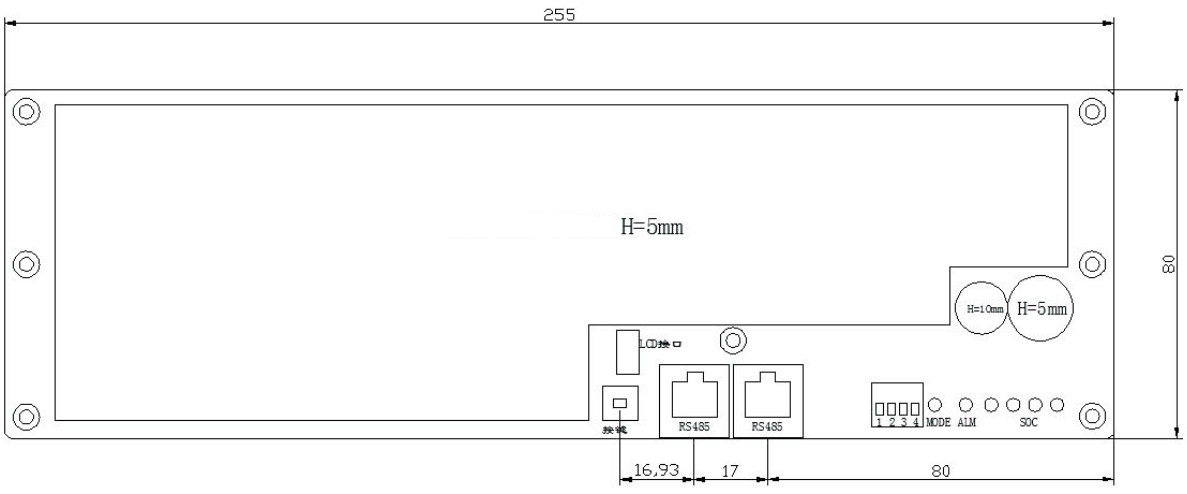


The picture above shows a current-limiting module



Side view

BMS size


255
H=5mm
H=10mm
H=5mm
80
RS485
RS485
1 2 3 4
MODE
ALM
SOC
16,93
17
80