PRODUCT SPECIFICATIONS

MASON 560L-N
BATTER PACK SPECIFICATION

Table of Content

1. Introduction

This battery pack System, is applicable both for residential and commercial energy storage system, which is assembled with 3.2V 280Ah lithium iron phosphate cell in 2P16S configuration, Andintelligent BMS form 51.2V 560Ah lithium battery system..

Each pack support 16packs inparallel to easily expand capacity.

Do not mix parallel the batterypacks of different brands or models.

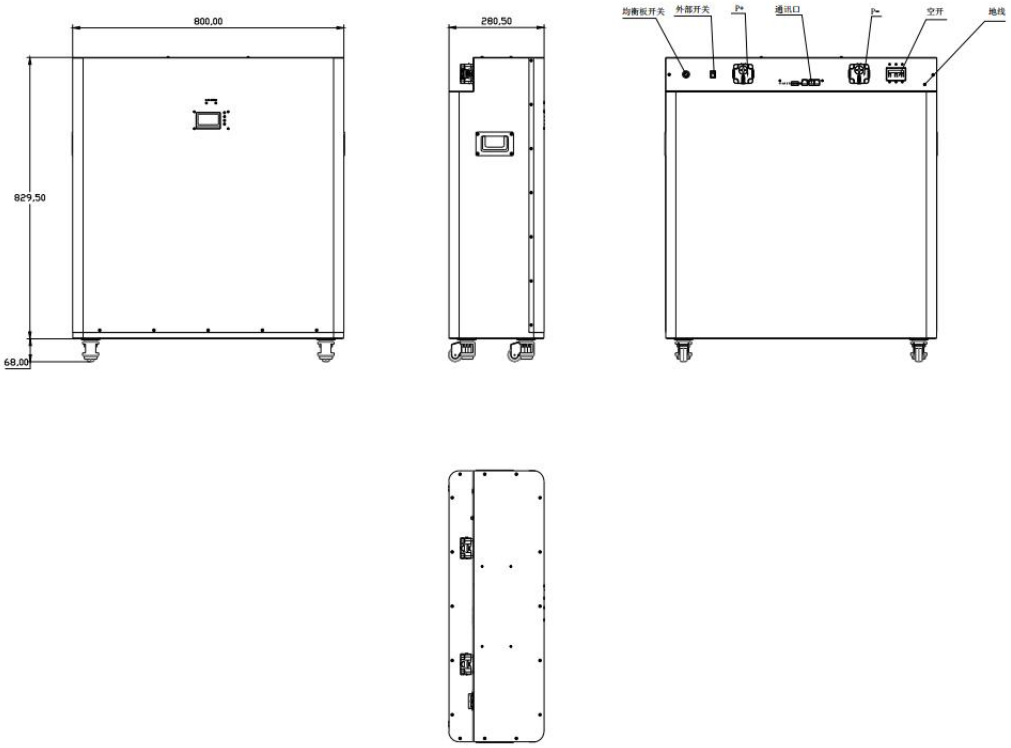
2. Functions

- Battery voltage calculation: 32 battery voltage sampling test, deviation ± 20mV
- Battery and ambient temperature detection: 4 battery temperature sensors, 1 ambient temperature sensor, 1 MOS temperature sensor, deviation ± 2 ℃.
- Battery capacity and cycle times: complete a complete charging, discharging cycle to set the actual capacity. Monitor the remaining capacity of the battery with the capacity estimation accuracy within 5% deviation. In addition, the charging and discharging cycle time and the complete charging and discharging cycle time can be configured.
- Smart cell balance: charging and static balance strategies can be flexibly set to effectively extend the service life.

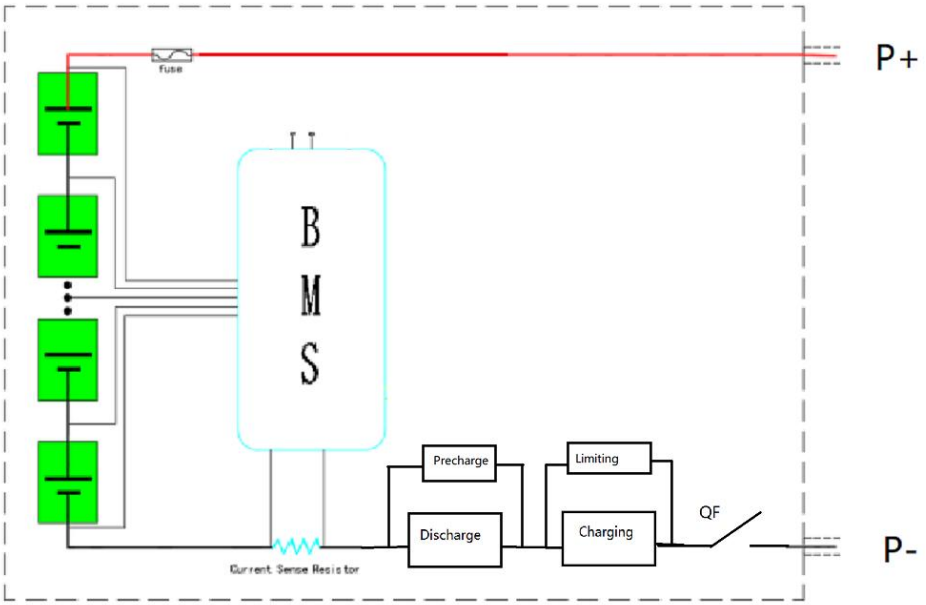
- Communication interface: PC or intelligent front-end can monitor battery data, control operation and set parameters through telemetry, remote signaling, remote adjustment, remote control and other commands. The communication protocol meets the requirements of YD/T 1363.3 and realizes cascade communication
- Historical data recording, saving and reading: when the battery is abnormal, record and save real-time battery status and alarm information. At present, up to 500 historical fault data can be stored.
- Battery management system parameter setting: battery management system parameters, including cell battery over voltage/under voltage, battery total voltage over voltage/under voltage, charge and discharge over current, battery high/low temperature, battery capacity, working mode, charge and discharge limit current, can be set in the battery monitoring system.
- Working mode: charging and discharging current limiting, constant voltage output, direct output and other working modes can be set in the monitoring system
- Multiple protection functions: hardware protection, battery protection, high and low temperature protection, output short circuit protection, etc.

3. Specifications

3.1 Appearance and interface

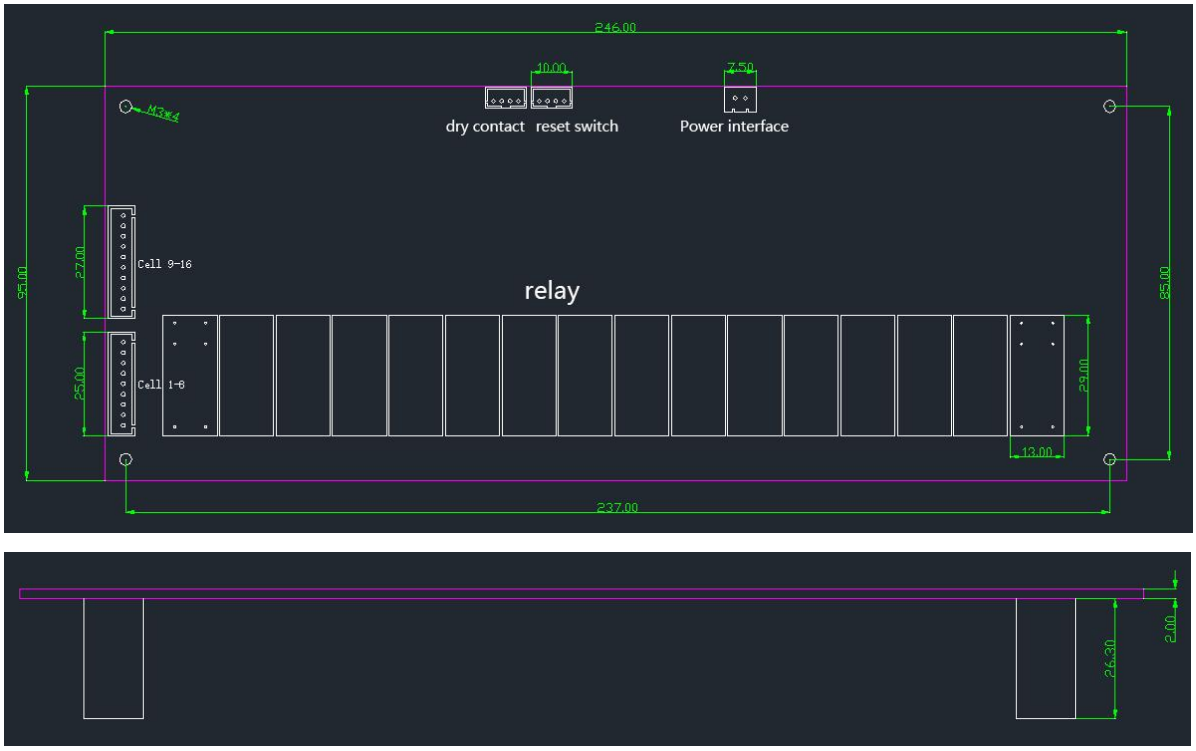


3.2 Electrical schematic diagram

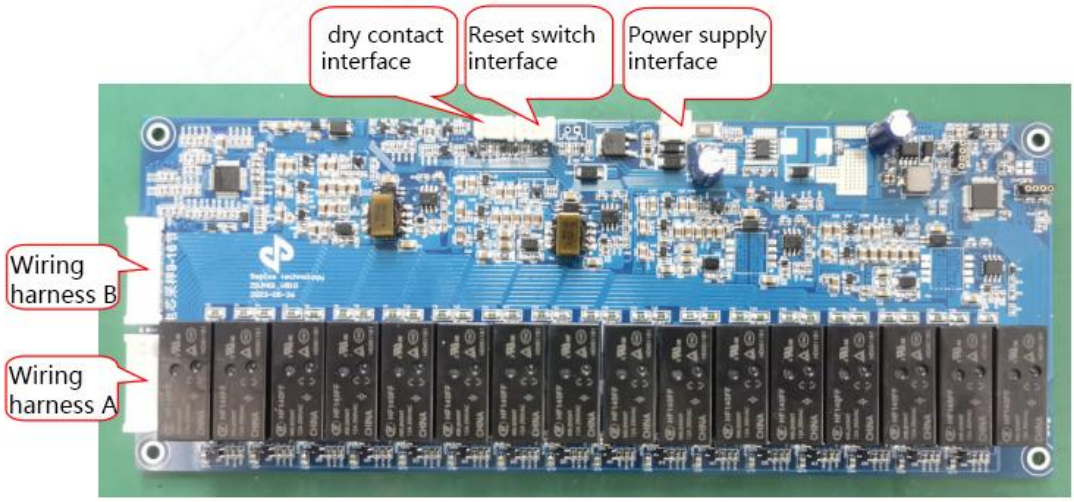


3.3Active balance board

3.3.1、Dimension



3.3.2、Installation method



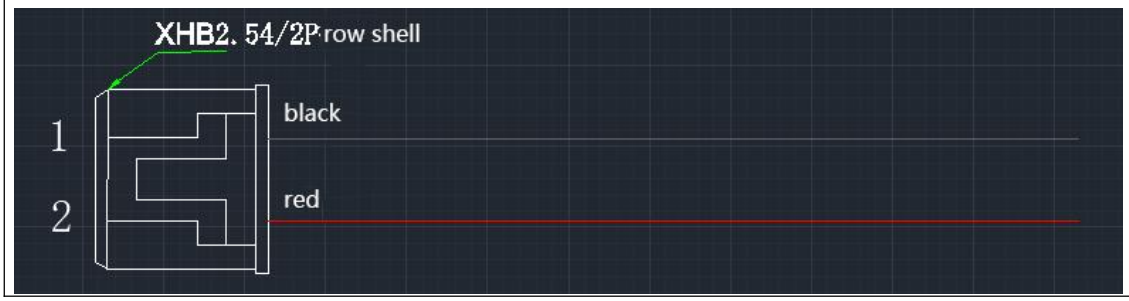
3.3.3、Harness definition

Wire harness A (1-8 cells)		
NO	Balance board wiring definition	Cell wiring definition
1	CELL1-	Connect the negative terminal of the first battery
2	CELL1+	Connect the positive terminal of the first battery
3	CELL2+	Connect the positive terminal of the second battery
4	CELL3+	Connect the positive terminal of the third battery
5	CELL4+	Connect the positive terminal of the fourth battery
6	CELL5+	Connect the positive terminal of the fifth battery
7	CELL6+	Connect the positive terminal of the sixth battery
8	CELL7+	Connect the positive terminal of the seventh battery
9	CELL8+	Connect the positive terminal of the eighth battery

Wire harness B (9-16 cells)		
NO	Balance board wiring definition	Cell wiring definition
1	CELL9-	Connect to the negative terminal of the ninth battery
2	CELL9+	Connect to the positive terminal of the ninth battery
3	CELL10+	Connect to the positive terminal of the tenth battery
4	CELL11+	Connect to the positive terminal of the eleventh battery
5	CELL12+	Connect to the positive terminal of the twelfth battery

6	CELL13+	Connect to the positive terminal of the thirteenth battery
7	CELL14+	Connect to the positive terminal of the fourteenth battery
8	CELL15+	Connect to the positive terminal of the fifteenth battery
9	CELL16+	Connect to the positive terminal of the sixteenth battery
10	NC	NC

Power supply cable (2PIN row housing)		
NO	Balance board wiring definition	Cell wiring definition
1	B-	Connect the battery negative
2	B+	Connect the battery positive



3.3.4The difference between active board and passive board

Passive Balance: Discharge the battery with higher voltage through resistor discharge, releasing power in the form of heat.

The advantage is low cost and simple circuit design;

The disadvantage is that balancing is based on the lowest remaining battery capacity, and the capacity of batteries with low remaining capacity cannot be increased, and 100% of the balanced power is wasted in the form of heat. If the balancing current is small, the power balancing effect in a large-capacity battery pack with a large difference in power will be very inefficient, and it will take a long time to achieve balance.

Active balance: balancing through power transfer, with high efficiency and small loss. Regardless of whether the battery is charging, discharging, or resting, as long as the voltage difference is greater than the set value, equalization will begin. Therefore, as long as there is a voltage difference, active balance should work 24 hours a day until the voltage difference is less than the set value. It will stop within the range. Since active balancing is not limited by charging time, the balancing time is longer, and the balancing current is relatively large, so it is more suitable for use in large-capacity battery packs.

3.3.5 Software internal setting parameters

NO	ITEM	SETTING VALUE	INSTRUCTION
1	Cell under voltage protection	2800mV	If any section of the cell reaches the under voltage protection value, the balancing board will shut down after 1 minute.
2	Balanced minimum starting voltage	3000mV	In order to balance the cell in all states, standby, charging, and discharging can all be balanced; when the battery is relatively low, the energy is insufficient and balancing is prohibited. A minimum starting balancing voltage is specially set.
3	Balanced minimum sustaining voltage	2900mV	
4	Balance starting voltage difference	50mV	When the cell voltage difference is greater than 50mV, active balance is enabled.
5	Balance closing voltage difference	30mV	After balance, the voltage difference is less than 30mV to stop active balance.
6	Balanced once	60S	The active balanced opening and

	duration		closing relay lasts for 60S, and the balanced opening is intermittent for 3S; real-time monitoring of whether the cell voltage reaches the opening condition
7	Balance interval	3S	
8	Balanced working hours	24h	Turn off balancing after the balancing time exceeds 24 hours
9	Balanced over-temperature protection released	70℃	The balance board detects that the temperature reaches the protection value and turns off the balance. It can only turn on the equalization when the temperature reaches the recovery value.
10	Balanced over-temperature protection	90℃	
11	Standby shutdown time	10h	The continuous standby state is not balanced and will be shut down after more than 10 hours.
12	Balanced current	2A	When the balancing board is turned on, the balancing current can reach 2A.
13	Power consumption	15mA	Power consumption in standby mode <15mA

3.3.6 Reset button LED light indication

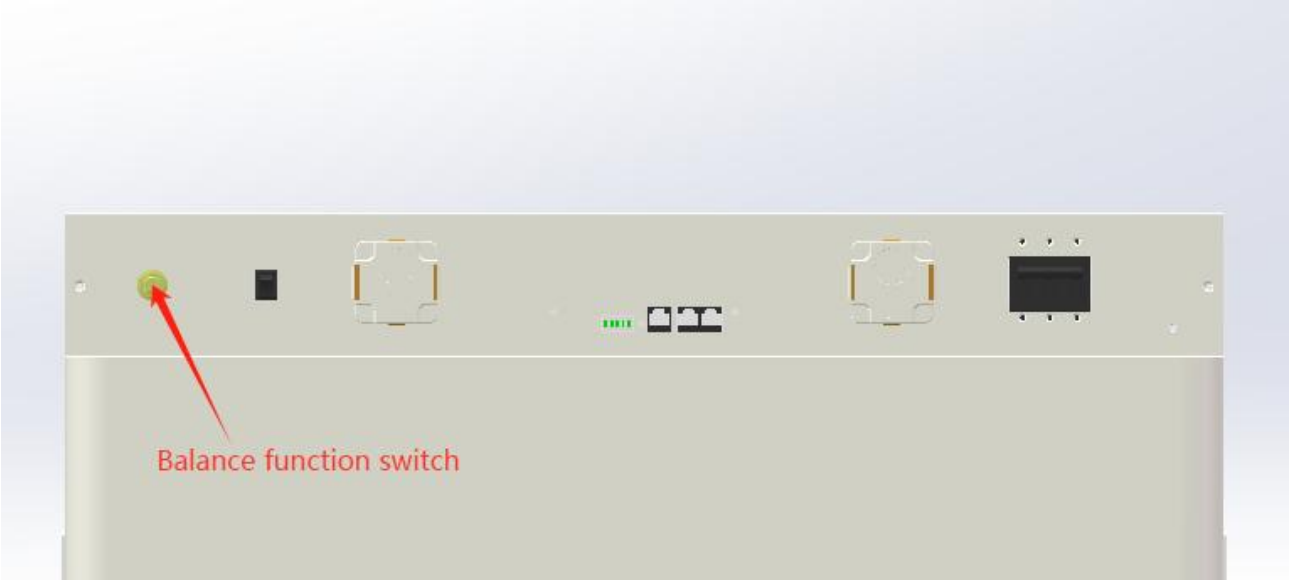
state	Function Description
standby	The LED light of the active balance board flashes in standby mode.
Turn on balance	When the active balancing board is in the balancing state, the LED light is always on.
Power on	Press the reset button, the LED light will flash once and then turn on the balance board.

Power off	Press the reset button, the LED light will flash 6 times, then the LED light will go out and then shut down.
Turn off balance	In the balance state, press the reset button and the LED light will flash 4 times to stop balance. Press the reset button and the LED light will flash 4 times to start balance.

3.3.7 active balance logic

Active balancing takes the total power of the battery. After the balancing is turned on, the total battery power is used to convert the charging voltage to charge the battery cells; the balancing board can enable charging balance of up to 3 cells at the same time, monitor in real time which battery cell is the lowest, and charge the lowest battery cell with a current of 2A .

3.3.8 Operation guide



In order to avoid frequent correction of the remaining capacity of the battery cell with high current, which will reduce the battery life. After pressing the balance function switch, the active balance function is turned on. The balance status refers to 3.3.6, and the single balance time is ≤24h.

Recommended to enable active balancing once a month

3.3 Parameters

Items	Specifications
Rated energy(kWh)	28.67KWh
Configuration	2P16S
Nominal Voltage(V)	51.2V
Working Voltage(V)	42V~58.4V
Nominal Capacity(Ah)	560Ah
Rated charge/ discharge Current(A)	100A @25± 2℃
Maximum charging current	200A@25± 2℃
Maximum discharge current	200A @25± 2℃
Working Temperature	0~40℃(Charge) -20~40℃(Discharge)
Humidity(%)	5~80%
Altitude Limited(m)	0-3000m
Weight(Kg)	210Kg± 3kg
Dimension(mm)	829.5×800×280.5mm
Storage temperature and humidity	- 10~35℃ （Within one month of storage） 25± 2℃（Within three months of storage） 65%±20% RH
cycle life	8000 cycles @25C 100ACharge and discharge current 80%DOD
IP grade	IP20
Communication mode	CAN&RS485

3.3 Protection parameters

3.3.1 Individual cell over voltage parameters

Individual cell over voltage parameter				
Functions	Status	Item	Default	Configurable Range
Over voltage warning	ON	Over voltage warning	3500mV	Over voltage warning recovery - over voltage protection
		Over voltage warning recovery	3400mV	3000mV - over voltage warning
		Under voltage warning	2900mV	Under voltage protection - under voltage warning recovery
		Under voltage warning recovery	3000mV	Under voltage warning - 3300mV
over voltage protection	ON	Over voltage protection	3650mV	Over voltage warning - 4500mV
		Over voltage protection recovery	3400mV	Over voltage warning recovery - over voltage protection
		Over voltage recovery condition	1. Individual cell voltage decrease to over voltage recovery threshold. 2. The remaining capacity lower than 96% of the intermittent power supply. Both conditions should be satisfied.	
			Output current ⩾1A	

3.3.2 Individual cell low voltage parameters

Individual cell low voltage parameter				
Functions	Status	Item	Default	Configurable Range
under voltage protection	ON	Under voltage protection	2700mV	1500mV - under voltage protection recovery
		Under voltage protection recovery	2900mV	Under voltage protection - under voltage warning
		Under voltage protection condition	When an individual cell gets under voltage protection threshold, BMS maintain communication with inverter for 1 minutes and powered off.	
		Under voltage protection recovery	Input current⩾1A	

3.3.3 Pack over voltage parameters

Pack over voltage parameter				
Functions	Status	Item	Default	Configurable Range
Over voltage warning	ON	Over voltage warning	56.0V	Over voltage warning recovery - over voltage protection
		Over voltage warning recovery	54.0V	53.0V - over voltage warning
		Under voltage warning	46.4V	Under voltage protection - under voltage warning recovery
		Under voltage warning recovery	48.0V	Under voltage warning - 55.0V
Over voltage protection	ON	Over voltage protection	57.6V	Over voltage warning - 60.0V
		Over voltage protection recovery	54.0V	Over voltage warning recovery - over voltage protection
		Over voltage protection recovery conditions	1. Individual cell voltage decrease to over voltage recovery threshold. 2. The remaining capacity is lower than 96% of the intermittent power supply. Both conditions should be satisfied.	
			Output current≥1A	

3.3.4 Pack low voltage parameters

Pack low voltage parameter				
Functions	Status	Item	Default	Configurable Range
Under voltage protection	ON	Under voltage protection	41.6V	36.0V - under voltage warning recovery
		Under voltage protection recovery	46.0V	Under voltage protection - under voltage warning
		Under voltage protection condition	When the total voltage gets under voltage protection threshold, BMS maintain communication with inverter for 1 minutes and powered off.	
		Under voltage protection recovery conditions	Input current≥1A	

3.3.5 Cell high/low temperature(charging) parameters

Cell high/low temperature (charging) parameters				
Functions	Status	Item	Default	Configurable Range
Cell temperature (Charging)	ON	High temperature warning	50℃	High temperature warning recovery - high temperature protection
		High temperature warning recovery	47℃	35℃ - high temperature warning
		High temperature protection (charging)	55℃	High temperature protection recovery - 80℃
		High temperature protection recovery	50℃	High temperature warning recovery - high temperature protection
		Low temperature warning	2 ℃	Low temperature protection - low temperature warning recovery
		Low temperature warning recovery (charging)	5 ℃	Low temperature warning - 10℃
		Low temperature protection	- 10℃	-20℃ - low temperature protection recovery
		Low temperature protection recovery	0 ℃	Low temperature protection - low temperature warning recovery

3.3.6 Cell high/low temperature(charging) parameters

Cell high/low temperature (discharging) parameters				
Functions	Status	Item	Default	Configurable Range
Cell temperature (charging)	ON	High temperature warning	52℃	High temperature warning recovery - high temperature protection
		High temperature warning recovery	47℃	35℃~Discharge high temperature alarm
		High temperature protection	55℃	Discharge over-temperature recovery~80℃
		High temperature protection recovery	50℃	High temperature warning recovery - high temperature protection
		Low temperature warning	-10℃	Low temperature protection - low temperature warning recovery
		Low temperature warning recovery	3 ℃	Low temperature warning - 10℃
		Low temperature protection	-15℃	-30℃ - low temperature protection recovery
		Low temperature recovery	0 ℃	Low temperature protection - low temperature warning recovery

3.3.7 Ambient high/low temperature parameters

Ambient high/ low temperature parameters				
Functions	Status	Item	Default	Configurable Range
Cell temperature (Discharging)	ON	High temperature warning	50℃	High temperature warning recovery - high temperature protection
		High temperature warning recovery	47℃	-20℃ - high temperature warning recovery
		High temperature protection	60℃	High temperature protection recovery -80℃
		High temperature protection recovery	55℃	High temperature warning recovery - high temperature protection
		Low temperature warning	0℃	Low temperature protection - low temperature warning recovery
		Low temperature warning recovery	3℃	Low temperature warning - 60℃
		Low temperature protection	-10℃	-30℃ - low temperature protection recovery
		Low temperature protection recovery	0℃	Low temperature protection - low temperature warning recovery

3.3.8 MOSFET high/low temperature parameters

MOSFET high/ low temperature parameters				
Functions	Status	Item	Default	Configurable Range
MOSFET temperature	ON	High temperature warning	90℃	High temperature warning recovery - high temperature protection
		High temperature warning recovery	85℃	60℃ - high temperature warning
		High temperature protection	100℃	High temperature warning - 120℃
		High temperature protection recovery	85℃	High temperature warning recovery - high temperature protection

3.3.9 Charging current limiting parameters

Charging current limiting parameters				
Functions	Status	Item	Default	Configurable Range
Current limiting (charging)	OFF	Active current limiting	10A	When the charger current＞10A, current limiting activated.
	ON	Passive current limiting		When the charger current＞charging over current warning (configurable), current limiting activated.
		Charging current limiting time delay	5 min	After the current limiting being activated, BMS re-check the current to judge whether to maintain current limiting.

3.3.10 Charging over limiting parameters

Charging current limiting parameters				
Functions	Status	Item	Default	Configurable Range
Over current warning (charging)	ON	Over current warning	200A	Charging over current warning recovery - charging over current protection
		Over current warning recovery	195A	0A - charging over current warning
Over current protection (charging)	ON	Over current protection	210A	0A~150A
		Over current protection time delay	10S	Configurable
		Over current protection recovery conditions	BMS detects any output discharge current. After 60 seconds, the protection recovers automatically.	
Effective charging current	Charging current (in)		1000mA	
	Charging current (out)		700mA	

3.3.11 Discharging over limiting parameters

Discharging over current parameters				
Functions	Status	Item	Default	Configurable Range
Over current warning	ON	Over current warning	-205A	Over current protection - over current warning recovery
		Over current warning recovery	-203A	Over current warning -0A
		Over current protection	-210A	Transient over current protection - 0A

Over current protection	ON	Over current protection time delay	10S	Configurable
		Over current protection recovery conditions	BMS detects any input charge current. After 60 seconds, the protection recovers automatically.	

3.3.12 Transient over limiting parameters

Transient over current parameters				
Functions	Status	Item	Default	Configurable Range
Over current protection (Transient)	ON	Over current protection	-300A	Discharge over current protection - 300A
		Over current protection time delay	30mS	Configurable
		Over current protection recovery	BMS detects any input charge current. After 60 seconds, the protection recovers automatically.	
	OFF	Over current lock	Continuously over current for 2 times. The over current lock times exceeded.	
		Over current lock times	5 times	
		Over current lock release	Connected with charger	

3.3.13 Short circuit parameters

Short circuit parameters				
Functions	Status	Item	Default	Configurable Range
Short circuit protection	ON	Short circuit protection current value and time delay	Programmed into the software (can not be edited) Cannot be turned off	
		Short circuit protection recovery	BMS detects any input charge current. After 60 seconds, the protection recovers automatically.	
	ON	Short circuit protection lock	Continuously short in the output circuit. The over current protection lock times exceeded.	
		Short circuit protection lock times	5 times	
		Short circuit protection lock release	Connected with charger	
Effective discharging current	Discharge current (in)		-1000mA	
	Discharge current (out)		-700mA	

3.3.14 Cell balance parameters

Short circuit parameters				
Functions	Status	Item	Default	Configurable Range
Cell balance	ON	Standby balance	When there is no charging and discharging current flow, the standby equalization will be activated.	
		Standby time	10 hours	configurable
	ON	Charging equalization	When at the charging or float charging status, the charging equalization will be activated.	
	Balance conditions	Activate voltage	3350mV	Configurable
		Activate voltage difference	30mV	
		End voltage	20mV	
	ON	Temperature	According to the temperature range of no equalization (ambient temperature)	
		No equalization high temperature	50℃	Configurable
		No equalization low temperature	0 ℃	
Cell failure	ON	Voltage difference	500mV	Configurable
		Voltage difference recovery	300mV	

3.3.15 Cell balance parameters

Capacity parameters				
Capacity	Nominal capacity		560AH	5-560Ah
	Remaining capacity	Calculated accordingly to the cell voltage		Configurable
	Cycle life accumulated capacity	20%	Cycle life (configurable)	
	ON	Remaining capacity warning	10%	
	OFF	Remaining capacity protection	2%	Output current flow will be cut off.
Reset button	Power on/ activation		When the BMS is in the sleep state, press the 1S reset button, the BMS will be activated, and the LED indicators will turn on in turn, then the BMS will turn into the normal working state	
	Shut down/ hibernate		When the BMS is in standby or working state (except charging), press the 3S reset button, the BMS will be hibernated, and the LED indicator lights will turn on in turn, and then the BMS will go into hibernation state;	

3.3.16 Other parameters

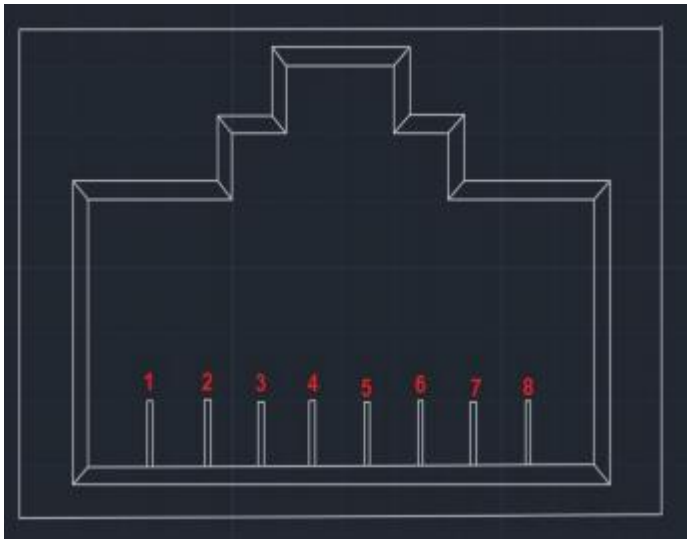
Pre-charging	2000ms	0-5000ms	The pre-charging function will be activated once the BMS powered on.	
BMS power consumption	ON	Longest standby time	48 hours (Do not connected with charger, and no effective charging current.)	
Heating	ON	Start heating temperature	0 ℃	Configurable
		Stop heating temperature	10℃	
		Heating function activation	When connected with charger, and the cell temperature reaches the setting value, the heating function activated. Heating function disabled when at standby and discharge status.	
External switch	OFF	When at the standby status, the BMS can be powered on/off through external switches.		
LCD screen	ON	Monitoring software to check the cell voltage, temperature and current.		
Charging activating	ON	1 minutes	The BMS powered off after under voltage protection. Press the button for recovering from protection status and activate output current.	Configurable
Compensating impedance	Connection fault impedance	10mΩ	Default between 8 and 9	Battery connection line impedance compensation
	Compensation 1	0mΩ	9	Configurable
	Compensation 2	0mΩ	13	

4. Communication

4.1 CAN communication

BMS transmit information through CAN interface. Buad rate 500KBITS/S. CAN interface applies 8P8C connectors. And CAN connector communicates with inverter or CAN TEST. RS485 collect the information. Then CAN transmit the battery pack information to PCS.

CAN connector definition:



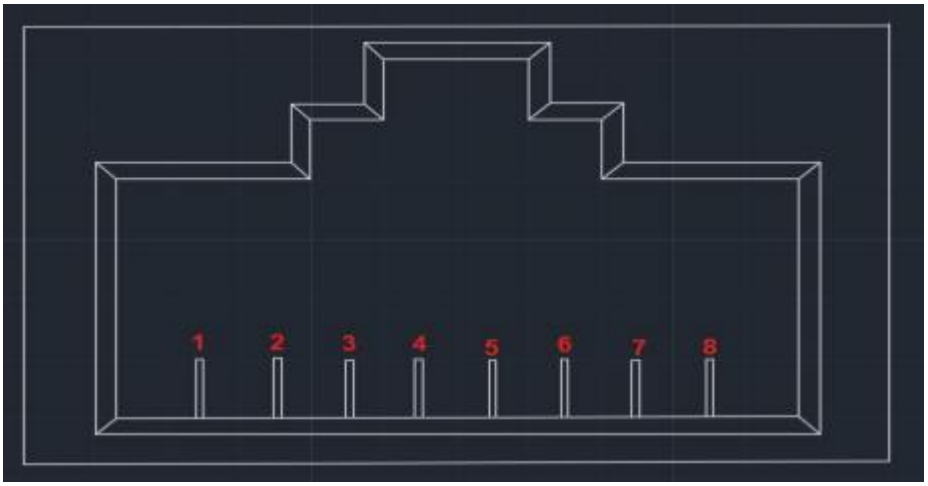
PINS	DEFINITION
1、 2、7、8	NC
4	CAN- L
5	CAN- H
3、6	GND

4.2 RS485

BMS could collect battery pack information through RS485 communication.

Baud rate: 19200bps. RS485 interface applies 8p8c connectors.

RS485 connectors definition:

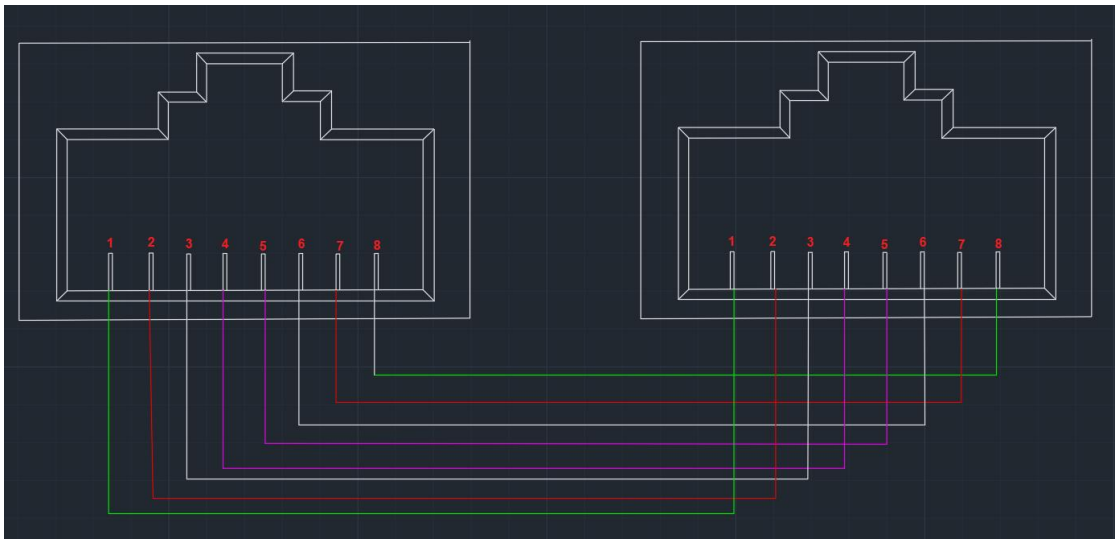


PINS	DEFINITION
1/8	RS485-B
2/7	RS485-A
3/6	GROUND
4/5	Internal communication (NC)

4.3 Parallel

When connected in parallel with RS485 connectors. CAN connectors act as upper communication interface. End devices could get the collected battery information through CAN interface.

RS485 connector connection:



5. Working mode

5.1 Charging mode

When a charger was detected, and the charger voltage is 0.5V+ more than the battery voltage, BMS will turn on the charging MOSFET.And when the charging current reaches the effective charging current value,enters charging mode.

5.2 Discharging mode

When a loads was detected, and the discharging current reaches the effective charging current value, BMS enters discharging mode.

5.3 Standby mode

When the BMS not in charging mode, nor discharging mode, it enters standby mode.

5.4 Power off mode

5.4.1 Power off

After 48 hours of normal standby, the battery triggers under-voltage protection, a button shutdown or an external switch shutdown is performed, and the BMS enters shutdown mode.

waken：

1、Charge activation；

2、48V voltage activation；

3、Button to power on.

6. LED indicator

6.1 LED lights

One running indicator (Green)

One warning indicator (Red)

And four capacity indicator (Green)

●	●	●	●	●	●
SOC				ALARM	RUN

6.2 Capacity indicators

Status	Charging				Discharging			
Capacity	L4●	L3●	L2●	L1●	L4●	L3●	L2●	L1●
0-25%	OFF	OFF	OFF	Blink	OFF	OFF	OFF	Green
25%-50%	OFF	OFF	Blink	Green	OFF	OFF	Green	Green
50%-75%	OFF	Blink	Green	Green	OFF	Green	Green	Green
≥75%	Blink	Green	Green	Green	Green	Green	Green	Green
Running	Green				Blink			

6.3 Lights blinking explanation A

Blink Type	Lighten TIEM	OFF TIME
Blink A	0.25S	3.75S
Blink B	0.5S	0.5S
Blink C	0.5S	1.5S

6.4 Running status indicators

SYSTEM	Running	RUN	ALM	SOC				REMARK
		●	●	●	●	●	●	
OFF	Sleeping	OFF	OFF	OFF	OFF	OFF	OFF	OFF
STANDBY	Running	Blink A	OFF	OFF	OFF	OFF	OFF	Standby
CHARGE	Running	Green	OFF	According to the remaining capacity				LED Blink B
	Over current warning	Green	Blink B	According to the remaining capacity				LED Blink B
	Over voltage protection	Blink A	OFF	OFF	OFF	OFF	OFF	
	Temp And over current protection	Blink A	Blink A	OFF	OFF	OFF	OFF	
DISCHARGE	Running	Blink C	OFF	According to the remaining capacity				
	warning	Blink C	Blink C					
	Temp Over current, short circuit protection	OFF	RED	OFF	OFF	OFF	OFF	
	Under voltage protection	OFF	OFF	OFF	OFF	OFF	OFF	No discharge

6.5 Installation and commissioning

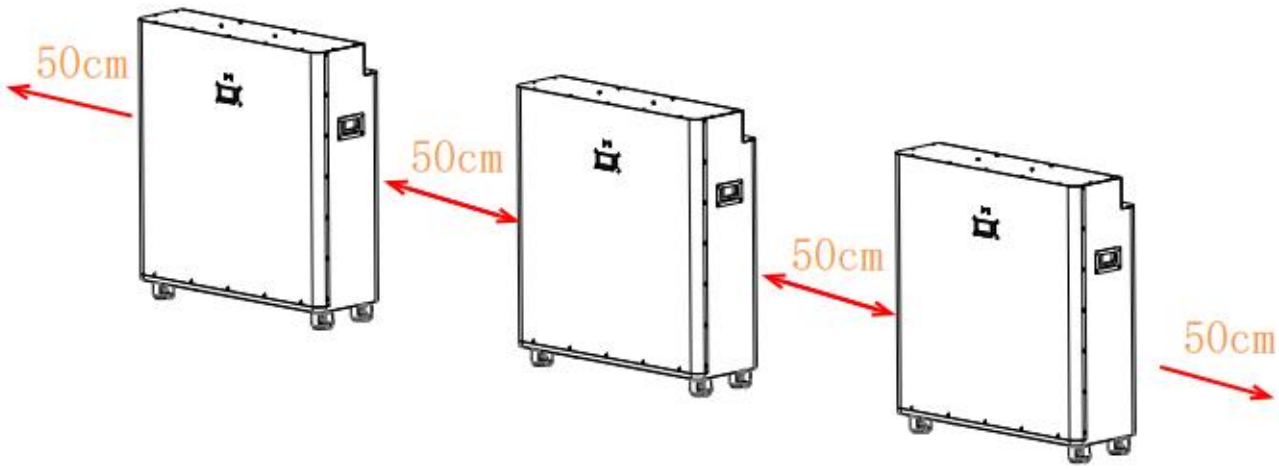
NO.	Item	Quantity	Photo
1	Battery Box	1 PCS	

6.6 Installation instructions

Check battery status before installation

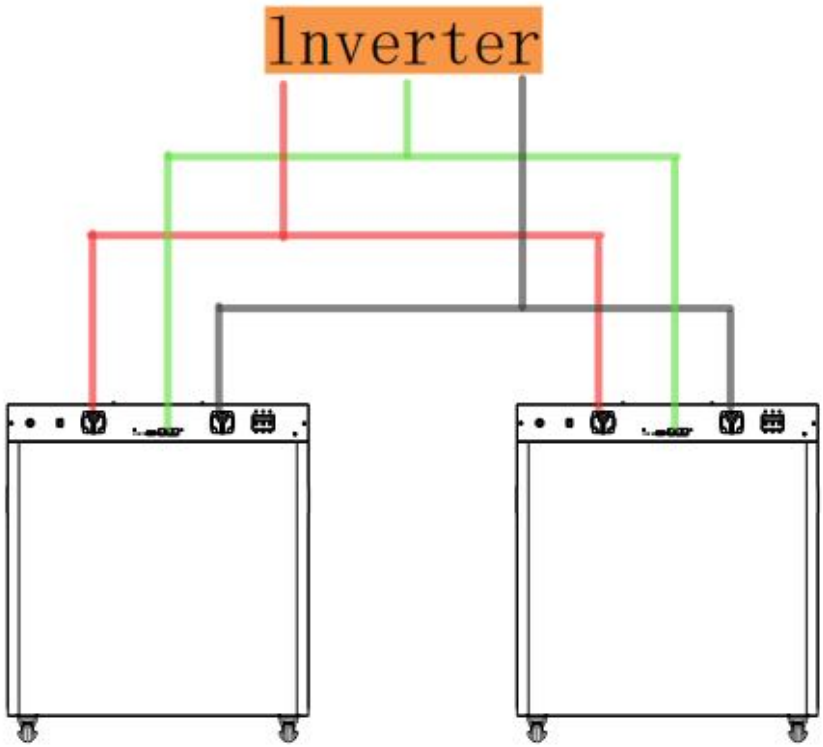
7. Safety precautions

- Do not place the battery on flammable building materials.
- Recommended to place the battery on the level ground.
- The temperature should be between 10℃ and 30℃ to maintain the best operating state .
- The installation site should be some free space around the battery to dissipate heat (as shown in the figure below), which is suitable for installation on the concrete surface or other non-flammable surfaces.



7.1 Harness connection

The battery should be turned off before connecting.



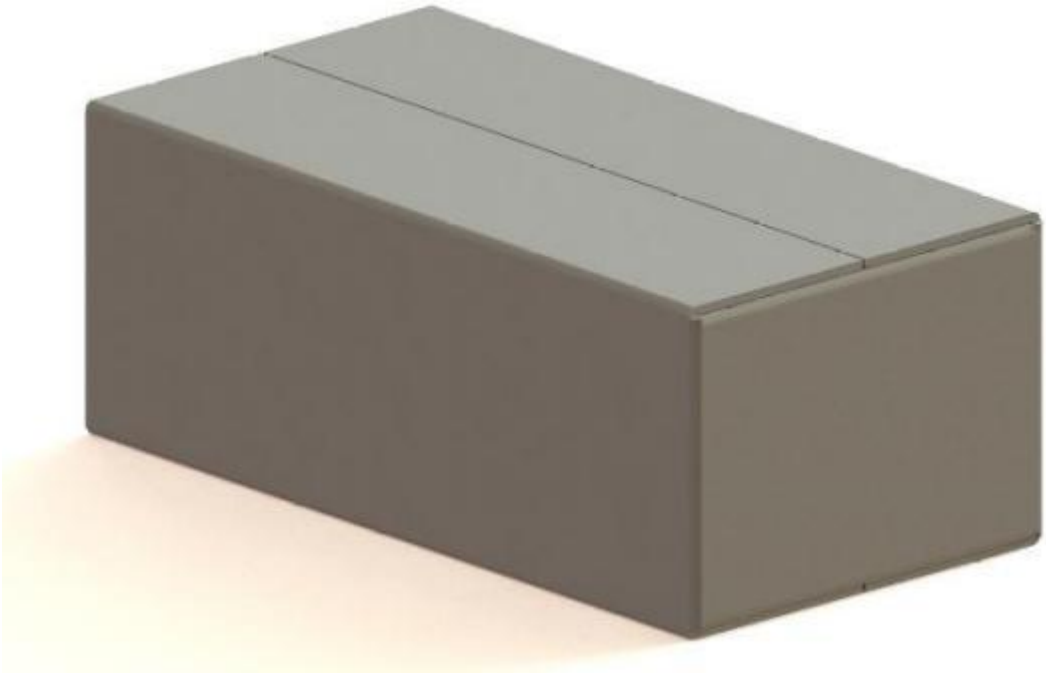
8. Package

Packed in a dry, dust proof and moisture-proof packaging box. The products shall be packed with plastic film/EPE and packed in cartons.

Specification: L 95cm*W85cm*H 32cm

Package quantity: 1 set

Weight: 215kg



9. Safety precaution

- Do not use the pack if there's any deformation.
- Do not stack up the battery.
- Please be notice the polarity of the battery and port.
- Make sure the insulation of equipment, use the tool and instrument correctly. The installation site should stay away from fire and Inflammable,keep ventilating and dry.
- Do not disconnect the battery terminals when its running.
- Not allow non-technology staff to open all of function module.
- Please fully charge a new battery pack, or a long-time-no-use battery pack with a designed charger.
- Do not uninstall,open, extrude, bend, impale or break the battery.
- Do not refit the battery or connect to other object, do not immerse the battery into any
- water, sea water, or drinks and other liquids.stay away from fire, explosive material or other dangerous item.
- Do not allow the battery short circuit, do not any metal or conductor contact the terminal.
- Do not let the battery fall. if does, especially on the solid surface, please contact the service center.
- If there is any signs of Electrolyte leakage, do not let it get any direct contact with your bare skin or eyes. If it happened, use plenty of water to clean up or ask doctor for help.
- Do not uninstall the battery cell, or there will cause internal short even fire disaster or other issue.
- Do not burn the battery or throw it to the fire, otherwise, there will be cause the fire of the
- battery.