PRODUCT SPECIFICATIONS

MASON-280 (3.0Y)
BATTERY PACK SPECIFICATION

Please read this manual carefully before operating

and retain it for future reference.

This manual introduces the MASON-280 51.2V280Ah designed by Technology. Please read this manual before installation of the battery module and follow the instruction carefully during the assembly. Any confusion, please contact Technology immediately for advice and clarification.

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1. Safety Precautions

This section describes the safety information that must be observed when working with battery packs. To prevent any damages, or personal injury, and to ensure the performance of the battery packs, please read this section carefully and observe the safety precautions at all times.

1.1 Precautions

- It is very important and necessary to read the user manual carefully before installing or using the product. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury or death, and could damage the battery, or potentially rendering it inoperable.
- If the battery pack is stored for long time, it is required to charge them every six months, and the SOC should be no less than 50%.
- Please recharged the battery pack within 12 hours, after fully discharged.
- All the battery pack terminals must be disconnected before any maintenance.
- Do not use cleaning solvents to clean battery pack.
- Do not expose battery pack to flammable or harsh chemicals, or corrosive gases or liquids.
- Do not paint any part of battery pack, include any internal or external components.
- Do not expose the battery pack to direct sunlight for extended periods of time.
- Do not connect battery pack with PV solar wiring directly.
- Do not insert any foreign object into any part of the battery pack.

1.2 Warning

- Do not touch the battery pack with wet hands.
- Do not crush, drop or puncture the battery pack.

- Always dispose of the battery pack according to local safety regulations.
- Store and recharge the battery pack in a manner in accordance with this user manual.
- Ensure reliable grounding.
- Do not reverse the polarity when installing.
- Do not short circuit the terminals, remove all jewelry items that could cause a short circuit before installation and handling.
- Disconnect battery from power or loads, and then power off battery before installation and maintenance.
- The battery packs should be not stacked more than specified numbers.
- Continued operation of a damaged battery pack can result in dangerous situation.

2. Introduction

MASON-280 51.2V 280Ah

series is a professional storage battery pack solution specially designed for DIYers with high safety ratings and better performances. And MASON-280 is specifically designed to fit with EVE 3.2V 280Ah prismatic cells.

2.1 Features

- Suitable for EVE 3.2V 280Ah and 3.2V 280Ah LiFePO4 prismatic cells.
- Battery cell is made from lithium iron phosphate (LiFePO4) with safety performance and longer cycle life.
- Specially designed plastic cell holder features fire proof and insulation. 8 cells in series composes a battery module, and two modules in series, then connected with BMS, composes a MASON battery pack.

- BMS has over-discharge, over-charge, over-current, high and low temperature warning and protection functions.
- BMS monitors the charge and discharge state, and balance the current and voltage of each cell.
- BMS comes with upper computer system for real-time cell and pack voltage, current, temperature, and battery status monitoring and recording.
- Flexible configuration, max. 16 packs can be connected in parallel for expanding capacity and power with 8 DIP switches.
- Pre-programmed with multi-protocols, MASON-280 51.2V 280Ah works withmulti-brands of inverters. Check the communication inverter list.

2.2 Specification

Basic Parameters	MASON-280
Nominal Voltage (V)	51.2V
Nominal Capacity (Ah)	280Ah @0.5C discharge current 25±2℃
Nominal Power (KWh)	14.3KWh
Dimension (mm)	750*440*251mm
Weight (Kg)	112±5KG
Discharge Cut-off Voltage (V)	41.6V
Charge Voltage (V)	57.6V
Continuously Charge/Discharge Current (A)	140A @25±2℃ (Recommended)
Max Standard charge/discharge Current (A)	200A @25±2℃
Standard charge/discharge Current (A)	140A @25±2℃ (Recommended)
Max Standard charge/discharge Current (A)	200A @25±2℃
Working Temperature	0～50℃(Charge)
	-10～50℃(Discharge)
	-20～55℃(Storage)
SOC Range	5%-100%
Recommended SOC Range	15-95%
Communication Interface	CAN /RS485
Humidity	10% - 85%
IP level	IP 20

2.3 Interfaces

RESET

Reset button: to start the battery pack, hold the button for 2s to turn on battery pack.

RS485

RS485 communication interface: RJ45 port, follow RS485 protocol. For transmitting battery pack information between paralleled packs. The first 4 DIP switches (#1, #2, #3, #4) are used for identifying packs' information on software.

CAN

CAN 5 communication interface: follow CAN BUS protocol, for output pack information to inverter. One pack should be assigned as master pack. And the last 4 DIP switches (#5, #6, #7, #8) to tell how many slave packs are followed. The firs DIP switches are used for identifying slave packs.

ADS

Spare part， automatic dialing has been realized.

ALARM

ALARM light: red LED flash to show the battery alarm status. And red light to show the battery in protection status of abnormal temperature, over-current, or short-circuit.

RUN

Working light: green LED to show the battery working status.

Details as follows:

Battery status	Operating Mode	RUN	ALM	LED Light				Remark
		●	●	●	●	●	●	
Power off	Standby	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Standby	Normal	Solid Green	OFF	According to battery SOC status				Standby mode
Charge Mode	Normal	Solid Green	OFF	According to battery SOC status				
	Over current warnings	Solid Green	Blink type 2					
	Over voltage protection	Blink type 1	OFF	OFF	OFF	OFF	OFF	
	Temperature, over current protection	Blink type 2	OFF	OFF	OFF	OFF	OFF	
Discharge Mode	Normal	Blink type 3	OFF	According to battery SOC status				
	Warning	Blink type 3	Blink type 3					
	Over current, temperature, short-circuit protection	OFF	Solid Red	OFF	OFF	OFF	OFF	Termination of discharge
	Under voltage protection	OFF	OFF	OFF	OFF	OFF	OFF	Termination of discharge

CAPACITY

SOC light: 4 green LED lights to show the capacity status of battery pack. Each LED represents 25% the capacity.

Status	**Charge**				**Discharge**			
Capacity indicator	● L4	● L3	● L2	● L1	● L4	● L3	● L2	● L1
0-25%	OFF	OFF	OFF	Blink	OFF	OFF	OFF	Solid Green
25%-50%	OFF	OFF	Blink	Solid Green	OFF	OFF	Solid Green	Solid Green
50%-75%	OFF	Blink	Solid Green	Solid Green	OFF	Solid Green	Solid Green	Solid Green
>75%	Blink	Solid Green	Solid Green	Solid Green	Solid Green	Solid Green	Solid Green	Solid Green
Operating indicator	Solid Green				Blink			

P+/P-

Power terminals: two pairs of power terminals with the same function, one connect to equipment, and the other one parallel to other battery pack for capacity expanding. For a single pack, both terminals can achieve charging and discharging functions.

Power cable uses 8.0mm power plug with lock button. And can be full rotation.



2.4 Cell Features

2.4.1 Specifications

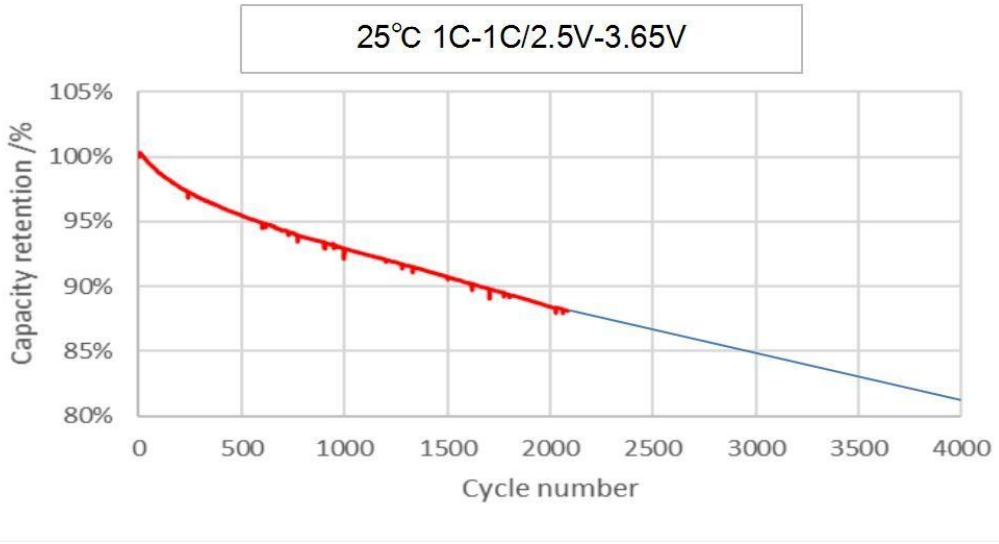
3.2V 100Ah lithium iron phosphate (LiFePO4) aluminum case prismatic rechargeable battery cell.

Nominal Voltage	3.2V
Nominal Capacity	280Ah
Weight	≤5.5Kg
Self-discharge Rate	3.0% per month
Initial Internal Resistance （1KHz）	≤0.23mΩ

Refer to the cell specification for more detailed information.

Technology applies high quality Grade A cells inside the battery box. And did the following designs to prolong the battery pack cycle life.

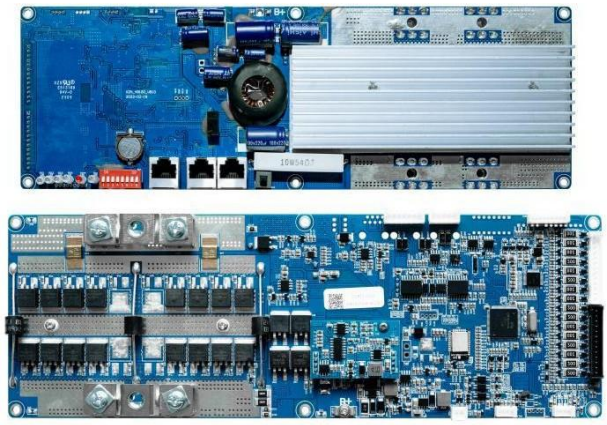
- Judging by the current testing report below, if the battery pack charging and discharging at 0.5C, the battery pack could reach a cycle life of 8000times or more at the remaining capacity of 80% capacity state at 25℃ room temperature, 100%DOD.



- The real capacity of each single cell is 285Ah.

2.5 Advanced Battery Management System (BMS)

The BMS is applied to monitor current, voltage, temperature, protection against over-charge, over-discharge, over-current, over-temperature, under-temperature and short circuit. The BMS provides cell balancing and current limitation during charging process to ensure a reliable safety and performance.



Refer to the BMS specification for the detailed information

2.5.1 BMS Functions

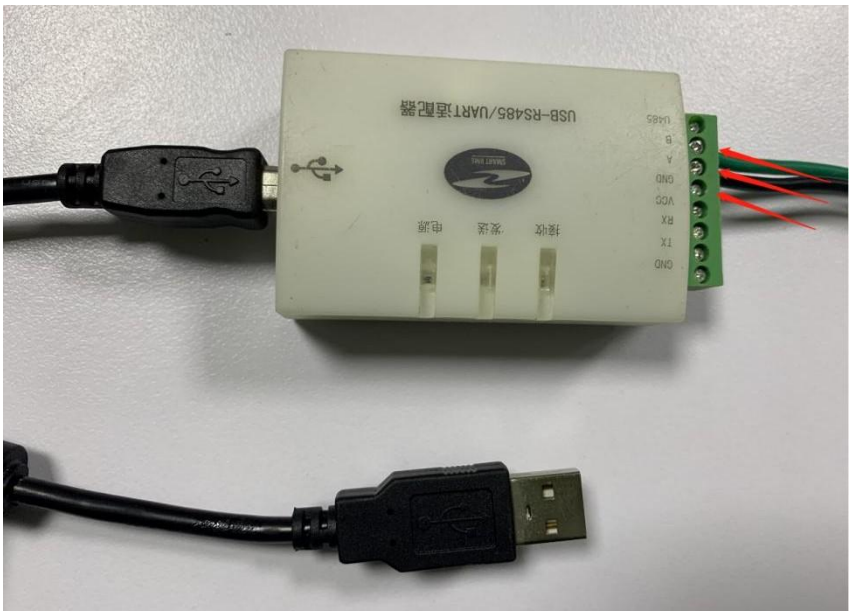
- Over charge protection
- Over discharge protection
- Over current protection
- Cell balancing
- Temperature protection
- CAN and RS485 communication
- Bluetooth function

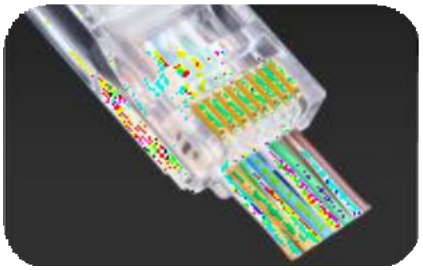
2.5.2 Monitoring software

Battery pack can be remotely monitored with BATTERYMONITOR software. With this software, battery voltage, cell voltage of single cell and pack, SOC status, cell temperature, voltage differences can be monitoring in real time. Through history record, battery status can be checked afterwards.

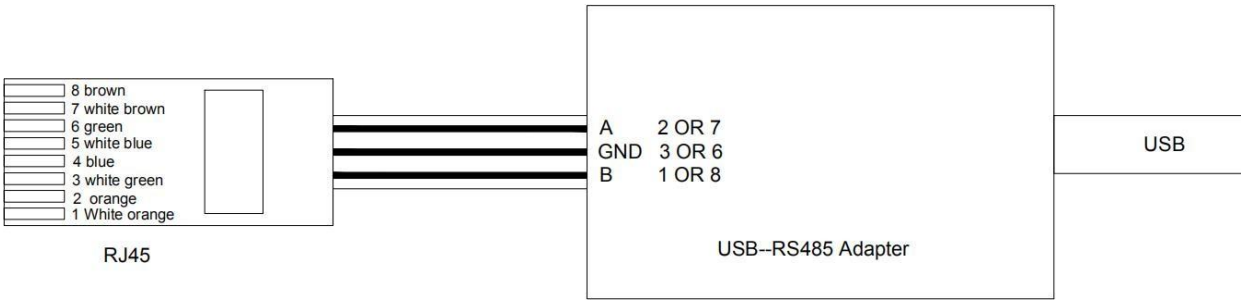
First, connect MASON to the master computer with USB-RS485 adapter.

If the adapter needs wiring, follow the wiring diagram.





RJ45



Wiring Diagram

Note: Download the software installation file at Google drive with this link:

https://drive.google.com/drive/folders/10pxgNLHovcDZRVGrCZsSkfecBrRw-AdW?usp=sharing

2.5.3 Compatible Inverters

MASON Battery pre-programmed with multiple CAN protocols to compatible with multi-brands of inverters. To make sure that the battery module works perfectly, it would be better to use the compatible inverters listed below.

Note: Different models of inverters may comes with different protocols and designing even for the same brand. For some models, a firmware updating is required for perfect communication.

Pre-programmed CAN Protocol list:

- Goodwe-V1.5
- Pylon-V1.3
- Growatt-V1.05
- Victron CANBUS_PROTOCOL
- LUXPOWER_CAN Protocol
- Sofar_REV5
- SMA_EN_10

Communicate inverters list (CAN Protocol):

- ✓ Goodwe (Choose custom mode, and the BMS choose default protocol)
- ✓ Growatt (Growatt inverter comes with both CAN and RS485 protocol models. Please confirm before purchase.) （Choose "Li" "CAN" "L51" / "Li" "485" "L01"）
- ✓ Victron （BMS choose victron）
- ✓ Voltronic (Voltronic inverter comes with RS485 protocol only. Please confirm with your sales representative before purchase.)（BMS choose Default protocol. ）
- ✓ Phocos (Phocos inverter comes with RS485 protocol only. Please confirm with your sales representative before purchase.)

- ✓ LUXPOWER
- ✓ Sofar (Choose custom mode, and the BMS choose SOFAR protocol)
- ✓ DEYE (Choose default, and the BMS choose default protocol)
- ✓ Sermatec
- ✓ RENAC
- ✓ TBB POWER
- ✓ SOLIS (Choose US2000B, and the BMS choose default protocol)
- ✓ SMA
- ✓ FoxESS
- ✓ IMEON (Choose Dyness /BMS choose Luxpower)

Inverter Settings:

Battery information would be synchronized to the inverter through CAN communication. If the inverter do not support CAN communication, the following parameters need to be modified before connecting with battery system.

Charging Settings:

Parameter	Setting
Battery type	Lithium
Charge curve	Fixed
Absorption voltage	57.6V
Float voltage	55V
Absorption time	1Hr

Note:

1. Make sure to double check the float voltage after completing Assistants, and if necessary set it back to 55.0V.

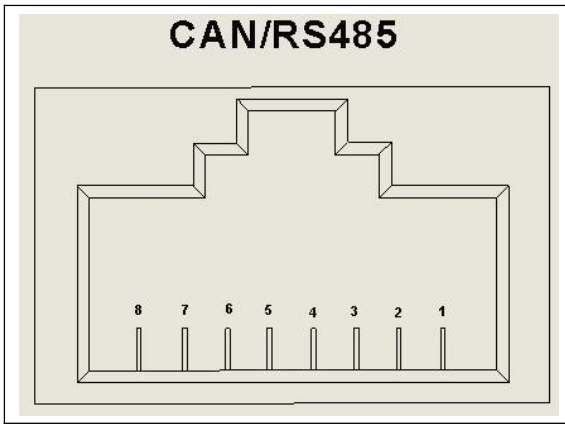
2. For off-grid use: ignore the 'BMS assistant required' warning.

Inverter Settings

Parameter	Setting
DC input low shut-down	43V
DC input low restart	47V
DC input low pre-alarm*	47V

Definition of communication interface

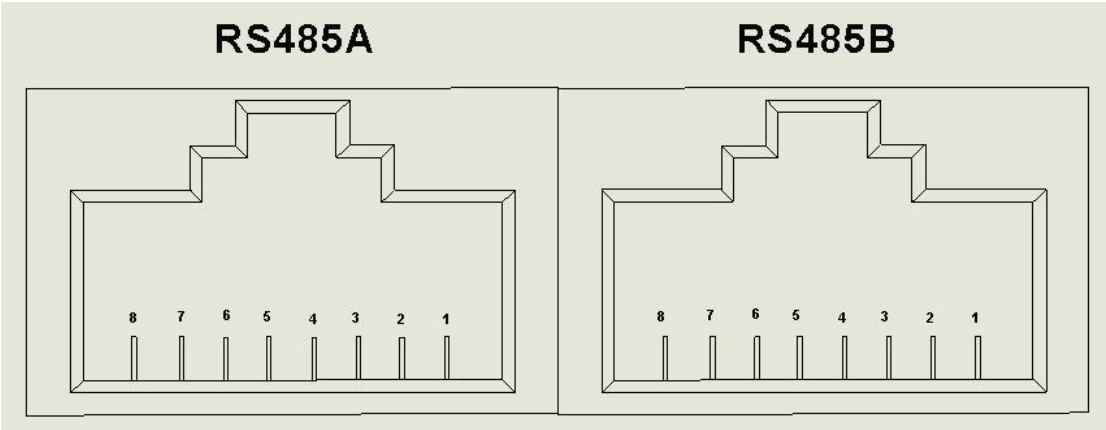
Define the corresponding BMS communication interface of different brands of inverters ； The definition of the special inverter communication port is inconsistent with the definition of the BMS communication port,customized network cable， If you use a regular network cable, the BMS may automatically turn on or fail to turn off；before use, it should be determined whether the definition of the communication interface is consistent.



CAN/RS485	
Pin	**Definition description**
1、8	RS485-B
2、7	RS485-A
4	CAN-H
5	CAN-L
3、6	GND

① Internal communication

Select the corresponding port for BMS internal communication、Baud rate selection 19200

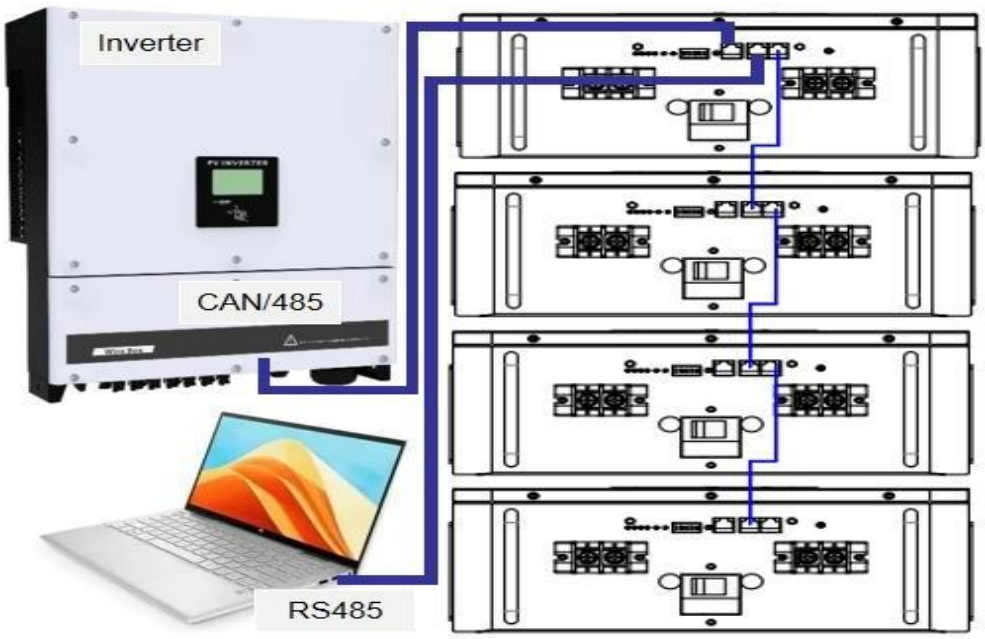


RS485A	
Pin	**Definition description**
1、8	RS485-B
2、7	RS485-A
3	Master flag enable
4	Autocode address 2
5	GND
6	GND

RS485B	
Pin	**Definition description**
1、8	RS485-B
2、7	RS485-A
3	GND
4	Autocode address 1
5	GND
6	Salve flag enable

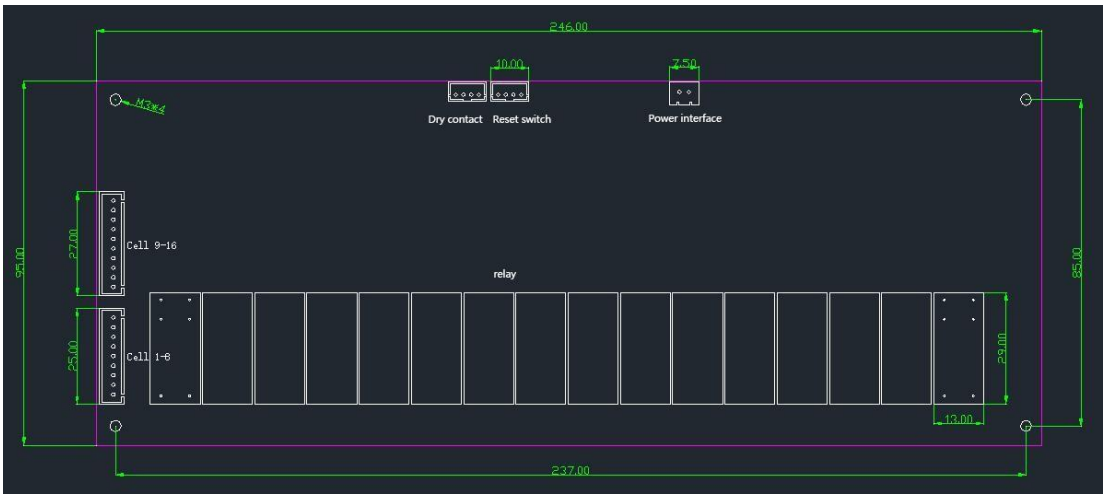
② Parallel communication

BMS has the function of automatically assigning addresses，there is no need to dial the code（The reserved dial switch on the BMS is not turned on)and a regular network cable can be used when paralleling the machine.

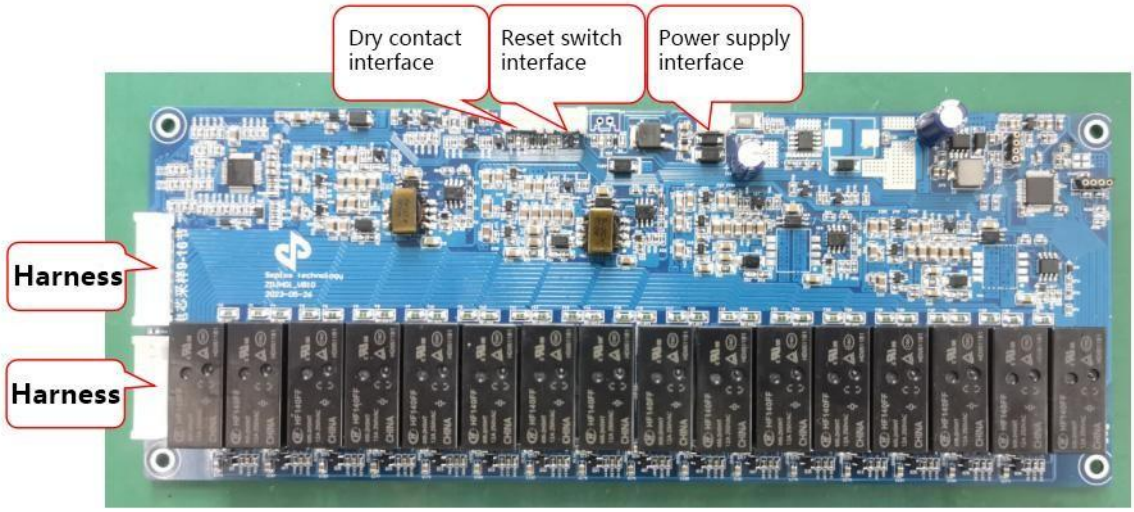


2.6 Automatic balance board

2.6.1、Dimension



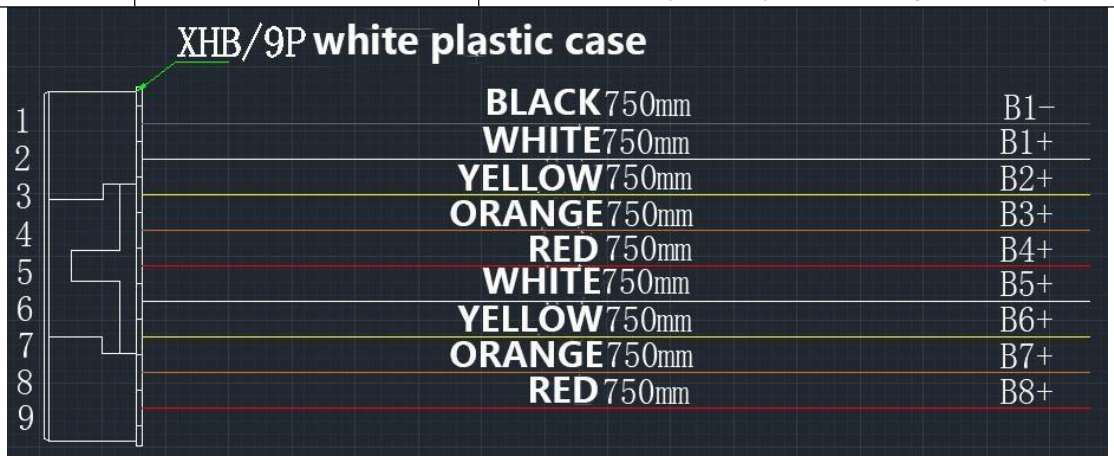
2.6.2 、Installation method



2.6.3 、Harness definition

Harness A（1-8 batteries）		
NO	**Balanced board wiring definition**	**Cell wiring definition**
1	CELL1-	Connect to the negative pole of the first battery
2	CELL1+	Connect to the positive pole of the first battery
3	CELL2+	Connect to the positive pole of the second battery
4	CELL3+	Connect to the positive pole of the third battery
5	CELL4+	Connect to the positive pole of the fourth battery

6	CELL5+	Connect to the positive pole of the fifth battery
7	CELL6+	Connect to the positive pole of the sixth battery
8	CELL7+	Connect to the positive pole of the seventh battery
9	CELL8+	Connect to the positive pole of the eighth battery



Harness B（9-16 batteries）		
NO	**Balanced board wiring definition**	**Cell wiring definition**
1	CELL9-	Connect to the negative pole of the ninth battery
2	CELL9+	Connect to the positive pole of the ninth battery
3	CELL10+	Connect to the positive pole of the tenth battery
4	CELL11+	Connect to the positive pole of the eleventh battery
5	CELL12+	Connect to the positive pole of the twelfth battery
6	CELL13+	Connect to the positive pole of the thirteenth battery
7	CELL14+	Connect to the positive pole of the fourteenth battery
8	CELL15+	Connect to the positive pole of the fifteenth battery
9	CELL16+	Connect to the positive pole of the sixteenth battery
10	NC	NC

Power cord（2PIN shelling）		
NO	**Balanced board wiring definition**	**Cell wiring definition**
1	B-	Connect to the total negative of the battery
2	B+	Connect to the total positive of the battery
		

2.6.4 The difference between active and passive balancing

Passive balancing： By way of resistance discharge, the battery with higher voltage is discharged, and the electricity is released in the form of heat. The advantages are low cost and simple circuit design;The disadvantage is that the balance is performed on the basis of the lowest battery remaining capacity, and the capacity of the battery with a small remaining capacity cannot be increased, and 100% of the balanced power is wasted in the form of heat.If the equalizing current is small, then in the case of a large-capacity battery pack with a large difference in power, the efficiency of the power balance effect is very low, and it takes a long time to achieve balance.

Active balancing： Equalization is carried out by means of power transfer, with high efficiency and low loss.Regardless of whether the battery is charging, discharging, or standing still, as long as the pressure difference is greater than the set value, the equalization will start. Therefore, as long as there is a pressure difference, the active equalization time should be working 24 hours a day until the pressure difference is less than the set value. stop within the range.Since the active equalization is not limited by the charging time, the equalization time is longer, and the equalization current is relatively large, so it is more suitable for use in large-capacity battery packs.

2.6.5 Software internal setting parameters

NO	Item	Setting	Instruction
1	Individual under voltage protection	2800mV	When any cell reaches the under voltage protection value, the balance board will shut down after 1 minute
2	Equalized minimum start voltage	3000mV	In order to balance the batteries in all states, they can be balanced in standby, charging, and discharging; when the batteries are relatively low, the energy is insufficient, and equalization is prohibited. A minimum
3	Equalized minimum sustaining voltage	2900mV	

			start-up equalization voltage is deliberately set.
4	Equalized starting pressure difference	50mV	Cell voltage difference is over than 50mV and the active equalization is turned on
5	Equalized closing pressure difference	30mV	After equalization, the pressure difference is less than 30mV to stop active equalization
6	Equalized the duration of a single shot	60S	Active balance open and close the relay for 60S, and balance open intermittently for 3S; real-time monitoring of cell voltage reaches the open condition
7	Equalization interval	3S	
8	Equalized working hour	24h	Turn off the equalization after the continuous equalization time exceeds 24h
9	Equalized over temperature protection released	70℃	The balance board detects that the temperature reaches the protection value and closes the balance, and waits for the temperature to reach the recovery value before turning on the balance
10	Equalized over temperature protection	90℃	
11	Standby shutdown time	10h	The continuous standby state is not balanced, and the shutdown is performed after more than 10H
12	Equalized current	2A	When the balance board is turned on, the balance current can reach 2A.
13	Power consumption	15mA	Power consumption in standby mode is less than 15mA

2.6.6 Reset button LED light indication

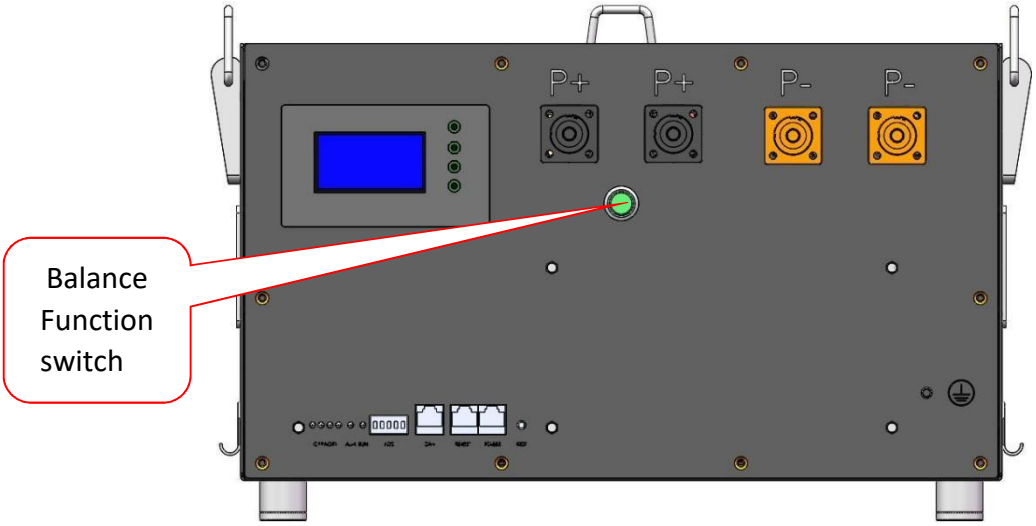
Status	Function instruction
Standby	The active balance board is in the standby state and the LED light is flashing
Turn on equalization	The active balance board is in the balance state and the LED light is always on
Turn on	Press the reset button and the LED light flashes once, then turn on the equalization board
Turn off	Press the reset button and the LED light flashes 6 times, then the LED light goes out and then shuts down
Stop equalized	In the balance state, press the reset button LED light flashes 4 times to stop equalization, press the reset button LED light flashes 4 times to start equalization

2.6.7 Active balancing logic

Active balance the total battery power. After the balance is turned on, the total battery power is used to convert the charging voltage to charge the battery cells; the balance board can open up to

3 battery charging balances at the same time, and monitor in real time which battery cell is the lowest, and charge the lowest battery with 2A current .

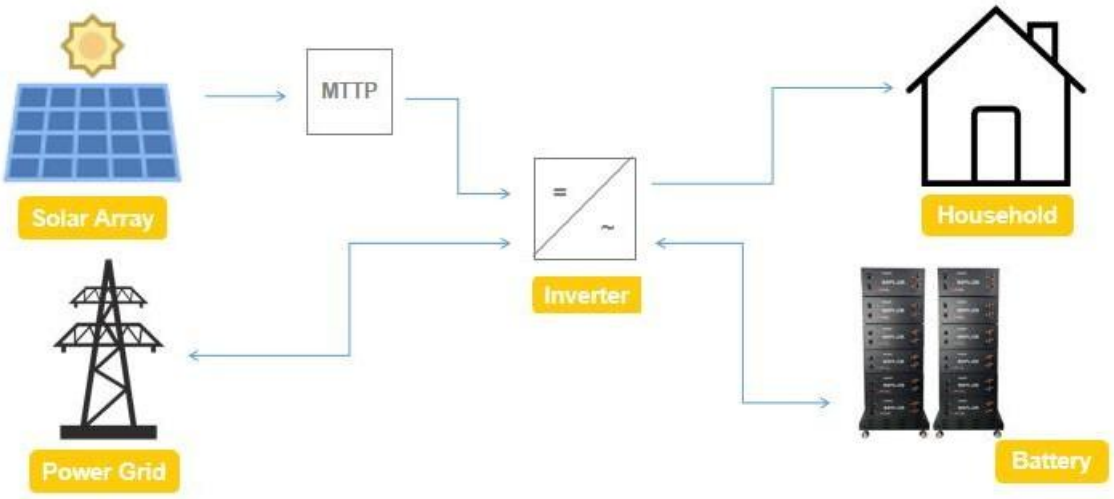
2.6.8 Operation guide



In order to avoid the disadvantage of reducing the battery life caused by frequent correction of the remaining capacity of the battery cell with a large current.After pressing the equalization function switch, the active equalization function is turned on,and the equalization state refers to 2.6.6, and the single equalization time is ≤24h.
It is recommended to turn on active balancing once a month.

3. Installation

3.1 Application



3.2 Battery pack wiring (Pack to pack)

- Stack the battery packs onto the base. (Maximum 4 packs can be stacked.)
- Connect cables between packs.
- Connect cable with inverter.

4. List

- 1 * Battery Case (Bottom case, Front Panel, Top Bracket, Front Bracket, Top cover)
- 1 * 48V 200A 16S BMS
- 1 * 58V 400A Fuse
- 4 * Handle
- 2 * PCB Board for BMS and Cell Connection
- 3 * Upper and Lower Latch lock
- 1 * LCD Screen
- 1 * LCD Screen Sticker
- 4 * Button Cap
- 3 * Wires (LCD Screen wire, PCB board A and PCB board Connector)
- 2 * Battery Terminals (P+ Terminal and P- Terminal)

Other components includes:

- 6 * Copper bus bars (BMS connection)
- 15 * Aluminum bus bars (Cell connection)
- 10 * Epoxy sheet (Between cell and the case)
- 26 * EVA Tape (Between cells)
- 1 * PC sheet (Top cover)

Screws Details:

- 12 * Phillip Hex M4 * 8mm (PCB board fix)
- 9 * Phillip Hex M5 * 8mm + Washer + Spring Set(Ground cable and top bracket fix)
- 7 * Phillip Hex M6 * 25mm + Washer + Spring Set(Front Panel fix)
- 10 * Phillip Round M3 * 8mm + Washer + Spring Set(BMS and LCD Screen fix)
- 12 * Phillip Pan M5 * 10mm (Latch fix)
- 16 * Hexagan Socket Pan M4 * 10mm (P+/P- Terminals fix)
- 42 * Hexagan Socket Countersunk M4 * 10mm (Handle and battery case)
- 4 * Phillip Hex M6 * 14mm + Washer + Spring Set(foot fix)
- 5 * Phillip Hex M8 * 10mm + Washer + Spring Set (P+/P- Bus bar fix)
  8 * Phillip Round M5 * 10mm + Wa