Battery Module User Manual

Product Name：Rack Mounted Battery Module

Product Model: AM5120S

(Certificate Model: YNJB16S100ND-L)

Version: P1.0

This manual describes the instructions for using the Rackmount-Battery Module (AM5120S). Please read this manual before installing the battery and follow the instructions carefully during installation. In case of any confusion, contact the manufacturer immediately for advice and clarification.

Catalogue

Chapter 1 Product Introduction

The Rackmount-Battery Module (AM5120S) is one of the new energy storage products that can be used to support reliable power for a variety of equipment and systems. It is particularly suitable for application scenarios with high power, limited installation space, restricted load carrying and long cycle life. AM5120S has a built-in BMS battery management system that manages and monitors battery information including voltage, current and temperature. In addition, the BMS can balance the charge and discharge of the battery to extend cycle life. Multiple batteries can be connected in parallel to expand capacity and power paralleling for greater capacity and longer power support time requirements.

1.1. Characteristics

- The battery module uses lithium iron phosphate cells, which reduces weight by 40% compared to lead-acid batteries of the same size;
- Appearance for the rack-type 3U structure, can be directly loaded into the 600 * 600mm standard network cabinet installation, maintenance is convenient, flexible and versatile;
- Optional professional brackets are available for stacking installation without cabinet conditions;
- The battery module housing is made of sheet metal with insulating coating and the panels are made of plastic;
- The power output input of the battery module adopts high-power connector with screw fastening, which is more solid and reliable;
- The battery module can support up to 16 groups to be used in parallel, not in series;
- Low self-discharge of the battery module, no memory effect, shallow charging and discharging performance is more excellent;
- BMS adopts professional battery management chip, ARM low power processor, more energy saving;

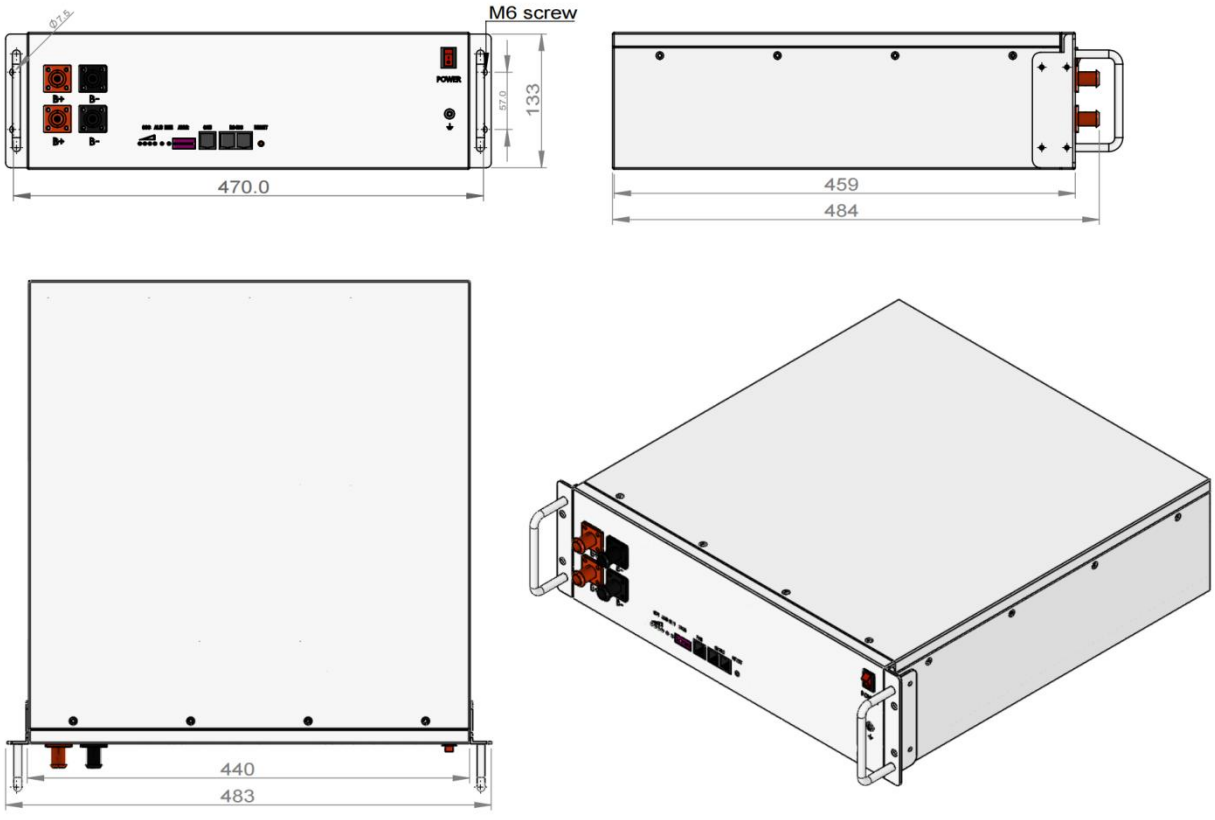
1.2. Function

✓ Supports CAN/RS485 communication;

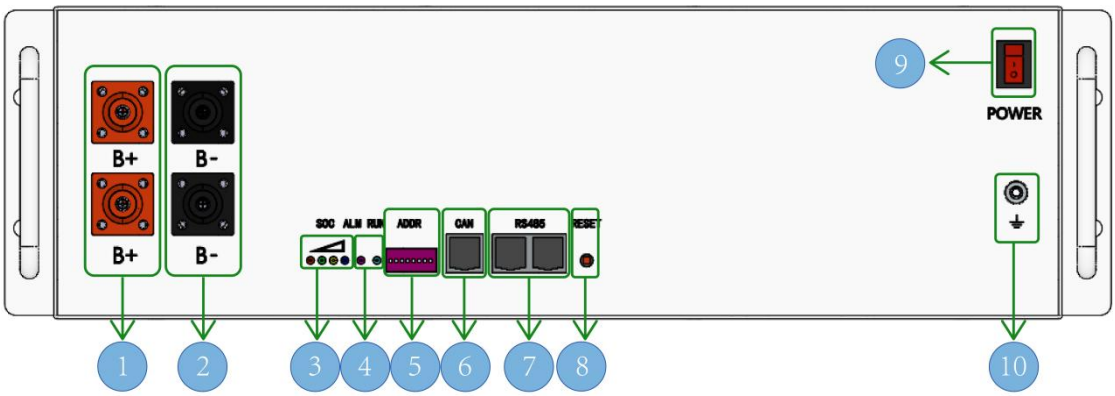
✓ Built-in 4-channel temperature acquisition;

- ✓ Supports high and low temperature overcharge and overdischarge protection;
- ✓ Supports battery equalization function;
- ✓ Supports SOC calculation and calibration;
- ✓ Supports two levels of overcurrent protection;
- ✓ Supports output short circuit protection;
- ✓ Supports reverse polarity protection;
- ✓ Support for data storage;
- ✓ Multiple automatic fault detection (sampling, MOS, battery failure).

1.3. Specification



Product Model	AM5120S
Rated Battery Voltage	51.2V
Operating Voltage Range	44.8V to 57.6V
Float charging voltage support	55V±1V
battery capacity	100Ah
battery level	5120Wh
internal resistance	≤50mΩ
Rated discharge current/Maximum allowable discharge current	50A/100A
Rated charging current/maximum allowable charging current	50A/100A
Battery operating temperature range	Charge 0℃～+56℃ Discharge -20℃～+56℃
Recommended operating temperature	+10℃～+30℃
Storage temperature specification	0-25°C/12 months
Battery module size (W*D*H mm)	Bare machine: 440*459*133mm (case) Installation: 483*484*133mm (including handles)
weights	43±1KG
housings	Metal housing with insulating coating
Cooling method	natural cooling
Display mode	indicator light
communication method	External: CAN/RS485 Internal: RS485 PC upper unit: RS485



1.4. Interface Definition

❶	Load Positive	❻	RS485/CAN interface
❷	Load Negative	❼	RS485 interface
❸	Battery Capacity Lamp	❽	reset switch
❹	warning light	❾	power switch
❺	dipswitch	❿	grounding hole

1.4.1 Switching lights on and off

Switching light: Always on when the power is on, off when the power is off.

1.4.2 Ground hole

Ground hole: equipment grounding.

1.4.3 Status lights

Status light: shows power switch is on, shows BMS is powered/not powered

1.4.4 Alarm lights

Alarm light: Battery failure indicator, red for failure, green for normal.

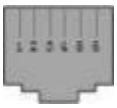
1.4.5 Battery capacity light

Battery Capacity Lamp: Displays the power supply power level, six indicator lamps show the current power level.

1.4.6 RS485/CAN interface

RS485/CAN communication interface: (RJ45 port) Communication according to RS485/CAN protocol.

RS485 - using 8P8C vertical RJ45 socket		CAN - using 8P8C vertical RJ45 socket	
RJ45 Pin	Description of definitions	RJ45 Pin	Description of definitions
1, 8	RS485-B1	4	CANH
2, 7	RS485-A1	5	CANL
3, 6	GND		

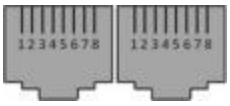


RS485/CAN interface definition

1.4.7 RS485 interface

RS485 communication interface: (RJ45 port) communicate according to RS485 protocol, read battery information, also can be used for multiple lithium batteries for parallel communication.

RS485 - using 8P8C vertical RJ45 socket		RS485 - using 8P8C vertical RJ45 socket	
RJ45 Pin	Description of definitions	RJ45 Pin	Description of definitions
1, 8	RS485-B1	1, 8	RS485-B1
2, 7	RS485-A1	2, 7	RS485-A1
3, 6	GND	3, 6	GND
4, 5	NC	4, 5	NC



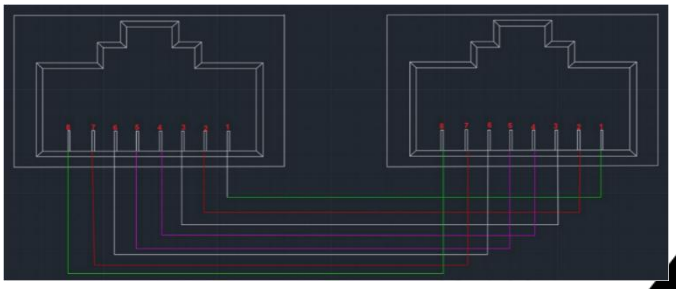
RS485 parallel communication interface definition

parallel communication

The RS485 interface is used as the parallel communication interface when multiple batteries are connected in parallel.

The CAN interface serves as the uplink communication interface. The end device can communicate via the CAN to read the sum of the data from all the batteries in the parallel.

When multiple units are connected in parallel, the RS485 interface connection is shown in the figure below:



1.4.8 Power switch

Power switch: turns on/off the entire battery pack status.

1.4.9 Power supply terminals (P+/P-)

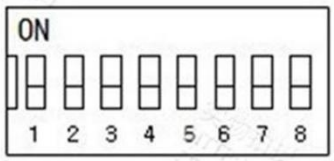
Power terminals: Use two pairs of terminals with the same function using cold press terminals RNB22-8, one connected to the unit and the other connected in parallel to other battery modules for capacity increase. For each single module, each terminal can realize charging and discharging functions.

1.4.10 Reset switch

Reset switch: When the BMS is in hibernation, press the button (3~6s) and then release it, the protection board will be activated and the LED indicator will be lit continuously for 0.5 seconds from "RUN".
When the BMS is active, press the button (3~6s) and release it, the protection board will be dormant and the LED indicator will light up from the lowest battery level light for 0.5 seconds.
When the BMS is active, press the button (6~10s) and release it, the protection board resets and all LEDs light up simultaneously for 1.5 seconds.

1.4.11 DIP switches

DIP ADDRESS SELECTION (manual dipping method)
Parallel DIP Switch Definition: Multi-computer communication when battery packs are connected in parallel, using dip switches to differentiate between different Pack addresses, hardware addresses.
It can be set by the dip switches on the board. (**Note: Support 8 groups of parallelization, 16 groups of parallelization need to make special request, the default is 8 groups**)
DIP Switch bit1 to bit8 Definition: bit1 to bit4 are used to set the address, bit5 to bit8 are used for the number of slaves.
Host setting: bit1 to bit4 are 0, the host address is fixed to 0, bit5 to bit8 are set according to the number of slaves connected in parallel.
(as in table 2)
Slave setting: bit1 to bit4 are set according to the device order, the slave address range is 1 to 15. bit5 to bit8 are fixed to 0.
(as in table 1)
Parallel use address setting: refer to the following table for the definition of the dip switches



Slave Settings (Table 1)

address	DIP Switch Position				Remarks
	#1	#2	#3	#4	
1	ON	OFF	OFF	OFF	Slave1
2	OFF	ON	OFF	OFF	Slave2
3	ON	ON	OFF	OFF	Slave3
4	OFF	OFF	ON	OFF	Slave4
5	ON	OFF	ON	OFF	Slave5
6	OFF	ON	ON	OFF	Slave6
7	ON	ON	ON	OFF	Slave7
8	OFF	OFF	OFF	ON	Slave8
9	ON	OFF	OFF	ON	Slave9
10	OFF	ON	OFF	ON	Slave10
11	ON	ON	OFF	ON	Slave11
12	OFF	OFF	ON	ON	Slave12
13	ON	OFF	ON	ON	Slave13
14	OFF	ON	ON	ON	Slave14
15	ON	ON	ON	ON	Slave 15

Host Settings (Table 2)

No.	DIP Switch				Remarks
	#5	#6	#7	#8	
2	ON	OFF	OFF	OFF	2 parallela
3	OFF	ON	OFF	OFF	3 parallel
4	ON	ON	OFF	OFF	4 parallel
5	OFF	OFF	ON	OFF	5 parallel
6	ON	OFF	ON	OFF	6 parallel
7	OFF	ON	ON	OFF	7 parallel
8	ON	ON	ON	OFF	8 parallel
9	OFF	OFF	OFF	ON	9 parallel
10	ON	OFF	OFF	ON	10 parallel
11	OFF	ON	OFF	ON	11 parallel
12	ON	ON	OFF	ON	12 parallel
13	OFF	OFF	ON	ON	13 parallel
14	ON	OFF	ON	ON	14 parallel
15	OFF	ON	ON	ON	15 parallel

1.5 LED indicators

1 Run Lamp, 1 Alarm Lamp, 4 Capacity Indicators

1.5.1, Standby mode

When neither of the above two modes is satisfied, the standby mode is entered.

1.5.2. Shutdown mode

The BMS enters the shutdown mode after 48 hours of normal standby, when the battery triggers undervoltage protection, or when it performs key shutdown or external switch shutdown.

Wake-up conditions for shutdown mode: 1. Charge activation; 2. 48V voltage activation; 3. Key on; 4. External switch.

1.6. LED indication description

1.6.1 LED Sequence

4 capacity indicators, 1 warning light, 1 run light.

●	●	●	●	●	●
SOC				ALARM	RUN

1.6.2 Capacity indication

State		Charging				Discharging			
Capacity Indicator		L4●	L3●	L2●	L1●	L4●	L3●	L2●	L1●
Remaining SOC	0~25%	off	off	off	blink	off	off	off	On
	25~50%	off	off	blink	On	off	off	On	On
	50~75%	off	blink	On	On	off	On	On	On
	≥75%	blink	On	On	On	On	On	On	On
Run indicator ●		on				blink			

1.6.3. Blinking instructions

Blink mode	On	Off
Blink 1	0.25s	3.75s
Blink 2	0.5s	0.5s
Blink 3	0.5s	1.5s

1.6.4 Status indicators

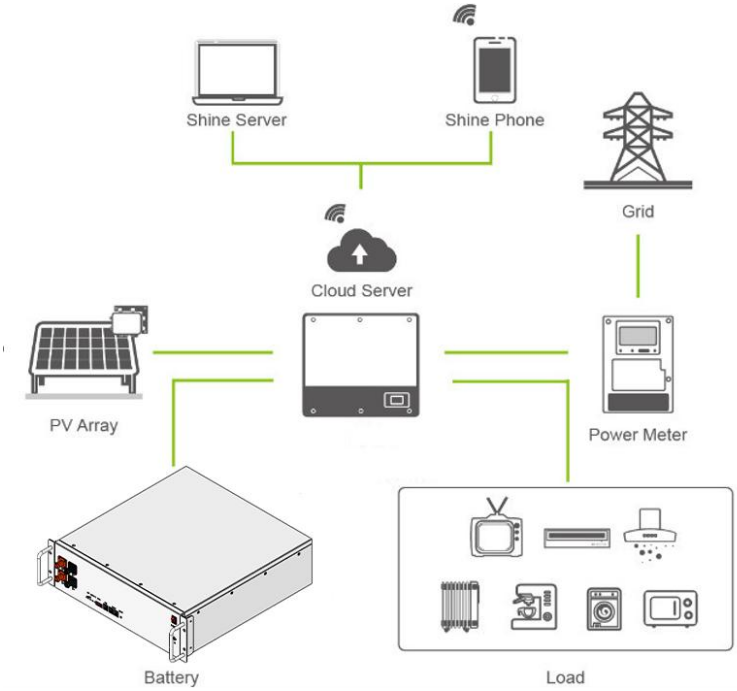
system status	running state	RUN	ALM	SOC				remarks
		●	●	●	●	●	●	
Shut down	sleep	off	off	off	off	off	off	Off completely
Stand by	normal	Blink 1	off	off	off	off	off	standby mode
Charging	normal	on	off	Based on power indication				Maximum LED blink 2
	overcurrent alarm	on	blink 2	Based on power indication				Maximum LED blink 2
	overpressure protection	blink 1	off	off	off	off	off	
	Temperature, overcurrent protection	blink 1	Blink 1	off	off	off	off	
discharge	normalcy	Blink 3	off	Based on power indication				Battery level indicator
	warning	Blink 3	Blink 3					
	Temperature, over-current, short-circuit, etc. protection	off	on	off	off	off	off	Stop discharging, no action forced sleep after 48h when mains power offline
	undervoltage protection	off	off	off	off	off	off	stop discharging

1.7 BMS functions

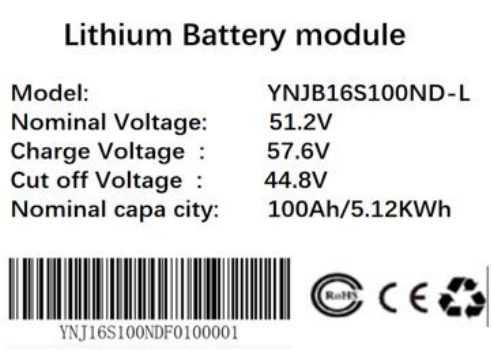
Protection and alarms	Management and monitoring
End of charge/discharge	Battery Balancing
Charging overvoltage	Smart Charging Mode
Charge/discharge overcurrent	Charge Current Limit
High/Low Temperature	Calculation of capacity reservation
shorts	Administrator Monitoring
Reversed power cord	Operation Record

Chapter 2 Guidelines for Safe Handling of Battery Modules

2.1. System Topology



2.2. markings



2.3. tools

To install the battery pack, you may need these tools below:

Tool Items	
Screwdriver (one, Phillips)	multimeter
torque wrench	clamp meter
tweezers	insulating tape
tweezers	thermometers
Wire snipers	antistatic bracelet
wire stripper	zip ties
tape rule	drill

NOTE: Use properly insulated tools to prevent accidental electric shock or short circuit. If insulated tools are not available, cover the entire exposed metal surface of the available tool, except its tip, with insulating tape.

2.4. safety protection

It is recommended that the following safety equipment be worn when handling battery packs

Insulated gloves

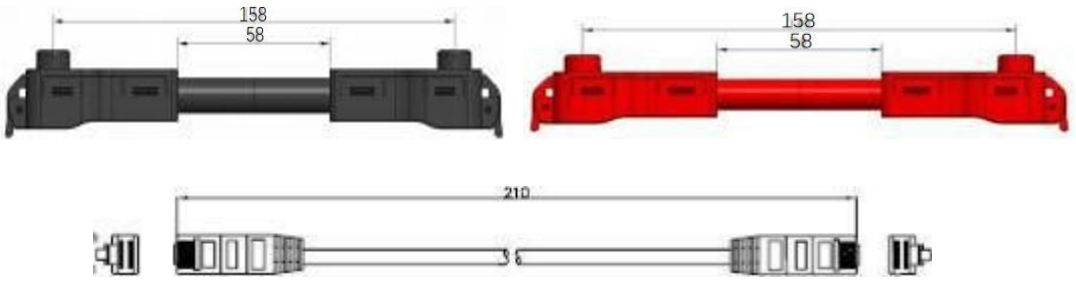
protective glasses

safety footwear

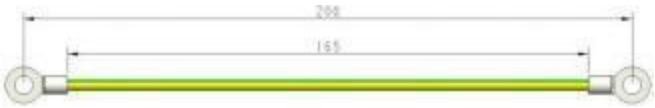
2.5. List of accessories

name (of a thing)	norm	quantities
Positive parallel cable (short)	4AWG 158mm	1
Negative parallel cable (short)	4AWG 158mm	1
communication line	Two-way RJ45 network cable 210mm	1
earth (wire)	Two OT terminals 200mm	1
Cabinet Screws	M6*16mm	4
ground screw	M5*6mm	1
User's Manual	AM5120S	1
Packing List	AM5120S	1
warranty card	AM5120S	1

There are two power cables and one communication cable on each battery pack:

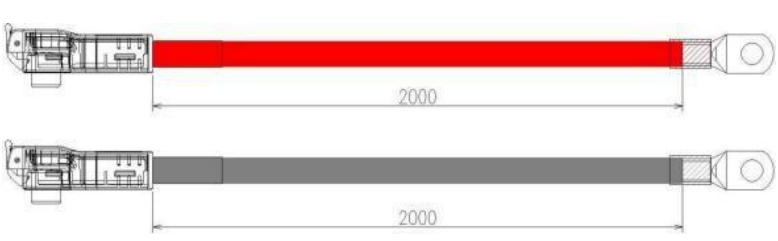


grounding cable



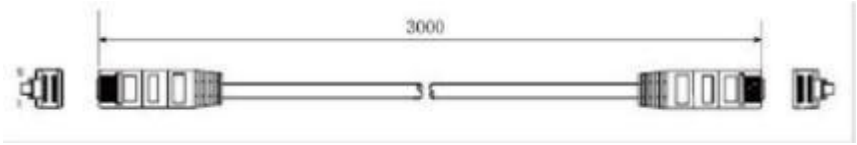
For battery systems, connect to the inverter:

Each energy storage system has two long power cables (current capacity 120A) and one communication cable:



Notes:

These three long cables are not in the battery pack, they are optional. If any are missing, please contact your dealer.

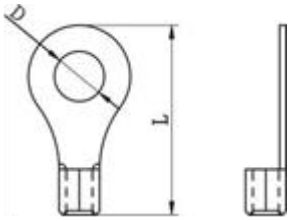


Chapter 3 Product Installation Instructions

3.1. Connection Instructions

NOTE: For safe operation and regulatory compliance, a separate DC overcurrent protector or disconnect is required for battery installation. In some applications, a disconnect may not be required, but an overcurrent protection device is still required. Refer to the table below for typical amperage for the required fuse or circuit breaker size.

环形端子:



Warning! All wiring must be done by qualified personnel.
Warning! It is important for the safe and efficient operation of the system to use the proper cables to connect the battery. To minimize the risk of injury, use the appropriate recommended cable and terminal sizes listed below.

Recommended battery cable and terminal sizes.

battery capacity	Cable Size	ring terminal		
		Cable mm^2	sizes	
			D (mm)	L(mm)
100Ah	4AWG	22	8.4	33.5

3.2. Installation conditions

Make sure that the installation location meets the following conditions:

- The area is completely waterproof.
- The floor is flat.
- No flammable or explosive materials.
- Ambient temperature in the range of 0°C to 50°C.
- Temperature and humidity are maintained at a consistent level.
- There is very little dust and dirt in the area.

3.3. Installation Instructions

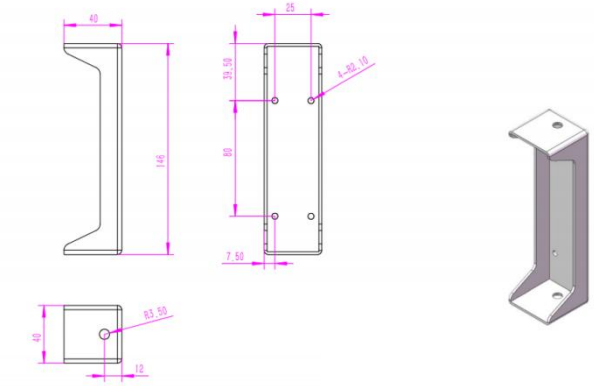
Caution ⚠

If the ambient temperature is outside the operating range, the battery pack will stop working to protect itself. The optimal temperature range for battery pack operation is 0°C to 50°C. Frequent exposure to harsh temperatures may degrade the performance

and life of the battery pack.

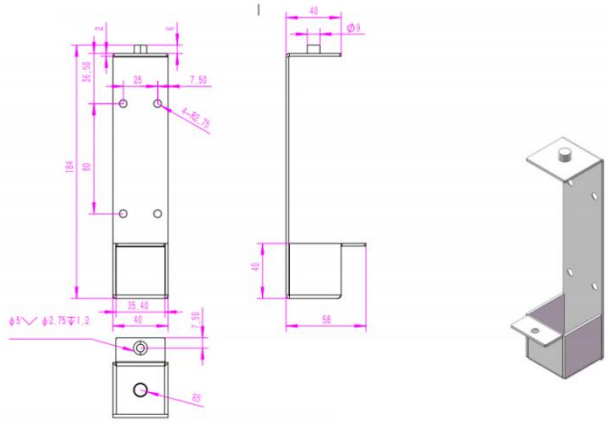
A. Stacked installation (mode I)

1. Place the battery on a horizontal floor or tabletop
2. Stack the battery packs in sequence
3. Bolt on the upper and lower battery pack brackets
3. Connect the ground cable between the battery modules
4. Connect the communication cable between the battery modules
5. Connect the cables between the battery modules
6. Connect the cable to the inverter



B. Stacked installation (mode II)

1. Place the battery on a horizontal floor or tabletop
2. Stack the battery packs in sequence
3. Connect the ground cable between the battery modules
4. Connect the communication cable between the battery modules
5. Connect the cables between the battery modules
6. Connect the cable to the inverter



C. **Cabinet installation**

1. Insert the battery into the standard cabinet
2. Secure the unit with 4 screws
3. Connect the ground cable between the battery modules
4. Connect the communication cable between the battery modules
5. Connect the cables between the battery modules
6. Connect the cable to the inverter

3.4. Start-up instructions

(1) Turn on the power

Double-check all power cables and communication cables.

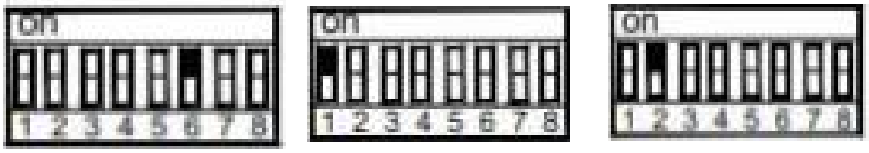
Turn on all battery modules and the green LED below will light up:

（2）Parallel mode setting

Number of parallel	DIP Switch Position								Remark
	#1	#2	#3	#4	#5	#6	#7	#8	
Single	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	single
2 in parallel	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	First master
	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Second slave
3 in parallel	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	First master
	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Second slave
	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Third slave

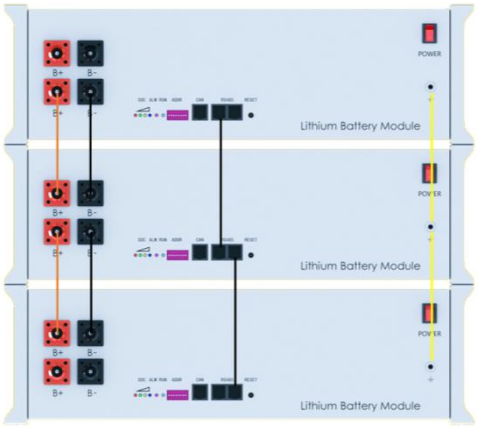
Note: Only the master can communicate with the slave.

hosts Slave 1 Slave 2



(3) Parallel mode connection

Normal parallel mode, as shown in the figure on the right



NOTE: If all of the battery LEDs come on and then go off, this means that the battery system is good and working properly.

Chapter 4 Safety Precautions

warnings

4.1. Precautions before installation

1) After opening the box, please check the product and packing list first, if the product is damaged or missing parts, please contact your local retailer;

2) Before installation, be sure to disconnect the power from the grid and make sure the battery is off;

3) Wiring must be correct, do not mistake positive and negative cables, and ensure that there is no short circuit with external equipment;

4) It is prohibited to connect batteries and AC power directly;

5) The embedded BMS in the battery is designed for 48VDC, do not connect the batteries in series;

6) The battery system must be well grounded and its resistance must be less than 1Ω;

7) Make sure that the electrical parameters of the battery system are compatible with the relevant equipment;

8) Keep batteries away from water and fire.

4.2. Precautions during use

1) If the battery system is to be moved or serviced, the power must be disconnected and the battery completely shut down;

2) It is strictly prohibited to connect the battery to a different type of battery.

3) It is strictly prohibited to operate the battery with a defective or incompatible inverter;

4) Battery disassembly is strictly prohibited (QC label removed or damaged);

5) In the event of a fire, only dry powder fire extinguishers may be used; liquid fire extinguishers are prohibited;

6) Do not open, repair or disassemble the battery except by staff authorized by the manufacturer or distributor. We are not responsible for any consequences or liabilities related to violations of safe operation or violations of design, production and equipment safety standards.

reminders

1) Please read the user manual (in the attached file) carefully;
2) If the battery is stored for a long period of time, it needs to be charged every six months and the SOC should be no less than 80%;
3) Batteries need to be recharged within 12 hours after being fully discharged;
4) Do not leave cables exposed;
5) All battery terminals must be disconnected for maintenance;
6) If there is any abnormal situation, please contact the supplier within 24 hours.
7) Direct or indirect damages caused by the above items are not covered by the warranty.

Chapter 5 Fault Solution

5.1. Troubleshooting Steps

1) Can the battery be turned on;
2) If the battery is on, check to see if the red light is off, blinking or on;
3) If the red light is off, check that the battery can be charged/discharged.

5.2. fault recognition

The battery won't turn on and none of the lights light up or flash when it is on.
If the battery external switch is on, the status light is blinking, the external supply voltage is 48V or more, and the battery still does not turn on, please contact your dealer.

The battery can be turned on, but the red light is on and cannot be charged or discharged. If the red light is on, the system is not normal, please check the following values:
Temperature: Batteries will not operate above 56°C or below -20°C.
Solution: Move the battery to a normal operating temperature range of -10°C to 50°C.
Current: If the current is greater than 100A, the battery protection will turn on.
Solution: Check if the current is too high, and if so, change the settings on the power supply side.
HIGH VOLTAGE: If the charging voltage exceeds 57.6V, battery protection will turn on.
Solution: Check if the voltage is too high, if so, change the setting on the power side.
LOW VOLTAGE: When the battery is discharged to 44.8V or lower, the battery protection will be turned on. Solution: Charge the battery for a period of time and the red light will turn off.
Apart from the above four points, if you still can't find the fault, turn off the battery and have it repaired.

5.3. Charging Troubleshooting

1) Cannot be charged:
Disconnect the power cord and measure the voltage on the power side, if the voltage is 53~54V, restart the battery, connect the power cord and try again, if it still doesn't work, turn off the battery and contact your dealer.
2) Cannot be discharged:
Disconnect the power cord and measure the voltage on the battery side, if it is lower

than 44.8V, please charge the battery; if the voltage is higher than 48V and still cannot be discharged, please turn off the battery and contact your dealer.

Chapter 6 Emergency Situation

6.1. Battery Leakage

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If contact is made with the leaked substance, the following measures should be taken immediately.

INHALATION: Evacuate contaminated area and seek medical attention.

CONTACT WITH EYES: Flush eyes with running water for 15 minutes and seek medical attention. Contact with skin: Wash affected area thoroughly with soap and water and seek medical attention.

Ingestion: Induce vomiting and seek medical attention.

6.2. fire (that burns buildings etc)

Do not use water! Use only a dry powder fire extinguisher; if possible, move the battery pack to a safe area before it catches fire.

6.3. soak

If the battery pack gets wet or is submerged in water, do not allow anyone to touch it, then contact the manufacturer or an authorized dealer for technical support.

6.4. Battery damage

Damaged batteries are dangerous and must be handled with the utmost care. They are unfit for use and may pose a danger to people or property. If the battery pack appears to be damaged, pack it in its original container and return it to the manufacturer or an authorized dealer.