

USER MANUAL

FOR LITHIUM RACK BATTERY
ENERGY STORAGE SYSTEM

VERSION 1.0



APPLIED FOR
24V100Ah/150Ah/200Ah
48V100Ah/150Ah/200Ah
51.2V100Ah/150Ah/200Ah

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Note: Please comply with all warnings and operating instructions in this manual strictly. Save this manual properly and read carefully the following instructions before installing the unit. Do not operate this unit before reading through all safety information and operating instructions carefully

1. Introduction

The Energy storage pack is an essential component of the photovoltaic power generation system. It can provide electricity for the connected load, and it can also store photovoltaic solar modules, fuel generators, or wind energy generators by charging the remaining energy in case of emergency. When the sun goes down, energy demand is high, or there is a power outage, you can use the energy stored in the system to meet your energy needs at no additional cost. In addition, the energy storage pack can help you achieve energy self-consumption and ultimately achieve the goal of energy independence.

According to different power conditions, the energy storage pack can output power during peak power consumption, and can also store energy during low power consumption. Therefore, when connecting the matching photovoltaic modules or inverter arrays, external equipment is required to match the energy storage the working parameters of the pack to achieve the highest operating efficiency. For a simple diagram of a typical energy storage system.

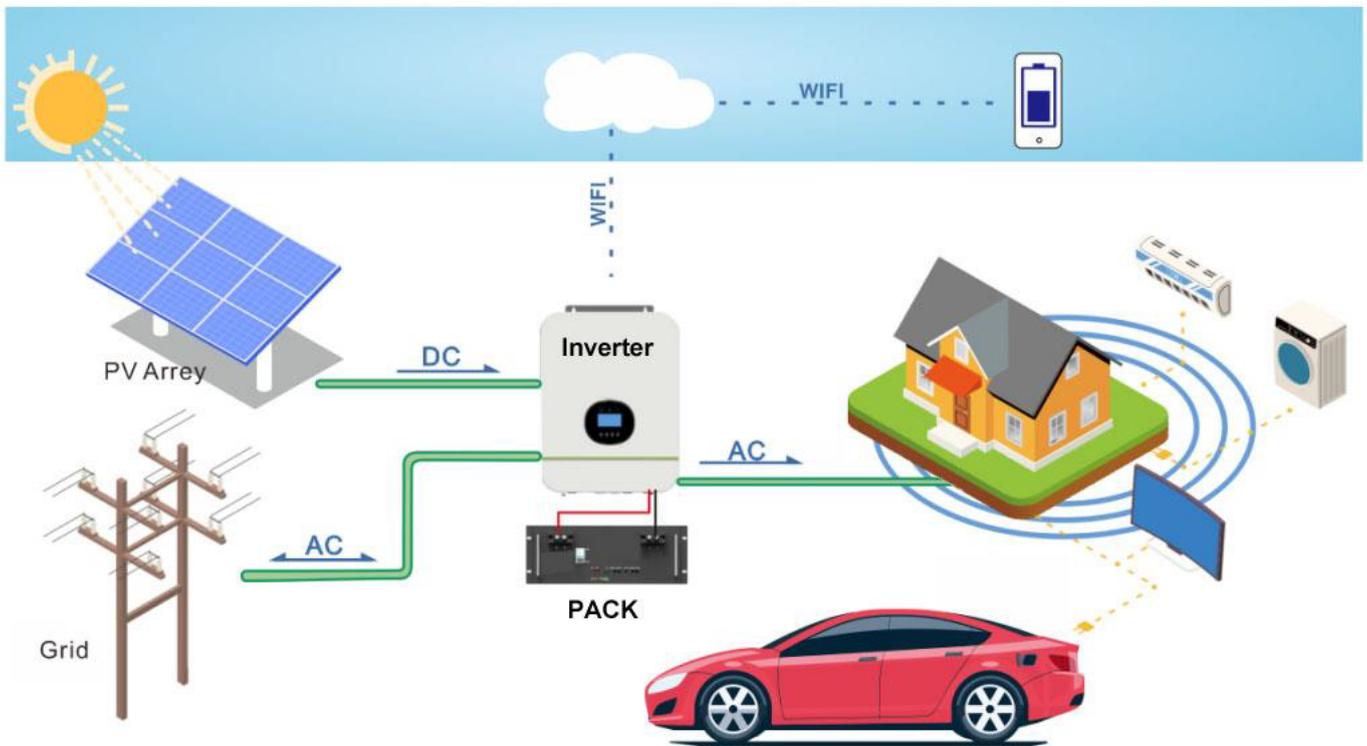


Figure1 . Energy storage System Overview

It is very important and necessary to read the user manual carefully before installing or using the battery. Failure to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, death or may damage the battery and the whole system.



2. Important Safety Warning

- Do not expose the battery to flammable or harsh chemicals or vapors.
 - Do not expose cable outside: Do not use cleaning solvents to clean the battery.
- All battery terminals must be disconnected before maintenance.

- Do not paint any part of the battery, include any internal or external components.
- Do not connect battery with PV solar wiring directly.
- Any external object is prohibited to be inserted into any part of the battery.
- Our company will not bear any warranty claims for direct or indirect damage caused by violation of the above items.
- Our company will not bear any warranty claims for direct or indirect damage caused by violation of the above items.

Before Connecting

- After unpacking, please check the battery and pack list first, if the battery is damaged or spare parts are missing, please contact the dealer.
- Before installation, be sure to cut off the grid power and make sure the battery is in the turned-off mode;
- Wiring must be correct, do not mix-connect the positive and negative cables, and ensure no short circuit with the external device;
- It is prohibited to connect the battery with AC power directly;
- The BMS in the battery is designed for 24VDC/48VDC, DO NOT connect battery in series;
- It is prohibited to connect the battery with different type of battery;
- Please ensure the electrical parameters of battery system are compatible to inverter;
- Keep the battery away from fire or water.

2.1 Necessary installation tools.

 <p>Multimeter + Current clamp</p>	 <p>Screw Driver Set</p>	 <p>Allen Key Set</p>	 <p>Drill + Hammer</p>
 <p>Electrician Scissors</p>	 <p>Wrench set</p>	 <p>Lifting strap + mechanical lifter</p>	 <p>RS 232/USB+screw terminal (insulated)</p>



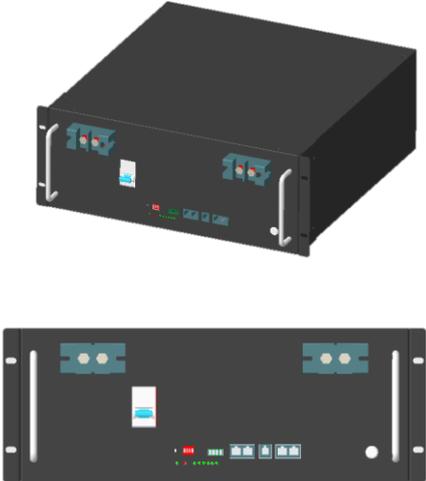
2.2 Personal protective equipment during operation:

- If the battery system needs to be moved or repaired, the power must be cut off first and the battery is completely shut down;
- It is prohibited to connect the battery with different type of battery;
- It is prohibited to put the batteries working with faulty or incompatible inverter;
- In case of fire, only dry powder fire extinguisher can be used, liquid fire extinguishers are prohibited;
- Please do not open, repair or disassemble the battery. We do not undertake any consequences or related responsibility due to violation of safety operation or violating of design, production and equipment safety standards.

3. Unpacking & Overview

3.1 Packing List

You will receive the following parts (Not a full set), sample as follow picture. For customized requirements, please place an order with the manufacturer.

Battery pack	Cable	Manual
		

*NOTE : Types of communication tools need extra order.

3.2 Product Overview

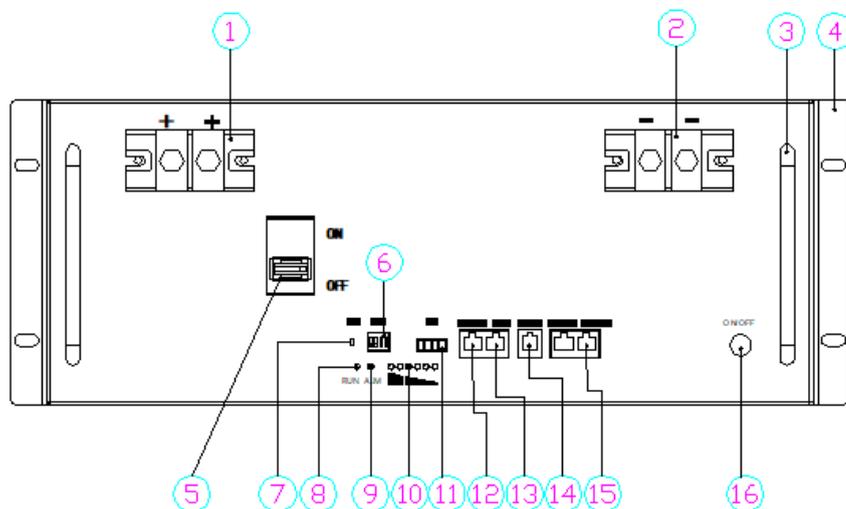


Figure 2 A General battery shape. Front view

No.	Description	Silk-screen	Remark
1	Output terminal	+ +	Output terminal
2	Output terminal	- -	Output terminal
3	Handle		
4	bracket		
5	Power Switch	ON OFF	
6	Dial switch	ADS	Set the address
7	Reset button	RST	For reset the batter
8	LED indicate	RUN	Operation indicator
9	LED indicate	ALM	Alarm indicator
10	LED indicate	CAPACITY	Capacity indicator
11	Dry port	DO	
12	RS485A Port	RS485A	RS485A and inverter connection port
13	CAN bus Port	CAN	CAN bus and inverter connection port
14	RS232 Port	RS232	RS232 and computer connection port
15	RS485B Port	RS485B	battery and battery connection port
16	E-switch	ON/OFF	

4. Installation

4.1 Selecting Mounting Location

Consider the following points to install the energy storage Pack:

- Do not mount the Pack on flammable construction materials. Mount on a solid surface;
- Install this Pack module at eye level in order to allow the readability of LCD display at all times.
- For proper air circulation to dissipate heat, please leave a gap of about > 0.3 meter from the ground, 30 cm from the side of the device.
- The ambient temperature should be between 0°C and 40°C and relative humidity should be between 25% and 85% to ensure optimal operation.
- The recommended installation is flat wise adherence.
- Install the battery module in a dry, protected area with no excessive dust and sufficient air circulation. Do not operate in locations where the temperature and humidity are outside the specified range.

4.2 Mounting The PACK (only for Parallel mode)



WARNING!! Remember that this Pack is heavy so please be careful when removing it from the package, or install it .

When installing the Pack bracket, use appropriate screws to fix it. After that, the equipment should be firmly bolted. The pack can be run indoors or outdoors. However, only professional personnel can enter this area for installation or maintenance.

Step 1: When receiving the product, first check whether all parts are complete, if not, please report to the dealer.

Step 2: Ensure that the Pack is installed on the Rack. Choose a suitable installation location and require the battery pack to be placed at a safe.

The first load-bearing plate should be at least 15cm away from the ground. The distance between the load-bearing plates is about 205mm. We recommend that the installation distance be 205mm.

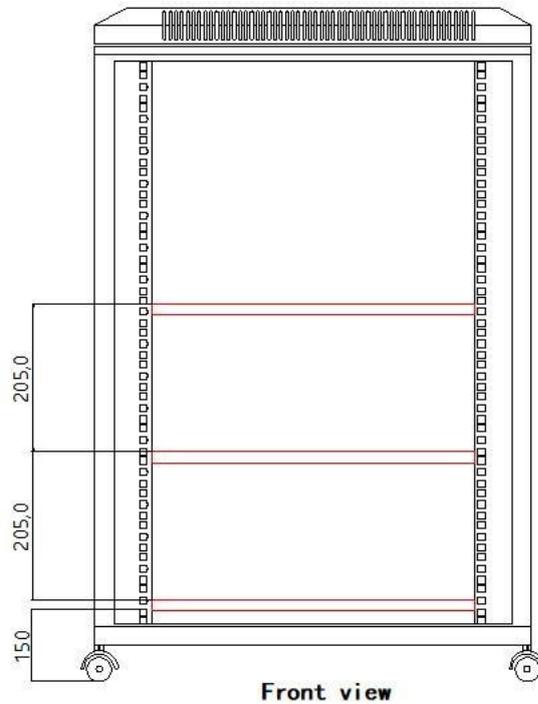


Figure3.

Step 3: Mark the position of the nut on the cabinet with the mounting bracket, and clamp the nut into the cabinet. See Figure4.

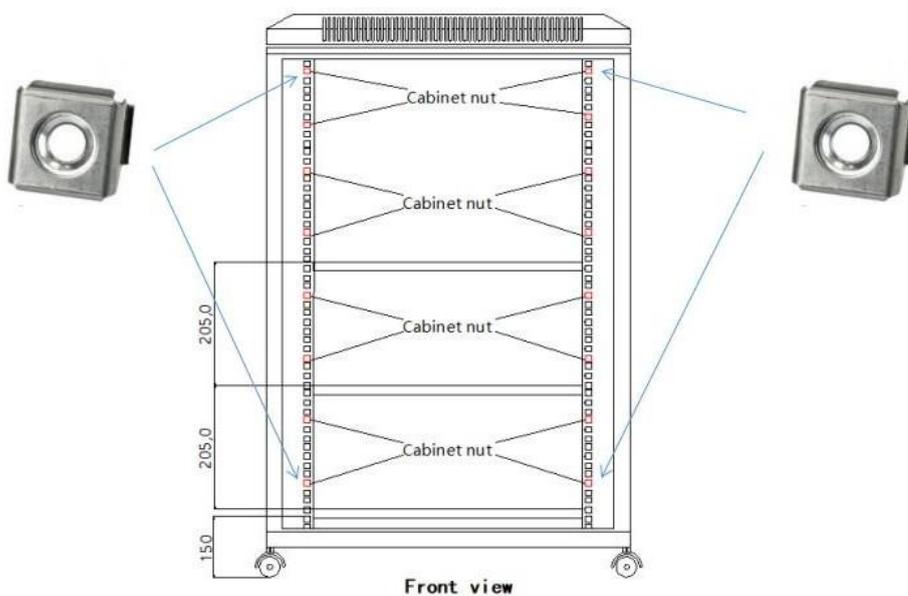


Figure 4

Step 4: As shown in the below, install the battery pack. The pack is too heavy, please use a special lifting device to lift the pack for operation and safety protection. Put the battery module into the cabinet and screw it, as shown in Figure 5.

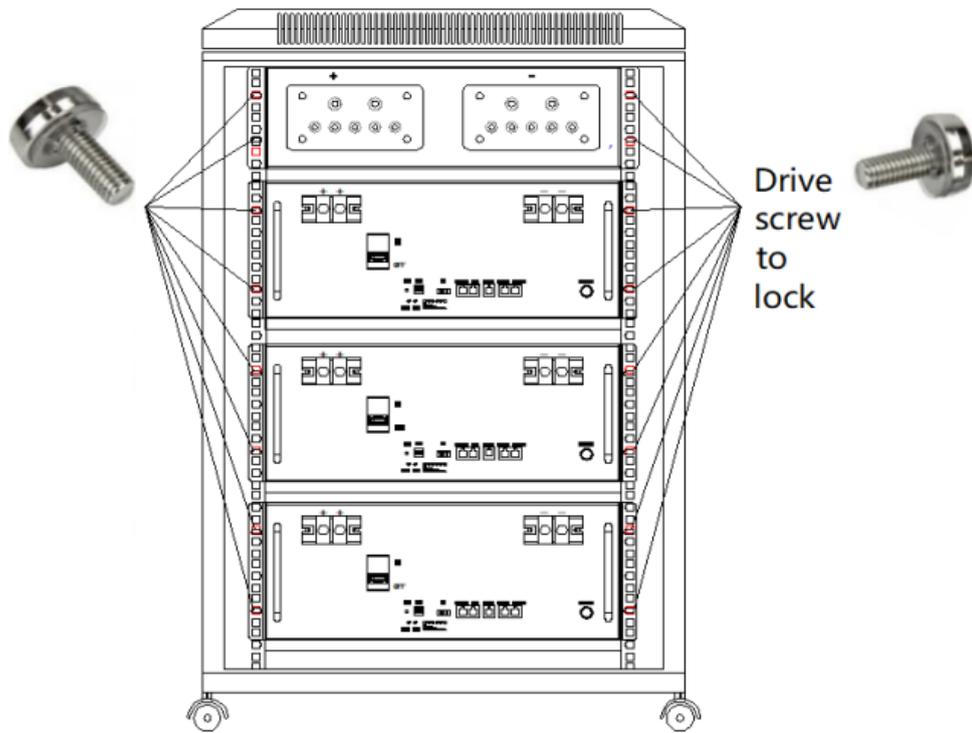


Figure 5.

Step 5: When more than 3 PCS packs are connected in parallel, then we recommend you install combiner box. 4 locations we recommend you install the combiner box. First select location is Top and Bottom ,see Figure6.

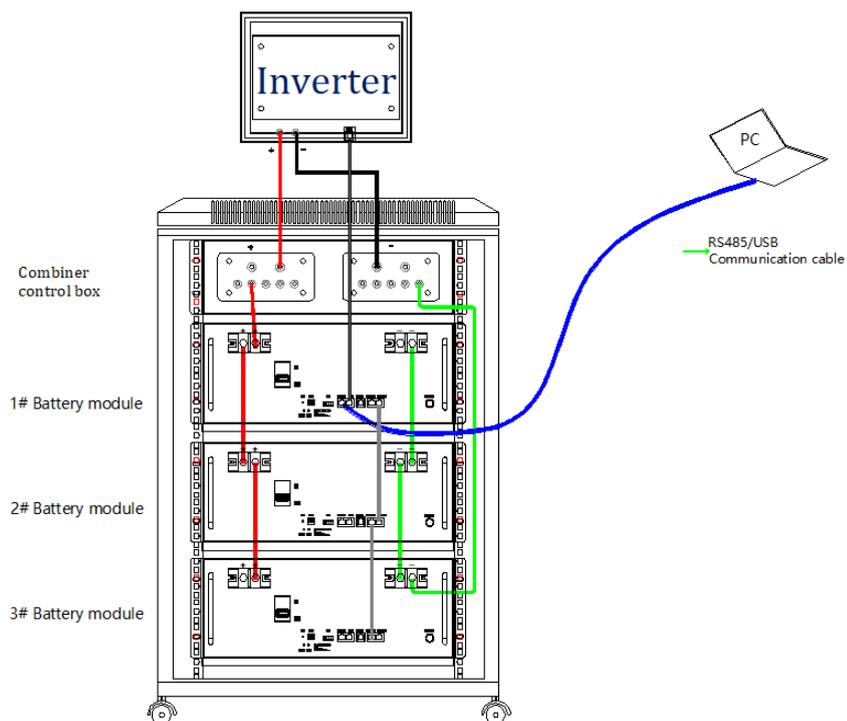
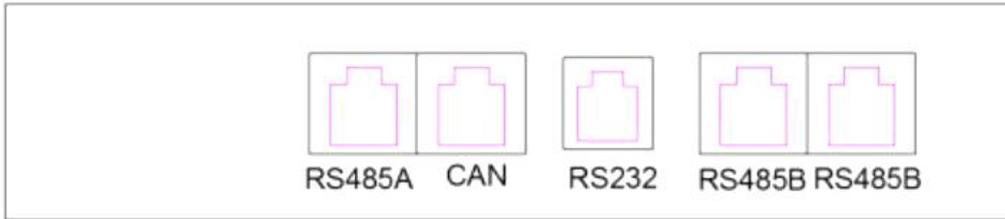


Figure 6.

Step 6: Connect the wiring of the Pack as shown below. see figure 11. If inverter need CAN BUS port /RS485 port. please insert communication cable (RJ45) to CAN port or RS485A,RS485B only be used for battery packs parallel mode.

port 1



RS485A---Communicate with external devices,sample as inverter ,EPS
 CAN ---
 RS232----Communication with host computer
 RS485B---Communication with host computer or parallel communication with battery pack

Figure7

1pack---1 Inverter. Single mode.

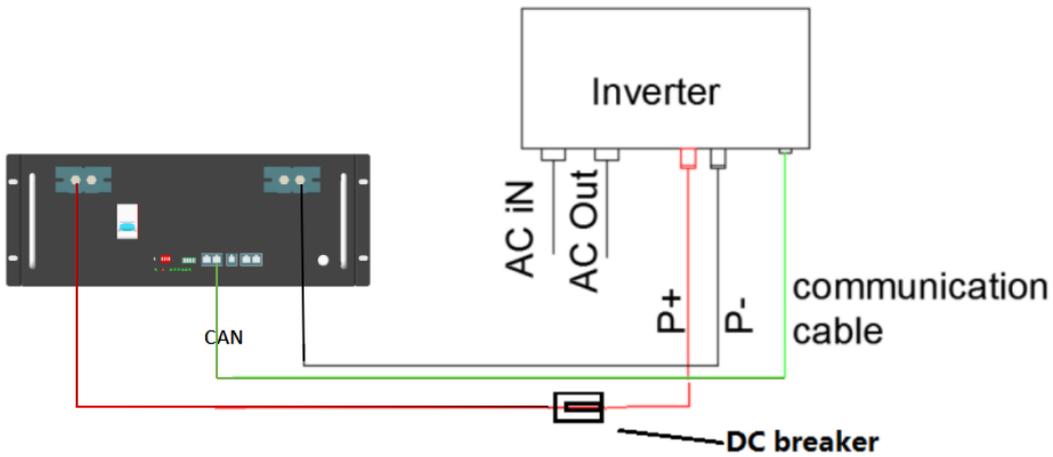


Figure8

2 packs parallel connection with 1 inverter:

1 Pack 1 is slave; pack 2 is master; Negative and Positive power cable has the same length.

Figure9

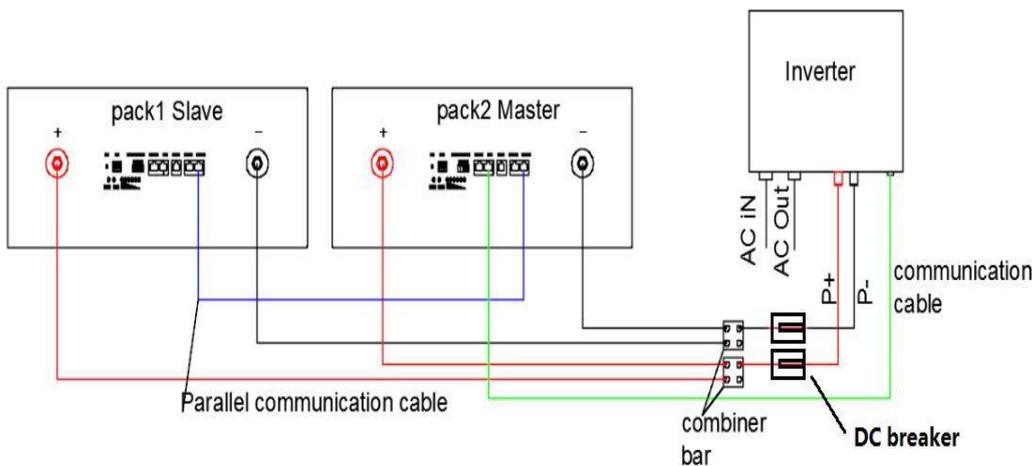


Figure9

3 packs parallel connection with 1 inverter:

Pack 1 ,2 is slave; pack 3 is master. more pack are parallel, one pack is master, other are slave. Negative and Positive power cable has the same. Figure10.

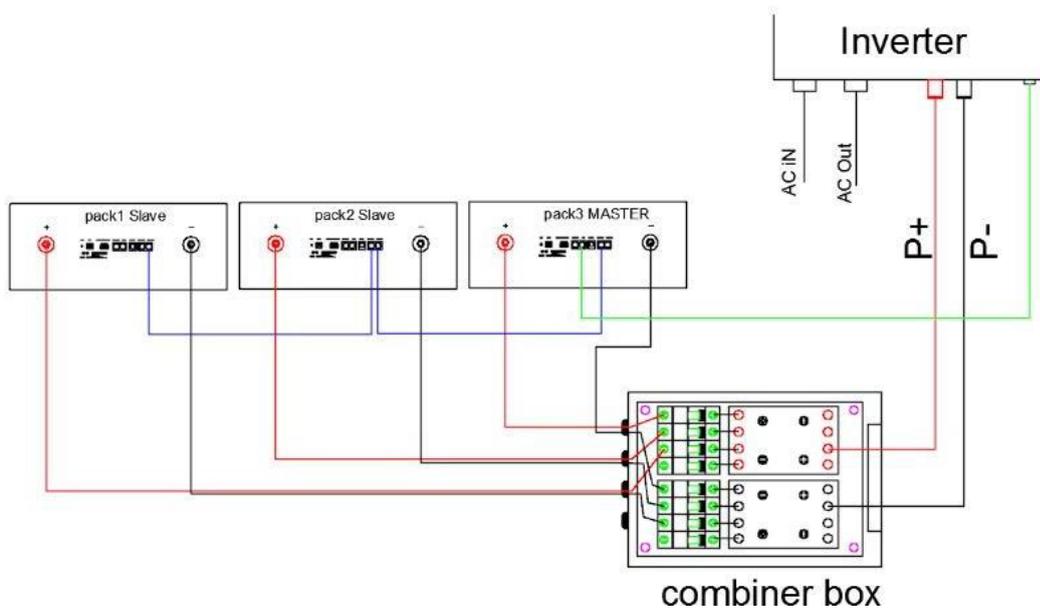
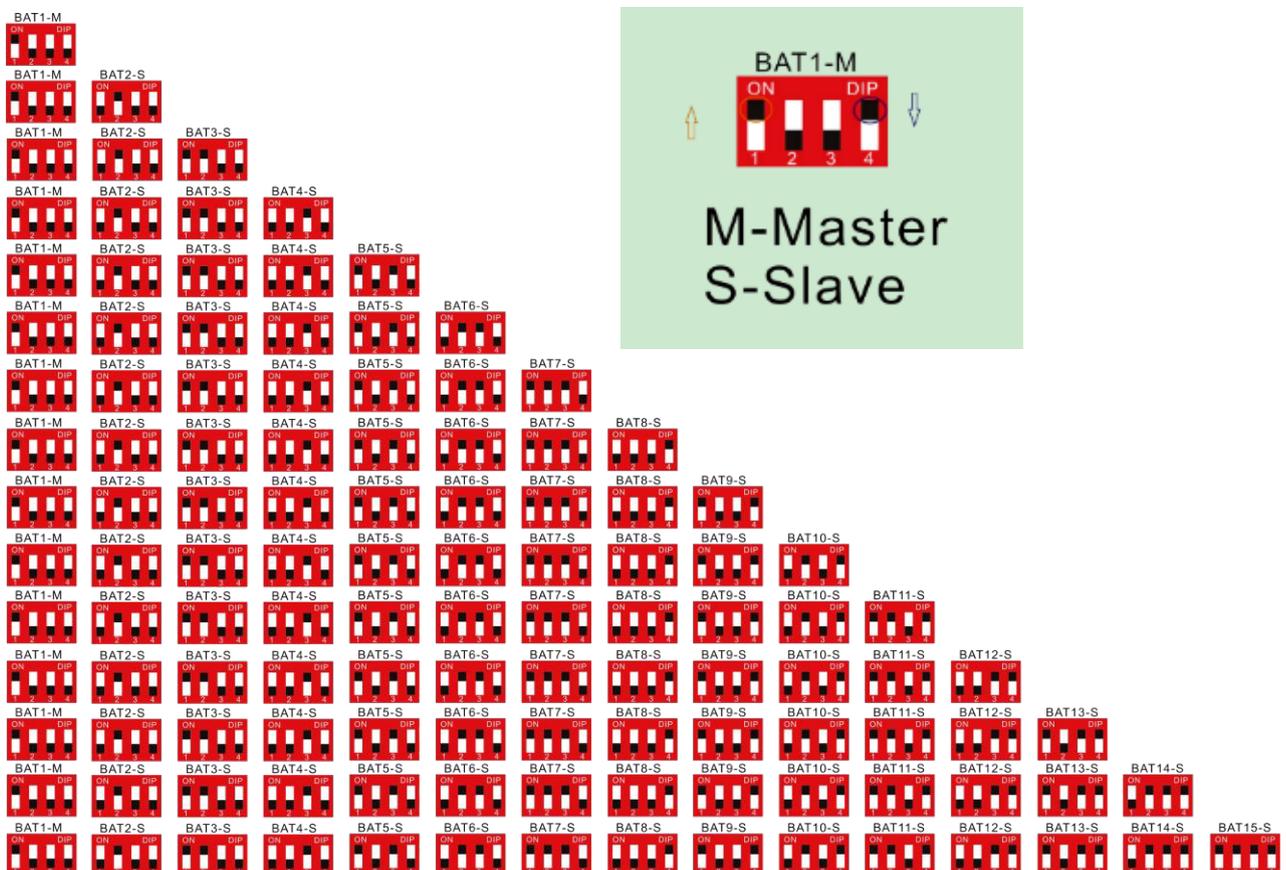


Figure10

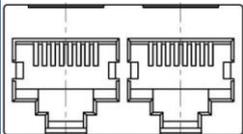
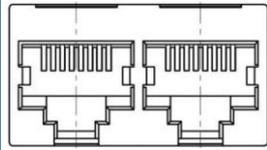
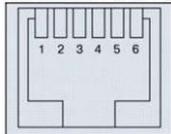
Step 7: Set the address of pack. this a important step, you can see there is 4 bit or 8bit coder in bottom of pack. please set as bill 1 and 2.

2 bit CODER: this is Binary CODER, Calculated by 8 4 2 1 BCD code. PACK 1 set as Master (BCD 1 0 0 0),see bill1.It support 15 PCS pack(max) in parallel. Address "0" is only used for single mode.



this is 4bits coder and communication port. CAN port and RS485A port can be selected as the same time.



Parallel communication		RS485B-8P8C		RS485B-8P8C	
		RJ45		RJ45	
		1,8	RS485-B	9,16	RS485-B
		2,7	RS485-A	10,15	RS485-A
		3,6	GND	11,14	GND
External communication		RS485A port		CAN port	
		RJ45		RJ45	
		1,8	RS485-B1	9,10,11,14,16	
		2,7	RS485-A1	12	CAN-L
		3,6	GND	13	CAN-H
Communication with host computer		RS232			
		RJ11		RJ11	
		1	NC	4	RX
		2	NC	5	GND
		3	TX	6	NC

NOTE: The output connected to the communication cable with a waterproof plug is listed according to the order requirements, which are customized products, and are not listed here.

Step 8: Connect the parallel communication cable (yellow network line). Any Pack has 2 PCS RS485B port for parallel communication, 1 PCS RS485A and 1PCS CAN port for inverter or other device. RS232 port only used for host software and update the firmware.

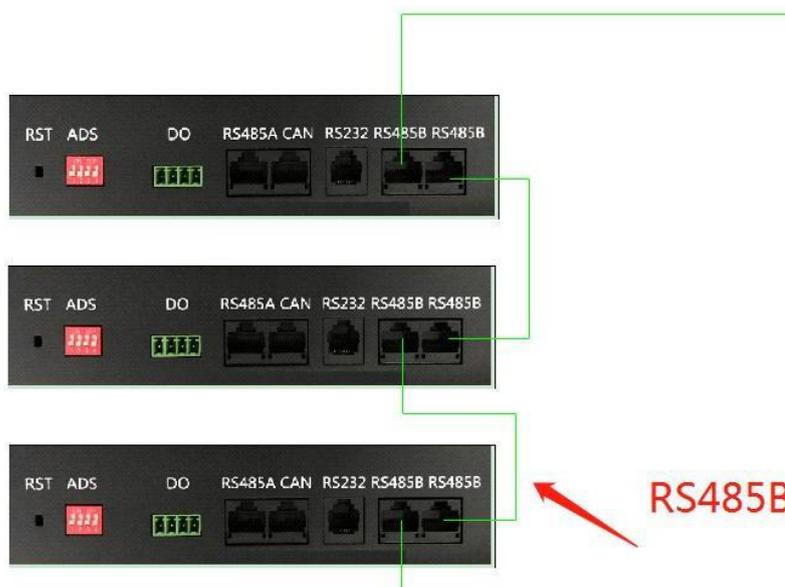
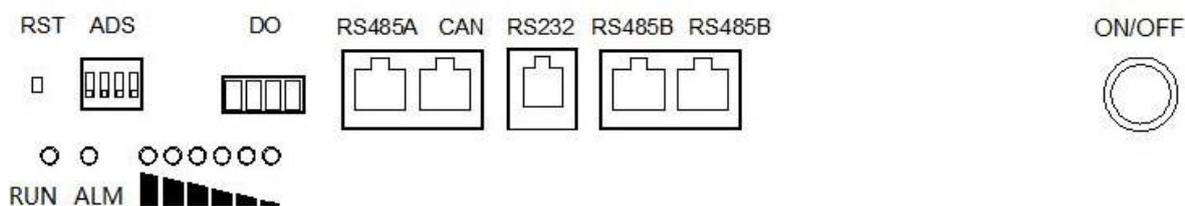


Figure10

Step 9: Start and stop battery pack. Confirm that the operation is correct, and the battery function can

be turned on after the wiring is correct, and You can press down power switch (ON/OFF) 3 second for start battery pack, then turn on switch in the combiner box , the battery start working and output ,it enter standby mode(if there is no power switch, please use a little pole and press down the RESET key 3-6second,like as follow picture, LED indicate all running status and check itself).



Note1: You need to turn on the low side switch first (Discharge negative); then turn on high side (Discharge positive), if any of pack has mistaken or alarm, you'd turn off the switch which connect to this pack, check and reset the pack, then turn on switch again. Turn off the pack, you must turn off the high side switch, then turn off low side switch.

Note2: When the external device needs a large current to start, it is necessary to turn on the power switches (not E-switch) of at least two batteries at the same time.

Step 10: Running the device, set the external charger or inverter parameters, please set according to the corresponding operation manual. Cannot exceed the rated parameter requirements.

4.3 Battery Pack parameters:

No	Item	General Parameter		
1	Combination method	24V	48V	51.2V
2	Rated Capacity (Ah)(typical)	100/150/200	100/150/200	100/150/200
3	Factory Voltage(V)	25.6-26.4V	48-50V	51-53V
4	Rate power (Wh)	2560/3840/5120	4800/7200/9600	5120/7680/10240
5	Charging Voltage(V) recommend/max	28/28.8V	54/54.6V	57/57.6V
6	Charging Current(A) recommend/max	0.2C/0.5C	0.2C/0.5C	0.2C/0.5C
7	Float charge Voltage(V)	27.6V	53.5V	55.5V
8	Discharge Cut-off Voltage(V)	<=22V	<=41V	<=44V
9	Max Discharging current(A)	0.5C	0.5C	0.5C
10	Charging Current limits(A)	/		
11	Charge over Current protect(A)	110/Adjustable		
12	Discharge over Current protect(A)	110/Adjustable		
13	Internal Impedance	≤100mΩ		
14	Communication protocol	CAN(500Kb/s)/485A(9600B/S)		
15	Host software and Communication protocol	RS232/485B		
16	Operation Temperature Range	Charge:0~55°C		
		Discharge: -20~55°C		
17	Storage Temperature Range(recommend)	0°C~25°C		

Step 11: Monitor all running status, and record all parameters, if there has any mistake, please



record it. After start the system, every pack is on, and led indicate this status.

Step 12: Stop running battery pack.

When it is necessary to stop the charging and discharging of the battery or troubleshooting, please stop the external equipment first, cut off the input and output circuits, and then press the power switch off each battery pack.

Appendix 1

SOC Indicator & Status Indicator Guides

Chart 1: Pack led indicate.

RUN	ALM	Capacity LED						Description

Chart 2: Pack Capacity indicate(电池电量指示)

Status	Normal/ Warning/ Protection	RUN	ALM	Capacity LED						Description	
Shut Down	Shut down	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All OFF
Standby	Normal	Flash	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Standby
Charge	Normal	ON	OFF	Based on capacity							
	Warning	ON	Flash								
	Protection	ON	ON								
Discharge	Normal	ON	OFF	Based on capacity							
	Warning	ON	Flash								
	Protection	OFF	ON								OFF
Fault	Protection	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Stop charging or discharging

Appendix 2

A host soft operation:

When the equipment manufacturer confirms that it is necessary, it can authorize to provide the customer with the host software and operating instructions.

名称	修改日期	类型	大小
Config	2022/2/25 11:23	文件夹	
PbmsTools V2.5FN	2020/3/2 15:59	应用程序	669 KB
PbmsTools V2.5FN.exe.config	2021/12/17 16:31	CONFIG 文件	1 KB

B Host soft operation:

The screenshot displays the PbmsTools V2.5FN software interface with the following sections:

- Serial Port:** Port COM8, Baud Rate 9600, Pack 1, Pack Qty 1, ADDR 1, Interval (S) 1. Buttons: Close, Try Connect.
- System Status:** CHARGING-ON (selected), CHARGING, CHG-LIMIT-OFF, ACin, DISCHARGING-ON, DISCHARGING, HEATER-OFF, Fully.
- Alarm Status:** None.
- Protect Status:** None.
- Fault Status:** None.
- Switch Control:** CHG Circuit (Close), Sound Alarm (Open), CHG Limiter (Close), DSG Circuit (Close), LED Alarm (Close), Shutdown (Off). Buttons: Password (888888), Change, Clear.

Pack Information:

Pack Voltage	51.363	V
Pack Current	0.00	A
SOC	48	%
SOH	100	%
RemainCapacity	96810	MAH
FullCapacity	200000	MAH
Battery Cycle	0	

Temperature:

Tcell 1	19.9	Tcell 2	19.8
Tcell 3	19.7	Tcell 4	19.8
MOS_T	21.7	ENV_T	22.6

Cell Voltage(mV):

MaxVolt	10	3206	MinVolt	1	3204	VoltDiff	2
Vcell 1	3204	Vcell 9	3204				
Vcell 2	3205	Vcell 10	3206				
Vcell 3	3205	Vcell 11	3204				
Vcell 4	3205	Vcell 12	3205				
Vcell 5	3205	Vcell 13	3204				
Vcell 6	3205	Vcell 14	3205				
Vcell 7	3204	Vcell 15	3205				
Vcell 8	3205	Vcell 16	3205				

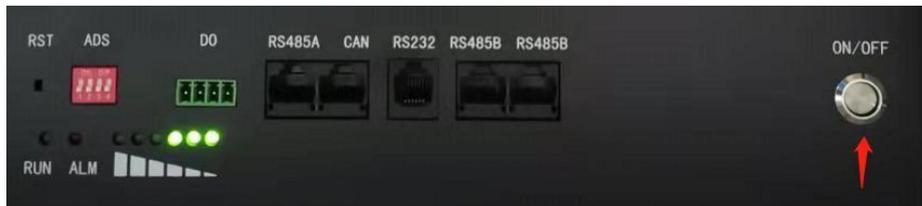
Footer: VER: P16S100A-14555-2.01 | BMS S/N: 9865201410053X | PACK S/N: A635-2202-00028 | COMM: Normal | 10:13:33 2022/02/28

Appendix 3 Trouble shoot

1 battery pack stop work.

A: turn on switch, be sure it is ON; if battery is low SOC.it need to charging in.

B: Battery pack low volt or enter sleep mode, there you will press down "RST" button 3-6 second, or charging in.



2 No communication, inverter cannot receive any DATA from BMS.

A : Check whether if communication cable is OK, check RJ45 PIN

P1:RS485A-B

P2:RS485V-A

P4:CAN-H

P5:CAN-L



P1:RS485B-A

P1:RS485B-B

B: Replace the communication line. Please give feedback to the dealer and exchange it.

C: Check inverter or other device which connect to BMS, update it is firmware.

D:If the communication function needs to be upgraded, please consult the agent or manufacturer.

E: confirm your inverter and battery protocol is correct, Different protocol or different connection will make a mistake.

3 Battery pack report SOC is mistake.

A: Inverter received Data from Master BMS, but it is SOC <total SOC, sample as :9PCS packs has 1800Ah, but inverter read DATA is 1600Ah. So you may check any one is disconnected. Check RS485B communication cable(yellow),RS485 communication cable ,replace the cable which is broken.RJ45 PIN:

RS485A:PIN2:485-A,PIN1:485-B;

B: SOC DATA has Large tolerance.

Discharge empty the battery first, then charge it fully with a small current, and learn to discharge. Any pack is mistake ,we advice you read the BMS Data(When we authorize the terminal to use) with host software. then we reset the BMS and calibration .

C: When multiple batteries are connected in parallel, the SOC is different.

We recommend that each pack has a small current discharged and it is emptied until the SOC alarm appears, and then recharged in parallel and fully charged.

4 How to turn on the Pack to discharge . we recommend method is :

A: reset the single pack's BMS,LED will flash and start work

B:turn on the power switch on the bottom/front panel;

C:turn on power switch in the combiner box .

5 When batteries are discharged in parallel and start fail .Alarm LED light and flash.

A: When the startup current of the external device exceeds the total current provided by the battery pack, it will cause over current protection. At this time, it is necessary to turn off the switch of the combiner box, and then turn off the power switch of the every pack;

B: Reset every pack once(there you will press down "RST" button 3-6 second,).We recommended to turn on two power switches synchronously at a time when starting again, and finally restart the switch of the combiner box. If there is no combiner box system, the charging function can be turned on with an external device, and this protection state can be released by charging with a small current.

C: if the packs connect to inverter, you'd turn on pack's power switch first, and then start the inverter .

 **WARNING:**

The operating parameters of the equipment cannot exceed the rated working voltage and current of the Pack exceed the rated volt and current, Can cause damage to the Pack or other failures.

6 Inverter or other external device cannot connect the battery. we recommend method is :

A: Check whether the working parameters of the device and battery are appropriate, and improper parameters cannot be matched.

B: When the device is turned on, the current is too large, resulting in battery protection. At this time, you should be able to see the LED flashing from the battery panel.in this case, You can adjust your equipment parameters or contact the dealer to solve.

C:it is necessary to update BMS parameters and match the device, then Reset BMS and restart your device.

7 Replace bad Pack .

There is a bad battery pack, it is need to replace, please connect your supplier need professional installers to operate it. We recommend replace all or make pack has same voltage and same specification batteries

pack.

NOTE: When replacing the battery, the same module needs to be replaced at the same time, and the voltage should be the same .

8 Need to replace spare parts or emergency maintenance .

Some parts can be obtained from the sales or agency, and the excess parts need to be purchased separately. Be careful, turn off the power switch before replacing parts.

9 Need to place some safety device for keep a safe environment.

You'd keep a safe case for Pack and external device, please place safety device, as: fire-fighting sand, fire- fighting blankets, fire-fighting water pipes, Install Monitor sound, light, electricity, smoke and other equipment.

WARNING:

Emergency process:

1 . The external device catches fire and explodes:

A: Under the condition of ensuring safety, non-operating personnel immediately move to a safe location;

B: Under the condition of ensuring safety, the operator immediately cut off the external power supply of the equipment and the internal power supply.

C: Use fire-fighting equipment for fire-fighting treatment (the use of fire-fighting sand, fire-fighting blankets, fire- fighting water pipes)

D: If you cannot completely extinguish the fire, please call the local fire department for help. E: Keep the accident site data so that the source of the accident can be traced.

2 . The Pack catches fire and explodes:

A: Under the condition of ensuring safety, non-operating personnel immediately move to a safe location;

B: Under the condition of ensuring safety, the operator immediately cut off the external power supply of the equipment and the internal power supply.

C: Use fire-fighting equipment for fire-fighting treatment (first the use of fire-fighting sand, fire-fighting blankets, then fire-fighting water pipes for cool the Pack)

D: If you cannot completely extinguish the fire, please call the local fire department for help. E: Keep the accident site data so that the source of the accident can be traced.

Product Responsibilities and Consulting

We will not be liable for the accidents resulting from operation breaking this specification and user manual.

- We will not send separate notice, provided that the contents of this specification are changed due to improvement of product quality or technological upgrading; provided that you want to understand the latest information of this product, please contact us.
- The shelf life of this product is within 36 months after it is delivered; we will maintain the product, which is in the warranty period for free of charge, provided that it has any product.
- quality problems within the specified operation range; we may replace the relevant parts, if we fail to maintain it, so as to achieve the purpose of sustainable use without performance reduction; our after-sales service personnel will propose the specific maintenance and troubleshooting methods. In case of any questions, please contact us.