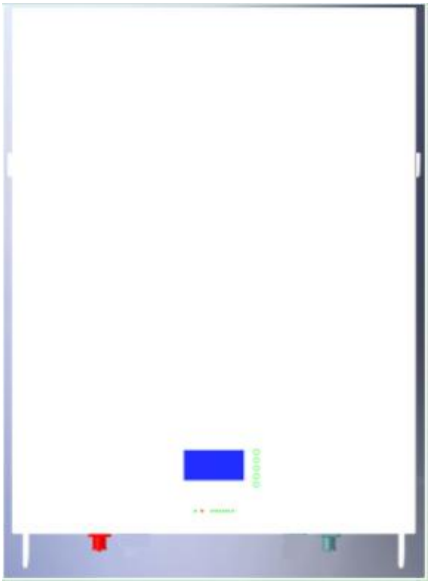
User Manual

Lithium Battery
Energy Storage System

Version: 1.0



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

Contents

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 energy from 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.

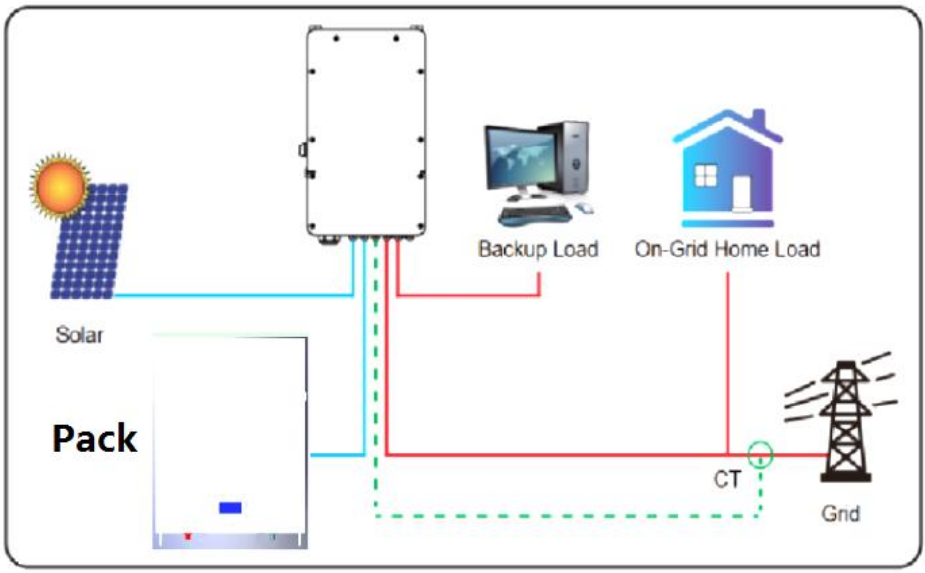


Figure 1 Energy storage System Overview

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.

- If the battery is stored for a long time, it is required that they are charged every three to six months, and the SOC should be no less than 80%. After discharged fully the battery needs to be recharged within 12 hours.
- Do not expose cable outside. Do not use cleaning solvents to clean the battery.
- All battery terminals must be disconnected before maintenance

2. Safety Warning

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

2.1 Before Connection

- After unpacking, please check the battery and packing list first. If the battery is damaged or spare parts are missing, please contact the dealer.
- Before installation, make sure to cut off the grid power and 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.

Necessary installation Tools

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

Personal protective equipment






2.2 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

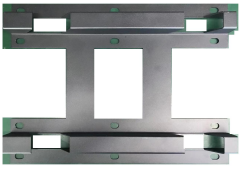
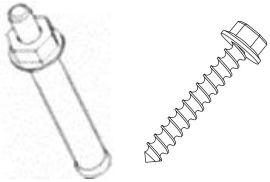
3-1. Packing List

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

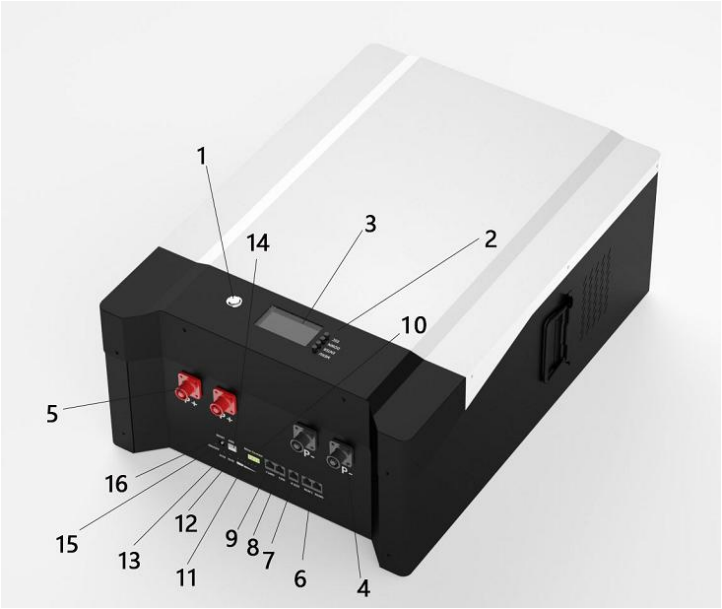
Battery Pack	Mounting Plate	Power out positive cable
		
Power out Negative cable	Manual*1	Parallel common cable(RJ45)
		

***NOTE : * types of communication tools need to place an order.**

Inverter common cable(RJ45)	Mounting brackets	Combiner out cable

		
Combiner out cable	software(or download)	Round-head screws
		
RS232common box	RS485 common box	CAN common box
		

3-2. Product Overview

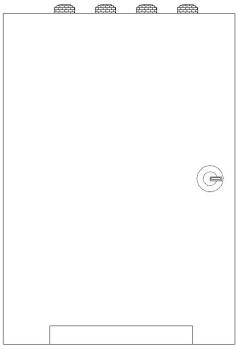


Port Description of Pack

No.	Description	Print	Remark
1	Power	ON/OFF	Start battery
2	LCD key		View battery status
3	LCD		
4	Battery Negative	P-	
5	Battery Positive	P+	
6	485B communication port	RS485B	For paralleling battery
7	RS232 communication port	CAN	Host software
8	CAN communication port	RS232	To connect to inverter
9	RS485A communication port	RS485A	To connect to inverter
10	DRY connect port	DRY	
11	Capacity LED indicator		
12	ALARM LED indicator	ALM	
13	RUN LED indicator	RUN	
14	ADS Coder	ADS	Set address code of the battery
15	Power indicator	ON/OFF	
16	Reset	RESET	

3-3 Combiner Box:

4 port IN, 4 port Out . see Figure 3



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, need 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 Vertical 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

⚠ WARNING: Remember that this pack is heavy so please be careful when removing if 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 wall surface. Choose a suitable installation location and require the battery pack to be placed at a safe distance greater than 30cm from the ground and the safety distance between battery packs is also greater than 30cm.We recommend an installation distance is 50cm.

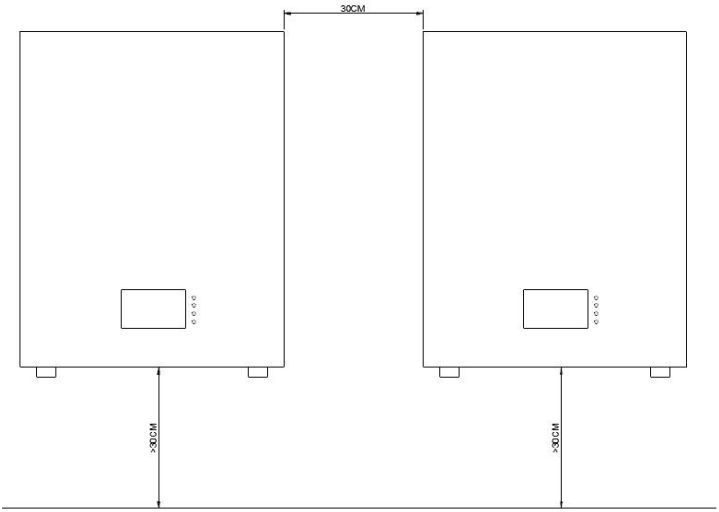


Figure 5.

Step 3:

Use the mounting bracket to mark the location of the positioning screw hole on the wall, and use an electric drill to drilling the hole. see Figure5.Need to be drilled with a drill of appropriate diameter.

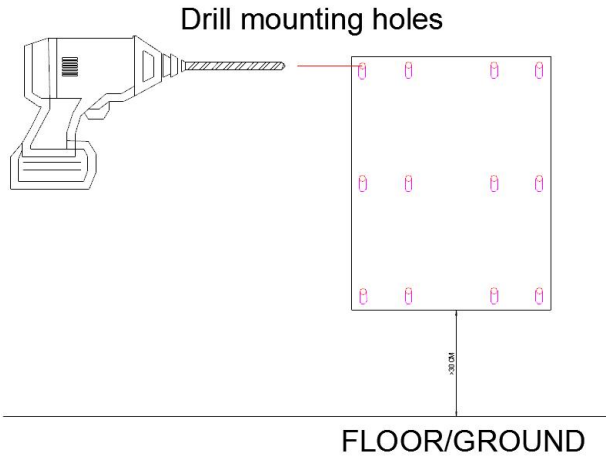


Figure 6

Step 4:

insert frame screws, then place the bracket, and use screws lock it .see Figure 6

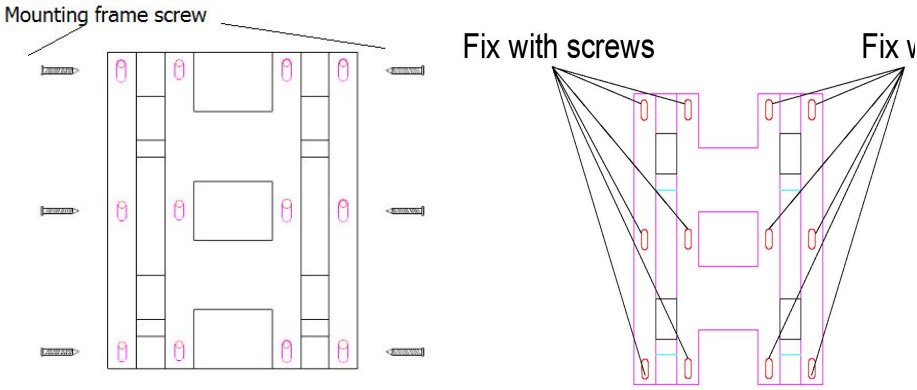


Figure 7

Step 5:

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. Lift the pack and put it into the slot of the fixing bracket from the front. You can install more packs as shown in the figure 8,9.

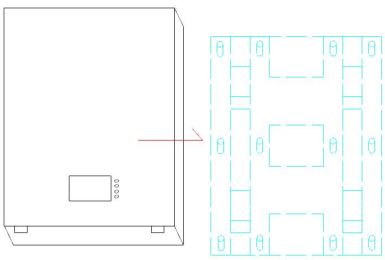


Figure 8

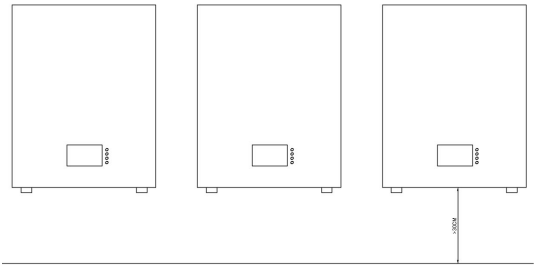


Figure 9

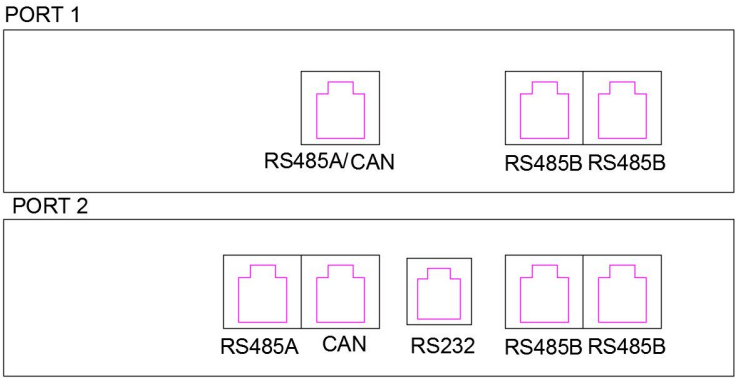
Step 6:

When more than 3 PCS packs are connected in parallel, we recommend you installing combiner box. 4 locations we recommend you install the combiner box. First select location is Top and Bottom, see Figure10.

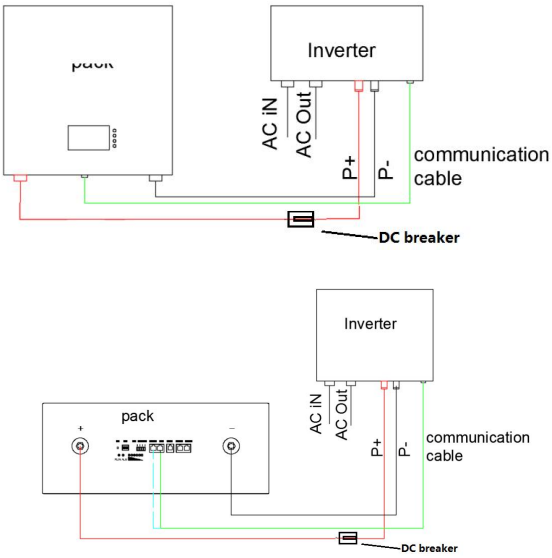
Figure 10

Step 7:

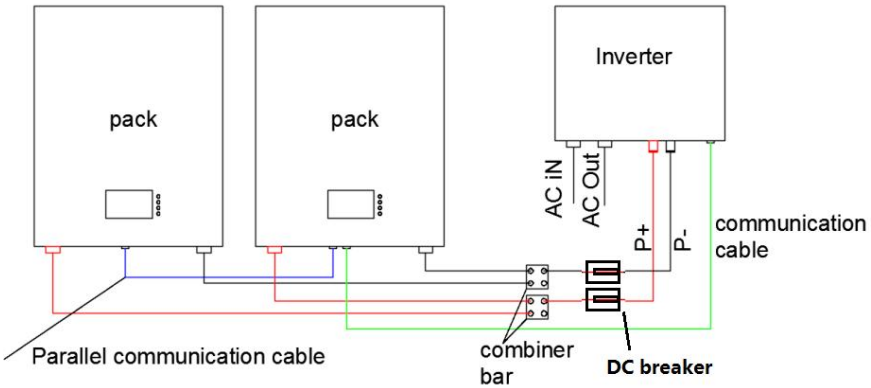
Connect the wiring of the Pack as shown below. see figure 11.If inverter need CAN BUS port /RS485 port, please insert communication cable (RJ45) to CAN port or RS485A,RS485B only be used for battery packs parallel mode.



1. pack:inverter=1:1



2 Pack:inverter=2:1. Pack 1 is slave ; pack 2 is master. Negative and positive power cable has the same length.Figure12



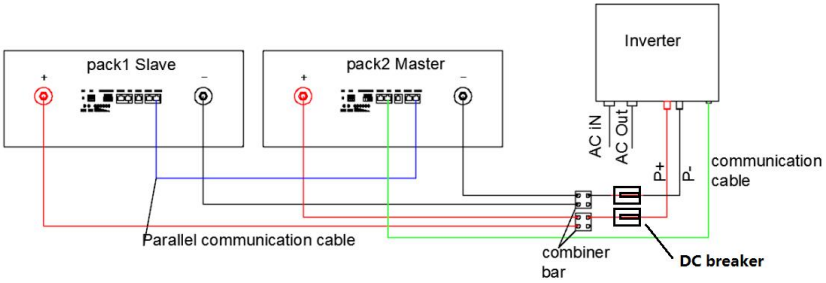
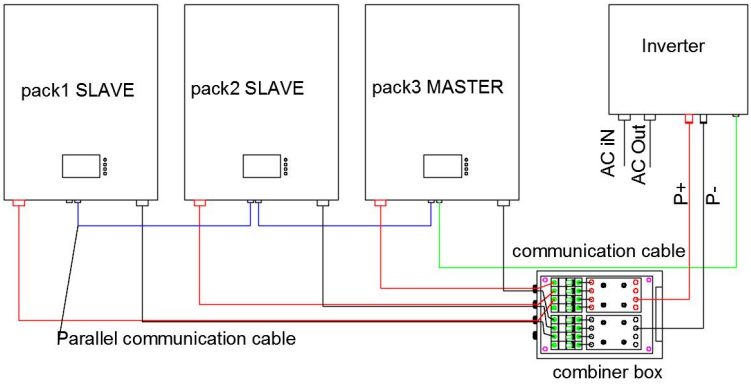
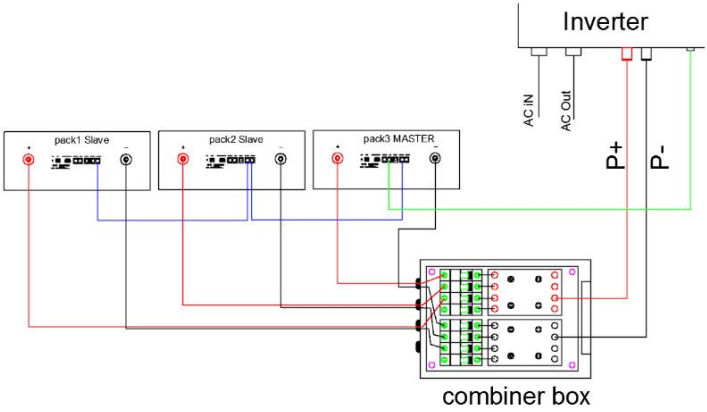


Figure12

3 Pack:Inverter=3:1, Pack 1 ,2 is slave ; pack 3 is master. When more pack are paralleled, one pack is master, other are slave. Negative and Positive power cable has the same. Figure13.





4 Battery:Inverter=3:3, Mainly wiring for 3-phase inverter. Pack 1 ,2 is slave, pack 3 is master. more packs are paralleled, one pack is master, other are slave. 3-phase inverter output 380VAC.One inverter is master, other are slave .Please refer to the operation manual of the inverter for the parallel connection method of the inverter, there is only an example.Figure14

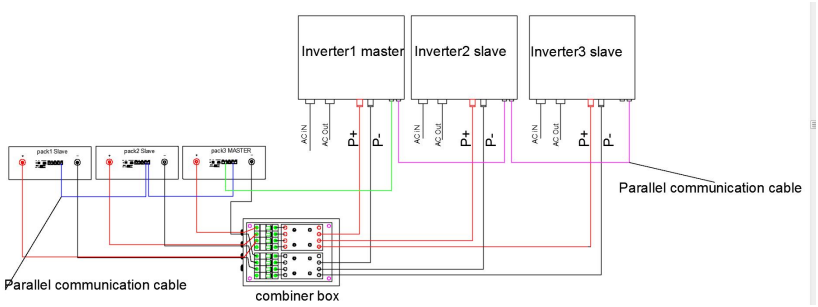
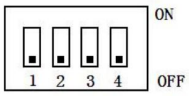


Figure 14

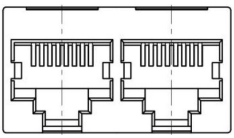
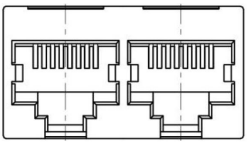
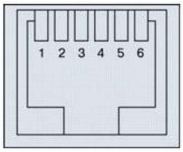
Step 8:

Setting the address of the battery pack is an important step. You can see that there is a 4-bit encoder at the bottom of the battery pack. When the PACK is used in parallel, the address of different PACKs can be distinguished by setting the dial switch on the BMS. It is necessary to avoid setting the address to the same. Refer to the following table for the definition of the BMS dial switch.



地址	拨码开关位置			
	#1	#2	#3	#4
0	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

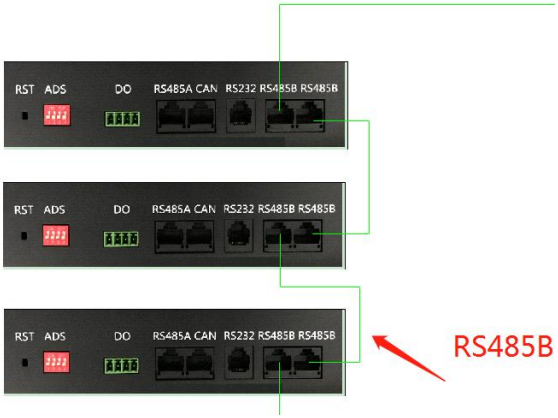
This is 4bits coder and communication port. CAN port and RS485A port can be selected as the same time.

Parallel Communication	 并联通讯端口	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
		4,5	NC	12,13	NC
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
		4,5	NC	15	GND
Communication with host computer		RS232 RJ11			
		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 9:

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.

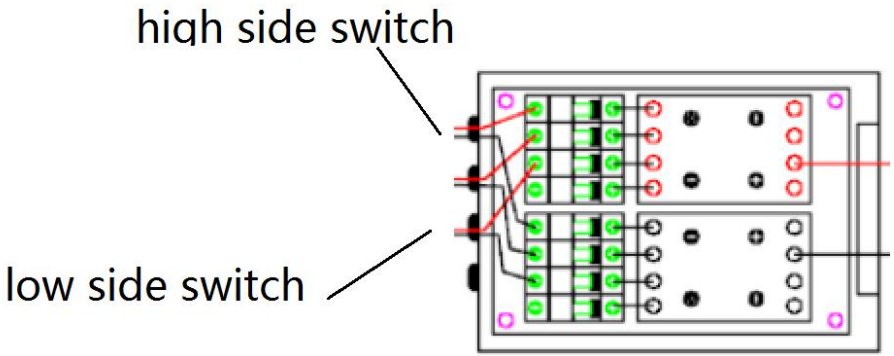


Sept 10:

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).

Note: You need to turn on the low side switch first (Discharge negative); then turn on high side (Discharge positive),if any of pack has mistake 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.



Step 11:

Running the device, set the external charger or inverter parameters, please set according to the corresponding operation manual. Can not exceed the rated parameter requirements.

Battery Pack Parameters:

N	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	Rated 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		
10	Charging Current limits(A)	10A /20A		
11	Charge over Current(A)	110/110/Adjustable		

12	Discharge over Current protect(A) Adjustable	110A/110A/220A		
13	Internal Impedance	≤100mΩ		
14	Communication protocol	CAN/485	CAN/485	CAN/485
15	Host software and Communication protocol	RS232/485	RS232/485	RS232/485
16	Operation Temperature Range	Charge:0~55℃		
		Discharge: -20~55℃		
17	Storage Temperature Range(recommend)	0℃~25℃		

Battery Pack parallel parameters::

No	Item	General Parameter		
1	Combination method	24V	48V	51.2V
2	Rated Capacity(Ah)*Parallel	PACK *Parallel	PACK *Parallel	PACK *Parallel
3	Factory Voltage(V)	25.6-26.4V	48-50V	51-53V
4	Charging Voltage(V)recommend/max	28/28.8V	54/54.6V	57/57.6V
5	Charging Current(A)recommend/max	0.1C/0.2C (total)	0.1C/0.2C (total)	0.1C/0.2C (total)
6	Float charge Voltage(V)	27.6V	53V	56V
7	Discharge Cut-off Voltage(V)	<=24V	<=48V	<=50V
8	Max Discharging current(A)	90*Parallel/150*Parallel/180*Parallel		
9	Charging Current limits(A)	10A/20A*Parallel		
10	Charge over Current protect(A)	110/110/Adjustable*Parallel		
11	Discharge over Current protect(A) Adjustable	110/110/Adjustable*Parallel		
12	Internal Impedance	≤100mΩ	≤100mΩ	≤100mΩ
13	Communication protocol	CAN or 485	CAN or 485	CAN or 485
14	Host software and Communication protocol	RS232/485	RS232/485	RS232/485
15	Operation Temperature Range	Charge:0~50℃		
		Discharge: -20~55℃		
16	Storage Temperature Range(recommend)	0℃~25℃		

Battery Pack support communication with inverter:
(More communication protocols need to be proposed separately)

NO.	Specification						
1	SMA						
2	MUST						
3	Victron						
4	Schneider						
5	DeYe						
6	Growatt						
7							
8							
9							

Step 12: 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 RUN-led indicate these status.

Step 13: 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

BMS Parameters.

Chart 1: Battery Status

SOC						ALARM	RUN

Chart 2: Battery Capacity

status	charge					discharge						
SOC(%)	L6	L5	L4	L3	L2	L1	L6	L5	L4	L3	L2	L1
0-16.6%	OFF	OFF	OFF	OFF	OFF	Flash 2	OFF	OFF	OFF	OFF	OFF	light
16.6-33.2%	OFF	OFF	OFF	OFF	Flash 2	light	OFF	OFF	OFF	OFF	light	light
33.2-49.8%	OFF	OFF	OFF	Flash 2	light	light	OFF	OFF	OFF	light	light	light
49.8-66.4%	OFF	OFF	Flash 2	light	light	light	OFF	OFF	light	light	light	light
66.4-83%	OFF	Flash 2	light	light	light	light	OFF	light	light	light	light	light
83-100%	Flash 2	light	light	light	light	light	light	light	light	light	light	light
RUN LED	light					Flash(flash 3)						

Chart 3: LED flash and buzzer mode (off by default)

MODE	ON	OFF	MODE	ON	OFF
Led Flash1	0.25S	3.75S	Buzzer1	0.25S	0.25S
Led Flash2	0.5S	0.5S	Buzzer2	0.25S	2S
Led Flash3	0.5S	1.5S	Buzzer3	0.25S	3S

Chart4: LED flash

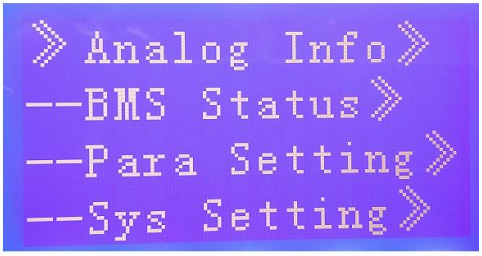
System status	Run status	ON/OFF	RUN	ALM	SOC						REMARK
Power off	SLEEP	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All led off
Stand by	NORMAL	Light	Flash1	OFF	Lighting for SOC						stand by mode
	ALARM	Light	Flash1	Flash3							Low volt alarm
CHARGE	NORMAL	Light	Light	OFF	Lighting for SOC(The LED flash2,while it is the high SOC)Alarm LED do not flash, when the BMS into OVP mode.						
	ALARM	Light	light	Flash3							
	OVP	Light	Light	OFF	Light	Light	Light	Light	Light	Light	No charge in, into standby
	OTP,OCP,Fail	Light	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	Stop charge
Discharge	NORMAL	Light	Flash3	OFF	Lighting for SOC						
	ALARM	Light	Flash3	Flash3							
	UVP	Light	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Discharge off
	OTP,OCP, SCP,Fail	Light	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	Discharge off
FAIL		OFF	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	NO Charge or discharge

Chart5: LCD screen display.

.1 Display

.2 Main menu page

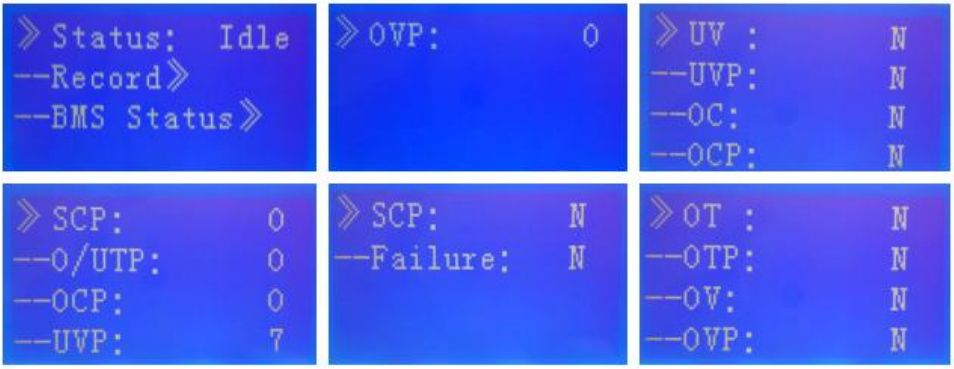
After BMS is activated, will show Welcome TO Use Smart BMS. Press MENU button then enter into main menu page. As shown below：



.3 Battery parameters page

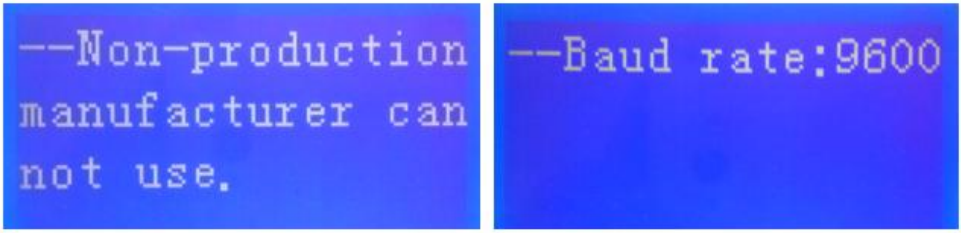
When cursor “》”point to Battery parameters , press Enter into Battery parameters page, as shown below ：

When cursor "》"point to Battery Status , press Enter into Battery status . As shown below, :



Parameters Setting

The screen cannot set the parameter baud rate: 9600, which cannot be set.。



Key Description

1） SW1----MEUN，SW2----ENTER，SW3----UP，SW4----DOWN，SW5----ESC。

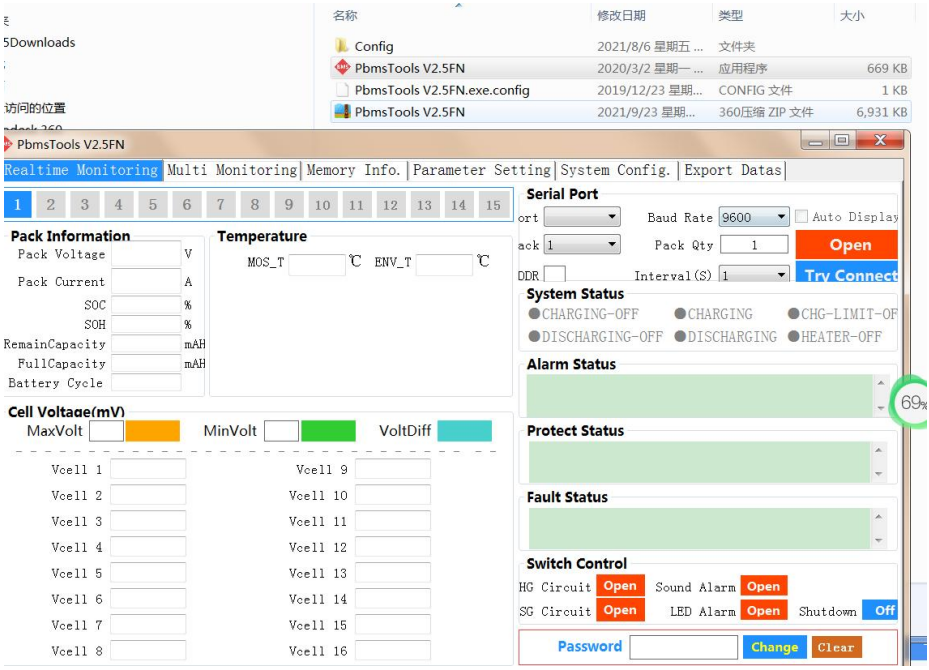
2） Each item started with 》 or -, 》 displays the current cursor position. Press the "Up" or "Down" key to move the cursor position to the end of the item. The content of the item has not been displayed. Press the "Enter" key to enter the corresponding page.

3） Press the "ESC" key to return to the next level of directory at any location, and press the "Menu" key to return to the main menu page. ◦

4） when BMS inter sleep mode, press any key to activate the screen. Enter standby mode , with no keystrokes 1 minutes later, LCD will enter Shutdown mode press any key, screen can be activated. ◦

Appendix 2

Host Software Operation:



Appendix 3

Troubleshooting

1 Battery pack stop work

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

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

2 No communication ,inverter can not received any DATA from BMS..

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

CAN :PIN4:CANH,485A-A,

PIN5:CANL; 485A-B

RS485A:PIN2:485A-A,

PIN1:485A-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:

CAN :PIN4:CANH,
PIN5:CANL;
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 .

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.

5 Inverter or other external device can not 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

6 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.

7 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.

8 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.