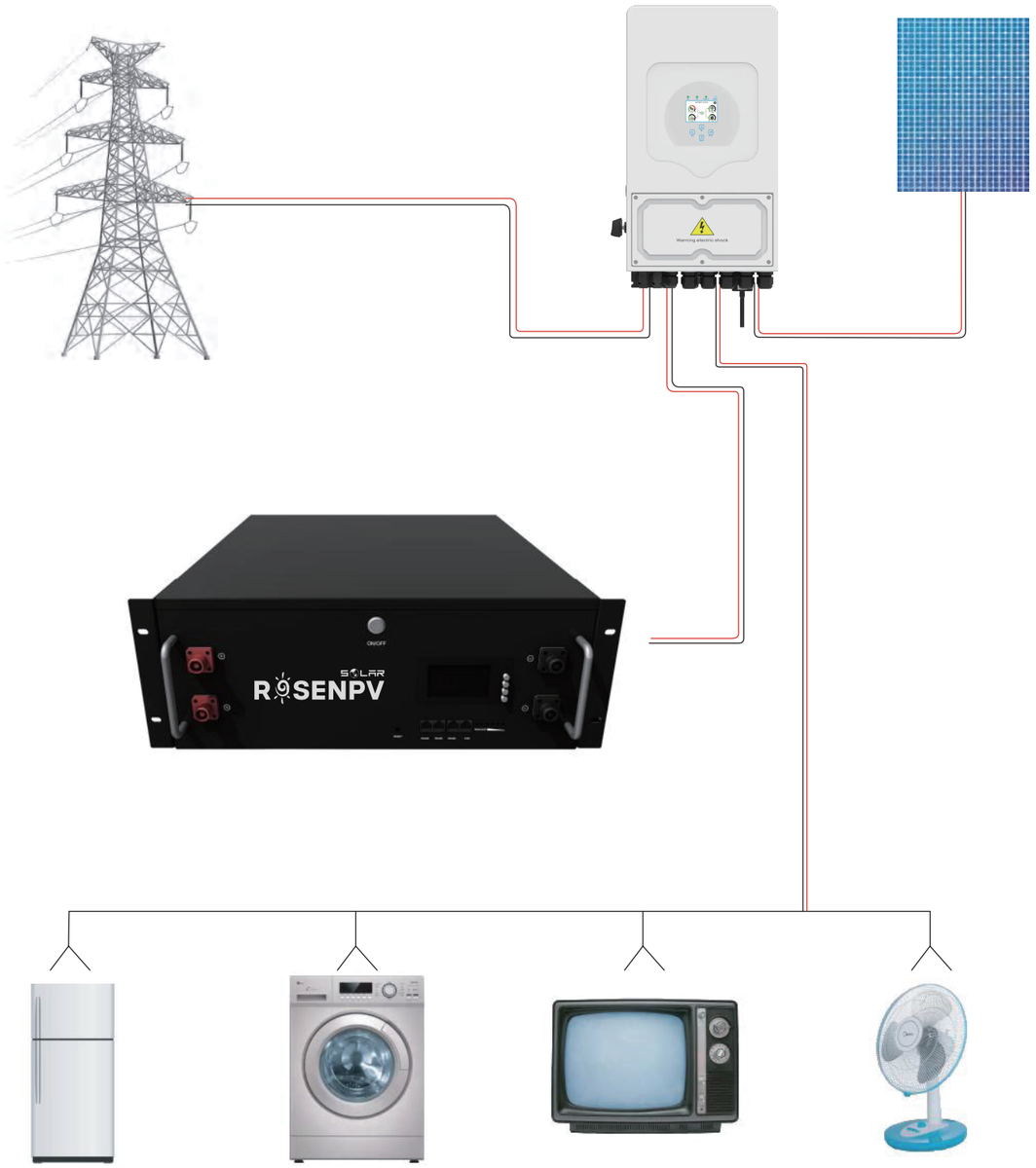

EN

Rack Type Energy Storage LiFePO4 Battery

User manual

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Important safety instructions

Important safety instructions
Please keep this manual for future reference.
This manual contains all the safety installation and operation instructions of the rack type energy storage $LiFePO_4$ battery.
Please read all instructions and precautions in the manual carefully before installation and use.

1. To avoid personal injury, users should disassemble it by professional installer. If need repairs, please contact our company's professional maintenance personnel.
2. Do not install the energy storage $LiFePO_4$ battery in a place where children can touch.
3. Do not install the energy storage $LiFePO_4$ battery in harsh environments such as damp greasy, flammable, explosive, or dust accumulation.
4. When the energy storage $LiFePO_4$ battery is working, please do not open the box.
5. It is recommended to install a suitable fuse or circuit breaker externally.
6. After installation, check whether all line connections are tight to avoid the risk of heat accumulation due to virtual connection.
7. Rack energy storage battery shall be charged with solar power or AC power supply, parallel connection with other AC power supply or different voltage and brand batteries is prohibited.

Contents

1. Basic information

1.1 Product overview

Rack type energy storage battery is mainly used in the field of household power storage. At the same time, it is also suitable for the internal energy storage of RV, household energy storage and temporary buildings. It adopts high-performance and long-life lithium iron phosphate battery as the basic energy storage unit, combined with advanced lithium-ion battery management system industrial design of household products and other technologies. Ensure that products have high reliability and high industrialization standards.

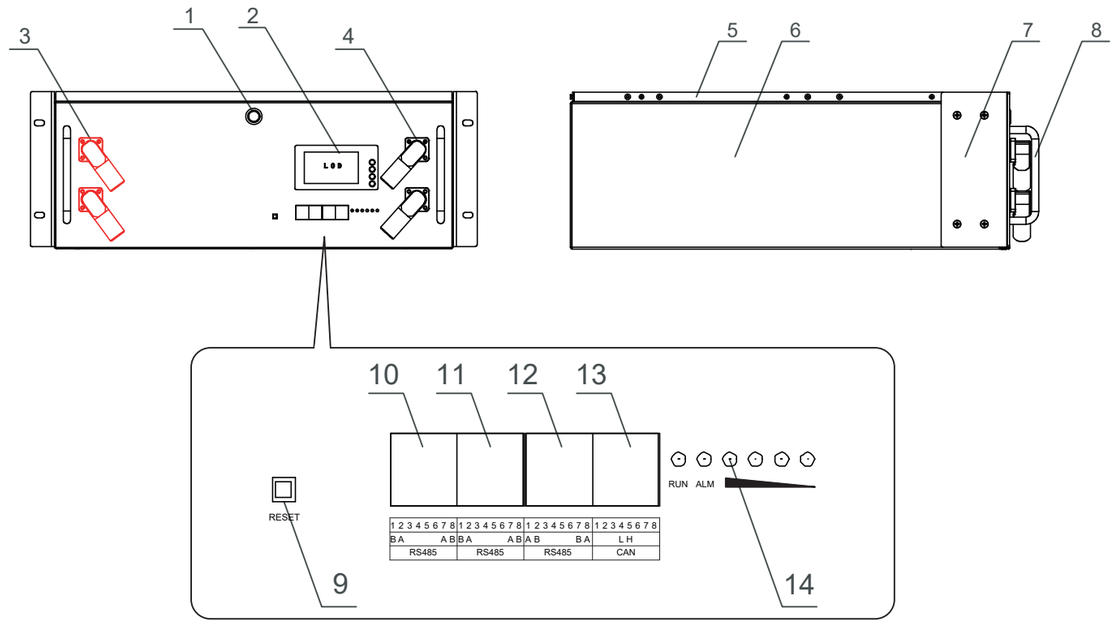
Rack type products have wall mounting function and can support external parallel use function, which greatly improves the convenience of use.

Through scientific and reasonable active heat dissipation. Rack type energy storage battery improves the consistency of internal temperature field, prolongs service life, and enables the product to continuously output high current.

1.2 Features

- ◆ The battery adopts high-performance lithium iron phosphate battery with high safety performance and long service life.
- ◆ External weak current switch reduces product power consumption and improves the safety of transportation and storage.
- ◆ With RS485/CAN communication function, it can easily communicate with the equipment with communication.
- ◆ External wireless module can be connected for remote data monitoring and corresponding control.
- ◆ It has multiple protection functions to protect the safety of power supply inan all-round way.
- ◆ The output is stable and can be connected to different loads with in the voltage rang.
- ◆ Support up to 15 independent modules for parallel use.

1.3 Function description



1	Switch	5	Welding parts of upper cover
2	LCD display	6	Box
3	Red terminal	7	Box fixings
4	Black terminal	8	Box handle

9	Reset	12	RS485 Communication
10	RS485 Communication	13	CAN Communication
11	RS485 Communication	14	LED indicator

2. Installation instructions

2.1 Installation notes

Before installation, please read this manual carefully and familiarize the installation steps.

(1) Be sure to leave a certain space around for heat dissipation during installation.

(2) Avoid sunlight direct and rainwater infiltration during outdoor installation to cause battery damage.

(3) Do not place metal products near the place of the energy storage $LiFePO_4$ battery installation to prevent short circuits.

(4) Virtual connection points and corroded wires may generate high heat, and the molten insulation layer will burn surrounding materials and even cause a fire. Therefore, it must be ensured that the connector has been tightened and the wires should be secured with cable ties to avoid loosening of the connector due to shaking during mobile applications.

(5) After the battery switch is turned off,there is still high voltage inside the energy storage case. Please do not open or touch the internal components, and external short circuit is strictly prohibited.

(6) Please do not install it in a harsh environment where a large amount of damp, greasy, flammable and explosive dust gathers.

(7) It is forbidden to reverse the charging and discharging terminals of the battery, other wise it is very easy to damage the battery or cause unpredictable risks.

(8) If an injury occurs during installation or use, please seek medical attention in time.

2.2 Installation and connection

Installation and connection must comply with national and local electrical code requirements. According to the current situation, firstly, choose the corresponding wire or a wire with a larger wire diameter to avoid unnecessary troubles during use. Secondly, determine the installation location. Thirdly, when installing, please make sure to leave at least 200 mm of space at the air outlets on both sides of the energy storage battery to ensure natural convection heat dissipation.

2.3 Recommended external wiring diameter and switch selection.

Mode1	Recommended extemal wiring diameter	Battery continuous current circuit breaker	Circuit breaker Model
M16S100BL-U	25mm² /4AWG	100A	2P-125A

Note: The wiring diameter is for reference only. If the distance between the load and the battery is relatively long,use a larger wire to reduce the voltage and improve the system performance. He above wiring diameter and circuit breaker are only recommendations, please follow the actual choose the appropriate wire diameter and circuit breaker according to the situation.

2.4 Recommended setting data of inverter:

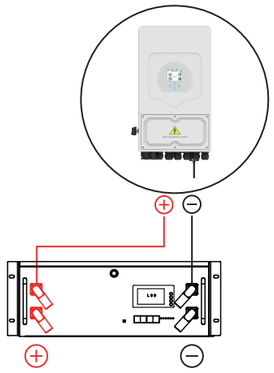
Battery model	$LiFePO_4$/Lithium battery
Model	M16S200BL-U
Discharge cut-off voltage	50
Over discharge recovery	51
Normal charging voltage	58
Surge charging voltage	40
Overvoltage protection	58.4
Overvoltage recovery	56
Discharge cut-off SOC	10%

2.5 Necessary Installation Tools

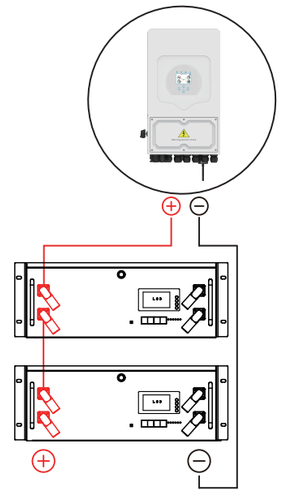
 Multimeter + Current clamp	 Insulated Screwdriver Set	 Insulated Allen Key Set from 2 mm to 8 mm	 Drill+Hammer
 Electrician Scissors	 Insulated Torque Wrench Set	 Lifting Strap + Mechanical Lifter	 RS232/USB +Screw Terminal (insulated)

2.6 Personal Protective Equipment +1000 Vdc Insulated Tools

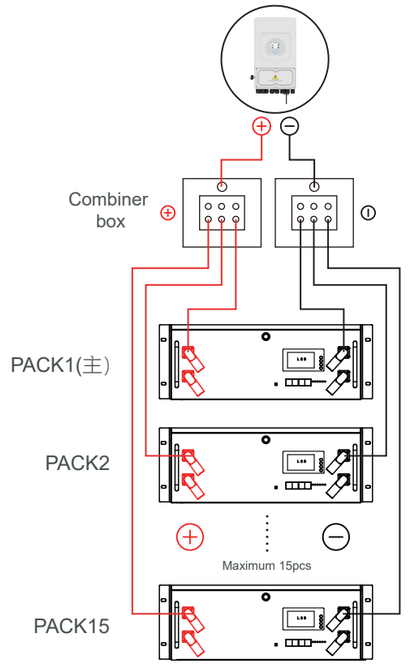
3. Parallel structure diagram



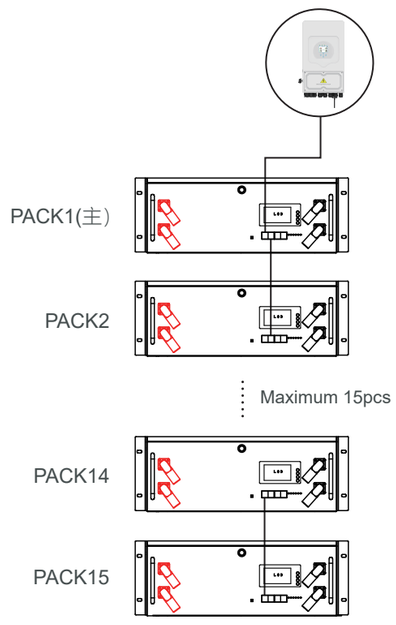
① One unit product



② Two units products



③ More than Two units products



④ Batteries are connected in communication

Note: 1. When the battery pack is used in parallel, the BMS automatic coding can encode the host to wake up the slave, and the slave can automatically wake up after the host wakes up.

2. There are strict sequence requirements for battery power-on, connect PACK in order from low to high, all connecting wires can only be loaded or charger after installation, and need to be charged or activated by pressing a button after powering on. When dismantling, unplug the charger or load first, and disassemble the PACK from the height to the bottom in turn.

4. LED instructions

Table1 LED working status indication

state	normal/warning/ protect	RUN	ALM	Battery indicator LED				illustrate
		●	●	●	●	●	●	
shutdown	hibernate	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	annihilate
Standby	normal	flash 1	extinguish	According to the battery indicator				standby mode
	alert	flash 1	flash 3					Module low voltage
Charge	normal	Always bright	extinguish	According to the battery indicator (battery indication maximum LED flashes 2)				Maximum battery LED flashes Move (flashing 2), overcharge warning ALM does not flash during alarm
	alert	Always bright	flash 3					
	Overcharge protection	Always bright	extinguish	Always bright	Always bright	Always bright	Always bright	If there is no utility power, indicate Light goes to standby
	temperature, overcurrent, Failsafe	extinguish	Always bright	extinguish	extinguish	extinguish	extinguish	stop charging
discharge	normal	flash 3	extinguish	According to the battery indicator				stop charging
	alert	flash 3	flash 3					
	Undervoltage protection	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	stop charging
	temperature, overcurrent, short circuit, Reverse connection, failsafe	extinguish	Always bright	extinguish	extinguish	extinguish	extinguish	stop charging
invalid		extinguish	Always bright	extinguish	extinguish	extinguish	extinguish	Stop charging and discharging

Table2 Description of capacity indication

state		Charge				discharge			
capacity indicator		L4 ●	L3 ●	L2 ●	L1 ●	L4 ●	L3 ●	L2 ●	L1 ●
Battery (%)	0~25%	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	constant
	25~50%	extinguish	flash 2	flash 2	constant	extinguish	extinguish	constant	constant
	50~75%	flash 2	flash 2	constant	constant	extinguish	constant	constant	constant
	75~100%	flash 2	constant	constant	constant	constant	constant	constant	constant
Running lights ●		constant				Blink (blink 3)			

Table 3 LED flashing description

flashing method	Bright	extinguish
flash 1	0.25S	3.75S
flash 2	0.5S	0.5S
flash 3	0.5S	1.5S

Remarks: The LED indicator alarm can be enabled or disabled through the host computer, and the factory default is enabled.

◆ Button description and hibernation

1. Button description

(1) Press the button switch for 1~2s, and the PACK will be powered on; When paralleling, the boot interval between the two PACKs should be less than 30s;

(2) Press the button switch for more than 5s, and the PACK will be powered off; When paralleling, you only need to press one PACK button switch for more than 5s, and the rest will be turned on normally;

(3) After the voltage under-voltage protection and under-voltage protection are powered off, press 5 times continuously within 10s to force activation; When paralleling, only one PACK needs to be operated, and the rest are also activated normally

2. Dormancy

When any of the following conditions are met, the system enters low-power mode:

(1) The single or overall over-discharge protection has not been lifted within 30s.

(2) Press the button (3~6s) and release the button.

(3) The lowest cell voltage is lower than the sleep voltage, and the duration reaches the sleep delay time (while satisfying no communication, no protection, no equalization, and no current).

(4) Standby time is more than 24 hours (no communication, no charge and discharge, no mains).

(5) Force shutdown through host computer software.

Before going to sleep, make sure that the input is not connected to an external voltage, otherwise you will not be able to enter the low-power mode.

5.BMS communication settings

5.1 BMS communication and setting

When the load (such as inverter) needs to communicate with the battery, in order to establish normal communication with the load, BMS needs to set the following settings for each brand. The RS485 communication protocols of inverters are different, but there are several RS485 communication protocols inside the inverter to match the battery. When using, you can directly select the communication protocol code in the inverter for matching. If you have other problems,please consult the supplier.

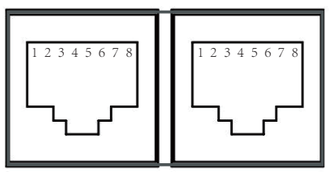
Battery BMS interface pin foot definition as shown in the following figure

When the battery is used in parallel, the BMS can distinguish the PACK through automatic coding, and the definition of the master-slave address refers to the "Communication Address Selection Description";

The "RS485/CAN" battery pack can communicate with inverter through this interface;

"RS485/RS485" is used in the battery pack for parallel use and monitoring software, and the master pack is connected to the slave through this interface Pack to communicate;

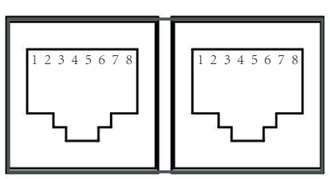
External interfaces



RS485 RS485

The battery communication interface adopts 8P8C RJ45 socket.			
RS485		PRS485	
PIN	Definition	PIN	Definition
1、8	RS485-B	1、8	RS485-B
2、7	RS485-A	2、7	RS485-A

Internal interfaces



RS485 CAN

The battery communication interface adopts 8P8C RJ45 socket.			
RS485		CAN	
PIN	Definition	PIN	Definition
1、8	RS485-A1	4	CAN-L
2、7	RS485-B1	5	CAN-H

5.2 Communication Instructions

5.2.1 CAN Communication

CAN communication, baud rate 500K.

5.2.2 RS485 communication

With RS485 interface, you can view PACK information, the default baud rate is 9600bps, if you need to communicate with the monitoring device through RS485, the monitoring device is the host, and the data is polled according to the address.

5.2.3 Features

(1) It has 16 channels of single voltage, overall voltage detection, overcharge, overdischarge alarm and protection functions. The quiescent voltage sampling accuracy can reach ≤10mV at room temperature.

(2) It has the functions of charging and discharging current detection, charging and discharging overcurrent alarm and protection. The charging current is displayed as positive, the discharge current is displayed as negative, and the current sampling accuracy can reach ≤2% @FS at room temperature. Reserved charge and discharge current detection, charge and discharge overcurrent alarm and protection functions. The charging current is displayed as positive, the discharge current is displayed as negative, and the current sampling accuracy can reach ≤2% @FS at room temperature.

(3) It has 4 cell temperature detection, cell high and low temperature alarm and protection functions. The temperature sampling accuracy can reach ≤2°C at room temperature.

(4) It has the function of short circuit protection.

(5) It has a charge equalization function.

(6) Cell capacity estimation is supported. The full charge capacity, current capacity, and design capacity of the battery pack can be set by the host computer, and the capacity can be automatically updated after a complete charge and discharge cycle.

(7) Support the software control function of the host computer, and the protection parameters such as overcharge, overdischarge, charge and discharge overcurrent, overtemperature, undertemperature, capacity, sleep, balance, and other parameters can be easily set through the host computer software.

(8) It has RS485, CAN communication interface.

(9) It has a variety of sleep and wake-up methods.

(10) Supports integrated 10A charging current limit.

(11) It has the functions of reset switch, automatic coding and so on.

(12) It has LCD interface (optional), charging current limit, buzzer, LED and other functions.

(13) Online upgrades are supported.

Note: The battery default protocol is Pylon.

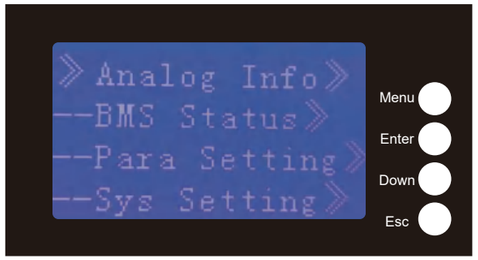
6. LCD screen description

1. Boot page

After the power on/sleep is activated, the welcome interface will be displayed, as shown in the following figure.

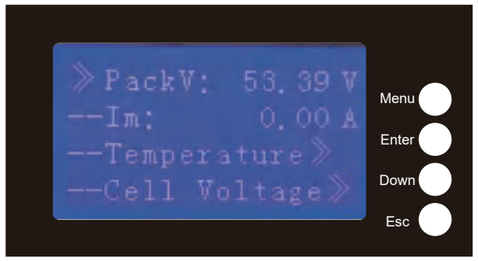
2. Main menu page

Press the menu key to enter the main menu page, as shown in the following figure.



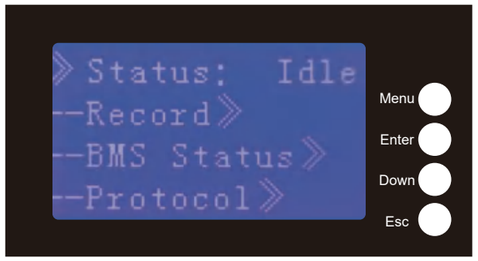
3. Battery parameter collection page

When the cursor points to“battery parameter acquisition”,press enter to enter the“battery parameter” acquisition page,as shown in the following figure.



4. Battery status page

When the cursor points to“battery state”, press the ENTER button to enter the battery status page,as shown in the following figure.



5. Key description

(1) SW1---- MENU, SW2---- ENTER, SW3----DOWN, SW4---- ESC.

(2) Every item will use the“》”or“--” to start,“》”means the current cursor position, press DOWN move the cursor position up and down. Items ending with “》” indicate that the item has contents not displayed. Press enter to enter the corresponding page.

(3) Press ESC to return to the previous directory. Press the menu key anywhere to return to the main menu page.

(4) In the sleep state, press any key to activate the display screen.

6. Sleep/Shutdown

In the normal operation state, the system will enter the sleep/shutdown state after 1 minute without key operation. In the sleep state, operate any key and the display screen will be activated.

7. All date of LCD display

Pack message》 Pack V:
Pack C: “_”: discharging
“+”: charging
“0”: stand by
Battery temp》 Temp1:
Temp2:
Temp3:
Temp4:
PCB temp:
EV temp:
Battery vol》 Vol 01:
Vol 02:
Vol 16:
Battery cap》 SOC:
Full Cap:
Sur Cap:
Cyc Indx:

Pack status》 Run mode: Charging or discharging
Abnormal》 Short Num:
Temp Pro:
Over C Pro:
Low V Pro:
Over V Num:
status》 HT Alarm:
HT Pro:
HV Alarm:
HV Pro:
LV Alarm:
LV Pro:
HC Aarm:
HC Pro:
Short Pro:
Fail Tro:

Argument tset》 --Not manufacturer. Cannot use. system set》 --Baud rate: 9600

7. Technical parameter list

Model	M16S200BL-U
Array Mode	16S
Nominal Energy (KWh)	≥5
Nominal Voltage (V)	51.2
Charge Voltage (V)	58.4
Discharge Cut-off Voltage (V)	42
Standard Charging Current(A)	40
Max.Continuous Charging Current (A)	100
Max.Continuous Discharging Curent (A)	200
Communication Mode	RS485/CAN
Cycle Life	≥6000 Times @80%DOD,25℃
Operating Temp	Charging: 0~60°C; Discharging: -10°C~65°C
Size(LxWxH) mm	570×440×244
Net Weight (Kg)	~84
Package Size (L×WXH) mm	755×525×410
Gross Weight (Kg)	~90

Note: The dimensions in the are the product appearance dimensions. If any change for the products, will adjusted by the manufacture.

8. Maintenance and conservation

Item	Problem description	Possible causes	Solution
1	The battery cannot be turned on normally, and there is no response when pressing the button.	1. The button is damaged or the button cable is disconnected; 2. BMS damaged; 3. The battery is seriously over-discharged.	1. Check whether the button is normal; 2. Check whether the voltage of the battery pack is normal; 3. If the voltage of the battery pack is too low, you need to use a constant current power supply or a lithium battery charger to charge the battery until the low voltage protection is released.
2	The BMS immediately enters the protection state after pressing the switch.	1.Battery pack voltage is abnormal; 2. Abnormal temperature; 3.External load mismatch.	1. Check whether the voltage of the battery pack itself is consistent; 2. Check whether the BMS voltage collection is abnormal; 3. Confirm whether the ambient temperature exceeds the BMS temperature preset value and whether the temperature probe is damaged; 4. Determine whether the load power and voltage match the battery.
3	Display screen does not display.	1.Display screen failure; 2.connection cable failure; 3.communication failure.	1. Press the power button to restart; 2. Check whether the display is damaged; 3. Check whether the cable is intact, whether there is any damage, disconnection, etc., and whether the connector is plugged in properly.
4	The communication fault occurs when the load is inverter	1. Communication line connection error (improper pin connection or poor contact); 2. Does not match the inverter communication protocol; 3. Communication mode do not match; 4. Correspondence address error; 5. Signal interference.	1. Check whether each pin of the communication line is breakover; 2. Check whether the corresponding pins are connected correctly; 3. Check whether the contact part of the communication cable connection terminal is oxidized; 4. Confirm whether the inverter selects the matching protocol; 5. Confirm whether the correct communication method is selected, such as CAN and RS485 or other communication methods; 6. Confirm whether the inverter needs to select a communication address, and confirm whether the battery communication address is correct; 7. Confirm whether there are high-frequency interference sources in the battery usage scenario.
5	The output is suddenly disconnected during use	1. The battery voltage is too low, triggering BMS protection; 2. BMS protection caused by excessive load power or short circuit at the output end.	1. Check whether the battery voltage is within the normal range. If the voltage is low, charge the battery; 2. Adjust the load power to match; short circuit: disconnect the load or restart the battery.
6	SOC does not match actual value	1. SOC cumulative error during charging and discharging; 2.SOC is not calibrated; 3. The internal battery parametersof BMS have changed.	1. Calibrate the SOC, discharge to battery protection and then charge to 100% of the battery to complete the calibration; 2. After the parameters related to the internal battery capacity of the BMS change, the SOC needs to be re-estimated and a power calibration needs to be performed.
7	In order to protect your rights and interests, after you purchase our products, if you encounter problems with the installation and use of the product, you can contact the supplier, and we will provide you with after-sales service as soon as possible.		

In order to maintain the best and long-term performance, the following items are recommended to be inspected twice a year.

1. Confirm that the surrounding air flow will not be blocked, and remove any dirts and debris on the cooling hole.
2. Check all exposed wires, shabby and damage, please place or repair them if necessary.
3. If it is not be used for a long time, it is recommended to charge it every three months.

Danger of electric shock! Make sure that the power supply has been disconnected during the above operations, and then carry out corresponding inspection and operation.

9. Warranty record card

Dear Customers:

Hello! Thank you very much for purchasing our products. In order to serve you better, please read and fill in and keep this warranty card after purchasing the product. In order to avoid your worries, our company here by makes a warranty service commitment and provides standardized after sales service accordingly.

Exemption of warranty liability scope:

1. Damage caused by man-made or other natural disasters.
2. Failure caused by incorrect operation and installation or use in an environment other than the product's prescribed use.
3. Damage caused by unauthorized disassembly and modification.

Contact: _____ Number: _____

Tel: _____ Email: _____

Purchase date: _____

Address: _____

Maintenance records			
Repair Date	Repair content	Repair Person	remark