Shenzhen Braun Power Energy Storage Co.

48V300AH Battery Pack Product Specification

Preparation:	Audit:	Approval:
Date:	Date:	Date:

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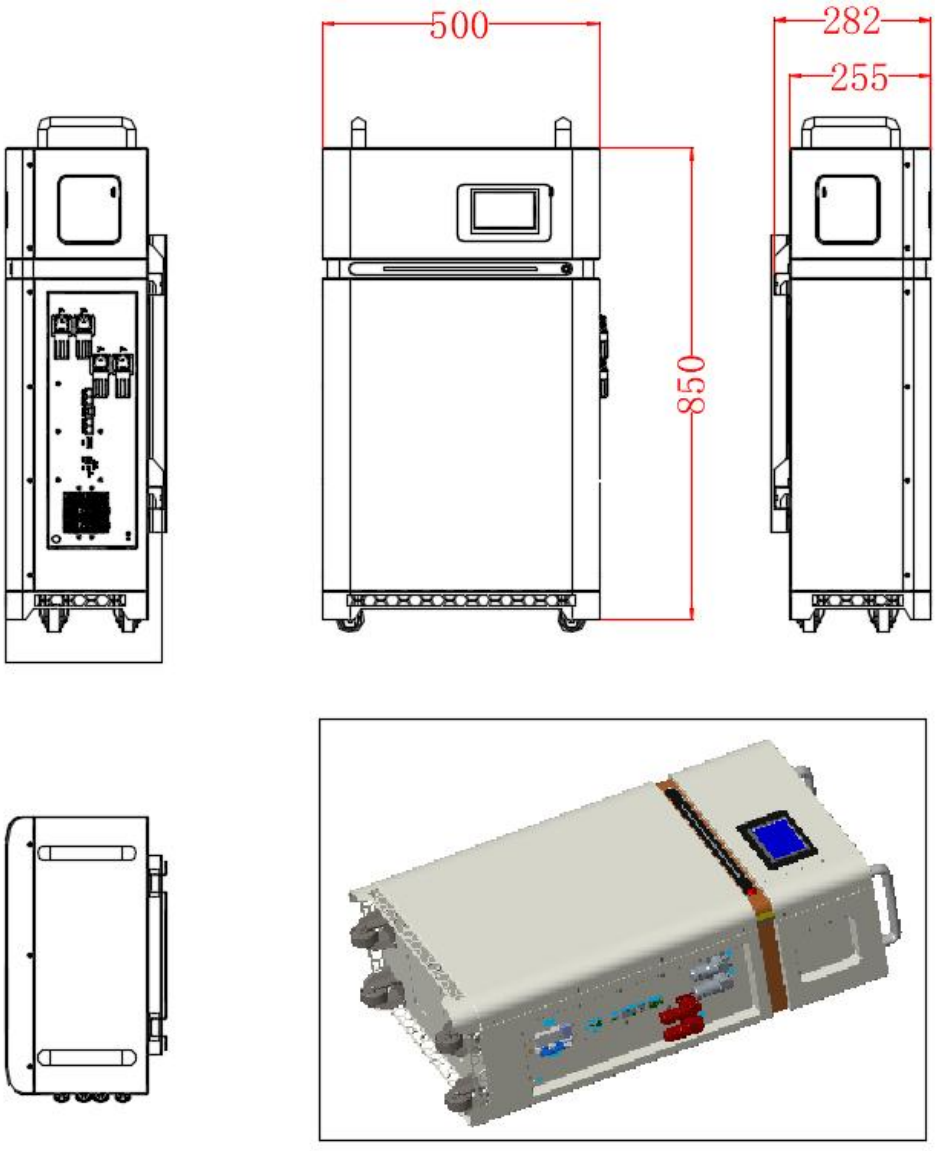
1. Product Overview

This product consists of a lithium iron phosphate battery pack with 16 strings of cells (including BMS), and this product is suitable for load equipment with an operating current within the range of 200A.

2.Product technical specifications

This product model is 48V300Ah battery pack, composed of 16S1P cells, maximum continuous charging and discharging current 200A, with 20A charging current limiting function, with communication function (dual RS485)) with storage function, the chassis color is white.

2.1 Battery Pack Product Structure



2.2 Technical parameters of the battery system

	Serial Number	Project name	Basic parameters	note
Battery Pack	1	Product Model	48V300Ah	
	2	Rated voltage	51.2V	
	3	Rated capacity	300Ah	
	4	Energy rating	15360Wh	
	5	Cooling method	natural cooling	
	6	Combinatorial approach	16 series 1 parallel	
	7	Charge and Discharge Ports (common or split)	common-language (e.g. mouth)	
	8	Communication port RS232/RS485/CAN	RS485/CAN	
	9	Monitor	5-inch touch screen	
	10	Heating function	None by default	mismatch
	11	Battery pack charging cut-off voltage	58.4V	Charge protection voltage
	12	Battery pack discharge cut off voltage	40V	Discharge protection voltage
	13	Monoblock charging cut-off voltage	3.65	
	14	Single Discharge Cutoff Voltage	2.5	
	15	Charging operating Temperature range	-0～55℃	
	16	Discharge operating Temperature range	-20～60℃	
	17	Standard Charge	0.2C Current Continuous Charge to 57.6V Cut off	
	18	Standard Discharge	1C Current Continuous Discharge to 43.2V Cut off	
	19	Maximum Allowable Continuous Charging Current	200A	
	20	Maximum Allowable Continuous Discharge	200A	

3.

		Current		
	21	Discharge Protection Current	215A	
	22	Battery Box Size (L*W*H mm)	850x500x282 mm	Dimensional tolerance ±2mm
	23	Battery box weight tolerance (KG)	125	Weight tolerance ±3KG
	24	Matching Inverter	CAN: Pylon, Deye, Goodwe, Growatt, INVT, Victron, SOFAR, SMA, etc.	
			RS485: VoltronicPower, SRNE, Pylon, etc.	

Battery Management (BMS) System

3.1 Overview of BMS system functions

3.1.1 Cell and battery voltage detection.

3.1.2 Battery charge/discharge current detection.

3.1.3 Core, ambient and power temperature testing.

3.1.4 Battery capacity calculation and cycle count function.

3.1.5 Charge/discharge MOSFET switching function.

3.1.6 Battery charge equalization function.

3.1.7 Key switch function.

3.1.8 RS485, CAN communication function.

3.1.9 Upper computer control functions.

3.1.10 Historical data storage function.

3.1.11 Charging current limiting function.

3.1.12 Secondary protection functions.

3.1.13 Heating function (optional).

3.2 BMS system parameterization

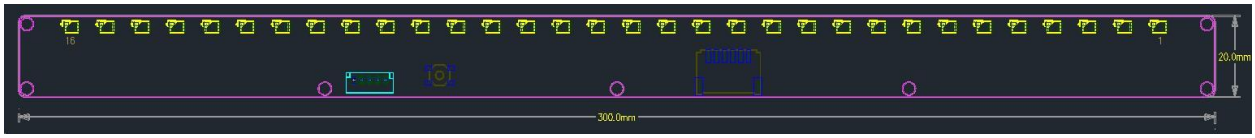
Project Name	Indicator project	standard value
Cells Overcharge Protection	Overcharge protection value	3.65±0.05V
	Overcharge alarm value	3.6±0.05V
	Overcharge recovery value	3.38±0.05V
Cells Discharge Protection	Over-Discharge protection value	2.5±0.05V
	Over-Discharge alarm value	2.7±0.05V
	Bleed-off recovery value	3.0±0.05V
Battery pack Overcharge Protection	Overcharge protection value	58.4±0.05V
	Overcharge alarm value	57±0.05V
	Overcharge recovery value	54.4±0.05V
Battery Pack Over-Discharge Protection	Over-Discharge protection value	40±0.05V
	Over-Discharge alarm value	44±0.05V
	bleed-off recovery value	48±0.05V
Battery Pack Over-Charge Current Protection	Over-Charge current1 protection	215A
	Over-Charge Current 1 delay	3000mS
	Over-Charge current 2 protection	250A
	Over-Charge current 2 delay	500mS
Battery Pack Over-Discharge Current Protection	Over-Discharge current 1 protection	215A
	Over-Discharge current 1 delay	3000mS
	Over-Discharge current 2 protection	250A
	Over-Discharge current 2 delay	500mS
Short Circuit Protection	Short-circuit protection current	380A
	Short circuit protection delay	300uS
	Short-circuit protection release	When there is charging, the short-circuit protection is released
		When the load is removed, it will automatically disengage the

3.3

Temperature Protection	Charging High Temperature Protection	60±2 °C
	Charge High Temperature Recovery	50±2 °C
	Charging Low Temperature Protection	-5±2 °C
	Charge cryoprotection recovery	0±2 °C
	Discharge heat protection	65±2 °C
	Discharge High Temperature Recovery	50±2 °C
	Discharge cryoprotection	-10±2 °C
	Discharge cryoprotection recovery	0±2 °C
Equalization Function	Equalized turn-on voltage	3.5V
	Equalize opening differential pressure	65mA

LED Indicator Description

RGB Lamps: 16 Bi-Color Lamps, Red and Green



3.3.1 Description of indications (definition of running lights and signals)

① Power-on self-test: green from low to high running horse, from light 1 has been lit to light 16, the frequency is 300mS, self-test is completed to enter the normal display state

State.

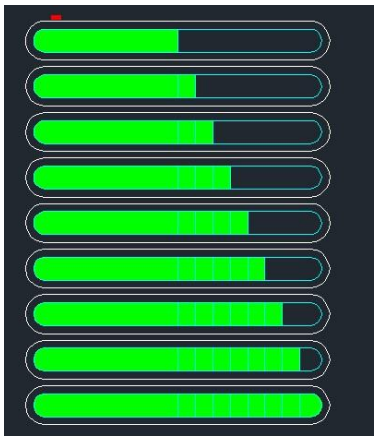
② BMS and lamp board communication interruption lasts for 30S, blinking yellow lamp, on for 1S off for 1S<

③ Red light is always on during fault and protection, red light flashes during alarm (0.5S flashing), (all off during under-voltage protection, red light flashes during over-voltage alarm or

over-voltage protection).

The light should not blink or stay on)

④ When charging, the green light blinks cyclically (e.g., when the SOC is 50%, Lamp 1 and Lamp 8 are always on, and the horse is running for 300mS from Lamp 6).



⑤ When discharging, decreasing according to SOC.

⑥ Over-discharge protection, the system goes into sleep, full extinction

⑦ When the battery is in standby (when not charging or discharging), the

corresponding length is displayed according to the actual SOC (e.g., when it is 50%, as shown in the figure below).

3.4 Reset Key Key Description

When the BMS is in sleep state, press the button for 1S and release it, the protection board is activated and the LEDs light up sequentially for 0.5 seconds starting from "L4".

When the BMS is active, press the button for 3S and then release it, the protection board will be put to sleep and the LEDs will light up in sequence from "RUN" for 0.5 seconds.

3.5 Hibernation and Wake-Up Functions

3.5.1 Dormancy

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

① The single unit undervoltage protection or overall undervoltage protection has not been released within 30 minutes.

②Press the button for 3 seconds and release it.

(iii) The minimum individual voltage is lower than the hibernation set voltage (default 3350mV) and the duration reaches the hibernation delay time (default 1440)

minutes) (while satisfying no communication and no charging and discharging currents).

④ Forced shutdown through the upper computer software.

Before entering hibernation, make sure that no external voltage is connected to the P-terminal, otherwise you will not be able to enter the low power mode.

⑤ The minimum unit voltage is lower than the undervoltage protection value of -500mV, and the delay time is 10min, forcing it to enter deep sleep.

3.5.2 Wakeup

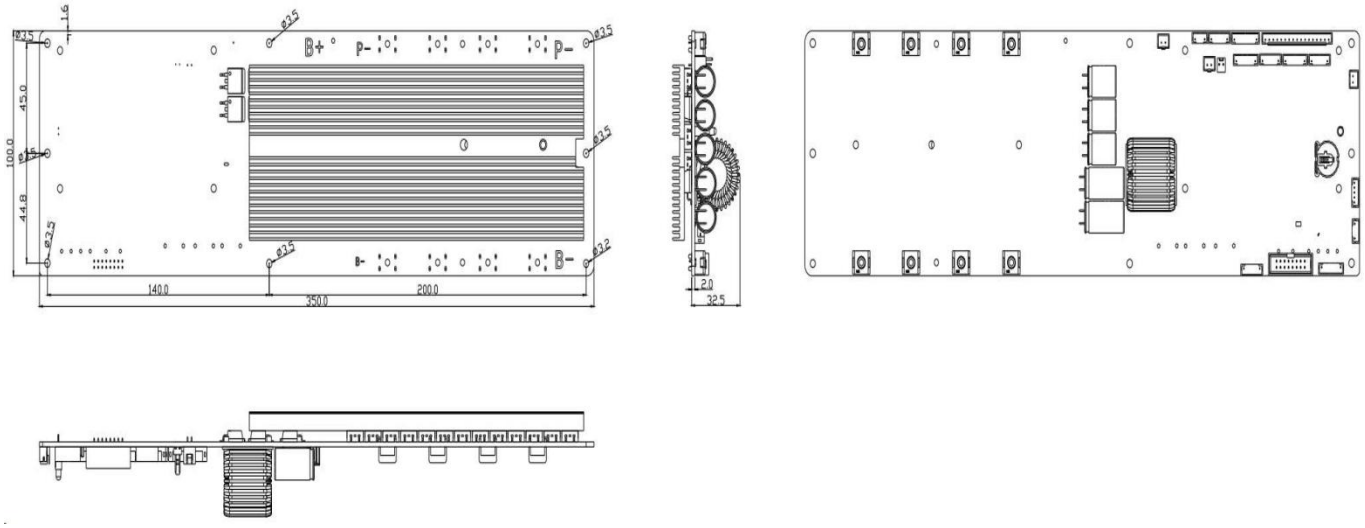
When the system is in low-power mode and any of the following conditions are met, the system will exit low-power mode and enter normal operation mode:

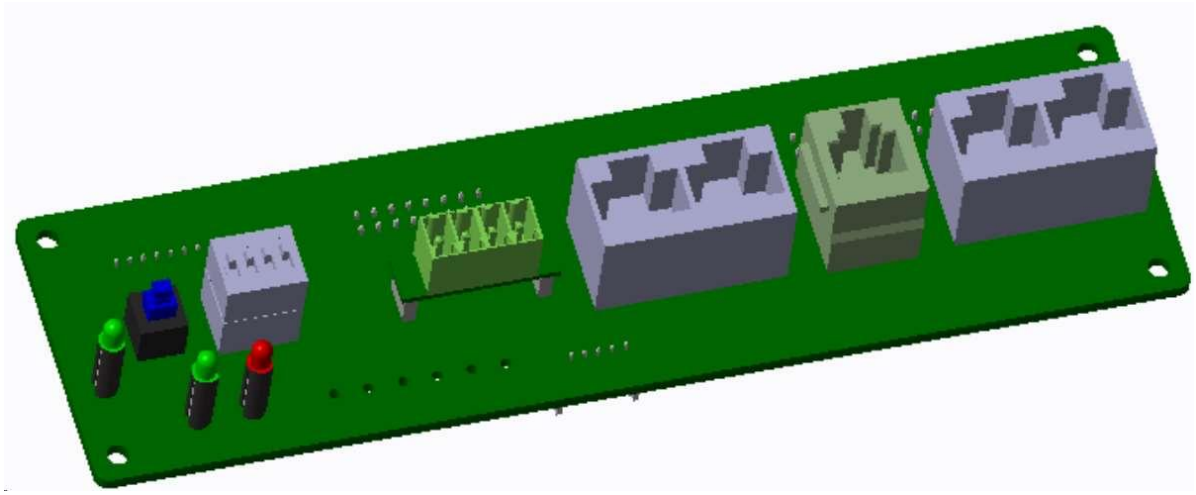
① Connect to the charger, the output voltage of the charger should be more than or equal to 48V.

② Press the button for 1S and release it.

③ Connect the RS485 communication line and open the software of the upper computer.

3.6 Physical drawing of protective plate dimensions

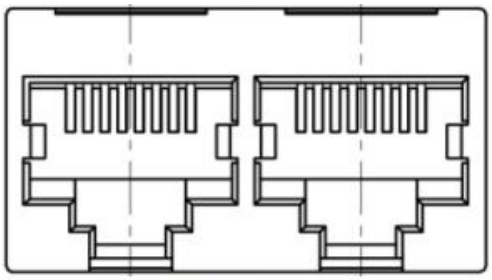




4. Communication

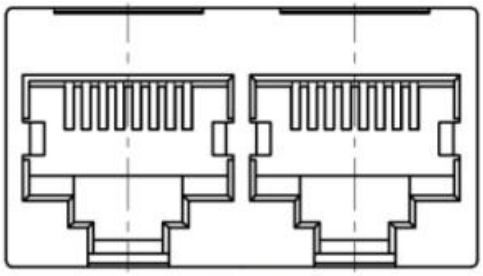
BMS can communicate with the upper computer through RS485 communication interface, parallel communication RS485 interface, can carry out multi-machine parallel communication; with inverter or terminal communication RS485 and CAN interface

4.1 Communication Interface Definitions



CAN 和 RS485 接口

RS485-1 接口（与上位机或逆变器通讯） 支持硕日、日月元、Pylon 协议一通过上位机切换协议		CAN-1 通信接口（逆变器通讯） 支持 Victron、Pylon、古瑞瓦特协议——通过上位机切换协议	
RS485—采用 8P8C 立式 RJ45 插座		CAN—采用 8P8C 立式 RJ45 插座	
RJ45 引脚	定义说明	RJ45 引脚	定义说明
1、8	RS485A-B1	4	CAN1-H
2、7	RS485A-A1	5	CAN1-L
6	GND	6	GND



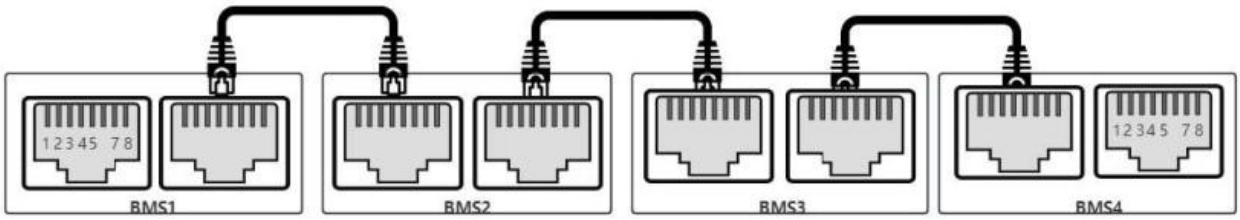
并联通讯端口

并机通讯端口（只用来并机）			
RS485-2—采用立式 RJ45 插座		RS485-2—采用 8P8C 立式 RJ45 插座	
RJ45 引脚	定义说明	RJ45 引脚	定义说明
1、8	RS485-B2	1、8	RS485-B2
2、7	RS485-A2	2、7	RS485-A2
6	GND	6	GND

4.2 Parallel Interface

The BMS packs communicate with each other in parallel via the RS485 bus and also with devices that have an RS485 bus, while the CAN interface enables communication with a PC or other devices that have an RS485 bus.

It is intelligent terminal communication, man-machine interaction RS485 bus parallel connection of any battery pack information, multi-machine parallel bus interface shown in the figure below.

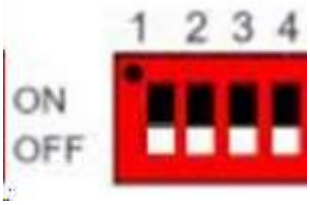


4.3 Address dip switches

4.3.1 Dialing Code Setting

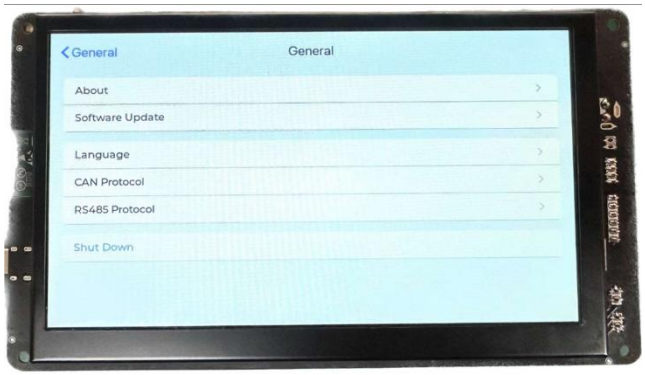
When packs are used in parallel, different PACK addresses are distinguished by

hardware dialing address, and the address of each PACK in the whole battery pack is unique, as follows, the hardware address is set by the dialing switch, refer to the table below.



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	
12	OFF	OFF	ON	ON	
13	ON	OFF	ON	ON	
14	OFF	ON	ON	ON	
15	ON	ON	ON	ON	

5. Physical display



6. test condition

Except for special cases, all test conditions are based on standard test conditions:

Ambient temperature: 25±5 ℃; ambient humidity 40%-80%RH

"Standard charging" means charging at a constant current of 0.2C to 58.4V at an ambient temperature of 25°C±5°C, and then charging at a constant voltage of 58.4V. Electric to current less than 0.02C.

"Standard Discharge" is a discharge to 40V at a constant current of 0.2C at an ambient temperature of 25°C±5°C. The discharge is performed at a constant current of 0.2C.

7. Electrical performance, safety performance testing

7.1 Electrical Performance Testing

Test items	test standard	technical requirement
25°C Room	The battery pack is first fully charged at 0.2C current under standard test conditions and	≥100% of nominal capacity

Temperature Discharge Capacity	then discharged at 0.2C current to record the discharge capacity of the battery pack.	
-10°C Low Temperature Discharge Capacity	The battery pack is first fully charged with 0.2C current under standard test conditions, then stored for 10H at a low ambient temperature of -10°C, and discharged to the termination voltage with 0.2C current to record the discharging capacity of the battery pack.	≥75% of nominal capacity
55°C High Temperature Discharge Capacity	The battery pack is first fully charged at 0.2C current under standard test conditions, then stored at 55°C high ambient temperature for 5H, and discharged to the termination voltage at 0.2C current to record the discharging capacity of the battery pack.	≥95% of nominal capacity
Charge Retention and Capacity Restoration	Battery packs are first charged and discharged at 0.2C under standard test conditions, initial capacity is recorded, fully charged under standard test conditions, set aside for 30d at 25°±5C ambient temperature, discharged at 0.2C to the termination voltage to test the retention of capacity, charged at 0.2C, discharged at 0.2C, cycling for 3 times, and the third time for the recovery of capacity.	Charge retention ≥ 95%; Capacity recovery rate ≥95%
Cycle Life at 25°C	Battery packs are fully charged at 0.2C current and then discharged at 0.2C current under standard test conditions, with continuous	≥3000 times

	charging and discharging test at 25°C±5°C ambient temperature, and the cycle life test is terminated when the discharged capacity is ≤ 80% of the initial capacity.	
55°C High Temperature Cycle Life	Battery packs are fully charged at 0.2C current and then discharged at 0.2C current under standard test conditions, with continuous charging and discharging at 55°C±5°C ambient temperature, and the cycle life test is terminated when the discharged capacity is ≤ 80% of the initial capacity.	≥1500 times

7.2 Safety Performance Testing

Test items	test standard	technical requirement
External Short Circuit Test	Battery pack in the standard test conditions for charging, will be fully charged battery pack placed in the explosion-proof box, with internal resistance of less than 100mΩ wire short-circuit in the battery pack outside the positive and negative electrodes, the test process to record the surface temperature of the battery, short-circuit duration of 10min, that is, to complete the test.	No fire, no explosion
Overcharge test	After the battery pack is charged under standard test conditions, a single cell of the battery pack is charged at 0.2C with a constant current and constant voltage source, and the constant current is charged	No fire, no explosion

	to 5V and then switched to constant voltage charging until the cutoff current reaches 0A, ending the test.	
Over-discharge test	After the battery pack is charged under standard test conditions, the battery pack is continuously discharged at 0.5C with load equipment until the voltage of a single cell reaches 0~0.5V, then the test is ended.	No fire, no explosion

8. Product Packaging Requirements

8.1 The battery box has a good appearance and must not have any defective phenomena such as paint loss, scratches, deformation and breakage.

8.2 Before packing, the battery is to be in the shutdown and dormant state.

8.3 The appearance of the battery should be inspected and passed before packing.

8.4 The outer packaging is packed in wooden crates, the information on the crates should be clear, and the crates are treated with nails around the crates to increase the strength and hardness of the crates to ensure safety in transportation.

8.5 Protective wrapping material should be added to the inside of the wooden crate to ensure that the battery box is not scratched during transportation.

8.6 A packing list is attached to the inside of the wooden crate.

9. Product Storage and Transportation

9.1 Product storage

When the product is not used for long-term storage, it should be stored in a dry, clean and well-ventilated warehouse at 10℃~35℃, avoiding flammable and explosive substances; every three months, the battery pack should be regularly charged and maintained to ensure that the battery is in the best performance state.

9.2 Product transportation

Battery packs should be externally packaged for transportation, and should be protected from violent shocks, impacts or extrusion during transportation, and from sun and rain.

10. Warnings and Precautions for Battery Use

To prevent possible battery leakage, heat generation, and explosion, please observe the following precautions

Warning!

① Do not immerse the battery in seawater or water, and keep it in a cool and dry environment when it is not in use.

② Do not use the battery with the positive and negative terminals reversed;

③ Prohibit short-circuiting the positive and negative terminals of the battery by connecting them directly with metal;

④ Prohibit transportation or storage of batteries with metals such as hairpins and necklaces;

⑤ Prohibit knocking or throwing, stepping on batteries, etc;

⑥ Prohibit direct soldering of batteries and piercing of batteries with nails or other sharp objects;

Attention!

① It is prohibited to use or place the battery under high temperature (under hot sunlight or in a very hot car), otherwise it may cause overheating, fire or functional failure, and shorten the life span of the battery; the recommended optimal temperature for long-term storage of the battery is 10-45℃.

② Prohibit the disposal of batteries in the fire or heater to prevent fire, explosion and pollution of the environment; end-of-life batteries should be returned to the supplier or the battery recycling point for disposal.

③ Prohibit the use in the place of strong static electricity and strong magnetic field, otherwise it is easy to destroy the battery safety protection device and bring unsafe hidden danger.

④ If the battery leaks and the electrolyte gets into your eyes, do not rub it, flush your eyes with water immediately and take it to a hospital for treatment immediately, otherwise it will harm your eyes. If the battery emits a strange odor, becomes hot, discolored, deformed, or if any abnormality occurs during use, storage, or charging, the battery should be immediately removed from the device or charger and taken out of service.

⑤ Prohibit the positive and negative terminals of the battery to be directly inserted into the power socket, and a special charger for lithium-ion batteries must be used.

⑥ Check the battery voltage and connections before installation, and use only after everything is normal.

⑦ Battery half-electricity storage, if the battery has not been used for three months, it is necessary to carry out the supplementary electricity once.

⑧ If the electrode is dirty, wipe it with a dry cloth before use, otherwise it may lead to poor contact and functional failure.