



Product Specifications

Power Base S20 Home Energy Storage System

Version: V1.1

Date: 2021-01-28

Version information

Version	Prepared	Checked	Approved	Date
V1.0				2021-02-04





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Revised Record

No.	Date	Revised Contents	Revised	Revised version
1	2020.02.04	Updated	ZJM	V1.0
2				
3				
4				
5				
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7				



1. Summary

Power base S20 Series is a lithium iron phosphate battery system produced by GARAYE Energy Technology (Shenzhen) Co., Ltd, which can be used to provide safe, reliable, and stable energy for various equipment. At the same time, the module supports expansion on both capacity and power by multiple parallel uses. It supports CAN, RS485, RS232 communication, and can meet the requirements of various PV inverter communication protocols.

Power base S20 Series has the advantages of high safety performance, long life span, wide charging voltage range, simple installation, and standard modular design.

Products can be widely used in household energy storage, industrial and commercial energy storage and other fields.

2. Technical Specification

2.1. Battery Pack Specification

No.	Item		Value	Remark
01	Cell model	-	100Ah/3.2V	
02	Combination Mode	-	1P16S	
03	Nominal Capacity	Ah	100	
04	Rated energy	Wh	5120	
05	Initial Internal Resistance	mΩ	<50	AC 1KHz
06	Rated Voltage	V	51.2	
07	Charge Cut-off Voltage	V	56.8	Unit cell max. charge voltage not exceed 3.55V
08	Discharge Cut-off Voltage	V	47.0	Unit cell min. discharge voltage not lower than 2.93V
09	Standard Charge Current	Α	20	0.2C
10	Max. Charge Current	Α	≤100	
11	Standard Discharge Current	Α	50	
12	Max. Discharge Current	Α	≤100	
13	On anothing Tanana and an	°C	-0~+50℃	Charge
15	Operating Temperature	C	-18~ +50°C	Discharge
14	Open Circuit Voltage	V	44.8~57.6	
15	Shell type	-	Painted metal	
16	Weight	kg	58±1	About
17	Dimension	mm	600(L)*480(W)*135(H)	





No.		Item	Value	Remark
		Overcharge alarm voltage	3450mV	
	Cell Overcharge	Overcharge protection voltage	3550mV	
1	Protection	Overcharge protection delay time	1.05	
1	Cell Over Voltage	Overcharge protection release voltage	3330mV	1
	Protection Release	SOC release	SOC < 96%	1
	Condition	Discharge release	Discharge Current>1A	
		Over Discharge alarm Voltage	3110mV	Over discharge
	Cell over-discharge	Over Discharge Protect Voltage	2930mV	30 seconds, if it
2	protection	Over Discharge Protect delay time	1.0S	still can't
	Cell Over Discharge	Over Discharge protection release voltage	3200mV	recover, enter
	protection release	Charging release	Access charger	into low-power mode
	Do els essenance	Overcharge alarm voltage	55.5V	
	Pack overcharge protection	Overcharge protection voltage	57.0V	
3	protection	Overcharge protection delay time	1.0S	
3	Pack over voltage	Overcharge protection release voltage	53.3V	
	protection Release	SOC release	SOC < 96%	
	Condition	Discharging release	Discharge	
	Da ali accan dia ahansa	Over Discharge alarm Voltage	49.5V	
	Pack over-discharge	Over Discharge Protect Voltage	48.0V	
4	protection	Over Discharge protect delay time	1.0S	
	Pack over Discharge	Over Discharge protection release voltage	51.2V	
	protection release	Charging release	Access charger	
		Charge Over-current alarm	≥125A	If it appears 10
	Charge over-current	Charge Over-current protection	≥130A	times, will lock
6	protection	Charge Over-current protection delay time	1.05	the status, and won't release
	Charge over-current	Automatic release	1min	automatically
	protection release	Discharging release	Discharge Current>1A	
	Disabassa Ossa	Discharge Over-Current alarm	≥125A	If it appears 10
	Discharge Over Current Protect 1st	Discharge Over-Current Protect	≥130A	times, will lock
	Current Protect_1st	Over-current protection delay time_1st	1.0S	the status, and
7	Discharge Over Current Protect	Automatic release	1min	won't release automatically
	Release Condition_1st	Charging release	Charge Current>1A	
		Discharge Over-Current Protect	≥150A	If it appears 10
	Discharge Over	Discharge Over-current protection delay	100150	times, will lock
	Current _2nd	time_2nd	100±50mS	the status, and
8	Discharge Over	Automatic release	1min	won't release
	Current Release	Automatic release	TIIIII	automatically
	Condition_2nd	Charging release	Charge Current>1A	
9	Short Circuit Protect	Short protection current	≥350A	





Short Circuit Protect Release Short Circuit Protect Release After removing load, will release automatically MOS Over-Temperature Protection Protection MOS Over-Temperature protection MOS Over-Temperature release Charge Low Temperature release SS*C Charge Low Temperature alarm Charge Low Temperature Protection Release Condition Charge High Temperature alarm 5°C Charge High Temperature alarm Discharge Low Temperature Protection Release Condition Charge High Temperature Protection Release Condition Discharge Low Temperature Protection So*C Discharge Low Temperature Protect Discharge Low Temperature Protect Discharge High Temperature Protect Discharge High Temperature Protect Discharge High Temperature Protect Condition Discharge High Temperature Protect Discharge High Temperature Protect Condition Discharge High Temperature Protect Discharge High Temperature Protect Condition Low Temperature Protect High Temperature Protect High Temperature Protect Condition Consumable current Ambient Consumable current Consumable current Discharge High Temperature Protect High Temperature Protect Release Condition Consumable current Aligh Temperature Protect Release Condition Consumable current Low Temperature Protect Release Condition Consumable current Aligh Temperature Protect Release Condition Consumable current Consume current while working Soma(With display) Soma(With display) Soma(Without display) Soma(Without display) Consume current while working Soma			Short Circuit Protect Delay Time	300μS	
Short Circuit Protect Release After removing load, will release automatically MOS Over-Temperature alarm 90°C MOS Over-Temperature protection 110°C MOS Over-Temperature alarm 90°C MOS Over-Temperature protection 110°C MOS Over-Temperature protection 110°C MOS Over-Temperature protection 110°C Charge Low Temperature Protect -0°C Charge Low Temperature Protection Release Condition Charge High Temperature alarm 50°C Charge High Temperature Protect 55°C Discharge Low Temperature Protect 60°C Discharge Low Temperature Protect 60°C Discharge High Temperature Protect 75°C Discharge High Temperature Protect 86°C Condition 105charge High Temperature Protect 86°C Discharge High Temperature Protect 85°C Low Temperature Protect 85°C Low Temperature Protect 85°C Low Temperature Protect 85°C Low Temperature Protect 86°C High Temperature Protect 95°C Low Temperature Protect 86°C High Temperature Protect 95°C Low Temperature Protect 86°C High Temperature Protect 86°C Condition 95°C S30mA(With display) \$20mA(without display) \$20mA(withou				Charging, short circuit	
MOS MOS Over-Temperature alarm 10 Over-Temperature protection MOS Over-Temperature protection Charge Low Temperature Protect Charge Low Temperature Protect Charge Low Temperature Protect Charge High Temperature protect on Release Condition Charge High Temperature Protect Charge High Temperature Protect Charge High Temperature Protect Charge Low Temperature Protect Charge High Temperature Protect Discharge Low Temperature Protect Discharge Low Temperature Protect Condition Discharge Low Temperature Protect Discharge High Temperature Protect Discharge High Temperature Protect Discharge High Temperature Protect Release Condition Discharge High Temperature Protect Condition 12 Over-Temperature Ambient Low Temperature Protect Low Temperature Protect High Temperat				protection release	
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MOS Over-Temperature MOS Over-Temperature protection MOS Over-Temperature protect S°C				_	
Over-Temperature protection				automatically	
Protection MOS Over-Temperature release Charge Low Temperature Protect Charge Low Temperature Protection Release Condition Charge High Temperature Protection Release Condition Charge High Temperature Protection Release Condition Charge High Temperature Protection Release Condition Charge High Temperature Protect Charge High Temperature Protection Release Condition Discharge Low Temperature Protect Discharge Low Temperature Protect Charge High Temperature Protect Discharge Low Temperature Protect Discharge High Temperature Protect Discharge High Temperature Protect Discharge High Temperature Protect Discharge High Temperature Protect Release Condition Discharge High Temperature Protect Discharge High Temperature Protect Discharge High Temperature Protect Release Condition Discharge High Temperature Protect Discharge High Temperature Protect Release Condition Low Temperature Protect Low Temperature Protect Low Temperature Protect Release Condition 12 Cow Temperature Protect Release Condition Discharge High Temperature Protect Discharge High Temperature Protect Release Condition 12 Cow Temperature Discharge High Temperature Protect Discharge High Temperature Protect Release Condition 13 Cow Temperature Discharge High Temperature Protect Discharge High Temperature Protect Release Condition 14 Balance Discharge High Temperature Protect So'C Discharge High Temperature Protect Release Condition 15 Consumable current Discharge High Temperature Protect Discharge High Temperature Protect Release Condition Discharge High Temperature Protect Discharge High Temperature		MOS	MOS Over-Temperature alarm	90°C	
Protection MOS Over-Temperature release 85°C	10	Over-Temperature	MOS Over-Temperature protection	110°C	
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Charge Low Temperature Protection Release Condition Charge High Temperature alarm Charge High Temperature Protect Charge High Temperature Protect Charge High Temperature Protect Charge High Temperature Protect S5°C Charge High Temperature Protect Charge High Temperature Protect S5°C Charge High Temperature Protect S5°C Charge High Temperature Protect Discharge Low Temperature alarm Discharge Low Temperature Protect Discharge Low Temperature Protect Discharge High Temperature Protect Discharge High Temperature Protect Release Condition Low Temperature Protect Release Condition Low Temperature Protect Release Condition 12 Over-Temperature Protection High Temperature Protect High Temper			Charge Low Temperature alarm	5℃	
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Release Condition Charge High Temperature alarm Charge High Temperature Protect Charge High Temperature Protect Charge High Temperature Protect S5°C Charge High Temperature Protect Discharge Low Temperature alarm Discharge Low Temperature Protect Release Condition Discharge High Temperature Protect Discharge High Temperature Protect Discharge High Temperature Protect Release Condition Low Temperature Protect Release Condition 12 Over-Temperature Protect Release Condition Protect Release Condition Cover-Temperature Protect Release Condition Protect Release Condition Consume thigh Temperature Protect High Temperature Protect Blease Condition Consume current while working Somal(with display) Somal(without display) Somal(without display) Somal Without display) Low-power mode current Blead Voltage Toward Without display Soc < 10% No alarm while charging rated capacity setting Toward Without Sleep mode			Charge Low Temperature Protection	-0.5	
Cell Over-Temperature protection Over-Temperature protection Discharge Low Temperature Protect Condition Discharge Low Temperature Protect Policy Consume Protect Policy Consumable current 12 Over-Temperature Protection Ambient Over-Temperature Protect Policy Consumable current Consumable current Discharge High Temperature Protect Policy Consume Consume Current Protect Policy Consume Current Protect Policy Consumed Current Consumable Current Coapacity default Setting Capacity default Setting Colicy Policy Consume Current Policy Consume Current Policy Consume Cons			Release Condition	5°C	
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Discharge High Temperature Protect Discharge High Temperature Protect Release Condition Low Temperature Protect Low Temperature Protect Protection High Temperature Protect High Temperature alarm Discharge High Temperature Protect Low Temperature Protect Low Temperature Protect High Temperature Protect High Temperature Protect High Temperature Protect Release Condition Consumable current Consume current while working Low-power mode current Balance Bleed Voltage Capacity default Setting Tated capacity setting Voltage Discharge High Temperature Protect So C So C So C So C So C So C No alarm while charging Tated capacity setting Voltage 3100mV			Condition	-15°C	
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Release Condition Low Temperature alarm Low Temperature Protect Low Temperature Protect Low Temperature Protect -25°C Low Temperature Protect Release Condition -20°C High Temperature Protect Release Condition To°C High Temperature Protect Release Condition Consumable current Consume current while working Low-power mode current Balance threshold voltage Bleed Voltage Tocapacity default setting Tocapacity default setting Soc < 10% No alarm while charging rated capacity setting Voltage 3100mV			Discharge High Temperature Protect	5506	
12 Ambient Over-Temperature Protection Low Temperature Protect Release Condition -20°C 12 High Temperature alarm 65°C High Temperature Protect 70°C High Temperature Protect Release Condition 65°C Consumable current Consume current while working ≤30mA(With display) ≤20mA(without display) ≤20mA(without display) SOC < 10%			Release Condition	55°C	
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12 Over-Temperature protection High Temperature Protect High Temperature Protect Condition Consumable current 13 Consumable current Consume current while working Low-power mode current Balance Balance threshold voltage Bleed Voltage Toward Alarm SoC < 10% No alarm while charging rated capacity setting Voltage 3100mV			Low Temperature Protect	-25°C	
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High Temperature Protect Release Condition Consumable current Consume current while working Low-power mode current Balance Bleed Voltage Capacity default setting Tated capacity setting Sleep mode High Temperature Protect Release 65°C ≤30mA(With display) ≤20mA(without display) ≤20mA(without display) Somv Somv No alarm while charging Tated capacity setting Voltage 3400mV No alarm while charging Tated capacity setting Voltage 3100mV	12	Over-Temperature	High Temperature alarm	65°C	
Condition Consumable current Consume current while working Consume current while working Consume current while working SomA(With display) SomA(without display) SomA(without display) Low-power mode current SomA(With display) SomA(without display) SomA(with display) SomA(with display) SomA(with display) SomA(with display) SomA(with display) SomA(with display) SomA(without display) SomA(withou		protection	High Temperature Protect	70°C	
Consumable current Consumable current Consume current while working Consume current while working Consume current while working SomA(With display) ≤20mA(without display) ≤100μA Balance Bleed Voltage 3400mV Bleed Voltage 30mV Capacity default setting Capacity default setting Capacity setting Capacity setting Voltage Soc < 10% No alarm while charging Tated capacity setting Voltage 3100mV			High Temperature Protect Release	0-	
Consume current while working ≤20mA(without display)			Condition	65°C	
13 Consumable current ≤20mA(without display) Low-power mode current ≤100μA 14 Balance Bleed Voltage 3400mV Bleed Voltage 30mV Capacity default setting rated capacity setting 100AH Voltage 3100mV				≤30mA(With display)	
14 Balance Balance threshold voltage 3400mV 15 Capacity default setting Low capacity Alarm SOC < 10% No alarm while charging 16 sleep mode Voltage 3100mV	13	Consumable current	Consume current while working		
14 Balance Bleed Voltage 30mV Capacity default setting rated capacity setting 100AH Voltage 3100mV			Low-power mode current	≤100µA	
14 Balance Bleed Voltage 30mV Capacity default setting			Balance threshold voltage	3400mV	
Capacity default setting	14	Balance		30mV	
15 setting rated capacity setting 100AH Voltage 3100mV		0 " 1 6 "	1	500 - 4001	No alarm while
rated capacity setting 100AH Voltage 3100mV	15		Low capacity Alarm	SOC < 10%	charging
1 16 sleep mode		setting	rated capacity setting	100AH	
1 16 sleep mode			Voltage	3100mV	
1 1 = ==:=1 :::::= 1 ==::::::: 1	16	sleep mode	Delay Time	5min	

Electrical performance test 2.3.

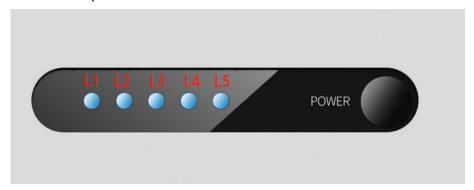




Test Item	Test Method	Technical Requirement
Discharge capacity	Under standard charging mode, charge the battery pack. Then discharge with 0.2C, record the discharge capacity.	≥100% Minimum capacity
-20°C Low Temperature Discharge Capacity	Standardly charge the batter pack, then put it into the constant temperature and humidity oven with -20±2°C for 8H, then discharge with 0.1C to cut-off voltage, record the discharge capacity.	≥65% Nominal Capacity(Without BMS)
55°CHigh Temperature Discharge Capacity	Standardly charge the batter pack, then put it into the constant temperature and humidity oven with 55±2°C for 4H, then discharge with 0.1C to cut-off voltage, record the discharge capacity.	≥97% nominal capacity
Charge Retention(Residual Capacity) and Capacity Restoration Ability	Standardly charge the battery pack, record initial capacity. Under 15°C~30°C, place it for 28 days, then discharge and record the residual capacity. Then standardly charge, record the restoration capacity.	Residual capacity(Charge Retention) ≥95% Restoration capacity ≥97%
Cycle life	Standardly charge the battery pack, then discharge with 0.3C. When discharge capacity is less than 80% of initial capacity, ending cycle test	≥3500 times
55°C 7 days storage	Standardly charge the battery pack, record initial capacity. Under 55±2°C, place it for 7 days, then discharge and record the residual capacity. Then standardly charge, record the restoration capacity.	Residual capacity≥90% Restoration capacity≥95%

Battery Pack Function Description 3.

LED indicators Description LED



NO.	Definition Functional description			
1	Power Switch			
2 VOLTAGE Ba		Battery Voltage		
	ENERGY	Total energy of system discharge		
3	SOC	State of charge		
3	SOH	State of health		
4	4 OUTPUT POWER Discharging power real-time			
	INPUT POWER Charging power real-time value			

3.2 Standby Function

When the battery pack is not charged or discharged and communicated after boot-strap, the



battery is in standby mode.

3.3 Dormancy Function

When any of the following conditions is met, the battery enters the low-power mode:

- 1) Under voltage protection is not released within 30 seconds.
- 2) Press the reset button for 3 seconds and then release the button.

NOTE:

- •If there are other batteries in the output state in parallel application scenario, the current battery cannot be set to sleep through the reset button at this time, because it will be charged and awakened by other batteries with normal output.
- 3) The lowest cell voltage is lower than the sleep voltage, and the duration reaches the sleep delay time (while meeting the requirements of no communication, no protection, no equilibrium, and no current).
- 4) Standby mode lasts for more than 24 hours (no communication, no charge and discharge, no mains power, minimum cell is less than 3.2V).
- 5) Forced shutdown from the Ems Tools.

Before entering sleep, make sure no charger is connected; otherwise it will not be able to enter Low-power mode.

3.4 Buzzer function

In case of failure, the buzz lasts 0.25S for every S;

In the case of protection, the buzz lasts for 0.25S every 2S (except overvoltage protection); In case of failure, the buzz lasts 0.25S for every S;

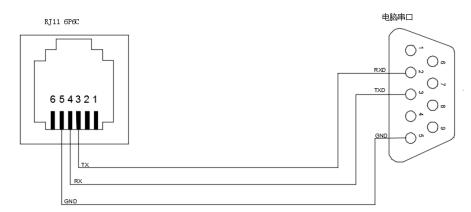
In the case of protection, the buzz lasts for 0.25S every 2S (except overvoltage protection);

In the case of warning, the buzz lasts for 0.25S for every 3S (except overpressure warning);

The buzzer function can be enabled or prohibited by the host computer, factory default is prohibited.

3.5 Communication function

• The battery pack has RS232 and RS485 communication functions. RS232 communication wiring is used to communicate with the host computer, so as to monitor battery information through the host computer.



• RS485 communication wiring is used for communication between master Pack and slave Pack in parallel connection of battery packs.

RS485Using 8P8C Vertical RJ45 Socket					
RJ45 Pin Definition					
1, 8	RS485-B				
2、7	RS485-A				
3、6	GND				



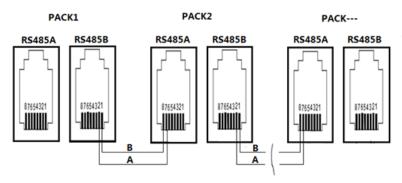
4、5 NC

 Inverter communication: the isolated CAN and RS485 communication interface CAN be used to communicate with SMA, Schneider, Victron, Studer, SunSynk, Growatt, GoodWe, Sofar, Ginlong/Solis, Sermatec, and other mainstream inverters in the market

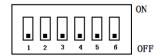
CAN/RS485Using 8P8C Vertical RJ45 Socket				
RJ45 Pin	Definition			
1	RS485-B			
2	RS485-A			
3	RS485-RL+			
4	CAN-RL			
5	RS485-GND\CAN-GND			
6	RS485-RL-			
7	CAN-H			
8	CAN-L			

3.6 Multi-device parallel connection definition

BMS batteries can communicate with devices with RS485 bus in parallel, and RS232 interface can communicate with PC or other intelligent terminals. Human-computer interaction RS485 bus can communicate with any battery package information in parallel. The multi-computer parallel bus interface is shown in the following figure.



3.7 Address Dial Switch



In the operation of multi-machine parallel communication, it is necessary to configure the dial address of each PACK first. Dialing is in BCD code format. Address 0 is defined as dot is O FF state, blank is ON state, the same below), Address 1

please refer to the table below for details.

Address			Instruction				
?	#12	#22	#32	#42	#52	#62	?
1	ON	OFF	OFF	OFF	OFF	OFF	Use lonely (Main)
2	OFF	ON	OFF	OFF	OFF	OFF	Set as Pack1
3	ON	ON	OFF	OFF	OFF	OFF	Set as Pack2
4	OFF	OFF	ON	OFF	OFF	OFF	Set as Pack3





5	ON	OFF	ON	OFF	OFF	OFF	Set as Pack4
6	OFF	ON	ON	OFF	OFF	OFF	Set as Pack5
7	ON	ON	ON	OFF	OFF	OFF	Set as Pack6
8	OFF	OFF	OFF	ON	OFF	OFF	Set as Pack7
9	ON	OFF	OFF	ON	OFF	OFF	Set as Pack8
10	OFF	ON	OFF	ON	OFF	OFF	Set as Pack9
11	ON	ON	OFF	ON	OFF	OFF	Set as Pack10
12	OFF	OFF	ON	ON	OFF	OFF	Set as Pack11
13	ON	OFF	ON	ON	OFF	OFF	Set as Pack 12
14	OFF	ON	ON	ON	OFF	OFF	Set as Pack13
15	ON	ON	ON	ON	OFF	OFF	Set as Pack14
16	OFF	OFF	OFF	OFF	ON	OFF	Set as Pack15
		•				•	
62	OFF	ON	ON	ON	ON	ON	Set as Pack61
63	ON	ON	ON	ON	ON	ON	Set as Pack62

4 Appearance

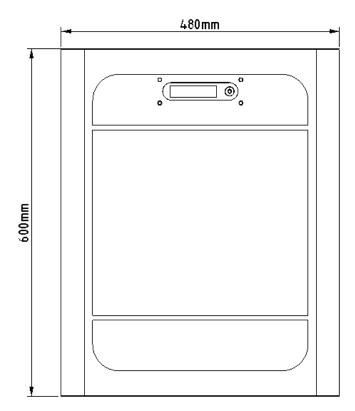
4.1、 View

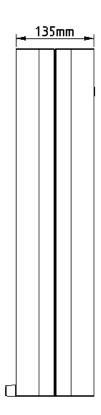




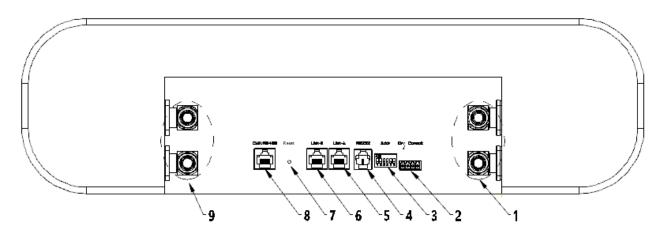


4.2、 dimensional drawing





4.3、 Interface View



No.	Items	Instructions
1	ı	Negative Pole
2	Dry Contact	dry contact
3	Addr	Address Dial Switch
4	RS232	RS232 communication port
5	Link-A	Multi-device parallel connection 1
6	Link-B	Multi-device parallel connection 2
7	Reset	Reset button
8	CAN/RS485	CAN/RS485 communication port
9	+	Positive Pole



5 Storage and Transportation

5.1 Storage

When the product is not in use for a long time, please put it in a dry and ventilated place to avoid inflammable and explosive articles; charge and maintain the battery pack regularly every three months to ensure that the battery is in the best performance state.

5.2 Transportation

Battery pack should be packed with outer packing before they can be transported. In the course of transportation, severe shock, shock or extrusion should be prevented, and sunshine and rain should be prevented.

6 Warning and Tips

- 6.1 Never put batteries in water or wet them o
- 6.2 It is forbidden to charge and use batteries outside the temperature range we prescribe. Do not store, charge and use this product near the source of fire or heat.
- 6.3 When the battery pack emits odor or leaks, it should stop using or charging immediately, and move to an open ventilated place, away from the source of fire, and contact us in time.
- 6.4 Do not connect the positive and negative poles in connection with the load.
- 6.5 Do not short-circuit the positive and negative poles of the battery pack with metal conductors
- 6.6 Do not put the battery pack into the fire or heat it.
- 6.7 It is strictly forbidden to dissect the battery pack artificially, to pierce the battery pack with nails or sharp objects, to strike the battery pack with hammers or other external forces, and to trample and drop the battery pack artificially.
- 6.8 It is strictly forbidden to put batteries in microwave ovens or pressure vessels.
- 6.9 If any abnormal phenomena occur during charging or using, please stop charging and using immediately.
- 6.10 The optimum operating temperature of the product is 25±5°C. If the product is not in this temperature
- 6.11rangenry thmakforuction of our sinter, other allity hourgers adjusting third losser pollers and do not disassemble the battery pack without permission.
- 6.12 The above test is for new batteries whose arrival time is not more than one month.