

锂离子电池组技术说明书

Lithium-ion Battery Pack Specification

Product Name/产品名称 51.2V100AH LFP battery system

Specifications/Model/规格型号: B034-51.2V-100AH

Draw up/制定: _____

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Ratify/批准: _____

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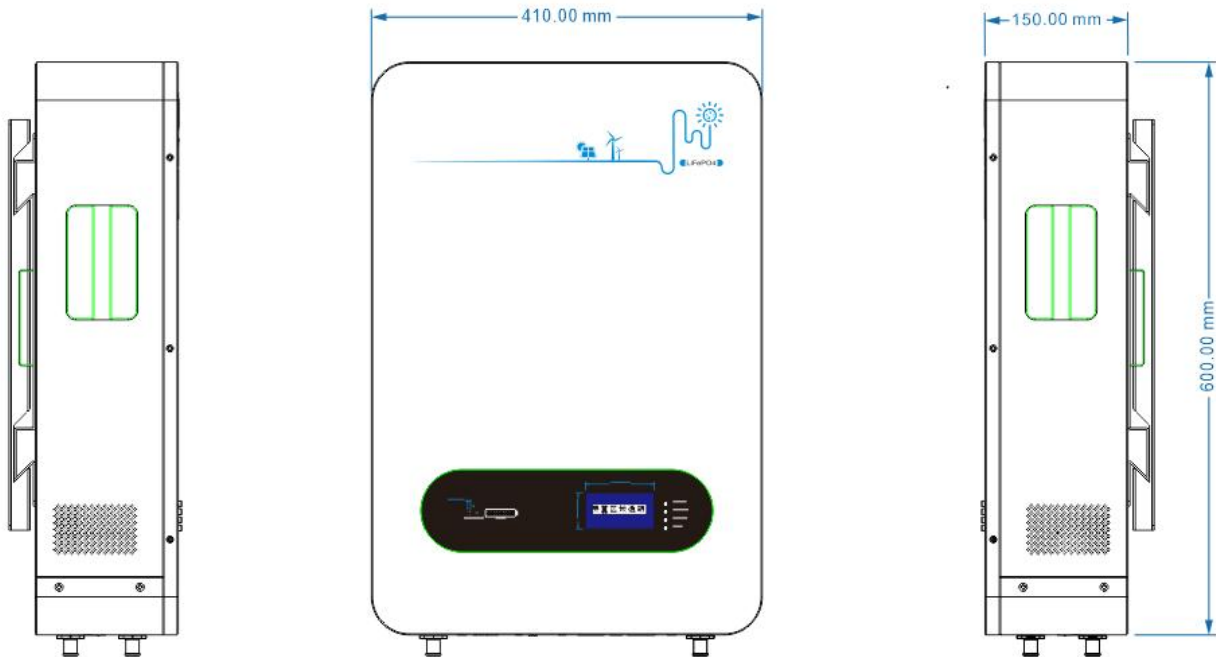
1.Product introduction 产品介绍

(1) This Shenzhen SAIJIAOYANG ENERGY SCIENCE TECHNOLOGY Co,Ltd pack (including BMS) designed and manufactured by Shenzhen SAIJIAOYANG ENERGY SCIENCE TECHNOLOGY Co,Ltd. It consists of 16S1P cells in series. The battery is assembled with intelligent sorting, which is accurate and reliable. The BMS uses a professional protection plate test system to conduct a comprehensive test before going online to ensure that the BMS achieves a comprehensive and effective protection for battery pack during the period of use. This product has the characteristics of high energy density, long life, safety and reliability, light weight, and wide temperature range.

(1) 本产品由深圳赛骄阳能源科技股份有限公司设计制造的 LFP 电池组(含 BMS)。它由 16S1P 单元串联而成。电池装配智能分拣, 准确可靠。BMS 采用专业的保护板测试系统, 在上线前进行全面测试, 确保 BMS 在使用期间对电池组进行全面有效的保护。本产品具有能量密度高、寿命长、安全可靠、重量轻、温度范围宽等特点。

(2) The 51.2V100Ah product has a height of 150 mm and a width of 410- mm. It is specially designed for 600-mm cabinet installation. It is mainly used for communication backup batteries and large-capacity backup power supply meet the requirements of energy storage systems, hybrid energy base stations, backup power supplies, and home energy systems.

(2) 51.2 v100 Ah 产品高 150mm 宽度 410mm。长度 600mm 机柜安装而设计。主要用于通信备用电池和容量备用电源, 满足储能系统、混合能源基站、备用电源和家庭能源系统的要求。



2. Function description 功能描述

The network position of the LFP battery module in the communication power system is shown in Figure 1. LFP 电池模块在通信电源系统中的组网位置如图 1 所示。

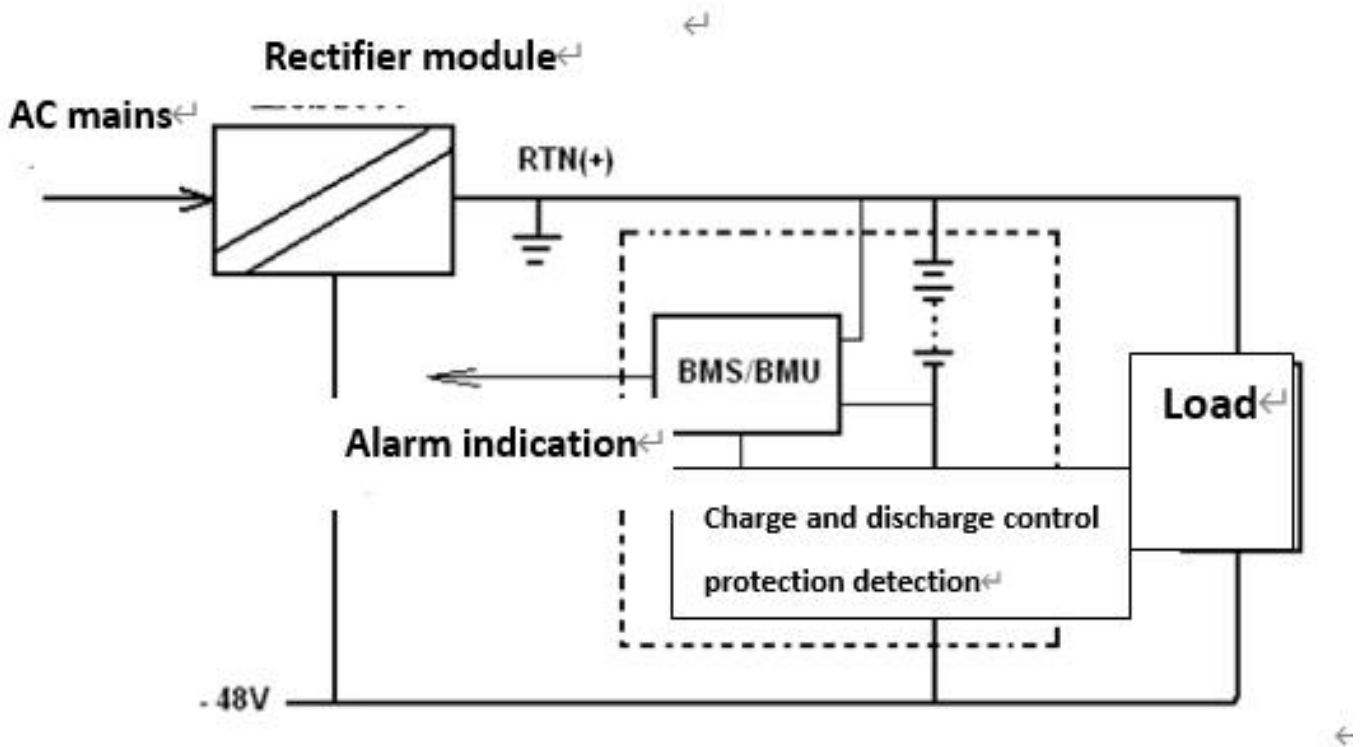


Figure 1 Network position of LFP module in communication power system

The LFP module keeps the floating charge online when it is fully charged. When the power module output is abnormal (non-output overvoltage), it provides a DC backup function with zero transition time. The built-in battery management unit performs charge and discharge management of the battery pack and provides various of protection functions, at the same time, the module's operating status and alarm information are reported via the alarm indication interface RS485.

The RTN (+) ground in Figure 1 is only for illustration. The positive and negative output ports of the external battery pack of the 51.2V100Ah LFP battery module must be completely isolated from the module's metal case²

图 1: LFP 模块在通信电源系统中的网络位置

LFP 模块在充满电时保持浮充在线。当电源模块输出异常(无输出过压)时, 提供零过渡时间的直流备份功能。内置的电池管理单元对电池组进行充放电管理, 并提供多种保护功能, 同时模块的保护功能通过告警指示接口 RS485 上报运行状态和告警信息。

图 1 中的 RTN(+)接地仅供说明。51.2V100Ah LFP 电池模块外接电池组的正负极输出端口必须与电池模块的金属外壳完全隔离。

The appearance of the front panel of the 51.2V100Ah module is shown in Figure 2 and the panel silk screen requirements are shown in Table 2.

51.2V100Ah 电池前面板外观如图 2 所示, 面板丝印要求如表 2 所示。

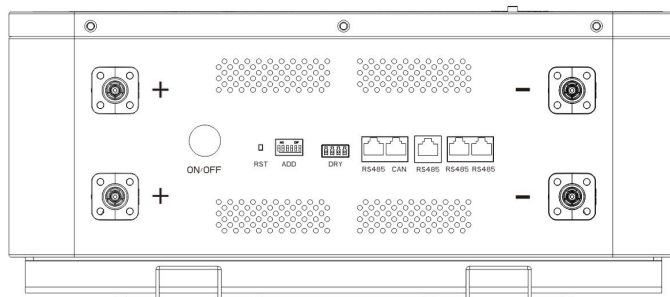


图 2 电池的结构尺寸和面板外观

Figure 2: The structure size of the battery and the appearance of the panel

表 1: 面板丝印说明

Device name/名称	Silk screen logo/标志	Function description/功能描述
DIP switch/拨码开关设置	ADDR	DIP switch address setting/拨码开关地址设置
RJ45-1 interface/ RJ45 接口	RS485/ CAN	485Communication input/通信输入
RJ45-2 interface/ RJ45 接口	RS485/ RS485	485Communication output/通信输入
Green LED indicator/ 绿色 LED 指示灯	RUN	Show running status/显示运行状态
Green LED indicator/ 绿色 LED 指示灯	ON/OFF	Show ON/OFF status/显示开关机状态
Red LED indicator/红色 LED 指示灯	ALM	Show alarm status/显示运行警报
Capacity display indicator/容量显示指示器	SOC	Display battery capacity status/显示电池容量状态
Reset/复位	RESET	Control the booting and shutdown of BMS system./ 控制 BMS 系统的启动和关闭
正极接线柱/Positive terminal	P+	Battery positive output 1 way terminal/电池正输出 1 路端子
/ 负极接线柱 Negative terminal	P-	Battery negative output 1 way terminal/电池负极输出 1 路端子
RS485 interface/ RS485 接口	RS485	RS485 Communication output/RS485 通讯输出
on-off 开关	POWER SWI TCH	电池系统开关/ Battery system switch
Ground Electrode/接地		接地 /Ground terminal

3.Extreme working range 工作范围

The battery is suitable for working in the following range. Unless otherwise stated, the actual operation of the device cannot exceed the following conditions.

该电池适用于以下范围内工作。除非另有说明，设备的实际运行不能超过以下条件

Table 3 51.2 v100Ah extreme working range

Parameter/参数	Unit 单位	Min 最小	Typical 典型	Max 最大	Remark/备注
Working voltage range/工作电压范围	V	43.2	51.2	58.4	
Battery power-off conditions (the relationship between the two conditions is "OR")/电池断电条件(两种条件的关系为“OR”)	V		43.2		Pack voltage of LFP battery module output low voltage protection/ LFP 电池模块封装电压输出低压保护
			2.7		Single cell output low voltage protection/单电芯输出低压保护
Alarm before battery is powered off (2 conditions are OR)/ 电池断电前报警 (有 2 种情况为 OR)	V		44.8		Pack voltage of LFP battery module output low voltage alarm/ LFP 电池模块封装电压输出低压报警
			2.8		Single cell output low voltage alarm 单电芯输出低压报警
Max Charging current 最大充电电流	A	/	50		Maximum is instantaneous pulse current 最大为瞬时脉冲电流
Charging temperature 充电温度	°C	0	25	55	Need to add heating module 需要增加加热模块
Max Discharging current 最大放电电流	A	/	100		Maximum is instantaneous pulse current 最大为瞬时脉冲电流
Discharge temperature 放电温度	°C	-25	25	60	The battery life at a high temperature of 50 ~ 60 degrees is expected to be half of normal temperature. /电池在 50 ~ 60 度高温下的使用寿命预计是正常温度的一半。
Ambient storage temperature 环境储存温度	°C	-20	25. system parameters/系统参数	40	<p>Allows the longest storage non-charge interval period under different temperature conditions after the LFP module leaves the factory</p> <p>1) ≥12 months @ 25 °C 2) ≥6 months @ 35 °C 3) ≥3 months @ 40 °C</p> <p>2.The factory state of charge is 30% -50%允许 LFP 模块出厂后，在不同温度条件下最长的储存不充电间隔时间</p> <p>1)≥12 个月@ 25°C 2)≥6 个月@ 35°C 3)≥3 个月@ 40°C</p> <p>2. 工厂充电状态为 30% -50%</p>

4.Ystem parameters 系统参数

Rated Voltage额定电压		51.2V
Rated Capacity额定容量		100Ah
The battery weight电池重量		48±0.3Kg
Rated Total Energy额定总能量		5.12kWh
Compound mode组合方式		16S1P
Internal resistance内阻		≤40 mΩ
cycle life循环寿命		≥3500循环次数25±2°C, 0.5C/0.5C, 70%DOD, 剩余容量衰减至80Ah ≥3500cycles @25±2°C, 0.5C/0.5C, 70%DOD, residual capacity decay to 80Ah
Chargingcurrent/ 25C° 充电电流/ 25C°	Standard charging current 标准充电电流	20.4A<0.2C>
	Max.Charge Current 最大充电电流	50A(Charging Current @25 C) 50A(最大连续充电电流@25 C)
	Charge Voltage 充电电压	58.4V<3.65V/ Cell >
Discharge current 放电电流	Standard discharge current 标准放电电流	50A<0.5C>
	Max.Charge Current 最大放电电流	100A(Max Continuous Discharge Current @25 C) 100A(最大连续充电电流@25 C)
	Discharge Cut-off Voltage 放电截止电压	43.2V<2.7V/ Cell >
Discharge Temperature放电温度		-20°C to 60°C
Charge Temperature充电温度		0°C to 55°C
Dimensions外形尺寸 (mm)		600mm*410mm*150mm
Remote and Communication逆变器		/

5.ctrical performance test 电性能测试

Note: Unless otherwise specified, the charge and discharge tests of the battery pack and cell are performed under the environment of temperature $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, relative humidity 25% ~ 85%, and atmospheric pressure 86Kpa ~ 106Kpa.

注:除另有规定外, 电池组和电池单体的充放电试验是在温度 $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 、相对湿度25% ~ 85%、大气压力 86Kpa ~ 106Kpa的环境下进行的

SN 序号	Test items 检测项目	Test Conditions 检测方法	Criteria 检验标准
1	Consistency of single battery capacity 单个电池容量的一致性	<p>1. After standard charging, leave the LFP module open circuit for 60 minutes at $25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, and then stop the test when the battery is discharged with 50A current until the battery voltage reaches the discharge termination voltage, and test capacity deviation of each single cell.</p> <p>2. Measure the internal resistance deviation of the single cell after the standard is fully charged.</p> <p>1. 标准充电后, 让 LFP 模块在 $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 开路 60 分钟, 待电池放电后停止测试 50A 电流直到电池电压达到放电终止电压, 并测试每个单体电池的容量偏差。</p> <p>2. 测量标准电池充满电后单体电池的内阻偏差。</p>	<p>Max Continuous</p> <p>1. This test item is for the individual batteries (cells) that make up the LFP battery module, and the capacity deviation should not exceed $\pm 2\%$ of the average capacity of the group of single cells. Test before module assembly.</p> <p>2. The internal resistance of the single cell does not exceed $\pm 0.5\text{m}\Omega$ of the average internal resistance value.</p> <p>1. 本测试项目为 LFP 电池组件的单体电池(单体电池), 容量偏差不应超过单体电池组平均容量的 $\pm 2\%$。组件组装前进行测试。</p> <p>2. 单电芯内阻不超过平均内阻值的 $\pm 0.5\text{m}\Omega$。</p>
2	Rated Capacity 额定容量	<p>After standard charging, leave the LFP battery module open circuit for 60 minutes at $25\text{ }^{\circ}\text{C} \pm 2$, and then stop the test when discharging with 50A until the battery group voltage reaches discharging termination voltage, and calculate the discharge capacity (in Ah)</p> <p>标准充电后, 让 LFP 电池模块在 $25^{\circ}\text{C} \pm 2$ 下开路 60min, 用 50A 放电时停止测试, 直到电池组电压达到放电终止电压, 计算放电容量(单位: Ah)</p>	<p>$\geq 100\text{Ah}$ The end discharge voltage of the battery string is 43.2V $\geq 100\text{Ah}$ 电池组放电结束电压为 43.2V</p>
3	Low-temperature capacity 低温容量	<p>After standard charging, leave the LFP battery module open circuit in a low-temperature box and set the temperature. After the preset temperature is stable, leave it for 120 minutes and discharge it with 20A</p>	<p>The discharge capacity at different temperatures meets $\geq 80\%$ of rated capacity</p>

		<p>to the specified termination voltage of 43.2V. And record the discharge capacity of the battery under the set low temperature conditions. Combined with the actual operating environment of the product, the test charging and discharging are performed under the same environment. 标准充电完成后, 将LFP 电池模块置于低温箱中开路, 设置温度。待温度稳定后, 静置 120 分钟, 20A 放电至规定的终止电压 43.2V。并记录电池在设定的低温条件下的放电容量。结合产品的实际运行环境, 在相同的环境下进行充放电试验。</p>	<p>@ 0 °C; ≥60% of rated capacity @ -20 °C; The temperature setting should not exceed ± 2 °C 不同温度下的放电容量满足 ≥额定容量的 80% @ 0°C; ≥额定容量的 60% @ -20°C; 温度设定不超过±2°C</p>
4	High temperature capacity 高温性能	<p>After standard charging, leave the LFP battery module open circuit in a high-temperature box and set the temperature. After the preset temperature has stabilized for 120 minutes, then discharge it to the specified termination voltage with 20A and record the discharge capacity of battery under the setting low temperature.</p> <p>Combined with the actual operating environment of the product, the test charging and discharging are performed under the same environment. 标准充电完成后, 将LFP 电池模块置于高温箱中开路, 设置温度。待预设温度稳定 120 分钟后, 用 20A 将其放电到指定的终止电压, 记录电池在设定的低温下的放电容量。结合产品的实际运行环境, 在相同的环境下进行充放电试验。</p>	<p>The discharge capacity at different temperatures meets ≥99% of rated capacity @ 40 °C; ≥99% of rated capacity @ 55 °C The temperature setting should not exceed ± 2 °C 不同温度下的放电容量满足 ≥额定容量的 99% @ 40°C; ≥99%额定容量@ 55°C 温度设定不超过±2°C</p>
5	Charge retention capacity 电荷保持能力	<p>Charge and discharge the LFP battery module once to measure the actual capacity of the battery pack. After re-charging, open circuit and storage 28 days at 20 ± 2 °C then discharge to the specified termination voltage with 1I₁₀ A. Calculate the discharge capacity (in Ah). The battery is required to have output when it is left unused. 对LFP 电池模块进行一次充放电, 测量电池组的实际容量。充电后, 在 20±2°C下开路储存 28 天, 用 1I₁₀ A 放电至规定的终止电压。计算放电容量(单位:Ah)。当电池闲置时, 要求它有输出。</p>	<p>The discharge capacity should not be less than 95% of the actual capacity. 放电容量不应小于实际容量的 95%</p>
6	Overcharge capability 过充电功能	<p>This test shall be performed after the protection unit circuit is removed.</p> <p>The battery module is placed in a fume hood. The constant current and constant voltage source voltage is set to 2 times the nominal voltage of the battery module. The battery module is charged with a current of 2 C₁₀ A. During the test, the battery module is monitored with a point thermometer with continuous recording function Temperature change ends when the battery temperature reaches steady state or drops to ambient temperature该试验应在保护单元电路拆除后进行。</p>	<p>The battery pack and batteries should not explode or catch fire. 电池组和电池不能爆炸或着火。</p>

		<p>电池模块放置在通风柜中。恒流恒压源电压设置为电池模块标称电压的2倍。电池模块充电电流为2c10a。在测试过程中,使用具有连续记录功能的点温度计对电池模块进行监测,当电池温度达到稳定状态或下降到环境温度时,温度变化结束</p>	
7	Over-discharge capability 过放电功能	<p>This test shall be performed after the protection unit circuit is removed. The battery module is placed in a fume hood, and the battery module is discharged with 2I₁₀A current (the discharge protection function of the BMS should be temporarily removed during the test) until a certain battery voltage reaches 0V. 该试验应在保护单元电路拆除后进行。将电池模块置于通风柜中,电池模块以 2I₁₀A 电流放电(测试时 BMS 暂时取消放电保护功能),直到电池电压达到一定的 0V。</p>	<p>The battery pack and batteries should not explode or catch fire. 电池组和电池不能爆炸或着火。</p>
8	Storage performance 存储性能	<p>The battery pack is a product produced within 3 months. Before the battery pack is stored, it should be charged according to the standard. After charging about 40% to 50% of its capacity, store it in any of the following environments:</p> <p>a) Storage time: 1 week, storage environment temperature: -20 °C ~ 50 °C, relative humidity: 45% ~ 85%;</p> <p>b) Storage time: 1 month, storage environment temperature: -20 °C ~ 45 °C, relative humidity: 45% ~ 85%;</p> <p>c) Storage time: 6 months, storage environment temperature: -20 °C ~ 40 °C, relative humidity: 45% ~ 85%.</p> <p>After the storage period expires, the battery pack is charged by the standard charging method, and discharged with a current of 2I₁₀ A to the end of power.</p> <p>该电池组是 3 个月内生产的产品。电池组在储存前,应按标准进行充电。充电约 40% ~ 50%后,可将其存储在以下环境中:</p> <p>a) 贮存时间:1 周,贮存环境温度:-20°C~ 50°C,相对湿度:45% ~ 85%;</p> <p>b) 贮存时间:1 个月,贮存环境温度:-20°C~ 45°C,相对湿度:45% ~ 85%;</p> <p>c) 贮存时间:6 个月,贮存环境温度:-20°C~ 40°C,相对湿度:45% ~ 85%。</p> <p>在存储期限结束后,电池组按标准充电方式充电,并以 2i10a 电流放电至电源结束。</p>	<p>2I₁₀A discharge capacity should not be less than 85% of the rated value. 2/10A 放电容量应不小于额定值的 85%。</p>

6.BMS function inside the battery module 电池内部的 BMS 功能

6.1 When the battery is charging 当电池充电时

4 capacity indicators (CAPACITY) will display according to the current battery capacity

The running indicator (RUN) is always on; ;

When 4 capacity indicators of the battery are on. When the RUN light is off, the battery is fully charged

根据当前电池容量显示4个容量指示器 (capacity)

运行指示灯 (RUN) 常亮; ;

当电池的4个容量指示灯亮时。 当RUN灯熄灭时, 电池充满电

6.2 When the battery is discharged 当电池放电时

RUN light flashes once every about 0.5S;

4 capacity indicators (CAPACITY) will be displayed according to the remaining capacity of the battery discharge

When the battery is discharged to the over-discharge protection voltage, it enters into protection. All battery lights will be dark.

RUN 指示灯每 0.5S 左右闪烁一次;

根据电池放电剩余容量显示 4 个容量指标 (capacity)

当电池放电至过放电保护电压时, 进入保护。所有的电池灯都将变暗

6.3 Battery Alarm 电池报警

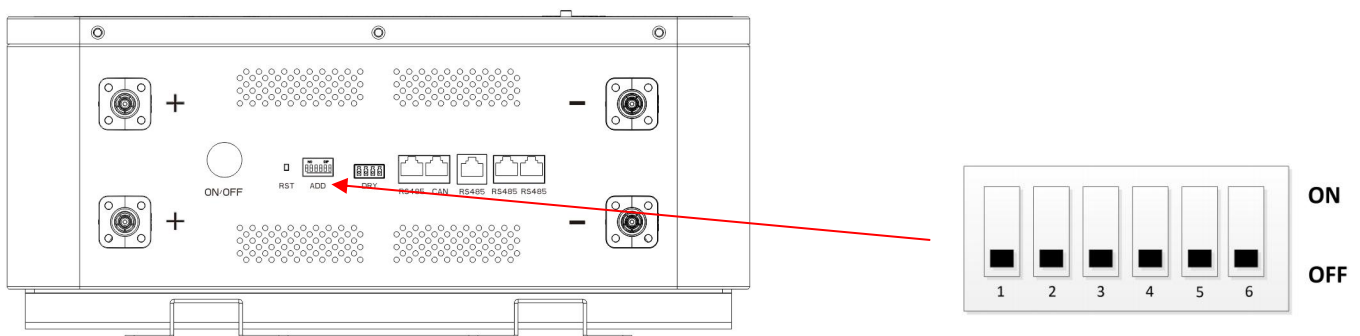
When the battery fails, the ALM indicator is displayed in red, and the battery failure is warning.

当电池故障时, ALM 指示灯显示为红色, 电池故障警告。

6.4 ADS dial code 拨码开关设置

The position of the DIP switch is on the left side of the socket of the protection plate, the shape is as shown below

拨码开关的位置在保护板插座左侧, 形状如下图所示



Dial setting 拨号设置

When packs are connected in parallel, use the DIP address function when DIP 6 is connected to ON. Otherwise, use the default automatic addressing function. Use the DIP switch on the BMS to set the address to distinguish different packs.

当 PACK 作并联使用时, 拨码 6 打到 ON 上使用拨码地址功能, 否则使用默认自动寻址功能, 通过 BMS 上的拨码

开关设置地址区分不同的 PACK, 需避免地址设为相同, BMS 拨码开关的定义参照下表, 系统最大支持 15 个并机。

地址位(二进制) Address bit (binary)	说 明 (Explain)				
	4	3	2	1	
0001(1)	OFF	OFF	OFF	ON	设置 PACK1 主机/单机使用 (Set PACK1 to be used by a host or single machine)
0010(2)	OFF	OFF	ON	OFF	设置 PACK2 (Set PACK2)
0011(3)	OFF	OFF	ON	ON	设置 PACK3 (Set PACK3)
0100(4)	OFF	ON	OFF	OFF	设置 PACK4 (Set PACK4)
0101(5)	OFF	ON	OFF	ON	设置 PACK5 (Set PACK5)
0110(6)	OFF	ON	ON	OFF	设置 PACK6 (Set PACK6)
0111(7)	OFF	ON	ON	ON	设置 PACK7 (Set PACK7)
1000(8)	ON	OFF	OFF	OFF	设置 PACK8 (Set PACK8)
1001(9)	ON	OFF	OFF	ON	设置 PACK9 (Set PACK9)
1010(10)	ON	OFF	ON	OFF	设置 PACK10 (Set PACK10)
1011(11)	ON	OFF	ON	ON	设置 PACK11 (Set PACK11)
1100(12)	ON	ON	OFF	OFF	设置 PACK12 (Set PACK12)
1101(13)	ON	ON	OFF	ON	设置 PACK13 (Set PACK13)
1110(14)	ON	ON	ON	OFF	设置 PACK14 (Set PACK14)
1111(15)	ON	ON	ON	ON	设置 PACK15 (Set PACK15)

6.5. Host computer communication address code setting 主机通讯地址码设置

Enter the code system of the current master or slave in the system parameters of the upper computer, and the communication can be detected and communicated. The BMS is configured to work in stand-alone mode, and the dialing address can be any address (need to match with the upper computer or FSU address); the BMS is configured to work in cascade, and the dialing address is selected from 1 to 15 (need to match with the upper computer or FSU address) 在上位机的系统参数中输入当前主从的代码系统, 即可进行通信检测和通信。

BMS 配置为单机工作模式, 拨号地址可为任意地址(需要与上位机或 FSU 地址匹配); BMS 配置为级联工作, 拨号地址选择 1 ~ 15(需要与上位机或 FSU 地址匹配)

6.6 Working Mode 工作模式

6.6.1 Charging mode 充电模式

When the BMS detects that there is an external charging voltage $\geq 58.4V$, and the cell voltage and temperature are both within the chargeable range, it will turn on the charging MOSFET for charging. When the charging current reaches the effective charging current, it enters the charging mode.

BMS 在检测到外部有充电电压且 $\geq 58.4V$, 同时电芯电压及温度均在可充电范围内时, 开启充电 MOSFET 进行充电。充电电流达到有效充电电流时, 进入充电模式。

6.6.2 Floating charge mode 浮充充电模式

When the detection of AC connection, charging current, charging temperature and other abnormal charging protection cannot be charged normally, or the external charging voltage is close to the internal voltage of the battery, the BMS enters the floating charging mode. In floating charging mode, the charging mosfet is disconnected

当检测到交流连接, 充电电流、充电温度等异常充电保护不能进行正常充电或外部充电电压接近电池内部电压时, BMS 进入浮充模式。浮动充电模式, 充电 mosfet 断开

6.6.3 Discharge mode 放电模式

The BMS enters the discharge mode when it detects that the load is connected, the cell voltage and temperature are within the dischargeable range, and the discharge current reaches the effective discharge current BMS 在检测到负载连接且电芯电压及温度在可放电范围内, 放电电流达到有效放电电流时进入放电模式。

6.7 Standby mode 待机模式

以上两种模式都不满足时, 进入待机模式。

When the above two modes are not satisfied, enter the standby mode.

6.7 Sleep mode 休眠模式

到正常待机规定时间后、电池触发欠压保护、执行按键关机或上位机执行关机命令, BMS 进入休眠(关机)模式。

After the specified time of normal standby, the battery triggers under-voltage protection, executes a button shutdown or the host computer executes a shutdown command, the BMS enters the sleep (shutdown) mode.

6.9 Button Function“RESET”按键功能

BMS 处于休眠状态时, 按下按键 3~6S 后松开, 保护板被激活, LED 指示灯从“RUN”开始依次点亮 0.5 秒。

When the BMS is in the sleep state, Hold down the key for 3~6S and release it, the BMS board is activated, and the LED indicator ON 0.5s successively from "RUN".

BMS 处于激活状态时, 按下按键 3~6S 后松开, 保护板被休眠, LED 指示灯从“Minimum Power”依次点亮 0.5 秒。

When the BMS is in the active state, hold down the key 3~6S and release it, the BMS board will in sleep, and the LED indicator light will on 0.5 seconds successively from " Minimum Power ".

BMS 处于激活状态时, 按下按键 3~6S 后松开, 保护板被复位, LED 指示灯全部点亮 1.5 秒。

When the BMS is in the active state, hold down the key 3~6S and release it, the BMS board will in reset, and All LED indicator light will on 1.5 seconds.

6.10 Sleep / wake function 休眠/唤醒功能

6.10.1 Sleep 休眠

当满足以下任意一条件时, 系统进入低功耗模式:

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

1) 单体或总体过放保护 30 秒内仍未解除。

Over discharging protection of the cell or the total voltage has not been released within 30 seconds

2) 按下按键达 3-6S 秒钟后, 松开按键。

Press the button for 3-6S seconds and release the button.

3) 通过上位机软件强制休眠。

Sleep is forced by computer or north software.

4) 单体电压低于休眠电压且无通讯无电流, 24 小时后自动休眠。(休眠电压和时间可以通过上位机配置)

When the voltage of the unit is lower than the sleep voltage and there is no communication and no current, it will sleep automatically for 24 hours. (sleep voltage and time can be configured by upper computer)

6.10.2 Wake Up 唤醒

当系统处于低功耗模式, 满足以下任意一条件时, 系统将退出低功耗模式, 进入正常运行模式:

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

1) 接入充电器, 充电器输出电压需大于 48V。

Connect the charger, and the output voltage of the charger shall be greater than 48V.

2) 按下按键 3-6S, 松开按键后。

Press the button 3S and release it. (when the minimum cell voltage is between 2.5V and 2.65V, the over discharge protection can wake up for 1 minutes with reset button)

6.11 通信功能 Communication Function

RS485 接口实现与 PC 或 者其它智能终端通讯

RS485 interface implementation for communication with PC or other intelligent terminals

6.12 RS485 通讯接口 RS485 Communication port

RS485 接口应采用两个 RJ45 网口插座便于多 BMS 级连, 两个接口物理上为一个串口, 在 BMS 板内进行连接, 各 BMS 间通过符合 T568B 标准的 8 芯直连网线进行级连。

The BMS provides two RJ45 communications ports. The two interfaces are physically one serial port, which are connected in BMS board. Each BMS is connected by 8-core direct connection network cable conforming to T568b standard.

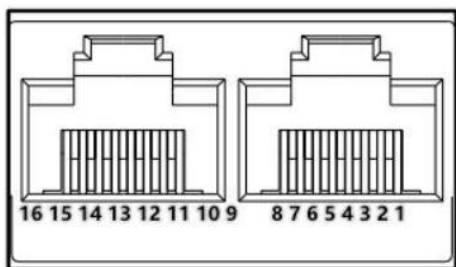
6.13 CAN Communication port CAN 通讯接口 CAN Communication port

CAN 接口实现与逆变器通讯。上传电池状态、故障信息，接受逆变器指令。

CAN interface communicate with Inverter.Upload battery status and fault information, accept inverter commands.

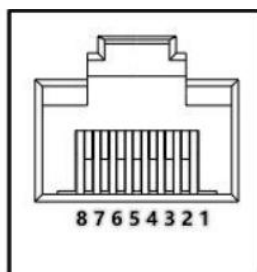
Port introduction 通讯接口定义

接口 Port	通讯 Communication	定义 Definition
RJ12	RS485	<p>Pin2: NC</p> <p>Pin3: BMS TX;</p> <p>Pin4: BMS RX;</p> <p>Pin5: GND</p>
RJ45-1	RS485/RS485	<p>Pin1/8/9/16 : RS485_B</p> <p>Pin2/7/10/15: RS485_A</p> <p>Pin3/6/11/14 : GND</p> <p>Pin4/5/12/13: NC</p>
RJ45-2	RS485/CAN	<p>Pin1/8/ : RS485_B1</p> <p>Pin2/7: RS485_A1</p> <p>Pin3/6/2 : GND</p> <p>Pin4/5/8/7/6/3/1: NC</p> <p>Pin5: CAN_L</p> <p>Pin4: CAN_H</p>

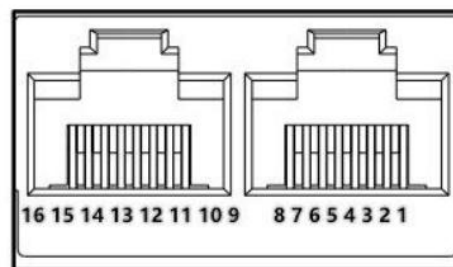


RS485-1

CAN1



RS485-2



CAN2&RS485_2

7. Set basic BMS parameters BMS 基本参数设置

Function 功能	Item list 项目	Set value 设定值
Single voltage alarm 单体电压报警	Unit overcharge protection 单体过充保护	3650mV
	The unit overcharge is restored. Procedure 单体过充保护恢复	3380mV
	A unit overcharge alarm is generated 单体过充告警	3600mV
	Single overcharge protection time 单体过充保护延时	1000ms
	An alarm is generated indicating the overrelease of a module 单体过放告警	2800mV
	Single overrelease protection 单体过放保护	2700mV
	The monomer overrelease protection is restored 单体过放保护恢复	2950mV
	Monomer overrelease protection time 单体过放保护延时	1000 ms
Battery Total Voltage Alarm close down turn on 电池总电压报警	The overall overcharge alarm is generated 总体过充告警	57.60V
	Overall overcharge protection 总体过充保护	58.4V
	Overall overcharge protection recovered 总体过充保护恢复	54V
	Overall overcharge protection is restored 总体过充保护恢复延时	1000 ms
	The overall overrelease alarm is generated 总体过放告警	44.8V
	Overall overrelease protection 总体过放保护	43.2V
	Overall overrelease protection recovery 总体过放保护恢复	51.75V
	The overall overrelease protection is restored 总体过放保护恢复延时	1000 ms
Charging current warning 充电电流警告	The charging overcurrent alarm is generated 充电过流告警	50A
	Charge overcurrent protection 充电过流保护	55A
	Overcurrent protection when charging 充电过流保护延时	1000 ms
Discharge current warning 放电电流警告	A discharge overcurrent alarm is generated 放电过流告警	105A
	Discharge overcurrent protection 放电过流保护	110A
	Discharge overcurrent protection for 1 tin 放电过流保护1 延时	1000 ms
	Discharge overcurrent protection 2 放电过流保护2	140A
	Short circuit protection time 短路保护延时	100 ms

7.1 Status indication 状态指示

State 状态	Normal/Alarm/Protection 正常/告警/保护	ON/OFF 开关	RUN	ALM	Power indicator 电量指示 LED						explain 说明
		●	●	●	●	●	●	●	●	●	
Shutdown 关机	dormancy 休眠	Destroy 灭	Destroy 灭	destroy 灭	Destr oy 灭	Destr oy 灭	Destr oy 灭	dest roy 灭	dest roy 灭	Destr oy 灭	Completely destroyed 全灭
Standby 待机	Normal 正常	Normally on 常亮	Flash 闪 1	destroy 灭	According to electric quantity indicator 依据电量指示						Standby 待机状态
	Alarm 告警	Normally on 常亮	Flash 闪 1	Flash 闪 3							The module of low pressure 模块低压
Charging 充电	Normal 正常	Normally on 常亮	Normally on 常亮	destroy 灭	According to electric quantity indicator 依据电量指示 (电量指示最高 LED 闪 2) Power indicator highest LED flash 2						最高电 量 LED 闪动 (闪 2), 过充告 警时 ALM 不 闪烁
	Alarm 告警	Normally on 常亮	Normally on 常亮	Flash 闪 3							
	The overcharge protection 过充保护	Normally on 常亮	Normally on 常亮	destroy 灭	Norm ally on 常 亮	Norm ally on 常 亮	Norm ally on 常 亮	Norm ally on 常 亮	Norm ally on 常 亮	Norm ally on 常 亮	The indicator switches to standby state 指示灯转为待 机状态
	Temperatureflow Failure 温度、过流、失效保护	Normally on 常亮	Destroy 灭	Normall yon 常 亮	dest roy 灭	dest roy 灭	dest roy 灭	dest roy 灭	dest roy 灭	dest roy 灭	Stop charging 停 止充电
Charging 放电	Normal 正常	Normally on 常亮	Flash 闪 3	destroy 灭	According to electric quantity indicator 依据电量指示						
	Normal 告警	Normally on 常亮	Flash 闪 3	Flash 闪 3							
	Under voltage protection 欠压保护	Normally on 常亮	Destroy 灭	destroy 灭	dest roy 灭	dest roy 灭	dest roy 灭	dest roy 灭	dest roy 灭	dest roy 灭	Stop discharge 停 止放电
	Temperature overcurrentshort circuitreverse connection Failure 温度、过流、短 路、反接、失效保护	Normally on 常亮	destroy 灭	Normall yon 常 亮	dest roy 灭	dest roy 灭	dest roy 灭	dest roy 灭	dest roy 灭	dest roy 灭	Stop discharge 停止放电
Failure 失效		destroy 灭	destroy 灭	Normall yon 常 亮	dest roy 灭	dest roy 灭	dest roy 灭	dest roy 灭	dest roy 灭	dest roy 灭	Stopchargin ganddischar ging 停止充、放 电

Capacity indication 容量指示说明

State 状态		Charging 充电						Discharge 放电					
		L6	L5	L4	L3	L2	L1	L6	L5	L4	L3	L2	L1
Capacity indicator light 容量指示灯		●	●	●	●	●	●	●	●	●	●	●	●
Electricity 电量 (%)	0~ 16.6%	destroy 灭	destroy 灭	destroy 灭	destroy 灭	destroy 灭	Normally on 闪 2	destroy 灭	destroy 灭	destroy 灭	destroy 灭	destroy 灭	Normally on 常亮
	16. ~ 33.2%	destroy 灭	destroy 灭	destroy 灭	destroy 灭	Normally on 闪 2	Normally on 常亮	Destroy 灭	destroy 灭	destroy 灭	destroy 灭	Normally on 常亮	Normally on 常亮
	33. ~ 49.8%	destroy 灭	destroy 灭	destroy 灭	Normally on 闪 2	Normally on 常亮	Normally on 常亮	Destroy 灭	destroy 灭	destroy 灭	Normally on 常亮	Normally on 常亮	Normally on 常亮
	49. ~ 66.4%	destroy 灭	destroy 灭	Normally on 闪 2	Normally on 常亮	Normally on 常亮	Normally on 常亮	Destroy 灭	destroy 灭	Normally on 常亮	Normally on 常亮	Normally on 常亮	Normally on 常亮
	66. ~ 83.0%	destroy 灭	Normally on 闪 2	Normally on 常亮	Normally on 常亮	Normally on 常亮	Normally on 常亮	Destroy 灭	Normally on 常亮	Normally on 常亮	Normally on 常亮	Normally on 常亮	Normally on 常亮

7.2 Data storage function 数据存储功能

电池系统具有充足的数据存储空间，能够记录电池的状态信息、统计信息和告警信息等，方便历史记录查询和故障排查。

The battery system has sufficient data storage space to record battery status information, statistical information and Alarm information, etc., to facilitate historical record query and troubleshooting.

7.3 System upgrade function 系统升级功能

电池系统可以通过串口实现系统软件的在线升级，可实现后续功能的扩展。

The battery system can realize the online upgrade of the system software through the serial port, which can realize the expansion of subsequent functions.

8.0 Using Methods 使用方法

8.1 Battery system power up 电池系统上电

正常情况下,设备面板上断路器处于闭合状态,以下是在断路器闭合,设备关闭的状态下上电,断路器由断开转到闭合的情况下,按下BMS开关,直接被激活。

Under normal circumstances, the circuit breaker on the device panel is in the closed state. The following is when the circuit breaker is closed and the device is turned on, and the circuit breaker is switched from open to closed, press the BMS switch, the device is directly activated.

(1) 确保系统所有接线连接正确无误;

Make sure all wiring connections of the system are complete and correct;

(2) 必须关闭电池系统和逆变器之间的所有开关;

All switches between the battery system and the inverter must be closed;

(3) 启动电池系统:按下BMS上的ON/OFF 1~2S(或重新连接激活线),BMS的指示灯将亮起,系统将被激活。

Start battery system: Press the ON/OFF 1~2S on the BMS (or Reconnect the activation line), the indicator light of the BMS will light up, and the system will be activated.



警告 CAUTION

在激活电池系统之前,必须关闭电池系统和逆变器之间的所有开关,否则系统将报告短路故障。

Before the battery system is activated, all switches between the battery system and the inverter must be closed, otherwise the system will report a short circuit fault.

8.2 Power off the battery system 电池系统下电

在停止系统之前,请按照以下顺序关闭系统电源:交流负载=>PV=>逆变器=>电池

关闭电池:断开电池和逆变器之间的断路器,然后按电池上的ON/OFF。

Before stopping the system, power off the system according to the following order:

AC Load=>PV=>Inverter=>Battery

Turn off the battery: Open the circuit breaker between the battery and the inverter, then press the ON/OFF on the Battery.

注:

停止系统后,请检查以下项目,

确认所有电池均已关闭电源;

所有指示灯均熄灭;

逆变器已经下电。

Notes:

After stopping the system, please check below items,

Confirm all the batteries are powered OFF;

All the LEDs are OFF;

Inverter has been powered off.

9. Installation and Maintenance Precautions 安装维护注意事项

9.1 Installation Precautions 安装注意事项

- (1) 安装前拆箱、检测配件数量和电池外观;

Unpack and check the number of accessories and battery appearance before ins

- (2) 安装挂耳和把手, 用万用表测量电池电压, 一般电池出厂电压在 47 V - 51V 之间;

Install mounting ears and handles, and use a multimeter to measure the battery voltage. Generally, the factory battery voltage is between 47V-51V;

- (3) 接线前查看好电池正负极, 严禁在安装电池时正负极端子接反;

Check the positive and negative terminals of the battery before wiring. It is strictly prohibited to reverse the positive and negative terminals when installing the battery;

- (4) 在电池连接过程中请戴好防护手套, 使用扭矩扳手等金属工具时, 请将金属工具进行绝缘包装, 绝对避免扭矩扳手等金属工具两端同时接触到电池正、负端子, 造成电池短路;

Please wear protective gloves during the battery connection process. When using metal tools such as torque wrenches, please insulate the metal tools to avoid the two ends of the metal tools such as torque wrench from touching the positive and negative terminals of the battery at the same time, causing a short circuit;

- (5) 跟外接设备连接之前, 使设备处于断开状态, 并再次检查电池的连接极性和总电压 是否正确.然后再将电池的正极连接设备的正极, 电池的负极连接设备的负极端, 并紧固好连接线;

Before connecting with the external device, make the device disconnected, and double check the polarity and total voltage of the battery. Then connect the positive terminal of the battery to the positive terminal of the device, and the negative terminal of the battery to the negative terminal of the device. And fasten the connection cable;

- (6) 电池在搬运和摆放中必须轻拿轻放, 严禁坠落、冲击, 禁止抛掷、敲打电池, 以免损坏电池或导致安全隐患;

The battery must be handled lightly during handling and placement . It is forbidden to drop, impact, and toss or knock the battery, so as not to damage the battery or cause safety hazards;

- (7) 禁止使用工具的尖锐部件接触到电池箱表面, 划伤或损坏电池箱;

It is forbidden to use the sharp parts of the tool to contact the surface of the battery box, scratch or damage the battery box;

- (8) 禁止私自拆解电池箱;

It is prohibited to disassemble the battery box without permission;

- (9) 禁止将任何金属、导电材质物件与电池放置一起或者一起组装进电池箱;

It is forbidden to put any metal or conductive material together with the battery into the battery box;

- (10)根据所选安装方式安装:

◆一体化室内外机柜(箱)安装; 根据所定制一体化机柜(箱)安装规范安装。

Integrated indoor and outdoor cabinet (box) installation; install according to customized installation specifications of integrated cabinet (box).



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SHENZHEN SAI JIAO YANG ENERGY & SCIENCE TECHNOLOGY CO.,LTD.

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9.2 Maintenance Precautions 维护注意事项

我司磷酸铁锂电池产品具有自放电率低、超长使用寿命、高可靠性、免维护的优点，集成智能化 BMS 电池管理系统，替代了人工检测环节，自动检测单体电压、总电压和总电流等，防止过充过放情况发生，极大地降低了电池组的故障率。BMS 具有高效率的电池均衡管理技术，极大的提高了电芯的一致性，最大程度的发挥电池的性能及延长使用寿命。

Our lithium iron phosphate battery products have the advantages of low self-discharge rate, long service life, high reliability, and maintenance-free. The integrated intelligent BMS battery management system replaces the manual detection link and automatically detects the cell voltage、total voltage and current, etc., prevent the occurrence of overcharge and over discharge, which greatly reduces the failure rate of the battery pack. BMS has a high-efficiency battery balance management technology, which greatly improves the consistency of the battery cell, maximizes the performance of the battery and extends the service life.

使用过程中对产品进行简单的维护检验即可，建议维护周期：3 个月进行一次。

A simple maintenance and inspection of the product is sufficient during use. The recommended maintenance period: once every 3 months.

◆检查磷酸铁锂电池的极柱、连接线是否出现松动、损伤、变形成腐蚀等现象，电池壳体有无损伤、变形；

Check whether the poles and connecting wires of the LFP battery are loose, damaged, deformed or corroded, and whether the battery case is damaged or deformed;

◆观察电池组运行指示灯的状态，正常状态下是绿灯亮，电池 SOC 灯仅剩最后一盏闪烁时，表明电池电量低，电池即将放干电关断输出；

Observe the status of the battery pack operation indicator. Under normal conditions, the green light is on. When the last one of the battery SOC light flashes, it indicates that the battery power is low, and the battery is about to discharge and shut down;

◆如果出现故障，电池组 ALM 红灯出现闪烁，发出告警，请检查电池连接是否正确或是否存在过流情况；之后按 RST 复位键，电池重启后看故障是否消除，如无法消除请联系厂家处理，请勿擅自打开电池组箱体；

If there is a fault, the ALM red light of the battery pack flashes and an alarm is issued. Please check whether the battery connection is correct or whether there is an over-current condition; then press the RST reset button, and the battery restarts to see whether the fault is eliminated. If it cannot be eliminated, please contact the manufacturer. Do not open the battery pack box without authorization;

◆针对多组电池并联的应用场景，如果当中的一组电池出现故障需要替换，请确保新替换的电池组电压和需要并联的其他电池组的电压压差在 2V 以内，如果压差较大，会发生电压高的电池组给电压低的电池组大电流充电，电压低的电池组发生充电过流保护，导致无法充电；

For the application scenario of multiple batteries in parallel, if one of the batteries fails and needs to be replaced, please ensure that the voltage difference between the voltage of the newly replaced battery and the other batteries in parallel is within 2V. If the pressure difference is larger, A battery pack with a voltage ramp will charge a low-voltage battery pack with a large current, and a low-voltage battery pack will be charged with over current protection, making it impossible to charge;

◆记录停电的时间和次数，对电池的供电时间做详细的统计。

Record the time and number of power outages and make detailed statistics on the power supply time of the battery.

10.Package 包装

磷酸铁锂电池设备进行整体包装，以确保产品在搬运、运输、贮存中不受任何有害气体、化学污染、静电、潮湿和机械损伤。

The lithium iron phosphate battery equipment is packaged as a whole to ensure that the product is free from any harmful gas, chemical pollution, static electricity, humidity and mechanical damage during handling, transportation, and storage.

11. Transport 运输

该产品运输过程应注意以下方面：

The following aspects should be paid attention to during the transportation of this product:

(1) 应轻拿轻放，避免设备受剧烈震动；

Handle with care to avoid severe vibration of the equipment;

(2) 禁止倒置、翻滚、摔、撞电池，避免破坏电池的外观；

It is forbidden to turn the battery upside down, roll over, drop, or hit the battery to avoid damage to the appearance of the battery;

(3) 电池应避免暴晒、雨淋，禁止直接将电池整体浸入水中；

The battery should avoid exposure to the sun and rain, and it is forbidden to submerge the battery as a whole in the water;

(4) 禁止非法拆封及使设备短路。

Illegal unpacking and short-circuiting of equipment is prohibited.

12. Storage 储存

(1) 电池组的外部端子处于绝缘状态；

The external terminals of the battery pack are in an insulated state;

(2) 不要在 60 度的高温下长时间放置或存放电池，否则会导致功能退化，缩短使用寿命；

Do not place or store the battery for a long time at a high temperature of 60 degrees, otherwise it will cause functional degradation and shorten the service life;

(3) 电池的处置应遵循当地法规。

Disposal of batteries should follow local regulations.