RJ ENERGY CO.LTD
No. 16 Ronghe Road, Nanhai District, Foshan , Guangdong, China

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Customer 客户:

Lithium LiFePO4 Battery
Specification Approval Sheet
锂离子电池规格确认书

Model 型号: RJ-51.2V/161AH-8.3KWh

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1 Scope 范围

本规格书描述本公司设计开发的电池，它是产品设计、生产和检验的依据。其作用是让顾客了解产品的质量及正确使用方法。
This specification describes the design and development of the company's battery; it is the product of design, production and inspection basis. Its role is to understand the quality of the product and using the correct method for customers.

本规范适用于由佛山龙马新能源科技有限公司制造的锂离子电池产品。

This specification applies to lithium LiFePO4 battery products manufactured by RJ ENERGY co., LTD

2 Product parameters 产品参数

序号 NO	项目 Projects	规格 Specification	备注 Remark
电池单体参数 Cell unit parameter			
1	电池类型及材料 Battery types and materials	$LiFePO_4$	
2	额定电压/容量 Rated voltage/capacity	3.2V/161Ah	
3	单体电池电压范围 Single battery voltage range	2.5V～3.65V	
4	单体电池重量 Single battery weight	约 3.1Kg	
5	电池内阻 The battery internal resistance	≤ 0.4mΩ	
6	电池尺寸 Module size	62*280*82mm（L*W*H）	
电池组参数 Battery parameter			
1	额定电压 Rated voltage	51.2V	
2	额定容量 Rated capacity	161Ah	
3	电池组电压范围 Battery pack voltage range	43.2V～58.4V	
4	总储电量（kWh） Total Power	8.3kWh	
5	组合方式 Combination	1P16S	
6	绝缘电阻测试值（Ω） Insulation resistance test value	≥20MΩ	
7	工作温度 Operating temperature	Charging 0～55℃； Discharging -20～65℃	
8	标准充电电流 Standard charging current	≤100A	并机版本带 20A（充电限流）
9	标准放电电流 Standard discharge current	≤100A	
10	总重量 Gross weight	约 69.5Kg	
11	电池模组尺寸 Battery Modle size	620*425*230±2mm	含脚垫
12	安装方式 Installation Method	Stack 堆叠式	
13	通讯 communication	RS485/RS232/CANBUS	可选 Optional

3 BMS Specification BMS规格

3.1 BMS parameter参数

编号 No	项目 Project		默认参数 default parameters	是否可设置 Whether can set up	备注 Remark
1	单体过充保护 Single section as the overcharge protection	单体过充告警电压 overcharge the alarm voltage	3600mV	Y	
		单体过充告警恢复电压 overcharge the alarm recovery voltage	3600mV	Y	
		单体过充保护电压 overcharge protection voltage	3700mV	Y	
		单体过充保护延时 overcharge protection latency time	1.0S	Y	
	单体过压保护解除 Single section as the overcharge protection remove	单体过充保护解除电压 overcharge protection remove voltage	33800mV	Y	
		容量解除 Capacity remove	SOC＜96%	Y	
		放电解除 Discharge remove	放电电流＞1A Discharge current＞1A		
2	单体过放保护 Single section as the over discharge protection	单体过放告警电压 Over discharge the alarm voltage	2800mV	Y	过放保护30秒后，仍无法恢复时，将进入低功耗模式 After discharge protection for 30 seconds, still unable to recover, will enter low power mode
		单体过放告警恢复电压 Over discharge the alarm recovery voltage	2800mV	Y	
		单体过放保护电压 Over discharge protection voltage	2700mV	Y	
		单体过放保护延时 Over discharge protection latency time	1.0S	Y	
	单体过压保护解除 Single section as the over discharge protection remove	单体过放保护解除电压 over discharge protection remove voltage	2950mV	Y	
		有充电时解除 charging remove	接入充电器可激活 Connected to the charger can be activated		
3	总体过充保护 Overall overcharge protection	总体过充警告电压 Overall overcharge the alarm voltage	57.6V	Y	
		总体过充警告恢复电压 Overall overcharge recovery voltage	58.4V	Y	
		总体过充保护电压 Overall overcharge protection voltage	58.4V	Y	
		总体过充保护延迟 Overall overcharge protection latency time	10.S	Y	
	总体过充保护解除 Overall overcharge protection remove	总体过充保护解除电压 Overall overcharge protection remove voltage	54.0V	Y	

		容量解除 Capacity remove	SOC＜96%	Y	
		放电解除 Discharge remove	放电电流＞1A Discharge current＞1A		
4	总体过放保护 Overall discharge protection	总体过放警告电压 Overall discharge the alarm voltage	44.8V	Y	过放保护30s后，仍无法恢复时，将进入低功耗模式 After discharge protection for 30 seconds, still unable to recover, will enter low power mod
		总体过放警告恢复电压 Overall discharge recovery voltage	44.8V	Y	
		总体过放保护电压 Overall discharge protection voltage	43.2V	Y	
		总体过放保护延迟 Overall discharge protection latency	1.0S	Y	
	总体过放保护解除 Overall discharge protection remove	总体过充保护解除电压 Overall discharge protection remove voltage	47.2V	Y	
		有充电时解除 charging remove	接入充电器可激活 Connected to the charger can be activated		
5	充电过流保护 Charging over-current protection	充电过流告警电流 Charging Over-current alarm current	105A	Y	连续出现 10 次将锁定该状态，不再自动解除 In 10 consecutive will lock in the state, no longer remove automatically
		充电过流告警恢复电流 Charging Over-current alarm current recovery	105A	Y	
		充电过流保护电流 Charging current over-current protection	110A	Y	
		充电过流保护延迟 Charging Over-current protection latency time	1.0S	Y	
	充电过流保护解除 Charging over-current protection remove	自动解除 Automatic remove	1min后自动解除 Remove automatically after 1 minute		
		放电解除 Discharge remove	放电电流＞1A Discharge current＞1A		
6	放电过流 1 保护 Discharge over-current 1 protection	放电过流 1 告警电流 Discharging Over-current alarm current	105A	Y	连续出现 10 次将锁定该状态，不再自动解除 In 10 consecutive will lock in the state, no longer remove automatically
		放电过流1告警恢复电流 Discharging Over-current alarm current recovery	105A	Y	
		放电过流1保护电流 Discharging current Over-current protection	110A	Y	
		放电过流1保护延时 Discharging Over-current protection latency time	1.0S	Y	
	放电过流1保护解除 Discharging over-current 1 protection remove	自动解除 Automatic remove	1min后自动解除 Remove automatically after 1 minute		
		充电解除 Charging remove	放电电流＞1A Discharge current＞1A		
7	放电过流 2保护	放电过流2保护电流	＞150A	Y	连续出现 10

	Discharge over-current 2 protection	Discharging current Over-current protection			次将锁定该状态，不再自动解除 In 10 consecutive will lock in the state, no longer remove automatically
		放电过流2保护延时 Discharging Over-current protection latency time	100mS	Y	
	放电过流 2保护解除 Discharging over-current 2 protection remove	自动解除 Automatic remove	1min后自动解除 Remove automatically after 1 minute		
		充电解除 Charging remove	放电电流＞1A Discharge current＞1A		
8	短路保护 Short circuit protection	短路保护电流 Short circuit protection current	≥400A	Y	短路保护发生后，未移除负载，按键将无法复位 Short circuit protection, not remove load, buttons will not be able to reset
		短路保护延迟 Short circuit protection latency time	≤300uS	Y	
		短路保护解除 Short circuit protection remove	有充电时，短路保护解除 charging remove		
			负载断开后自动解除 Automatically remove after load disconnect		
9	MOS高温保护 MOSFET High temperature protection	MOS过温告警温度 High temperature alarm temperature	90℃	Y	
		MOS过温告警恢复温度 Temperature alarm recovery temperature	90℃	Y	
		MOS过温保护温度 High temperature protection	115℃	Y	
		MOS过温解除温度 High temperature remove	85℃	Y	
10	电芯温度保护 Batteries temperature protection	充电低温告警温度 Charging the alarm temperature at low temperature	0℃	Y	
		充电低温告警恢复温度 Charging low temperature alarm recovery temperature	0℃	Y	
		充电低温保护温度 Charging protection temperature at low temperature	-5℃	Y	
		充电低温保护解除温度 Charging protection recovery temperature at low temperature	0℃	Y	
		充电高温告警温度 Charging high temperature alarm temperature	60℃	Y	
		充电高温告警恢复温度 Charging High temperature alarm recovery temperature	55℃	Y	
		充电高温保护温度	65℃	Y	

		Charging temperature high temperature protection			
		充电高温保护解除温度 Charging protection recovery temperature High temperature	55℃	Y	
		放电低温告警温度 Discharge the alarm temperature at low temperature	-15℃	Y	
		放电低温告警恢复温度 Discharge low temperature alarm recovery temperature	-15℃	Y	
		放电低温保护温度 Discharge protection temperature at low temperature	-20℃	Y	
		放电低温保护解除温度 Discharge protection recovery temperature at low temperature	-15℃	Y	
		放电高温告警温度 Discharge of high temperature alarm temperature	65℃	Y	
		放电高温告警恢复温度 Discharge of high temperature alarm recovery temperature	65℃	Y	
		放电高温保护温度 Discharge protection temperature High temperature	70℃	Y	
		放电高温保护解除温度 Discharge protection recovery temperature High temperature	60℃	Y	
11	环境温度告警 The environment temperature alarm	环境低温告警温度 Low temperature alarm temperature	-15℃	Y	
		环境低温告警恢复温度 Low temperature alarm recovery temperature	-15℃	Y	
		环境低温保护温度 Low temperature protection	-20℃	Y	
		环境低温保护解除温度 Protect remove temperature in low temperature	-15℃	Y	
		环境高温告警温度 High temperature alarm temperature	65℃	Y	
		环境高温告警恢复温度 High temperature alarm recovery temperature	65℃	Y	
		环境高温保护温度 High temperature protection temperature	75℃	Y	
		环境高温保护解除温度 High temperature protection removing temperature	60℃	Y	
12	消耗电流	工作时自耗电电流	≤30mA（带显示屏）		

	Current consumption	Current consumption at work	≤30mA （Have the screen）		
			≤20mA（不带显示屏） ≤20mA（No screen）		
		低功耗模式电流 Low power mode	≤100μA		
13	均衡功能 Balance	均衡开启电压 Open the voltage balance	3500mV	Y	
		开启压差 Open the voltage difference	30mV	Y	
14	容量默认设置 Capacity of the default Settings	电量低告警门槛 Battery low alarm threshold	SOC＜5%	Y	**充电时不警告**Charging without warning
		剩余容量设置 The residual capacity setting	112AH		
		满容量设置 Set the full capacity	161AH		
15	串口通信 A serial port communication	隔离的 RS-232/RS-485 Isolated RS - 232 / RS - 485 CAN			
16	充电限流功能 Charging current limiting function	充电限流电流 Charging current limiting current	20A		**可选**
17	显示屏 **display screen**	显示屏功能 Display function	有 YES		**可选**
18	储存 Storage	储存功能 Storage function	有 YES		
19	反接保护 Reverse connect protection	反接保护功能 Reverse connect protection function	无 NO		

3.2 休眠及唤醒 Dormancy and Awakening

3.2.1 休眠 Dormancy

当满足以下任意一条件时，系统进入低功耗模式 ；

When the following conditions are met, the system enters a low power consumption mode；

1） 单体或总体过放保护 30 秒内仍未解除。

The monomer or the overall over-release protection has not been released within 30 seconds.

2）按下按键达 3 秒钟后松开按键。

Release the key after pressing the key for 3 seconds.

3）所有单体电压低于休眠设定电压（**默认值 3100mV**），并丐持续时间达到休眠延迟时间（**默认值 1 分钟**）（同时满足无通信、无保护、无均衡、无电流）。

All monomer voltages are lower than the hibernation setting voltage(default 3100mV) and the duration time reaches the hibernation delay time(default 1 minute)(at the same time satisfying no communication, no protection, no equilibrium, no current).

4）待机时间超过 24 小时（无通信、无充放电，无市电）。

Standby time exceeds 24 hours(no communication, no charge discharge, no market power).

5）通过上位机软件强制关机。

Forced shutdown through the upper computer software.

3.2.2 唤醒 Awakening

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

When the system is in a low power consumption mode and satisfies the following conditions, the system will exit the low

power consumption mode and enter the normal operating mode:

1）接入充电器，充电器输出电压需大于 48V;

Connect the charger, the charger output voltage must be greater than 48V;

2）按下按键 3S，松开按键后 ；

Press the key 3S, release the button;

3）接入通信线，开启上位机软件（因过放保护而进入休眠状态，此方法丌能唤醒保护板）

Connect the communication line and open the upper computer software(due to over-release protection and enter a dormant state, this method can not awaken the protective plate)

单体或总体过放保护后进入低功耗模式，每 4 个小时定时唤醒一次，开启充放电 MOS。如可以充电，将退出休眠状态进入正常充电；如果连续 10 次自动唤醒无法充电，将丌再自动唤醒。

After entering the low-power mode after the monomer or overall over-discharge protection, wake up once every 4 hours to open the charge and discharge MOS. If it can be charged, it will exit the dormant state and enter normal charging; If 10 consecutive automatic arousal can not be charged, the automatic arousal will no longer be automatic.

当系统定义为充电结束后，待机 **2** 天**/48h**(待机时间设定值)后仍未达到恢复电压，强制恢复充电至再次充电结束.

When the system is defined as the end of charging, the standby voltage has not reached recovery after 2 days/48 H(standby time setting value), and the recharging is forced until the end of recharging

3.3 按键说明 Key Description

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

BMS are in a dormant state, press the button 3 s after loosening, protective plate is activated, the LED indicator light starting from the "RUN" in light of 0.5 seconds.

BMS 处于激活状态时，按下按键 3S 后松开，保护板被休眠，LED 指示灯从最低电量灯开始依次点亮 0.5 秒，BMS 处于激活状态时，按下按键 6S 后松开，保护板被复位，LED 灯全部同时点亮 1.5 秒。

BMS is active, press the button 3 s after loosening, protective plate is dormant, LED light is from the lowest power light and light 0.5 seconds,BMS is active, press the button after the 6 s to loosen, the protective plate are reset, leds light up all at the same time of 1.5 seconds.

BMS 被复位后仍保留通过上位机设置的参数和功能，如果需要恢复到初始参数可以通过上位机的“恢复默认值”来实现，但相关运行记录和存储数据保持不变（如电量、循环次数、保护记录等）。

BMS remains after being reset through setting the parameter and function of upper machine, if you need to return to the initial parameters can be through the upper machine to implement the "restore default values", but the running record and store data remains the same (such as electricity, cycle times, record, etc.).

3.4 监控内容 Monitor content

遥测：电压、电流、温度、 SOC、 SOH(可选)等；

Telemetry: voltage, current, temperature, SOC, SOH(optional), etc.;

遥信：充放电状态、过充/过流告警、欠压/过流告警、、环境/电池组/PCBA/电池高温告警、环境低温告警、电池组容量过低告警、电池组温度/电压/电流传感器失效告警、电池失效（单体压差过大超限后只告警丌切断）告警（可选）、电池组失效告警（可选）；

Remote communications: charging state, overcharge/overcurrent warning, undervoltage / overflow warning, environment/battery/PCBA/cell high temperature warning, environmental low temperature warning, low battery capacity warning, battery temperature / voltage/current sensor failure warning, Battery failure(single unit pressure difference is too large after the limit is cut off only) warning(optional), battery failure warning(optional);

遥控：充电/放电（可选）、告警声音关、智能间歇充电方式、限流充电方式；

Remote control: charge/discharge(optional), alarm sound off, intelligent intermittent charging method, limited current charging method;

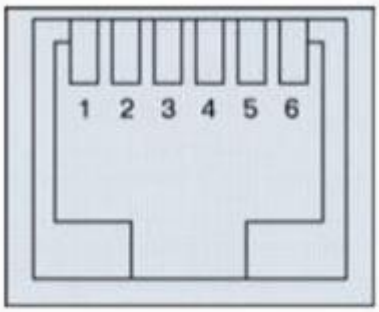
遥调（可选）：电池组的充电/放电管理参数等，且与开关电源系统的输出参数匹配。

Remote transfer(optional): Charge/discharge management parameters for batteries, etc.. The output parameters of the power supply system are not matched.

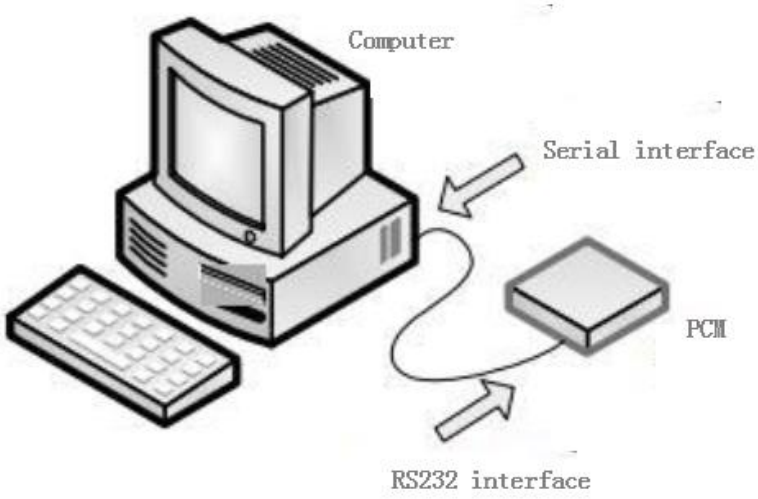
3.5 RS232 通信 Communication

BMS 可以通过 RS232 接口与上位机进行通讯，从而在上位机端察看电池的各种信息，包括电池电压、电流、温度、状态、 SOC、 SOH 及电池生产信息等。

BMS can communicate with PC through RS232 interface, to see the battery on the PC end all kinds of information, including the battery voltage, current, temperature, status, SOC and SOH and battery production information, etc.



RS232 Communication interface



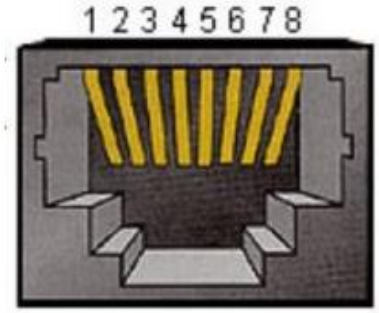
该接口采用 6P6C 立式 RJ11 插座(圆针)，引脚定义如下表
The interface adopts 6 p6c vertical RJ11 socket (needle), pins are defined as follows form

RS232--采用 6P6C 立式 RJ11 插座	
RS11 引脚 RS11 pin	定义说明 Description
2	NC
3	TX(PCM)
4	RX(PCM)
5	GND

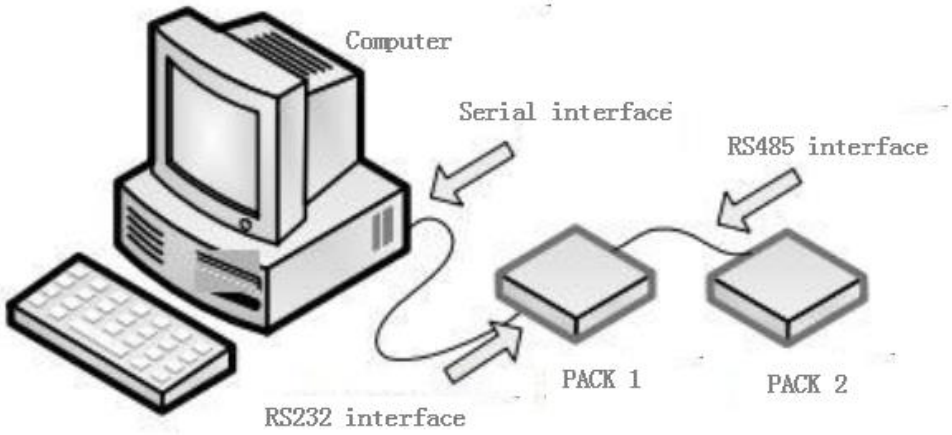
3.6 RS485 通信 Communication

具有 RS485 接口，在电池组作并联使用时，主 Pack 可通过 RS485 接口与从 Pack 进行通讯，从而可以通过上位机查看 主 Pack 和各副 Pack 的信息。

With RS485 interface, use battery as in parallel with the main Pack by RS485 interface and communication from the Pack, thus can through the PC to check the main Pack and each pair Pack information.



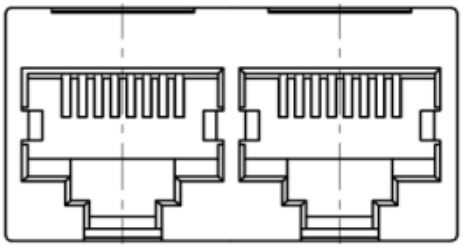
RS485 Communication interface



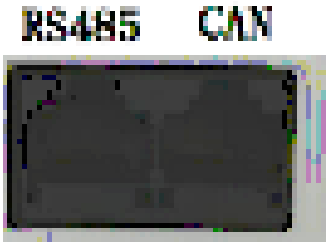
该接口采用 8P8C 立式 RJ45 插座(圆针)，引脚定义如下表
The interface adopts 8 p8c vertical RJ45 socket (needle), pins are defined as follows form.

RS485--采用 8P8C 立式 RJ45 插座	
引脚 pin	定义说明 Description
1，8	RS485B
2，7	RS485A
3，6	GND
4，5	NC

3.7 RS485 和 CAN 通信 RS485 and CAN Communication



CAN 和 RS485 接口



该接口采用 8P8C 立式 RJ45 插座，引脚定义如下表
The interface adopts 8 p8c vertical RJ45 socket, pins are defined as follows form.

RS485--采用 8P8C 立式 RJ45 插座		CAN--采用 8P8C 立式 RJ45 插座	
引脚 pin	定义说明 Description	引脚 pin	定义说明 Description
1，8	RS485B1	9,10,11,14,16	NC

2，7	RS485A1	12	CANL
3，6	GND	13	CANH
4，5	NC	15	GND

3.8 LED indicator 指示灯说明

表 1- 工作指示灯 Working Light

状态	正常/告警/保护	NC	RUN	ALM	电量指示 LED						说明
		●	●	●	●	●	●	●	●	●	
关机	休眠	灭	灭	灭	灭	灭	灭	灭	灭	灭	全灭
待机	正常	常亮	闪1	灭	依据电量指示						待机状态
	告警	常亮	闪1	闪3							模块低压
充电	正常	常亮	常亮	灭	依据电量指示 (电量指示最高 LED 闪2)						最高电量 LED 闪动（闪2），过充告警时 ALM 不闪烁
	告警	常亮	常亮	闪3							
	过充保护	常亮	常亮	灭	常亮	常亮	常亮	常亮	常亮	常亮	若无市电，指示灯转为待机状态
	温度、过流、失效保护	常亮	灭	常亮	灭	灭	灭	灭	灭	灭	停止充电
放电	正常	常亮	闪3	灭	依据电量指示						
	告警	常亮	闪3	闪3							
	欠压保护	常亮	灭	灭	灭	灭	灭	灭	灭	灭	停止放电
	温度、过流、短路、反接、失效保护	常亮	灭	常亮	灭	灭	灭	灭	灭	灭	停止放电
失效		灭	灭	常亮	灭	灭	灭	灭	灭	灭	停止充、放电

表 2-容量指示灯 Working Light

状态			充电						放电					
容量指示灯		L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●	L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●
电量（%）	0～16.6%	灭	灭	灭	灭	灭	闪 2	灭	灭	灭	灭	灭	常亮
	16.6～33.2%	灭	灭	灭	灭	闪 2	常亮	灭	灭	灭	灭	常亮	常亮
	33.2～49.8%	灭	灭	灭	闪 2	常亮	常亮	灭	灭	灭	常亮	常亮	常亮
	49.8～66.4%	灭	灭	闪 2	常亮	常亮	常亮	灭	灭	常亮	常亮	常亮	常亮
	66.4～83.0%	灭	闪 2	常亮	常亮	常亮	常亮	灭	常亮	常亮	常亮	常亮	常亮
	83.0～100%	闪 2	常亮	常亮	常亮	常亮	常亮	常亮	常亮	常亮	常亮	常亮	常亮
运行指示灯 ●		常亮						闪烁（闪 3）					

表 3-LED 闪烁说明

闪动方式	亮	灭
闪1	0.25S	3.75S
闪2	0.5S	0.5S
闪3	0.5S	1.5S

3.9 电磁兼容性 Electromagnetic compatibility

3.9.1 **静电放电抗扰性** Static discharge disturbance resistance

满足 GB/T 17626.2-2006 等级 4 的要求，接触 8KV，空气 15KV；试验后能正常工作。

Meet the requirements of GB/T 17626.2 -2006 level 4, contact 8KV, air 15KV; After the test, it can work properly.

3.9.2 **传导骚扰限值** Conductive Harassment Limit

满足 YD/T 983-1998 等级 A 的要求；试验后能正常工作。

Meet the requirements of YD/T 983-1998 level A; After the test, it can work properly.

3.9.3 **辐射骚扰限值** Radiation Harassment Limit

满足 YD/T 983-1998 等级 A 的要求；试验后能正常工作。

Meet the requirements of YD/T 983-1998 level A; After the test, it can work properly.

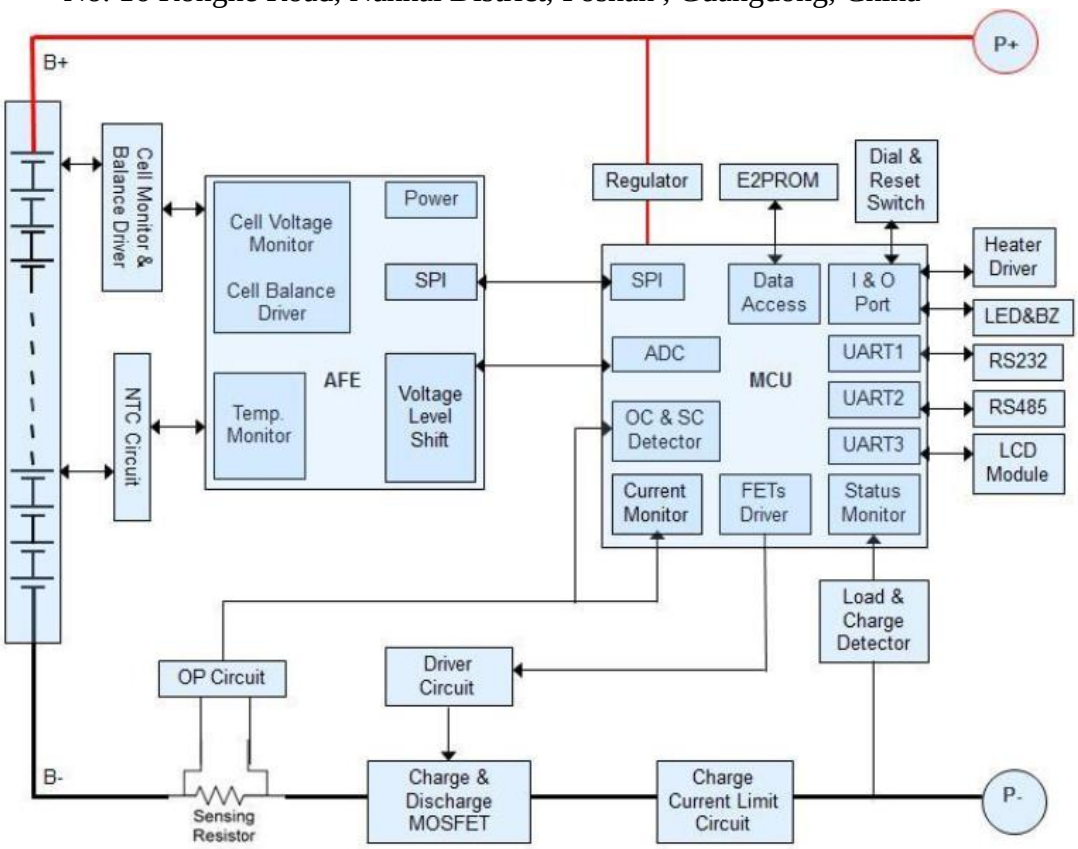
3.9.4 **浪涌（冲击）抗扰性** Surge(impact) disturbance resistance

电池组通信端口线对线应满足 GB/T 17626.5-2008 等级 1 的要求，线对地应满足 GB/T 17626.5-2008 等级 2 的要求；试验后能正常工作。

Battery communication port lines should meet the requirements of GB/T 17626.5 -2008 level 1, and the line to the ground should meet the requirements of GB/T 17626.5 -2008 level 2; After the testCan work properly.

3.10 电路原理图

The circuit principle diagram



4 Product Electric Performance Test 产品电性能测试

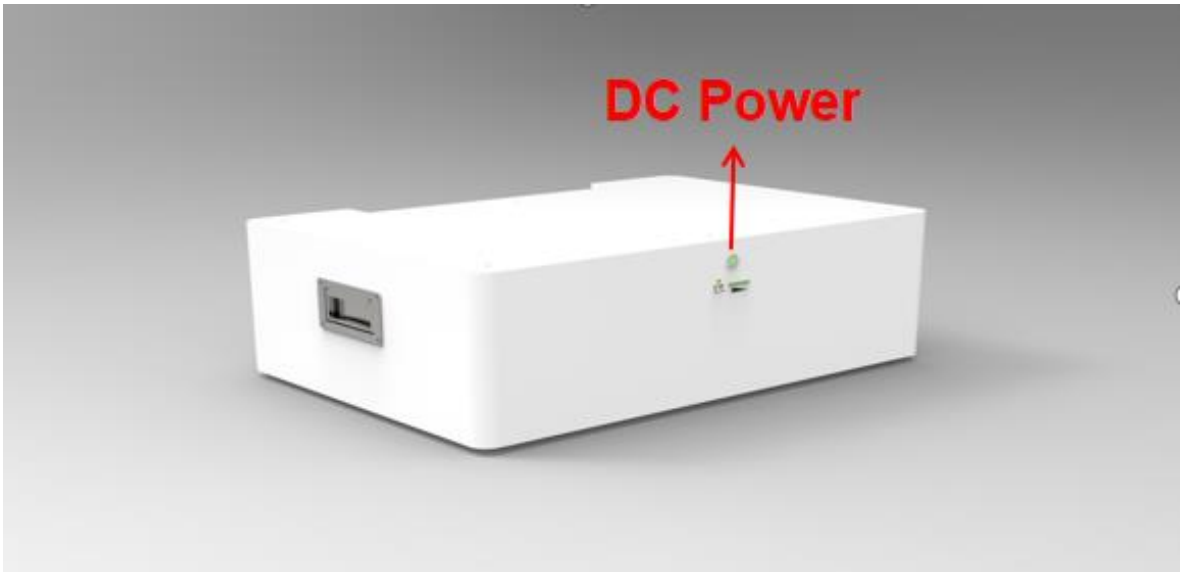
No.	项目 Items	测试方法 Test Conditions	达到要求 Requirements
1	开路电压 Open circuit voltage	标准充电后，24 小时内测量的开路电压 Open circuit voltage measured within 24 hours after standard charge	≥51.2V
2	内阻 Impedance	充满电状态下，测量其 AC1kHz 下的交流阻抗 Under the condition of full power, the AC impedance of AC1kHz is measured	≤15mΩ
3	荷电保持能力 Capacity retention	以标准模式充电后，在环境温度 20℃±5℃的条件下，将电池开路搁置 28d，再以 0.2C 电流进行放电至 40.0V。 Fully charging, store them at (20±5)℃ for 28 days, then discharge to 40.0V @0.2C.	放电时间≥300min Discharging time≥300min
4	常温循环寿命 Cycle Life @25℃	以 0.2C 电流恒流放电至 40.0V，再以 0.2C 电流恒流充电至 58.4V，然后恒压 58.4V 充至电流≤0.02C，静止 10min，以 0.2C 电流恒流放电至 40.0V，放电结束后，静止 10min，再进行下一充放循环，Discharge to 40.0V @0.2C, then Charge the battery @0.2C to reach 58.4V. Then charge the battery at constant 58.4V voltage until the charging current decreasing to 0.02C. Rest for 10 min. discharge to 40.0V@ 0.2C and rest for 10 min. Continue the charge/discharge cycles	循环次数≥8000 次 Cycles life ≥8000

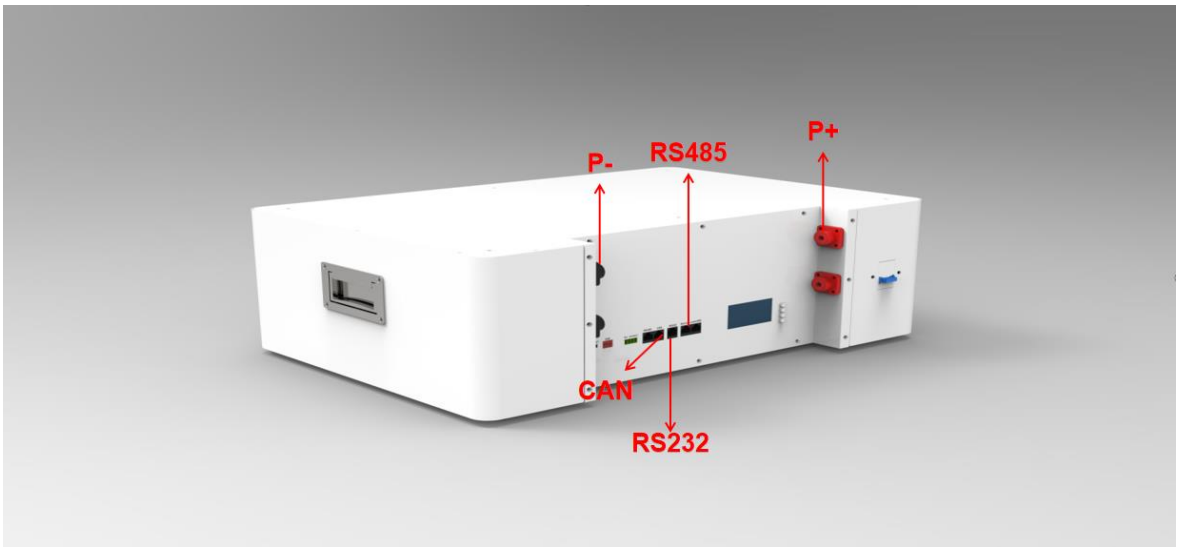
5	储存 storage	以标准模式充电给电池充入 40%～65%的容量，然后在环境温度 20℃±5℃，相对湿度 45%～85%的环境中贮存。贮存 12 个月后满充以 0.2C 电流放电至终止电压。 进行贮存试验的电池应选自生产日期到试验日期不足 3 个月的电池。 Charge the battery to 40%~65% of its rated capacity using standard charging mode, then keep it in an 20℃±5℃, humidity 45%～85% room for 12 months, fully charge and discharge it @0.2C until voltage down . (The testing sample should be within 3 months dated from production date)	放电时间≥300min Discharge time≥300min

5 Mechanical Performance 机械特性

序号 No.	内容 content	测试方法 Testing method	达到要求 Requirements
1	振动实验 Vibration Test	电池标准充电后固定在振动台上，以 X，Y，Z 三个方向从 10Hz~55Hz 循环振动各 30min，扫描速率为 1oct/min；振动频率：10Hz~30Hz；移位振幅/单振幅：0.38mm；振动频率：30Hz~55Hz；移位振幅/单振幅：0.19mm。 After standard charging, put battery on the vibration table. 30 min experiment from X, Y, Z axis. Scan rate: 1oct/min; Frequency 10-30Hz, Swing 0.38mm; Frequency 30-55Hz, Swing 0.19mm.	电性能及外观不受影响 No influence to batteries' electrical performance and appearance.
2	跌落试验 Drop Test	将电池样品由高度 1m 的位置自由跌落到置于水泥地面上的钢板上，并从电池的两个轴向正负方向(四个方向)每个方向自由跌落 1 次 The battery samples by the position of the height of 1 m free fall to placed in the sheet metal on the surface of the cement floor, and from the battery two axial direction of the positive and negative (four directions) free fall once in each direction.	不爆炸 不着火 No explosion or fire
3	挤压测试 Extrusion Test	将电池放在平板间进行挤压，其压力通过一个直径位 32mm 的液压缸进行施压，直到压力达到 17.2Mpa,施加的压力为 13KN,当达到压力后泄压 The battery is placed between the plate extrusion, the pressure through a diameter of 32mm hydraulic cylinder pressure, until the pressure reaches 17.2Mpa, the applied pressure is 13KN, when the pressure reaches the pressure	不爆炸 不着火 No explosion or fire

6 Product description and description 产品图示及说明





支持并联或单机使用 Support for parallel or stand-alone use

使用说明 Instructions for use：

开机：按下 DC Power 按键即可。Boot: Press the DC Power button.

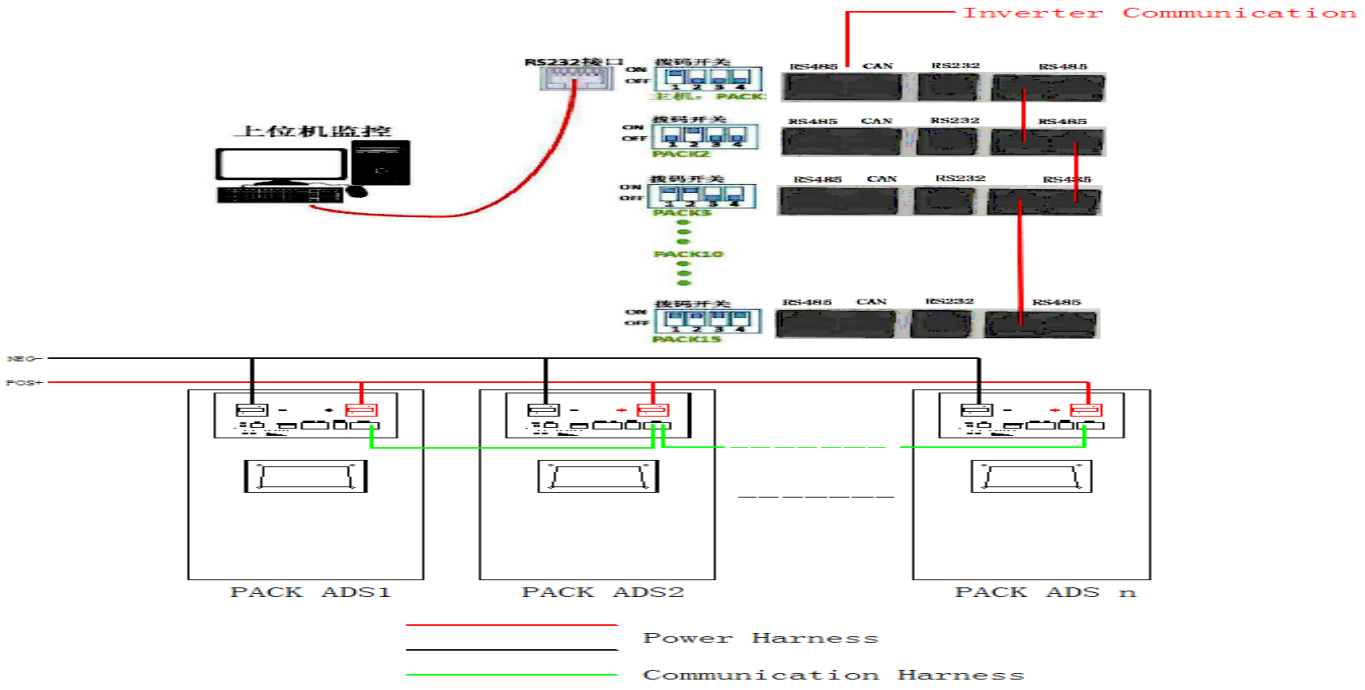
关机：当满足以下任意一条件时，系统进入关机模式（只有在无外接充电器的状态才能关机）： 1） 单体或总体过放保护 30 秒内仍未解除。 2） 通过按 DC Power 关机。 Shut down: When any of the following conditions are met, the system enters the shutdown mode(only can it be turned off without an external charger): 1) The monomer or the overall over-protection is still not released within 30 seconds. 2) Shut down after pressing DC Power.

注意：当电池无充电器接入或者电池未放电时，系统将自动进入休眠模式；再次使用时候，可通过按 DC Power 按键重启电池系统。Note: When the battery has no charger access or the battery is not discharged, the system will automatically enter hibernation mode; When used again, the battery system can be restarted by pressing the DC Power button.

项（ITEM）	签名（Signature)	日期（DATE）	备注（Remark）		RJ ENERGY CO.LTD			
编制（Drw）	Qianrong Chen	2022-02-17						
审核（CHK）	Hong Shang		页(Page)	1/1	型号(Model)	RJ-51.2V/161Ah-8.3KWh-2		
批准（App）			版本(Edition)	A/0	尺寸(Size)	620*425*230±2mm（含脚垫）		

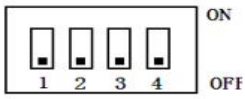
7.电池组并机连接图示 Diagram of parallel connection of battery pack

7.1 电池组可单组使用，也可用于多组并联使用，最大支持并联 16 台，单组最多叠放不超过 4 台。可通过 PC 端上位机连接电池组 RS485 通讯接口查看并联电池组参数信息。The battery can be used in single group or in multi-group parallel. The maximum number of parallel connection is 16. The parameters of the battery can be viewed through the RS232 communication interface connected with PC



并机示意图
Schematic diagram of parallel connection

7.2 拨码开关设置 Ads switch settings



地址	拨码开关位置						说明
	#1	#2	#3	#4	#5	#6	
0	OFF	OFF	OFF	OFF			无级联 ，单机使用
1	ON	OFF	OFF	OFF			设置为 Pack1（主）
2	OFF	ON	OFF	OFF			设置为 Pack2
3	ON	ON	OFF	OFF			设置为 Pack3
4	OFF	OFF	ON	OFF			设置为 Pack4
5	ON	OFF	ON	OFF			设置为 Pack5
6	OFF	ON	ON	OFF			设置为 Pack6
7	ON	ON	ON	OFF	可	选	设置为 Pack7
8	OFF	OFF	OFF	ON			设置为 Pack8
9	ON	OFF	OFF	ON			设置为 Pack9
10	OFF	ON	OFF	ON			设置为 Pack10
11	ON	ON	OFF	ON			设置为 Pack11
12	OFF	OFF	ON	ON			设置为 Pack12
13	ON	OFF	ON	ON			设置为 Pack13
14	OFF	ON	ON	ON			设置为 Pack14
15	ON	ON	ON	ON			设置为 Pack15

8 Storage and Transportation 储存和运输

8.1 Storage 储存

8.1.1 The Li-ion battery pack should be stored in a cool, dry and well-ventilated area, and should be far from the fire and the high temperature.
锂离子电池需保存在阴凉，干燥，通风的环境中，避免接触火源与热源。

8.1.2 The battery should store in the product specification book stipulation temperature range, the best storage temperature is 25±5℃. The best humidity is 60±15%.
电池需按规格书规定温度范围进行储存，最佳储存温度为 25±5℃，最佳湿度为 60±15%。

8.1.3 The battery should be stored within room temperature, and charged to 40%~60% electric quantity. In order to avoid over-discharge, we suggest charge and discharge the batteries every three months, then charge to 40%~60%electric quantity .
电池应当在室温下存放，应充到 40%至 60%的电量。为防止电池过放，建议每 3 个月按标准充放电方式进行一次充电,然后按标准充电方式进行充电至 40%~60%的电量。

8.2 Transportation 运输

8.2.1 Don't put the battery product mix with other goods.
请勿与其他货物混合。

8.2.2 Do not immerse the battery products in water or allow it to get wet.
请勿将电池浸入水中或使其受潮。

8.2.3 Do not over 1 layers staking and upside-down.
请勿叠放超过 1 层或倒置。

8.2.4 The highest temperature in transportation is lower than 65℃.
最高运输温度不超过 65℃。

9 Warning 注意事项

9.1 为确保安全，电池应安装安全装置，在静电强于制造时所要求的静电时请勿使用，否则，安全装置会失效，导致电池过热、破裂、爆炸及着火。
In order to ensure the safe, battery should be installed safety device, in static than manufacturing request when electrostatic when do not use, otherwise, safety device would failure, battery overheat, rupture, explosion and fire.

9.2 请在下列条件下正常使用，否则会过热、着火、性能降低及缩短寿命。
In the normal use of the following conditions, otherwise they will overheat and catch fire, performance and shorten the life.
环境条件 Ambient condition: (T 温度 temperature)
充电 charging: 0~+55^{0}C
放电 discharging: -20~+65^{0}C

9.3 若电池泄露，电解质粘于皮肤或衣服上，请用水冲洗掉或用流水洗衣服，否则将会腐蚀皮肤。
If the battery leaks, electrolytes stick to the skin or clothing, wash off with water or fluid washing clothes or skin

corrosion will die.

9.4 为了不装错或损耗电池，请认真阅读使用说明书，并按照指导进行安装与拆卸(从装置上)。

In order to not install error or loss of the battery, please carefully read the operating instructions, and follow the instructions for installation and removal (from device).

9.5 若电池不长期使用，请把电池拿出并放于干燥的地方，否则电器将会被腐蚀电池降低性能和减少寿命。

If the battery is not used, please take the battery out and placed in a dry place or electrical appliances will be corrosion of battery performance and reduce life.

9.6 若被污染了电池终端，请在使用之前用干布擦干净，否则将导致与装置接触不良，功率不足或充电失败。

If it is polluted battery terminal, please before you use it with a dry cloth to wipe clean, otherwise will result in poor contact with the device, power shortage or charge failure.