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51.2V/100Ah 储能电源规格书

51.2V/100Ah Rack Mounting Lithium Battery Storage



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1、适用范围 Scope

本规格书描述储能电源有关参考技术指标及要求。

This specification describes the reference technical specifications and requirements for energy storage battery packs

2、产品描述 Description

该电池组是一款采用磷酸铁锂电池系统的智能型基站储能电源产品。

The product is an smart storage battery with LiFeCoPO4 lithium-ion batteries for communication station or solar energy storage.

产品主要特点如下：

Main Features

- ∅ 能量密度高，减少产品重量和占地面积。
High energy density.
- ∅ 大电流充放电性能优异。
Excellent performance in Charging and discharging at large current.
- ∅ 超长循环使用寿命，降低维护成本。
Long working life, reducing maintenance cost
- ∅ 多重保护功能。充电高压保护、放电低压保护、充、放电过流保护、高温保护、短路保。护、反接保护功能、抗浪涌冲击、抗静电放电。
Multiple protection functions. Charging high voltage protection, discharge low voltage protection, charging and discharging, over current protection, high temperature protection, short protection. reverse connection protection, ESD protection.
- ∅ 配有 RS485 和 RS232 接口，可实现数据传输和并联组网。
Data transmission and parallel networking With RS485 and RS232 port
- ∅ 精准计量 SOC 和 SOH。
Accurate calculation of SOC and SOH

3、基本参数 Basic Characteristics

No.	项目 Item	规格 Spec
1	电芯 Cell	磷酸铁锂电芯 3.2V/100Ah LiFeCoPO4 3.2V/100Ah
2	电芯串并方式 Array mode	16S1P
3	额定容量 Nominal Capacity	100Ah

4	最低容量 Minimum Capacity	≥95Ah
5	容量 Capacity	5.12kWh
6	工作电压 Work voltage	35.2-60V
7	标称电压 Rated voltage	51.2V
8	电芯内阻 Resistance	$IR \leq 0.6m\Omega$
9	充电电压 Charge voltage	57.6V
10	放电截止电压 Discharge cut-off voltage	35.2V
11	标准充电电流 Standard Charging Current	0.5C 50A
12	最大持续充电电流 Max continuous Charging current	1C 100A
13	标准放电电流 Standard Discharging Current	0.5C 50A
14	最大持续放电电流 Max continuous discharge current	1C 100A
15	通讯接口 Communication port	RS485/CAN
15	指示灯 Light	ALM / RUN / SOC
16	循环寿命 Cycle Life	5000 cycles (0.5C charge , 0.5C discharge, capacity)
17	工作温度 Operating Temperature	充电: 0°C ~ 55°C ; 放电: -10°C ~ 55°C
18	贮存温度 Storage Temperature	1 month: -20°C ~ 45°C 1 year: 0°C ~ 35°C
19	重量 Weight (Kg)	45.5±0.5Kg
20	贮存相对湿度 Relative Humidity	65±20%
21	出货电压 Delivery Voltage	≥51.2V

22	<p>荷电保持能力与容量恢复能力</p> <p>Charge retention and capacity recovery capability</p>	<p>电池标准充电后，常温搁置 28d 或 55°C搁置 7d, 荷电保持率≥90%,容量恢复率≥90%</p> <p>Standard charge the battery, and then put aside at roomtemperature for 28d or 55 °C for 7d, Charge retention rate≥90%, Recovery rate of charge≥90%</p>
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4、BMS 参数和功能 BMS parameters and functions

No.	功能	参数/描述		备注
1	休眠功能 Sleep Function	启动条件 Activation state to Resting state	断开开关或无电流\通讯\保护状态下延时 5±2min (默认) Delay 5±2min under no current \ communication \ protection state (default)	可设置 Parameters can be set
		解除条件 Resting state to Activation state	1.充电激活(Charging) 2.连接 RS485(connect RS485) 3.拨开关Dial switch	
2	硬件开关功能 Hardware switch function	激活状态进入休眠状态 Activation state to Resting state	长按复位键 3--5S (Press "RESET" key 3-5S)	
		休眠状态进入激活状态 Resting state to Activation state	长按复位键 6-8S, 充电激活, 通讯激活 long press reset key 6-8 S, charge activated, communication activated	

3	自加热功能 Heating function	启动条件-10C° Activation condition-10C°		可选项 Optional
4	充电限流 Charging current limiting	10A		默认值 Default value
5	充电总电压高压保护 Over-voltage protection	告警值 Alarm value	58.88V	默认可设置 Default value
		开启保护值 Activation value	60V	默认可设置 Default value
		恢复值 Release value	58.4V	默认可设置 Default value
6	充电单体电压高压保护 Cell Over-voltage protection	告警值 Alarm value	3.68V	默认可设置 Default value
		开启保护值 Activation value	3.75V	默认可设置 Default value
		恢复值 Release value	3.65V	默认可设置 Default value
7	放电总电压 低压保护 under-voltage protection	告警值 Alarm value	40V	默认可设置 Default value
		开启保护值 Activation value	35.2V	默认可设置 Default value
		恢复值 Release value	43.2V	默认可设置 Default value
8	放电 单体电压 低压保护 Cell under-voltage protection	告警值 Alarm value	2.5V	默认可设置 Default value
		开启保护值 Activation value	2.2V	默认可设置 Default value
		恢复值 Release value	2.7V	默认可设置 Default value
9.	放电 高温保护 Discharge high-temperature protection	告警值 Alarm value	70°C	默认可设置 Default value
		开启保护值 Activation value	75°C	默认可设置 Default value
		恢复值 Release value	65°C	默认可设置 Default value
10.	放电 低温保护 Discharge low-temperature protection	告警值 Alarm value	-13°C	默认可设置 Default value
		开启保护值 Activation value	-20°C	默认可设置 Default value
		恢复值 Release value	-10°C	默认可设置 Default value

11	充电 高温保护 Charge high-temperature protection	告警值 Alarm value	60°C	默认可设置 Default value
		保护值 Activation value	65°C	默认可设置 Default value
		恢复值 Release value	55°C	默认可设置 Default value
12	充电 低温保护 Charge low-temperature protection	告警值 Alarm value	-7°C	默认可设置 Default value
		开启保护值 Activation value	-10°C	默认可设置 Default value
		恢复值 Release value	-5°C	默认可设置 Default value
13	一级 过流保护	警告 Alarm value	110A	
		开启保护 Activation value	120A	
		延时 Delay	10S	
		解除 Release	32秒后自动解除 Automatic release after 32S	
14	二级 过流保护	开启保护 Activation value	450A	
		延时 Delay	1000mS	
		解除 Release	32秒后自动解除 Automatic release after 32S	
15	短路保护	短路电流 current	1400A	默认可设置 Default value
		延时 Delay	500μs	默认可设置 Default value
		解除 Release	充电或断开负载自动恢复 Automatic recovery of charging or disconnecting	
16	BMS 记录功能	有 yes	记录警告信息, 电池电压, 容量, 温度等 Record warning information, battery voltage, capacity, temperature, etc.	

17	BMS 历史记录功能	有 yes	≥1000 条记录	More than 1000 records
18	电芯容量计量功能 Capacity Metrology function	SOC 和 SOH	tolerance≤5% tolerance≤5%	
19	BMS 检测精度 Detection precision of BMS	电流 current	≤2%	
		电压 Voltage	≤10mV	
		容量 Capacity	≤5%	
		温度 temperature	≤2°C	
20	均衡功能 Balance function	充电均衡 Charge Balance	均衡开启电压: 3.3V Activation value: 3.3V 均衡电压差: 15mV Activation Voltage difference : 15mV	
21	远程 监控能 Remote monitoring functions	有 yes		
22	远程报警功能 remote Alarm functions	有 yes		
23	远程关断功能 remote cut-OFF functions	有 yes		
24	ESD 防静电 ESD protection	满足 GB/T 17626.2-2006 要求, 可承受 15KV (空气放电) 8KV (接触放电) 冲击, 元件无损坏, 工作正常 To meet the requirements of GB/T 17626.2-2006, it can withstand 15KV (air discharge) 8KV (contact discharge) impact, and the components are free from damage and work normally.		

5、环境适应性能 Environmental Characteristic

序号 No.	项目 Item	测试条件 Testing Instruction	性能要求 Requirement
1	振动测试 Vibration Test	<p>电池满充电后，将电池安装在振动台上，在 X,Y,Z 三个垂直的方向进行实验，振动频率在 10Hz 和 55Hz 间以 1Hz/min 的速率变化，往复振动 30min。振动频率：10-30Hz 位移振幅：0.38mm 振动频率：30-55Hz位移振幅：0.19mm</p> <p>The battery will be vibrated 30 minutes in three mutually perpendicular directions and changing frequency between 10 to 55Hz. The rate of scanning frequency is from 10 Hz to 55Hz with the rate of 1Hz per min. Vibration frequency: 10-30Hz amplitude: 0.38mm vibration frequency: 30-55Hz: amplitude: 0.19mm</p>	<p>电池外观应无明显的损伤，不能破裂、漏液、冒烟或爆炸。</p> <p>The battery shall not rupture, smoke, explode or leak.</p>
2	恒温恒湿性能 Constant Temperature/ Humidity Test	<p>电池满充电后，将电池放入 40°C±2°C、相对湿度为 90%-95%的恒温恒湿箱中，搁置 48h，实验结束后，将电池放在环境温度为 20°C±5°C的条件下搁置 2h，目测电池外观。以 0.5C 的恒流放电至终止电压。Keep the battery at 40±2°C and 90%-95%RH for 48 hrs after complete charge. After the test, keep the battery at 20±5°C for 2 hrs. Discharge at 10A constant current discharge to the termination voltage.</p>	<p>电池外观应无明显的变形、锈蚀、冒烟或爆炸 电池放电容量 ≥ 80%</p> <p>Appearance of the battery shall not rust, smoke or explode. Discharge Capacity ≥ 80%</p>
3	高温性能 High Temperature Performance Test	<p>电池满充电后，将电池放入 55°C±2°C的高温箱中恒温2h，然后以 0.5C 电流放电至截止电压，实验结束后，将电池放在环境温度为 20°C±2°C的条件下搁置 2h，目测电池外观。Keep the battery at a hot oven with 55±2°C for 2 hrs, then measure the capacity with constant discharge current 0.5C to discharge protection point after complete charge. After the test, keep the battery at 20±5°C for 2 hrs.</p>	<p>电池外观应无生锈、冒烟或爆炸，电池放电容量≥90%</p> <p>Appearance of the battery shall not rust, smoke or explode Discharge Capacity >90%</p>
4	低温性能 Low Temperature Performance Test	<p>电池满充电后，将电池放入 -10°C±2°C的低温箱中恒温20h 后，以 0.5C 电流放电截止电压。实验结束后，将电池放在环境温度为 20°C±5°C的条件下搁置 2h，目测电池外观。Keep the battery at -10±2°C for 16-24 hrs, then measure the capacity with constant discharge current 0.5C to discharge protection point after complete charge. After the test, keep the battery at 20±5°C for 2 hrs.</p>	<p>电池外观应无生锈、冒烟或爆炸，电池放电容量≥55%</p> <p>Appearance of the battery shall not rust, smoke or explode Discharge Capacity >55%</p>

6、电芯安全性测试 Safe Characteristic

序号 No.	项目 Item	测试条件 Testing Instruction	性能要求 Requirement
1	外部短路 External short circuit	充满电的电池放置在 20°C±5°C环境中, 用电阻不超过 5mΩ的线将正负极端子直接短接 10Min。 Fully charged batteries are stored in an ambient temperature of 20°C±5°C, battery is then short-circuited by connecting the positive and negative terminals with a total external resistance of less than 5mΩ. The batteries remain on test for 10Min.	不爆炸不起火 no fire , no explosion
2	自由跌落 Free fall	充满电的电池从 1.0m 高度自由跌落到水泥地面上 3 次, 方向随机。 Each fully charged battery is dropped three times from a height of 1.0 m onto a concrete floor. The batteries are dropped so as to obtain impacts in random orientations.	不爆炸不起火 no fire , no explosion
3	机械冲击 Mechanical shock	将充满电的电池固定在测试机器上进行冲击测试。电池要承受等值的三次冲击, 在相互垂直的三个方向上各进行一次。其中至少有一个方向应当和电池的最大平面垂直。电池承受冲击的加速方式: 在最初 3ms 内, 最小平均加速度为 75 gn, 峰值加速度应在 125 gn 和 175 gn 之间。电池应在 20°C±5°C的环境下进行测试。 The fully charged battery is secured to the testing machine by means of a rigid mount which will support all mounting surfaces of the battery. The battery is subjected to a total of three shocks of equal magnitude. The shocks are applied in each of three mutually perpendicular directions. At least one of them shall be perpendicular to a flat face. For each shock the battery is accelerated in such a manner that during the initial milliseconds the minimum average acceleration is 75 gn. The peak acceleration shall be between 125 gn and 175 gn. Batteries are tested in an ambient temperature of 20 °C ± 5 °C.	不爆炸不起火 no fire , no explosion
4	加热测试 Thermal abuse	将充满电的单体电池放置在空气循环烘箱中, 烘箱温度以 5 °C/min ± 2 °C/min 升高到 130°C ± 2°C, 在此温度下保留 10min。	不爆炸不起火 no fire , no explosion

5	<p>挤压 Crushing of cells</p>	<p>将充满电的单体电池放置在 20°C±5°C条件下, 挤压方向: 垂直于电芯极板方向施压; 挤压头面积: 不小于 20c m² ; 挤压程度: 直至电芯壳体破裂或内部电路 (电芯电压为 0V) Put the fully charged single cell in the condition of 20°C ±5°C. Extrusion direction: Pressure on the direction of perpendicular to the battery plate Extrusion size: not less than 20 c m²; Extrusion Level: until the battery case rupture or the internal circuit (battery voltage is 0V)</p>	<p>不爆炸不起火 no fire , no explosion</p>
6	<p>过充电 Overcharge</p>	<p>单体电池以 0.3 C 放电到终止电压, 然后使用 5 V 的充电器, 以 0.3C 电流充电 12.5 小时。 The cell is discharged with 0.5 C to the end-of-discharge voltage, then charged from a power supply of 5 V, at the charging current 0.3 C for 12,5 h.</p>	<p>不爆炸不起火 no fire , no explosion</p>
7	<p>过放电 Forced discharge</p>	<p>电池在 20°C±5°C下, 以 0.3C 电流放电 (如果有电子保护线路, 应暂时除去放电电子保护线路), 直至某一单体电池电压达到 0V 结束试验。 20 °C ± 5 °C ,0.3C discharge.(If has electronic protection circuits, the electronic discharge protection circuit should be temporarily removed), tests ends until a single battery voltage reaches 0V.</p>	<p>不爆炸不起火 no fire , no explosion</p>

7、指示灯定义 LED Definition



7.1 容量指示灯 Capacity LED

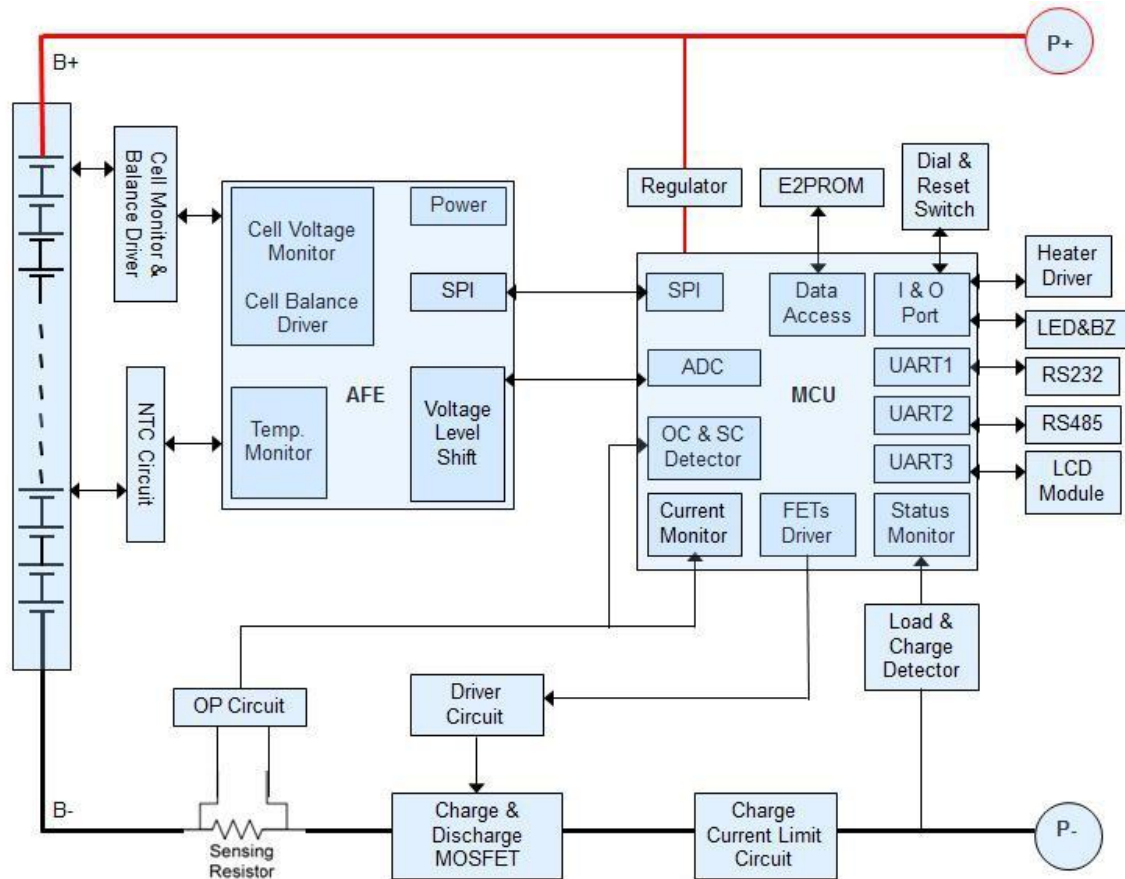
状态 (State)	电量百分比 (Percentage of Battery)	LED6	LED5	LED4	LED3	LED2	LED1
Power off		OFF	OFF	OFF	OFF	OFF	OFF
Standby		FLASH	OFF	OFF	OFF	OFF	OFF
Charging	<25%	ON	OFF	OFF	OFF	OFF	FLASH ²
	≥25%, <50%	ON	OFF	OFF	OFF	FLASH	ON
	≥50%, <75%	ON	OFF	OFF	FLASH	ON	ON
	≥75%, <100%	ON	OFF	FLASH	ON	ON	ON
Discharging	FULL	ON	OFF	ON	ON	ON	ON
	≥75%, <100%	FLASH	OFF	ON	ON	ON	ON
	≥50%, <75%	FLASH	OFF	OFF	ON	ON	ON
	≥25%, <50%	FLASH	OFF	OFF	OFF	ON	ON
	≥6%, <25%	FLASH	OFF	OFF	OFF	OFF	ON

状态指示State LED

系统状态 state	异常事件 Event	RUN	ALM	电量 LED				说明
		●	●	●	●	●	●	
关机 OFF		灭 off	灭 off	全灭 off				
待机 Standby	正常 Normal	闪烁 1 Flash1	灭 off	全灭 off				
	告警 Alarm	闪烁 1 Flash1	闪烁 3 Flash3					
充电 Charging	正常 Normal	常亮 on	灭 off	依据电量指示 According to the capacity				
	告警 Alarm	常亮 on	闪烁 2 Flash2					
	任何保护 Any protection	常亮 on	灭 off	全部常亮 on				
放电 Discharging	正常 Normal	闪烁3 Flash3	灭 off	依据电量指示 According to the capacity				
	告警 Alarm	闪烁 3 Flash3	闪烁 3 Flash3					
	欠压保护 under-voltage	灭 off	灭 off	全灭 off				
	过流、短路保护 over-current/short protection	灭 off	常亮 on	全灭 off				
温度 Temperature	正常 Normal	闪烁 1 Flash1	灭 off	依据电量指示 According to the capacity				
	充电告警 Charge Alarm	常亮 on	闪烁 3 Flash3	依据电量指示 According to the capacity				
	放电告警 Discharge Alarm	闪烁 3 Flash3	闪烁 3 Flash3	依据电量指示 According to the capacity				
	任何保护 Any protection	灭 off	常亮 on	全灭 off				

闪动方式 Flash mod	亮 On	灭 Off
闪烁 1 Flash1	0.25 S	3.75 S
闪烁 2 Flash2	0.5 S	0.5 S
闪烁 3 Flash3	0.5 S	1.5 S

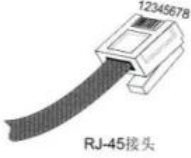
8、保护板原理图Schematic Diagram



9、通讯功能 Communication functions

BMS具备电池级联的RS485通讯功能，波特率默认值为9600bps，RS485级联 通讯接口采用8P8C直式PCB焊接电话插座；RS485具备电池组上传的通信功能， 通讯地址位从"0"开始

BMS has the RS485 communication function of battery cascade, the baud rate default value is 9600 bps,RS485 level Unicom communication interface adopts 8 straight PCB welding telephone socket; RS485 has the communication function of battery pack upload, the communication address bit starts from "0"

接插件示意图 (Schematic diagram)	PIN	端口定义 port definition			备注 (Notes)
		主机	RS485-IN	RS485-OUT	
 <p>12345678</p> <p>RJ-45接头</p>	1	RS485-B	RS485-B2	RS485-B2	
	2	RS485-A	RS485-A2	RS485-A2	
	3	GND	GND	GND	
	4	CANH	ADS_IN	ADS_OUT	
	5	CANL	ADS_OUT	ADS_IN	
	6	NC	GND	GND	
	7	RS485-A	RS485-A2	RS485-A2	
	8	RS485-B	RS485-B2	RS485-B2	

10、拨码开关选择地址 Dial switch select address

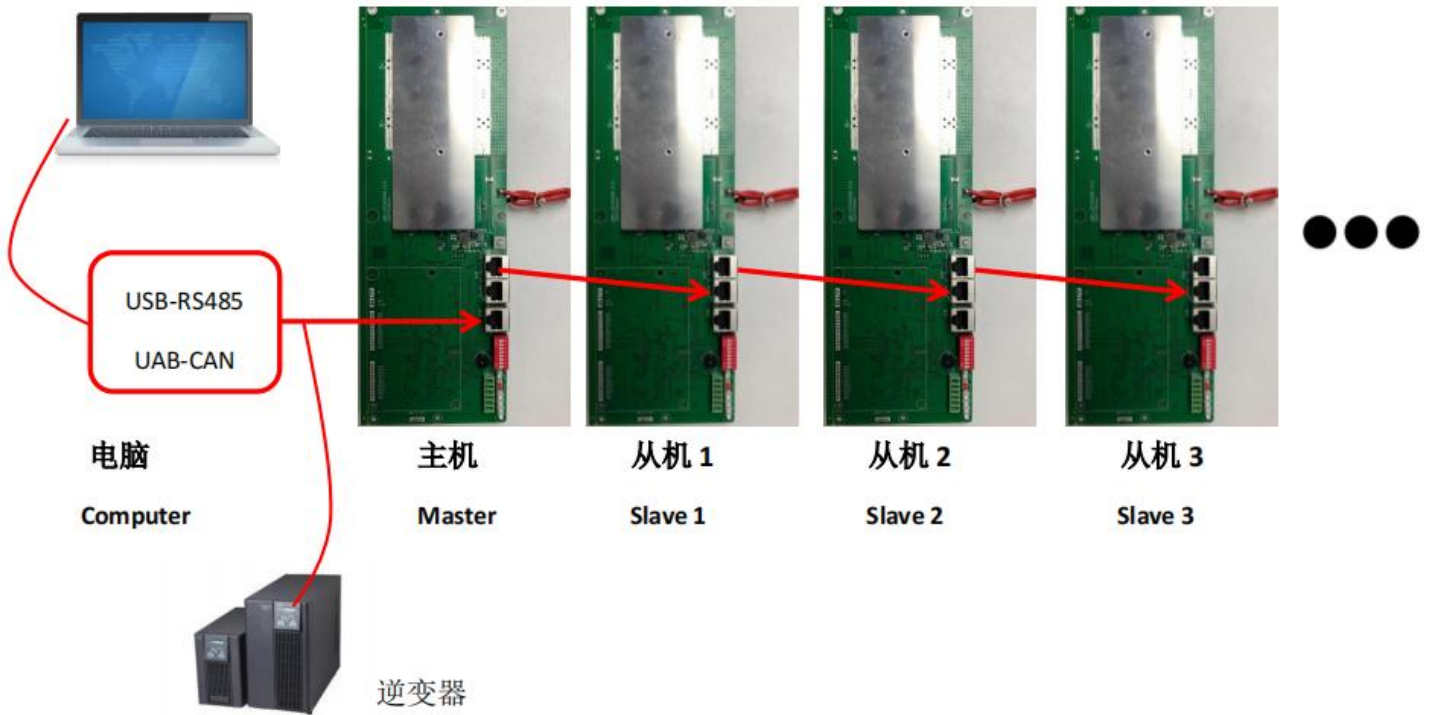
在电池组做并联使用时，可通过硬件地址区分不同PACK，且整个电池堆中每个 PACK的硬件地址是唯一的，硬件地址通过板上的拨码开关进行依次设置，开关的定义参照下表。 When the battery pack is used in parallel, the hardware address can be distinguished PACK, and the hardware address of each PACK in the whole battery stack is unique. The hardware address is set sequentially through the dial code switch on the board, and the definition of the switch refers to the following table.



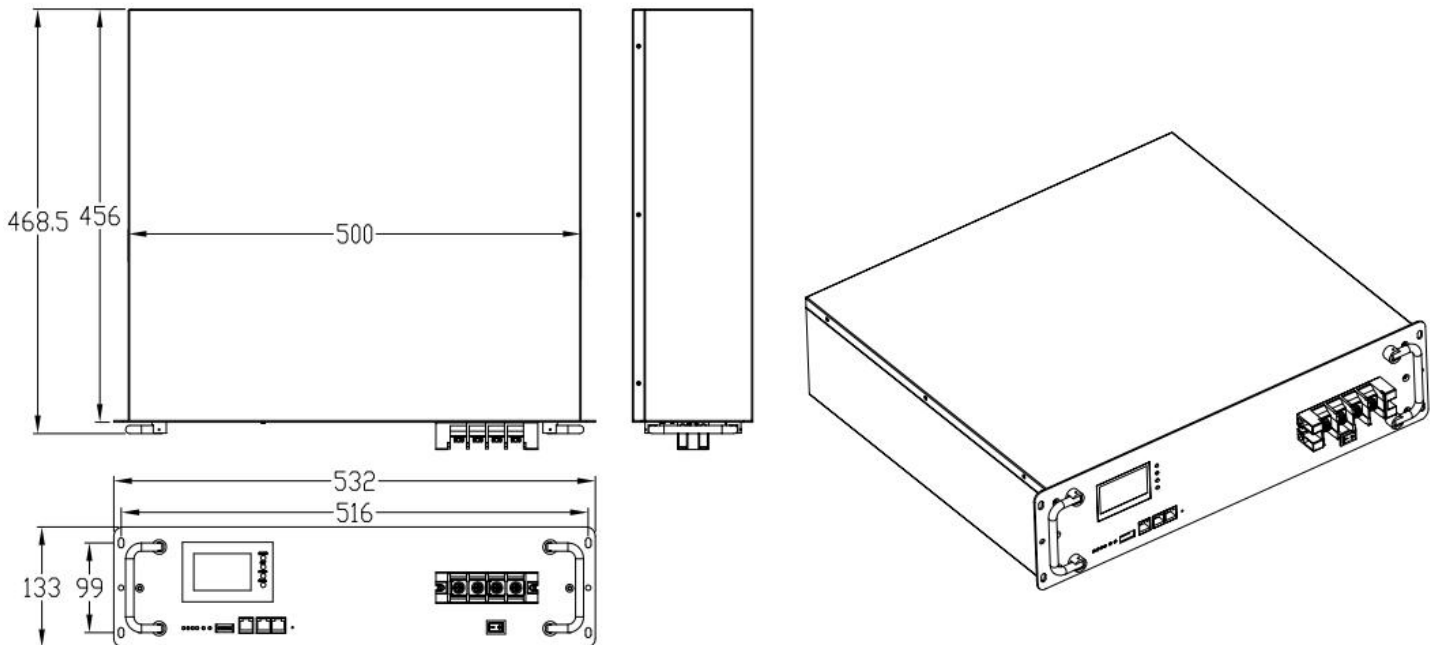
地址位(二进制) Binary Address	开关位置				说明 Explain
	5	6	7	8	
0000	OFF	OFF	OFF	OFF	单独用 485 通讯时选"MASTER(0000)", 并机通讯时做主机。
0001	OFF	OFF	OFF	ON	单路 485 通讯时选"SLAVE1(0001)"
0010	OFF	OFF	ON	OFF	单路 485 通讯时选"SLAVE2(0010)"
0011	OFF	OFF	ON	ON	单路 485 通讯时选"SLAVE3(0011)"
0100	OFF	ON	OFF	OFF	单路 485 通讯时选"SLAVE4(0100)"
...
1111	ON	ON	ON	ON	单路 485 通讯时选"SLAVE15(1111)"

多机并联时RS485接口作为并机通信接口,通讯地址位从地址0开始,两个RS485接口并机时用一一对应的网线对接即可。

Multi-machine parallel RS485 interface as a parallel communication interface, the communication address bit from address 0, two RS485 interface parallel machine with one-to-one corresponding network connection can be.



11、外箱规格尺寸Dimensions



12、外观实物图 Physical appearance drawings

13、包装方式 Packaging Method



(具体包装方式，以实际交付为准)

14、储存条件Storage conditions:

产品如长期贮存时，请将电池组充电至60%左右的电量，放置于干燥、通风处，每3个月用充电器充电**3小时（10A充电）**。电池组与充电器应贮存在清洁、干燥、通风处，应避免与腐蚀性物质接触，远离火源及热源。

If the product is stored for a long time, please charge the battery pack to about 60% of the electricity, put it in the dry and ventilated place, and charge the charger for 3 hours (10A charge) every 3 months. Batteries and chargers should be stored in clean, dry and ventilated places. Avoid contact with corrosive substances, away from fire sources and heat sources.

15、产品责任 Product liability

* 本公司对违反本规格书规定操作而导致的意外不负任何责任；

* 如果规格书、原材料、生产过程或生产控制系统发生改变，改变的信息将会随质量和 可靠性数据以书面形式通知客户。

* The company is not responsible for any accident resulting from violation of the provisions of this specification.

* If the specification, raw material, production process, or production control system changes, the changed information will be informed in written form with the quality and reliability data.

16、使用电池注意事项 Battery Handling Precautions

➤ 勿将电池组投入水中或将其浸湿!

➤ Do not put the battery pack into the water or soak it.

➤ 禁止在火源或极热条件下给电池组充电! 勿在热源(如火或加热器)附近使用或贮存电池组! 如果电池泄漏或发出异味, 应立即将其从接近明火处移开。第一次使用电池, 需将电池充满电后再使用!

It is forbidden to charge battery pack under fire source or extremely hot condition. Do not use or store batteries near heat sources (such as fire or heater). If the battery leaks or smells, it should be removed immediately from the open flame. The first time you use batteries, you need to charge the battery and use it again.

➤ 勿将正负极接反!

Do not reverse the positive and negative.

➤ 勿将电池组投入火中或给电池组加热!

Do not put the battery pack into the fire or heat the battery pack!

➤ 禁止用导线或其他金属物体将电池组正负极短路!

No wires or other metal objects are allowed to short circuit the positive and negative poles of the battery pack.

l 禁止用钉子或其他尖锐物体刺穿电池组壳体, 禁止锤击或脚踏电池组!

➤ 禁止以任何方式分解电池组和电池!

It is forbidden to pierce the battery housing with nails or other sharp objects.

No hammer or pedal batteries are allowed.

➤ 禁止将电池组置于微波炉或压力容器中!

It is forbidden to put battery in microwave oven or pressure vessel.

如果电池组发出异味、发热、变形、变色或出现其他任何异常现象时不得使用；如果电池组正在使用或充电，应立即从用电器或充电器上取出并停止使用！

If the battery pack is out of smell, heat, deformation, discoloration, or any other abnormal phenomenon, if the battery group is being used or charged, it should be removed from the appliance or charger immediately and stop using it.

不能使用处于极热环境中的电池组，如阳光直射或热天的车内。否则，电池组会过热，这样就会影响性能、缩短电池组的使用寿命！

You cannot use batteries in extremely hot environments, such as in direct sunlight or hot days. Otherwise, the battery pack will overheat, which will affect the performance and shorten the battery life.

如果电池漏液后电解液进入眼睛，不要擦，应立即用水冲洗，立即寻求医疗救助。如不及时处理，眼睛将会受到伤害！

If the electrolyte drops into the eyes after the battery is leaking, do not rub it. Rinse immediately with water and seek medical help immediately. If you don't handle it in time, your eyes will be hurt!

环境温度会影响放电容量，环境温度超出标准环境（ $25\pm 5^{\circ}\text{C}$ ），放电容量会有所降低！

The ambient temperature will affect the discharge capacity. When the ambient temperature exceeds the standard environment ($25 + 5^{\circ}\text{C}$), the discharge capacity will be reduced.

电池组在充电过程中，如果出现异味、异常声响，请立即停止充电。

If the battery pack has abnormal smell or abnormal sound during charging, stop charging immediately.

电池组在放电过程中，如果出现异味、异常声响，请立即停止放电。

If the battery has abnormal smell and abnormal sound during discharge, stop discharging immediately.

如果出现上述现象，请与厂家联系，请勿私自拆卸。

If the above phenomenon occurs, please contact the manufacturer, do not disassemble privately.