SAKO SK-LFP160kWh 512V314Ah

户外储能机柜用户手册
Outdoor Energy Storage Cabinet User Manual

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一、产品概述
I. Product Overview

本电池是一种新型储能产品，可用于为各种设备和系统提供可靠的电源。特别适用于功率大、安装空间有限、承载能力受限、寿命长的应用场合。电池内置的 bms 电池管理系统，可对电池电压、电流、温度等信息进行管理和监控。此外，电池组可以平衡电池的充电和放电，以延长循环寿命。多个机柜可以并联，以扩大容量和功率，并行扩大容量和更长的功率支持时间的要求。

This battery is an innovative energy storage solution designed to provide reliable power supply for various devices and systems. It is particularly suitable for high-power applications with limited installation space, constrained load capacity, and extended service life requirements. The built-in Battery Management System (BMS) enables real-time monitoring of key parameters including voltage, current, and temperature. The battery pack features balanced charging and discharging cycles to enhance cycle life durability. Multiple cabinets can be connected in parallel configuration to expand capacity and power output, effectively meeting demands for increased energy storage capacity and extended power support duration.

二、功能特性
II. Functional Characteristics

可靠性充放电：通过磷酸铁锂离子电池高效充放电，使用寿命长，可靠性高。自动保护功能，响应迅速，高精度数据采样，拥有完善可靠的保护功能：

Reliability in charging and discharging: Through efficient charging and discharging of lithium iron phosphate (LFP) ion batteries, the product boasts long service life and high reliability. It features automatic protection functions with rapid response, high-precision data sampling, and comprehensive reliable protection capabilities.

◇ 电池组整体过压、欠压保护，电池单节过压、欠压保护；

◇ Comprehensive overvoltage and undervoltage protection for battery packs, as well as individual cell overvoltage and undervoltage protection;

◇ 充放电过流保护；

◇ Overcurrent protection during charging and discharging;

◇ 充放电温度过温保护。

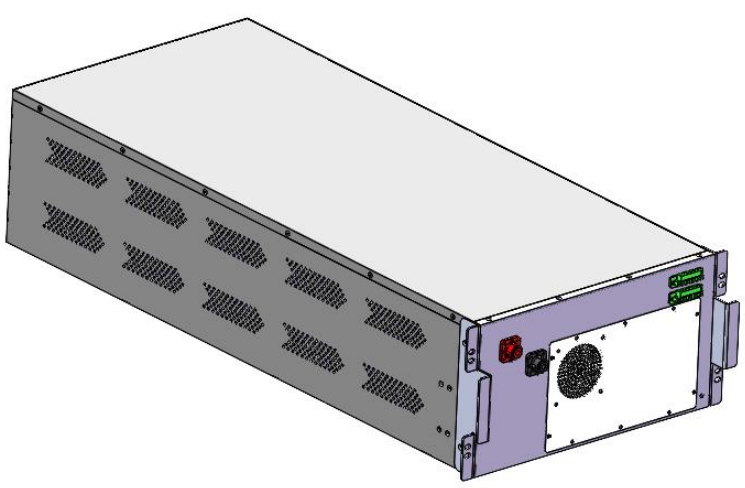
◇ Overtemperature protection during charge and discharge.

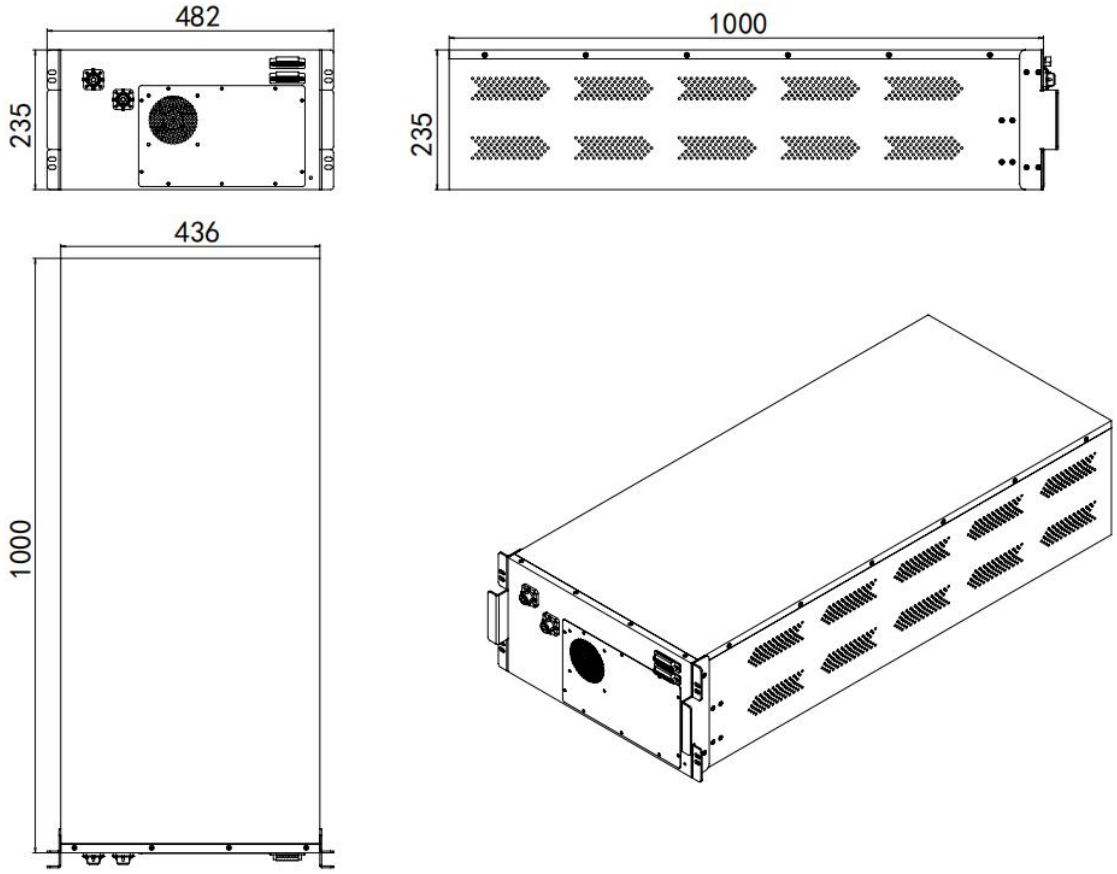
三、产品布局图
III. Product Layout Diagram

3.1 产品外观尺寸图
3.1 Product Exterior Dimensions Diagram

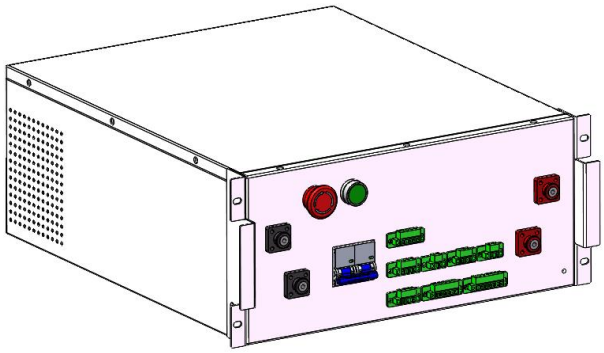
1.单个电池箱

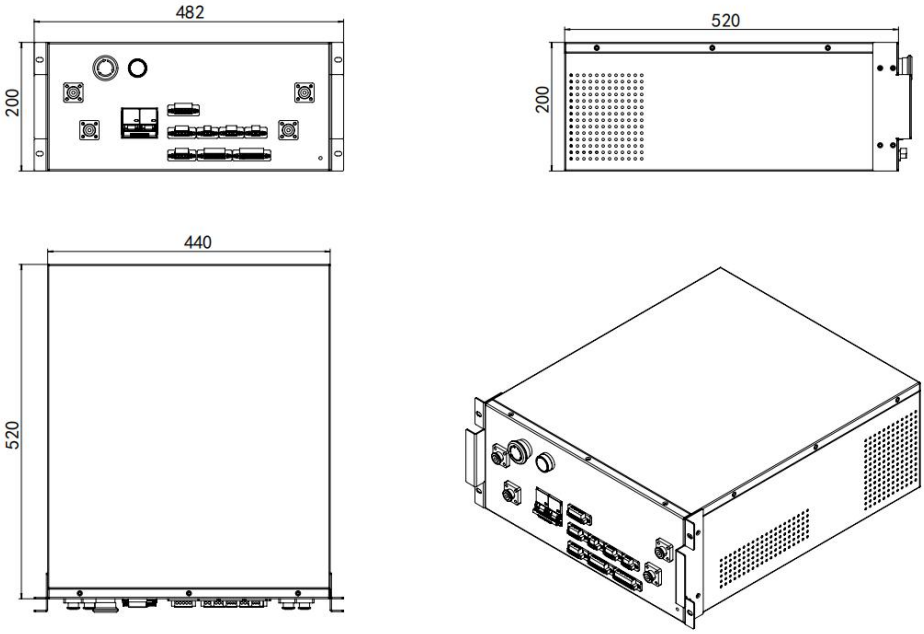
1. Single battery pack





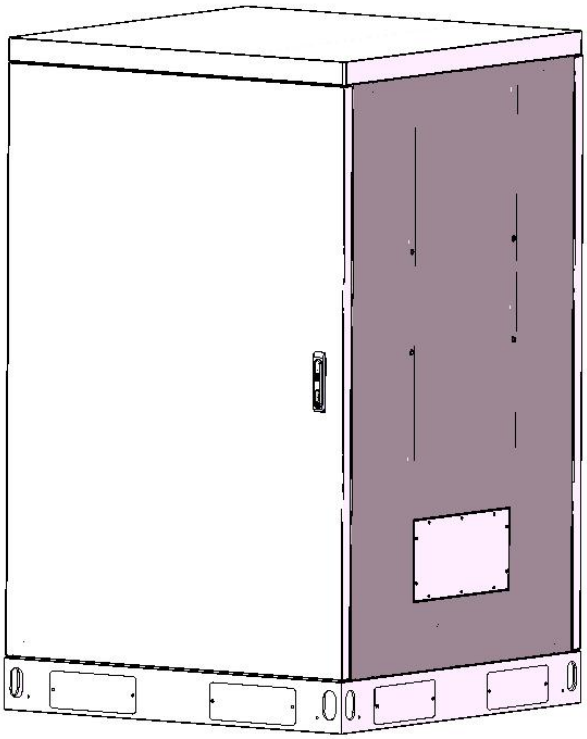
2. 高压箱
2. High-Voltage Compartment

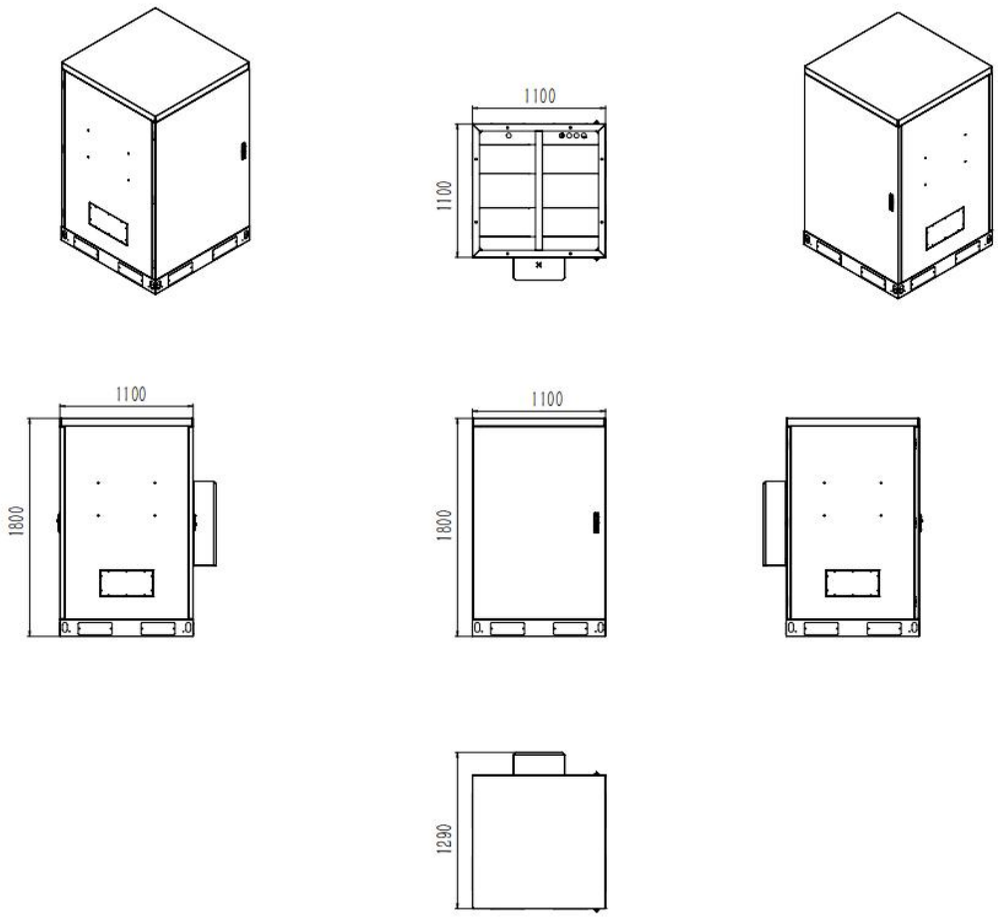




3.机柜

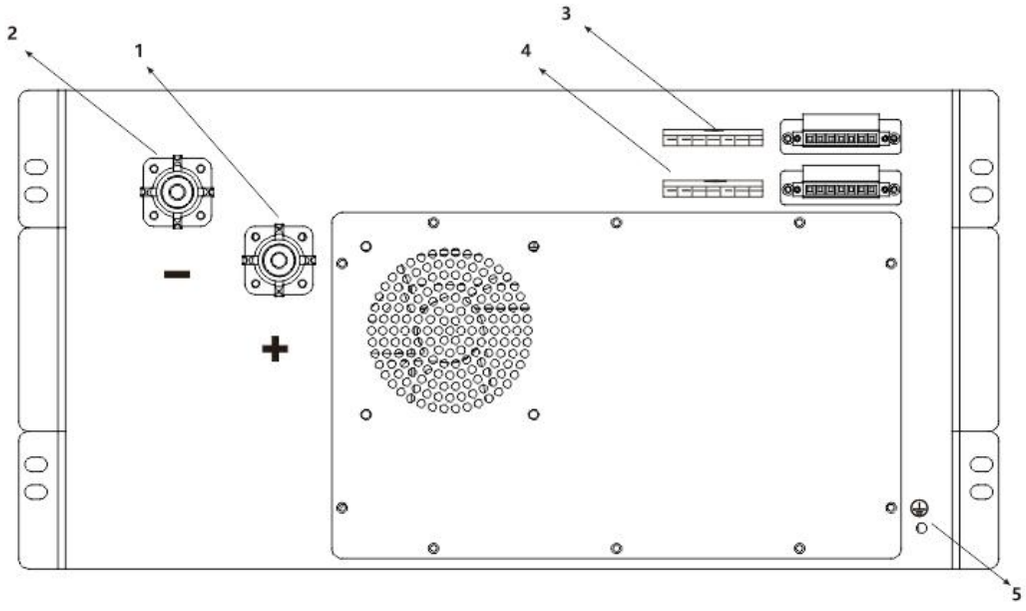
3. Cabinet





3.2 面板定义
3.2 Panel Definition

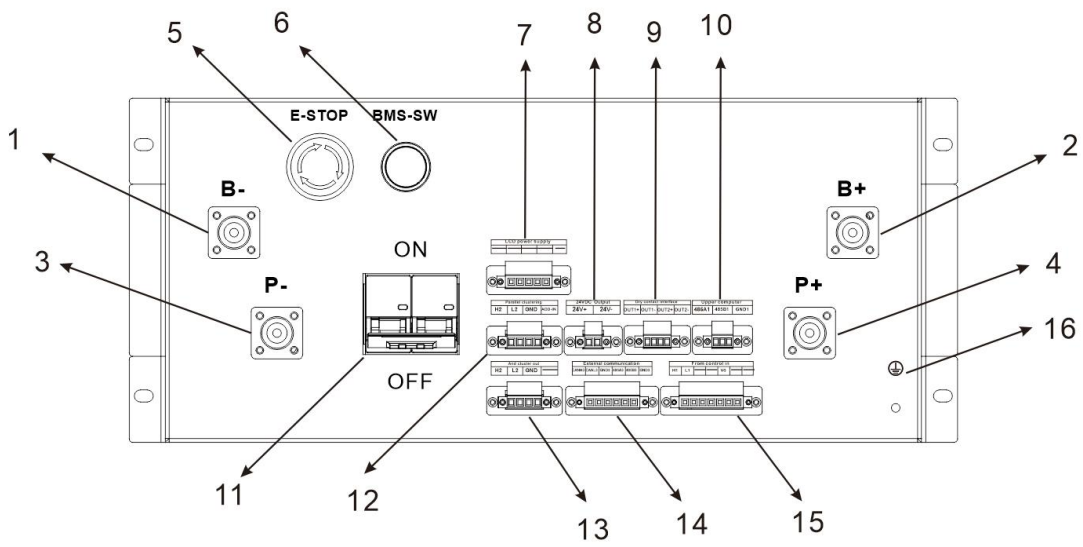
1.电池箱
1. Battery Box



序号 Order number	定义 Definition	说明 Explain	备注 Remarks

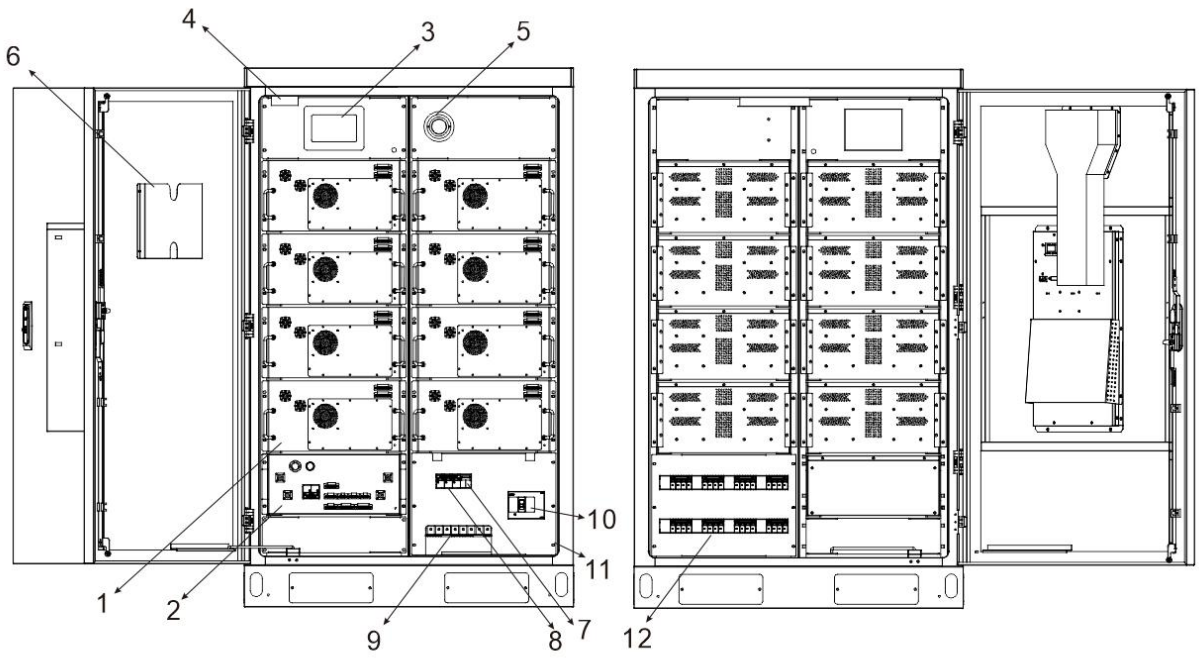
1	+	电池正极 Battery cathode	电池正极 Battery cathode
2	-	电池负极 Battery negative electrode	电池组负极 Battery pack negative electrode
3	BNU-IN	从控进 From control entry	通讯接口 Communication interface
4	BMU-OUT	从控出 From control out	通讯接口 Communication interface
5	⏚	地线螺丝 Ground wire screw	电池接地 Battery grounding

2. 高压箱
2. high-voltage compartment



序号 Order number	定义 Definition	说明 Explain	备注 Remarks
1	B-	电池簇总负 Total negative battery cluster	接电池簇 Connect to battery cluster
2	B+	电池簇总正 Total positive battery cluster	
3	P-	PCS、逆变器总负 PCS, total inverter load	接 PCS、逆变器 Connect to PCS and inverter
4	P+	PCS、逆变器总正 PCS, Total Inverter Positive	
5	E-STOP	开关按下，高压箱 BMS 处于断电状态 When the switch is pressed, the high-voltage box BMS enters a power-off state.	常规情况禁止触碰 Touching is generally prohibited under normal circumstances.
		开关弹出，高压箱 BMS 处于工作状态 The switch pops up, and the high-voltage box BMS is operational.	
6	BMS-SW	长按按钮 3~5 秒，指示灯闪烁后松开，再次长按 3~5 秒，BMS 开机 Hold the button for 3–5 seconds until the indicator light flashes, then release. Hold again for 3–5 seconds to power on the BMS.	长按 BMS 开关前，确认急停开关是否处于弹开状态 Before long-pressing the BMS switch, confirm whether the emergency stop switch is in the open position.
		长按按钮 3~5 秒，指示灯熄灭后松开，BMS 关机 Hold the button for 3–5 seconds until the indicator light turns off, then release to shut down the BMS.	/
7	Display screen	显示屏供电及通讯 Display screen power supply and communication	显示屏控制模块供电与通讯 Power Supply and Communication for Display Control Module
8	24V DC Output	24V 直流输出 24V DC output	EMS 供电、外部设备供电 EMS power supply, external device power supply
9	Dry contacts	干节点信号 Dry node signal	接干节点信号 Receive node signal
10	Upper computer	上位机通讯接口 Host computer communication interface	上位机调试通讯 Upper computer communication debugging
11	ON	扳动手柄至“开”，代表闭合断路器 Turn the handle to "ON" to close the circuit breaker.	/
	OFF	扳动手柄至“关”，代表断开断路器 Turn the handle to "OFF" to disconnect the circuit breaker.	
12	Parallel clustering	并簇进 And cluster merge	电池簇上级并簇通讯进 Upper-level parallel cluster communication in battery packs
13	And cluster out	并簇出 And cluster out	电池簇下级并簇通讯出 Communication Out of Lower-Level Parallel Clusters under Battery Pile
14	External commu nication	外部通讯 External Communication	与 PCS、EMS 通信 Communicate with PCS and EMS
15	From control in	从控通讯进接口 From control communication to interface	电池箱 BMU 通讯 Battery box BMU communication
16	⏚	地线螺丝 Ground wire screw	电池接地 Battery grounding

3. 机柜
3. cabinet



序号 Order number	定义 Definition	说明 Explain
1	电池箱 Battery box	单个电池箱 Single battery pack
2	高压箱 High-voltage compartment	高压箱 High-voltage compartment
3	显控模块 Control Module	显示电池电压、电量、容量、温度等参数 Display battery parameters such as voltage, charge, capacity, and temperature
4	气溶胶 Aerosol	消防模块 Fire protection module
5	烟雾报警器 Smoke alarm	烟雾报警器 Smoke alarm
6	文件兜 File folder	存放文件 Save files
7	A/C-Switch	空调开关 Air conditioner switch
8	GEN-Switch	柴油发电机开关 Diesel generator switch
9	GEN/LOAD	柴发、负载接口 Hair shaft, load interface
10	LOAD	负载开关 Load switch
11	地线铜排 Ground wire bu-sbar	机柜接地 Cabinet grounding
12	PV	光伏开关 Photovoltaic switch

四、技术参数
IV. Technical Parameters

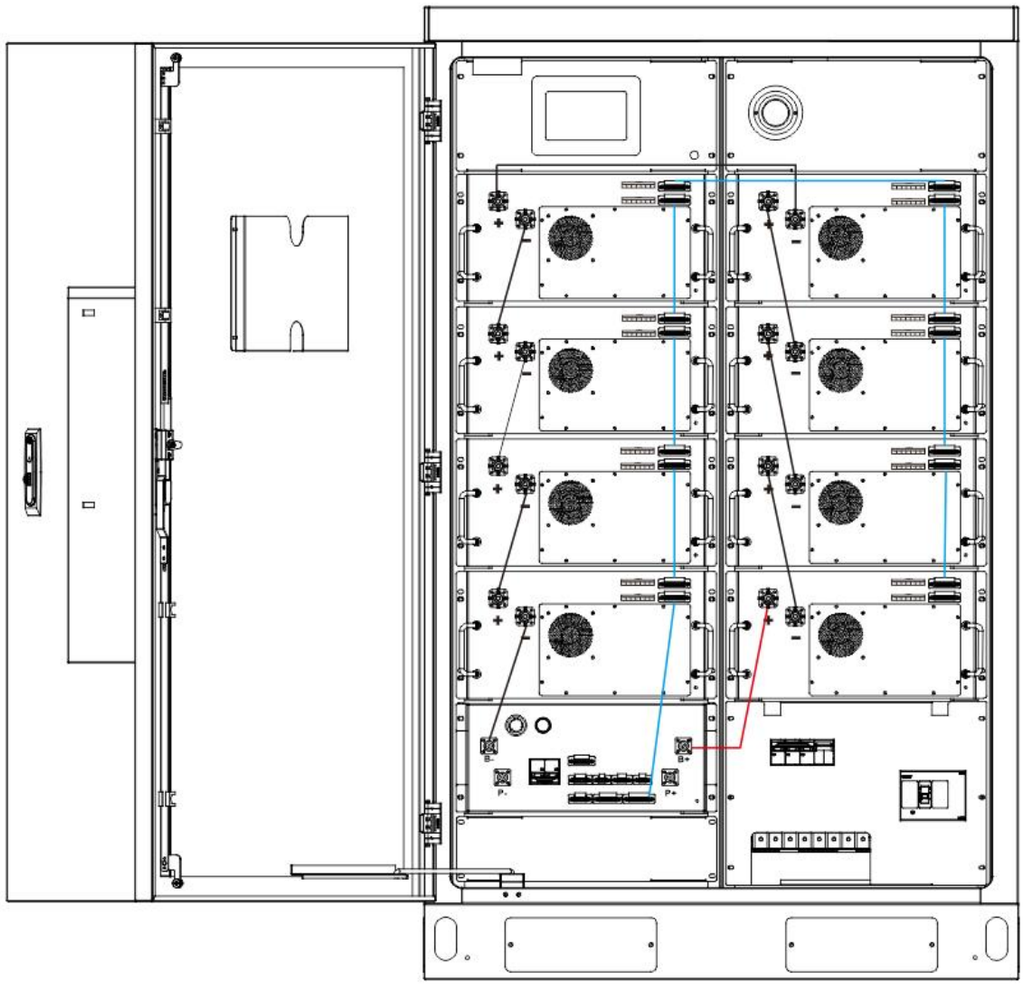
4.1 电池主要参数
4.1 Key Battery Parameters

项目 Project	规格/参数 Specifications/Parameters	备注 Remarks
型号 Model	512V314AH	

额定电压 Rated voltage	512V	
额定容量 Rated capacity	314Ah	25℃下 0.2C 放电 0.2C discharge at 25°C
额定能量 Rated energy	160768W	25℃下 0.2C 放电 0.2C discharge at 25°C
电池组充电电压 Battery pack charging voltage	544-584 V	
电池组过充保护电压 Battery pack overcharge protection voltage	592V	
电池组过充保护恢复 Battery pack overcharge protection restoration	568V	
电池组过放保护电压 Battery pack over-discharge protection voltage	400V	
电池组过放保护恢复 Battery pack over-discharge protection restoration	464V	
逆变器建议放电截止电压 Recommended discharge cutoff voltage for inverters	432V	
电池组过放解除 Battery pack over-discharge relief	充电立即恢复 Recover immediately after charging	
额定充电电流 Rated charging current	50A	
最大持续充电电流 Maximum continuous charging current	80A	
额定放电电流 Rated discharge current	50A	
最大持续放电电流 Maximum continuous discharge current	80A	
充电高温保护 High Temperature Protection During Charging	55℃	
充电低温保护 Cooling under low temperature protection	0℃	
放电高温保护 Discharge high-temperature protection	65℃	
放电低温保护 Discharge low-temperature protection	-20℃	
环境高温保护 Environmental high-temperature protection	60℃	
环境低温保护 Environmental low-temperature protection	-25℃	
机柜尺寸（L*H*W） Rack dimensions (L*H*W)	宽 1100*高 1800*1500mm（不含逆变器） Dimensions: 1100mm wide × 1800mm high × 1500mm deep (excluding inverter)	
重量（kg） Weight (kg)	约 1200kg Approximately 1200 kg	

五、锂电池操作指南
V. Lithium Battery Operation Guidelines

5.1 连接示意图
5.1 Connection Diagram



六、安装、维护注意事项
VI. Installation and Maintenance Precautions

6.1 安装注意事项
6.1 Installation Notes

（1）安装前拆箱、检测配件数量和电池外观。

(1) Before installation, unpack the box, inspect the quantity of accessories and the appearance of the battery.

（2）安装、维护等操作时，电池回路应保持断开状态。

(2) During installation, maintenance, and other operations, the battery circuit should remain disconnected.

（3）禁止跌落、挤压或穿刺电池；避免让电池遭受外部大的压力，从而导致电池内部短路和过热。

(3) Do not drop, crush, or puncture the battery; avoid exposing the battery to significant external pressure that may cause internal short circuits and overheating.

（4）用万用表测量电池电压，一般电池出厂电压在 512V-540V 之间。

(4) Use a multimeter to measure the battery voltage. Typically, the factory voltage of batteries ranges from 512V to 540V.

（5）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。

(5) Before wiring, carefully check the positive and negative terminals of the battery. Never reverse the polarity when installing the battery.

（6）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。

(6) During battery connection procedures, wear protective gloves. When using metal tools such as torque wrenches, ensure the tools are insulated. Strictly avoid simultaneous contact between both ends of metal tools (e.g., torque wrenches) and the battery's positive/negative terminals to prevent battery short circuits.

（7）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。

(7) Before connecting to external devices, disconnect the device and recheck 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, followed by securing the connecting cables.

（8）电池在搬运和摆放过程中必须轻拿轻放，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。

(8) Batteries must be handled with care during transportation and storage. Dropping, impact, throwing, or striking batteries are strictly prohibited to prevent damage or potential safety hazards.

（9）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。

(9) The use of sharp tool components to contact the battery case surface is prohibited to avoid scratching or damaging the battery case.

（10）禁止私自拆解电池箱。

(10) Unauthorized disassembly of battery boxes is prohibited.

（11）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。

(11) It is prohibited to place any metal or conductive material objects together with batteries or assemble them into battery boxes.

（12）电池组在完成安装前，至少留下一断点，避免形成回路，在检查确认后再闭合断点完成安装。

(12) Before completing the battery pack installation, leave at least one open circuit to prevent loop formation. Close the open circuit after inspection and confirmation to finalize the installation.

（13）电池线缆或铜排安装须按照标准力矩拧紧，否则电池螺栓虚连将导致连接压降过大，甚至在电流较大时大量发热将电池烧毁。

(13) Battery cables or copper busbars must be tightened according to standard torque specifications. Failure to do so may result in loose connections of battery bolts, leading to excessive voltage drop in circuits. Under high-current conditions, this can cause severe overheating that may ultimately result in battery failure.

（14）请定期检查电池连接端子螺钉，确认拧紧，无松动。

(14) Please regularly inspect the battery terminal screws to ensure they are tightened and free from looseness.

6.2 安装工具与安全设备
6.2 Installation Tools and Security Devices

6.2.1 工具
6.2.1 Tool

安装电池需要用到以下工具
The following tools are required to install the battery

斜口钳

网线压线钳

螺丝刀

6.2.2 安全装备
6.2.2 Safety Equipment

处理电池时，建议穿戴以下安全装备。
When handling batteries, the following safety equipment is recommended.

橡胶绝缘手套

护目镜

劳保鞋

6.3 漏液处理规范
6.3 Leakage Management Guidelines

（1）电池温度过高会导致电池变形、损坏及电解液溢出。

(1) Excessive battery temperature may lead to battery deformation, damage and electrolyte leakage.

（2）当电池温度超过 60℃时，应检查是否有电解液溢出。如有电解液溢出，应及时处理。

(2) When the battery temperature exceeds 60°C, inspect for electrolyte leakage. If electrolyte leakage is detected, immediate action should be taken.

（3）电解液溢出会对设备造成潜在的危害，溢出的电解液会腐蚀金属物体及单板，导致单 板损坏。

(3) Electrolyte leakage poses potential hazards to equipment, as the spilled electrolyte can corrode metal components and circuit boards, leading to board damage.

（4）有电解液溢出时，应及时做好液体的吸收和中和。在移开、搬动漏液电池时，应注意电解液可能带来的伤害。

(4) In case of electrolyte leakage, prompt absorption and neutralization of the liquid should be performed. When removing or moving a leaking battery, precautions must be taken to avoid potential injuries caused by the electrolyte.

6.4 维护注意事项
6.4 Maintenance Considerations

我司磷酸铁锂电池组因其自放电率低、耐浮充、超长使用寿命等性能，具有免维护的特性，完全智能化 BMS 电池管理系统，替代了人工监测环节，可以自动监控电池组内各单体电池的电压及电池组的总电压、总电流，在充电和放电过程中，对单体电池进行均衡，防止过充过放情况发生。电池管理系统的自动检测和保护功能，极大地降低了电池组的故障率，超长的使用寿命，大大降低了通讯行业的使用成本。安装使用后期可以对铁锂电池进行简单的维护检验，因其免维护特点，可以延长维护的周期，如 3 个月进行一次。

Our lithium iron phosphate battery packs feature maintenance-free operation due to their low self-discharge rate, float charge tolerance, and extended service life. The fully intelligent Battery Management System (BMS) replaces manual monitoring by automatically tracking individual cell voltages and overall pack voltage/current. During charging/discharging cycles, it performs cell balancing to prevent overcharging/overdischarge. The BMS's automated detection and protection mechanisms significantly reduce failure rates while extending service life, substantially lowering operational costs for telecommunications industries. With maintenance-free operation characteristics, periodic inspections (e.g., every three months) become feasible during post-installation maintenance phases.

- 检查磷酸铁锂电池的极柱、连接线是否出现松动、损伤、变形或腐蚀等现象，电池壳体有无损伤、变形；
- Inspect the terminal posts and connecting wires of lithium iron phosphate batteries for looseness, damage, deformation, or corrosion, and check the battery casing for any damage or deformation.
- 观察电池组运行指示灯的状态，正常状态下是绿灯亮，电池组 CAPCITY 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；
- Monitor the battery pack's operational indicator lights. Under normal conditions, the green light remains illuminated. When only the last CAPACITY indicator light flickers, it signals low battery capacity, indicating imminent discharge and subsequent power output shutdown.
- 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 a fault occurs and the battery pack ALM red light flashes with an alarm, first check whether the battery connections are correct or if there is an overcurrent condition. Then press the RST reset button. After the battery restarts, verify if the fault has resolved. If the issue persists, contact the manufacturer for assistance. Do not open the battery pack enclosure 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 parallel battery system applications, when replacing a faulty battery pack, ensure the voltage difference between the new replacement and other connected battery packs remains within 2V. Excessive voltage differences may cause high-voltage packs to overcharge low-voltage ones, triggering overcurrent protection mechanisms that prevent proper charging.
- 记录停电的时间和次数，对电池的供电时间作详细的统计。
- Record the duration and frequency of power outages, and conduct detailed statistics on battery power supply time.