372 kWh Outdoor Liquid-cooled Battery Cabinet

User Manual

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关于用户手册 About the User Manual

目的：

本用户手册介绍了 372 户外液冷电池柜的安装、电气连接、上下电操作、故障排查和产品维护。在安装、操作户外液冷电池柜前，请先熟悉本文档提供的特性、功能和安全注意事项。

Purpose:

This manual describes the installation, electrical connection, power-on and power-off operations, troubleshooting and maintenance of 372 outdoor liquid-cooled battery cabinet. Before installing and operating the outdoor liquid-cooled battery rack, please familiarize yourself with the features, functions and safety precautions provided in this document.

对象：

本手册适用于电站操作人员和合格的技术人员。安装本产品必须且只能由符合以下要求的专业技术人员进行:

- 已接受过专业培训
- 仔细阅读本手册，了解操作过程中涉及的安全说明
- 熟悉当地标准和电气系统相关安全规范

Target audience:

This manual is intended for power station operators and qualified technicians. This product must and can only be installed by professional technicians who:

- have received professional training;
- have read this manual carefully and known the safety instructions involved in the operation process; and
- are familiar with local standards and safety regulations related to electrical systems.

符号说明

文档中可能出现的符号说明如下表。

Description of symbols

See the table below for the description of possible symbols in this document.

Symbol	Description
DANGER	表示有高度潜在危险，如果不能避免，会导致人员死亡或严重伤害。 Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	表示有中度潜在危险，如果不能避免，可能会导致人员死亡或严重伤害。Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠ CAUTION	表示有低度潜在危险，如果不能避免，可能会导致人员轻微或中等伤害。 Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
NOTICE	表示有潜在风险，如果不能避免，可能会导致设备损坏、数据丢失、设备性能降低或不可预知的结果。 Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results.
NOTE	对正文的重要信息进行补充。 Supplements the important information in the main text.

标记说明

产品上可能出现的标记说明如下表。

Description of marks

See the table below for the description of possible marks on the product.

Mark	Description
	内部高压!触摸有触电危险。High voltage inside! Risk of electric shock by touching it
	表示保护接地端子，为保证操作人员的安全，需要牢固接地 This symbol indicates a protective ground terminal which needs to be firmly grounded to ensure the safety of operators
	对产品进行操作前请仔细阅读使用说明。 Read the instructions before performing any operation on the product.

	注意危险。请勿在带电状态下操作产品。 Pay attention to the danger. Do not operate this product in the live status!

缩写词
Abbreviations

Complete designation	Abbreviations
电池储能系统 Battery Energy Storage System	BESS
储能系统 Energy Storage System	ESS
储能变流器 Power Conversion System	PCS
消防系统 Fire Suppression System	FSS
液冷系统 Liquid Cooling System	LCS
能量管理系统 Energy Management System	EMS
Battery Module	BM (also referred to as PACK)
Battery Cluster	BC (also referred to as RACK)
Battery Module Management Unit	BMU
Battery Cluster Management Unit	BCU
Battery System Management Unit	BSU
Battery Management System	BMS
State Of Charge	SOC
State Of Energy	SOE
State Of Health	SOH

安全须知
Safety instructions

1. 人员安全 Personnel Safety

DANGER	BESS 的吊装、运输、安装、接线、操作和维护必须由专业电工按照当地法规执行。 The lifting, transportation, installation, wiring, operation and maintenance of BESS must be carried out by professional electricians in accordance with local regulations.
DANGER	安装过程中请确保电源处于关闭状态。禁止带电安装、拆除线缆。在电缆芯与导体接触的瞬间，会产生电弧、火花、火灾或爆炸，可导致人身伤害。 Please make sure that the power supply is turned off before installation. Installation or removal of cables with power on is prohibited. Electric arc, spark, fire or explosion will occur at the moment of contact between the cable core and the conductor, which may result in personal injury.

DANGER	对带电设备进行不规范、不正确的操作，可能会导致火灾、电击、爆炸等事故，造成人身、财产损失甚至死亡。 Non-standard or incorrect operation of live equipment may lead to fire, electric shock, explosion and other accidents, resulting in personal injury, property loss or even death.
DANGER	操作前，应去除手表、手镯、戒指、项链等易导电物体，防止电击。 Be sure to remove any easily conductive objects, such as watches, bracelets, rings and necklaces, before operation to prevent electric shock.
WARNING	操作时，应穿上防护服、绝缘鞋、护目镜、安全帽、绝缘手套等个人防护装备。 Be sure to wear personal protective equipment, such as protective clothing, insulated shoes, goggles, safety helmets and insulated gloves, during operation.

2. 电气安全 Electrical Safety

DANGER	连接线缆前，请检查设备是否完好。否则，可能会发生触电或火灾。 Please check whether the equipment is in good condition before connecting any cables. Otherwise, electric shock or fire may occur.
DANGER	请勿直接接触电源设备，也不要将电源与潮湿物体等导体接触。在接触导体表面和端子前，应测量接触点的电压，以确保没有触电危险。 Do not directly touch the power supply equipment, and do not allow the power supply to come into contact with conductors such as damp objects. Before touching any conductor surface or terminal, be sure to measure the voltage at the contact point to ensure that there is no risk of electric shock.
DANGER	安装、拆除电源线前，请先关闭设备及其上下游开关。 Please turn off the equipment and disconnect its upstream and downstream switches before installing or removing the power supply harness.
DANGER	如果检测到设备内部有液体，请立即切断电源，不要使用设备。 If any liquid is detected inside the equipment, please cut off the power supply immediately and stop using the equipment.
DANGER	设备维护时，应在上下游开关或断路器附近粘贴“禁止接通”的标签和警告标志，防止误接。待故障处理完成后，设备才能上电。 Before equipment maintenance, be sure to paste "Do Not Power On" labels and warning signs near upstream and downstream switches or circuit breakers to prevent accidental power connection. The equipment can be powered on only after the troubleshooting is completed.
DANGER	确保设备永久性地连接到保护地。操作设备前，应检查设备的电气连接，确保已可靠接地。 Make sure that the equipment has been permanently connected to the protective ground. Before operating the equipment, check the electrical connection of the equipment to ensure that it has been reliably grounded.
WARNING	铜排或电缆上的螺钉按本手册规定的力矩拧紧。定期检查螺钉是否拧紧，如有生锈、腐蚀等异物，应及时清理。螺丝连接松动会导致电压下降过大，当电流很大时，可能会着火。 Tighten the screws on copper bars or cables with the torque specified in this manual. Regularly check whether the screws are properly tightened. In case of rust, corrosion or other foreign matters, remove them in time. Loose screw connection will cause excessive voltage drop and

	may even cause fire when the current is high.

3. 环境要求 Environmental Requirements

DANGER	禁止将设备暴露在易燃、易爆气体或烟雾中。请勿在此环境下对设备进行任何操作。 Do not expose the equipment to flammable or explosive gases or fumes. Do not operate the equipment in such environments.
WARNING	为防止高温造成设备损坏或火灾，设备运行时应确保通风口或散热系统没有被其他物体遮挡或堵塞。 In order to prevent equipment damage or fire caused by high temperature, make sure that the vent or cooling system is not obstructed or blocked by any other objects during equipment operation.
DANGER	请确保设备存放于干净、干燥、通风良好、温度和湿度适宜的地方，并避免灰尘和冷凝水。 Please ensure that the equipment is stored in a clean, dry and well-ventilated place with appropriate temperature and humidity and protected from dust and condensate.
DANGER	请勿将设备放置在热源或火源附近。温度过高可能导致设备损坏或火灾。 Do not place the equipment near a heat or fire source. Excessive temperature may cause equipment damage or fire.
DANGER	禁止将设备安装在有灰尘、烟雾、挥发性或腐蚀性气体、红外等辐射、有机溶剂或含盐空气等环境中。 Do not install the equipment in an environment with dust, smoke, volatile or corrosive gases, infrared radiation, organic solvents or salty air.
DANGER	在进行设备的安装、操作和维护操作时，开门前应先清理设备顶部的水、冰、雪或其他异物，防止异物落入设备内部。 During the installation, operation and maintenance of the equipment, remove any water, ice, snow or other foreign matters on the top of the equipment before opening the door to prevent such foreign matters from falling into the equipment.
WARNING	请勿将设备安装在有强振动、噪声或电磁干扰的地方。 Do not install the equipment in a place with strong vibration, noise or electromagnetic interference.
DANGER	请勿将设备安装在可能被水淹没的位置。 Do not install the equipment in a location that may be flooded.

4. 机械安全 Mechanical Safety

WARNING	检查工具是否齐全，并经过专业机构检验。严禁使用有损伤、不合格或已过检验有效期的工具。确保工具安全、无过载。 Check whether the tools are complete and have been inspected by a professional institution. Do not use any tools that are damaged, unqualified or have expired. Make sure the tools are safe and not overloaded.
WARNING	在机柜中安装设备前，请确保机柜已固定牢固，重心平衡。机柜倾斜或坠落可能会造成人身伤害或设备损坏。 Before installing the equipment in the cabinet, please ensure that the cabinet is firmly fixed

	and its center of gravity is balanced. Tilting or falling of the cabinet may cause personal injury or equipment damage.
DANGER	请勿在设备上钻孔。这样做可能会影响设备的密封性能和电磁安全壳，损坏设备内部的元器件或电缆。钻孔产生的金属屑可能会使设备内部的电路板短路。 Do not drill holes in the equipment. This may affect the sealing performance and electromagnetic containment of the equipment and damage the internal components or cables. In addition, metal chips generated by drilling may short-circuit the circuit board inside the equipment.
DANGER	设备在运输、安装过程中出现划痕，应及时重新油漆。有划痕的设备不能长时间暴露。 In case of any scratches on the equipment during transportation and installation, repaint the equipment in time. Scratched equipment cannot be exposed for a long time.
DANGER	吊装过程中，严禁在起重机或被吊装物下方站立、行走。 During lifting, do not stand or walk under the crane or lifted object.
DANGER	吊装过程中，严禁拖拽钢索和吊装工具，严禁将被吊装物与硬物碰撞。 During lifting, do not drag the wire ropes and lifting tools, and do not collide the lifted object with any hard objects.
DANGER	使用叉车搬运设备时，应确保叉车脚位置正确，避免设备倾倒。搬运设备前，请先用绳索将设备固定在叉车上。搬运设备时，应安排专人看管。 When using a forklift to handle the equipment, ensure that the forks are positioned correctly to avoid the equipment from tipping over. Before handling the equipment, please secure it to the forklift with ropes. During the handling, assign a dedicated person to take care of the equipment.

第一章 产品介绍 Product Overview

1.1 适用产品 Applicable Scope

本手册适用于以下产品型号：

372

① ② ③

This manual is applicable to the battery racks of the following model: 372

No.	Meaning	Description
1	产品定义 Product definition	高压储能系统 High-voltage energy storage system
2	产品类别 Product category	户外储能柜 Outdoor energy storage cabinet
3	产品容量 Product capacity	标称能量 372kWh Nominal capacity: 372 kWh

1.2 主要功能和特征 Main Function and Feature

户外液冷电池柜集成电池簇、液冷系统、消防系统、辅助配电盒、户外机柜等一体，具有结构紧凑、部署灵活、环境适应性强、安全可靠的特点。通过与 PCS、EMS 的联合运行，可实现能量的高效存储和释放。主要功能特征有：

● 电池管理系统实时检测电池运行状态(电压、电流、温度、SOC/SOH/SOP 等)，根据电池现行状态和电气组件的实际性能来调节电池充放电及能量存储。

● 当电池发生故障时，系统将上报并限制充放电电流或功率，必要时延迟断开接触器，保护系统安全。

● 电池系统可以控制液冷机组冷却、加热及温度设置，保持电池温度在合适区间。

● 电池柜配备有火情探测及灭火装置，可以实时检测电柜内温度及烟雾状态，防范电池意外起火等消防安全事故。

Integrating the battery cluster, liquid cooling system, fire protection system, auxiliary distribution box and outdoor cabinet, the outdoor liquid-cooled battery cabinet is compact, safe and reliable. It can be deployed flexibly and can adapt to different environments. Operating with PCS and EMS, it can store and discharge energy efficiently. Main functions and features:

● The battery management system is able to detect the battery operation status (voltage, current, temperature, SOC/SOH/SOP, etc.) in real time, and adjust the battery charging and discharging and energy storage according to the current battery status and the actual electrical component performance.

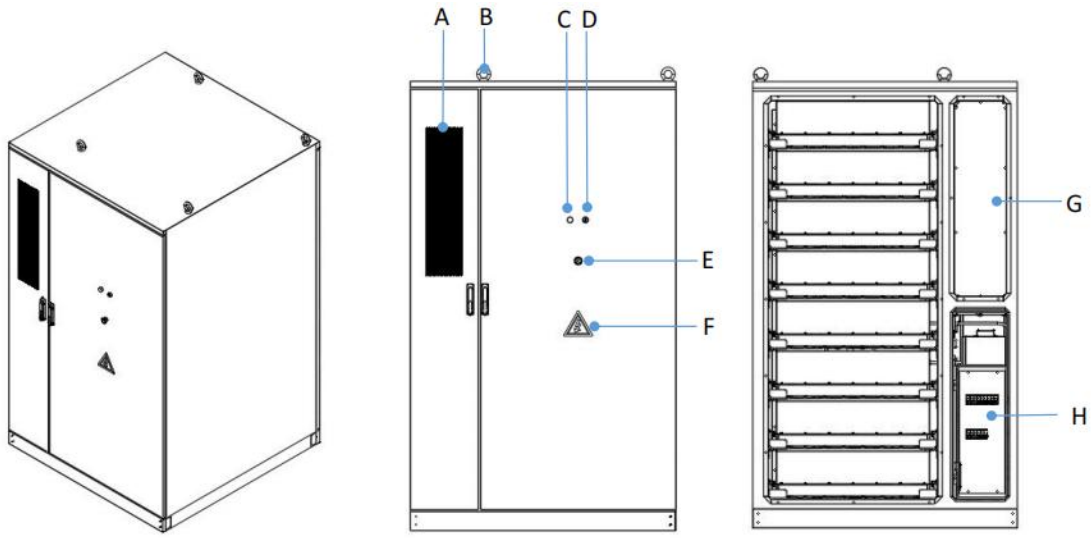
● When the battery fails, the system will report the fault and limit the charging and discharging current or

power, and delay the disconnection of the contactor if necessary to keep the system safe.

● The battery system is able to control the cooling, heating and temperature setting of the liquid cooling unit to keep the battery temperature within an appropriate range.

● The battery cabinet, equipped with fire detection and fire extinguishing devices, is able to detect the temperature and smoke status in the electric cabinet in real time to prevent, for example, accidental fire of batteries.

1.3 产品外观 Appearance

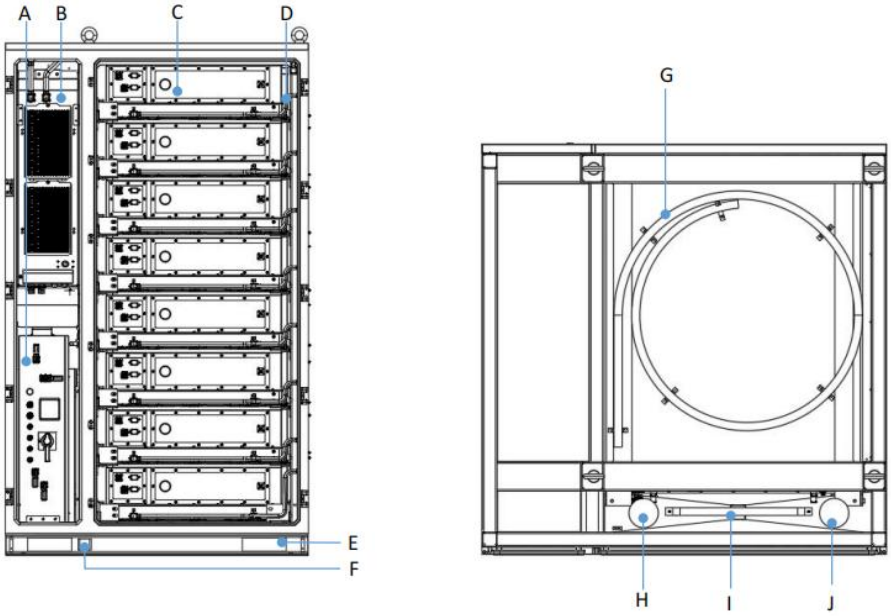


编号 No.	名称 Description
A	液冷机外循环进风口 External circulation air inlet of liquid cooler
B	柜体吊环 Cabinet lifting ring
C	交流电源指示灯 AC power indicator
D	故障指示灯 Fault indicator
E	急停按钮 Emergency stop button
F	警示标识 Warning sign
G	液冷机外循环出风口 External circulation air outlet of liquid cooler
H	交流辅助配电盒 AC auxiliary distribution box

1.4 产品外形尺寸和重量 Outline Dimensions and Weight

宽 Width	深 Depth	高 Height	重量 Weight
1380mm	1400mm	2330mm	约 3.7T

1.5 产品内部组成 Internal Composition



No.	Description
A	主控箱 Main control box
B	液冷机组 Liquid cooling unit
C	电池箱 Battery box
D	液冷管路 Liquid cooling pipeline
E	叉车孔（拆除底部封板可见） Forklift hole (visible after removal of bottom blanking plate)
F	柜体接地点（拆除底部封板可见） Cabinet grounding point (visible after removal of bottom blanking plate)
G	柔性抑制管（柜体顶部电池簇上方） Flexible suppression tube (above the battery cluster on the top of the cabinet)
H	感温探测器（柜体顶部电池簇上方） Heat detector (above the battery cluster on the top of the cabinet)
I	照明灯（柜体顶部电池簇上方） Lighting lamp (above the battery cluster on the top of the cabinet)
J	感烟探测器（柜体顶部电池簇上方） Smoke detector (above the battery cluster on the top of the cabinet)

1.6 主要部件 Main Components

1.6.1 电池簇 Battery Cluster

电池簇由 8 个电池箱和 1 个主控箱串联组成。电池箱由 3.2V-280Ah 方形铝壳磷酸铁锂电芯通过 1P52S 组成。电池箱内含 BMU，实现电芯电压、温度实时采集，以及电芯容量均衡等功能。

主控箱内包含熔断器、接触器、直流断路器等电气安全保护器件。主控箱内含 BCU，实现电池簇电压、电流采样，电池簇充放电管理，电池簇环境安全监控，电池簇与上一级控制单元或 PCS 的通信等功能。

The battery clauster consists of 8 battery boxes and 1 main control box connected in series. The battery box is composed of 3.2V-280Ah square aluminum-shell lithium iron phosphate cells through 1P52S. The battery box contains BMU, which allows for real-time collection of cell voltage and temperature, and balance of cell capacity.

The main control box contains fuses, contactors, DC circuit breakers and other electrical safety protection devices. The main control box contains BCU, which allows for voltage and current sampling, charging and discharging management and environmental safety monitoring of battery cluster, and communication between the battery cluster and the upper level control unit or PCS.

1.6.2 液冷系统　　Liquid Cooling System

参数 Parameters	型号 EMW90HDNC1A Model: EMW90HDNC1A		
机组性能参数 **Performance parameters**	制冷量@W18/L45 Cooling capacity @ W18/L45	kW	8.0
	制冷输入功率@W18/L45 Cooling input power @ W18/L45	kW	4.6
	电加热量 Electric heating capacity	kW	2.0
	电源 Power supply	V, Hz	220±15%,50/60±3
	最大工作电流 Maximum operating current	A	25
	工作环境范围 Operating ambient temperature range	ºC	-30~+55
	IP 防护等级 IP rating		IPX5
	噪声等级 Noise level	dB(A)	75
冷媒系统 **Refrigerant system**	制冷剂 Refrigerant		R134a
	压缩机型式 Compressor type		变频压缩机 Variable frequency compressor
	风机类型 Fan type		AC 离心风机 AC centrifugal fan
	风机数量 Number of fans		3

	冷凝风量 Condensate air volume	m³/h	2200
水路系统 **Waterway system**	冷却液 Coolant		50%乙二醇 50% ethylene glycol
	蒸发器型式 Type of evaporator		板式换热器 Plate heat exchanger
	接管管径 Connecting pipe diameter	mm	φ20
	接管型式 Connecting pipe type		快接头 Quick connector
	水流量 Water flow	l/min	50@90kPa
安装参数 **Installation parameters**	外形尺寸（宽×深×高） **Overall dimensions (width × depth × height)**	mm	275×1150×1040
	质量 Quality	kg	115
	安装环境 Installation environment		户外应用 Outdoor applications

1.6.3 消防系统 Fire Protection System

户外柜装有感温和感烟探测器，一旦探测到火情，探测器将发送信号给 BCU，执行电气保护动作。

柔性抑制管采用全氟己酮灭火剂，能迅速降低保护区的温度，同时降低保护区内的含氧量，从而抑制火情。灭火剂对人和环境无害。

柔性抑制管有常规启动和玻璃球定温启动两种方式。当受保护区域温度升高，柔性抑制管在 90~110℃温度范围内破裂释放灭火剂。或当受保护空间温度升至温感玻璃球的温度值时，温感玻璃球破裂，灭火剂释放。

柔性抑制管释放灭火剂后，可通过其压力反馈装置反馈信号给 BCU，作电气保护动作。

The outdoor cabinet is equipped with heat and smoke detectors. Once a fire is detected, the detectors will send signals to the BCU to activate electrical protection actions.

Using perfluorohexanone extinguishing agent harmless to people and the environment, the flexible suppression tube is able to quickly reduce the temperature and the oxygen content in the protected area, thus suppressing the fire.

The flexible suppression tube can be started conventionally or by glass ball at a constant temperature. When the temperature in the protected area rises to 90~110°C, the flexible suppression tube will rupture and release the extinguishing agent. Or when the temperature in the protected space rises to the set temperature of the temperature-sensitive glass ball, the temperature-sensitive glass bulb will rupture, releasing extinguishing agent.

After the flexible suppression tube releases the fire extinguishing agent, it can send a signal to the BCU through its pressure feedback device to activate the electrical protection actions.

第二章　包装、运输和储存 Packaging, Transportation and Storage

2.1 包装 Packaging

系统进行整体包装，以确保产品在搬运、运输和储存中不受任何有害气体、化学污染、静电、潮湿和机械损伤。包装箱已标明：产品的名称、型号规格、生产日期、数量和批号。

The system is packaged as a whole to ensure that the product is well protected from any harmful gases, chemical contamination, static electricity, moisture and mechanical damage during handling, transport and storage. The name of product, specification, production date, quantity and lot number have been labeled on the packaging box.

2.2 运输 Transportation

适应于卡车和轮船，运输中应遮蓬，防晒，文明装卸。装有产品的包装箱允许任何运输工具运输，电池在装卸过程中，应轻搬轻放，严防摔掷、翻滚、重压。运输中应避免雨、雪的直接淋袭和机械撞击。

Trucks and shipping are preferred as means of transport while shelter and sun protection should be guaranteed during transportation. Please load and unload in a civilized way. Packing boxes with products inside can be transported by any means of transport. Batteries shall be handled with care in the middle of loading and unloading. Be cautious of throwing, rolling over and heavy pressure. Avoid direct contact with rain, snow and mechanical impacts.

2.3 储存 Storage

系统储存时应放在干燥的仓库中，不得暴晒和雨淋。仓库内不允许有有害气体，易燃，易爆的产品及有腐蚀性的化学物品，避免机械冲击、重压和强磁场作用，避免受阳光直射，距离热源不得少于2m，包装箱应垫离地至少 20cm 高，距离墙壁、窗口或空气入口至少 50cm。

日均平均存储温度：≤20℃，允许存储温度：-30~60℃；存储湿度：≤95%无冷凝。

The system should be stored in a dry warehouse to avoid exposure and rain. No harmful gases, flammable or explosive products and corrosive chemicals are allowed in the warehouse. Keep away from mechanical impact, heavy pressure and strong magnetic field. Avoid direct sunlight and the distance to heat source should be more than 2m away. The packaging box should be at least 20cm high from floor, and at least 50cm away from the wall, windows or air inlets.

Recommended storage temperature: ≤20℃;

Allowable storage temperature: -30~60℃;

Humidity: <95% (no condensation).

在本规定条件下：

产品出厂后 6 个月内至少进行一次补充电至 50%SOC，每 12 个月需要进行容量核对性试验和重新检验。

Under these conditions, the product shall be supplemented to 50% SOC at least once within 6 months after leaving the factory.The capacity verification test and re-inspection are required every 12 months.

第三章　安装 Installation

电池系统为高压储能设备，属于危险品，非专业人士及不当的操作与使用可能引起触电、燃烧、爆炸等严重的后果。电池系统的安装、维护必须由专业技术人员操作，使用时必须严格遵守相关的安全规定。

The battery system is a high-voltage energy storage device, which is regarded as dangerous goods; operation and use by non-professional persons or improper operation and use of it might result in severe consequences, e.g. electric shock, combustion and explosion. The battery system must be installed and maintained by professional technicians and used in strict accordance with the relevant safety provisions.

3.1　装配主要部件 Main constituent parts for installation

Table 1. Main constituent parts for installation

Components 器件	Diagram 示意图	Number 数量	Unit 单位	Remark 备注
Rack 电柜		1	pcs	Dimension 尺寸: 1380W*1400D*2330H(mm) Weight 重量：约 3.7T Voltage range 电压范围： 1164.8~1497.6V DC
HV harness 高压线束		1	set	One for the positive pole and one for the negative pole on the control box. 主控箱正负各一根

Auxiliary power supply harness 辅源供电		1	pcs	Including power supply for chiller and lighting. 水冷机组和照明供电
Power supply for BMS BMS 供电		1	pcs	Power supply from the external UPS 外部 UPS 提供的电源
Communication harness 通讯线束		1	set	Connection between two adjoining racks, one for input and one for output. 连接上下两个电柜，一路输入，一路输出

3.2 安装过程概述 Description of the installation process

Installation steps **安装步骤**	**Specific implementation** **具体实施**	**Remark** **备注**
Rack installation 柜体安装	A． Transfer the rack to the designated location by means of forklift transfer or hoisting. 通过叉车转运或者吊装的方式将电柜转移至指定位置	The tool should meet the weight requirements, and the tilt angle should be smaller than 5°. 满足电柜重量需求，倾斜角度小于5°
	B． Fix the bottom foot of the rack. 将电柜底部底脚固定	M16 bolt, required torque is 150~200N.M M16 螺栓，扭矩 150~200N.M

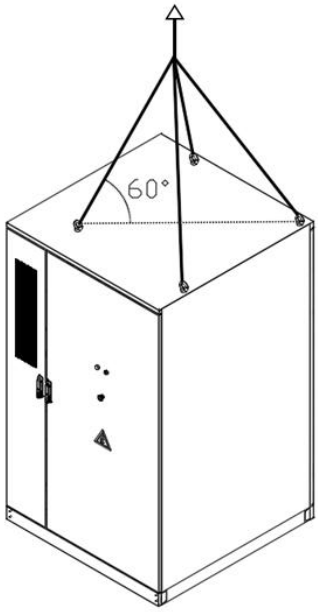
	C. Grounding of the rack. 柜体接地	M12 bolt, required torque is 60~70N.M, wire size ≥50mm² (cooper) M12 螺栓，扭矩 60~70N.M，线径 ≥50mm²（铜导线）或满足当地规范。
Wiring 线束安装	A. Power harness 直流功率线束	Including positive P+ and negative P- poles 分为 P+、P-正负两极 线径 50㎜2
	B. Auxiliary power supply harness 辅源线束	Including power supply for chiller and lighting 水冷机组和照明供电 线径 16㎜2
	C. Power supply for BMS BMS 供电	Power supply from the external UPS 外部 UPS 提供电源 线径 4㎜2
	D. Communication harness 通讯线束	One for input and one for output. 通讯线束

3.3 柜体机械安装 Mechanical Installation of Cabinet

3.3.1 柜体搬运 Handling of Cabinet Body

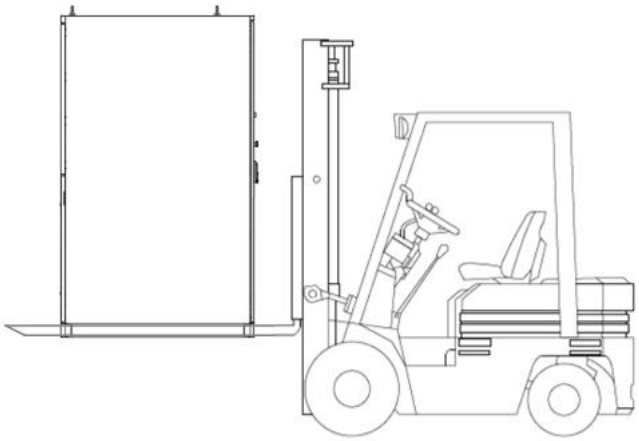
吊装：起重机起吊重量要求大于 5t。起吊点居于中心位置，吊绳与水平面夹角大于 60°。提升、移动、落地过程中应尽可能动作缓慢。

Lifting: Use a crane with lifting capacity of 5t. Keep the lifting point at the center of the cabinet, and the included angle between the lifting rope and the horizontal plane greater than 60°. Lift, move and land the cabinet as slowly as possible.



叉车搬运：柜体底部叉车孔尺寸为 200mm*60mm。使用叉车时，需根据现场情况对电池柜进行绑扎和固定，确保电池柜无掉落风险。提升、移动、落地过程中应尽可能动作缓慢。

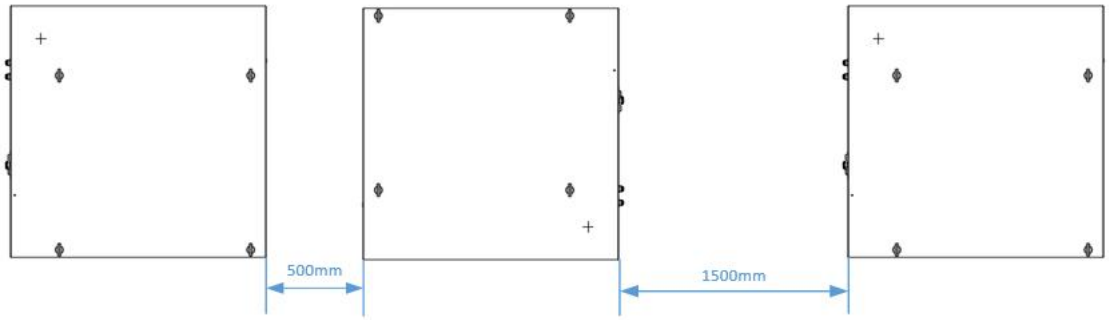
Forklift handling: There is a forklift hole at the bottom of the cabinet in a size of 200 mm * 60 mm. When using a forklift, bind and fix the battery cabinet according to the site conditions to prevent it from falling off. Lift, move and land the cabinet as slowly as possible.



3.3.2 柜体排布 Cabinet Arrangement

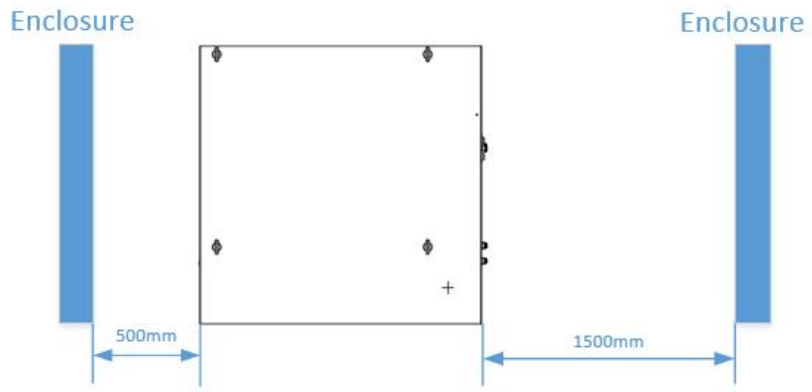
柜体背靠背排列时，柜体间的最小间隙为 500mm。柜体面对面排列时，柜体之间的间距最小为 1500mm。

The minimum spacing between cabinets arranged back to back shall be 500 mm. The minimum spacing between cabinets arranged face to face shall be 1,500 mm.



如果柜体周围加围挡，机柜背面与围挡的最小间距为 500mm。机柜正面与围挡的最小间距为 1500mm，以便于安装和维护。

The enclosure, if added around the cabinet, shall be at least 500 mm from the back of the cabinet and at least 1,500 mm from the face of the cabinet to facilitate installation and maintenance.



3.3.3 地基要求 Foundation Requirements

安装选址应具备以下特点：

●不易发生水浸；

●备有适当的排水设施；

●土壤应干燥、压实、稳定且均质。

基础必须具有支持系统所需的最小强度。必须对该位置进行岩土工程研究，以确定其特征，从而设计出最合适的基础。预制电缆沟必须有通风条件。在适当的位置做电缆开口以允许电气连接。

地基高度 a 要求为 mm，地基伸出柜体边缘尺寸 b 要求为 mm。

The installation site shall:

● not be susceptible to flooding;

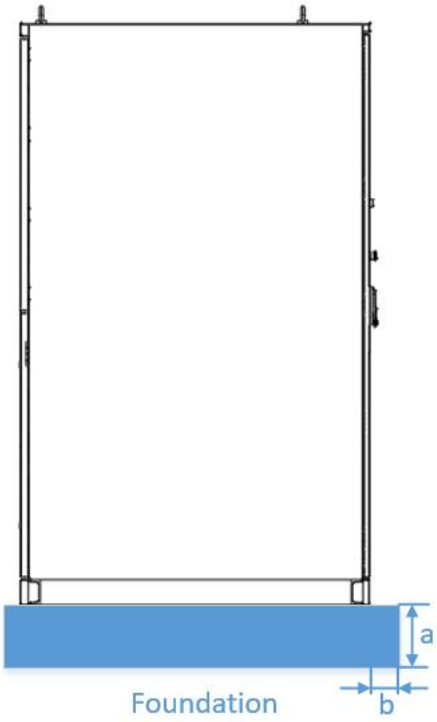
● be provided with adequate drainage facilities;

● have dry, compacted, stable and homogeneous soil.

The foundation must have the minimum strength required to support the system. A geotechnical study must be carried out at this location of foundation to determine characteristics and design the most suitable foundation. Prefabricated cable trenches must be ventilated. Cable openings shall be reserved at suitable locations to allow for electrical connections.

The foundation height a shall be XX mm, and the dimension b of the foundation extending out of the edge

of the cabinet body shall be XX mm.



3.3.4 柜体固定 Cabinet Fixing

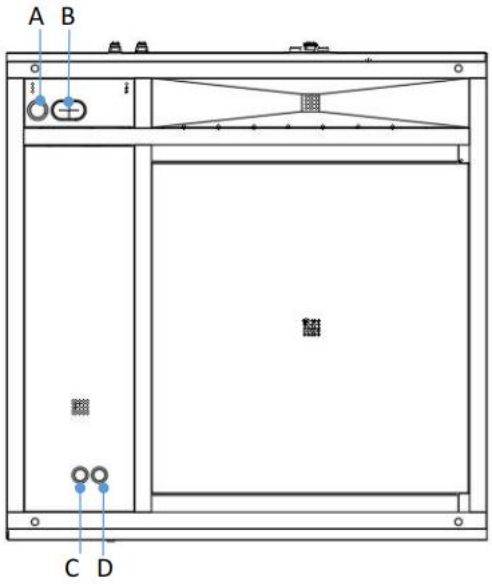
电池柜底脚采用 M16 螺栓固定，拧紧力矩设定为 150~200N.M。

Each foot of the battery cabinet is fixed with M16 bolts at a tightening torque of 150~200 N.M.

3.4 电气连接 Electrical Connection

柜体底部留有线缆孔，如下图所示。

Cable holes are reserved at the bottom of the cabinet, as shown in the figure below.

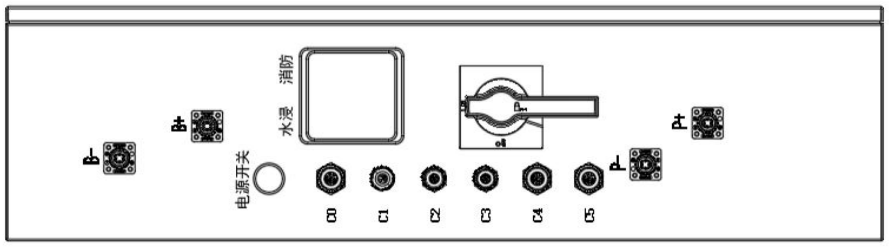


编号 No.	名称 Description
A	通讯线缆孔 Communication cable hole
B	直流线缆孔 DC cable hole
C	交流辅助供电线缆孔 AC auxiliary power cable hole
D	BMS 电源线缆孔 BMS power cable hole

3.4.1 电缆的连接 Wiring

通讯线缆和直流线缆接到主控箱上。主控箱面板标识如下图所示。

The communication cable and DC cable are connected to the main control box. The marks of the main control box panel are shown in the figure below.



交流辅助配电和 BMS 电源线缆，接到配电盒内。

The AC auxiliary power distribution and BMS power cables are connected to the power distribution box.

1. 通讯线缆的安装

1. Installation of communication harness

- 将对应的通讯线束安装在主控箱的 C3 和 C4 连接器上
- Install the corresponding communication harness on C3 and C4
- 首柜 C3 连接到综控柜，C4 连接下一个电柜的主控箱 C3
- In the first rack, C4 is connected to the C3 of the next rack.
- 中间柜 C3 连接上一个电柜主控箱 C4，C4 连接下一个电柜的主控箱的 C3
- In the middle rack, C4 is connected to the C3 of the next rack, and C3 is connected to C4 of the last rack.
- 末端柜 C3 连接上一个电柜主控箱的 C4，C4 接终端电阻
- In the terminal rack, C3 is connected to C4 of the last rack, and C4 is connected to the terminal resistor.

2. 直流功率线束的安装

2. Installation of DC power harness

- 主控箱上的断路器 QF1 处于 OFF 状态

- QF1 on the control box should be in OFF state.
- 红色连接器接 P+，黑色连接器接 P-
- Red connector connects to P+, black connector connects to P-.

3. 交流辅助供电线缆的安装

3. Installation of auxiliary power supply harness

- 将辅源供电线缆(水冷机组和照明供电)安装在配电盒的断路器 QF1 上
- Install the auxiliary power supply harness (power supply for chiller and lighting) on breaker QF1 inside AC panel

4. BMS 电源线的安装

4 Installation of BMS power supply harness

- 将 BMS 供电线缆安装在配电盒的断路器 QF2 上
- Install the BMS power supply harness on breaker QF2 inside AC panel

3.4.2 连接注意事项 Precautions in wiring

● 在安装 C3 和 C4 时需要拧紧航空插头。

The connector need to be tighten during the installation of C3 and C4.

● 水冷机组供电和 BMS 供电线路不同，接线时不能出现错误。

The power supply harness for the chiller is different from the BMS, and no errors are allowed to occur during wiring.

● 在安装高压连接器过程中需要确保连接器锁紧

To ensure the high voltage connector is locked.

● 严防在连接过程中出现任何形式的短路；

Strictly prevent any form of short circuit during the connection process.

● 严禁未经过培训的操作人员进行操作

It is strictly forbidden for the operator to operate without training.

● 禁止未穿戴符合相关要求保护装备操作人员操作

It is strictly forbidden for the operator to operate freehand without wearing protective equipment.

- 所有连接必须在明确指导下进行，严禁任何形式的猜想与模糊尝试形式的作业方式

All connections must be made under explicit guidance, and any form of guessing and vague trial operation methods are strictly prohibited.

- 连接的关键点为：确保连接正确、可靠(不会松脱)、接触良好、无短路；

The key points of the connection are: ensure the connection is correct, reliable (will not be loosened), good contact, no short circuit.

- 连接完成后，必须逐点测量、确认；

After the connection is completed, it must be measured and confirmed point by point.

- 接线之前，请确保所有处于断开状态

Before wiring, make sure all switch in off state.

●其它不确定的因素，需请教专业人士确认后方可实施。

If there are other uncertain factors, need to be confirmed by professionals before implementation.

第四章　使用说明 Operating Instructions

为了保证您的储能系统长期安全可靠的运行，请您仔细阅读并遵守以下使用说明。

In order to ensure the long-term safe and reliable operation of your energy storage system, please read and follow the instructions below.

4.1 电柜温度特性 Rack Temperature Characteristics

- 工作温度:　　-20℃~55℃　(放电)　/ 0℃~55℃　(充电)
- Operating temperature:-20℃~55℃　(discharge)　/ 0℃~55℃　(charge)
- 安全存储环境温度:　　-30℃~60℃
- Safe storage ambient temperature:-30℃~60℃
- 推荐存储环境温度：平均温度≤25℃
- Recommended storage environment temperature: average temperature ≤25 ℃
- 最佳工作环境温度:　　20℃~40℃
- Optimum operating ambient temperature:20℃~40℃

4.2 电缆连接确认 Cable Connection Confirmation

- 正式通电前，检查整个系统的连接电缆，确保线缆连接可靠、没有老化断裂以及绝缘破坏等现象。
- Before power on, check the connection cable of the whole system, and make sure that the cable connection is reliable without aging fracture and insulation damage.
- 检查电池柜的输出直流动力线缆正负极是否连接正确；
- Check whether the positive and negative poles of the DC output power cable in the battery rack are connected correctly;
- 检查电池柜交流电源连接是否正确；

- Check whether the power connection of the battery cupboard is correct;
- 检查所有通信线缆和连接端子连接是否紧密可靠；
- Check whether all communication wires and cables and sub connections at the connection end are tight and reliable

4.3 二次回路上电 Power up the Secondary Circuit

依次闭合配电盒里的断路器 QF1、QF2。并按下主控箱上的带灯开关。

接通交流电源后，此时各指示灯状态如下：

After connecting AC power supply, the indicator lights is as follows:

系统状态 System status	主控箱直流输出指示灯● DC output indicator light on control box●	电柜交流指示灯 AC indicator Light	电柜故障指示灯● Fault indicator light ●
开机 Power ON	红灯灭 Red light is OFF	白灯亮 White light is ON	红灯灭 Red light is OFF

- 如果各状态指示灯亮灭组合与上列表不符，则表示系统未正常开机，重复步骤即可。
- If the combination of the lights on and off is inconsistent with the above list, it means that the system is not normally started up. Repeat the steps.
- 如果不能解决，请联系厂家进行系统故障排除。
- If the problem cannot be solved, please contact the manufacturer for system troubleshooting.

4.4 电柜一次回路上电 Power up of Primary Circuit of Battery Rack

- 二次回路上电后，对电池柜进行一次回路上电。合上主控箱断路器 QF1，BMS 接受并执行上高压指令，自动闭合高压接触器。此时电池柜的正负输出极两端将会产生 1372.8V 左右(50%SOC)的直流高压，上电后各指示灯亮灭组合将对应如下状态：
- After the secondary circuit is electrified, charge the primary circuit for the battery rack. At this moment, the positive and negative output ends of the battery rack will generate about 1372.8V (50%SOC) DC high voltage. After electrification, the light combination will correspond to the following state:

系统状态 System status	主控箱直流输出指示灯● DC output indicator light on control box●	电柜交流指示灯 AC indicator Light	电柜故障指示灯● Fault indicator light ●
开机 Power ON	红灯亮 Red light is ON	白灯亮 White light is ON	红灯灭 Red light is OFF

➢ 如果各状态指示灯亮灭组合与上列表不符，则表示系统未正常上电，重复步骤即可。

➢ If the combination of the lights on and off is inconsistent with the above list, it means that the system is not properly powered on. Repeat the steps.

➢ 如果不能解决，请连联系厂家进行系统故障排除。

➢ If the problem cannot be solved, please contact the manufacturer for system troubleshooting.

4.5 电柜充放电 Charging or Discharging of Battery Rack

➢ 电柜一次回路上电完成后，PCS 控制电柜进入充放电状态，此时各指示灯亮灭组合将对应如下状态:

➢ After powering on the primary circuit, the battery rack will enter the charging or discharging state. At this time, corresponding states of indicator lights are as follows:

系统状态 System status	主控箱直流输出指示灯● DC output indicator light on control box●	电柜交流指示灯 AC indicator Light	电柜故障指示灯● Fault indicator light ●
开机 Power ON	红灯亮 Red light is ON	白灯亮 White light is ON	红灯灭 Red light is OFF

4.6 电池故障 Fault of Battery Rack

➢ 电池系统发生故障时，BMS 会主动切断主控箱的断路器输出开关。此时各指示灯亮灭组合将对应如下状态:

➢ If the battery system fault, BMS cut off the breaker of the control box. At this time, corresponding states of indicator lights are as follows:

系统状态 System status	主控箱直流输出指示灯● DC output indicator light on control box●	电柜交流指示灯 AC indicator Light	电柜故障指示灯● Fault indicator light ●
开机 Power ON	红灯灭 Red light is OFF	白灯亮 White light is ON	红灯亮 Red light is ON

4.7 电柜一次回路下电 Power Down of Primary Circuit of Battery Rack

➢ PCS(EMS)停止充放电，并下发一次回路下电指令给电柜 BMS，电柜进行一次回路下电，系统状态会进入系统刚开机时所处状态；此时电柜主回路断开，正负输出极两端无高压，下电后各指示灯亮灭组合将对应如下状态：

➢ During power down of primary circuit, the main circuit of the battery rack is disconnected and there is no high voltage at both ends of the positive and negative output poles, and the combination of lights on and off will correspond to the following state:

系统状态 System status	主控箱直流输出指示灯● DC output indicator light on control box●	电柜交流指示灯 AC indicator Light	电柜故障指示灯● Fault indicator light ●
开机 Power ON	红灯灭 Red light is OFF	白灯亮 White light is ON	红灯灭 Red light is OFF

4.8 电柜二次回路下电 Secondary Circuit Power Down

➢电柜一次回路下电完成后，断开配电盒交流电源开关 QF1 和 QF2，二次回路下电，所有指示灯熄灭。

➢ After the primary circuit is powered off, turn off the AC power switches QF1 and QF2 in the AC panel. All indicators are off.

第五章　产品维护 Product Maintenance

5.1　术语解释 Terms Explanation

- 正常运行：指每天在工作的系统。
- Normal operating：Refers to the system that works every day.
- 间断运行：指每月运行频率不固定，无法保证每天工作的系统。
- Intermittent operating： Refers to a system that does not have a fixed monthly running frequency and cannot guarantee daily work.
- 久放不用：连续超过 3 个月未启动工作的电池系统(电池系统在暂停使用前需充电到 40%SOC)
- Long-time unused：The battery system that has not started working for more than 3 months (the battery system needs to be charged to 40% SOC before being suspended).

5.2　正常运行的系统使用要求 Operating Instructions for Normal Operating System

- 每十二个月对系统做一次电池保养，防止造成电池损伤，具体保养操作方法参考 5.5 节。
- Perform battery maintenance on the system every twelve months to prevent battery damage. Refer to *Section 5.5* for specific maintenance operating method.
- 每十二个月对系统进行巡检(参考附录 1)，并做好巡检记录。
- Conduct an inspection of ESS every twelve months (refer to *Appendix 1*) and make inspection record.

5.3　间断运行的系统使用要求 Operating Instructions for Intermittent Operating System

- 使用要求与正常运行系统相同
- The operating instructions are the same as those of normal operating system.

5.4 久放不用的系统使用要求 Operating Instructions for Long- time Unused System

- 储能电池存放的 SOC 区间：30%~50%，避免电芯在低于 15% SOC 以下长期存放，电池久置不用需要及时切断耗电设备
- SOC range of battery storage: 30%~50%., avoid long-term storage of batteries below 15%

SOC. If the battery is not used for a long time, it is necessary to cut off the power-consuming equipment in time

- 每三个月对储能系统进行一次巡检(参考附录 1)，并做好巡检记录。

- Conduct an inspection of ESS every three months (refer to *Appendix 1*) and make inspection record.

- 每三个月对系统做一次电池保养，防止造成电池损伤，具体保养操作方法参考 5.5 节。

- Perform battery maintenance on the system every three months to prevent battery damage. Refer to *Section 5.5* for specific maintenance operating method.

- 久放系统首次使用前，为激活电池系统需至少做一次满充电，以恢复电池的性能到最佳状态。

- Before the first usage of long-time unused system, the battery system must be fully charged at least once to activate the battery system in order to recover the battery performance to the best condition.

NOTE
储能系统久放不用，会对电池造成不可逆的损伤，请务必进行定期维护 If the energy storage system is not used for a long time, it will cause irreversible damage to the battery. Please perform regular maintenance.

5.5 电池保养的操作方法 Operating Method of Battery Maintenance

为了保证您的储能系统长期安全可靠的运行，请您仔细阅读并遵守以下使用说明：

In order to ensure the long-term safe and reliable operation of your energy storage system, please read and follow the instructions below:

保养操作流程:

Maintenance process:

方案一：当电池系统 SOC 处于低端时，推荐此省电方案。

Plan 1　This plan is applicable when SOC of the battery system is low

1、将电池系统放电至截止条件(平均单体电压< 3.1V 或 最低电压<2.8V)，然后停止放电，静置 1 小时。

Discharge the battery system to the cut-off condition (Average cell voltage< 3.1V or the lowest voltage<2.8V), then stop discharging, standing for 1 hour.

2、对电池系统进行自动满充电(最高单体电压>3.65V)，充电结束后，静置 1 小时。

Full charging automatically to the battery system (The highest voltage>3.65V), after charging, standing for 1 hour.

3、对电池系统放电到 40%停止

Discharge the battery system to 40% and stop

方案二：当电池系统 SOC 处于高端时，推荐此省电方案

Plan 2　This plan is applicable when SOC of the battery system is high

1、对电池系统进行自动满充电(最高单体电压>3.65V)，充电结束后，静置 1 小时

Full charging automatically to the battery system (The highest voltage>3.65V), after charging, standing for 1 hour.

2、将电池系统放电至截止条件(平均单体电压<3.1V 或最低电压<2.8V)，然后停止放电，静置 1 小时。

Discharge the battery system to the cut-off condition (Average cell voltage< 3.1V or the lowest voltage<2.8V), then stop discharging, standing for 1 hour.

3、对电池系统充电到 40%停止 Charge the battery system to 40% and stop

NOTE

1、 在进行保养操作前须检查确保环境安全、系统安全、无报警、无故障。

Check to ensure environmental safety, system safety, no alarm, no fault

before performing maintenance operations.

2、在对储能系统进行电池保养完毕后，可通知我司售后服务人员进行免费数据分析。

After the battery maintenance of ESS is completed, you can notify our after-sales engineer to perform data analysis for free.

5.6 水冷系统维护及保养要求 Maintenance Requirements for Liquid Cooling System

- 如果电柜内部发生漏液，请及时停机联系 S Y 进行检修。
- In case of liquid leakage inside the electric cabinet, please stop the machine in time and contact S Y for maintenance .
- 冷却液采用 S Y 推荐，五年检查一次。若冷却液退化到如下水平，需要更换。
- The coolant shall be recommended by SY. If the coolant deteriorates to the following level, it needs to be replaced .
- pH 值＜6.5,或者 pH 值＞9.5
- PH value < 6.5 or PH value > 9.5
- 氯离子浓度＞60ppm
- Chloride concentration>60ppm
- 外观: 冷却液浑浊，有杂质
- Appearance: turbid coolant with impurities
- 储能水冷管路采用的是液位报警器，如果液位传感器提示报警，即需要加液
- The energy storage water cooling pipeline uses a liquid level alarm. If the liquid level sensor prompts an alarm, the liquid needs to be added .
- 若自行采购冷却液，需选择冰点低于当地最低温度，建议 40%~50%乙二醇浓度、对铝防腐性能好的冷却液，并按照冷却液供应商的要求进行维护。建议增大维护频次。由于使用其他非 SY推荐的冷却液造成的电柜相关部件的损坏,不在质保范围内。
- If you purchase the coolant by yourself, you need to choose the coolant with the ice point lower than the local minimum temperature . It is recommended that the concentration

of 4 0 % ~ 5 0 % glycol is good for aluminum corrosion resistance, and the maintenance should be carried out according to the requirements of the coolant supplier. It is recommended to increase the maintenance frequency . Any damage to the relevant parts of the electric cabinet caused by the use of other coolants not recommended by SY is not covered by the warranty .

- 水冷管路在每年维护保养时进行观察，如有破损需立即更换

- The water cooling pipeline is observed during annual maintenance, and if it is damaged, it needs to be replace immediately.

- 水冷机组的维护参考水冷机组使用说明书

- For the maintenance of water cooling chiller , please refer to appendix the user manual of water cooling chiller .

5.7 消防系统维护 Fire Protection System Maintenance

- 柔性抑制管的使用寿命为 10 年，每 10 年需要进行一次维护更换

- The service life of the Flexible suppressor tube is 10 years, and replacement are required every 10 years.

- 每 12 个月巡检温感和烟感:

- Check the temperature sensor and smoke sensor every 12 months:

- 打开柜门，电柜上低压，观察到温感和烟感指示灯每隔几秒闪烁一次，即为正常工作状态。

- Open the rack door, the rack is powered by low voltage, and observe that the sensor indicator flashes once every few seconds, which is the normal working state.

5.8 柜体维护 Cabinet Maintenance

- 定期除尘：每6 个月清洁系统，特别是注意清洁进风网孔和出风网孔、地漏，特别是多沙尘应用场景，必要时使用吸尘器进行清理，确保空气能够在机柜内自由流通。除尘前必须切断电源；严禁用水冲洗。

- Dust regularly: to ensure the free circulation of air in the cabinet, clean the

system every 6 months . Especially for dusty application scenarios, especially the air inlet and outlet of the fan, Floor drain, and use a vacuum cleaner when necessary. Power must be cut off before dust removal; do not rinse with water.

- 柳絮季节需至少一周维护清理一次柜体进风网孔，防止网孔被堵塞。

- The catkins need to be maintained and cleaned at least once a week during the catkin season to prevent the mesh from being blocked

第六章 常见异常问题诊断 Diagnosis of common abnormal problems

6.1 系统告警处理对策 Countermeasures of system alarm

当您启用电柜以后，如果不能正常工作，请不要急于判定为电柜发生故障，不妨参照下表查找可能原因。同时，注意检查是否是由于外部环境造成的，如温度、湿度不符合要求或者负载过载。如涉及零部件维修或更换，请联系厂家，不允许擅自进行拆卸安装等操作。

When you enable the battery rack, if it cannot work normally, please do not hastily determine that the battery rack is out-of-order, please refer to Table below for possible reasons . At the same time, pay attention to check whether it is caused by external environment, such as non-compliant temperature, humidity or load overload. If the maintenance or replacement of spare parts is involved, Please contact the manufacturer. Meanwhile, the disassembly and installation are not allowed without authorization.

故障或告警现象 Failure or alarm phenomena	可能故障原因 Possible cause of failure	排除方案 Troubleshooting scheme
电池柜交流电源指示灯不亮 The AC power indicator light of the battery rack is not on	1.外部供电异常 External AC power supply failure	排查外部供电 Check external AC power
	2.线束接触不良 Poor contact of wiring harness	排查指示灯线束 Check indicator light wiring harness
	3.指示灯坏 Breakdown of indicator	更换指示灯 Replacement of indicator light
主控箱高压指示灯不亮 The high voltage indicator light of the control box is not on	1.高压继电器坏 Relay failure	更换继电器 Replacement of relay
	2. BCU 故障 BCU failure	更换 BCU Replacement of BCU
	3. 指示灯坏 Breakdown of indicator	更换指示灯 Replacement of indicator light
预充继电器不能闭合 Precharged relay cannot be	1. 继电器线束连接不良 Poor connection of relay wiring harness	排查线束连接 Check wiring harness connection
	2. 继电器故障 Relay failure	更换预充继电器 Replacement of precharged relay

closed	3. BCU 故 障 BCU failure	更换 BCU Replacement of BCU
主正继电器不能闭合 Main positive relay cannot be closed	1.主正继电器线束连接不良 Poor connection of main positive relay wiring harness	排查线束连接 Check wiring harness connection
	2.主继电器故障 Main relay failure	更换主继电器 Replacement of main negative relay
	3.BCU 故障 BCU failure	更换 BCU Replacement of BCU
主负继电器能闭合 Main negative relay cannot be closed	1. 主负继电器线束连接不良 Poor connection of main negative relay wiring harness	排查线束连接 Check wiring harness connection
	2.主负继电器故障 Main negative relay failure	更换主负继电器 Replacement of main negative relay
	3.BCU 故障 BCU failure	更换 BCU Replacement of BCU
主正继电器粘连 Adhesion of main positive relay	1. 主正继电器损坏 Damage of main positive relay	更换主正继电器 Replacement of main positive relay
主负继电器粘连 Adhesion of main negative relay	1. 主负继电器损坏 Damage of main negative relay	更换主负继电器 Replacement of main negative relay
单体电压检测异常 Abnormal monomer voltage detection	1. 电压检测线束连接不良 Poor connection of voltage detection wiring harness	排查线束连接 Check wiring harness connection
	2. BMU 故障 BMU failure	更换 BMU Replacement of BMU
单体温度检查异常 Abnormal monomer temperature detection	1. 温度检测线束连接不良 Poor connection of temperature detection wiring harness	排查线束连接 Check wiring harness connection
	2. 温度传感器故障 Temperature sensor failure	更换温度传感器 Replacement of temperature sensor
	3. BMU 故障 BMU failure	更换 BMU Replacement of BMU

电柜总电压检测异常 Abnormal total voltage detection	1. 电压检测线束连接不良 Poor connection of total voltage detection wiring harness	排查线束连接 Check wiring harness connection
	2. BCU 故障 BCU failure	更换 BCU Replacement of BCU
内部通信异常 Internal communication abnormal	1. 内部 CAN 线连接不良 Poor connection of internal CAN wire	拔插检查 CAN 连接线 Unplug and check CAN cable
系统参数未配置 System parameters are not configured	1. 电池系统参数未配置 The battery system parameters are not configured	配置系统参数 Configure system parameters
温度极值 Temperature extreme	1. 电芯温度超出正常工作范围 The battery temperature exceeds the normal working range	停止充放电 Stop charging and discharging
电压极值 Voltage extreme	1. 单体电芯电压超出正常允许阈值 Single cell voltage exceeds the normal allowable threshold	停止充放电 Stop charging and discharging
烟雾传感器异常 Smoke sensor is abnormal	1. 传感器接线不良 Bad sensor wiring	排查线束连接 Check the wiring harness connection
	2. 烟雾传感器故障 Smoke sensor malfunction	更换烟雾传感器 Replace the smoke sensor
温度传感器异常 Temperature sensor abnormal	1. 传感器接线不良 Bad sensor wiring	排查线束连接 Check the wiring harness connection
	2. 温度传感器故障 Temperature sensor failure	更换温度传感器 Replace temperature sensor
单体过压告警 Monomer over-voltage alarm	1. 均衡不良 Poor equalization	停止充电，待机均衡 Stop charging and standby equalization
	2. 系统过充 System over-discharge	停止充电 Stop charging

单体欠压告警 Monomer under-voltage alarm	1. 均衡不良 Poor equalization	停止放电，待机均衡 Stop discharge and standby equalization
	2. 系统过放 System over-discharge	停止放电 Stop discharge
单体过温告警 Monomer over-temperature alarm	1. 个别电芯温度过高 Excessive temperature of individual cores	检查空调是否运转 Check whether the air conditioner is in operation
	2.充放电电流过大 Excessive charging-discharge current	适当降低充放电电流 Appropriately reduce charging and discharge current
单体低温告警 Monomer under-temperature alarm	1. 个别电芯温度过低 Lower temperature of individual cores	检查加热功能是否开启（如果机柜带加热功能） Check whether the heating function is on (if the equipment cabinet has heating function)
	2. 环境温度过低 Lower ambient temperature	禁止充电 No charging
柜体过压告警 Cabinet over-pressure alarm	1. 系统过充 System overcharge	停止充电 Stop charging
柜体欠压告警 Cabinet under voltage alarm	1. 系统过放 System over discharge	停止放电 Stop discharge
柜体过温告警 Cabinet over temperature alarm	1. 电池柜温度过高 The RACK temperature is too high	检查散空调是否运转 Check if the air conditioner is running
	2. 温度传感器故障 Temperature sensor failure	更换温度传感器 Replace temperature sensor
柜体低温告警 RACK low temperature alarm	1. 电池柜温度过低 RACK temperature is too low	检查空调加热功能是否开启 Check whether the air conditioning heating function is turned on
	2. 环境温度过低 The ambient temperature is too low	禁止充电 No charging
充电过流告警 Charging over-current alarm	1. 系统充电过流过大 Excessive current of system charging	降低充电功率 Reduce charging power
放电过流告警 Discharge over-current alarm	1. 系统放电电流过大 Excessive current of system discharge	降低系统负载 Reduce system load

机组无显示不运行 The unit does not run without display	冷水机组未上电 The chiller is not powered on	检查冷水机组电源输入端是否有电 Check if there is electricity at the power input of the chiller
	保险管烧毁 The fuse burned	检查水冷机组保险管是否烧毁，烧毁后进行更换 Check whether the fuse of the water-cooled unit is burned out, and replace it after burning
外循环风机不运行 External circulation fan does not run	空调电源输入异常，如：电源过压、欠压。 The power input of the air conditioner is abnormal, such as overvoltage or undervoltage.	检查机组显示器，确定冷水机组是否存在相应告警，并修正 Check the unit display, determine whether there is a corresponding alarm in the chiller, and correct it
	空调属于待机状态 Air conditioner is on standby	正常现象，冷水机组上电，待机 30S 后，进入自动控制逻辑 Normal phenomenon, when the chiller is powered on, it enters the automatic control logic after 30s standby
	风机卡死 Fan stuck	检查是否有异物卡住风机 Check if there are foreign objects stuck in the fan
	端子松脱 Loose terminal	检查风机对接端子是否松脱 Check whether the fan docking terminal is loose
	压缩机未启动 The compressor does not start	压缩机启动后外风机才启动 The external fan starts after the compressor starts
外循环风机异响 Abnormal noise of external circulation fan	风机轴承磨损 Fan bearing wear	更换风机 Replace the fan
	扇叶刮擦其它物体 Fan blades scrape other objects	检查是否有线缆等与风机扇叶干涉 Check if there are cables or other interference with the fan blades

压缩机不启动 The compressor does not start	未开电源（待机） Power off (standby)	检查主电源开关，并检查操作显示界面是否已经开机 Check the main power switch, and check whether the operation display interface has been turned on
	电路连接松动 Loose circuit connection	禁固电路接头 Forbidden circuit connector
	压缩机电机烧坏 Compressor motor burned out	检查电机，如发现缺陷立即更换 Check the motor and replace it immediately if any defect is found
压缩机不工作 Compressor not working	无冷却需求 No cooling requirements	检查室内回风温度显示及操作界面中压缩机的输出状态 Check the indoor return air temperature display and the output status of the compressor in the operation interface
	停机延时 Stop delay	压缩机在正常状态下具有最短停机时间，如果温度在此期间内湿度重新升高到开启点，压缩机仍然会延时开启 The compressor has the shortest stop time under normal conditions. If the temperature rises to the opening point again during this period, the compressor will still start with a delay
排气压力高 High exhaust pressure	冷凝器脏堵 Dirty condenser	检查冷凝器是否脏堵并清洁冷凝器 Check if the condenser is dirty and clean the condenser
	外循环风机不运转 External circulation fan does not work	参考外风机不运行描述 Refer to the description of the external fan not running

内循环泵不启动 The internal circulation pump does not start	未开电源（待机） Power off (standby)	检查主电源开关，并检查操作显示界面是否已经开机 Check the main power switch, and check whether the operation display interface has been turned on
	电路连接松动 Loose circuit connection	紧固电路接头 Fasten the circuit connector
	泵体烧坏 The pump body is burned out	检查水泵，如发现已经烧坏，立即更换 Check the water pump, if it is found to be burned out, replace it immediately
	冷却介质中有空气或没有冷却介质导致水泵自保护 There is air or no cooling medium in the cooling medium, which causes the pump to protect itself	检查系统内是否有空气或没有冷却介质，若系统内有空气或没有冷却介质，需进行排空或补充冷却介质 Check whether there is air or no cooling medium in the system. If there is air or no cooling medium in the system, it needs to be evacuated or supplemented with cooling medium
电加热管不工作 Electric heating tube does not work	No heating requirements 无加热需求	检查出水温度及加热设定点是否设置合理 Check whether the outlet water temperature and heating set point are set properly
	电路连接松动 Loose circuit connection	紧固电路接头 Fasten the circuit connector
	电加热管烧坏 Electric heating tube burned out	检查电加热管，如发现已经烧坏立即更换 Check the electric heating tube, if it is found to be burned out, replace it immediately

6.2 紧急事故处理方法 Emergency Treatment Method

(场景 1)火灾(Scenario 1) Fire

第一步：疏散现场人员撤离至安全区域 ，划出安全隔离区，根据现场情况拨打报警电话。

Step 1: Evacuate people to safe area, delimit the safety isolation zone and call the police according to the situation.

第二步：保证人身安全的情况下，有条件的进行如下操作：

Step 2: If possible, proceed as follows in the case of personal safety:

1) 如果线束冒烟起火，使用二氧化碳或者干粉灭火器灭火。

1) If the wiring harness is smoking or on fire, use carbon dioxide or dry powder fire extinguisher to extinguish the fire.

2) 如果储能电池起火，在远距离使用高压水枪灭火。

2) If the batteries are on fire, use a high pressure water gun to extinguish the fire at a distance.

3) 如果不慎吸入浓烟，请尽快转移并就医。

3)If you accidentally inhale smoke, please transfer and seek medical attention as soon as possible.

第三步：通知系统厂家，获取进一步的处理意见。

Step 3: Notify the manufacturer to obtain further handling suggestions.

(场景 2)水淹(Scenario 2) Flooding

第一步：无论系统是否上电，紧急疏散现场人员撤离至安全区域，划出安全隔离区。

Step 1: Regardless of whether the system is powered on, evacuate people to safe area and delimit the safety isolation zone.

第二步：通知系统供应商，待水褪去之后进行检修。

Step 2: Notify the supplier to perform an overhaul after the flood faded.

第三步：在系统厂家给出系统安全判定结果前禁止启动系统。

Step 3: It is forbidden to start the system until the manufacturer provides the safety results of the system.

附录 1： Appendix 1

项目 Item	方法 Method	是–√ 否- × 不适用-O Yes–√ No- × Not applicable-O	异常记录 Abnormal record
灭火系统是否完整 Is the fire extinguishing system	目测 Visual inspection		
灭火系统是否在有效期内 Whether the fire extinguishing system is within the validity period	目测 Visual inspection		
散热系统是否完整 Is the cooling system complete	目测 Visual inspection		
散热系统风道是否堵塞 Is the cooling system air duct blocked	目测 Visual inspection		
电柜外观是否变形 Whether the appearance of the electric cabinet is deformed	目测 Visual inspection		
电柜外观是否生锈破损 Whether the appearance of the electric cabinet is rusted or damaged	目测 Visual inspection		
电柜内部是否有水气 Is there water vapor inside the electric cabinet	目测 Visual inspection		
低压线束是否松脱或者破损 Whether the LV harness is loose or damaged	目测 Visual inspection		
高压线束是否松脱或者破损 Whether the HV harness is loose or damaged	目测 Visual inspection		
线束是否与结构件干涉 Whether the wiring harness interferes with the structural parts	目测 Visual inspection		

高压连接是否烧蚀 Whether the high voltage connection is ablated	目测 Visual inspection		
结构件固定螺栓是否松脱或者缺失 Whether the fixing bolt of structural parts is loose or missing	目测 Visual inspection		
水冷管是否破损 Whether the water cooling pipe is damaged	目测 Visual inspection		
电柜内有无刺激性气味 Is there a pungent smell in the electric cabinet	鼻嗅 Sniffing		
高压连接部位是否有烧焦味 Whether HV connection part has burnt smell	鼻嗅 Sniffing		
概要数据是否齐全 Is the summary data complete	监控上位机 Monitor master computer		
单体电压数据是否齐全 Is the cell voltage data complete	监控上位机 Monitor master computer		
单体温度数据是否齐全 Is the cell temperature data complete	监控上位机 Monitor master computer		
告警栏有无异常报警 Whether there is an abnormal alarm in the alarm bar	监控上位机 Monitor master computer		
说明：巡检中发现任何异常请及时反馈，联系安排相关人员进行处理 **Note: If any abnormalities are found during the inspection, please feedback in time, and contact the relevant personnel for processing.**			