105kW/215kWh
工商业储能系统规格书
105kW/215kWh Industrial and Commercial ESS
Product Specification

产品名称 Product Name	215kWh 工商业储能系统/ 215kWh Industrial and Commercial ESS
产品规格 Product Spec	105kW/215kWh
项目代码 Product Type	HC100K-215-02B
产品代码 Product code	RFE-M11M22-002/RFE-M11M22-00F
制作日期 Date	2024/11/26

编制/ Edit	审核/ Audit	批准/ Approval
余凯/ Yu Kai		

客户确认 Customer Approval	签名 Signature	日期 Date
	公司名称 Company Name	
	公司盖章 Company Stamp	

变更履历表 Version updates list

版本 Version	变更内容 /Change contents	日期 Date	编制 Edit
V1.0	新版发行/ New Release	2024-04-17	余凯/ Yu Kai
V2.0	PACK 插箱增加气溶胶 Add aerosol to PACK	2024-07-30	余凯/ Yu Kai
V3.0	增加英文 Adding English	2024-11-26	余凯/ Yu Kai

目录/ Content

1. 总则/ General Principles

1.1 安全说明/ Safety Instructions

（1） 保证电池或电池系统远离危险物品或危险材料，如腐蚀性的化学品、危险的机械设备、高温环境等； Ensure that the battery or battery system is kept away from dangerous goods or materials, such as corrosive chemicals, hazardous mechanical equipment, high temperature environments, etc;

（2） 不合理的使用该系列产品可能导致冒烟，如外部短路、过充电、过高的环境温度等。若发生冒烟的情况，请及时切断电源，使用二氧化碳或干粉灭火器进行处理，并用沙土或泥土掩埋。整个过程中必须及时疏散人群并及时报警（若必要时）； Unreasonable use of this series of products may lead to smoking, such as external short circuits, overcharging, and excessively high ambient temperatures. If smoking occurs, please cut off the power in a timely manner, use carbon dioxide or dry powder fire extinguishers for disposal, and bury with sand or soil. During the entire process, it is necessary to evacuate the crowd in a timely manner and report to the police (if necessary);

（3） 不合理的使用该系列产品可能导致单体电池鼓胀，严重时可能导致外壳破裂或产生裂纹，此时应立即停止使用该电池，请及时联系我公司相关技术部门或售后服务部门以获得处理方法；Unreasonable use of this series of products may cause the individual battery to swell, and in severe cases, it may lead to the shell breaking or cracking. In this case, the use of this battery should be stopped immediately. Please contact our relevant technical department or after-sales service department in a timely manner for handling methods;

（4） 禁止拆卸、挤压、穿刺、高温搁置或烘烤电池，避免电池受到过高幅度的震动、外力冲击、高处跌落等，此操作可能导致人身伤害或财产损失； Forbid disassemble, squeeze, puncture, store or bake batteries at high temperatures to avoid excessive vibration, external impact, falling from heights, etc. This operation may cause personal injury or property damage;

（5） 禁止直接把电池的正负极短路，避免有电池极柱压紧螺栓和导电带之外的任何金属或其他导电物体接触电池的正极和负极，此操作可能导致人身伤害或财产损失；It is prohibited to directly short-circuit the positive and negative terminals of the battery, and to avoid any metal or other conductive object outside the battery pole compression bolt and conductive tape from contacting the positive and negative terminals of the battery. This operation may cause personal injury or property damage;

（6） 禁止将电池暴露或长期搁置在 60℃以上的环境中，禁止试图加热或将电池投入火中，此操作可能导致人身伤害或财产损失； Do not expose or store the battery in an environment above 60 ℃ for a long time. Do not attempt to heat or put the battery into fire, as this operation may cause personal injury or property damage;

（7） 禁止在没有安装合理的充电保护装置（锂离子电池保护线路板、电池管理系统等）或使用非多氟多认可的充电设备（充电器、直流电源等）的情况下对电池进行充电，此操作可能导致人身伤害或财产损失； It is prohibited to charge the battery without installing a reasonable charging protection device (lithium-ion battery protection circuit board, battery management system, etc.) or using non PTFE approved charging equipment (charger, DC power supply, etc.), as this operation may cause personal injury or property damage;

（8） 禁止将电池浸入到水或其他导电的液体中，此操作可能导致人身伤害或财产损失； Forbit immerse the battery in water or other conductive liquids, as this operation may cause personal injury or property damage;

（9） 禁止儿童和其他缺乏锂离子电池安全使用知识的人使用本系列产品，此操作可能导致人身伤害或财产损失； Children and others who lack knowledge of safe use of lithium-ion batteries are prohibited from using this series of products, as this operation may result in personal injury or property damage;

（10） 禁止将本系列产品与其他型号或类型的电池进行串联或并联使用，此操作可能导致人身伤害或财产损失；禁止将含有锂离子电池保护线路板或电池管理系统的整套电池系统再进行串联或并联操作，此操作可能导致人身伤害或财产损失,若有需要请联系本公司相关技术部门以获得正确的技术支持。It is prohibited to use this series of products in series or parallel with other models or types of batteries, as this operation may cause personal injury or property damage; It is prohibited to operate the entire battery system containing lithium-ion battery protection circuit boards or battery management systems in series or parallel, as this operation may cause personal injury or property damage. If necessary, please contact the relevant technical department of our company for correct technical support.

1.2 满足的标准/ Standards

设备至少应满足所列标准的最新版本要求，但不限于所列标准。下列文件对于本文件的应用是必不可少的。凡是注日期的引用文件，仅注日期的版本适用于本文件。凡是不注日期的引用文件，其最新版本(包

括所有的修改单)适用于本文件,包括但不限于以下内容：监控系统应与电池管理系统、储能变流器继电保护与安全自动装置、消防系统、采暖通风与空气调节系统等正常通讯，且遥测遥信、遥控、遥调等功能正常，并形成电气联锁,一旦检测到故障，及时切断正在运行的电池成套设备。EMS 与 PCS 以及 BMS 实时通信，实时采集 PCS 设备以及电池设备的运行工况，根据制定的储能系统保护策略以及热管理策略，确保储能系统的安全稳定运行。The equipment should at least meet the latest version requirements of the listed standards, but not limited to the listed standards. The following documents are essential for the application of this document. For all referenced documents with dates, only the version with dates is applicable to this document. For any reference document without a date, its latest version (including all modification orders) applies to this document, including but not limited to the following: the monitoring system should communicate normally with the battery management system, energy storage converter relay protection and safety automatic device, fire protection system, heating, ventilation and air conditioning system, etc., and the functions of telemetry, remote control, remote adjustment, etc. should be normal, and an electrical interlock should be formed. Once a fault is detected, the running battery equipment should be cut off in a timely manner. EMS communicates with PCS and BMS in real-time, collecting the operating conditions of PCS equipment and battery equipment in real-time. Based on the formulated energy storage system protection and thermal management strategies, it ensures the safe and stable operation of the energy storage system。

遵循的标准/ Standards List

标准号/ Standards Num.	标准名称/ Standards Name
GB/T36558-2018	《电力系统电化学储能系统通用技术条件》/ 《General Technical Conditions for Electrochemical Energy Storage Systems in Power Systems》
GB/T36276-2018	《电力储能用锂离子电池》/ 《Lithium ion batteries for electric energy storage》
NB/T 42091-2016	《电化学储能电站用锂离子电池技术规范》/ 《Technical specification for lithium-ion batteries used in electrochemical energy storage power plants》
GB/T34131-2017	《电化学储能电站用锂离子电池管理系统技术规范》/ 《Technical Specification for Lithium ion Battery Management System for Electrochemical Energy Storage Power Station》
GB 21966-2008	《锂电池和蓄电池在运输中的安全要求》/ 《Safety requirements for lithium batteries and rechargeable batteries during transportation》
GB/T34120-2017	《电化学储能系统储能变流器技术规范》/ 《Technical Specification for Energy Storage Converter in Electrochemical Energy Storage System》

GB/T 36547-2018	《电化学储能系统接入电网技术规定》/ 《Technical regulations for connecting electrochemical energy storage systems to the power grid》
NB/T33014-2014	《电化学储能系统接入配电网运行控制规范》/ 《Specification for Operation Control of Electrochemical Energy Storage System Connected to Distribution Network》
NB/T33015-2014	《电化学储能系统接入配电网技术规定》 / 《Technical regulations for connecting electrochemical energy storage systems to distribution networks》
NB/T 33016-2014	《电化学储能系统接入配电网测试规程》 / 《Test code for electrochemical energy storage system connected to distribution network》
Q/GDW 564-2010	《储能系统接入配电网技术规定》/ 《Technical Regulations for Connecting Energy Storage Systems to Distribution Networks》
GB311.1-311.3	《绝缘配合》/ 《Insulation coordination》
GB11022	《高压开关设备和控制设备标准的共同技术要求》 / 《Common Technical Requirements for High Voltage Switchgear and Control Equipment Standards》
GB7251	《低压成套开关设备和控制设备》 / 《Low voltage switchgear and control equipment》
GB1208	《电流互感器》/ 《Current transformer》
DL/T478	《继电保护和及安全自动装置通用技术条件》 / 《General technical specifications for relay protection and safety automatic devices》
GB4208	《外壳防护等级(IP 代码)》 / 《Protection level of shell (IP code)》
GB 1497	《低压电器基本标准》/ 《Basic standards for low-voltage electrical appliances》
DL/T621	《交流电气装置的接地》 / 《Grounding of AC Electrical Devices》
GB11021	《电气绝缘的耐热性评定和分级》/《Thermal resistance assessment and grading of electrical insulation》
GB/T 19666	《阻燃和耐火电线电缆通则》/ 《General rules for flame-retardant and fire-resistant wires and cables》
GB/T 6995	《电线电缆识别标志方法》/ 《Identification mark method for wires and cables》
GB/T17650	《取自电缆或光缆的材料燃烧时释出气体的试验方法》 / 《Test method for gas release during combustion of materials taken from cables or optical cables》
GB/T17651	《电缆或光缆在特定条件下燃烧的烟密度测定》/《Measurement of Smoke Density of Cables or Optical Cables Burning under Specific Conditions》

1.3 术语定义/ Terms

1） BMU：电池管理单元(从控模块（一级）)/ Battery Management Unit;

2） BCU：电池控制单元(主控模块（二级）)/Battery Control Unit;

3） ESMU：能量管理单元(显控模块（三级）)/ Energy Storage Management Unit;

4） PCS：双向能量转换系统/ Power Conversion System，;

5） EMS：能量管理系统/ Energy Management System，;

6） SOC：电荷状态/ State-Of-Charge;

7） SOP：功率状态/ State-Of-Power;

8） SOE：能量状态/ State-Of-Energy；

9） SOH：健康状态/ State-Of-Health；

2. 产品概述及主要技术参数/ Product Overview and Main Technical Parameters

2.1 产品概述 / Product Overview

储能系统拟选用磷酸铁锂电池，运营模式为“自发自用，峰谷套利”,储能系统可满足每天 2 充 2 放或 1 充 1 放要求，并网电压等级为 0.4kV。

The ESS uses LFP batteries, the operation mode is "spontaneous self use, peak valley arbitrage". The energy storage system can meet the requirements of 2 charges and 2 discharges per day or 1 charge and 1 discharge per day, and the grid connected voltage level is 0.4kV.

液冷户外储能柜（以下简称储能柜）是一种基于锂离子电池的储能装置，内部采用锂离子电池作为储能部件，具有能量密度高、充放电功率大、循环寿命长等特点。

Liquid cooled outdoor energy storage cabinet (abbreviation energy storage cabinet) is an energy storage device based on lithium-ion batteries, which uses lithium-ion batteries as energy storage components inside. It has the characteristics of high energy density, high charging and discharging power, and long cycle life.

该产品采用一体化集成设计，将电芯、BMS、PCS、消防系统、配电系统、热管理系统、能量管理系统集成在标准化户外机柜，形成一体化可即插即用的一站式集成产品，适用于独立储能电站、工商业用户侧、微电网等应用场景。

This product adopts an integrated design, integrating battery cells, BMS, PCS, fire protection system, power distribution system, thermal management system, and energy management system into standardized outdoor cabinets, forming an integrated plug and play one-stop integrated product suitable for independent energy storage power stations, industrial and commercial user sides, microgrids and other application scenarios.

储能柜采用模块化设计，储能电池单体-电池模组-电池机架-电池系统模块化层级，层次分明、结构清晰、功能完善，包含完善的电池插箱、电池管理系统（BMS）、温控系统、火灾探测及自动灭火系统。储能系统具备完善的保护功能，包括但不限于电池本体保护、电池过流过压保护、并网保护。

The energy storage cabinet adopts a modular design, with a clear hierarchy of energy storage battery cells, battery modules, battery racks, and battery systems, including a complete battery

plug-in box, battery management system (BMS), temperature control system, fire detection and automatic fire extinguishing system. The energy storage system has comprehensive protection functions, including but not limited to battery body protection, battery overcurrent and overvoltage protection, and grid connection protection.

2.2 主要技术参数要求/ Main Technical Parameters

序号 / No.	名称/ Items	规格参数/ Specification	备注/ Notes
1	额定充/放电功率/ Rated charging/discharging power	105kW	
2	额定能量/ Rated energy	215kWh	
3	组成方式/ Composition method	1P240S	
4	电池类型/ Battery type	LFP	280Ah
5	额定电压/ Rated voltage	768V	直流侧/ DC side
6	工作电压范围/ Working voltage range	650~864V	
7	循环效率/ Efficiency	≥93%	0.5C，直流侧效率/ 0.5C，DC side efficiency
8	循环次数/ Cycle	6000(放电倍率0.5C EOL70%)	
9	外形尺寸/ Dimensions	D1450*W1400*H2203mm	不含吊环/ Excluding lifting rings
10	防护等级/ IP Grade	IP54	
11	防腐等级/ Anti corrosion grade	C4	
12	海拔高度/ Altitude	≤3000m	超过2000m以上降额/ Reduce the rating for distances exceeding 2000m
13	整机重量/ Weight	约2.7T / About 2.7T	±50kg
14	消防方式/ Fire type	全氟己酮消防/ Perfluorohexane	
15	柜体前、后最小操作距离/ Min	柜前≥1500mm；柜后≥800mm	

	operating distance in front and behind the cabinet	Front the cabinet≥ 1500mm ; Behind the cabinet ≥ 800mm	
16	通信协议 / Communication	支持IEC104、modbus-RTU、 DL/T645等 Supports IEC104, modbus RTU, DL/T645, etc	
17	日历寿命/ Calendar Life	10年/ Ten years	25℃，0.5C，90%DOD，EOL≥70%

2.3 整机铭牌/ Nameplate

3. 系统技术要求/ System Technical Requirements

3.1 电池侧系统概述/ Overview of DC side system

储能系统为 215kWh 工商储项目。 单套电池簇为 215.04kWh，由 5 个电池插箱串联而成，电池插箱由赣锋 3.2V/280Ah-LFP 电芯以 1P48S 的方式组合而成。

The energy storage system is a 215kWh industrial and commercial storage project. The single battery cluster has a capacity of 215.04kWh and is composed of 5 battery plug-in boxes connected in series. The battery plug-in boxes are composed of Ganfeng 3.2V/280Ah-LFP cells combined in a 1P48S configuration.

序 号 /No.	名称/ Items	示意图/ Sketch Map	额定电压/ Rated voltage	额定容量/ Rated capacity	电量/ Energy （kWh）	备注/ Notes

			（V）	（Ah ）		
1	电芯/ Cell		3.2	280	0.896	磷酸铁锂电芯/LFP cell
2	电池插箱/Pack（含 BMM）		153.6	280	43.008	1P48S
3	电池簇/ Battery cluster（ 含 BCM）		768	280	215.040	1P48S *5S
4	电池堆/ Battery stack（含 ESMU: ）		768	280	215.040	1P48S *5S

3.1.1 电芯规格参数/ Cell Specification Parameters

电池单体技术参数表/ Cell Specification Parameters

序 号 /No.	项目名称/Items	规格参数/ Parameters	备注/ Notes
1	电池类型/ cell type	LFP	
2	标称容量/ Nominal capacity	280Ah	
3	标称电压/ Nominal voltage	3.2V	
4	内阻/ Resistance	≤0.1mΩ	5% SOC
5	最大持续放电倍率/ Max continuous discharge rate	0.5C	
6	最大脉冲放电倍率 / Max pulse discharge rate	1C	
7	倍率放电容量比/ Rate discharge capacity ratio	≥90%	
8	常温(25℃)循环寿命/ 25℃ Cycle life	≥6000 次	70%SOH

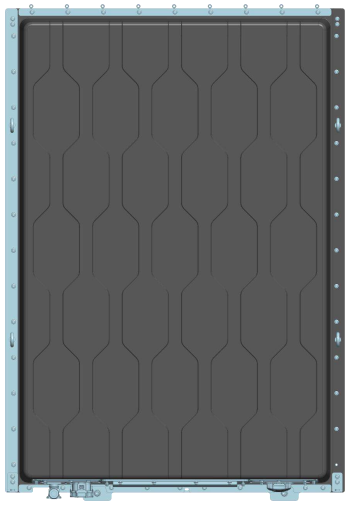
3.1.2 电池插箱规格参数/ Pack Specification Parameters

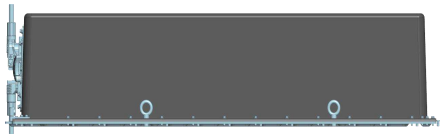
序号	项目名称/ Items	规格参数/ Parameters	备注/ Notes

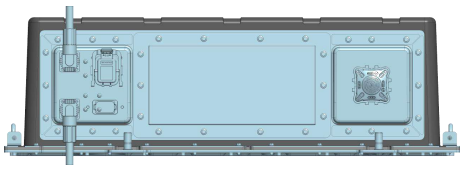
/No.			
1	串并联方式/ Connection method	1P48S	
2	标称容量/ Nominal capacity	280Ah	
3	标称电压/ Nominal voltage	153.6V	
4	标称能量/ Nominal voltage	43.008kWh	
5	最大持续放电倍率/ Max continuous discharge rate	0.5C	
6	最大脉冲放电倍率 / Max pulse discharge rate	1C	
7	消防系统/ Fire protection system	40g 热气溶胶/ 40g hot aerosol	质保 10 年/ Warranty for 10 years
8	结构尺寸/ Dimensions	1172*808*240mm	公差/ Tolerance：±5mm
9	重量/ Weight	~300kg	公差/ Tolerance：±15kg
10	防护等级/ IP Grade	IP67	
11	最佳工作温度/ Best operating temperature	10℃～35℃	
12	存储温度/ Storage temperature	-30℃～55℃	
13	存储湿度/ Storage humidity	5%RH～95%RH	无凝露/ No condensation

电池插箱由 4 个电池模组串联组成，单个电池模组是由 1P12S 组成，整个电池插箱是 1P48S。每个电池箱内部有 1 个 BMM 单元，可以采集电池箱内部电芯温度、电压等参数信息。电池插箱采用液冷散热，配备 1 个液冷板，1 个热气溶胶，且同时配有 MSD 维修开关、防爆阀以及通信端子。参考图片如下（以实物为准）：

The Pack is composed of four battery modules connected in series, with a single battery module consisting of 1P13S and the entire battery plug-in box consisting of 1P52S. Each battery box has one BMM unit inside, which can collect parameter information such as cell temperature and voltage inside the battery box. The battery plug-in box adopts liquid cooling heat dissipation, equipped with 1 liquid cooling plate, 1 hot aerosol, and also equipped with MSD maintenance switch, explosion-proof valve, and communication terminal. The reference image is as follows (subject to the actual product):





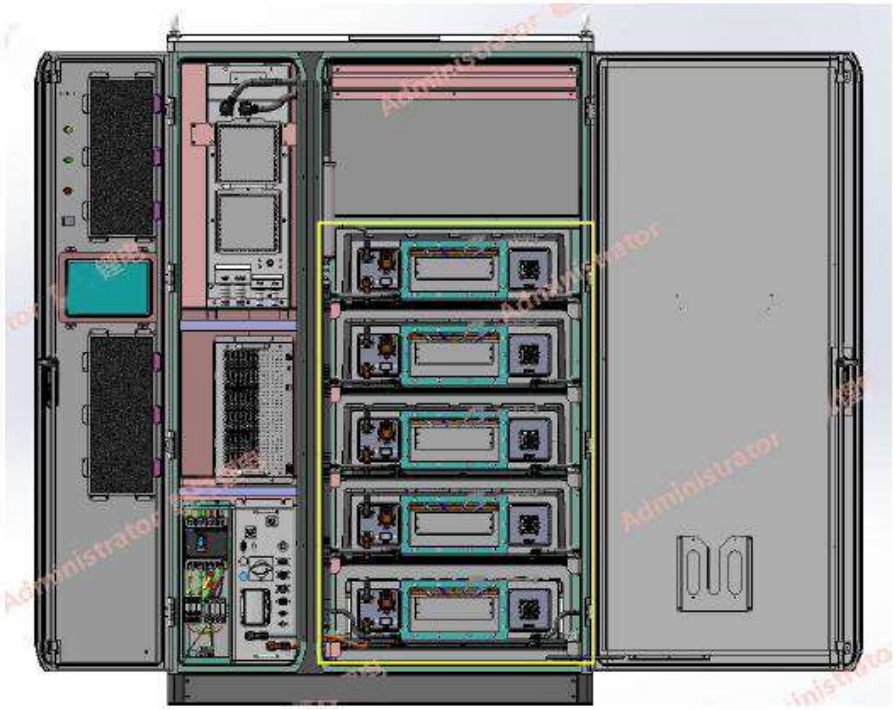


3.1.3 电池簇规格参数/ Battery cluster Specification Parameters

序号 /No.	项目名称/ Items	规格参数/ Parameters	备注/ Notes
1	标称容量/ Nominal capacity	280Ah	
2	标称电压/ Nominal voltage	768V	
3	电压范围/ Voltage range	650V-864V	
4	标称能量/ Nominal energy	215.04kWh	

电池簇由 5 个电池插箱串联而成，5 个插箱摆在电池架上，通过 EV 动力电缆连接，以及菊花链通讯线汇聚到主控箱上。同时，将液冷管连接到插箱，接入到液冷机组中，就构成了电池系统。参考下图黄色方框（以实物为准）：

The battery cluster is composed of 5 Pack connected in series, which are placed on the battery rack and connected to the main control box through EV power cables and daisy chain communication lines. At the same time, connecting the liquid cooling pipe to the plug-in box and connecting it to the liquid cooling unit constitutes the battery system. Refer to the yellow box in the following figure (based on the actual product):



3.2 BMS 系统概述 / Overview of BMS

电池管理系统（BMS）为二级架构，每个电池插箱由电池管理单元 BMM 管理 48 串电池，BMM 负责对电池进行单体电压、温度采集，均衡等功能进行管理。BMM 采用 CAN 总线方式通信 ，电池的单体信息（单体电压、单体温度、单体 SOC、单体 SOH 及均衡状态等）由 BMM 实现数据对上发送。

The Battery Management System (BMS) is a two-level architecture, and each battery plug-in box is managed by a Battery Management Unit (BMM) that manages 52 strings of batteries. The BMM is responsible for collecting individual cell voltage, temperature, balancing, and other functions of the batteries. BMM uses CAN bus for communication, and the individual information of the battery (such as individual voltage, individual temperature, individual SOC, individual SOH, and equilibrium status) is transmitted through BMM for data exchange.

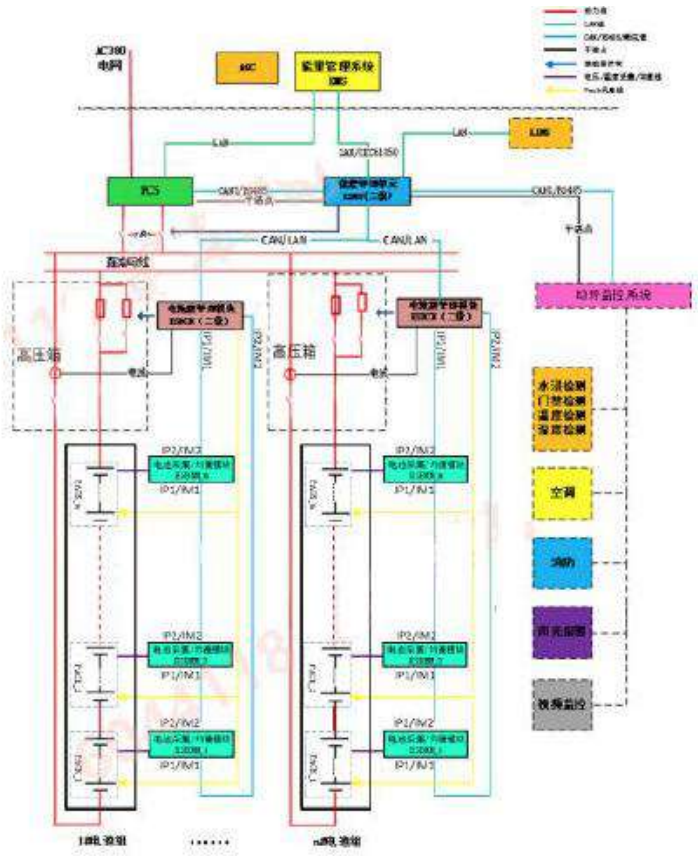
电池簇配置 1 个电池组控制单元（BCM），对电池簇进行总电压、电流采集及电池 组接触器控制，并对上进行数据通讯（菊花链通讯）。

The battery cluster is equipped with one Battery Control Unit (BCM), which collects the total voltage and current of the battery cluster, controls the battery contactor, and performs data communication (daisy chain communication) with the upper end.

整个系统配置 1 个电池管理系统人机界面（ESBMU），对电池簇控制单元（BCM）上传的电池信息进行处理，具有显示、参数设置、故障报警、数据记录等功能。

The entire system is equipped with one Battery Management System Human Machine Interface (ESBMU), which processes the battery information uploaded by the Battery Cluster Control Unit (BCM) and has functions such as display, parameter setting, fault alarm, and data recording.

3.2.1 BMS 系统框图/ BMS system diagram



3.2.2 BMM 规格参数/ BMM specification parameters

能够提供单串电池（单体）电压和温度的实时监测功能，同时具有热管理和被动均衡能力，并可通过级联通讯与主控单元（ESBCM）组成具有高度灵活性的电池管理系统（ESBMS）。支持被动均衡，采用能量消耗均衡技术，可同时对电池组内多个单体电池进行放电均衡，均衡电流 100mA，且单体电池的均衡能量可被测算。支持供电/单体电压（过压，欠压），温度（过温），通信故障等报警功能；支持均衡故障检测。

It can provide real-time monitoring of voltage and temperature of single battery (cell), as well as thermal management and passive balancing capabilities, and can form a highly flexible battery management system (ESBMS) through cascade communication with the main control unit (ESBCM).

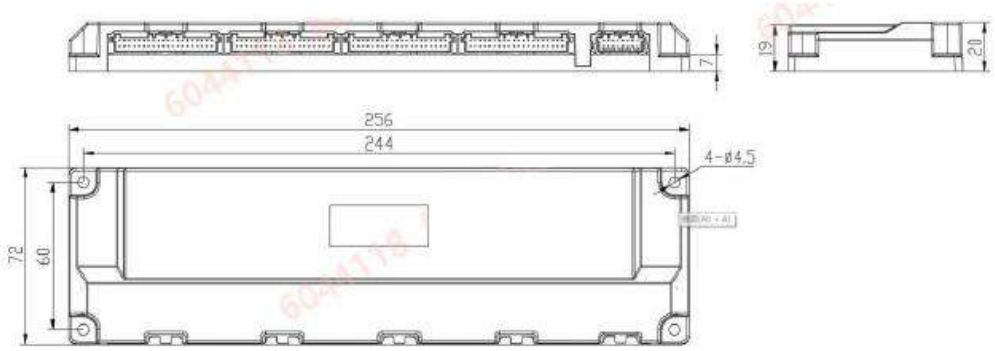
Support passive balancing, using energy consumption balancing technology, can discharge multiple individual cells in the battery pack simultaneously, with a balancing current of 100mA, and the balancing energy of individual cells can be calculated. Support alarm functions for power supply/individual voltage (overvoltage, undervoltage), temperature (overtemperature), communication faults, etc; Support balanced fault detection.

3.2.2.1 规格参数/ Parameters

No.	项目/Items	条件/ Conditions	参数/ Parameters	备注/ Notes
1	环 境/ environment	工作温度/ Working temperature	-20~+55℃	
		运行湿度/ Operating humidity	<90%	
		海拔要求/ Altitude	<3000m	
2	均衡管理/ Balanced management	电压均衡范围/ Voltage balance range	2V~5V	
		电池均衡方式/ Battery balancing method	被动均衡/ Passive equilibrium	
		电池均衡电流/ Balanced current	100mA	平均电流（非峰值）/ average current
3	温度采集/ Temperature collection	温度采集范围/ Temperature collection range	-40~125℃	
		温度采集精度/ Temperature acquisition accuracy	±1℃	±1℃@-25℃~65℃ ±2℃@-40℃~-25℃或者 65℃~125℃
4	安规/ Safety regulations		UL60950,IEC 60730-1:2013, GB/T36276-2018,IEC 62477-1	

3.2.2.2 外观尺寸图/ Appearance dimension diagram

外观尺寸仅供参考，具体以实物为准。The external dimensions are for reference only, please refer to the actual product for details.



3.3 高压箱设计/ High voltage box design

高压箱内包含 ESBCM 主控单元和电气元件，用于对整个电池簇运行状态的管理与保护。尺寸参考下图（以实物为准）：

The high-voltage box contains the ESBCM main control unit and electrical components, which are used to manage and protect the operating status of the entire battery cluster. Size reference diagram (subject to actual product):

高压箱参考图/ Reference diagram of high-voltage box

3.3.1 功能描述/ Function Description

- 支持 AC~220V（ 或 DC-24V 供电）和电池组端 DC/DC 双电源供电（市电优先）； Supports AC~220V (or DC-24V power supply) and battery pack end DC/DC dual power supply (mains power priority);
- 支持对储能电池管理模块 ESBMM 的供电，供电功率可根据 ESBMM 模块数量配置；Support power supply to the energy storage battery management module ESBMM, and the power supply can be configured according to the number of ESBMM modules ；
- 支持与储能电池管理模块 ESBMM 的 CAN 通信功能，实现电池簇信息的汇总和管理； Support CAN communication function with the energy storage battery management module ESBMM to achieve the aggregation and management of battery cluster information;
- 支持与电池管理系统主机 ESMU 的 LAN、CAN 通信功能，实现信息的交互；Support LAN and CAN communication functions with the battery management system host ESMU to achieve information exchange;
- 支持与储能变流器的通信控制和干接点控制，支持 CAN 通信和 RS-485 通信方式； Support

communication control and dry contact control with energy storage inverters, and support CAN communication and RS-485 communication methods;

- 支持 ESBCM 自动编址功能； Support ESBCM automatic addressing function;
- 支持数字信号输入检测，可以检测开关状态信号等；Support digital signal input detection, can detect switch status signals, etc;
- 支持电池簇组端电压检测、组端电流检测和电池簇绝缘状态检测； Support voltage detection, current detection, and insulation status detection at the end of battery clusters;
- 高压控制箱尺寸(宽*深*高)：500*600*200mm（不包含固定支架）；Dimensions of high-voltage control box (width * depth * height): 500 * 600 * 200mm (excluding fixed brackets);
- 支持 IP54 防护； Supports IP54 protection;
- 该高压箱支持系统允许参数：电池簇总压≤1500V，电池簇最大电流≤250A。The high-voltage box supports system allowable parameters: total voltage of battery cluster ≤ 1500V, maximum current of battery cluster ≤ 250A.

3.3.2 主控模块 ESBCM 规格参数/ Main control module ESBCM specification parameters

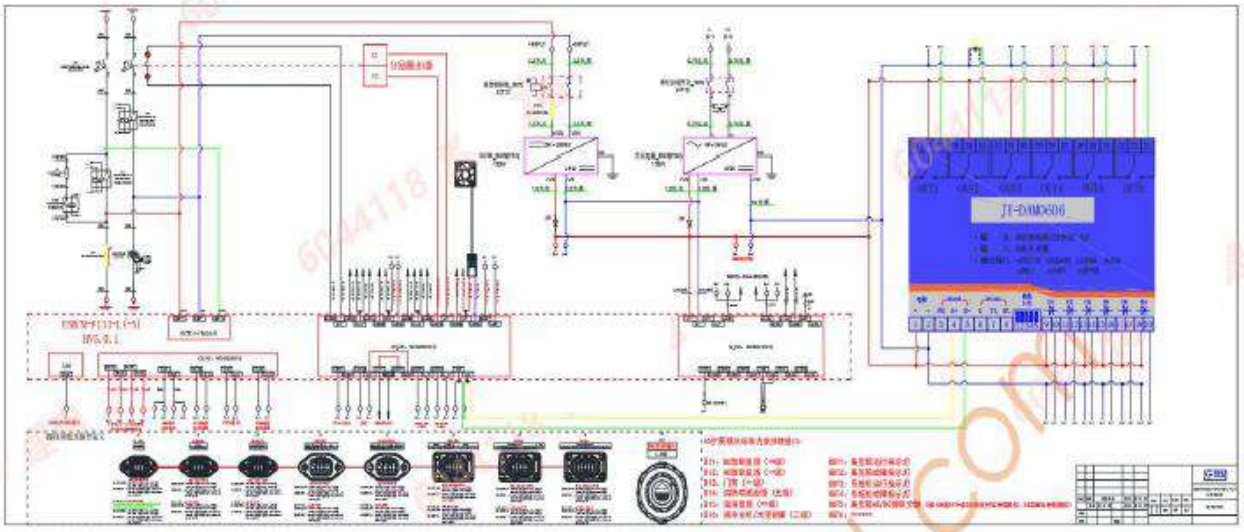
该模块对储能电池系统中的电池簇进行管理，主要负责电池簇的电压采集、电流采集、汇总簇内单体电池电压和温度信息，计算电池簇 SOC/SOH 等状态、执行均衡策略判断和电池故障诊断功能、根据电池故障信息实现电池簇的就地保护和继电器控制等功能。具备绝缘采集功能和单体 SOC/SOH 等状态计算功能，具备冗余的 CAN 通讯接口、RS-485 通讯接口及以太网通讯接口，用于与外部设备的通讯。ESBCM 是储能电池管理系统的核心模块，是保障储能系统安全、可靠、高效、运行的关键设备。主要规格参数如下：

This module manages the battery clusters in the energy storage battery system, mainly responsible for voltage and current collection of the battery clusters, summarizing the voltage and temperature information of individual cells in the clusters, calculating the SOC/SOH status of the battery clusters, executing balancing strategy judgment and battery fault diagnosis functions, and implementing on-site protection and relay control of the battery clusters based on battery fault information. Equipped with insulation acquisition function and single SOC/SOH state calculation function, with redundant CAN communication interface, RS-485 communication interface and Ethernet communication interface, used for communication with external devices. ESBCM is the core module of the energy storage battery management system, which is a key equipment to ensure the safety, reliability, efficiency, and operation of the energy storage system. The main specification parameters are as follows.

项目/ Items		参数/ Parameters	备注/ Notes
电压采集/ Voltage acquisition	电压范围/ Voltage range	0~1500V	
	采集精度/	＜±0.2% FS	

	acquisition accuracy		
电流采集/ Current acquisition	电流范围/ Current range	-500~500A	
	采集精度/ acquisition accuracy	±(0.5% FS+0.5%RD)	
温度采集/ temperature acquisition	温度范围/ Temp range	-40~125℃	
	采集精度/ acquisition accuracy	±1℃	±1℃@-25℃~65℃ ±2℃@-40℃~-25℃或者 65℃~125℃
通讯/ communication	CAN/LAN/RS485		
安规/ Safety regulations	UL60950,UL60730,GB/T 36276-2018,IEC62477,IEC62619		

3.3.3 高压箱原理图/ Schematic diagram of high-voltage box



高压箱原理图/ Schematic diagram of high-voltage box

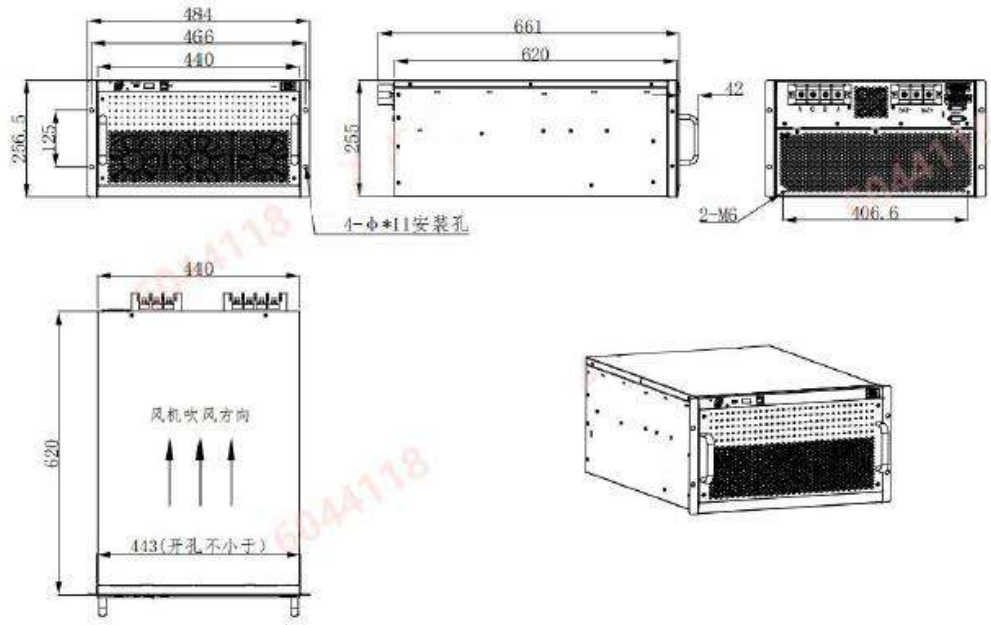
3.4 储能变流器关键技术参数/ PCS Main Technical Parameters

储能变流器（PCS）是连接储能电池系统和电网的双向电流可控转化装置，主要功能是实现蓄电池与电网之间的能量交换，对蓄电池进行充放电的控制和管理。在并网模式中，可以实现对电网的削峰填谷、调峰调频、虚拟增容以及离网备电。同时，PCS 也支持恒压、恒流和浮充的多种充放电模式。

PCS is a bidirectional current controllable conversion device that connects the energy storage battery system and the power grid. Its main function is to achieve energy exchange between the battery and the power grid, and to control and manage the charging and discharging of the battery.

In grid connected mode, peak shaving and valley filling, peak shaving and frequency regulation, virtual capacity expansion, and off grid backup can be achieved for the power grid. Meanwhile, PCS also supports multiple charging and discharging modes including constant voltage, constant current, and float charging.

3.4.1 产品尺寸图/ Product dimension diagram



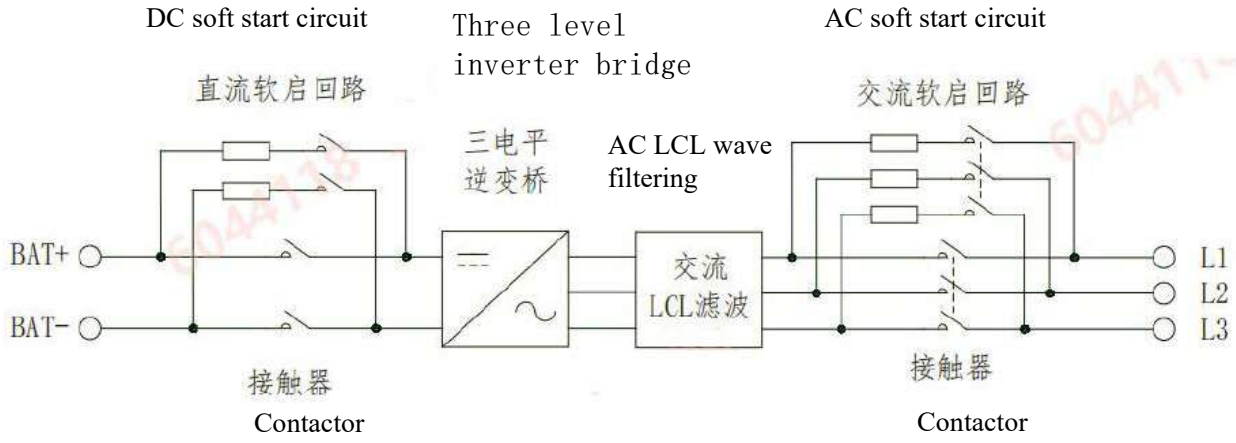
3.4.2 PCS 技术参数/ PCS technical parameter

名称/ Items	技术参数/ Parameters	备注/ Notes
直流侧参数/ DC side parameters		
额定功率/ Rated power（kW）	105	
最大电流/ Max current（A）	170	
工作电压范围/ Working voltage range（V）	615~950(3W+PE)/650-950(3W+N+PE)	
交流侧参数/ AC side parameters（并网）		
额定交流功率/ Rated AC power（kW）	105	
最大输出功率/ Max output power（kW）	116	
最大电流/ Max current（A）	167	
交流接入方式/ AC access method		
隔离方式/ Isolation method	无隔离/ No isolation	
功率因素/ Power factor	0.99	

功率因数可调范围/ Adjustable range of power factor	-1~+1	
交流侧并网运行参数/ AC side grid connected operation parameters		
额定电压/ Rated voltage（Vac）	AC 230/400	
允许电网电压范围/ Allow the voltage range of the power grid	-10%~10%	
额定电网频率/ Rated grid frequency（Hz）	50/60	
电压总谐波畸变率/ Voltage total harmonic distortion rate (THD)	<3%（额定功率/ Rated power）	
交流侧离网运行参数/ Off grid operation parameters on the AC side		
额定输出电压/ Rated output voltage	AC 230/400	
交流电压谐波/ AC voltage harmonics	<3%（线性负载/ Linear load）	
额定输出频率/ Rated output frequency（Hz）	50/60	
主要保护特性/ Main protective features		
主要保护特性/ Main protective features	交流过流保护、交流过压保护、交流浪涌保护、交流短路保护、防孤岛保护、直流反接保护、直流浪涌保护/ AC overcurrent protection, AC overvoltage protection, AC surge protection, AC short circuit protection, anti islanding protection, DC reverse connection protection, DC surge protection	
总体参数/ Overall parameters		
交流相数/ AC phase number	三相四线/ Three phase four wire	兼容三相三线/ Compatible with three-phase three wire
过载能力/ Overload	110%长期/110%(long-term)	
最大放电效率/ Max discharge efficiency	98.5%	
通讯接口/ communication interface	CAN/RS485	
正常使用环境条件/ Normal environmental conditions for use		
防护等级/ IP grade	IP20	
工作环境温度/ Working environment temperature	-25℃～+55℃（>50℃降额 运行）	
相对湿度/ Relative humidity	0%～95%	
海拔/ Altitude	≤3000m	超过 2000m 以上降额/ Reduce the rating for distances exceeding 2000m
接线、出风方向 /Wiring and air	后接线、前进风后出风/ Rear wiring,	

outlet direction	forward airflow, and rear airflow	
尺寸/ Dimensions （H×D×W mm）	≤484×703×272 mm	

3.4.3 原理方框图/ Principle Block Diagram



3.5 消防系统 / Fire protection system

3.5.1 系统概述 / Overview

插箱采用热气溶胶消防系统，舱级采用的是全氟己酮灭火系统，灭火效率高，灭火浓度低，能灭 B、C、E 类火灾。不导电，易挥发不留痕迹残渣，可用于保护价值昂贵的装置和物品存放场所，使用它对装备和物品无任何损害。

The Pack adopts a hot aerosol fire extinguishing system, and the cabin level adopts a perfluorohexane fire extinguishing system, which has high fire extinguishing efficiency, low fire extinguishing concentration, and can extinguish Class B, C, and E fires. It is non-conductive, volatile, and leaves no trace residue. It can be used to protect valuable devices and storage places, and its use does not cause any damage to equipment and items.

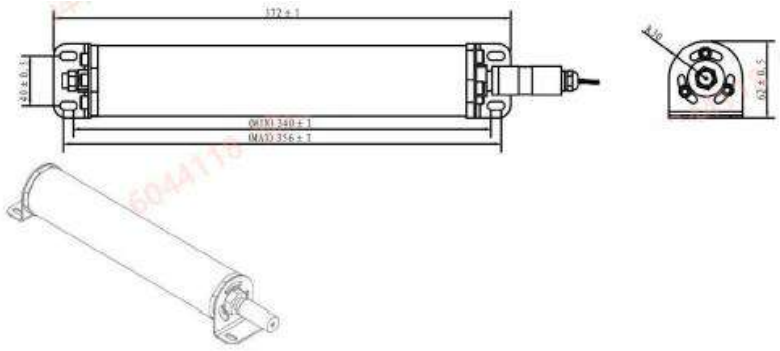
3.5.2 主要技术参数/ Main technical parameters

项目/ Items	参数/ Parameters
使用环境温度范围/ Range of environmental temperature for use	－20℃～＋70℃
规格尺寸/ Dimensions	372mm×62mm×60mm
使用环境相对湿度/ Relative humidity of the usage environment	≤95%RH
启动方式/ Startup method	电/热启动 / Electric/Thermal Start
可靠启动电流 / Reliable starting current	≥700mA
安全电流 / Safe current	≤150mA
喷放时间 / Spray time	≤10s

热启动温度/ Hot start temperature	185±10℃
灭火剂名称 / Name of fire extinguishing agent	全氟己酮 / perfluorohexane
保护空间/ Protecting space	1m³
有效期/ term of validity	10年/ Ten years

3.5.3 产品尺寸外观/ Product dimensions and appearance

产品外观尺寸图参考如下，具体以实物为准。The product appearance dimension diagram is as follows, and the actual product shall prevail.



3.6 液冷系统 / Liquid cooling system

3.6.1 功能描述/ Function Description

能够实现制冷功能和制热功能。制冷功能：能有效的解决电池在充放电过程中由于温度过高引起的充放电速度变慢、寿命衰减、安全隐患等热失控的问题。加热模式：能有效的解决电池在低温环境无法启动和性能衰减的问题，确保电池在合适的温度范围内高效率的运行。

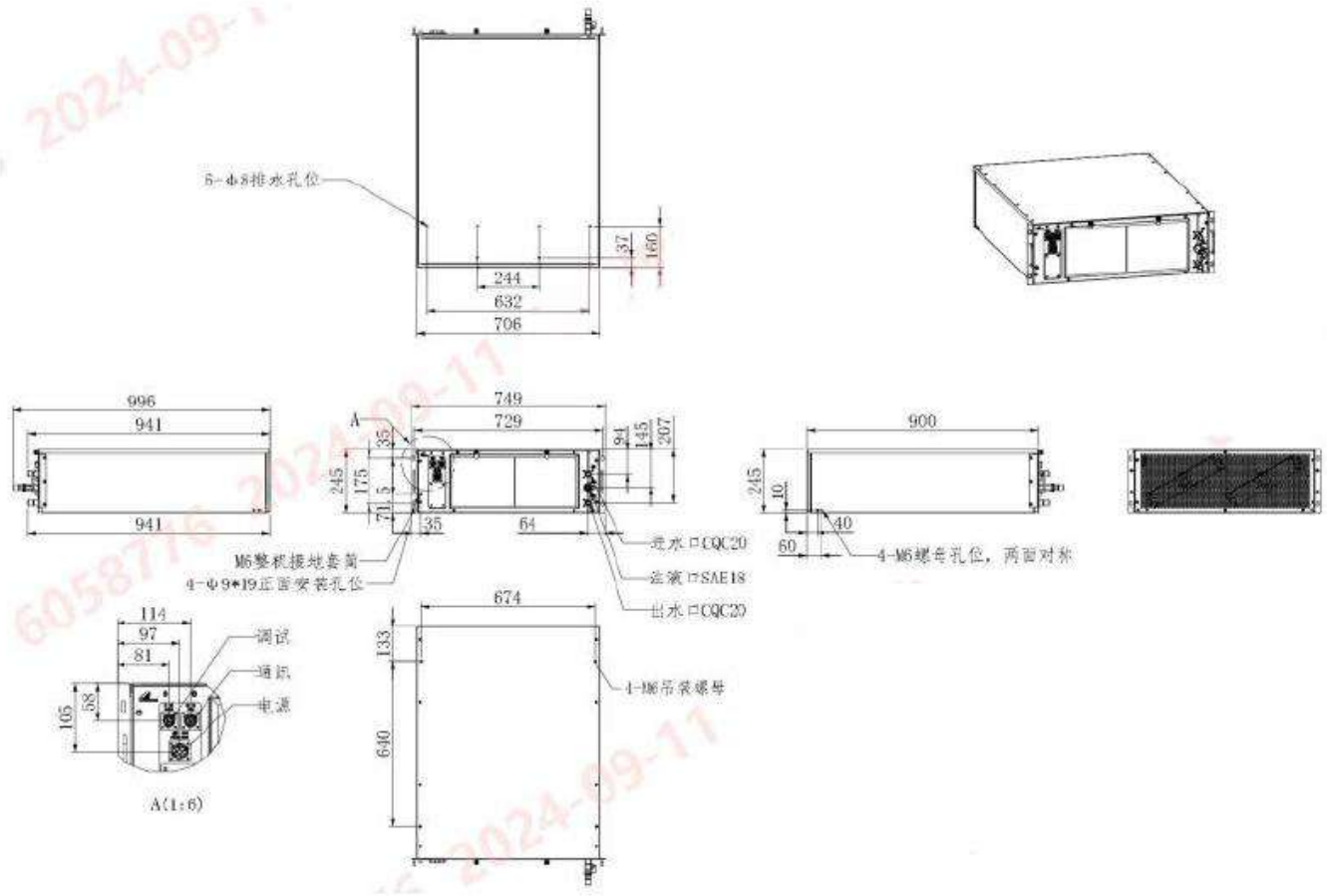
Capable of achieving both cooling and heating functions. Cooling function: It can effectively solve the problems of slow charging and discharging speed, reduced lifespan, and safety hazards caused by high temperature during battery charging and discharging. Heating mode: It can effectively solve the problem of battery failure to start and performance degradation in low-temperature environments, ensuring that the battery operates efficiently within the appropriate temperature range.

3.6.2 主要技术参数/ Main technical parameters

项目/ Items	单位/ Unit	参数/ Parameters
工作环境温度/ Work temp	℃	-30~+55
存储湿度范围/ Storage humidity range	RH	5%~95%
噪声等级/ Noise grade	dB(A)	75@1米处/ 75@1 meter
防腐等级/ Anti corrosion grade	/	C3M
防水防尘等级/ IP grade	/	IPX5

制冷剂/ cryogen	/	R134A
载冷剂/ cooling medium	/	50%乙二醇水溶液/ 50% ethylene glycol aqueous solution
制冷/制热能力/ Cooling/Heating Capacity		
制冷量@45/W18/ Cooling capacity @ 45/W18	kW	5.0
加热量@T=10℃/ Heating capacity @ T=10	kW	2.0
消耗功率/ Power consumption		
制冷输入功率@L35/W18/ Cooling input power@L35/W18	kW	2.5
制热输入功率@Tu=10℃/ Heating input power@Tu=10℃	kW	2.3
电源形式及通讯/ Power supply form and communication		
额定交流输入电源/ Rated AC input power supply	V/Hz	220~240V ,50/60Hz
最大工作电流/ Max operating current	A	19.2
通信方式/ communication	/	RS485,CAN

3.6.3 外形尺寸（以实物为准）/ **Dimensions** and appearance



3.7 电池管理系统主机/ ESMU

3.7.1 功能介绍 / Function Introduction

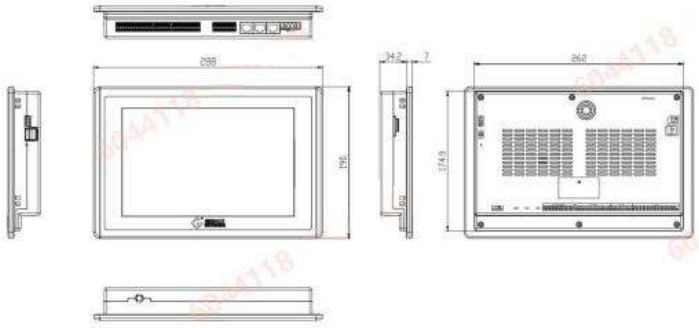
ESMU 又称三级 BMS，是一款适用于储能电池管理系统的控制管理主机，对 ESBCM（二级 BMS）、ESBMM（一级 BMS）上传的电池实时数据进行数值计算、性能分析、报警处理及记录存储，此外，还可实现与 PCS 主机、储能能量管理系统（EMS）等进行联动控制，根据输出功率要求及各簇电池的 SOC 状态优化负荷控制策略，保障电池系统安全稳定且高效地运行。

ESMU, also known as Level 3 BMS, is a control and management host suitable for energy storage battery management systems. It performs numerical calculations, performance analysis, alarm processing, and record storage of real-time battery data uploaded by ESBCM (Level 2 BMS) and ESBMM (Level 1 BMS). In addition, it can also achieve linkage control with PCS host, energy storage management system (EMS), etc. It optimizes load control strategies based on output power requirements and SOC status of each cluster of batteries, ensuring the safe, stable, and efficient operation of the battery system.

3.7.2 技术参数/ Technical parameters

项目/ Items	参数/ Parameters
处理器/ Processor	ARM 平台，四核，主频最高为 2.0GHz/ ARM platform, quad core, with a maximum clock frequency of 2.0GHz
存储/ Storage	16GB
操作系统/ Operating system	Linux
液晶屏/ LCD screen	10.1 寸真彩液晶屏（选配）/ 10.1-inch true color LCD screen (optional)
报警方式/ Alarm method	声光报警，并显示报警内容，故障节点输出闭合/ Sound and light alarm, display the alarm content, and close the fault node output
通讯接口/ Communication	LAN/CAN/RS485/USB
工作环境/ Work environment	环境温度：-10 ～ +60℃ 相对湿度：＜95%（无凝露）/ Environmental temperature: -10~+60 ℃ Relative humidity:<95% (no condensation) 环境磁场：＜ 400A/m、周围不允许有易腐蚀易燃易爆气体/ Environmental magnetic field:<400A/m, no corrosive, flammable or explosive gases are allowed in the surrounding area

3.7.3 产品外观尺寸图/ Product dimensions and appearance



产品外观尺寸图/ Product dimensions and appearance（以实物为准）

4. 供货范围表/ Supply list

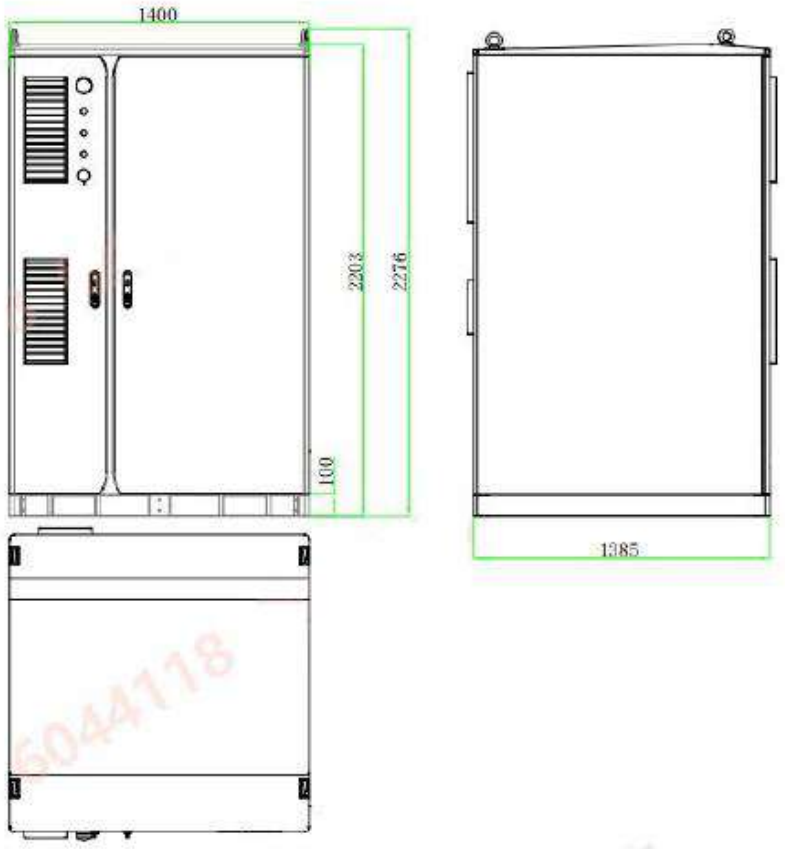
主要供货清单/ Main supply list

序号 /No.	设备名称/ Equipment name	型号及规格/ Model and specifications	单 位/ Unit	数量/ quantity	备注 / Notes
1	储能柜/ Energy storage cabinet	105kW/233kWh	台/ set	1	含：5 个电池插箱，报警器，运行指示灯（3 个），急停开关/ Includes: 5 Pack, alarm, 3

					running indicator lights, emergency stop switch
2	变流器/ PCS	105kW	套/ set	1	满足并离网使用/ Satisfy on-grid and off-grid use
3	插箱/ Pack	46.6kWh	个/ pcs	5	
4	电池管理系统/ BMS	被动均衡/ Passive equilibrium	套/ set	1	
5	消防系统/ Fire protection system	全氟己酮 / perfluorohexane	套/ set	1	
6	液冷机/ Liquid cooling machine	5kW	套/ set	1	
7	液冷管道/ Liquid cooled pipe	特殊定制/ Special customization	套/ set	1	

5. 产品 2D 图/ Product 2D image

以下 2D 图仅供参考，具体以实物为准。The following 2D images are for reference only, please refer to the actual product for details.



6. 包装及运输/ Packaging and transportation

所有货物符合国家主管机关的规定，具有适合长途运输和装卸的坚固包装。包装应保证在运输、装卸过程中完好无损，并有减振、防冲击及防磨损措施。

All goods comply with the regulations of the national regulatory authorities and have sturdy packaging suitable for long-distance transportation and loading and unloading. The packaging should be ensured to be intact and undamaged during transportation, loading and unloading, and have measures to reduce vibration, impact and wear.

对裸装货物应在金属标签上注有相关内容，并要带有足够的货物支架或包装垫木。 Bare goods should be labeled with relevant information on the metal tag and equipped with sufficient cargo supports or packaging pads.

专用工具（如有）分别包装并附上上述内容。 Special tools (if any) are packaged separately and attached with the above content.

电池柜应包装后进行运输，电量不高于 30%，在运输过程中应防止剧烈振动、冲击或挤压， 防止日晒雨淋，装卸和运输过程中应避免较大的外力冲击，禁止抛掷、翻滚、倒置、挤压以及堆垛。

The battery cabinet should be packaged before transportation, with a capacity of no more than 30%. During transportation, it should be protected from severe vibration, impact, or compression, as well as exposure to sunlight and rain. During loading, unloading, and transportation, significant external impact should be avoided, and throwing, rolling, inversion, compression, and stacking are prohibited.

本储能柜包装示意图如下：The packaging diagram of this energy storage cabinet is as follows:

参考 215 机柜包装方式/ Refer to the packaging method of cabinet 215

7. 免责声明/ Disclaimer

所有电池产品交付项目都必须完成产品安装确认程序，我公司对已经履行完成安装确认程序的电池产品承担质保责任。 All battery product delivery projects must complete the product installation confirmation procedure, and our company assumes warranty responsibility for battery products that have completed the installation confirmation procedure.

对于用户使用不当，或者经鉴定为下述事实，而造成的损失或导致的事故，我公司不承担责任： Our company is not responsible for any losses or accidents caused by improper use by users or identified as the following facts:

（1）使用电池包或对电池系统进行充放电测试的时候私自更换 BMS 系统，造成部分或者整组电池过充电或者过放电； Replacing the BMS system without authorization while using the battery pack or conducting charge and discharge tests on the battery system, resulting in partial or complete overcharging or overdischarging of the battery;

（2）安装过程不按操作手册进行操作，磕碰损坏造成电池包电池无法使用的； The installation process was not carried out according to the operation manual, resulting in damage from collision and causing the battery pack to be unusable;

（3）私自拆解电池包，并对电池包结构进行变动的； Disassembling the battery pack without authorization and making structural changes to the battery pack;

（4）因为自行连接错误，导致电池被反向充电，造成部分或者整组电池提前报废； Due to incorrect self connection, the battery was charged in reverse, causing some or the entire battery pack to be scrapped prematurely;

（5）未能有效对电池系统进行充电控制，造成了部分或者整组电池被过充电； Failed to effectively control the charging of the battery system, resulting in some or the entire battery pack being overcharged;

（6）未能有效对电池系统进行放电控制，造成了部分或者整组电池被过放电； Failed to effectively control the discharge of the battery system, resulting in partial or complete battery over discharging;

（7）由于电气回路的电缆线、连接器、接线端子等电气元部件的规格选型不当，造成因线路过热自燃而引起的火灾等重大安全事故； Due to improper specification selection of electrical components such as cables, connectors, and terminal blocks in electrical circuits, major safety accidents such as fires caused by overheating and spontaneous combustion of the circuit have occurred;

（8）动力主回路未安装适当的高压安全保护器件，由于线路老化、破损等原因造成了电池系统短路或车载设备损坏； The main power circuit is not equipped with appropriate high-voltage safety protection devices, resulting in short circuits in the battery system or damage to onboard equipment due to aging, damage, and other reasons;

（9）因为采取了影响电池系统荷电平衡的接法（例如单独从个别电池上引出电源线给车载低压电器供电），造成个别电池被过放电； Due to the adoption of a connection method that affects the balance

of charge in the battery system (such as separately drawing power lines from individual batteries to supply power to the vehicle's low-voltage electrical appliances), some batteries have been over discharged;

（10）动力主回路的电缆线端子和导电条与电池极柱的连接可靠性差，因连接螺栓松动，造成连接处严重发热，导致电池寿命衰减，甚至出现安全事故； The reliability of the connection between the cable terminals and conductive strips of the main power circuit and the battery poles is poor. Due to loose connecting bolts, severe heating occurs at the connection point, leading to a decrease in battery life and even safety accidents;

（11）未定期对电池使用情况进行检查和维护，没有及时发现并排除事故隐患，最终导致事故发生。Failure to regularly inspect and maintain battery usage, failure to promptly identify and eliminate potential safety hazards, ultimately leading to accidents;

（12）私自更换关键器件（如：PCS，液冷机等）造成电池系统损坏或者发生安全事故。Unauthorized replacement of key components (such as PCS, liquid coolers, etc.) resulting in damage to the battery system or safety accidents.

8. 修订说明/ Revision Explanation

本公司拥有为提高产品质量和性能改善，在不通知以往客户的情况下，对产品规格书和使用说明书有做任何更改/修订的权利。由于产品在技术上不断改进更新，可能出现实物与说明书稍有不同的情况，请以实物为准。

Our company has the right to make any changes/revisions to the product specifications and user manuals without notifying previous customers in order to improve product quality and performance. Due to continuous technological improvements and updates, there may be slight differences between the actual product and the manual. Please refer to the actual product for accuracy.

本公司拥有对本产品规格或使用说明书的最终解释权。

Our company have the final right of the product specifications or user manual.