

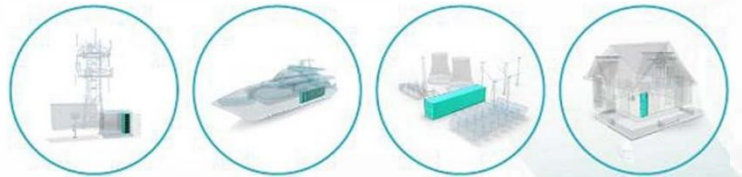
Product Specification

— Liquid Cooling Energy Storage System

ESS-3440-2H-L

Version V1.0

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名称缩写 Acronyms and abbreviations

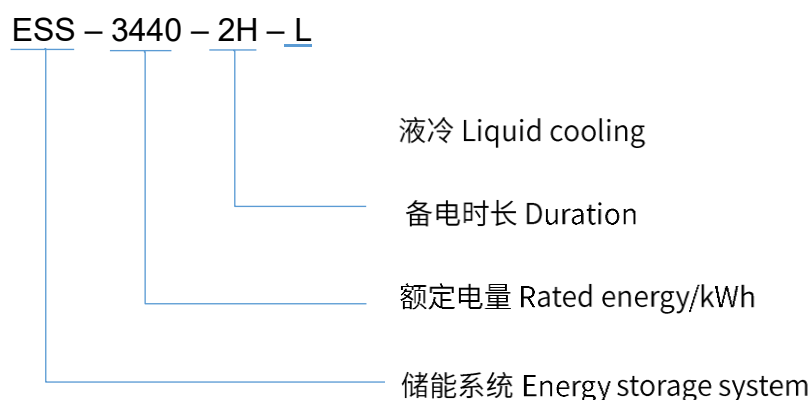
BMS	电池管理系统	Battery Management System
BMU	电池管理单元	Battery Management Unit
BCMU	电池簇管理单元	Battery Cluster Management Unit
BAMS	电池堆管理系统	Battery Array Management System
BOL	电池初始状态	Begin of Life
SOC	荷电状态	State of Charge
SOE	能量状态	State of Energy
SOP	功率状态	State of Power
SOH	电池健康状态	State of Health
MSD	手动维护开关	Manual Service Disconnect
EOL	电池寿命终端状态	End of Life
CC	恒流	Constant Current
CCCV	恒流恒压	Constant Current Constant Voltage
CP	恒功率	Constant Power
CPCV	恒功率恒压	Constant Power Constant Voltage

符号定义 Definitions of symbols

 危险 Danger
<p>本指示提示操作过程中存在安全危险，如果不遵守此类警示信息，直接导致严重人身伤亡事故。</p> <p>This indicates that there are dangers during operation, and failure to comply with such warnings will directly lead to serious personal injury or accidents.</p>
 警告 Warning
<p>本指示提示操作过程中存在潜在危险，如果不遵守此类警示信息，可能导致人身伤亡事故。</p> <p>This indicates that there are potential risks during operation, and failure to comply with such warnings may lead to personal injury or accidents.</p>
 注意 Caution
<p>本指示提示操作过程中存在潜在危险，如果不遵守此类警示信息，可能导致人身伤亡事故。</p> <p>This indicates that there are potential risks during operation, and failure to comply with such warnings may lead to personal injury or accidents.</p>

1. 产品型号 Product Model

产品型号定义规则参考以下说明。The definition of product model is shown as follows.



2. 应用说明 Scope of Application

本文件旨在说明液冷集装箱的规格，并向客户提供该产品的使用信息。本产品的标准供货内容为 20 尺集装箱。不包含集装箱外接正负极出线、外接通信出线，低压供电线。详细组件清单参考下表。

The purpose of this document is to specify the specifications of liquid cooling energy storage system: ESS-3440-2H-L, and also provide customers with information on the usage of the specified product. The supply scope of this product is: 20ft battery container; customer' s accessories: container external positive and negative output wires, container external output communication wires, low-voltage power cables. The details are as following.

表 1 标准供货清单

Table 1 Components of energy storage system

序号 No.	子系统 Sub-parts	设备/部件 Components	单套系统配置 数量 Quantity	备注 Remark
1	集装箱 Battery container	20 尺高柜 20HP	1	含配电、照明系统等 Including distribution and lighting system
2	电池簇 Battery cluster	电池箱 Battery pack	80	BP-48-153.6/280-L
		高压箱 Battery cluster switchgear unit	10	簇控制箱，含 BCMU、断路器、熔断器、接触器、电流传感器等 Including BCMU, breaker, fuse, contactor, current sensor, etc.
3	汇流柜 DC combiner cabinet	汇流柜 DC combiner cabinet	1	
4	液冷系统 Liquid cooling system	液冷机组 Liquid cooling machine	1	制冷量 45kW，制冷剂为 R134a，冷却液为 50%乙二醇+50%水 Cooling Capacity: 45kW, Refrigerant: R134a

序号 No.	子系统 Sub-parts	设备/部件 Components	单套系统配置 数量 Quantity	备注 Remark
				Liquid coolant: 50% ethylene glycol + 50% water
		管路系统 Liquid cooling pipes	1	含一二三级管路 Including three-stage pipes
5	消防系统 Fire suppression system	消防系统 Fire suppression	1	包括消防主机、外部水消防接口、可燃气体探测器、CO 气体探测器、烟雾探测器、舱内排爆泄爆板以及排风系统等 Including fire suppression machine, external fire-extinguishing interface, flammable gas sensor, CO sensor, smoke sensor, explosion vent plate in the cabin and ventilation system, etc.

注：具体型号规格和数量以供货前确认为准。

Note: The specific model, specification and quantity are subject to confirmation before delivery.

3. 产品规格 Product Specification

表 2 液冷电池系统参数表

Table 2 Parameters of energy storage system

序号 No.	项目 Items	规格 Specification	备注 Remark
1	成组方式 Configuration	1P384S×10	单簇 8 个电池箱串联 8 battery packs in series per cluster
2	标称电量 Rated energy	3440kWh	0.5P @25±3°C
3	标称电压 Nominal voltage	1228.8V	
4	电压范围	1075.2V~1382.4V	

	Voltage range			
5	充放电方式 Charge/discharge mode		CC/CCCV/CP/CPCV	
6	标准充放电功率/电流 Standard charge power/current		1720kW/1400A	
7	工作温度 Operating temperature	充电 Charge	0°C~55°C	
8		放电 Discharge	-20°C~55°C	
9	推荐使用环境温度范围 Recommended operating environment temperature		20°C~30°C	
10	充放电效率 Charge/discharge efficiency		93%	0.5P@25±3°C, BOL
11	冷却方式 Thermal management		液冷 Liquid cooling	
12	通信方式 Communication		RS485/以太网/CAN RS485, Ethernet, CAN	
13	辅电制式 Auxiliary power supply		480Vac, 50 Hz/60Hz	
14	尺寸 Dimension		L6058×W2438×H2896mm	
15	重量 Weight		约 35T About 35T	以实际为准 Subject to actual situation
16	IP 等级 IP rating		IP55	
17	存储温度 Storage temperature	6 个月 6 months	0°C-35°C	
18		1 个月 1 month	-20°C-45°C	
19	储存/运行湿度 Humidity		<75% RH, 无冷凝水 <75% RH, without condensation	
20	海拔高度 Application altitude		≤4000m (污染等级 II) ≤4000m (Pollution level II)	3000m 以上降额使用 Derating use above 3000m
21	循环寿命 Cycle Life		System 4000	LiFePO4 cell cycle life 8000,@0.5C, 70%SOH

4. 产品描述 Product Description

4.1 系统架构 System Architecture

本集装箱电池储能系统采用 20 尺集装箱，包括 10 个电池架构成的电池系统、1 个汇流柜、1 套液冷机组、1 套消防以及照明系统等。集装箱满足吊车安装的基本安装要求，并提供螺栓的固定方式，同时向用户提供 2 个符合电力标准要求的接地点。

This energy storage system adopts the design of 20ft container, including 10 battery clusters system, 1 DC combiner cabinet, 1 set of liquid cooling unit, 1 set of fire suppression and lighting system, etc. The container meets the basic installation requirements of crane installation, and provides bolt fixing method, while providing users with 2 grounding points that meet the electricity standards requirements.

集装箱具备良好环境适应性，具有防腐、防火、防水、防尘（防风沙）、防震、防紫外线、防盗等功能。集装箱相关图示如下所示：

This container system has good environmental adaptability, with anti-corrosion, fireproof, waterproof, dustproof (windswept sand), shockproof, ultraviolet-proof, anti-theft and other functions. The container related diagram is shown below:

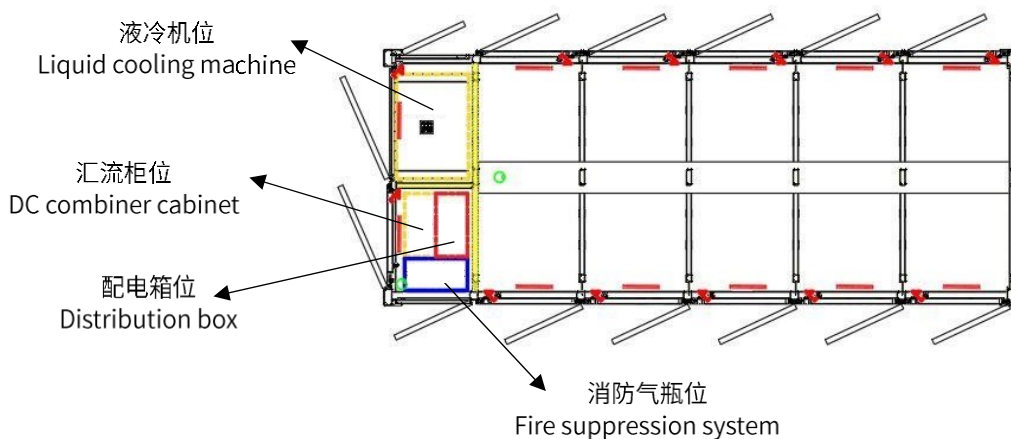


图 1 集装箱设备布局图（仅供参考，以实际为准）

Figure 1 The layout of the container (for reference, subject to actual conditions)



图2 集装箱系统效果图（仅供参考，以实际为准）

Figure 2 The appearance of container (for reference, subject to actual conditions)

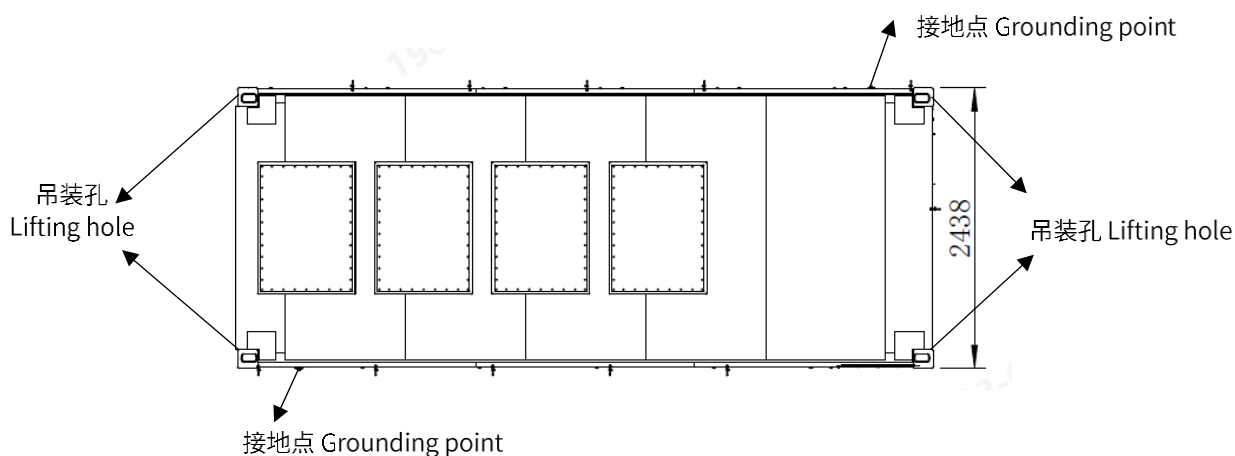


图3 集装箱吊装和接地示意图（仅供参考，以实际为准）

Figure 3 The diagram of lifting and grounding (for reference, subject to actual conditions)

4.2 液冷系统 Liquid Cooling System

本产品热管理系统采用液冷方式对电池系统进行温度控制。利用集装箱内一体式液冷机组和合理的管路设计，实现对电池系统内部电芯等有效温度的控制，使储能系统的工作环境在最佳范围内，延长整个系统的使用寿命以及运行的安全可靠。

The thermal management system of this product applies liquid cooling method to control the temperature of the battery system. The integrated liquid cooling unit in the container and reasonable pipeline design are used to realize the effective temperature control of the internal cells of the battery system, so that the working environment of the energy storage system is controlled within the best range, and the service life of the

entire system is extended and the operation is safe and reliable.

液冷机组应有以下五种工作模式：制冷、制热、自循环、待机、故障。

The liquid cooling unit should have the following five working modes: cooling, heating, self-circulation, standby, and fault.

制冷模式：压缩机开启，高温高压制冷剂从压缩机中排出，进入冷凝器冷凝放热降温后，进行节流降压，进入电池冷却器蒸发并与冷却液换热，制冷剂在板式换热器中吸热蒸发后回流压缩机，作为一个制冷循环。水路中水泵开启，PTC不开启，冷却液在板式蒸发器中冷却后进入电池包液冷板，冷却电池。

Cooling mode: The compressor is turned on, and the high temperature and high-pressure coolant is released from the compressor, after entering the condenser to cool down, the throttling and pressure reduction are carried out; Then the coolant enters the battery cooler to evaporate and exchange heat with the coolant, and the coolant is refluxed to the compressor after endothermic evaporation in the plate heat exchanger, which forms a cooling cycle. The water pump is turned on and PTC turned off, after the coolant cooling down in the plate evaporator, it enters the battery pack liquid cooling plate to cool the battery.

制热模式：压缩机关闭，水泵、PTC加热器开启，冷却液经PTC加热器加热后进入电池包液冷板加热电池。

Heating mode: The compressor is turned off, and the water pump and PTC heater are turned on, and then the coolant is heated by the PTC and then enters the battery pack liquid cooling plate to heat the battery.

自循环模式：压缩机、风机、PTC关闭，水泵开启，冷却液在电池包液冷板和机组中循环流动，将热量带出，适用于电池充放电时负荷较小时。

Self-circulation mode: The compressor, fan, PTC are turned off, then the water pump is turned on, and the coolant will circulate in the liquid cooling plate and unit of battery pack so as to bring out the heat, which is suitable for low load during the battery

charge/discharge.

待机模式：器件全部关闭，根据BMS信号执行。

Standby mode: The device is all turned off and start to work according to the BMS signal.

故障模式：故障信息反馈至BMS，根据故障等级执行策略。

Failure mode: Fault information is fed back to the BMS, and strategies are implemented according to the fault level.

4.3 消防系统 Fire Suppression System

集装箱火灾抑制系统包含火灾抑制装置、可燃气体探测器、CO探测器、烟雾探测器、手动启动开关、声光报警器、喷头、管路及接头等，配套的探测器装置进行早期火灾的预警，一旦发生火灾，相应的探测器报警后，火灾抑制装置启动、相应的管路分区阀打开、排烟系统打开、声光报警系统、信号反馈至储能相应的控制系统切断外部电路等同步开始工作，灭火剂迅速喷洒至相应的火灾区域，实现早期火灾扑灭并持续降温，抑制火灾复燃和电池热失控扩展。

The container fire suppression system includes fire suppression device, flammable gas sensor, CO sensor, smoke sensor, manual switch, sound and light alarm, sprinkler, pipeline and plugs, etc., such equipped sensor devices will be applied for early fire warning. Once there is a fire, the corresponding sensors will alarm and fire suppression device starts, then the corresponding pipeline partition valve and smoke exhaust system will open; at the same time, the sound and light alarm system will feedback signals to the energy storage corresponding control system to cut off the external circuit, then the fire extinguishing agent will quickly be sprayed to the corresponding fire area to achieve early fire extinguishing and continuous cooling, inhibit fire re-ignition and battery thermal runaway expansion.

自动灭火系统的供电线路、消防联动控制线路应采用耐火铜芯电线电缆。自动灭火系统应引入电站消防专用供电备用电源，保证在没有市电的情况下也能维持消防系统正常工作。

The fire-resistant copper core wires and cables shall be applied for power supply

and fire linkage control of the automatic fire extinguishing system. Meanwhile, the automatic fire extinguishing system should introduce a special backup power supply for fire protection to ensure that the normal operation of the fire protection system can be maintained in the absence of AC mains power.

在集装箱的侧面预留1个DN65标准水消防快速接头，并配上水接头闷盖，供消防车灭火使用。

A DN65 standard quick interface shall be reserved for fire suppression on the side of the container, and equipped with a water joint cover for fire trucks.

4.4 配电柜对外接口 The external interface of distribution cabinet

表 3 配电柜对外接口表

Table 3 The external interface of distribution cabinet

序号 No.	名称 Item	线径 Cable model	端子规格 Definition	数量 Quantity
1	L1	35 mm ²	M8	1
2	L2	35 mm ²	M8	1
3	L3	35 mm ²	M8	1
4	PE	16 mm ²	M8	1
5	N	16 mm ²	M8	1

4.5 汇流柜柜外接口 The external interface of DC Combiner Cabinet

表 4 汇流柜柜体接口表

Table 4 The external interface of DC Combiner Cabinet

序号 No.	名称 Item	线径 Cable model	端子规格 Definition	数量 Quantity
1	PCS+	185 mm ²	M12 外六角法兰盘 M12 hex flange	4
2	PCS-	185 mm ²	M12 外六角法兰盘 M12 hex flange	4
3	CAN_H	AWG20	适配 AWG20 管状端子 Adopt to AWG20 terminal	1
4	CAN_L	AWG20	适配 AWG20 管状端子 Adopt to AWG20 terminal	1

5	干接点常闭 1 Closed dry contact 1	AWG20	适配 AWG20 管状端子 Adopt to AWG20 terminal	1
6	干接点常闭 2 Closed dry contact 2	AWG20	适配 AWG20 管状端子 Adopt to AWG20 terminal	1

5. 产品使用说明 Product Instructions

a. 电池系统必须在规定的充电倍率或功率条件下使用，并且充电上限电压不得超过产品技术要求，防止电池过充电。以免影响电池的充放电性能、机械性能和安全性能。

The energy storage system must be operated within the specified charging conditions. Overcharging will lead the electrical performance, mechanical performance and safety performance of the battery cluster to be decreased.

b. 电池系统必须在规定的放电倍率或功率条件下使用，并且放电下限电压不得超过产品技术要求，防止电池过放电。以免影响电池的充放电性能、机械性能和安全性能。

The energy storage system must be operated within the specified discharging conditions. Over-discharging will lead the electrical performance, mechanical performance and safety performance of the battery cluster to be decreased.

c. 电池系统必须在规定的的环境条件下使用，过高或过低的温度环境都会影响电池的性能和安全。

The energy storage system must be operated within the specified environment conditions, since too high or too low ambient temperature will affect the performance of the battery.

d. 电池系统必须在清洁、通风的环境条件下使用或存储，避免与腐蚀性物质接触，并远离火源及热源。

The energy storage system shall be used or stored in clean, dry and ventilated environmental conditions, and avoid contact with corrosive substances and keep away from fire and heat sources.

e. 电池系统禁止在强静电和强磁场的地方使用和存储，以免产生安全隐患。

The energy storage system shall not be used or stored in places with strong static

electricity and strong magnetic fields to avoid potential safety hazards.

f 未经我司允许，不得私自拆卸或改装本产品，否则质保终止，若产生安全事故，我司概不负责。

g. 不得将电池与金属物体混放，避免造成短路，产生安全风险

The product shall not be disassembled or modified without permission, otherwise the warranty will be terminated, and our company will not be responsible for any safety accidents.

。 Do not mix the battery with metal objects to avoid short circuits and safety risks.

电池系统的使用必须严格遵照以上要求，否则质保终止，造成产品的性能损坏以及安全事故，我司概不负责。

6. 产 品维护保养 Product Maintenance

The usage of 3.44MWh energy storage system must strictly comply with the above requirements, otherwise the warranty will be terminated, and will not be responsible for any product performance damages or safety accidents.

e a. 电池系统长时间搁置或存放时，应保持在 30%~50%的荷电状态下。

If the energy storage system would be stored for a long time, it is recommended to maintain the SOC at 30%~50%.

b. 电池系统长时间搁置或存放时，建议每 3个月进行一次补充电，防止电池过放亏，每半年应进行一次充放电循环。

In order to prevent the occurrence of over-discharge, the energy storage system should be charged every 3 months regularly, and it is recommended to charge and discharge the battery every 6 months.

★ 免责声明：本设备应在产品本规格书等规定的范围内使用。由于产品需求单位在安装、调试、维修、使用等过程中存在不当行为或用于产品规定的使用范围外等不按规定使用行为造成人员、动物或财产损失，生产厂家不负合同条款上和合同条款以外的责任。

- ★ Disclaimer: These mentioned products shall be used within the scope specified in product specifications. The manufacturer shall be free from liability for any damages to people, animals or property caused by the improper operations in the process of installation, commissioning, maintenance, use, etc., or uses not in accordance with the terms and conditions specified in product specifications.