

D-Ocean-5016D

Specification



Version: 1.0

All rights reserved by SHANGHAI HOENERGY POWER TECHNOLOGY CO.,LTD., should not reproduce without permission, product picture is for reference only. Specifications are subject to change without notice



HOENERGY

Copyright

©2024 Hoenergy Storage (Shanghai) Energy Co., Ltd. All Rights Reserved.

Statement

- Please read this manual carefully before using the product and keep it in a convenient place for future reference.
- Hoenergy Storage reserves the right to modify the product and documentation at any time. The information in this manual supersedes all previously published materials. In addition, the specifications and other information provided in this manual are subject to change without prior notice.
- The images provided in this manual are for illustrative purposes only. Specific product design details may vary slightly depending on the product version and market region. Hoenergy Storage reserves the final right of interpretation of all product design details.
- Hoenergy Storage shall not be liable for any errors that may be contained in this manual or for any losses arising from the information provided herein or from the use of this manual.
- Without the prior written consent of Hoenergy Storage, no part of this document may be reproduced, printed, or adapted in any form.

Contact Us

If you have any questions during the use of this product or the related documentation, please contact Hoenergy Storage directly.

Address: No. 1, Jinyi Road, Fengxian District, Shanghai, China

Email: aftersales@hoenergy.com.cn

Tel: 400-103-2166

Website: <http://www.hoenergypower.com>

Table of contents

I.About this manual	1
1.1 Applicable Product.....	1
1.2 Applicable Standards.....	错误! 未定义书签。
II.Containerized Energy Storage System.....	2
2.1Product Overview	2
2.2 Product Model.....	2
2.3 Appearance size.....	2
III.System parameters.....	4
3.1 Battery system	5
3.1.1 Battery cell	5
3.1.2 PACK.....	6
3.1.3High voltage box.....	7
3.1.4 Battery cluster.....	8
3.2 Thermal management system.....	8
3.2.1 Liquid cooler.....	9
3.2.2 Dehumidifier.....	11
3.3Fire protection system	12
3.3.1 Ventilation system.....	12
3.3.2 Automatic fire protection system.....	12
3.3.3 Emergency water system.....	12
3.3.4 Working principle.....	12
IV.System communication.....	14

I.About this manual

1.1 Applicable Product

This manual applies to the [D-Ocean-5016D](#) containerized energy storage system.This user manual includes the following contents:

- System specifications of the liquid-cooled energy storage container;
- System communication architecture of the liquid-cooled energy storage container;
- System composition and component parameters of the liquid-cooled energy storage container.



II.Containerized Energy Storage System

2.1 Product Overview

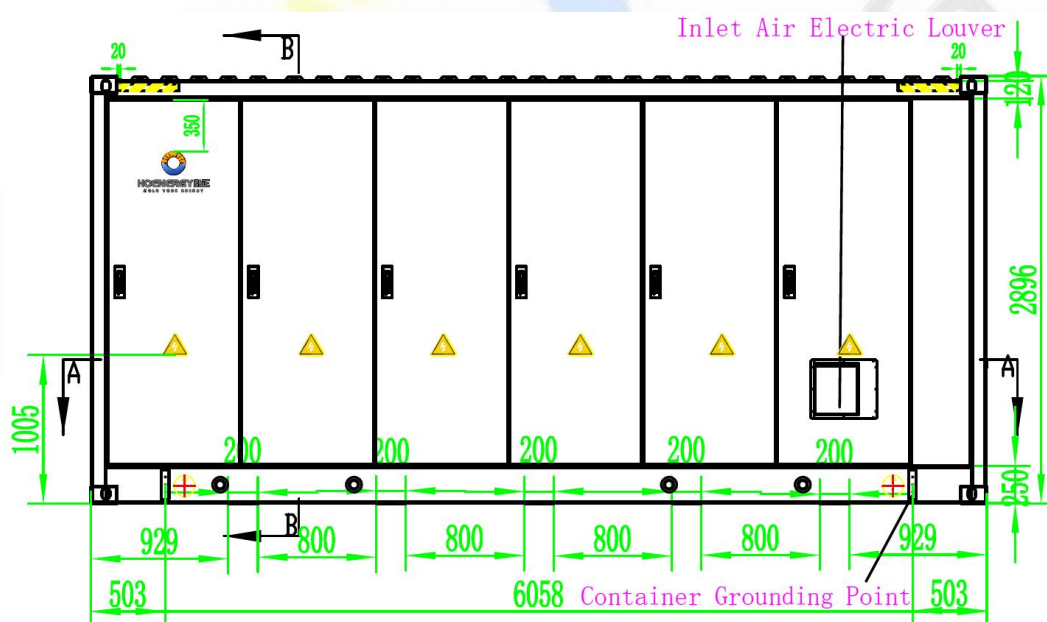
The D-Ocean-5016D container is mainly applied in medium and large-scale energy storage power stations. It adopts a standard 20-foot container design and integrates liquid cooling temperature control, modular design, systematic safety design, intelligent management, and O&M functions. These features ensure temperature uniformity of the battery system, high efficiency, long service life, and convenient installation and maintenance.

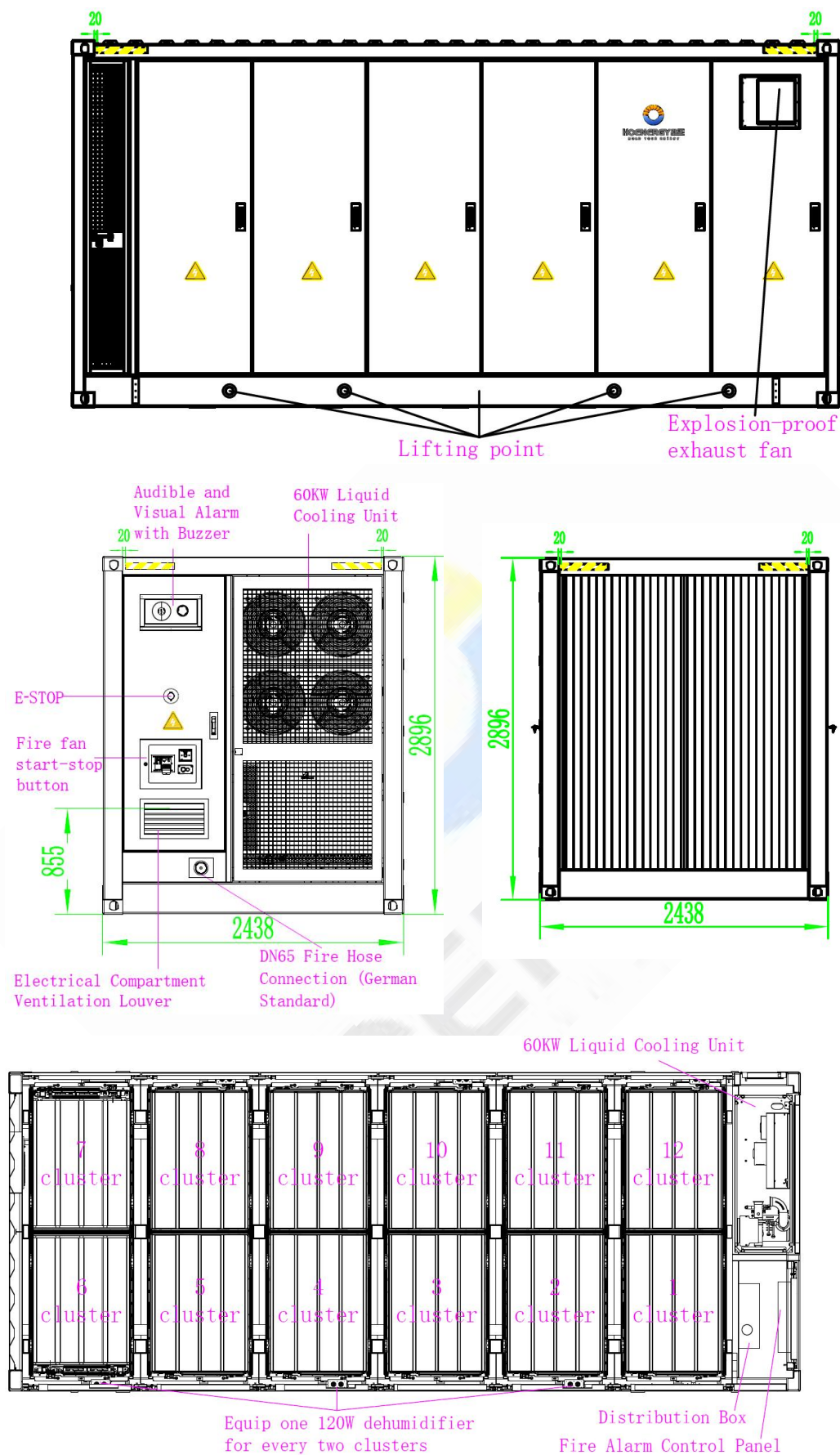
2.2 Product Model

The components of the example model are defined as follows:

D	-	Ocean	-	5016	D
Energy Storage System	-	Containerized	-	Capacity	direct current

2.3 Appearance size





*The above pictures are for reference only. Please refer to the actual product received!

III. System parameters

The designed capacity of this containerized energy storage system is 5.016 MWh. It adopts a liquid cooling system design and supports a 0.5P charge/discharge rate. The system integrates the battery system, thermal management system, fire protection system, power collection system, and security system into an all-in-one design solution.

The main product specifications and models of this containerized energy storage power station system are as follows:

DC Parameters		
Cell Type		Lithium Iron Phosphate/LFP
Cell Capacity	V/Ah	3.2V/314Ah
Configuration		12*1P416S
Rated Capacity	kWh	5016
Rated Voltage	V	1331.2
Voltage Range	V	1102~1500
Topology		String /Centralized Type
System Parameters		
Charge/Discharge Rate	P	≤0.5
Depth of Discharge (DoD)	%	95
Protection Rating		IP54
Thermal Management System		Intelligent Liquid Cooling
Fire Protection System		aerosol + Water Fire Suppression
Ambient Temperature	℃	-30 ~ 50
Relative Humidity	%	5 ~ 95%RH (Non-condensing)
Operating Altitude	m	4000 (>2000 m derating required)
Weight	t	≈42
Dimensions	mm	6058 *2438*2896

3.1 Battery system

This containerized energy storage system integrates one independent 5.016 MWh energy storage system, consisting of 12 battery clusters. The battery system adopts 314 Ah / 3.2 V long-cycle lithium iron phosphate (LFP) cells throughout. Each battery cluster corresponds to 8 battery PACKs, and each PACK adopts a 1P52S configuration, resulting in a capacity of 418 kWh per battery cluster.

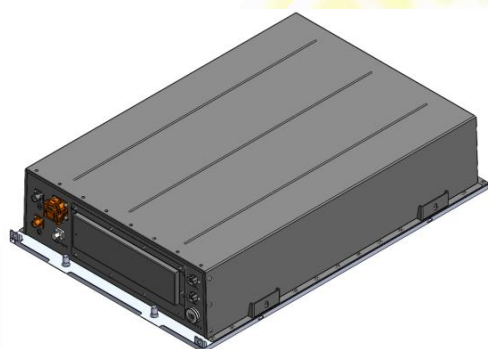
The battery system features high energy capacity and long-duration charge and discharge performance, enabling it to meet the system's long-duration peak shaving requirements.

3.1.1 Battery cell

Item	Specification	Remarks
Battery Type	LFP	
Nominal Capacity	314Ah	25±2°C, 0.5P/0.5P
Nominal Voltage	3.2V	
Operating Voltage Range	2.5V-3.65V	T > 0°C
	2.0V-3.65V	T ≤ 0°C
Standard Charge Power	502.4W	25±2°C, 0.5P
Standard Discharge Power	502.4W	25±2°C, 0.5P
Standard Charge Mode (0.5P)	Charge at constant power of 0.5P1(W) at 25±2°C. Discharge at 0.5P1(W) to 2.5V, rest for 30 minutes. Then charge at 0.5P1(W) to 3.65V, rest for 30 minutes.	
Standard Discharge Mode (0.5P)	Discharge at constant power of 0.5P1(W) at 25 ± 2 ° C. Charge at 0.5P1(W) to 3.65V, rest for 30 minutes. Then discharge at 0.5P1(W) to 2.5V, rest for 30 minutes.	
Operating Temperature	0°C < T ≤ 60°C	Charging
	-30°C ≤ T ≤ 60°C	Discharging
Storage Temperature	-20°C ~ 35°C	Ambient humidity ≤ 80% RH, no condensation

Room Temperature Charge/Discharge Cycle Life	≥8000 times	At 25±2°C, cell clamped with 15mm aluminum plate, fixture force (3000±200) N, tested in a high/low temperature chamber. Charge at 0.5P constant power to 3.65V, rest for 30 min. Discharge at 0.5P constant power to 2.5V, rest for 30 min, repeat until capacity decreases to 70% of nominal capacity.
Dimensions	71.7*174.26*207.11mm	New battery at 300±20 Kgf pressure
Weight	5.49±0.3kg	
AC Internal Resistance	0.18±0.05mΩ	New battery state ~30% SOC

3.1.2 PACK



The iBAT-LM-52.25H module is a battery system specially designed by Hoenergy for energy storage power station applications. The module integrates 52 units of 314 Ah battery cells, along with a BMU system, liquid cooling system, and fire protection system. The battery cell is the most fundamental energy storage unit. The BMU (Battery Management Unit) is responsible for collecting cell data and internal enclosure temperature information, as well as communicating with other equipment. The liquid cooling system is responsible for heat dissipation of the entire battery PACK, while the fire protection system provides fire detection, early warning, and fire suppression for the PACK system.

Item	Specification	Remarks
Module Mode	iBAT-LM-52.25H	
Configuration	1P52S	
Nominal Capacity	314Ah	0.5P constant power charge/discharge
Nominal Energy	52.25kWh	
Nominal Voltage	166.4V DC	3.2V/cell (1P52S)
Charge Cut-off Voltage	189.8V DC	3.65V/cell (1P52S)
Discharge Cut-off Voltage	140.4V DC	2.7V/cell (1P52S)

Rated Charge Power	26.13kW	0.5P
Rated Discharge Power	26.13kW	0.5P
Operating Temperature	0℃ < T≤60℃	Charging
	-30℃≤T≤60℃	Discharging
Storage Temperature	-20℃≤T≤45℃	Ambient Humidity: ≤70% RH, non-condensing
Dimensions	790*1145*245mm	main body
Protection Rating	IP66	
Weight	approx. 370 kg	

3.1.3 High voltage box

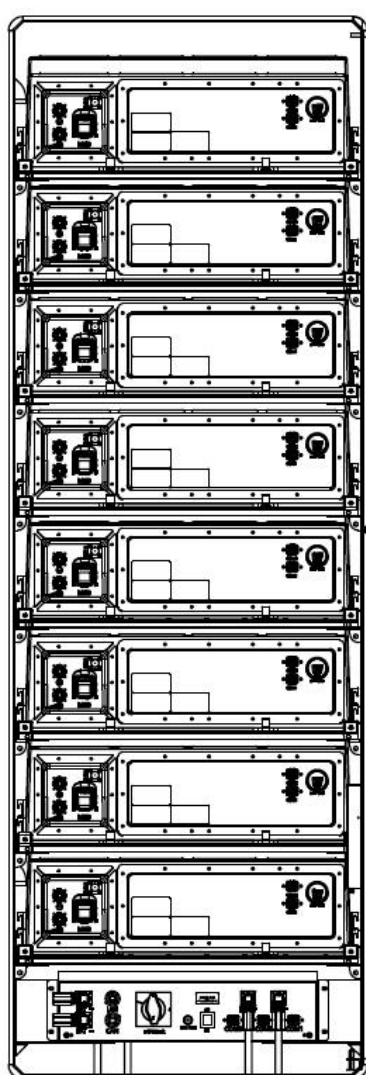


The iHCU-L1500/G2 High-Voltage Control Unit is a high-voltage power circuit management module specifically designed by Shanghai Hoenergy Power Technology Co., Ltd.. for commercial and industrial energy storage cabinets. It serves as an intermediate unit connecting the battery pack to the energy storage converter. The high-voltage control unit (HCU) provides functions such as battery pack voltage and current measurement, battery pack circuit contactor control, and protection. The HCU is equipped with circuit breakers, contactors, fuses, pre-charge control circuits, current sensors, the Battery Cluster Control Unit (BCU), and a DC power supply. During the design phase, the electrical characteristics, thermal performance, safety, and maintainability of all components were fully considered. The unit features a well-organized spatial layout, compact structure, flexible configuration, and high reliability. The embedded Battery Cluster Control Unit (BCU) inside the HCU supports CAN and RS-485 communication buses, as well as an Ethernet RJ45 interface. It enables communication between the high-voltage control unit and the battery management modules, Energy Management System (EMS), liquid cooling system, energy storage converter (PCS), and fire protection system. Through this communication, the HCU can perform battery cluster control, protection, thermal management, and data exchange functions.

Item	Specification
Operating Voltage Range	DC250-1500V

Maximum Operating Current	200A
DC Power Output	24V/5A
Communication Interface	CAN/RS485/TCP_IP
Dimensions	508*600*162mm (excluding mounting ears)
DC Terminals	FSPC22180Q-M8B2/FSPC22180P-M8A2
Communication Terminals	RS-J12ZY-AH-B

3.1.4 Battery cluster



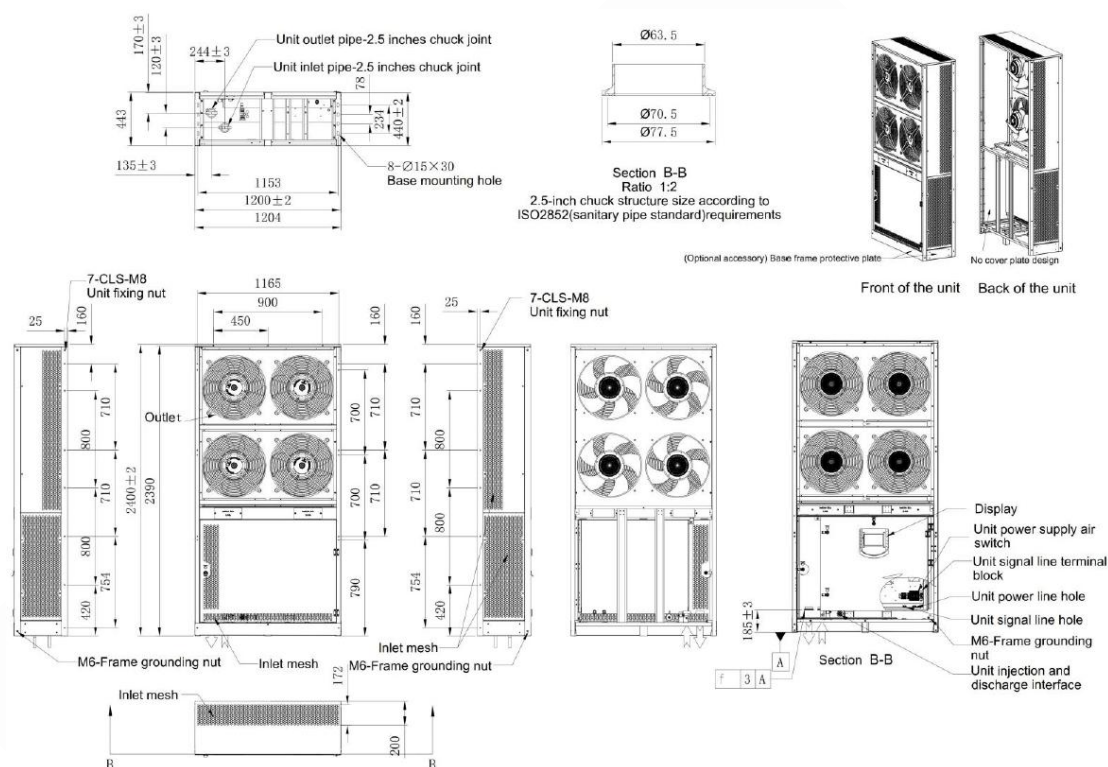
The battery cluster is designed based on a 1500V platform, with a total voltage of 1331.2 V and a total energy of 418 kWh. Each subsystem consists of 8 packs and one high-voltage control unit. The high-voltage unit is equipped with a BMS master controller, main positive/negative pre-charge circuit contactors, current Hall sensors, and other components responsible for the overall safety management of the battery system.

Project type	Item	Specification
System Side	Cell Type	LFP
	System Configuration	1P416S
	System Capacity	418kWh
	Rated Voltage	DC1331V
	Voltage Range	DC1102 ~ 1500V
	Rated Output Power	125kW
	Rated Grid Voltage	AC380V
	Allowable Grid Voltage	AC340 ~ 460V
	Rated Grid Frequency	50Hz
	Power Factor	0.99/-1 ~ 1
	THDI	<3%

3.2 Thermal management system

To ensure the battery operates within the 25°C–45°C temperature range throughout its entire lifecycle and to prevent thermal runaway caused by overheating, each energy storage DC compartment is equipped with a liquid cooling unit. To avoid excessive temperature differences between the inside and outside of the DC compartment or condensation caused by day-night temperature variations, a dehumidifying air conditioner and multiple dehumidifiers are installed to ensure anti-condensation control for the electrical and DC compartments.

3.2.1 Liquid cooler

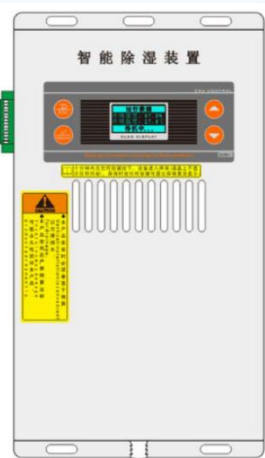


The main parameters of the water-cooled unit used in this product are shown in the table below. The selection of the unit comprehensively considers factors such as system heat load, system flow requirements, and low-temperature heating. For more details, please refer to the “5 MWh Containerized 0.5P Energy Storage System Thermal Design Description.”

Parameter	Model	EMW600HCNC3E
Power Supply		
Rated Voltage	V, Hz	380~415 V ,3~ ,50/60 Hz
Power Supply Range	V, Hz	380~415±15%V, 3~, 50/60±3 Hz
Max. Operating Current	A	72
Power Consumption		
Cooling Input Power @ W18/L35	kW	27.8

Heating Input Power @ Tu=10°C	kW	24
Cycle Mode(only pump operation) Power	kW	0.74
Max. Power Consumption	kW	30
Circulation Flowrate		
Rated Circulation Flowrate	L/min	500 @ 150 kPa
Cooling/Heating Capacity		
Cooling Capacity @ W18/L35	kW	60
Heating Capacity @ Tu = 10°C	kW	24
Outlet Coolant Temperature	°C	18
Dimensions, Weight & Installation Mode		
Dimension (W × D × H)	mm	1200×440×2400
Weight (without coolant)	kg	471
Installation Mode	/	Floor mounted
Application	/	Outdoor
Environmental Protection & Performance		
Operating Ambient Temperature	°C	-30~+55
Storage Temperature	°C	-40~+70
Working Altitude	m	≥4000m
Noise Level	dB(A)	≤80
IP Rating (for outdoor side)	/	IPX5
Corrosion Protection Level	/	C5-M
Refrigerant	/	R32
Coolant	/	50% glycol aqueous solution
RoHS 2.0 Compliance	/	Yes
CE	/	Yes

3.2.2 Dehumidifier



The dehumidifier used in this product employs a thermoelectric condensation dehumidification mode. Moist air inside the battery compartment is drawn into the dehumidification duct by a fan. Water vapor in the air is condensed through a thermoelectric cooling device and then discharged from the cabinet via a drain pipe. This ensures effective dehumidification and prevents condensation inside the battery compartment.

Data Name	Technical Parameter	Data Name	Technical Parameter
Operating Power	AC220V/1.3A(MAX)[120W] DC24V/8.0A(MAX) [120W]	Dehumidification Efficiency	1000 mL/day (120 W, 35°C, RH=85%)
Output Function	Passive output [contact capacity MAX 500 W]	Dehumidification Temperature	5°C ~ 45°C
Dehumidification Power	120W	Operating Temperature	-30°C ~ 75°C
Humidity Detection Range	1%RH~99.9%RH	Temperature Detection Range	-20°C ~ 85°C
Dehumidification Start Value	25%RH~98%RH	Temperature Start Value	1°C ~ 55°C
Humidity Measurement Accuracy	±5%RH	Temperature Measurement Accuracy	±1°C
Display	OLED(1.3 寸)	Display Resolution	0.1
Rated Airflow	32.1CFM*2	Rated Static Pressure	12.4mm-H ₂ O*2
Housing Material	SUS304 Stainless Steel	Dimensions	240×146×63mm (H×W×D)
Net Weight	2.9kg (excluding accessories)	Drain Hose	SiliconeD10mm 、L1.5m

3.3 Fire protection system

3.3.1 Ventilation system

When thermal runaway occurs in battery cells inside the prefabricated container and combustible gases are generated, the combustible gas detector installed within the container will detect the gas concentration. Once the concentration reaches the preset threshold, it will immediately activate the ventilation system to initiate air exchange, thereby preventing the combustible gas from reaching an explosive concentration and reducing the risk of explosion when exposed to an external ignition source.

3.3.2 Automatic fire protection system

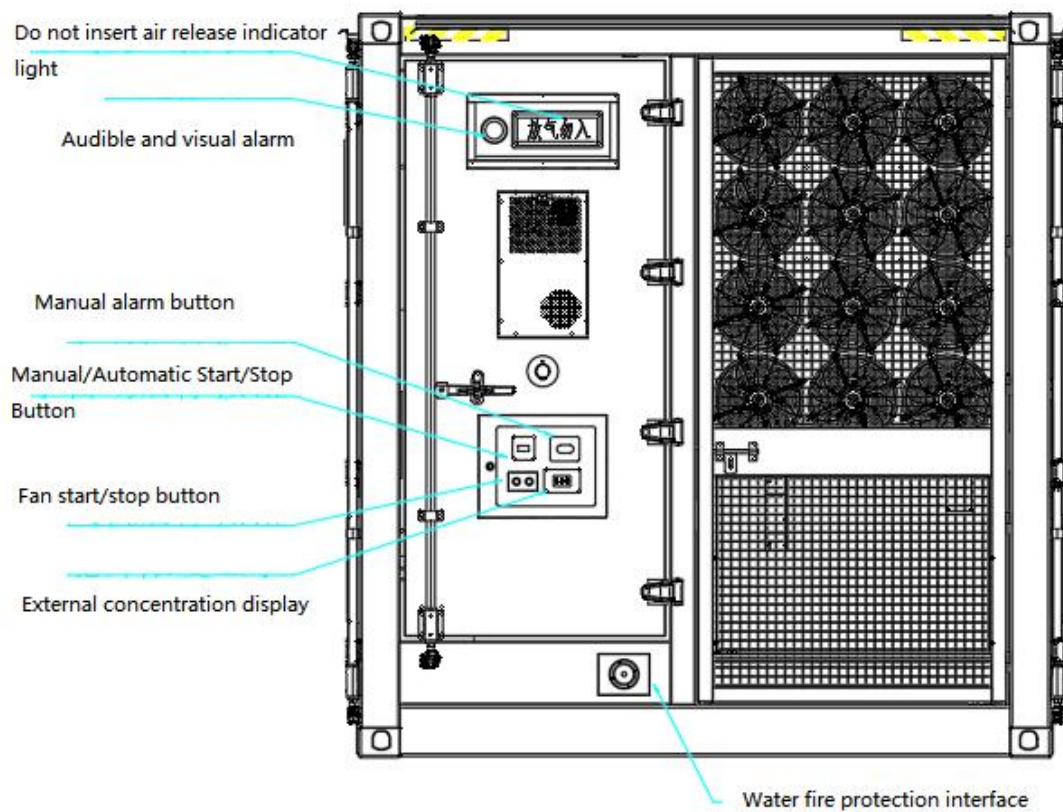
When a fire occurs in the battery cells inside the prefabricated container, the fire detector installed within the container will detect the fire and transmit the signal to the gas fire suppression controller. The gas fire suppression controller will then activate the fire extinguishing system inside the container to carry out fire suppression, while simultaneously interlocking with and shutting down the ventilation system.

3.3.3 Emergency water system

If, due to environmental or other factors, the automatic fire protection system fails or the fire escalates into a larger incident, professional personnel shall activate the emergency water system to carry out fire suppression and cooling.

3.3.4 Working principle

When a smoke detector or heat detector within the protected area is triggered, the alarm bell outside the protected area will immediately activate to alert personnel to take action. When both the smoke and heat detectors simultaneously detect a fire, or when a fire is manually confirmed and the emergency start button is pressed, a second-level fire alarm will be triggered. The alarm bell and audible-visual alarm devices will activate, and after a preset delay, the gas fire suppression controller will send a signal to the fire extinguishing system. The fire extinguishing system will then activate to carry out fire suppression and provide a feedback signal.



Fire protection layout plan

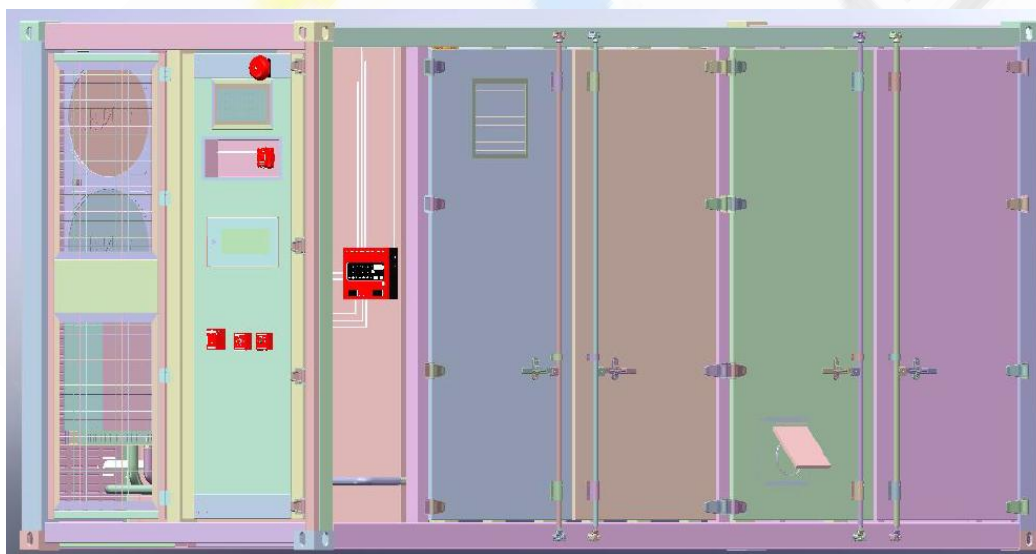
Note: For detailed configuration and parameters, please refer to the "Fire Protection Plan for a 5MWh Containerized Energy Storage System".

IV. System communication

The Battery Management System (BMS) of this containerized energy storage system adopts a three-layer architecture. The BAU + HMI is responsible for unified management. The 12 battery clusters are each managed by 12 individual BCUs, with the BAU overseeing all 12 BCUs. Under each BCU, there are 8 BMUs responsible for managing 1P48S modules (1 BCU manages 8 BMUs). Designed according to GB/T 34131-2017, the BMS provides comprehensive control and protection of the energy storage battery stacks and enables communication with the PCS and the energy storage EMS.

The BMS is capable of high-precision and high-reliability acquisition of individual cell voltages and temperatures, and it can accurately estimate the State of Charge (SOC) of the battery system. Through the balancing control circuit, it achieves cell-to-cell charge equalization. In the event of abnormal battery data, the BMS generates fault alarms and protection actions.

The BMS topology is coordinated with the PCS topology and the battery grouping configuration, enabling optimized control and comprehensive management of battery operating conditions. The implementation level of each BMS function is determined by the system's topology, with hierarchical execution locally at each layer. The basic system architecture is as follows:



*The above pictures are for reference only. Please refer to the actual product received!

