

PC – G3

Energy Storage System

User Manual



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Introduction

Overview

This document provides guidance on the installation, electrical connection, commissioning, and troubleshooting methods for the DC Cabinet Series energy storage battery cabinet (hereinafter referred to as the "energy storage battery cabinet"). Prior to installation, operation of the energy storage system (ESS), please read this manual carefully, ensuring comprehension of the safety information and familiarity with the system's functions and features.

Users

This manual applies to operators of the energy storage power station and qualified electrical technical personnel.

All installation and related operations must only be carried out by professional technical personnel. Professional technical personnel shall meet the following requirements:

- Have received specialized training
- Have thoroughly read this manual and fully understood the relevant safety precautions
- Be familiar with local standards and the relevant safety regulations for electrical systems

Symbol Convention

In this document, the following symbols may be used with the meanings described below.

Symbol	Description
	It indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
	It indicates a hazard with a moderate level of risk that, if not avoided, could result in death or serious injury.
	It indicates a hazard with a low level of risk that, if not avoided, could cause minor or moderate injury.

	It is used to convey warning information related to equipment or environmental safety. If not avoided, it may result in damage to equipment, loss of data, degradation of equipment performance, or other unpredictable consequences. The "BEWARE" symbol does not refer to personal injury.
	It is used to emphasize important/critical information, best practices, and tips. The "NOTE" symbol is not a safety warning and does not refer to personal injury, equipment damage, or environmental hazards.

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1 Safety Precautions

1.1 General Safety

Declaration

Please thoroughly read this manual before installing, operating, and maintaining the equipment, and follow the markings present on the equipment, as well as all safety precautions outlined in this manual.

The "BEWARE", "CAUTION", "WARNING", and "DANGER" instructions contained in this manual do not cover all safety considerations that need to be observed, but are only intended to supplement all safety precautions. WHES disclaims any liability for damages resulting from failure to comply with general safe operation requirements or from violation of safety standards applicable to the design, production, and use of the equipment.

This equipment must be used in an environment that meets the design specifications, otherwise the equipment may fail, resulting in equipment malfunctions, component damage, personal safety accidents, property losses, etc., which are not covered by the quality warranty.

Be sure to install, operate and maintain the equipment in accordance with local laws, regulations, and specifications. The safety precautions contained in this manual are intended only to supplement local laws and regulations.

WHES shall not be held liable in any of the following circumstances:

- Installing or operating the equipment in an environment that exceeds applicable international, national, or local standards;
- Failure to operate the equipment under the conditions specified in this manual;
- Unauthorized disassembly, modification of the product or alteration of the software codes;
- Failure to operate the equipment in accordance with the operating instructions and safety warnings present on the product or outlined in the document;

- Damage to the equipment caused by abnormal natural environment (force majeure, such as earthquake, fire, storm, flood, mudslide);
- Damage caused by the customer's failure to comply with transport and installation requirements;
- Damage caused by storage conditions not meeting the requirements specified in the product document;
- Damage to the hardware or data of the equipment due to customer negligence, improper operation or intentional damage;
- Damage to the system caused by third parties or customers, including relocation and installation of the system not in accordance with the requirements of this manual, and adjustment, modification, or removal of identification marks not in accordance with the requirements of this manual;
- Defects, failures or damage caused by acts, events, negligence or accidents beyond the reasonable control of the Seller, including power outages or electrical failures, theft, war, riots, civil commotion, terrorism, intentional or malicious damage, etc.

General Requirements



The equipment operates at high voltages and improper handling poses a risk of electric shock or fire, which may cause death, serious injury, or substantial property damage. Always operate according to instructions:

- Follow the operating procedures and safety precautions described in this manual and other relevant documents.
- Follow warning labels, cautions, and protective measures affixed to the equipment.
- Use the correct tools as specified in this manual and be proficient in the proper use of the tools.
- Comply with the safety regulations of the power plant, such as implementing the operation ticket and work ticket system.
- No one except the operator is allowed to access the equipment. Temporary warning signs or fencing must be erected to isolate the area during operation of the equipment.
- All warning labels, cautions, and protective measures affixed to the equipment shall remain legible. Unauthorized alteration, damage, or

obstruction of such safety information is strictly prohibited. Any illegible markings shall be replaced in a timely manner.

- Do not perform installation, wiring, maintenance and replacement operations while the equipment is powered on.
- Do not clean the electrical components inside the equipment with water.
- Check the equipment for damage, such as holes, dents or other signs of possible internal damage.
- Check that the pre-installed cables of the equipment are securely connected.
- Check that the equipment is free from displacement of internal components, or unauthorized modification of internal structure and installation procedures.
- Do not power on the equipment until it has been installed or approved by qualified personnel.
- Measure the voltage at the contact point before touching any conductor surface or terminal, and confirm that the protective grounding conductor of the equipment or parts to be repaired is securely grounded to ensure that there is no risk of electric shock.
- Immediately press the EMERGENCY STOP switch and notify the on-site management if any liquid ingress is detected in the equipment.
- Do not open the cabinet door while the system is operating.
- For the first power - on of the equipment or when working in the live main - circuit area, it is recommended to wear level 1 arc - resistant clothing.

 CAUTION

- Do not perform arc welding, drilling, or cutting operations on the equipment. Such operations may damage the sealing of the entire enclosure, the electromagnetic shielding performance of the equipment, the internal components and cables, and the metal chips generated during the operation may cause short circuits, affecting the equipment function or causing equipment damage.
- The casing temperature is elevated during operation of the equipment, posing a risk of burns. Avoid physical contact with the equipment.
- If, during operation of the equipment, a fault is detected that may cause personal injury or damage to the equipment, stop operation immediately, notify the person in charge, and take effective protective measures.
- Evacuate the area immediately if an audible/visual fire alarm is activated.

-
- Close and lock the cabinet door if the equipment has to be left temporarily unattended during the maintenance procedure.
-

** BEWARE**

- All transport, transit, installation, wiring, and maintenance activities must comply with the applicable laws, regulations, and standards of the country/region where the work is performed.
 - The materials to be prepared by the user and the tools required during operation must comply with the applicable laws, regulations, and standards of the country or region where the work is performed.
 - Permission from the local power authority must be obtained before the equipment is connected to the grid.
 - Before opening the cabinet door during installation, operation, and maintenance, be sure to remove any accumulated water, snow, or other debris from the top of the enclosure to prevent debris from falling into the enclosure.
-

** NOTE**

- It is prohibited to reverse engineer, decompile, disassemble, dismantle, adapt, implant, or perform other derivative operations on the equipment software. It is not allowed to research the internal implementation of the equipment, obtain the source code of the equipment software, or steal intellectual property rights in any way, nor is it allowed to disclose the results of any performance tests of the equipment software.
- It is recommended that users prepare video recording devices to document the detailed process of installation, operation, and maintenance of the equipment.

1.2 Personnel Requirements

All operations related to hoisting and transportation, installation and wiring, operation, and maintenance of the energy storage system must be performed by professional technical personnel in compliance with local regulations. Operating personnel shall meet the following requirements:

- Possess basic knowledge of electronics, electrical wiring, and mechanical systems, and be familiar with electrical and mechanical schematics.
- Be familiar with the structure and working principles of the energy storage cabinet, as well as the structure and working principles of the cabinet and its upstream and downstream equipment.
- Have received professional training related to electrical equipment installation and commissioning.
- Have the ability to respond to emergencies and hazardous situations during installation or commissioning.
- Be familiar with the relevant standards and regulations of the country/region where the project is located.
- Wear personal protective equipment (PPE) in compliance with local safety protection requirements when operating the equipment.

NOTE

Local regulations and industry standards shall be consulted for specific qualification requirements.

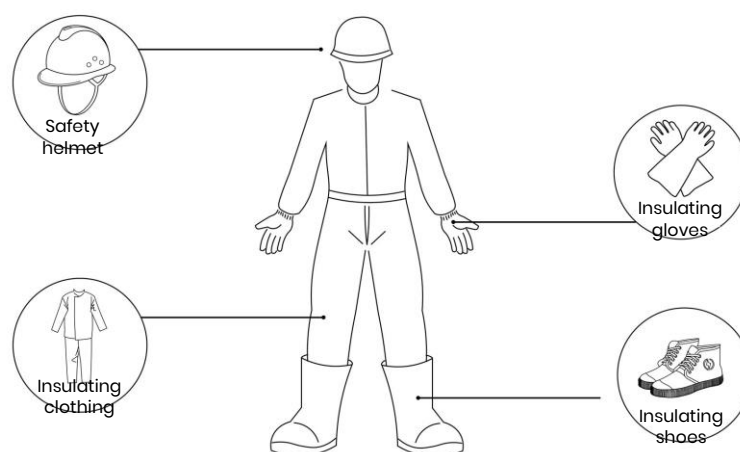


Figure 1-1 Illustration of Personal Protective Equipment

- Do not wear watches, bracelets, bangles, rings, necklaces, or other conductive items during installation, operation, or maintenance to prevent electric shock and burns.
- All transport, transit, installation, wiring, and maintenance activities must comply with the applicable laws, regulations, and standards of the country/region where the work is performed.
- It is important to ensure a comprehensive understanding of the construction and working principles of the entire ESS, and conduct all activities in accordance with the instructions provided in this manual.

1.3 Storage and Installation Environment Requirements

General requirements

NOTE

- During the storage period, relevant evidence demonstrating compliance with product storage requirements, including temperature and humidity logs, photos of the storage environment, and inspection reports, must be properly maintained.
- The storage environment must be maintained in a clean and dry condition to prevent dust and moisture contamination. The equipment shall be protected from exposure to rain or groundwater.
- The ambient air must not contain any corrosive or flammable gases.
- Do not store the equipment in a tilted or inverted position.
- Equipment that has been stored for two years or more should be inspected and tested by qualified personnel before being put into use.

EES Storage Requirements

- Stacking storage is prohibited.
- Store the equipment on a level surface (for long-term or temporary storage).
- Keep the cabinet door securely closed.
- Storage temperature: -30 °C~+60°C, humidity: 5%RH~95%RH.
- The energy storage system contains lithium battery packs and should be kept in a dry, well-ventilated area, protected from direct sunlight, rain, and sources of intense infrared radiation, organic solvents, corrosive gases, and ignition.
- The warehouse keeper should be responsible for monitoring the ESS inventory on a monthly basis and reporting it to the planning department on a regular basis, and should arrange for personnel to inspect the ESS that has been stored for an extended period in a timely manner.
- ESS must be shipped based on the "first in, first out" principle.

Installation Environment Requirements

For site selection, please refer to [3.2 Installation Environment Requirements](#). The following requirements must also be met during on-site installation:

- The installation layout of the ESS must meet the local standard requirements for fire protection distance or fire walls, including but not limited to the requirements of GB 51048-2014: Design Code for Electrochemical Energy Storage Power Station and NFPA 855 Standard for the Installation of Stationary Energy Storage Systems.
- It is prohibited to place the equipment in an environment with flammable, explosive gases, or smoke, and to operate the equipment in such an environment.
- The installation, use, and operation of outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, plugging and unplugging outdoor signal interfaces, working at heights, and outdoor installation) is prohibited during thunderstorms, rain, snow, and winds of level 6 or above.
- It is recommended to install fences, walls, and other protective measures around the ESS, and erect safety warning signs to isolate the area and prevent unauthorized personnel from accessing the equipment during operation, which may result in personal injury or property damage.
- Do not block the vents and the cooling system during operation of the equipment to prevent fires caused by high temperatures.
- The equipment shall be installed in an area free from liquids and away from locations prone to condensation (such as under water pipes, air outlets) or prone to potential water leakage (such as under air conditioners, vents, machine room cable exit windows) to prevent liquid from entering the equipment and causing faults or short circuits.
- The installation site must be located away from sources of ignition, and no flammable or explosive materials shall be placed in the vicinity of the equipment.
- If the equipment is installed in an area with lush vegetation, periodic weeding and hardening of the soil beneath the equipment is required to prevent weed growth.

Elevated Work Requirements

- Implement proper safety protection measures, including using safety helmets, safety harnesses, waist safety belts, and attaching them to robust and reliable structural members. Do not hang them on moving unstable objects or sharp-edged metals, to prevent the hook from slipping and causing a fall accident.
- The elevated work site must be clearly designated as a restricted, hazardous area with prominent markings to deter unauthorized access.
- The ground area directly beneath the elevated work zone must be kept clear of any stacked scaffolding, planks, or other debris. Ground personnel are prohibited from staying or passing directly below the high-altitude operation area.
- Do not throw objects from a high place to the ground or vice versa. All items must be transported using appropriate methods such as ropes, hanging baskets, overhead vehicles, or cranes.
- All scaffolding, planks, and work platforms utilized for elevated work must undergo a thorough safety inspection and certification prior to use, ensuring structural reliability and preventing scaffold overloading.
- Elevated work must be immediately suspended during rain or other potentially hazardous conditions. Thereafter, WHES's safety supervisor and relevant technicians must inspect all equipment and give approval before elevated work can be safely resumed.
- All edges and openings within the elevated work zone shall be outfitted with guardrails and markings to prevent the risks of accidental falls or step-through incidents.
- Securely carry all necessary apparatus and tools during operations to prevent accidental falls.
- If an elevated worker is found to be violating safety protocols and performing construction work improperly, the site supervisor or safety officer must immediately issue a warning and instruct the worker to make corrections. Work may not be resumed until the elevated worker is in full compliance with established operating specifications.

1.4 Loading/Unloading and Transport Requirements

BEWARE

This product has been certified to comply with UN38.3 (UN38.3: Section 38.3 of the sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria) and SN/T 0370.2-2009 Rules for the Inspection of Packing for Export Dangerous Goods - Part 2: Performance Test, and is consequently classified as a Class 9 Dangerous Good.

Shipment conditions:

Energy storage system must be inspected prior to shipment to ensure that the enclosure is intact and undamaged, the cabinet doors are properly closed and locked, no foreign objects are protruding from the interior, and no indications of smoke or burning are present. Failure to meet any of these criteria will result in the shipment being prohibited.

NOTE

- The product must be inspected prior to shipment to ensure that the enclosure is intact and undamaged, the cabinet doors are properly closed and locked, no foreign objects are protruding from the interior, and no indications of smoke or burning are present. Otherwise, shipment is prohibited.
- During loading/unloading and transport, care should be taken to handle gently and provide moisture protection measures. Due to the influence of external environmental factors (such as temperature, transport and storage conditions), the product specifications are subject to the date of manufacture.
- The battery cabinet is not intended for railway or air transport methods.
- For sea transport, the International Maritime Dangerous Goods Code (IMDG) must be observed.
- For land transport, the requirements of the Authorization Dangerous Road (ADR) or JT/T 617-2018: Regulations concerning Road Transportation of Dangerous Goods must be followed.
- Comply with the regulatory requirements set forth by the transport authorities in the countries of origin, transit, and destination.

- Comply with international transport rules for dangerous goods and the regulatory requirements set forth by the transport authorities in relevant countries.
- Monitoring is required throughout the entirety of the transport process.
- Vehicle used for land transport must have sufficient load capacity.
- The speed limit for land transport is 80km/h on flat roads and 60km/h on rugged roads, with local traffic regulations taking precedence if they conflict with these guidelines.
- Stacking is prohibited during port handling and on-board transport. The following situations are strictly prohibited during transport: falling into water, dropping or mechanical impact, as well as inverting or overturning.

1.5 Electrical Safety

Wiring Requirements

- Do not push cables directly off the vehicle or otherwise mishandle them.
- Do not route cables through the air inlet/outlet of the equipment.
- Cables of the same type shall be bundled together, while cables of different types shall be spaced at least 30 mm apart without intertwining or crossing.
- If the site has to be left unattended temporarily after or during the wiring process, the cable openings must be immediately sealed using sealing mud to prevent the ingress of small animals.
- Cables used in high-temperature environments are susceptible to insulation aging and damage. A minimum clearance of 30 mm must be maintained between cables and heat-generating components or heat source peripheries.
- Select cables that are in compliance with local laws and regulations.
- Cable troughs and openings must be free of sharp edges and provided with appropriate protection.
- Cable conduits or openings shall be protected against damage from sharp edges or burrs.
- Cables used in the ESS must be firmly connected, well-insulated, and comply with the appropriate specifications.
- After wiring, the cables must be securely fixed using cable supports and clamps. For cables in backfilled soil areas, ensure they are in close contact with the ground to prevent deformation or damage during backfilling.
- At low temperatures, violent impact and vibration may cause the outer plastic sheath of the cables to become brittle and crack. To ensure construction safety, the following requirements shall be followed:
 - ✧ All cables must be laid and installed at temperatures above 0°C. Care should be taken when handling cables, especially in low-temperature environments.
 - ✧ If cables are stored at temperatures below 0°C, they must be placed at room temperature for at least 24 h prior to installation.

Grounding Requirements

- Do not damage grounding conductors.
- Do not operate the equipment without installed grounding conductors.
- For equipment requiring grounding, always install the protective ground wire first and remove it last.
- The main grounding body of the equipment must be permanently connected to the protective grounding network. Before operating the equipment, the electrical connection must be checked to ensure reliable grounding.
- The grounding impedance of the equipment shall meet the requirements applicable to local electrical standards

AC/DC Operation Requirements

- Before installing or removing the power cord, turn off the power switch first.
- Prior to connecting the power cord, verify that the label on the power cord is correct.
- If the equipment has multiple inputs, all inputs shall be disconnected and the equipment shall be completely de-energized before any work is performed.

Operation, Maintenance and Repair Safety Requirements

1. Turn off the circuit breaker before connecting or disconnecting any cables.
2. Place a "Do Not Close" warning sign on the open switch.
3. Use a voltage tester of the appropriate rating to verify the equipment is completely de-energized.
4. Cover or wrap any nearby live parts with insulating sheeting or tape.
5. Before performing any operation, maintenance or repair activities, connect the circuit to be repaired securely to the grounding circuit using a grounding wire.



- Prior to connecting cables, verify that the label on the cable is correct.
- If the equipment has multiple inputs, all inputs shall be disconnected and the equipment shall be completely de-energized before any work is performed.

-
6. After the repair is completed, remove the grounding wire between the repaired circuit and the grounding circuit.

1.6 Mechanical Safety

Safety Instructions for Ladder Use

- Using straight ladders is prohibited.
- Before using a ladder, ensure it is in good condition and the load capacity meets the requirements. Overloading is strictly prohibited.
- Use wooden or fiberglass ladders when working overhead where electricity may be involved.
- When working overhead, it is preferable to use platform ladders with guardrails, where all four feet are securely fixed and the ladder is held by one person.

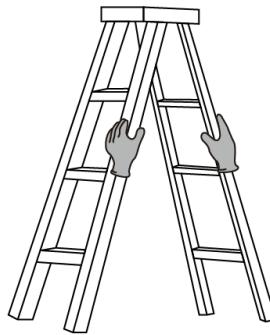


Figure 1-2 Holding Ladder

- For herringbone ladders, the rope must be secured and a person must hold the ladder during use.
- When climbing a ladder, please pay attention to the following actions to reduce danger and ensure safety.



- Maintain a stable body posture.
- Stand on the ladder without exceeding the 4th rung from the top.
- Ensure your center of gravity remains within the ladder frame.

Equipment Exterior Drilling Safety

- Before drilling, carefully select the drilling location to avoid short circuits or other adverse effects.
- Wear safety goggles, gloves and other personal protective equipment when drilling.

- Effectively shield the equipment during drilling to prevent ingress of debris, and clean and remove debris promptly afterward.

Safety Instructions for Handling Heavy Objects

- When handling heavy objects, arrange for the number of people recommended in the diagram to ensure collaborative operation and load sharing.

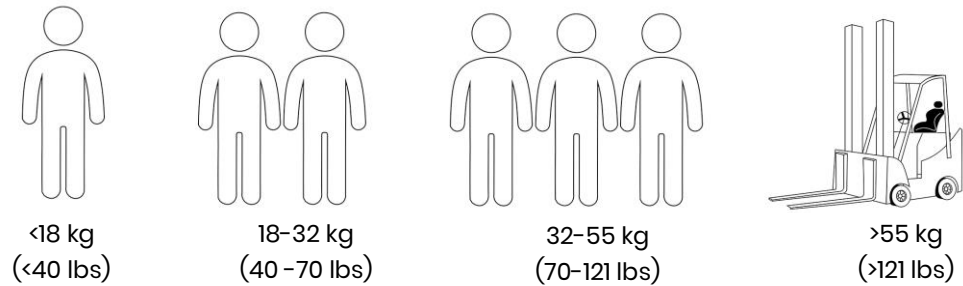


Figure 1-3 Installation Personnel Requirements

- Wear protective gloves, anti-smash anti-puncture safety shoes and other personal protective equipment when handling the equipment by hand.
- Protect the equipment from surface scratches or damage to internal components/cables during handling.
- For forklift handling, ensure the forks are centered under the load to prevent tipping. Secure the equipment to the forklift with ropes before moving, and assign a dedicated person to monitor during movement.
- Move the equipment carefully to avoid collisions or falls.

1.7 Battery Safety

Declaration

WHES will not be liable for damage to the battery supplied by WHES due to the following reasons:

- Battery capacity loss or irreversible damage caused by the customer's failure to charge the battery in a timely manner, resulting in expired storage.
- Damage to the battery caused by the customer's failure to accept the battery in a timely manner;
- Failure by the customer to properly set the system operation and management strategy, resulting in battery performance degradation;
- Unauthorized changes to the battery pack application scenario by the customer or a third party without prior notification to WHES, such as unauthorized connection of additional loads to the battery pack, and mixing the original battery pack with others, including different brands or varying rated capacities;
- Damage to the battery pack caused by the equipment operating environment or external power parameters failing to meet the normal operating requirements, including excessively high or low actual temperatures;
- Improper maintenance by the customer resulting in frequent over-discharge of the battery, capacity extension on site by the customer or long-term inability to fully charge the battery, etc.
- Failure by the customer to properly maintain the battery in accordance with the supplied equipment operating manual, including but not limited to ensuring the integrity of the cooling system, and addressing any loose or damaged HV cable harness or loose or missing structural fixing bolts;
- Theft of battery packs;
- Battery packs beyond the warranty period.

Basic Requirements



- Do not expose the battery pack to high temperatures or near heating devices, such as direct sunlight, fire sources, transformers, heaters, etc. Overheating of the battery pack may cause fire or explosion hazards.

- Do not disassemble, modify, or damage the battery pack in any way (e.g. by inserting foreign objects, immersing in water or other liquids) to prevent battery pack leakage, overheating, fire or explosion.
- Lithium-ion battery energy storage systems pose a high risk of fire. Before performing any battery-related operations, it is essential to thoroughly consider the following safety risks:
 1. The electrolyte in the battery pack is flammable, toxic, and volatile.
 2. Thermal runaway of the battery pack may generate flammable and harmful gases such as carbon monoxide and hydrogen fluoride.
 3. The accumulation of flammable gases from thermal runaway of the battery pack poses a risk of combustion and explosion.
- The battery pack shall be stored with its original outer packaging in a dedicated warehouse, separated from other materials. Outdoor storage is prohibited. The stacking height must be maintained within safe limits. Firefighting facilities, such as fire sand and fire extinguishers, must be provided on site in accordance with regulations.
- For outdoor applications, it is recommended to charge an unpacked battery pack within 24 h. If timely charging is not possible, the battery pack shall be stored in a dry, indoor environment free of non-corrosive gases.

Under normal circumstances, do not remove the outer packaging of the battery pack. Recharging, if necessary, must be performed by qualified personnel as per the specified requirements. The battery pack must be properly repackaged upon completion of recharging.

- The battery pack shall be properly oriented according to the anti-inversion label or marking on the packaging to prevent cell leakage from prolonged inverted storage.
- The ESS shall be subject to regular fire safety inspections, at least once a month.
- Use the battery pack only within the temperature range specified in this manual. Do not charge the battery pack when the ambient temperature is below the lower operating limit to prevent crystallization and internal short circuits.
- The battery pack must be protected from impacts.
- The storage location for damaged battery packs must be free of flammable materials, with access restricted to unauthorized personnel. During storage, damaged battery packs shall be monitored for signs of smoke, flames, electrolyte leakage, or heating.

- The battery pack that has been accidentally exposed to water must not be installed, but must be transported to a safe, isolated location for timely replacement with spare parts.
- The storage area must be protected from direct sunlight and rain, and must be dry, well ventilated, clean, and free from excessive infrared/ionizing radiation, organic solvents, and corrosive gases.
- Dispose of used battery packs in accordance with local laws and regulations. Do not treat them as household waste to prevent environmental contamination.
- Do not use damaged battery packs (such as dents or other damage on the casing), as damaged battery packs may release flammable gases and shall not be stored near undamaged products.

Recharging Requirements

WHES will not be liable for damage to the battery supplied by WHES due to the following reasons:

- Recharging is mandatory if the battery cabinet has not been charged for more than 5-12 months. Failure to adhere to the recharging schedule may compromise the performance and lifetime of the battery cabinet.
- The production completion date of the battery cabinet can be determined by querying the shipment records using the battery cabinet serial number (SN) or by consulting WHES's service engineers.

NOTE

- Use only the specified battery pack model. Use of non-specified models may result in damage to the battery cabinet.
- Before installing the battery pack, check whether the packaging is intact. Battery packs with damaged packaging must not be used.
- The battery pack must be placed horizontally and secured.
- Do not place any installation tools or debris on the battery pack during installation.
- When installing the battery pack, it is important to properly connect the positive and negative terminals. Short-circuiting the positive and negative terminals of the battery pack is strictly prohibited.
- When installing the battery pack, use a torque wrench to ensure that the terminals are tightened securely. Check the terminals on a regular basis for signs of loosening.

Battery Pack Short-Circuit Protection



A short circuit in the battery pack may generate a large current surge and release significant energy, posing a serious risk of personal injury and property damage.

- When installing and maintaining the battery pack, use insulating tape to wrap the exposed wire terminals on the battery pack.
- Prevent foreign objects (such as conductive objects, screws, liquids) from entering the battery pack and causing short circuits.

Hazard and Toxicity Information



- Hazard: A damaged battery pack may cause overheating or electrolyte leakage. Electrolyte is flammable. If leakage occurs, immediately move the battery cabinet away from any heat source.
- Toxicity: Vapors from a burning battery pack may cause irritation to the eyes, skin, and throat.

Countermeasures for Abnormal Battery Packs



- In case of electrolyte leakage or an unusual odor, avoid contact with the leaking liquid or gas. Access shall be restricted to unauthorized personnel. Contact qualified personnel immediately for proper handling. Professionals must wear personal protective equipment, including goggles, rubber gloves, a gas mask, and protective clothing to protect against possible hazards caused by electrolyte spillage.
- Electrolyte is corrosive and may cause skin irritation and chemical burns. In case of exposure to electrolyte, the following measures must be taken:
- Inhalation: Evacuate the contaminated area, provide fresh air, and seek medical attention immediately.
- Eye contact: Immediately flush eyes with plenty of water for at least 15 min, without rubbing the eyes, and seek medical attention.

- Skin contact: Immediately wash the affected area with soap and water, and seek medical attention.
- Ingestion: Seek medical attention immediately.

Battery Pack Drop Incident

- If the battery pack falls (with or without packaging) but shows no visible deformation or damage, and no noticeable odor, smoke, or fire, proceed with caution and safety in mind as follows:
 - Warehouse: Evacuate personnel, use mechanical tools to transfer the battery pack to a safe, open area by qualified personnel, and contact WHES's service engineers. Allow the battery pack to rest for 1 h and monitor the temperature to ensure it remains within ambient temperature $\pm 10^{\circ}\text{C}$ before further proceeding.
 - ESS site: Evacuate personnel, close the ESS door, use mechanical tools to transfer the battery pack to a safe, open area by qualified personnel, and contact WHES's service engineers. Allow the battery pack to rest for 1 h before further proceeding.
- If the battery pack exhibits a noticeable odor, damage, smoke, or fire after a drop, immediately evacuate personnel, contact professionals, and promptly call emergency services. Professionals should use firefighting equipment to extinguish the fire while ensuring safety.
- Do not continue to use a dropped battery pack. Contact WHES's service engineers for evaluation.

1.8 Maintenance



Before removing any component from the cabinet, verify that all other components are securely fastened.

- A minimum of two people is required on site during ESS maintenance.
- During equipment maintenance, always use insulating materials to cover nearby live components.
- Do not open the cabinet door in severe weather conditions such as rain, snow, lightning, sandstorms, or heavy fog.
- Never allow objects (such as fingers, components, screws, or tools) to come into contact with a running fan before it is powered off or stops rotating.
- Do not power on the equipment before troubleshooting.
- During live system patrol inspections, observe hazard warnings on the equipment and avoid standing near the cabinet door.
- After shutting down the equipment other than the battery packs, wait 15 min to ensure complete de-energization before proceeding with any operation on the equipment.
- A "Do Not Close" warning sign must be displayed on any switch that is disconnected for maintenance.
- After replacing power components or changing wiring in the ESS, manually initiate wiring detection and topology identification to prevent system malfunctions.
- Lock the cabinet door, secure the safety cable, and keep the key in a safe location immediately after completing maintenance and replacement.

1.9 Emergency Procedures

In the event of an incident, including but not limited to those listed below, immediately take appropriate measures to ensure the safety of all personnel on site, and contact WHES's service engineers.

In Case of Fire



Recommendations for on-site operation and maintenance personnel:

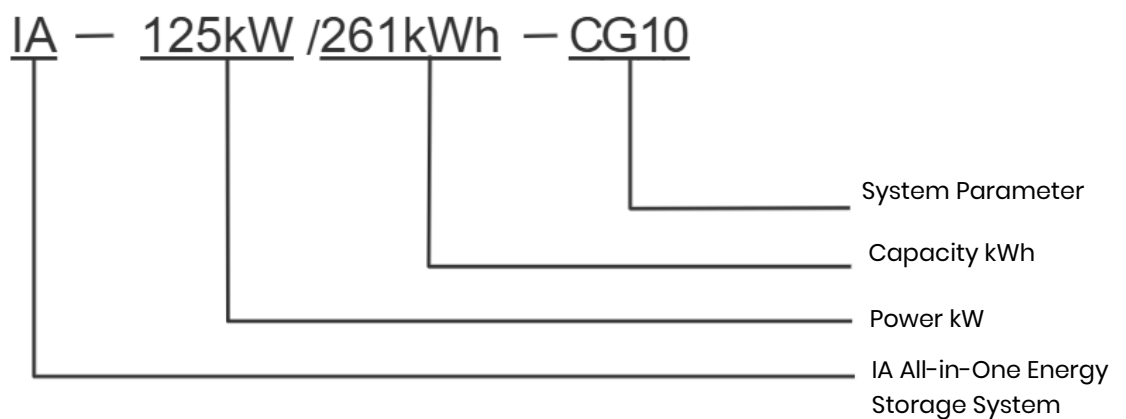
1. In case of fire, evacuate the building or equipment area and activate the fire alarm bell. Call the fire department and provide them with relevant product information, including but not limited to battery pack type, ESS capacity, and battery pack distribution.
2. Never re-enter the burning building or equipment area, or open the ESS door. Isolate and monitor the site, and restrict access to unauthorized personnel.
3. After contacting the fire department, remotely shut down the system while prioritizing your own safety.
4. Upon the arrival of professional firefighters, provide them with relevant product information, including but not limited to battery pack type, ESS capacity, battery pack distribution, and user manual.
5. Once professional firefighters confirm the fire is extinguished, allow qualified personnel to handle the situation according to local regulations. Do not open the ESS door without authorization.
6. Post-disaster product maintenance: Contact WHES's service engineers for evaluation.

Recommendations for fire professionals:

1. Review the product information provided by operation and maintenance personnel, including but not limited to battery pack type, ESS capacity, battery pack distribution, and the user manual.
2. Do not open the ESS door if the internal safety of the system cannot be guaranteed.
3. Please follow local fire regulations for fire extinguishing operations.

2 Product Introduction

2.1 Model Description



Product Model Description:

This document primarily focuses on the following product models:

IA-125kW261kWh-CG10

2.2 Functions and Features

Function

The energy storage system (ESS) integrates a large-capacity battery pack, energy management system (EMS), monitoring system, and fire protection system. Combined with PCS, the ESS system supports self-consumption, Peak shaving, Backup capacity, etc, making it an ideal solution for various industrial and commercial scenarios.

Features

1. **Compact & Integrated**

- o Energy density of up to 174 kWh/m².
- o Seamless side-by-side installation.

2. **Flexible Capacity Configuration**

- o Scalable capacity for large-scale applications, supporting 2-, 4-, 6-, and 8-hour systems.
- o The system supports up to 24 units in parallel.

3. **Safe and Reliable**

- o IP55 protection rating and C5 corrosion resistance, ensuring high adaptability to various environments.
- o Three-level fire protection combining active and passive safety systems
- o Operates in -30°C to 55°C for harsh environments.

4. **User Friendly**

- o Automatic coolant refill and replacement, reducing maintenance time.
- o Low-noise operation below 65 dB
- o Door-mounted liquid cooling system, easy to operate and maintain.
- o Larger wiring space for simpler operation.

2.3. External Design

2.3.1 ESS External Design

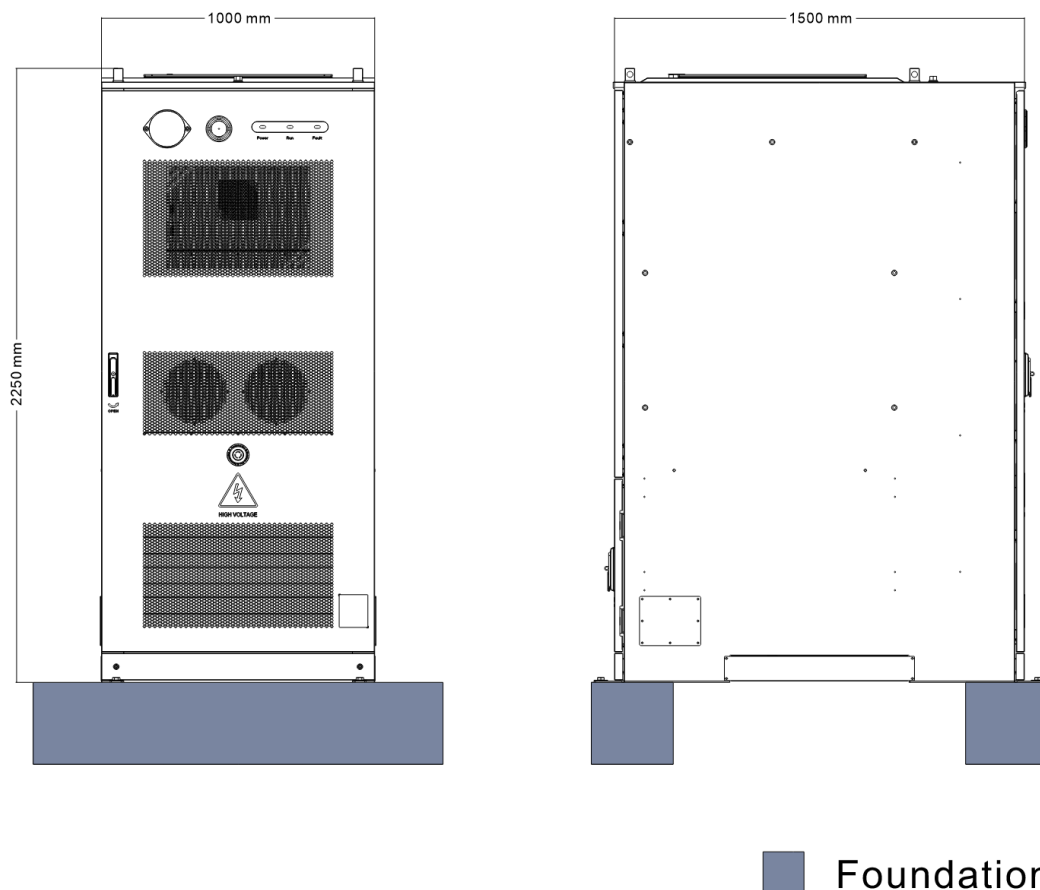


Figure 2-1 Appearance and Dimensions

NOTE

The foundation must be provided according to the construction site design drawings, which can be obtained from WHES's product manager.

2.3.2 Ventilation Design

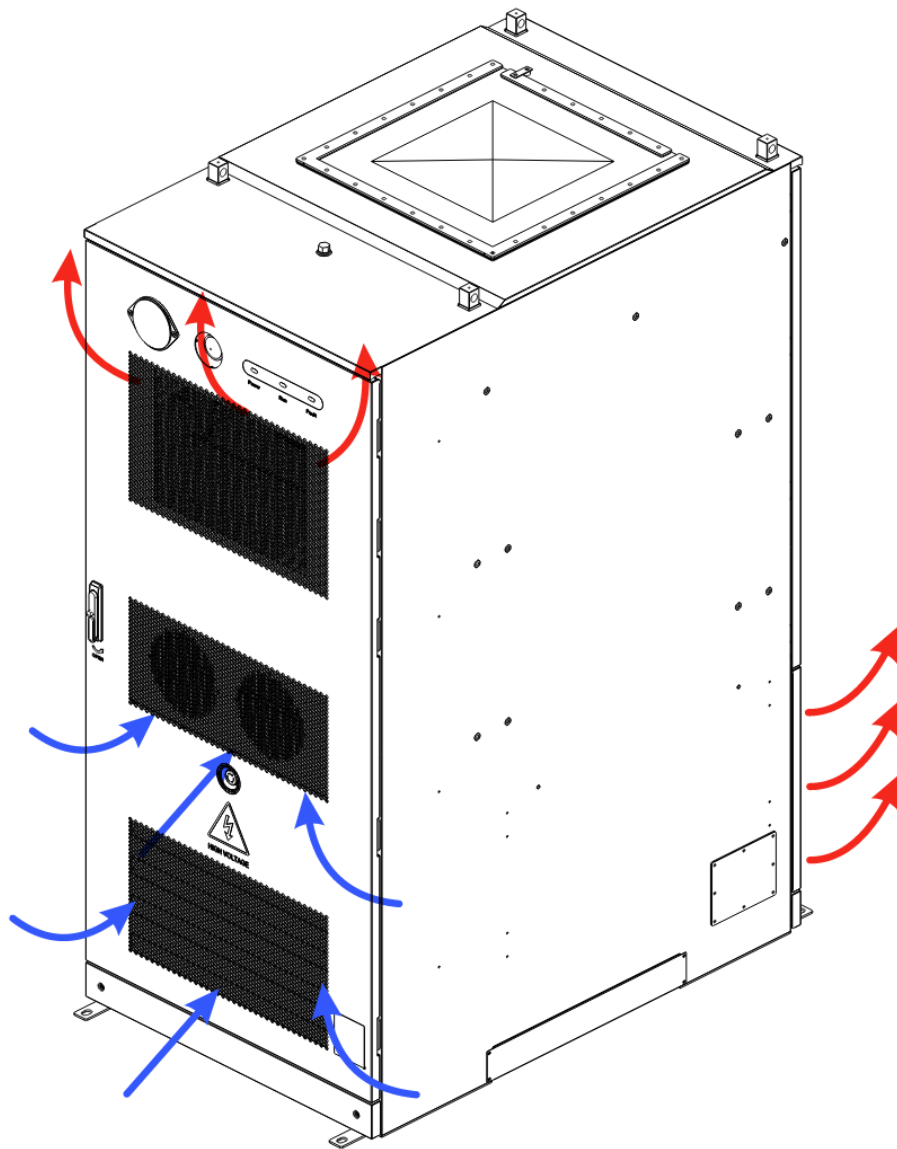


Figure 2-2 Ventilation Design

NOTE

When the equipment is in operation, please ensure that there are no obstacles blocking the front of the air inlet and outlet.

2.3.3 Door Opening Angle Layout Drawing

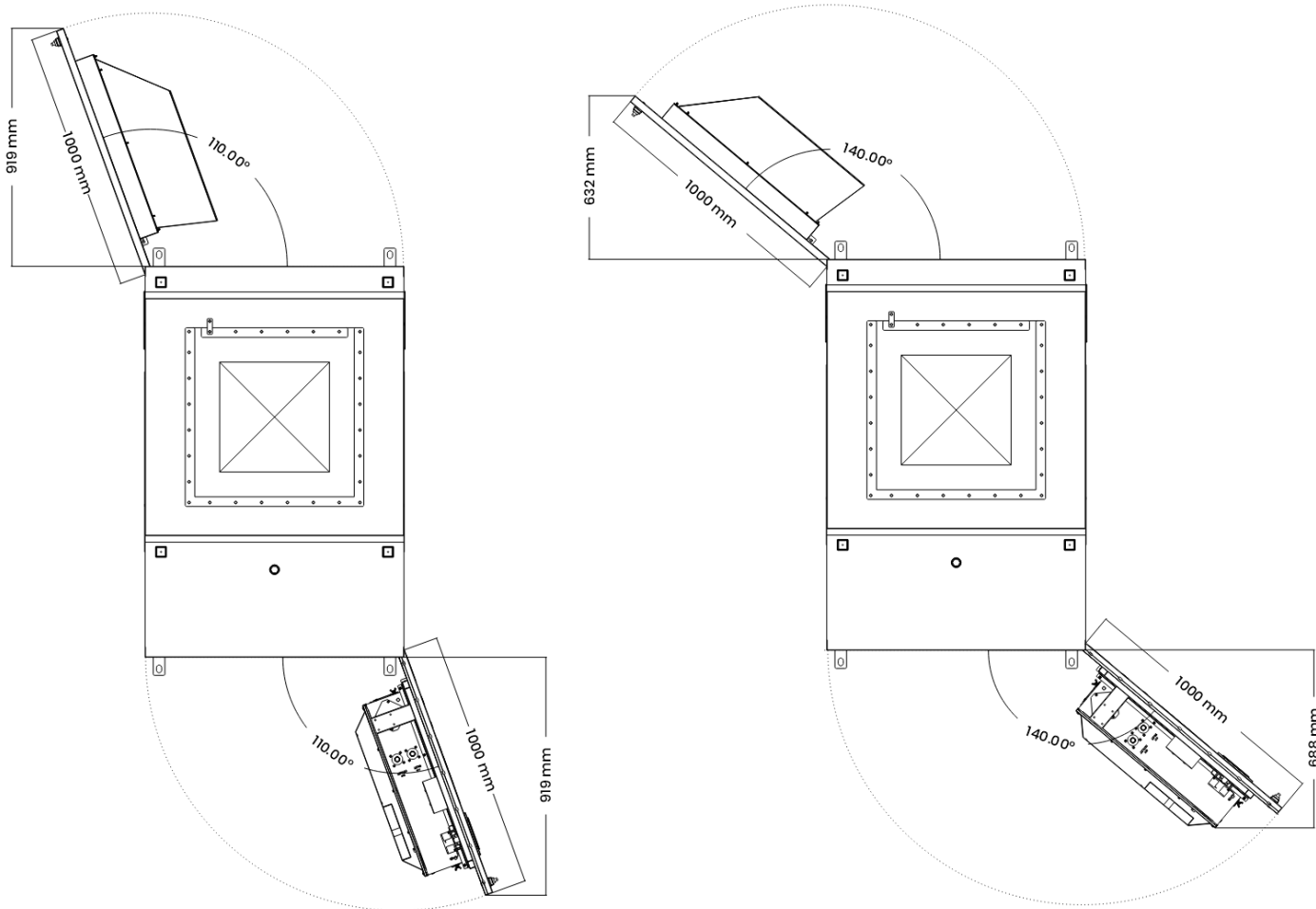


Figure 2-3 Door Opening Angle Schematic Diagram

2.3.4 External Components

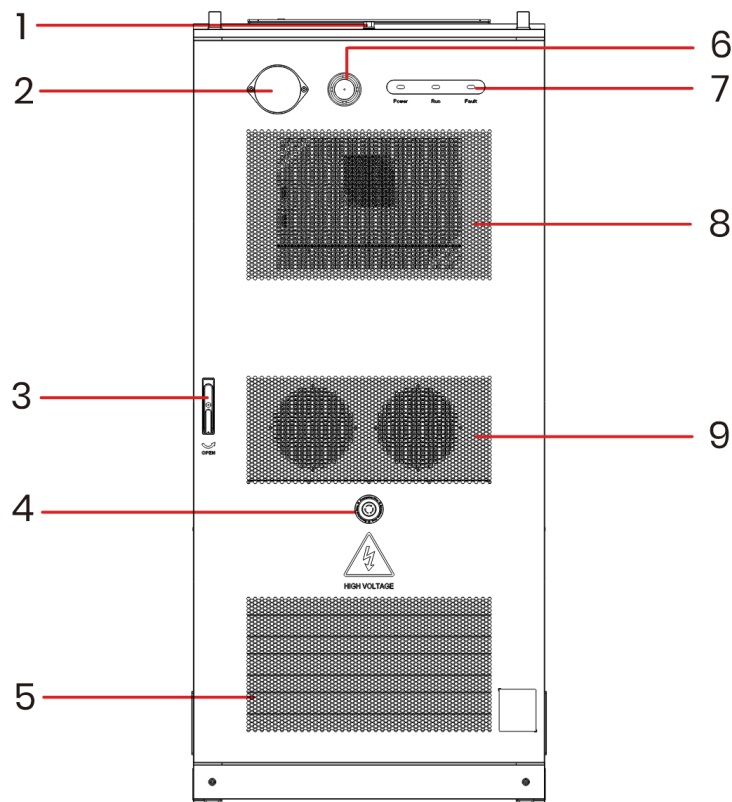


Figure 2-4 External Component Introduction

Table 2-1 Component Configuration

SN	Name	No.	Remarks
1	Water spraying connection	1	DN15 external thread connection
2	Air exhaust unit	1	The exhaust unit discharges harmful gases.
3	Door handle	1	Turn the handle to open the control cabinet door.
4	Emergency-stop switch	1	Press the button to stop the system in the event of an abnormal equipment condition.
5	Air inlet	1	Air inlet
6	Audible and visual alarm	1	Provide audible and visual warnings for hazards to alert users in a timely manner.
7	Indicator	3	Power: White, power indicator Run: Green, run indicator Fault: Red, fault indicator

SN	Name	No.	Remarks
8	Liquid chiller heat dissipation outlet	1	Heat dissipation outlet
9	Liquid chiller air inlet	1	Air inlet

2.4 Internal Design

2.4.1 Internal Components

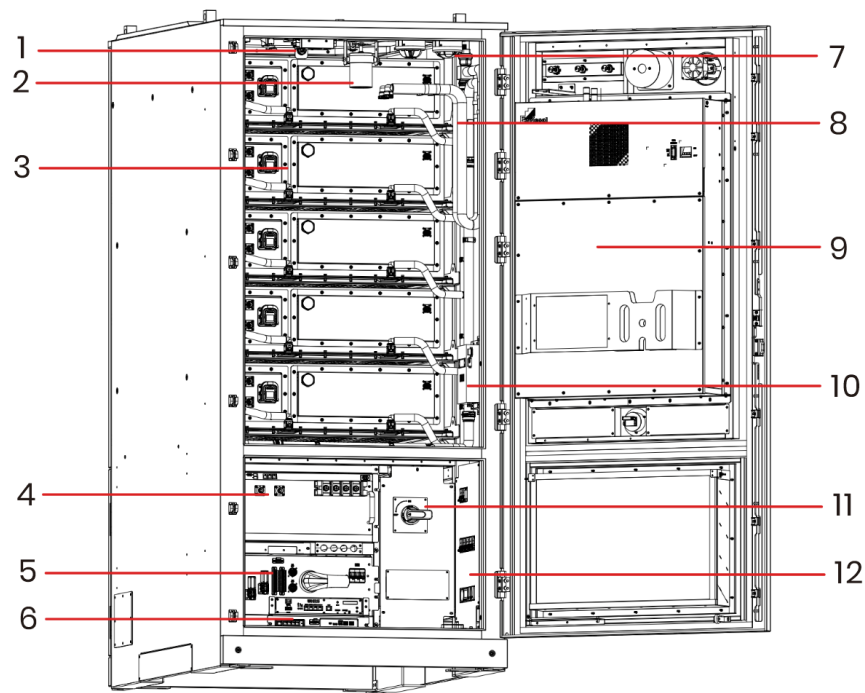


Figure 2-5 Internal Component Introduction-1

Table 2-2 Component Configuration 2

SN	Module Description	No.	Remarks
1	Gas detector	1	Real-time fire detection to trigger safety alarms.
2	Aerosol	1	To be used with the composite detector for fire suppression
3	Battery pack	5	Core energy storage unit, ensuring continuous power supply.
4	PCS	1	A 125 kW power module, enabling power conversion and management to optimize the ESS performance
5	Integrated distribution box	1	Integrated with EMS, BMS, data exchange and power distribution functions.
6	Coordination control module	1	Detect fire and trigger alarm and extinguishing operations
7	Smoke and temperature detector	2	Real-time smoke and temperature detection based on dual-signal fusion to trigger early warning and protective measures.

SN	Module Description	No.	Remarks
8	Liquid cooling pipeline	1	Connect the liquid chiller and the battery pack
9	Liquid chiller	1	Efficient heat dissipation to maintain stable equipment operation.
10	Dehumidifier	1	Reduce humidity to prevent the ESS from moisture damage.
11	Circuit breaker	1	AC incoming line circuit breaker
12	LV power distribution area	1	Meter and circuit breaker assembly

2.4.2 Integrated Distribution Unit

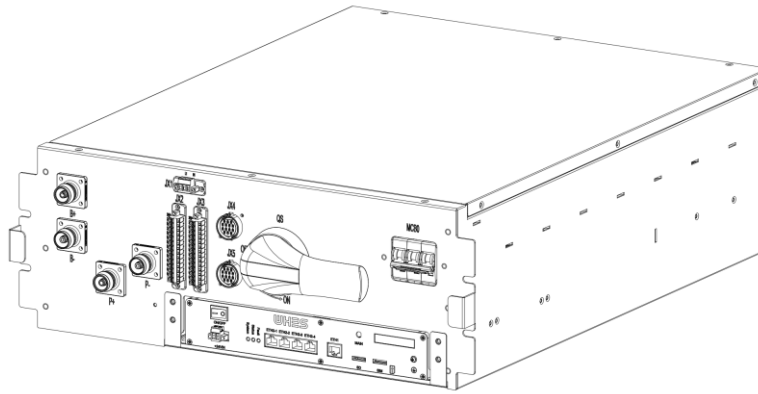


Figure 2-6 Integrated Distribution Unit Appearance Drawing

Module Description: This integrated power distribution cabinet integrates EMS, BMS, AC/DC switches and communication devices into a single module, simplifying the design and installation of the energy storage system, greatly reducing the number of components, and lowering the complexity of installation and maintenance. The integrated design not only saves space and costs, but also improves system stability and reliability, reduces failure points, and ensures long-term and efficient operation of equipment. In addition, the unified management and maintenance interfaces simplify operation and subsequent maintenance. It features high flexibility and scalability, further optimizing the overall system performance and management efficiency.

Functional Features:

1. Energy Management & Optimization: Regulate battery charging and discharging, and optimize the overall efficiency of the energy storage system.
2. Energy Management and Optimization: Control battery charge and discharge to optimize the efficiency of the energy storage system.
3. Real-time Data Monitoring and Alarm: Monitor system status and provide timely fault early warning.
4. Safety Protection Mechanism: Integrate over-current, over-voltage, over-temperature and other protection functions to prevent system failures.
5. Remote Control and Maintenance: Support remote monitoring, operation and fault diagnosis to improve maintenance efficiency.
6. Battery Health Management: Real-time monitoring of battery state of health (SOH), effectively avoiding overcharging and overdischarging, and improving battery utilization efficiency and service cycle.

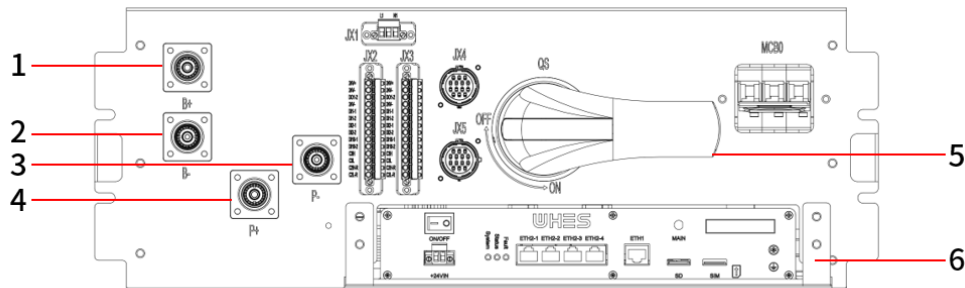


Figure 2-7 Integrated Distribution Box Components

Table 2-3 Component Configuration

SN	Module Description	No.	Remarks
1	B+	1	Power distribution box input - main positive terminal (to battery)
2	B-	1	Power distribution box input - main negative terminal (to battery)
3	P-	1	Power distribution box output - main positive terminal (to PCS)
4	P+	1	Power distribution box output - main negative terminal (to PCS)
5	QS	1	DC switch-disconnector
6	EMS100	1	EMS control box

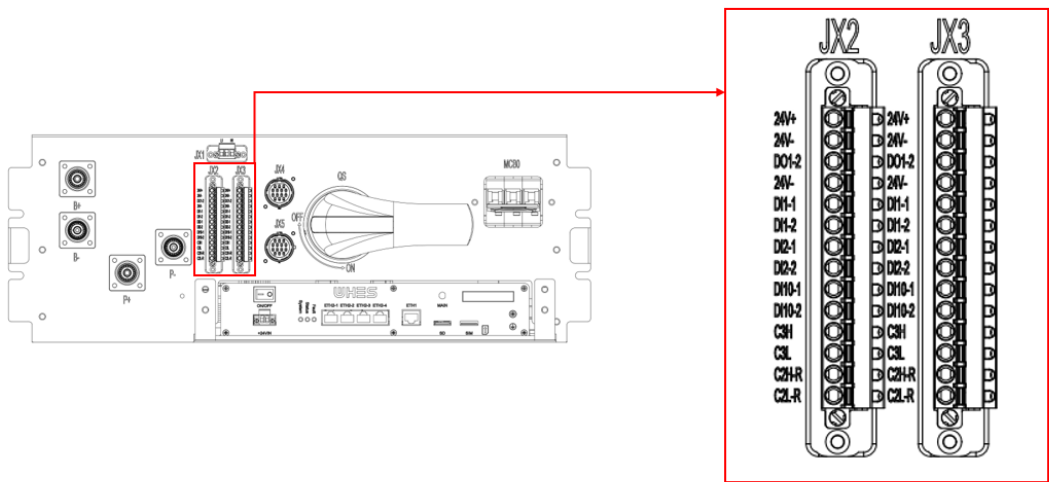


Figure 2-8 Integrated Distribution Box Components

Table 2-4 Component Configuration

NO.	Name	Remarks
JX2	DI10-1	EMS External
	DI10-2	Emergency Stop Interface
	C3H	Reserved CAN Interface
	C3L	
	C2H-R	BMS Terminal
	C2L-R	Resistor Interface
JX3	5A	Reserved RS485 Interface
	5B	
	6A	Reserved RS485 Interface
	6B	
	7A	Reserved RS485 Interface
	7B	
	C2H	Reserved BMS-CAN1 Interface
	C2L	
	C1H	Reserved BMS-CAN2 Interface
	C1L	

2.4.3 Battery Pack

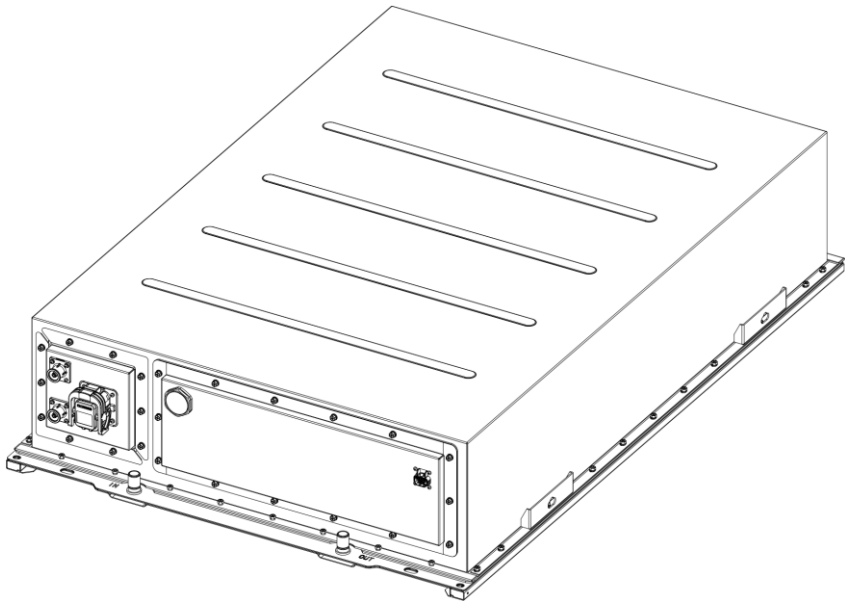


Figure 2-9 Battery Pack Outline Drawing

Module Description: The electrical box contains 52 cells, 1 CSC, and is equipped with 26 NTC temperature sampling points. The CSC collects cell voltage, internal temperature and box voltage data, and performs cell balancing. An explosion-proof valve is configured as the pressure relief device inside the box.

Table 2-5 Technical Parameters

NO.	Name	Spec.	Remarks
1	S/P Configuration	1P52S	314Ah Cell
2	Nominal Voltage	166.4V	—
3	Nominal Capacity	314Ah	—
4	Nominal Energy	52.24kWh	—
5	Operating Voltage Range	130V~189.8V	—
6	Recommended Operating Voltage Range	145.6V~187.2V	—
7	Rated Charging Power	26.12kW	—

8	Rated Discharging Power	26.12kW	—
9	Max. Continuous Discharging Power	26.12kW	—
10	Charge-Discharge Efficiency	≥94%	—
11	IP Protection Rating	IP67	—
12	Thermal Management Method	Liquid Cooling	—
13	Communication Mode	CAN	—
14	BMU Model	ESBMM-6412-F	—
15	Operating Temperature Range	Charge: 0~60℃; Discharge: -20~60℃	—
16	Recommended Operating Temperature Range	25±3℃	—
17	Overall Dimensions	790±3mm×1145±3mm×245±3mm	—
18	Weight	340±5kg	—
19	Application Altitude	≤4000m	—
20	Recommended Storage Temperature	0~35℃	—
21	Operating Humidity	5%~95% Relative Humidity	Non-condensing

2.4.4 PCS System

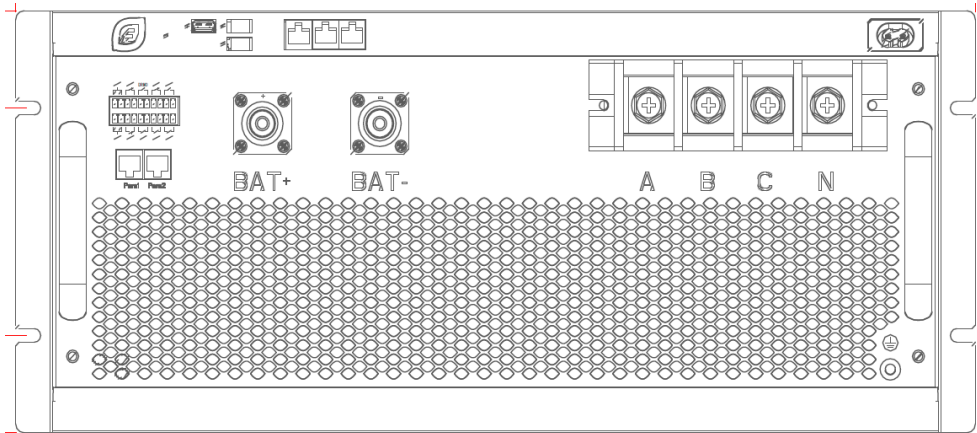


Figure 2-10 PCS Appearance Drawing

Module Description:

The Power Conversion System (PCS) is a core component, responsible for bidirectional energy conversion between batteries and the power grid. It regulates the charging and discharging of batteries to realize high-efficiency power conversion between AC and DC. In addition, the PCS supports grid-connected operation and ensures stable system operation under multiple working modes. With high-efficiency energy management and flexible operation modes, it enables the energy storage system to maintain high efficiency and reliability in diverse application scenarios.

Table 2-6 125kW Technical Specifications

Model	WH-BEC-125AC
Dimensions (W×D×H, mm)	520×785×232
Altitude (m)	4000m (> 2000m Derating)
Operating Temperature	-30℃ ~ 55℃ (> 45℃ Derating)
Storage Temperature	- 45℃ ~ 70℃
Relative Humidity	5%RH~95% RH, Non-condensing
Cooling Method	Intelligent Forced Air Cooling
IP Rating	IP20
Communication Interface	CAN/RS485/Ethernet
Grid Support	L/HVRT, Active and Reactive Power Control

DC side (Battery)	
Operating Voltage Range (V)	615~950 (3W+PE) /650~950 (3W+N+PE)
Full-load Voltage Range (V)	615~950 (3W+PE) /680~950 (3W+N+PE)
Input Channels	1
Maximum Current (A)	203
AC side (On-Grid)	
Rated Voltage (V)	230/400
Voltage Deviation: -15% ~ +15%	-15%~+15%
AC Output Category	(3W+PE) / (3W+N+PE)
Rated Output Power (kW)	125
Max. Output Power (kW)	138
Max. Output Current (A)	200
Rated Grid Frequency (Hz)	50/60
Power Factor	0.99
Power Factor Range	1 (Leading) ~1(Lagging)
THDi	< 2% (Rated Power)
DC Component	< 0.5%
Overload Capacity	110% Long-term
Max. Efficiency	98.5%

2.4.5 Liquid Cooling System

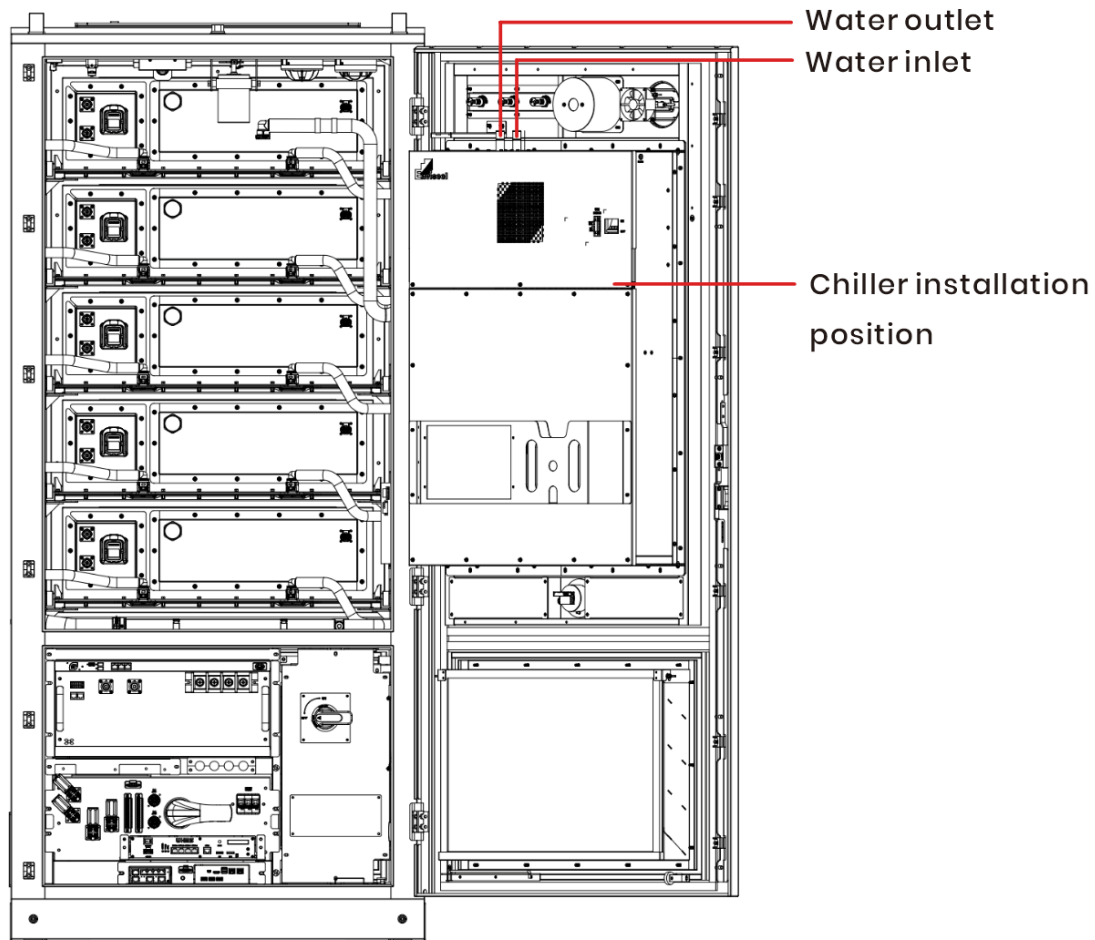


Figure 2-11 Liquid Cooling System Location Schematic

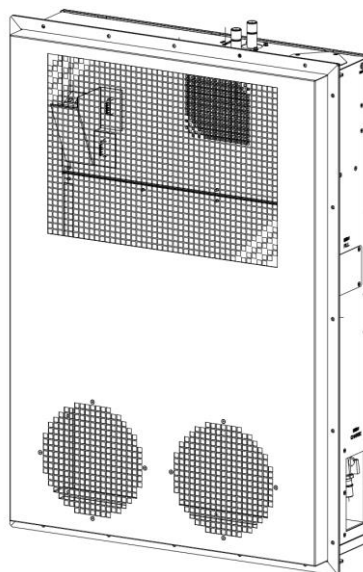


Figure 2-12 Liquid Cooling Unit External View Drawing

Component Description: The unit adopts a compact door-mounted structure. It

delivers powerful core performance with integrated high-efficiency cooling and heating functions. Supporting RS485/CAN communication protocols, it enables convenient system linkage. Compliant with RoHS standards, it features low energy consumption and high stability. It is suitable for high-reliability scenarios such as industrial cooling and outdoor temperature control, balancing energy conservation and long-term stable operation

Table 2-7 Technical Parameters

Item	Specification Parameters
Overall Dimensions	1000×700×220mm
Installation Method	Door-mounted
Anti-corrosion Grade	C3M
IP Protection Rating	IPX5
Refrigerant	R134a
Secondary Refrigerant	50% Ethylene Glycol Aqueous Solution
RoHS Certification	yes
Air Outlet Mode	Front Air Outlet
Cooling Capacity @ L45/W18	5.0kW
Heating Capacity @ Tu=10°C	2.5kW
Max. Power Consumption	2.8kW
Rated Voltage	220~240V 50/60Hz
Max. Operating Current	15.8A

2.4.6 Environmental Control System

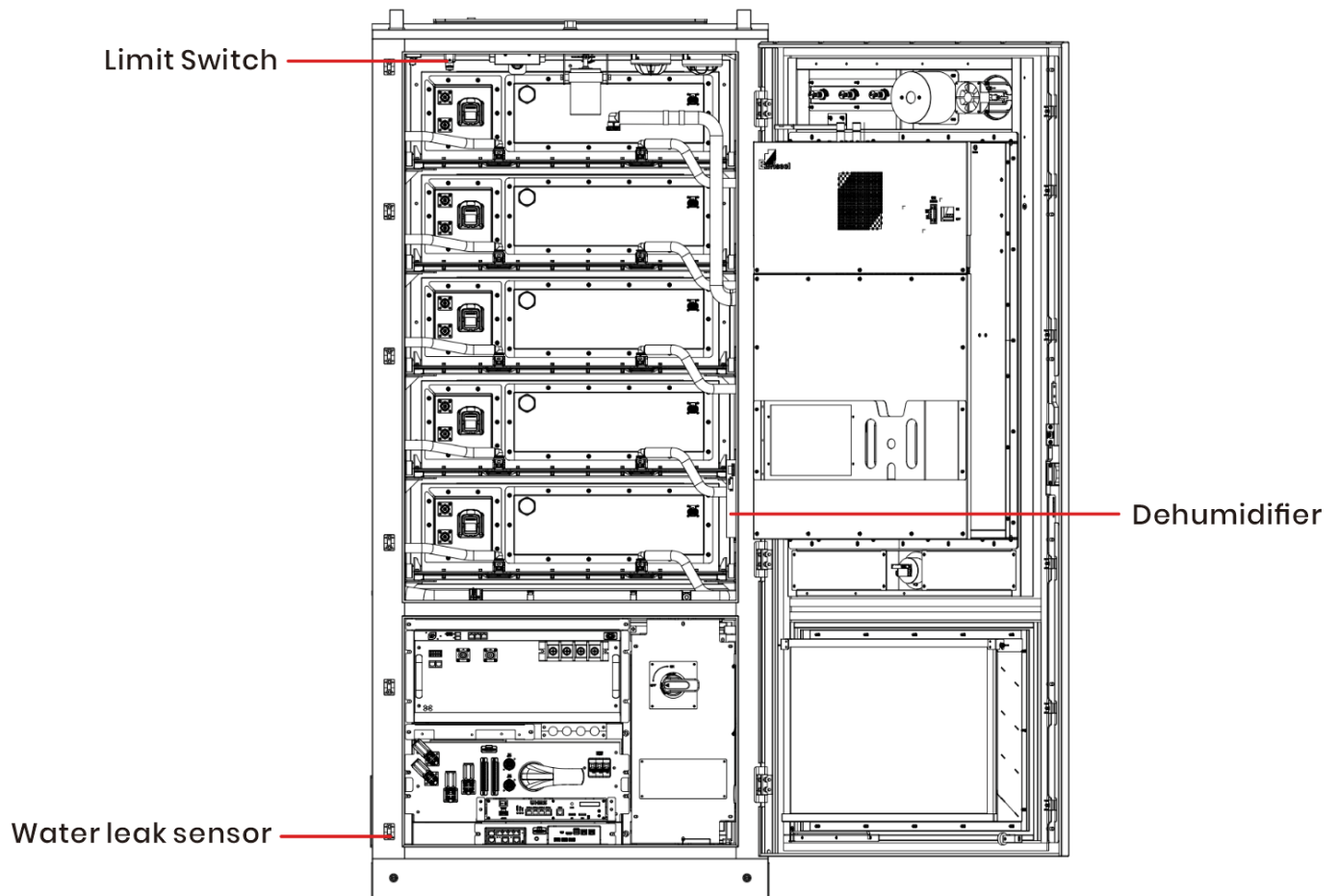


Figure 2-13 Front Layout of ECS

2.4.6.1 Limit Switch

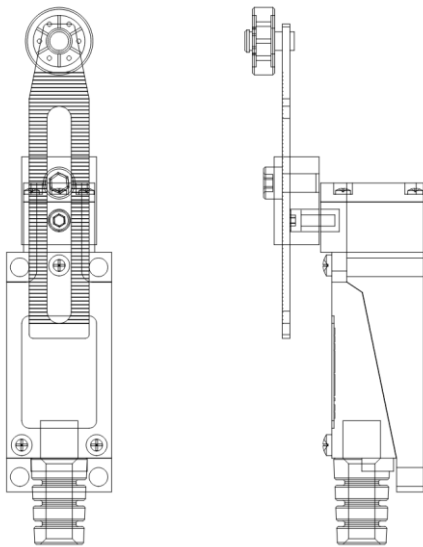


Figure 2-14 Limit Switch Appearance

Table 2-8 Technical Parameters

Model	CHNT/YBLX-ME/8108
Operating Frequency	20 cycles/min
Rated Voltage	AC-15:380V DC-13:220V
Rated Operating Current	AC-15:0.8A DC-13:0.16A
Installation Category	II
Pollution Degree	Pollution Degree 3
Rated Insulation Voltage	415V
Rated Impulse Withstand Voltage	2.5kV
Installation Conditions	Install in places without significant shaking, impact or vibration

2.4.6.2 Water Leakage Sensor

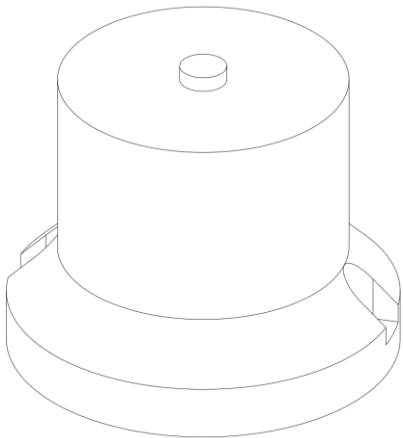


Figure 2-15 Water Leakage Sensor Appearance

Table 2-9 Technical Parameters

Item	Parameters
Input	Electrode-type water leakage detection
Output	Relay NO/NC
Auxiliary Power Supply	①DC12V±5%; ②DC24V±10%
Operating Current	①DC12V<40mA (max) ; ②DC24V<20mA (max)
Relay Contact Load Capacity	2A 24VDC,2A 120VAC
Water Level Alarm Height	≥1mm (Detection Medium: Tap Water)
Response Time	<1S

2.4.6.3 Dehumidifier

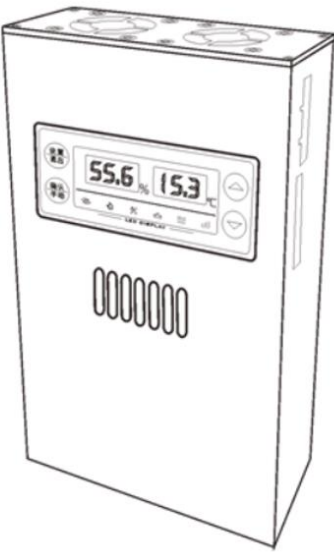


Figure 2-16 Dehumidifier Appearance

Component Description: Compact and lightweight, easy and quick to install. It supports switching between automatic and manual dehumidification, with adjustable temperature trigger value and dehumidification set value. Equipped with an active condensation air duct and heated air exhaust, it achieves efficient overall moisture prevention and dehumidification for enclosed electrical cabinet spaces.

Table 2-10 Technical Parameters

Data Name	Technical Parameters	Data Name	Technical Parameters
Working Power Supply	AC220V	Dehumidification Efficiency	380mL±5%/24h (60W 35℃ RH=85% Under Working Conditions)
Heating Power	50 ~ 300W	Dehumidification Temperature	5℃ ~ 45℃
Power Selection	20W~60W	Operating Temperature	-25℃ ~ 75℃
Humidity Detection Range	20%RH~98%RH	Temperature Detection Range	-20℃ ~ 85℃
Dehumidification Start Value	25%RH~98%RH	Temperature Start Value	1℃ ~ 55℃
Humidity Measurement Accuracy	±3%RH	Temperature Measurement Accuracy	±1℃

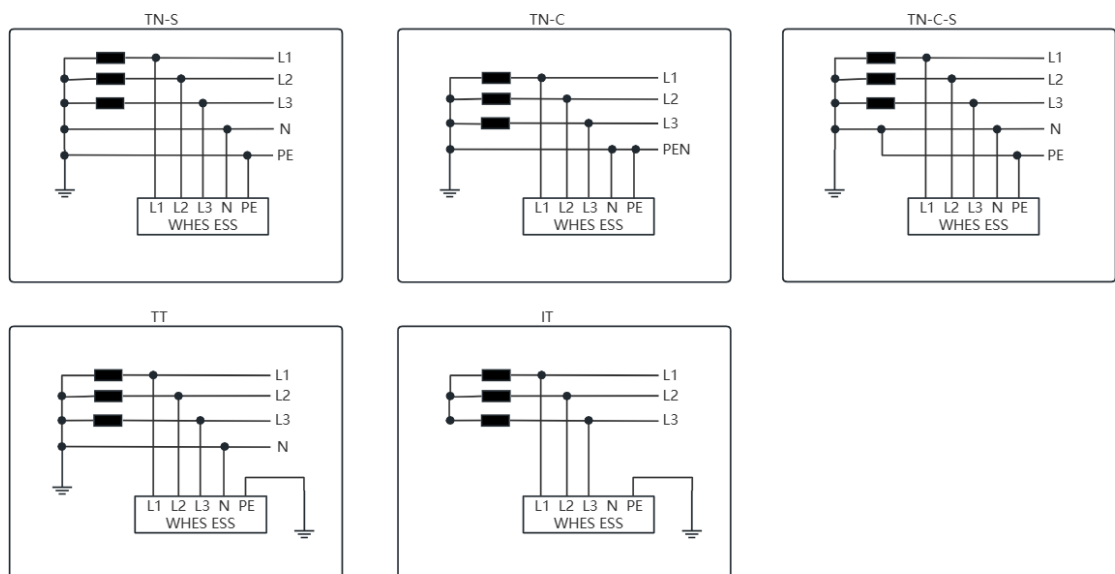
Display Mode	6-digit display	Display Resolution	0.1
Housing Material	Aluminum Alloy	Overall Dimension	180×62×110mm (W × D × H)
Net Weight	1kg	Drainage Pipe	Silicone D10mm

2.5 Grid Type

The ESS supports the following grid types: TN-S, TN-C, TN-C-S, TT, and IT.



For TN-S, TN-C, TN-C-S, and TT systems, the ESS neutral (N) conductor must be connected to the utility grid.



3 Equipment Installation

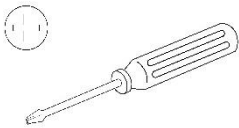
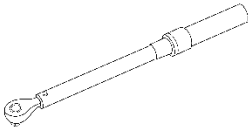
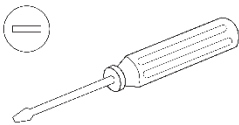
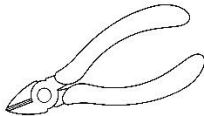
3.1 Preparations Before Installation

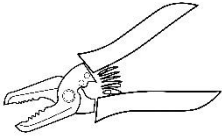
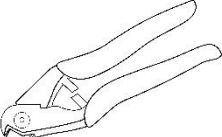
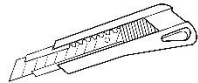
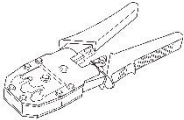
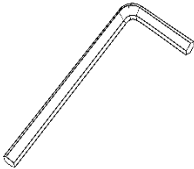
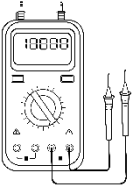
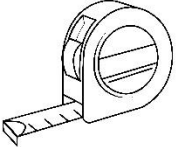
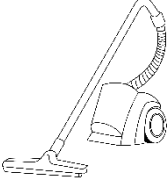
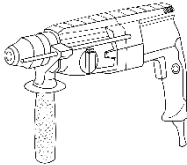
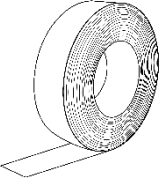
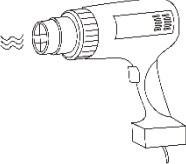
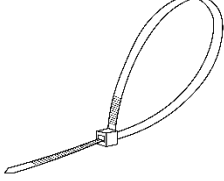
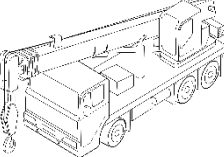
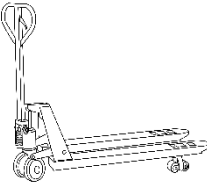
3.1.1 Tool Preparation

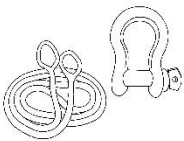
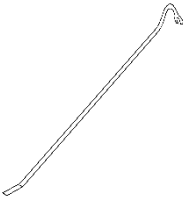


- The illustrated tools are for reference only and may differ from actual tools.
- Due to varying site conditions, this tool list may not be exhaustive. On-site installers and users are responsible for preparing unlisted tools based on actual needs.

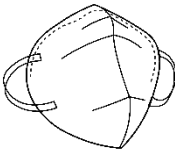
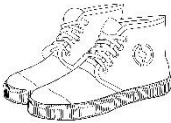
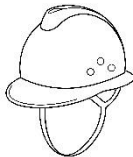
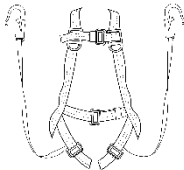
Installation Tools

			
Phillips Insulated Torque Screwdriver	Insulated Torque Socket Wrench (including extension rod) ● Socket size: 7mm~19mm ● Socket depth: ≥32mm ● Socket interface compatible with torque wrench ● Torque range: 1.2N·m~45N·m	Flathead Insulated Torque Screwdriver	Diagonal Pliers

			
Wire Strippers	Wire Cutters	Rubber Hammer	Utility Knife
			
Crimping Tool	Hydraulic Pliers	Hex Wrench: 5mm~12mm	Multimeter DC Voltage range ≥1500V DC
			
Steel Tape Measure	Spirit Level	Vacuum Cleaner	Impact Drill
			
Impact Drill Bit Φ16mm	Heat Shrink Tubing	Heat Gun	Cable Tie
			
Insulated Ladder	Crane	Manual Forklift	Forklift

 Lifting Rope & Shackle Rope length: ≥1500mm	 Crowbar
--	--

Personal Protective Equipment

 Insulating Gloves	 Protective Gloves	 Goggles	 Dust Mask
 Insulating Shoes	 Reflective Vest	 Safety Helmet	 Seat Belts

3.1.2 Inspect The Deliverables

Outer Packaging Inspection

Before unpacking the equipment, inspect the outer packaging for visible damage such as holes, cracks, or other signs of possible internal damage, and verify that the product model is correct. If the packaging appears abnormal or the equipment mode does not match, do not open the packaging and contact your dealer immediately.

NOTE

- It is recommended to remove the outer packaging within 24h before preparing to install the cabinet.

WARNING

- If the cabinet height exceeds 2 m, ensure appropriate safety precautions for elevated work are in place when removing the outer packaging.

Deliverable Inspection

WARNING

- Check whether the actual cabinet received is consistent with the ordered model.
- Check the energy storage cabinet and its internal equipment to ensure there is no damage.
- If you find any problems or have any questions, please contact the carrier or our company in a timely manner.

BEWARE

- Check if the equipment has any paint bumps or damages. To prevent rust, it is recommended to carry out paint repairs.

3.2 Installation Environment Requirements

3.2.1 Site Selection Requirements

The ESS is designed for outdoor installation. For indoor application, comply with local laws and regulations. General site selection requirements:

- Select the installation site at a high elevation above the historical highest water level and avoid low-lying areas.
- Keep a reasonable safe distance from airports, landfills, river banks and dams.
- Choose an open location and ensure a 10-meter unobstructed area around the site.
- Maintain a minimum distance of 50 meters from residential areas to avoid noise pollution.
- Ensure convenient transportation conditions and reliable fire protection systems.
- Reserve sufficient space to meet current demands and future expansion requirements throughout the service life cycle.
- Select a well-ventilated installation location.
- Outdoor installation is prohibited within 2 km of the coastline and areas affected by sea winds. High-salinity corrosive environments will accelerate metal rusting and equipment aging, and lead to potential safety hazards. Sea wind affected areas specifically refer to coastal zones within 2 km of the coastline. The actual affected range shall be determined comprehensively based on local meteorological conditions (e.g., typhoons, seasonal winds) and terrain features (e.g., dikes, hills).

 NOTE

Site selection shall exclude locations, areas, and places that are not recommended by industry standards and regulations, including but not limited to:

- Areas with high vibration, noise, or electromagnetic interference;
- Places where dust, fumes, harmful or corrosive gases are produced or are present;
- Places where corrosive, flammable, or explosive materials are produced or stored;
- Places with existing underground facilities;
- Areas with poor geological conditions, such as rubber soil, soft soil layers, or areas prone to water accumulation and subsidence;
- Earthquake faults and areas with seismic intensity greater than 9 degrees;
- Locations susceptible to direct hazards such as mudslides, landslides, quicksand, or caves;
- Locations affected by mining subsidence (dislocation) hazards;
- Areas affected by explosion hazards;
- Areas at risk of flooding due to dam or dike failure;
- Important water source and sanitary protection zones;
- Historical and cultural relic protection zones;
- Crowded areas, high-rise buildings, and underground structures.

3.2.2 Installation Space Requirements

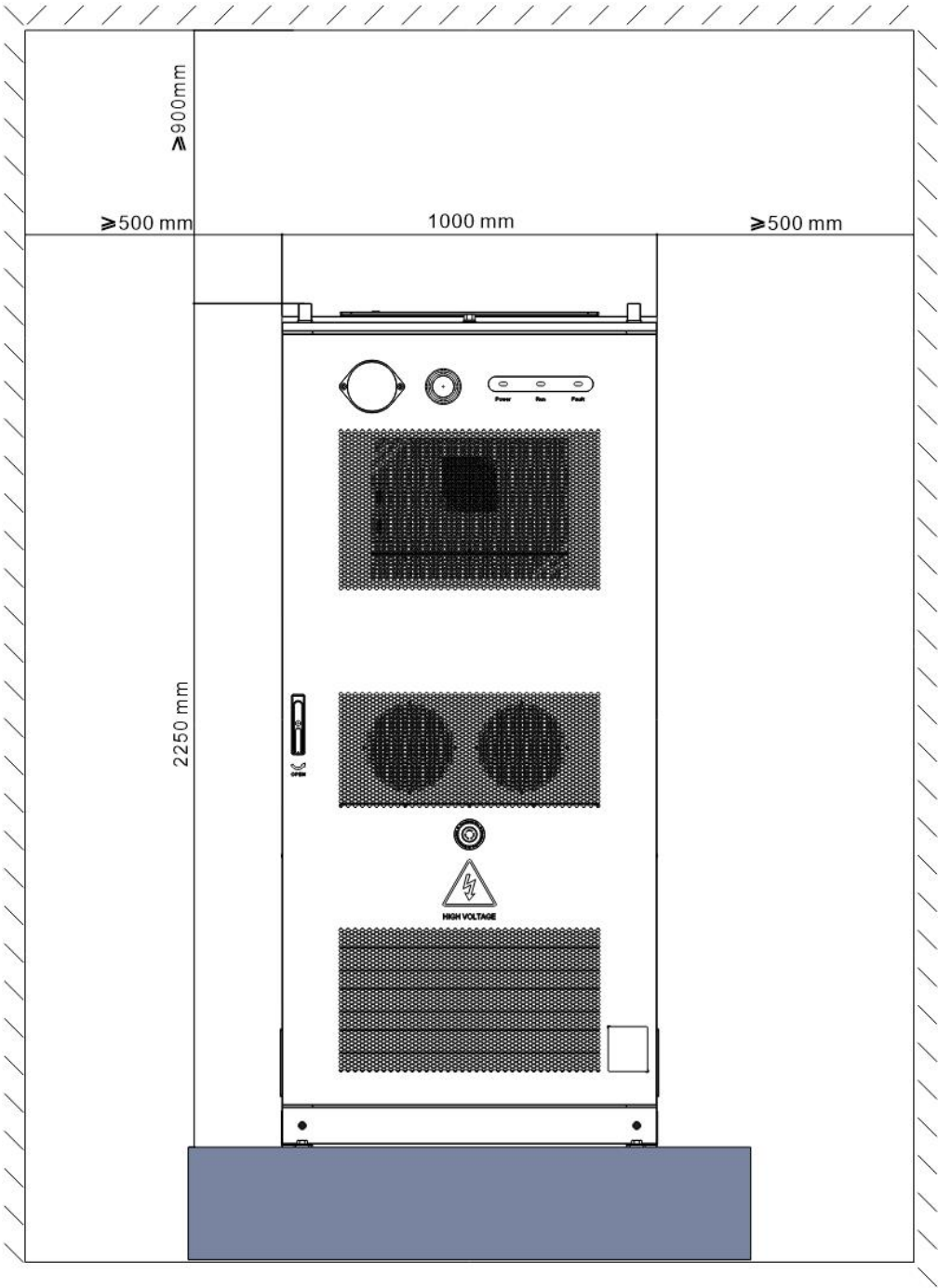
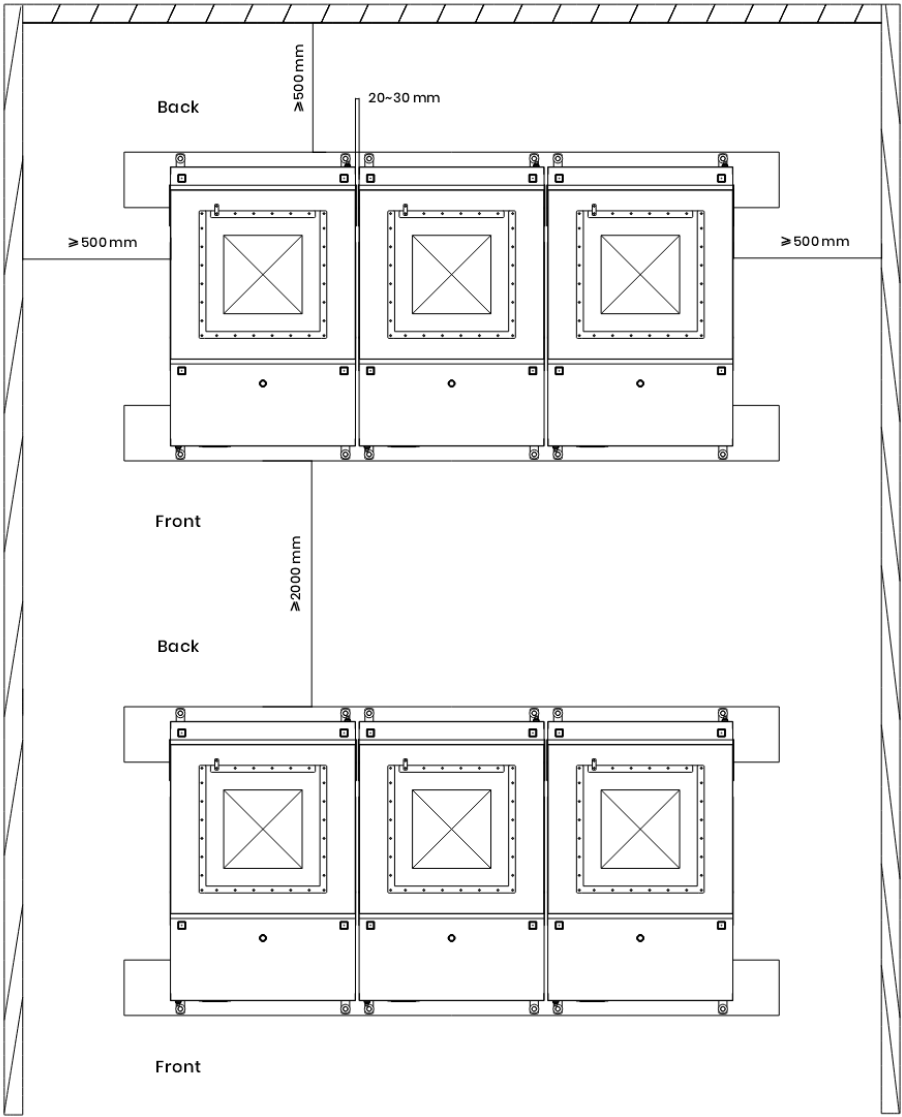


Figure 3-1 Front view of floor-mounted installation



 **Figure 3-2 Side-by-side Installation (Top View)**

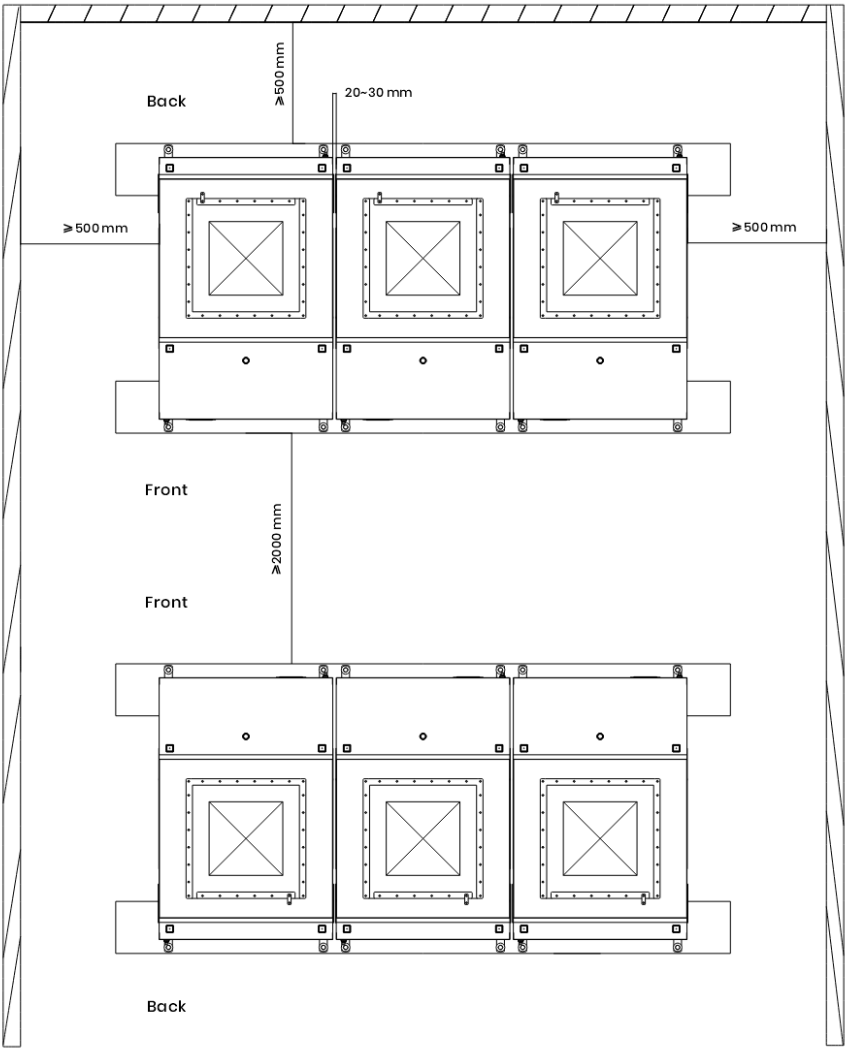


Figure 3-3 Face-to-face Installation (Top View)

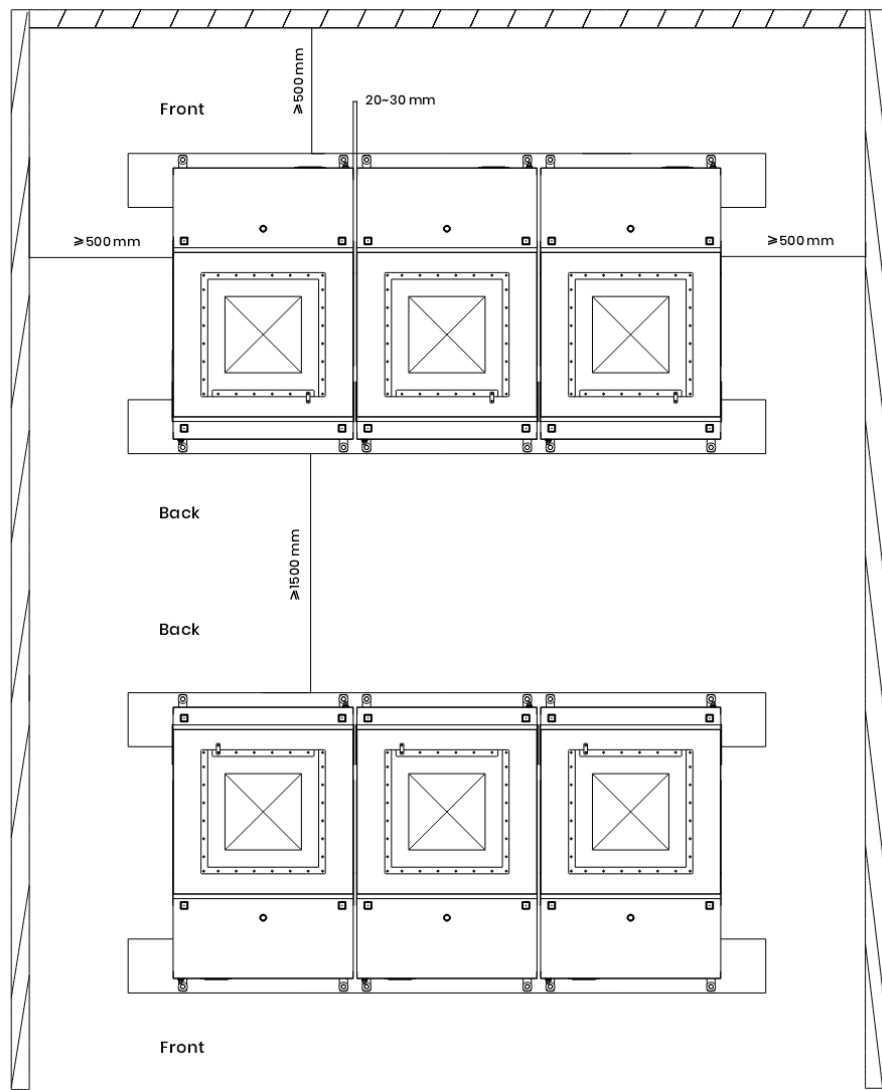


Figure 3-4 Back-to-back Installation (Top View)

3.2.3 Install Equipment

Step 1 Remove the wooden crate of the ESS.

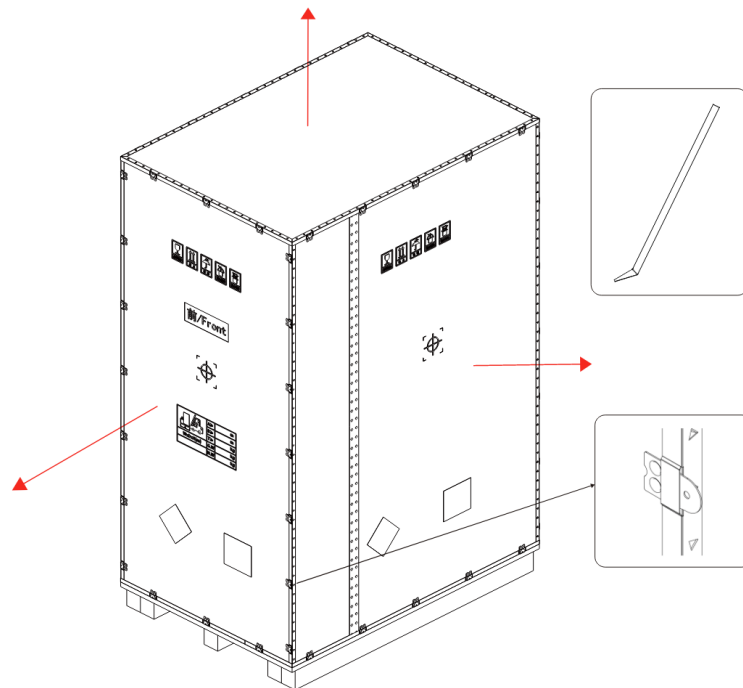


Figure 3-5 Remove the wooden crate

Step 2 Remove the foam of the ESS.

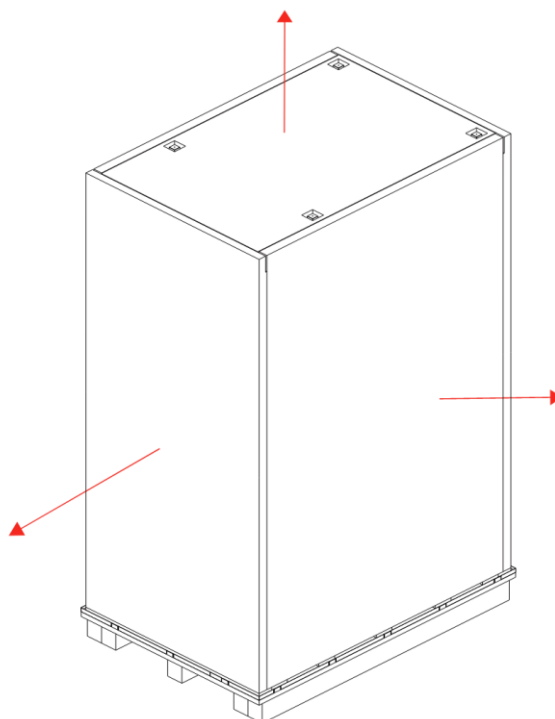


Figure 3-6 Remove the foam

Step 3 Remove the front and rear bottom cover plates.

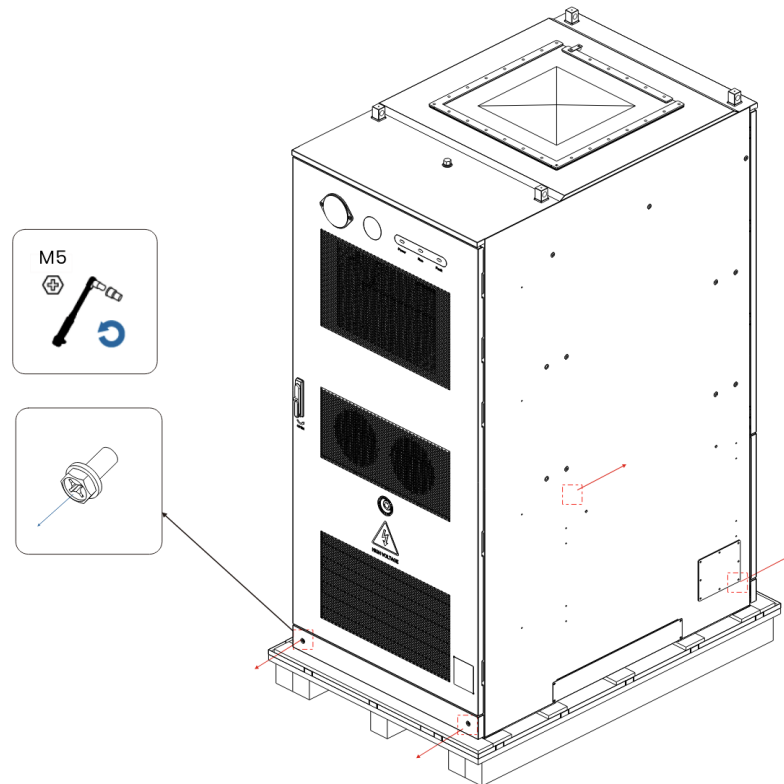


Figure 3-7 Remove the front and rear bottom cover plates

Step 4 Remove the wooden pallet and fixing brackets.

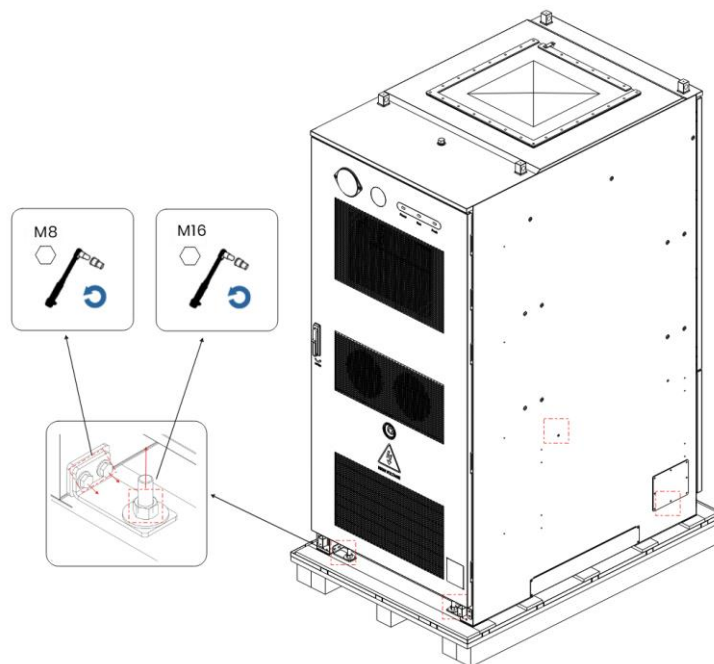


Figure 3-8 Remove the wooden pallet and fixing brackets

Step 5 Drill holes on the foundation and install expansion screws (M16×100, 4 pcs in total).

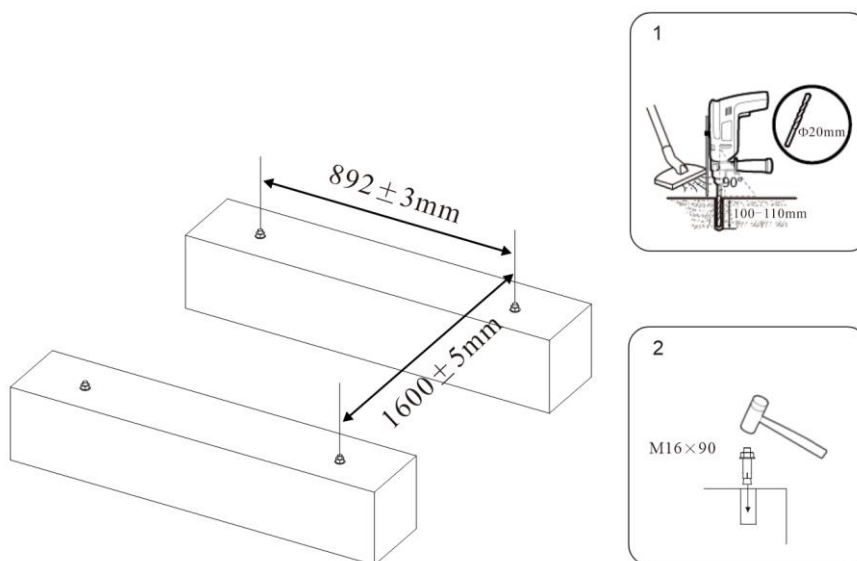


Figure 3-9 Drill holes on the foundation and install expansion bolts

Step 6 Move the cabinet to the mounting platform using a forklift.

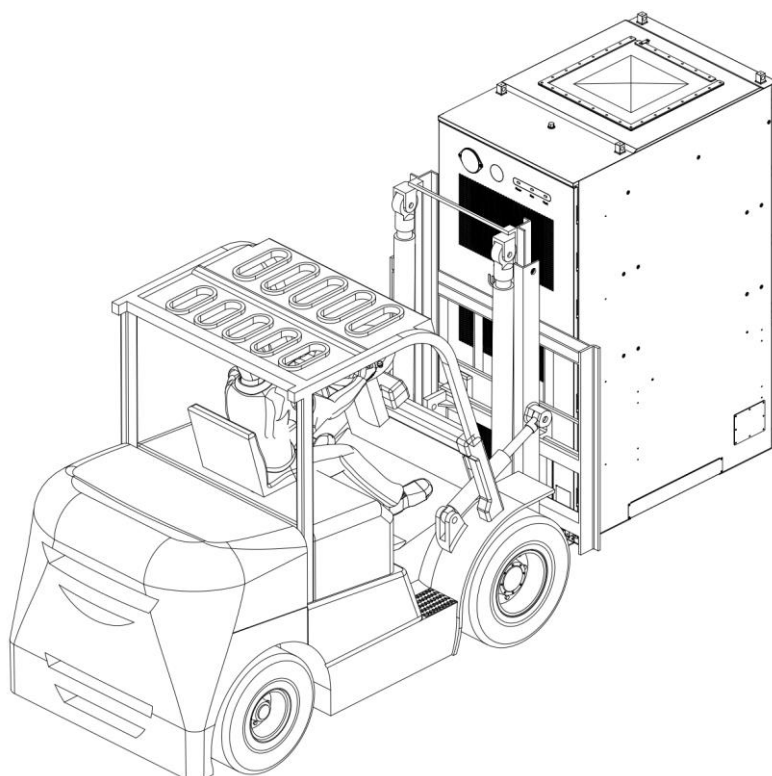


Figure 3-10 Move the cabinet to the mounting platform using a forklift

BEWARE

When using a forklift to move the equipment, secure the equipment with appropriate straps based on the actual situation to prevent the risk of overturning.

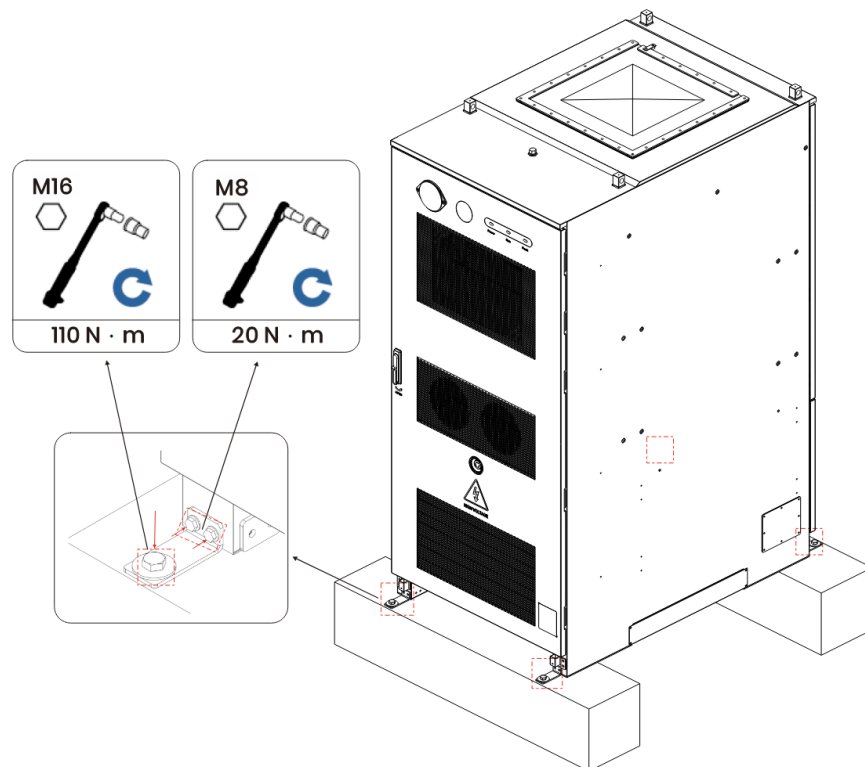
Step 7 Fix the ESS.

Figure 3-11 Fix the ESS on the mounting platform

4 Electrical Connection

4.1 System Schematic Diagram

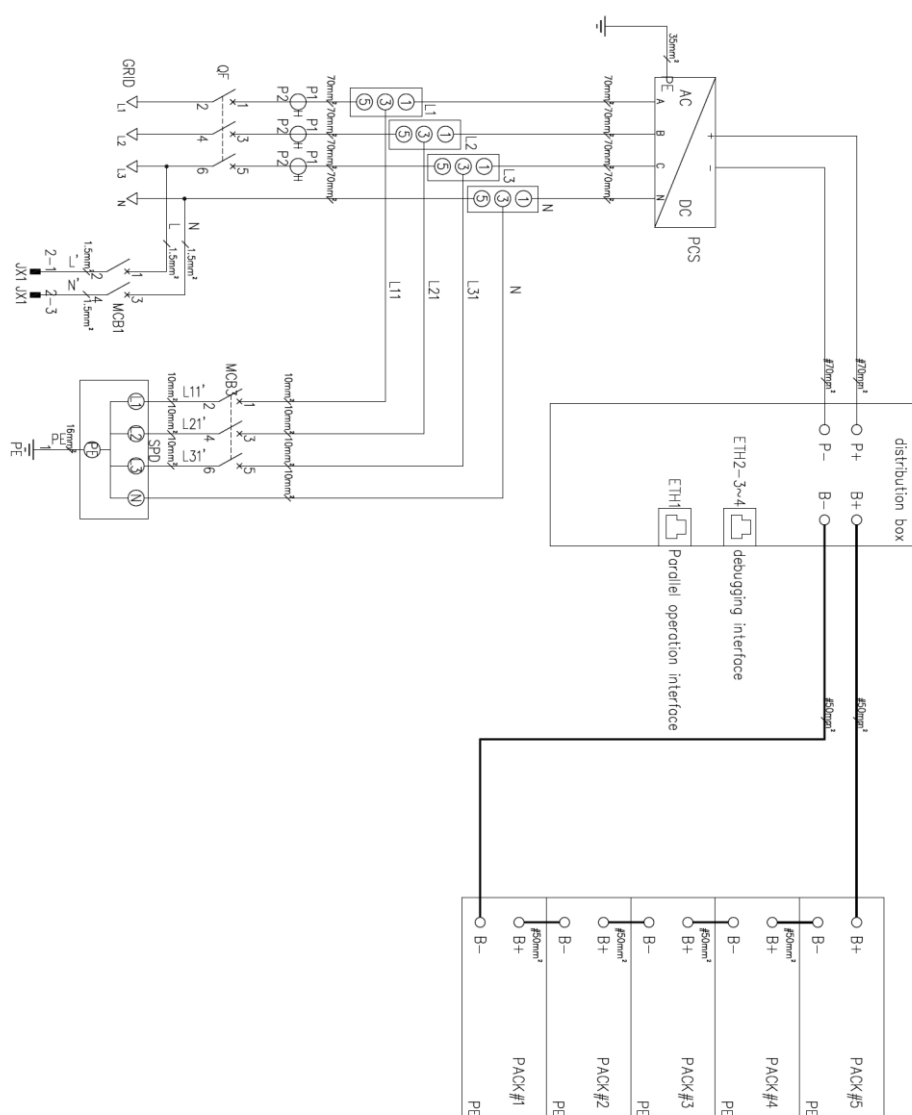


Figure 4-1 system principle diagram

4.2 Cable Preparation

Name	Type	Cross Sectional Area
AC Input Line	3-core Outdoor Copper Cable	$\geq 95\text{mm}^2$ (single-core)
	3-core Outdoor Aluminum Cable	$\geq 120\text{ mm}^2$ (single-core)
Neutral Input Line	Single-core Outdoor Copper Cable	$\geq 95\text{mm}^2$
	Single-core Outdoor Aluminum Cable	$\geq 120\text{ mm}^2$
PE Line	Single-core Outdoor Copper Cable	$\geq 50\text{mm}^2$
	Single-core Outdoor Aluminum Cable	$\geq 70\text{ mm}^2$

BEWARE

The cable cross-sectional areas listed in the table represent the minimum values necessary for the normal operation of a single system. For multi-machine parallel operation, the cable sizes need to be adjusted accordingly.

When aluminum cables are used for connection, **copper-aluminum transition connectors** must be adopted to strictly prevent safety accidents caused by poor contact, overheating and arcing.

4.3 Grounding Wire Connection

Step 1 Install the grounding busbar.

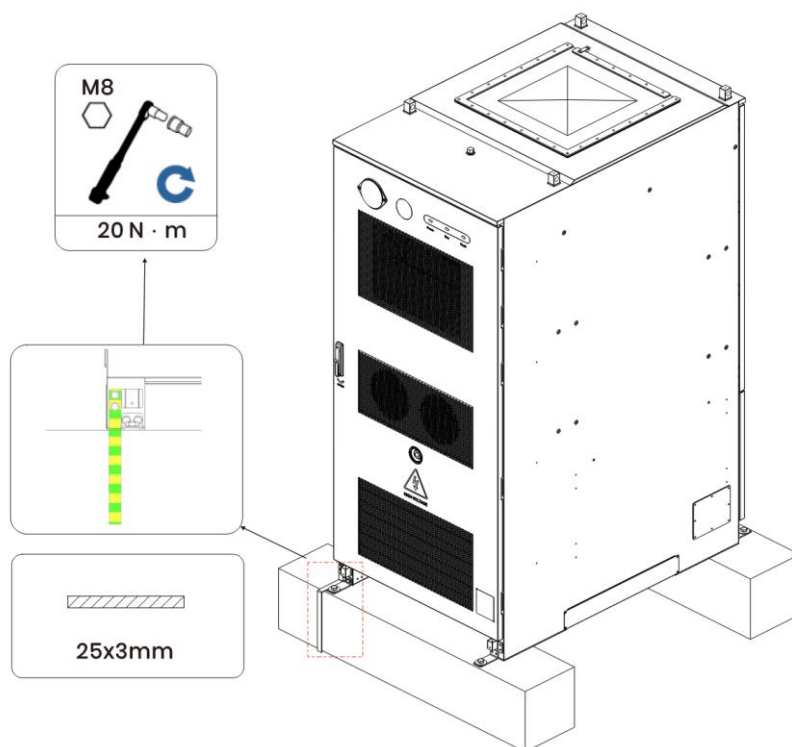


Figure 4-2 Install the grounding busbar

Step 2 Install the front and rear bottom cover plates.

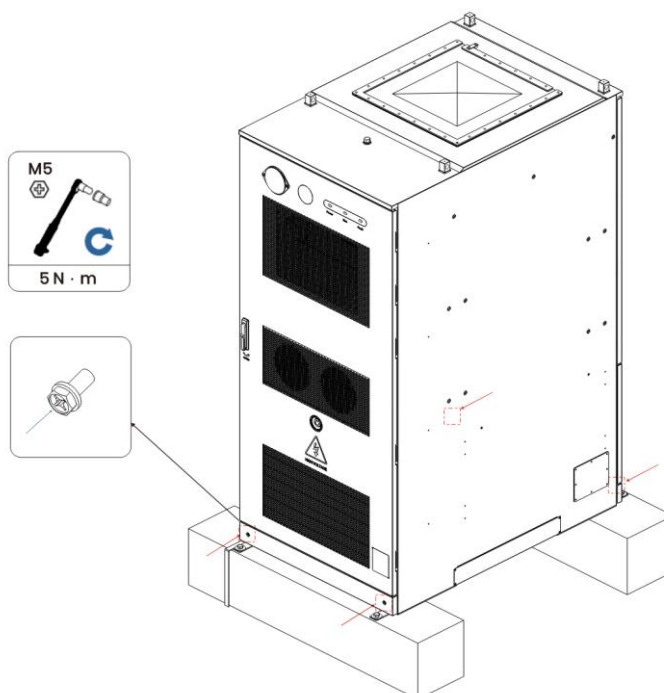


Figure 4-3 Install the front and rear bottom cover plates

4.4 DC Side Connection

4.4.1 DC Output Wiring

Step 1 Open the front door of the ESS.

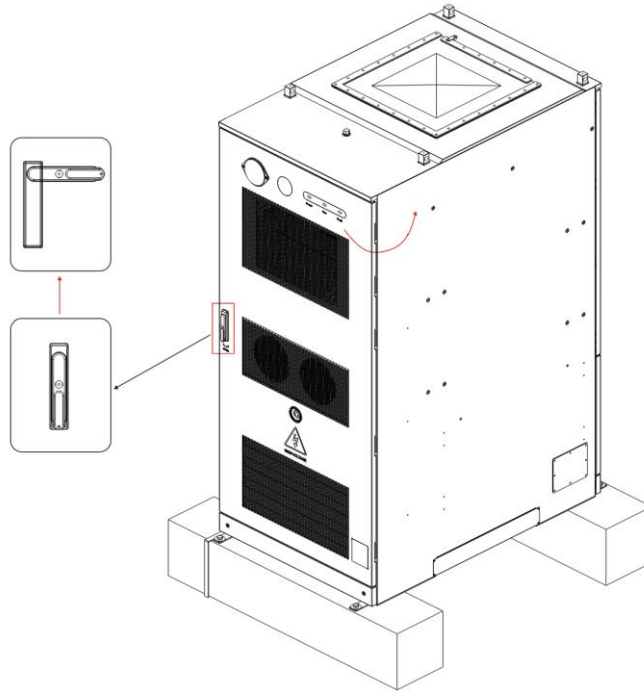


Figure 4-4 Open the front door of the energy storage cabinet.

Step 2 Install the MSD.

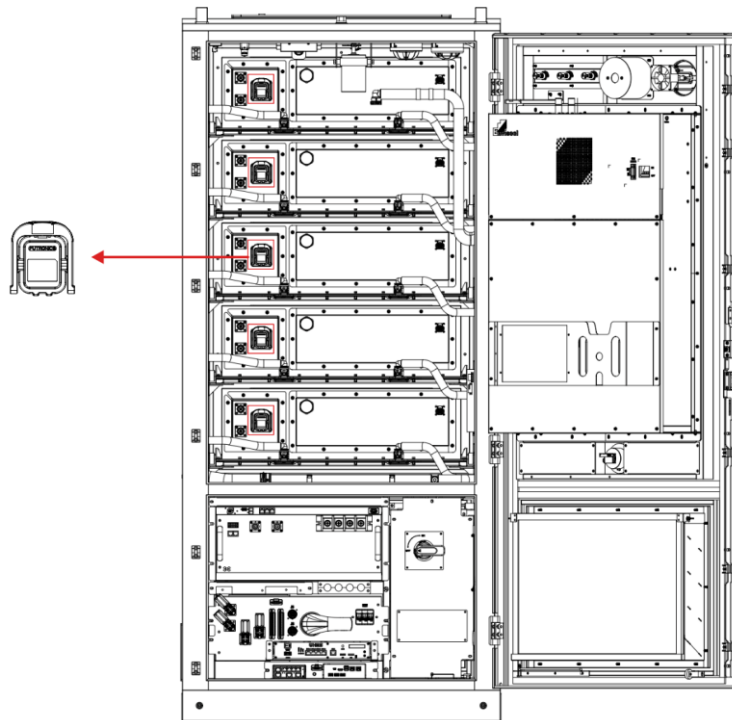


Figure 4-5 Install the MSD.

4.5 AC Side Connection

4.5.1 AC Output Wiring

Step 1 Open the front door of the ESS.

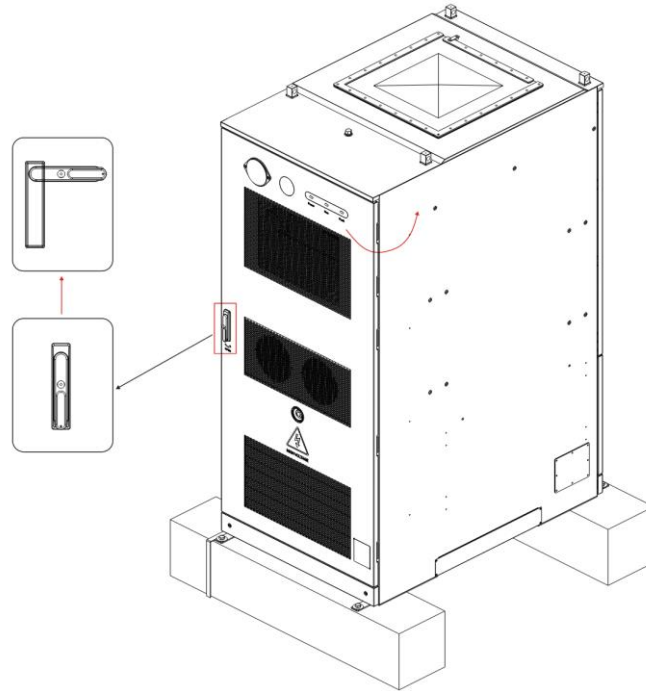


Figure 4-6 Open the front door of the energy storage cabinet.

Step 2 Remove the circuit breaker cover plate.

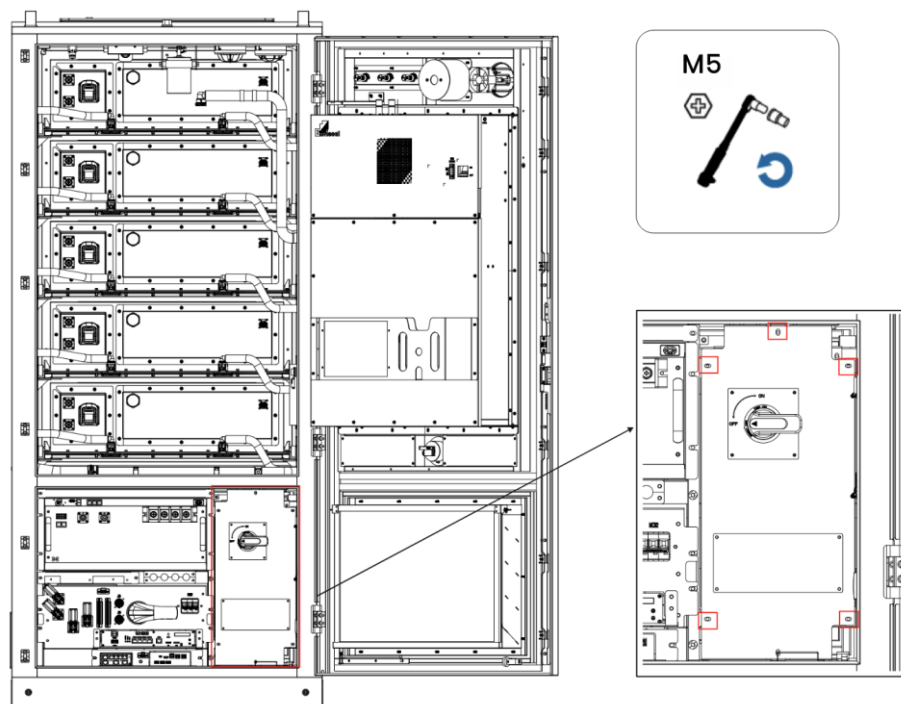


Figure 4-7 Remove the circuit breaker cover plate

Step 3 Install the power cables.

ⓘ BEWARE

The color codes of AC cables shown in the figure below follows the European standard. For color codes applicable in other regions, please refer to **Table 4-1**: Color Codes of Three-Phase Wires.

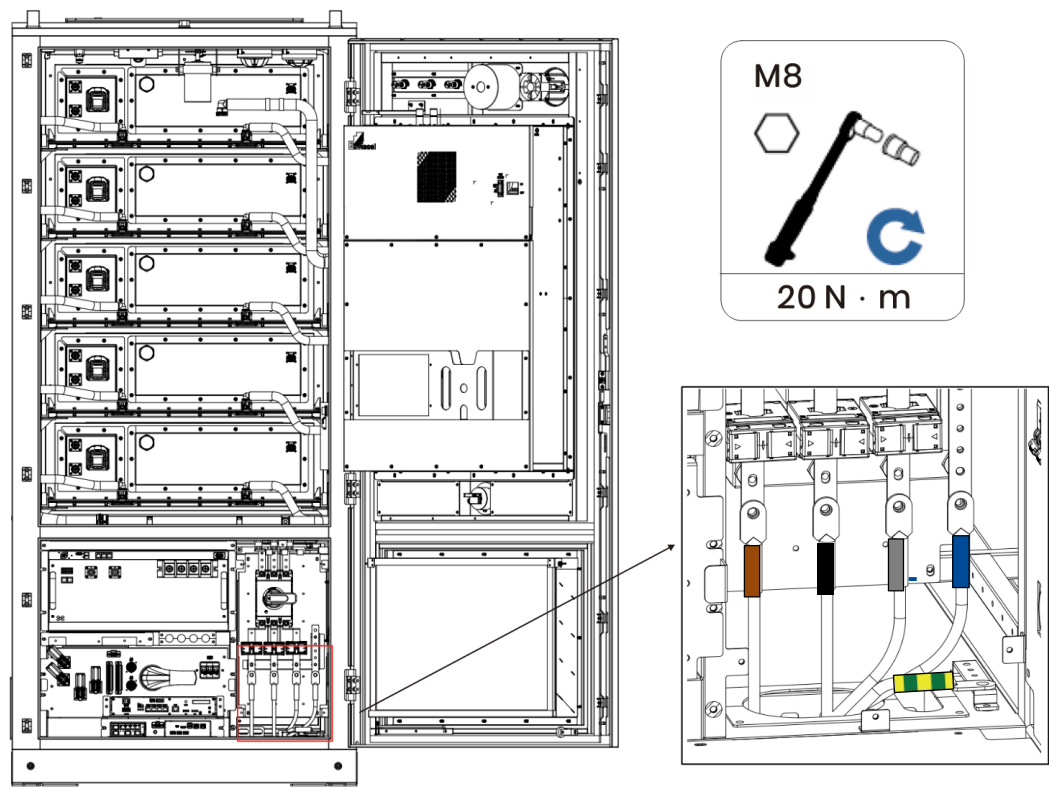


Figure 4-8 Install the power cables

Table 4-1 Color Codes of Three-Phase Wires

Region	L1	L2	L3	Neutral wire	Ground wire	Remarks
China	Yellow	Green	Red	Blue	Yellow-Green Stripes	The table outlines the three-phase wire color requirements for various countries and regions worldwide. If the colors indicated in the table differ from those at the installation site, the latter shall
America	Black	Red	Blue	Gray	Green	
Europe	Brown	Black	Gray	Blue	Yellow-Green Stripes	
Malaysia	Red	Yellow	Blue	Black	Yellow-Green Stripes	
India	Red	Yellow	Blue	Black	Green	

Region	L1	L2	L3	Neutral wire	Ground wire	Remarks
						prevail.

Step 4 Bind and fix cables

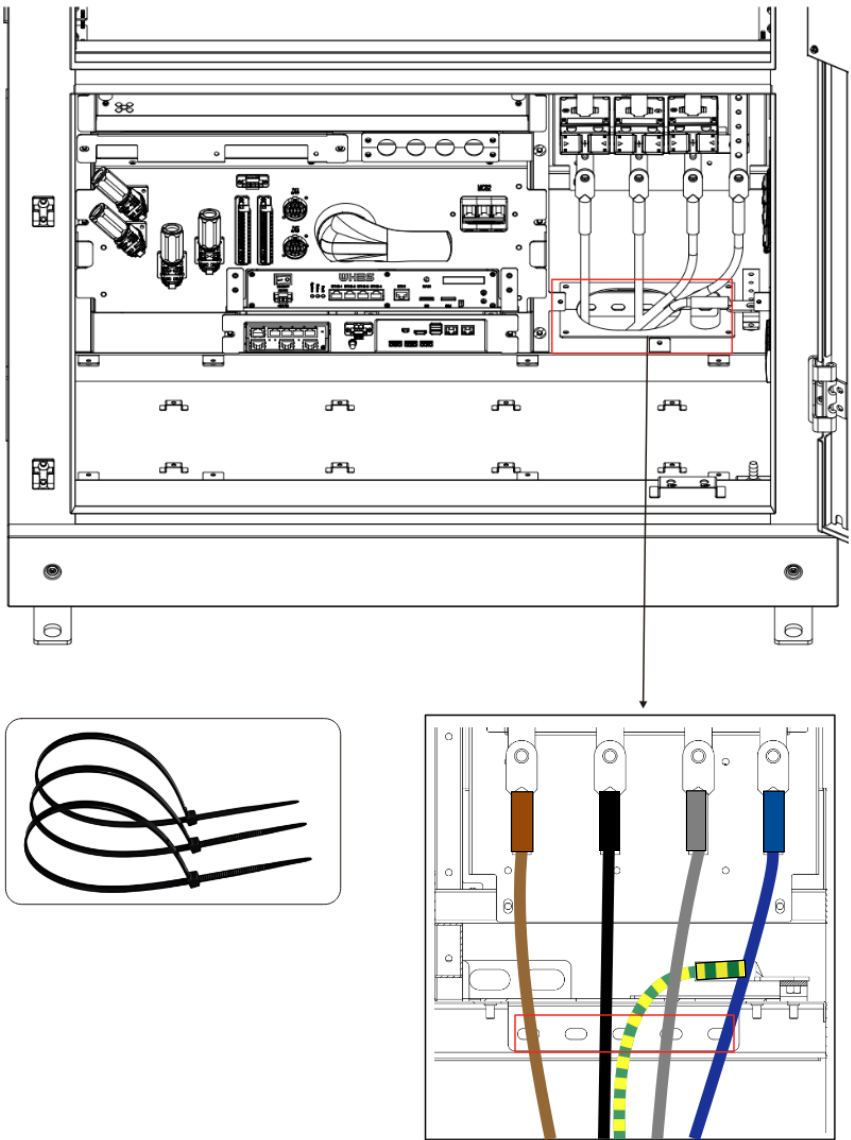


Figure 4-9 Bind and fix cables

4.6 Ethernet Communication Wiring

Step 1 Remove the bottom cable passing cover

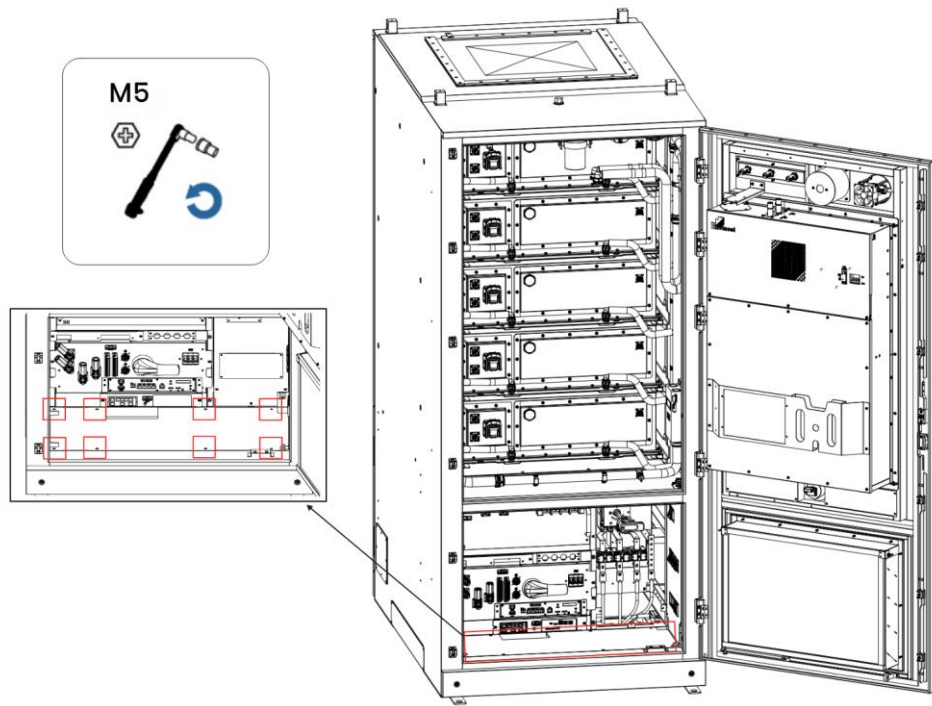


Figure 4-10 Remove the bottom cable passing cover

Step 2 Connect the communication network cable

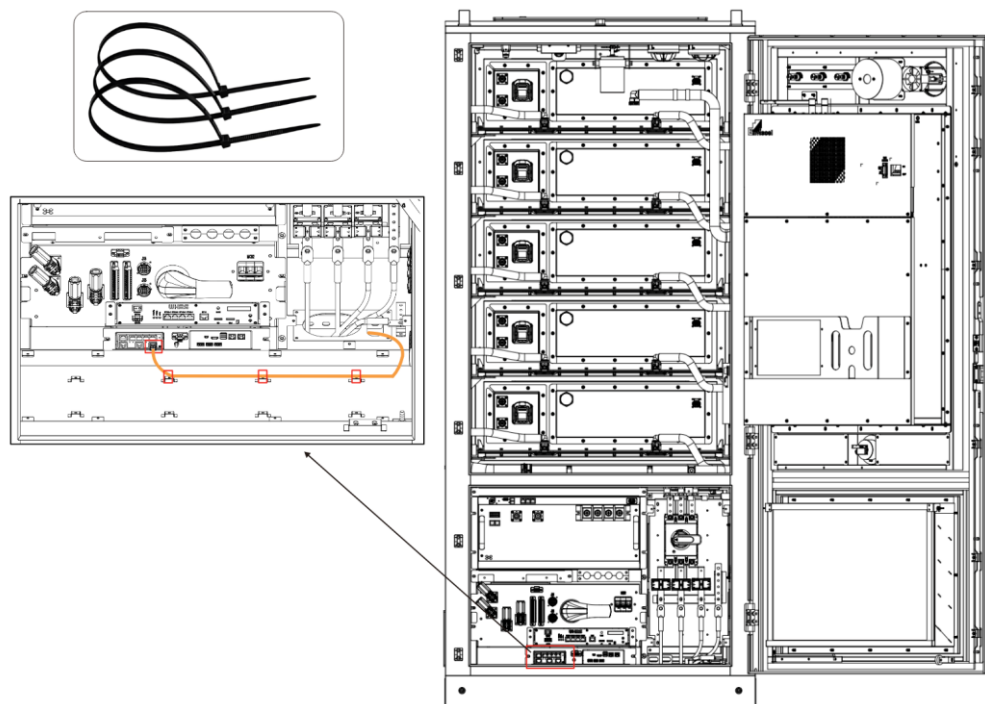
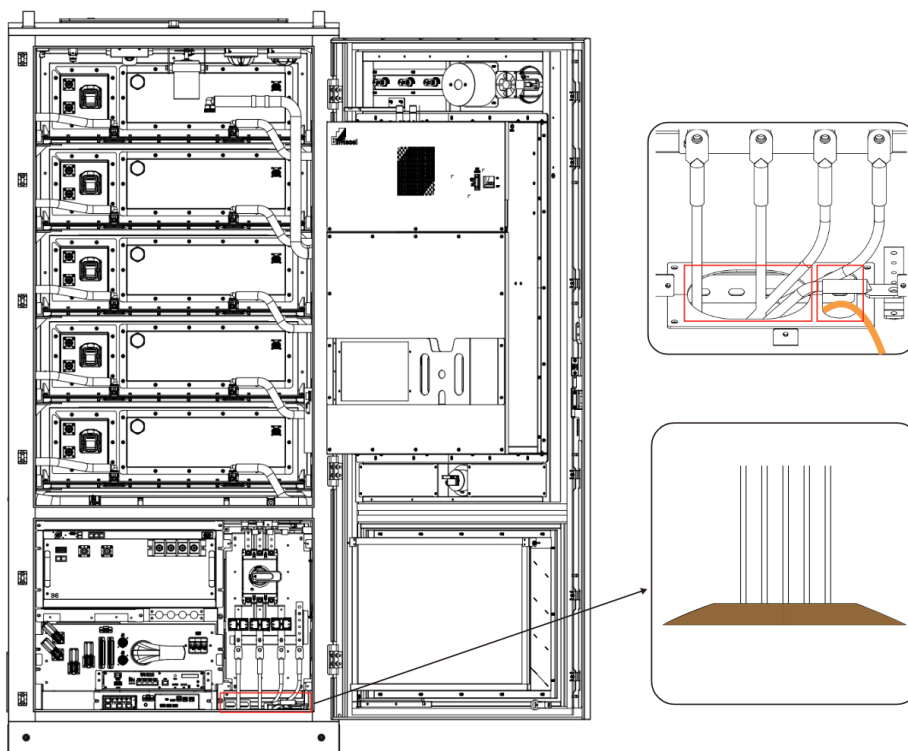


Figure 4-11 Connect Ethernet Communication Wire

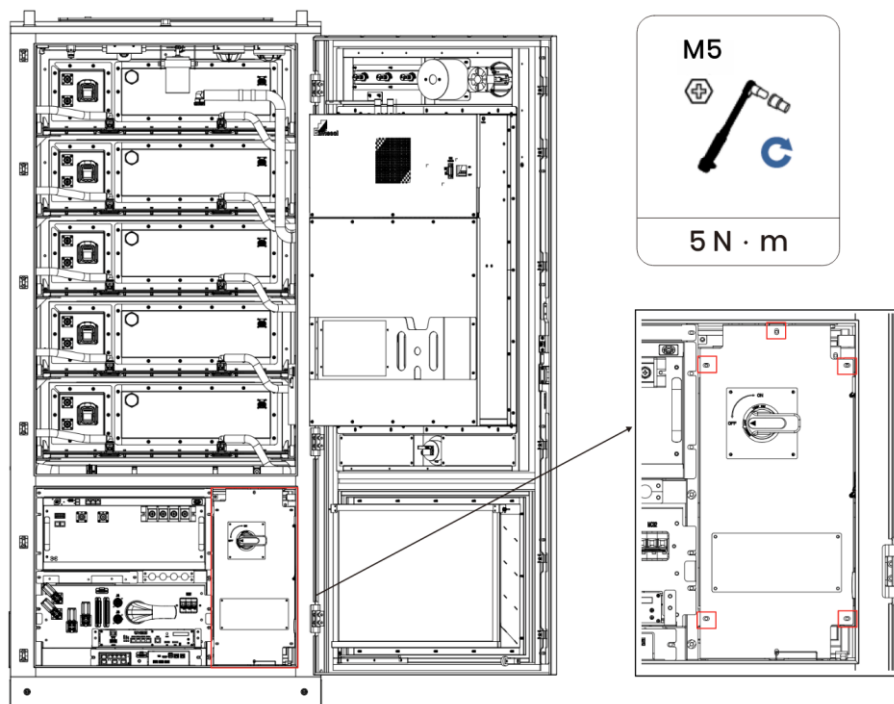
4.7 Final wiring steps

Step 1 Seal with firestop putty.



■ **Figure 4-12 Seal with firestop putty**

Step 2 Install the circuit breaker cover plate.



■ **Figure 4-13 Install the circuit breaker cover plate**

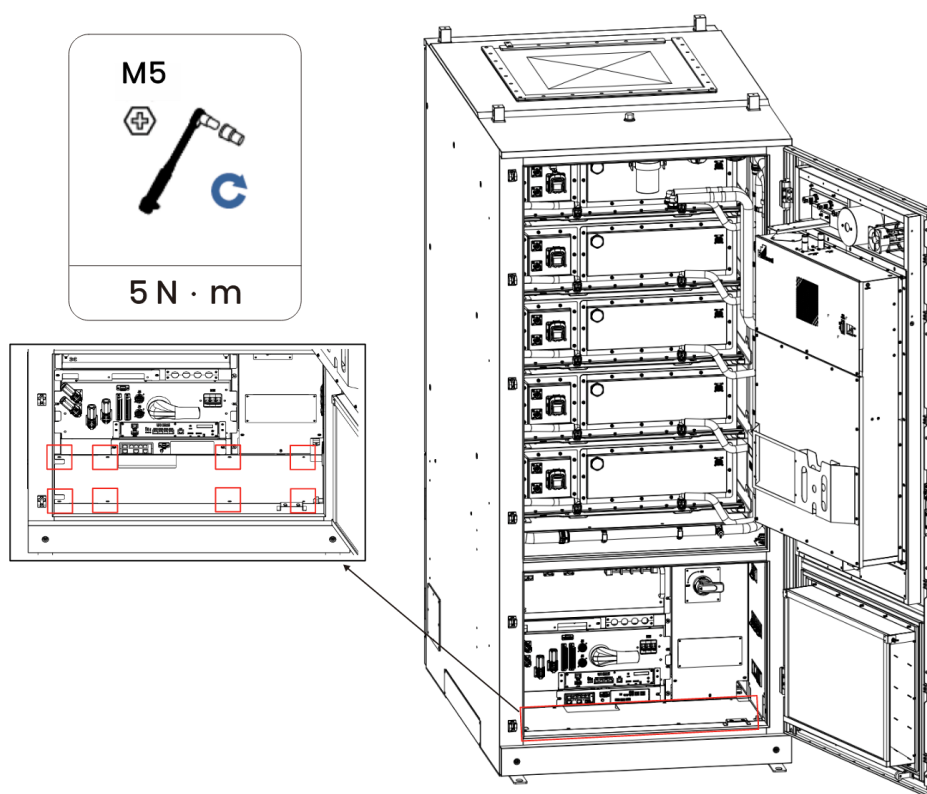
Step 3 Install the bottom cable entry cover

Figure 4-14 Install the circuit breaker cover plate

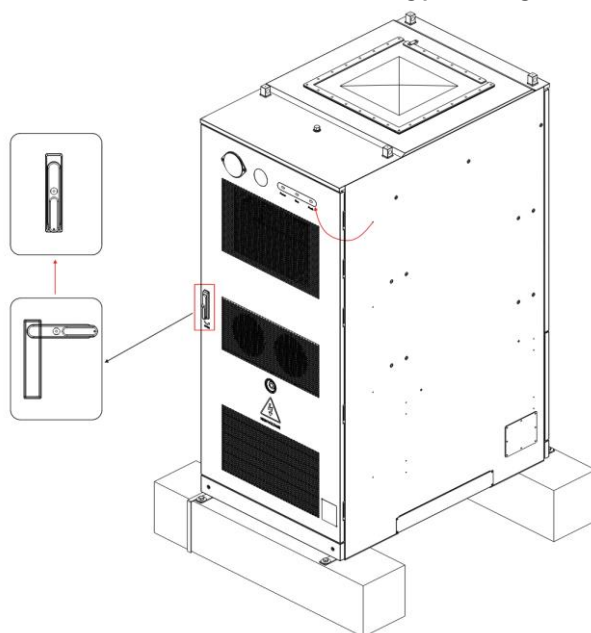
Step 4 Close the front door of the energy storage cabinet.

Figure 4-15 Close the front door of the energy storage cabinet

5 System Power-On & Power-Off

5.1 Pre-Power-On Inspection

No.	Inspection Item	Acceptance Criteria
1	Equipment Appearance	The equipment is intact and free of visible damage, rust, or peeling paint. Repaint any areas with peeling paint.
		All labels on the equipment are clearly visible and legible. Replace damaged labels promptly.
2	Cable Appearance	Cable protective layers are well wrapped and free of visible damage.
		Cable conduits/hoses are intact.
3	Cable Connection	Cable connections are correctly positioned according to the design.
		Terminals are properly installed in accordance with specifications, and connections are secure and reliable.
		All cables are clearly identified at both ends with legible labels that are oriented in a consistent manner.
4	Cable Routing	Cables are routed by separating strong and weak power systems.
		Cabling is organized in a neat and orderly manner.
		Cable ties are trimmed flush, eliminating sharp edges or protrusions.
		Bends are properly managed with sufficient slack, without over-tensioning cables.
		All cables are routed straight and smooth inside the cabinet, avoiding crossovers.
5	Switch	All circuit breakers in the power distribution cabinet are in the OFF position.

No.	Inspection Item	Acceptance Criteria
		All switches in the HV box are in the OFF position. (battery cabinet)
6	Enclosure Grounding	Each enclosure has at least two securely connected grounding points with a maximum contact resistance of 0.1Ω.
7	Identification	Identification is correct, legible, and complete.
8	Sealing of Cable Openings	All cable openings are properly sealed.
9	Battery Pack	All battery pack are free of visible damage.
10	Foreign Objects	All foreign objects such as tools, and leftover installation materials are removed from the cabinet.
11	Power Distribution Area Cover Plate	The cover plates in the power distribution area are free of visible cracks, dents, scratches, breakage, or looseness.

5.2 Circuit Breaker Description

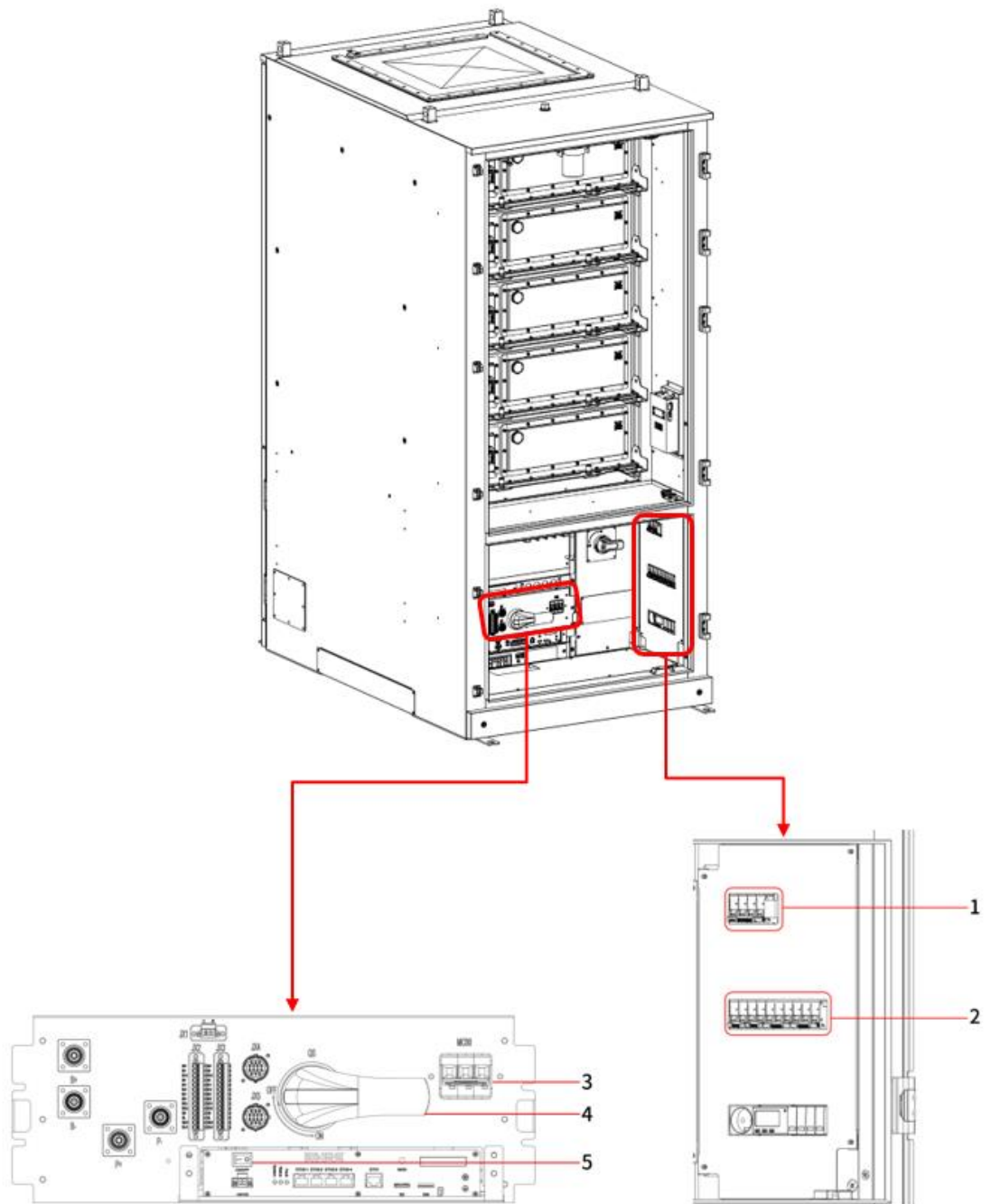


Figure 5-1 Schematic diagram of switch position

Table 5-1 Circuit Breaker List

SN	Name	Remarks
1	Circuit breaker group # 1	MCB1 (integrated power distribution box power supply) MCB2 (chiller and dehumidifier power supply) MCB3 (SPD switch) MCB4 (meter switch)
2	Circuit Breaker Group # 2	/
3	MCB0	Auxiliary power circuit breaker
4	QS	DC isolator switch
5	ON / OFF	EMS100 power switch

5.3 Power-On Procedure

Table 5- 2 Power-On Procedure

Step	Item	Comments
1	Close the auxiliary power circuit breaker MCB0	Observe the Power indicator on the front of the cabinet lights up.
2	Close the AC incoming circuit breaker QF and the DC circuit breaker QS	/
3	Close the circuit breaker groups MCB0, MCB1, MCB2, MCB3, and MCB4 in sequence	/
4	The energy storage battery cabinet is powered on.	Check if all equipment is powered on and pay attention to safety precautions.
Note a: Before closing the auxiliary power circuit breaker (MCB0) of the energy storage cabinet, check that the connection cables between the battery packs are securely connected.		

5.5 Power-Off Procedure

 BEWARE

When equipment installation and commissioning are completed, there is no need to power off the system; simply follow the shutdown procedure.

If the equipment needs to be powered off for maintenance, please refer to the power-off procedure in this section.

To prevent battery module power loss during extended storage, disconnect the auxiliary power.

This step is not required if the equipment will not be stored for an extended period.

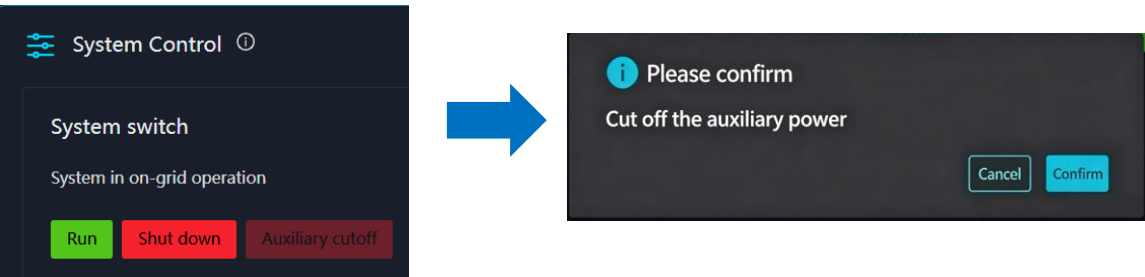
 CAUTION

Do not activate this function while the equipment is operating normally. Doing so may affect its operation and pose safety hazards.

The user is liable for all consequences resulting from improper operation of this function.

Disconnect Auxiliary Power Operation Procedures

Step 1 Navigate to System Status > Power On/Off, select Disconnect Auxiliary Power, and click Confirm.



Step 2 The auxiliary power is disconnected and the PANGU LITE is inactive.

Table 5-3 Power-Off Procedure

Step	Item	Comments
1	Disconnect the circuit breaker groups MCB1, MCB2, MCB3, and MCB4 in sequence.	/
2	Disconnect the AC incoming circuit breaker QF and the DC circuit breaker QS	/
3	Disconnect the auxiliary power circuit breaker MCB0	Observe the Power indicator on the front of the cabinet turns off.
4	The energy storage battery cabinet is powered off.	Even after the equipment is powered off, the AC input line may still be live. Please take proper safety precautions.
Note a: After disconnecting the auxiliary power circuit breaker (MCB0) of the energy storage cabinet, the power connection cables between the battery packs must be disconnected to ensure the DC side is powered off.		

6 System Commissioning

6.1 Prepare and Enter WHES OS

Operating Procedure

Step 1: Connect the computer to any LAN port of the switch labeled “NET1” using an Ethernet cable.

Step 2: Verify that the computer’s current IP address is 133.144.155.XXX.

Step 3: Open a web browser and enter 133.144.155.209:8080/lite to access the WHES OS interface.

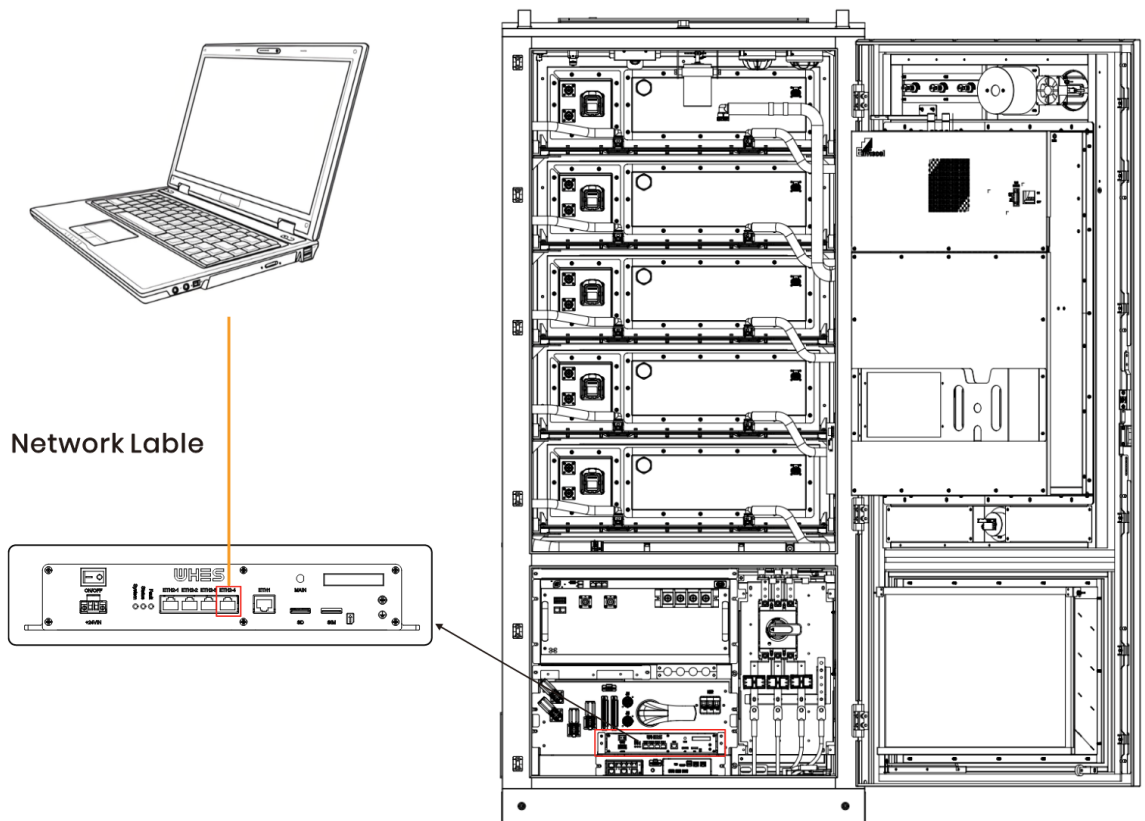


Figure 6-1 Diagram Wiring Diagram for Communication Cables

6.2 Introduction to the WHES OS Interface

6.2.1 WHES OS Home Page Overview

1. After entering the interface, language, time zone, display settings, and other parameters can be configured in the upper-right corner.
2. This page displays the energy flow of the energy storage cabinet, as well as the real-time operating status of the battery, grid, and load. Alarm information indicates system operating conditions, and the data is refreshed every 5 seconds.
3. The flow diagram shows the grid power and energy, the power, energy, and SOC of the energy storage cabinet, and the load power.
4. Operating Status of the Energy Storage Cabinet:
 - Charging: Indicates that the system is currently charging.
 - Discharging: Indicates that the system is currently discharging.
 - Offline: Indicates that the system is not connected or is out of service.
 - Standby: Indicates that the system is functioning normally, with no faults and no charging or discharging activity.
 - Shutdown: Indicates that the system has stopped operating.

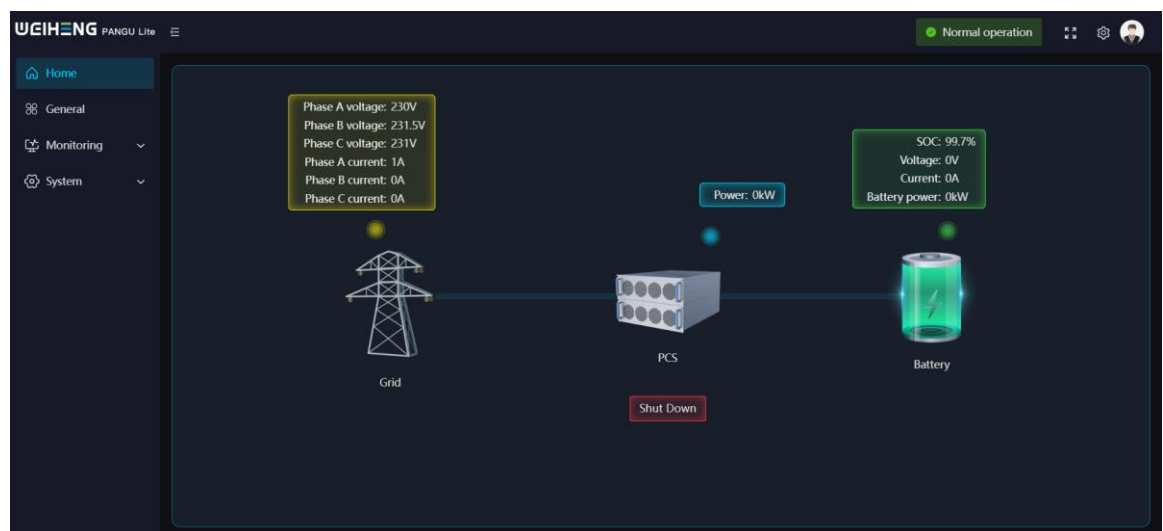


Figure 6-2 Home Page

6.2.2 Energy Storage System Overview

Displays the basic system information, including the rated power, rated capacity, maximum charge/discharge power, number of PCS units, number of battery

clusters, total charge /discharge power, commissioning time, days of safe operation, currentavailable/usable charge and discharge capacity, SOH and SOC, total grid consumption and total grid feed-in energy, today’s revenue, and the real-time charge/discharge power curve.

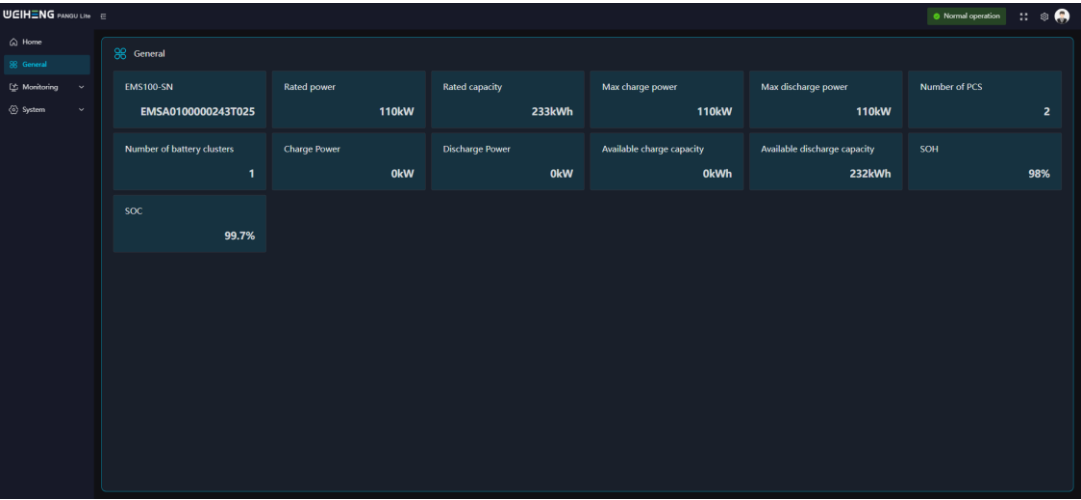


Figure 6-3 Energy Storage System Overview

6.2.3 Operational Monitoring

PCS Interface:

Real-time monitoring of DC current, DC voltage, and three-phase phase voltage data. Monitors all operating states of the PCS. Displays PCS operational data as well as simulation data.

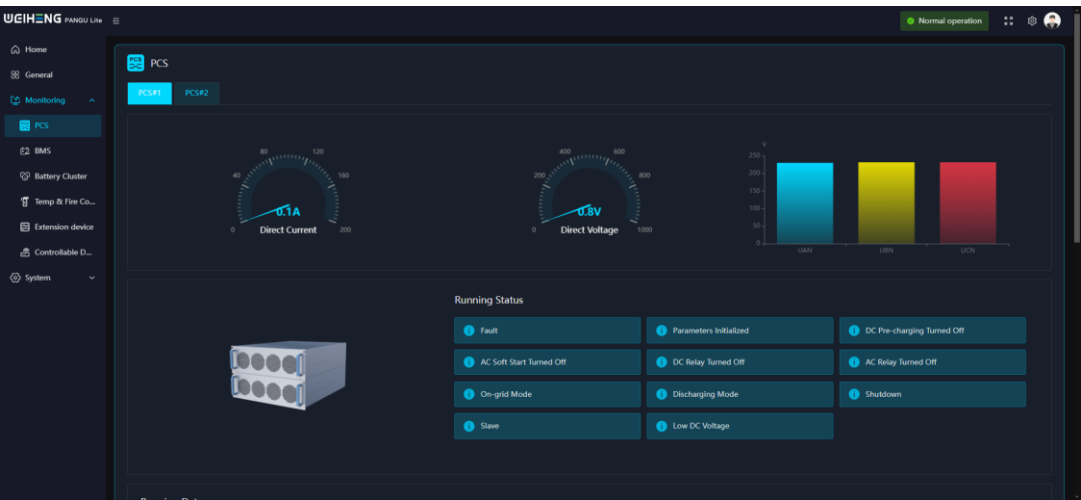


Figure 6-4 PCS Interface

BMS Interface:

This interface displays monitoring information for SOC and SOH, operating status, and detailed operational data of the battery BMS. It also provides real-time

monitoring information for all battery clusters, including their current status and data.

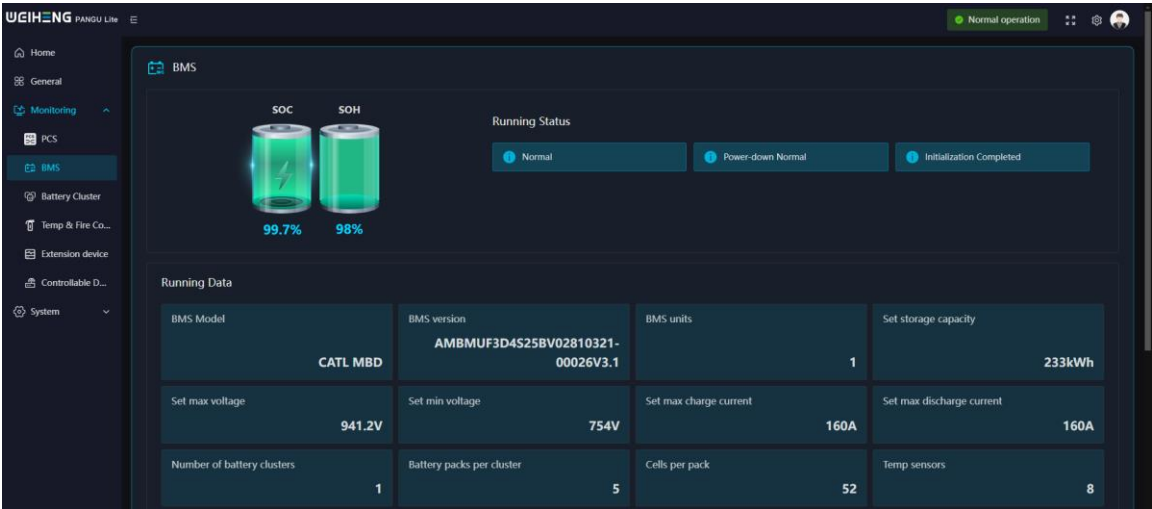


Figure 6-5 BMS Interface

Battery Cluster Interface:

This interface monitors the voltage and temperature of each individual battery within the battery pack, and tracks all operational data of the entire battery cluster.

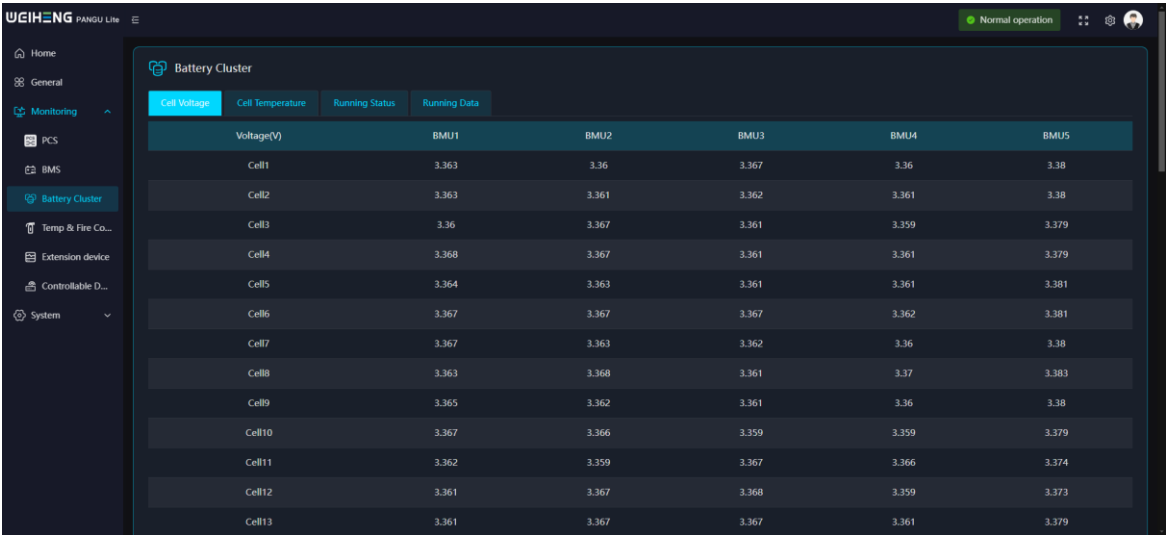


Figure 6-6 Battery Cluster Interface

Temperature Control & Fire Protection Interface:

This interface monitors the supply and return water temperature, pressure, and operating status of the water-cooling system. It also monitors the operating status of the air-conditioning equipment and fire protection devices.

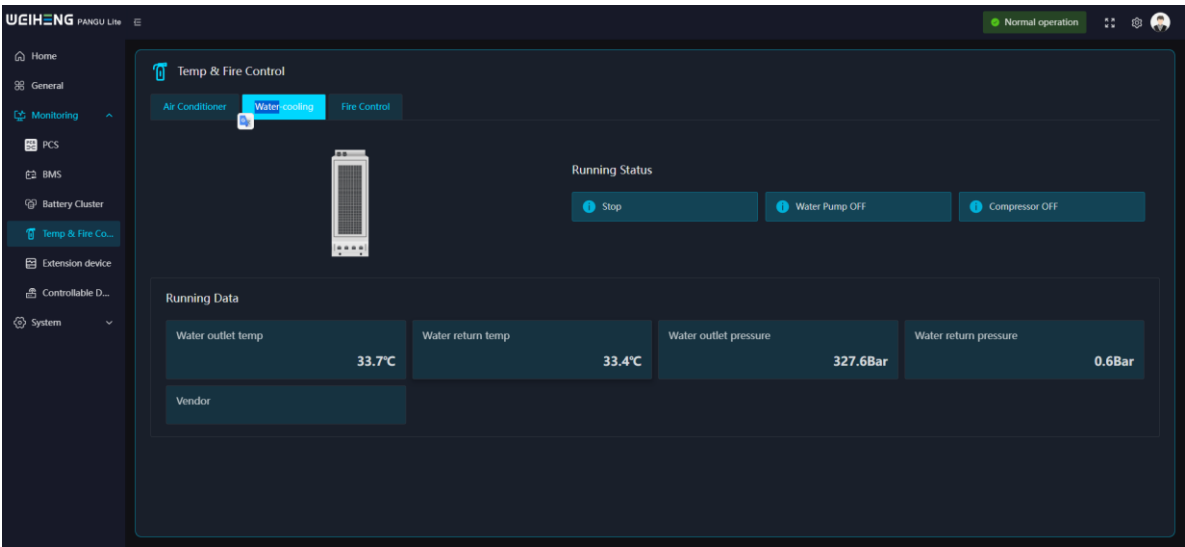


Figure 6-7 Temperature Control & Fire Protection Interface

6.2.4 System Configuration

System Status Interface:

This interface allows users to view the system’s operating status and perform system control operations.

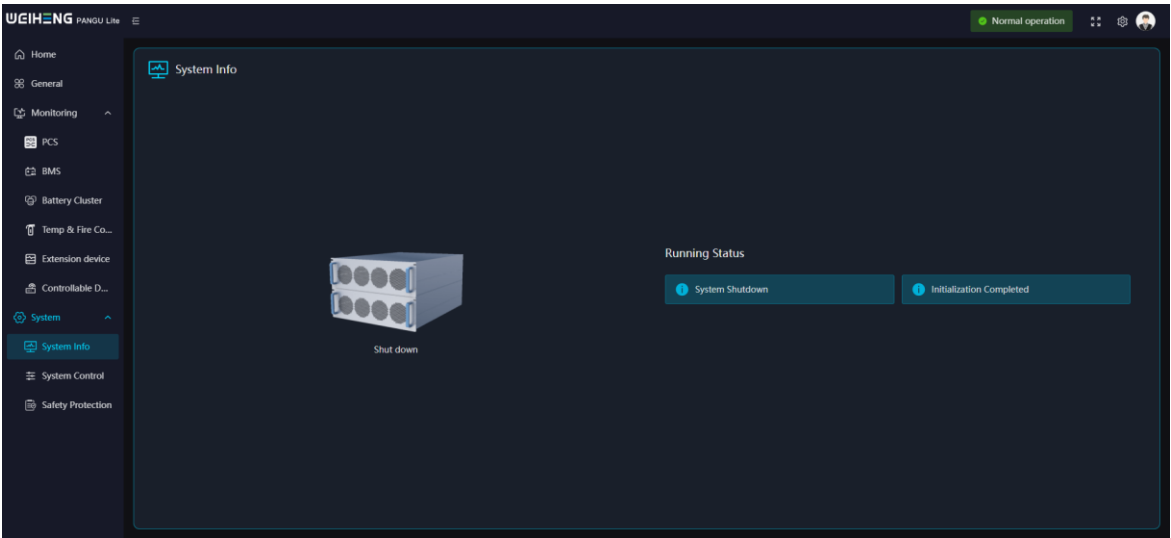


Figure 6-8 System Status Interface

System Control Interface:

This interface allows control of the energy storage system, including system on/off, system reset, grid switch, control mode, minimum discharge SOC, power factor, power control, and coordination control switches.

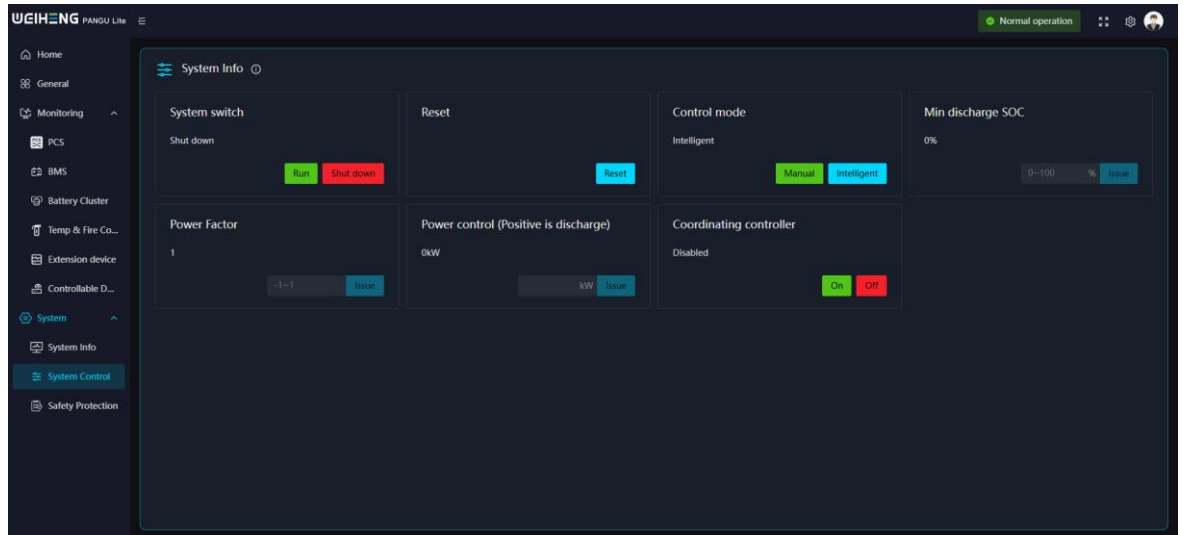


Figure 6-9 System Control Interface

6.3 Power-On with WHES OS

Operating Steps

Step 1: Access the System Control within the System Configuration interface, click the Power On button, and observe that the device status changes to Grid-Connected Operation.



Figure 6-10 Power-On Step 1

Step 2: Check the Home Page to verify that the PCS operating status has changed to Standby.

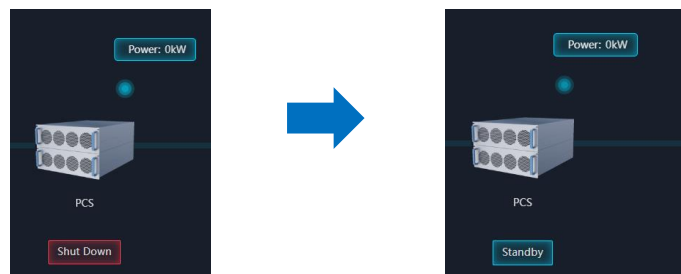


Figure 6-11 Power-On Step 2

Step 3: Navigate to the Power Station Control Strategy interface, create a new strategy, configure the charge/discharge power, schedule, and SOC, then click the Apply button.

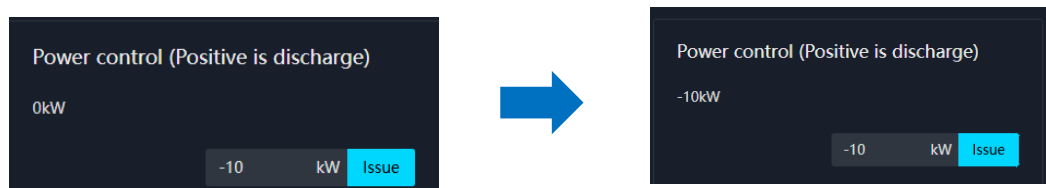


Figure 6-12 Power-On Step 3

Step 4: Check the Home Page to verify that the PCS operating status has changed to Charging, and observe the system's real-time operating power.



Figure 6-13 Power-On Step 4

6.4 Power-Off with WHES OS

Operation Procedures

Step 1: Navigate to "System Configuration > System Control", enter 0 kW in the "Power Control" module, and click the "Apply" button.



Figure 6-14 Power-Off Step 1

Step 2: Check the "Home" screen to verify that the PCS is in standby mode.



Figure 6-15 Power-Off Step 2

Step 3: Navigate to "System Configuration > System Control", click the "Stop" button, and verify that the equipment status has been switched to inactive mode.

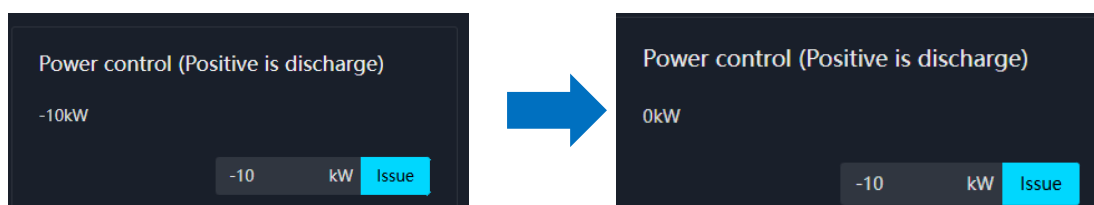


Figure 6-16 Power-Off Step 3

Step 4: Check the "Home" screen to verify that the PCS is in inactive mode, indicating that the equipment has been shut down

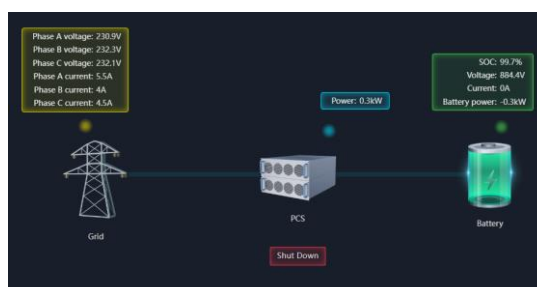


Figure 6-17 Power-Off Step 4

7 Fire Protection System

7.1 Fire Protection System Components

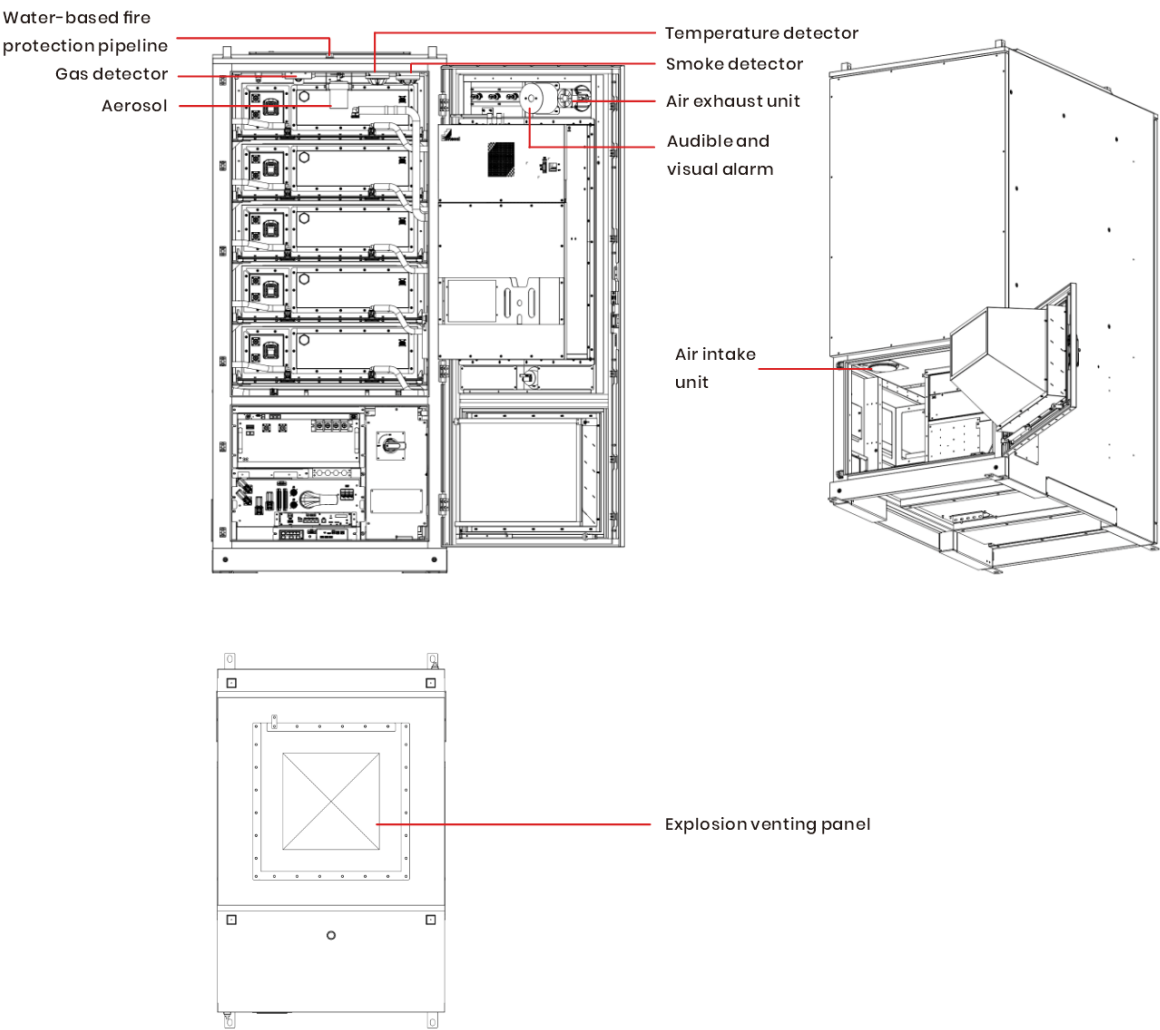


Figure 7-1 Fire Protection System – Front View

7.1.1 Smoke Detector

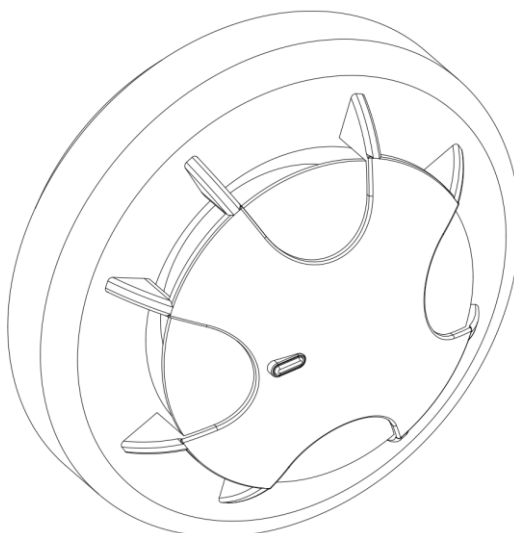


Figure 7-2 Smoke Detector

Component Description: This product is an explosion-proof smoke detection device dedicated to energy storage systems. Adopting an intrinsically safe explosion-proof design, it can be safely applied in scenarios such as energy storage containers and power stations, enabling accurate detection of early smoke and fire hazards.

The device features environmental adaptability and self-diagnosis for faults, ensuring stable and reliable operation. It can be seamlessly connected to the energy storage fire protection system, providing 24-hour all-weather smoke safety monitoring for energy storage systems.

Table 7-1 Technical Parameters

No.	Model/Spec	Value
1	Product Model	DC-9102(IS)
2	Product Name	Intrinsically Safe Conventional Photoelectric Smoke Detector
3	Working Voltage	24V (16V~28V)
4	Standby Current	≤60μA
5	Alarm Current	10mA≤I≤30mA
6	Indicator Status	Red light: flashing in normal operation, steady on for alarm
7	Explosion-proof Mark	Exib II CT6 Gb
8	Explosion-proof Certificate	CEI1.2130
9	Zener Barrier	Uo=28V, Io=93mA
10	Alarm Reset	Momentary Power Failure (Min.5s , Max.2.5VDC)
11	Operating Temperature	-10℃~+55℃
12	Relative Humidity	≤95%, Non-condensing
13	Housing Material	ABS
14	IP Rating	IP23
15	Overall Dimensions	Diameter 100mm , Height 54.5mm (With base)
16	Mounting Hole Spacing	45mm~75mm
17	Weight	Approx. 110g

7.1.1 Temperature Detector

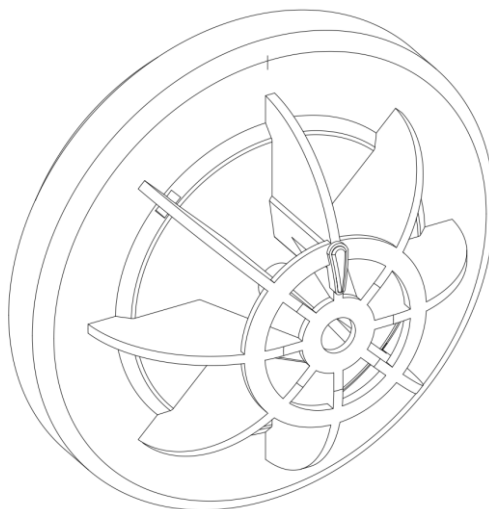


Figure 7-3 Temperature Detector

Component Description: This product is an explosion-proof temperature detection device dedicated to energy storage systems. Adopting an intrinsically safe explosion-proof structure, it is suitable for hazardous and explosion-proof areas such as energy storage cabins and power stations. It can real-time monitor abnormal temperature rise and over-temperature fire risks.

The device supports on-site working mode configuration, featuring stable performance and strong environmental adaptability. It is fully compatible with energy storage fire protection systems, providing accurate temperature and fire early warning for energy storage systems.

Table 7-2 Technical Parameters

No.	Model/Spec	Value
1	Product Model	DC-9103(IS)
2	Product Name	Intrinsically Safe Conventional Rate of Rise and Fixed Temperature Heat Detector
3	Working Voltage	24V (16V~28V)
4	Standby Current	≤60μA
5	Alarm Current	10mA≤I≤30mA
6	Indicator Status	Red light: flashing in normal operation, steady on for alarm
7	Explosion-proof Mark	Exib II CT6 Gb
8	Explosion-proof Certificate	CEI2.2146
9	Zener Barrier	Uo=28V , Io=93mA , Co=0.083μF , Lo=4mH, Um:250V
10	Alarm Reset	Instantaneous power cut (Min.5s , Max.2.5VDC)
11	Detector type	AIR、BS (Field programmable)
12	Operating Temperature	AIR: -10℃~+50℃; BS: -10℃~+65℃
13	Relative Humidity	≤95%, Non-condensing
14	Housing Material	ABS
15	IP Rating	IP33
16	Overall Dimensions	Diameter 100mm , Height 53.3mm (With base)
17	Mounting Hole Spacing	45mm~75mm
18	Weight	Approx. 130g

7.1.2 Sound Light Alarm

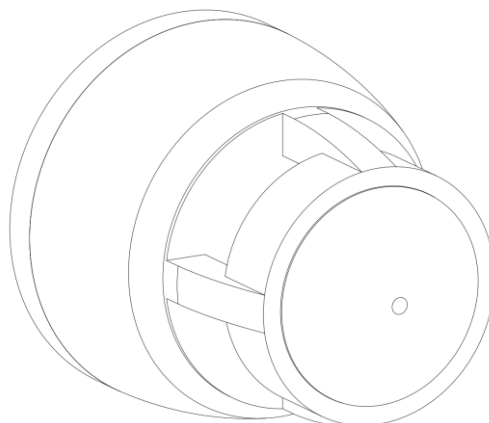


Figure 7-4 sound light alarm - Appearance

Component Description: This audible and visual alarm can provide audible and visual alerts when triggered. It can be used with a bus-type fire alarm controller via the output module. When the fire alarm controller issues a start command, the output module activates the audible and visual alarm accordingly. Then, the audible and visual alarms emit intense visual alerts and piercing audible signals to notify on-site personnel of the fire occurrence and the necessity to implement evacuation measures, thereby preventing the fire incident from escalating.

Table 7-3 Technical Parameters

Device model	AW-D316
Operation Voltage	Power supply: 24 V DC (20 V ~ 28 V)
Operating Current	≤100 mA
EN54 - 23 Coverage	C - 3 - 8/W - 2.4 - 6 (see the figure below for volume coverage)
Flash Color and Frequency	White, 0.5 Hz
Light Output	According to EN54 - 23
Working Temperature	-10℃ ~ +55℃
Relative Humidity	≤ 95% (non-condensing)
Lens/Housing Material	Flame-retardant polycarbonate/acrylonitrile-butadiene-styrene (ABS) copolymer
Measurement	Diameter 100 mm × height 100.5 mm (including base)
Mounting Hole Spacing	45 mm ~ 70 mm
Weight	Approx. 266 g (including base)

7.1.3 Aerosol

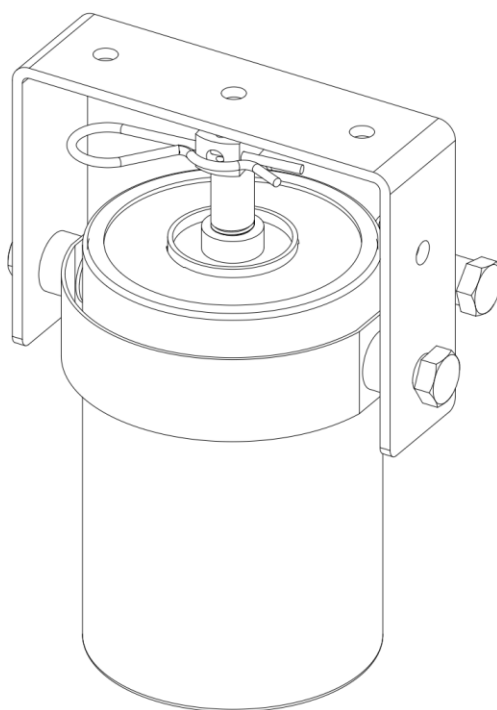


Figure 7-5 Aerosol Appearance

Component Description: The DSPA aerosol generator is a high-efficiency fixed fire extinguishing component, featuring a non-pressure design that allows for direct installation in the confined space to be protected. After activation, the device releases a fully flooded aerosol cloud that quickly spreads to cover the entire protected area, and effectively extinguishes Class A (solid), Class B (liquid), and Class C (gas) fires through the dual effects of chemical suppression and suffocation.

Table 7-4 Technical Parameters

Model/Spec	Value
Model	100T
Aerosol Mass	100 grams
Weight	0.827 kg. / 1.82 lbs.
Length	152 mm / 6.00 inches
Diameter	76 mm / 3.00 inches
Discharge Time	11.5 seconds

7.1.4 Explosion Vent Panel

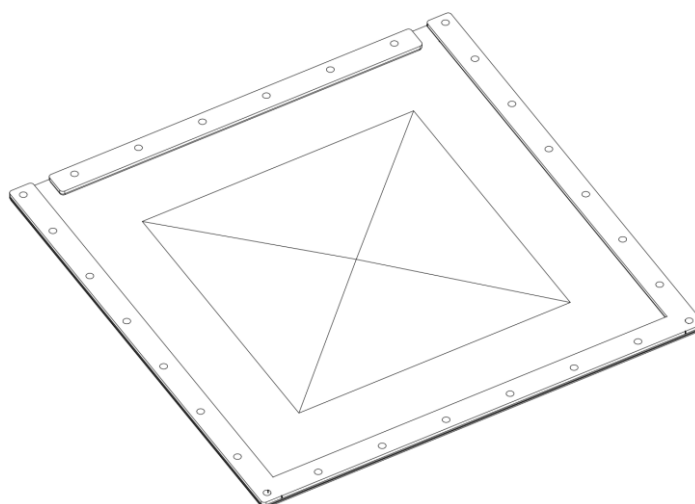


Figure 7-6 Explosion Vent Panel

Component Description: The explosion vent panel plate is an important safety component of the energy storage cabinet. It is designed to release high-pressure gas and smoke in a controlled manner, preventing the cabinet from exploding in the event of a sudden rise in internal pressure due to battery abnormalities such as thermal runaway or short circuit. The explosion vent panel is installed on the top of the enclosure and is linked with the smoke and temperature detection and fire extinguishing system, creating a multi-layer protection strategy as the last line of defense. It is also used to minimize secondary hazards through directional pressure venting channels, ensuring the safety of both equipment and personnel.

Table 7-5 Technical Parameters

Model/Spec	Value
ATEX Certification	ATEX II GD - INERIS15ATEX0001X_ Type VL
Protection Level (IP Degree of Protection)	IP65 (compliant with IEC 60529)
Static Pressure (Pstatl)	<500 mbar
Standard Static Pressure (Pstatl standard)	100 mbar +/-15% @22°C
Pressure Change Rate (Kgr)	dp/dt <130 bar/s
Maximum Pressure (Pmax)	<12 bar
Maximum Rated Pressure (Pred, max)	<1.8 bar
Material (In - ox 304L)	Stainless Steel 1.4307
Material (In - ox 316L)	Stainless Steel 1.4404
Gasket (Joint / gasket)	SILICONE UL50E - UL157
Temperature Range (Temperature)	-55...+200 °C

7.1.5 Gas Detector ACP

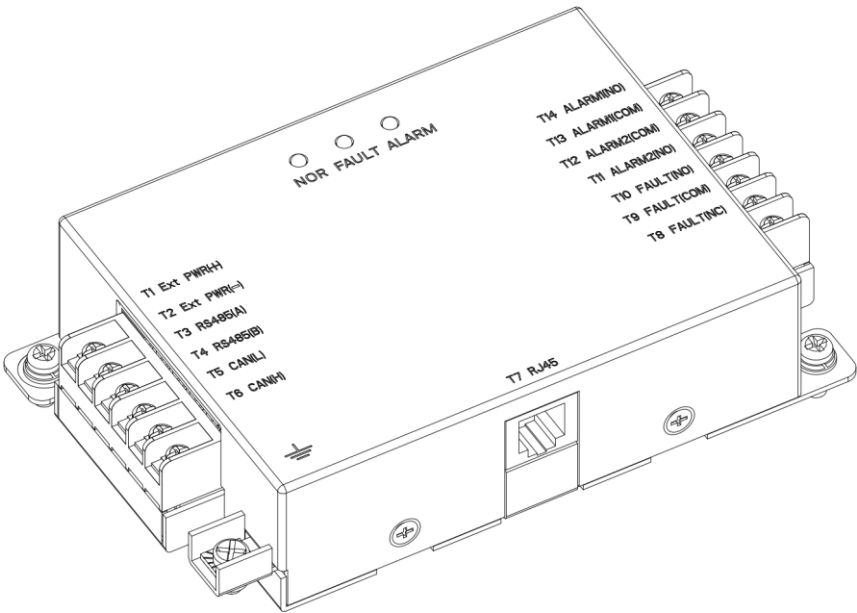


Figure 7-7 Gas Detector Module

Component Description: This module offers a compatible interface for the Li-ion Tamer (LT-SEN-IM), enabling customers to use it independently without the need for an additional controller for Li-ion Tamer detectors. It is suitable for compact energy storage application scenarios, including outdoor energy storage cabinets and independent lithium-ion battery racks. This module facilitates system integration for manufacturers before leaving the factory, eliminating the need for on-site interconnection between cabinets.

Table 7-6 Technical Parameters

Model/Spec	Value
Operating Temperature Range	-20°C ~ 70°C
Humidity Range (Non-condensing)	5% ~ 95% RH
Dimensions (H×W×T)	140mm×85mm×32.8mm
Transportation Weight	365g
Input Voltage Range	15V ~ 32V DC
Input Current	5mA ~ 13mA
Max Power	0.5W
Relay Load Capacity	30V DC/125V AC, 2A DC/0.5A AC
RJ45 Output	5V DC, 53mA

7.1.6 Gas Detector

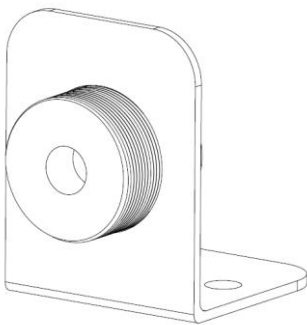


Figure 7-8 Gas Interface Module

Component Description: The combustible gas detector monitors real-time concentrations of combustible gases (such as methane, propane, and hydrogen) in the environment. When levels reach a preset danger threshold, it immediately activates an audible and visual alarm, cuts off the power supply, or initiates the fire extinguishing system to prevent gas accumulation and mitigate the risk of explosions or fires.

Table 7-7 Technical Parameters

Model/Spec	Value
Temperature (Operating)	-10 to +60°C
Temperature (Storage)	-10 to +70°C
Humidity	5 to 95% relative humidity
Maximum Temperature Change	8.6°C per minute
Sensor	Ø 28.6 x 25.4 mm
Monitor Cable	165 mm *
Connector Type	Female RJ45
Wire Type	Brown (Power +)
Wire Type	Green/White (Ground)
Wire Type	Brown/White (Signal +)
Product Safety	UL/IEC 61010
EMC	EN 60326 - 1 compliant with EU Directive (2014/30/EU)
RoHS	RoHS 3 EU 2015/863

7.1.7 Intake and Exhaust Device

NOTE

If the intake and exhaust fan is not selected for installation, the original installation position of the intake and exhaust fan will be default equipped with a spring explosion-proof valve. The specific parameters shall be subject to the physical product.

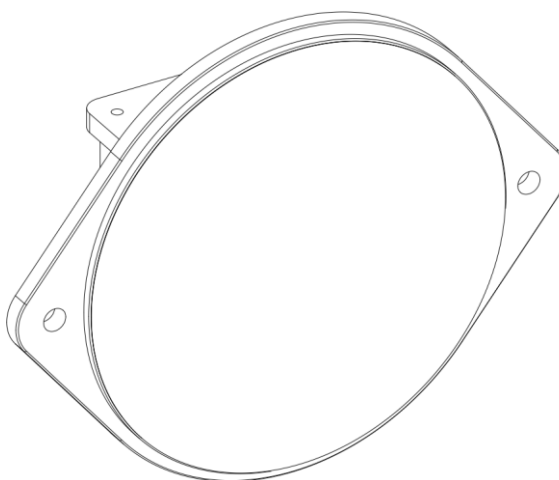


Figure 7-9 Air intake device

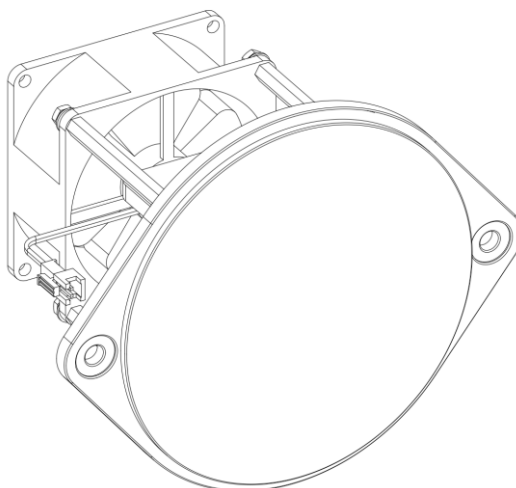


Figure 7-10 Air exhaust device

Component Description: Once abnormal pressure or smoke is detected by the internal sensors, a 24V forward-phase voltage signal is triggered to activate the electric actuator. The actuator then extends and drives the valve to open in a specific direction, allowing for the quick discharge of high-pressure gases and smoke, thus preventing explosion risks. Upon completing pressure relief, a 24V

reverse-phase voltage is automatically applied to retract the electric actuator, which then precisely closes the valve and restores the system to an airtight state. This establishes a closed-loop safety mechanism that highlights the core advantages of rapid response and reusability.

Table 7-8 Technical Parameters

No.	Parameter Category	Key parameters	Specifications/Indicators
1	Basic Protection	Waterproof Level	IP66
		Operating Temperature Range	-20℃ ~ +80℃
		Anti-corrosion Grade	Exterior C4H (720h salt spray) / Interior C3H (72h salt spray)
		Environmental Standard	ROHS 2.0
		Design Life	10 years
2	Explosion-Proof Valve Performance	Exhaust Area (Opened)	>5836 mm²
		Electric Actuator Drive Voltage	DC 24V (minimum startup voltage: 18V)
		Electric Actuator Power/Current	<2W / 0.05A ±15% (inrush <0.3A)
		Stroke Speed & Distance	4mm/s, 30mm stroke
		Wiring Mode	Red positive, black negative; automatic power-off protection (burnout risk if >100s)
		Wiring Specification	UL1007 #24 AWG, wire length 290mm, female terminal
3	Cooling Fan	Fan Power/Current	48W / 2.0A ±15% (inrush <2A)
		Voltage/Speed	DC24V / 13650 RPM
		Airflow Range	121.2~134.7 CFM
		Measurement	80×80×38mm
		Wiring Specification	UL1007 #24 AWG, wire length 300mm, male terminal

7.2 Fire Protection System Control Logic

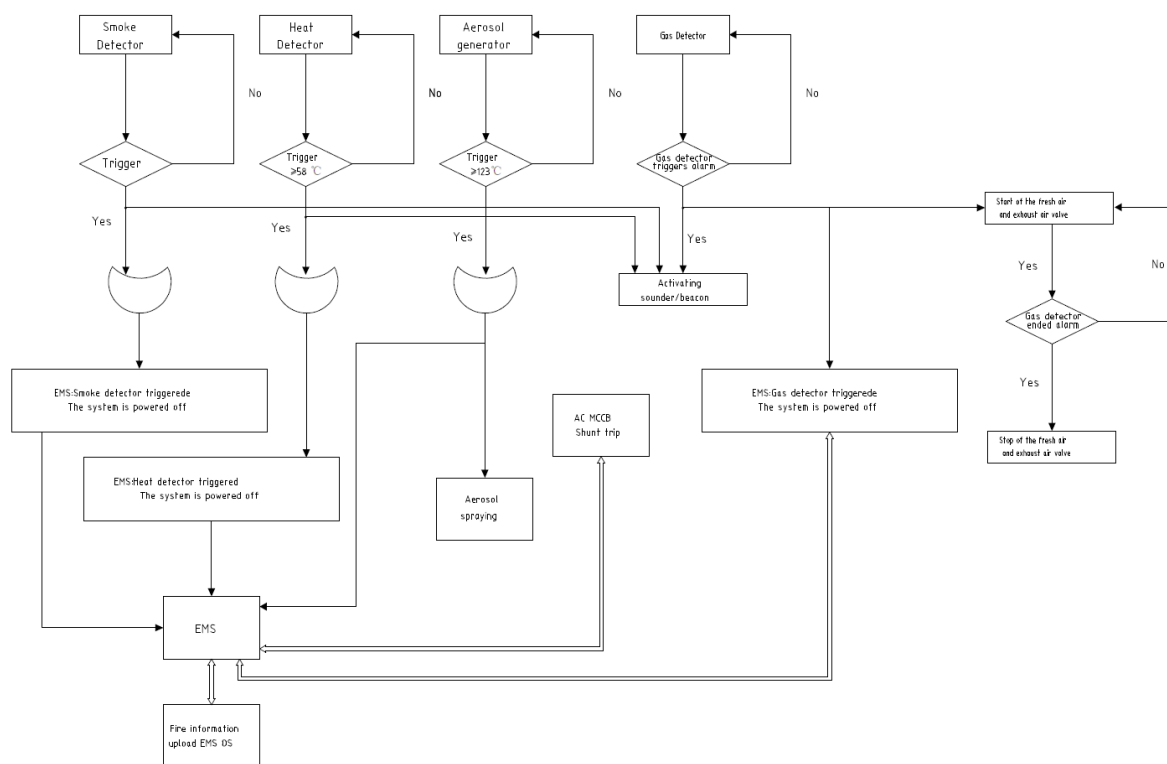


Figure 7-11 Fire protection logic diagram



Figure 7-11 is the fire protection logic diagram for the fully equipped version. For other versions, please contact our company's after-sales service personnel for obtaining the diagram.

7.3 Water-Based Fire Protection System

Single cabinet installation

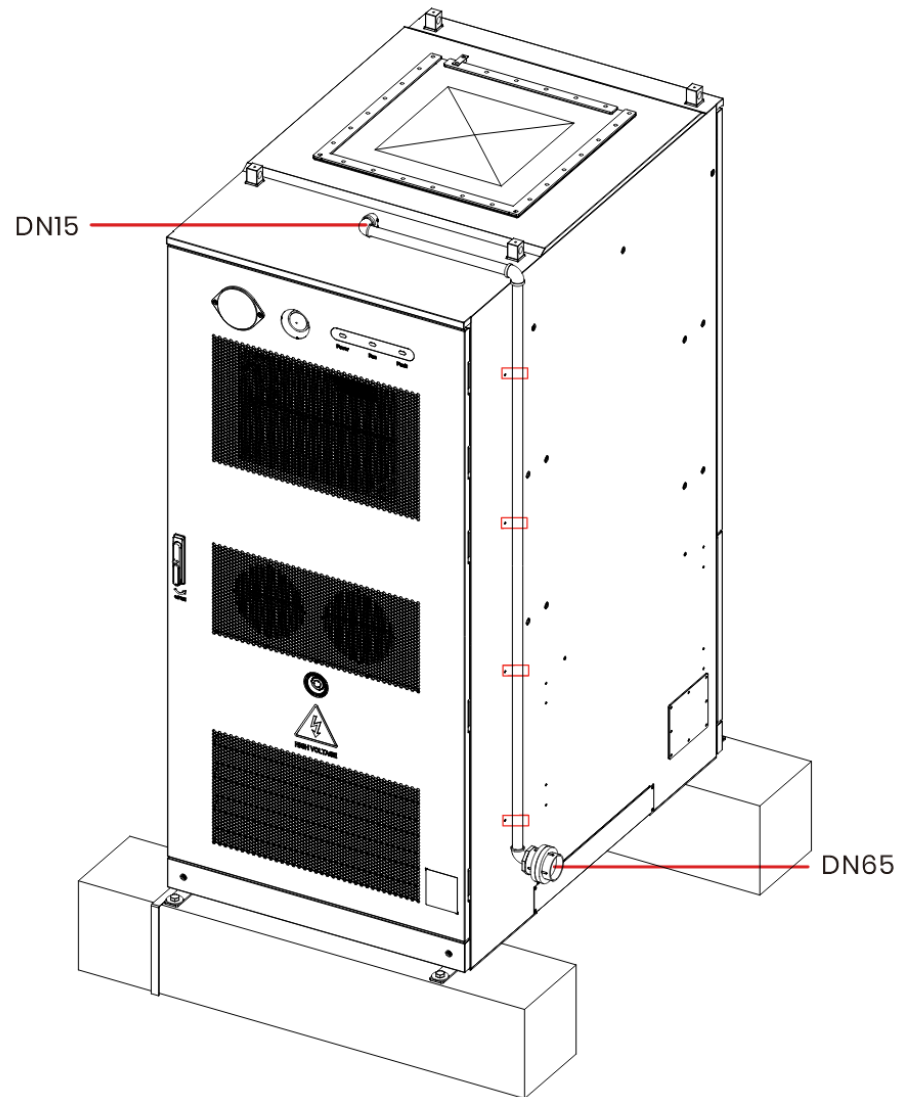
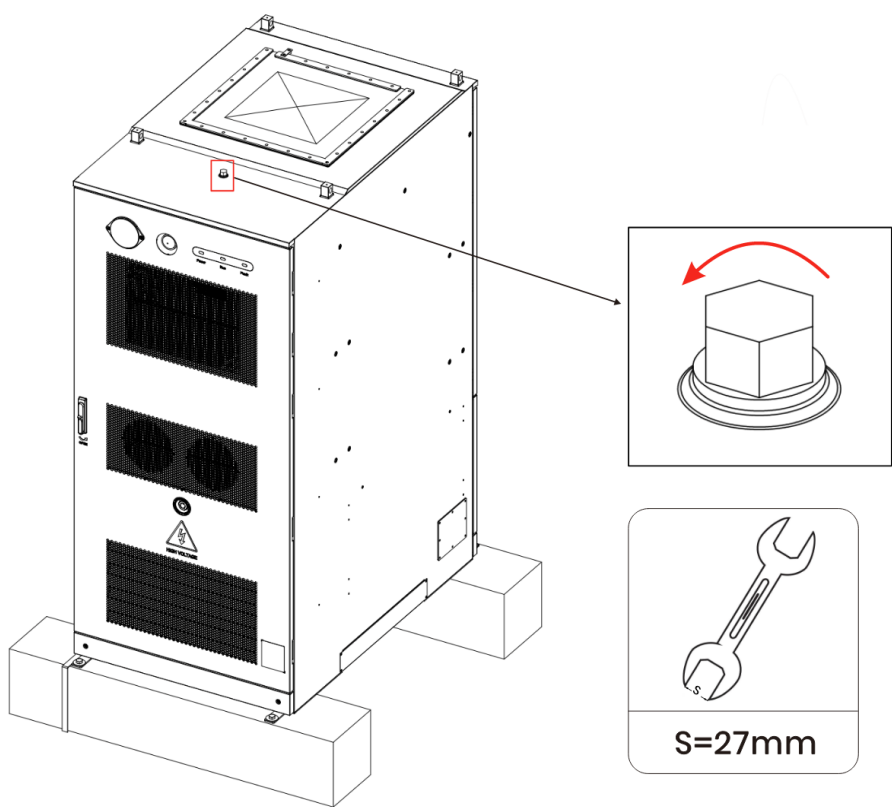
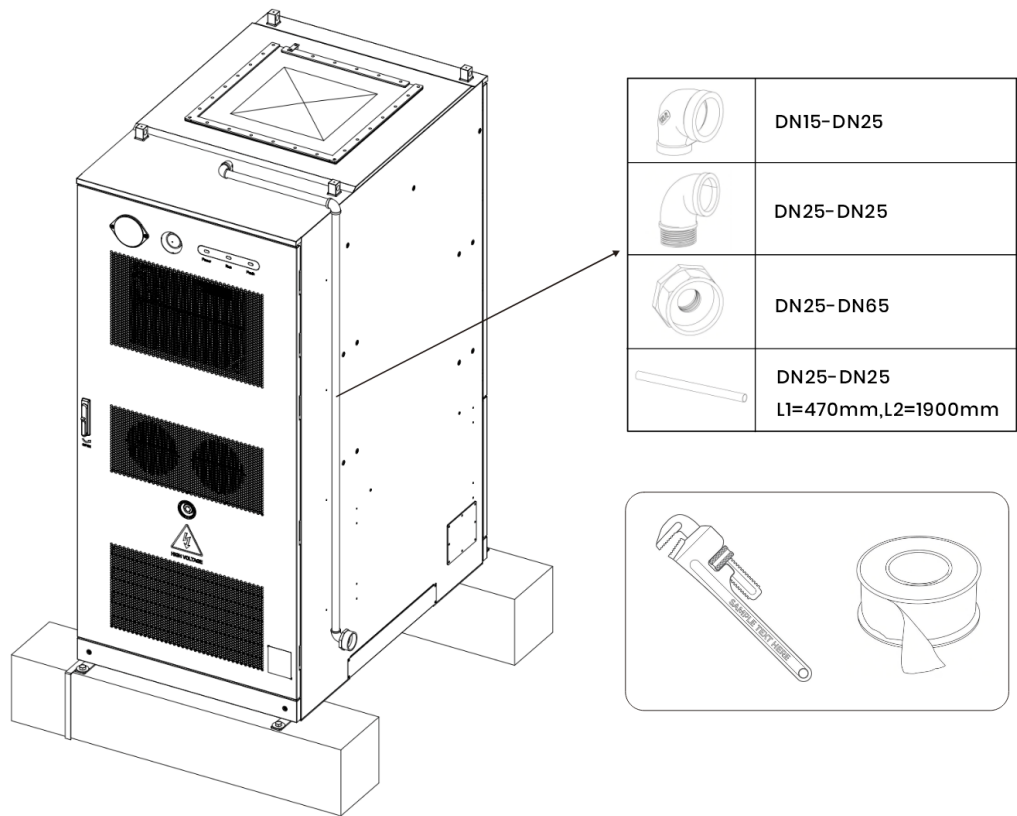


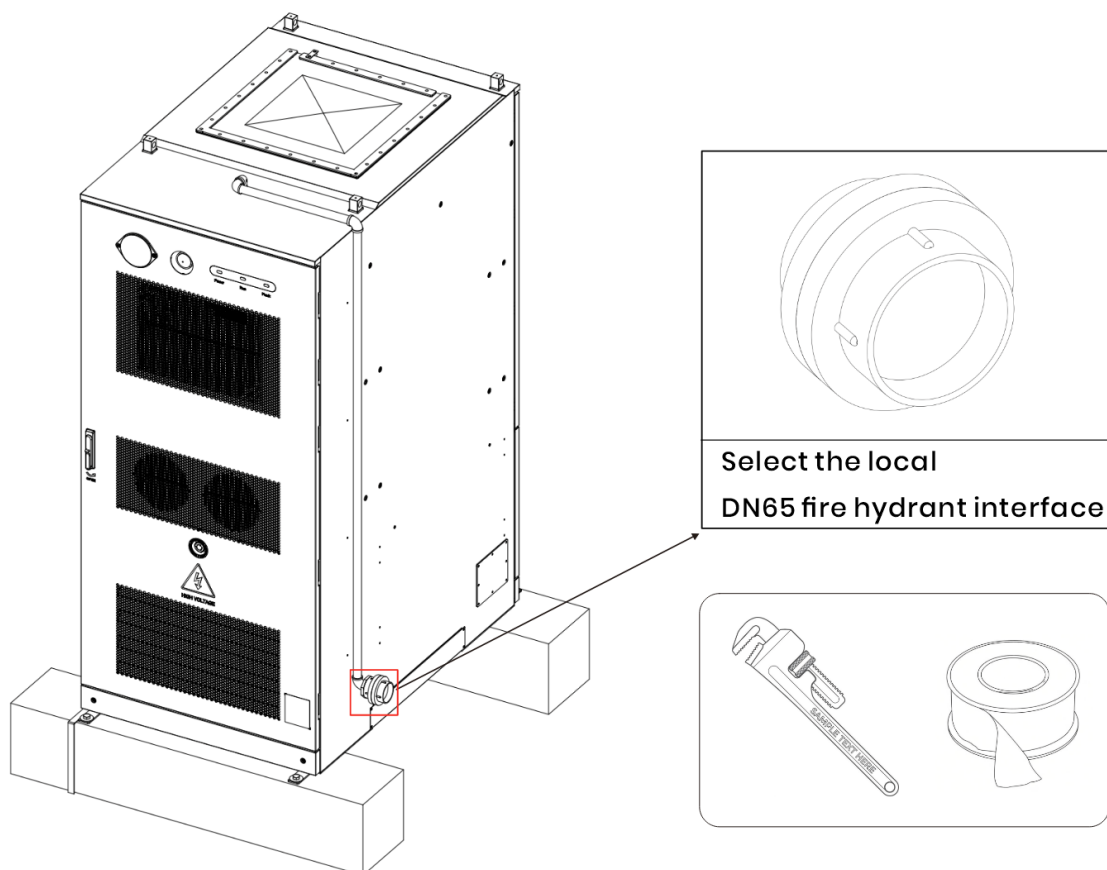
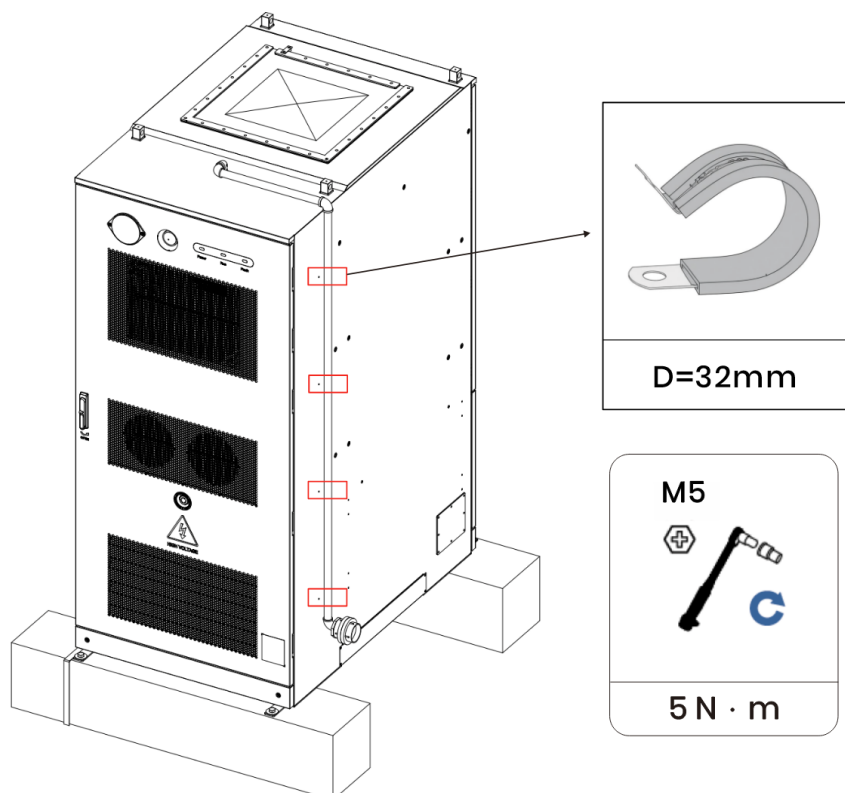
Figure 7-12 Single cabinet installation

Step 1 Remove the top DN15 cap



Step 2 Install adapter and pipeline



Step 3 Install fire hydrant connector**Step 4** Fix the side pipeline

Multiply cabinet installation

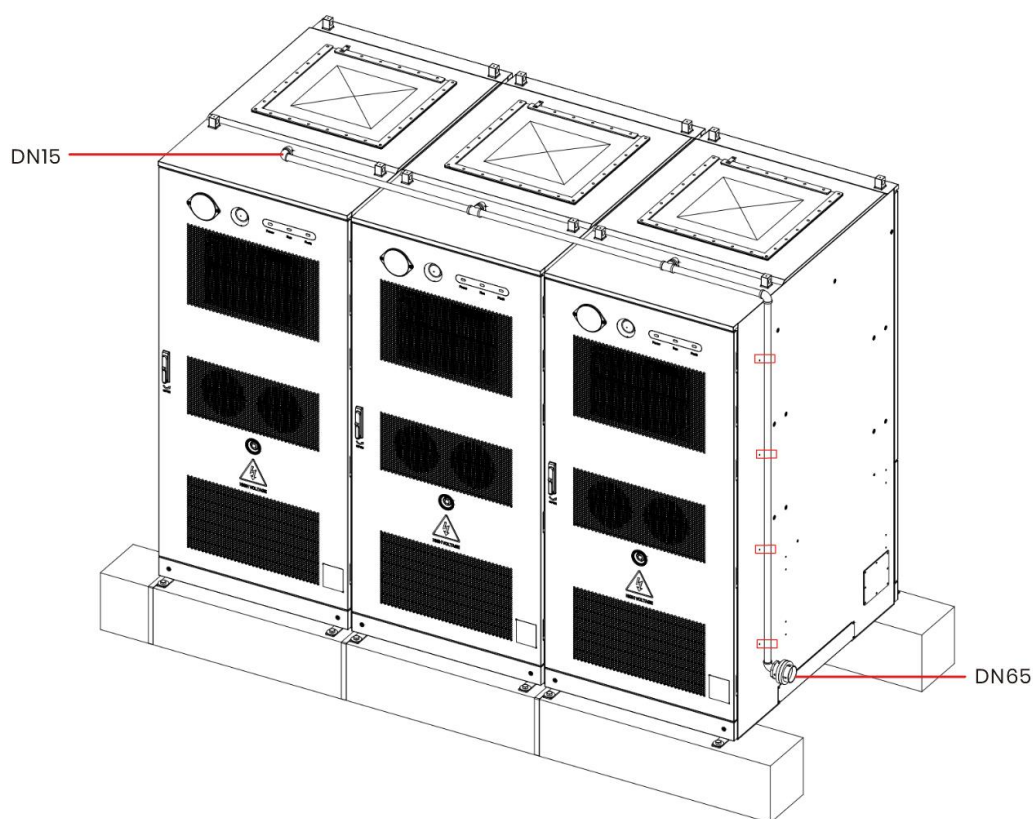
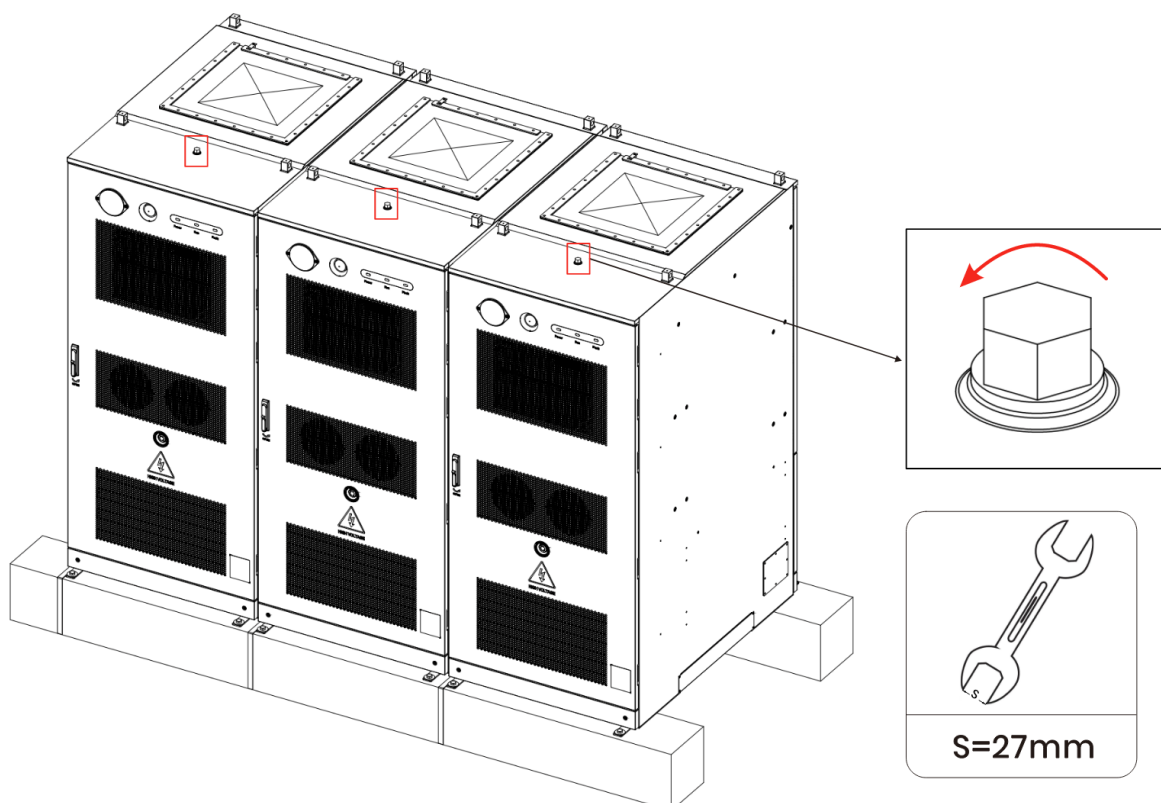
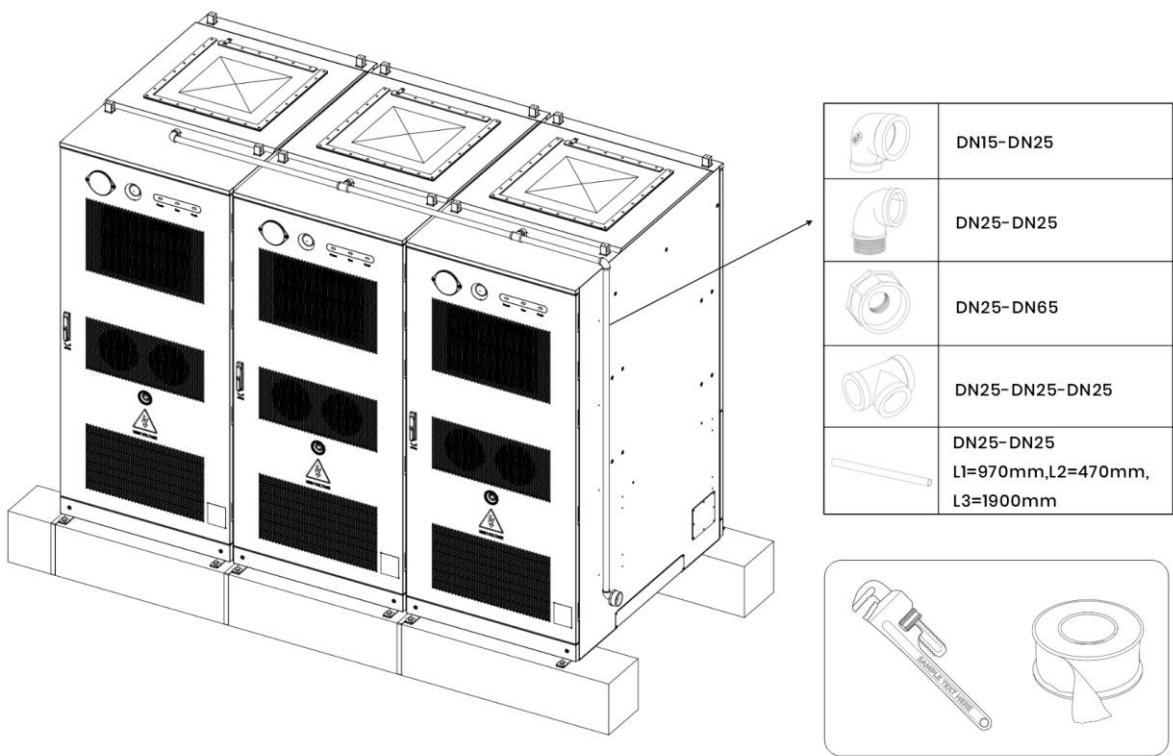


Figure 7-13 Multiply cabinet installation

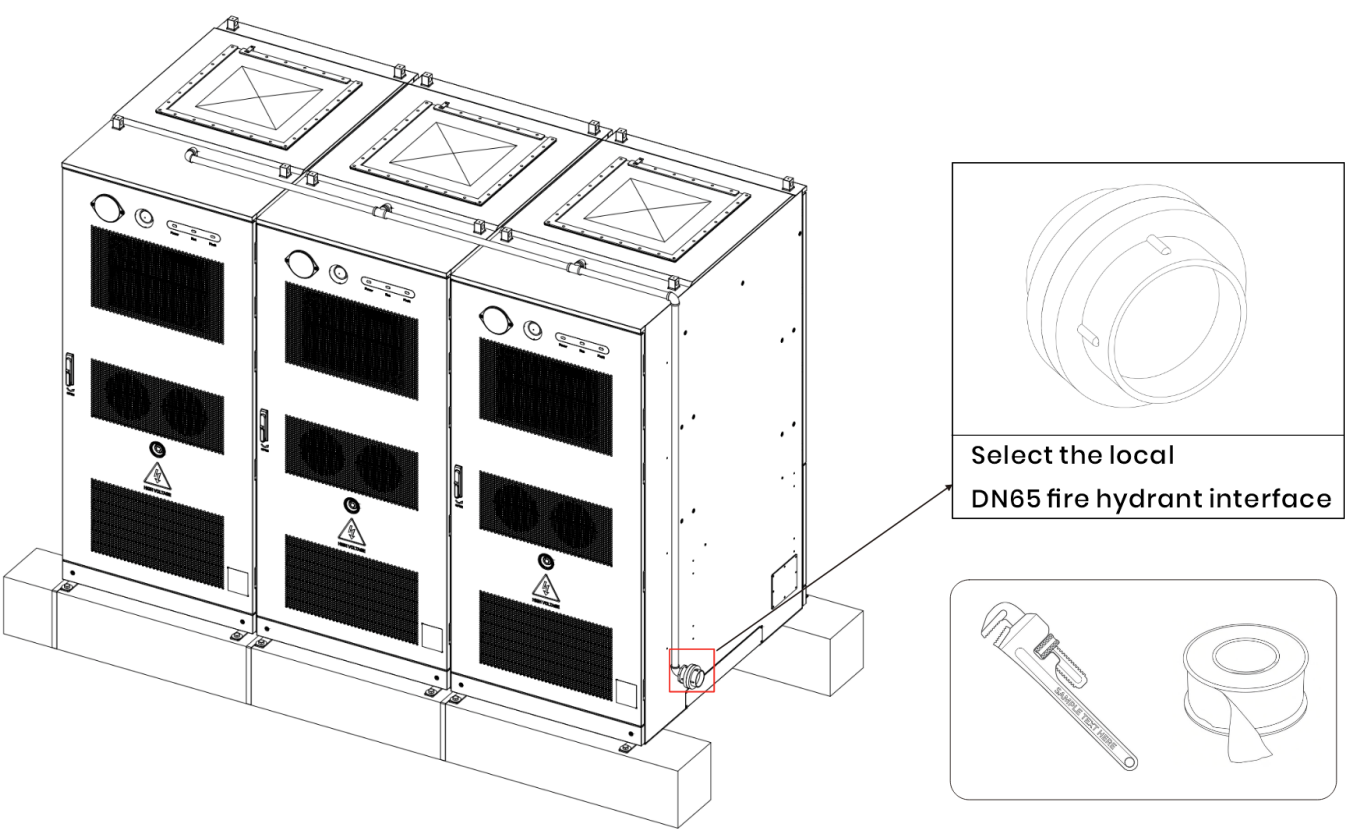
Step 1 Remove the top DN15 sealing cap

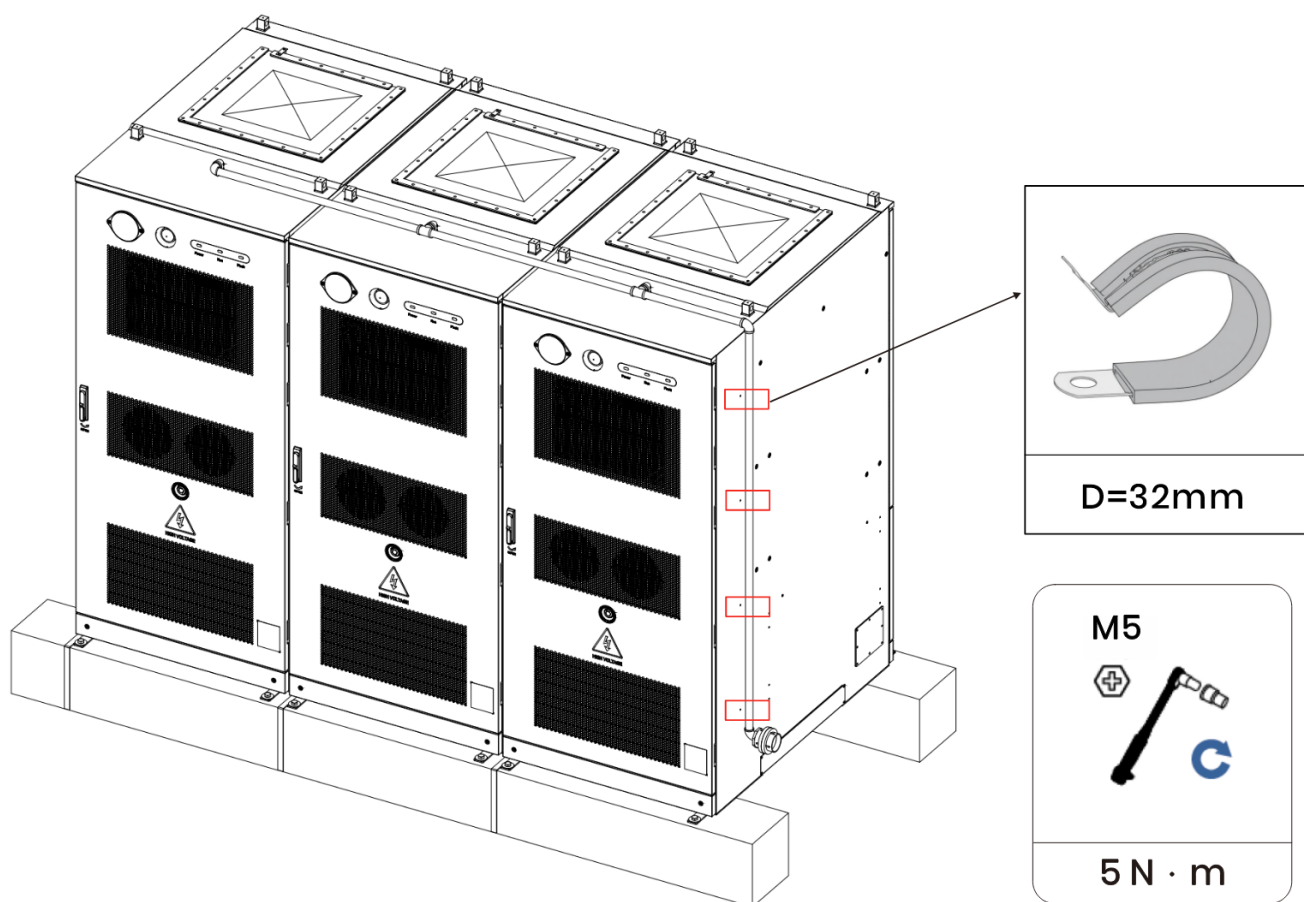


Step 2 Install the adapter and piping



Step 3 Install the fire hydrant connection fitting



Step 4 Secure the side piping

8 Product Maintenance

8.1 Precautions Before Maintenance

Regular maintenance is required for the energy storage system. More frequent maintenance

service is needed in the worse work environment. Please make records of the maintenance.



- Do not perform maintenance on the energy storage system during heavy rain, strong winds, or other adverse weather conditions. The company shall not be held liable for any damage resulting from failure to comply with this warning.
- To avoid electric shock, do not perform any maintenance or repair operations beyond the scope of this user manual.
- Only qualified person can perform the maintenance for the energy storage system.

8.2 Maintenance Item

 NOTE

- The maintenance interval of the product may be affected by on-site environmental conditions. If the operating environment contains heavy dust or frequent exposure to sand and dust, it is necessary to shorten the maintenance interval and correspondingly increase the maintenance frequency.

Table 8- 1 Maintenance Item

Maintenan ce Interval	Maintenance Item	Inspection Method
First Grid Connection	Electrical connection	Verify that the material and specifications of the input and output cables meet the required standards.
		Check whether the material, specifications, and installation orientation of the wiring terminals meet the required specifications.
		Inspect the cable connections for any loose contacts or short-circuit conditions.
		Verify that the cable phase sequence is correct.
		Check whether the cable insulation meets the requirements; an insulation resistance test must be performed.
		Verify that the equipment grounding resistance meets the specified requirements.
Once Every Six Months	ESS status	Check the cabinet for signs of oxidation, rust, or corrosion.
		Inspect the cabinet and internal equipment for any damage or deformation.
		Check the top and surrounding area of the cabinet for any flammable materials.
		Check whether the cabinet’s welds to the foundation steel plate are secure and free from rust.
		Check whether the cabinet door locks and latches can open and close smoothly.

Maintenan ce Interval	Maintenance Item	Inspection Method
		Check whether the sealing strips and gaskets are securely installed.
		Inspect the inside of the cabinet for foreign objects, fallen screws, dust, dirt, or condensation.
		Check whether any internal equipment produces abnormal noise during operation.
		Check whether the internal temperature of the cabinet is excessively high.
		Check whether the internal humidity of the cabinet is within the normal range.
	Cables	Check whether the cables are damaged.
	Air inlet and outlet	Check the cabinet’s air inlet and outlet for foreign objects and ensure they are not blocked.
	Safety Functions	Check the functionality of the emergency stop button.
		Check whether the warning labels on the equipment and other device markings are clear and undamaged. If any labels are faded or damaged, replace them promptly.
	Internal Component Inspection	Check whether the fans are operating normally and whether there is any abnormal noise.
		Check the temperature and dust accumulation on the heat sinks. If necessary, clean the heat sink and related modules using a vacuum cleaner.
		Replace the air filter if necessary.
	Component Maintenance	Perform a routine inspection for corrosion on all metal components.
		Perform an annual inspection of the contactors (including auxiliary and micro switches) to ensure proper mechanical operation.
		Check the operating parameters, with particular attention to voltage and insulation.
Once a Year	Grounding of the cable shielding	Check that the cable shielding and insulation sleeves have proper contact, and ensure

Maintenan ce Interval	Maintenance Item	Inspection Method
	layer	that the grounding copper busbar is securely fastened.
	SPD and fuse	Check whether the surge protection devices and fuses are in good condition.
	Wiring and cable arrangement	Check whether the cable routing is proper and whether there is any insulation damage. Any abnormalities must be corrected immediately.
		Check that all cable entry and exit holes in the cabinet are properly sealed.
		Check whether the power cable connections are loose, and re-tighten them according to the previously specified torque.
		Inspect the power and control cables for any damage, paying particular attention to the outer sheath in areas contacting metal surfaces for signs of cuts or abrasions.
		Check whether the insulation tape on the power cable terminals is intact and not peeling off.
	Grounding Inspection	Check the grounding resistance; the value must not exceed 4 Ω.

A Crimping OT/DT Terminals

OT/DT Terminal Requirements

- For copper core cables, please use copper terminals.
- For copper-clad aluminum cables, copper terminals are required.
- For aluminum alloy cables, use copper-aluminum transition terminals, or aluminum terminals with copper-aluminum transition pads.

BEWARE

- It is strictly forbidden to connect aluminum terminals directly to terminal blocks, as this may cause electrochemical corrosion and affect the reliable cable connection.
 - When using copper-aluminum transition terminals, or aluminum terminals with copper-aluminum transition pads, ensure compliance with IEC61238-1.
 - When using copper-aluminum transition pads, ensure proper orientation so that the aluminum side of the pad contacts the aluminum terminal, and the copper side contacts the terminal block.
-

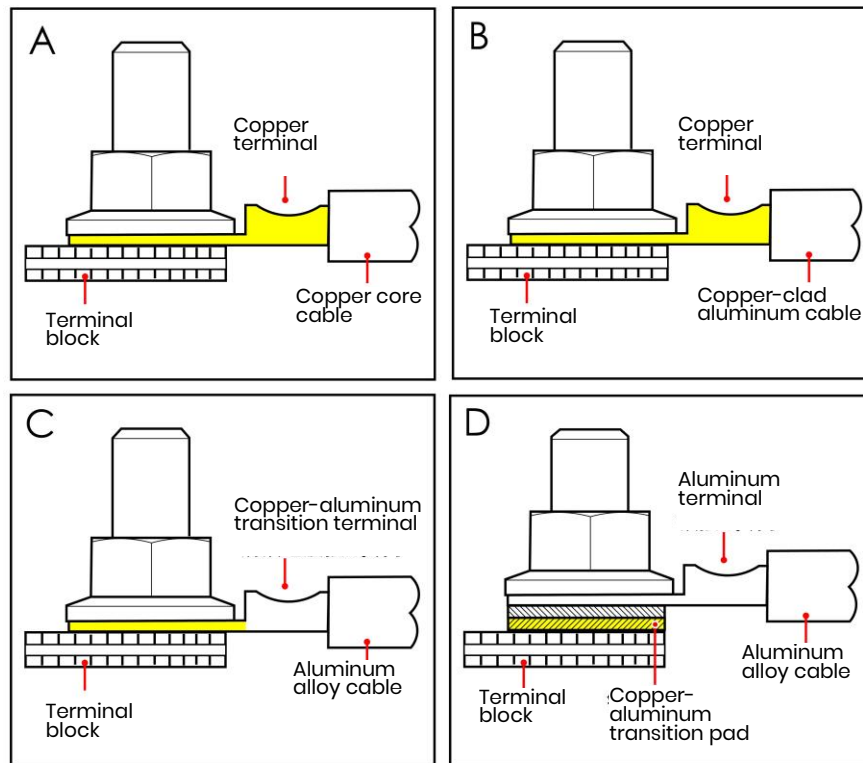


Figure A-1 OT/DT Terminal Requirements

Crimping OT/DT Terminals

BEWARE

- Do not scratch the conductor when stripping the cable.
- The cavity formed by the conductor crimping tab of the OT/DT terminal after crimping shall completely enclose the conductor, and the conductor shall be tightly connected to the OT/DT terminal without any looseness.
- The crimped area can be covered with heat shrink tubing or insulating tape. Below is an example of using heat shrink tubing.
- When using a heat gun, pay attention to safety precautions to prevent damage to the equipment.

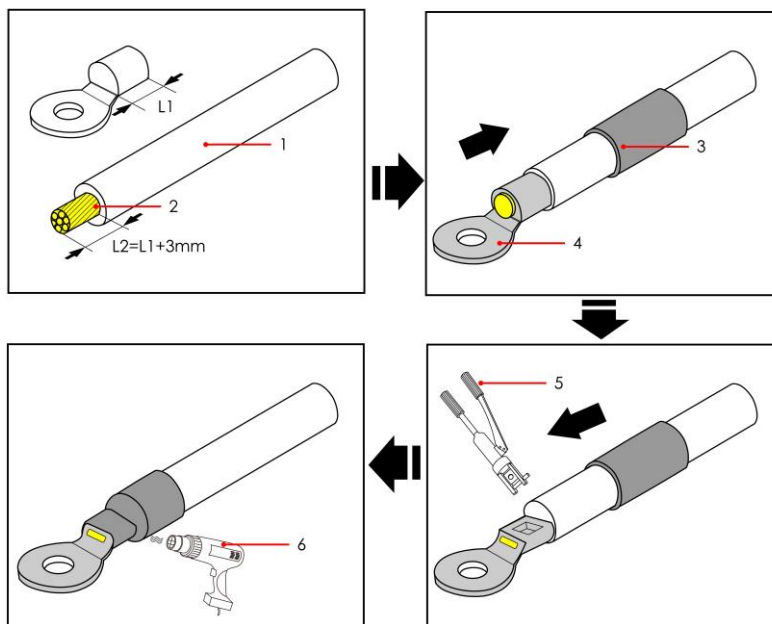


Figure A-2 Crimping OT Terminal

- | | | |
|-----------------|-------------------------------|------------------------|
| (1) Cable | (2) Conductor | (3) Heat shrink tubing |
| (4) OT terminal | (5) Hydraulic crimping pliers | (6) Heat gun |

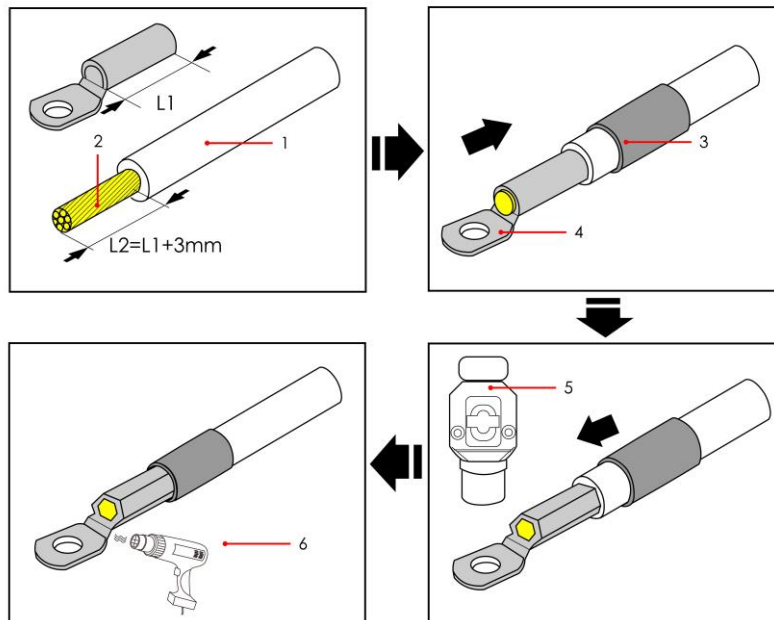


Figure A-3 Crimping DT Terminal

- | | | |
|-----------------|-------------------------------|------------------------|
| (1) Cable | (2) Conductor | (3) Heat shrink tubing |
| (4) DT terminal | (5) Hydraulic crimping pliers | (6) Heat gun |

B How to Recycle Used Batteries

BEWARE

- WHES does not provide battery recycling services. Customers are responsible for contacting local recyclers for disposal.
- If no local service is available, customers are advised to contact the nearest national recycler for disposal.

Step 1 Contact the nearest recycler.

Step 2 The recycler evaluates the recycling cost.

Step 3 The recycler recycles batteries using one of the following two methods:

- On-site recycling: The recycler collects lithium batteries from the customer site, at a price determined based on the actual travel distance/transportation cost and other factors.
- Centralized recycling: The customer brings all lithium batteries to be recycled to a designated location for centralized collection by the recycler.

NOTE

Transportation cost arising from the on-site recycling service is to be borne by the customer.

Step 4 The recycler is fully responsible for the disposal of the recycled batteries. The recycler takes full responsibility for disposing of the recycled lithium batteries, with no further involvement from the customer.

C Technical Data

Model	IA-125kW/261kWh-CG10
Battery Data	
Battery Type	LFP , 3.2 V / 314Ah
Battery PACK Configuration	1P*52S
Battery Capacity	261kWh (52.25kWh * 5)
Rated Battery Voltage / Voltage Range	832 V / 702...936 V
AC Parameters (On-grid)	
Rated Output Power	125kW
Max. Apparent Output Power	137.5kVA
Rated Voltage	230V/400V, 3W+N+PE
Voltage Range	340...460V
Rated Output Current	180A
Rated Frequency	50Hz
Frequency Range	45...55 Hz
Total Harmonic Distortion (THDi)	<3%
Power Factor	-1...+1
General Data	
Topology	Non-isolated
Dimensions (W*D*H)	1000*1500*2250 mm
Weight	~2.5 t
Operating Temperature Range	-30°C...+55°C (derating @ > 45°C)
Relative Humidity	0...95%
Altitude	≤2000 m
Cooling	Smart Air Cooling (PCS) Liquid Cooling (Battery)
Noise	<65dB
Ingress Protection	IP55
Corrosion	C5
Display	LCD / LED / APP

	Firefighting	Smoke Detector, Heat Detector, Alarm Sounder, Aersol, Sprinkler , Flammable Gas Detector, Vent Plate
	Communication	RS485 / CAN / Ethernet
	Installation	Floor-standing
	Standard	IEC 61000, IEC 62109, IEC 62619, EN 50549-2 EN 50549-10,UL9540A, UN38.3

D Troubleshooting

According to Section 6.1, you can enter the PANGU interface. In the upper right corner of the interface , you can view the fault alarm information.

Please troubleshoot according to the following methods. If the troubleshooting methods do not help you, please contact the after-sales service center. When contacting the after-sales service center, please collect the following information to facilitate quick problem-solving.

- 1. Software version, equipment installation time, time of failure occurrence, frequency of failure occurrence, etc.
- 2. Equipment installation environment, such as weather conditions, etc., system information, such as serial number, installation environment. It is recommended to provide photos, videos and other files to assist in problem analysis.
- 3. Grid conditions.

(Here, a table of common faults, their causes and solutions needs to be provided)

No.	Fault Description	Fault level	Solution
1	Backup circuit breaker overload alarm	Instruction	Please reduce backup load to prevent potential disconnection.
2	Relay self-check failure	Emergency	1. Restart the inverter after a complete power-off. 2. If the issue still persists, please contact customer service for further assistance.
3	Busbar hardware overvoltage	Emergency	This fault can be automatically restored. If the fault persists after waiting for 5 minutes, please follow these steps: 1. Turn off the DC input switches and check whether the PV or battery input voltage exceeds the maximum input voltage of the inverter.

No.	Fault Description	Fault level	Solution
			2. Restart the inverter after confirming that the previous step is normal. 3. If the issue still persists, please contact customer service for further assistance. Please note that, due to version updates, this fault was previously known as "OV-Vbatt-H" in certain earlier models.
4	DC input overvoltage	Emergency	1. Check if the PV string configuration is too high, causing the open-circuit voltage of the PV array to exceed the inverter's maximum input voltage. If so, reduce the length of strings to ensure the open-circuit voltage is within the inverter's specification range. 2. If the issue still persists, please contact customer service for further assistance.
5	AC hardware overcurrent (ABC phases)	Emergency	1. Check that the AC connection is correct. 2. Restart the inverter 3. If the fault is not eliminated after completing the above steps, please contact customer service.
6	PV insulation failure	Emergency	1、Remove all PV strings and connect them to the inverter one by one. With the help of the inverter alarm function, if the inverter does not continue to report errors after starting up, it means that the insulation of the string is good. If the inverter reports an error, it means that the newly connected string has bad insulation which does not

No.	Fault Description	Fault level	Solution
			meet the requirements. 2、Turn off the inverter, remove the PV strings, and use the multimeter to measure the DC voltage of the strings to ground respectively. The red test lead is connected to the positive or negative pole of the PV, and the black test lead is grounded. Observe whether the DC voltage drops to within 20V. If it is fixed as open circuit voltage (voltage between PV+ and -), there is poor insulation in the string. 3、Use a megger to measure the insulation resistance of the PV+/PV- cables between string and ground one by one. The impedance must be greater than 1MΩ. If it is less than this value, the insulation of the string is poor.
7	Positive grounding fault	Emergency	1. Restart the inverter after a complete power-off. 2. If the issue persists, check whether all PV cables are properly insulated from ground. For detailed assistance, please contact customer service.
8	Negative grounding fault	Emergency	1. Restart the inverter after a complete power-off. 2. If the issue persists, check whether all PV cables are properly insulated from ground. For detailed assistance, please contact customer service.
9	System failure	Emergency	1. Restart the inverter 2. If it has not been eliminated, contact the factory's customer service.

No.	Fault Description	Fault level	Solution
10	Temperature over-temperature fault	Emergency	1. Check whether the inverter installation position meets the requirements of the user manual 2. Try to reduce the ambient temperature 3. Restart the inverter after fifteen minutes 4. If the error persists, please contact the factory's customer service
11	DC over-temperature fault	Emergency	Contact the manufacturer's customer service and stop the machine to check the AC and DC terminals
12	PCS communication failure	Emergency	1. Check if the communication line from the PCS to the electrical cabinet is properly connected. 2. Check if the outer skin of the communication line is damaged. 3. Contact our company for handling.
13	Air conditioning communication failure	Emergency	1. Check if the air conditioner has been turned on. 2. Check if the outer casing of the communication cable is damaged. 3. Contact our company for handling.
14	DC voltage low	Instruction	The DC high voltage is not powered on. After power-on, the fault will recover by itself. 2. In case of any other situation, please contact our company for handling.

E Contact Details

Please contact us if you have any questions about this product.

Table D-1 Customer Service Contact Details

Country	E-mail	Phone
China	aftersales@whes.com	+86 4008776999

F Abbreviations

A	
AC	Alternating Current
B	
BMS	Battery Management System
C	
CAN	Controller Area Network
D	
DC	Direct Current
E	
EMS	Energy Management System
ESS	Energy Storage System
H	
HV	High Voltage
I	
IEC	International Electrotechnical Commission
IP	Ingress Protection
L	
LFP	Lithium Iron Phosphate
LV	Low Voltage
P	
PCS	Power Conversion System
PE	Protective Earth
S	
SOC	State of Charge
SOH	State of Health
SPD	Surge Protective Device
U	
UL	Underwriters Laboratories