LUNA2000-2.0MWH Series Smart String ESS

User Manual

Issue	11
Date	2023-04-28

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About This Document

Purpose

This document describes the installation, electrical connections, commissioning and troubleshooting of LUNA2000-2.0MWH-1H0, LUNA2000-2.0MWH-2H0, LUNA2000-2.0MWH-1H1 and LUNA2000-2.0MWH-2H1 Smart String Energy Storage Systems (also referred to as ESS). Before installing and operating the ESS, ensure that you are familiar with the features, functions, and safety precautions provided in this document.

Intended Audience

This document is intended for plant operating personnel and qualified electricians.

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.
NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all updates made in previous issues.

Issue 11 (2023-04-28)

Updated **1.3 Environment Requirements**.

Updated **5.2 Unpacking and Acceptance**.

Updated **12 Emergency Handling**.

Issue 10 (2023-03-30)

Updated **1 Safety Information**.

Updated **4.1 Site Selection Requirements**.

Updated **4.3 Foundation Requirements**.

Issue 09 (2023-02-20)

Updated **1 Safety Information**.

Updated **3 Transportation and Storage**.

Updated **4.1 Site Selection Requirements**.

Updated **4.2 Clearance Requirements**.

Updated **5.2 Unpacking and Acceptance**.

Updated **5.3.2 Hoisting the ESS**.

Updated **5.3.5 Securing the ESS**.

Updated **5.4.2 (Optional) Filling the Fire Cylinder with Extinguishant**.

Updated **5.4.3 Installing the Battery in the Extinguishant Control Panel**.

Updated **6.5 (Optional) Connecting Single-phase AC Input Power Cables**.

Updated **8.2 Installing the Solenoid Valve**.

Updated **12 Emergency Handling**.

Issue 08 (2022-11-15)

Updated **2.4 Appearance**.

Updated **2.5.1 Battery Cabin**.

Updated **2.5.2 Control Unit Cabin**.

Updated **2.7.1 Battery circuit diagram**.

Updated **2.8 Typical Application Scenarios**.

Updated **6.1 Preparing Cables**.

Updated **6.2 Connecting Socket Circuit Wires**.

Updated **6.5 (Optional) Connecting Single-phase AC Input Power Cables**.

Updated **8.1 Installing the PSU**.

Updated **8.2 Installing the Solenoid Valve**.

Updated **8.3 Power-on Process**.

Updated **8.7 Powering On the ESS**.

Updated **9.1 Preparations and WebUI Login**.

Updated **9.2 Commissioning Using Deployment Wizard**.

Updated **10.5 Powering Off the ESS**.

Updated **13.7 How Do I Perform a Dielectric Voltage Withstand Test on the AC Side of an ESS?**.

Updated **14 Technical Data**.

Issue 07 (2022-06-30)

Updated **4.3 Foundation Requirements**, and updated the diagram of foundation.

Updated **11 Alarm Reference**.

Updated **14 Technical Data**, and added LUNA2000-2.0MWH-1H1.

Issue 06 (2022-06-08)

Updated **5 Installation**.

Updated **8.2 Installing the Solenoid Valve**.

Updated **9 SmartLogger Web-based Deployment**.

Issue 05 (2022-04-30)

Updated **5.4.1 Installing Copper Bars Between Battery Packs**.

Updated **5.4.2 (Optional) Filling the Fire Cylinder with Extinguishant**.

Updated **13.2 How to Ensure that the Solenoid Valve Is Not Activated**.

Issue 04 (2022-03-30)

Updated **About This Document**.

Updated **1-Safety Information**.

Updated **2 Overview**.

Updated **2.6.4.6-Input/Output modules**.

Updated **2.7.2 Working Modes**.

Updated **3-Site Requirements**.

Updated **5.3.4 Grounding the ESS**.

Updated **5.3.5 Securing the ESS**.

Updated **4.3.2-(Optional) Filling the Fire Cylinder with Extinguishant**.

Updated Connecting Socket Circuit Wires.

Updated **6.6 Installing Signal Cables**.

Updated **8.1 Installing the PSU**.

Updated **8.2 Installing the Solenoid Valve**.

Updated **9.2 Commissioning Using Deployment Wizard**.

Updated **10 Powering Off the System**.

Updated **11 Alarm Reference**.

Updated **13.6 What Should I Do If the ESU Cable Connection Detection Abnormal Alarm Is Generated on the WebUI?**.

Updated **12-Technical Data**.

Issue 03 (2022-01-04)

Updated **1 Safety Information**.

Updated **4 Site Requirements**.

Issue 02 (2021-11-15)

Updated **1.3-Electrical Safety**.

Updated **1.4-Storage and Installation Environment Requirements**.

Updated **1.5-Transportation requirements**.

Updated 1.7-Battery Safety.

Updated **2-Overview**.

Updated **3.2-Space Requirements**.

Updated **3.3-Foundation Requirements**.

Updated **4.2-Installing the ESS**.

Updated **4.3-Installing Components**.

Updated **5-Installing Cables**.

Updated **7.4-Powering On the Distribution Transformer**.

Updated **7.5-Powering On the ESS**.

Updated **8-SmartLogger Web-based Deployment**.

Updated **9.5-Powering Off the ESS**.

Updated **9.6-Powering Off the Distribution Transformer**.

Updated **10-Alarm Reference**.

Updated **11-FAQ**.

Issue 01 (2021-08-30)

This issue is used for first office application (FOA).

Contents

1 Safety Information

Statement

Before transporting, storing, installing, operating, using, and/or maintaining the equipment, read this document, strictly follow the instructions provided herein, and follow all the safety instructions on the equipment and in this document. In this document, "equipment" refers to the products, software, components, spare parts, and/or services related to this document; "the Company" refers to the manufacturer (producer), seller, and/or service provider of the equipment; "you" refers to the entity that transports, stores, installs, operates, uses, and/or maintains the equipment.

The **Danger**, **Warning**, **Caution**, and **Notice** statements described in this document do not cover all the safety precautions. You also need to comply with relevant international, national, or regional standards and industry practices. **The Company shall not be liable for any consequences that may arise due to violations of safety requirements or safety standards concerning the design, production, and usage of the equipment.**

The equipment should be used in an environment that meets the design specifications. Otherwise, the equipment may be faulty, malfunctioning, or damaged, which is not covered under the warranty. The Company shall not be liable for any property loss, personal injury, or even death caused thereby.

Comply with applicable laws, regulations, standards, and specifications during transportation, storage, installation, operation, use, and maintenance.

Do not perform reverse engineering, decompilation, disassembly, adaptation, implantation, or other derivative operations on the equipment software. Do not study the internal implementation logic of the equipment, obtain the source code of the equipment software, violate intellectual property rights, or disclose any of the performance test results of the equipment software.

The Company shall not be liable for any of the following circumstances or their consequences:

- The equipment is damaged due to force majeure such as earthquakes, floods, volcanic eruptions, debris flows, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, and other extreme weather conditions.
- The equipment is operated beyond the conditions specified in this document.

- The equipment is installed or used in environments that do not comply with international, national, or regional standards.
- The equipment is installed or used by unqualified personnel.
- You fail to follow the operation instructions and safety precautions on the product and in the document.
- You remove or modify the product or modify the software code without authorization.
- You or a third party authorized by you cause the equipment damage during transportation.
- The equipment is damaged due to storage conditions that do not meet the requirements specified in the product document.
- You fail to prepare materials and tools that comply with local laws, regulations, and related standards.
- The equipment is damaged due to your or a third party's negligence, intentional breach, gross negligence, or improper operations, or other reasons not related to the Company.

1.1 Personal Safety

DANGER

Ensure that power is off during installation. Do not install or remove a cable with power on. Transient contact between the core of the cable and the conductor will cause electric arcs, sparks, fire, or explosion, which may result in personal injury.

DANGER

Non-standard and improper operations on the energized equipment may cause fire, electric shocks, or explosion, resulting in property damage, personal injury, or even death.

DANGER

Before operations, remove conductive objects such as watches, bracelets, bangles, rings, and necklaces to prevent electric shocks.

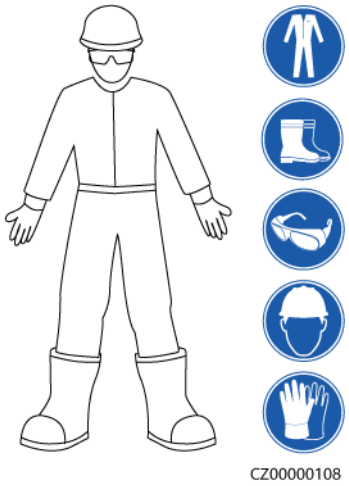
DANGER

During operations, use dedicated insulated tools to prevent electric shocks or short circuits. The dielectric withstanding voltage level must comply with local laws, regulations, standards, and specifications.

WARNING

During operations, wear personal protective equipment such as protective clothing, insulated shoes, goggles, safety helmets, and insulated gloves.

Figure 1-1 Personal protective equipment



General Requirements

- Do not stop protective devices. Pay attention to the warnings, cautions, and related precautionary measures in this document and on the equipment.
- If there is a likelihood of personal injury or equipment damage during operations, immediately stop, report the case to the supervisor, and take feasible protective measures.
- Do not power on the equipment before it is installed or confirmed by professionals.
- Do not touch the power supply equipment directly or with conductors such as damp objects. Before touching any conductor surface or terminal, measure the voltage at the contact point to ensure that there is no risk of electric shock.
- Do not touch operating equipment because the enclosure is hot.
- Do not touch a running fan with your hands, components, screws, tools, or boards. Otherwise, personal injury or equipment damage may occur.
- In the case of a fire, immediately leave the building or the equipment area and activate the fire alarm or call emergency services. Do not enter the affected building or equipment area under any circumstances.

Personnel Requirements

- Only professionals and trained personnel are allowed to operate the equipment.
  - Professionals: personnel who are familiar with the working principles and structure of the equipment, trained or experienced in equipment operations and are clear of the sources and degree of various potential hazards in equipment installation, operation, maintenance

  - Trained personnel: personnel who are trained in technology and safety, have required experience, are aware of possible hazards on themselves in certain operations, and are able to take protective measures to minimize the hazards on themselves and other people
- Personnel who plan to install or maintain the equipment must receive adequate training, be able to correctly perform all operations, and understand all necessary safety precautions and local relevant standards.
- Only qualified professionals or trained personnel are allowed to install, operate, and maintain the equipment.
- Only qualified professionals are allowed to remove safety facilities and inspect the equipment.
- Personnel who will perform special tasks such as electrical operations, working at heights, and operations of special equipment must possess the required local qualifications.
- Only authorized professionals are allowed to replace the equipment or components (including software).
- Only personnel who need to work on the equipment are allowed to access the equipment.

1.2 Electrical Safety

DANGER

Before connecting cables, ensure that the equipment is intact. Otherwise, electric shocks or fire may occur.

DANGER

Non-standard and improper operations may result in fire or electric shocks.

DANGER

Prevent foreign matter from entering the equipment during operations. Otherwise, equipment damage, load power derating, power failure, or personal injury may occur.

WARNING

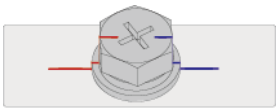
For the equipment that needs to be grounded, install the ground cable first when installing the equipment and remove the ground cable last when removing the equipment.

CAUTION

Do not route cables near the air intake or exhaust vents of the equipment.

General Requirements

- Follow the procedures described in the document for installation, operation, and maintenance. Do not reconstruct or alter the equipment, add components, or change the installation sequence without permission.
- Obtain approval from the national or local electric utility company before connecting the equipment to the grid.
- Observe the power plant safety regulations, such as the operation and work ticket mechanisms.
- Install temporary fences or warning ropes and hang "No Entry" signs around the operation area to keep unauthorized personnel away from the area.
- Before installing or removing power cables, turn off the switches of the equipment and its upstream and downstream switches.
- If any liquid is detected inside the equipment, disconnect the power supply immediately and do not use the equipment.
- Before performing operations on the equipment, check that all tools meet the requirements and record the tools. After the operations are complete, collect all of the tools to prevent them from being left inside the equipment.
- Before installing power cables, check that cable labels are correct and cable terminals are insulated.
- When installing the equipment, use a torque tool of a proper measurement range to tighten the screws. When using a wrench to tighten the screws, ensure that the wrench does not tilt and the torque error does not exceed 10% of the specified value.
- Ensure that bolts are tightened with a torque tool and marked in red and blue after double-check. Installation personnel mark tightened bolts in blue. Quality inspection personnel confirm that the bolts are tightened and then mark them in red. (The marks should cross the edges of the bolts.)



- After the installation is complete, ensure that protective cases, insulation tubes, and other necessary items for all electrical components are in position to avoid electric shocks.
- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.
- Before maintaining a downstream electrical or power distribution device, turn off the output switch on the power supply equipment.
- During equipment maintenance, attach "Do not switch on" labels near the upstream and downstream switches or circuit breakers as well as warning signs to prevent accidental connection. The equipment can be powered on only after troubleshooting is complete.

- If fault diagnosis and troubleshooting need to be performed after power-off, take the following safety measures: Disconnect the power supply. Check whether the equipment is live. Install a ground cable. Hang warning signs and set up fences.
- Check equipment connections periodically, ensuring that all screws are securely tightened.
- Only qualified professionals can replace a damaged cable.
- Do not scrawl, damage, or block any labels or nameplates on the equipment. Promptly replace labels that have worn out.
- Do not use solvents such as water, alcohol, or oil to clean electrical components inside or outside of the equipment.

Grounding

- Ensure that the grounding impedance of the equipment complies with local electrical standards.
- Ensure that the equipment is connected permanently to the protective ground. Before operating the equipment, check its electrical connection to ensure that it is reliably grounded.
- Do not work on the equipment in the absence of a properly installed ground conductor.
- Do not damage the ground conductor.
- For the equipment that uses a three-pin socket, ensure that the ground terminal in the socket is connected to the protective ground point.
- If high touch current may occur on the equipment, ground the protective ground terminal on the equipment enclosure before connecting the power supply; otherwise, electric shock as a result of touch current may occur.

Cabling Requirements

- When selecting, installing, and routing cables, follow local safety regulations and rules.
- When routing power cables, ensure that there is no coiling or twisting. Do not join or weld power cables. If necessary, use a longer cable.
- Ensure that all cables are properly connected and insulated, and meet specifications.
- Ensure that the slots and holes for routing cables are free from sharp edges, and that the positions where cables are routed through pipes or cable holes are equipped with cushion materials to prevent the cables from being damaged by sharp edges or burrs.
- If a cable is routed into the cabinet from the top, bend the cable in a U shape outside the cabinet and then route it into the cabinet.
- Ensure that cables of the same type are bound together neatly and straight and that the cable sheath is intact. When routing cables of different types, ensure that they are at least 30 mm away from each other.
- When cable connection is completed or paused for a short period of time, seal the cable holes with sealing putty immediately to prevent small animals or moisture from entering.

- Secure buried cables using cable supports and cable clips. Ensure that the cables in the backfill area are in close contact with the ground to prevent cable deformation or damage during backfilling.
- If the external conditions (such as the cable layout or ambient temperature) change, verify the cable usage in accordance with the IEC-60364-5-52 or local laws and regulations. For example, check that the current-carrying capacity meets requirements.
- When routing cables, reserve at least 30 mm clearance between the cables and heat-generating components or areas. This prevents deterioration or damage to the cable insulation layer.
- When the temperature is low, violent impact or vibration may damage the plastic cable sheathing. To ensure safety, comply with the following requirements:
  - Cables can be laid or installed only when the temperature is higher than 0°C. Handle cables with caution, especially at a low temperature.
  - Cables stored at subzero temperatures must be stored at room temperature for at least 24 hours before they are laid out.
- Do not perform any improper operations, for example, dropping cables directly from a vehicle. Otherwise, the cable performance may deteriorate due to cable damage, which affects the current-carrying capacity and temperature rise.

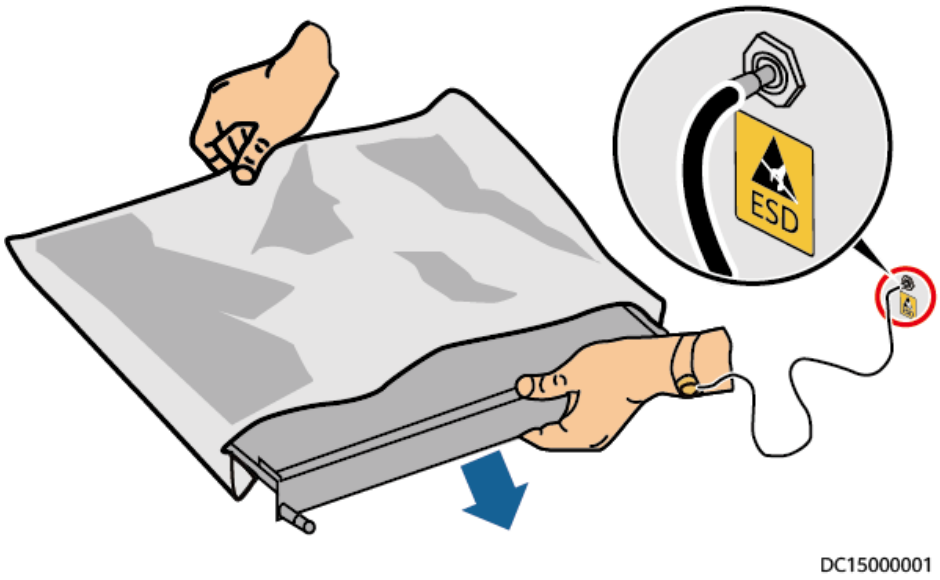
ESD

NOTICE

The static electricity generated by human bodies may damage the electrostatic-sensitive components on boards, for example, the large-scale integrated (LSI) circuits.

- When touching the equipment and handling boards, modules with exposed circuit boards, or application-specific integrated circuits (ASICs), observe ESD protection regulations and wear ESD clothing and ESD gloves or a well-grounded ESD wrist strap.

Figure 1-2 Wearing an ESD wrist strap



- When holding a board or a module with exposed circuit boards, hold its edge without touching any components. Do not touch the components with bare hands.
- Package boards or modules with ESD packaging materials before storing or transporting them.

1.3 Environment Requirements

DANGER

Do not expose the equipment to flammable or explosive gas or smoke. Do not perform any operation on the equipment in such environments.

DANGER

Do not store any flammable or explosive materials in the equipment area.

DANGER

Do not place the equipment near heat sources or fire sources, such as smoke, candles, heaters, or other heating devices. Overheat may damage the equipment or cause a fire.

WARNING

Install the equipment in an area far away from liquids. Do not install it under areas prone to condensation, such as under water pipes and air exhaust vents, or areas prone to water leakage, such as air conditioner vents, ventilation vents, or feeder windows of the equipment room. Ensure that no liquid enters the equipment to prevent faults or short circuits.

WARNING

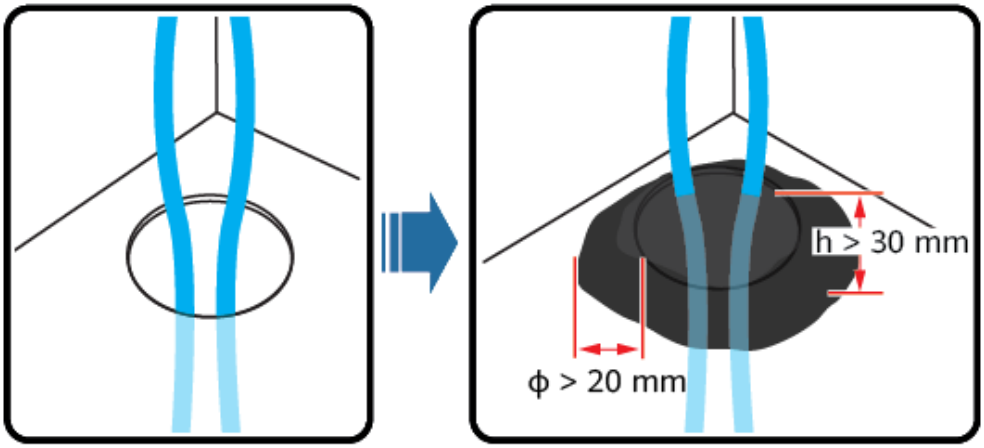
To prevent damage or fire due to high temperature, ensure that the ventilation vents or heat dissipation systems are not obstructed or covered by other objects while the equipment is running.

General Requirements

- Ensure that the equipment is stored in a clean, dry, and well ventilated area with proper temperature and humidity and is protected from dust and condensation.
- Keep the installation and operating environments of the equipment within the allowed ranges. Otherwise, its performance and safety will be compromised.
- Do not install, use, or operate outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, inserting connectors to or removing connectors from signal ports connected to outdoor facilities, working at heights, performing outdoor installation, and opening doors) in harsh weather conditions such as lightning, rain, snow, sandstorm, and level 6 or stronger wind.
- Do not install the equipment in an environment with dust, smoke, volatile or corrosive gases, infrared and other radiations, organic solvents, or salty air.
- Do not install the equipment in an environment with conductive metal or magnetic dust.
- Do not install the equipment in an area conducive to the growth of microorganisms such as fungus or mildew.
- Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference.
- Ensure that the site complies with local laws, regulations, and related standards.
- Ensure that the ground in the installation environment is solid, free from spongy or soft soil, and not prone to subsidence. The site must not be located in a low-lying land prone to water or snow accumulation, and the horizontal level of the site must be above the highest water level of that area in history.
- Do not install the equipment in a position that may be submerged in water.
- If the equipment is installed in a place with abundant vegetation, in addition to routine weeding, harden the ground underneath the equipment using cement or gravel.
- Before opening doors during the installation, operation, and maintenance of the equipment, clean up any water, ice, snow, or other foreign objects on the

top of the equipment to prevent foreign objects from falling into the equipment.

- When installing the equipment, ensure that the installation surface is solid enough to bear the weight of the equipment.
- All cable holes should be sealed. Seal the used cable holes with sealing putty. Seal the unused cable holes with the caps delivered with the equipment. The following figure shows the criteria for correct sealing with sealing putty.



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- After installing the equipment, remove the packing materials such as cartons, foam, plastics, and cable ties from the equipment area.

1.4 Mechanical Safety

DANGER

When working at heights, wear a safety helmet and safety harness or waist belt and fasten it to a solid structure. Do not mount it on an insecure moveable object or metal object with sharp edges. Make sure that the hooks will not slide off.

WARNING

Ensure that all necessary tools are ready and inspected by a professional organization. Do not use tools that have signs of scratches or fail to pass the inspection or whose inspection validity period has expired. Ensure that the tools are secure and not overloaded.

WARNING

Before installing equipment in a cabinet, ensure that the cabinet is securely fastened with a balanced center of gravity. Otherwise, tipping or falling cabinets may cause bodily injury and equipment damage.

WARNING

When pulling equipment out of a cabinet, be aware of unstable or heavy objects in the cabinet to prevent injury.

WARNING

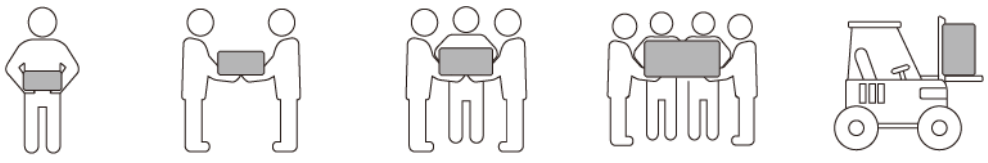
Do not drill holes into the equipment. Doing so may affect the sealing performance and electromagnetic containment of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

General Requirements

- Repaint any paint scratches caused during equipment transportation or installation in a timely manner. Equipment with scratches cannot be exposed for an extended period of time.
- Do not perform operations such as arc welding and cutting on the equipment without evaluation by the Company.
- Do not install other devices on the top of the equipment without evaluation by the Company.
- When performing operations over the top of the equipment, take measures to protect the equipment against damage.
- Use correct tools and operate them in the correct way.

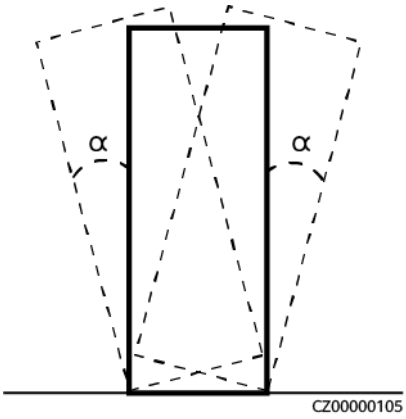
Moving Heavy Objects

- Be cautious to prevent injury when moving heavy objects.



- If multiple persons need to move a heavy object together, determine the manpower and work division with consideration of height and other conditions to ensure that the weight is equally distributed.
- If two persons or more move a heavy object together, ensure that the object is lifted and landed simultaneously and moved at a uniform pace under the supervision of one person.
- Wear personal protective gears such as protective gloves and shoes when manually moving the equipment.
- To move an object by hand, approach to the object, squat down, and then lift the object gently and stably by the force of the legs instead of your back. Do not lift it suddenly or turn your body around.
- Move or lift the equipment by holding its handles or lower edges. Do not hold the handles of modules that are installed in the equipment.

- Do not quickly lift a heavy object above your waist. Place the object on a workbench that is half-waist high or any other appropriate place, adjust the positions of your palms, and then lift it.
- Move a heavy object stably with balanced force at an even and low speed. Put down the object stably and slowly to prevent any collision or drop from scratching the surface of the equipment or damaging the components and cables.
- When moving a heavy object, be aware of the workbench, slope, staircase, and slippery places. When moving a heavy object through a door, ensure that the door is wide enough to move the object and avoid bumping or injury.
- When transferring a heavy object, move your feet instead of turning your waist around. When lifting and transferring a heavy object, ensure that your feet point to the target direction of movement.
- When transporting the equipment using a pallet truck or forklift, ensure that the tynes are properly positioned so that the equipment does not topple. Before moving the equipment, secure it to the pallet truck or forklift using ropes. When moving the equipment, assign dedicated personnel to take care of it.
- Choose sea or roads in good conditions for transportation as transportation by railway or air is not supported. Avoid tilt or jolt during transportation.
- The tilt angle of the ESS should meet the requirements shown in the figure: α ≤ 5°.



Working at Heights

- Any operations performed 2 meters or higher above the ground should be supervised properly.
- Only trained and qualified personnel are allowed to work at heights.
- Do not work at heights when steel pipes are wet or other risky situations exist. After the preceding conditions no longer exist, the safety owner and relevant technical personnel need to check the involved equipment. Operators can begin working only after safety is confirmed.
- Set a restricted area and prominent signs for working at heights to warn away irrelevant personnel.
- Set guard rails and warning signs at the edges and openings of the area involving working at heights to prevent falls.

- Do not pile up scaffolding, springboards, or other objects on the ground under the area involving working at heights. Do not allow people to stay or pass under the area involving working at heights.
- Carry operation machines and tools properly to prevent equipment damage or personal injury caused by falling objects.
- Personnel involving working at heights are not allowed to throw objects from the height to the ground, or vice versa. Objects should be transported by slings, hanging baskets, highline trolleys, or cranes.
- Do not perform operations on the upper and lower layers at the same time. If unavoidable, install a dedicated protective shelter between the upper and lower layers or take other protective measures. Do not pile up tools or materials on the upper layer.
- Dismantle the scaffolding from top down after finishing the job. Do not dismantle the upper and lower layers at the same time. When removing a part, ensure that other parts will not collapse.
- Ensure that personnel working at heights strictly comply with the safety regulations. The Company is not responsible for any accident caused by violation of the safety regulations on working at heights.
- Behave cautiously when working at heights. Do not rest at heights.

Using Ladders

- Use wooden or insulated ladders when you need to perform live-line working at heights.
- Platform ladders with protective rails are preferred. Do not use single ladders.
- Before using a ladder, check that it is intact and confirm its load bearing capacity. Do not overload it.
- Ensure that the ladder is securely positioned and held firm.

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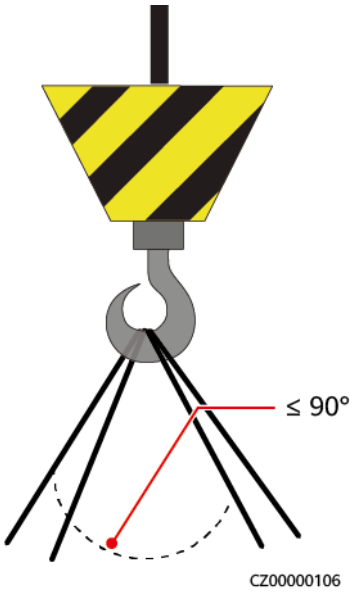
- When climbing up the ladder, keep your body stable and your center of gravity between the side rails, and do not overreach to the sides.
- When a step ladder is used, ensure that the pull ropes are secured.

Hoisting

- Only trained and qualified personnel are allowed to perform hoisting operations.
- Install temporary warning signs or fences to isolate the hoisting area.

- Ensure that the foundation where hoisting is performed on meets the load-bearing requirements.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a fixed object or wall that meets the load-bearing requirements.
- During hoisting, do not stand or walk under the crane or the hoisted objects.
- Do not drag steel ropes and hoisting tools or bump the hoisted objects against hard objects during hoisting.
- Ensure that the angle between two hoisting ropes is no more than 90 degrees, as shown in the following figure.



Drilling Holes

- Obtain consent from the customer and contractor before drilling holes.
- Wear protective equipment such as safety goggles and protective gloves when drilling holes.
- To avoid short circuits or other risks, do not drill holes into buried pipes or cables.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings.

Welding

- A welder must have a work permit. Obtain consent from the customer before welding.
- Ensure that at least two persons are present onsite for welding and that fire extinguishers, wet cloth, and water containers are available.
- Ensure that the welding site is free from inflammables.
- Do not weld or cut on pressurized containers or pipes. Electric devices must be powered off before welding.
- A burning welding torch must not be placed on a component or on the floor, and must not be placed in a metal container with acetylene and oxygen. Otherwise, the gas may leak and cause a fire.

- High-temperature pipes after welding must be promptly cooled.

Using a Jack

- A hydraulic jack is used to lift the container. Load bearing requirement: 30 t
- Only one side of the equipment can be raised or lowered. Before applying force, place wood sleepers and pads and take measures to prevent the jack from slipping and the equipment from vibrating.
- You can use two jacks to apply even forces simultaneously at two points on a short side of the equipment. Lift the equipment only from one side and then the other side, alternately. The height cannot exceed 120 mm each time the equipment is lifted.

1.5 Equipment Safety

1.5.1 ESS Safety

DANGER

Do not open battery cabin doors when the system is running.

DANGER

If the ESS is faulty, do not stand within the opening range of the battery cabin doors.

CAUTION

The equipment is equipped with a fire suppression system. Start the fire suppression system only in emergency.

CAUTION

Do not disable the protection devices.

CAUTION

Evacuate from the site immediately once the fire alarm horn/strobe is triggered.

NOTICE

Take protection and isolation measures for the ESS, such as installing fences, walls, and safety warning signs to prevent personal injury or property damage caused by unauthorized access during operations.

- When installing the ESS, comply with the fire separation distance or fire wall requirements specified in local standards, including but not limited to *GB 51048-2014 Design Code for Electrochemical Energy Storage Station* and *NFPA 855 Standard for the Installation of Stationary Energy Storage Systems*.
- Check the fire safety of the ESS regularly, at least once a month.
- When inspecting the system with power on, pay attention to the hazard warning signs on the equipment. Do not stand at the battery cabin doors. You are advised to perform the inspection near the control unit cabin.
- After power components of the ESS are replaced or cable connections are changed, you need to manually start cable connection detection and topology identification to prevent system malfunction.
- After the equipment is powered off, wait for 15 minutes and ensure that the equipment is not energized before operations.
- It is recommended that you prepare a camera to record the detailed processes of equipment installation, operation, and maintenance.

1.5.2 Battery Safety

DANGER

Do not connect the positive and negative poles of a battery together. Otherwise, the battery may be short-circuited. Battery short circuits can generate high instantaneous current and releases a large amount of energy, which may cause battery leakage, smoke, flammable gas release, thermal runaway, fire, or explosion. To avoid battery short circuits, do not maintain batteries with power on.

DANGER

Do not expose batteries at high temperatures or around heat sources, such as scorching sunlight, fire sources, transformers, and heaters. Battery overheating may cause leakage, smoke, flammable gas release, thermal runaway, fire, or explosion.

DANGER

Protect batteries from mechanical vibration, falling, collision, punctures, and strong impact. Otherwise, the batteries may be damaged or catch fire.

DANGER

To avoid leakage, smoke, flammable gas release, thermal runaway, fire, or explosion, do not disassemble, alter, or damage batteries, for example, insert foreign objects into batteries, squeeze batteries, or immerse batteries in water or other liquids.

DANGER

Do not touch battery terminals with other metal objects, which may cause heat or electrolyte leakage.

DANGER

There is a risk of fire or explosion if the model of the battery in use or used for replacement is incorrect. Use a battery of the model recommended by the manufacturer.

DANGER

Battery electrolyte is toxic and volatile. Do not get contact with leaked liquids or inhale gases in the case of battery leakage or odor. In such cases, stay away from the battery and contact professionals immediately. Professionals must wear safety goggles, rubber gloves, gas masks, and protective clothing, power off the equipment, remove the battery, and contact technical engineers.

DANGER

A battery is an enclosed system and will not release any gases under normal operations. If a battery is improperly treated, for example, burnt, needle-pricked, squeezed, struck by lightning, overcharged, or subject to other adverse conditions that may cause battery thermal runaway, the battery may be damaged or an abnormal chemical reaction may occur inside the battery, resulting in electrolyte leakage or production of gases such as CO and H_2. To prevent fire or device corrosion, ensure that flammable gas is properly exhausted.

DANGER

The gas generated by a burning battery may irritate your eyes, skin, and throat. Take protective measures promptly.

WARNING

Install batteries in a dry area. Do not install them under areas prone to water leakage, such as air conditioner vents, ventilation vents, feeder windows of the equipment room, or water pipes. Ensure that no liquid enters the equipment to prevent faults or short circuits.

WARNING

Before installing and commissioning batteries, prepare fire fighting facilities, such as fire sand and carbon dioxide fire extinguishers, according to construction standards and regulations. Before putting into operation, ensure that fire fighting facilities that comply with local laws and regulations are installed.

WARNING

Before unpacking, storage, and transportation, ensure that the packing cases are intact and the batteries are correctly placed according to the labels on the packing cases. Do not place a battery upside down or vertically, lay it on one side, or tilt it. Stack the batteries according to the stacking requirements on the packing cases. Ensure that the batteries do not fall or get damaged. Otherwise, they will need to be scrapped.

WARNING

After unpacking batteries, place them in the required direction. Do not place a battery upside down or vertically, lay it on one side, tilt it, or stack it. Ensure that the batteries do not fall or get damaged. Otherwise, they will need to be scrapped.

WARNING

Tighten the screws on copper bars or cables to the torque specified in this document. Periodically confirm whether the screws are tightened, check for rust, corrosion, or other foreign objects, and clean them up if any. Loose screw connections will result in excessive voltage drops and batteries may catch fire when the current is high.

WARNING

After batteries are discharged, charge them in time to avoid damage due to overdischarge.

Statement

The Company shall not be liable for any damage or other consequences to the batteries it provides due to the following reasons:

- Batteries are damaged due to force majeure such as earthquakes, floods, volcanic eruptions, debris flows, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, and other extreme weather conditions.
- Batteries are damaged because the onsite equipment operating environment or external power parameters do not meet the environment requirements for normal operation, for example, the actual operating temperature of batteries is too high or too low, or the power grid is unstable and experiences outages frequently.
- Batteries are damaged, fall, leak, or crack due to improper operations or incorrect connection.
- After being installed and connected to the system, the batteries are not powered on in time due to your reasons, which causes damage to the batteries due to overdischarge.
- Batteries are damaged because they are not accepted in time due to your reasons.
- You set battery operating parameters incorrectly.
- You use batteries of different types together, causing acceleration of capacity attenuation. For example, you use our batteries together with batteries of other vendors or with batteries of different rated capacity.
- You maintain batteries improperly, causing frequent overdischarge; you expand the load capacity without notifying us; or you have not fully charged the batteries for a long time.
- You do not perform battery maintenance based on the operation guide, such as failure to check battery terminals regularly.
- Batteries are damaged because you do not store them in accordance with storage requirements (for example, in an environment that is damp or prone to rain).
- Batteries are not charged as required during storage due to your reasons, resulting in capacity loss or other irreversible damages to the batteries.
- Batteries are damaged due to your or a third party's reasons, for example, relocating or reinstalling the batteries without complying with the Company's requirements.
- You change the battery use scenarios without notifying the Company.
- You connect extra loads to the batteries.
- The battery storage period has exceeded the upper limit.
- The battery warranty period has expired. Do not use a battery whose warranty period has expired, as this poses safety risks.

General Requirements

NOTICE

To ensure battery safety and battery management accuracy, use batteries provided by the Company. The Company is not responsible for any faults of batteries not provided by it.

- Before installing, operating, and maintaining batteries, read the battery manufacturer's instructions and comply with their requirements. The safety precautions specified in this document are highly important and require special attention. For additional safety precautions, see the instructions provided by the battery manufacturer.
- Use batteries within the specified temperature range. When the ambient temperature of the batteries is lower than the allowed range, do not charge the batteries to prevent internal short circuits caused during low-temperature charging.
- Before unpacking batteries, check whether the packaging is intact. Do not use batteries with damaged packaging. If any damage is found, notify the carrier and manufacturer immediately.
- Install batteries within 24 hours after unpacking. If the batteries cannot be installed in time, place them in a dry indoor environment without corrosive gases. The process from unpacking batteries to powering on the system must be completed within 72 hours. During routine maintenance, ensure that the power-off time does not exceed 24 hours.
- Do not use a damaged battery (such as damage caused when a battery is dropped, bumped, bulged, or dented on the enclosure), because the damage may cause electrolyte leakage or flammable gas release. In the case of electrolyte leakage or structural deformation, contact the installer or professional O&M personnel immediately to remove or replace the battery. Do not store the damaged battery near other devices or flammable materials and keep it away from non-professionals.
- Before working on a battery, ensure that there is no irritant or scorched smell around the battery.
- When installing batteries, do not place installation tools, metal parts, or sundries on the batteries. After the installation is complete, clean up the objects on the batteries and the surrounding area.
- If batteries are exposed to water accidentally, do not install them. Instead, transport the batteries to a safe isolation point and dispose of them in a timely manner.
- Before installing battery packs, check whether they are abnormal. A battery pack is deemed abnormal when any of the following symptoms occurs:
  - The enclosure of the battery pack is obviously deformed or damaged.
  - The voltage between the positive and negative electrodes of the battery pack is far below the specified range.
- Check whether the positive and negative battery terminals are grounded unexpectedly. If so, disconnect the battery terminals from the ground.

- Do not perform welding or grinding work around batteries to prevent fire caused by electric sparks or arcs.
- If batteries are left unused for a long period of time, store and charge them according to the battery requirements.
- Do not charge or discharge batteries by using a device that does not comply with local laws and regulations.
- Keep the battery loop disconnected during installation and maintenance.
- Monitor damaged batteries during storage for signs of smoke, flame, electrolyte leakage, or heat.
- If a battery is faulty, its surface temperature may be high. Do not touch the battery to avoid scalds.
- Do not stand on, lean on, or sit on the top of the equipment.
- In backup power scenarios, do not use the batteries for the following situations:
  - Medical devices substantially important to human life
  - Control equipment such as trains and elevators, as this may cause personal injury
  - Computer systems of social and public importance
  - Locations near medical devices
  - Other devices similar to those described above

Short-Circuit Protection

- When installing and maintaining batteries, wrap the exposed cable terminals on the batteries with insulation tape.
- Avoid foreign objects (such as conductive objects, screws, and liquids) from entering a battery, as this may cause short circuits.

Leakage Handling

NOTICE

Electrolyte leakage may damage the equipment. It will corrode metal parts and boards, and ultimately damage the boards.

Electrolyte is corrosive and can cause irritation and chemical burns. Should you come into direct contact with the battery electrolyte, do as follows:

- Inhalation: Evacuate from contaminated areas, get fresh air immediately, and seek immediate medical attention.
- Eye contact: Immediately wash your eyes with water for at least 15 minutes, do not rub your eyes, and seek immediate medical attention.
- Skin contact: Wash the affected areas immediately with soap and water and seek immediate medical attention.
- Intake: Seek immediate medical attention.

Recycling

- Dispose of waste batteries in accordance with local laws and regulations. Do not dispose of batteries as household waste. Improper disposal of batteries may result in environmental pollution or an explosion.
- If a battery leaks or is damaged, contact technical support or a battery recycling company for disposal.
- If batteries are out of service life, contact a battery recycling company for disposal.
- Do not expose waste batteries to high temperatures or direct sunlight.
- Do not place waste batteries in environments with high humidity or corrosive substances.
- Do not use faulty batteries. Contact a battery recycling company to scrap them as soon as possible to avoid environmental pollution.

2 Overview

2.1 Model Description

Product Model

This document involves the following product models:

- LUNA2000-2.0MWH-1HX[1]
- LUNA2000-2.0MWH-2HX[1]

NOTE

[1]: The number corresponding to X is on the nameplate.

Figure 2-1 Model number (LUNA2000-2.0MWH-2HX is used as an example)

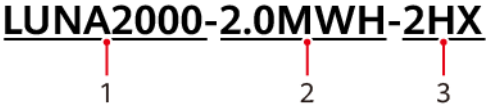


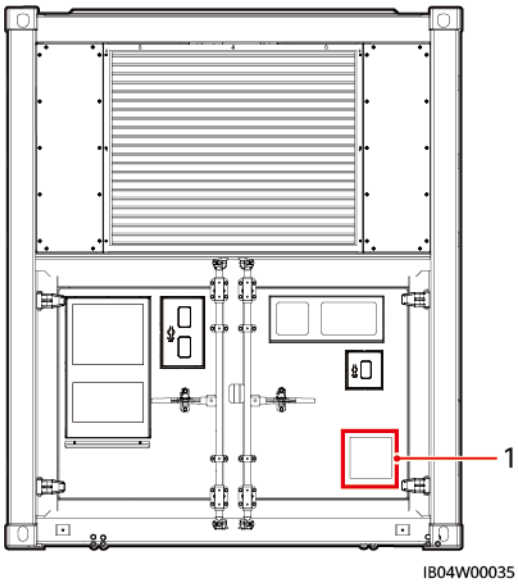
Table 2-1 Model number description

No.	Meaning	Description
1	Product family	LUNA2000: Smart String ESS
2	Capacity level	2.0MWH: Nominal capacity[1]
3	Backup power	• 1HX: Applies to scenarios where the backup duration is greater than or equal to 1 hour • 2HX: Applies to scenarios where the backup duration is greater than or equal to 2 hours
Note [1]: The nominal capacity is on the nameplate.		

Model Identification

You can view the product model on the nameplate on the side of the container.

Figure 2-2 Position of the nameplate



(1) Position of the nameplate

2.2 Label Description

Label	Name	Meaning
	Electric shock warning	High voltage may occur after the device is powered on. Only qualified and trained electrical technicians are allowed to install and operate the device.
	Grounding symbol	Indicates the position for connecting the ground cable.

Label	Name	Meaning
	ADR transportation warning label – diamond-shape label	Helps other traffic participants identify and keep away from hazardous sources in a timely manner to reduce the risk of accidents.
	Scald and heat warning label	Indicates high temperature of the equipment to prevent scald.
	Height label	The equipment is high. You may need tools such as an insulation stool or a step ladder to facilitate operation.
	Height (or mind the step) warning label	Indicates that the container height is greater than 2.6 m to alert the personnel during transportation and operation.
HWFU 000000 0	Container No. label	Displays the equipment container number.

2.3 Functions and Features

Functions

The Smart String ESS LUNA2000-2.0MWH Series (excluding the Smart PCS) can manage charge and discharge of the DC power rectified by the Smart PCS for power grid peak shaving and frequency regulation.

Features

The ESS is a prefabricated all-in-one energy storage system that integrates the prefabricated modular structure system, power supply and distribution system, monitoring system, environment control system, fire suppression system, and integrated cabling system. It features high safety and reliability, fast deployment, low cost, high energy efficiency, and intelligent management.

- One controller per rack

  Each battery rack is connected to a Smart Rack Controller that manages the charge and discharge of the rack independently, improving the available capacity and system availability and supporting the mixed use of old and new batteries.
- One optimizer per pack

  a. Fully leverages the module capacity in the battery racks.

  b. The battery pack can be replaced directly without manual SOC calibration. The replacement time is reduced and experts are not required onsite.
- Flexible and phased deployment

  Flexible replacement and capacity expansion: The capacity of a PV plant can be expanded by adding ESSs without changing the AC power loop.

2.4 Appearance

NOTE

The appearance and position diagrams are for reference only. The actual situation may vary.

LUNA2000-2.0MWH-1HX

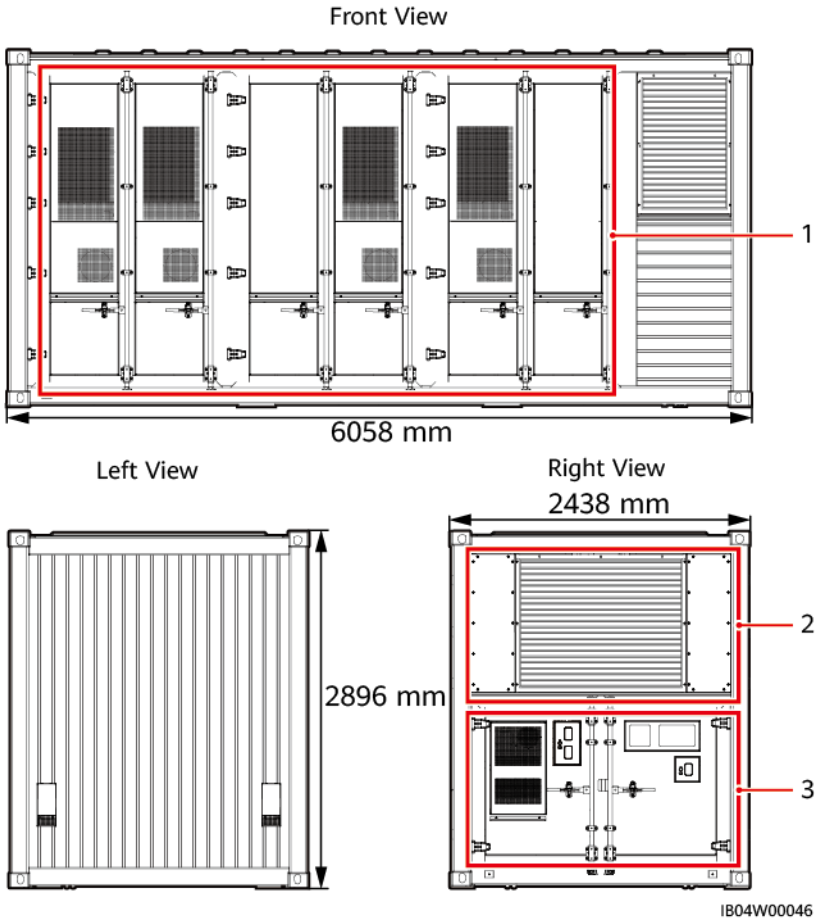
NOTE

The LUNA2000-2.0MWH-1HX models have multiple layouts. The figures use one layout as an example. For details, see the following table.

Table 2-2 LUNA2000-2.0MWH-1HX layout

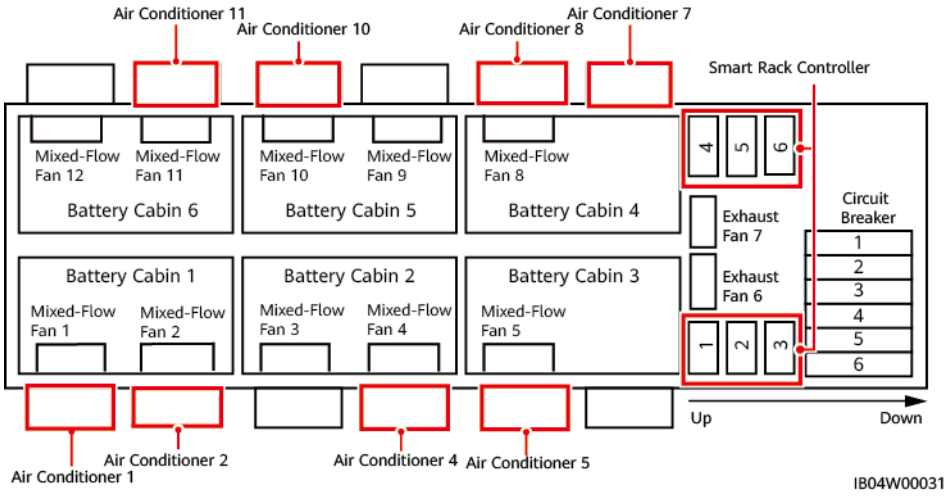
Air Conditioner Position in the Battery Cabin	Number of DC Circuit Breakers in the Control Unit Cabin	Number of Smart Rack Controllers	Number of Exhaust Fans	Number of Mixed-Flow Fans
1/2/4/5/7/8/10/11	6	6	2	8
1/3/5/7/9/11	6	6	2	8

Figure 2-3 LUNA2000-2.0MWH-1HX appearance



(1) Battery cabin	(2) Smart Rack Controller cabin	(3) Control unit cabin

Figure 2-4 Component position of LUNA2000-2.0MWH-1HX



LUNA2000-2.0MWH-2HX

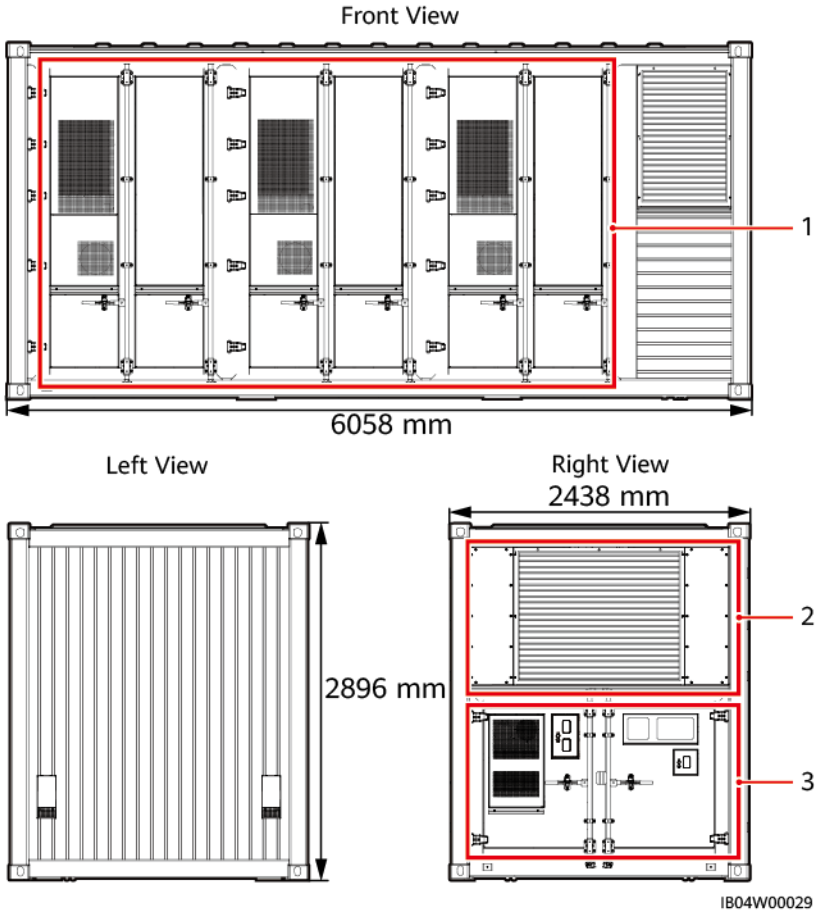
NOTE

The LUNA2000-2.0MWH-2HX models have multiple layouts. The figures use one layout as an example. For details, see the following table.

Table 2-3 LUNA2000-2.0MWH-1HX layout

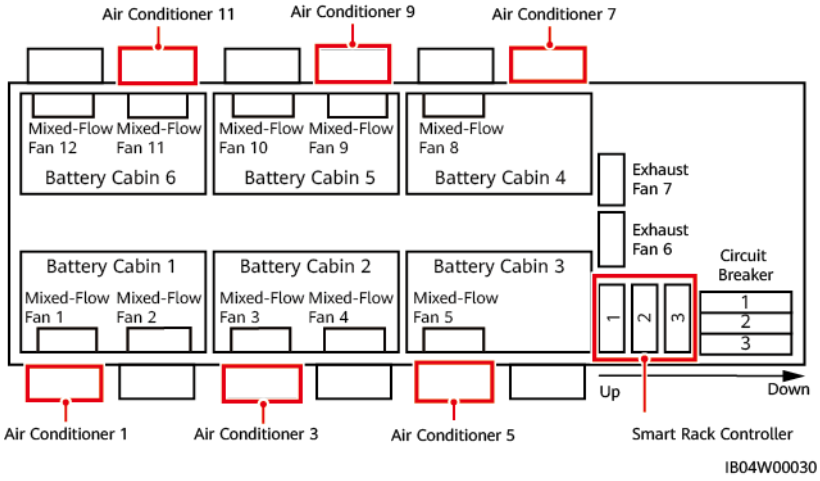
Air Conditioner Position in the Battery Cabin	Number of DC Circuit Breakers in the Control Unit Cabin	Number of Smart Rack Controllers	Number of Exhaust Fans	Number of Mixed-Flow Fans
1/3/5/7/9/11	3	3	2	8
2/4/6/8/10/12	3	3	2	8
1/4/7/10	6	3	2	8

Figure 2-5 LUNA2000-2.0MWH-2HX appearance 1



(1) Battery cabin (2) Smart Rack Controller cabin (3) Control unit cabin

Figure 2-6 Component position 1 of LUNA2000-2.0MWH-2HX



2.5 ESS Composition

2.5.1 Battery Cabin

Figure 2-7 LUNA2000-2.0MWH-1HX battery cabin configurations 1

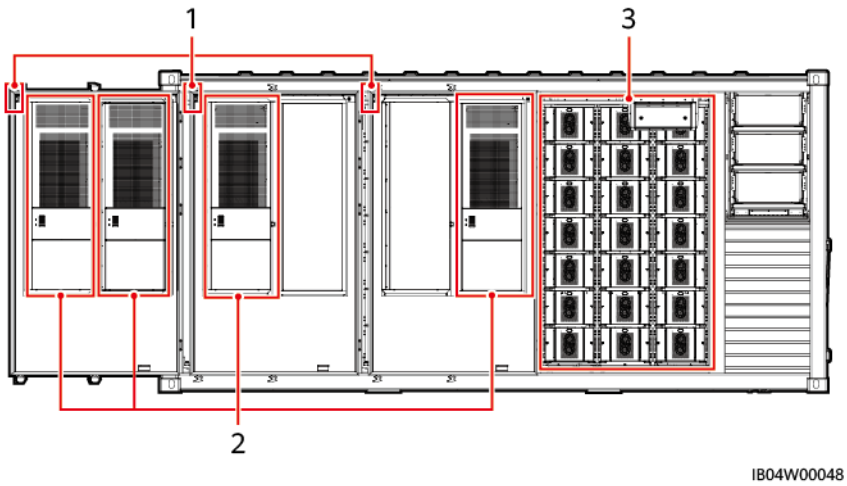


Figure 2-8 LUNA2000-2.0MWH-2HX battery cabin configurations 1

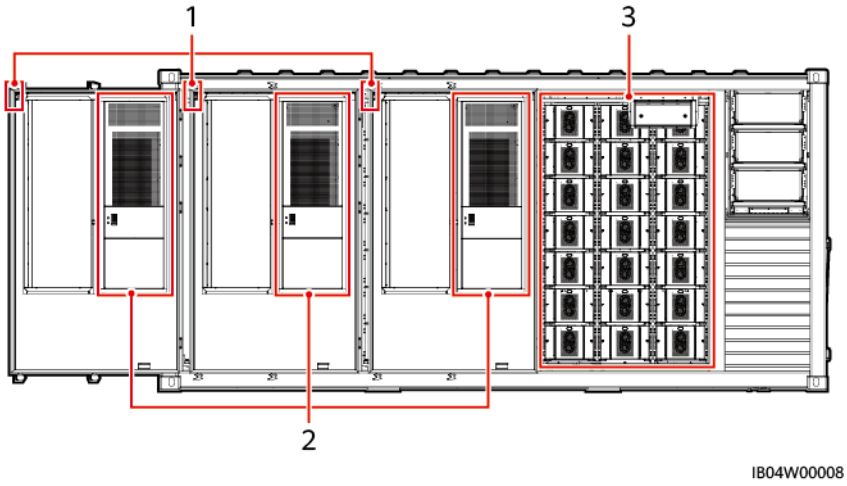
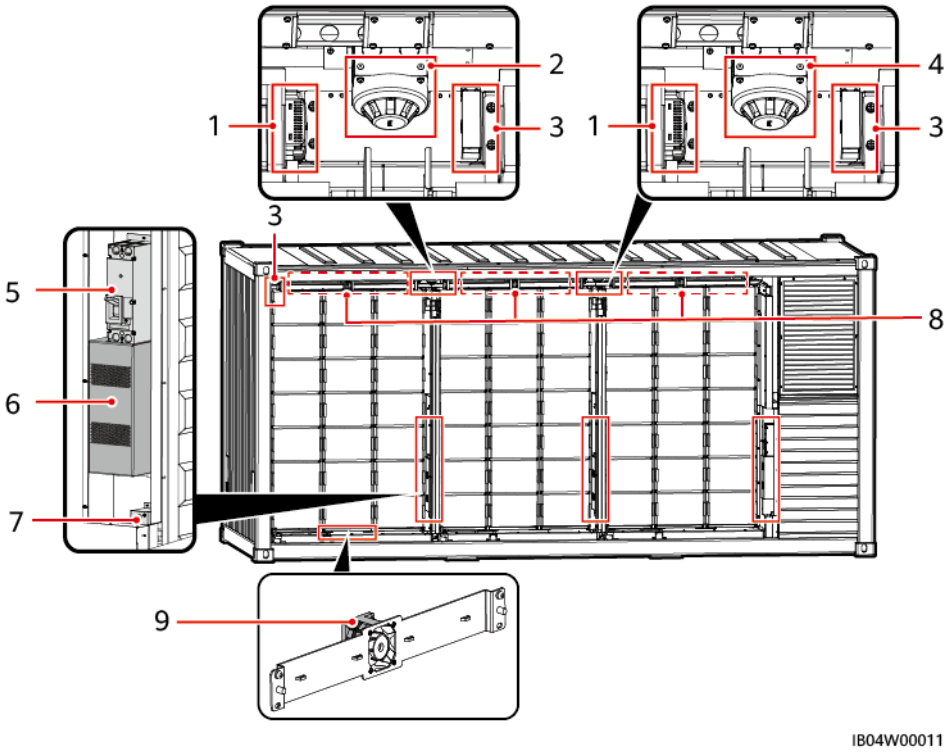


Table 2-4 Battery cabin configurations 1

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
1	Door status sensor	Mandatory	6	Monitors the door status of the battery cabin.
2	Air conditioner in the battery cabin	Mandatory	• LUNA2000-2.0MWH-1HX: 8/6 • LUNA2000-2.0MWH-2HX: 6/4	Dissipates heat for components in the battery cabin.

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
3	Battery pack	Mandatory	126	The battery pack is a combination of batteries connected in series and output through a pair of positive and negative terminals. Each battery pack is configured with a pack optimizer and a battery monitoring unit (BMU).

Figure 2-9 Battery cabin component configurations 2



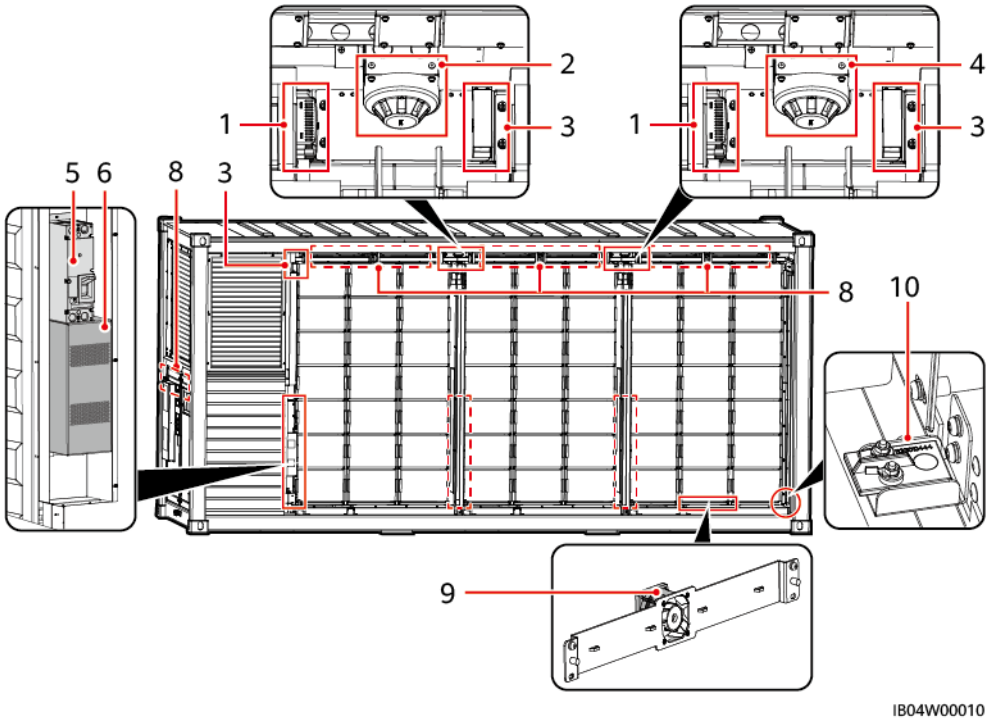


Table 2-5 Battery cabin configurations 2

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
1	Temperature and humidity (T/H) sensor	Mandatory	4	Detects the indoor temperature and humidity in real time.
2	Smoke detector	Mandatory	2	Common photoelectric smoke detector (voltage output type)
3	CO sensor	Mandatory	6	Detects the concentration of CO in combustible gases.
4	Heat detector	Mandatory	2	Monitors the temperature of the battery cabin.
5	Circuit breaker	Mandatory	6	Provides short-circuit protection and disconnects the high-voltage circuit of the battery rack.

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
6	Fuse	Mandatory	• LUNA2000-2.0MWH-1HX: 12 • LUNA2000-2.0MWH-2HX: 6	Provides short-circuit protection.
7	Black start button	Optional	1	Used for black start of the ESS.
8	Light	Mandatory	6 (apply only to some models)	Used to illuminate the interior of the battery cabin.
9	Mixed-flow fan	Mandatory	10	Facilitates the exhaust fans.
10	Water sensor	Mandatory	1	Detects water based on the resistance change between both electrodes.

Figure 2-10 Battery cabin configurations 3

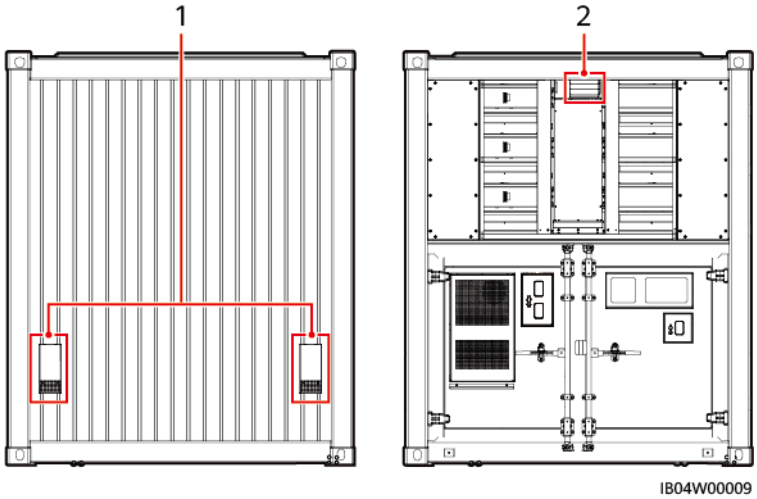


Table 2-6 Battery cabin configurations 3

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
1	Air intake module	Mandatory	2	Consists of the labyrinth and air filter foam.
2	Air exhaust module	Mandatory	1	Consists of the fan module and air filter foam.

2.5.2 Control Unit Cabin

Figure 2-11 Control unit cabin component configuration 1

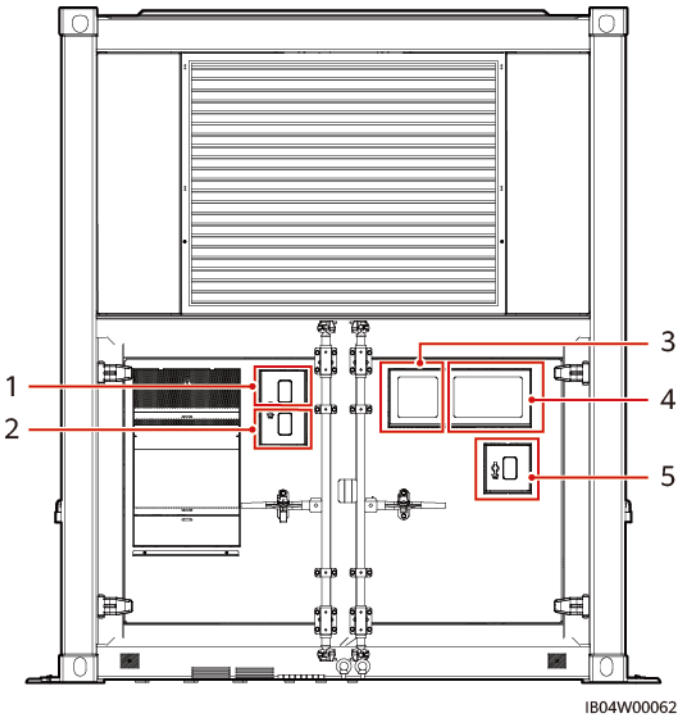


Table 2-7 Control unit cabin component configuration 1

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
1	Extinguishant release button	Mandatory	1	-
2	Extinguishant abort button	Mandatory	1	-

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
3	Fire alarm horn/strobe	Mandatory	1	Used for audible and visual alarm in the area where an accident occurs.
4	Gas release alarm	Mandatory	1	Used for audible and visual alarm in the extinguishant protection area.
5	ESS emergency stop	Mandatory	1	-

Figure 2-12 Control unit cabin component configuration 2

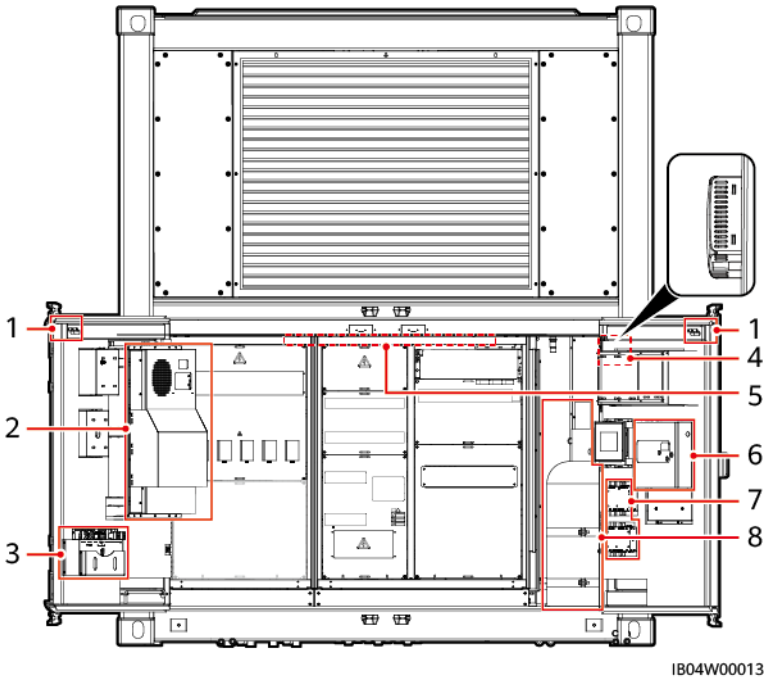


Table 2-8 Control unit cabin component configuration 2

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
1	Door status sensor	Mandatory	2	Monitors the door status of the control unit cabin.

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
2	Air conditioner in the control unit cabin	Mandatory	1	Dissipates heat for components in the control unit cabin.
3	Document holder	Mandatory	1	-
4	T/H sensor	Mandatory	1	Detects the indoor temperature and humidity in real time.
5	Lights	Mandatory	1	Used to illuminate the interior of the control unit cabin.
6	Extinguishant control panel	Mandatory	1	Used for fire alarms and automatic fire extinguishing control. For details, see the extinguishant control panel manual included with the ESS.
7	Exhaust controller	Mandatory	2	Controls exhaust fans.
8	Fire cylinder	Mandatory	1	Stores fire extinguishant and its components include a solenoid valve, pressure gauges, and pipes.

NOTE

The control unit cabin has multiple internal layouts. The following figures are for reference only.

Figure 2-13 LUNA2000-2.0MWH-1HX control unit cabin component configuration 3

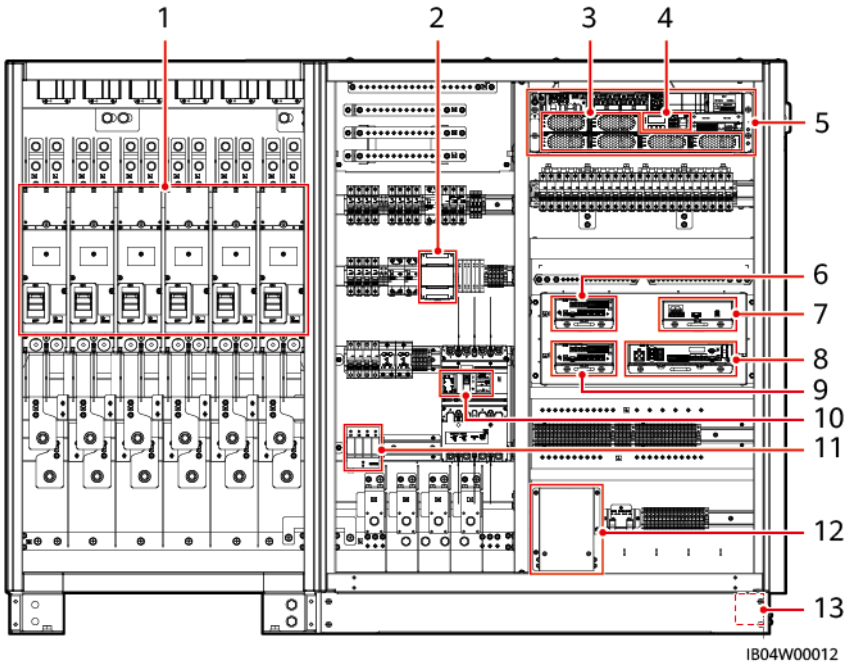


Figure 2-14 LUNA2000-2.0MWH-2HX control unit cabin component configuration 3

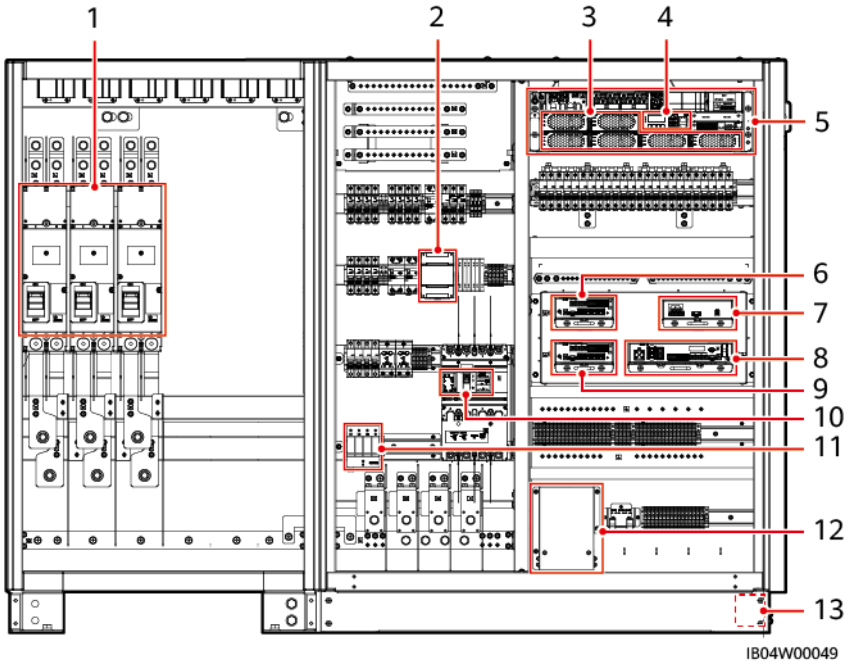


Figure 2-15 LUNA2000-2.0MWH-2HX control unit cabin component configuration 4

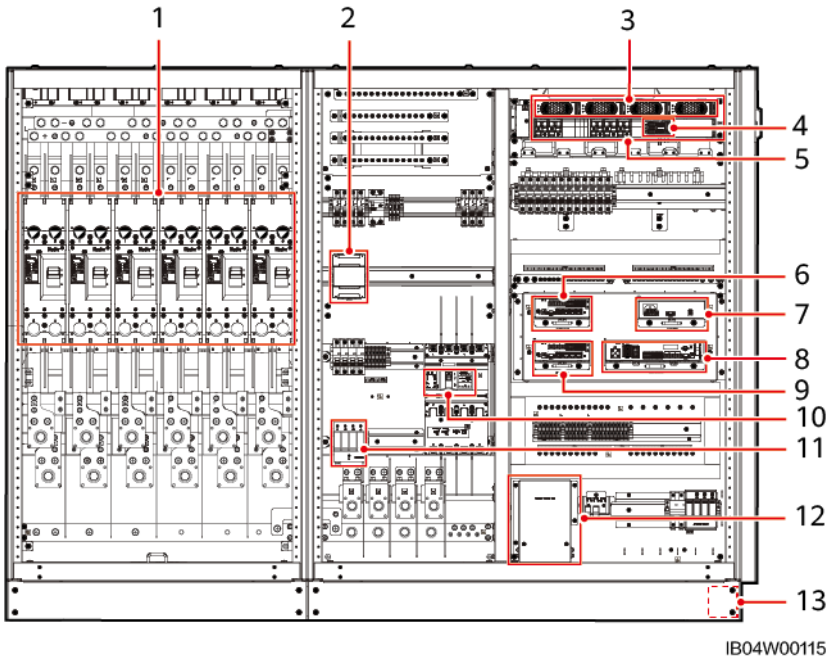


Table 2-9 Control unit cabin component configuration 3

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
1	DC circuit breaker	Mandatory	• LUNA2000-2.0MWH-1HX: 6 • LUNA2000-2.0MWH-2HX: 3/6	Provides short-circuit protection and DC circuit disconnection.
2	AC meter	Mandatory	1	Collects information about the auxiliary AC input power supply.
3	PSU	Mandatory	6/4	Converts AC input power into stable DC power.
4	SMU	Mandatory	1	Collects PSU information and controls PSU output.
5	Embedded Power Subrack	Mandatory	1	An embedded power subrack

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
6	SmartModule	Optional	1	Converges interfaces, converts protocols, and collects data for devices in the ESS, and expands ports for the CMU.
7	Adapter	Mandatory	1	Supplies power to the CMU and SmartModule of the ESS.
8	Central monitoring unit (CMU)	Mandatory	1	Aggregates interfaces, converts protocols, collects, stores, and monitors data, and performs unified monitoring and local maintenance for devices in the ESS.
9	SmartModule	Mandatory	1	Converges interfaces, converts protocols, and collects data for devices in the ESS, and expands ports for the CMU.
10	AC circuit breaker	Mandatory	1	Provides short-circuit protection and disconnects the auxiliary power supply circuit of the ESS.
11	AC surge protective device (SPD)	Mandatory	1	Provides AC surge protection.
12	Fiber management tray	Mandatory	1	Holds optical fibers.

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
13	Water sensor	Mandatory	1	Detects water based on the resistance change between both electrodes.

2.5.3 Smart Rack Controller Cabin

Figure 2-16 Configuration of components in the Smart Rack Controller cabin of LUNA2000-2.0MWH-1HX

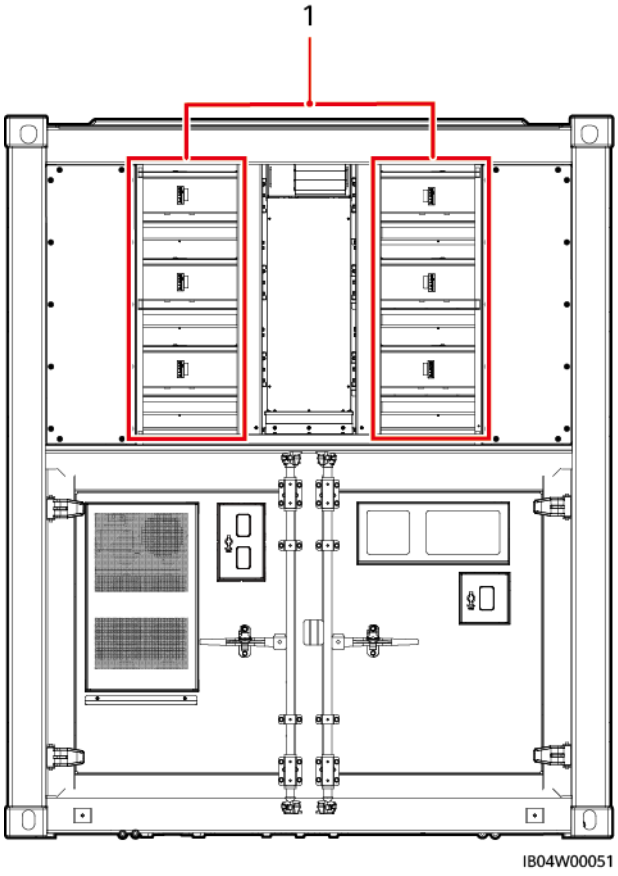


Figure 2-17 Configuration of components in the Smart Rack Controller cabin of LUNA2000-2.0MWH-2HX

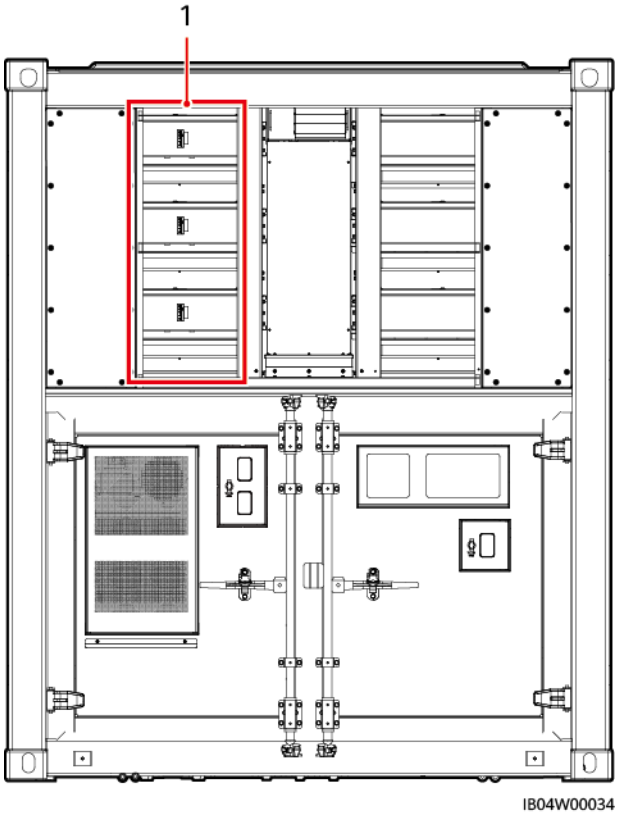


Table 2-10 Configuration of components in the Smart Rack Controller cabin

No.	Component Name	Configuration	Quantity Configured for an ESS	Description
1	Smart Rack Controller	Mandatory	• LUNA2000-2.0MWH-1HX: 6 • LUNA2000-2.0MWH-2HX: 3	Manages charge and discharge of the battery rack.

2.6 Components

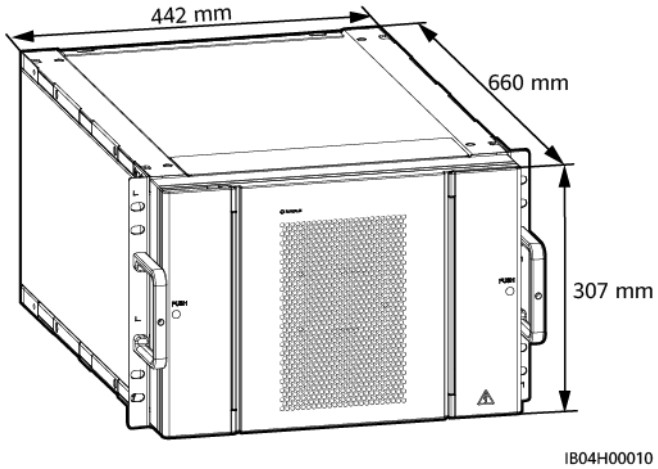
2.6.1 Power Supply and Distribution System

2.6.1.1 Battery Pack

NOTE

The appearance of the battery pack is for reference only, and that of the actual product may vary.

Figure 2-18 Appearance



Technical Specifications	Battery Pack	
Model	ESM51320AS1	ESM-57280AS1
Cell material	Lithium iron phosphate	Lithium iron phosphate
Cell capacity	3.2 V/320 Ah	3.2 V/280 Ah
Battery configuration	16S1P	18S1P
Rated voltage	51.2 V	57.6 V
Nominal energy	16.38 kWh	16.128 kWh
Charging and discharging rate	≤ 1C	≤ 1C
Net weight	≤ 140 kg	≤ 140 kg
Dimensions (H x W x D)	307 mm x 442 mm x 660 mm	307 mm x 442 mm x 660 mm
Cooling mode	Air cooled	Air cooled
IP rating	IP20	IP20
Storage temperature	0°C to 40°C	0°C to 40°C
Transportation temperature	–20°C to +60°C	–20°C to +60°C
Equalization mode	Passive cell equalization	Passive cell equalization
Communications port	CAN 2.0	CAN 2.0

2.6.1.2 Smart Rack Controller

Figure 2-19 Appearance

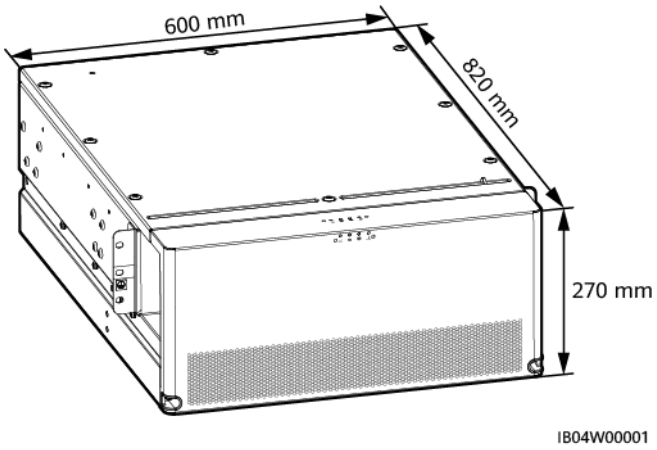


Table 2-11 Technical specifications of efficiency

Technical Specifications	Smart Rack Controller
Maximum efficiency	≥ 99.0%

Table 2-12 Technical specifications of battery side

Technical Specifications	Smart Rack Controller
Number of battery strings	2
Minimum startup voltage	350 V
Rated power of a single battery string	172 kW
Rated power of a battery pack	344 kW

Table 2-13 Technical specifications of bus side

Technical Specifications	Smart Rack Controller
Number of battery strings connected to the bus	2
Maximum DC voltage	1500 V
Rated operating voltage	1200 V
Rated working current of a single battery string	143.3 A

Table 2-14 General specifications

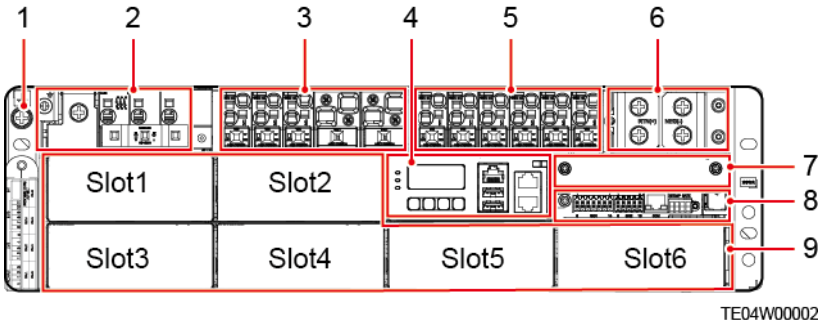
Technical Specifications	Smart Rack Controller
Parallel mode	Two parallel Smart Rack Controllers on the battery side and two on the bus side
Overvoltage category	Bus side DC II
Dimensions (H x W x D)	270 mm x 600 mm x 820 mm
Net weight	≤ 90 kg
IP rating	IP66
DC surge protection on the bus side	Type II
Operating temperature range	–30°C to +60°C
Operating humidity range	0–100% (non-condensing)
Storage temperature	–40°C to +70°C
Storage humidity	5%–95% RH
Cooling mode	Intelligent air cooling
Maximum Operating Altitude	4000 m
Communications port	CAN, RS485, FE

2.6.1.3 Embedded Power Subrack

ETP48400-C3B1

Embedded Power Subrack (ETP48400-C3B1) is an embedded power system that converts AC power into DC power. It supplies DC constant voltage to the equipment.

Figure 2-20 Appearance



(1) Ground screws (2) AC input module (3) LLVD power distribution

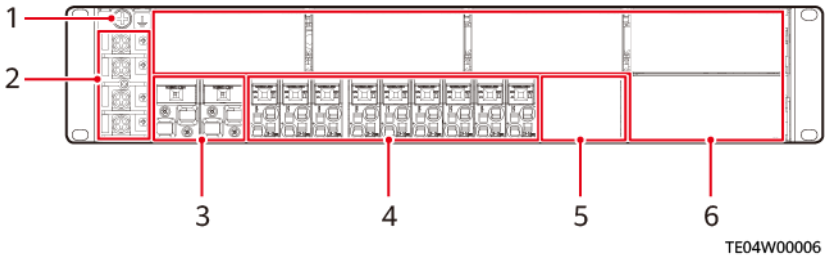
(4) Monitoring module SMU02C
(5) BLVD power distribution
(6) Battery wiring ports
(7) Reserved slot for the communications expansion module CIM02C/NIM01C3
(8) User interface module UIM05B1
(9) Space for PSUs

Technical specification	Embedded Power Subrack
AC input system	Three-phase 380 V/400 V AC; 3W + N + PE; 50 Hz/60 Hz

ETP48200-B2A1

Embedded power subrack (ETP48200-B2A1) provides positions for installing components.

Figure 2-21 Appearance



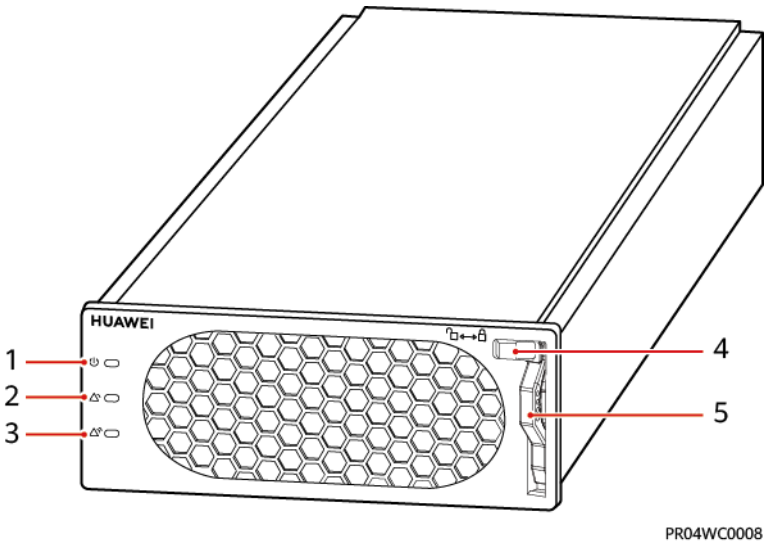
(1) Ground screw
(2) Input terminals
(3) Power switches
(4) Load switches
(5) Monitoring module SMU11B
(6) Space for PSUs

2.6.1.4 Rectifier Module PSU

The PSU (R4875G) converts AC input power into stable DC power.

Appearance

Figure 2-22 Appearance



(1) Power indicator (2) Alarm indicator (3) Fault indicator

(4) Locking latch (5) Handle -

Indicators

Table 2-15 Indicator description

Indicator	Color	Status	Description
Power indicator	Green	Steady on	The PSU has an AC input.
		Off	There is no AC input.
			The PSU is damaged.
		Blinking at 0.5 Hz	Querying is in progress.
		Blinking at 4 Hz	The PSU is loading the application program.
Alarm indicator	Yellow	Off	The PSU does not generate any protection alarm.
		Steady on	• A warning is generated due to ambient overtemperature. • A shutdown protection alarm is generated due to ambient overtemperature or undertemperature.
			AC input overvoltage or undervoltage protection is triggered.

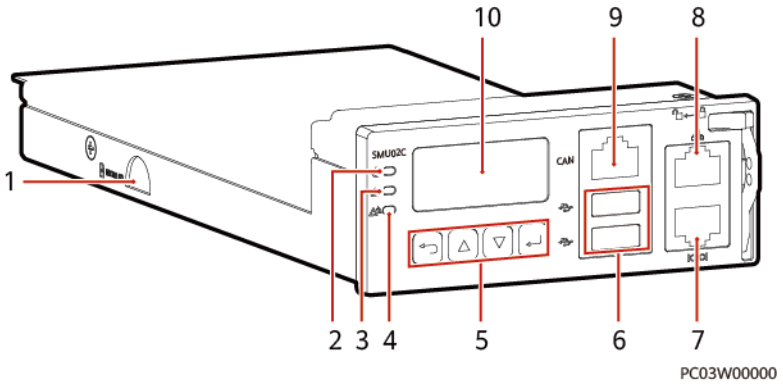
Indicator	Color	Status	Description
			The PSU is hibernating.
		Blinking at 0.5 Hz	The communication between the PSU and the monitoring module is interrupted.
Fault indicator	Red	Off	The PSU is normal.
		Steady on	The PSU locks out due to output overvoltage.
			The PSU has no output due to an internal fault.

2.6.1.5 SMU

SMU collects PSU information and controls PSU output.

SMU02C

Figure 2-23 Appearance



(1) SD card slot	(2) Running indicator	(3) Minor alarm indicator
(4) Major alarm indicator	(5) Buttons	(6) USB port (protected by a security protection mechanism)
(7) RS485/RS232 communications port	(8) FE communications port	(9) CAN communications port
(10) Liquid crystal display (LCD)	-	-

Table 2-16 Indicator description

Name	Color	Status	Description
Running indicator	Green	Off	The SMU is faulty or has no DC input.

Name	Color	Status	Description
		Blinking slowly (0.5 Hz)	The SMU is running properly and communicating with the host properly.
		Blinking fast (4 Hz)	The SMU is running properly but fails to communicate with the host.
Minor alarm indicator	Yellow	Off	No minor or warning alarm is generated.
		Steady on	A minor or warning alarm is generated.
Major alarm indicator	Red	Off	No critical or major alarm is generated.
		Steady on	A critical or major alarm is generated.

Table 2-17 Button description

Button	Name	Description
▲	Up	Press ▲ or ▼ to scroll through the menus or to change the value of a parameter.
▼	Down	
⮌	Cancel	Returns to the previous menu without saving the settings.
↵	Enter	• Enters the main menu from the standby screen. • Enters a submenu from the main menu. • Saves menu settings on a submenu.
Note: • The LCD screen becomes dark if no button is pressed within 30s. • You need to log in again if no button is pressed within 1 minute. • To increase or decrease a parameter value quickly, press and hold ▲ or ▼. • Press and hold ↵ and ⮌ for 10s to restart the SMU. • Press and hold ↵ and ▲ (or ▼) for 2s to increase or decrease the LCD contrast.		

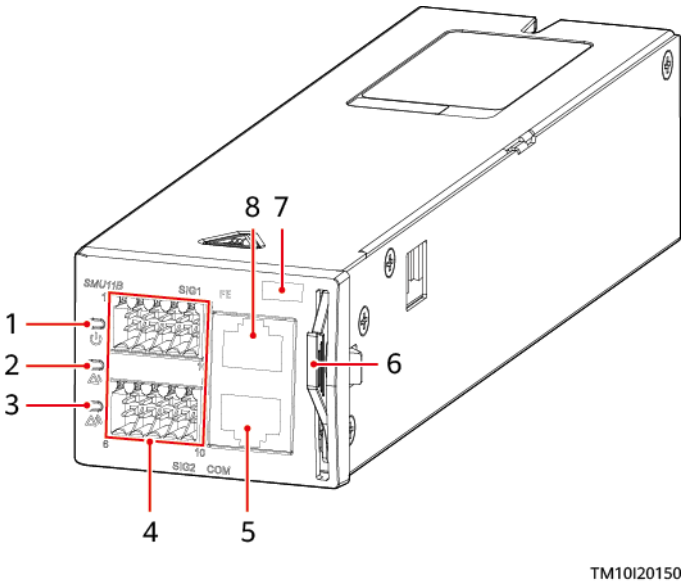
The LCD supports two-level password management for different users.

Table 2-18 Two-level password management

Level	Operation Permission	Password
Engineer	All permissions except for changing the administrator password and resetting the web password	000001
Administrator	All permissions	012589[a]
Note a: The administrator password can be used only by administrators. Do not provide the password to third-party maintenance personnel.		

SMU11B

Figure 2-24 Appearance



(1) Running indicator
(2) Minor alarm indicator
(3) Major alarm indicator
(4) Wiring terminals
(5) COM port
(6) Handle
(7) SN label
(8) FE communications port
-

Table 2-19 Indicator description

Indicator	Color	Status	Description
Running indicator	Green	Off	The SMU is faulty or has no DC input.

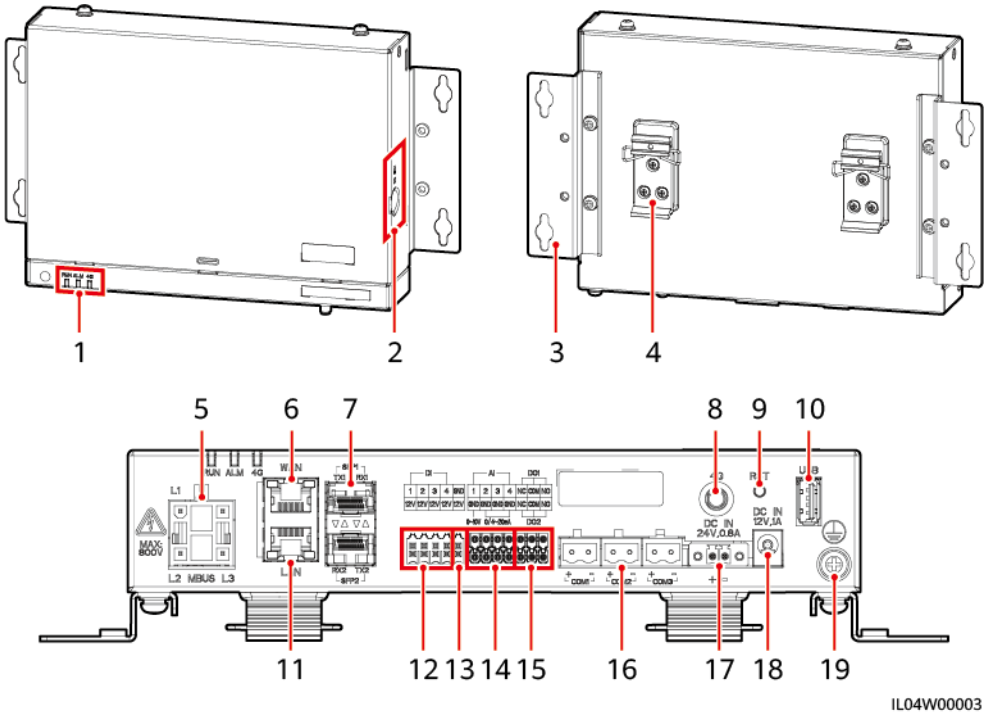
Indicator	Color	Status	Description
		Blinking slowly (0.5 Hz)	The SMU is running properly and communicating with the host properly.
		Blinking fast (4 Hz)	The SMU is running properly but fails to communicate with the host.
Minor alarm indicator	Yellow	Off	No minor or warning alarm is generated.
		Steady on	A minor or warning alarm is generated.
Major alarm indicator	Red	Off	No critical or major alarm is generated.
		Steady on	A critical or major alarm is generated.

2.6.2 Monitoring System

2.6.2.1 CMU

Appearance

Figure 2-25 Appearance



(1) LED indicator	(2) SIM card slot	(3) Mounting ear
(4) Guide rail clamp	(5) MBUS port (reserved)	(6) GE port (WAN)
(7) SFP port	(8) 4G antenna port (reserved)	(9) RST button
(10) USB port	(11) GE port (LAN)	(12) DI port
(13) 12 V output power port	(14) AI port	(15) DO port
(16) COM port	(17) 24 V input power port	(18) 12 V input power port
(19) Protective ground point	-	-

Indicators

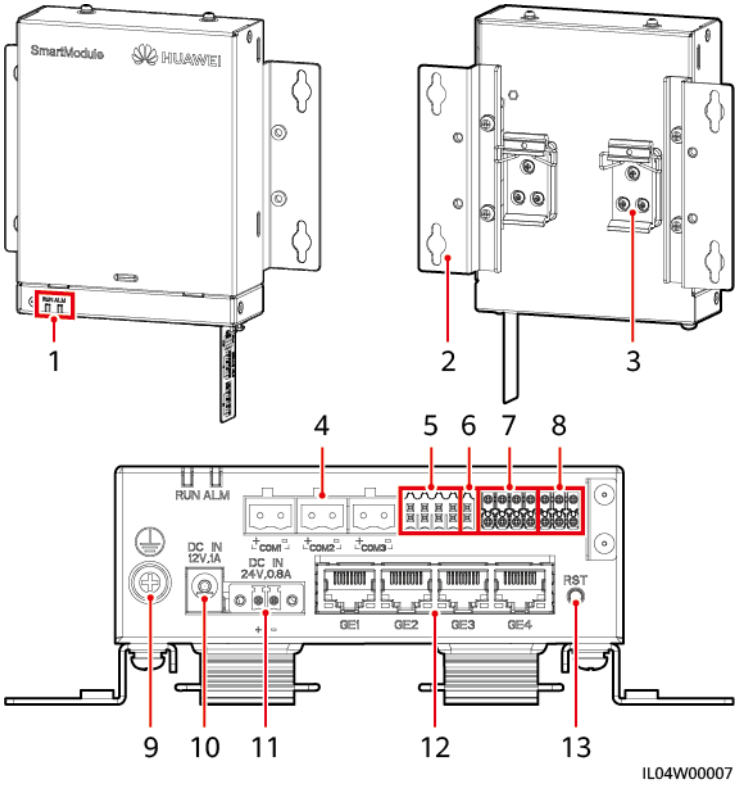
Table 2-20 Indicators

Indicator	Status		Description
Running indicator (RUN) RUN 	Green off		Not powered on
	Blinking green slowly (on for 1s and then off for 1s)		The communication with the management system is normal.
	Blinking green fast (on for 0.125s and then off for 0.125s)		The communication with the management system is interrupted.
Alarm/ maintenance indicator (ALM) ALM 	Alarm status	Red off	No system alarm is generated.
		Blinking red slowly (on for 1s and then off for 4s)	The system raises a warning alarm.
		Blinking red fast (on for 0.5s and then off for 0.5s)	The system raises a minor alarm.
		Steady red	The system raises a major alarm.
	Maintenance status	Green off	No local maintenance is in progress.
		Blinking green slowly (on for 1s and then off for 1s)	Local maintenance is in progress.
		Blinking green fast (on for 0.125s and then off for 0.125s)	Local maintenance fails or the connection to the app is to be set up.
		Steady green	Local maintenance succeeded.

2.6.2.2 SmartModule

Appearance

Figure 2-26 Appearance



(1) LED indicator	(2) Mounting ear	(3) Guide rail clamp
(4) COM port	(5) DI port	(6) 12 V output power port
(7) AI port	(8) PT port	(9) Protective ground point
(10) 12 V input power port	(11) 24 V input power port	(12) GE port
(13) RST button	-	-

Indicators

Indicator	Status		Description
Running indicator (RUN) 	Green off		Not powered on
	Blinking green slowly (on for 1s and then off for 1s)		The communication with the CMU is normal.
	Blinking green fast (on for 0.125s and then off for 0.125s)		The communication with the CMU is interrupted.
Alarm/ maintenance indicator (ALM) 	Alarm status	Red off	No alarm is raised for the SmartModule.
		Blinking red slowly (on for 1s and then off for 4s)	The SmartModule runs with an expired digital certificate.
		Blinking red fast (on for 0.5s and then off for 0.5s)	The SmartModule digital certificate is invalid.
		Steady red	Reserved

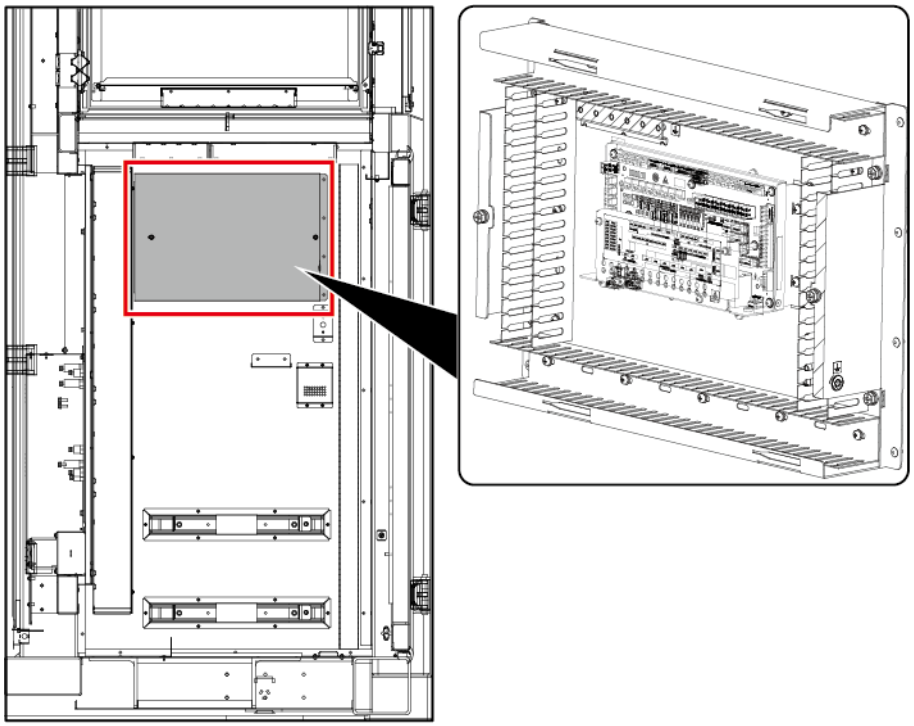
2.6.2.3 Input/Output Board (IO Board)

NOTE

Only some models are equipped with the IO Board.

The IO Board controls and monitors some devices in the ESS, such as door status sensors, detectors, and air conditioners, as well as connects cables to the fire suppression system.

Figure 2-27 Position of IO board



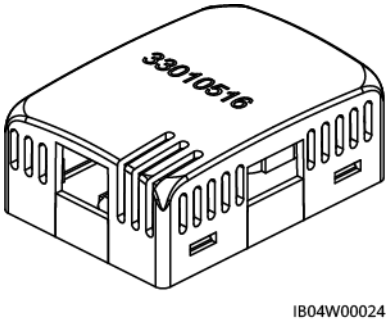
(1) Position of IO Board

Technical Specifications	IO Board
Model	ENF1DETC
Operating voltage	220 V AC/12 V DC/24 V DC
Operating current	≤ 1 A
Operating temperature	–30°C to +55°C
Humidity	≤ 95% RH (non-condensing)
Dimensions (W x H x D)	251 mm x 113.7 mm x 54.5 mm

2.6.3 Environmental Control System

2.6.3.1 T/H Sensor

Figure 2-28 Appearance



NOTE

The appearance of the T/H sensor depends on the actual delivery.

Table 2-21 T/H sensor technical specifications

Technical Specifications	T/H sensor
Temperature measuring range	–20°C to +80°C
Temperature precision	≤ ±0.5°C (25°C) ≤ ±1°C (full measuring range)
Operating temperature	–20°C to +80°C
Operating voltage	9–16 V DC
Storage temperature	–40°C to +80°C
Signal output	Two RJ45 ports, bidirectional cascading

The T/H sensor uses an RJ45 connector.

Figure 2-29 Pins of an RJ45 connector

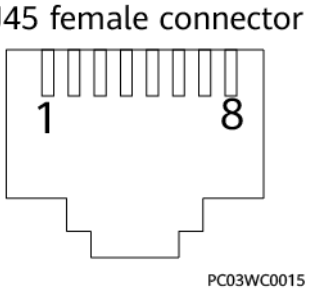
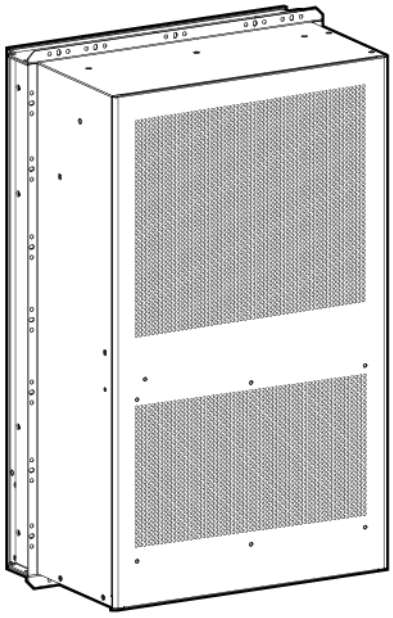


Table 2-22 Pin definitions of an RJ45 connector

Pin	Description
Pin 1 or Pin 4	A
Pin 2 or Pin 5	B
Pin 3	V+
Pin 6	Reserved
Pin 7	Reserved
Pin 8	V-

2.6.3.2 Air Conditioner in the Control Unit Cabin

Figure 2-30 Appearance of the air conditioner in the control unit cabin

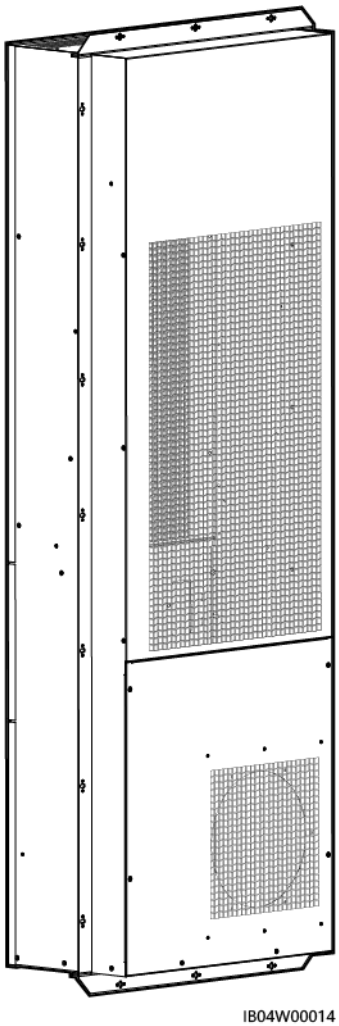


Technical Specifications	Air Conditioner in the Control Unit Cabin
Air conditioner model	PC3000D-3
Operating temperature	–30°C to +55°C
Rated DC input voltage	–48 V DC
Rated DC input power	1015 W
Rated input current	20.5 A
Cooling capacity (L35/L35)	2000 W

Technical Specifications	Air Conditioner in the Control Unit Cabin
Heating capacity	1100 W
Dimensions (H x W x D)	• 746 mm x 446 mm x 300 mm (without flanges) • 783 mm x 479 mm x 300 mm (with flanges)
Net weight	40 kg
IP rating	IP55
Refrigerant	R134a
Surface treatment	Electrostatic spraying

2.6.3.3 Air Conditioner in the Battery Cabin

Figure 2-31 Appearance



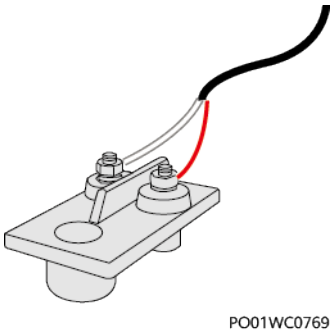
Technical Specifications	Air Conditioner in the Battery Cabin
Air conditioner model	PC6H
Rated voltage	208–230 V AC
Rated cooling capacity	• 6350 W (L25/L45) • 9300 W (L25/L35)
Rated heating capacity (W)	3000 W (PTC)
Rated cooling power	• 4150 W (L25/L45) • 4120 W (L25/L35)
Rated heating power	3000 W (PTC)
Refrigerant (g)	R134a
Operating temperature	–30°C to +55°C
Humidity	5%–100% RH
Dimensions (H x W x D)	1770 mm x 620 mm x 300 mm (with flanges)
Transport performance	Transported by train, vehicle, air, or sea
IP rating	IP55
Fire-retardant performance	Complies with UL94.
External circulation corrosion	Complies with DKBA0.450.0065.
Safety	Complies with EN60335, IEC 60950, UL60950, UL1995, and UL484.
Net weight	125 kg

2.6.3.4 Electrode Water Sensor

The water sensor detects water based on the resistance change between both electrodes.

When the electrodes detect water, they are short-circuited and the CMU reports an alarm.

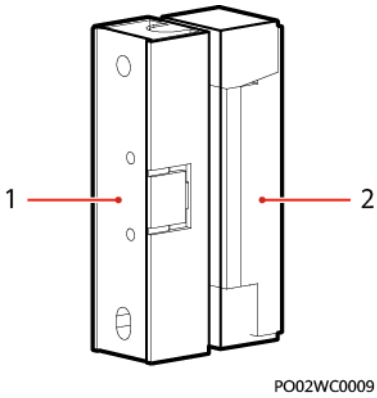
Figure 2-32 Appearance



Technical Specifications	Electrode Water Sensor
Operating temperature	–40°C to +80°C
Storage temperature	–40°C to +80°C

2.6.3.5 Door Status Sensor

Figure 2-33 Appearance



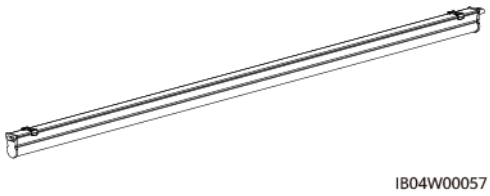
(1) Switch (2) Magnet

Technical Specifications	Door Status Sensor
Connection method	Wiring terminals
Rated current	500 mA
Startup distance	25–45 mm
Rated Power	10 W
Securing method	Screw
Hole spacing	40±0.8 mm

Technical Specifications	Door Status Sensor
Switch voltage	100 V DC (Max)
Contact withstand voltage	150 V DC (Max)
Impedance	0.3 ohms
Switch status	Steady on
Outer material	White acrylonitrile butadiene styrene (ABS) engineering plastic

2.6.3.6 Light

Figure 2-34 Appearance



Technical Specifications	Light
Installation mode	Ceiling-mounting
Type	LED lights
Light holder	Integrated with the lights
IP rating	IP20
Rated voltage	220 V AC
Frequency	50 Hz
Power	10.5 W (68 x 0.2 W)
Color temperature	5700 k
Color	White

2.6.4 Fire Suppression System

NOTE

The component models in this section may vary.

2.6.4.1 CO Sensor

CO sensor detects the concentration of CO in combustible gases.

Figure 2-35 Appearance

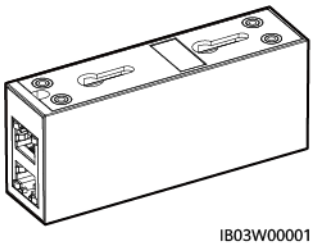


Table 2-23 Technical specifications of the CO sensor

Technical Specifications	CO Sensor
Dimensions (H x W x D)	40 mm x 97 mm x 25 mm
Operating voltage	8–30 V DC
Stability	≤ ±3% FS/year
Precision	≤ ±10% FS
Power consumption	0.12 W
Output signal	RS485
Operating temperature	–25°C to +55°C
Humidity	5%–95% RH (non-condensing)
Resolution	≤ 30 ppm
Response time	≤ 60s
Cabling mode	RJ45 network port
Installation mode	Gourd-shaped mounting hole/nut/magnet

Figure 2-36 Pins of an RJ45 connector

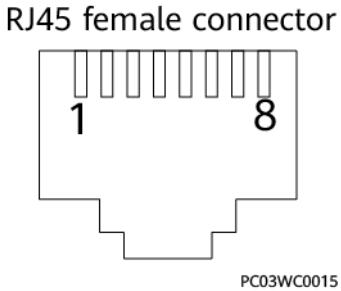


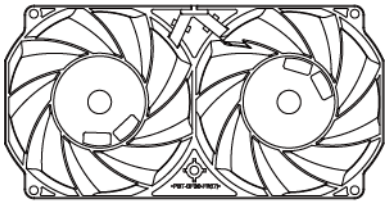
Table 2-24 Pin definitions of an RJ45 connector

Pin	Description
Pin 1 or Pin 4	A
Pin 2 or Pin 5	B
Pin 3	V+
Pin 6	Reserved
Pin 7	Reserved
Pin 8	V–

2.6.4.2 Air Exhaust Module

The air exhaust module is the actuator of the active air exhaust system. When the combustible gas is released from the battery, the air exhaust module reduces the concentration of combustible gas in the battery cabin.

Figure 2-37 Appearance



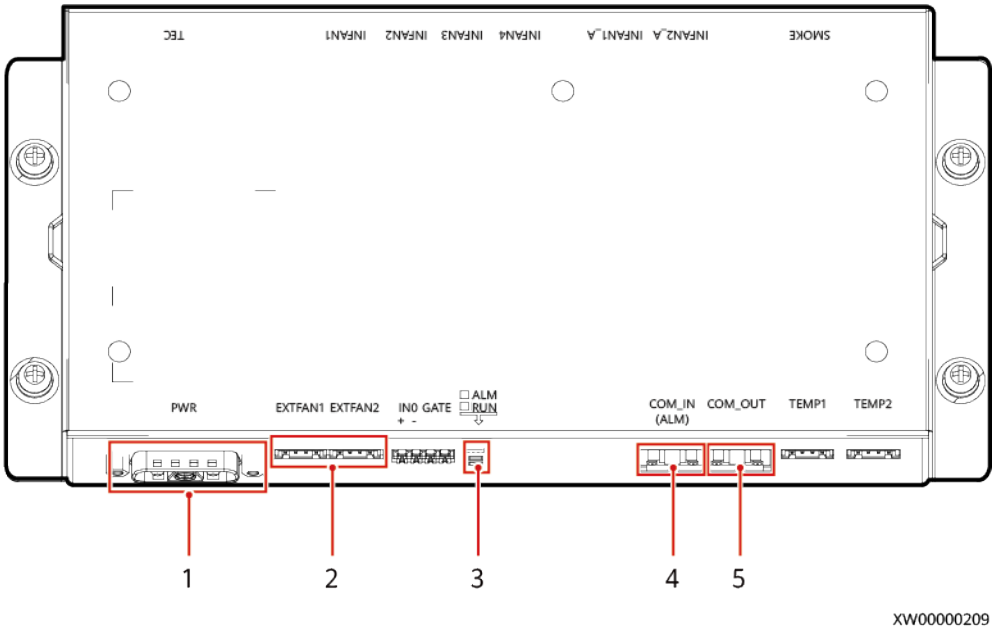
IB04W00020

Technical Specifications	Air Exhaust Module
Dimensions (H x W x D)	38 mm x 194 mm x 99 mm
Operating voltage	36–72 V DC
Rated rotating speed	9500±10% RPM
Operating temperature	–25°C to +70°C

2.6.4.3 Air Exhaust Controller

The air exhaust controller TCUE receives commands from the CMU and adjusts the fan speed.

Figure 2-38 Appearance



(1) Power input ports (2) Fan ports (3) Indicators

(4) Communications port 1 (5) Communications port 2 -

Table 2-25 Indicator description

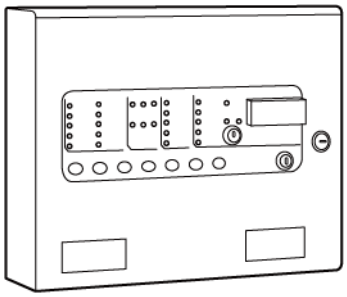
Silkscreen	Color	Status	Description
RUN	Green	Steady on	Power supply to the board is normal but no program is running.
		Blinking at 0.5 Hz	The system is running properly.
		Blinking at 4 Hz	Serial port communication is interrupted or the board is not registered.
		Off	The system is not powered on.
ALM	Red	Steady on	Power supply to the board is normal but no program is running.
		Blinking at 0.5 Hz	An alarm is generated.
		Off	No alarm is generated.

2.6.4.4 Extinguishant Control Panel

Extinguishant control panel is used for fire alarms and automatic fire extinguishing control. For details, see the extinguishant control panel manual included with the ESS.

Model: K11031M2

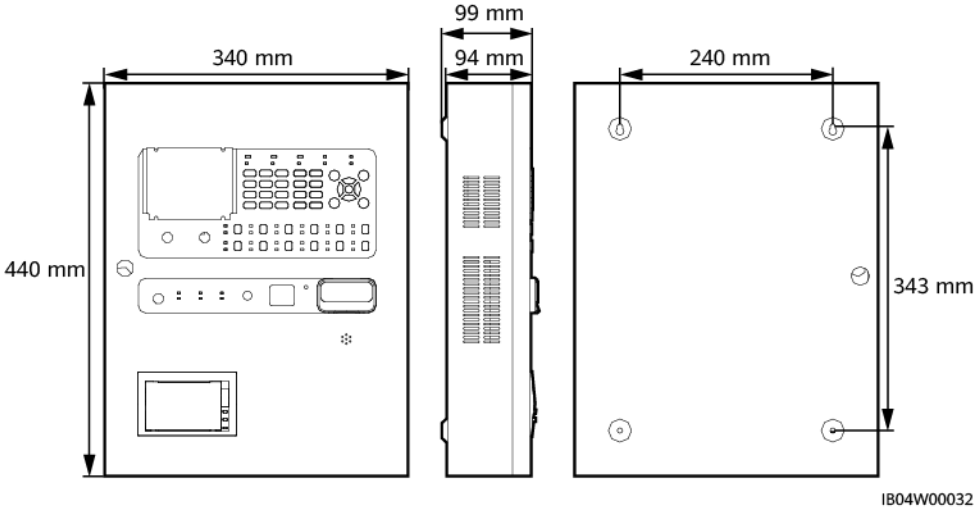
Figure 2-39 Appearance



Technical Specifications	Extinguishant Control Panel
Model	K11031M2
Dimensions (H x W x D)	385 mm x 310 mm x 90 mm
Operating voltage	• 230 V+10%/–15% AC • Two 12 V 7 Ah sealed lead acid in series
Power	AC Input ≤ 100 W
Capacity	• Number of detection circuits: 3 • Number of detectors per zone: ≤ 32
Detector loop requirements	• Wire system of the detector loop: two-wire system • Length of the detector loop: ≤ 1000 m
Enclosure material	1.2 mm mild sheet steel
Operating temperature	–5°C (±3°C) to +55°C (±2°C)
Humidity	≤ 95% RH (non-condensing)
IP rating	IP30

Model: JB-QBL-QM210

Figure 2-40 Appearance



Technical Specifications	Extinguishant Control Panel
Model	JB-QBL-QM210
Dimensions (H x W x D)	340 mm x 440 mm x 99 mm
Operating voltage	• AC input voltage: 220±20% V AC, 50 Hz • Maintenance-free battery 12 V DC/5 Ah x 2
24 V DC power output	Long-term: 3 A
Power	AC Input ≤ 120 W
Capacity	• Number of detection circuits: 3. Two circuits connect to the common heat detector and smoke detector, respectively. The third circuit is reserved. • Number of detectors per zone: ≤ 24
Cabling mode	Non-polarized two-wire system
Detector loop requirements	• Wire system of the detector loop: two-wire system • Length of the detector loop: ≤ 1000 m
Enclosure material	A3 steel
Installation mode	Wall-mounted
Operating temperature	–10℃ to +55℃

Technical Specifications	Extinguishant Control Panel
Humidity	≤ 95% RH (non-condensing)
IP rating	IP30

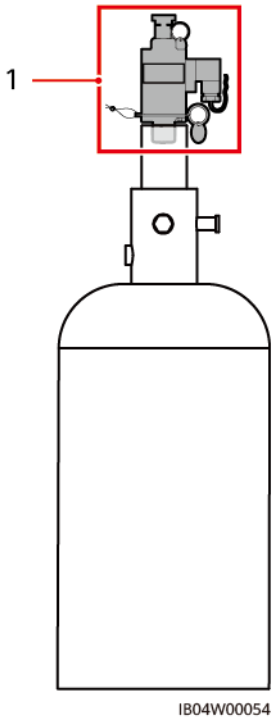
2.6.4.5 Fire Cylinder

Fire cylinder stores fire extinguishant and its components include an electromagnetic valve, pressure gauges, and pipes.

NOTICE

- Fire cylinders should be protected from direct sunlight.

Figure 2-41 Appearance of a fire cylinder



(1) Position of the electromagnetic valve after installation

Technical Specifications	Fire Cylinder				
Model	227M38 UFAA	SPS020-MS-032B-EN	P0009438	NCM38UFAA	40L cabinet

Technical Specifications	Fire Cylinder				
Operating voltage	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
Storage pressure (at 20°C)	2.5 Mpa	2.5 Mpa	2.5 Mpa	2.5 Mpa	2.5 Mpa
Maximum operating pressure (at 50°C)	4.2 Mpa	4.2 Mpa	3 Mpa	3 Mpa	4.2 Mpa
Startup mode	Electromagnetic startup	Electromagnetic startup	Electromagnetic startup	Electromagnetic startup	Electromagnetic startup
Electromagnetic startup voltage/ current	24 V DC/0.6 A	24 V DC/0.6 A	24 V DC/0.6 A	24 V DC/0.6 A	24 V DC/1 A
Operating temperature	-10°C to +55°C	-10°C to +60°C	-10℃ to +55℃	-10℃ to +55℃	0℃ to 50℃
Relative humidity	≤ 95% RH (non-condensing at 40°C)	≤ 95% RH (non-condensing at 40°C)	≤ 95% RH (non-condensing at 40°C)	≤ 95% RH (non-condensing at 40°C)	≤ 95% RH (non-condensing)
Outer diameter of cylinder	≤ 324 mm	324 mm	330 mm	300 mm	328 mm
Cylinder height	≤ 706 mm	730 mm	≤ 850 mm	≤ 850 mm	918 mm
Gas release time	6s to 10s	≤ 10s	≤ 10s	≤ 10s	≤ 10s
Hose	Length: 800 mm; diameter: DN20	Length: 800 mm; diameter: DN30	Length: 800 mm; diameter: DN20	Length: 700 mm; diameter: DN20	Length: 800 mm; diameter: DN20
Extinguishing Chemical	HFC-227ea	HFC-227ea	FK5112	FK5112	HFC-227ea
Nominal Capacity	38 L	32 L	40 L	38 L	40 L

2.6.4.6 Input/Output Modules

NOTE

Only some models are equipped with input/output modules.

Figure 2-42 Appearance

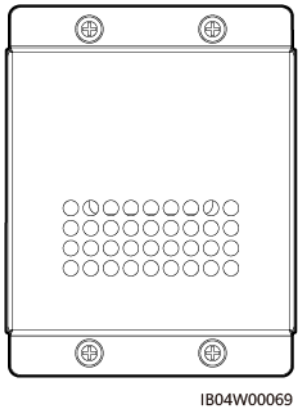
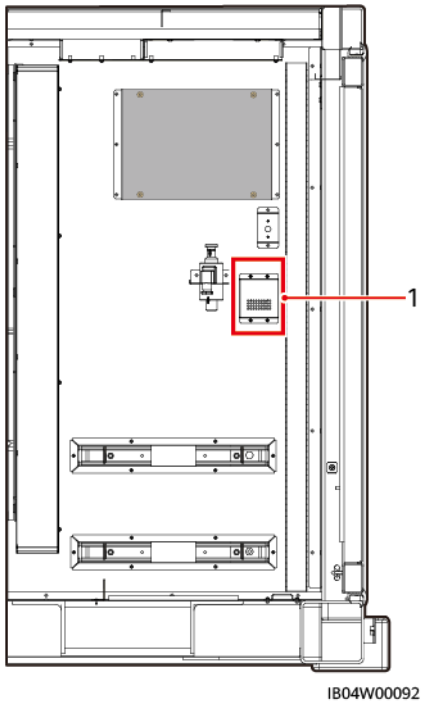


Figure 2-43 Position of input/output modules



(1) Position of input/output modules.

Technical Specifications	Input/Output modules
Model	KZJ-956
Cabling mode	Non-polarized two-wire system
Quiescent current	<0.6 mA

Technical Specifications	Input/Output modules
Operating current	<10 mA
Output control contact capacity	2 A @ DC 30 V
Working status indication	• The indicator blinks about every 12 seconds in the inspection state, and is steady on in the output state. • The input indicator is steady on in the input state.
Operating temperature	–10℃ to +50℃
Relative humidity	≤ 95% RH (non-condensing at 40°C ± 2°C)
Terminal load	47 kilo-ohm resistor
Dimensions (H x W x D)	86 mm x 86 mm x 40 mm (with base)
Weight	Approx. 130 g (with base)

2.6.4.7 Fire Signal Transfer Board

NOTE

Only some models are equipped with the fire signal transfer board.

Figure 2-44 Appearance

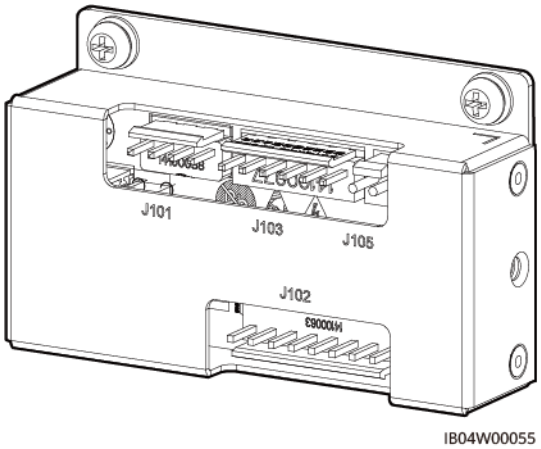
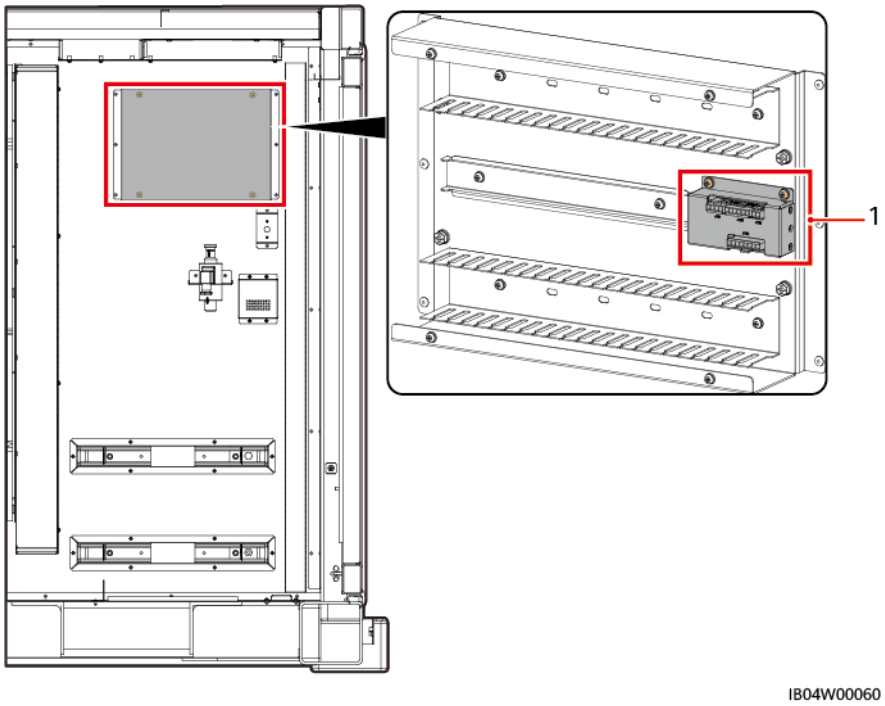


Figure 2-45 Position of the fire signal transfer board



(1) Position of the fire signal transfer board

Technical Specifications	Fire Extinguishing Board
Model	ENF1DETAA
Operating voltage	24 V
Operating current	≤ 1 A
Operating temperature	–30°C to +55°C
Humidity	≤ 95% RH (non-condensing)
Dimensions (H x W x D)	95 mm x 55 mm x 24 mm

2.6.4.8 Heat Detector

Figure 2-46 Appearance

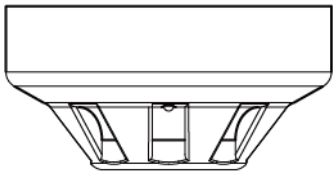


Table 2-26 Indicator description

Item	Color	Status	Description
Indicators	Red	Steady on	Enters alarm status
		Blinking	Enters monitoring status

Table 2-27 Technical specifications of the heat detector

Technical Specifications	Heat Detector	
Configuring model	55000-121-EH/ 55000-121-WZ	JTW-ZD-920
Dimensions	100 mm diameter x 50 mm height (with base)	100 mm diameter x 56 mm height (with base)
Operating voltage	Supply voltage: 9 V to 33 V	24 V
Net weight	Approx. 80 g	Approx. 65 g
Alarm category	A1R	A2R, 54°C to 70°C
Enclosure material	Polycarbonate, white	ABS, white
Cabling mode	Polarized two-wire system	Non-polarized two-wire system
Operating current	Monitoring status < 55 μA @24 V DC; alarm status < 52 mA	Monitoring status < 300 μA; alarm status < 1.5 mA
Operating temperature	–20°C to +90°C	–10℃ to +50℃
Humidity	≤ 95% RH (non-condensing)	≤ 95% RH (non-condensing)
Installation mode	Ceiling-mounted	Ceiling-mounted
Encoding mode	No encoding	The encoder can be used for onsite encoding. The address ranges from 1 to 324.
Protected area	About 50 m^2 (storey height ≤ 8 m), referring to GB50116-2013 Code for Design of Automatic Fire Alarm System	About 30 m^2 (storey height ≤ 8 m), referring to GB50116-2013 Code for Design of Automatic Fire Alarm System
Applicable base	45681-200	DZ-916

Technical Specifications	Heat Detector	
IP rating	IP54	IP30

2.6.4.9 Smoke Detector

The smoke detector can detect the smoke concentration in the environment.

Figure 2-47 Appearance

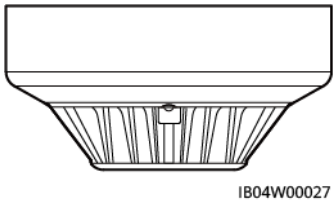


Table 2-28 Indicator description

Item	Color	Status	Description
Indicator	Red	Steady on	Enters alarm status
		Blinking	Enters monitoring status

Table 2-29 Technical specifications

Technical Specifications	Smoke Detector
Model	55000-316
Dimensions	100 mm diameter x 50 mm height (with mounting base)
Operating voltage	Supply voltage: 9 V DC to 33 V DC
Net weight	Approx. 99 g
Enclosure material	Polycarbonate, white
Cabling mode	Polarized two-wire system
Operating current	• Power-up surge current: 115 μA at 24 V • Alarm LED current: 4 mA
Operating temperature	–20°C to +60°C
Humidity	≤ 95% RH (non-condensing)

Table 2-30 Technical specifications

Technical Specifications	Smoke Detector
Model	JTY-GD-930
Dimensions	100 mm diameter x 54 mm height (with mounting base)
Operating voltage	24 V
Net weight	Approx. 82 g
Enclosure material	ABS, white
Cabling mode	Non-polarized two-wire system
Operating current	Monitoring status < 300 uA; alarm status < 1.5 mA
Operating temperature	–10℃ ~ +55℃
Humidity	≤ 95% RH (non-condensing)
Installation height	≤ 12 m
Encoding mode	The encoder can be used for onsite encoding. The address ranges from 1 to 324.
Protection area	About 80 m^2 (storey height ≤ 12 m), referring to GB50116-2013 Code for Design of Automatic Fire Alarm System
Installation mode	Ceiling-mounted
Applicable base	DZ-916

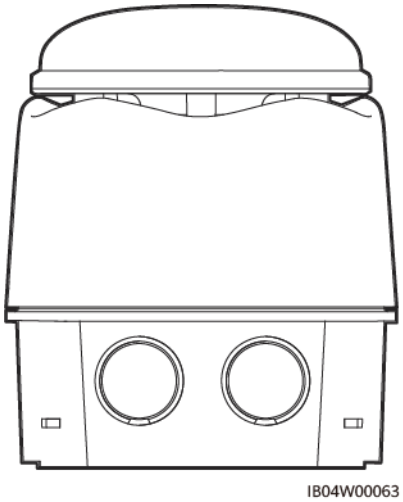
2.6.4.10 Fire Alarm Horn/Strobe

Table 2-31 Indicator description

Item	Color	Status	Description
Indicators	Red	Steady on	Enters the alarm status.
		Blinking	Enters the monitoring status.

Model: 958CHL1001

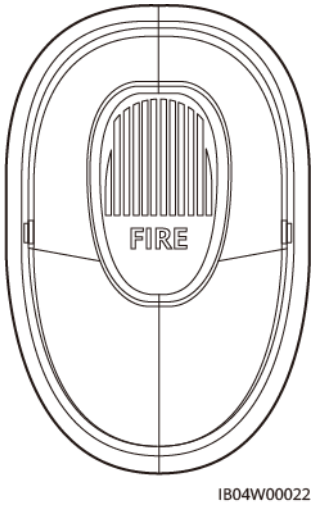
Figure 2-48 Appearance



Technical Specifications	Fire Alarm Horn/Strobe
Model	958CHL1001
Operating voltage	Bus 24 V DC
Operating current	55 mA MAX @24 V DC
Blinking frequency	1 Hz
Operating temperature	–20°C to +70°C
Humidity	≤ 95% RH (non-condensing)
Alarm volume	88+ dBA @24 V
Dimensions (H x W x D)	92 mm x 109 mm x 92 mm (with base)
Enclosure material	ABS, red
Cabling mode	Polarized two-wire system
IP rating	IP33C

Model: SG-993

Figure 2-49 Appearance



Technical Specifications	Fire Alarm Horn/Strobe
Model	SG-993
Operating voltage	24 V DC
Operating current	Monitoring status < 1 mA; alarm status < 120 mA
Blinking frequency	1 Hz to 1.5 fHz
Operating temperature	0℃ to 55℃
Humidity	≤ 95% RH (non-condensing)
Alarm volume	75 dB to 95 dB
Dimensions (H x W x D)	99 mm x 152 mm x 53 mm (with base)
Weight	Approx. 155 g (with base)
Enclosure material	ABS, red
Installation mode	Wall-mounted
Encoding mode	The encoder can be used for onsite encoding. The address ranges from 1 to 324.
Cabling mode	Non-polar two-line (L1, L2) + power cable
IP rating	IP30

2.6.4.11 Extinguishant Release Indicator

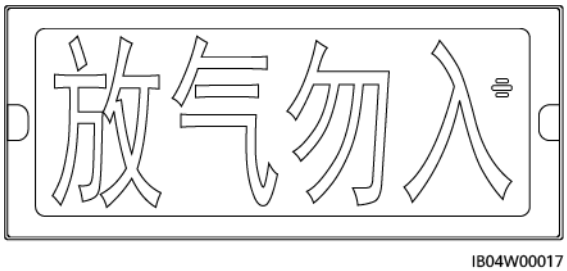
Model: K27102

Figure 2-50 Appearance

Technical Specifications	Extinguishant Release Indicator
Model	K27102
Operating voltage	–15 V DC to 30 V DC
Operating current	140 mA MAX @24 V DC
Operating temperature	–15°C to +40°C
Humidity	≤ 95% RH (non-condensing)
Dimensions (H x W x D)	300 mm x 195 mm x 50 mm
Net weight	Approx. 2 kg
Enclosure material	BS 00 A 05 grey - fine texture
Cabling mode	Polarized two-wire system
IP rating	IP30

Model: QM-ZSD-02

Figure 2-51 Appearance

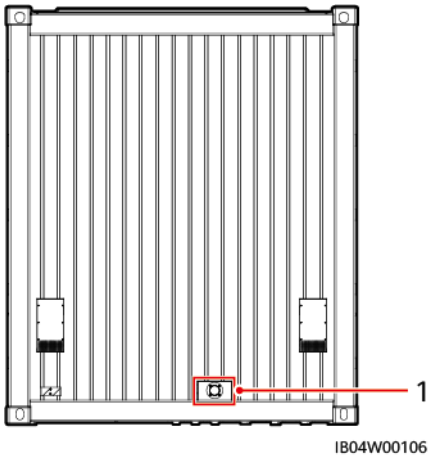


Technical Specifications	Extinguishant Release Indicator
Model	QM-ZSD-02
Operating voltage	24 V + 24 V DC
Operating current	• Bus current in static state: ≤ 500 μA • When an alarm is generated, bus current ≤ 4 mA, 24 V DC current ≤ 150 mA
Blinking frequency	1 Hz to 2 Hz
Operating temperature	0℃ to 55℃
Humidity	≤ 95% RH (non-condensing)
Luminous text surface brightness	50 cd/m^2 to 300 cd/m^2
Sound pressure level	75 dB to 120 dB
Tone changing period	0.2s to 5s
Dimensions (H x W x D)	339 mm x 150 mm x 35 mm
Net weight	Approx. 435 g
Enclosure material	ABS, white
Encoding mode	The encoder can be used for onsite encoding. The address ranges from 1 to 324.
Cabling mode	Four-wire, non-polar two signal lines (L1, L2) + 24 V DC power cable (non-polar)
Installation mode	Wall-mounted
IP rating	IP30

2.6.4.12 (Optional) Water Sprinkler System

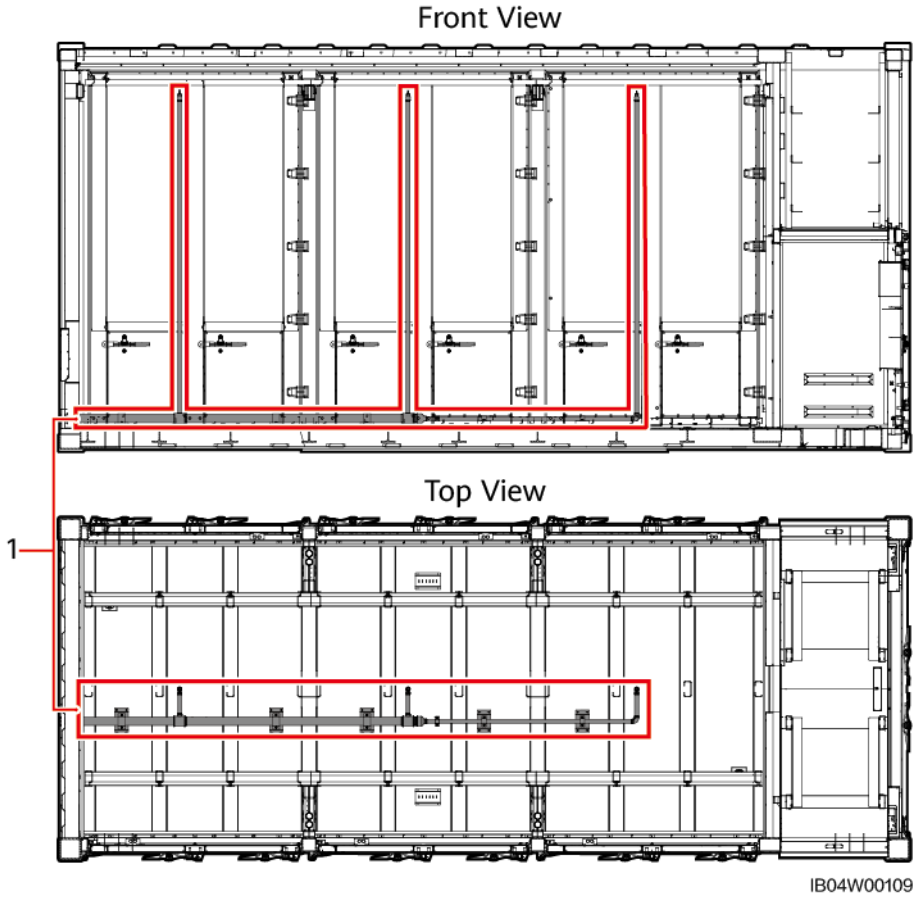
The water sprinkler system is used to put out a fire in the container if the fire suppression system fails or the fire cannot be put out due to other uncontrollable factors.

Figure 2-52 Position of the water sprinkler port



(1) Position of the water sprinkler port

Figure 2-53 Layout diagram of the water sprinkler port



(1) Layout of the water sprinkler port

Table 2-32 Port specifications

Item	Specifications
External thread	BSPT 2"
Thread length	20 mm

Table 2-33 Water inlet requirements

Item	Specifications
Total inlet water flow	175.38 L/min
Water inlet pressure	0.94 bar
Water inlet pipe diameter	DN50

Startup Requirements

NOTICE

- Check that the extinguishant monitoring devices are connected to the plant control system.
- Check that the ambient temperature monitoring devices in the ESS are connected to the plant control system.

- Check the status of the extinguishant in the ESS via the plant control system. If the extinguishant is not released, do not start the water sprinkler system.
- Check that the extinguishant has been released and at lease two temperature monitoring points exceeds 80°C in the ESS via the plant control system. Then start the water sprinkler system.
- Start the water sprinkler system in the ESS if open flames outside the ESS are detected through the video surveillance of the plant control system.

  NOTE

  It is recommended that the video surveillance system with the infrared temperature measurement function be used.

Emergency Rescue Suggestions

Rescue personnel are not allowed to stand in the door opening areas of the ESS, and must be away from the areas at a distance of greater than or equal to 20 m.

2.7 Working Principles

2.7.1 Battery circuit diagram

NOTE

The LUNA2000-2.0MWH-1HX and LUNA2000-2.0MWH-2HX models have multiple circuit diagrams. The figures use one circuit diagram for each model as an example. For details, see the following table.

Table 2-34 Switch configuration

Models	Air Conditioner Position in the Battery Cabin	Air Conditioner Switches No.	Battery Pack Fans Switches No.	Smart Rack Controller Switches No.	DC Circuit Breakers No. in the Control Unit Cabin
LUNA2000-2.0MWH-1HX	1/2/4/5/7/8/10/11	3FCB1, 3FCB2, 3FCB4, 3FCB5, 3FCB7, 3FCB8, 3FCB10, 3FCB11	7FCB7–7FCB15, 7FCB19–7FCB27	7FCB16, 7FCB17, 7FCB18, 7FCB28, 7FCB29, 7FCB30	1Q2–6Q2
LUNA2000-2.0MWH-1HX	1/3/5/7/9/11	3FCB1, 3FCB3, 3FCB5, 3FCB7, 3FCB9, 3FCB11	7FCB7–7FCB15, 7FCB19–7FCB27	7FCB16, 7FCB17, 7FCB18, 7FCB28, 7FCB29, 7FCB30	1Q2–6Q2
LUNA2000-2.0MWH-2HX	1/3/5/7/9/11	3FCB1, 3FCB3, 3FCB5, 3FCB7, 3FCB9, 3FCB11	7FCB7–7FCB15, 7FCB19–7FCB27	7FCB16, 7FCB17, 7FCB18	1Q2–3Q2
LUNA2000-2.0MWH-2HX	2/4/6/8/10/12	3FCB2, 3FCB4, 3FCB6, 3FCB8, 3FCB10, 3FCB12	7FCB7–7FCB15, 7FCB19–7FCB27	7FCB16, 7FCB17, 7FCB18	1Q2–3Q2
LUNA2000-2.0MWH-2HX	1/4/7/10	3FCB1, 3FCB4, 3FCB7, 3FCB10	7FCB7–7FCB12	7FCB16, 7FCB17, 7FCB18	1Q2–6Q2

LUNA2000-2.0MWH-1HX

Figure 2-54 Battery circuit diagram 1 of the LUNA2000-2.0MWH-1HX

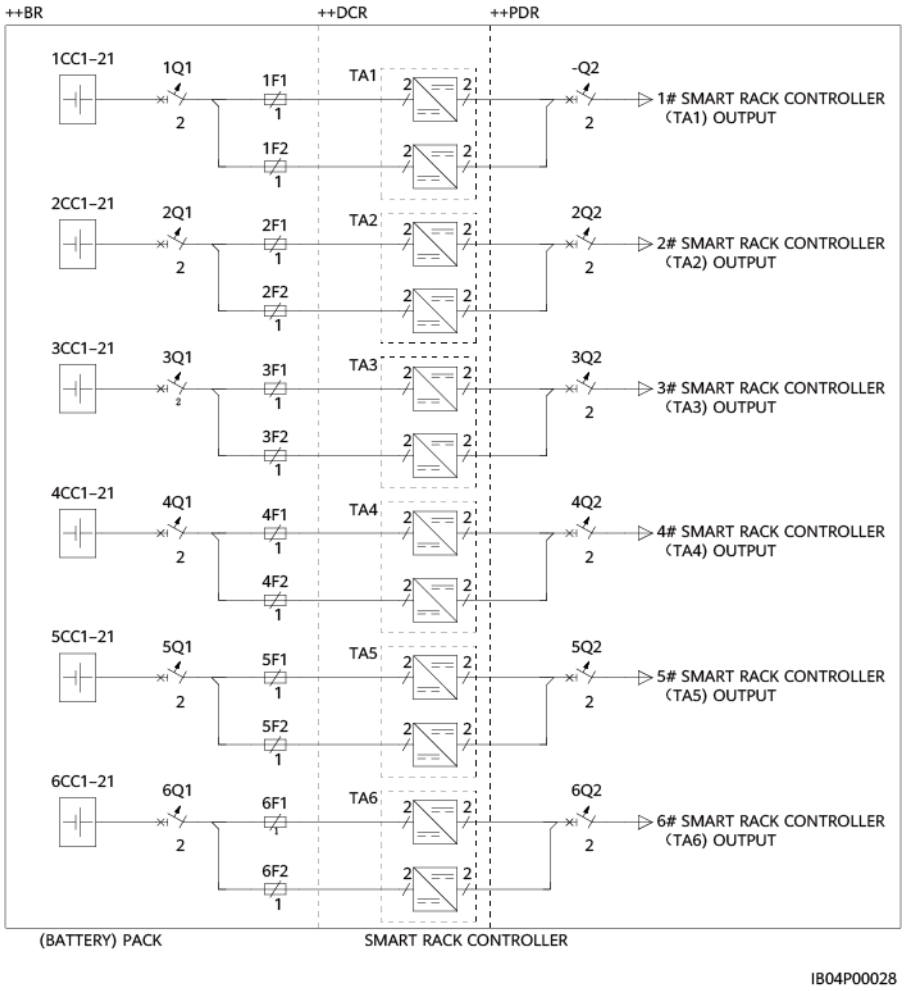


Figure 2-55 Battery circuit diagram 2 of the LUNA2000-2.0MWH-1HX

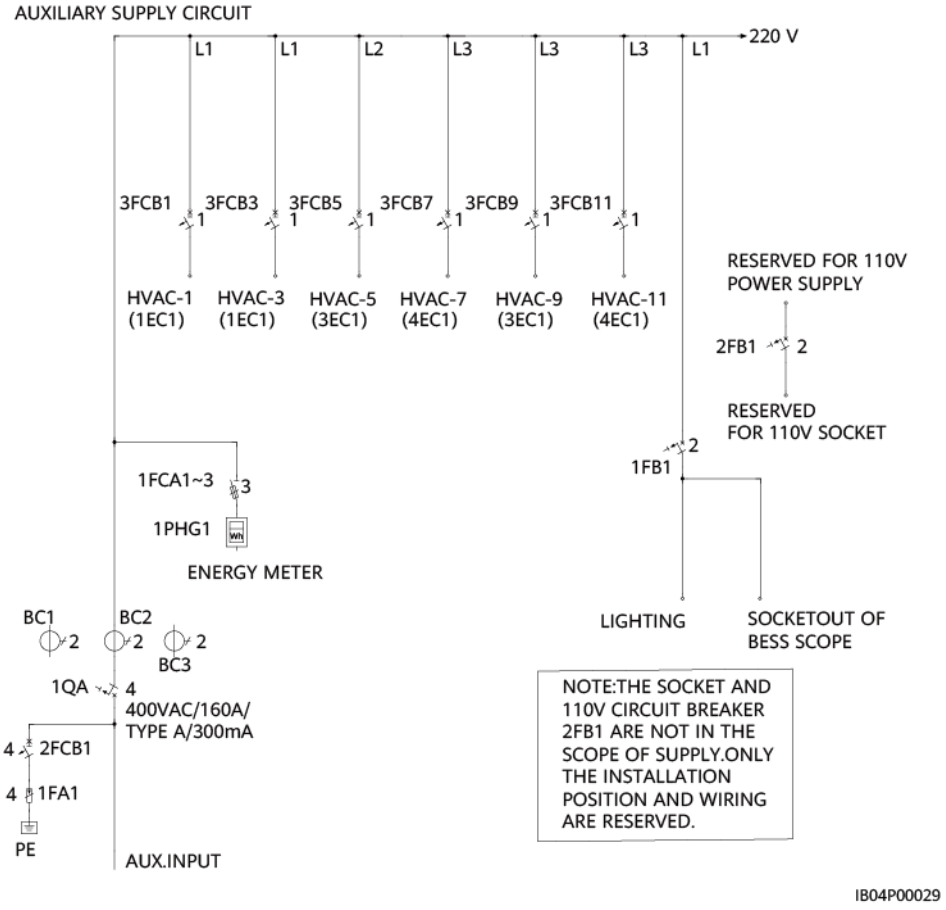


Figure 2-56 Battery circuit diagram 3 of the LUNA2000-2.0MWH-1HX

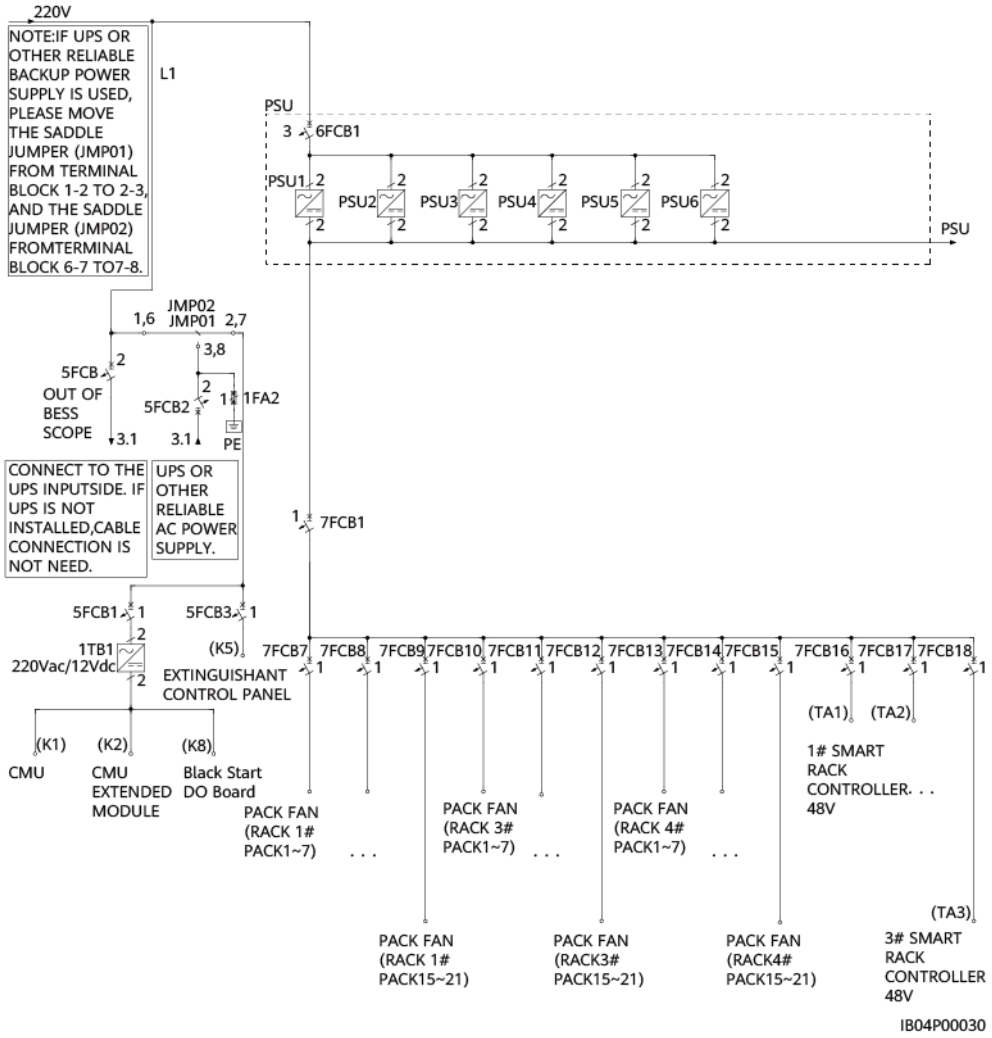
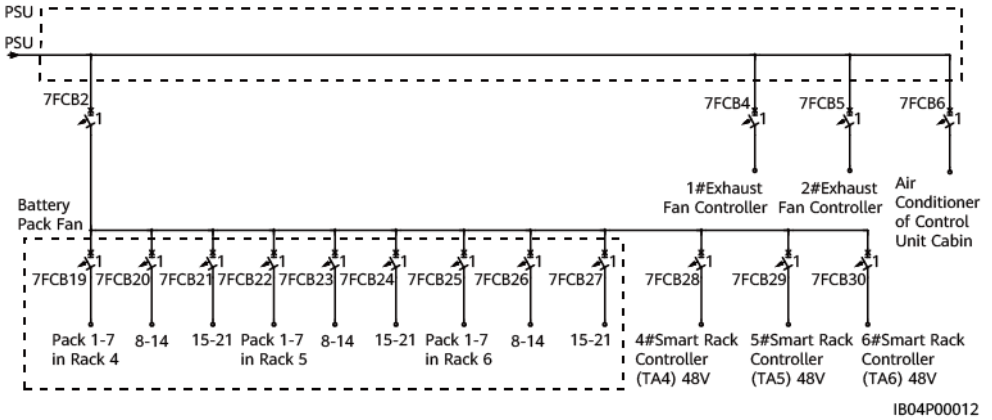


Figure 2-57 Battery circuit diagram 4 of the LUNA2000-2.0MWH-1HX



LUNA2000-2.0MWH-2HX

Figure 2-58 Battery circuit diagram 1 of the LUNA2000-2.0MWH-2HX

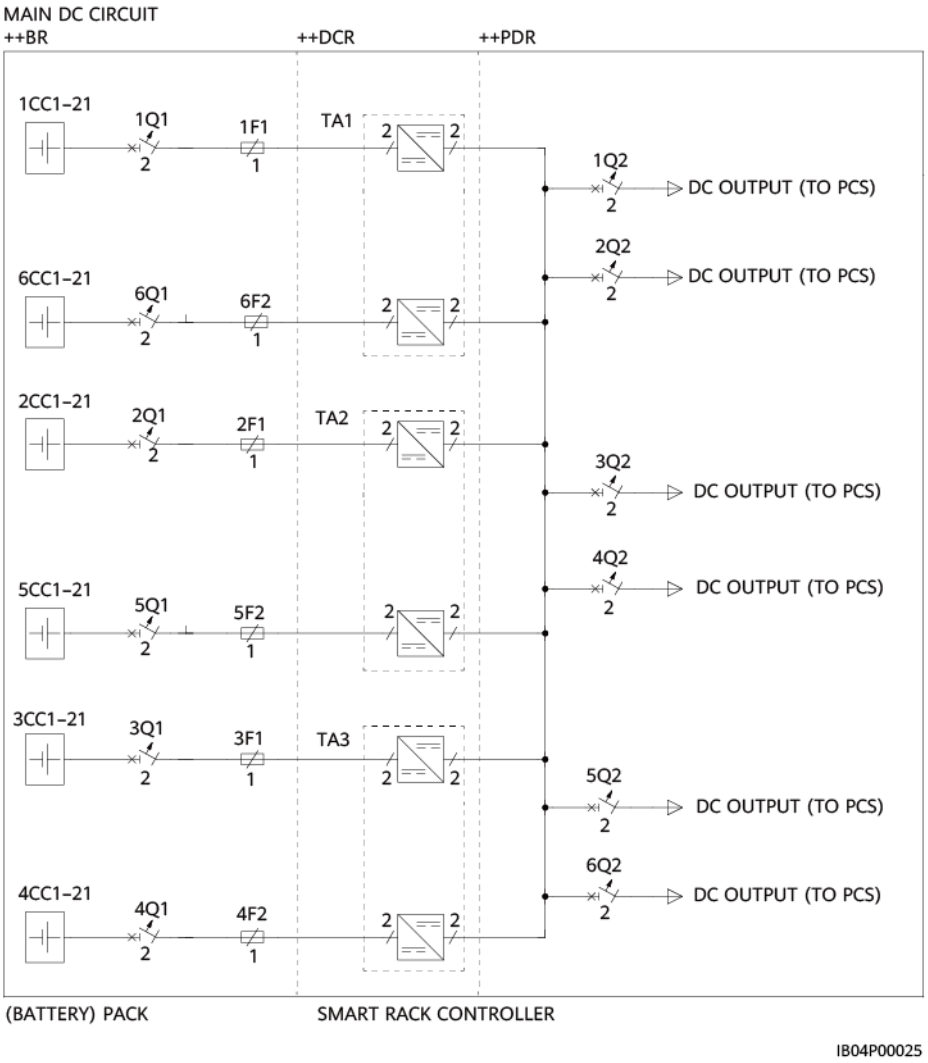


Figure 2-59 Battery circuit diagram 2 of the LUNA2000-2.0MWH-2HX

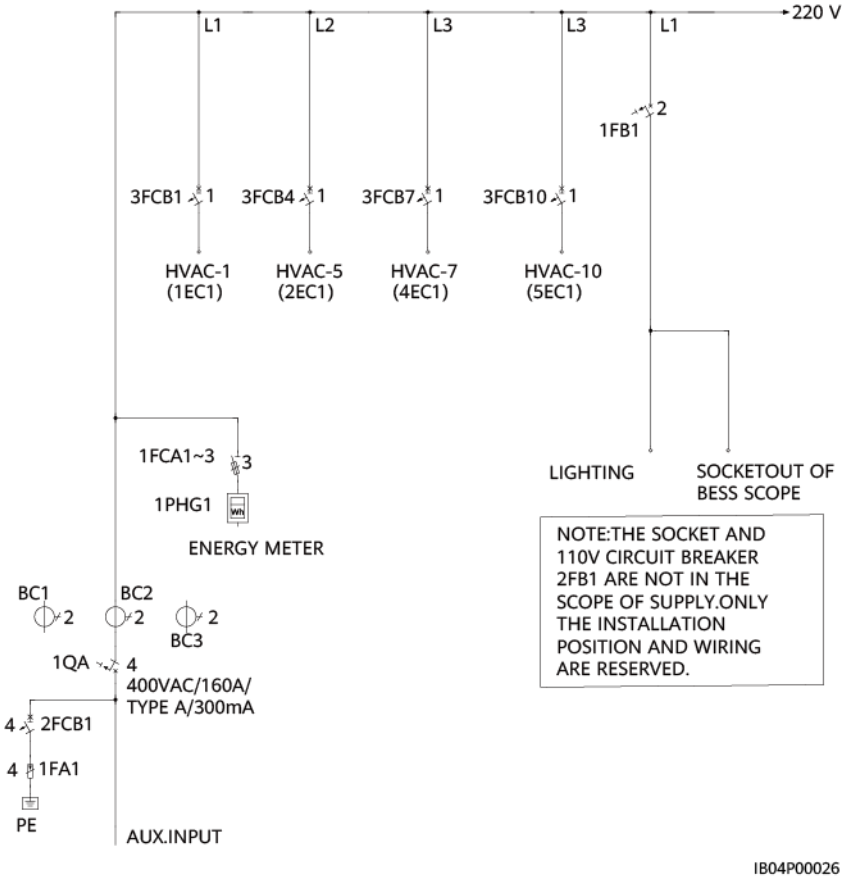
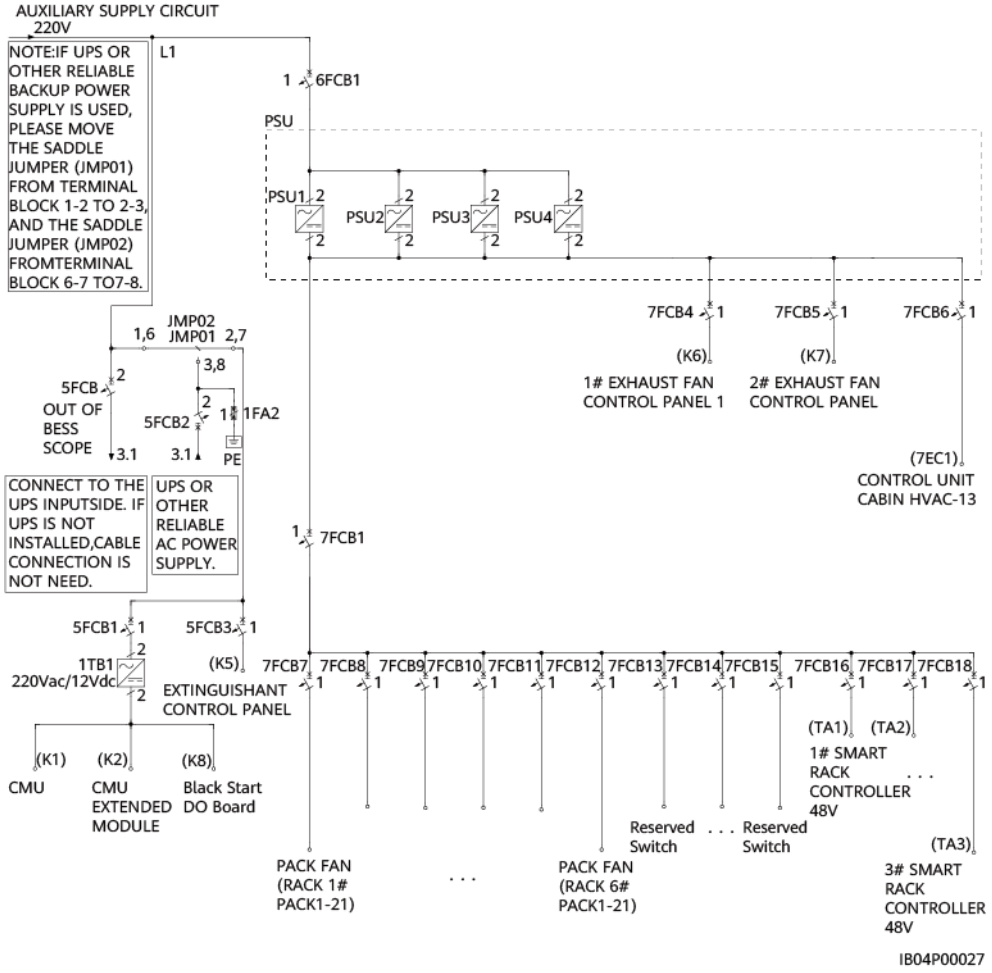


Figure 2-60 Battery circuit diagram 3 of the LUNA2000-2.0MWH-2HX



2.7.2 Working Modes

The ESS has six working states: running, hibernation, self-check, fault, offline, and loading.

Table 2-35 Working states

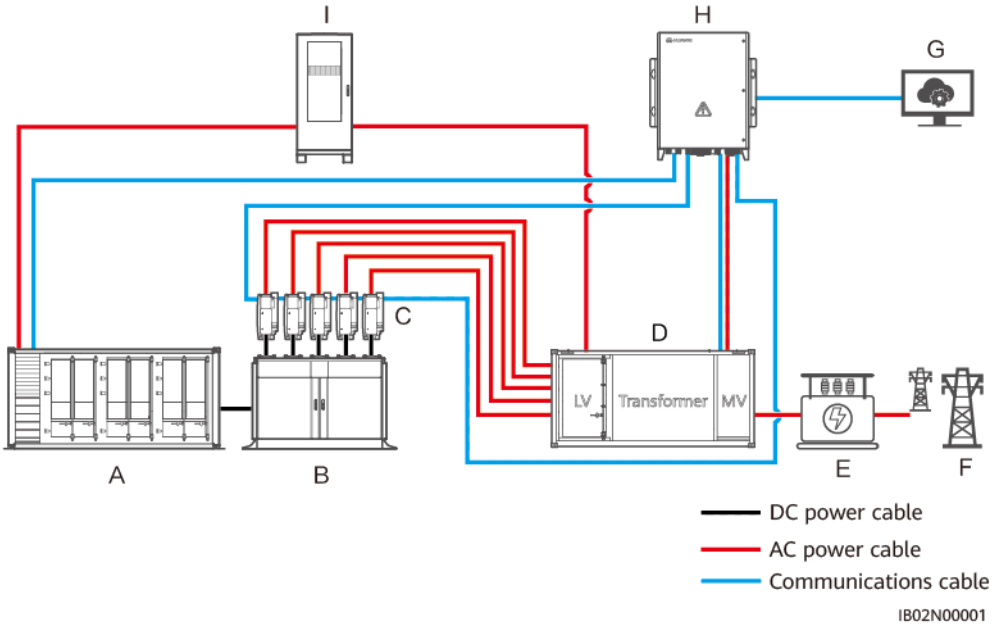
Working State	Description
Running	The ESS is charging from an external DC source or discharging for external devices.
Hibernation	The ESS stops charging and discharging and shuts down the Smart Rack Controllers. • In the running state, if the ESS receives a hibernation command, it enters the hibernation state. • In the hibernation state, if the ESS receives a running command, it enters the running state.
Self-check	The ESS is in progress of a self-check.

Working State	Description
Fault	If a Smart Rack Controller or a battery pack is faulty, the ESS enters the fault state.
Offline	Smart Rack Controllers are disconnected from the CMU.
Loading	After the CMU starts, the ESS is waiting for the energy storage units (ESUs) to be connected.

2.8 Typical Application Scenarios

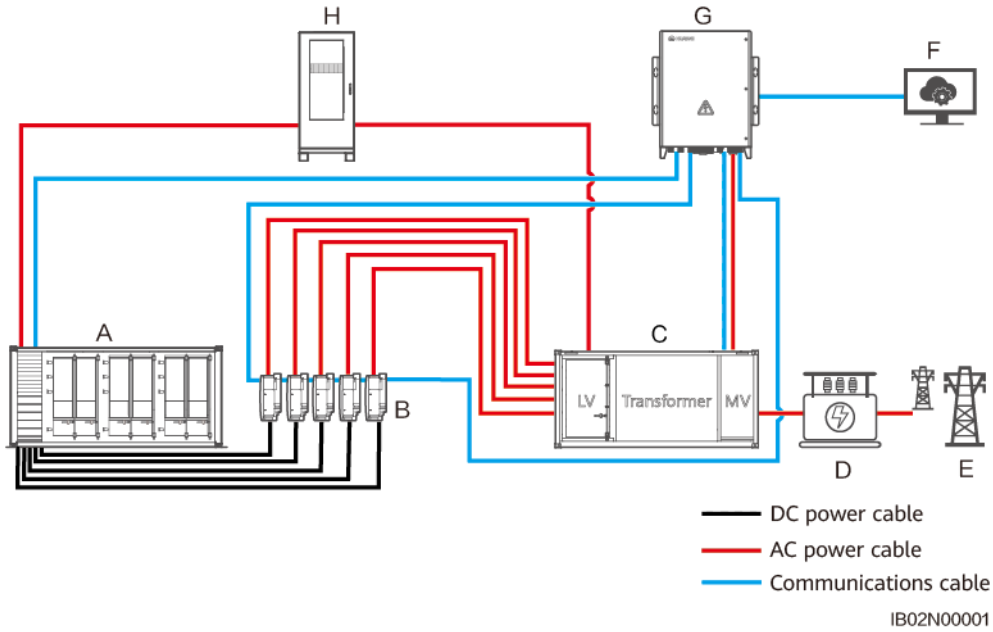
The system consists of the Smart ESS (including the Smart Rack Controller), DC LV Panel, Smart PCS, Smart Transformer Station, Distribution Transformer, and step-up transformer.

Figure 2-61 LUNA2000-2.0MWH-1HX networking application



(A) Smart ESS
(B) DC LV Panel
(C) Smart PCS
(D) Smart Transformer Station (STS)
(E) Step-up transformer
(F) Power grid
(G) Management system
(H) Smart Array Controller
(I) Distribution Transformer

Figure 2-62 LUNA2000-2.0MWH-2HX networking application



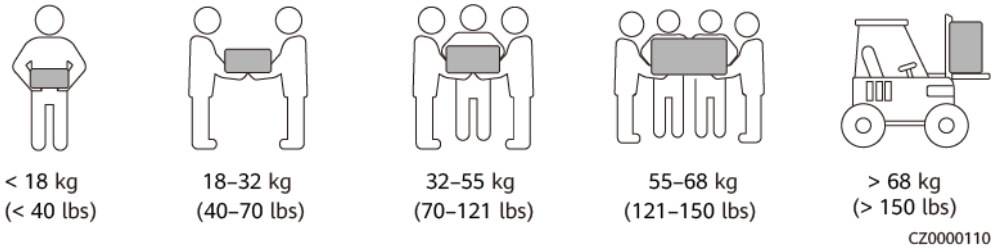
(A) Smart ESS	(B) DC LV Panel	(C) Smart Transformer Station (STS)
(D) Step-up transformer	(E) Power grid	(F) Management system
(G) Smart Array Controller	(H) Distribution Transformer	-

3 Transportation and Storage

3.1 Transportation Requirements

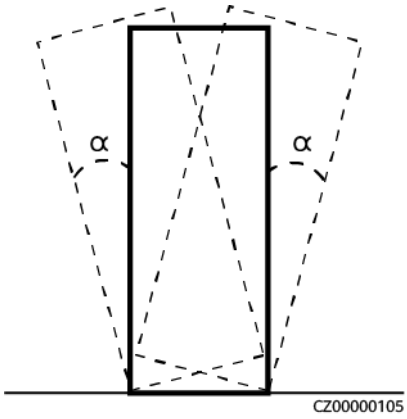
General Requirements

- Be cautious to prevent injury when moving heavy objects.



- If multiple persons need to move a heavy object together, determine the manpower and work division with consideration of height and other conditions to ensure that the weight is equally distributed.
- If two persons or more move a heavy object together, ensure that the object is lifted and landed simultaneously and moved at a uniform pace under the supervision of one person.
- Wear personal protective gears such as protective gloves and shoes when manually moving the equipment.
- To move an object by hand, approach to the object, squat down, and then lift the object gently and stably by the force of the legs instead of your back. Do not lift it suddenly or turn your body around.
- Move or lift the equipment by holding its handles or lower edges. Do not hold the handles of modules that are installed in the equipment.
- Do not quickly lift a heavy object above your waist. Place the object on a workbench that is half-waist high or any other appropriate place, adjust the positions of your palms, and then lift it.
- Move a heavy object stably with balanced force at an even and low speed. Put down the object stably and slowly to prevent any collision or drop from scratching the surface of the equipment or damaging the components and cables.

- When moving a heavy object, be aware of the workbench, slope, staircase, and slippery places. When moving a heavy object through a door, ensure that the door is wide enough to move the object and avoid bumping or injury.
- When transferring a heavy object, move your feet instead of turning your waist around. When lifting and transferring a heavy object, ensure that your feet point to the target direction of movement.
- When transporting the equipment using a pallet truck or forklift, ensure that the tynes are properly positioned so that the equipment does not topple. Before moving the equipment, secure it to the pallet truck or forklift using ropes. When moving the equipment, assign dedicated personnel to take care of it.
- The tilt angle of the ESS should meet the requirements shown in the figure: α ≤ 5°.



Transportation Requirements

DANGER

Load or unload batteries with caution. Otherwise, the batteries may be short-circuited or damaged (such as leakage and crack), catch fire, or explode.

WARNING

Do not move a battery by holding its terminals, bolts, or cables. Otherwise, the battery may be damaged.

Keep batteries in the correct direction during transportation. They must not be placed upside down or tilted, and must be protected against falling down, mechanical impact, rains, snows, and falling into water during transportation.

- The product has obtained the certifications of the 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 (Part 2: Performance Test of the Rules for the Inspection of Packaging for Exporting Dangerous Goods). This product belongs to class 9 dangerous goods.
- The transportation service provider must be qualified for transporting dangerous goods.

- Comply with the international regulations on the transport of dangerous goods and meet the requirements of the transportation regulatory authorities in the countries of departure, route, and destination.
- Choose sea or roads in good conditions for transportation. Do not transport batteries by railway or air. Avoid tilt or jolt during transportation.
- Maritime transport must comply with the *International Maritime Dangerous Goods Code* (IMDG Code).
- Monitor the entire transportation process.
- Vehicles for road transport should meet the load bearing capacity requirements: The weight of a single ESS is about 30 t.
- The speed limit for road transport is 80 km/h on flat roads and 60 km/h on rough roads. In the case of any conflict, comply with local traffic laws and regulations.
- Stacking requirements at ports and during shipping: A maximum of five ESSs can be stacked.
- Road transport must comply with the *Agreement Concerning the International Carriage of Dangerous Goods by Road* (ADR) or JT/T 617.
- Before transportation, ensure that the ESS container is intact, the cabin doors are closed and locked, no foreign matter protrudes from the container, and there is no smell of smoke or burning. Otherwise, do not transport the ESS.
- Before transportation, check that the battery package is intact and that there is no abnormal odor, leakage, smoke, or sign of burning. Otherwise, the batteries cannot be transported.
- Handle the ESS with care during loading, unloading, and transportation and moisture-proof measures must be in place. The product specifications upon delivery may be affected subsequently by the environment conditions, such as temperature, transportation, and storage.
- The packing case must be secured for transportation. Handle the case with care during loading and unloading, and take moisture-proof measures during transportation.
- Exercise caution when moving batteries to prevent bumping and ensure personal safety.
- Unless otherwise specified, dangerous goods cannot be mixed with goods containing food, medicine, animal feed, or their additives in the same vehicle or container.
- Unless otherwise specified, when dangerous goods packages are loaded in the same vehicle or container as ordinary goods, they should be separated in either of the following ways:
  - Use a spacer that is as high as the packages.
  - Keep a distance of at least 0.8 m around.
- Before transporting a faulty battery (with scorch, leakage, bulge, or water intrusion), insulate its positive and negative terminals, pack it, and place it in an insulated explosion-proof box as soon as possible. Record information such as the site name, address, time, and fault symptom on the box.
- When transporting faulty batteries, avoid approaching flammable material storage areas, residential areas, or other densely populated places, such as mass transit facilities or elevators.

3.2 Storage Requirements

General Requirements

- Proof that the product is stored according to the requirements must be available, such as temperature and humidity log data, storage environment photos, and inspection reports.
- The storage environment must be clean and dry. The product must be protected against rain and water.
- The air must not contain corrosive or flammable gases.
- Do not tilt the product or place it upside down.
- If equipment except battery packs has been stored for more than two years, it must be checked and tested by professionals before use.

ESS Storage Requirements

- The total storage and transportation time of the ESS cannot exceed eight months (starting from delivery).
- Do not stack the ESSs.
- The ground for (long-term or temporary) storage is level, and the height tolerance of the ground in contact with the container is less than 5 mm.
- The container doors are closed tightly.
- Storage temperature: –40°C to +60°C; relative humidity: 5%–95% RH
- Place desiccant in control unit cabins and battery cabins for long-term storage.
- The main power loop of the ESS must be disconnected during storage. It is recommended that the auxiliary power loop be powered on to ensure that the monitoring system works properly.

Battery Storage Requirements

WARNING

- Ensure that batteries are stored in a dry, clean, and ventilated indoor environment that is free from sources of strong infrared or other radiations, organic solvents, corrosive gases, and conductive metal dust. Do not expose batteries to direct sunlight or rain and keep them far away from sources of heat and ignition.
- If a battery is faulty (with scorch, leakage, bulge, or water intrusion), move it to a dangerous goods warehouse for separate storage. The distance between the battery and any combustible materials must be at least 3 m. The battery must be scrapped as soon as possible.
- Place batteries correctly according to the signs on the packing case during storage. Do not place batteries upside down, lay them on one side, or tilt them. Stack batteries in accordance with the stacking requirements on the packing cases.
- Store batteries in a separate place. Do not store batteries together with other devices. Do not stack batteries too high. The site must be equipped with qualified fire fighting facilities, such as fire sand and fire extinguishers.

CAUTION

Batteries should be used soon after being deployed onsite. Batteries that have been stored for an extended period should be charged periodically. Otherwise, they may be damaged.

Table 3-1 Packaging label description

Label	Description
	This way up: The package should be vertically oriented during transport and storage.
	Fragile: The package contains fragile objects and must be handled with care.

Label	Description
	Keep dry: The package must be kept away from rain.
	Stacking limit by number: The packages should not be vertically stacked beyond the specified number. The actual label may vary.

- The storage environment requirements are as follows:
  - Ambient temperature: –40°C to +60°C (recommended: 20°C to 30°C)
  - Relative humidity: 5%–95% RH (recommended: about 45% RH)
  - Dry, clean, and well-ventilated
  - Away from corrosive organic solvents and gases
  - Away from direct sunlight
  - At least 2 meters away from heat sources
- The batteries in storage must be disconnected from external devices. The indicators (if any) on the batteries must be off.
- The storage duration starts from the latest charge time labeled on the battery package. If a battery is qualified after charge, update the latest charge time (recommended format: YYYY-MM-DD HH:MM) and the next charge time (Next charge time = Latest charge time + Charge interval) on the label.
- The total storage and transportation time of the battery packs cannot exceed eight months (starting from delivery). If it exceeds eight months, charge the batteries and calibrate the SOC to at least 50%. Otherwise, the battery performance and service life may be deteriorated.
- Do not unpack batteries. Batteries should be charged during storage by professionals as required, and they should be put back to their packaging after charge.
- The warehouse keeper should collect battery storage information every month and periodically report the battery inventory information. The batteries in long-term storage should be charged in a timely manner.

CAUTION

- Only trained and qualified personnel are allowed to charge batteries. Wear insulated gloves and use dedicated insulated tools during the operation.
- Observe onsite during charge and handle any exceptions in a timely manner.
- If a battery experiences an abnormality such as bulging or smoking during charge, stop charging immediately and dispose of it.

- For details about how to charge batteries, see **3.3 Charging Requirements for a Single Battery**.
- If batteries have been stored for longer than allowed, promptly report the event to the person in charge.
- Ensure that batteries are delivered based on the "first in, first out" rule.
- Handle batteries with caution to avoid damage.

Storage Requirements for Fire Suppression Equipment

- At room temperature (about 25°C), charge the backup battery of the extinguishant control panel at least once every six months. The charge interval is halved for every 10°C increase in temperature.
- When the fire suppression equipment is stored as spare parts, the ambient temperature should range from 0°C to 50°C and the humidity should be less than or equal to 95% RH.

Storage Requirements for a Smart Rack Controller

If a spare Smart Rack Controller will not be used immediately, store it according to the following requirements:

- Do not remove the packaging. Check the packaging regularly (recommended: once every three months). Replace any packing materials that become damaged during storage. If the Smart Rack Controller is unpacked but will not be used immediately, put it back to the original packaging with the desiccant, and seal with tape.
- Storage temperature: –40°C to +70°C; relative humidity: 5%–95% RH
- Stack Smart Rack Controllers with caution to prevent them from falling over, resulting in personal injury or equipment damage.

3.3 Charging Requirements for a Single Battery

Material Delivery Check

There must be a battery charge label on the packing case. The charge label must specify the latest charge time and the next charge time.

Figure 3-1 Battery charge label

Conditions for Determining Overdue Storage

- Do not store batteries for extended periods.
- The total storage and transportation time of the battery packs cannot exceed eight months (starting from delivery). If it exceeds eight months, charge the batteries and calibrate the SOC to at least 50%. Otherwise, the battery performance and service life may be deteriorated.
- If batteries have been stored for longer than allowed, promptly report the event to the person in charge.
- Dispose of deformed, damaged, or leaking batteries directly irrespective of how long they have been stored.
- The storage duration starts from the latest charge time labeled on the battery package. If a battery is qualified after charge, update the latest charge time (recommended format: YYYY-MM-DD HH:MM) and the next charge time (Next charge time = Latest charge time + Charge interval) on the label.
- Charge batteries during storage once every eight months for a maximum of three times. Dispose of batteries if the maximum charge times are exceeded.
- You can obtain the battery production completion time by querying the delivery record based on the battery pack serial number (SN) or consulting the Company's service engineers.

Preparing Charging Devices

- Multimeter
- Clamp meter
- Insulated torque socket wrench
- Charger

Inspection Before Charge

1. Before charging a battery, you need to check its appearance. Charge the qualified battery or dispose of the unqualified one.

2. The battery is qualified if it is free from the following symptoms:
   - Deformation
   - Shell damage
   - Leakage
3. Check that the accessories are complete based on the packing list delivered with the charger.

Full Charge Strategy

The charging ambient temperature ranges from 15°C to 40°C.

Charge and Discharge Current (Unit: Ampere)	Charging Duration (Excluding Equalization)
20	24 hours (fully discharge the battery and then charge the battery to 50% SOC)
40[1]	12 hours (fully discharge the battery and then charge the battery to 50% SOC)
Note 1: In customized mode, use the AC 220 V/20 A (6 mm^2) power cable delivered with the charger.	

Charging Procedure

NOTE

Prepare the battery qualified for charge.

Step 1 Connect the communications port on the charger to the COM-2 and 48V-2 ports on the battery using the CAN communications cable (48 V) delivered with the charger.

Step 2 Connect the positive and negative cable ports on the charger to the positive and negative ports on the battery using the positive and negative DC input power cables delivered with the charger.

Step 3 Connect the AC INPUT port on the charger to the utility power source using the power cable delivered with the charger.

Step 4 Turn on the AC circuit breaker of the charger.

Step 5 Turn on the DC circuit breaker of the charger.

Step 6 Operate the charger according to its manual.

Step 7 After the discharge and charge are complete, wait until the fan in the charger keeps running for about 5 minutes to dissipate the residual heat, turn off the AC and DC circuit breakers, and remove the cables.

----End

4 Site Requirements

4.1 Site Selection Requirements

NOTICE

Refer to the GB 51048 *Design code for electrochemical energy storage station*, NFPA 855 *Standard for the Installation of Stationary Energy Storage Systems*, and local laws and regulations.

The ESS applies only to outdoor scenarios and can only be deployed outdoors. The general requirements for site selection are as follows:

- The site must not be located in a low-lying land. The horizontal level of the installation site must be above the highest water level of that area in history and at least 300 mm above the ground.
- There must be no vegetation, especially flammable plants within 3 m of the ESS and the site to protect the ESS from possible fires.
- For safety purposes, the distance between the ESS and residential buildings must be greater than or equal to 12 m, and the distance between the ESS and densely populated buildings such as schools and hospitals must be greater than 30.5 m. If the safety distance requirement cannot be met, fire walls must be installed between the ESS and the buildings.
- The safety distances between the ESS and production buildings must comply with local fire protection regulations or standards.
  - The ESS located outdoors must be at least 10 ft (3.048 m) away from lot lines, public ways, buildings, combustible materials, hazardous materials, high-piled stock, and other exposure hazards not associated with electrical grid infrastructure.
  - If either of the following conditions is met, the distance between the ESS and the production building can be reduced to 3 ft (0.914 m). In addition, space requirements for equipment transportation, installation, and maintenance must be considered.

    - There are 1-hour freestanding fire walls, extending 5 ft (1.5 m) above and extending 5 ft (1.5 m) beyond the physical boundary of the ESS installation.
    - Non-combustible exterior walls with no openings or combustible overhangs are provided on the walls adjacent to the ESS and the fire resistance rating of the exterior walls complies with 2-hour fire resistance rating of ASTM E119 or UL 263.
- The ESS and the site should be in an environment free from explosion risks.
- Transportation to the site should be convenient and fire suppression facilities should be reliable.

  NOTE

  - When installing, commissioning, and operating the ESS, ensure that at least two gas fire extinguishers are provided near each unit to ensure fire safety.
  - The distance between the exhaust device of an ESS and the heating and ventilation vents, air intake vents of air conditioners, windows, doors, unloading platforms, and fire sources of other buildings or facilities must be greater than 4.6 m.
  - Reserve sockets for the water fire suppression system at the ESS site.
  - Outdoor fire hydrants should be installed around the plant. The distance between fire hydrants should be less than or equal to 60 m. The number of outdoor fire hydrants should be calculated based on the flow rate and protection radius of fire hydrants. The maximum protection radius should be less than or equal to 150 m, and the flow rate should be greater than or equal to 15 L/s.
- The site area must meet the requirements and there should be space for capacity expansion.
- The site must be in a well-ventilated place.
- The ESS cannot be installed in salt-affected or polluted areas because this will cause corrosion. The ESS can be used in the following or better environments:
  - Outdoor environment more than 2000 m away from the coast. You are advised not to use the ESS in an area 500 m to 2000 m away from the coast. (If you need to use it, confirm with the vendor or the Company's engineers.) Do not use the ESS in an area less than 500 m away from the coast.
  - More than 1500–3000 m away from heavy pollution sources such as smelteries, coal mines, and thermal power plants
  - More than 1000–2000 m away from medium pollution sources such as chemical, rubber, and electroplating industries
  - More than 500–1000 m away from light pollution sources such as packing houses, tanneries, boiler rooms, slaughterhouses, landfill sites, and sewage treatment plants

NOTE

Reselect the site if the safety distance for a site cannot meet the requirements of relevant national standards.

Do not select the sites that are not recommended by industry standards and regulations, including but not limited to the following areas:

- Areas with sources of strong vibration, loud noises, and strong electromagnetic interference

- Areas with dust, oil fumes, harmful gases, corrosive gases, etc.
- Areas with corrosive, flammable, and explosive materials
- Areas with existing underground facilities
- Areas with adverse geological conditions such as rubbery soil and soft soil layer, or prone to waterlogging and land subsidence
- Under a reservoir, water landscape, and water room

  NOTE

  - If areas prone to waterlogging cannot be avoided, install water blocking and drainage facilities or raise the ground.
  - Cable trenches cannot be used for drainage. Fire retardant sealing should be implemented at cable holes (such as holes through partition walls and floors).
- Areas prone to earthquakes and with seismic fortification intensity higher than 9
- Areas prone to debris flow, landslide, quicksand, karst caves, and other direct hazards
- Areas within the mining land subsidence (dislocation) zone
- Areas within the scope of blasting hazard
- Areas prone to flood due to a dam or levee failure
- Protection areas for important water supply sources
- Protection areas for historic relics
- Populated areas, high-rise buildings, and underground buildings
- Intersections and busy roads of urban main roads

Requirements for flood and waterlogging prevention in site selection:

- The site design elevation of a large-scale electrochemical energy storage system (power ≥ 100 MW) should be higher than the flood level with a probability of 1% or the historical highest waterlogging level.
- The site design elevation of a medium- or small-scale electrochemical energy storage system (power < 100 MW) should be higher than the flood level with a probability of 2% or the historical highest waterlogging level.
- If the site design elevation cannot meet the preceding requirements, change the site location or take different flood and waterlogging prevention measures based on the site requirements.
- For energy storage plants prone to wind and waves from rivers, lakes, and seas, the elevation of flood prevention facilities should consider the wind and wave height with a probability of 2% and an additional safety height of 0.5 m.
- When a large amount of catchment water flows into or passes through the site, it is recommended that side ditches or drainage ditches be built to drain water from the ground in an organized manner.

Security fencing:

It is recommended that physical walls or fences be used for isolation and protection in the energy storage equipment area. The fences should be equipped with a door lock. The fence height should be greater than 2.2 m. Fire walls can be substituted for part or all of the fences, depending on the actual design plans.

4.2 Clearance Requirements

Clearance must be reserved for installation and O&M, as required in the following:

- Reserve at least 3000 mm clearance on the long sides and the control unit cabin side of the ESS, respectively.

  NOTE

  If the preceding safety distance requirements cannot be met, install fire walls between the ESSs. Ensure that the length and height of the fire walls extending above and beyond the physical boundary of the ESS installation meet the requirements in section "Site Selection Requirements".

- Set up a maintenance aisle around or on one side of the container. The net width of the aisle should be no less than 1200 mm.
- The preceding clearance requirements are for reference only in terms of installation and O&M. The clearances must also comply with local fire control requirements.

4.3 Foundation Requirements

NOTE

The foundation layout design should meet the space requirements for ESS installation and O&M. The design institute can contact local Huawei pre-sales engineers to obtain the drawings about the foundation.

Before installation, build a concrete platform and trenches on the selected ground. The foundation construction requirements are as follows:

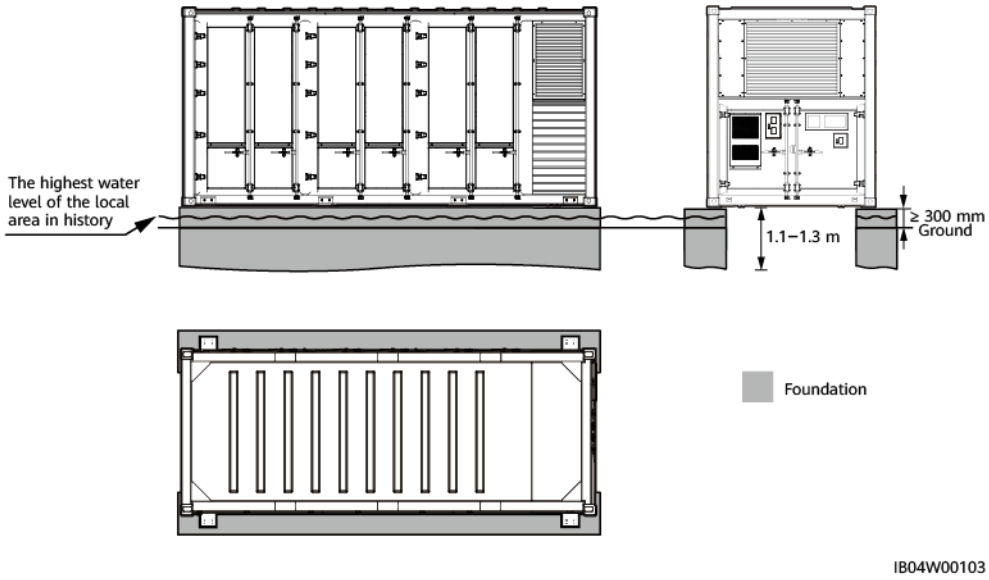
- The dimensions of the foundation should meet the installation and bearing requirements of the equipment.
- The foundation must be above the highest water level of the local area in history and at least 300 mm above the ground.
- The average foundation strength should exceed 100 kg/cm^2.
- The horizontal error between the foundation and the contact surface of the equipment should be less than 5 mm.
- The ground resistance for the equipment should be less than or equal to 0.1 ohm.
- The ESS uses bottom cabling. Cables need to be pre-buried under the control unit cabin.
- The inner diameter of the protective tube should not be less than 1.5 times of the outer diameter of the cable (including the protective layer).
- Construct drainage facilities based on the local geological conditions and municipal drainage requirements to ensure that no water will accumulate at the equipment foundation. The foundation should meet the local drainage requirements for the local historical maximum rainfall. Drained water should be disposed of in accordance with local laws and regulations.

- After the foundation is excavated, prevent water from entering the foundation. If water enters the foundation, excavate and refill the affected parts.
- A cable trench (if any) cannot be used for drainage. Fire retardant sealing should be implemented at cable holes (such as holes through partition walls and floors).

Check Item

No.	Check Item	Acceptance Criteria
1	Cabling space at the bottom	• If there is no maintenance space at the bottom, it is recommended that the cabling space at the bottom of the container be no less than 1.1 m. • If there is maintenance space at the bottom, it is recommended that the cabling space at the bottom of the container be no less than 1.3 m.
2	Cable	• The bending radius of the cables is not less than 15 times the cable diameter. • The voltage drop of the farthest loop does not exceed 5%. • The sensitivity, voltage level, and thermal stability of the cables meet the local design specifications.

Figure 4-1 Diagram of foundation



5 Installation

5.1 Installation Preparations

5.1.1 Preparing Tools

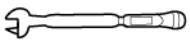
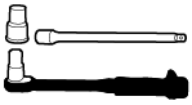
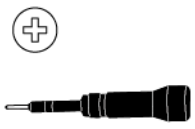
NOTE

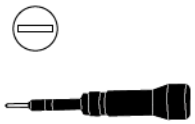
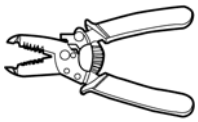
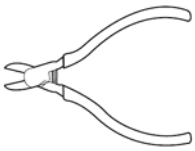
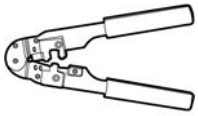
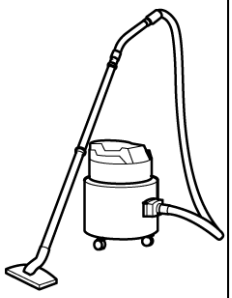
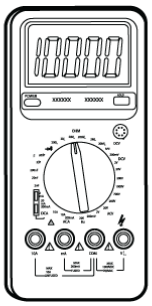
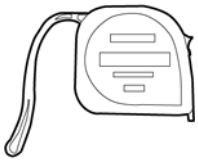
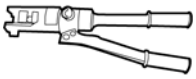
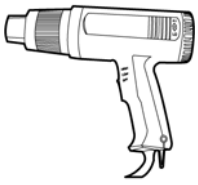
- The tools shown in the figures are for reference only.
- The tool table may not list out some tools required onsite. Onsite installation personnel and the customer need to prepare the tools based on site requirements.

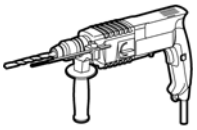
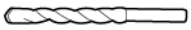
Installation Tools

CAUTION

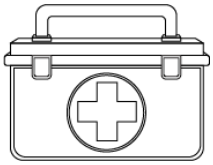
Tools such as socket wrenches, torque wrenches, and screwdrivers must be insulated tools.

			
Adjustable torque wrench	Insulated torque socket wrench (including an extension bar)	Insulated torque socket wrench (including an extended socket)	Phillips insulated torque screwdriver

 Flat-head insulated torque screwdriver	 Wire strippers	 Diagonal pliers	 Utility knife
 Cable cutter	 RJ45 crimping tool	 Vacuum cleaner	 Multimeter DC voltage measurement range ≥ 1500 V DC
 Marker	 Steel measuring tape	 Digital or bubble level	 Hydraulic pliers
 Heat-shrink tubing	 Heat gun	 Cable tie	 Insulation ladder

 Crane	 Hoisting rope and lifting eye	 Rubber mallet	 Hammer drill
 Drill bit (ϕ14/ϕ16/ϕ20)	-	-	-

Personal Protective Equipment (PPE)

 Insulated gloves	 Protective gloves	 Safety goggles	 Dust mask
 Safety shoes	 Reflective vest	 Safety helmet	 Safety harness
 Medical kit	-	-	-

5.1.2 Installation Environment Check

Check the site requirements one by one, and start installation only after all requirements are met. The Company will not be liable for any consequences in the case that the installation environment does not meet the requirements.

NOTICE

Mark the safe zone: Use red caution belts to delimit a safe zone, clean up obstacles in the safe zone, and place construction signs and warning signs in prominent positions.

5.2 Unpacking and Acceptance

NOTICE

- After placing the equipment in the installation position, unpack it with care to prevent scratches. Keep the equipment stable during unpacking.
- After unpacking, check whether the fastening components and removable components are loose. If they are loose, notify the carrier and manufacturer immediately.
- The blue adhesive plastic film on the outdoor air conditioner unit of the ESS is used to prevent foreign objects from entering the air conditioner unit during storage. Do not remove the blue adhesive plastic film during storage. Remove the blue adhesive plastic film before power-on and commissioning.

5.3 Installing the ESS

5.3.1 Determining the Installation Position of the ESS

Prerequisites

- The site requirements are met.
- Check and adjust the height of the concrete platforms to ensure that the height difference between the upper surfaces of all platforms does not exceed 5 mm.

  NOTICE

  Ensure that the concrete platforms meet requirements.

- Determine the installation position and orientation of the ESS based on site conditions.

Procedure

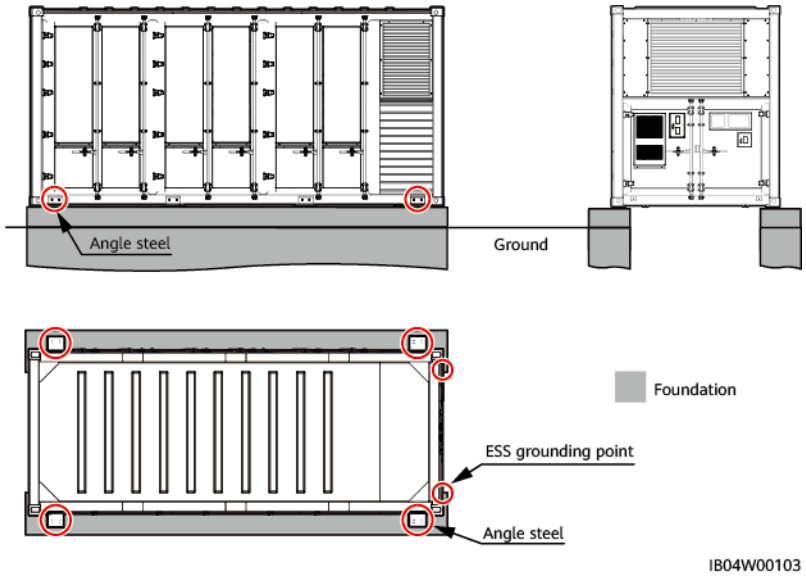
Step 1 Determine the reference points for installing the ESS on the concrete platforms. Mark the reference points using a marker.

Step 2 On the basis of the reference points, mark the mounting positions for the four corner fittings of the ESS using an ink fountain and a long soft measure tape.

NOTICE

When marking the positions for corner fittings, ensure that the four lines form a rectangle.

Figure 5-1 Position of corner fittings



----End

5.3.2 Hoisting the ESS

Prerequisites

- Before installing the equipment, check the ESS for damage, such as holes and cracks, and check the equipment model. If the appearance is abnormal or the equipment model is incorrect, contact your dealer.
- Before hoisting, ensure that the crane and hoisting ropes meet the load-bearing requirements.
- The steel hoisting ropes are available.
- An appropriate crane is selected based on standards of the crane company and assessed by professionals onsite.
- The doors of the ESS to be hoisted have been closed.
- It is recommended that the ESS be hoisted outdoors when the weather is clear and there is no wind.

- When installing or removing the hoisting equipment, do not drag it on the ESS to prevent scratches.

Hoisting Precautions

Table 5-1 Hoisting precautions

Stage	Precautions
Before hoisting	Ensure that the crane can hoist a load greater than 50 t, and the working radius is not less than 10 m. If the onsite environment does not meet the required working conditions, ask a professional to assess the conditions.
	Only trained and qualified personnel should perform hoisting operations.
	Check that hoisting tools are complete and in good condition.
	Ensure that the hoisting tools are secured to a load-bearing object or wall.
	Ensure that the crane and steel hoisting ropes provide the required bearing capacity.
	All doors of the ESS should be locked.
	Ensure that the steel hoisting ropes are securely connected.
	It is recommended that the ESS be hoisted from left to right or from right to left to ensure successful hoisting.
During hoisting	Do not allow any unauthorized person to enter the hazardous areas and do not stand under the crane arm.
	Ensure that the crane is properly located and avoid long-distance hoisting.
	Ensure that the ESS is stable and the diagonal gradient of the ESS is less than or equal to 5 degrees.
	Ensure that the angle between two ropes is less than or equal to 90°.
	Lift and land the ESS slowly to prevent shock to the devices inside it.
	Remove the steel ropes after ensuring that the ESS is placed evenly on the concrete platforms.
	Do not drag steel ropes and hoisting tools or bump hoisted objects against hard objects during hoisting.

NOTE

- You are advised to level concrete platforms before hoisting the ESS.
- The horizontal error of concrete platforms cannot exceed 5 mm.
- Prepare and install the lifting eyes and steel ropes.

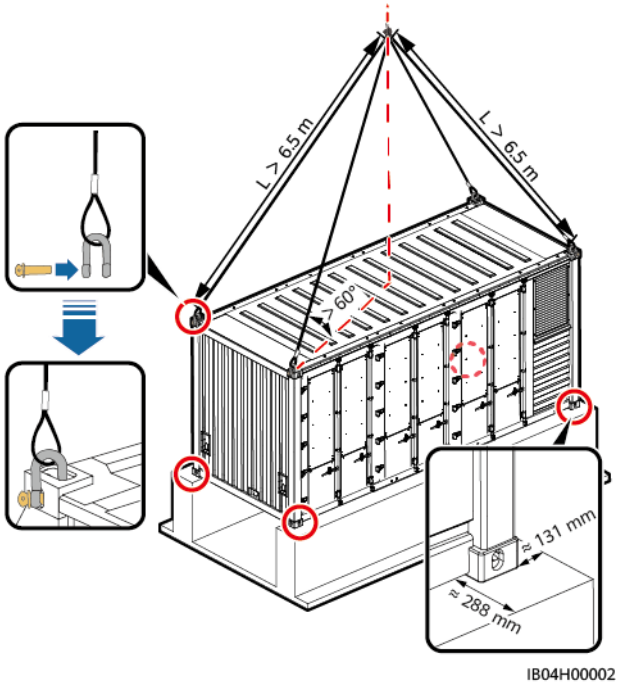
Procedure

Step 1 Connect hoisting ropes, and hoist the ESS onto the concrete platforms.

NOTICE

The requirements of distances between the corner of the ESS and the edge of the foundation are the same for the four corners of the ESS. The figure uses one of the corners as an example.

Figure 5-2 Hoisting the ESS



Step 2 Cut open the protective cover using a utility knife and remove the protective cover.

WARNING

- When removing the protective cover, take protective measures for working at heights.
- Do not remove the protective cover in bad weather conditions such as rain and snow.

----End

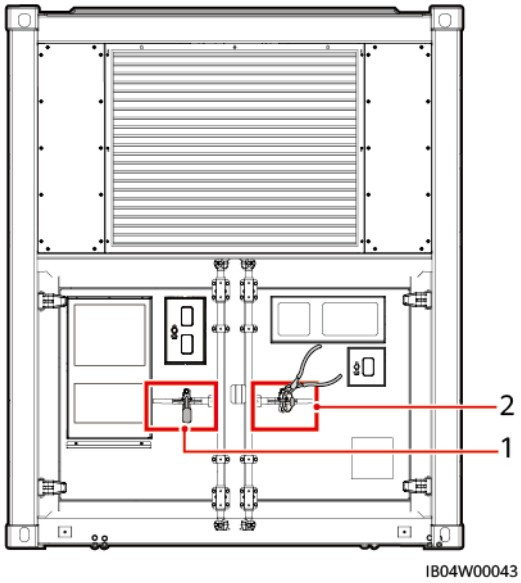
5.3.3 Opening the Doors of the ESS

> **CAUTION**
>
> Do not open the container door in rainy, snowy, lightning, or dusty weather conditions.

Procedure

Step 1 Use a cable cutter to cut off the TSA approved lock on the door of the control unit cabin.

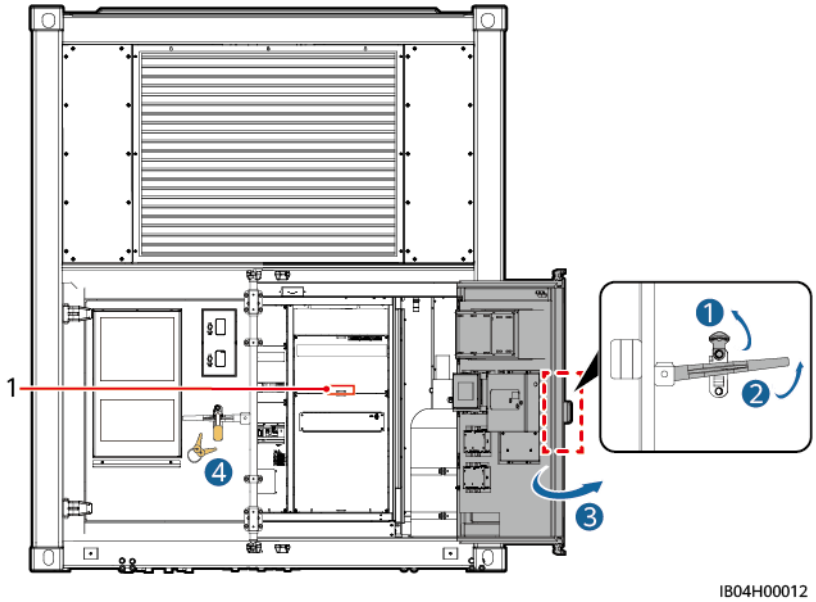
Figure 5-3 Position of safety lock and TSA approved lock



(1) Safety lock (2) TSA approved lock

Step 2 Open the door, take the key from the control unit cabin, and use the key to open the safety lock.

Figure 5-4 Open the door of the control unit cabin

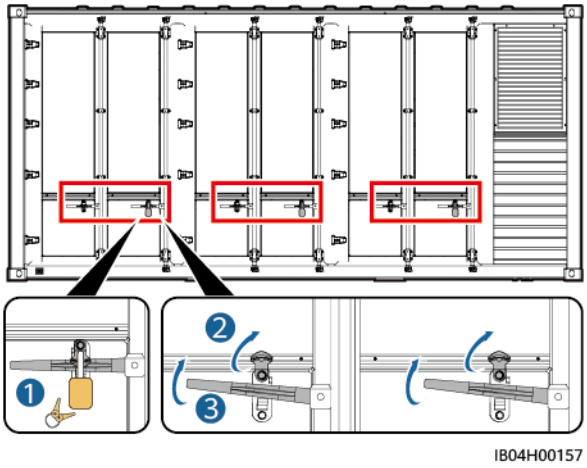


(1) Position of keys

Step 3 Use the key to open the safety locks on the right handle of the battery cabin, and then open the doors of the battery cabin.

NOTE

- At least two persons are required to open the door.
- After the door is opened, secure it using a door strut to prevent the door from moving.



Step 4 Obtain the packing list and the quick guide. Check the materials against the packing list.

----End

5.3.4 Grounding the ESS

Prerequisites

WARNING

Do not connect devices such as fuses and switches to ground cables.

CAUTION

The grounding should comply with the local electrical safety regulations.

- The ESS is installed.
- The grounding requirements are clear.

Context

The requirements of ground cable are as follows:

Table 5-2 Ground cable description

Cable	Type	Cross-Sectional Area	Outer Diameter	Source
Ground cable	Single-core outdoor copper cable and M10, M12 OT/DT terminals	16–95 mm^2	10–32 mm	Prepared by the customer
The specifications of the ground cable are subject to this table or calculated according to IEC 60364-5-54.				

Connect Ground Cables

Step 1 Connect the main ground bar of the control unit cabin.

NOTICE

- The ground cable of the main ground bar in the control unit cabin must be connected.
- After connecting the ground cable of the main ground bar in the control unit cabin, close the cabin door in time.

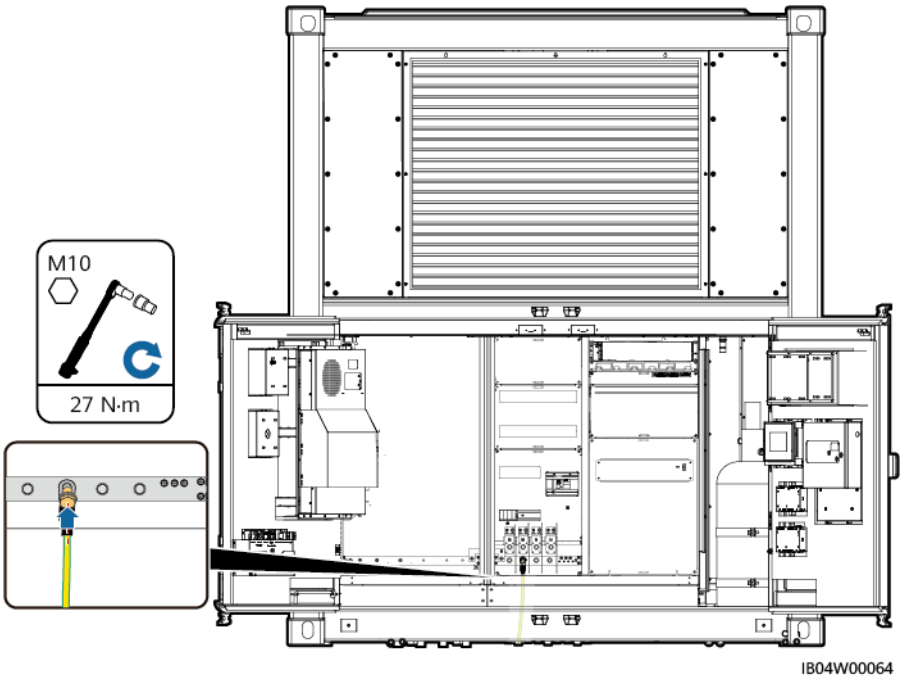
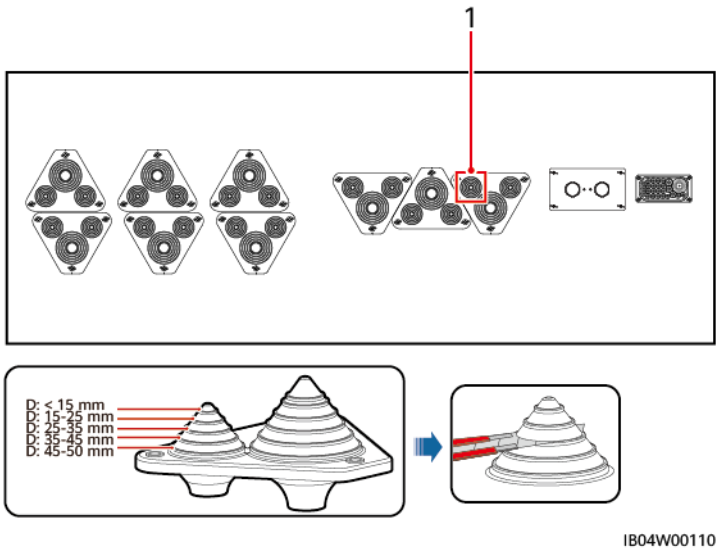


Figure 5-5 Position of the ground cable hole and pagoda connector cutting



(1) Ground cable hole

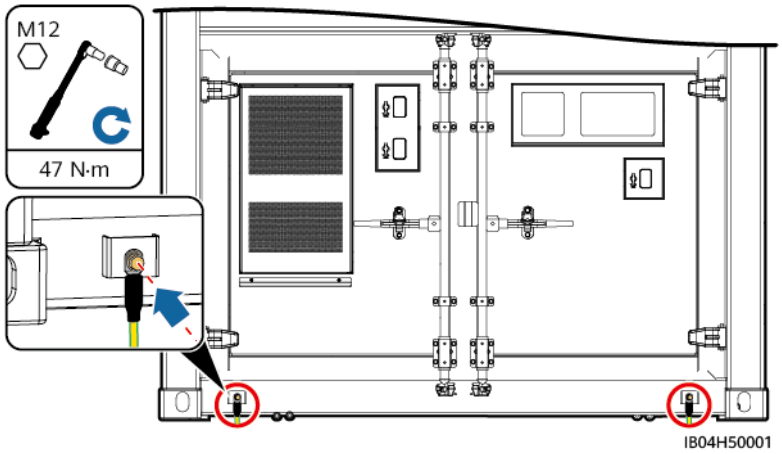
NOTE

The position for cutting the pagoda connector is for reference only. The actual cable usage may vary.

Step 2 (Optional) Connect ground cables/ground lugs to the ground points of the ESS enclosure.

- Connect ground cables to the ground points of the ESS using M12x30 stainless steel bolt assemblies. The ground cables can be routed through plastic-coated metal hoses based on site requirements.

Figure 5-6 Installing ground cables

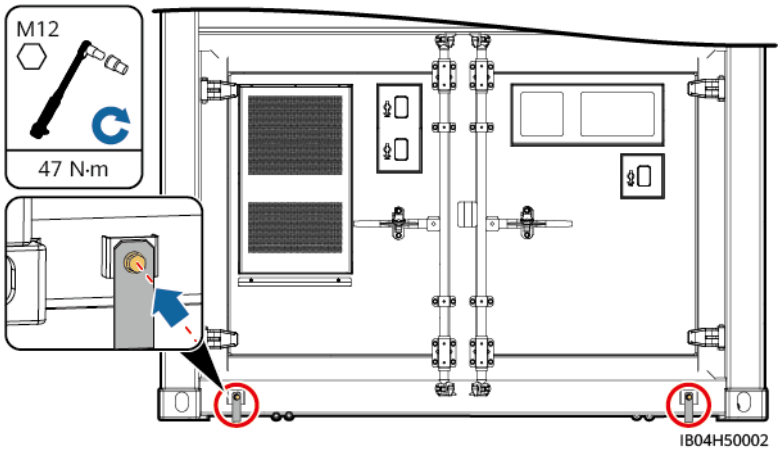


- Connect ground lugs to the ESS ground points using M12x30 stainless steel bolt assemblies.

  NOTE

  - Ground lug: Use ground lugs made of hot-dip zinc-coated flat steel sheet with a cross-sectional area of 40 mm x 4 mm, and leave 300 mm of each ground lug out of the concrete platform (same as the height between the foundation and the ground).
  - Before the installation, remove the tinfoil from the ground lugs.

Figure 5-7 Installing ground lugs



----End

5.3.5 Securing the ESS

Step 1 Open the door of the control unit cabin to get the angle steels in the carton. Secure the ESS using four angle steels.

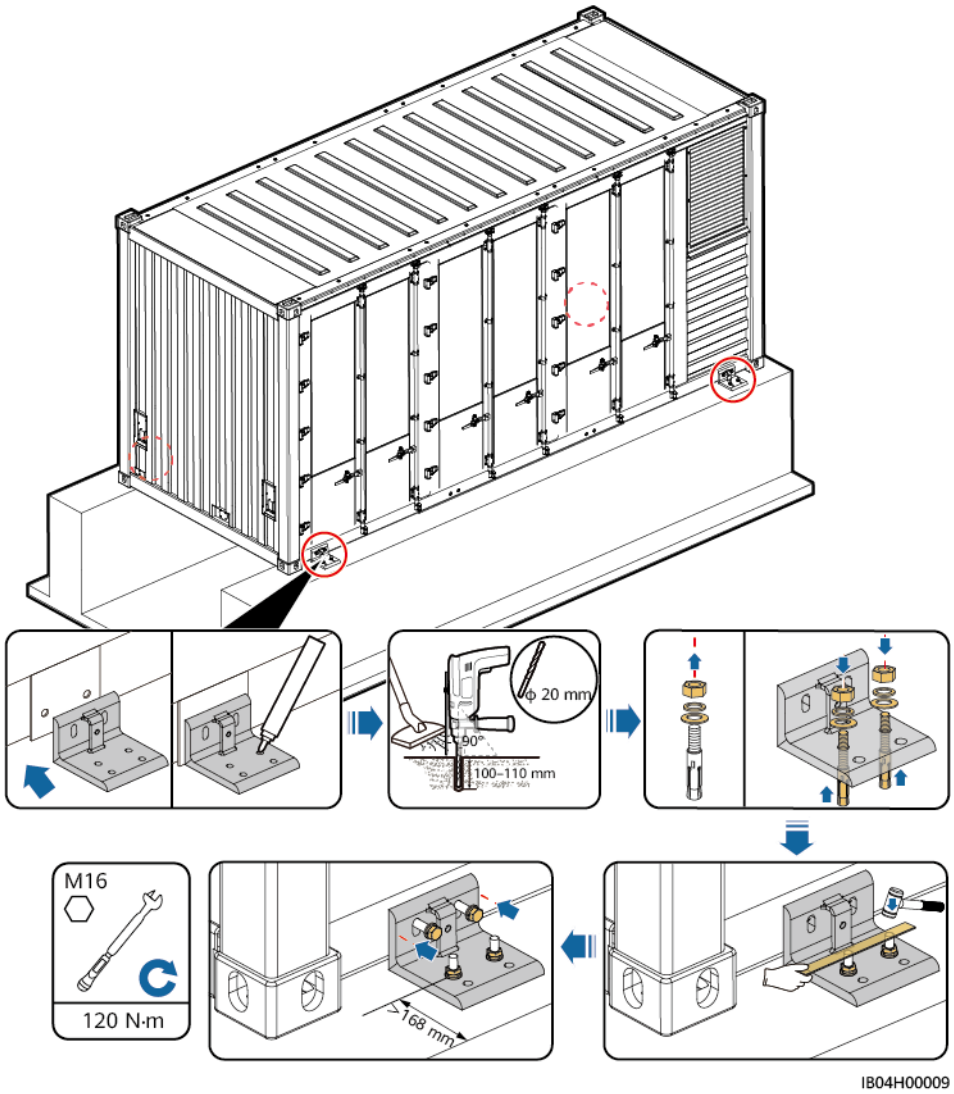
CAUTION

- Place a wooden block on the top of an expansion bolt, and then knock at the wooden block using a claw hammer to avoid damaging the expansion bolt.
- Ensure that the expansion bolts are tightened when securing the angle steel to the base.

NOTE

- There are four mounting holes where angle steel brackets contact the base. Mark all mounting holes.
- Each angle steel bracket must be secured by two mounting holes. It is recommended that the outer two mounting holes be used. If steel bars in a concrete base block the drill bit or when the position deviation occurs during the first drilling, use the inner mounting holes.

Figure 5-8 Securing the ESS



----End

Follow-up Procedure

After the ESS is installed, verify the installation to ensure normal use of products and smooth subsequent installation.

Table 5-3 Verifying the installation

No.	Check Item	Check Method	Criteria
1	Bolts and nuts	Tighten the bolts and nuts again using a wrench with the same torque.	Bolts and nuts are tightened.
2	Check whether the doors of the ESS can be opened and closed properly.	Open and close the doors of the ESS.	All doors of the ESS can be opened and closed properly.

NOTE

If the doors of the ESS cannot be opened and closed properly, please refer to the first question in chapter 11, **'How do I Level the ESS When Doors Cannot Be Opened or Closed'**.

5.4 Installing Components

CAUTION

- Ensure that the ESS is not powered on.
- The installation personnel have taken safety protection measures, for example, wearing insulated gloves and shoes.

5.4.1 Installing Copper Bars Between Battery Packs

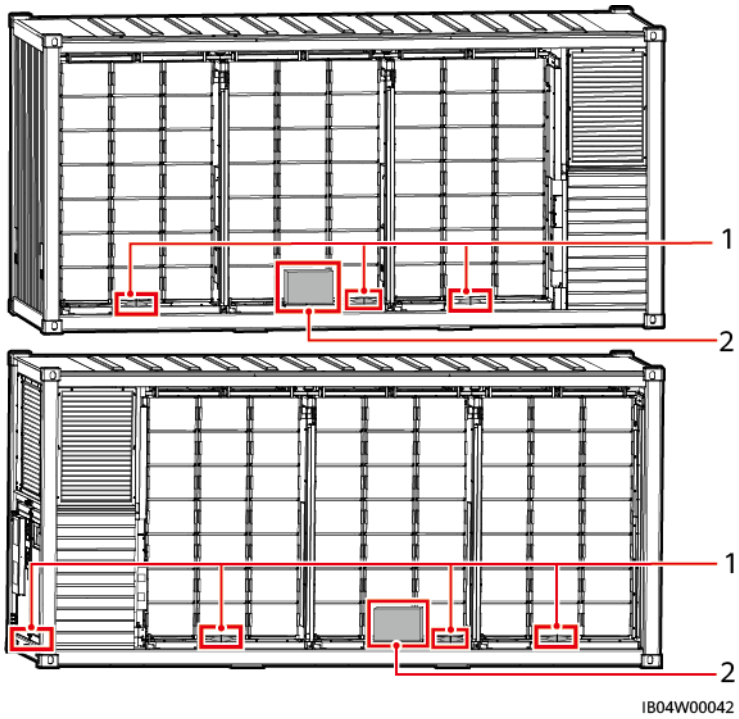
Prerequisites

The battery cabin door is open.

Procedure

Step 1 Take out the copper bars from the battery cabin.

Figure 5-9 Positions of the copper bars



(1) Desiccan (Montmorillonite desiccant, 500 g)

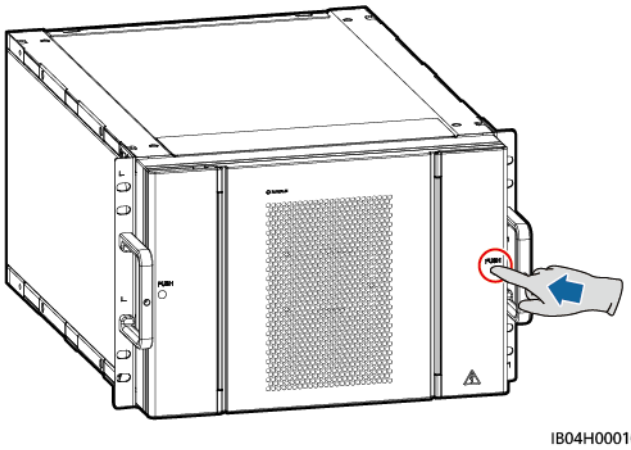
(2) Copper bar

NOTE

- There are 25 desiccant bags, four bags for each battery rack in the battery cabin and one bag for the control unit cabin.
- After cables are connected, do not remove the desiccants before power-on.
- If the ESS has been stored for more than six months, replace them with new ones (Montmorillonite desiccant, 500 g).

Step 2 Press and open the battery pack cover on the right side.

Figure 5-10 Opening the battery pack cover



Step 3 Wear insulation gloves and install copper bars between battery packs.

CAUTION

When installing copper bar C, keep away from communications cables and fan power cables of battery packs to prevent cables from being squeezed.

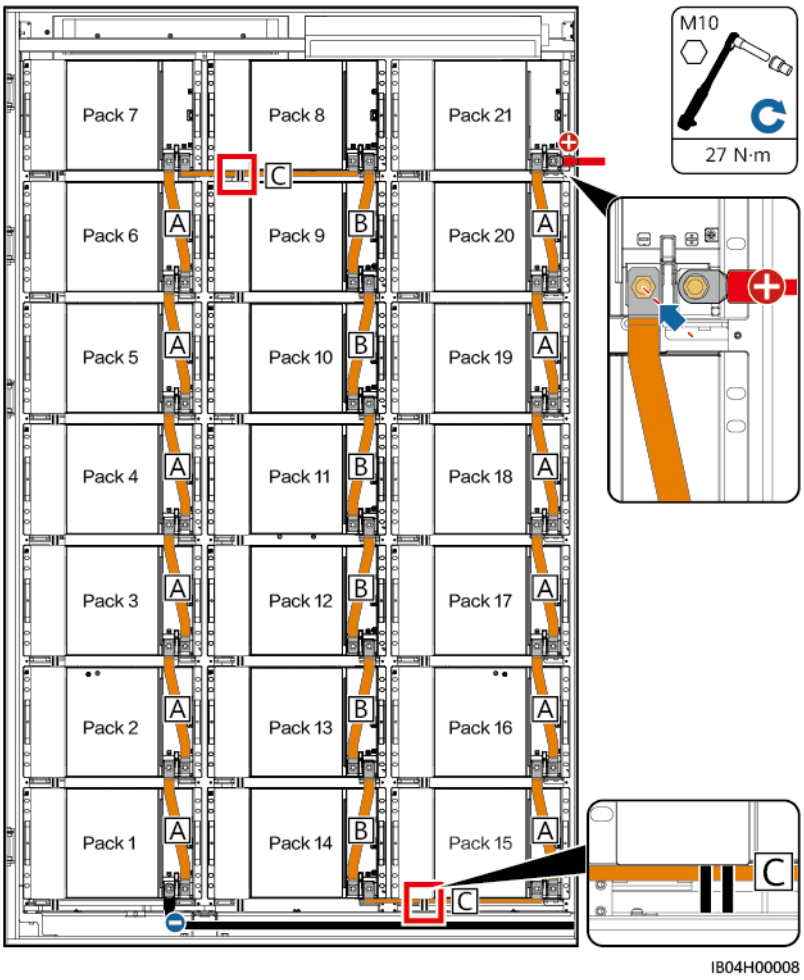
NOTICE

- Use the copper bars delivered with the ESS. Do not use copper bars from ESSs of different models.
- When installing a nut, manually insert the nut into the screw plate, and then use a socket wrench to completely secure the nut in place. This prevents the screw thread from being stuck or stripped due to the deviation of the nut position.
- Pre-install nuts according to the recommended torque of 27 N·m.
- Verify the torque of the installed nuts using a torque wrench set to 27 N·m.
- Mark the nuts whose torque has been verified using a marker.
- Use an extension rod for the torque wrench.

NOTE

Three types of copper bars are included with the equipment and are identified by the silkscreens A, B, and C printed on the front.

Figure 5-11 Installing copper bars between battery packs



Step 4 Close the battery pack cover.

Step 5 Close the battery cabin door.

----End

5.4.2 (Optional) Filling the Fire Cylinder with Extinguishant

CAUTION

- This document does not provide details about how to fill the fire cylinder with extinguishant. Perform this operation in a dedicated station.
- Protect the fire cylinder from collision during transportation and installation.

NOTE

This step applies only to some models.

Step 1 Remove the hose active connector from the ESS piping using a torque wrench.

Step 2 (Optional) Remove the extinguishant release hose from the high-pressure elbow using a torque wrench.

Step 3 (Optional) Remove the high-pressure elbow from the changeable-diameter joint using a torque wrench.

NOTE

- If there is no changeable-diameter joint, remove the high-pressure elbow directly from the fire cylinder.
- If there is no changeable-diameter joint and high-pressure elbow, remove the extinguishant release hose directly from the fire cylinder.

Step 4 (Optional) Remove the changeable-diameter joint from the release vent using a torque wrench.

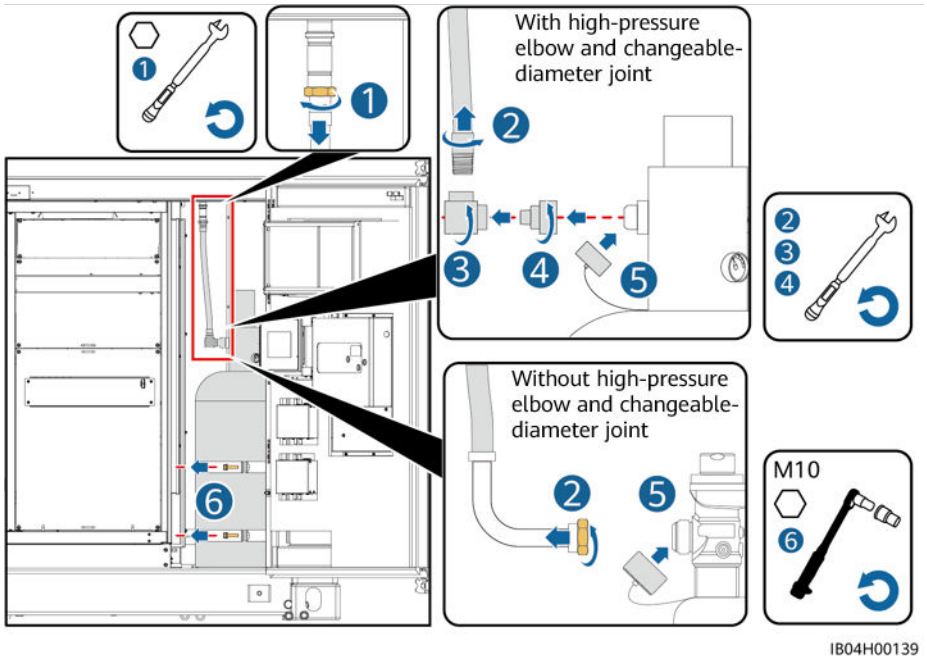
NOTE

If there is no changeable-diameter joint on the fire cylinder, skip this step.

Step 5 Install the safety cap of the release vent.

Step 6 Remove the fire cylinder from the bracket.

Figure 5-12 Removal process diagram



Step 7 Fill the fire cylinder with extinguishant.

Table 5-4 Requirements

Technical Specifications	Values	
Extinguishant	HFC-227ea	FK5112
Extinguishant weight	26–27 kg	31–32 kg
Purity requirement	≥ 99.9%	

Technical Specifications	Values
Fire cylinder pressure (by filling nitrogen)	Refer to the table **Pressure requirements under different ambient temperatures**.

Table 5-5 Pressure requirements under different ambient temperatures

Ambient Temperature (℃)	Pressure (Bar) of 227M38UFAA	Pressure (Bar) of SPS020-MS-032B-EN	Pressure (Bar) of P0009438	Pressure (Bar) of NCM38UFAA
0	20.2	16.92	22.1	20.2
5	21.4	18.85	22.8	21.4
10	22.6	20.77	23.5	22.6
15	23.8	22.69	24.3	23.8
20	25.0	24.62	25	25
25	26.2	26.54	25.8	26.2
30	27.4	28.46	26.5	27.4
35	28.6	30.38	27.3	28.6
40	29.8	32.31	28.1	29.8
45	31.0	34.23	28.8	31
50	32.2	36.15	29.5	32.2
Note: The actual cylinder pressure should not be lower than 90% of the specified pressure at the corresponding ambient temperature.				

Step 8 Install the fire cylinder.

Step 9 Remove the safety cap of the release vent.

Step 10 (Optional) Install the changeable-diameter joint to the release vent using a torque wrench.

Step 11 (Optional) Wrap eight turns of sealing tape around the external threads of the changeable-diameter joint, and install the high-pressure elbow to the changeable-diameter joint using a torque wrench.

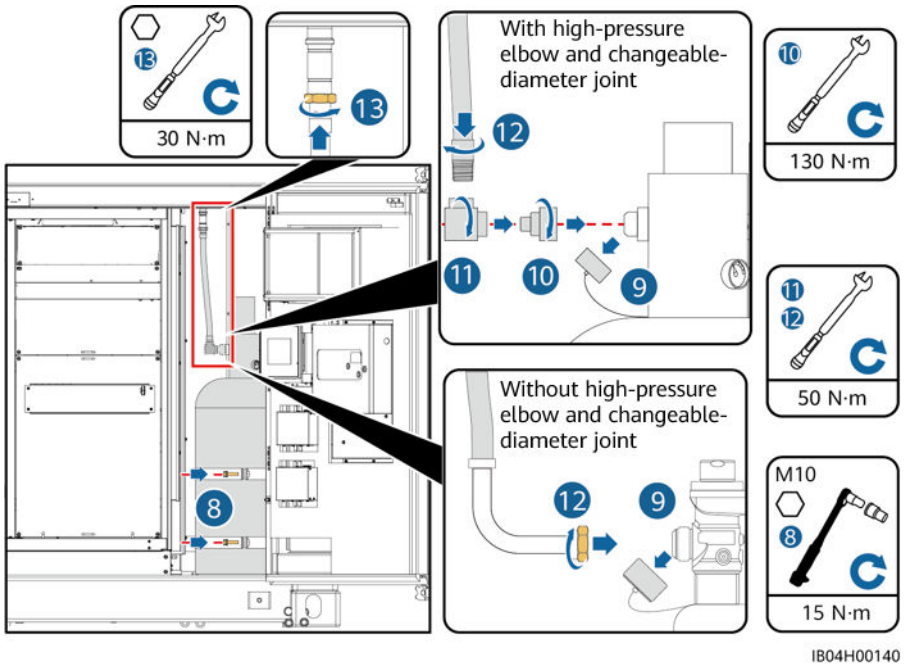
Step 12 (Optional) Wrap eight turns of sealing tape around the external thread connector of the extinguishant release hose and install the extinguishant release hose to the high-pressure elbow using a torque wrench.

NOTE

- Remove any old sealing tape from the threads.
- If there is no changeable-diameter joint, install the high-pressure elbow directly to the fire cylinder.
- If there is no changeable-diameter joint and high-pressure elbow, install the extinguishant release hose to the fire cylinder.

Step 13 Place the white gasket in the nut end of the extinguishant release hose and install the hose active connector to the ESS piping using a torque wrench.

Figure 5-13 Installation process diagram



----End

5.4.3 Installing the Battery in the Extinguishant Control Panel

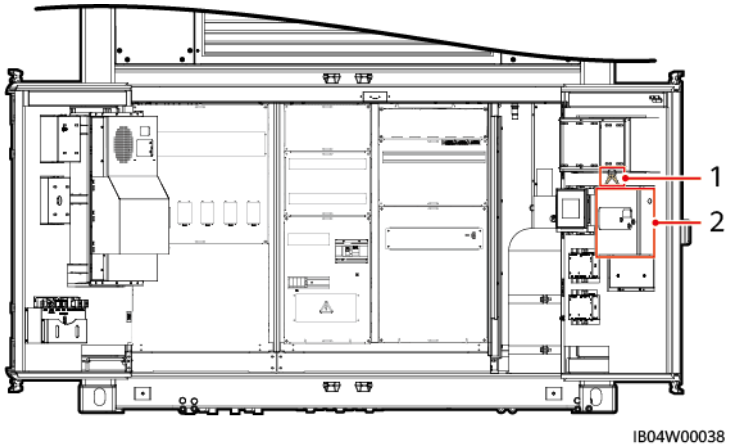
Prerequisites

NOTICE

- The extinguishant control panel has been configured and commissioned before delivery. Non-professional personnel are prohibited from configuring the extinguishant control panel without permission.
- Non-professional personnel are prohibited from operating the Write Enabler button.
- In an outdoor scenario, you are advised to power on the extinguishant control panel within 24 hours after unpacking. Otherwise, place it in a dry indoor environment without corrosive gas.

- If a battery is damaged, contact your local office.
- Determine the position of the Extinguishant Control Panel.

Figure 5-14 Position of the extinguishant control panel



(1) Position of keys

(2) Position of the extinguishant control panel

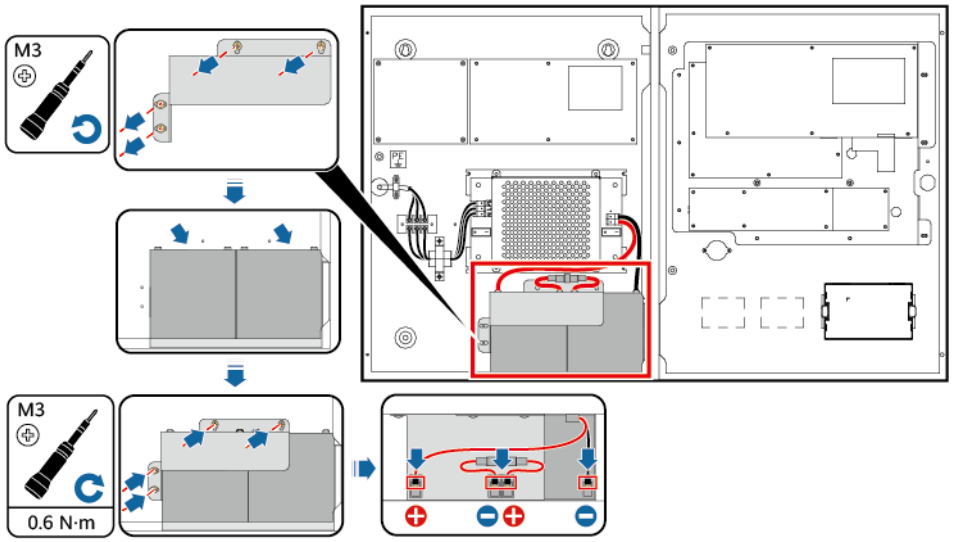
Procedure

CAUTION

Do not damage components in the extinguishant control panel during the installation.

- **Model: JB-QBL-QM210**
  a. Remove the key from above the extinguishant control panel.
  b. Open the extinguishant control panel and remove the cover.
  c. Install the battery and cover in the extinguishant control panel.
  d. Connect battery cables to the extinguishant control panel.

Figure 5-15 Installing the battery in the extinguishant control panel



e. Turn off the extinguishant control panel.

f. Take out the key of the extinguishant control panel.

NOTE

Hand over the key to the responsible personnel for safekeeping.

- **Model: K11031M2**

CAUTION

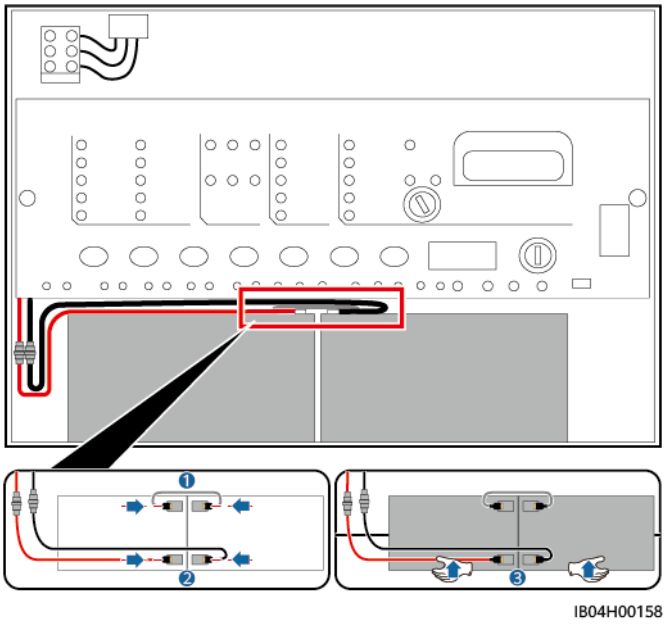
If the extinguishant control panel has been powered off for more than 30 hours, disconnect its cables from batteries.

a. Remove the key from above the extinguishant control panel.

b. Cut off the cable ties from battery cables on the main board of the extinguishant control panel.

c. Connect battery cables to the extinguishant control panel.

Figure 5-16 Installing the battery in the extinguishant control panel



d. Turn off the extinguishant control panel.

e. Take out the key of the extinguishant control panel.

NOTE

Hand over the key to the responsible personnel for safekeeping.

6 Installing Cables

DANGER

- Do not smoke or have an open flame around batteries.
- The site must be equipped with qualified fire fighting facilities, such as fire sand and carbon dioxide fire extinguishers.
- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.

CAUTION

- Do not connect two or more cables to the positive or negative power port of a battery in parallel.
- Stay away from the equipment when preparing cables to prevent cable scraps from entering the equipment. Cable scraps may cause sparks and result in personal injury and equipment damage.

6.1 Preparing Cables

CAUTION

Select cables in compliance with local cable standards, especially the electrical specifications and application environment. The key factors include the rated current, cable type, routing method, maximum expected line loss, rated temperature, ambient temperature, thermal resistance, acidity, sedimentation, and environmental protection requirements.

Table 6-1 Cable description

No.	Cable	Type	Conductor Cross-Sectional Area Range	Outer Diameter	Terminal	Source
1	DC power cable	Two-core outdoor copper/ copper-clad aluminum/ aluminum alloy cable	• LUNA2000-2.0MWH-1HX: 240–400 mm^2 • LUNA2000-2.0MWH-2HX: 70–185 mm^2	25–68 mm	M12 OT/DT terminal	Prepared by the customer
		Single-core outdoor copper/ copper-clad aluminum/ aluminum alloy cable	• LUNA2000-2.0MWH-1HX: 185–400 mm^2 • LUNA2000-2.0MWH-2HX: 50–185 mm^2	25–47 mm		
2	AC input power cable (with external grid power supply)	Four-core/Five-core outdoor copper/copper-clad aluminum/ aluminum alloy cable	• LUNA2000-2.0MWH-1HX: 35–185 mm^2 • LUNA2000-2.0MWH-2HX: 10–185 mm^2	24.6–72 mm	M10 OT/DT terminal	Prepared by the customer
3	Single-phase AC Input Power Cable (without external grid power supply)	Two-core/Three-core outdoor copper cable	1.5–10 mm^2	5-32 mm	Pin cord end terminal with an insertion depth of 14 mm	Prepared by the customer
4	FE communications cable	CAT 5E outdoor shielded network cable, internal resistance ≤ 1.5 ohms/10 m	-	< 9 mm	Shielded RJ45 connector	Prepared by the customer
5	Optical cable	Supports the four-core or eight-core single-mode armored cable with the transmission wavelength of 1310 nm.	-	≤ 18 mm	-	Prepared by the customer

6.2 Connecting Socket Circuit Wires

Scenario 1

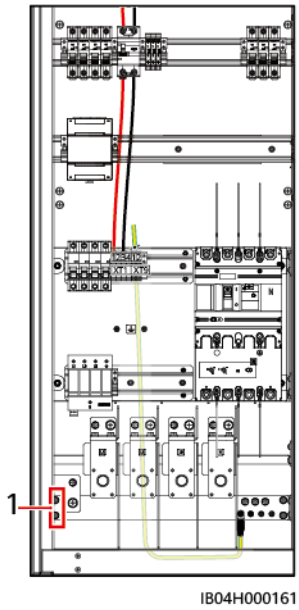
This procedure applies only to the models listed in the table below.

Models	Air Conditioner Position in the Battery Cabin
LUNA2000-2.0MWH-1HX	1/3/5/7/9/11
LUNA2000-2.0MWH-2HX	1/4/7/10

NOTE

- Cables 1733, 1735, 1734 and 1736 are pre-installed. Cables 1751, 1752, 1757, 1760, 2055, 2056, 1761 and 1762 need to be installed.
- The cables to be installed can be obtained from the cable binding position shown in the figure before installing the socket.

Figure 6-1 Before installing the socket



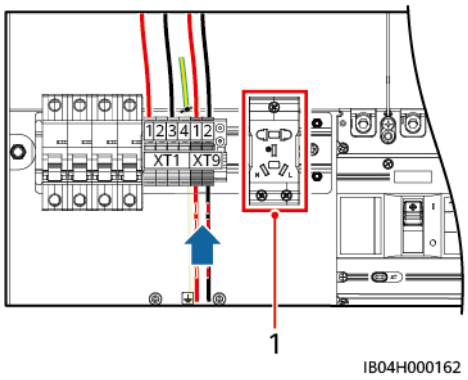
(1) Cable binding position

Step 1 Select a 110 V or 220 V socket as required.

Step 2 Connect the live wire and neutral wire.

- **Installing a 110 V socket**
  a. Connect the live wire and neutral wire from the mains to positions 1 and 2 of the XT9 terminal block.

Figure 6-2 Connecting the live wire and neutral wire from the mains

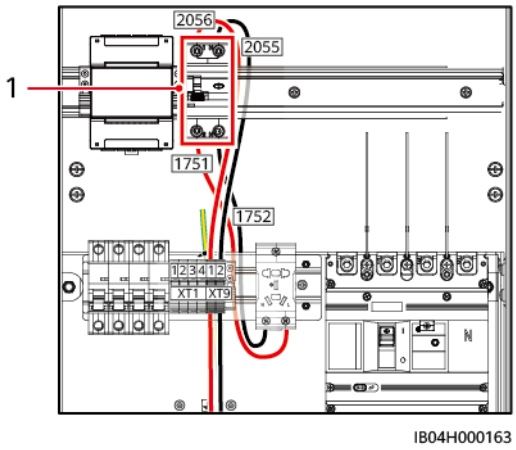


(1) 110 V/220 V socket installing position

b. Install the 110 V switch.

c. Connect the live wire (corresponding to cable 2056) and neutral wire (corresponding to cable 2055) from the upper end of the switch to positions 1 and 2 of the XT9 terminal block. Connect the live wire (corresponding to cable 1751) and neutral wire (corresponding to cable 1752) from the lower end of the switch to the socket.

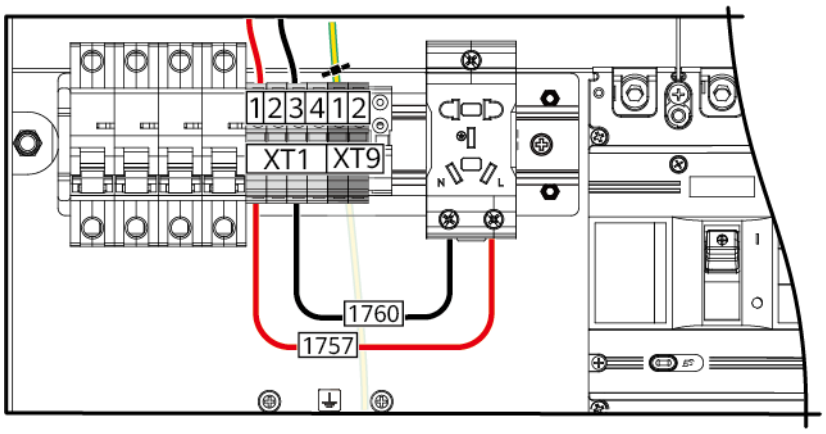
Figure 6-3 Connecting live wires and neutral wires



(1) 110 V switch installing position

- **Installing a 220 V socket**

  a. Connect the live wires (corresponding to cables 1757) and neutral wires (corresponding to cables 1760) from the lower end of the terminal block to the socket.



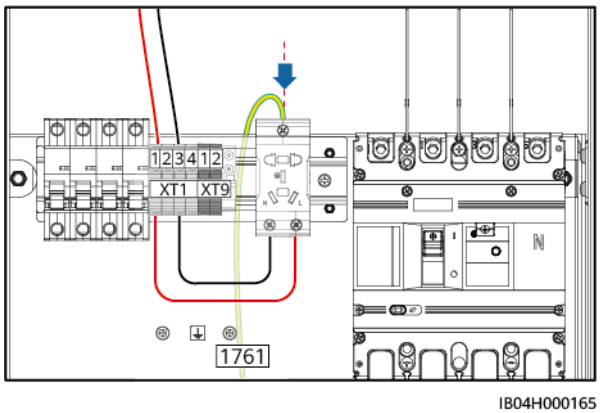
Step 3 Connecting ground cables: Determine whether the socket ground cables are routed in from the top or bottom.

NOTE

Step 3 applies to the scenarios where a 220 V or 110 V socket is installed. The following figure uses a 220 V socket as an example.

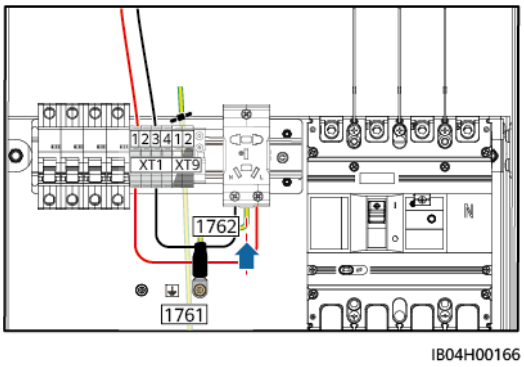
- If cables are routed in from the top of the socket, the cables (1761) are connected to the ground points. Remove the other end of the cables from the rear panel and connect them to the ground points of the socket.

Figure 6-4 Routing the ground cables in from the top



- If cables are routed in from the bottom of the socket, connect one end of the cables (1762) to the ground points of the socket and the other end to the reserved ground points on the rear panel.

Figure 6-5 Routing the ground cables in from the bottom



----End

Scenario 2

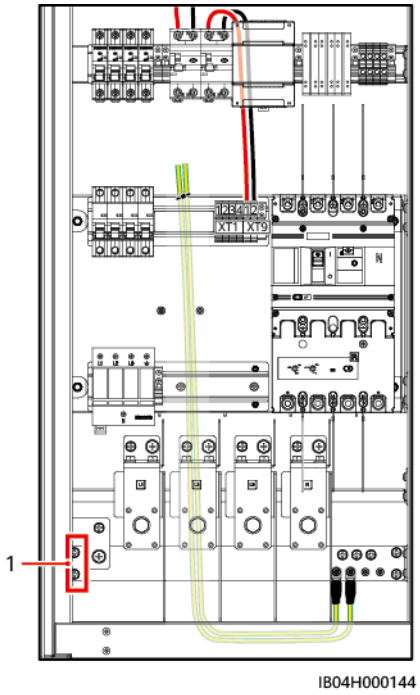
This procedure applies only to the models listed in the table below.

Models	Air Conditioner Position in the Battery Cabin
LUNA2000-2.0MWH-1HX	1/2/4/5/7/8/10/11
LUNA2000-2.0MWH-2HX	1/3/5/7/9/11
LUNA2000-2.0MWH-2HX	2/4/6/8/10/12

NOTE

- Cables 1755, 1758, 2066, 2065, 1761, and 1766 are pre-installed. Cables 1756, 1751, 1759, 1752, 1757, 1763, 1760, 1765, 1762, and 1764 need to be installed.
- The cables to be installed can be obtained from the cable binding position shown in the figure before installing the socket.

Figure 6-6 Before installing the socket



(1) Cable binding position

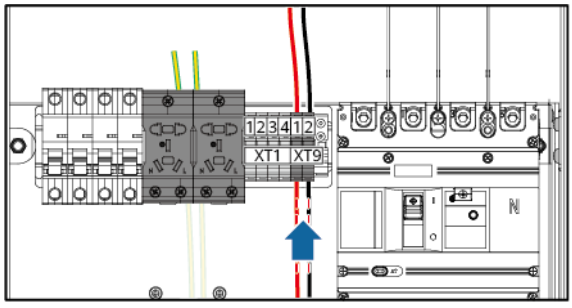
Step 1 Select a 110 V or 220 V socket as required.

Step 2 Connect the live wire and neutral wire.

- **Installing a 110 V socket**

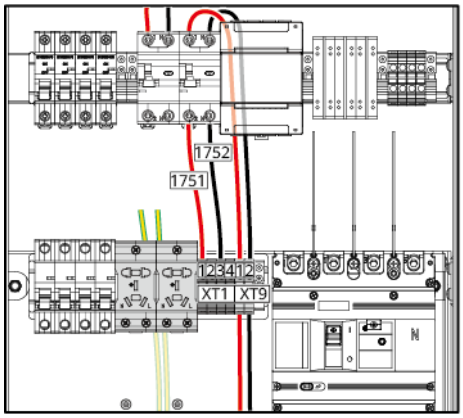
  a. Connect the live wire and neutral wire from the mains to positions 1 and 2 of the XT9 terminal block.

  Figure 6-7 Connecting the live wire and neutral wire from the mains

  b. Connect the live wire (corresponding to cable 1751) and neutral wire (corresponding to cable 1752) from the lower end of the switch to positions 1 and 3 of the XT1 terminal block.

Figure 6-8 Connecting the live wire and neutral wire from the lower end of the switch

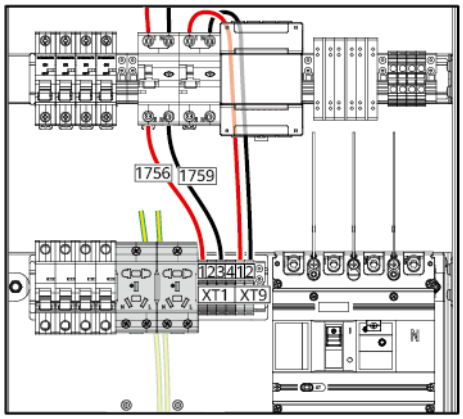


IB04H000146

- **Installing a 220 V socket**

  Connect the live wire (corresponding to cable 1756) and neutral wire (corresponding to cable 1759) from the lower end of the switch to positions 1 and 3 of the XT1 terminal block.

  Figure 6-9 Connecting the live wire and neutral wire from the lower end of the switch



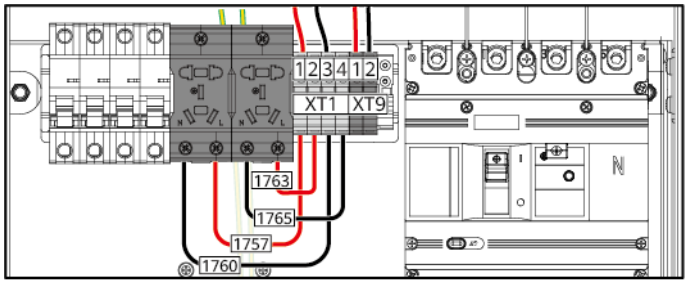
IB04H000150

Step 3 Connect the live wires (corresponding to cables 1757 and 1763) and neutral wires (corresponding to cables 1760 and 1765) from the lower end of the terminal block to the socket.

NOTE

Steps 3 and 4 apply to the scenarios where a 220 V or 110 V socket is installed. The following figure uses a 220 V socket as an example.

Figure 6-10 Connecting the live wires and neutral wires from the lower end of the terminal block

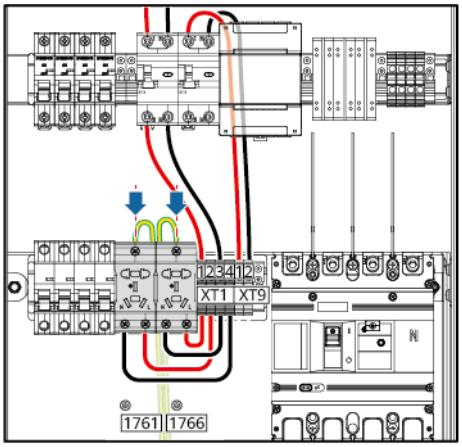


IB04H000147

Step 4 Connecting ground cables: Determine whether the socket ground cables are routed in from the top or bottom.

- If cables are routed in from the top of the socket, the ground cables (1761 and 1766) are connected. Remove the cables bound to the rear panel and connect the other end to the grounding points of the socket.

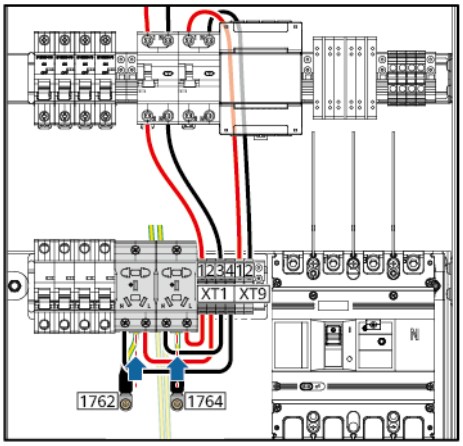
  Figure 6-11 Routing the ground cables in from the top

  IB04H000148

- If cables are routed in from the bottom of the socket, connect one end of the cables (1762 and 1764) to the ground points of the socket and the other end to the reserved ground points on the rear panel.

Figure 6-12 Routing the ground cables in from the bottom



----End

6.3 Installing DC Power Cables

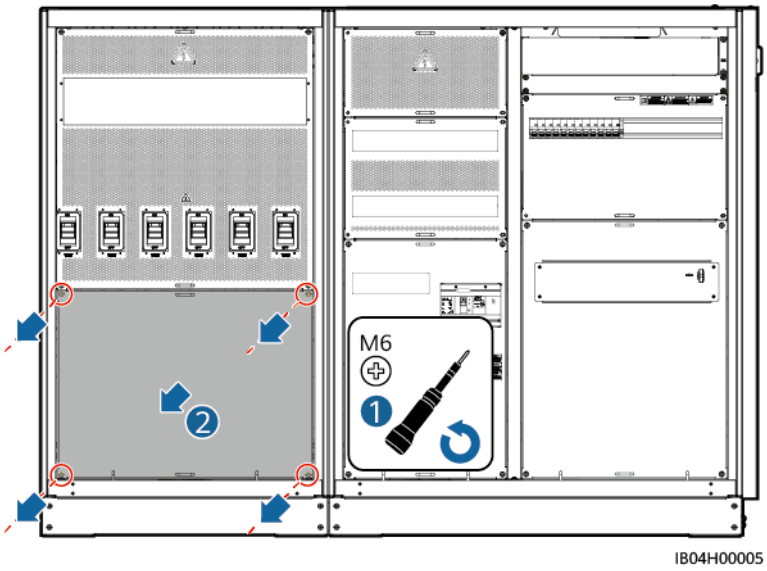
Prerequisites

- The ESS is not powered on.
- The DC power cables have been pre-buried according to the specifications.
- The OT/DT terminals have been crimped according to the specifications. For details, see **C Crimping an OT or DT Terminal**.

Procedure

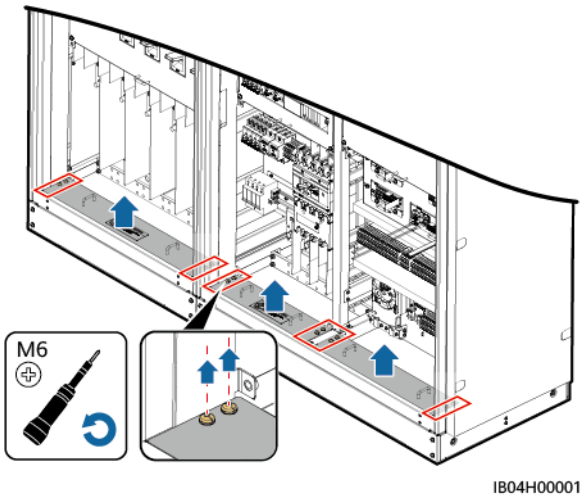
Step 1 Remove the protective cover

Figure 6-13 Removing the protective cover



Step 2 Remove the baffle plates for the DC power cables.

Figure 6-14 Removing the baffle plates for the DC power cables



Step 3 Connect the DC power cables.

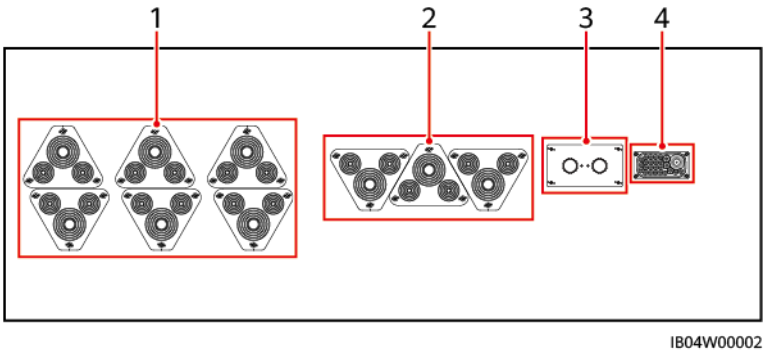
NOTICE

- The screw assembly whose model is subject to the delivery should be tightened according to the corresponding standard torque.
- Partially tighten the nuts of the DC power cables to a torque of 5 N·m when securing the cables.
- The wiring terminal must be installed with heat-shrink tubing at the crimping area of the cable conductor to ensure that the electrical clearance between the conductors is greater than 20 mm.
- Lay out the DC power cables according to the design, route the cables to the wiring positions on the corresponding switches, and label the cables.

NOTE

- Tighten the nuts using the socket wrench with an extension rod. The length of the extension rod is greater than 30 cm. Secure the screw assembly using an adjustable wrench.
- After connecting the DC power cables, ensure that the OT terminals are properly attached to and aligned with the copper bar, and that the DC power cables point vertically downwards.

Figure 6-15 DC power cable positions at the bottom



(1) DC power cable hole

(2) AC input power cable or ground cable hole

(3) Optical cable or FE communications cable hole

(4) UPS or RS485 cable hole (reserved)

NOTICE

- Pre-install nuts according to the recommended torque of 47 N·m.
- Verify that the torque of the installed bolts is 47 N·m using a torque wrench.
- Mark the nuts whose torque has been verified using a marker.
- Verify the torque promptly after connecting the negative DC power cables, and then connect the positive DC power cables.

NOTE

When armored cables are used, it is recommended that the armored layer be grounded at the opposite side.

Figure 6-16 Connect the single-core DC power cables of LUNA2000-2.0MWH-1HX

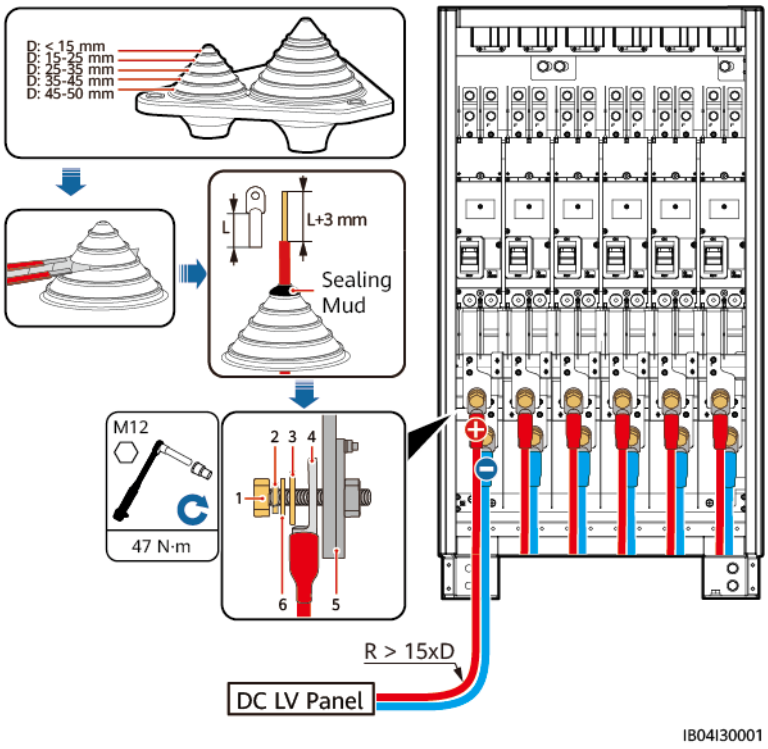
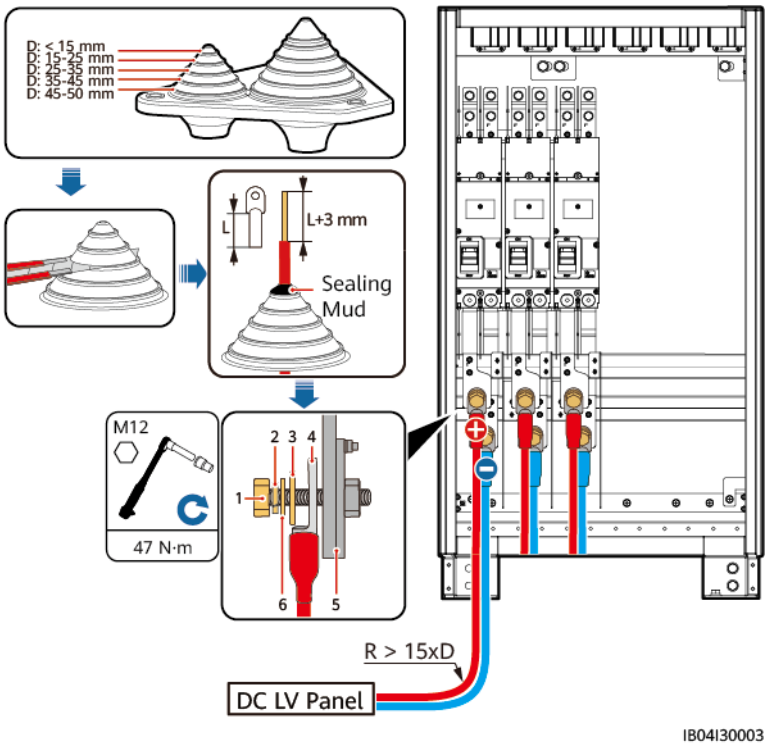


Figure 6-17 Connect the single-core DC power cables of LUNA2000-2.0MWH-2HX



(1) Screw assembly (2) Spring washer (3) Large washer (optional)

(4) Wiring terminals (5) Copper bar (6) Flat washer

Figure 6-18 Connect the single-core DC power cables of LUNA2000-2.0MWH-1HX

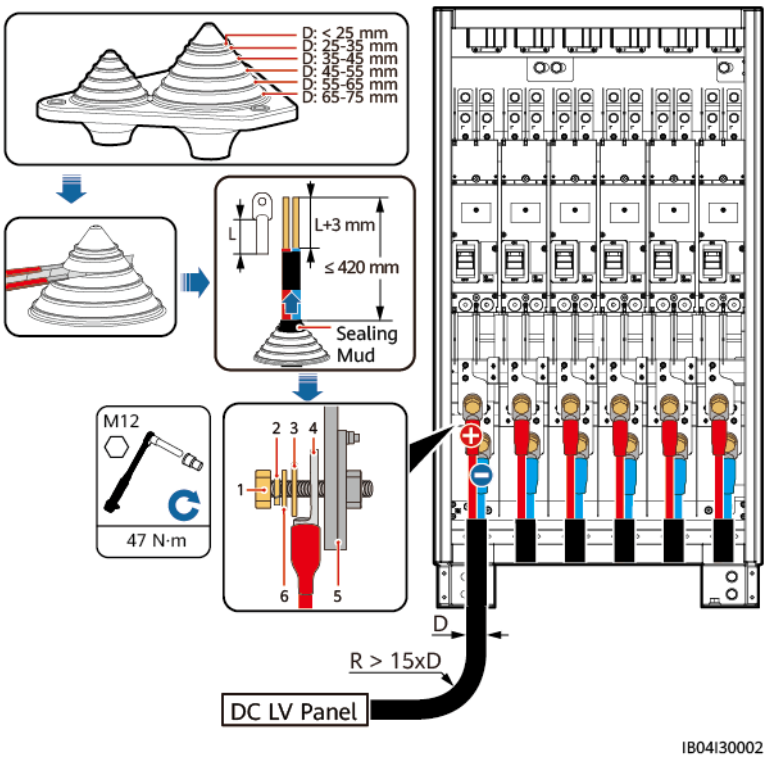
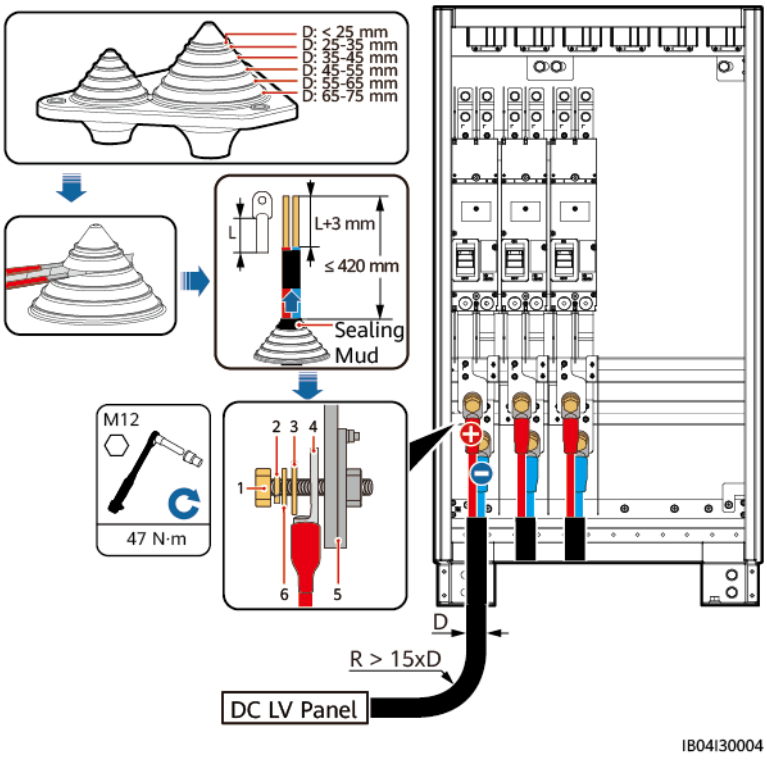


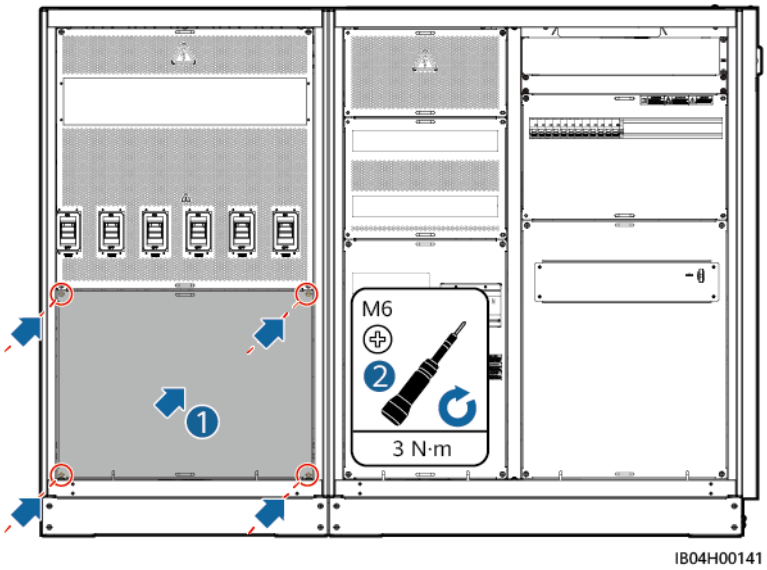
Figure 6-19 Connecting two-core DC power cables of LUNA2000-2.0MWH-2HX



(1) Screw assembly (2) Spring washer (3) Large washer (optional)

(4) Wiring terminals (5) Copper bar (6) Flat washer

Step 4 Install the removed cover.



----End

6.4 Installing AC Input Power Cables (With External Grid Power Supply)

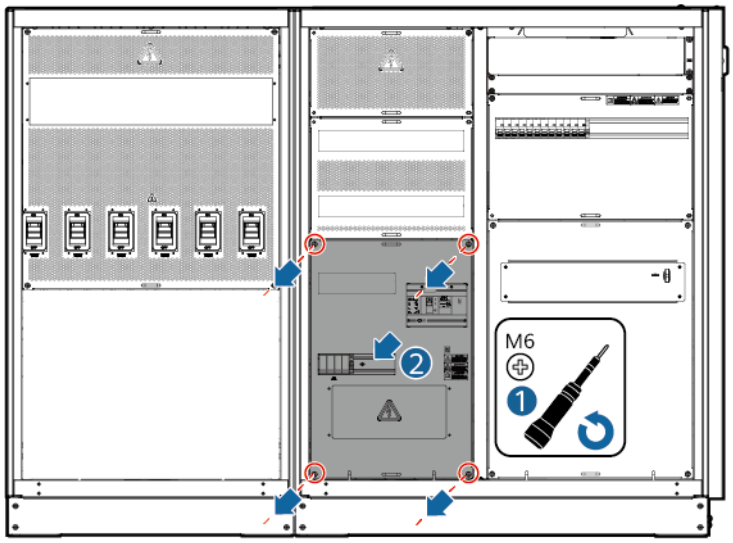
Prerequisites

- The ESS is not powered on.
- AC input power cables have been pre-buried according to the specifications.
- The OT/DT terminals of the AC input power cables have been crimped according to the specifications. For details, see **C Crimping an OT or DT Terminal**.

Procedure

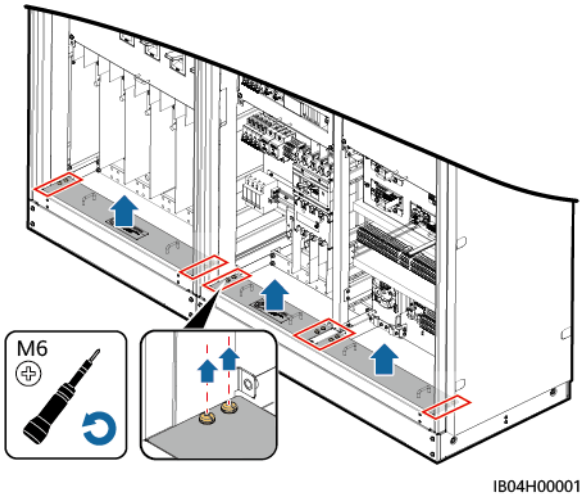
Step 1 Remove the protective cover.

Figure 6-20 Removing the protective cover



Step 2 Remove the baffle plates for the AC input power cables.

Figure 6-21 Removing the baffle plates for the AC input power cables



Step 3 Connect AC input power cables.

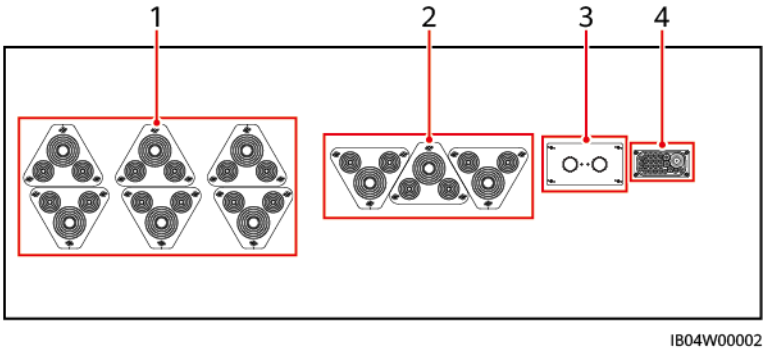
CAUTION

When connecting AC input power cables, ensure that the cables are not damaged or disconnected. Ensure that the neutral wire is securely connected. Otherwise, AC power devices in the system may be damaged.

NOTICE

- The screw assembly whose model is subject to the delivery should be tightened according to the corresponding standard torque.
- Partially tighten the nuts of the AC input power cables to a torque of 5 N·m when securing the cables.
- The wiring terminal must be installed with heat-shrink tubing at the crimping area of the cable conductor to ensure that the electrical clearance between the conductors is greater than 20 mm.
- Lay out the AC input power cables according to the design, route the cable to the wiring positions on the corresponding switches, and label the cables.
- After connecting the DC power cables, ensure that the OT terminals are properly attached to and aligned with the copper bar, and that the DC power cables point vertically downwards.

Figure 6-22 AC input power cable positions at the bottom



(1) DC power cable hole

(2) AC input power cable or ground cable hole

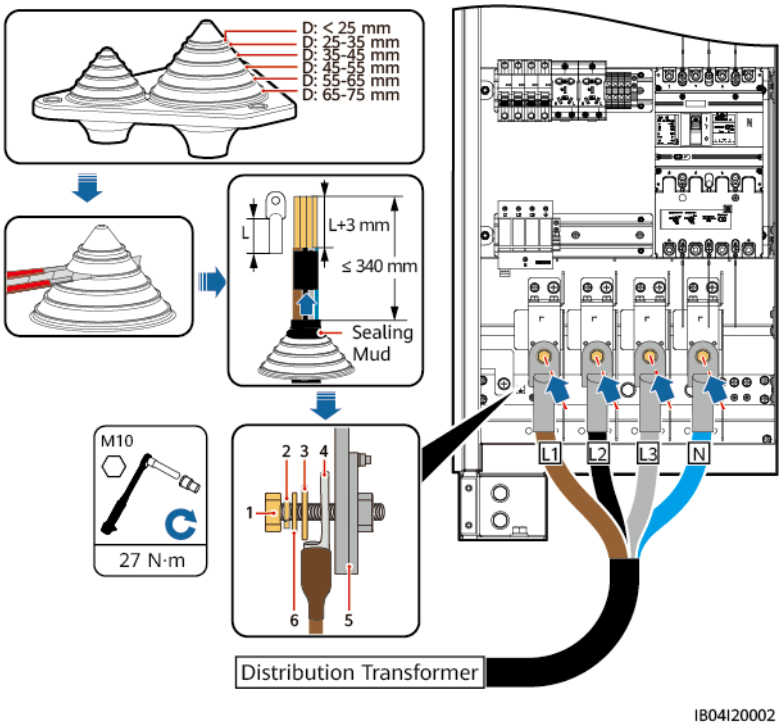
(3) Optical cable or FE communications cable hole

(4) UPS or RS485 cable hole (reserved)

NOTICE

1. Pre-install nuts according to the recommended torque of 27 N·m.
2. Verify that the torque of the installed bolts is 27 N·m using a torque wrench.
3. Mark the nuts whose torque has been verified using a marker.

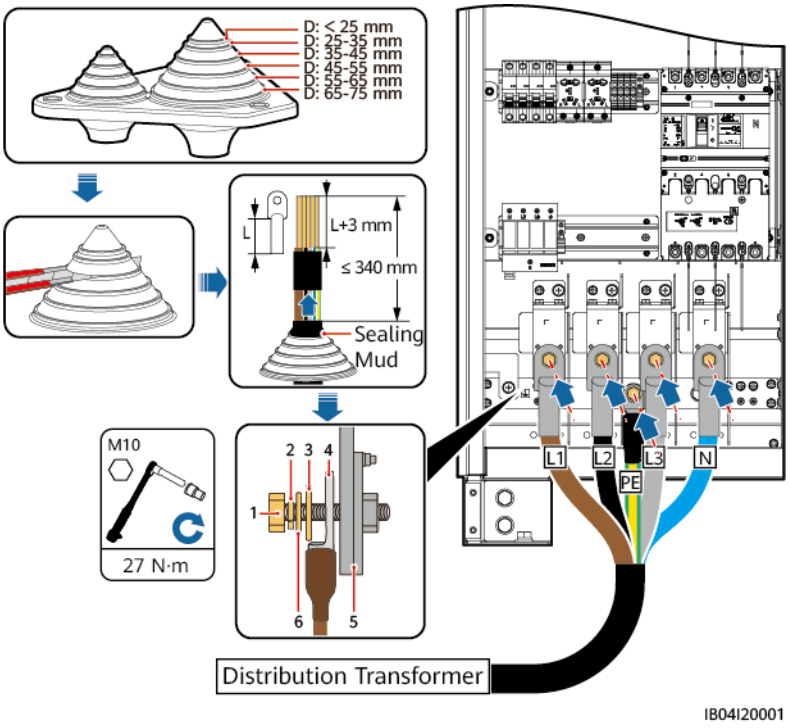
Figure 6-23 Connecting the four-core AC input power cables (excluding the ground cable and including the neutral wire)



(1) Screw assembly (2) Spring washer (3) Large washer (optional)

(4) Wiring terminals (5) Copper bar (6) Flat washer

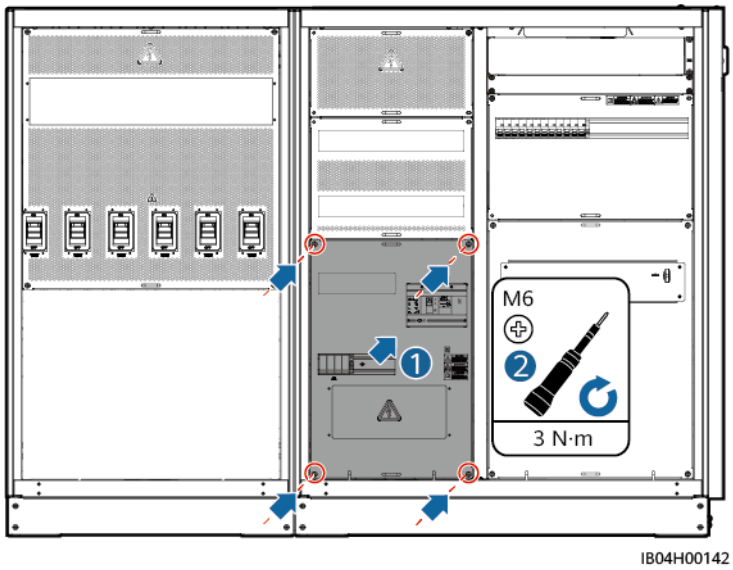
Figure 6-24 Connecting the five-core AC input power cable (including the ground cable and the neutral wire)



(1) Screw assembly (2) Spring washer (3) Large washer (optional)

(4) Wiring terminals (5) Copper bar (6) Flat washer

Step 4 Install the removed cover.



----End

6.5 (Optional) Connecting Single-phase AC Input Power Cables

NOTE

- This step applies only to some models. The figure is for reference only.
- If a UPS (provided by the customer) or other reliable backup power supplies (provided by the customer) is used to supply power, perform the following steps to change the connection mode of the single-phase AC input power cables.
- Recommended single-phase AC switch (5FCB, provided by the customer): 220/230 V AC; 10 A/2P.

Scenario 1: The UPS Obtains Power from an External Power Source (Not from the ESS)

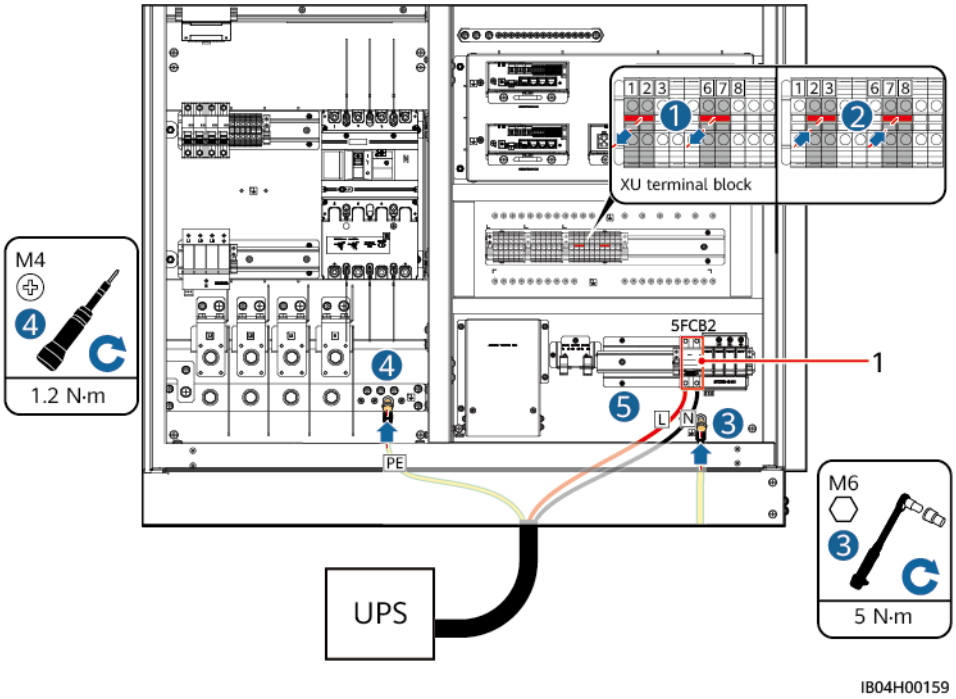
Step 1 Remove the short-circuiting bar from 1–2 and insert it to 2–3 on the XU terminal block.

Step 2 Remove the short-circuiting bar from 6–7 and insert it to 7–8 on the XU terminal block.

Step 3 Connect the armored cable to the ground point on the rear panel of the control unit cabin.

Step 4 Connect the PE cable (provided by the customer) to the ground bar of the control unit cabin, and connect the L and N wires (provided by the customer) to switch 5FCB2.

Figure 6-25 Wiring diagram



(1) Switch 5FCB2, connected to the UPS output

----End

Scenario 2: The UPS Obtains Power from the ESS

Step 1 Remove the short-circuiting bar from 1–2 and insert it to 2–3 on the XU terminal block.

Step 2 Remove the short-circuiting bar from 6–7 and insert it to 7–8 on the XU terminal block.

Step 3 Connect the two armored cables to the ground points on the rear panel of the control unit cabin.

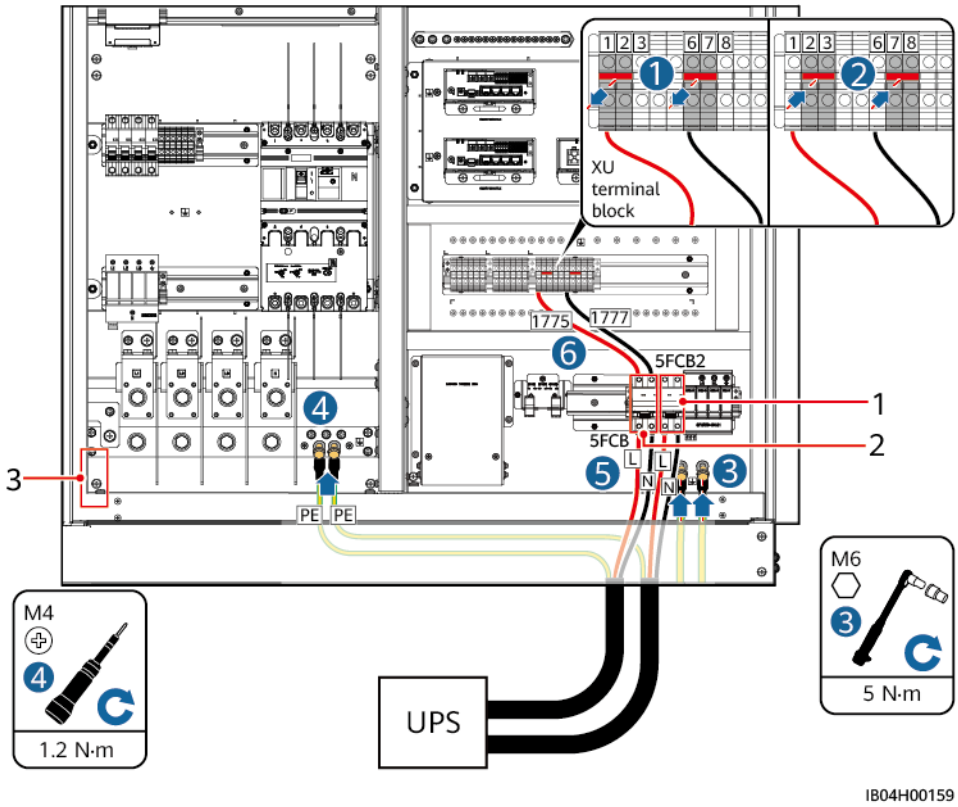
Step 4 UPS output: Connect the PE cable (provided by the customer) to the ground bar of the control unit cabin, and connect the L and N wires (provided by the customer) to switch 5FCB2.

Step 5 Install a UPS switch 5FCB (provided by the customer).

Step 6 Connect the live wire 1775 and neutral wire 1777 (obtained from position 2 in the figure).

Step 7 UPS input: Connect the PE cable (provided by the customer) to the ground bar of the control unit cabin, and connect the L and N wires (provided by the customer) to switch 5FCB.

Figure 6-26 Wiring diagram



(1) Switch 5FCB2, connected to the UPS output

(2) Binding positions of live wire 1775 and neutral wire 1777

(3) Switch 5FCB, connected to the UPS input

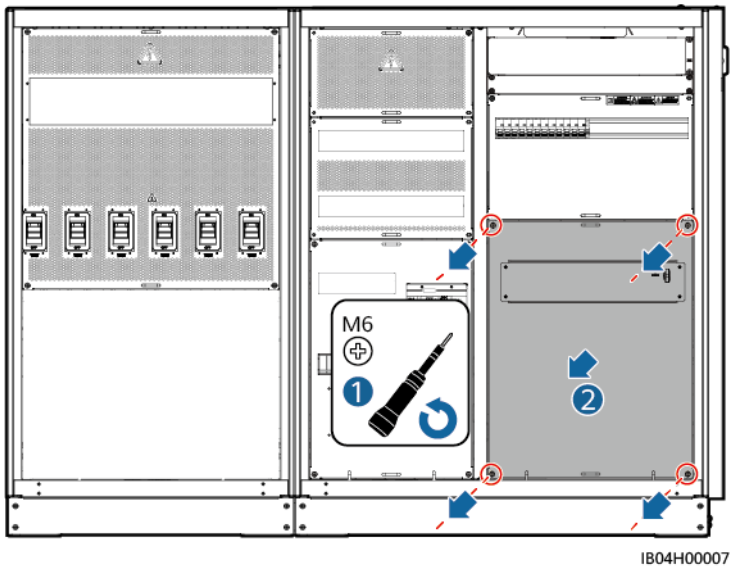
----End

6.6 Installing Signal Cables

6.6.1 Installing FE Communications Cables

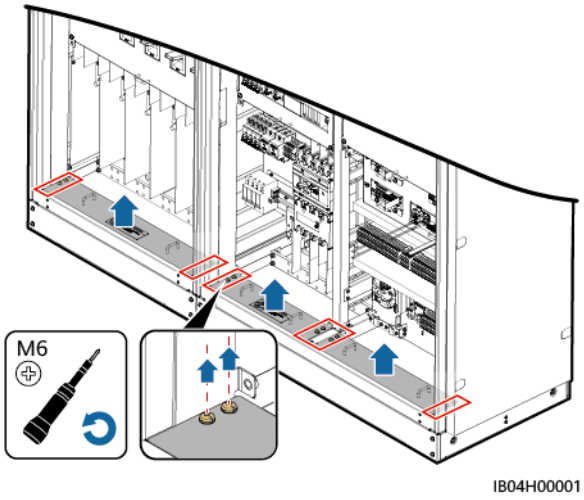
Step 1 Remove the protective cover.

Figure 6-27 Removing the protective cover



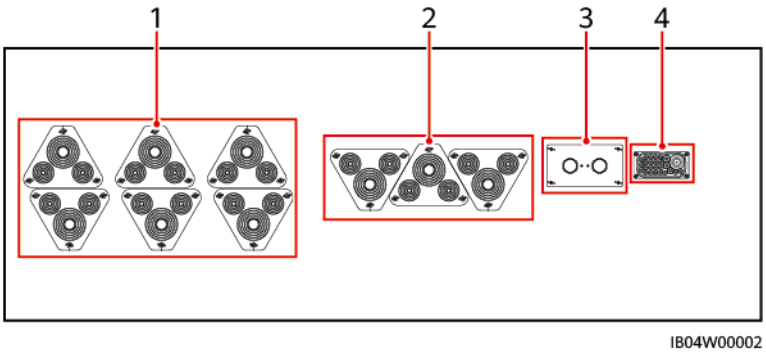
Step 2 Remove the baffle plates for the signal cables.

Figure 6-28 Removing the baffle plates for the signal cables



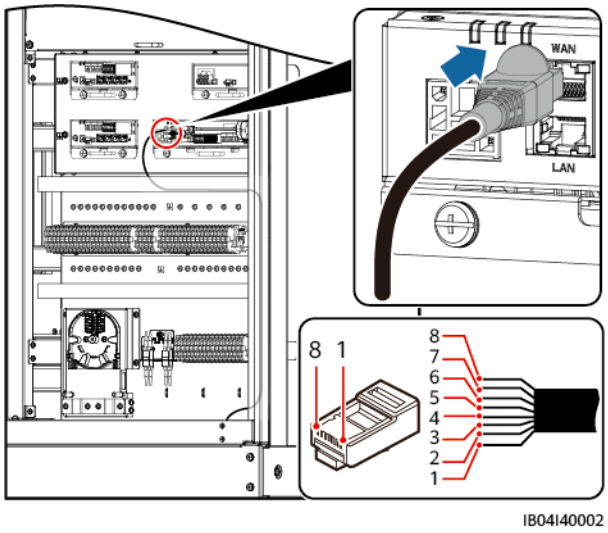
Step 3 Connect the FE communications cables to the **WAN** ports on the CMU.

Figure 6-29 Optical cable positions at the bottom



(1) DC power cable hole
(2) AC input power cable or ground cable hole
(3) Optical cable or network cable hole
(4) UPS or RS485 cable hole (reserved)

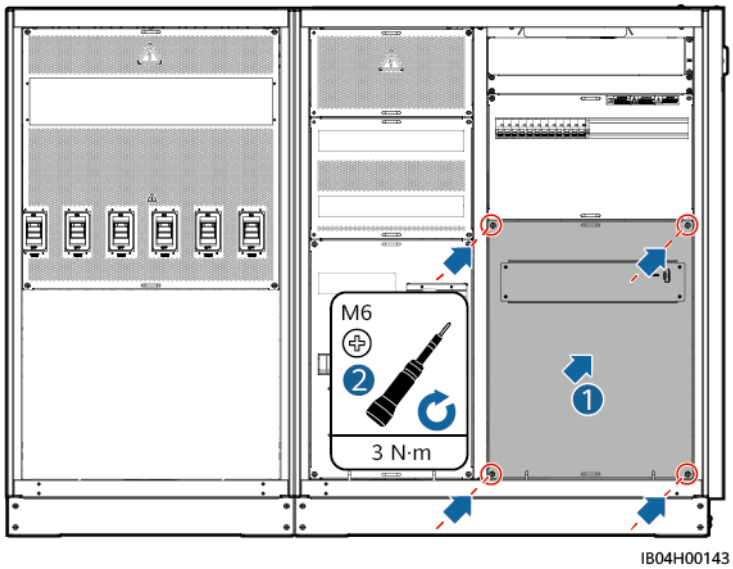
Figure 6-30 Connecting FE communications cables



(1) White-and-orange
(2) Orange
(3) White-and-green
(4) Blue
(5) White-and-blue
(6) Green
(7) White-and-brown
(8) Brown

Step 4 Bind the cables.

Step 5 Install the removed cover.



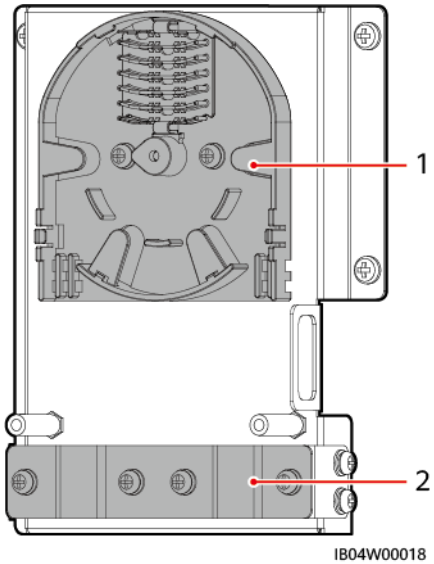
----End

6.6.2 Installing Optical Cables

NOTICE

Only professionals are allowed to connect optical cables.

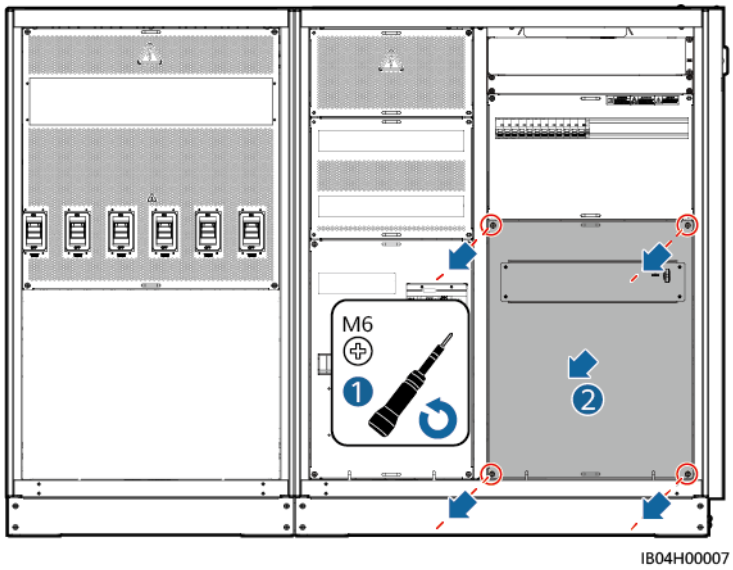
Figure 6-31 Optical Terminal Box (ATB) interior



(1) Fiber spool (2) Cable clip

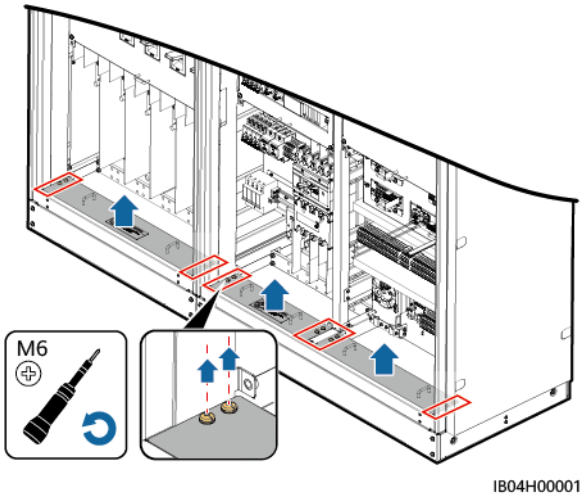
Step 1 Remove the protective cover.

Figure 6-32 Removing the protective cover



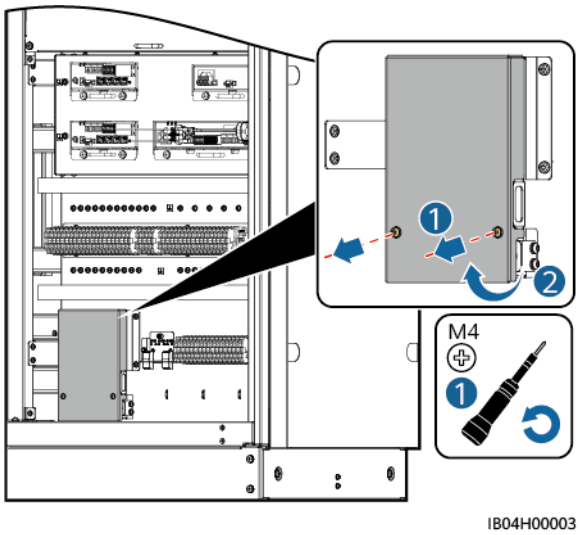
Step 2 Remove the baffle plates for the optical cables.

Figure 6-33 Removing the baffle plate for the optical cables



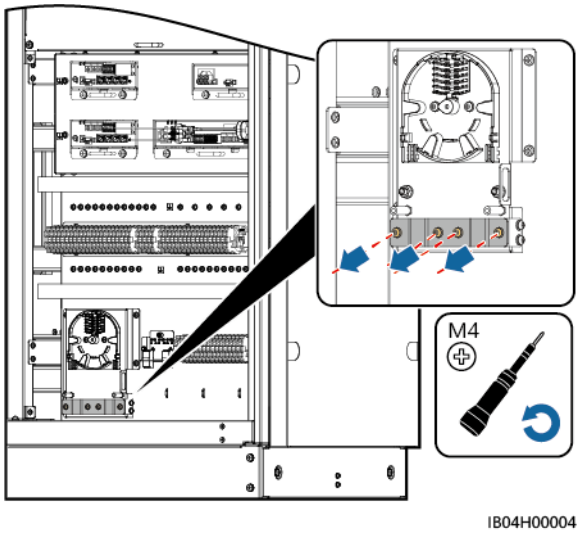
Step 3 Remove the external mechanical parts from the ATB.

Figure 6-34 Removing external mechanical parts



Step 4 Remove the optical cable fastener.

Figure 6-35 Removing a fastener



Step 5 Connect one end of the optical jumper to the fiber adapter.

Step 6 Route the other end of the optical jumper through the cable hole on the side of the ATB, and connect the cable to the ATB.

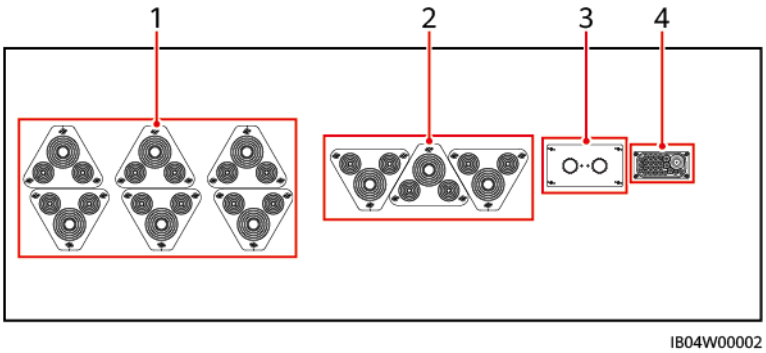
Step 7 Connect the peripheral optical cable to the ATB, splice the optical cable and the optical jumper, and wind the spliced cable around the fiber spool on the ATB.

Step 8 Install an optical module on the CMU panel, connect one end of the optical jumper to the optical module, and connect the other end to the fiber adapter.

NOTICE

Only professionals are allowed to splice fibers.

Figure 6-36 Optical cable positions at the bottom



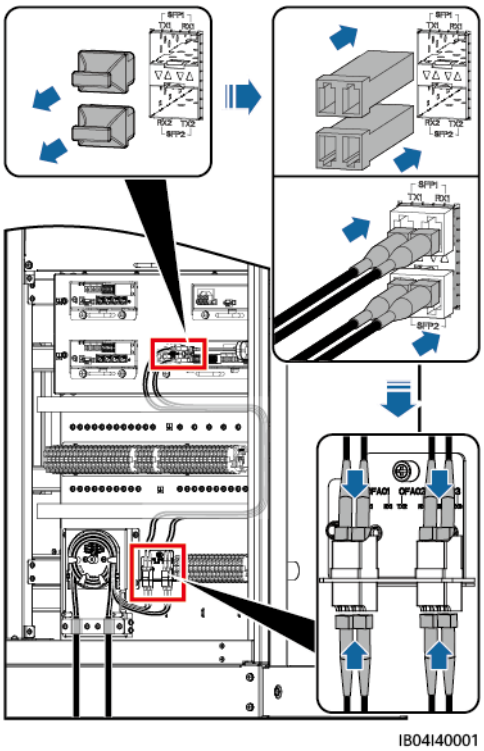
(1) DC power cable hole

(2) AC input power cable or ground cable hole

(3) Optical cable or FE communications cable hole

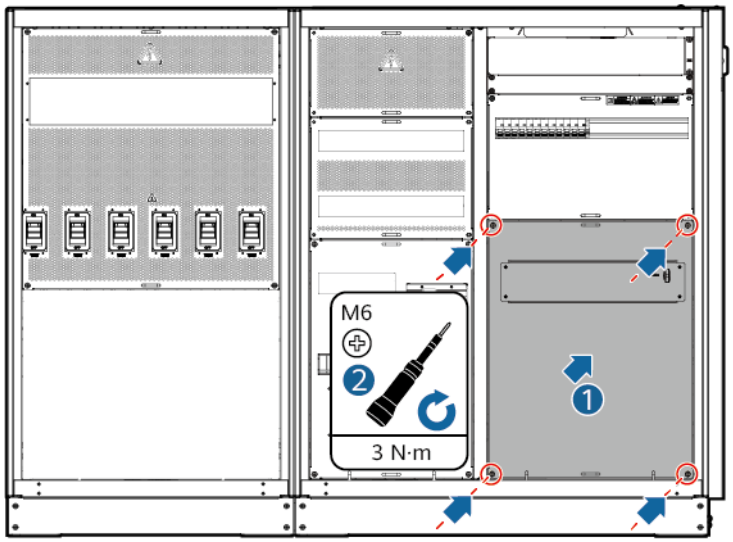
(4) UPS or RS485 cable hole (reserved)

Figure 6-37 Connecting optical cables



Step 9 Check that the cables are connected correctly and securely. Then reinstall the optical cable fastener and external mechanical parts.

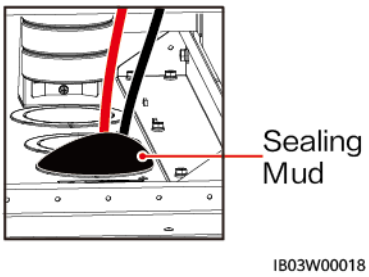
Step 10 Install the removed cover.



----End

6.7 Sealing the Cable Holes

After the cables are installed, seal the cable holes using the sealing mud delivered with the equipment.



7 Checking Before Power-On

Item	No.	Check Item	Acceptance Criteria
General inspection	1	Equipment appearance	• The equipment is intact and free from rust or paint flake-off. If paint flakes off, repaint the equipment. • The labels on the equipment are clear. Damaged labels must be replaced.
	2	Cable appearance	• Cable sheathings are properly wrapped and not damaged. • Cable hoses are intact.
	3	Cable connections	• Cables are connected in the designed positions. • Terminals are prepared as required and securely connected. • Labels on both ends of each cable are clear and specific, and attached in the same direction.
	4	Cable layout	• Electrical and ELV cables are routed separately. • Cables are neat and tidy. • Cable tie joints are evenly cut without burrs. • Cables are placed properly and reserve some slack at bending points to avoid stress. • Cables are routed neatly without twists or crossovers in the cabinet.
	5	Switch	• The DC LV Panel switch is set to OFF. • The battery rack switch is set to OFF.
ESS	1	Installation	• The installation meets the design requirements. • The ESS is level, and each door can be opened properly.
	2	Grounding	Each ESS has at least two ground points and is grounded securely with a ground resistance of 0.1 ohm or less.

Item	No.	Check Item	Acceptance Criteria
	3	Accessory	The number and positions of external accessories installed meet design requirements.
	4	Label	All labels are correct, clear, and complete.
	5	Cleanness	The ESS is clean and tidy inside, without any unnecessary cables, cable ends, terminals, or tools. No garbage is found outside the equipment.
Battery cabin	1	Circuit breaker	The MCCBs are set to OFF.
	2	Copper bar	The copper bar is not deformed, and no foreign objects are placed on the copper bar.
	3	Fuse	There is no indication for broken fuses.
	4	Cable	The bolts for installing the cables are tightened and the cables are not loose.
	5	Cable hole sealing	Cable holes have been sealed.
	6	Component	All components are intact.
	7	Foreign object	Remove all foreign objects from the battery cabin, such as tools and remaining installation materials.
Control unit cabin	1	SPD	The SPD indicator is green.
	2	AC meter	The buttons of the AC meter function properly and the screen is free of cracks.
	3	Cable	The bolts for installing the cables are tightened and the cables are not loose.
	4	Foreign object	There are no foreign objects in the control unit cabin, such as packing materials.
	5	Component (such as CMU, adapter, extinguishant control panel)	All components are intact.
	6	Fire cylinder	The pressure of fire cylinder is normal.

8 Powering On the System

8.1 Installing the PSU

Prerequisites

WARNING

- Do not put your hands into the PSU slot to avoid electric shock.
- When the PSU is running, a high temperature is generated around the air outlet at the rear. Do not touch the PSU or place cables or other objects on it.

CAUTION

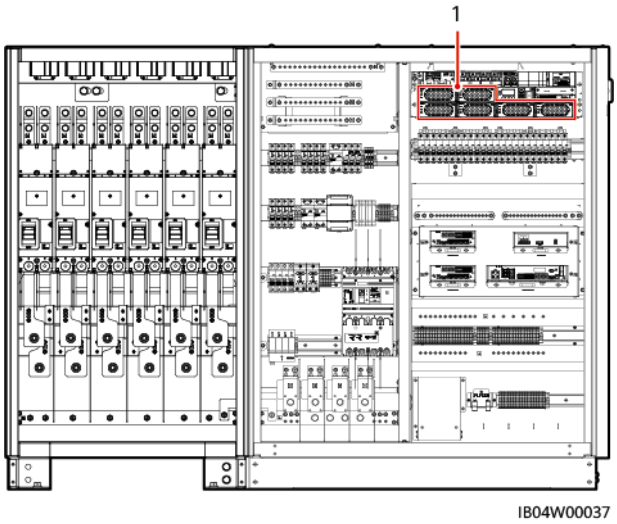
Power on the PSU within 24 hours after unpacking. Otherwise, place it in a dry indoor environment without corrosive gas.

NOTE

The subracks vary with the ESS models. The figure uses one type of subrack as an example.

- If the PSU is damaged, contact the local office.
- Determine the PSU installation position.

Figure 8-1 PSU installation position



Procedure

Step 1 Push the locking latch leftward.

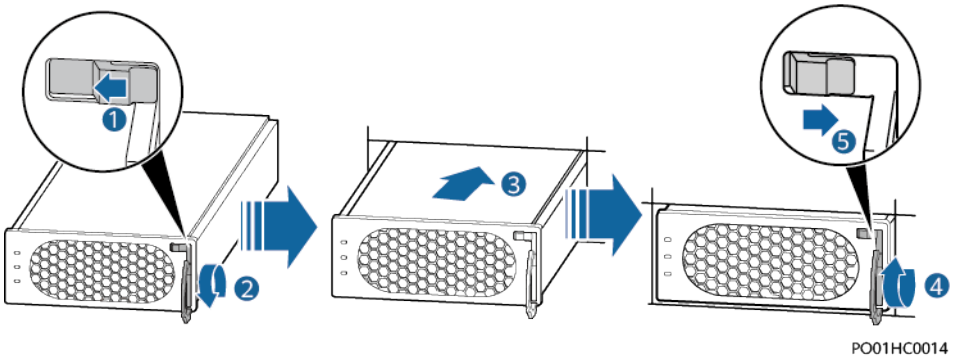
Step 2 Pull out the handle.

Step 3 Gently push the PSU into its slot along the guide rails.

Step 4 Push the handle upward.

Step 5 Push the locking latch rightward to lock the handle.

Figure 8-2 Installing the PSU



----End

8.2 Installing the Solenoid Valve

CAUTION

- If a solenoid valve is configured with a reset device, ensure that the solenoid valve is not activated before installing it on the fire cylinder. For details, see ''FAQ''.
- Before installing the solenoid valve, ensure that the fire suppression system has been tested and passed the acceptance inspection (Auxiliary power-on is required for the test and acceptance of the fire suppression system.).

NOTE

- The appearance of the solenoid valve is for reference only, and that of the actual product may vary.
- The model of the solenoid valve may vary. For details about the applicable installation procedure, see the model of the fire cylinder.

Procedure

WARNING

For non-emergency manual operations, do not remove the safety pull ring.

- **Fire cylinder model: 40 L cabinet-type**

Step 1 Remove the solenoid valve from the bracket.

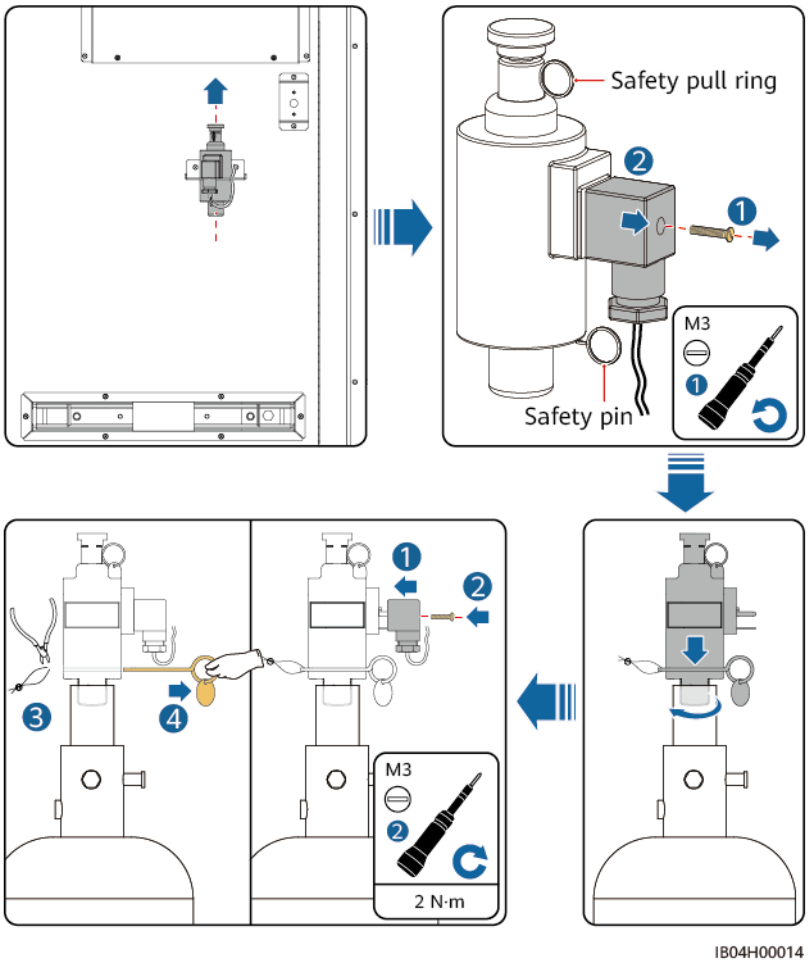
Step 2 Remove the screws using a screwdriver and remove the electric control plug from the solenoid valve.

Step 3 Tighten the solenoid valve clockwise to the top of the fire cylinder.

Step 4 Insert the electric control plug and tighten the screws using a screwdriver.

Step 5 Remove the safety pin.

Figure 8-3 Installing the Solenoid Valve



----End

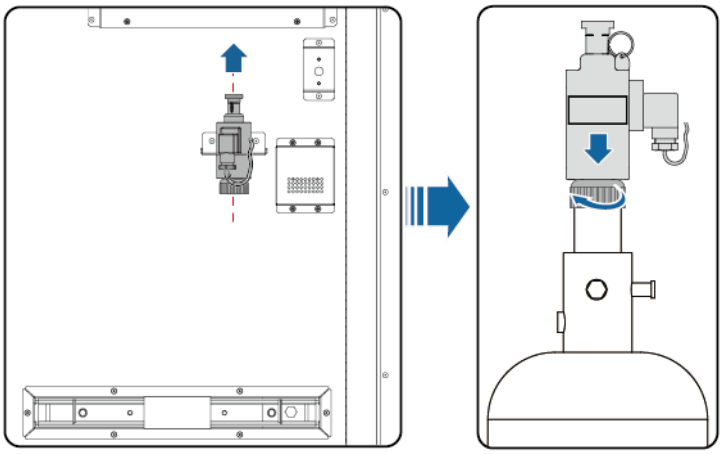
- **Fire cylinder models: NCM38UFAA, 227M38UFAA, SPS020-MS-032B-EN**

Step 1 Remove the solenoid valve from the bracket.

Step 2 Remove the reset device at the bottom of the solenoid valve.

Step 3 Tighten the solenoid valve clockwise to the top of the fire cylinder.

Figure 8-4 Installing the Solenoid Valve



----End

- **Fire cylinder model: P0009438**

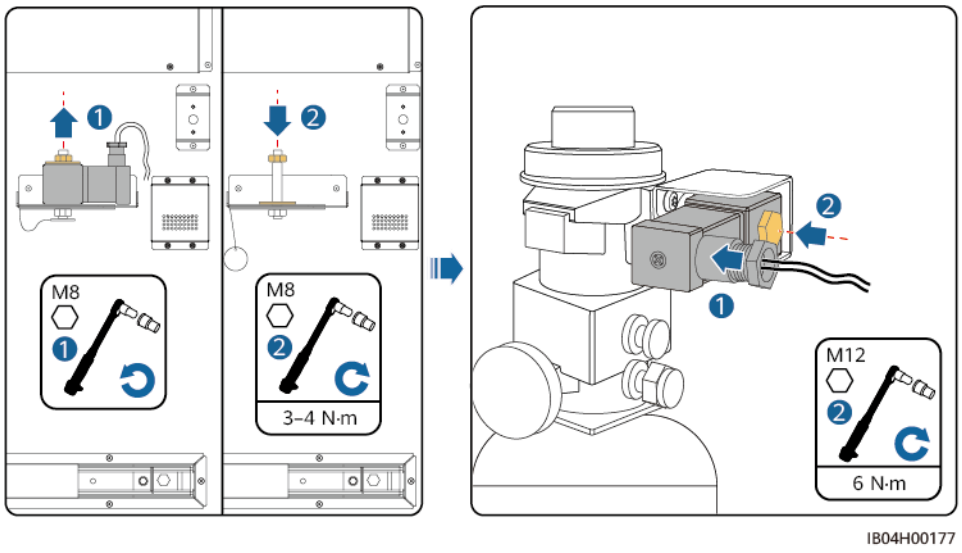
Step 1 Remove the solenoid valve from the bracket and reinstall the nut and washer.

Step 2 Install the solenoid valve on the corresponding stud on the fire cylinder.

NOTE

Nut specifications: outer hexagon HEX17. Nuts are customized and cannot be replaced with common nuts.

Figure 8-5 Installing the Solenoid Valve



----End

8.3 Power-on Process

NOTICE

The following figure is used only to guide the power-on sequence of the system. Do not use it for onsite cable connections.

Figure 8-6 Power-on process of LUNA2000-2.0MWH-1HX

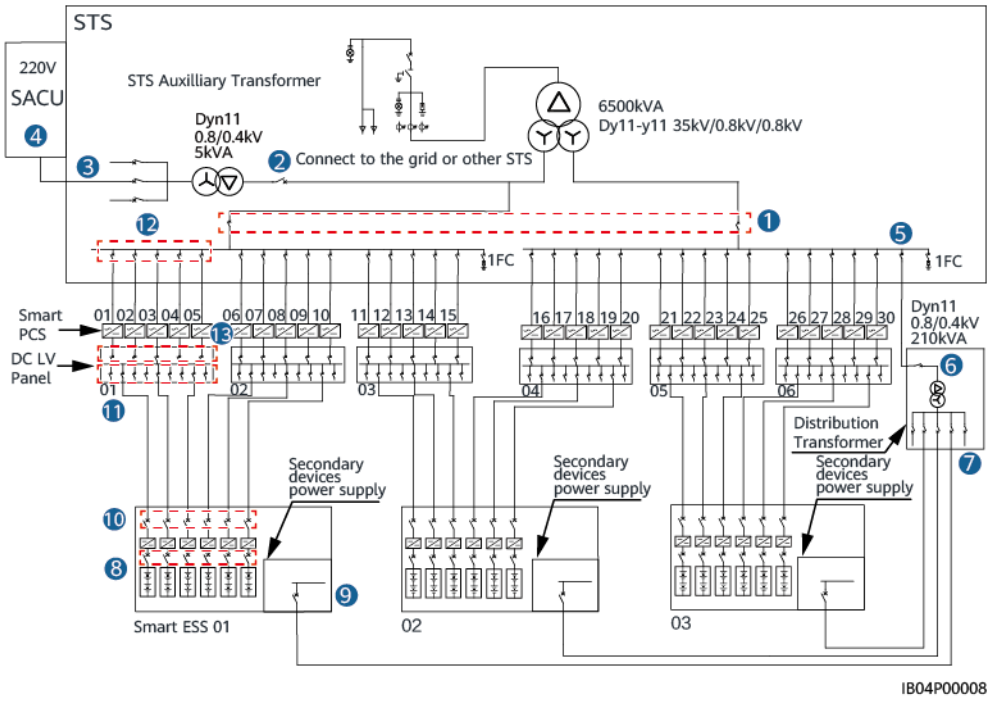
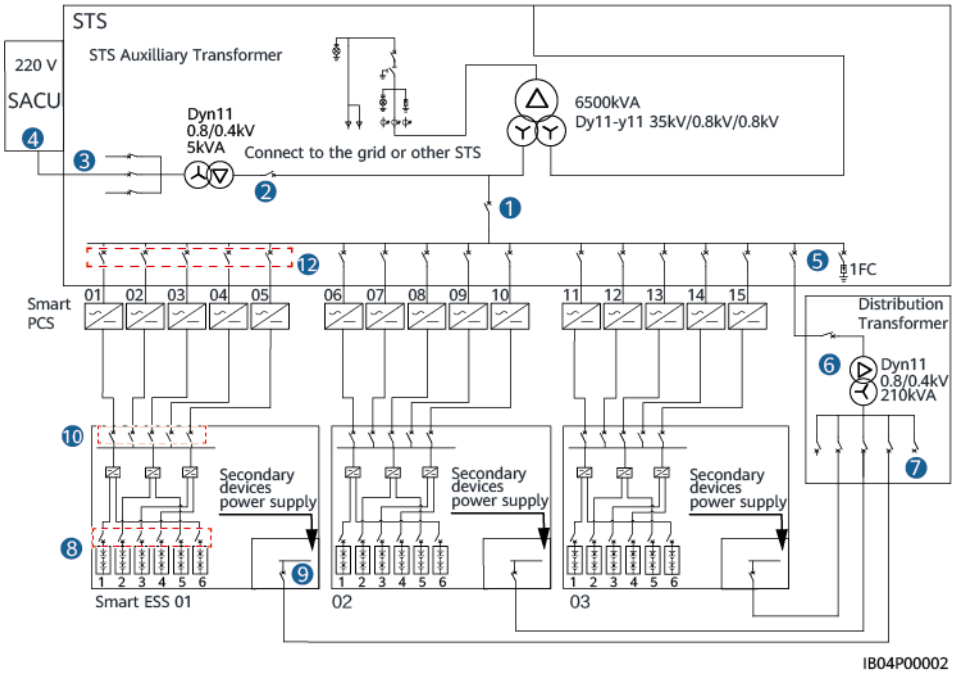


Figure 8-7 Power-on process of LUNA2000-2.0MWH-2HX



NOTICE

- Check the equipment before power-on. For details, see the corresponding user manual.
- Before the first power-on, check that cables are correctly connected.
- Incorrect cable connections may cause damage to the STS or the Smart PCS. Verify the cable connections between the STS and the Smart PCS for the initial power-on. If any exception occurs during the power-on process, stop the operation. You can proceed with the operation only after the exception has been handled.

Procedure	Item	Remarks
1	Powering on the STS (including the STS Auxiliary Transformer)	Corresponding to number 1, number 2, and number 3 in the power-on flowchart
2	Powering On the Smart Array Controller (SACU)	Corresponding to number 4 in the power-on flowchart

Procedure	Item		Remarks
3	Powering on the Distribution Transformer (Huawei or non-Huawei equipment)		Corresponding to number 5, number 6, and number 7 in the power-on flowchart
4	Powering On the ESS	Switching on the DC circuit breakers of the rack in the battery cabin	Corresponding to number 8 in the power-on flowchart
5		Powering on the secondary devices (turning on the AC switches and then the DC switches)	Corresponding to number 9 in the power-on flowchart
6		Switching on the DC circuit breakers in the control unit cabin	Corresponding to number 10 in the power-on flowchart
7	(Optional) Turning on the switches at battery side of the DC LV Panel		Corresponding to number 11 in the power-on flowchart
8	Powering on the Smart PCS	Turning on the switches at AC side of the Smart PCS	Corresponding to number 12 in the power-on flowchart
9		(Optional) Turning on the switches at DC side of the Smart PCS	Corresponding to number 13 in the power-on flowchart

NOTE

After the system is powered on, you are advised to use a thermal imager to check whether the DC power cables and AC input power cables in the control unit cabin of the ESS are in good contact.

8.4 Powering On the Smart Transformer Station (STS)

- If a Huawei STS is used, see the corresponding product documents.
- If non-Huawei transformer is used, see the corresponding product documents from the manufacturer.

8.5 Powering On the Smart Array Controller (SACU)

Prerequisites

- You have completed the power-on check.
- You have put on proper personal protective equipment (PPE).
- Ensure that the power voltage of the SACU is within the operating voltage range, and the three-phase input voltage is within the operating voltage range of the MBUS CCO.

Procedure

Step 1 Turn on power switch 3FB3 for the Smart Array Controller in the auxiliary power distribution cabinet of the medium-voltage room.

Step 2 Open the cabinet door of the Smart Array Controller and turn on the power switch of the SmartLogger. The running indicator of the SmartLogger starts blinking 30 seconds later.

----End

8.6 Powering On the Distribution Transformer

⚠ CAUTION

Before connecting the power supply, ensure that all switches of the Distribution Transformer are turned off.

Procedure

Step 1 Turn on the SPD switch MCB 6FB7 on the 400 V side of the auxiliary transformer cabinet.

Step 2 Turn on the incoming power switch MCCB 6QA on the 800 V side of the auxiliary transformer cabinet.

NOTE

When the transformer is powered on, a loud buzz will be generated. Then the buzz is weakened rapidly and becomes stably low.

Step 3 Turn on the meter switch MCB 6FB8 in the auxiliary transformer cabinet.

NOTE

The digital display meter is started, showing that the line voltage at the low-voltage side is about 400 V, the phase voltage is about 230 V, and the current is 0 A.

Step 4 Turn on the auxiliary circuit switch MCB 6FB9 in the auxiliary transformer cabinet.

NOTE

- The heat exchanger fan starts. The heat exchanger performs the self-check program first, and the internal fan rotates for about 10s. The internal fan stops and the external fan rotates for about 10s. After the self-check is complete, the heat exchanger enters the normal operating mode, and the internal fan keeps running at a low speed.

  When the smoke sensor is started, the green indicator blinks slowly and no alarm sound is generated.
- The transformer temperature sensor is started to display the current transformer temperature.

----End

8.7 Powering On the ESS

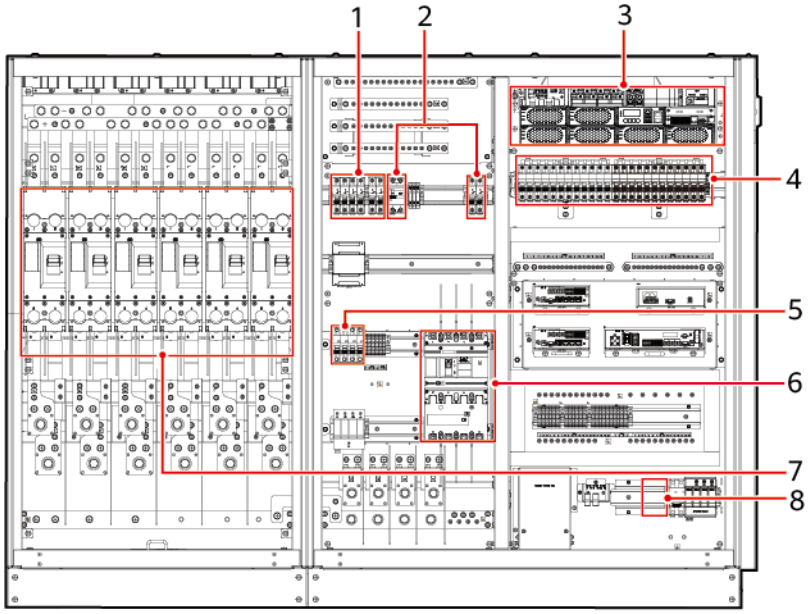
NOTICE

- Before turning on the switches in the secondary devices of the ESS, check that the AC voltage of the auxiliary power supply and bus voltage are within the normal ranges.
- If the ESS has not been used for six months or longer after being installed, it must be checked and tested by professionals before operation.
- Perform power-on within two weeks after cables are connected. Otherwise, replace the desiccants with new ones (Montmorillonite desiccant, 500 g).
- Before power-on, remove the desiccants from the cabins and dispose of them according to the applicable local waste disposal act.
- Before power-on, remove the blue protective films with the label 

.
- Before powering on the ESS, ensure that the safety pin is removed from the solenoid valve on the fire cylinder.
- Do not open the battery compartment door after power-on. Otherwise, the system will shut down.

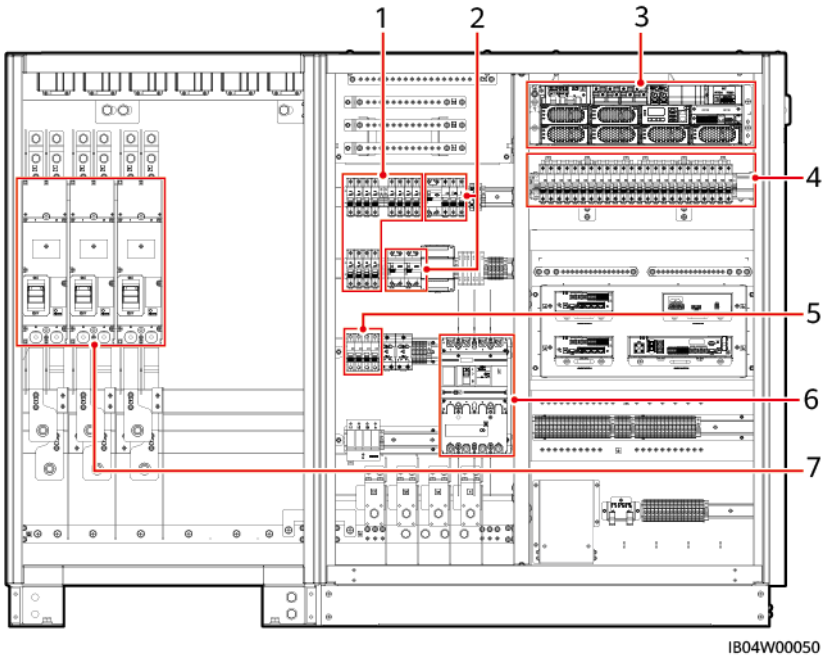
Procedure

Figure 8-8 Switches in the Control Unit Cabin of LUNA2000-2.0MWH-1HX



(1) AC power switch of the air conditioner	(2) Extinguishant control panel switch, lighting switch, socket switch, and CMU adapter switch	(3) DC input switch, exhaust fan controller switch, and air conditioner switch in the control unit cabin	(4) Battery pack fan switch and Smart Rack Controller switch
(5) SPD switch	(6) AC main input switch of the ESS	(7) DC circuit breaker in the control unit cabin	(8) Position for the UPS switch (reserved)

Figure 8-9 Switches in the Control Unit Cabin of LUNA2000-2.0MWH-1HX



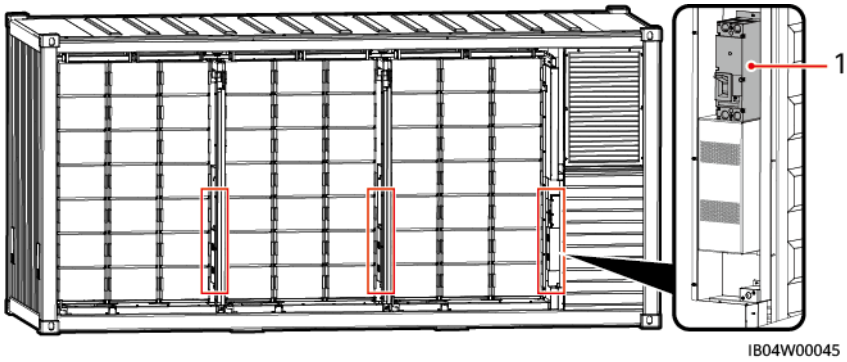
(1) AC power switch of the air conditioner	(2) Extinguishant control panel switch, lighting switch, 220/230 V socket switch, and CMU adapter switch	(3) PSU AC input switch, DC input switch, exhaust fan controller switch, and air conditioner switch in the control unit cabin	(4) Battery pack fan switch and Smart Rack Controller switch
(5) SPD switch	(6) AC main input switch of the ESS	(7) DC circuit breaker in the control unit cabin	-

NOTE

- The figures of switches use two of the models as an example.
- Switches labeled SPARE are reserved switches.

Step 1 Switch on the DC circuit breakers 1Q1–6Q1 of battery racks in the Battery Cabin.

Figure 8-10 Positions of the DC circuit breakers of battery racks in the battery cabin



(1) Positions of the DC circuit breakers of battery racks in the battery cabin

Step 2 (Optional) Switch on UPS circuit breaker 5FCB (corresponding to number 8 in **the figure of switches**).

NOTE

- The UPS switch position is reserved only in some models. If the UPS switch is needed, install it by yourself.
- Perform this operation only in microgrid or off-grid scenarios.

Step 3 Switch on circuit breaker 2FCB1 on the SPD (corresponding to number 5 in **the figure of switches**) and check that the SPD display window is green.

Step 4 Switch on the circuit breaker 1QA for the AC input power cable of the ESS. (corresponding to number 6 in **the figure of switches**)

CAUTION

- After turning on the main switch, immediately check that the L1, L2, and L3 phase voltages are 220 V AC/230 V AC.
- If the phase voltage displayed on the digital display meter is 400 V or other values, the cables between the L1, L2, L3, and N wires may be incorrectly connected. In this case, check the cables. Do not power on devices before checking cables. Otherwise, devices such as air conditioners may be damaged.

Step 5 Switch on all circuit breakers of the ESS power distribution system.

Table 8-1 Switch configuration

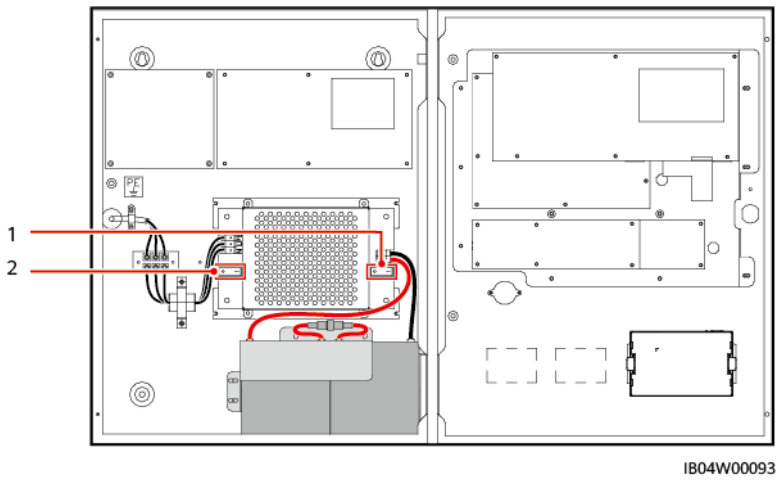
Models	Air Conditioner Position in the Battery Cabin	Air Conditioner Switches No.	Battery Pack Fans Switches No.	Smart Rack Controller Switches No.
LUNA2000-2.0MWH-1HX	1/2/4/5/7/8/10/11	3FCB1, 3FCB2, 3FCB4, 3FCB5, 3FCB7, 3FCB8, 3FCB10, 3FCB11	7FCB7–7FCB15, 7FCB19–7FCB27	7FCB16, 7FCB17, 7FCB18, 7FCB28, 7FCB29, 7FCB30
LUNA2000-2.0MWH-1HX	1/3/5/7/9/11	3FCB1, 3FCB3, 3FCB5, 3FCB7, 3FCB9, 3FCB11	7FCB7–7FCB15, 7FCB19–7FCB27	7FCB16, 7FCB17, 7FCB18, 7FCB28, 7FCB29, 7FCB30
LUNA2000-2.0MWH-2HX	1/3/5/7/9/11	3FCB1, 3FCB3, 3FCB5, 3FCB7, 3FCB9, 3FCB11	7FCB7–7FCB15, 7FCB19–7FCB27	7FCB16, 7FCB17, 7FCB18
LUNA2000-2.0MWH-2HX	2/4/6/8/10/12	3FCB2, 3FCB4, 3FCB6, 3FCB8, 3FCB10, 3FCB12	7FCB7–7FCB15, 7FCB19–7FCB27	7FCB16, 7FCB17, 7FCB18
LUNA2000-2.0MWH-2HX	1/4/7/10	3FCB1, 3FCB4, 3FCB7, 3FCB10	7FCB7–7FCB12	7FCB16, 7FCB17, 7FCB18

1. Switch on the AC power circuit breakers of the air conditioner in sequence. (corresponding to number 1 in **the figure of switches**)
2. Switch on ESS adapter circuit breaker 5FCB1, extinguishant control panel circuit breaker 5FCB3, lighting system circuit breaker 1FB1 in sequence. (corresponding to number 2 in **the figure of switches**)
3. Switch on 220/230 V socket circuit breaker 1FB2.

   NOTE

   Only some models are equipped with a separate socket circuit breaker.
4. Open the extinguishant control panel and turn on the two power switches inside (applicable only to the JB-QBL-QM210 extinguishant control panel). Switch off extinguishant control panel circuit breaker 5FCB3, make sure it running well using the battery power supply. Switch on the circuit breaker 5FCB3.

Figure 8-11 Position of the power switch in the extinguishant control panel



(1) Position of the right power switch in the extinguishant control panel

(2) Position of the left power switch in the extinguishant control panel

5. Switch on the PSU AC input circuit breaker 6FCB1.

   NOTE

   If a 3 U subrack is configured, the PSU switch is in the subrack. If a 2 U subrack is configured, the PSU switch is in (2) in the figure that shows switch positions.

6. On the subrack, switch on the DC input circuit breakers 7FCB1 and (optional) 7FCB2, the exhaust fan controller circuit breakers 7FCB4 and 7FCB5, and the air conditioner circuit breaker 7FCB6 of the control unit cabin in sequence. (corresponding to number 3 in **the figure of switches**)
7. Switch on the circuit breakers of the battery pack fan in sequence. (corresponding to number 4 in **the figure of switches**)
8. Switch on the circuit breakers of the Smart Rack Controller. (corresponding to number 4 in **the figure of switches**)

Step 6 Switch on the DC circuit breakers in the control unit cabin. (corresponding to number 7 in **the figure of switches**)

Table 8-2 Switch configuration

Models	Air Conditioner Position in the Battery Cabin	DC Circuit Breakers No. in the Control Unit Cabin
LUNA2000-2.0MWH-1HX	1/2/4/5/7/8/10/11	1Q2–6Q2
LUNA2000-2.0MWH-1HX	1/3/5/7/9/11	1Q2–6Q2
LUNA2000-2.0MWH-2HX	1/3/5/7/9/11	1Q2–3Q2
LUNA2000-2.0MWH-2HX	2/4/6/8/10/12	1Q2–3Q2

Models	Air Conditioner Position in the Battery Cabin	DC Circuit Breakers No. in the Control Unit Cabin
LUNA2000-2.0MWH-2HX	1/4/7/10	1Q2–6Q2

NOTE

The status of DC switches in the control unit cabin is subject to the actual number of PCSs connected.

----End

8.8 (Optional) Powering On the Battery Side of the DC LV Panel

CAUTION

- If any exception occurs during the power-on process, stop the operation. You can proceed with the operation only after the exception has been handled.
- At least two persons are required for the first power-on. One person operates the MCCB on the ESS side, while the other person observes the running status on the DC LV Panel side.

Step 1 Power on the battery side of the DC LV Panel.

1. Check that DC circuit breakers 1Q2, 2Q2, 3Q2, 4Q2, 5Q2, and 6Q2 in the control unit cabin of the ESS are switched on.
2. Switch on the DC circuit breakers on the battery side of the DC LV Panel.

----End

8.9 Powering On the Smart PCS

Precautions

NOTICE

- Before turning on the AC switch between the Smart PCS and the power grid, check whether the AC voltage is within the required range using a multimeter. (See the local power grid standard.)
- If the Smart PCS has not been used for six months or longer after being installed, it must be checked and tested by professionals before operation.

Procedure

Step 1 Turn on the AC switch between the Smart PCS and the power grid.

Step 2 Turn on the DC switches between the Smart PCS and the DC LV Panel busbar.

Step 3 Observe the LED indicators to check the running status of the Smart PCS.

----End

Indicator Description

You can view the running status of the Smart PCS by observing the LED indicators on the panel.

Figure 8-12 LED indicators

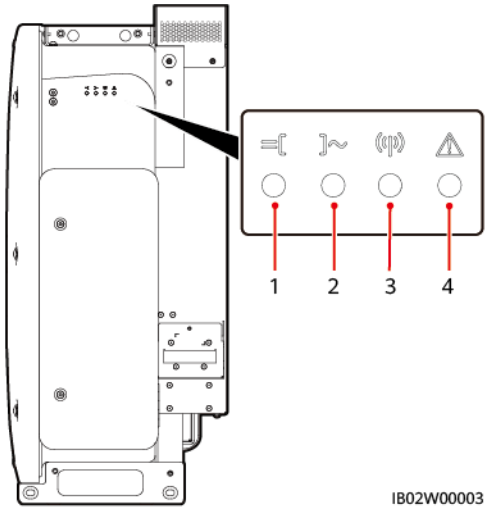


Table 8-3 LED indicators

No.	Category	Indicator Status	Description
1	DC indication	Steady green	The DC side is properly connected, and the voltage on the DC side is greater than or equal to 500 V.
		Blinking green slowly	The device is in standby mode.
		Blinking red fast	An environmental fault occurs on the DC side.
		Off	The DC side is not properly connected, or the voltage on the DC side is less than 500 V.
2	Running indication	Steady green	The device is operating in grid-tied mode.
		Blinking green slowly	The system environment is normal and the device is not in the working state.

No.	Category	Indicator Status	Description
		Blinking red fast	An environmental fault occurs on the AC side.
		Off	The AC side is not connected to the power grid.
3	Communication indication 	Blinking green fast	The device receives data through the northbound FE ports.
		Off	The device has not received data through the FE ports in at least 10s.
4	Fault/ Maintenance indication 	Steady red	A major alarm is generated on the device.
		Blinking red fast	A minor alarm is generated on the device.
		Blinking red slowly	A warning is generated on the device.
		Blinking green slowly	The device is under local maintenance or shuts down after receiving a command.
		Off	No alarm is generated, and no local maintenance operations are performed.

NOTE

- Local maintenance refers to the operation of inserting a WLAN module or USB data cable into the USB port of the device. For example, connecting to the SUN2000 app through the WLAN module.
- If alarms are generated during the local maintenance, the fault/maintenance indicator shows the local maintenance state first. After the WLAN module or USB cable is removed, the indicator shows the alarm state.

9 SmartLogger Web-based Deployment

Prerequisites

1. The commissioning equipment is available onsite.
2. The system is powered on and alarms are cleared.
3. All devices onsite have been commissioned.
4. Before the deployment, wait until the air conditioner adjusts the temperature inside the cabinet and the temperature of batteries to the specified temperature range (5°C to 45°C).

   NOTE

   The screenshots in this document correspond to SmartLogger V300R023C00 and are for reference only.

9.1 Preparations and WebUI Login

Prerequisites

- The operating system of Windows 7 or later is supported.
- Browser: Chrome 52, Firefox 58, or Internet Explorer 9, or a later version is recommended.

Procedure

Step 1 Connect the network cable between the network port of the PC and the WAN or LAN port of the SmartLogger.

Step 2 Set the IP address for the PC on the same network segment as the SmartLogger IP address.

Connected Port	Item	SmartLogger Default Value	Example PC Setting
LAN port	IP address	192.168.8.10	192.168.8.11
	Subnet mask	255.255.255.0	255.255.255.0

Connected Port	Item	SmartLogger Default Value	Example PC Setting
	Default gateway	192.168.8.1	192.168.8.1
WAN port	IP address	192.168.0.10	192.168.0.11
	Subnet mask	255.255.255.0	255.255.255.0
	Default gateway	192.168.0.1	192.168.0.1

NOTE

- When the IP address of the WAN port is in the network segment from 192.168.8.1 to 192.168.8.255, set the default gateway to 192.168.8.1 and the IP address of the LAN port to 192.168.3.10. If the connected port is a LAN port, you need to adjust the network configuration of the PC.
- It is recommended that the PC be connected to the LAN port of the SmartLogger or the GE port of the SmartModule. When the PC is connected to the GE port of the SmartModule, adjust the network configuration of the PC to the configuration mode when the PC is connected to the LAN port of the SmartLogger.

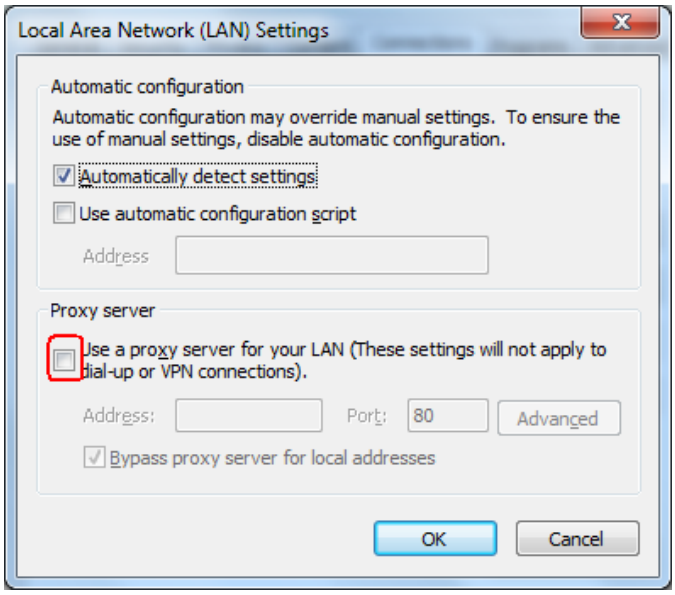
Step 3 Set LAN parameters.

NOTICE

- If the SmartLogger is connected to a local area network (LAN) and a proxy server has been set, you need to cancel the proxy server settings.
- If the SmartLogger is connected to the Internet and the PC is connected to the LAN, do not cancel the proxy server settings.

1. Open Internet Explorer.
2. Choose **Tools** > **Internet Options**.
3. Click the **Connections** tab and then click **LAN settings**.
4. Clear **Use a proxy server for your LAN**.

Figure 9-1 LAN settings



5. Click **OK**.

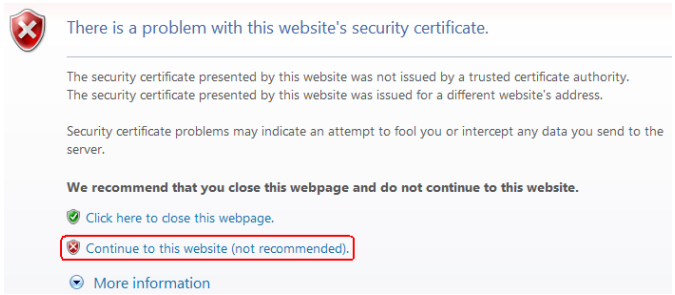
Step 4 Log in to the SmartLogger WebUI.

1. In the address box of a browser, enter https://XX.XX.XX.XX (XX.XX.XX.XX is the IP address of the SmartLogger) and press Enter. The login page is displayed. If you log in to the WebUI for the first time, a security risk warning is displayed. Click **Continue to this website** to log in to the WebUI.

   NOTE

   - It is recommended that users use their own certificates. If the certificate is not replaced, the security risk warning will be displayed during each login.
   - After logging in to the WebUI, you can import a certificate under **Maintenance** > **Security Settings** > **Network Security Certificate**.
   - The imported security certificate needs to be bound to the SmartLogger IP address. Otherwise, the security risk warning will still be displayed during login.

Figure 9-2 Security risk warning



2. Select a desired language.
3. Select the **User Name** and enter the **Password** according to the following table, and then click **Log In**.

If...	Then...
On the login page, the **User Name** is **admin** by default.	1. Enter the initial password **Changeme** in the **Password** and click **Log In**. 2. Change the initial password as prompted and use the **admin** user name and new password to log in again.
On the login page, the **User Name** is empty by default.	Select **installer** in the **User Name**, set the login password as prompted, and click **Log In**.

NOTE

- Update the SmartLogger software as required.
- Protect the password by changing it periodically, and keep it secure. If you lose the password, the device must be restored to its factory settings. Huawei will not be held liable for any losses resulting from improper password management.
- You will be locked out for 10 minutes after five failed password attempts in five minutes.
- A dialog box with recent login information is displayed after login. Click **OK**.

4. Choose **Monitoring > Logger(Local) > About** to view the SmartLogger software version and check whether software upgrade is needed.
5. (Optional) To upgrade the SmartLogger software version, contact the Company's engineers to obtain the upgrade package and guide and complete the upgrade accordingly.

NOTE

- After the software upgrade is complete, the SmartLogger automatically restarts. Log in to the SmartLogger WebUI again 3 minutes later.
- If the SmartLogger is upgraded from V300R001C00, the original **admin** user becomes an advanced user, and the login password remains unchanged. If administrator rights are required, log in to the SmartLogger as the **installer** user. The password is the same as that for logging in to the mobile app (the initial password is **00000a**).

----End

Follow-up Procedure

If any page is blank or a menu cannot be accessed after you log in to the WebUI, clear the cache, refresh the page, or log in again.

9.2 Commissioning Using Deployment Wizard

Procedure

Step 1 Log in as **admin** to access the deployment wizard page.

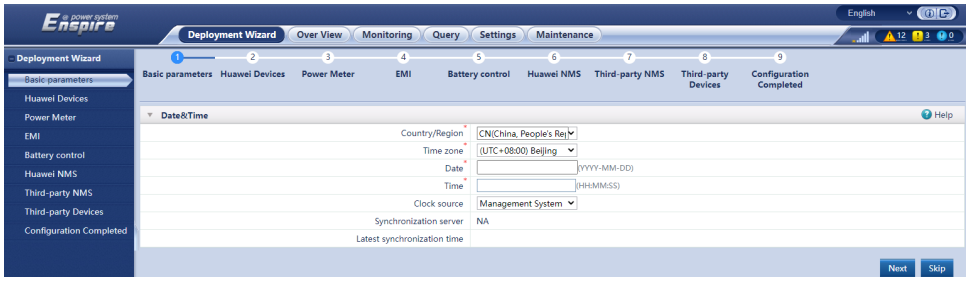
Step 2 Set corresponding parameters as prompted. For details, see **Help** on the page.

NOTE

During parameter setting, click **Previous**, **Next**, or **Skip** as required.

1. Complete settings on the **Basic parameters** page.

Figure 9-3 Setting basic parameters



After setting basic parameters, you can choose one of the communication methods according to the actual situation.

Figure 9-4 Using the wireless network (4G/3G/2G) for communication

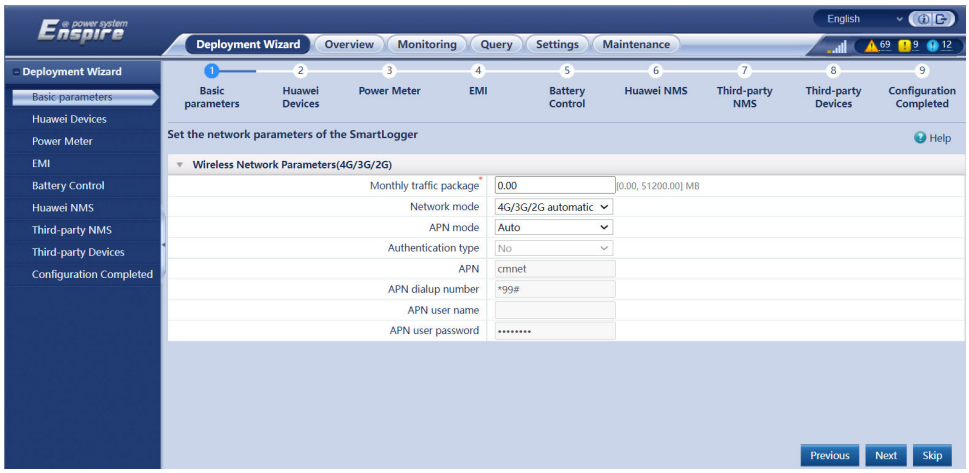
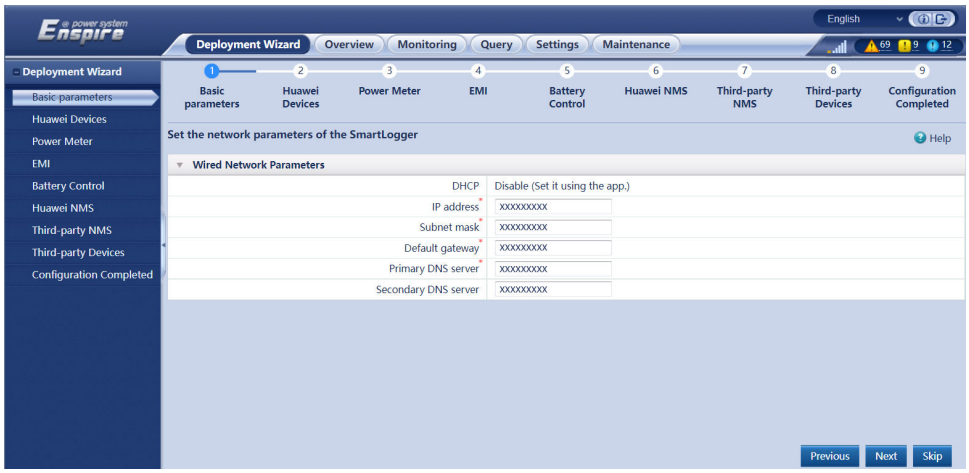
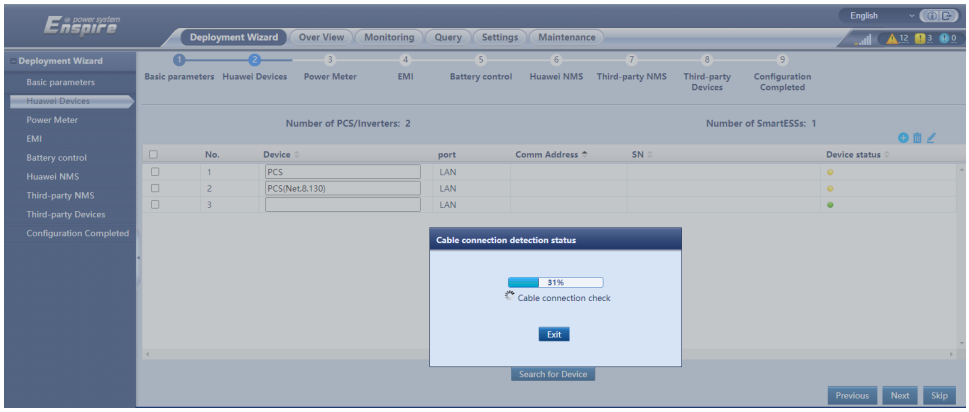


Figure 9-5 Using the ETH interface for communication



2. After Huawei devices are connected, click **Search for Device** to check cable connections, identify the topology, and rectify alarms.

Figure 9-6 Cable connection detection



NOTE

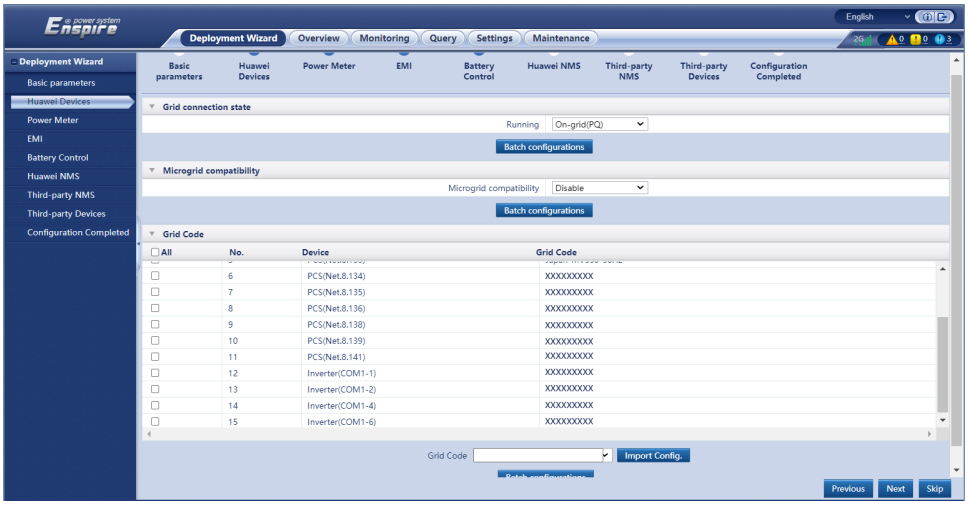
- During the process of **Search for Device**, do not perform upgrade operations (such as upgrading through the app, network management system, or WebUI).
- When a user clicks **Search for Device**, cable connections (DC and AC) will be checked before device search (not applicable to third-party devices), and device address will be automatically allocated.
- After the cable connection check and device search are complete, if a cable connection alarm is generated, you can click the alarm icon to view the corresponding alarm information.
- If an alarm is generated when the cable connection check fails, click the alarm icon to view the alarm cause and handling suggestions. After the fault is rectified, check the cable connection again.
- After the cable connection check and device search are complete, click to view the corresponding topology information.
- After a device is added or deleted, you need to click **Search for Device** again. Otherwise, the system topology will not update.

3. (Optional) After searching for devices, set the **Microgrid compatibility**, **Grid connection state**, and **Grid Code** based on the site requirements.

NOTE

This procedure applies only to SmartLogger V300R023C00 and later versions.

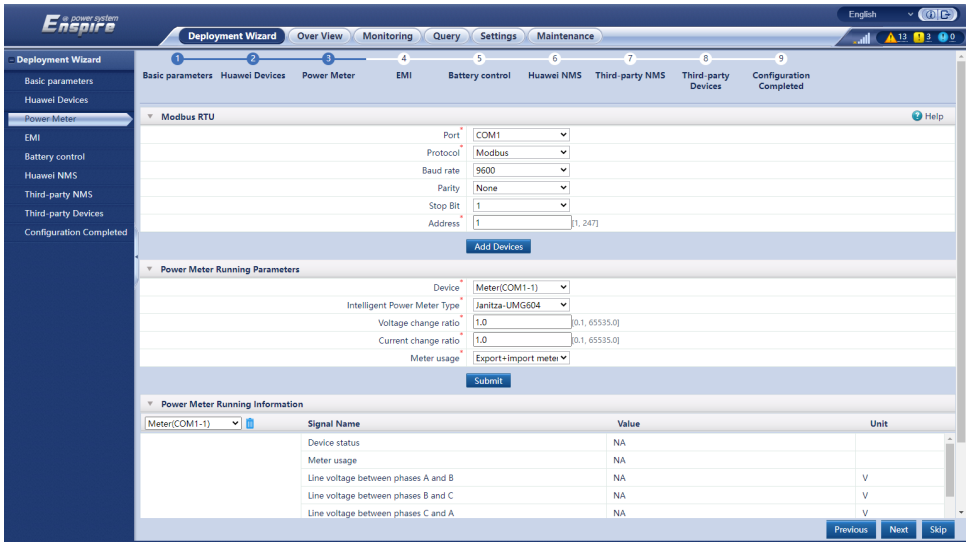
Figure 9-7 Parameter settings after device search



Parameter	Description
Running under **Grid connection state**	You need to set this parameter only for the PCS, but not the SUN2000. – In the on-grid scenario, set this parameter to **On-grid(PQ)**. – In the off-grid scenario, set this parameter to **Off-grid(VSG)**.
Microgrid compatibility	– In the on-grid scenario, set this parameter to **Disable**. – In the off-grid scenario, set this parameter to **Enable**.
Grid Code	Set this parameter based on the grid code of the country or region where the devices are used.

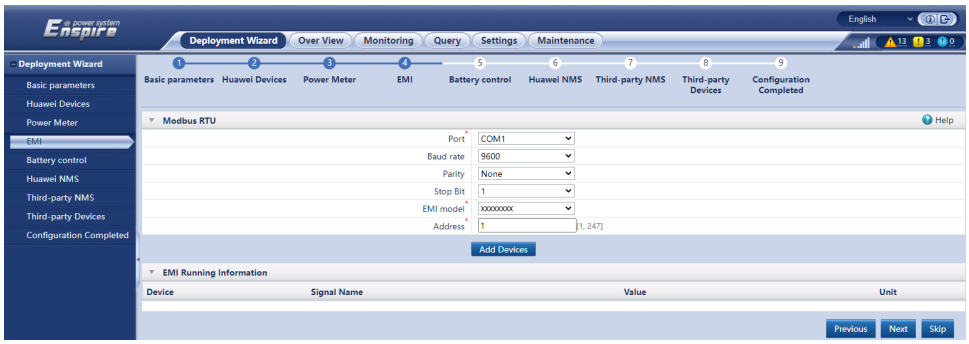
4. Connect to the power meter.

Figure 9-8 Setting power meter parameters



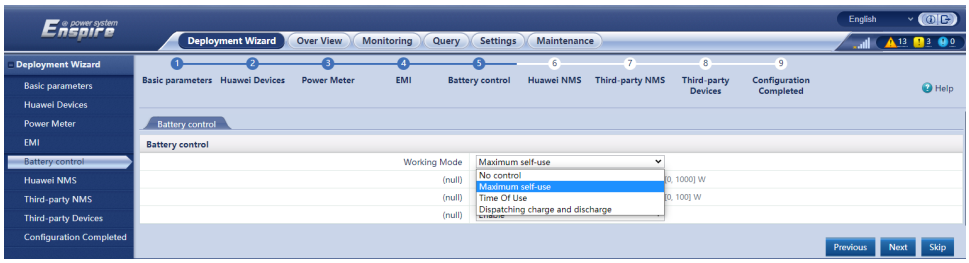
5. Connect to the EMI.

Figure 9-9 Setting EMI parameters



6. Click **Settings** > **Battery control** to set the battery working mode.

Figure 9-10 Working modes



Working Mode	Description
No control	SmartLogger directly delivers the external scheduling power limit. No other power scheduling control is performed. The power is automatically controlled by the device.

Working Mode	Description
Maximum self-consumption	– This mode applies to areas where the electricity price is high, or areas where the FIT subsidy is low or unavailable. – Excess PV energy is stored in batteries. When PV power is insufficient or no PV power is generated at night, batteries discharge to supply power to the loads, improving the self-consumption rate of the PV system and the self-sufficiency rate of energy, and reducing electricity costs. – The SmartLogger performs battery scheduling based on the external scheduling power limit and the preceding policies.
TOU	– This mode applies to scenarios where the price difference between peak and off-peak hours is large. – You can manually set the charge and discharge time segments to lower the electricity cost. You need to enable **Fed to grid** in **Battery control** when the electricity price is low at night, the power grid charges the batteries. When the electricity price is high, the batteries discharge to supply power to the loads. – Click **Add** to set the charge/discharge time. A maximum of 14 time segments can be set. During the charging period, the power grid charges the batteries, and during the discharging period, the batteries discharge to supply power to the loads. In other time segments that are not set, the batteries do not discharge, and the PV modules and grid supply power to the loads. (In grid-tied/off-grid mode, if the grid fails, the batteries can discharge at any time.) – In some countries, the grid is not allowed to charge batteries. Therefore, this mode cannot be used. – The SmartLogger performs battery scheduling based on the external scheduling power limit and the preceding policies.

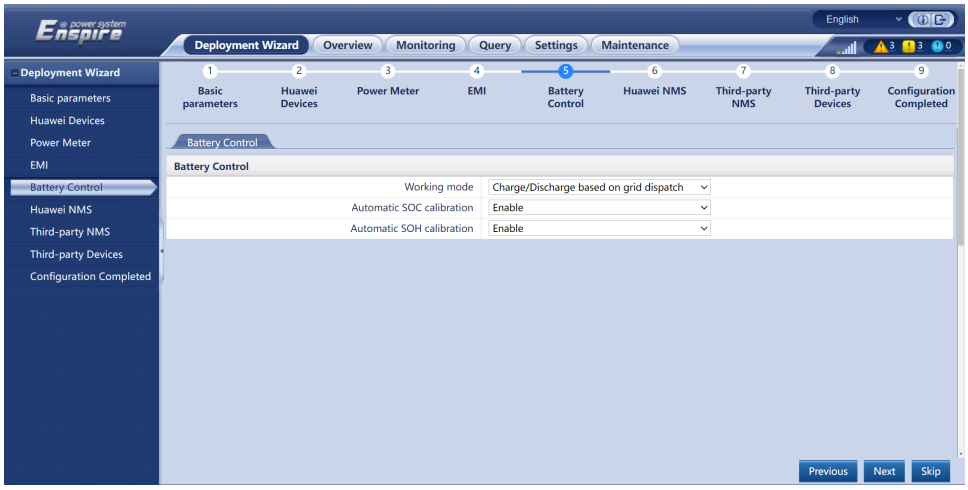
Working Mode	Description
Charge/Discharge based on grid dispatch	– This mode applies to scheduling scenarios in ground-mounted plants. – In scheduled discharge, the AC output aims to reach the target value of the scheduled active power: PV power supply is prioritized. If the PV power is sufficient, the system outputs at the target value and the excess PV power is used to charge the batteries. If the PV power is insufficient, the batteries supplies power. – In scheduled charge, the AC output aims to reach the target value of the scheduled active power: If the battery charging power is insufficient or the PCS power is limited, the grid supplies power. If the batteries have excess power, PV power is used to charge the batteries.

NOTICE

- If **Working mode** is set to **TOU** or **Maximum self-consumption**, ensure that a power meter is correctly connected and **Meter purpose** is set to **Charge/Discharge based on grid dispatch**.
- If you are not sure about the energy storage scenario, set **Working mode** to **Charge/Discharge based on grid dispatch**. The SmartLogger controls the charge and discharge of the ESS following dispatch instructions. If the SmartLogger does not receive any dispatch instructions, it dispatches energy with zero power.

- Set the working mode to **Charge/Discharge based on grid dispatch**.

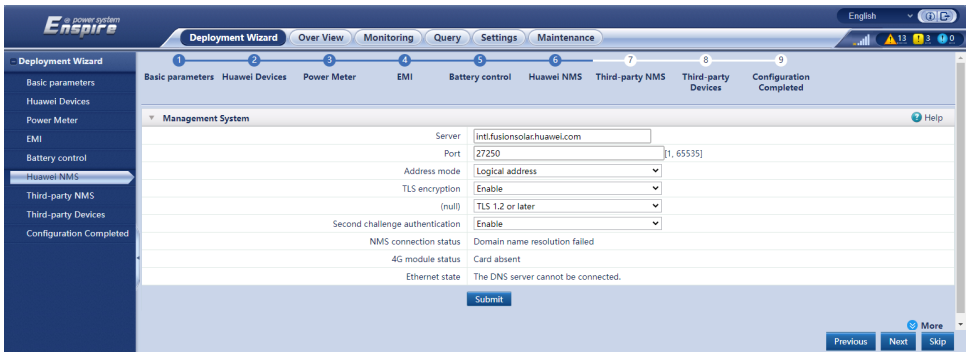
Figure 9-11 Charge/Discharge based on grid dispatch



Parameter	Description
Automatic SOC calibration	■ The default value is **Disable**. ■ If an ESS is required to automatically calibrate the SOC precision, set this parameter to **Enable**. During automatic SOC calibration, the SOC of each ESR is charged to 99% or higher in turn.
Automatic SOH calibration	■ The default value is **Disable**. ■ If this parameter is set to **Enable**, the ESS calibrates the SOH precision and fully charges and discharges each ESR in turn.

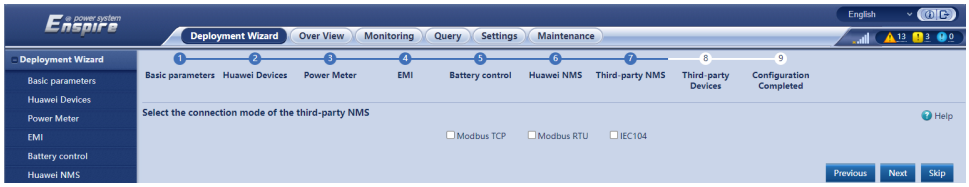
7. Connect to Huawei NMS.

Figure 9-12 Huawei NMS



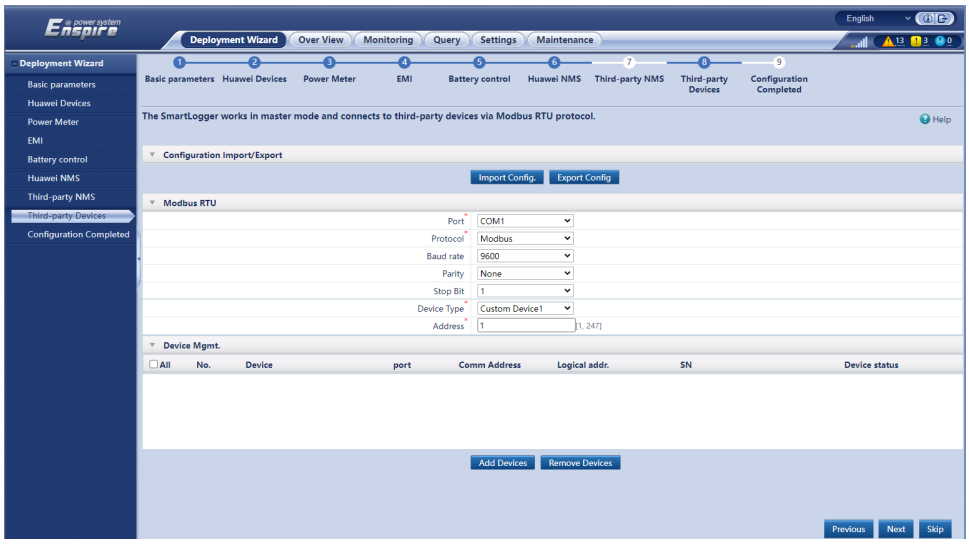
8. Connect to a third-party NMS.

Figure 9-13 Third-party NMS



9. Connect to third-party devices.

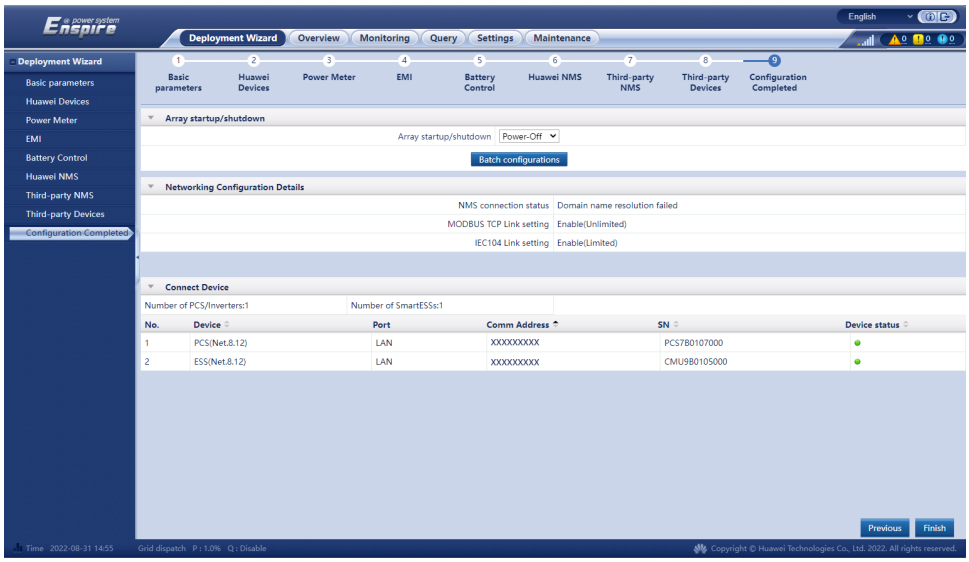
Figure 9-14 Third-party device



10. Complete the configuration.

NOTICE

SmartLogger V300R023C00 and later versions support the **Array startup/shutdown** command. Set **Array startup/shutdown** based on the site requirements.



----End

9.3 (Optional) System Setup

Prerequisites

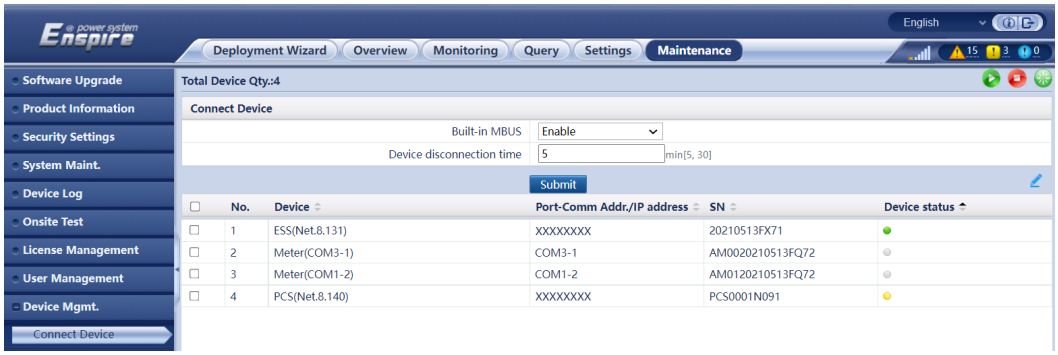
Start up the system when needed.

Procedure

Step 1 Choose **Maintenance** > **Connect Device** on the SmartLogger WebUI.

Step 2 Click  in the upper right corner to start devices in batches.

Figure 9-15 System startup



----End

9.4 Check Alarms

Step 1 Log in to the SmartLogger WebUI and check whether an alarm is generated. If no alarm is generated, proceed with the power-on operations. If an alarm is generated, clear the alarm by referring to the handling suggestions.

Step 2 Short-circuit the water sensor and check whether a water alarm is generated on the SmartLogger WebUI:

- If a water alarm is generated, the water sensor is properly connected. In this case, the water alarm will be cleared after the short circuit is removed.
- If no water alarm is generated, check whether the water sensor cable is properly connected.

Figure 9-16 Position of Electrode Water Sensor in Battery Cabin

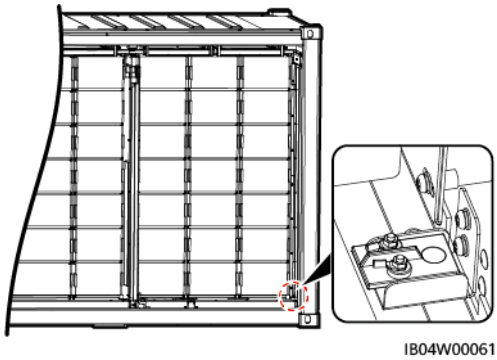
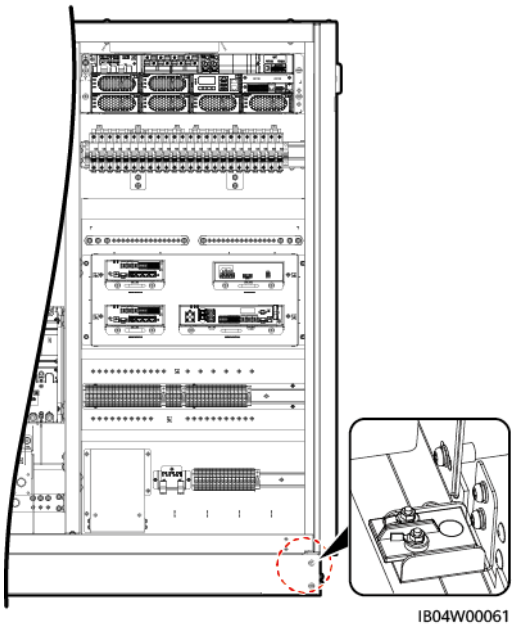
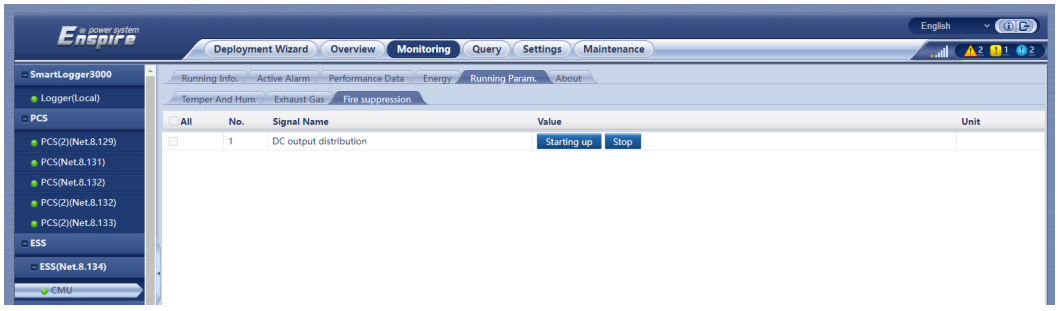


Figure 9-17 Position of Electrode Water Sensor in Control Unit Cabin



After the alarm is cleared, choose **Monitoring** > **Running Param.** > **Fire suppression** > **Starting up** on the SmartLogger WebUI.

Figure 9-18 Page of restoring the power supply



----End

10 Powering Off the System

10.1 Delivering a Shutdown Command on the SmartLogger

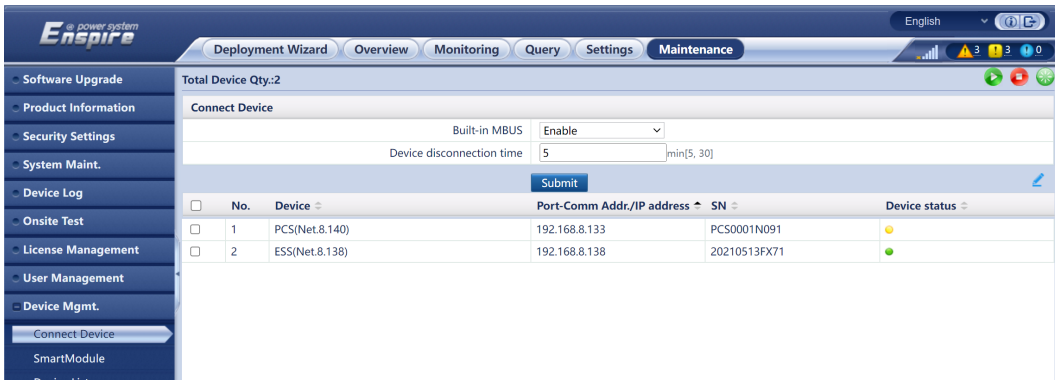
Prerequisites

The system has connected to the grid and is running properly.

Procedure

Step 1 Log in to the SmartLogger WebUI, choose **Maintenance** > **Connect Device**, and click  to shut down the Smart PCS and Smart Rack Controller.

Figure 10-1 Shutdown command



Step 2 Choose **Device Monitoring** > **PCS** > **Running Info.** Check the device status, active power, and DC voltage to verify that the shutdown is successful.

Step 3 Choose **Device Monitoring** > **CMU** > **Running Info.** Check the rated power and total output voltage of the rectifier to ensure that the shutdown is successful.

----End

10.2 Power-off Process

Figure 10-2 Power-off process of LUNA2000-2.0MWH-1HX

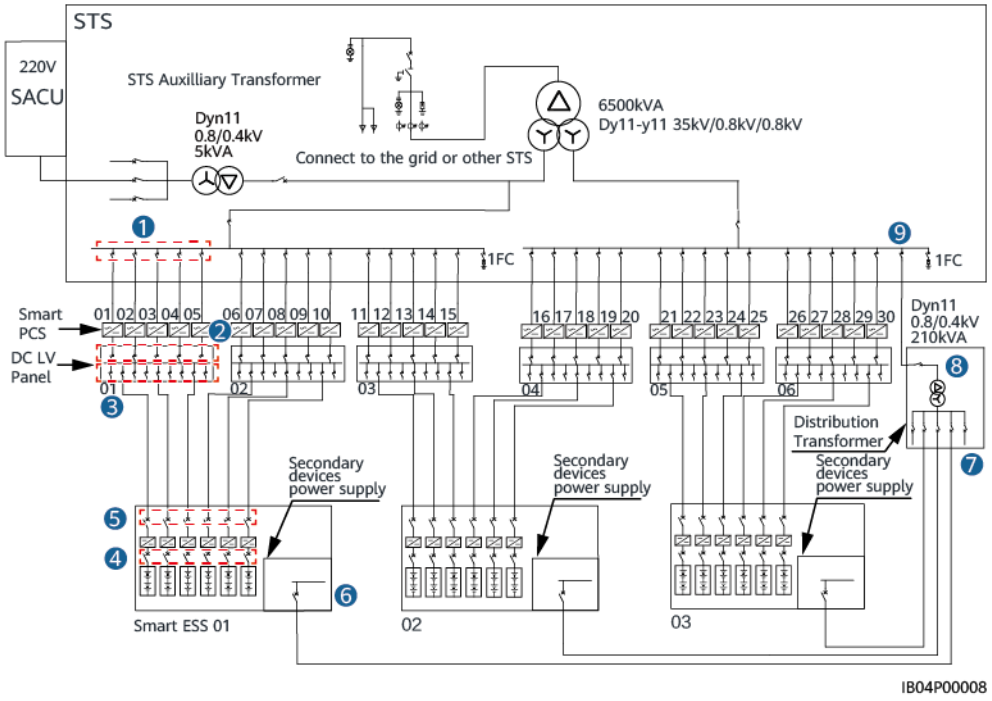
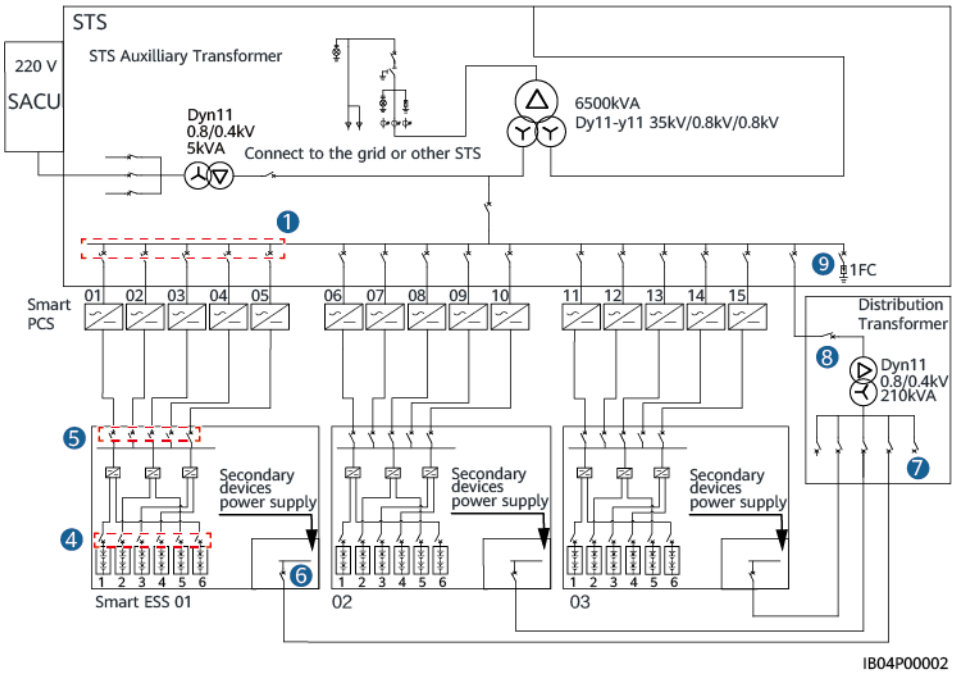


Figure 10-3 Power-off process of LUNA2000-2.0MWH-2HX



NOTE

Before powering off the system, shut down the entire system on the SmartLogger WebUI, including the Smart PCS and the Smart Rack Controller.

Procedure	Item		Remarks
1	Powering off the Smart PCS	Powering off the AC side of the Smart PCS	Corresponding to number 1 in the power-off flowchart
2		(Optional) Powering off the DC side of the Smart PCS	Corresponding to number 2 in the power-off flowchart
3	(Optional) Powering off the battery side of the DC LV Panel		Corresponding to number 3 in the power-off flowchart
4	Powering off the ESS	Switching off the DC circuit breakers of the rack in the battery cabin	Corresponding to number 4 in the power-off flowchart
5		Switching off the DC circuit breakers in the control unit cabin	Corresponding to number 5 in the power-off flowchart
6		Powering off the secondary devices (turning off the DC switches and then the AC switches)	Corresponding to number 6 in the power-off flowchart
7	Powering off the Distribution Transformer (Huawei or non-Huawei equipment)		Corresponding to number 7, 8, and 9 in the power-off flowchart

10.3 Powering Off the Smart PCS

Procedure

Step 1 Wear proper personal protective equipment (PPE).

Step 2 Turn off the AC switch between the Smart PCS and the grid.

Step 3 Open the AC maintenance compartment door, install a support bar, and use a multimeter to measure the voltage between the AC terminal block and the ground. Ensure that the AC side of the Smart PCS is disconnected.

Step 4 Turn off the DC switch between the Smart PCS and the DC LV Panel busbar.

Step 5 Open the DC maintenance compartment door, install a support bar, and use a multimeter to measure the voltage between the DC terminal block and the ground. Ensure that the DC side of the Smart PCS is disconnected.

----End

10.4 (Optional) Powering Off the Battery Side of the DC LV Panel

Step 1 Turn off the switches on the battery side of the DC LV Panel.

----End

10.5 Powering Off the ESS

Table 10-1 Switch configuration

Models	Air Conditioner Position in the Battery Cabin	Air Conditioner Switches No.	Battery Pack Fans Switches No.	Smart Rack Controller Switches No.	DC Circuit Breakers No. in the Control Unit Cabin
LUNA2000-2.0MWH-1HX	1/2/4/5/7/8/10/11	3FCB1, 3FCB2, 3FCB4, 3FCB5, 3FCB7, 3FCB8, 3FCB10, 3FCB11	7FCB7–7FCB15, 7FCB19–7FCB27	7FCB16, 7FCB17, 7FCB18, 7FCB28, 7FCB29, 7FCB30	1Q2–6Q2
LUNA2000-2.0MWH-1HX	1/3/5/7/9/11	3FCB1, 3FCB3, 3FCB5, 3FCB7, 3FCB9, 3FCB11	7FCB7–7FCB15, 7FCB19–7FCB27	7FCB16, 7FCB17, 7FCB18, 7FCB28, 7FCB29, 7FCB30	1Q2–6Q2
LUNA2000-2.0MWH-2HX	1/3/5/7/9/11	3FCB1, 3FCB3, 3FCB5, 3FCB7, 3FCB9, 3FCB11	7FCB7–7FCB15, 7FCB19–7FCB27	7FCB16, 7FCB17, 7FCB18	1Q2–3Q2
LUNA2000-2.0MWH-2HX	2/4/6/8/10/12	3FCB2, 3FCB4, 3FCB6, 3FCB8, 3FCB10, 3FCB12	7FCB7–7FCB15, 7FCB19–7FCB27	7FCB16, 7FCB17, 7FCB18	1Q2–3Q2
LUNA2000-2.0MWH-2HX	1/4/7/10	3FCB1, 3FCB4, 3FCB7, 3FCB10	7FCB7–7FCB12	7FCB16, 7FCB17, 7FCB18	1Q2–6Q2

Step 1 Turn off output switches 1Q1, 2Q, 3Q, 4Q1, 5Q1, and 6Q1 of each battery rack in the ESS.

Step 2 Switch off DC output circuit breakers of the ESS.

Step 3 Switch off all circuit breakers of the ESS power distribution system.

1. Switch off the AC power circuit breakers of the air conditioner in sequence. (corresponding to number 1 in **the figure of switches**)
2. Switch off the extinguishant control panel circuit breaker 5FCB3, Open the extinguishant control panel and turn off the power switch inside, Switch off lighting system circuit breaker 1FB1, (optional) 220 V socket circuit breaker 1FB2, and ESS adapter circuit breaker 5FCB1 in sequence. (corresponding to number 2 in **the figure of switches**)
3. Switch off the circuit breakers of the battery pack fan in sequence. (corresponding to number 4 in **the figure of switches**)
4. Switch off the circuit breakers of the Smart Rack Controller. (corresponding to number 4 in **the figure of switches**)
5. On the subrack, the DC input circuit breakers 7FCB1 and (optional) 7FCB2, the exhaust fan controller circuit breakers 7FCB4 and 7FCB5, and the air conditioner circuit breaker 7FCB6 of the control unit cabin in sequence. (corresponding to number 3 in **the figure of switches**)
6. Switch off the PSU AC input circuit breaker 6FCB1.

Step 4 Switch off circuit breaker 1QA (corresponding to number 6 in **the figure of switches**) for the AC input power cable of the ESS.

Step 5 Switch off circuit breaker 2FCB1 (corresponding to number 5 in **the figure of switches**) of the SPD.

Step 6 (Optional) Switch on UPS circuit breaker 5FCB (corresponding to number 8 in **the figure of switches**).

----End

10.6 Powering Off the Distribution Transformer

> ⚠ CAUTION
>
> Follow the relevant power operation procedure. Wear high-voltage insulation gloves, insulation shoes, and safety helmets, and use operation levers.

Procedure

Step 1 Turn off the auxiliary circuit switch MCB 6FB9 in the auxiliary transformer cabinet.

Step 2 Turn off the meter switch MCB 6FB8 in the auxiliary transformer cabinet.

Step 3 Turn off the incoming power switch MCCB 6QA on the 800 V side of the auxiliary transformer cabinet.

Step 4 Turn off the SPD switch MCB 6FB7 on the 400 V side of the auxiliary transformer cabinet.

----End

11 Alarm Reference

Alarm severities are defined as follows:

- Major alarm: The device is faulty or the external environment is abnormal. As a result, the output power decreases or the device stops feeding to the grid.
- Minor alarm: Some components of the device are faulty but the device can still connect to the grid and generate power.
- Warning: The device functions normally, but its output power decreases or some authorization functions fail due to external factors.

NOTE

[HVAC-No] indicates the number of the air conditioner.

Table 11-1 CMU common alarms and troubleshooting measures

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3800	Water Alarm	Major	Cause ID = 1 Water is detected in the battery cabin. Cause ID = 2 Water is detected in the control unit cabin.	1. Check whether there is water in the cabin. If yes, drain the water. 2. Check whether the devices in the cabin are intact and normal. If yes, manually clear the alarm. If not, replace the damaged devices.
3801	Door Status Alarm	Major	Cause ID = 1–6 Battery compartment door 1–6 is open. Cause ID = 7 Battery compartment door is open.	1. Check whether the cabin doors are completely closed. If not, close the doors completely. 2. Check whether the cable is disconnected from the door status sensor. If yes, connect the cable correctly. 3. Check whether the door status sensor is displaced. If yes, move it back to the original position.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3802	Fire Alarm	Major	Cause ID = 1 Smoke or overheating is detected in the battery cabin.	1. Remotely monitor the system for 30 minutes to check whether other exceptions (such as abnormal battery voltage, abnormal battery temperature, and abnormal combustible gas concentration) occur. If yes, remotely power off the system. During remote monitoring, do not approach the battery cabin or open the cabin doors. 2. If no exception is found during the remote monitoring, assign trained personnel to the site and observe the system for 30 minutes from a safe distance. If there is smoke or fire, remotely power off the system, evacuate onsite personnel as soon as possible, and call the fire emergency service. 3. If no exception is found during remote monitoring or onsite observation, open the doors of the control unit cabin and check whether the Extinguishant Control Panel generates an alarm. If yes, reset the fire alarm on the Extinguishant Control Panel. If the fire alarm reset fails, contact your technical support. 4. If the fire alarm is reset successfully, manually clear the active alarm remotely. If the alarm clearance fails, close the cabin doors and clear the alarm 20 minutes later. If the alarm persists, contact your technical support.
			Cause ID = 2 A fire has been detected in the battery cabin.	1. Do not open the cabin doors and evacuate onsite personnel. 2. For details, see the "Emergency Handling Plan" section in the maintenance manual. 3. Contact your technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3803	Fire Suppression System Fault	Major	Cause ID = 1 Sensor or controller fault	1. Troubleshoot faults based on the instructions in the fire suppression system user manual. 2. If the fault persists, contact your technical support.
3804	AC SPD Fault	Major	Cause ID = 1 The AC SPD is faulty.	1. Check whether the AC SPD signal cable is loose. 2. Check whether the color of the AC SPD indicator changes. 3. Replace the AC SPD.
3805	Air Conditioner Temperature High	Major	Cause ID = 1–13 The return air temperature of [HVAC-No] exceeds the high temperature alarm threshold.	1. If multiple air conditioners report the alarm, shut down the system and contact your technical support. 2. If only one air conditioner reports the alarm, check other alarms reported by the air conditioner and rectify the faults based on the troubleshooting suggestions. If no other alarm is generated, shut down the air conditioner and contact your technical support.
3806	Air Conditioner Temperature Low	Major	Cause ID = 1–13 The return air temperature of [HVAC-No] is below the low temperature alarm threshold.	1. If multiple air conditioners report the alarm, shut down the system and contact your technical support. 2. If only one air conditioner reports the alarm, check other alarms reported by the air conditioner and rectify the faults based on the troubleshooting suggestions. If no other alarm is generated, shut down the air conditioner and contact your technical support.
3807	Air Conditioner Internal Fan Fault	Major	Cause ID = 1–13 1. The fan cable of [HVAC-No] is loose. 2. The fan is damaged.	1. Shut down the system at a proper time. 2. Power off the air conditioner, open the enclosure, and check whether the fan cable is loose. If yes, connect the cable securely. Check whether the fan is damaged or burnt. If yes, contact your technical support.
3808	Air Conditioner External Fan Fault	Major		

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3809	Air Conditioner Compressor Fault	Major	Cause ID = 1–13 1. The fan cable of [HVAC-No] is loose. 2. The fan is damaged.	1. Shut down the system at a proper time and take safety measures. 2. Power off the air conditioner, open the enclosure, and check whether the compressor cable is loose. If yes, connect the cable securely. Check whether the compressor is damaged or burnt. If yes, contact your technical support.
3810	Air Conditioner Return Air Temperature Sensor Fault	Major	Cause ID = 1–13 1. The cable to the return air temperature sensor on [HVAC-No] is loose. 2. The sensor is damaged, open-circuited, or short-circuited.	1. Shut down the system at a proper time and take safety measures. 2. Check whether the cable is loose. 3. Replace the return air temperature sensor.
3811	Air Conditioner Supply Air Temperature Sensor Fault	Major	Cause ID = 1–13 1. The cable to the supply air temperature sensor on [HVAC-No] is loose. 2. The sensor is damaged, open-circuited, or short-circuited.	1. Shut down the system at a proper time and take safety measures. 2. Check whether the cable is loose. 3. Replace the supply air temperature sensor.
3812	Air Conditioner System High Pressure Alarm	Major	Cause ID = 1–13 1. The outdoor heat exchanger of [HVAC-No] is blocked or has scale buildup. 2. The outdoor fan is faulty. 3. The air intake or exhaust vent of the outdoor fan is blocked.	1. Check whether the outdoor heat exchanger is blocked by dirt. If yes, clean it using a high-pressure water gun. 2. Check whether the outdoor fan is running properly. If not, replace it. 3. Check whether the air intake or exhaust vent of the outdoor fan is blocked. If yes, clean the air intake or exhaust vent. 4. If the fault persists, contact your technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3813	Air Conditioner AC Overvoltage	Major	Cause ID = 1–13 1. The auxiliary power cable is incorrectly connected. 2. The main control board of [HVAC-No] is faulty. 3. The overvoltage alarm threshold is incorrect.	1. Measure the voltage of the air conditioner wiring terminal. If the voltage is approximately 380 V, the auxiliary power cable is incorrectly connected. In this case, disconnect the auxiliary power supply and reconnect the cable correctly. 2. If the voltage is approximately 220 V, contact your technical support.
3814	Air Conditioner AC Undervoltage	Major	Cause ID = 1–13 1. The power cable of HVAC-No1] is loose. 2. The model of auxiliary power supply is incorrect. 3. The main control board is faulty. 4. The undervoltage alarm threshold is incorrect.	1. Measure the voltage of the air conditioner wiring terminal. If the voltage is approximately 110 V or 127 V, the model of the auxiliary power supply is incorrect. In this case, disconnect the auxiliary power supply immediately and replace it with a 380 V power supply. 2. If the voltage is less than 150 V, check whether the cable is loose. 3. If the voltage is approximately 220 V, contact your technical support.
3815	Air Conditioner AC Power Failure	Major	Cause ID = 1 1. The power supply device is faulty or disconnected. 2. The power supply circuit is disconnected.	1. Check the voltage of the input power supply and the power supply device. 2. Check whether the power supply circuit is abnormal. 3. If the fault persists, contact your dealer or technical support.
3816	Air Conditioner Evaporator Temperature Sensor Fault	Minor	Cause ID = 1–13 1. The cable to the evaporator temperature sensor on [HVAC-No] is loose. 2. The sensor is damaged, open-circuited, or short-circuited.	1. Shut down the system at a proper time and take safety measures. 2. Check whether the cable is loose. 3. Replace the evaporator temperature sensor.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3817	Air Conditioner Condenser Temperature Sensor Fault	Minor	Cause ID = 1–13 1. The cable of [HVAC-No] is not connected securely or correctly. 2. The sensor is damaged, open-circuited, or short-circuited.	1. Shut down the system at a proper time and take safety measures. 2. Check whether the cable is loose. 3. Replace the condenser temperature sensor.
3818	Air Conditioner Ambient Temperature Sensor Fault	Minor	Cause ID = 1–13 1. The cable of [HVAC-No] is not connected securely or correctly. 2. The sensor is damaged, open-circuited, or short-circuited.	1. Shut down the system at a proper time and take safety measures. 2. Check whether the cable is loose. 3. Replace the environment temperature sensor.
3819	Air Conditioner Evaporator Frozen	Minor	Cause ID = 1–13 1. The air intake or exhaust of [HVAC-No] is blocked. 2. The indoor fan is faulty. 3. The cooling system cannot be shut down in a timely manner. 4. The evaporator temperature sensor is faulty.	1. Check whether the air intake or exhaust vent of the CMU cabin is blocked. If yes, clean it. 2. If the fault persists, contact your technical support.
3820	Frequent Air Conditioner System High Pressure Alarm	Major	Cause ID = 1–13 1. The condenser of [HVAC-No] is blocked or has scale. 2. The condenser fan is faulty. 3. The external air flow experiences a shortcut or is blocked.	1. Clean the outdoor heat exchanger. 2. Repair or replace the outdoor fan. 3. Check whether there are obstacles in front of the air or exhaust vent of the outdoor fan. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3821	Air Conditioner DC Overvoltage	Major	Cause ID = 1–13 1. The input voltage of [HVAC-No] is higher than the overvoltage threshold. 2. The overvoltage threshold setting is improper. 3. The voltage test device is faulty.	1. Check the voltage of the input power supply. If the voltage is too high, check the power distribution device. 2. Check whether the overvoltage threshold is correctly set. If not, adjust it to a proper range. 3. Replace the voltage test device on the control board. 4. If the fault persists, contact your dealer or technical support.
3822	Air Conditioner DC Undervoltage	Major	Cause ID = 1–13 1. The input voltage of [HVAC-No] is lower than the undervoltage threshold. 2. The undervoltage threshold setting is improper. 3. The voltage test device is faulty.	1. Check the voltage of the input power supply. If the voltage is too low, check the power distribution device. 2. Check whether the undervoltage threshold is correctly set. If not, adjust it to a proper value. 3. Replace the voltage test device on the control board. 4. If the fault persists, contact your dealer or technical support.
3825	UPS Alarm	Major	Cause ID = 1 A UPS alarm has been generated.	Troubleshoot the fault by referring to the alarm troubleshooting section in the UPS user manual.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3826	Combustible Gas Alarm	Major	Cause ID = 1 1. The safety valve of the lithium battery is open, and combustible gas is leaked. 2. Lithium battery thermal runaway occurs.	1. Remotely monitor the system for 30 minutes to check whether other exceptions (such as abnormal temperature, abnormal battery voltage, abnormal battery temperature, and exhaust fan startup) occur. If yes, ensure that the ESS is shut down. During remote monitoring, do not approach the battery cabin or open the cabin doors. 2. If no exception is found during the remote monitoring, assign trained personnel to the site and observe the system for 30 minutes from a safe distance. If there is smoke or fire, remotely power off the system, evacuate onsite personnel as soon as possible, and call the fire emergency service. 3. If no exception is found during remote monitoring and onsite observation, manually clear the alarm. If the alarm clearance fails, contact your technical support.
3827	Ambient Temperature High	Major	Cause ID = 1 The ambient temperature in the battery cabin is too high.	1. Check whether the air conditioners in the battery cabin are faulty. 2. Check whether the doors of the battery cabin are completely closed. 3. After the battery cabin temperature and battery rack temperature drop to below 58°C, manually clear the alarm. If the alarm persists, contact your technical support.
			Cause ID = 2 The ambient temperature of the control unit cabin is too high, which triggers system derating or shutdown.	1. Check whether the air conditioners in the control unit cabin are faulty. 2. Check whether the doors of the control unit cabin are completely closed.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
			Cause ID = 3 The ambient temperature of the control unit cabin is too high, which triggers system shutdown.	1. Check whether the air conditioners in the control unit cabin are faulty. 2. Check whether the doors of the control unit cabin are completely closed. 3. After the control unit cabin temperature drops to below 58°C, manually clear the alarm. If the alarm persists, contact your technical support.
3828	Condensation Risk	Minor	Cause ID = 1 Condensation risk exists in the battery cabin.	1. This alarm indicates that the cabin needs to be dehumidified. Ensure that the temperature control mode is set to automatic. 2. If the alarm persists for more than 30 minutes, check whether the air conditioner in the battery cabin is normal and whether the cabin doors are completely closed.
			Cause ID = 2 Condensation risk exists in the control unit cabin.	1. This alarm indicates that the cabin needs to be dehumidified. Ensure that the temperature control mode is set to automatic. 2. If the alarm persists for more than 30 minutes, check whether the air conditioner in the control unit cabin is normal and whether the cabin doors are completely closed.
3829	All T/H Sensors Faulty	Minor	Cause ID = 1 There are too many faulty temperature and humidity sensors in the battery cabin.	1. Repair the temperature and humidity sensor based on the alarm. 2. On the maintenance screen, check that the temperature and humidity sensor is correctly connected.
			Cause ID = 2 There are too many faulty temperature and humidity sensors in the control unit cabin.	
3830	Temperature and Humidity Control	Major	Cause ID = 1 There are too many faulty air conditioners in the battery cabin.	1. Repair the air conditioner based on the alarm. 2. On the maintenance screen, check that the air conditioner is correctly connected.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
	Malfunction		Cause ID = 2 The air conditioners in the control unit cabin are faulty.	
3833	Rectifier Fault	Major	Cause ID = 1–6 The rectifier hardware is faulty.	1. Replace the rectifier [NUMBER]. 2. If the fault persists, contact your dealer or technical support.
3834	Rectifier Protection	Major	Cause ID = 1–6 1. The AC voltage is abnormal. 2. The ambient temperature is too high.	1. Check whether the AC input voltage is greater than 300 V. If yes, check the power supply. 2. Check whether the air vent of rectifier [NUMBER] is blocked. If yes, clean it. Check whether there is a heat source near the air vent. If yes, remove the heat source. Check whether the heat dissipation fan is damaged. If yes, replace the rectifier. 3. If the fault persists, contact your technical support.
3835	Rectifier Communication Failure	Major	Cause ID = 1–6 1. The rectifier has been removed. 2. The rectifier is faulty and not working.	1. Turn off the AC input switch of the PSU. 2. Remove rectifier [NUMBER] and insert it again. 3. If the fault persists, replace rectifier [NUMBER] or the monitoring module. 4. If the fault persists, contact your technical support.
3836	Rectifier Power Failure	Major	Cause ID = 1–6 The AC loop is disconnected.	1. Check whether the AC input voltage is less than 80 V. If yes, check the power supply. If not, replace rectifier [NUMBER]. 2. If the fault persists, contact your technical support.
3837	Rectifier Output Overvoltage	Major	Cause ID = 1–6 Lockout has occurred due to output overvoltage.	1. Remove the rectifier and then insert it 1 minute later. 2. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3838	T/H Sensor Communication Failure	Minor	Cause ID = 1–5 T/H sensor communication failed.	1. Check whether the communication cable is correctly connected to the device. If not, reconnect the cable properly. 2. Check whether the power supply of the device is normal. If not, contact your technical support.
3839	Air Conditioner Communication Failure	Minor	Cause ID = 1–13 [HVAC-No] communication failed.	1. Check whether the communication cable is correctly connected to the device. If not, reconnect the cable properly. 2. Check whether the power cable of the device is loose. If yes, connect the cable securely. 3. If the fault persists, contact your technical support.
3840	CO Sensor Communication Failure	Minor	Cause ID = 1–6 CO sensor communication failed.	1. Check whether the communication cable is correctly connected to the device. If not, reconnect the cable properly. 2. Check whether the power supply of the device is normal. If not, contact your technical support.
3842	ESC Communication Failure	Minor	Cause ID = 1–6 ESU communication failed.	1. Check whether the communication cable is correctly connected to the device. If not, reconnect the cable properly. 2. Check whether the power cable of the device is loose. If yes, connect the cable securely. 3. If the fault persists, contact your technical support.
3843	TCU Communication Failure	Minor	Cause ID = 1, 2 TCU communication failed.	1. Turn off the TCU power switch. 2. Check whether the communication cable is correctly connected to the device. If not, reconnect the cable properly. 3. Check whether the power supply of the device is normal. If not, contact your technical support.
3844	Rectifier Communication Failure	Minor	Cause ID = 1 Rectifier communication failed.	

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3845	SmartModule Communication Failure	Minor	Cause ID = 1 SmartModule communication failed.	1. Check whether the communication cable is correctly connected to the device. If not, reconnect the cable properly. 2. Check whether the power cable of the device is loose. If yes, connect the cable securely. 3. Check whether a certificate expiration alarm is displayed in the alarm list. If yes, contact your technical support. 4. If the fault persists, contact your technical support.
3846	CMU Communication Failure	Minor	Cause ID = 1 CMU communication failed.	1. Check whether the communication cable is correctly connected to the device. If not, reconnect the cable properly. 2. Check whether the power cable of the device is loose. If yes, connect the cable securely. 3. If the fault persists, contact your technical support.
3848	T/H Control Mode: Manual	Minor	Cause ID = 1 The temperature and humidity control mode is set to manual.	After the commissioning is complete, set the temperature and humidity control mode to automatic.
3849	Air Exhaust Malfunction	Major	Cause ID = 1 There are too many faulty exhaust fans.	Repair the exhaust fan based on the fault alarm.
			Cause ID = 2 There are too many faulty TCUs.	1. Repair the TCU based on the fault alarm. 2. On the maintenance screen, check that the TCU is correctly connected.
3850	Combustible Gas Detection Malfunction	Major	Cause ID = 1 There are too many faulty combustible gas sensors.	1. Repair the combustible gas sensor based on the fault alarm. 2. On the maintenance screen, check that the combustible gas sensor is correctly connected.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3851	Exhaust Fan Fault	Major	Cause ID = 1–12 The exhaust fan is faulty.	1. Check whether the cable to the exhaust fan is loose. If yes, reconnect the cable. Check whether the fan is damaged or burnt. If yes, replace the fan. 2. Check whether the TCU connected to the exhaust fan works properly. 3. If the fault persists, contact your technical support.
3852	Ambient Temperature Low	Major	Cause ID = 1 The ambient temperature in the battery cabin is too low.	1. Check whether the air conditioners in the battery cabin are faulty. 2. Check whether the doors of the battery cabin are completely closed.
			Cause ID = 2 The ambient temperature in the control unit cabin is too low.	1. Check whether the air conditioners in the control unit cabin are faulty. 2. Check whether the doors of the control unit cabin are completely closed.
3853	ESU Physical Location Failure	Minor	Cause ID = 1 ESU physical location failed.	1. Check whether the network connections between the ESCs are normal. 2. Check whether the network connections between the CMU and the first and last nodes of the ESC are normal. 3. Check whether the RS485 cable between ESC-1 and the CMU is properly connected.
3856	Battery Fault Protection	Major	Cause ID = 1 Some battery packs are severely faulty, causing the system to shut down.	Maintain the battery pack based on the alarm and troubleshooting suggestions.
			Cause ID = 2 The temperature of some battery packs is too low. As a result, charge capacity is not reached due to low temperature protection.	

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3857	Memory Exception	Minor	Cause ID = 1 1. The storage space is insufficient. 2. The memory is faulty.	Contact your technical support.
3858	48 V DC Auxiliary Power Supply Faulty	Major	Cause ID = 1 1. The 48 V DC auxiliary power supply is inadequate. 2. The SMU communication failed or the SMU is not connected.	1. Check whether the rectifier is correctly installed. 2. Maintain the rectifier based on the alarm and troubleshooting suggestions. 3. Check whether the SMU has been added to the device list. 4. Maintain the SMU based on the alarm and troubleshooting suggestions.
3859	Forced Dehumidification Started	Major	Cause ID = 1 1. Forced dehumidification has been manually started. 2. To prevent condensation in the cabinet after the cabinet door is opened, the system automatically starts forced dehumidification.	1. Wait for 20 to 30 minutes for the system to automatically stop forced dehumidification. 2. If you manually start forced dehumidification, the system will shut down after forced dehumidification is completed. You need to manually start the system. 3. If forced dehumidification is automatically started, the system automatically restores to the original state after forced dehumidification is completed.
3860	IO Expansion Board Fault	Minor	Cause ID = 1 IO Expansion Board Fault	1. Check whether the cable between the I/O expansion board and the CMU (RS485-1) is correctly connected. If not, reconnect the cable. 2. Check whether the power cable of the I/O expansion board is loose. If yes, connect the cable securely. 3. If the fault persists, contact your technical support.

NOTE

If ALM-3833 Rectifier Fault, ALM-3834 Rectifier Protection, ALM-3835 Rectifier Communication Failure, ALM-3836 Rectifier Power Failure, or ALM-3837 Rectifier Output Overvoltage is generated, rectify the fault by referring to the following table.

Table 11-2 PSU indicator status and troubleshooting

Indicator	Color	Status	Description	Suggestion
Power indicator 	Green	Steady on	The PSU has an AC input.	Normal.
		Off	The PSU has no AC input.	Check whether the input is normal. If yes, replace the PSU.
			The PSU is damaged.	Replace the PSU.
		Blinking at 0.5 Hz	Querying is in progress.	Normal.
		Blinking at 4 Hz	The PSU is loading the application program.	The PSU automatically recovers after the loading is finished, and no action is required.
Alarm indicator 	Yellow	Off	The PSU does not generate any protection alarm.	Normal.
		Steady on	• A warning is generated due to ambient overtemperature. • A shutdown protection alarm is generated due to ambient overtemperature or undertemperature.	Check that the air vent is not blocked and the ambient temperature is within the normal range.

Indicator	Color	Status	Description	Suggestion
			AC input overvoltage or undervoltage protection is triggered.	Check the power grid voltage.
			The PSU is hibernating.	Normal.
		Blinking at 0.5 Hz	The communication between the PSU and the monitoring module is interrupted.	Replace the PSU or monitoring module.
Fault indicator 	Red	Off	The PSU is normal.	Normal.
		Steady on	The PSU locks out due to output overvoltage or it is not properly inserted.	Remove the PSU and then insert it 1 minute later.
			The PSU has no output due to an internal fault.	Replace the PSU.

NOTE

- The ESC-No ID is the same as that displayed on the app. The ID is 1 on the left and 2 on the right. A maximum of two ESC-No IDs are supported.
- The ESR-CabinetNo ID is the same as that displayed on the app. The ID is 1 on the left and 2 on the right. A maximum of two ESR-CabinetNo IDs are supported.
- ESM-SlotNo indicates the slot number of the battery pack.

Table 11-3 ESC/BCU common alarms and troubleshooting measures

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3013	Battery Pack Communication of Rack Controller Abnormal	Major	Cause ID = 1 The rack controller failed to communicate with the battery pack.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the communication cable to battery [ESR-CabinetNo ESM-SlotNo] is correct. 4. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3014	Rack Controller Abnormal	Major	Cause ID = 1–34 A major fault has occurred on the internal circuit of the rack controller.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a hibernation command to the ESR corresponding to the ESC, and turn off the switch on the battery side and the switch on the bus side in sequence, and wait for 5 minutes. 3. Turn on the switch on the battery side and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.
3015	Battery Side Overvoltage on Rack Controller	Major	Cause ID: 1–3 The battery side voltage exceeds the maximum operating voltage of the power module.	1. Check whether a battery pack overvoltage alarm is generated in the rack. If yes, clear the alarm by referring to the alarm handling suggestions. 2. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3016	Battery Side Undervoltage on Rack Controller	Major	Cause ID = 1–3 The batteries are abnormal or not securely connected.	1. Determine the positions of the input and output circuit breakers associated with [ESC-No] and the AC input power switch of the PSU. 2. Issue a hibernation command to all ESRs. 3. Check whether the switch on the battery side is turned on. If not, turn on the switch and issue a running command. 4. If the switch on the battery side is ON, turn off the switch, the switch on the bus side, and the AC input power switch of the PSU. Then wait for 5 minutes. 5. Check the cable connections on the battery side of the power control module by referring to the maintenance manual of the product. 6. After checking that the battery power cable is correctly connected, turn on the AC input power switch of the PSU, the switch on the battery side, and the switch on the bus side in sequence, and issue a running command. 7. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3017	Battery Side Short Circuit on Rack Controller	Major	Cause ID = 1–3 The battery cable is incorrectly connected.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check for voltage at both ends of the battery switch. If no voltage is detected, check whether the cable is short-circuited or grounded. 4. Check the cable connections on the battery side of the power control module by referring to the maintenance manual of the product. 5. After checking that the battery power cable is correctly connected, turn on the switch on the battery side and then the switch on the bus side, and issue a startup command. 6. If the alarm persists, contact your dealer or technical support.
3018	Battery Side Reverse Polarity on Rack Controller	Major	Cause ID = 1–3 Battery cables are connected in reverse polarity.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check whether the copper bars and cables on the battery side of the power control module are connected in reverse polarity by referring to the product maintenance manual. 4. After checking that the battery power cable is correctly connected, turn on the switch on the battery side and then the switch on the bus side, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3019	Bus Side Overvoltage on Rack Controller	Major	Cause ID = 1–3 The bus cable is not correctly connected, or the bus voltage exceeds the maximum operating voltage of the power module.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check the cable connections on the bus side of the power control module by referring to the maintenance manual of the product. 4. After checking that the battery power cable is correctly connected, turn on the switch on the battery side and then the switch on the bus side, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3020	Bus Side Reverse Polarity on Rack Controller	Major	Cause ID = 1–3 The bus is connected in reverse polarity.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check whether the cable between the copper bar on the bus side of the power control module and the DC LV Panel is connected in reverse polarity by referring to the product maintenance manual. 4. After checking that the battery power cable is correctly connected, turn on the switch on the battery side and then the switch on the bus side, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3021	Insulation Resistance of Rack Controller Abnormal	Major	Cause ID = 1–3 1. The battery is short-circuited to the ground. 2. The battery is in a humid environment and the insulation between the battery and ground is poor.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a hibernation command to the ESR corresponding to the ESC, and turn off the switch on the battery side and the switch on the bus side in sequence, and wait for 5 minutes. 3. Check the ground impedance of the battery output (measured on both the battery side and the bus side). If a short circuit occurs or the insulation is insufficient, rectify the fault. 4. Check whether the PE cable of the system is correctly connected. 5. If the impedance is lower than the specified protection threshold in rainy and cloudy days, set Insulation resistance protection threshold using the mobile app, SmartLogger, or NMS. 6. After checking that the battery power cable is correctly connected, turn on the switch on the battery side and the switch on the bus side in sequence, and issue a running command. 7. If the alarm persists, contact your dealer or technical support.
3022	Rack Controller Temperature High	Minor	Cause ID = 1–9 1. The installation position of the battery power control module is not well ventilated. 2. The ambient temperature is too high. 3. The battery power control module is abnormal. 4. The fan of the battery power control module is abnormal.	1. Check the ventilation of [ESC-No] and whether the ambient temperature of the optimizer exceeds the upper threshold. 2. If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation. 3. Check whether the internal or external fan of the rack controller is faulty. 4. If the ventilation and ambient temperature meet requirements, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3023	Battery Terminal Overtemperature on Rack Controller	Major	Cause ID = 1–3 The battery terminal is not securely connected.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check whether the torque of the bolts on the battery side of the power control module meets the requirements by referring to the DCDC replacement section in the maintenance manual of the product. 4. After checking that the battery power cable is correctly connected, turn on the switch on the battery side and then the switch on the bus side, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3024	Bus Terminal Overtemperature on Rack Controller	Major	Cause ID = 1–3 The bus terminal is not securely connected.	1. Determine the positions of the input and output circuit breakers associated with [ESC-No] and the AC input power switch of the PSU. 2. Issue a hibernation command to all ESRs, and turn off the switch on the battery side, the switch on the bus side, and the AC input power switch of the PSU. Then wait for 5 minutes. 3. Check whether the torque of the bolts on the bus side of the power control module meets the requirements by referring to the DCDC replacement section in the maintenance manual of the product. 4. After checking that the battery power cable is correctly connected, turn on the AC input power switch of the PSU, the switch on the battery side, and the switch on the bus side in sequence, and issue a running command. 5. If the alarm persists, contact your dealer or technical support.
3025	Rack Controller Version Mismatch	Minor	Cause ID = 1, 2 The update failed.	1. Version mismatch on [ESC-No]. Please update. 2. If the update fails multiple times, contact your dealer or technical support.
3026	Internal Fan of Rack Controller Fault	Warning	Cause ID = 1, 2 The internal fan is short-circuited, the power supply is insufficient, or the fan is damaged.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Turn on the switch on the battery side and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3033	Communication Failure on Power Control Unit of Rack Controller	Major	Cause ID = 1 The internal communication of the rack controller has failed.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3034	Rack Controller Cable Connection Abnormal	Major	Cause ID = 1 The cable connection between the battery rack and the corresponding power module is incorrect.	If the system is in the array topology identification process, wait until the process is complete or exit the process. 1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the cable connection between battery rack and power module under [ESR-CabinetNo] is correct by referring to the DCDC replacement section in the maintenance manual of the product. 4. Check whether the auxiliary power supply of battery rack [ESR-CabinetNo] is normal and whether the auxiliary power supply switch is turned on by referring to the product maintenance manual. 5. Check that the power cable is securely connected. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 6. If the alarm persists, contact your dealer or technical support.
			Cause ID = 2 The power-on self-test was terminated due to a system exception.	1. Check other active alarms of the device and rectify the faults based on the alarm handling suggestions. 2. If the alarm persists after the system is reset, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3035	Battery Pack Positions of Rack Controller Abnormal	Major	Cause ID = 1 1. The actual number of battery packs is different from the configured value. 2. The system has not identified the battery pack address. 3. The battery pack has been replaced and the new address has not been identified. 4. Cables of the battery packs are not properly connected.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the communications cable between battery packs under [ESR-CabinetNo] are correctly connected and whether the configured number of battery packs matches the actual number by referring to the product maintenance manual. 4. After checking that the battery power cable is correctly connected, turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3040	Incorrect Bus Connection on Rack Controller	Major	Cause ID = 1 The output buses are not connected in parallel in the 1C scenario.	If the system is in the array topology identification process, wait until the process is complete or exit the process. 1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check whether the cable connection to the bus side of the power control module meets the 1C requirement by referring to the quick installation guide. 4. After checking that the battery power cable is correctly connected, turn on the switch on the battery side and then the switch on the bus side, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3042	Rapid Shutdown Cable Connection of Battery Pack Abnormal	Major	Cause ID = 1 The rapid shutdown cabling between battery racks is incorrect.	If the system is in the array topology identification process, wait until the process is complete or exit the process. 1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the rapid shutdown cables between battery racks under [ESR-CabinetNo] are correctly connected by referring to the DCDC replacement section in the maintenance manual of the product. 4. Check that the cables are securely connected. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
			Cause ID = 2 The rapid shutdown cabling in the battery rack is incorrect.	If the system is in the array topology identification process, wait until the process is complete or exit the process. 1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the rapid shutdown cables in the battery racks under [ESR-CabinetNo] are correctly connected by referring to the product maintenance manual. 4. Check that the power cable is securely connected. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
			Cause ID = 3 The power-on self-test was terminated due to a system exception.	1. Check other active alarms of the device and rectify the faults based on the alarm handling suggestions. 2. If the alarm persists after the system is reset, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3052	External DC Auxiliary Power Supply of Rack Controller Fault	Major	Cause ID = 1 1. The DC circuit breaker is OFF. 2. The PSU is faulty.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the PSU in the power distribution cabin reports a fault alarm. 4. Check whether the DC circuit breaker is ON. 5. After checking that the PSU is normal, turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence. 6. If the alarm persists, contact your dealer or technical support.
3053	External Fan of Rack Controller Fault	Warning	Cause ID = 1–3 The external fan is short-circuited or damaged, the power supply is insufficient, or the air channel is blocked.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check whether the fan blades are damaged. If yes, clear the foreign matter around the fan, and install a new fan. 4. Turn on the switch on the battery side and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3054	Rack Controller Temperature Abnormal	Warning	Cause ID = 1, 2 The NTC is short-circuited, open-circuited, or not securely connected.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Turn on the switch on the battery side and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.
3056	Emergency Power-Off	Major	Cause ID = 1 The emergency power-off (EPO) button is pressed down.	1. Troubleshoot system faults. 2. After the faults are rectified, pull up the EPO button. 3. Reset all battery racks in sequence.
3057	Version Inconsistent Between Rack Controller and Battery Packs	Warning	Cause ID = 1 1. The versions of the rack controller and battery packs are inconsistent. 2. The update failed. 3. The battery packs have been replaced.	1. The version of [ESC-No] is inconsistent with that of the battery packs. Although this does not affect the normal running of the system, you are advised to update the entire ESU. 2. If the update failed multiple times, contact your dealer or technical support.
3058	Version Incompatible Between Rack Controller and Battery Packs	Major	Cause ID = 1 1. The versions of the rack controller and battery packs are inconsistent. 2. The update failed. 3. The battery packs have been replaced.	1. The version of [ESC-No] is incompatible with that of the battery packs. Consequently, the functions are limited, affecting the normal running of the system. Please update the entire ESU. 2. If the update failed multiple times, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3059	Communication Interruption Between the Rack Controller and PCS	Major	Cause ID = 1 1. The communications cable between the CMU and SmartLogger is abnormal. 2. The communications cable between the PCS and SmartLogger is abnormal.	1. Check whether the CMU status indicator on the WebUI indicates that the CMU is offline. If yes, check whether the communications link between the CMU and the SmartLogger is normal. 2. Check whether the PCS status indicator on the WebUI indicates that the PCS is offline. If yes, check whether the power supply to the PCS is normal. If the power supply is normal, issue a shutdown command to the PCS, turn off the circuit breaker on the AC side, and check whether the communication link between the PCS and the SmartLogger is normal. If the link is normal: a. Determine the positions of the input and output circuit breakers associated with [ESC-No] and the AC input power switch of the PSU. b. Issue a hibernation command to all ESRs, and turn off the switch on the battery side, the switch on the bus side, and the AC input power switch of the PSU. Then wait for 5 minutes. c. Turn on the AC input power switch of the PSU, the switch on the battery side, and the switch on the bus side in sequence, and issue a running command. d. If the alarm persists, contact your dealer or technical support.
3060	Incompatible ESM	Major	Cause ID = 1 The replacement ESM is incompatible with the system.	1. The model of [ESR-CabinetNo ESM-SlotNo] is incompatible with the system. Replace it with an ESM of the original model. 2. If the alarm persists, contact your dealer or technical support.

Table 11-4 BMU common alarms and troubleshooting measures

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3027	Battery Pack Monitoring Board Abnormal	Major	Cause ID = 1–20 A major fault has occurred on the internal circuit of the battery pack monitoring device.	1. The 3027-1 alarm (cell voltage sampling fault) does not affect the running of other battery packs. 2. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 3. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 4. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
		Major	Cause ID = 21 The BMU is incompatible with the battery pack.	The BMU is incompatible. Contact your technical support to deliver a replacement of the original model.
3028	Battery Pack Abnormal	Major	Cause ID = 1–8 A major fault has occurred on the battery pack.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch. 3. Contact your dealer or technical support to replace the battery pack.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3029	Battery Pack Locked	Major	Cause ID = 1, 2 The battery pack has triggered the same fault for multiple times.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 24 hours. 3. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.
			Cause ID = 3–5 The battery pack has triggered the same fault for multiple times.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3030	Battery Module Fan Fault	Major	Cause ID = 1 1. The fan is short-circuited. 2. The power supply is insufficient. 3. The fan is damaged. 4. The fan is stuck.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Replace the fan if it is damaged, clear the foreign matter if there are any, and rectify power supply failure if any. 4. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3031	Battery Pack Temperature Imbalance	Minor	Cause ID = 1 Temperature imbalance occurs between cells in the battery pack.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether an air conditioner or battery pack fan has generated a fault alarm. Rectify the fault based on the alarm handling suggestions. 4. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3032	Battery Pack Overvoltage	Major	Cause ID = 1, 2 The voltage of the battery pack or its cell is too high.	1. The 3032-1 alarm (battery pack overvoltage protection) does not affect the running of other battery packs. 2. Check the alarm module associated with the corresponding ESC. 3. Issue a shutdown command and wait for 5 minutes. 4. If the alarm is cleared, issue a startup command. If the alarm persists for 20 minutes, contact your dealer or technical support.
3036	Optimization Unit of Battery Pack Abnormal	Major	Cause ID = 1–4 A major fault has occurred on the internal circuit of the optimization unit in the battery pack.	1. Determine the position of [ESR-CabinetNo ESM-SlotNo] and the positions of the input and output circuit breakers of the ESC. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3037	Overtemperature on Optimization Unit of Battery Pack	Minor	Cause ID = 1–3 1. The installation position of the battery pack is not well ventilated. 2. The ambient temperature is too high. 3. The battery power control module is abnormal. 4. The optimization unit is abnormal.	1. Determine the position of [ESR-CabinetNo ESM-SlotNo] and the positions of the input and output circuit breakers of the corresponding ESC. 2. Check the ventilation and whether the ambient temperature of the battery exceeds the upper threshold. 3. If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation. 4. If the ventilation and ambient temperature meet requirements, contact your dealer or technical support.
3038	Overtemperature on Optimization Unit Terminal of Battery Pack	Major	Cause ID = 1 The terminal is not securely connected.	1. Determine the position of [ESR-CabinetNo ESM-SlotNo] and the positions of the corresponding input and output circuit breakers. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check the cable connections of the battery pack and optimization unit by referring to the product maintenance manual. 4. Check that the power cable is securely connected. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3039	Battery Pack Optimization Unit Version Mismatch	Major	Cause ID = 1, 2 The update failed.	1. The versions of optimization units in [ESR-CabinetNo ESM-SlotNo] do not match. Please update. 2. If the update fails multiple times, contact your dealer or technical support.
3041	Loose Connection of Battery Pack Copper Bar	Major	Cause ID = 1 The copper bar of the battery pack is loosely connected.	1. Determine the position of [ESR-CabinetNo ESM-SlotNo] and the positions of the input and output circuit breakers of the corresponding ESC. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the copper bar connection of battery pack meets the torque requirements by referring to the quick installation guide of the product. 4. Check that the power cable is securely connected. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3043	Battery Module SOH Low	Warning	Cause ID = 2 The battery module SOH is too low.	1. Determine the position of [ESR-CabinetNo ESM-SlotNo] and the positions of the input and output circuit breakers of the corresponding ESC. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Replace the battery pack by referring to the product maintenance manual. 4. Check that the power and monitoring cables are securely connected. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3044	Battery Module Overcurrent	Major	Cause ID = 1 The battery pack has been working beyond the maximum operating current for a long time.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3045	Battery Pack Temperature High	Major	Cause ID = 1, 2 1. The installation position of the battery pack is not well ventilated. 2. The air conditioner is not running properly.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the installation position is well ventilated (If not, improve the ventilation and heat dissipation). Check whether the copper bar is securely connected and whether the air conditioner is running properly. 4. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3046	Battery Pack Temperature Low	Major	Cause ID = 1, 2 The ambient temperature is too low, which triggers charge or discharge protection.	1. The 3046-1 alarm (low temperature protection during battery charge) does not affect the running of other battery packs. 2. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 3. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 4. Check whether the air conditioner is running properly. 5. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 6. If the alarm persists, contact your dealer or technical support.
3047	Battery Pack Undervoltage	Major	Cause ID = 1, 2 1. The voltage of the battery pack or its cell is too low. 2. The battery pack has been stored for a long period of time. 3. The battery pack has been idle for a long time after grid connection.	1. The 3047-1 (battery pack undervoltage protection) and 3047-2 (cell undervoltage protection) alarms do not affect the running of other battery packs. 2. Connect to the power grid and charge batteries in 48 hours. 3. If the alarm persists after the battery has been charged for one hour, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
			Cause ID = 4 1. The voltage of the battery pack or its cell is too low. 2. The battery pack has been stored for a long period of time. 3. The battery pack has been idle for a long time after grid connection.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.
3048	ESM Auxiliary Power Supply Fault	Warning	Cause ID = 1 The black start auxiliary power supply relay control is faulty. Cause ID = 2 The black start button is faulty. Cause ID = 3 The black start auxiliary power supply cannot be powered-off properly. Cause ID = 4 The black start function cannot be enabled. Cause ID = 5 The primary and secondary sources disabling function is faulty.	1. System running is not affected. 2. Locate the input and output circuit breakers associated with [ESC-No]. 3. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 4. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3055	Undertemperature on Optimization Unit of Battery Pack	Major	Cause ID = 1 The ambient temperature is excessively low.	1. Check whether the air conditioner is running properly. 2. If the alarm persists, contact your dealer or technical support.

12 Emergency Handling

If an accident (including but not limited to the following) occurs on the site, ensure the safety of onsite personnel first and contact the Company's service engineers.

Battery Falling or Strong Impact

- If a battery has obvious damage or abnormal odor, smoke, or fire occurs, evacuate the personnel immediately, call emergency services, and contact the professionals. The professionals can use fire extinguishing facilities to extinguish the fire under safety protection.
- If the appearance is not deformed or damaged, and there is no obvious abnormal odor, smoke, or fire, ensure safety and perform the following operations:
  - Warehouse: Evacuate personnel, transfer the battery to an open and safe place by professionals using mechanical tools, and contact the Company's service engineers. Leave the battery for an hour and ensure that the battery temperature is within the room temperature range (tolerance: ±10°C) before handling.
  - ESS onsite: Evacuate personnel, close the doors of the ESS, transfer the battery to an open and safe place by professionals using mechanical tools, and contact the Company's service engineers. Leave the battery for an hour before handling.

Flood

- Power off the system if it is safe to do so.
- If any part of the batteries is submerged in water, do not touch the batteries to avoid electric shock.
- Do not use batteries that have been soaked in water. Contact a battery recycling company for disposal.

Fire Alarm Horn/Strobe

When the alarm indicator on the equipment blinks or buzzes:

- Do not approach.

- Do not open the door.
- Stay away immediately.
- Cut off the power supply remotely only when your safety is guaranteed.

Gas Exhaust

- Onsite personal protection: Do not directly face the exhaust vents.
- Post-disaster product maintenance: Contact the Company's service engineers for evaluation.

Extinguishant Release or Fire

- Suggestions for onsite O&M personnel:
  a. When a fire occurs, evacuate from the building or equipment area, press the fire alarm bell, and immediately call the fire emergency service. Notify the professional firefighters and provide them with relevant product information, including but not limited to battery pack types, ESS capacity, and battery pack location and distribution.
  b. Do not enter the affected building or equipment area under any circumstances, and do not open the doors of the ESS. Isolate and monitor the site. Keep irrelevant personnel away from the site.
  c. After calling the fire emergency service, remotely power off the system (such as the Smart Transformer Station, Smart PCS, auxiliary power supply devices, and combiner box power supply) while ensuring your own safety.
  d. After professional firefighters arrive, provide relevant product information, including but not limited to battery pack types, ESS capacity, battery pack location and distribution, and user manuals.
  e. After the fire is extinguished, the site must be handled by professionals in accordance with local laws and regulations. Do not open the doors of the ESS without permission.
  f. Post-disaster product maintenance: Contact the Company's service engineers for evaluation.
- Suggestions for professional firefighters:
  a. For product information, see the information provided by O&M personnel, including but not limited to battery pack types, ESS capacity, battery pack location and distribution, and user manuals.
  b. Do not open the doors of the ESS before it is deemed safe by professionals.
  c. Follow local fire fighting regulations.

13 FAQ

13.1 (Optional) How to Level the ESS When Doors Cannot Be Opened or Closed

NOTE

This procedure applies only to some models.

Step 1 Use a jack to support the ESS.

- Jack specification: 30 t
- Position requirements: on the control unit cabin side or its opposite side (the short side of the ESS container).

NOTE

Wood sleepers can be used in the following circumstances.

- Insufficient jack height: Place wood sleepers underneath the jack.
- Earth ground: Use wood sleepers to extend contact area.

Step 2 Adjust the height using leveling washers from the control unit cabin.

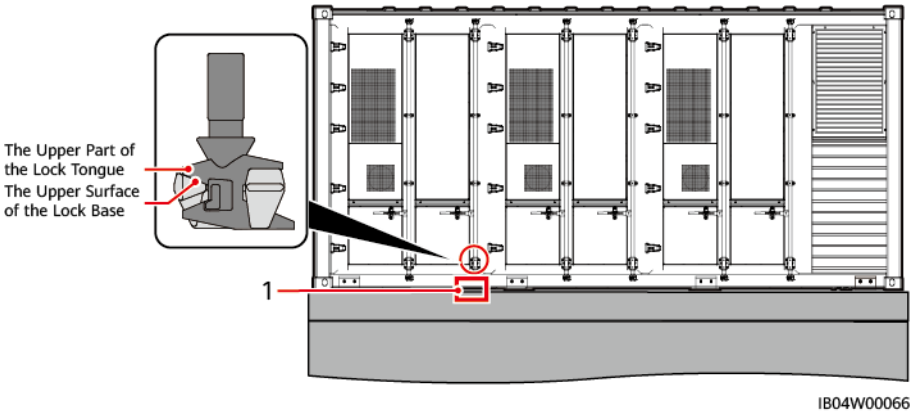
Scenario 1: The Upper Part of the Lock Tongue Interferes With the Upper Surface of the Lock Base

Use leveling washers to raise ESS by 5–10 mm on the foundation under the door hinge.

NOTE

The raising height leveling washers may vary according to the actual conditions.

Figure 13-1 The Upper Part of the Lock Tongue Interferes With the Upper Surface of the Lock Base

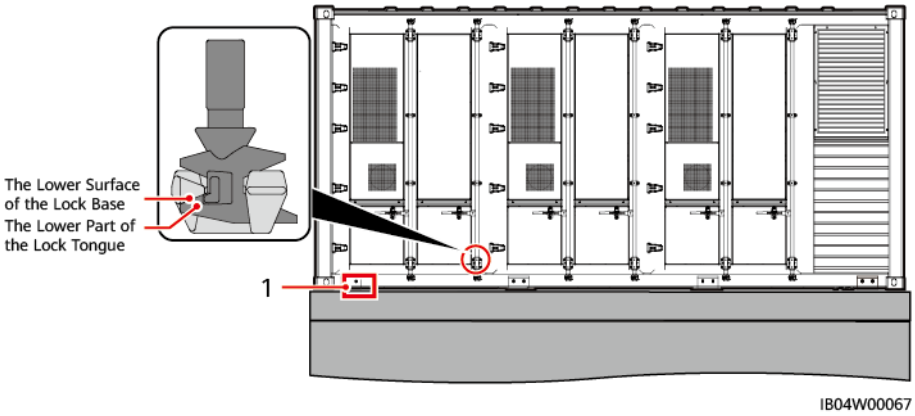


(1) Position of leveling washers

Scenario 2: The Lower Part of the Lock Tongue Interferes With the Lower Surface of the Lock Base

Use leveling washers to raise ESS by 5–10 mm on the foundation under the lock base farthest to the door hinge.

Figure 13-2 The Lower Part of the Lock Tongue Interferes With the Lower Surface of the Lock Base



(1) Position of leveling washers

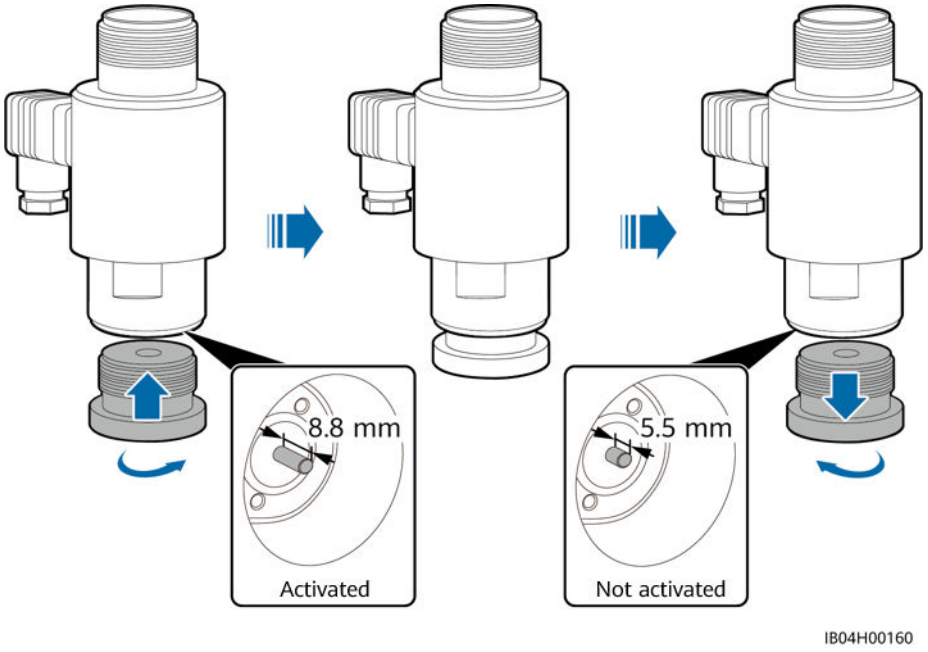
----End

13.2 How to Ensure that the Solenoid Valve Is Not Activated

Step 1 Check whether the solenoid valve is not activated.

Step 2 If it is activated, reset it. The reset procedure is as follows:

1. Insert the reset device into the solenoid valve to reset the ejector pin.
2. After resetting, remove the solenoid valve reset device.

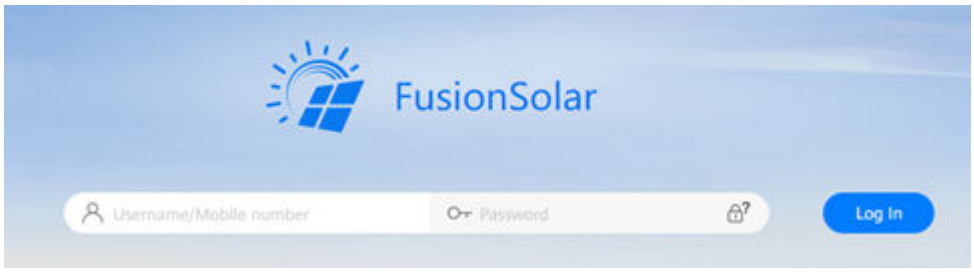


----End

13.3 How to Connect the ESS to the Smart PV Management System

Step 1 Enter https://SmartPVMS IP address: 31943 in the address box of a browser, and press **Enter**. The login page is displayed.

Step 2 Enter the username or mobile number, and password, and click **Log In**.

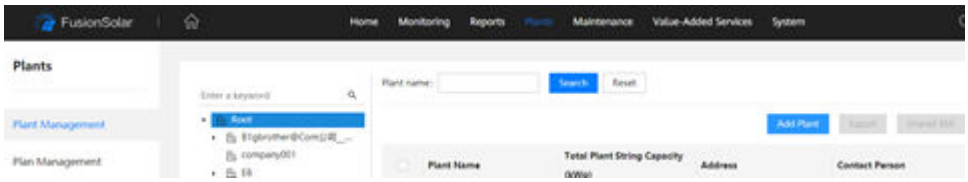


----End

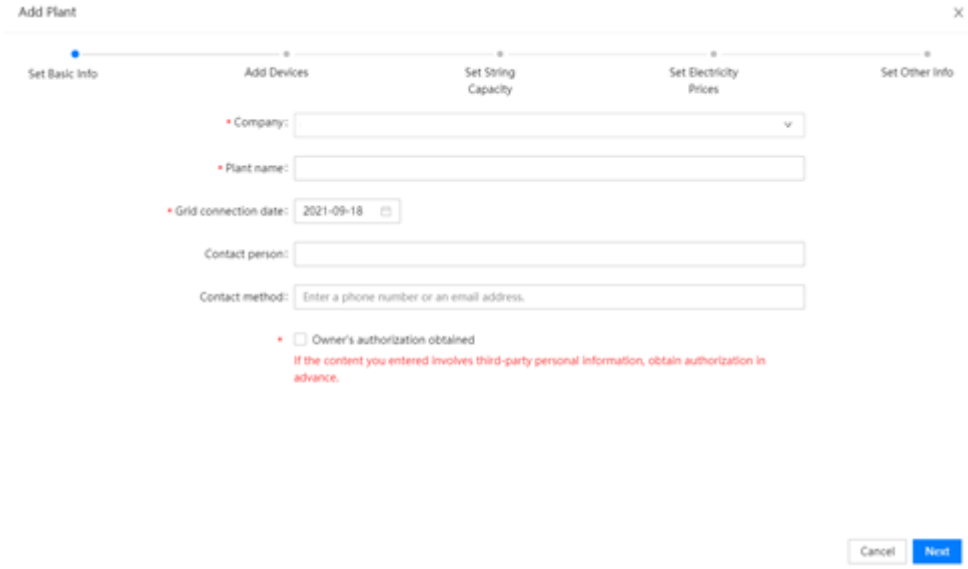
13.4 How to Create a Plant

Step 1 Choose **Plants** > **Plant Management** from the main menu.

Step 2 On the **Plant Management** page, click **Add Plant**.



Step 3 Perform the next step as prompted.

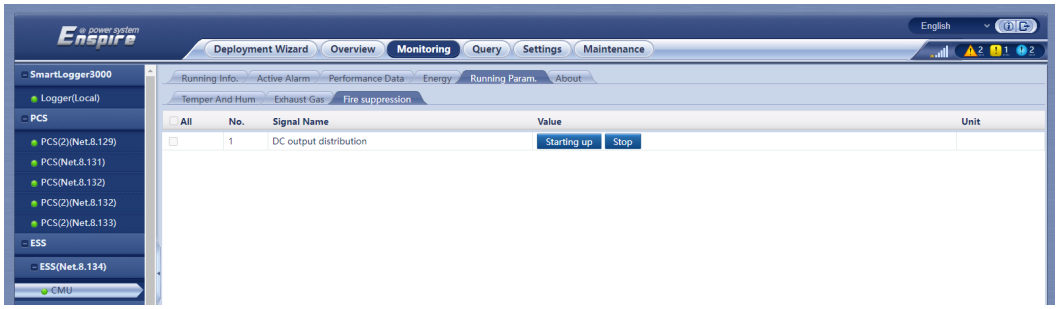


----End

13.5 Why Does the PSU Not Start After the Water and Fire Alarms Are Cleared

Step 1 Choose **Monitoring** > **Running Param** > **Fire suppression** > **Starting up** on the SmartLogger WebUI.

Figure 13-3 Page of restoring the power supply



----End

13.6 What Should I Do If the ESU Cable Connection Detection Abnormal Alarm Is Generated on the WebUI?

Step 1 Press the reset button ( ) in the upper right corner of the ESU screen. The ESU restarts cable connection detection.

NOTE

If the alarm persists, contact your dealer or technical support.

----End

13.7 How Do I Perform a Dielectric Voltage Withstand Test on the AC Side of an ESS?

Prerequisites

1. Turn on the main switch of the AC circuit breaker, as shown by ① in the figure. Turn off other switches.

   NOTE

   Make sure the power switch of the 3 U or 2 U subrack is off, as shown by ② in the figure.
2. Remove the SMU from the 3 U or 2 U subrack, as shown by ③ in the figure.
3. Disconnect the power meter fuse, as shown by ④ in the figure.
4. Disconnect the main neutral wire, as shown by ⑤ in the figure.

Figure 13-4 3U subrack positions

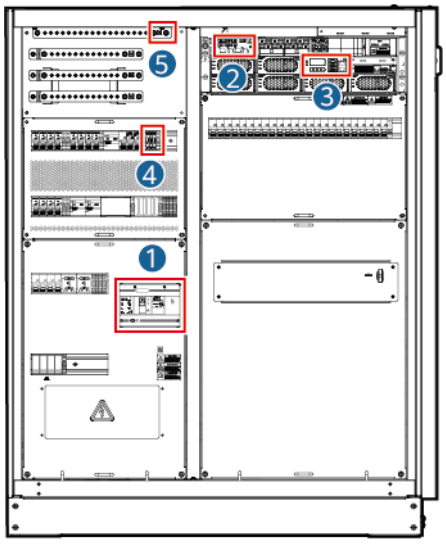
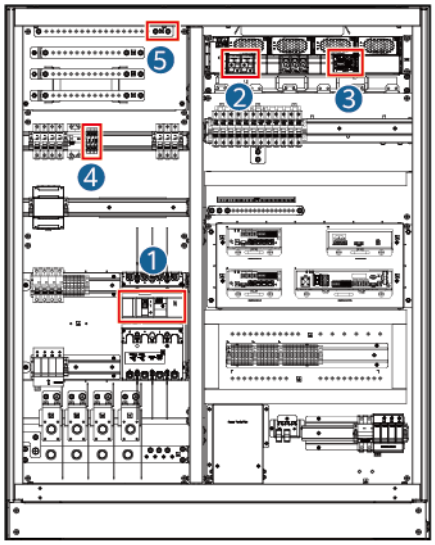


Figure 13-5 2U subrack positions



Test Instrument

Withstand voltage tester

Test Items and Criteria

No.	Test Item	Procedure	Criteria
1	Withstand voltage of the main ground after L1, L2, L3, and N are short-circuited	1. Short-circuit L1, L2, L3, and N. 2. Select the withstand voltage test function for the tester. Connect one end to the short-circuit point of the phase wire and the other end to the main ground point. Set the dielectric withstand voltage to 2121 V DC, rise time to 10s, and hold time to 60s.	• The leakage current during the test is less than 10 mA. • No breakdown or flashover occurs during the test.

No.	Test Item	Procedure	Criteria
2	Main ground insulation resistance after L1, L2, L3, and N are short-circuited	1. Short-circuit L1, L2, L3, and N. 2. Select the insulation resistance test function for the tester. Connect one end of the tester to the short-circuit point of the phase wire and the other end to the main ground point. Set the test voltage to 1 kV DC and record the test resistance.	• The test voltage is 1 kV. • The stable insulation resistance is greater than or equal to 1 MΩ.
Note: If the result of the first test does not meet the requirements, perform the test again following the prerequisites. If the test result still fails to meet the requirements, contact the Company's service engineers immediately.			

Follow-up Procedure

Remove the short-circuit cable and restore all switches to factory settings.

14 Technical Data

Table 14-1 Technical Data

Technical Specifications	LUNA2000-2.0MWH-1H0 (320 Ah battery cell)	LUNA2000-2.0MWH-2H0 (320 Ah battery cell)	LUNA2000-2.0MWH-1H1 (280 Ah battery cell)	LUNA2000-2.0MWH-2H1 (280 Ah battery cell)
Rated voltage on the bus side of the Smart Rack Controller	1200 V	1200 V	1250 V	1250 V
Maximum voltage on the bus side of the Smart Rack Controller	1500 V	1500 V	1500 V	1500 V
Smart Rack Controller model	ESC360KW-F	ESC360KW-F	ESC360KW-F	ESC360KW-F
Smart Rack Controller configuration	One battery rack is configured with a Smart Rack Controller	Two battery racks are configured with a Smart Rack Controller	One battery rack is configured with a Smart Rack Controller	Two battery racks are configured with a Smart Rack Controller

Technical Specifications	LUNA2000-2.0MWH-1H0 (320 Ah battery cell)	LUNA2000-2.0MWH-2H0 (320 Ah battery cell)	LUNA2000-2.0MWH-1H1 (280 Ah battery cell)	LUNA2000-2.0MWH-2H1 (280 Ah battery cell)
Rated voltage of a single rack	1075.2 V	1075.2 V	1209.6 V	1209.6 V
Voltage range of a single rack	907–1227 V	907–1227 V	1020–1365 V	1020–1365 V
Battery pack model	ESM51320AS1	ESM51320AS1	ESM-57280AS1	ESM-57280AS1
Single-rack battery pack configuration	One battery rack is configured with 21 battery packs	One battery rack is configured with 21 battery packs	One battery rack is configured with 21 battery packs	One battery rack is configured with 21 battery packs
Nominal energy of a single rack	344.1 kWh	344.1 kWh	338.7 kWh	338.7 kWh
Nominal power	6 x 344 kW	3 x 344 kW	6 x 339 kW	3 x 339 kW
Rated charge and discharge current	6 x 287 A	3 x 287 A	6 x 271 A	3 x 271 A
Maximum bus charge/ discharge current	6 x 320 A	3 x 320 A	6 x 280 A	3 x 280 A
Maximum battery current	320 A	160 A	280 A	140 A
Charging and discharging rate	≤ 1C@40°C	≤ 0.5C@40°C	≤ 1C@40℃	≤ 0.5C@40℃

Technical Specifications	LUNA2000-2.0MWH-1H0 (320 Ah battery cell)	LUNA2000-2.0MWH-2H0 (320 Ah battery cell)	LUNA2000-2.0MWH-1H1 (280 Ah battery cell)	LUNA2000-2.0MWH-2H1 (280 Ah battery cell)
Rack balancing mode	Module-level proactive equalization	Module-level proactive equalization	Module-level proactive equalization	Module-level proactive equalization
Number of racks in the ESS	6	6	6	6
Battery capacity of the ESS	2064 kWh	2064 kWh	2032 kWh	2032 kWh
ESS container dimensions (W x H x D)	20 inch: 6058 mm x 2896 mm x 2438 mm	20 inch: 6058 mm x 2896 mm x 2438 mm	20 inch: 6058 mm x 2896 mm x 2438 mm	20 inch: 6058 mm x 2896 mm x 2438 mm
Net weight	≤ 30 tons	≤ 30 tons	≤ 30 tons	≤ 30 tons
IP rating	IP55	IP55	IP55	IP55
Operating temperature range	–30°C to +55°C	–30°C to +55°C	–30℃ to +55℃	–30℃ to +55℃
Storage temperature range	–40°C to +60°C	–40°C to +60°C	–40℃ to +60℃	–40℃ to +60℃
Operating humidity range	0%–100% (non-condensing)	0%–100% (non-condensing)	0%–100% (non-condensing)	0%–100% (non-condensing)
DC surge protection	Type II	Type II	Type II	Type II
Maximum operating altitude	4000 m	4000 m	4000 m	4000 m
Battery temperature control mode	Industrial air conditioning	Industrial air conditioning	Industrial air conditioning	Industrial air conditioning

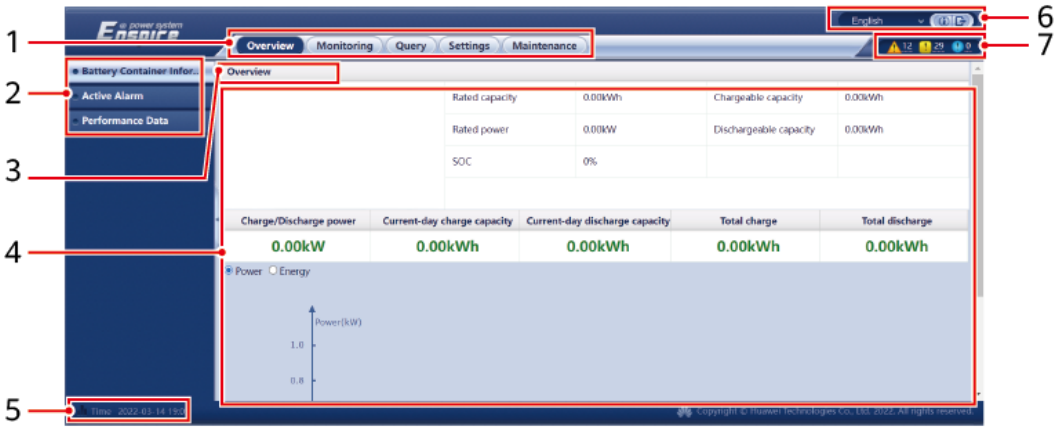
Technical Specifications	LUNA2000-2.0MWH-1H0 (320 Ah battery cell)	LUNA2000-2.0MWH-2H0 (320 Ah battery cell)	LUNA2000-2.0MWH-1H1 (280 Ah battery cell)	LUNA2000-2.0MWH-2H1 (280 Ah battery cell)
Number of air conditioners in the battery cabin	8	6	8 or 6	6 or 4
Fire Suppression System	FM-200	FM-200	FM-200	FM-200
System communications port	Ethernet/ optical fiber (standard configuration)	Ethernet/ optical fiber (standard configuration)	Ethernet/ optical fiber (standard configuration)	Ethernet/ optical fiber (standard configuration)
System communications protocol	Modbus TCP	Modbus TCP	Modbus TCP	Modbus TCP

A Operations on the CMU WebUI

A.1 CMU WebUI Operations

A.1.1 WebUI Layout

Figure A-1 WebUI layout



No.	Function	Description
1	First-level menu	Choose the corresponding first-level menu before you perform any operation over the WebUI.
2	Second-level menu	Under the first-level menu, choose the device to be queried or the parameter to be set under the second-level menu.
3	Third-level menu	After choosing a second-level menu, choose a third-level menu to access the query or setting page.
4	Details page	Displays details of the queried information or parameter setting.
5	System time	Displays the current system time.

No.	Function	Description
6	Display language	Selects the display language or chooses to log out.
7	Alarm icon	Displays the severities and number of active system alarms. You can click a number to access the alarm page.

A.1.2 Icon Description

Icon	Description	Icon	Description
	Click the About icon to query the WebUI version information.		Click the Drop-down icon to choose a parameter or time.
	Click the Exit icon to log out.		Alarms are classified into major, minor, and warning ones. Click the Alarm icon to query an alarm.
	Click the Increase/ Decrease icon to adjust time.		Click the Start icon to start the device.
	The Select icon indicates that a parameter is selected.		Click the Stop icon to shut down the device.
	The Select icon indicates that a parameter is not selected. Click the icon to select a parameter.		Click the Reset icon to reset the device.
	Hide icon and Display icon		The CMU is in **Running** state.
	• The device is in **Disconnection** state. • When the device is in **Disconnection** state, its parameters cannot be set.		The CMU is in **Loading** state.

Icon	Description	Icon	Description
	The CMU is in **Initializing**, **Power-off**, **Idle** or other state in which the device is not feeding power into the grid.		Ascending order or descending order icon. Click the icon to sort parameters in ascending or descending order for the corresponding column.

A.1.3 WebUI Menus

Table A-1 WebUI menus

Main Menu	Second-Level Menu	Third-Level Menu	Function
Overview	ESS information	-	Queries ESS information.
	Active Alarm	-	Queries active alarms.
	Performance Data	-	Queries or exports performance data.
Monitoring	CMU	Running Info.	Queries the running information.
		Active Alarm	Queries active alarms.
		Running Param.	Set running parameters.
		Module(M1)	Queries the expansion module.
		About	Queries the version and communication information.
Query	Alarm History	-	Query historical alarms.
	Operation Log	-	Queries operation logs.
	Export Data	-	Exports historical alarms, energy yield, operation logs, and power grid scheduling data.
Settings	User parameters	Date&Time	Sets the date and time.
	Comm. Param.	Wireless Network	• Sets parameters for the built-in WLAN. • Sets mobile data (4G/3G/2G) parameters.
		Wired Network	Sets wired network parameters.

Main Menu	Second-Level Menu	Third-Level Menu	Function
		RS485	Sets RS485 parameters.
		Modbus TCP	Sets Modbus TCP parameters.
	Other parameters	-	-
Maintenance	Software Upgrade	-	Upgrades the CMU software.
	Product Information	-	Queries product information.
	Security Settings	-	• Changes the user password. • Sets the automatic logout time. • Upload a network security certificate. • Updates the key. • Sets web TLS1.0. • Sets digital signature verification.
	System Maint.	-	• Resets the system. • Restore factory settings. • Clears data. • Exports all configuration files. • Imports all configuration files.
	Device Log	-	Exports device logs.
	Device Mgmt.	Connect Device	• Adds or removes a device. • Imports or exports configurations.
		SmartModule	• Removes the SmartModule. • Sets the authentication password.
		Clear Alarm	Clears device alarms.

A.2 Maintenance Operations

A.2.1 Preparations and WebUI Login

Prerequisites

- The operating system of Windows 7 or later is supported.
- Browser: Chrome 52, Firefox 58, or Internet Explorer 9, or a later version is recommended.

Procedure

Step 1 Connect the network cable between the network port of the PC and the WAN or LAN port of the CMU.

Step 2 Set the IP address for the PC on the same network segment as the CMU IP address.

- When the CMU is connected to the SACU

Connected Port	Item	CMU Default Value	Example PC Setting
LAN port	IP address	192.168.8.10	192.168.8.11
	Subnet mask	255.255.255.0	255.255.255.0
	Default gateway	192.168.8.1	192.168.8.1
WAN port	IP address	192.168.0.10	192.168.0.11
	Subnet mask	255.255.255.0	255.255.255.0
	Default gateway	192.168.0.1	192.168.0.1

- When the CMU is not connected to the SACU

SACU LAN Port IP Address	CMU WAN Port IP Address	CMU LAN Port IP Address
192.168.8.10	192.168.8.XXX	192.168.3.10
XXX.XXX.XXX.XXX[a]	XXX.XXX.XXX.XXX[a]	192.168.8.10
Note a: When you set the IP address of the SACU LAN port, the IP address of the CMU WAN port changes with the IP address of the SACU LAN port. You can view the IP address on the SACU WebUI or SUN2000 app.		

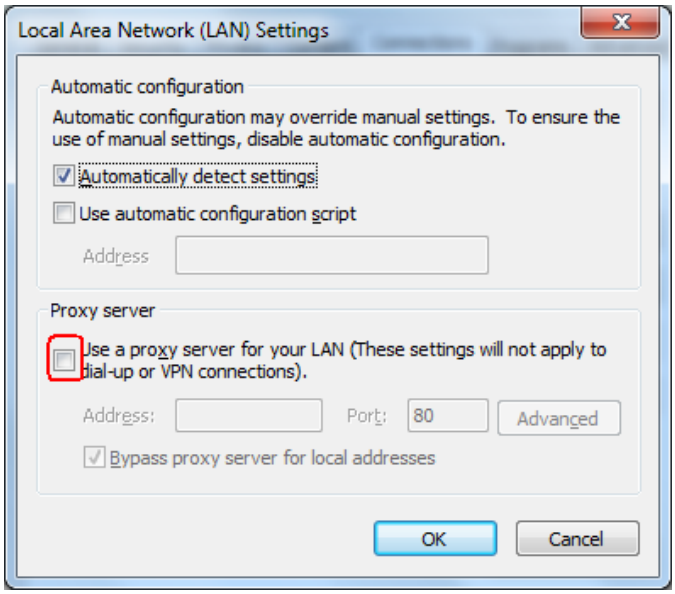
Step 3 Set LAN parameters.

NOTICE

- If the CMU is connected to a local area network (LAN) and a proxy server has been set, you need to cancel the proxy server settings.
- If the CMU is connected to the Internet and the PC is connected to the LAN, do not cancel the proxy server settings.

1. Open Internet Explorer.
2. Choose **Tools** > **Internet Options**.
3. Click the **Connections** tab and then click **LAN settings**.
4. Clear **Use a proxy server for your LAN**.

Figure A-2 LAN settings



5. Click **OK**.

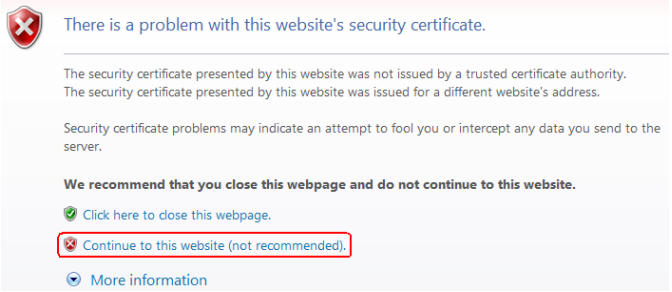
Step 4 Log in to the CMU WebUI.

1. In the address box of a browser, enter https://XX.XX.XX.XX (XX.XX.XX.XX is the IP address of the CMU) and press Enter. The login page is displayed. If you log in to the WebUI for the first time, a security risk warning is displayed. Click **Continue to this website** to log in to the WebUI.

   NOTE

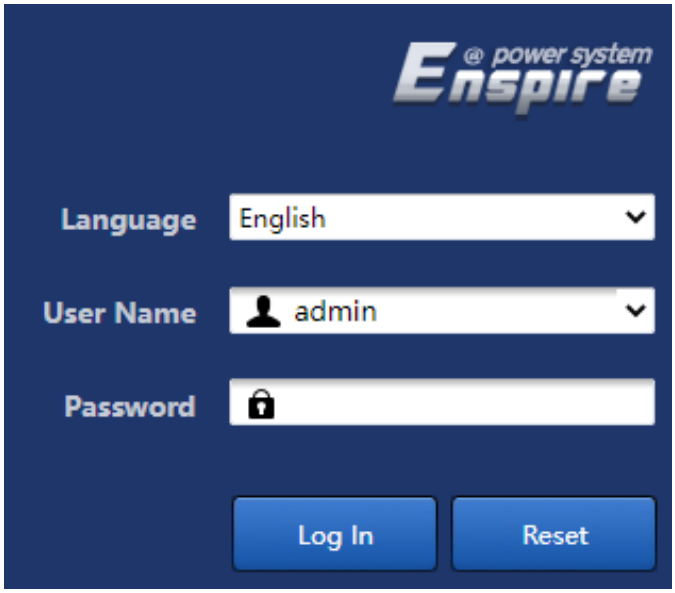
   - It is recommended that users use their own certificates. If the certificate is not replaced, the security risk warning will be displayed during each login.
   - After logging in to the WebUI, you can import a certificate under **Maintenance** > **Security Settings** > **Network Security Certificate**.
   - The imported security certificate needs to be bound to the CMU IP address. Otherwise, the security risk warning will still be displayed during login.

Figure A-3 Security risk warning



2. Specify **Language**, **User Name**, and **Password**, and click **Log In**.

Figure A-4 Login page (Initial login when the user name is displayed as admin)



NOTE

In this scenario, you need to update the software version to V800R021C10SPC020 or later.

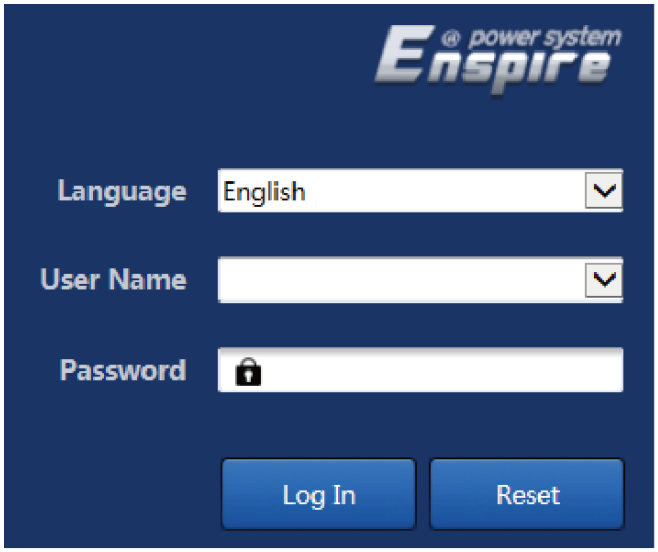
Parameter	Description
Language	Set this parameter as required.
User Name	Default value: admin
Password	– The initial password is **Changeme1234**. – Use the initial password upon first power-on and change it immediately after login. Then, use the new password to log in again.

NOTE

Updating the CMU to V800R021C10SPC020 or later:

- Method 1: Log in as admin using your new password.
- Method 2: Log in as installer using your app login password (the initial password is 00000a).

Figure A-5 Login page (Initial login when the user name is null)



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NOTE

In this scenario, the software version is V800R021C10SPC020 or later.

Parameter	Description
Language	Set this parameter as required.
User Name	Log in as installer.
Password	Set the login password as prompted.

NOTE

- Protect the password by changing it periodically, and keep it secure. If you lose the password, the device must be restored to its factory settings. Huawei will not be held liable for any losses resulting from improper password management.
- You will be locked out for 10 minutes after five failed password attempts in five minutes.
- A dialog box with recent login information is displayed after login. Click **OK**.

----End

Follow-up Procedure

If any page is blank or a menu cannot be accessed after you log in to the WebUI, clear the cache, refresh the page, or log in again.

A.2.2 Upgrading the Software Version

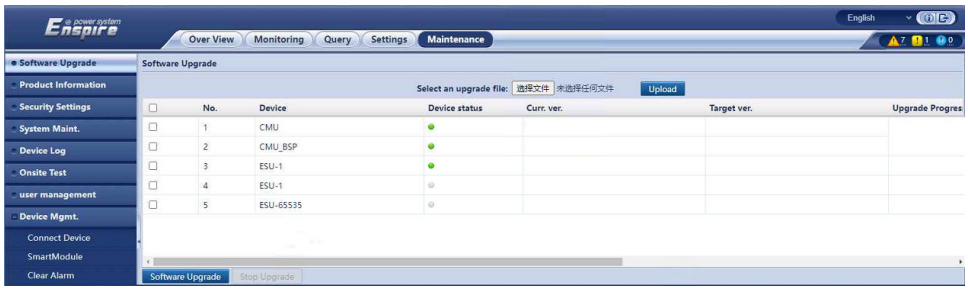
Prerequisites

- Before upgrade, check whether an ESU alarm is generated. If yes, clear the alarm by referring to the alarm handling suggestions and then perform the upgrade.
- Before upgrade, ensure that the SOC of the battery rack is greater than 30%. Otherwise, the delayed upgrade function may be triggered (only software is loaded without performing the upgrade).

Procedure

Step 1 Upgrade the software.

Figure A-6 Software upgrade



----End

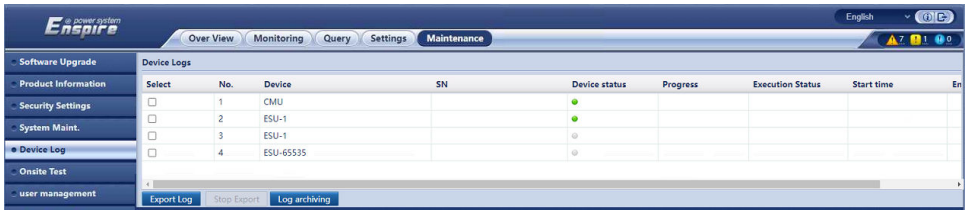
NOTE

- The **Stop Upgrade** function applies only to the devices waiting to be upgraded.
- If the system displays a message indicating that the loading is successful instead of the upgrade, the delayed upgrade function is triggered. The system automatically performs the upgrade when the conditions are met.
- If the upgrade fails, contact Huawei technical support.

A.2.3 Exporting Device Logs

Step 1 Access the device log page.

Figure A-7 Exporting logs



Step 2 Select the device whose logs are to be exported and click **Export Log**.

NOTE

Logs can be exported for a maximum of six devices of the same type at a time.

Step 3 Observe the progress bar and wait until the log export is complete.

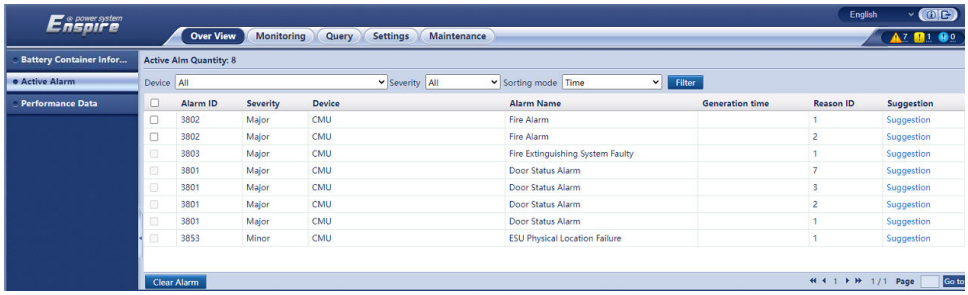
Step 4 After the export is successful, click **Log archiving** to save the logs.

----End

A.2.4 Checking Alarms

Step 1 Choose **Overview** > **Active Alarm**.

Figure A-8 Checking alarms



----End

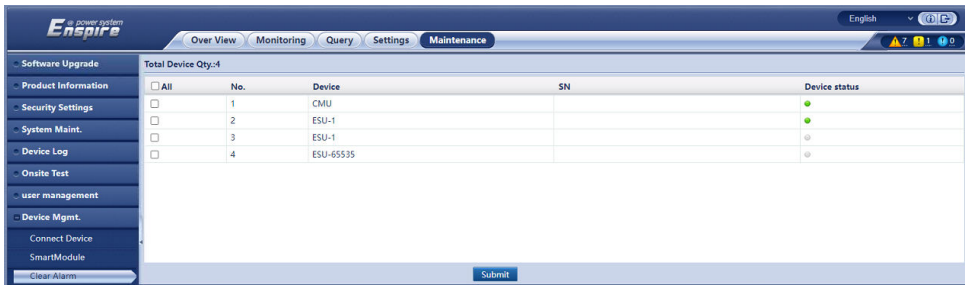
A.2.5 Clearing Alarms

You can clear all active and historical alarms for the selected device and re-collect alarm data.

Procedure

Step 1 Choose **Maintenance** > **Device Mgmt.** > **Clear Alarm**.

Figure A-9 Clearing alarms



Step 2 Select the name of the device whose alarms are to be cleared, click **Submit**, and choose **All**, **Locally synchronized alarms**, or **Alarms stored on devices** to clear alarms.

----End

NOTE

If alarms are cleared for the CMU, you must reset alarms on the management system. Otherwise, the SmartLogger cannot obtain the alarm information collected by the CMU after the alarms are cleared.

B APP Commissioning

B.1 Downloading and Installing the App

SUN2000 app: Access Huawei AppGallery and search for **SUN2000**, or scan the following QR code (or directly visit https://appgallery.cloud.huawei.com/appdl/C10279542) to download and install the app.

QR code:

B.2 Logging In to the App

Prerequisites

- The CMU has been powered on.
- The WLAN function has been enabled on your phone.
- Keep the phone within 5 m of the CMU. Otherwise, the communication quality might be poor.

Procedure

Step 1 Press and hold the **RST** button for 1s to 3s to power on the CMU's built-in WLAN module.

NOTE

- If the **ALM** indicator blinks green fast for 2 minutes and other indicators are off, the WLAN module is powered on.
- If the WLAN module is not connected to the app, the WLAN module is automatically powered off after being powered on for 4 hours.

Step 2 In the SUN2000 app, select a connection mode.

NOTE

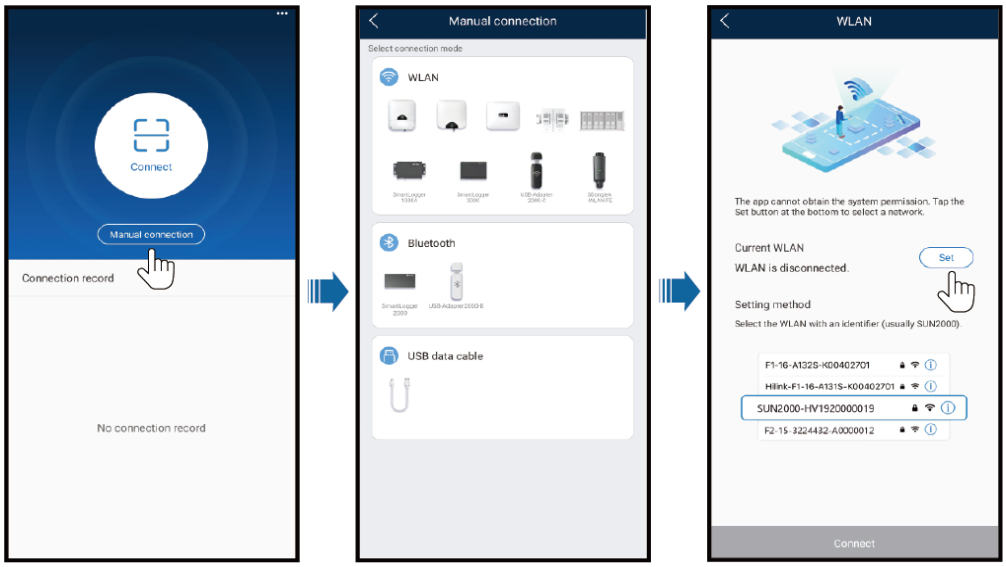
- The screenshots in this section correspond to the SUN2000 app 6.22.10.117 (Android).
- Use the initial password for the first login and change it immediately after login. To ensure account security, protect the password by changing it periodically, and keep it secure. Your password might be stolen or cracked if it is left unchanged for extended periods. If a password is lost, devices cannot be accessed. In these cases, the Company shall not be liable for any loss caused to the plant.

1. Tap **Manual connection** and select a product icon.

   NOTE

   - The CMU has a built-in WLAN module. The initial name of the WLAN hotspot is **SN of the Monitor-CMU**, and the initial password is **Changeme**.
   - If **Changeme** cannot be used for the first login, obtain the initial password from the QR code on the CMU.

   Figure B-1 Manual connection



2. Tap **Connect** and scan the QR code on the CMU.

   NOTE

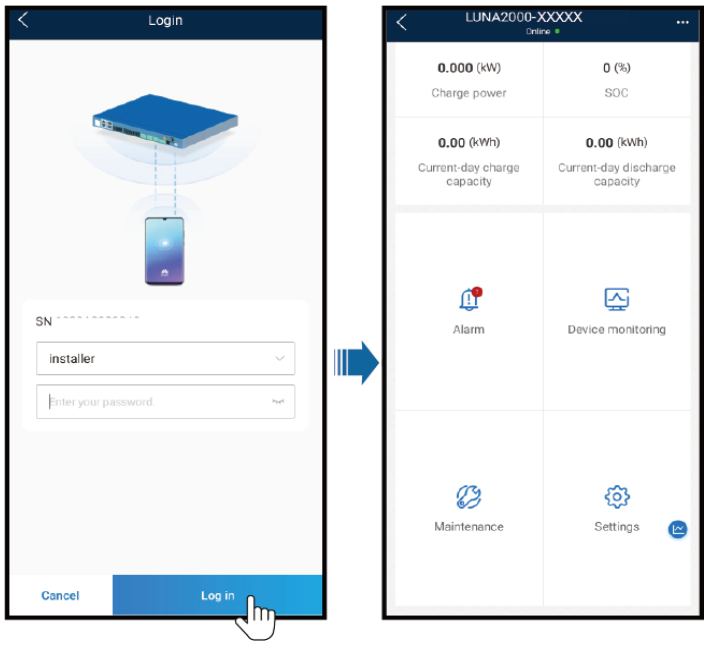
   Products delivered earlier do not support connection by scanning the QR code. In this case, manually connect the product.

Step 3 Select the login user and enter the login password. The main menu screen is displayed.

NOTICE

- When you log in to the system for the first time, set the login password. To ensure account security, protect the password by changing it periodically, and keep it secure. Your password might be stolen or cracked if it is left unchanged for extended periods. If a password is lost, devices cannot be accessed. In these cases, the Company shall not be liable for any loss caused to the plant.
- For the same username, the password for logging in to the app is the same as that for logging in to the CMU WebUI.
- You will be locked out for 10 minutes after five consecutive failed password attempts in 5 minutes.

Figure B-2 Login



----End

B.3 Change Password

Changing the WLAN Hotspot Password of a Device

Log in to the app, choose **Settings** > **Communication settings** > **Device WLAN**, and change the WLAN hotspot password of the device.

Changing the Login Password of a User

After logging in to the app, tap  in the upper right corner of the screen, and choose **Change password** to change the login password.

C Crimping an OT or DT Terminal

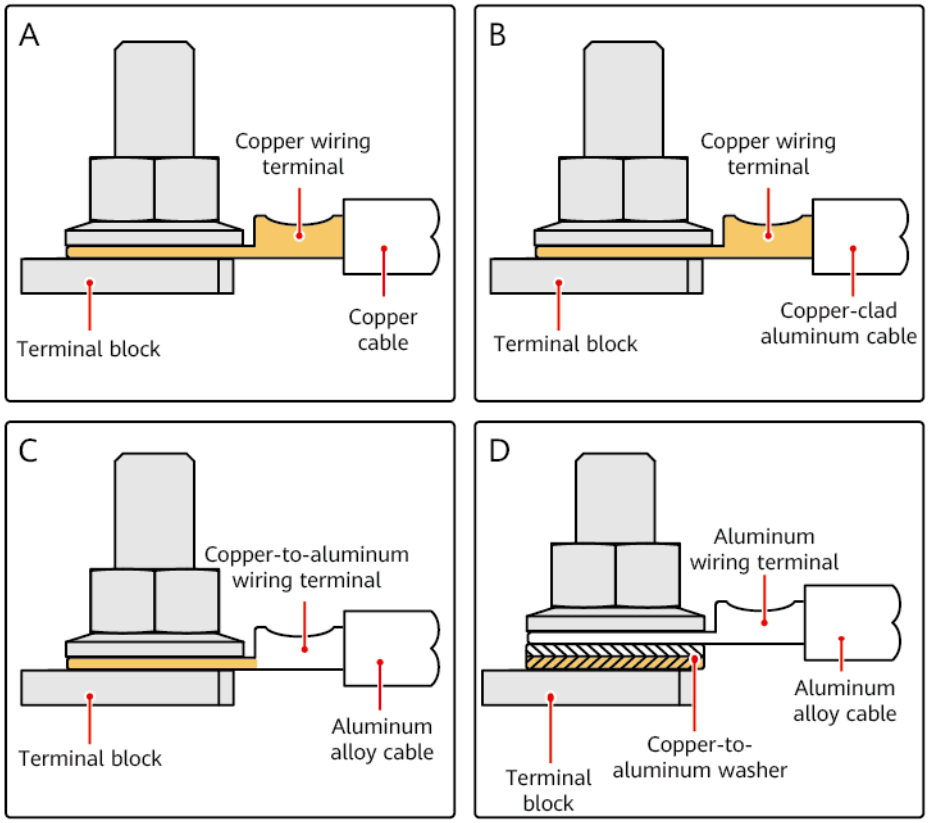
Requirements on an OT or DT Terminal

- If a copper cable is used, use copper wiring terminals.
- If a copper-clad aluminum cable is used, use copper wiring terminals.
- If an aluminum alloy cable is used, use copper-to-aluminum wiring terminals, or aluminum wiring terminals along with copper-to-aluminum washers.

NOTICE

- Do not connect aluminum wiring terminals to the terminal block. Otherwise electrochemical corrosion may occur, affecting the reliability of cable connections.
- Comply with the IEC 61238-1 requirements when using copper-to-aluminum wiring terminals, or aluminum wiring terminals along with copper-to-aluminum washers.
- Do not mix up the aluminum and copper sides of a copper-to-aluminum washer. Ensure that the aluminum side of the washer contacts the aluminum wiring terminal, and that the copper side contacts the terminal block.

Figure C-1 Requirements on an OT or DT terminal

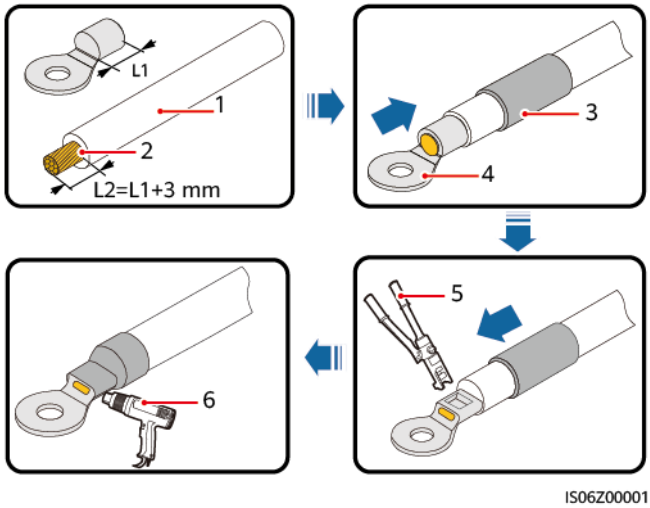


Crimping an OT or DT Terminal

NOTICE

- Avoid scratching the core wire when stripping a cable.
- The cavity formed after the conductor crimp strip of the OT or DT terminal has been crimped must wrap around the core wire completely. The core wire must make close contact with the OT or DT terminal.
- Wrap the wire crimping area with heat shrink tubing or insulation tape. The heat shrink tubing is used as an example.
- Use a heat gun carefully to avoid heat damage to the equipment.

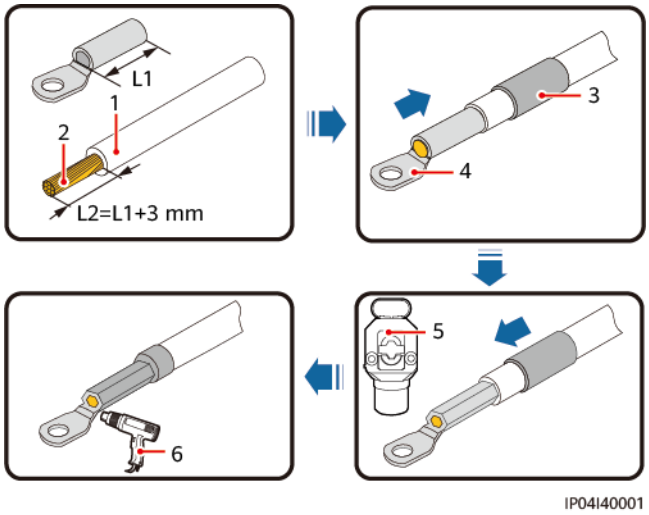
Figure C-2 Crimping an OT terminal



(1) Cable (2) Core wire (3) Heat shrink tubing

(4) OT terminal (5) Hydraulic pliers (6) Heat gun

Figure C-3 Crimping a DT terminal



(1) Cable (2) Core wire (3) Heat shrink tubing

(4) DT terminal (5) Hydraulic pliers (6) Heat gun

D How Do I Repair Paint Damage?

Prerequisites

- Do not apply paint in bad weather, such as rain, snow, strong wind, and sandstorm, when there is no shelter outdoors.
- You have prepared the required paint that matches the color palette delivered with equipment.

Paint Repair Description

The equipment appearance should be intact. If paint has flaked off, repair paint damage immediately.

NOTE

Check the paint damage on the equipment and prepare appropriate tools and materials. The number of materials depends on site requirements.

Table D-1 Paint repair description

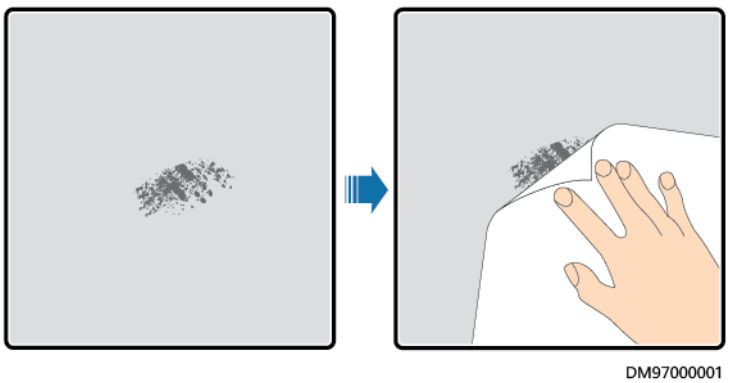
Paint Damage	Tool and Material	Procedure	Description
Slight scratch (steel base material not exposed)	Spray paint or paint, brush (required for repainting a small area), fine sandpaper, anhydrous alcohol, cotton cloth, and paint spray gun (required for repainting a large area)	Steps 1, 2, 4, and 5	1. For the color of the finish coat (acrylic acid paint), see the delivered color palette and Pantone number specified on it. 2. For a few scratches, smudges, or rust, manual paint spraying
Smudges and rust that cannot be removed			

Paint Damage	Tool and Material	Procedure	Description
Deep scratch (primer damaged, steel base material exposed)	Spray paint or paint, zinc-rich primer, brush (required for repainting a small area), fine sandpaper, anhydrous alcohol, cotton cloth, paint spray gun (required for repainting a large area)	Steps 1, 2, 3, 4, and 5	or brushing is recommended. 3. For many scratches or large-area smudges and rusts, use a paint spray gun. 4. The paint coating should be thin and even. Paint drops are prohibited on the coating. The surface should be smooth. 5. Leave the repainted area for approximately 30 minutes before performing any further operation.
Logo and pattern damage	If a logo or pattern is damaged, provide the logo size and color number. Seek help from a local supplier of advertisement coatings to formulate a repair solution based on the logo size, color, and damage.		
Dent	1. If a dent is less than or equal to 100 mm^2 in area and less than 3 mm in depth, fill the dent with Poly-Putty base and then perform the same operations as those for processing deep scratches. 2. If a dent is greater than 100 mm^2 in area or greater than 3 mm in depth, ask the local supplier for an appropriate repainting solution.		

Procedure

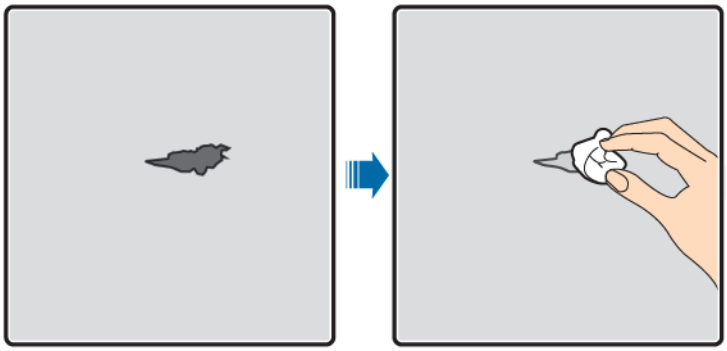
Step 1 Gently polish damaged areas using fine sandpaper to remove smudges or rust.

Figure D-1 Polishing a damaged area using sandpaper



Step 2 Dip a piece of cotton cloth into anhydrous alcohol and wipe the polished or damaged area to remove the dirt and dust. Then wipe off the anhydrous alcohol with a clean and dry cotton cloth

Figure D-2 Wiping a polished or damaged area using anhydrous alcohol



Step 3 Paint zinc-rich primer on the damaged coat using a brush or paint spray gun.

NOTICE

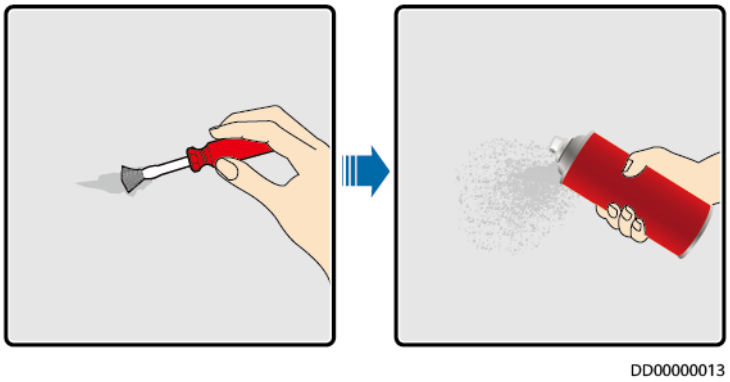
- If the base material is exposed in the area to be repaired, apply epoxy zinc-rich primer, wait until the paint has dried, and then apply acrylic acid top coat.
- Select epoxy zinc-rich primer or acrylic acid top coat with a color the same as the surface coating color of the equipment.

Step 4 Apply paint evenly to the damaged area based on the damage degree of the paint using an aerosol spray, brush, or paint spray gun until all damage traces are invisible.

NOTICE

- Ensure that the painting is thin, even, and smooth.
- In the case that an equipment pattern has different colors, to prevent undamaged areas and those with different colors as the damaged area from being contaminated during repainting, cover such areas using white paper and adhesive tape before repairing paint.

Figure D-3 Repainting a damaged area



Step 5 Wait for 30 minutes and check whether the painting meets the requirements.

NOTE

- The color of the repainted area must be consistent with that of the surrounding area. Use a colorimeter to measure the color difference, which should be less than or equal to 3 (ΔE ≤ 3). If a colorimeter is unavailable, ensure that there is no visible edge between the repainted area and the surrounding area. The paint should be free of bulges, scratches, flaking, or cracks.
- If you choose to spray paint, it is recommended that you spray paint three times before checking the result. If the color does not meet the requirements, paint more times until the painting meets the requirements.

----End

Paint Supply Information

Table D-2 Paint requirements

Item	Requirement
Primer thickness	60 μm
Intermediate coat thickness	120 μm
Top coat thickness	60 μm
Primer type	Epoxy zinc-rich paint
Intermediate coat type	Zinc-rich paint
Color number of the top coat	Obtain the color number based on the color palette delivered with the product.

NOTE

The following is a paint model list provided by Huawei. The list may be updated from time to time and is for reference only. The cost of paint and technical services is subject to the local pricing standards.

Supplier	Position	Paint Model
Hempel	Equipment surface painting	Zinc-rich primer for pretreatment: HEMPADUR ZINC (shopprimer) 1536C/19830 Zinc-rich primer for the entire container: HEMPADUR ZINC (on line) 1536C/19830 Intermediate coat: HEMPADUR FAST DRY 15560/12170 Top coat: HEMPATHANE 55210/17630 (RAL9003)
	Logo	Red: HEMPATHANE 55210/57200 (RAL3020) Black: HEMPATHANE 55210-19990 (RAL9005)
CMP	Equipment surface painting	Zinc-rich primer for pretreatment: EPICON ZINC SC B-2 M (SHOP PRIMER) Zinc-rich primer for the entire container: EPICON ZINC SC B-2 M (ON LINE ZINC) Intermediate coat: EPICON SC PRIMER GREY CSC-9107 Top coat: UNYMARINE SC FINISH WHITE CSC-9205 (RAL-9003)
	Logo	Red: UNYMARINE SC MARKING RAL-3020 Black: UNYMARINE SC MARKING RAL-9005

E Contact Information

If you have any questions about this product, please contact us.

Table E-1 Customer service contact information

Region	Country/ Region	Email	Tel
Europe	France	eu_inverter_support@huawei.com	0080033888888
	Germany		
	Spain		
	Italy		
	United Kingdom		
	Netherlands		
	Others	For details, visit solar.huawei.com.	
Asia Pacific	Australia	eu_inverter_support@huawei.com	1800046639
	Türkiye	eu_inverter_support@huawei.com	-
	Malaysia	apsupport@huawei.com	0080021686868 /1800220036
	Thailand		(+66) 26542662 (charged at local call rates)
			1800290055 (free in Thailand)
	China	solarservice@huawei.com	400-822-9999
	Others	apsupport@huawei.com	0060-3-21686868

Region	Country/ Region	Email	Tel
Japan	Japan	solarsupportjp@huawei.com	0120258367
India	India	indiaenterprise_TAC@huawei.com	1800 103 8009
South Korea	South Korea	koreainverter@huawei.com	-
North America	United States	eu_inverter_support@huawei.com	1-877-948-2934
	Canada	eu_inverter_support@huawei.com	1-855-482-9343
Latin America	Mexico	la_inverter_support@huawei.com	018007703456 /0052-442-4288288
	Argentina		0-8009993456
	Brazil		0-8005953456
	Chile		800201866 (only available on fixed-line)
	Others		0052-442-4288288
Middle East and Africa	Egypt	eu_inverter_support@huawei.com	08002229000 /0020235353900
	United Arab Emirates		08002229000
	South Africa		0800222900
	Saudi Arabia		8001161177
	Pakistan		0092512800019
	Morocco		0800009900
	Others		0020235353900

NOTE

EU Representative Information: Huawei Technologies Hungary Kft.
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Email: hungary.reception@huawei.com

F Acronyms and Abbreviations

B	
BCU	Battery Control Unit
BMU	Battery Monitoring Unit
C	
CMU	Central Monitoring Unit
E	
ESS	Smart String Energy Storage System
ETH	Ethernet
ESU	Energy Storage Unit
ESC	Smart Rack Controller
ESR	Battery Rack
ESM	Battery Pack
L	
LCD	Liquid Crystal Display

P	
PSU	Power Supply Unit
PCS	Smart PCS
S	
SACU	Smart Array Controller
SMU	Site monitoring unit
STS	Smart Transformer Station
T	
TCU	Temperature Control Unit

