LUNA2000-2.0MWH and 1.0MWH Series Smart String ESS

Maintenance Manual

Issue	11
Date	2023-11-01

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About This Document

Purpose

This document describes the routine maintenance, troubleshooting, and parts replacement of the LUNA2000-2.0MWH-1H0, LUNA2000-2.0MWH-2H0, LUNA2000-2.0MWH-1H1, LUNA2000-2.0MWH-2H1, LUNA2000-2.0MWH-4H1, LUNA2000-1.0MWH-1H1 LUNA2000-1.0MWH-ES1H1 and LUNA2000-2.0MWH-HE2H1 smart string energy storage system (ESS). Before maintaining the energy storage system (ESS), read this document carefully to understand the safety information and get familiar with the ESS functions and features.

Intended Audience

This document is intended for photovoltaic (PV) 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.

Symbol	Description
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 (2023-11-01)

Updated **2.2.1 Powering Off a Single ESS**.

Updated **2.2.2 Powering Off ESSs Connected to the Same DC Bus**.

Updated **6.1 Replacing a Battery Pack (Using a Truss-based Kit)**.

Updated **6.2 Replacing a Battery Pack (Using a Forklift-based Kit)**.

Updated **6.4.4 Replacing an Air Conditioner in the Battery Cabin**.

Updated **7.1.4 Replacing an Air Conditioner in the Control Unit Cabin**.

Add **7.2 Replacing a CMU (Automatic Configuration File Backup)**.

Updated **7.3 Replacing a CMU (Mannual Configuration File Backup)**.

Updated **8.1.2 Replacing a Smart Rack Controller (Using a Truss-based Kit)**.

Updated **8.1.3 Replacing a Smart Rack Controller (Using a Forklift-based Kit)**.

Issue 10 (2023-6-30)

Updated **2.5 Semi-annual Maintenance**.

Updated **7.13 Replacing an Extinguishant Start/Abort Button**.

Updated **8.1.2 Replacing a Smart Rack Controller (Using a Truss-based Kit)**.

Updated **8.1.3 Replacing a Smart Rack Controller (Using a Forklift-based Kit)**.

Issue 09 (2023-04-28)

Updated **1.3 Environment Requirements**.

Updated **2 Routine Maintenance**.

Updated **2.4 Quarterly Maintenance**.

Updated **6 Replacing Devices in the Battery Cabin**.

Updated **7 Replacing Devices in the Control Unit Cabin**.

Updated **9 Emergency Handling**.

Issue 08 (2023-01-06)

Updated **1 Safety Information**.

Updated **9 Emergency Handling**.

Issue 07 (2022-12-15)

Updated **1 Safety Information**.

Updated **2.4 Quarterly Maintenance**.

Updated **2.5 Semi-annual Maintenance**.

Updated **8.1.2 Replacing a Smart Rack Controller (Using a Truss-based Kit)**.

Issue 06 (2022-10-15)

Updated **2.6 Annual Maintenance**.

Updated **5 Introduction to Engineering Installation Kits**.

Updated **6.1 Replacing a Battery Pack (Using a Truss-based Kit)**.

Updated **6.3 Replacing a Battery Management Module**.

Updated **6.4.4 Replacing an Air Conditioner in the Battery Cabin**.

Issue 05 (2022-08-30)

Updated **2.2 Powering off the ESS**.

Added **7.30 Replacing the 227M38UFAA/SPS020-MS-032B-EN Fire Cylinder**.

Added **10.6 How Do I Reset the Extinguishant Control Panel?**.

Issue 04 (2022-06-08)

Updated **2.1 Preparations Before Maintenance**.

Issue 03 (2022-05-26)

Updated **1 Safety Information**.

Updated **2.6 Annual Maintenance**.

Updated **2.7 Other Maintenance**.

Added **3 Troubleshooting**.

Updated **6.1 Replacing a Battery Pack (Using a Truss-based Kit)**.

Updated **6.3 Replacing a Battery Management Module**.

Updated **6.5 Replacing a Battery Rack Circuit Breaker in the Battery Cabin**.

Updated **6.7 Replacing an Airflow Fan**.

Updated **6.10 Replacing a CO Sensor**.

Updated **6.11 Replacing a Temperature and Humidity Sensor (T/H Sensor)**.

Updated **7.3 Replacing a CMU (Mannual Configuration File Backup)**.

Updated **7.5 Replacing a CMU Adapter**.

Updated **7.20 Replacing an Exhaust Controller**.

Updated **8.1.2 Replacing a Smart Rack Controller (Using a Truss-based Kit)**.

Added **10.5 How Can I Export Device Logs from the CMU/SmartLogger3000?**.

Issue 02 (2021-12-30)

Updated **1 Safety Information**.

Updated **5 Introduction to Engineering Installation Kits**.

Updated **6.1 Replacing a Battery Pack (Using a Truss-based Kit)**.

Updated **6.8 Replacing a Smoke Detector**.

Updated **6.9 Replacing a Heat Detector**.

Updated **7.1.4 Replacing an Air Conditioner in the Control Unit Cabin**.

Updated **7.13 Replacing an Extinguishant Start/Abort Button**.

Updated **7.14 Replacing a Fire Alarm Horn/Strobe**.

Updated **7.15 Replacing a Extinguishant Release Indicator**.

Updated **7.16 Replacing an Extinguishant Control Panel (Model: K11031M2)**.

Updated **8.1.2 Replacing a Smart Rack Controller (Using a Truss-based Kit)**.

Issue 01 (2021-11-15)

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 shall 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.

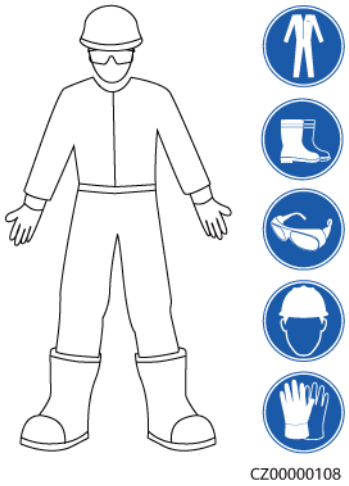
DANGER

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

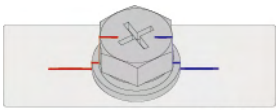
For the equipment that needs to be grounded, install the ground cable first when installing the equipment and remove the ground cable last when removing the equipment.

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 must cross the edges of the bolts.)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- 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.

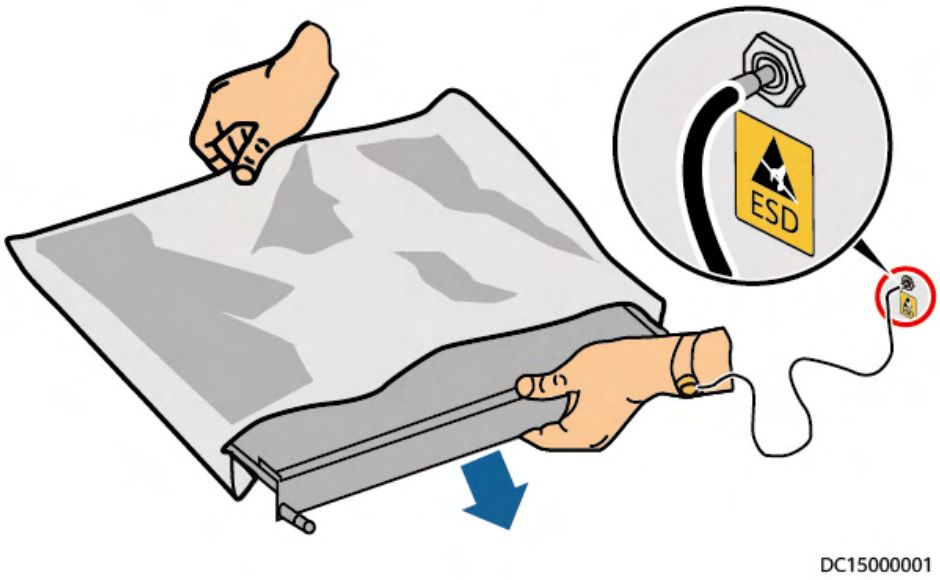
ESD

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

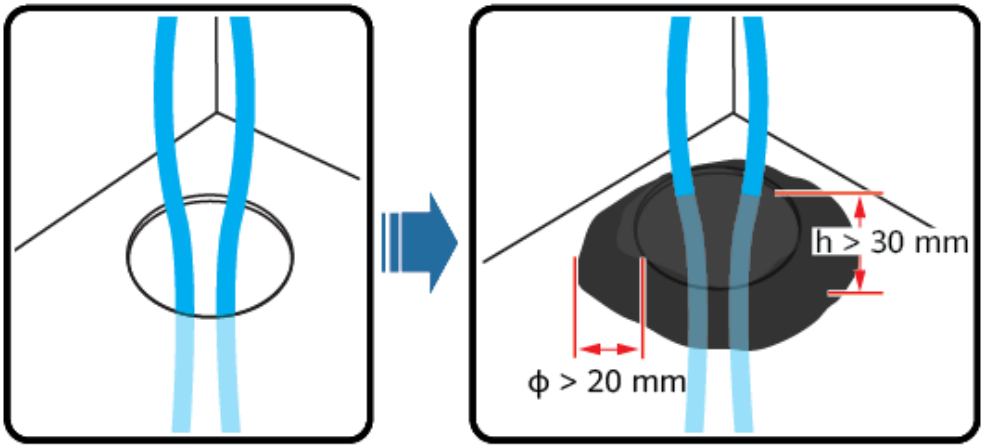
To prevent damage or fire due to high temperature, ensure that the ventilation vents or heat dissipation systems are not obstructed or covered by other objects while the equipment is running.

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 must 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

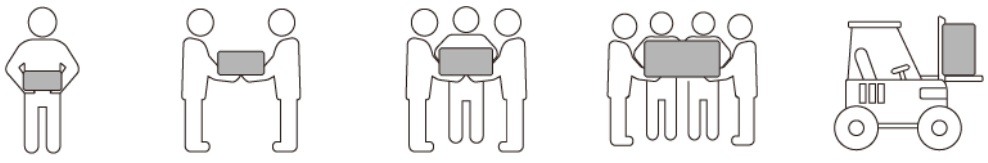
Do not drill holes into the equipment. Doing so may affect the sealing performance and electromagnetic containment of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

General Requirements

- Repaint any paint scratches caused during equipment transportation or installation in a timely manner. Equipment with scratches must not 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.

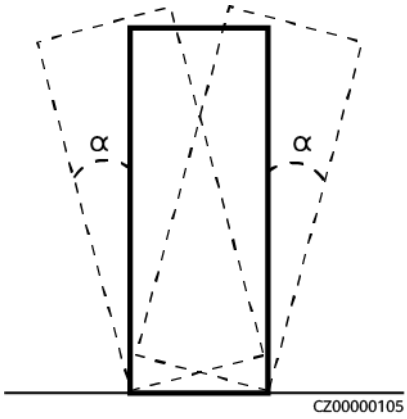
Moving Heavy Objects

- 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. Do not transport the equipment by railway or air. Avoid tilt or jolt during transportation.
- The tilt angle of the ESS shall meet the requirements shown in the figure: $\alpha \leq 5°$.



Working at Heights

- Any operations performed 2 m or higher above the ground shall 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 shall 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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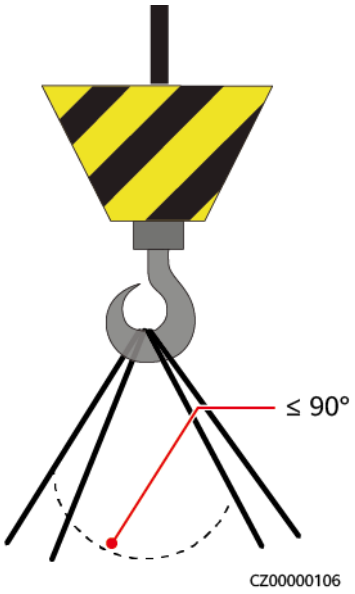
- When climbing up the ladder, keep your body stable and your center of gravity between the side rails, and do not overreach to the sides.
- When a step ladder is used, ensure that the pull ropes are secured.

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 shall not 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. You are advised not to 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, put them in the original packaging and 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.
- Do not install battery packs on rainy, snowy, or foggy days. Otherwise, the battery packs may be corroded by moisture or rain.
- 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 a battery pack, check that its enclosure is not deformed or damaged.
- 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. If 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 Routine Maintenance

⚠ CAUTION

Safety requirements in maintenance and repair:

- Before connecting or removing cables, turn off the protection switch of the corresponding loop.
- Place a warning sign indicating that the switch must not be turned on at the position where the switch resides.
- Use an electroscope of a proper voltage level to check whether the equipment is energized and ensure that the equipment is completely powered off.
- If charged bodies are found nearby, block or wrap them with insulation plates or insulation tapes.
- Before performing maintenance or repair, securely connect the loop to be repaired to the main ground loop using a ground cable.
- After the maintenance or repair is complete, remove the ground cable between the loop that has been maintained and the main ground loop.

NOTICE

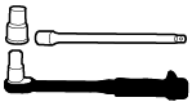
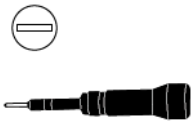
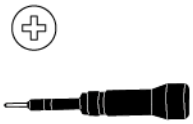
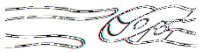
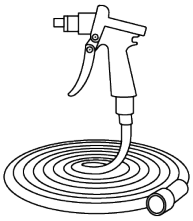
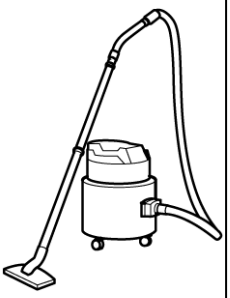
- In sandstorm-stricken areas such as deserts and Gobi, use dustproof devices during maintenance.
- After each maintenance is complete, you are advised to use cordless vacuum cleaners to clean up sand and dust inside the ESS. Once the cleaning is complete, close the cabin doors.

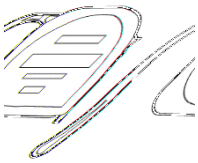
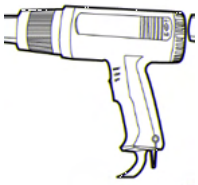
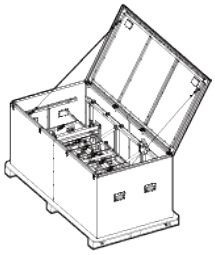
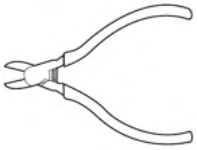
2.1 Preparations Before Maintenance

Preparing Tools

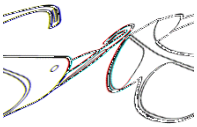
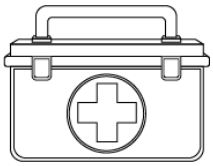
⚠ CAUTION

Use insulated tools or take insulation measures for tools such as socket wrenches, torque wrenches, and screwdrivers.

 Insulated torque socket wrench (including an extended socket)	 Insulated torque socket wrench (including an extension bar)	 Flat-head insulated torque screwdriver	 Phillips insulated torque screwdriver
 Cable cutter	 Multimeter	 Rubber mallet	 Utility knife
 High pressure water gun	 Insulation ladder	 Vacuum cleaner	 Cable tie

 Marker	 Steel measuring tape	 Digital or bubble level	 Hydraulic pliers
 Heat-shrink tubing	 Heat gun	 Maintenance tooling	 Open-end wrench
 Diagonal pliers	-	-	-

Personal Protective Equipment (PPE)

 Insulated gloves	 Protective gloves	 Safety goggles	 Dust mask
 Safety shoes	 Reflective vests	 Safety helmets	 Medical kit

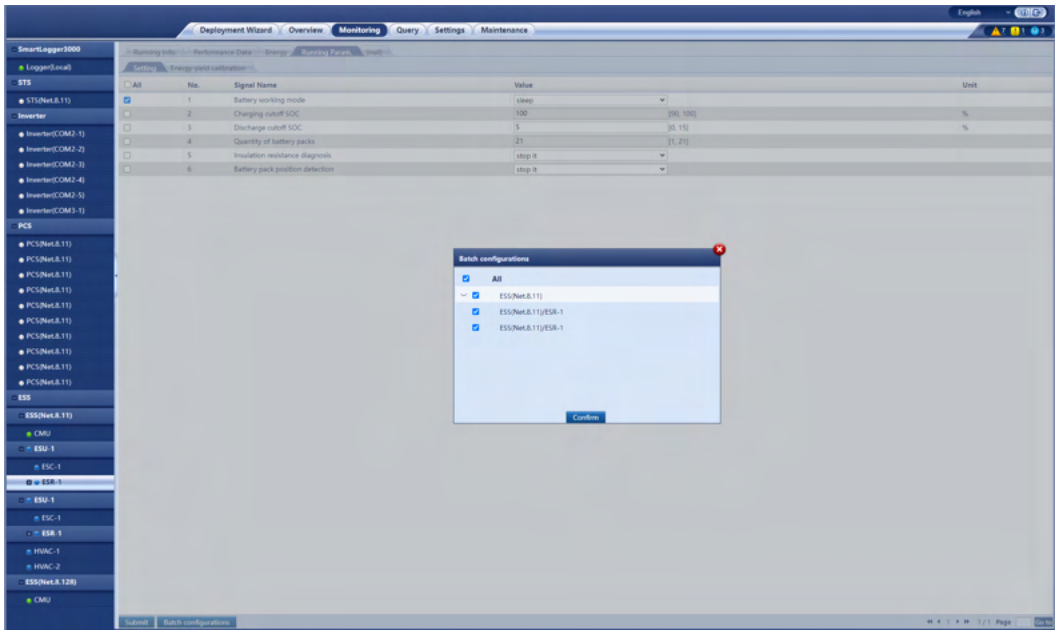
 Safety belt	-	-	-

2.2 Powering off the ESS

2.2.1 Powering Off a Single ESS

Step 1 Log in to the SmartLogger WebUI, click **Monitoring** and then click **ESR**. Choose **Running Param.** > **Setting**, set **Battery working mode** to **sleep**, click **Batch configurations**, select the ESS to be shut down, and send a shutdown command.

Figure 2-1 Shutting down the ESS



Step 2 Turn off all battery rack circuit breakers in battery cabins.

NOTE

For details about the positions of circuit breakers, see the ESS power-on section in the corresponding user manual.

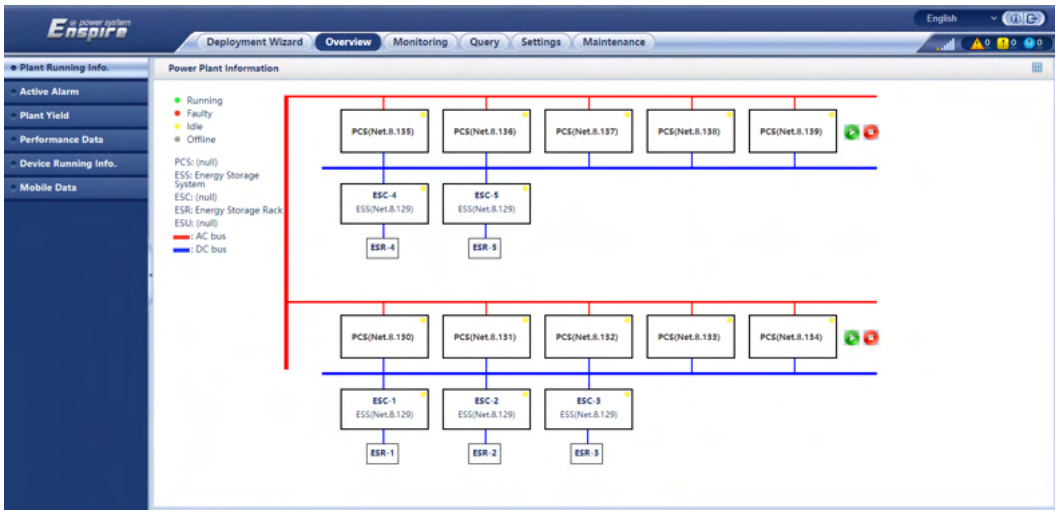
Step 3 Turn off all DC circuit breakers in the control unit cabin.

----End

2.2.2 Powering Off ESSs Connected to the Same DC Bus

Step 1 Log in to the SmartLogger WebUI, choose **Overview** > , and click to send a batch shutdown command to the ESSs connected to the same DC bus.

Figure 2-2 Batch shutdown of the ESSs connected to the same DC bus



Step 2 Turn off the battery rack circuit breakers in the battery cabins of all ESSs connected to the same DC bus.

Step 3 Turn off all DC circuit breakers in the control unit cabins of all ESSs connected to the same DC bus.

----End

2.3 Unscheduled Maintenance

Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/SmartPVMS and check whether there are major or minor alarms.

NOTE

For details, see the software user manuals.

2.4 Quarterly Maintenance

Table 2-1 Quarterly maintenance checklist

Maintenance Category	Maintenance Action	Expected Result	System Powered Off or Not
Container	Visual inspection: • Appearance • Rust condition • Door lock • Ventilation vent[1]	• The coating is not peeling or scratched. • There is no obvious paint peeling or rust. • The door locks are not damaged. • There is no dust and foreign objects at the ventilation vents. • There are no insects, rodents, snakes and other animals.	No
Adapter	Check the indicator status.	The indicator is steady green.	No
Smart Rack Controller cabin	Check whether there are foreign objects in the Smart Rack Controller cabin.	The cabin is clean and free from foreign objects.	No
Note [1]: Maintain the ventilation vents once after each sandstorm.			

2.5 Semi-annual Maintenance

Table 2-2 Semi-annual maintenance checklist

Maintenance Category	Maintenance Action	Expected Result	System Powered Off or Not
Air conditioner	• Check the appearance. • Remove and clean the filter[1]. • Clean the condenser[2]. • Clean the external fan[3].	• There is no obvious damage to the appearance. • There is no obvious paint peeling or rust. • The screws are secured. • The fan rotates properly without abnormal sound. Its surface is clean without sand, dust or foreign object. • The filter is clean and not blocked. • The condenser is not blocked.	No

Note [1]: Monthly maintenance is recommended in a high-temperature (≥ 35°C) or low-temperature (≤ 0°C) environment. The first maintenance interval starts when the ESS is installed.

Note [2]: You are advised to clean the condenser after each occurrence of a sandstorm and before summer in sandstorm-stricken areas. In other areas, clean the condenser according to the actual situation and ensure that the filter and condenser are not blocked. You are advised to use a high-pressure water gun or air blow gun. For a high-pressure water gun, the pressure shall be less than or equal to 30 kPa, the flow rate shall be less than or equal to 12.5 L/min, and the recommended working distance is 2.5 m to 3 m. For a high-pressure air blow gun, the recommended working distance is 0.5 m to 1 m.

Note [3]: You are advised to clean the fan once a quarter in areas with heavy sandstorm and dust. In other areas, clean the fan according to the actual situation and ensure that there is no sand or dust on the fan blades of the air conditioner. To clean the fan blades, you need to remove the front cover of the air conditioner. You are advised to use a dust brush or a high-pressure air blow gun and meet the corresponding requirement in Note [2].

2.6 Annual Maintenance

Product Maintenance

Before power-off, check that the fan of the battery pack rotates properly and generates no abnormal sound.

Table 2-3 Annual maintenance checklist

Maintenance Category	Maintenance Action	Expected Result	System Powered Off or Not
Battery pack	Visual inspection: • Appearance • Rust condition • Screw • Front panel ventilation vent • Color of the copper bar connection point	• There is no obvious damage to the appearance. • There is no obvious paint peeling or rust. • The screws are secured. • The front panel vent is clean and free from blockage. • The copper bar does not change color.	Yes. Power off ESSs connected to the same DC bus.
Smoke detector and heat detector	Spot check the detectors using dedicated devices to generate smoke or heat. [1][2]	• The detector indicator is steady red. • The extinguishant control panel reports the corresponding alarm.	Power off a single ESS. In the ESS, the battery rack DC circuit breakers of battery cabins are OFF, and the DC circuit breakers of the control unit cabin are OFF. The AC auxiliary power supply is not powered off.

Maintenance Category	Maintenance Action	Expected Result	System Powered Off or Not
extinguishant control panel	• Check the working status of devices in the extinguishant control panel such as display and indicators. • Clean the extinguishant control panel as required. • Perform the self-check for the solenoid valve and LLVD.	• The display is normal. • The text on the maintenance card is correct and clear. The extinguishant control panel is clean and free from dust. • The alarm and response of the extinguishant control panel are normal.	Power off a single ESS. In the ESS, the battery rack DC circuit breakers of battery cabins are OFF, and the DC circuit breakers of the control unit cabin are OFF. The AC auxiliary power supply is not powered off.
Extinguishant control panel power supply	• Appearance of backup batteries.[3] • Test the automatic switchover of the main and standby power supply.[4]	• The batteries are not deformed, damaged, or leaking. • The standby power supply can start automatically and support the extinguishant control panel and terminal devices to work for at least 30 minutes.	No
Fire cylinder[5]	Check the pressure gauge on the fire cylinder.	All components are free from collision, deformation, or other mechanical damage, the surfaces are free from rust, and the protective layer is intact. For the range of the pressure gauge, see the **Table2 Pressure requirements under different ambient temperatures**.	No

Note [1]: Remove cables from the solenoid valve in advance to prevent extinguishant release.

Note [2]: After the check is complete, perform a reset on the extinguishant control panel.

Note [3]: Annual maintenance is performed for new batteries in the first two years. Quarterly maintenance is performed from the third year until the batteries are replaced with new ones.

Note [4]: The ESS shuts down during switchover of the main and standby power supply.

Note [5]: Comply with local regulations or standards when using the fire cylinder.

Table 2-4 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.				

Environment Maintenance

Check whether the site environment meets requirements by referring to section "Site Selection Requirements" in the user manual.

2.7 Other Maintenance

2.7.1 Torque Check for the Battery Pack Copper Bar

After the initial power-on, check the torque of the battery pack copper bar in the first, sixth, and twelfth months.

Step 1 Power off the ESS.

Step 2 Verify the torque of the nuts with a torque wrench set to 27 N·m.

----End

2.7.2 Self-Check for the Solenoid Valve and LLVD

Fire Cylinder Models: 40 L cabinet-type, 227M38UFAA, SPS020-MS-032B-EN, NCM38UFAA

Step 1 Loosen the solenoid valve power plug with a flat-head screwdriver.

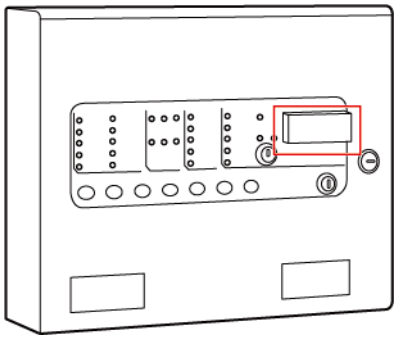
Figure 2-3 Loosening the solenoid valve power plug

Step 2 Rotate the solenoid valve counterclockwise to remove it from the fire cylinder.

Figure 2-4 Removing the solenoid valve

Step 3 Open the cover and press the emergency start button on the extinguishant control panel.

Figure 2-5 Extinguishant control panel start button



Step 4 When the countdown ends, check whether the solenoid ejector pin is ejected for 7 to 10 seconds. If the solenoid ejector pin is not ejected, contact technical support.

Step 5 Log in to the CMU and check whether alarms 3802 **Fire Alarm** and 3842 **ESU Communication Failure** are generated. If the alarms are not generated, contact technical support.

Step 6 Check that no **LLVD Contactor Fault** alarm is generated on the SMU. If the alarm is generated, contact technical support.

Step 7 After verification, reset the extinguishant control panel, screw the solenoid valve clockwise onto the cylinder, and connect the solenoid valve base to the plug. Secure the plug to 0.5 N·m with an M3 flat-head screwdriver.

Step 8 Check that the CMU and SMU alarms are cleared.

----End

Fire Cylinder Model: P0009438

Step 1 Remove the nut from the mechanical part where the solenoid valve driver is located and remove the upper washer.

Step 2 Remove the nut from the solenoid valve driver on the fire cylinder, remove the solenoid valve driver, insert the solenoid valve driver into the bolt of the mechanical part, and secure the solenoid valve driver to a torque of 3–4 N·m using the upper washer and nut.

Step 3 Open the cover and press the emergency start button on the extinguishant control panel.

Step 4 When the countdown ends, check whether the solenoid ejector pin is ejected for 7 to 10 seconds. If the solenoid ejector pin is not ejected, contact technical support.

Step 5 Log in to the CMU and check whether alarms 3802 **Fire Alarm** and 3842 **ESU Communication Failure** are generated. If the alarms are not generated, contact technical support.

Step 6 Check that no **LLVD Contactor Fault** alarm is generated on the SMU. If the alarm is generated, contact technical support.

Step 7 After the check is complete, reset the extinguishant control panel. Install the solenoid valve driver on the fire cylinder bolt, and tighten the nut to a torque of 6 N·m.

Step 8 Check that the CMU and SMU alarms are cleared.

----End

2.7.3 Checking the Fire Cylinder

NOTE

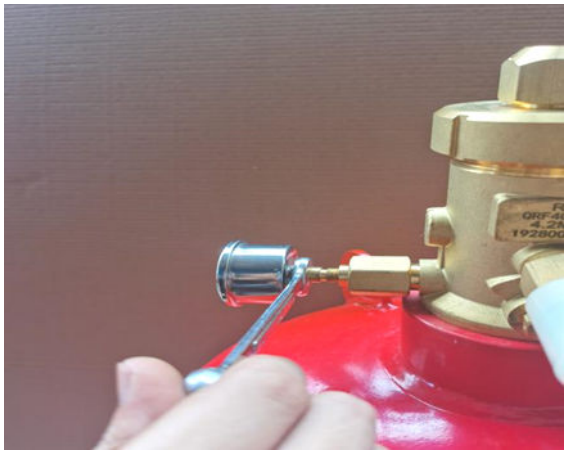
This section is applicable to a 40 L cabinet-type fire cylinder.

Step 1 Check the exterior: All components are free from collision, deformation, and other mechanical damage. The surface is free from rust and the protective layer is intact.

Step 2 Check the pressure of the fire cylinder.

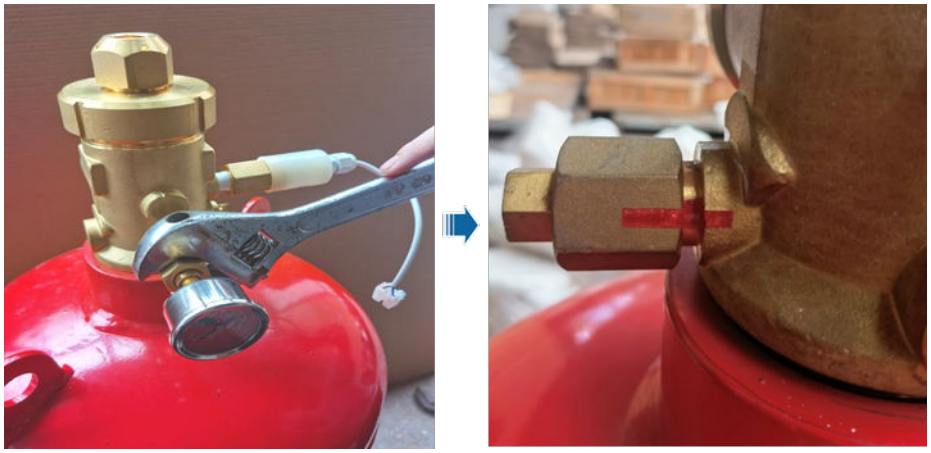
1. Check whether the pressure gauge is tightened. If not, tighten it using the wrench delivered with the fire cylinder.

Figure 2-6 Tightening the pressure gauge



2. Use the adjustable wrench delivered with the fire cylinder to rotate the large hex nut on the valve counterclockwise until the red line is aligned (less than one circle). Ensure that the pressure gauge has readings.

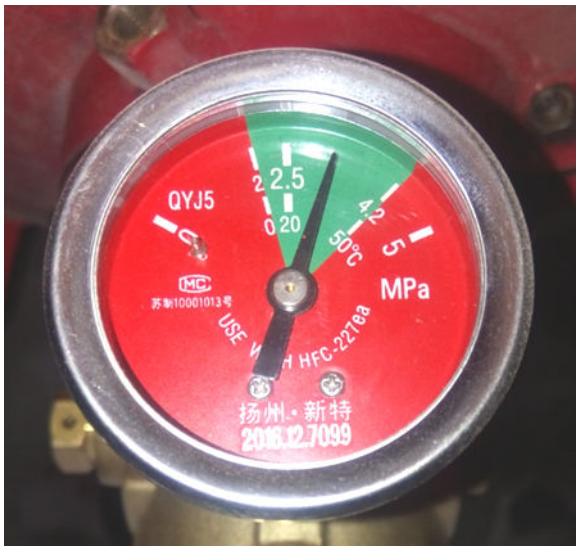
Figure 2-7 Aligning with the red line



3. If the pressure reading falls within the green range, it indicates that the pressure in the device is within normal limits. If the pressure reading falls

outside the green range, return the fire cylinder to the manufacturer for inspection.

Figure 2-8 Pressure reading



4. Use the adjustable wrench delivered with the fire cylinder to tighten the large hex nut on the valve clockwise until the white line is aligned. Tighten the hex nut to prevent long-term pressure leakage.

Figure 2-9 Aligning with the white line

----End

2.7.4 Checking the Backup Lead-Acid Batteries of the Extinguishant Control Panel

NOTE

Perform either step 3 or step 4.

Step 1 Check that the batteries are not deformed, damaged, or leaking.

Step 2 Power off the system, power off the extinguishant control panel, and remove battery cables.

Step 3 (Optional) If you use a multimeter to measure the battery terminal voltage, the voltage must be greater than or equal to 12.6 V. If the voltage does not meet the requirement, replace the battery.

Step 4 (Optional) If you use a battery capacity tester or multifunction tester, the remaining battery lifespan or state of health (SOH) must be greater than or equal to 50%. If the lifespan or SOH does not meet the requirement, replace the battery.

NOTE

A battery capacity detector with the constant current discharge function is recommended. Set the end-of-discharge voltage to 10.5 V and discharge current rate to less than or equal to 1C. Discharge capacity = Constant discharge current (A) x Discharge time (h), Remaining SOH = Discharge capacity/Rated capacity

----End

3 Troubleshooting

Symptom	Possible Cause	Solution
1. The AC main switch 1QA is trip-free. 2. The PSU AC input switch 6FCB1 is OFF.	• A PSU is faulty. • The embedded power subrack is faulty.	1. Turn off all switches in the power distribution system of the ESS. For details, see the section about powering off the ESS in the ***LUNA2000-2.0MWh Series Smart String Energy Storage System User Manual***. 2. Ensure that the AC main switch 1QA is OFF, and turn on the PSU AC input switch 6FCB1. 3. Check for short circuit between the input terminals (L1, L2, L3, and N) of the PSU loop using a multimeter. • If a short circuit occurs, the embedded power subrack is faulty. Contact the Company's technical support. • If no short circuit occurs, a PSU is faulty. To locate the faulty PSU, perform the following steps: 4. Turn off the PSU AC input switch 6FCB1. 5. Turn on the AC main switch 1QA and the PSU AC input switch 6FCB1. The PSU will not be started and the indicators will be off if the PSU is faulty. 6. Turn off the PSU AC input switch 6FCB1 and the AC main switch 1QA. Replace or remove the faulty PSU. 7. Turn on all switches of the power distribution system of the ESS. For details, see the section about powering on the ESS in the ***LUNA2000-2.0MWh Series Smart String Energy Storage System User Manual***.

Symptom	Possible Cause	Solution
		8. Check the running status of the system and ensure that the functions are restored.

Troubleshooting the Fire Suppression System (K11031M2 Extinguishant Control Panel)

Symptom	Alarm	Possible Cause	Solution
Smoke detector fault		1. The circuit is short-circuited or disconnected.	Use a multimeter to measure the resistance between terminals ZONE1+ and ZONE1– after power-off. Check whether the circuit is short-circuited. It is short-circuited if the measured resistance is 0 Ω. Check whether the circuit is disconnected. It is disconnected if the measured resistance is OL MΩ.
		2. The 6.8 kΩ termination resistor is not securely connected.	Use a multimeter to measure the resistance between terminals ZONE1+ and ZONE1– after power-off. If the measured resistance is OL MΩ, the smoke detector is disconnected. Check whether the resistor is securely connected.

Symptom	Alarm	Possible Cause	Solution
		3. The termination resistor is not a 6.8 kΩ resistor.	Use a multimeter to measure the resistance between terminals ZONE1+ and ZONE1– after power-off. If the resistance is not 6.8 kΩ, replace the existing resistor with a 6.8 kΩ termination resistor.
		4. The device is damaged.	Replace the device.
Heat detector fault		1. The circuit is short-circuited or disconnected.	Use a multimeter to measure the resistance between terminals ZONE2+ and ZONE2– after power-off. Check whether the circuit is short-circuited. It is short-circuited if the measured resistance is 0 Ω. Check whether the circuit is disconnected. It is disconnected if the measured resistance is OL MΩ.

Symptom	Alarm	Possible Cause	Solution
		2. The 6.8 kΩ termination resistor is not securely connected.	Use a multimeter to measure the resistance between terminals ZONE2+ and ZONE2– after power-off. If the measured resistance is OL MΩ, the heat detector is disconnected. Check whether the resistor is securely connected.
		3. The termination resistor is not a 6.8 kΩ resistor.	Use a multimeter to measure the resistance between terminals ZONE2+ and ZONE2– after power-off. If the resistance is not 6.8 kΩ, replace the existing resistor with a 6.8 kΩ termination resistor.
		4. The device is damaged.	Replace the device.
Extinguishant abort button status indication		1. Button pressing status: The feedback is normal.	Check whether button is pressed.
		2. If an alarm is reported when the button is not pressed, the possible cause is that the resistor of pins 1 and 3 is not a 470 Ω resistor.	Use a multimeter to measure the resistance between terminals Hold+ and Hold– on the extinguishant control panel. If the resistance is not in the range of 460–470 Ω, replace the existing resistor with a 470 Ω resistor.

Symptom	Alarm	Possible Cause	Solution
Extinguishant abort button status indication		1. Button pressing status: The feedback is normal.	Check whether the start button is pressed.
		2. If an alarm is reported when the button is not pressed, the possible cause is that the resistor of pins 1 and 3 is not a 470 Ω resistor.	Use a multimeter to measure the resistance between terminals MAN RELEASE+ and MAN RELEASE– on the extinguishant control panel. If the resistance is not in the range of 460–470 Ω, replace the existing resistor with a 470 Ω resistor.
Fire alarm horn/ strobe loop or extinguishant release indicator loop fault		1. The loop between the fire alarm horn/ strobe or extinguishant release indicator and the extinguishant control panel is short-circuited.	Use a multimeter to measure the resistance between terminals 2ND SOUNDER+ and 2ND SOUNDER– on the extinguishant control panel. If the resistance is 0 Ω, the circuit is short-circuited. In this case, check the cable connection for the short circuit.

Symptom	Alarm	Possible Cause	Solution
		2. The fire alarm horn/strobe resistor is open-circuited with the extinguishant control panel loop.	Use a multimeter to measure the resistance between terminals 2ND SOUNDER+ and 2ND SOUNDER– on the extinguishant control panel. If the resistance is OL MΩ, the fire alarm horn/strobe is disconnected. In this case, rectify the disconnection fault.
Main power supply failure		1. The power cable of the extinguishant control panel is in poor contact.	Check whether the AC power input is 230 V.
		2. The fuse of the power supply is broken or loose.	Check whether the power supply fuse is normal and whether the power cable of the extinguishant control panel is securely connected.
Battery power failure		1. Battery cables are loose or the positive and negative poles are reversely connected.	Reconnect the cables.
		2. Batteries are damaged due to overdischarge. If the voltage is lower than 21.6 V DC, an undervoltage alarm is reported.	Replace the battery.

Symptom	Alarm	Possible Cause	Solution
Extinguishant control panel CPU fault		The CPU fails to execute the code correctly and has been restarted by the system watchdog.	Replace the extinguishant control panel.
Auxiliary 24 V fault		The output current of the auxiliary 24 V power supply exceeds the rated value, and the fuse is broken.	Set the multimeter to the DC current range and check whether the AUX 24 V positive and negative outputs are normal.
Battery overdischarge		1. The system is powered by batteries, and the battery voltage ranges from 21.5 V to 20.5 V.	Check the voltage of the batteries. If the voltage is lower than 20 V, use the main AC power supply.
Grounding fault		The system ground cable is not securely connected.	Check whether the system ground cable is securely connected.
Extinguishant control panel fuse fault		The fuse of the main power supply is broken.	Replace the fuse.

Symptom	Alarm	Possible Cause	Solution
S1 Fault/ S2 Fault		1. The fire alarm horn/strobe loop is open-circuited or short-circuited.	Use a multimeter to measure the resistance between terminals S1+ or S1– or resistance between terminals S2+ or S2– on the extinguishant control panel. If the resistance is 0 Ω, the circuit is short-circuited. In this case, check the cable connection for the short circuit. If the resistance is OL MΩ, the circuit is disconnected. In this case, rectify the disconnection fault.
		2. The 6.8 kΩ termination resistor is not securely connected.	Use a multimeter to measure the resistance between terminals S1+ or S1– or resistance between terminals S2+ or S2– on the extinguishant control panel. If the resistance is OL MΩ, check whether the termination resistor is securely connected.

Symptom	Alarm	Possible Cause	Solution
		3. The termination resistor is not a 10k resistor.	Use a multimeter to measure the resistance between terminals S1+ or S1– or resistance between terminals S2+ or S2–. If the resistance is not 10 kΩ, replace the existing resistor with a 10 kΩ resistor.
S3 Fault		This is a common fault and often followed by a flooding zone fault.	Check for other faults and then check whether the fault is reported. If no other fault is reported and only the S3 fault is reported, you are advised to replace the extinguishant control panel.
Output loop fault of the solenoid valve		1. Cables are incorrectly connected between the EXTING+ and EXTING– ports of the extinguishant control panel.	Check whether the cables to the ports (EXTING+ and EXTING–) are loose.
		2. The polarity of the protection diodes at the solenoid valve ports are reversely connected.	Check whether the positive and negative poles of the protection diodes at the solenoid valve are reversely connected.
		3. The fire extinguishing board is damaged.	Replace the board.

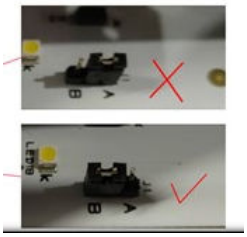
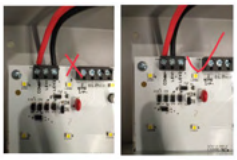
Symptom	Alarm	Possible Cause	Solution
Extinguishant abort button loop fault		1. Cables are disconnected or short-circuited.	Use a multimeter to measure the resistance between terminals Hold+ and Hold– on the extinguishant control panel. If the resistance is 0 Ω, the circuit is short-circuited. In this case, check the cable connection for the short circuit. If the resistance is OL MΩ, the extinguishant abort button is disconnected from the extinguishant control panel. In this case, rectify the disconnection fault.
		2. The 6.8 kΩ termination resistor is not securely connected.	Use a multimeter to measure the resistance between terminals Hold+ and Hold– on the extinguishant control panel. If the resistance is OL MΩ, check whether the termination resistor is securely connected.

Symptom	Alarm	Possible Cause	Solution
		3. The termination resistor is not a 6.8 kΩ resistor.	Use a multimeter to measure the resistance between terminals Hold+ and Hold– on the extinguishant control panel. If the resistance is not 6.8 kΩ, replace the existing resistor with a 6.8 kΩ resistor.
Extinguishant release button fault		1. Cables are disconnected or short-circuited.	Use a multimeter to measure the resistance between terminals MAN RELEASE+ and MAN RELEASE– on the extinguishant control panel. If the resistance is 0 Ω, the circuit is short-circuited. In this case, check the cable connection for the short circuit. If the resistance is OL MΩ, the extinguishant release button cable is disconnected. In this case, rectify the disconnection fault.

Symptom	Alarm	Possible Cause	Solution
		2. The 6.8 kΩ termination resistor is not securely connected.	Use a multimeter to measure the resistance between terminals MAN RELEASE+ and MAN RELEASE– on the extinguishant control panel. If the resistance is OL MΩ, check whether the termination resistor is securely connected.
		3. The termination resistor is not a 6.8 kΩ resistor.	Use a multimeter to measure the resistance between terminals MAN RELEASE+ and MAN RELEASE– on the extinguishant control panel. If the resistance is not 6.8 kΩ, replace the existing resistor with a 6.8 kΩ resistor.
Mode Fault Mode fault		1. Cables are disconnected or short-circuited.	Check the resistance between terminals MODE SELECT+ and MODE SELECT– on the extinguishant control panel. If the resistance is 0 Ω, the circuit is short-circuited. In this case, check the cable connection for the short circuit. If the resistance is OL MΩ, the circuit is disconnected. In this case, rectify the disconnection fault.

Symptom	Alarm	Possible Cause	Solution
		2. The 6.8 kΩ termination resistor is not securely connected.	Check the resistance between terminals MODE SELECT+ and MODE SELECT– on the extinguishant control panel. If the resistance is OL MΩ, check whether the termination resistor is securely connected.
		3. The termination resistor is not a 6.8 kΩ resistor.	Check the resistance between terminals MODE SELECT+ and MODE SELECT– on the extinguishant control panel. If the resistance is not 6.8 kΩ, replace the existing resistor with a 6.8 kΩ resistor.
Pressure switch fault		1. Cables are disconnected or short-circuited.	Check the resistance between terminals LOW PRES. SWITCH+ and LOW PRES. SWITCH– on the extinguishant control panel. If the resistance is 0 Ω, the circuit is short-circuited. In this case, check the cable connection for the short circuit. If the resistance is OL MΩ, the circuit is disconnected. In this case, rectify the disconnection fault.

Symptom	Alarm	Possible Cause	Solution
		2. The 6.8 kΩ termination resistor is not securely connected.	Check the resistance between terminals LOW PRES. SWITCH+ and LOW PRES. SWITCH– on the extinguishant control panel. If the resistance is OL MΩ, check whether the termination resistor is securely connected.
		3. The termination resistor is not a 6.8 kΩ resistor.	Check the resistance between terminals LOW PRES. SWITCH+ If the resistance is not 6.8 kΩ, replace the existing resistor with a 6.8 kΩ resistor.
Remote/Local manual extinguishant release button pressed		Check whether the manual extinguishant release button is pressed.	Check whether the manual extinguishant release button on the extinguishant control panel is pressed and not reset.
General fault		General fault	Check for other faults and then check whether this fault is reported.
System fault		The extinguishant control panel is faulty.	Check other faults and then check whether this fault is reported.

Symptom	Alarm	Possible Cause	Solution
Extinguishant release indicator exception		1. The short-circuiting caps A and B are installed in wrong positions.	
		2. The positive and negative cables are incorrectly connected.	
Heat detector or smoke sensor triggered		1. Smoke detector: Fire smoke is detected. 2. A false alarm is generated due to condensation, dust, insects, and other foreign objects. 3. Heat detector: High temperature is detected.	Use a multimeter to measure the resistance between terminals ZONE1+ and ZONE1– after power-off. If the resistance is 470 Ω, the smoke detector triggers an alarm. Check whether a fire occurs. If not, check whether condensation or dust exists on the smoke detector surface. Clean the smoke detector surface and power off and reset the smoke detector. If the alarm persists, replace the smoke detector.

Symptom	Alarm	Possible Cause	Solution
			Heat detector: Use a multimeter to measure the resistance between terminals ZONE2+ and ZONE2– after power-off. If the resistance is 470 Ω, the heat detector triggers an alarm. Check whether a fire occurs. If the alarm persists after the device is powered off and reset, replace the device.

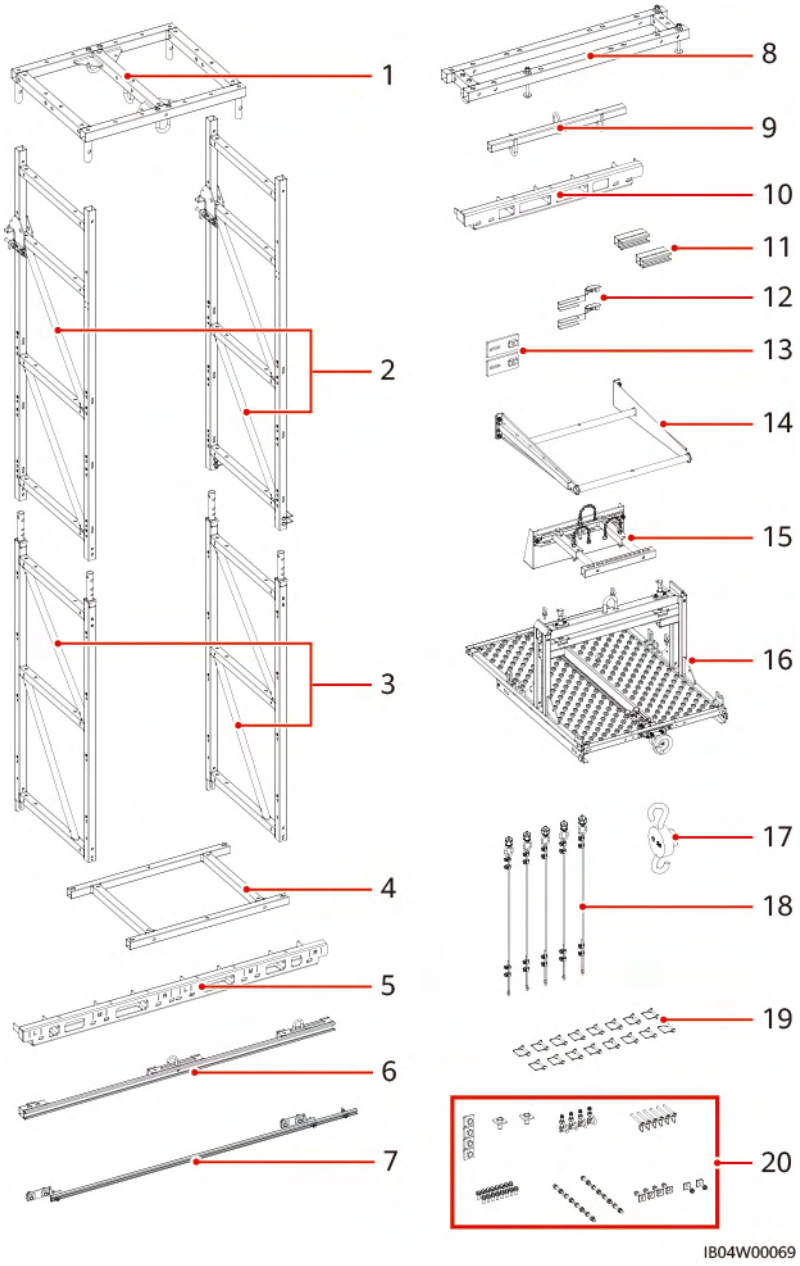
4 Alarm Reference

For details about the alarm reference, see **LUNA2000-2.0MWH and 1.0MWH Series Smart String ESS Alarm Reference**.

5 Introduction to Engineering Installation Kits

5.1 Truss-based Engineering Installation Kit

Figure 5-1 Components



(1) Top support	(2) Upper trusses	(3) Lower trusses
(4) Bottom support	(5) Long top beam	(6) Long bottom beam (type 1)
(7) Long bottom beam (type 2)	(8) Air conditioner boom brace	(9) Air conditioner hanging beam
(10) Short top beam	(11) Short bottom beams	(12) Node handles

(13) Adapter plates	(14) Smart Rack Controller operating handle	(15) Battery pack operating handle
(16) Tray	(17) Chain hoist	(18) Protective steel ropes
(19) Hasp pins	(20) Screws and bolts	-

NOTE

There are two types of long bottom beams as shown in (6) and (7). Each set of engineering installation kit contains one type. The actual model may vary.

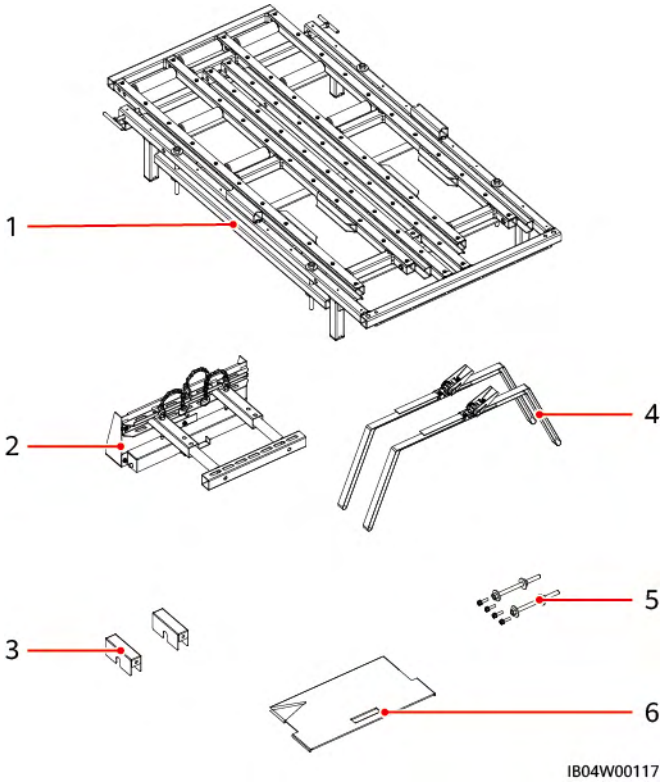
NOTICE

- Do not use the engineering installation kit on rainy days. Dry the engineering installation kit if it comes in contact with water to prevent rusting.
- Place the engineering installation kit in the packing case after use and store it in a dry place indoors.
- If rust occurs on the parts, remove the rust immediately and apply lubricating oil.

5.2 Forklift-based Engineering Installation Kit

Components

Figure 5-2 Components



(1) Engineering installation kit components
(2) Battery pack shovel pan
(3) Distance blocks
(4) Binders
(5) Screws
(6) Protective plate

Environment Requirements

NOTE

- Lifting height of a forklift: If the foundation is less than or equal to 0.3 m high, the lifting height should be greater than or equal to 2.6 m. If the foundation is greater than 0.3 m high, the lifting height should be increased accordingly.
- Load capacity of a forklift: 3–5 tons.
- The installation ground must be solid without spongy or soft soil and not prone to subsidence. Common forklifts are recommended for concrete ground, and rough-terrain forklifts are recommended for other types of ground.

Figure 5-3 Maintenance clearances

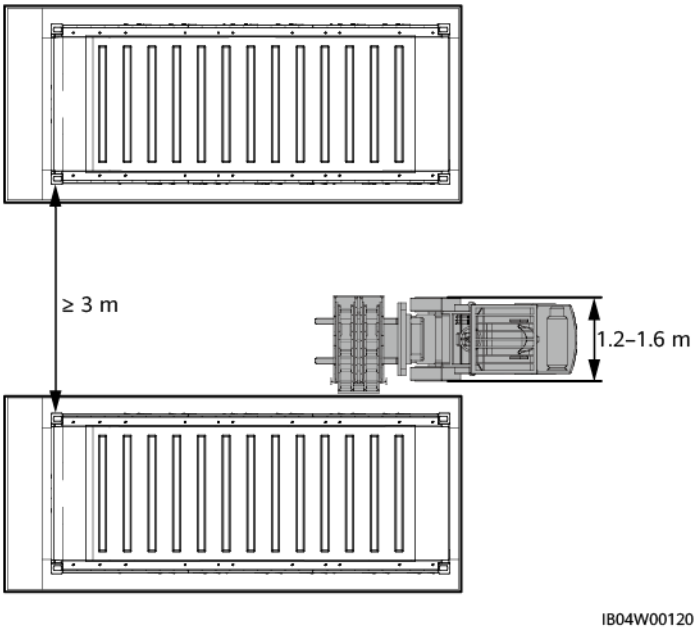


Figure 5-4 Inserting the kit from the long side

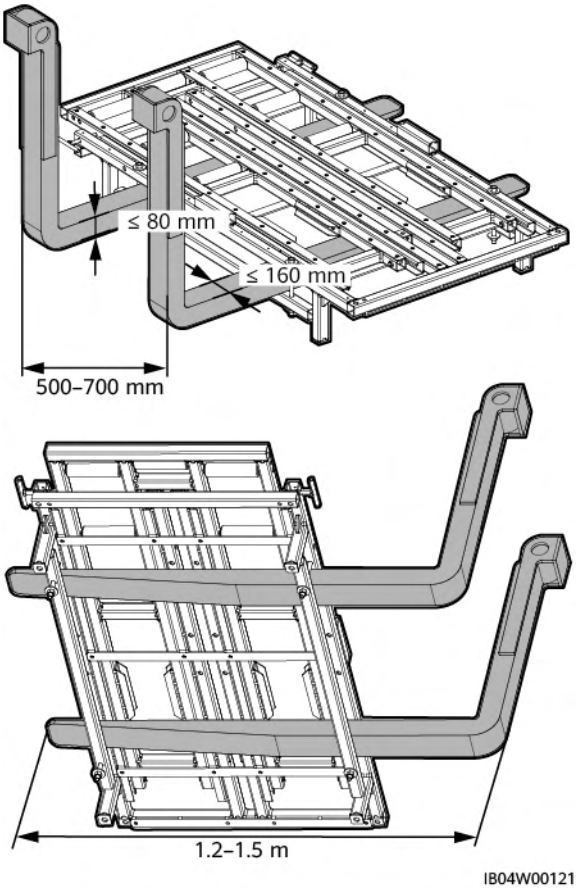
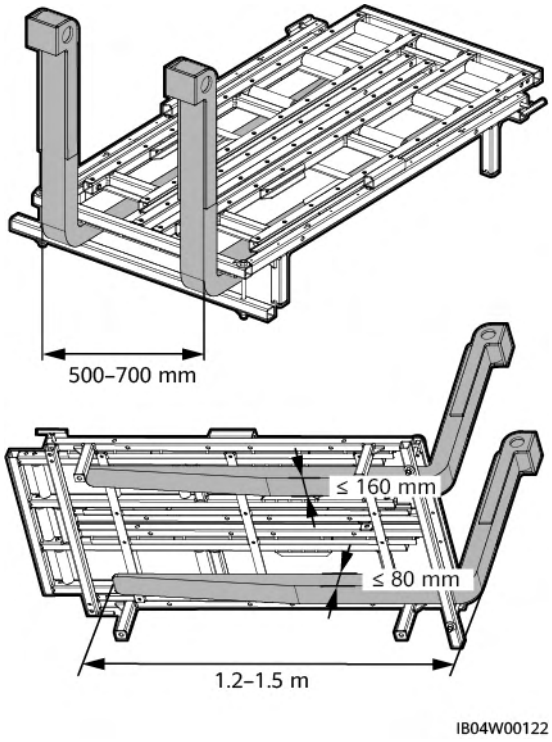


Figure 5-5 Inserting the kit from the short side



6 Replacing Devices in the Battery Cabin

NOTICE

- Before maintaining the battery cabin, ensure that the ESS is powered off.
- During the maintenance and commissioning of the battery cabin of the ESS, if the door must be open, open the door at the minimum angle and within the shortest time. Use sandproof and dustproof devices during maintenance. After the maintenance is complete, use devices such as vacuum cleaners to clean up sand and dust in the cabin. Once the cleaning is complete, close the cabin door.
- In sandstorm-stricken areas such as deserts and Gobi, install 18 cm x 25 cm dustproof bags for dust-sensitive devices such as smoke detectors, heat detectors, CO sensors, and T/H sensors with climbing devices and seal the bags with seal tape before maintenance. After the maintenance is complete, remove the dustproof bags and close the cabin door.
- In sandstorm-stricken areas such as deserts and Gobi, use windproof and sandproof devices to protect the operation site during maintenance. After the maintenance is complete, use vacuum cleaners to clean up sand and dust on the battery pack surface and in the cabin. Once the cleaning is complete, close the cabin door.

6.1 Replacing a Battery Pack (Using a Truss-based Kit)

NOTE

The battery pack appearance may vary. The figures in this section are for reference only.

Prerequisites

DANGER

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.
- Do not smoke or have an open flame around batteries.
- Do not use wet cloth to clean exposed copper bars or other conductive parts.
- Do not use water or any solvent to clean batteries.

WARNING

Do not maintain batteries with power on. To power off the batteries before performing operations such as checking and tightening screw torques, explain the risks to the customer, obtain the customer's written consent, and take effective preventive measures.

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.
- 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.

CAUTION

- Do not use the battery packs if the packing cases are exposed to rain, damaged, or deformed, or if the battery packs leak or fall.
- Do not install battery packs on rainy, snowy, or foggy days. Otherwise, the battery packs may be eroded by moisture or rain.
- Exercise caution when moving batteries to prevent bumping and ensure personal safety.
- Slowly push or move battery packs to prevent damage and collision.

NOTICE

Battery packs with different cell capacities cannot be used in the same battery rack. You can check the cell capacity of a battery pack by viewing the model on the nameplate on the top of the battery pack.

Figure 6-1 Positions of battery racks

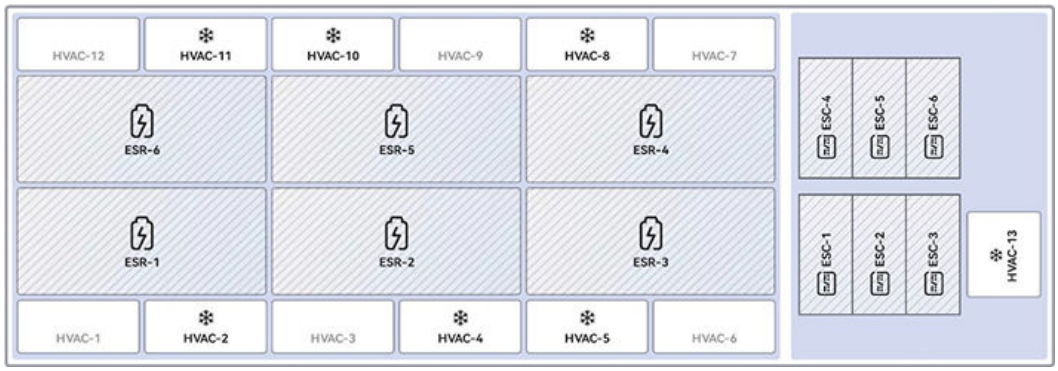
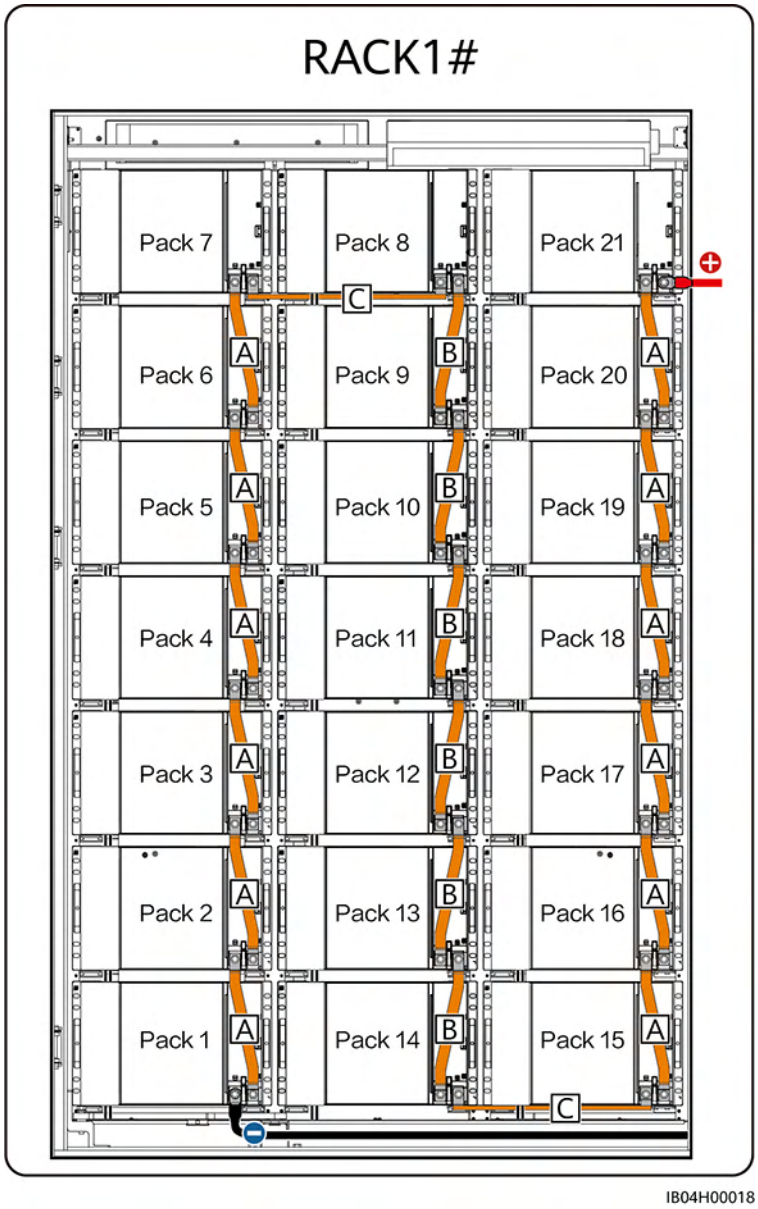


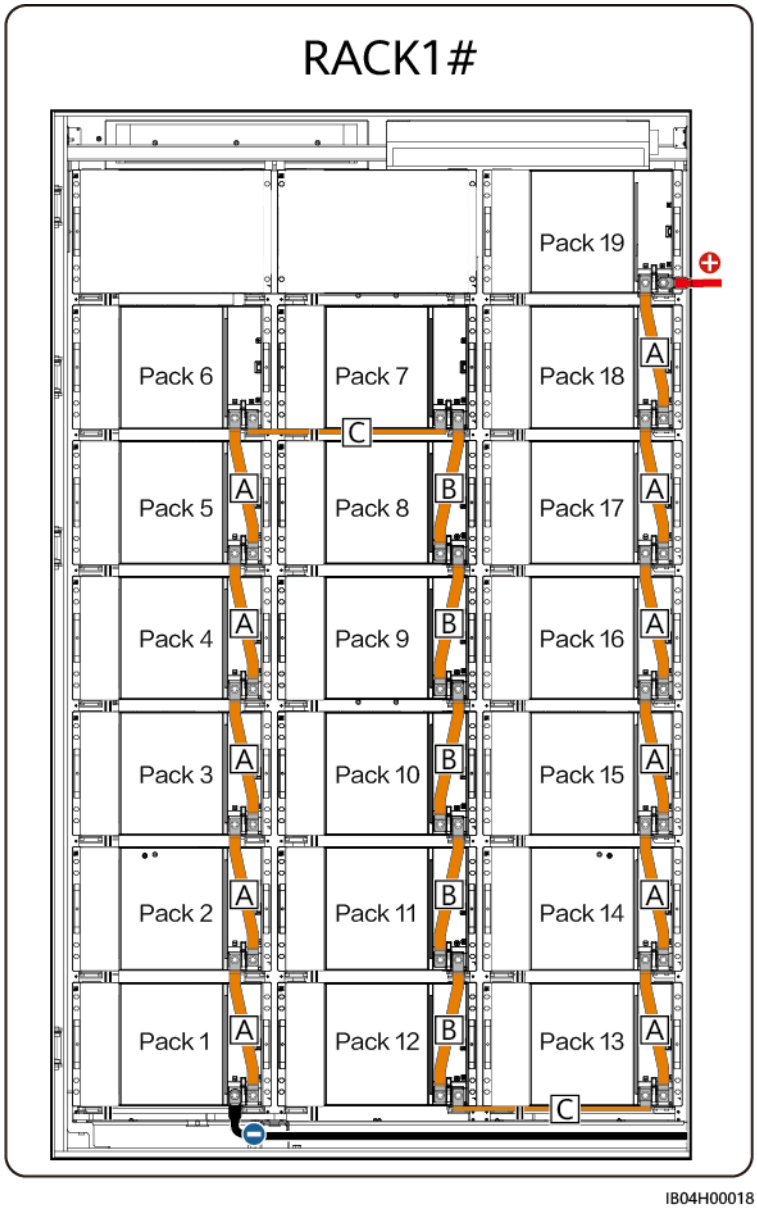
Figure 6-2 Positions of battery packs



NOTE

For some models, each battery rack contains only 19 battery packs, as shown in the following figure.

Figure 6-3 Positions of battery packs (19 battery packs)



- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Four persons are required to replace a battery pack.
- Tools: ladder, insulated flat-head/Phillips screwdriver, insulated torque wrench, adjustable wrench, open-end wrench, engineering installation kit, safety gloves, safety shoes, safety helmet, safety rope, safety goggles, gas mask, forklift, and infrared thermometer

NOTE

- At least two ladders are required.
- The personnel, tools, and environment must meet relevant safety requirements.

- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Checking the Battery Pack Status

After the ESS is powered off, wait for 5 to 10 minutes, open the battery cabin door, and check the battery pack status.

Step 1 Ensure that the indicator on the front panel of the battery pack is off.

Step 2 Check the temperature of the copper bars and screws of the battery pack using an infrared thermometer. If the temperature is too high, wait until the battery pack cools down before proceeding to the next step.

Step 3 If any irritating odor, leakage, bulging, or damage is present, contact service engineers for handling.

Step 4 If sparks or burn marks occur on the front panel or handles of the battery pack, contact service engineers for handling.

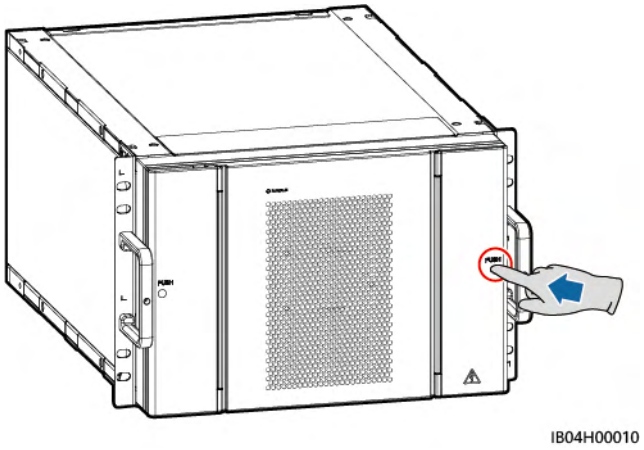
Step 5 If the battery pack appears normal and has no irritating odor, remove the faulty battery pack.

----End

Removing a Faulty Battery Pack

Step 1 Press to open the covers on both sides of the battery pack.

Figure 6-4 Opening battery pack covers

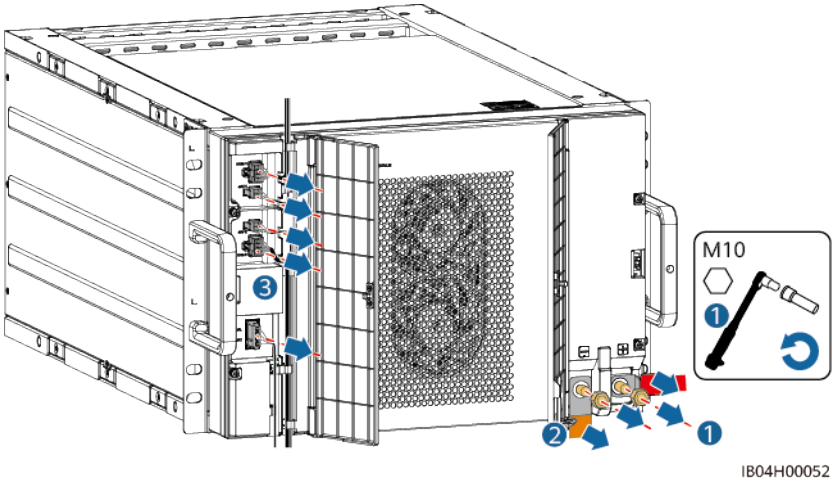


Step 2 Remove copper bars and cables from the battery pack, and close the covers.

NOTICE

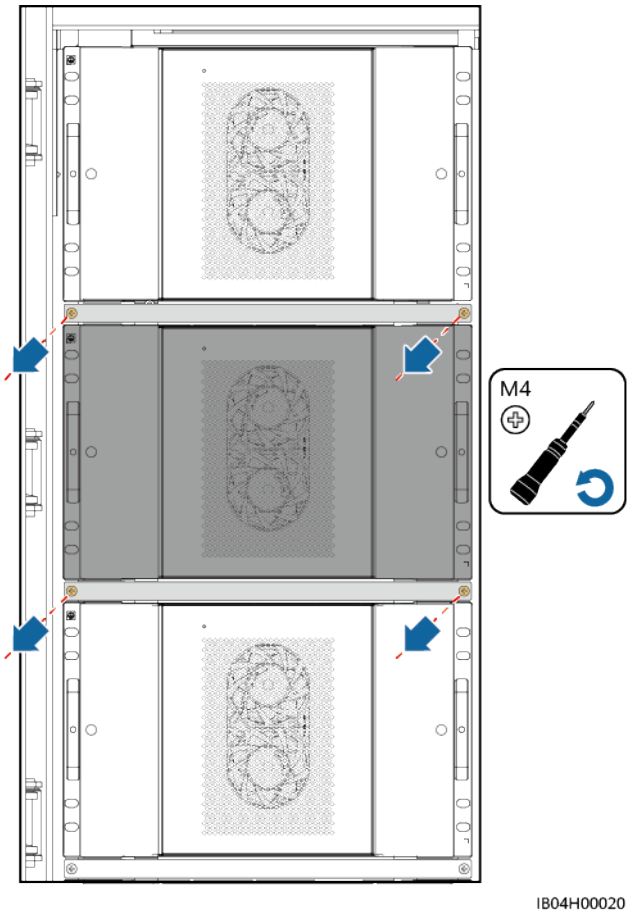
If Pack 1 and Pack 21 are replaced, disconnect cables from the battery pack, insulate the cables, and reconnect them to the new battery pack. This prevents damage to the cables and interference with the installation of other components.

Figure 6-5 Removing copper bars and cables



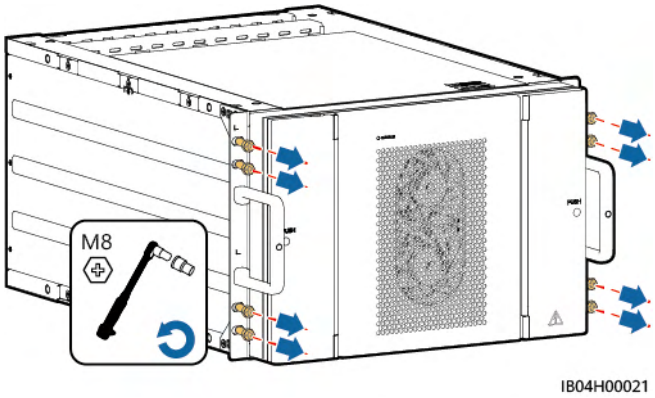
Step 3 Remove the baffle plates from the top and bottom of the battery pack.

Figure 6-6 Removing baffle plates



Step 4 Remove screws from the battery pack.

Figure 6-7 Removing screws

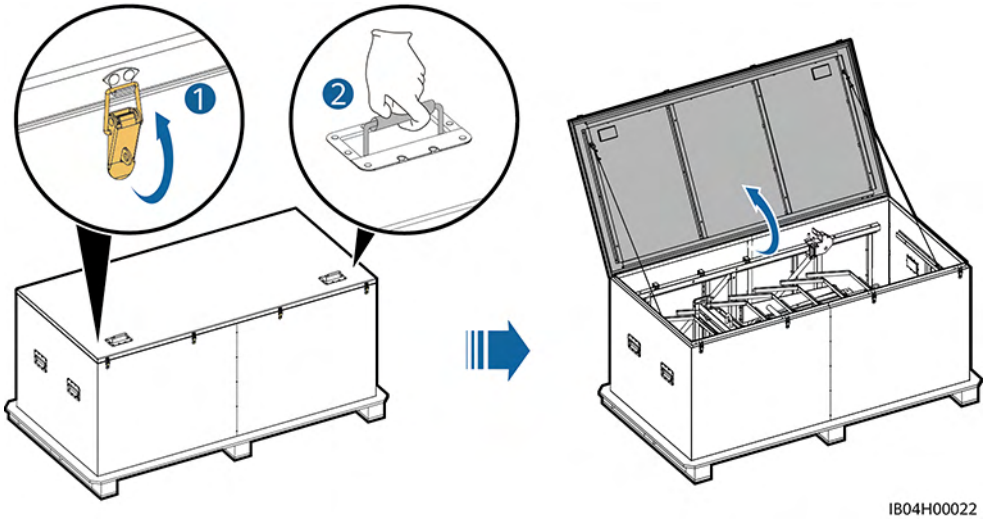


Step 5 Take out the engineering installation kit.

CAUTION

Use the handles to open or close the packing case door. The door is heavy. Exercise caution to avoid injury.

Figure 6-8 Taking out the engineering installation kit



Step 6 Install the engineering installation kit.

CAUTION

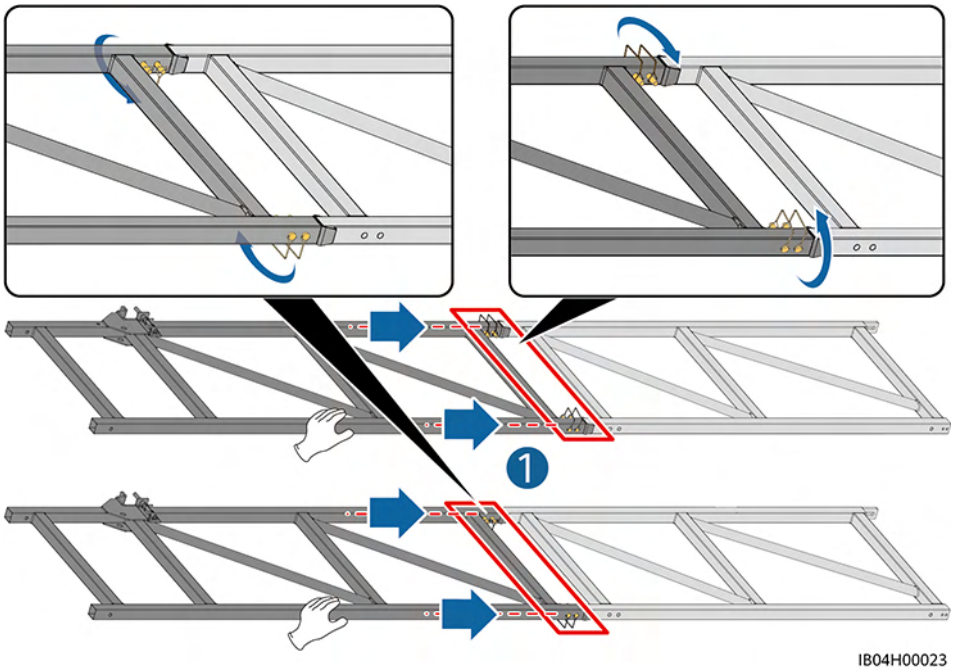
Multiple persons are required in the operation. Take protective measures to prevent collision.

1. Place the trusses horizontally and assemble the upper and lower trusses together on the ground.

NOTICE

Ensure that the diagonal beams of the upper and lower trusses are in the same direction, and that the steel rope of the hasp pin is on the outer side.

Figure 6-9 Assembling trusses

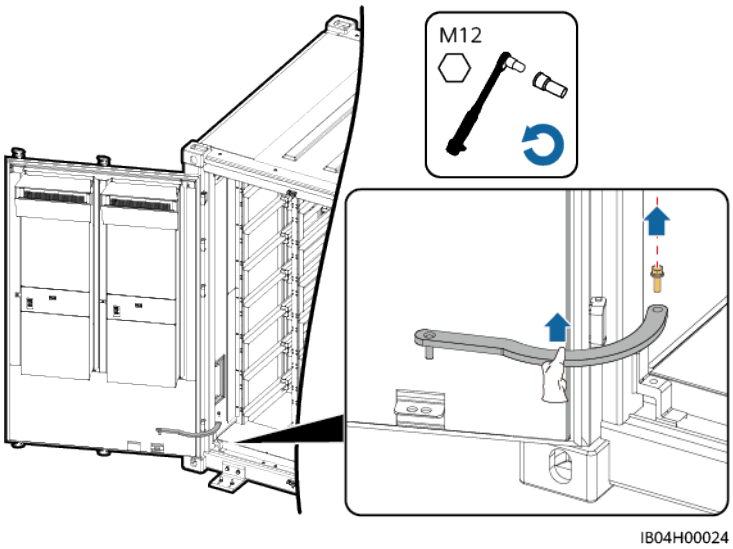


2. (Optional) Remove the door strut when replacing a battery pack on the left.

CAUTION

Take measures to prevent the door from rotating after removing the door strut.

Figure 6-10 Removing the door strut

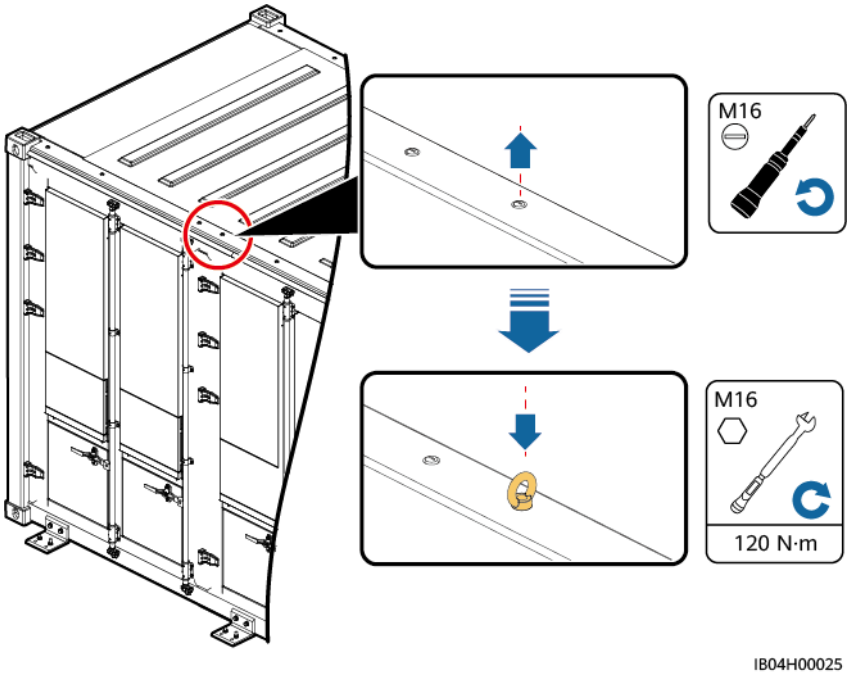


3. Remove the hole plug from the screw hole on the top of the ESS and install a lifting eye.

CAUTION

Working at heights is involved. For details, see the relevant safety precautions.

Figure 6-11 Installing a lifting eye



4. The operator wears a safety rope that is secured to the lifting eye on the top of the ESS container.
5. Install the long top beam and the long bottom beam.

Figure 6-12 Installing the long top beam and the long bottom beam (scenario 1)

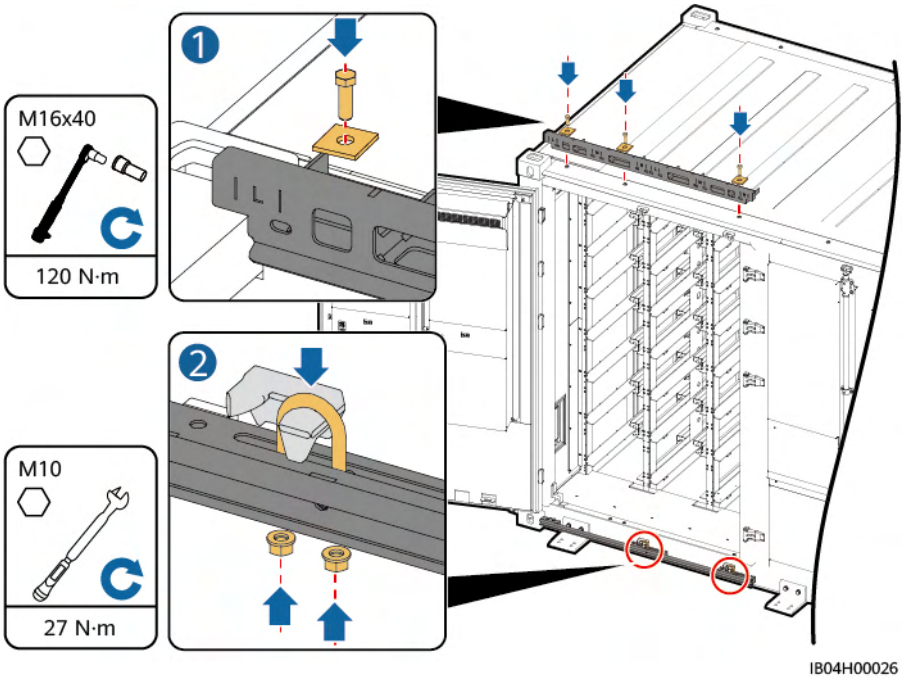


Figure 6-13 Installing the long top beam and the long bottom beam (scenario 2)

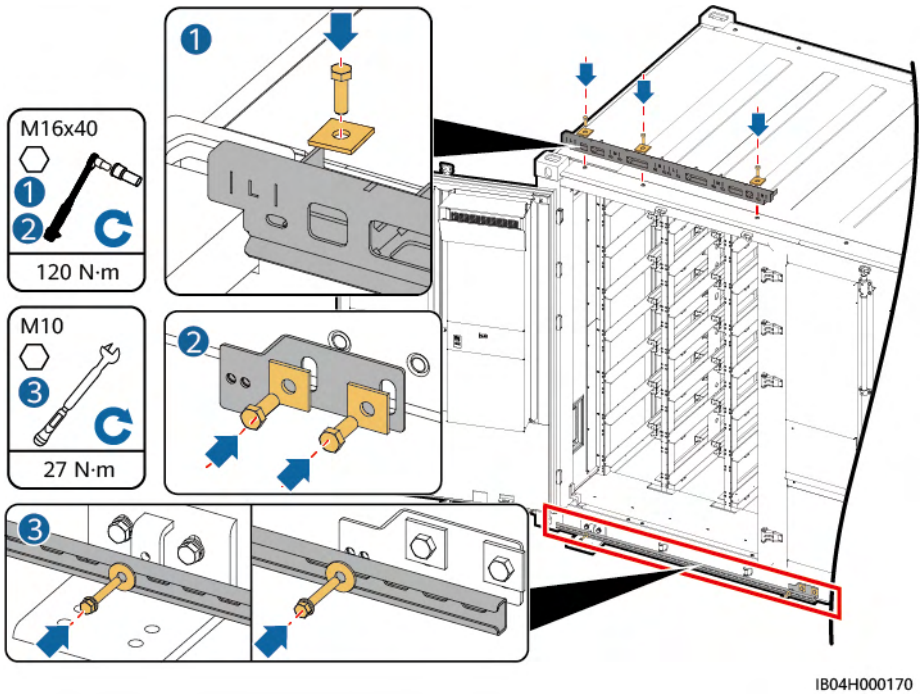
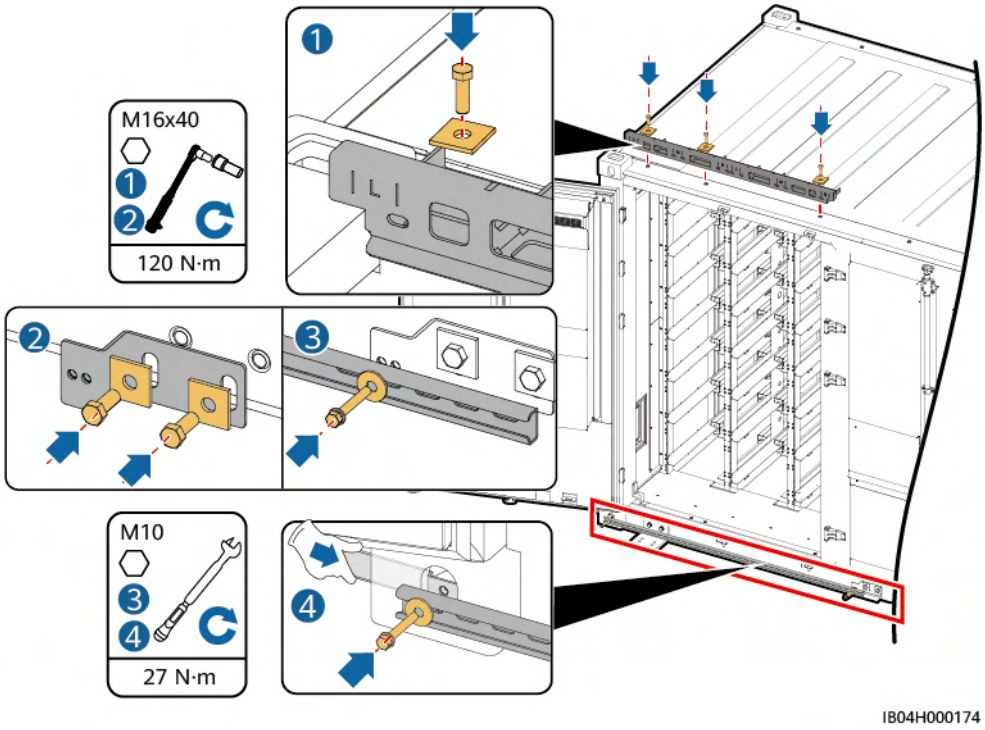


Figure 6-14 Installing the long top beam and the long bottom beam (scenario 3)



NOTE

When replacing devices in different battery cabins, the positions or directions of the long bottom beam vary. Refer to the following figures.

Figure 6-15 Long bottom beam installation position 1 (scenario 1)

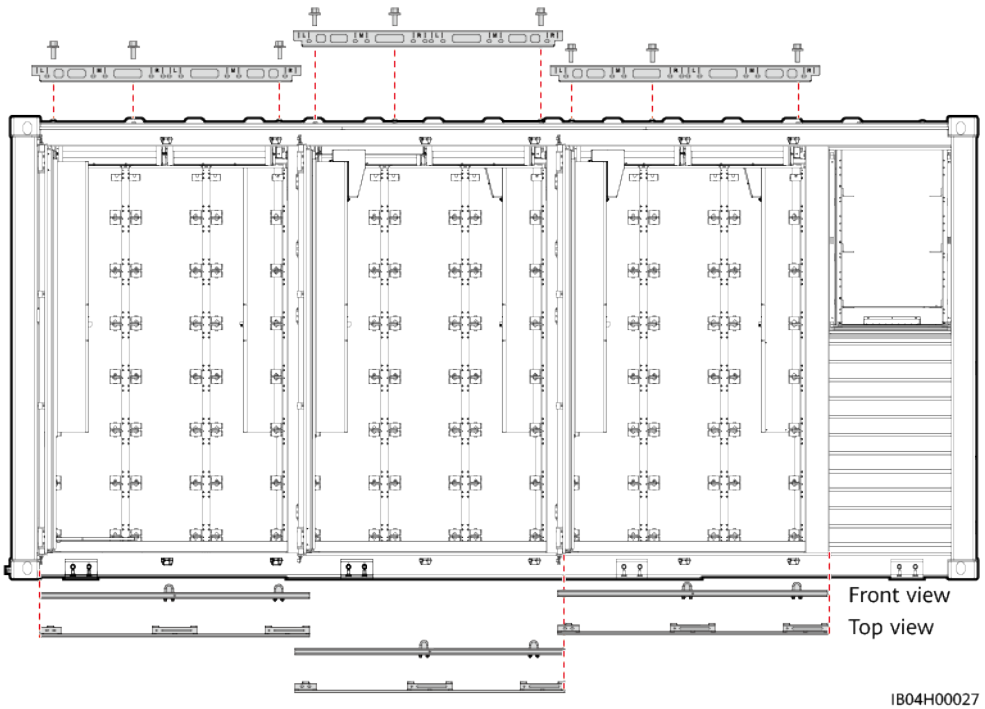


Figure 6-16 Long bottom beam installation position 2 (scenario 1)

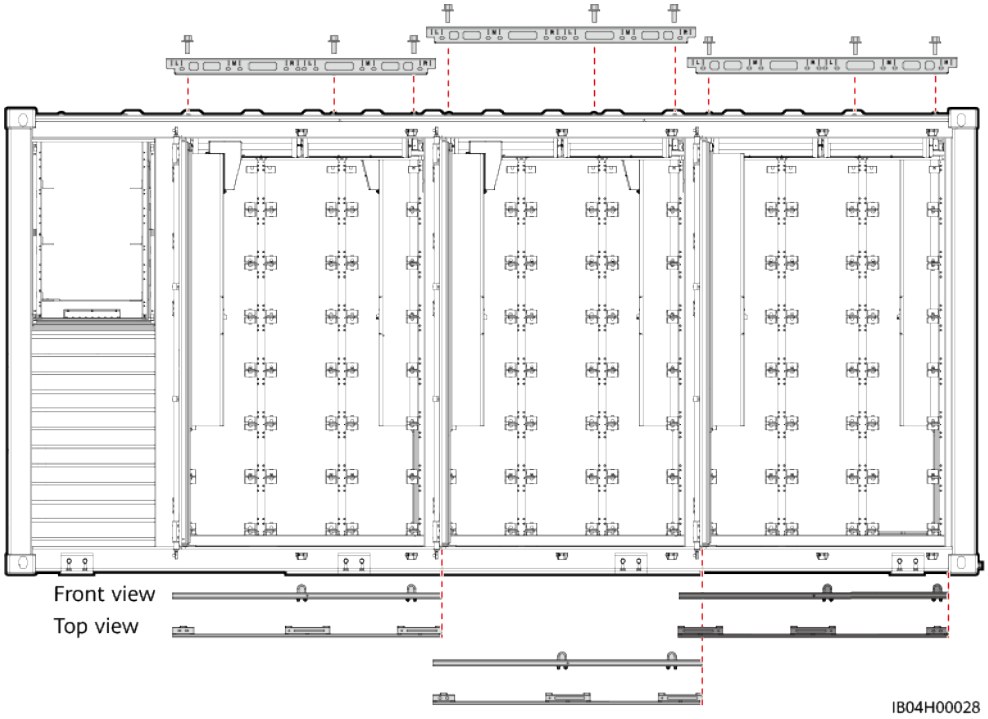


Figure 6-17 Long bottom beam installation position 1 (scenario 2)

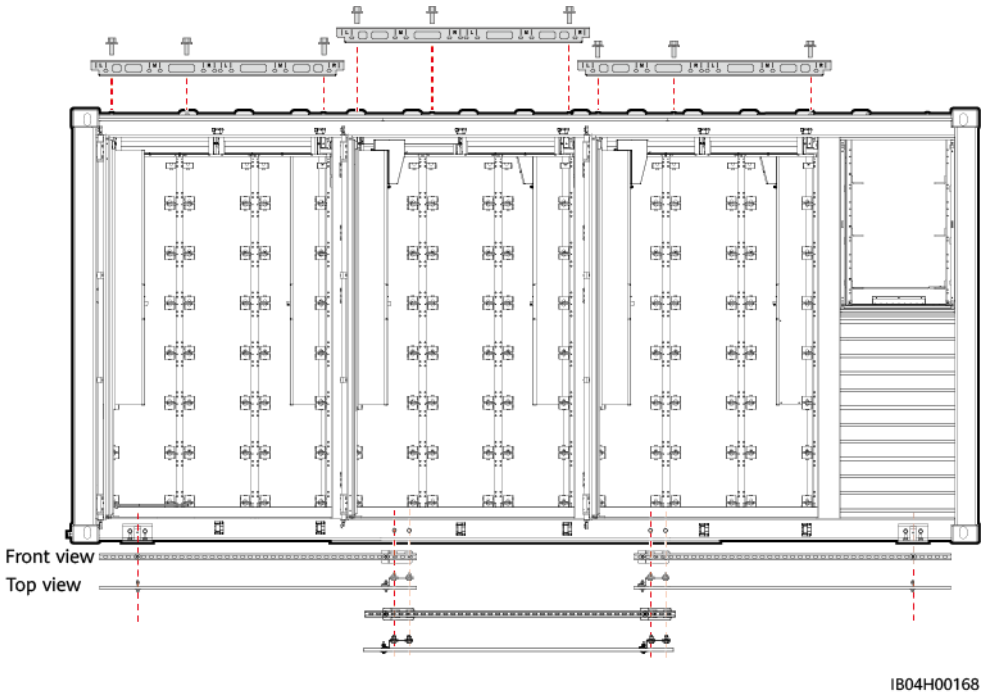


Figure 6-18 Long bottom beam installation position 2 (scenario 2)

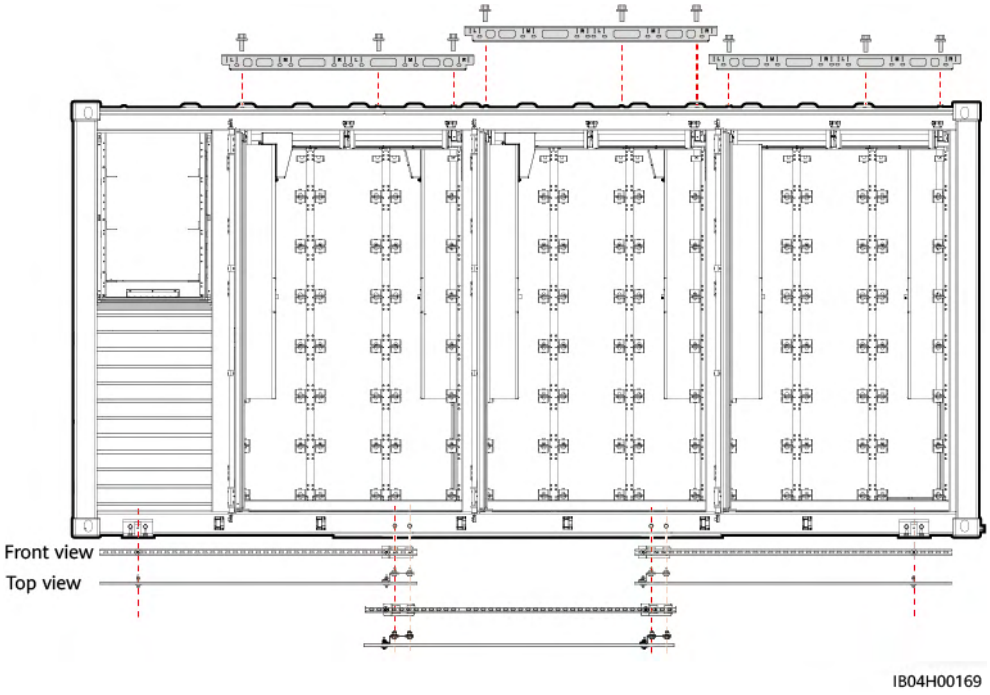


Figure 6-19 Long bottom beam installation position 1 (scenario 3)

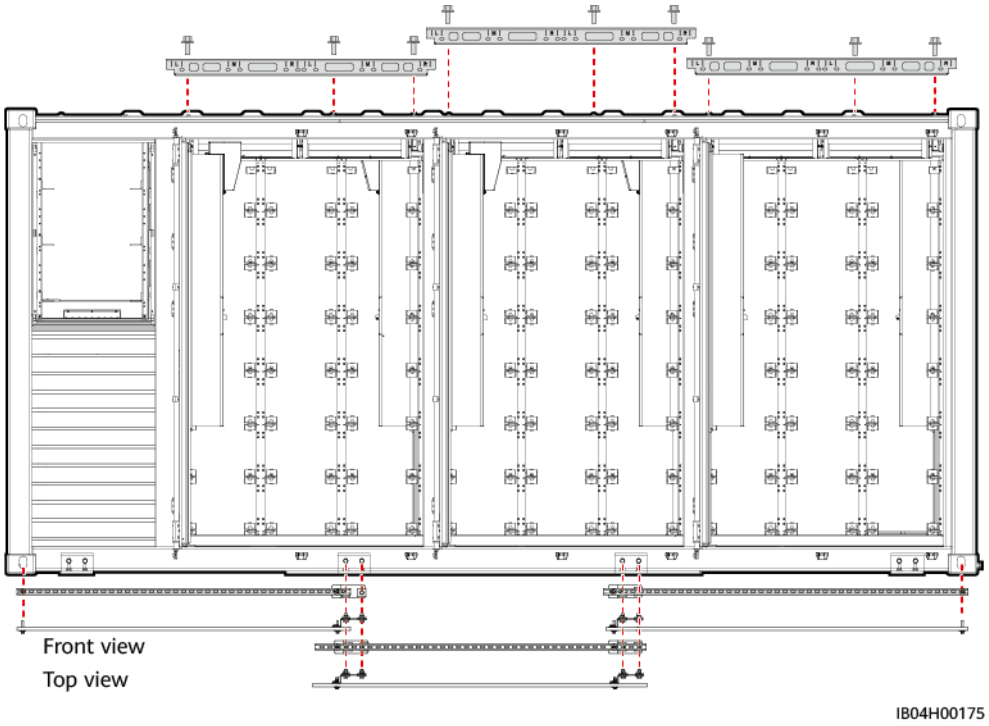
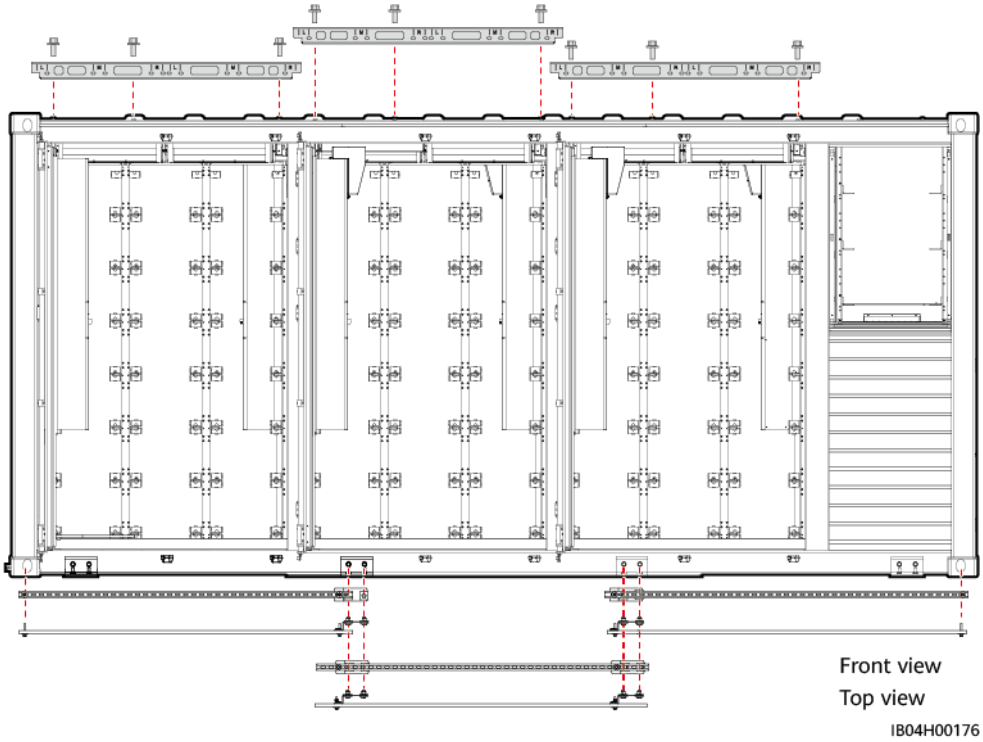


Figure 6-20 Long bottom beam installation position 2 (scenario 3)



6. Install trusses (the battery pack on the left is used as an example).

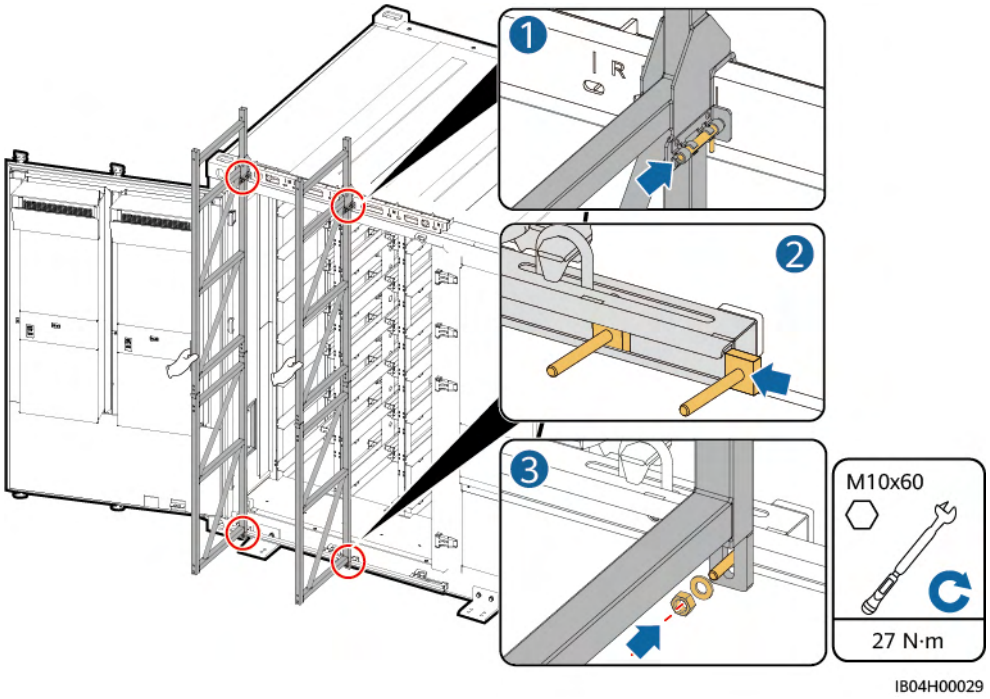
CAUTION

Multiple persons are required to install trusses. Prevent the trusses from tilting, which may cause equipment damage or personal injury.

Table 6-1 Truss installation hole silkscreen

Battery Pack Location	Truss Installation Hole Silkscreen
Left	L
Middle	M
Right	R

Figure 6-21 Installing trusses

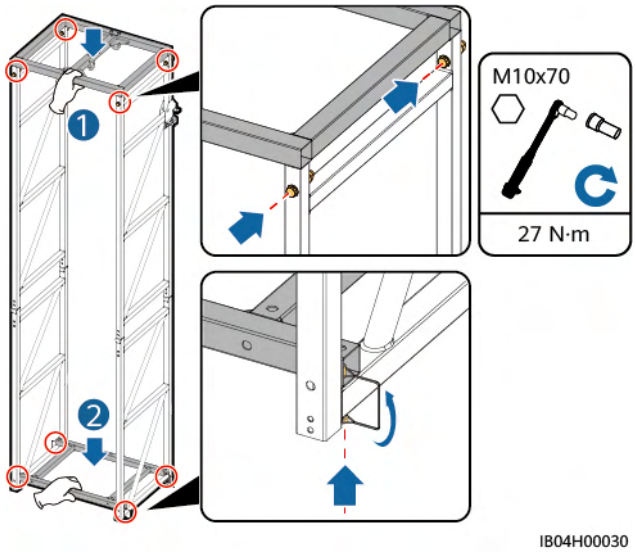


7. Install the top and bottom supports.

NOTICE

Install the top support and then the bottom support. Prevent objects from falling off during the installation.

Figure 6-22 Installing supports

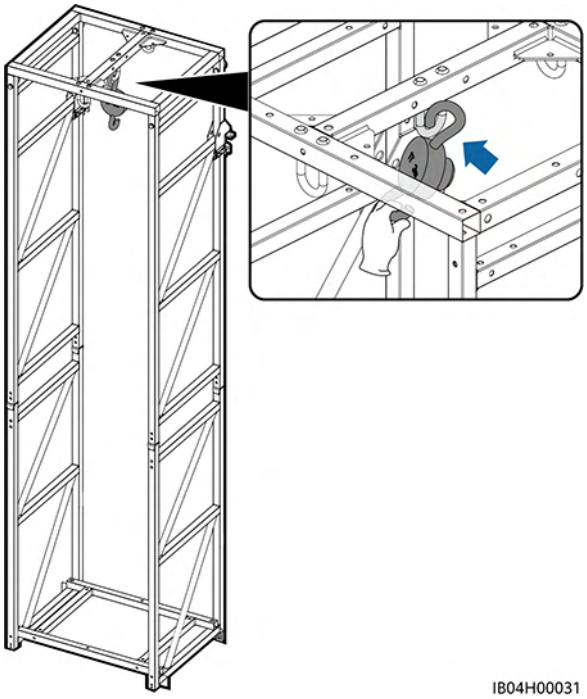


8. Install a chain hoist.

NOTE

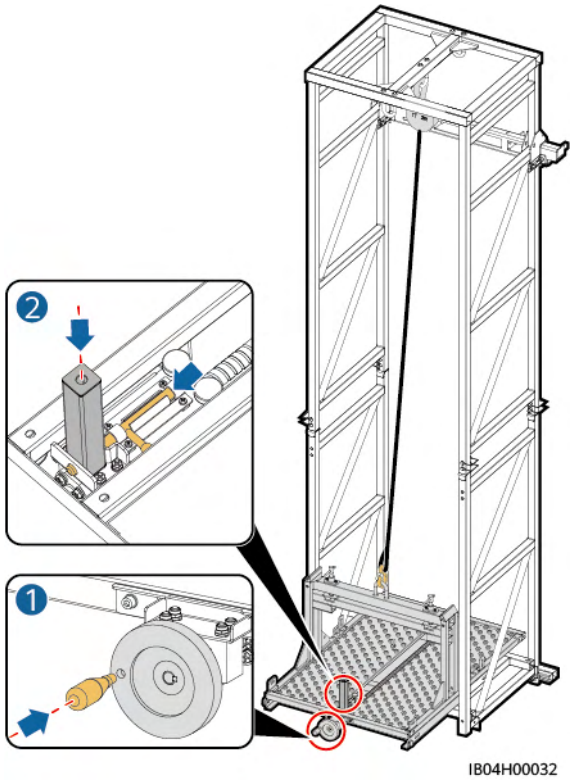
When replacing the battery pack, hang the chain hoist on the hook in the middle.

Figure 6-23 Installing a chain hoist



9. Install a tray.

Figure 6-24 Installing a tray



Step 7 Pull the chain hoist to the top and then lower it to the bottom. Ensure that the tray is secured and that the trusses are not loose or tilted.

Step 8 Remove the faulty battery pack.

1. Raise the tray to the rail height of the battery pack to be replaced, and then install bolts on the tray (a battery pack on the sixth layer is used as an example).

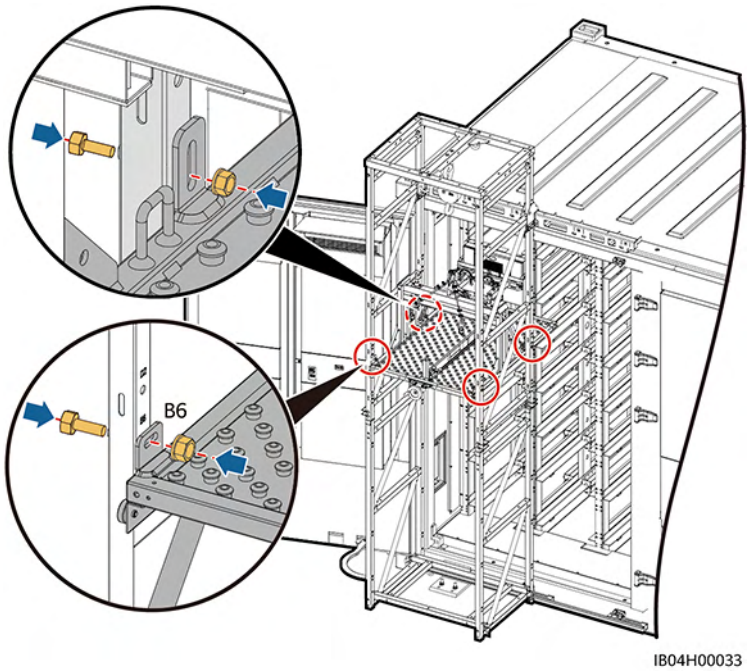
NOTICE

Do not fully tighten the nut when installing the bolt on the tray. Reserve margin to adjust the tray height.

Table 6-2 Tray securing hole silkscreen

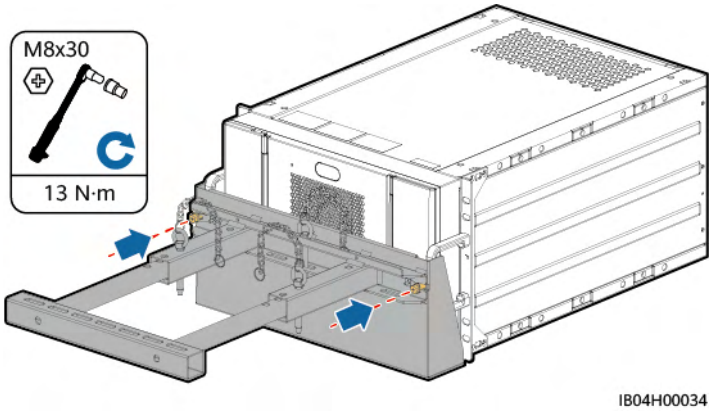
Battery Pack Location (From Bottom to Top)	Tray Securing Hole Silkscreen
Layer 1	B1
Layer 2	B2
Layer 3	B3
Layer 4	B4
Layer 5	B5
Layer 6	B6
Layer 7	B7

Figure 6-25 Securing the tray



2. Pull the chain hoist to ensure that the chains are tight.
3. Install a battery pack operating handle.

Figure 6-26 Installing an operating handle



4. Adjust the height of the tray through the chain hoist and pull out the battery pack onto the tray.

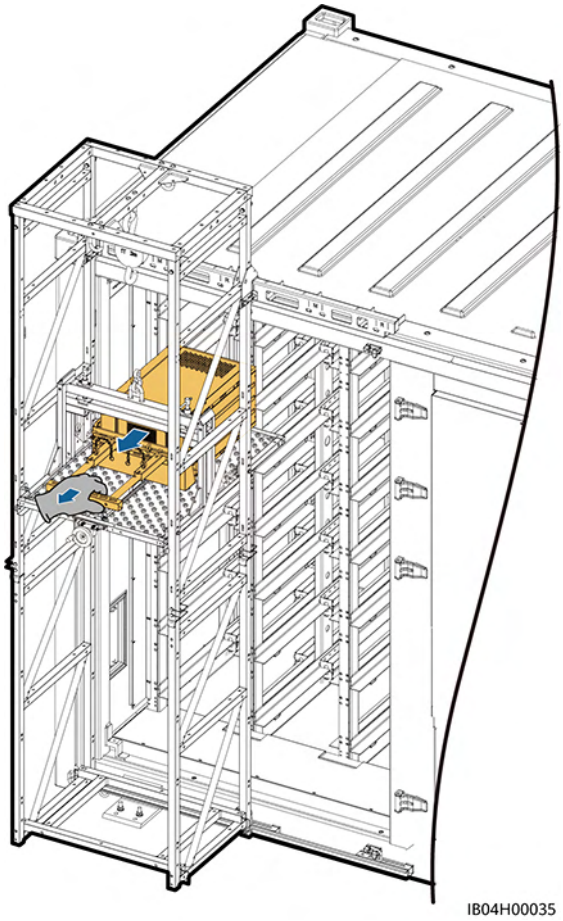
WARNING

- Do not remove the screws from the tray. Do not pull out the device when the tray is not secured.
- Do not stand under the tray.
- Do not put your head, hands, feet, or other body parts under the tray.
- If the device cannot be pulled out, contact technical support. Do not pull it out forcibly.

CAUTION

- When working at heights, the ladder must be held by personnel to prevent it from falling over. For details, see the requirements for working at heights.
- Do not climb on trusses.

Figure 6-27 Pulling out the battery pack



5. Secure the bolt and binding strap, tightly press the battery pack with a rod, and install protective steel ropes.

Figure 6-28 Installing the battery bolt and binding strap

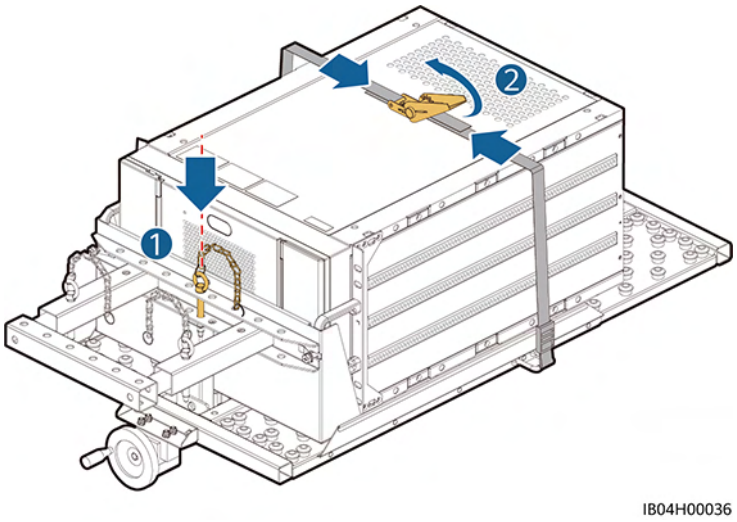


Figure 6-29 Tightening the battery

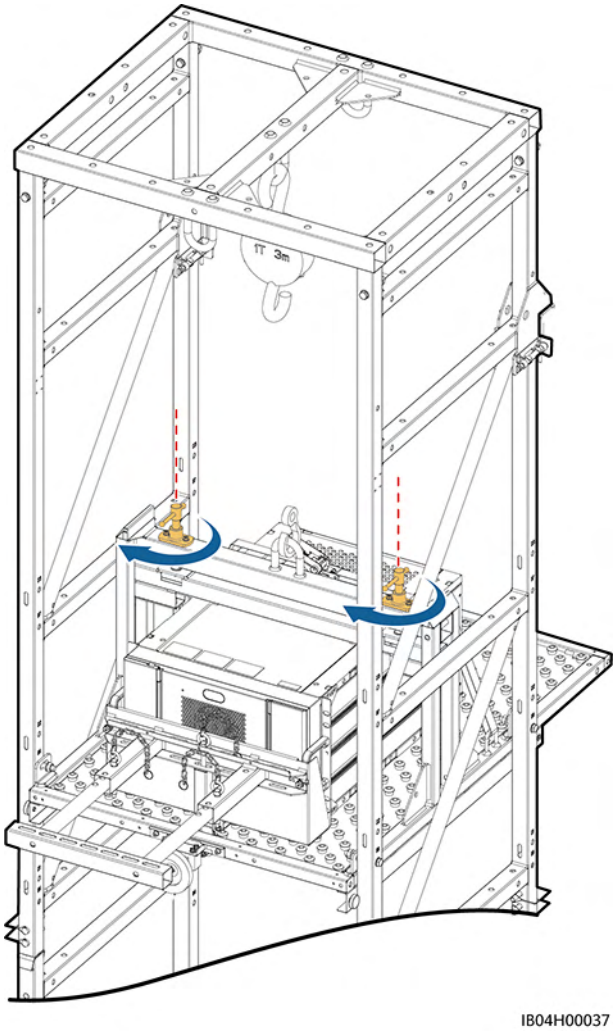
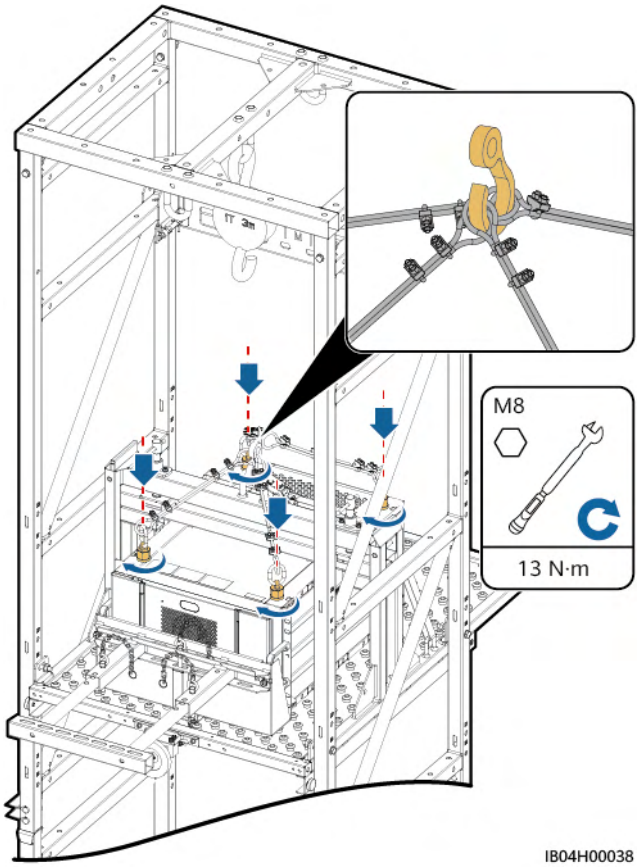


Figure 6-30 Installing the protective steel ropes



6. Remove the bolts from the tray and lower the battery pack with the chain hoist.

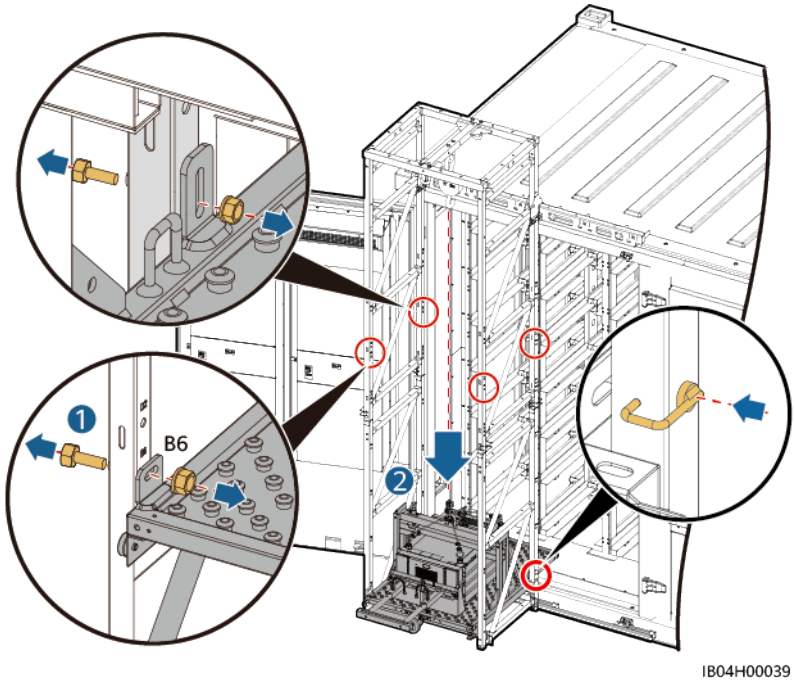
WARNING

- When lowering the tray, do not stand under the tray.
- Do not pull the tray if the tray shakes when its screws are removed.

NOTE

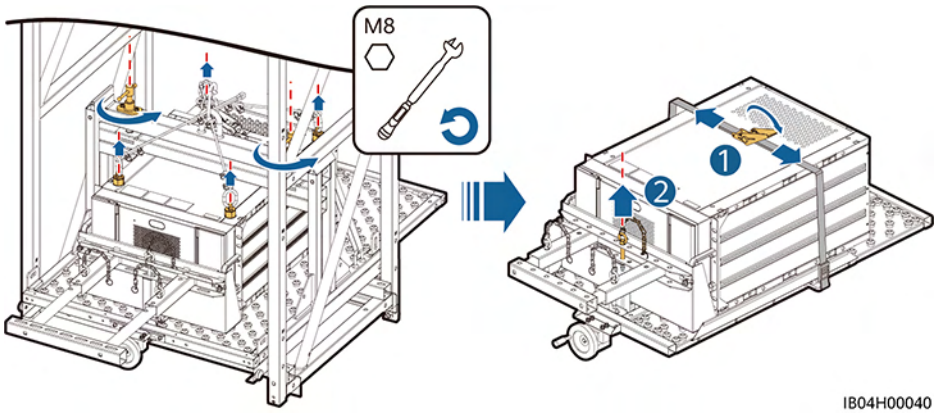
If the chain hoist is stuck during lifting, pull back its chains and try again. Do not pull the chains forcibly.

Figure 6-31 Lowering the battery pack



Step 9 Remove the protective ropes from the battery pack, loosen the rod, and remove the binding strap and bolt.

Figure 6-32 Removing the battery pack

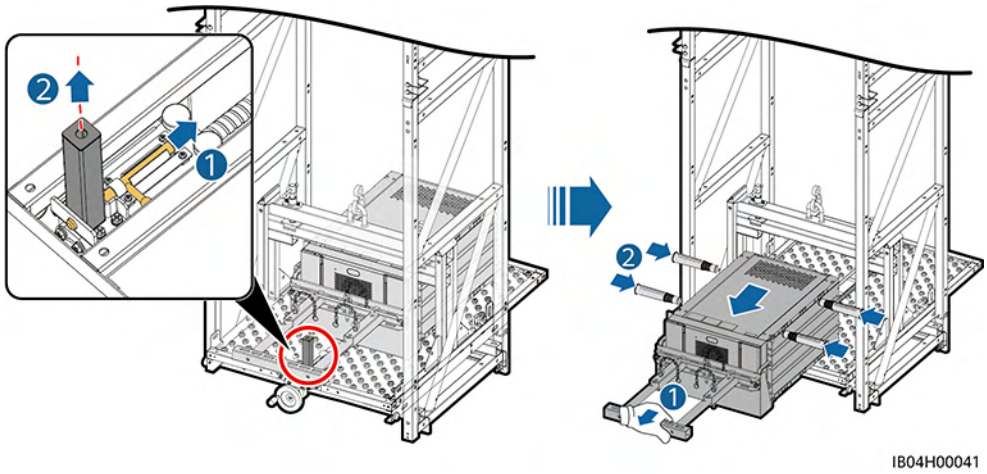


Step 10 Remove the tray column, install the battery pack lifting handles, and remove the faulty battery.

NOTICE

- At least four persons are required to move a battery pack.
- Use the lifting handles to move the battery pack. Do not use the handles on the battery pack.
- When installing the lifting handles, install the two on the front first. Move the battery pack slowly to the front of the tray and then install the other two lifting handles after the securing holes appear.
- After the lifting handles are secured (with the steel washers of the lifting handles closely fitted to the battery pack), grip the lifting handles near the ends that are closer to the battery pack to lift the battery pack. Do not lift the battery pack before the handles are secured.
- If the stud of a lifting handle is bent, replace the lifting handle in time.
- If the battery pack has been dropped, perform operations according to the emergency handling plan.

Figure 6-33 Removing the faulty battery pack



NOTE

Huawei is responsible for maintaining and transferring abnormal modules within the warranty scope. For lithium batteries beyond the warranty period, contact the local recycling agencies to handle the batteries according to the local laws and regulations.

----End

Installing a New Battery Pack

WARNING

- Do not stand under the tray.
- Do not put your head, hands, feet, or other body parts under the tray.

CAUTION

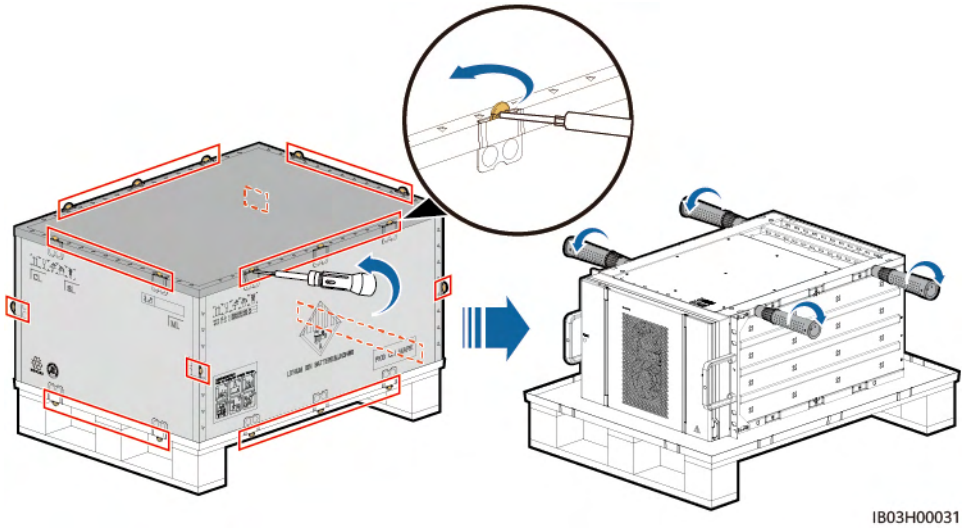
- Multiple persons are required in the operation. Take protective measures to prevent collision.
- When working at heights is involved, see the relevant safety precautions.

Step 1 Take out the battery pack.

NOTICE

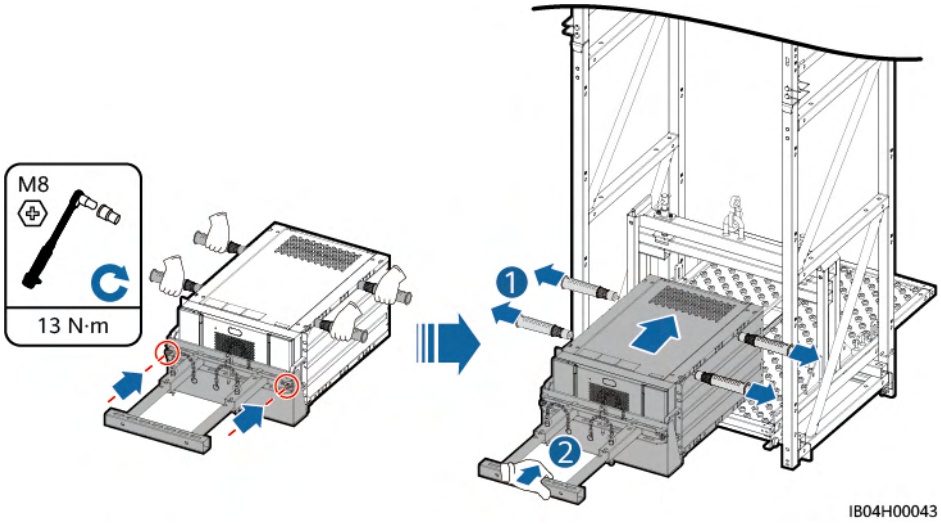
- At least four persons are required to move a battery pack.
- Use the lifting handles to move the battery pack. Do not use the handles on the battery pack.
- When installing the lifting handles, install the two on the front first. Move the battery pack slowly to the front of the tray and then install the other two lifting handles after the securing holes appear.
- After the lifting handles are secured (with the steel washers of the lifting handles closely fitted to the battery pack), grip the lifting handles near the ends that are closer to the battery pack to lift the battery pack. Do not lift the battery pack before the handles are secured.
- If the stud of a lifting handle is bent, replace the lifting handle in time.
- If the battery pack has been dropped, perform operations according to the emergency handling plan.

Figure 6-34 Taking out the battery pack



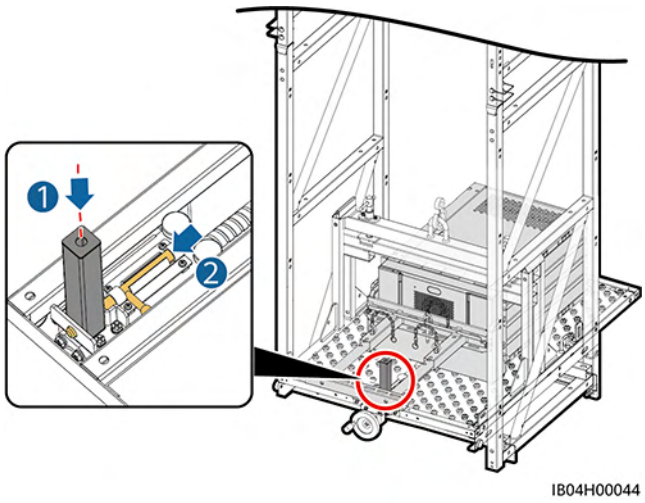
Step 2 Install the battery pack operating handle, move the battery pack onto the tray, and remove the lifting handles.

Figure 6-35 Moving the battery pack onto the tray



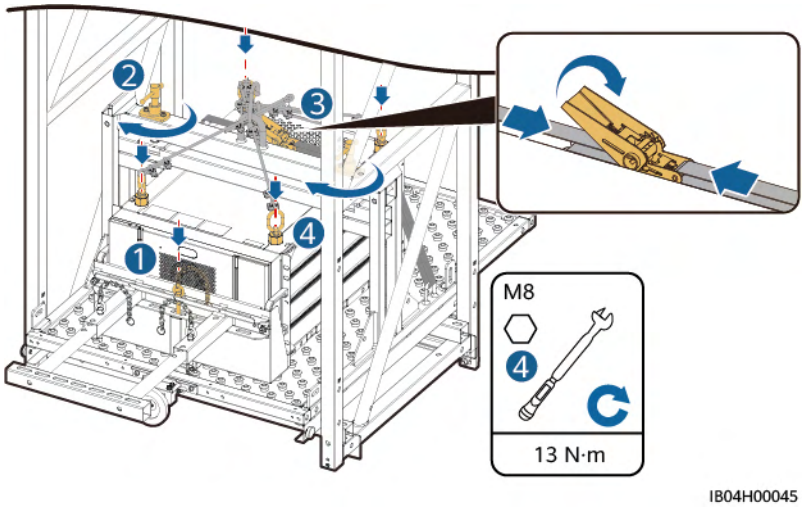
Step 3 Install the tray column.

Figure 6-36 Installing the tray column



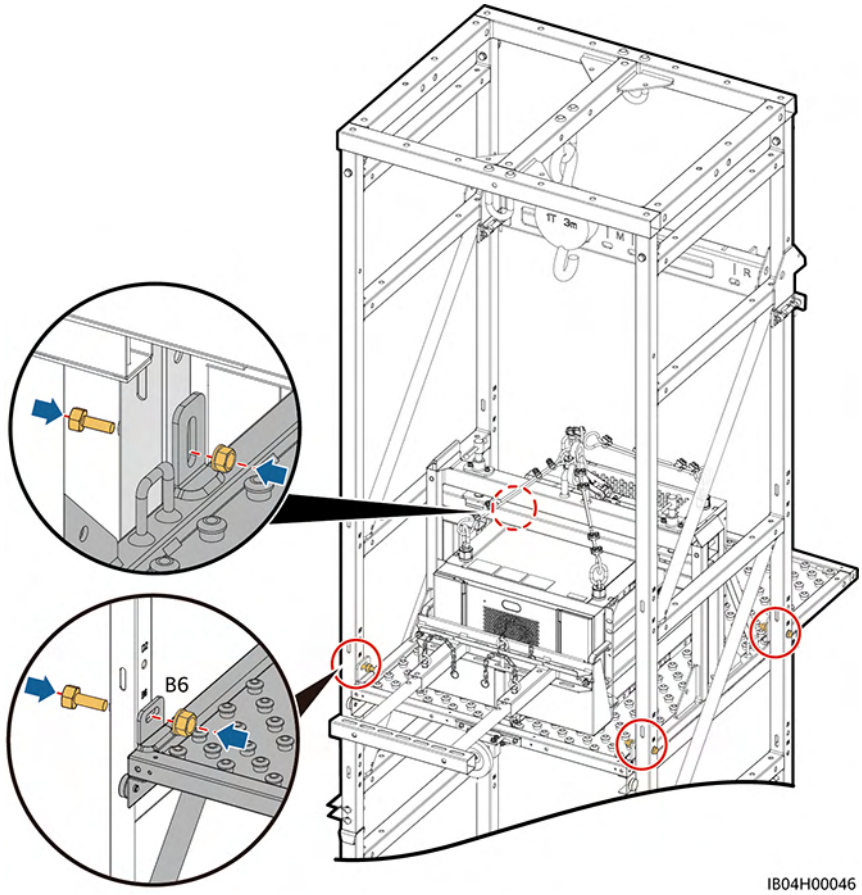
Step 4 Install the bolt, rod, binding strap, and protective ropes.

Figure 6-37 Securing the battery pack



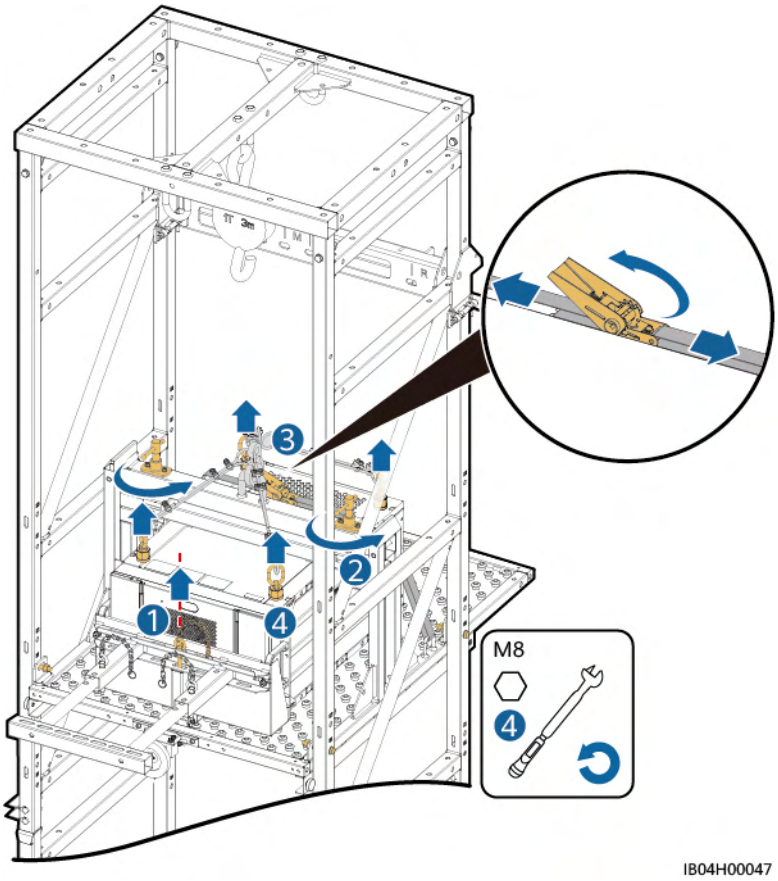
Step 5 Hoist the tray to the corresponding rail height and secure it.

Figure 6-38 Securing the tray



Step 6 Remove the bolt, loosen the rod, and remove the binding strap and protective ropes.

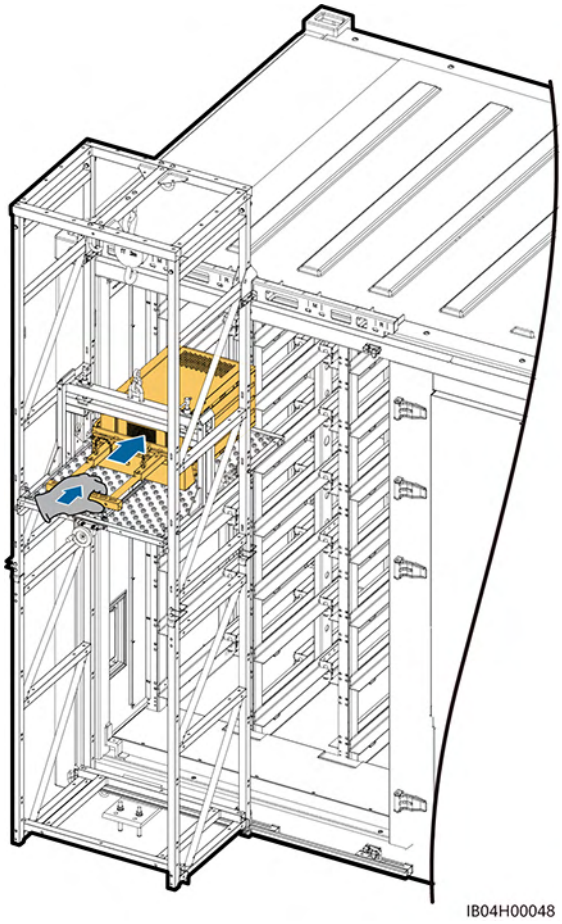
Figure 6-39 Loosening the battery pack



Step 7 Adjust the tray height through the chain hoist to align the tray with the battery pack rails.

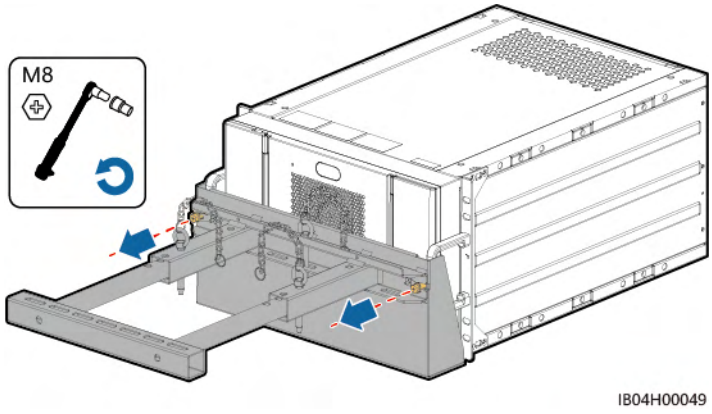
Step 8 Push the battery pack onto the rails.

Figure 6-40 Pushing in the battery pack



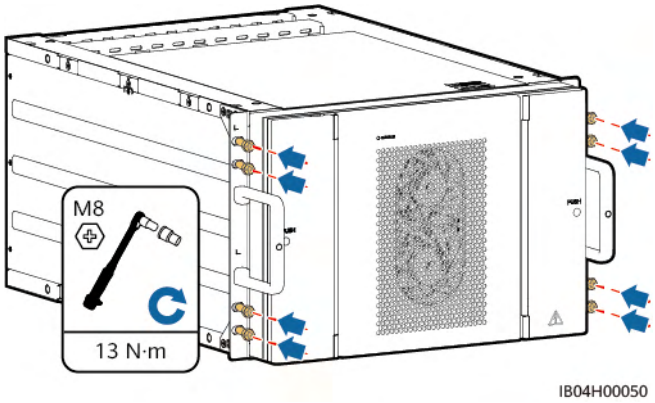
Step 9 Remove the operating handle.

Figure 6-41 Removing the operating handle



Step 10 Install screws to secure the battery pack.

Figure 6-42 Installing screws to secure the battery pack



Step 11 Remove the engineering installation kits.

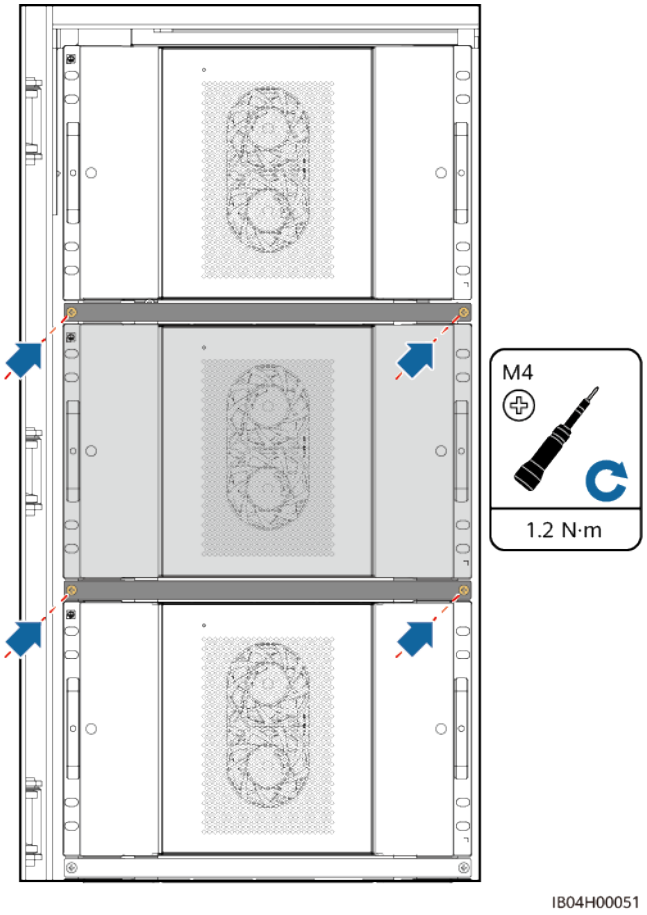
NOTICE

Multiple persons are required in the removal. Take protective measures to prevent collision.

Step 12 Insert the hole plug to the screw hole on the top of the ESS.

Step 13 Install battery pack baffle plates.

Figure 6-43 Installing battery pack baffle plates



Step 14 Install copper bars and cables for the battery pack.

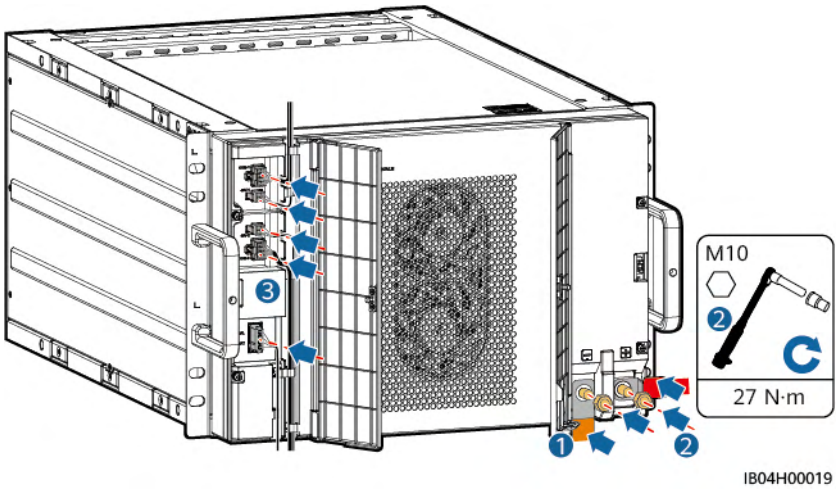
DANGER

Note the polarities when installing batteries. Do not connect the positive and negative poles of a battery or battery string together. Otherwise, the battery may be short-circuited.

NOTICE

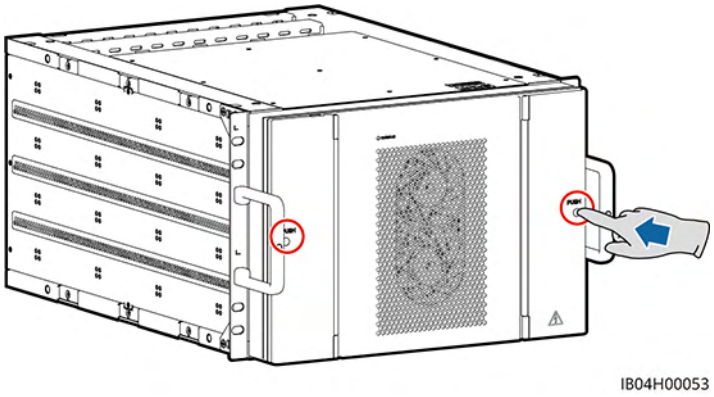
After installing nuts, verify the torque. Mark the nuts whose torque has been verified using a marker.

Figure 6-44 Installing copper bars and cables for the battery pack



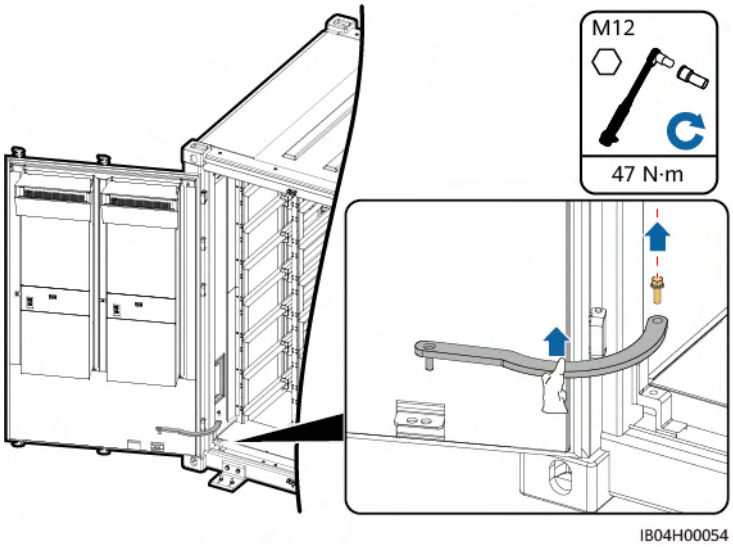
Step 15 Close the battery pack covers.

Figure 6-45 Closing the battery pack covers



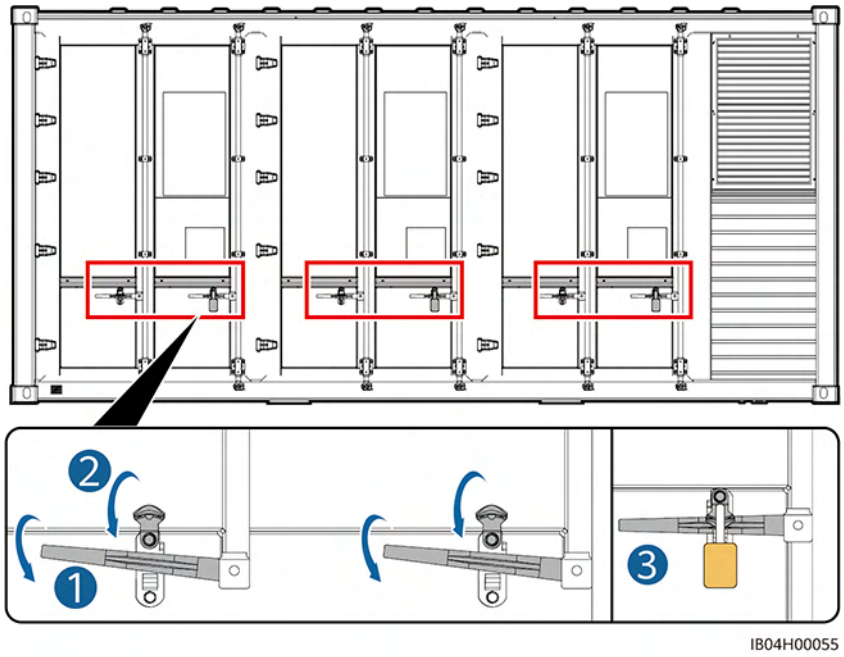
Step 16 (Optional) Remove a door strut.

Figure 6-46 Removing a door strut



Step 17 Close the cabin doors.

Figure 6-47 Closing the cabin doors



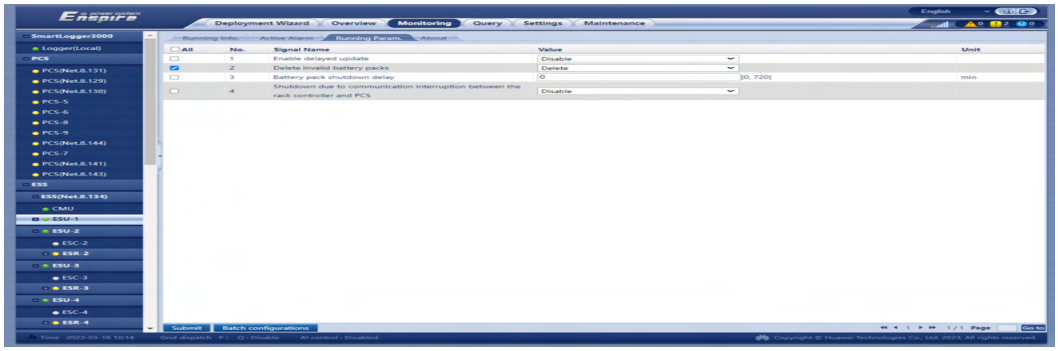
----End

Follow-up Procedure

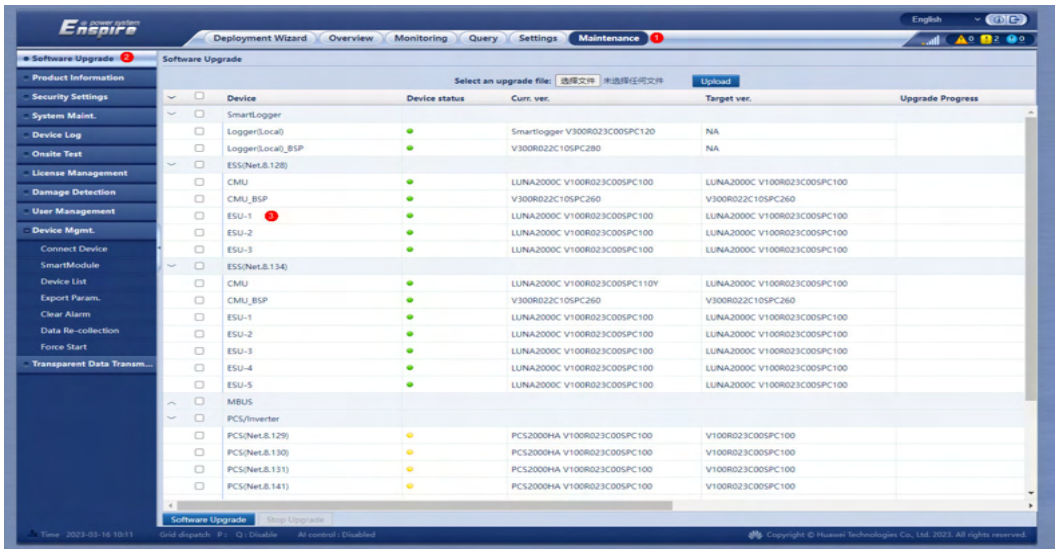
Step 1 Power on the system. For details, see the system power-on section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Step 2 Choose **Monitoring** > **ESU** > **Running Param.**, select **Delete invalid battery packs**, and click **Submit**.

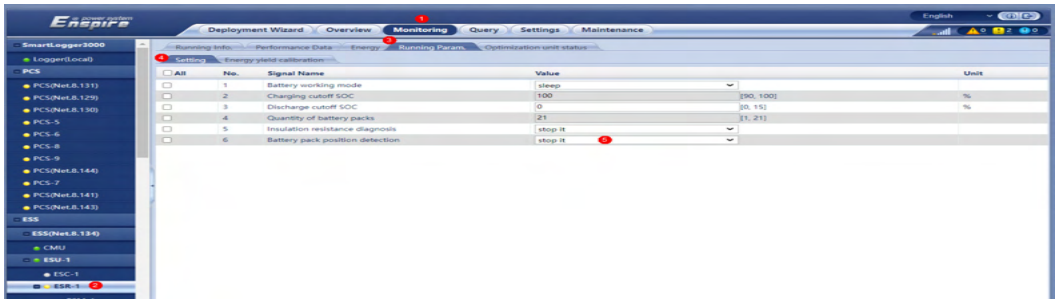
Figure 6-48 Deleting invalid battery packs



Step 3 Upgrade the ESU software version of the battery rack where the new battery pack is located.



Step 4 Identify physical locations.



Step 5 Check whether the functions are restored.

Check Item	Criteria
Alarm information	No major or minor component alarms are generated.
Function	The communication and charging/discharging functions are normal.

----End

6.2 Replacing a Battery Pack (Using a Forklift-based Kit)

NOTE

The battery pack appearance may vary. The figures in this section are for reference only.

Prerequisites

DANGER

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.
- Do not smoke or have an open flame around batteries.
- Do not use wet cloth to clean exposed copper bars or other conductive parts.
- Do not use water or any solvent to clean batteries.

WARNING

Do not maintain batteries with power on. To power off the batteries before performing operations such as checking and tightening screw torques, explain the risks to the customer, obtain the customer's written consent, and take effective preventive measures.

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.
- 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.

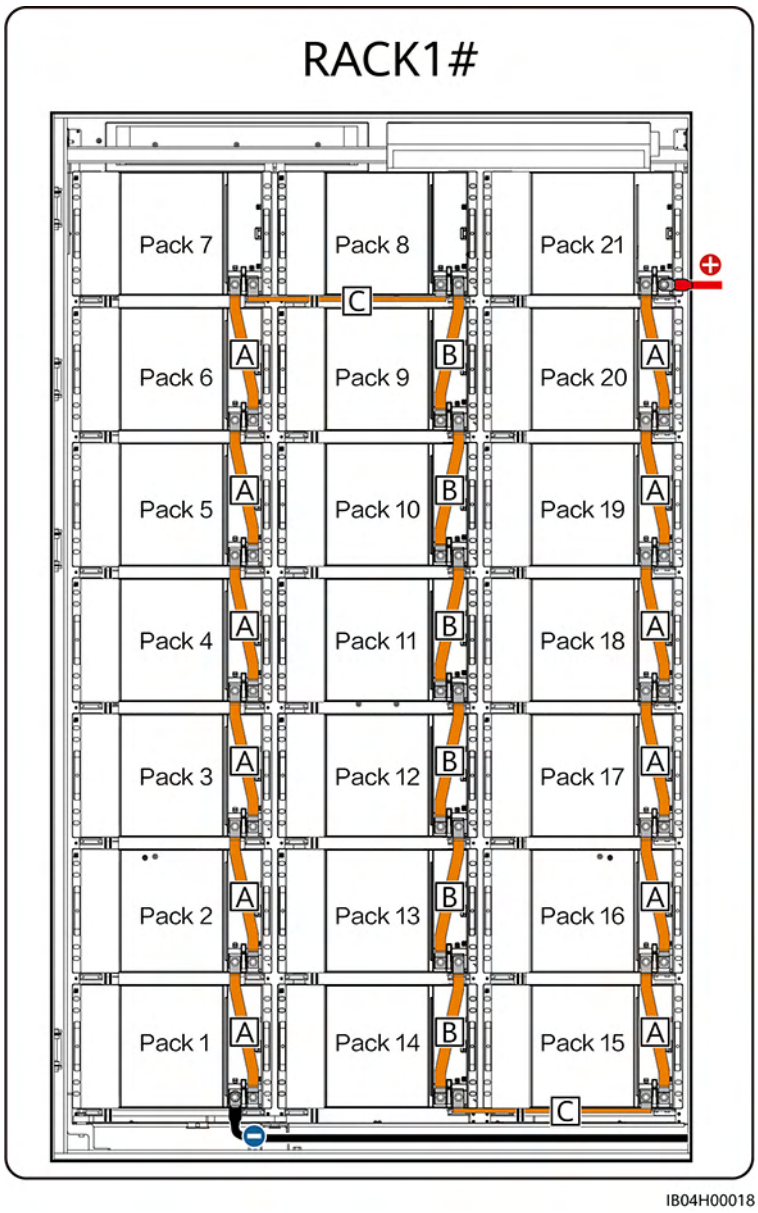
CAUTION

- Do not use the battery packs if the packing cases are exposed to rain, damaged, or deformed, or if the battery packs leak or fall.
- Do not install battery packs on rainy, snowy, or foggy days. Otherwise, the battery packs may be eroded by moisture or rain.
- Exercise caution when moving battery packs to prevent bumping and ensure personal safety.
- Slowly push or move battery packs to prevent damage and collision.

NOTICE

Battery packs with different cell capacities cannot be used in the same battery rack. You can check the cell capacity of a battery pack by viewing the model on the nameplate on the top of the battery pack.

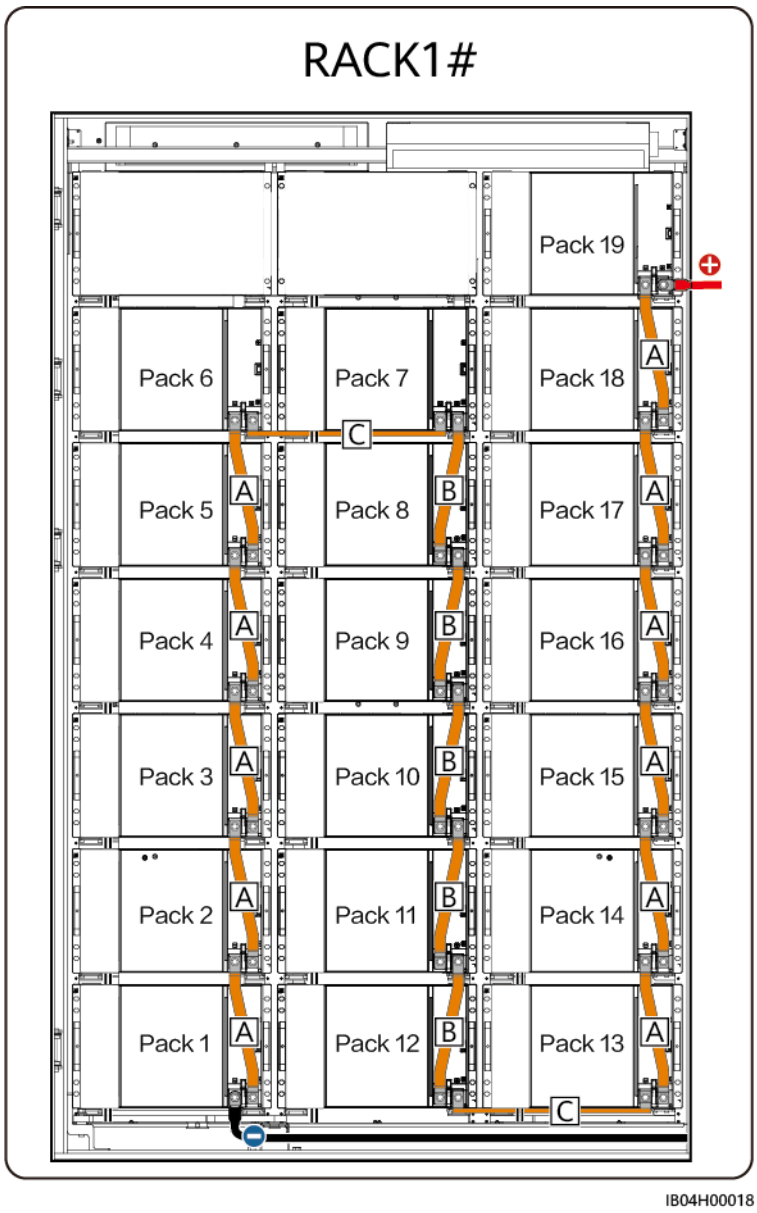
Figure 6-49 Positions of battery packs



NOTE

For some models, each battery rack contains only 19 battery packs, as shown in the following figure.

Figure 6-50 Positions of battery packs (19 battery packs)



- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Four persons are required to replace a battery pack.
- Tools: One insulated torque socket wrench set, one M4 Phillips insulated screwdriver, one M12 adjustable wrench, one multimeter (DC voltage range ≥ 1500 V DC), one forklift, two ladders, four lifting handles, four safety helmets, four pairs of goggles, four pairs of insulated gloves, four sets of arc flash clothing, four reflective vests, and four pairs of insulated shoes

NOTE

- At least two ladders are required.
- The personnel, tools, and environment must meet relevant safety requirements.

- The ESS has been powered off. For details, see the system power-off section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Checking the Battery Pack Status

After the ESS is powered off, wait for 5 to 10 minutes, open the battery cabin door, and check the battery pack status.

Step 1 Ensure that the indicator on the front panel of the battery pack is off.

Step 2 Check the temperature of the copper bars and screws of the battery pack using an infrared thermometer. If the temperature is too high, use a multimeter to check whether the voltage between the positive and negative poles of the copper bars is 0 V after the temperature decreases to a normal state.

Step 3 If any irritating odor, leakage, bulging, or damage is present, contact service engineers for handling.

Step 4 If sparks or burn marks occur on the front panel or handles of the battery pack, contact service engineers for handling.

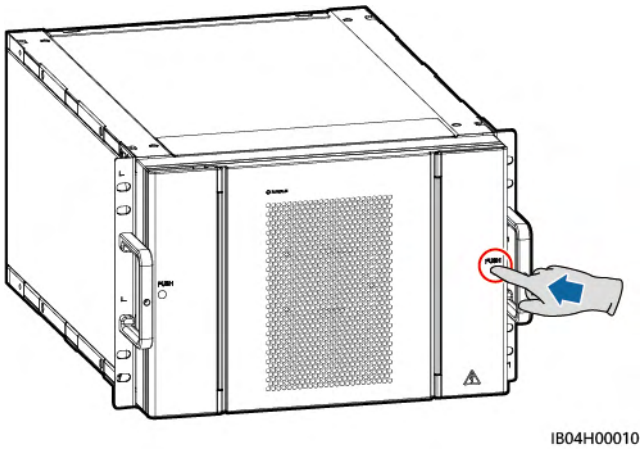
Step 5 If the battery pack appears normal and has no irritating odor, remove the faulty battery pack.

----End

Removing a Faulty Battery Pack

Step 1 Press to open the covers on both sides of the battery pack.

Figure 6-51 Opening battery pack covers

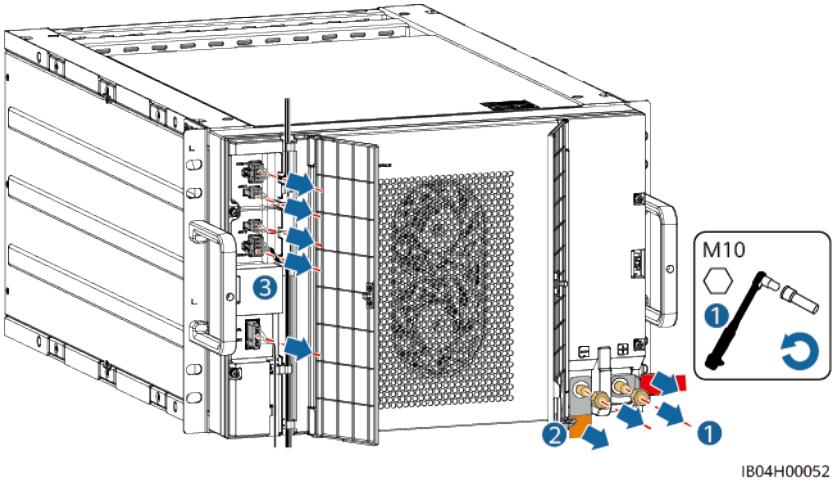


Step 2 Remove copper bars and cables from the battery pack, and close the covers.

NOTICE

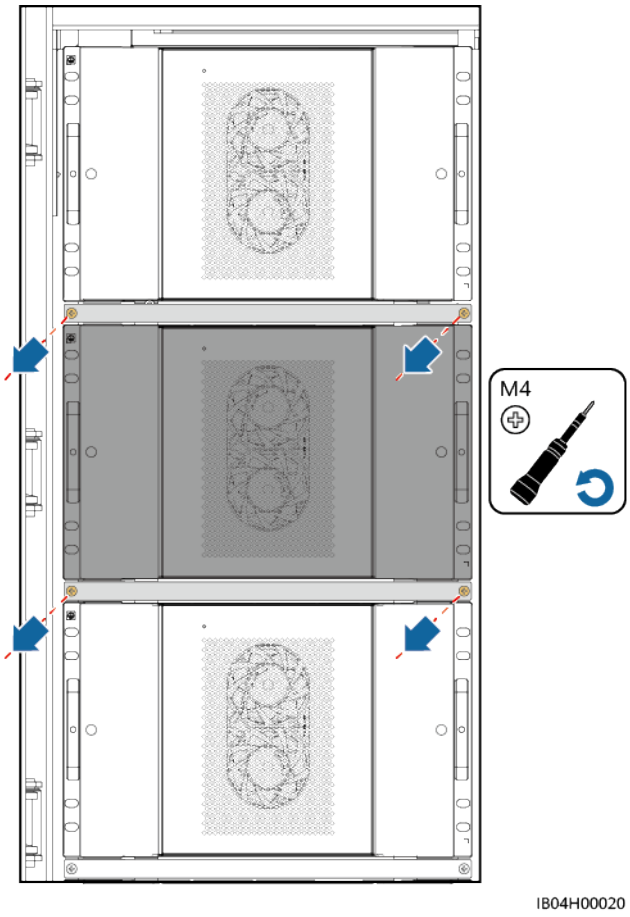
If Pack 1 and Pack 21 are replaced, disconnect cables from the battery pack, insulate the cables, and reconnect them to the new battery pack. This prevents damage to the cables and interference with the installation of other components.

Figure 6-52 Removing copper bars and cables



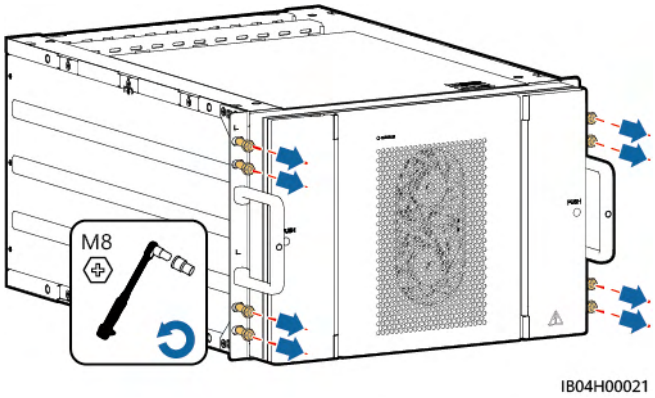
Step 3 Remove the baffle plates from the top and bottom of the battery pack.

Figure 6-53 Removing baffle plates



Step 4 Remove screws from the battery pack.

Figure 6-54 Removing screws



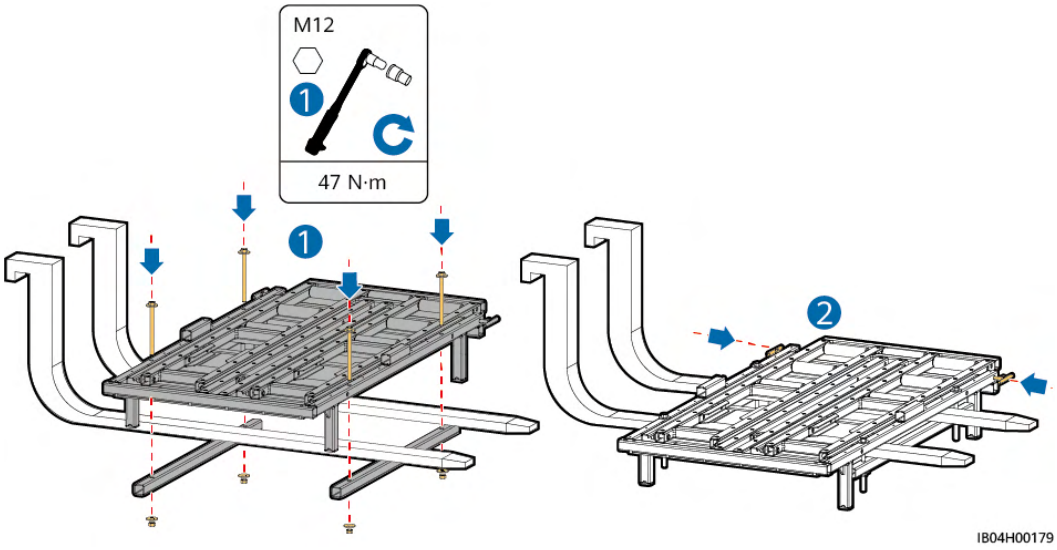
Step 5 Take out the engineering installation kit.

CAUTION

Use the handles to open or close the packing case door. The door is heavy. Exercise caution to avoid injury.

Step 6 Assemble the kit: Tighten the four screws and two handles.

Figure 6-55 Assembling the kit

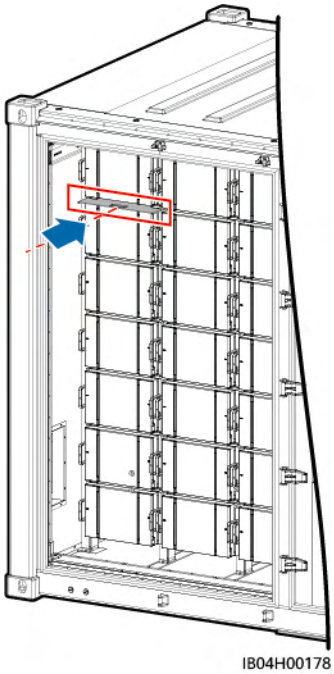


Step 7 (Optional) Install the protective plate.

NOTE

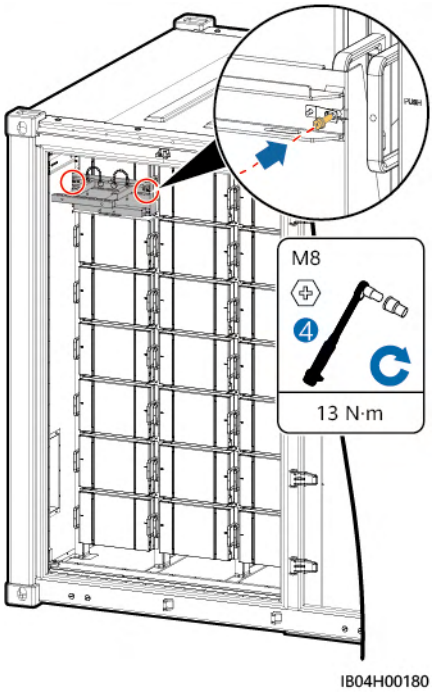
When replacing a battery pack at the bottom, you do not need to install a protective plate.

Figure 6-56 Installing the protective plate (Layer 7 battery pack is used as an example.)



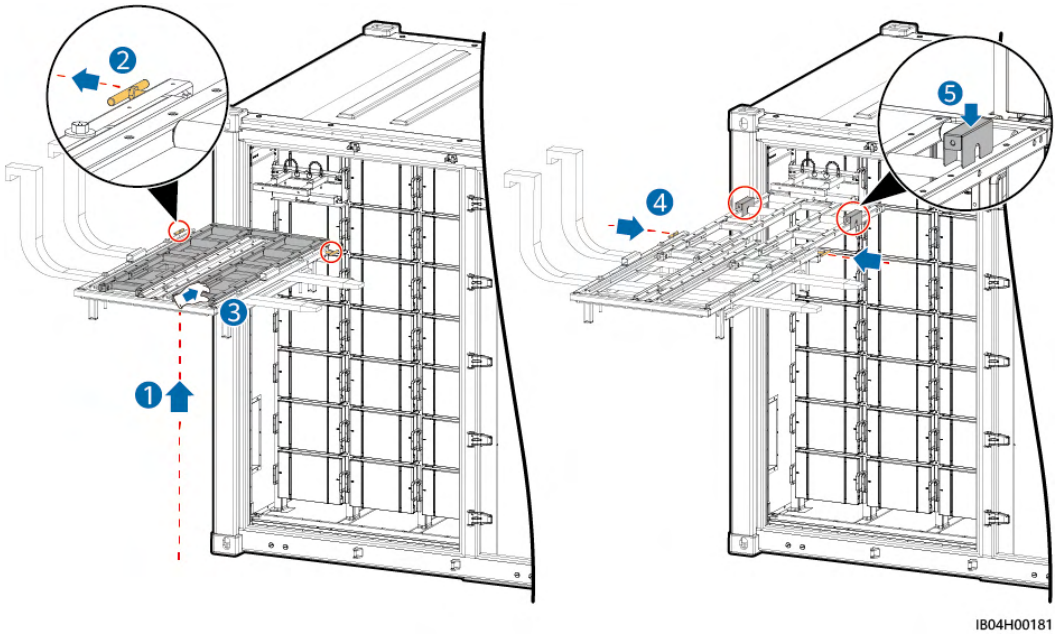
Step 8 Install the battery pack shovel pan.

Figure 6-57 Installing the shovel pan



Step 9 Lift up the kit, and pull out the kit drawer: Loosen the two handles, pull out the drawer, and tighten the two handles.

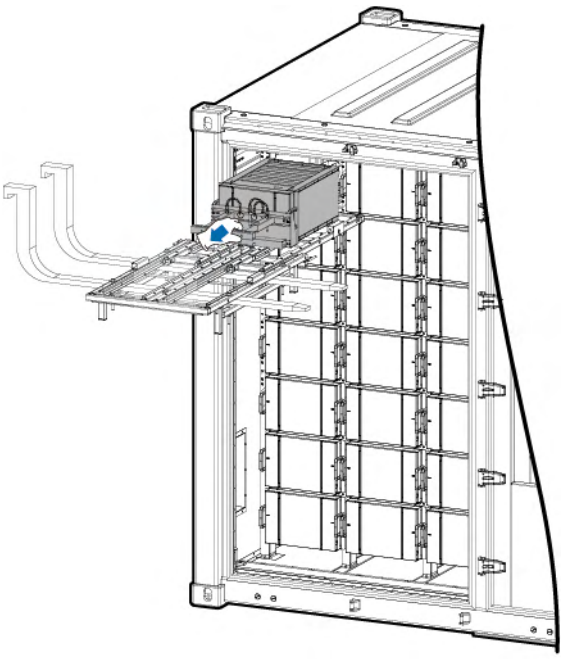
Step 10 Install the distance blocks.



Step 11 Pull out the battery pack onto the kit drawer.

NOTICE

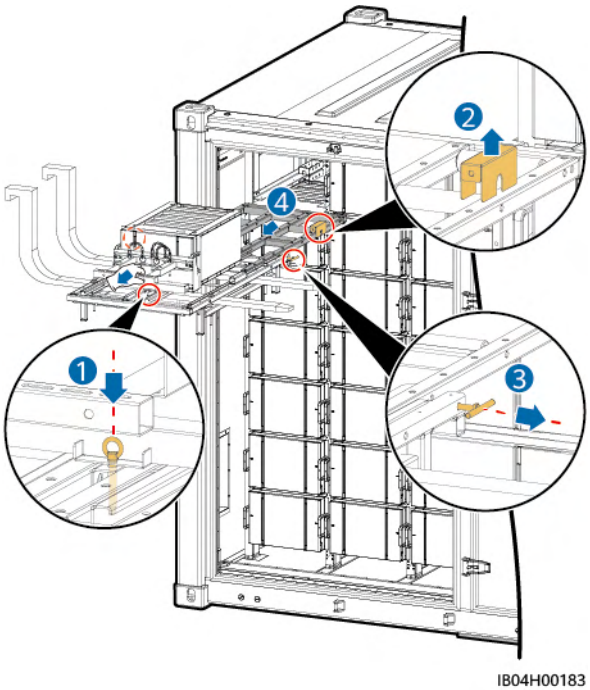
When the center of gravity of the battery pack is on the drawer, the forklift should lift the load up by 2 cm to 3 cm to align the drawer with the battery slot rails.



IB04H00182

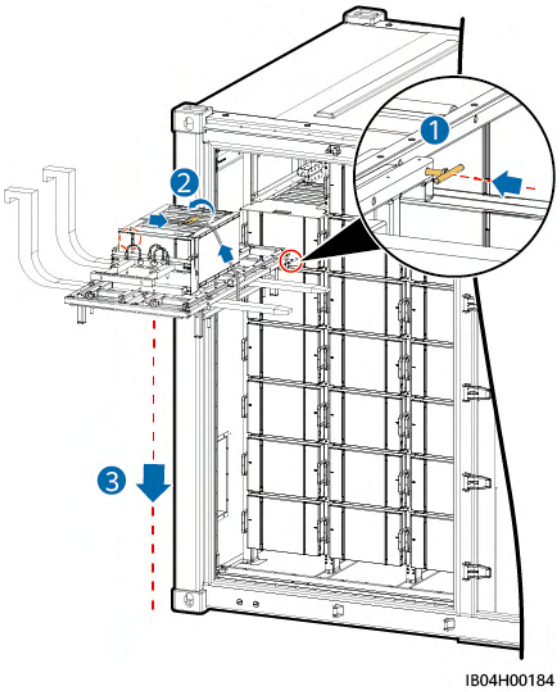
Step 12 Adjust the kit to an appropriate position, move the battery pack completely onto the kit base, and secure the positioning pin.

Step 13 Remove the distance blocks and push in the kit drawer.

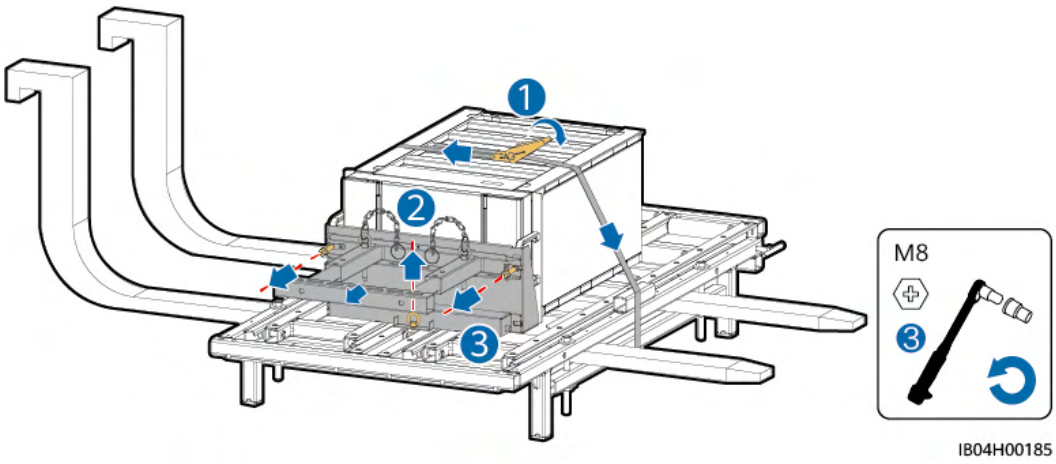


IB04H00183

Step 14 Install binding straps and lower the kit.



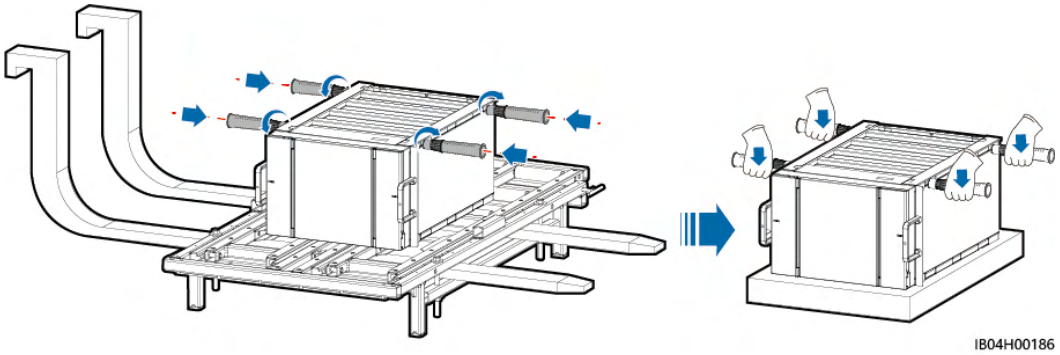
Step 15 Remove the positioning pin, binding straps, and shovel pan.



Step 16 Install the lifting handles and remove the old battery pack.

NOTICE

- At least four persons are required to move a battery pack.
- Use the lifting handles to move the battery pack. Do not use the handles on the battery pack.
- When installing the lifting handles, install the two on the front first. Move the battery pack slowly to the front of the tray and then install the other two lifting handles after the securing holes appear.
- After the lifting handles are secured (with the steel washers of the lifting handles closely fitted to the battery pack), grip the lifting handles near the ends that are closer to the battery pack to lift the battery pack. Do not lift the battery pack before the handles are secured.
- If the stud of a lifting handle is bent, replace the lifting handle in time.
- If the battery pack has been dropped, perform operations according to the emergency handling plan.



----End

Installing a New Battery Pack

WARNING

- Do not stand under the tray.
- Do not put your head, hands, feet, or other body parts under the tray.

CAUTION

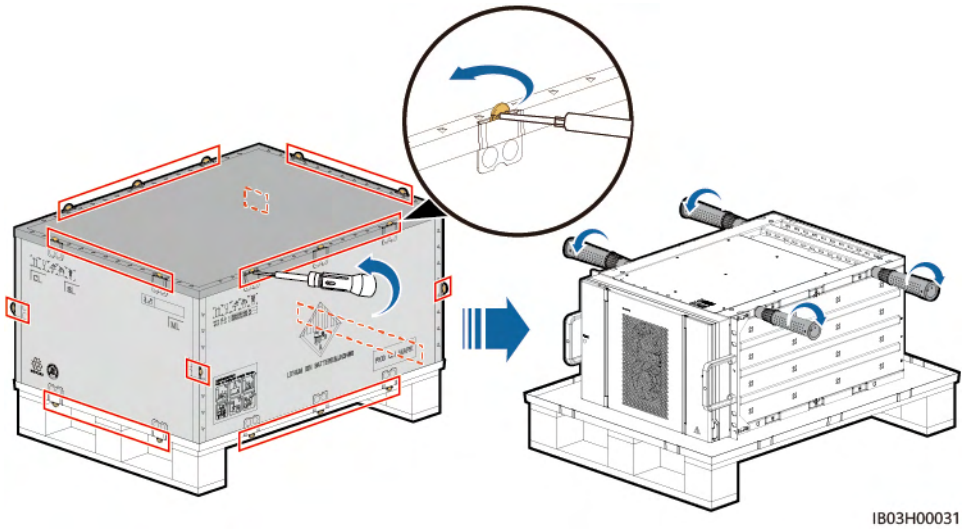
- Multiple persons are required in the operation. Take protective measures to prevent collision.
- When working at heights is involved, see the relevant safety precautions.

Step 1 Take out the battery pack and install the lifting handles.

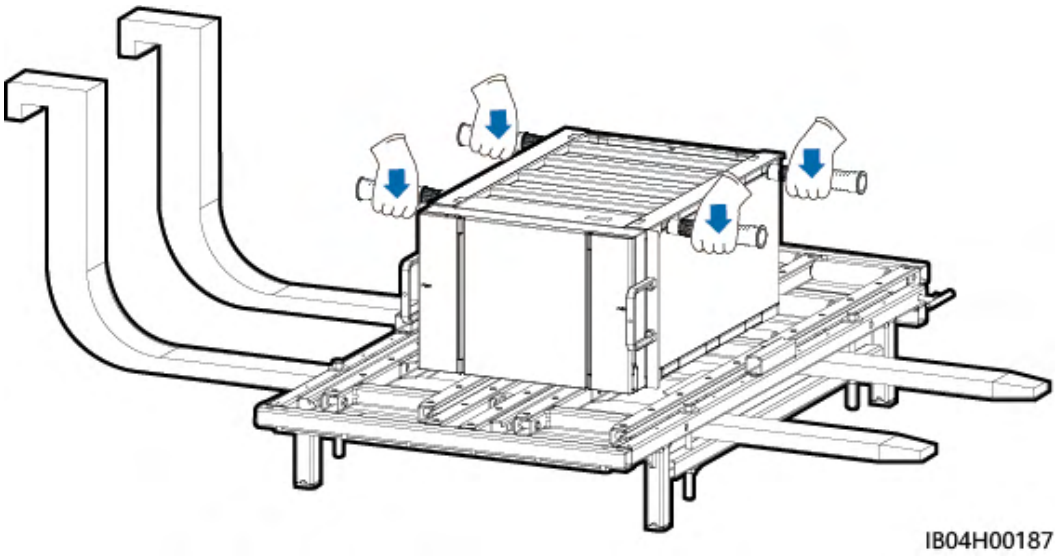
NOTICE

- At least four persons are required to move a battery pack.
- Use the lifting handles to move the battery pack. Do not use the handles on the battery pack.
- When installing the lifting handles, install the two on the front first. Move the battery pack slowly to the front of the tray and then install the other two lifting handles after the securing holes appear.
- After the lifting handles are secured (with the steel washers of the lifting handles closely fitted to the battery pack), grip the lifting handles near the ends that are closer to the battery pack to lift the battery pack. Do not lift the battery pack before the handles are secured.
- If the stud of a lifting handle is bent, replace the lifting handle in time.
- If the battery pack has been dropped, perform operations according to the emergency handling plan.

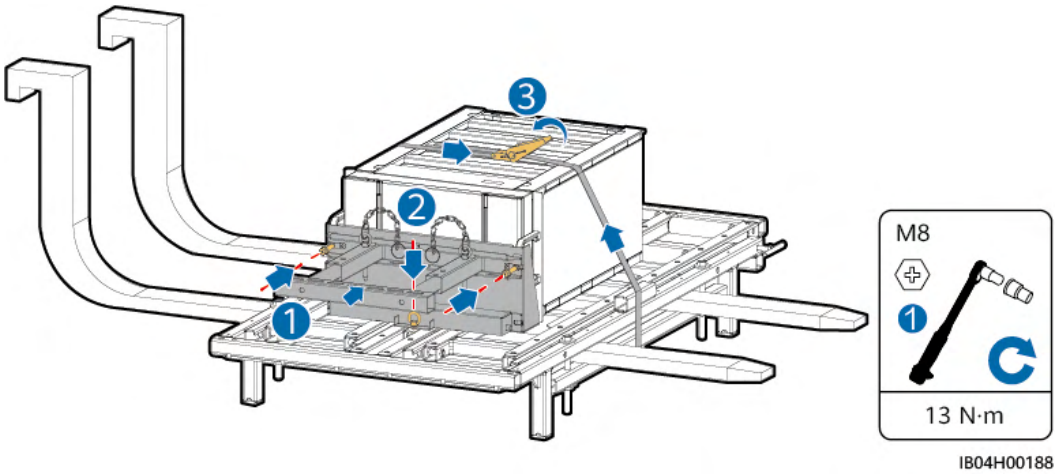
Figure 6-58 Taking out the battery pack



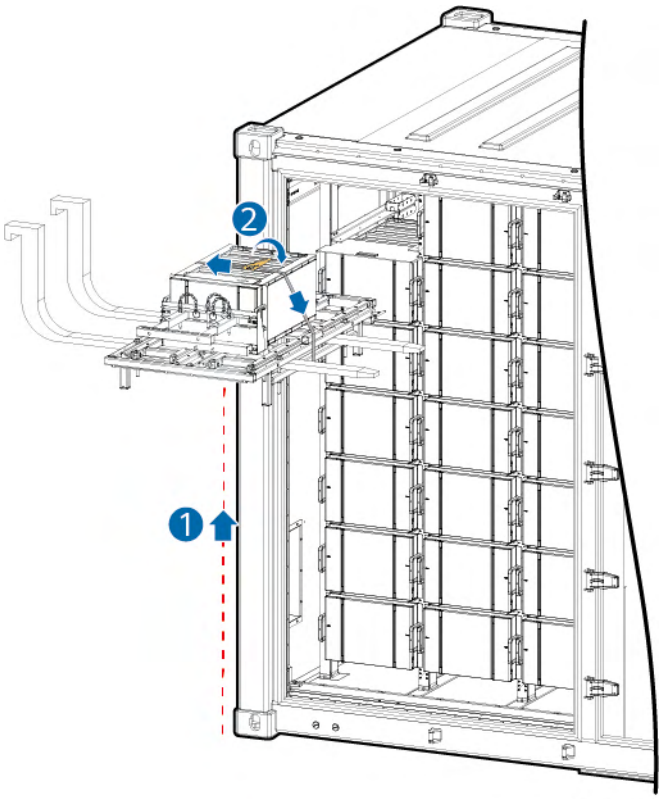
Step 2 Move the battery pack onto the kit base, and remove the lifting handles.



Step 3 Install the shovel pan, positioning pin, and binding straps.



Step 4 Lift up the kit and remove the battery pack binding straps.



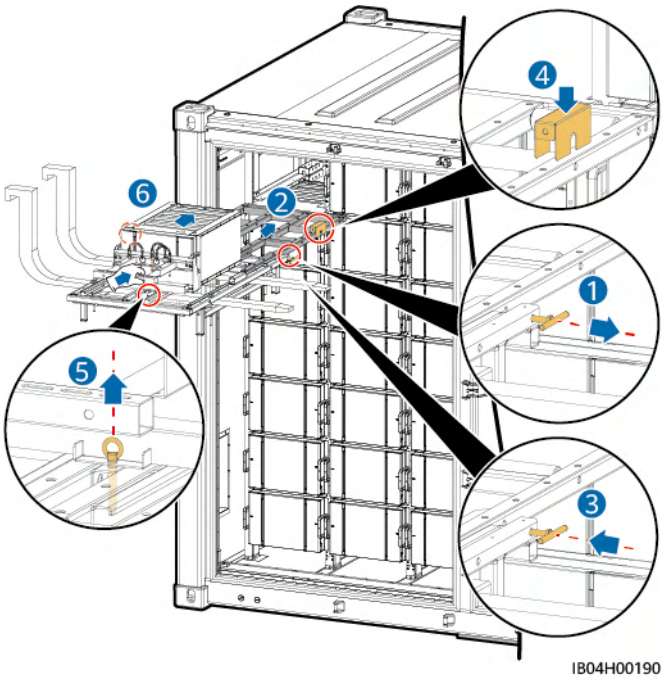
Step 5 Pull out the kit drawer: Loosen the two handles, pull out the drawer, and tighten the two handles. Then, install the distance blocks.

NOTICE

- The kit drawer shall be flush with the protective plate.
- Determine the number of distance blocks and their positions based on the actual application scenario.

Step 6 Remove the battery pack positioning pin and pull the battery pack onto the kit drawer.

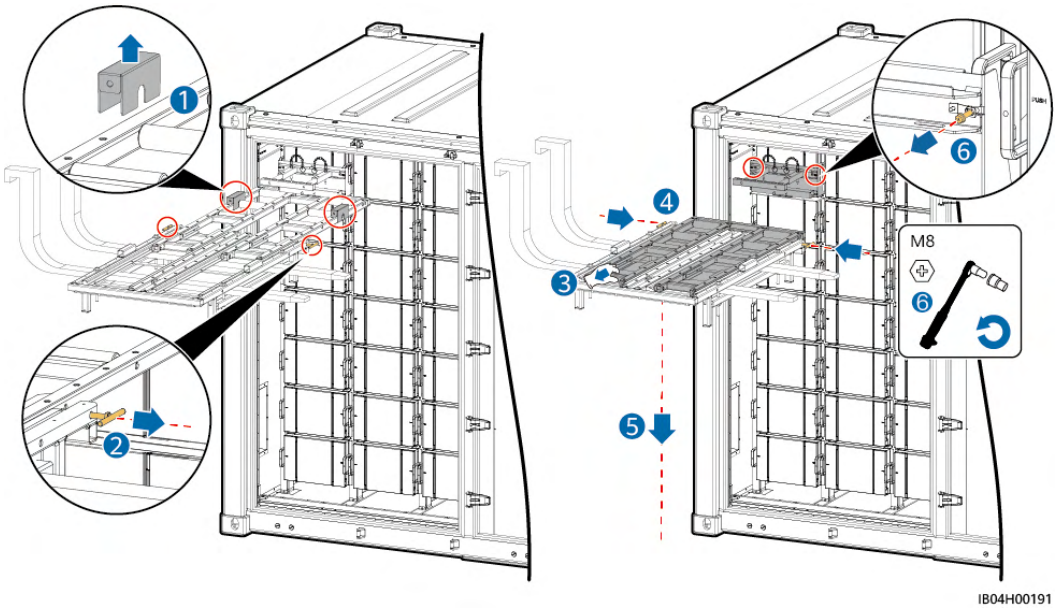
Step 7 Move the battery pack into the installation slot.



Step 8 Remove the distance blocks, and push in the kit drawer: Loosen the two handles, push in the drawer, and tighten the two handles.

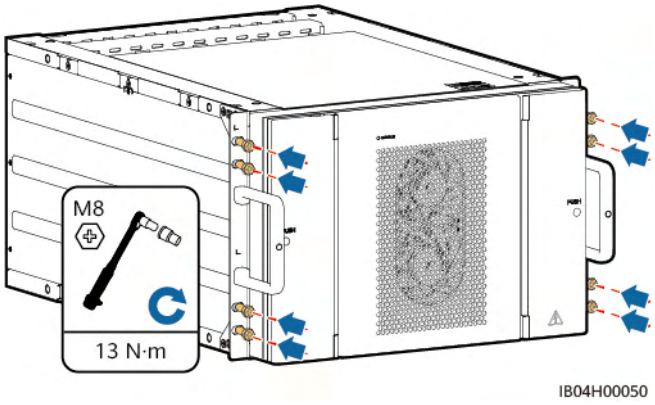
Step 9 Lower the kit.

Step 10 Remove the shovel pan and the protective plate.



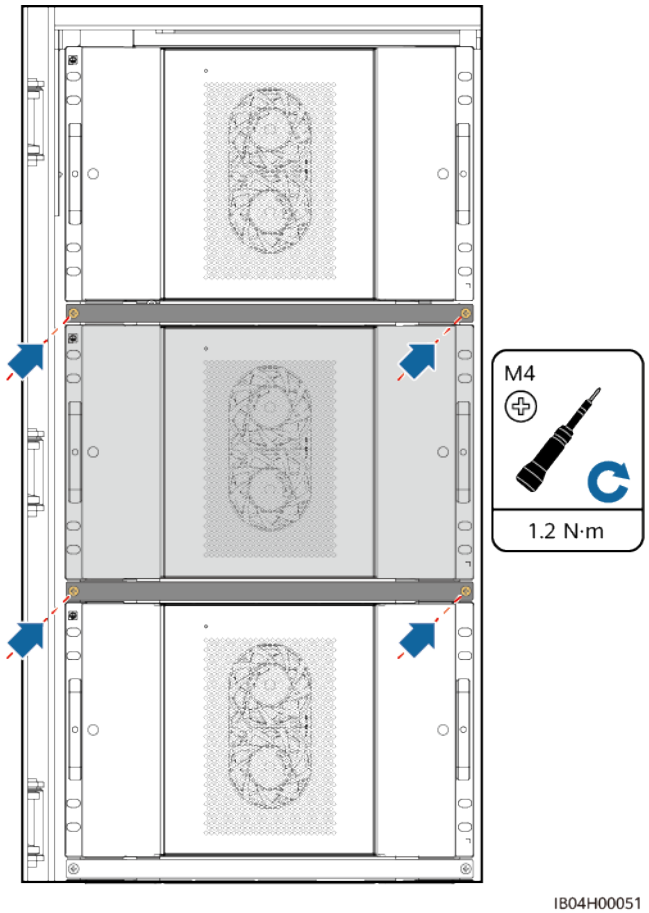
Step 11 Install screws to secure the battery pack.

Figure 6-59 Installing screws to secure the battery pack



Step 12 Install battery pack baffle plates.

Figure 6-60 Installing battery pack baffle plates



Step 13 Install copper bars and cables for the battery pack.

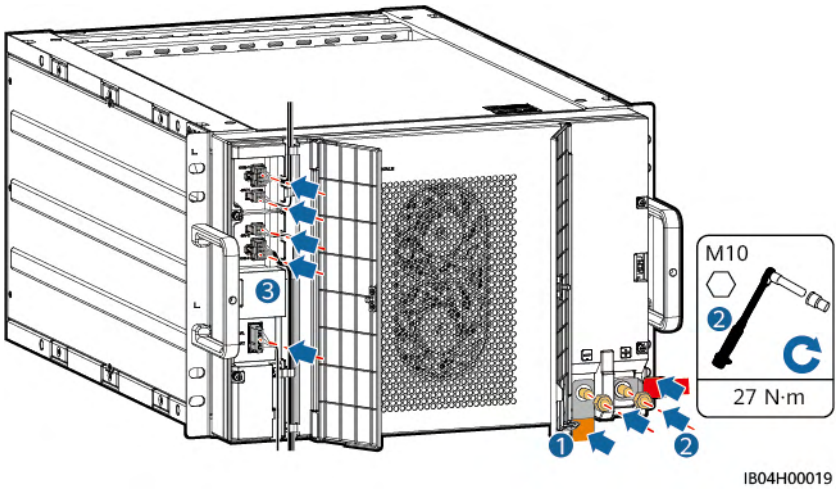
DANGER

Note the polarities when installing batteries. Do not connect the positive and negative poles of a battery or battery string together. Otherwise, the battery may be short-circuited.

NOTICE

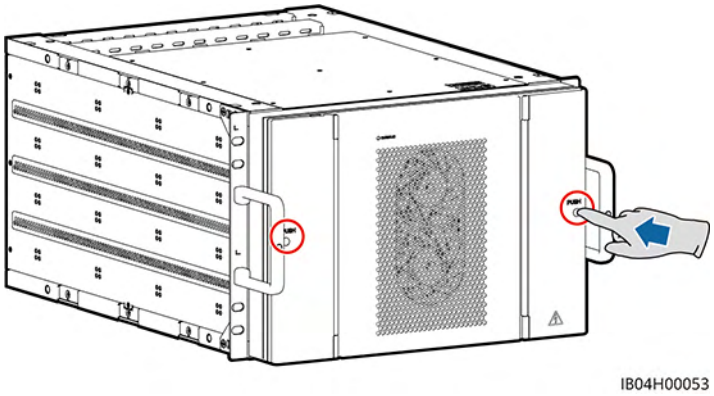
After installing nuts, verify the torque. Mark the nuts whose torque has been verified using a marker.

Figure 6-61 Installing copper bars and cables for the battery pack



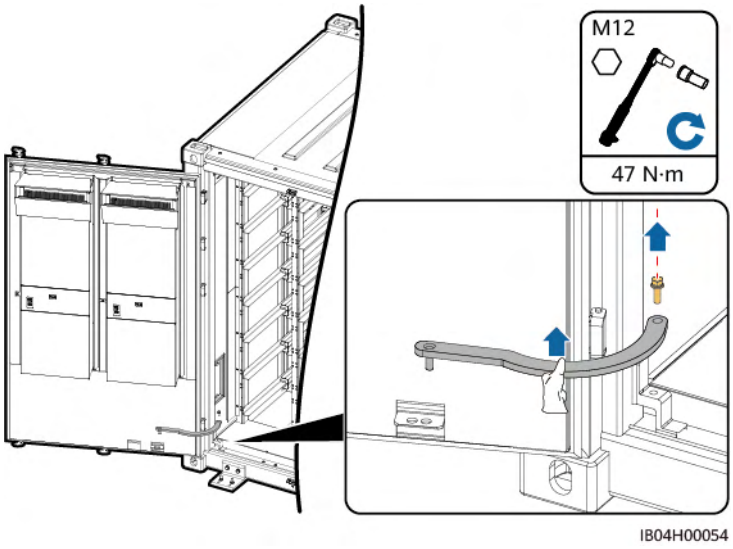
Step 14 Close the battery pack covers.

Figure 6-62 Closing the battery pack covers



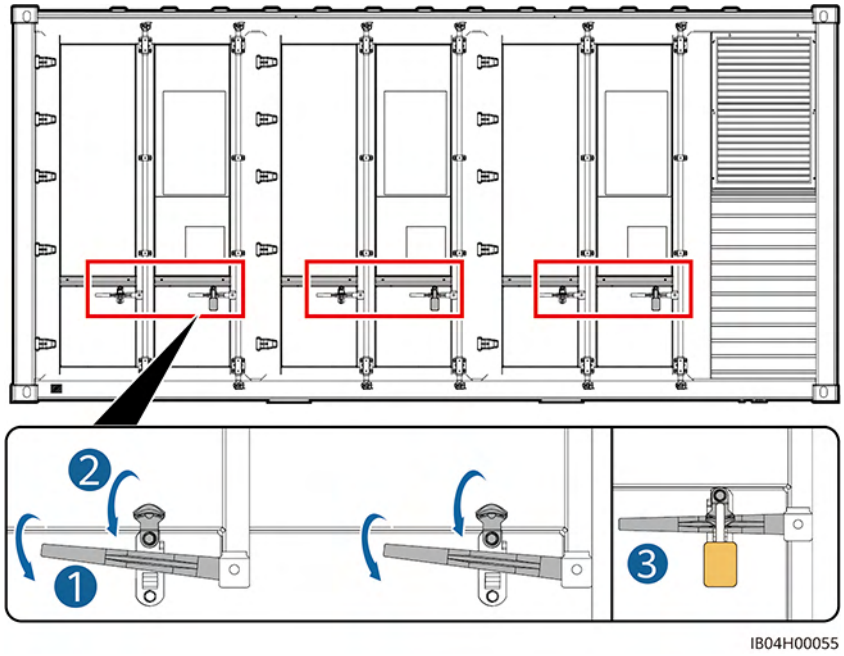
Step 15 (Optional) Remove the door stopper.

Figure 6-63 Removing the door stopper



Step 16 Close the cabin doors.

Figure 6-64 Closing the cabin doors



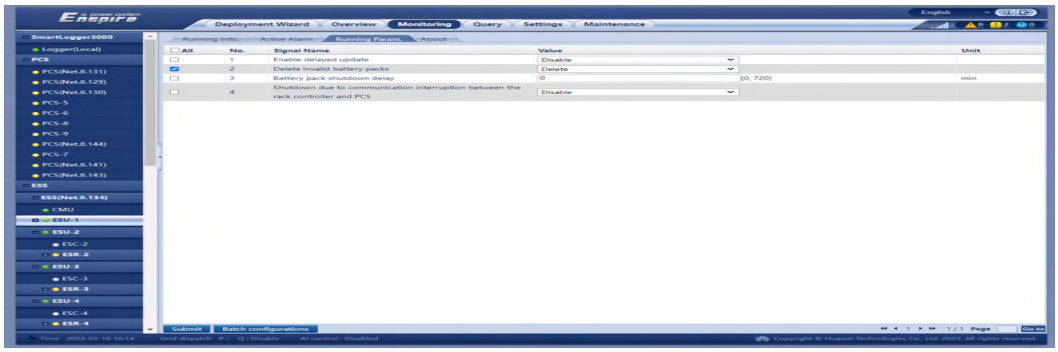
----End

Follow-up Procedure

Step 1 Power on the system. For details, see the system power-on section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Step 2 Choose **Monitoring** > **ESU** > **Running Param.**, select **Delete invalid battery packs**, and click **Submit**.

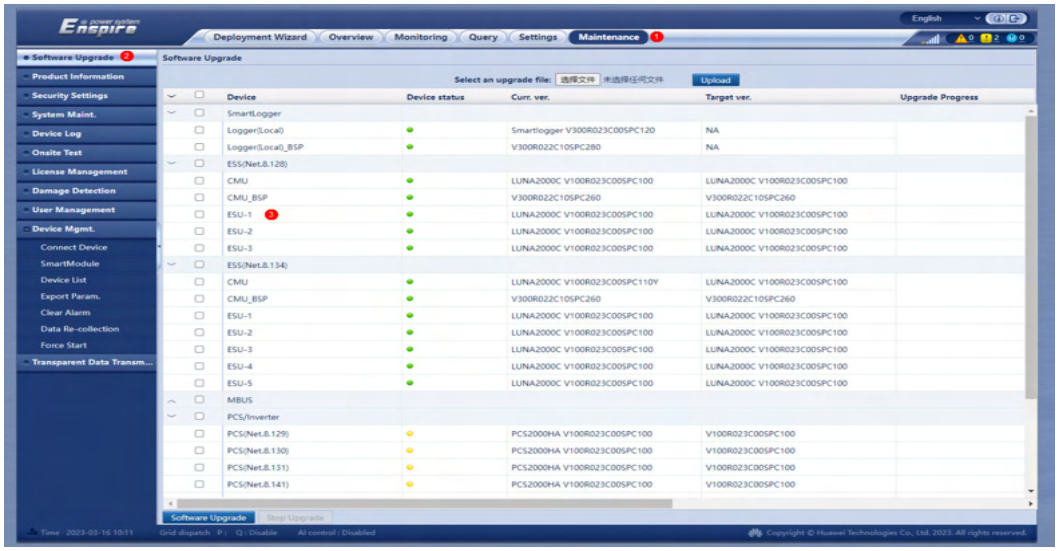
Figure 6-65 Deleting invalid battery packs



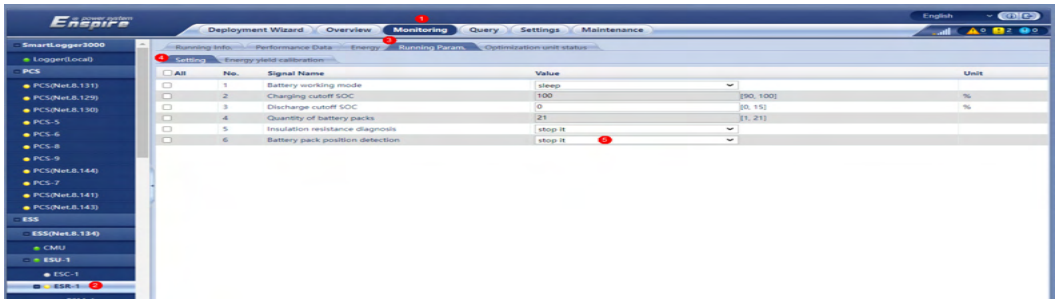
Step 3 Upgrade the ESU software version of the battery rack where the new battery pack is located.

NOTE

Before the upgrade, ensure that the new battery pack has been successfully connected: The old battery pack has been deleted, and **NA** is displayed in the corresponding position of the new battery pack.



Step 4 Identify physical locations.



Step 5 Check whether the functions are restored.

Check Item	Criteria
Alarm information	No major or minor component alarms are generated.

Check Item	Criteria
Function	The communication and charging/discharging functions are normal.

----End

6.3 Replacing a Battery Management Module

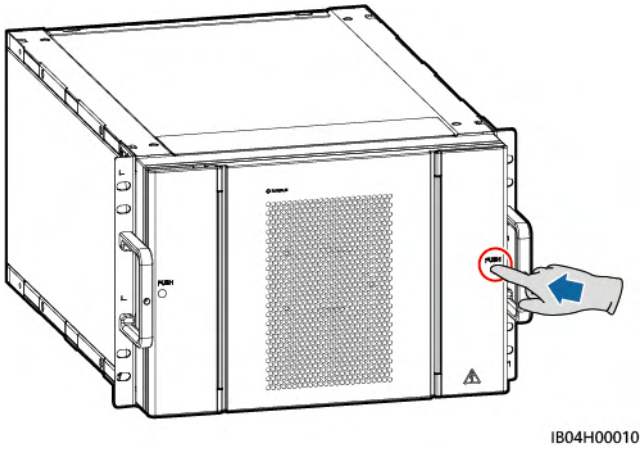
Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tools: insulated flat-head or Phillips screwdriver, insulated torque socket wrench, insulation tape, insulated gloves, ESD gloves, safety shoes, safety helmet, and ladder.
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Press to open the covers on both sides of the battery pack.

Figure 6-66 Opening battery pack covers

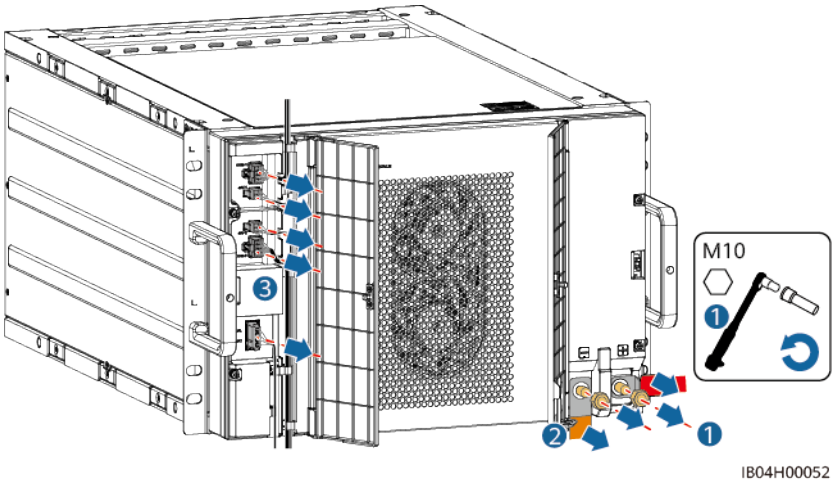


Step 2 Remove copper bars and cables from the battery pack.

NOTICE

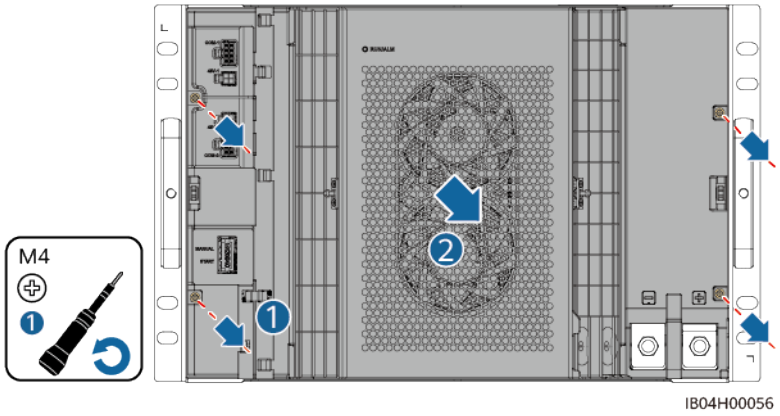
If Pack 1 and Pack 21 are replaced, disconnect cables from the battery pack, insulate the cables, and reconnect them to the new battery pack. This prevents damage to the cables and interference with the installation of other components.

Figure 6-67 Removing copper bars and cables



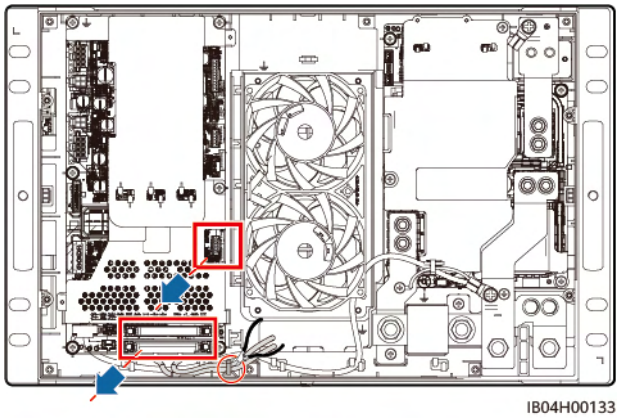
Step 3 Remove the front panel of the battery pack.

Figure 6-68 Removing the front panel of the battery pack



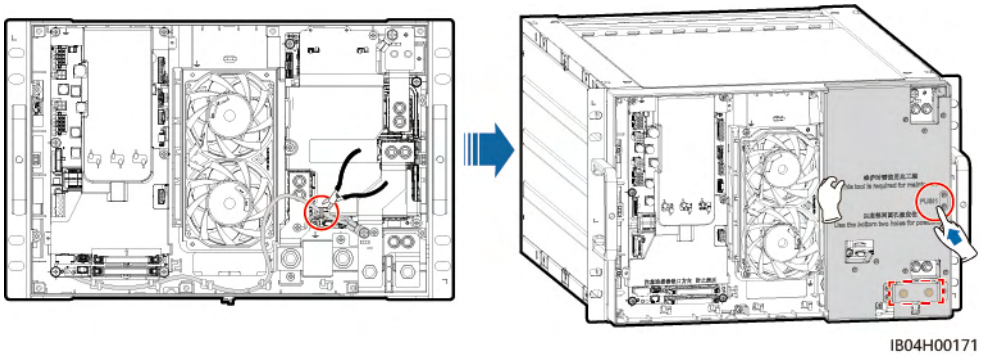
Step 4 Remove the three flat cables from the management module, cut off the cable ties and wrap them with insulation tape.

Figure 6-69 Removing the flat cables



Step 5 Cut off the cable ties and install the battery pack fixture.

Figure 6-70 Installing the battery pack fixture

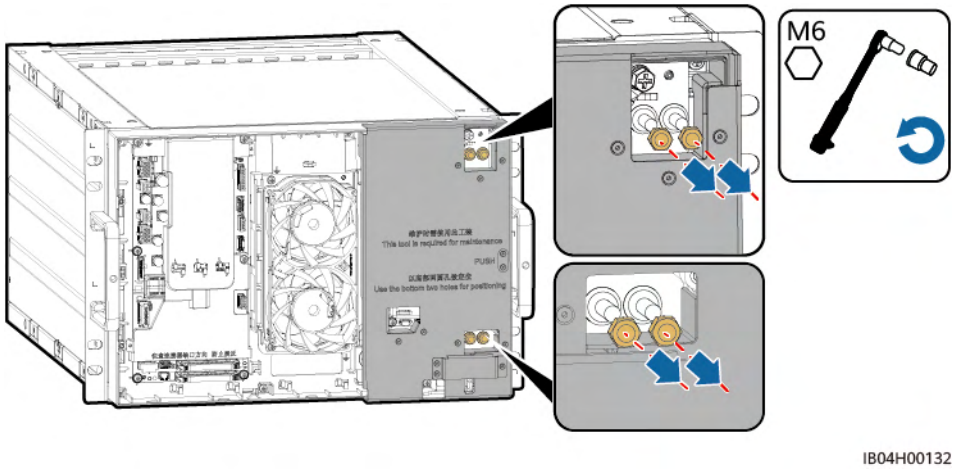


Step 6 Remove the short copper bar from the management module.

CAUTION

- If you do not perform operations as required, the module may be energized during maintenance, which poses safety risks.
- Tighten the nuts using the insulated torque socket wrench with an extension rod. The length of the extension rod is greater than 40 cm.

Figure 6-71 Removing the short copper bar

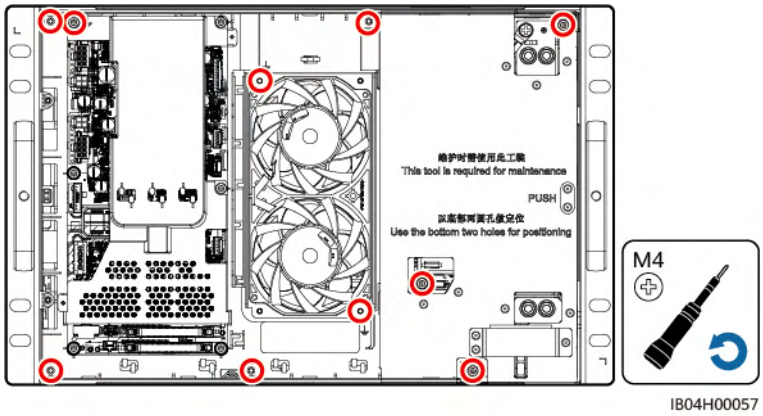


Step 7 Remove the 10 screws from the management module and remove the management module (including the battery pack fixture).

NOTICE

During the operation, prevent screws from falling into the bottom of the battery cabin.

Figure 6-72 Removing the screws



Step 8 Install a new management module.

Figure 6-73 Installing the screws

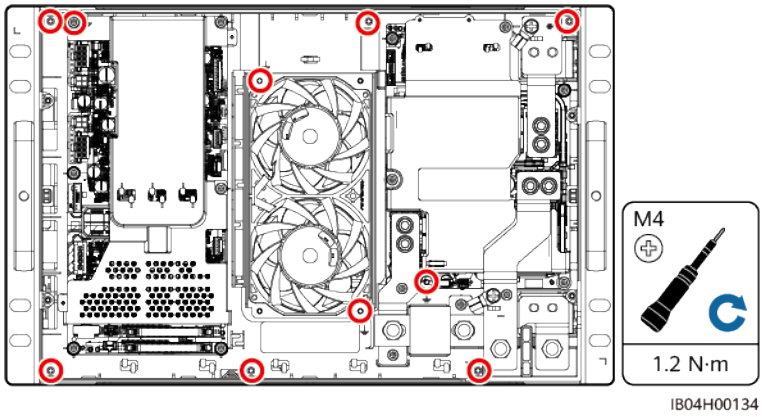


Figure 6-74 Installing the nuts

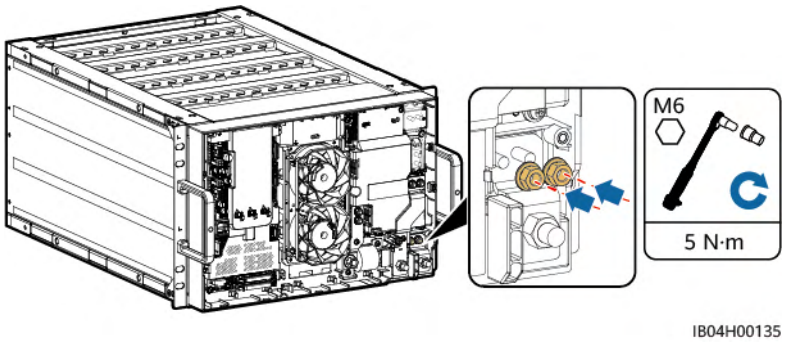
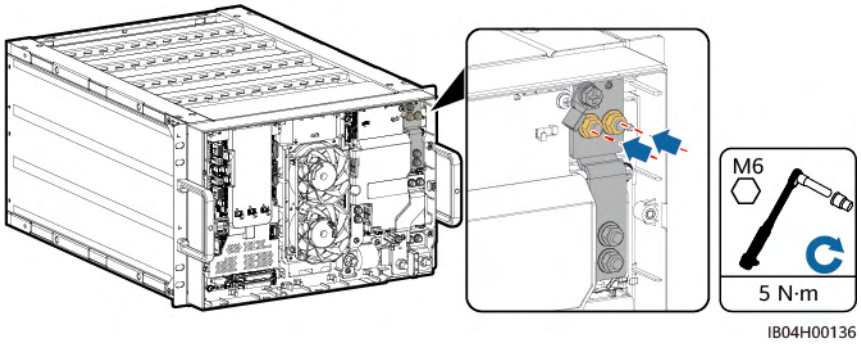


Figure 6-75 Installing the short copper bar

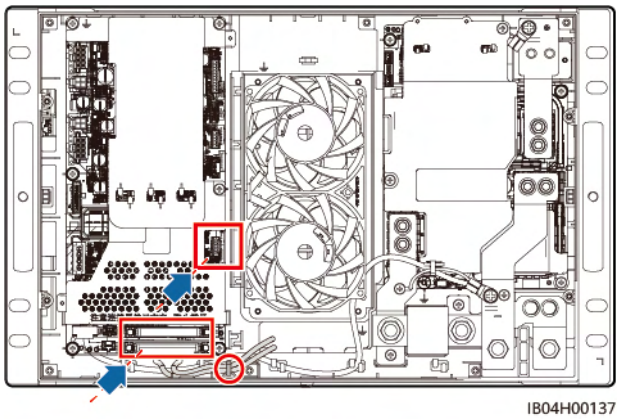


Step 9 Remove the insulation tape from the flat cables, install the flat cables to the management module, and bind the cables.

NOTICE

Install the flat cables according to the notch direction. Reverse connection may damage the device.

Figure 6-76 Installing the flat cables



Step 10 Install the front panel. Use a M4 Phillips screwdriver with a torque of 0.6 N·m.

Step 11 Install copper bars and cables for the battery pack.

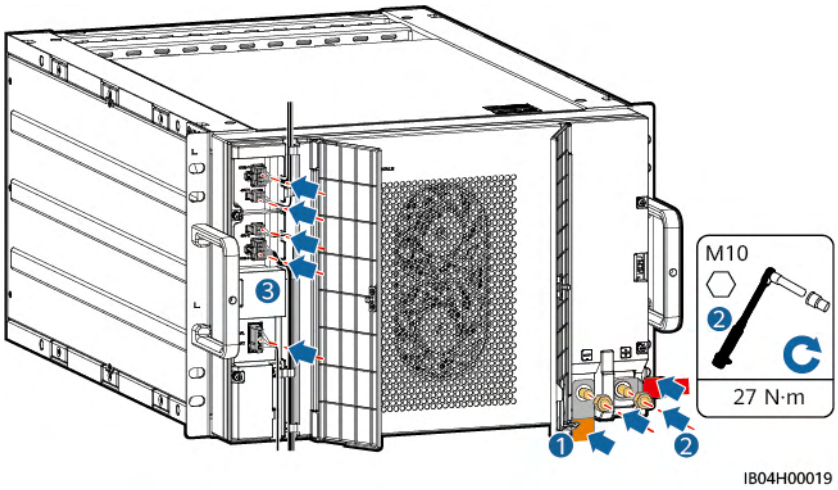
DANGER

Note the polarities when installing batteries. Do not connect the positive and negative poles of a battery or battery string together. Otherwise, the battery may be short-circuited.

NOTICE

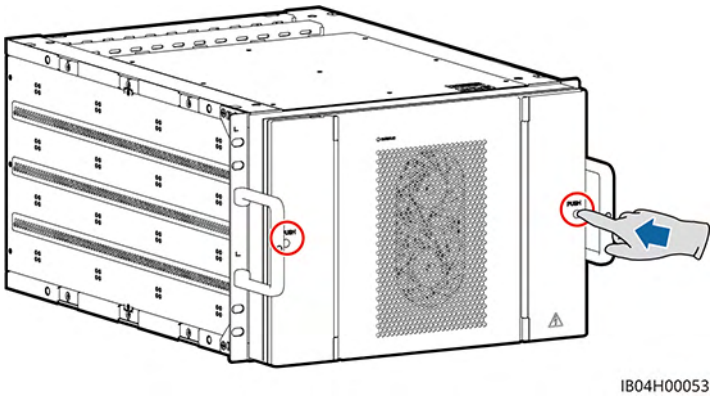
After installing nuts, verify the torque. Mark the nuts whose torque has been verified using a marker.

Figure 6-77 Installing copper bars and cables for the battery pack



Step 12 Close the battery pack covers.

Figure 6-78 Closing the battery pack covers



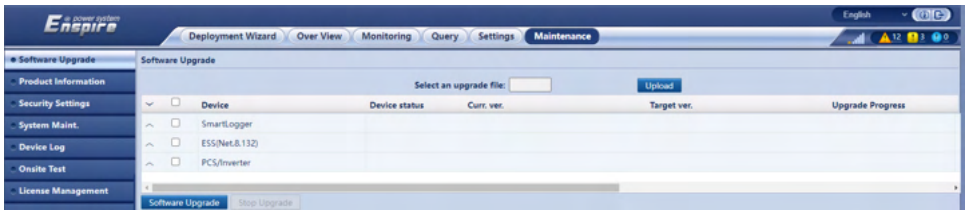
----End

Follow-up Procedure

Step 1 Power on the system. For details, see the system power-on section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Step 2 Log in to the CMU WebUI/SmartLogger WebUI, and choose **Maintenance** > **Software Upgrade** to upgrade the new battery pack.

Figure 6-79 Upgrading the battery pack



Step 3 Check whether the functions are restored.

Check Item	Criteria
Alarm information	No major or minor component alarms are generated.
Function	The communication and charging/discharging functions are normal.

----End

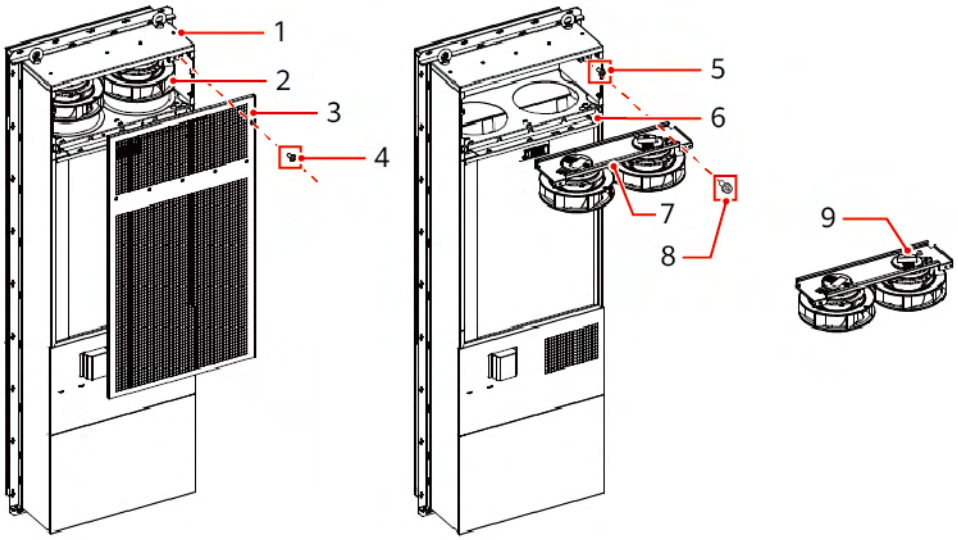
6.4 Replacing Devices for the Air Conditioner in the Battery Cabin

6.4.1 Replacing an Internal Fan of the Air Conditioner in the Battery Cabin

Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tools: flat-head or Phillips screwdriver and diagonal pliers
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

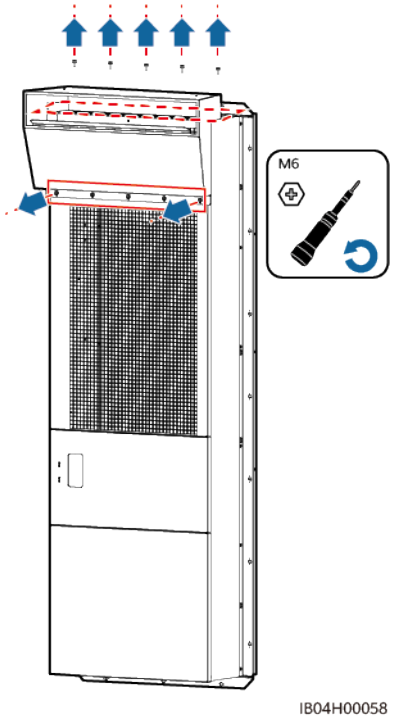
Procedure



(1) Air conditioner	(2) Internal fan	(3) Front cover
(4) Front cover screw (M4x10, tightening torque 1.2 N·m)	(5) Internal fan air deflector screw (M4x10, tightening torque 1.2 N·m)	(6) Internal fan air deflector
(7) Internal fan fixing plate	(8) Internal fan fixing plate screw (M6x12, tightening torque: 5 N·m)	(9) Internal fan mounting plate screw (M5x12, tightening torque 3 N·m)

Step 1 Remove the air duct.

Figure 6-80 Removing the air duct



Step 2 Use a Phillips screwdriver to remove the screws from the internal circulation panel and the subrack (M4x10, cross recessed countersunk head screw).

Step 3 Use diagonal pliers to remove the cable ties from the internal fan cables.

Step 4 Remove the wiring terminals from the internal fan.

Step 5 Use a Phillips screwdriver to remove the screws (M6x12, cross recessed screw assembly) from the fixing plate of the internal fan.

Step 6 Pull out the internal fan and the fixing plate.

Step 7 Use a Phillips screwdriver to remove the screws (M5x12, cross recessed screw assembly) from the internal fan and the fixing plate.

Step 8 Install a new internal fan in the reverse order of removal.

----End

Follow-up Procedure

Step 1 Power on the system. For details, see the system power-on section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Step 2 Check whether the function is restored.

Check Item	Criteria
Alarm Information	There is no alarm related to the internal fan.
Function	Low-speed operation in air supply mode and high-speed operation in cooling mode
Running data	Internal fan status: normal operation

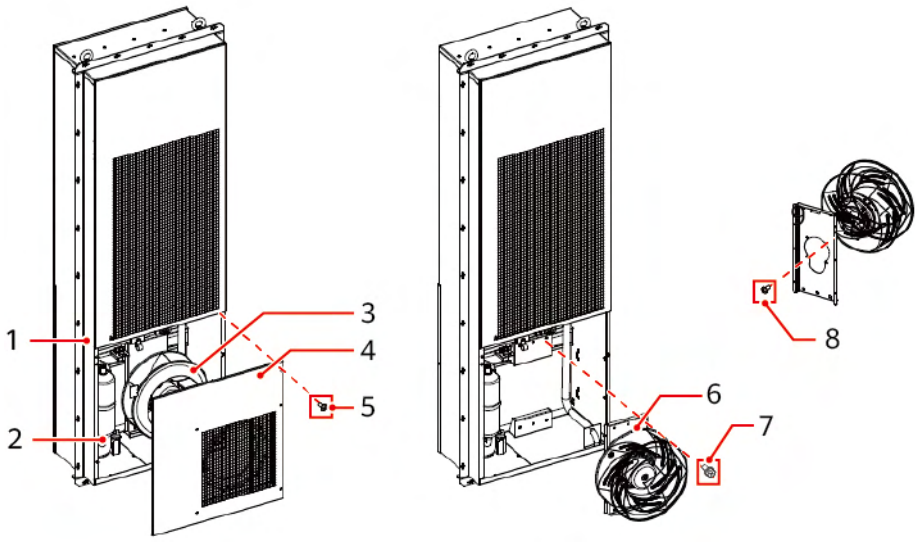
----End

6.4.2 Replacing an Air Conditioner External Fan in the Battery Cabin

Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tools: flat-head or Phillips screwdriver, T20 anti-theft screwdriver, and diagonal pliers
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure



(1) Air conditioner	(2) Compressor	(3) External fan
(4) External fan maintenance panel	(5) Anti-theft screw on the external fan maintenance panel (M4x16, torque of 1.2 N·m)	(6) External fan fixing plate
(7) Screw on the external fan fixing plate (M6x12, torque of 5 N·m)	(8) Screw for securing the external fan (M5x12, torque of 3 N·m)	

Step 1 Use a dedicated anti-theft screwdriver to remove the external fan maintenance panel (M4x16 anti-theft screw).

Step 2 Remove cable ties from the external fan cables.

Step 3 Remove the wiring terminals from the external fan.

Step 4 Use a Phillips screwdriver to remove the screws (M6x12) from the fixing plate of the external fan.

Step 5 Use a Phillips screwdriver to remove the external fan from the fixing plate, and take out the external fan for replacement (M5x12 screws).

Step 6 Install a new external fan in the reverse order of removal.

----End

Follow-up Procedure

Step 1 Power on the system. For details, see the system power-on section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Step 2 Check whether the function is restored.

Check Item	Criteria
Alarm Information	There is no alarm related to the external fan.
Function	The rotation speed is adjusted automatically according to the condensing pressure.
Running data	External fan status: standby when no cooling is required, and normal when cooling is required.

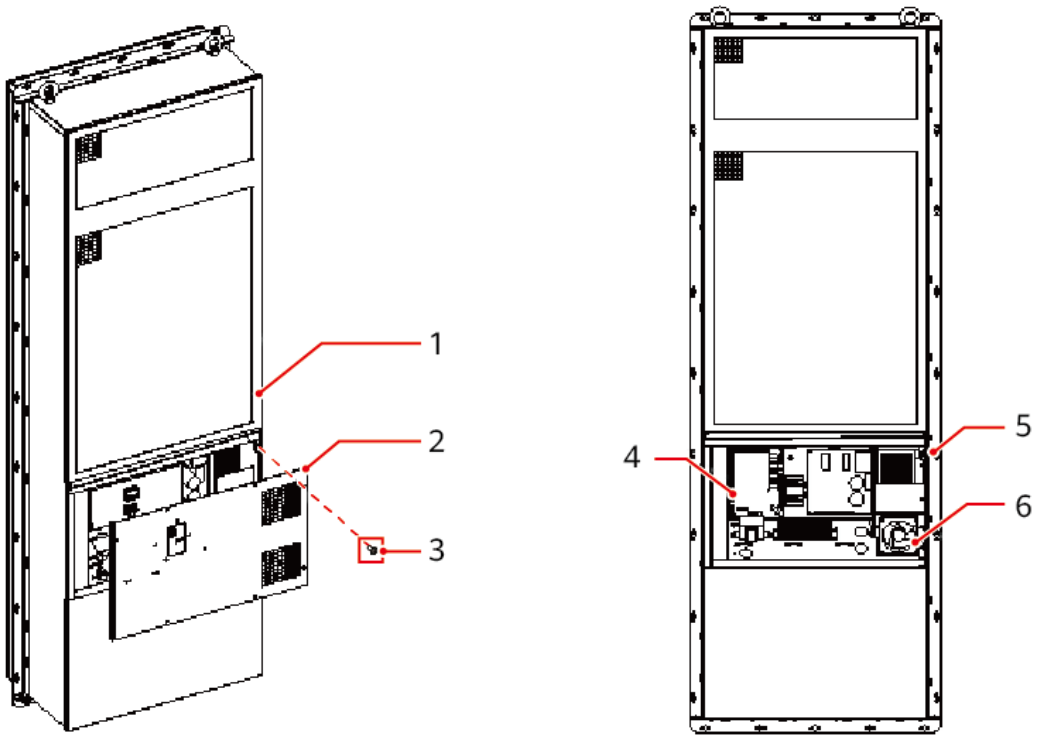
----End

6.4.3 Replacing a Main Control Board of the Air Conditioner in the Battery Cabin

Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tools: flat-head or Phillips screwdriver, clamp meter, and utility knife
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure



(1) Air conditioner	(2) Electric control panel	(3) Screws on the electric control panel (M4x10, tightening torque 1.2 N·m)
(4) Control board (M3x8, tightening torque 0.5 N·m)	(5) Drive board	(6) Drive board fan

Step 1 Remove the power supply protective cover.

Step 2 Remove the air conditioner power cables and communications cables.

Step 3 Remove the maintenance panel using a Phillips screwdriver (M4x10, countersunk head screws).

Step 4 Remove all wiring terminals from the main control board.

Step 5 Remove the screws (M3x8) from the main control board using a Phillips screwdriver.

Step 6 Take out the main control board for replacement.

NOTE

- As some terminal connectors on the main control board are secured with transparent adhesive, you need to use a utility knife to remove the transparent adhesive.
- Replace the damaged cables if any.

Step 7 After the maintenance is complete, install the boards in the reverse order of removal.

NOTE

For details about how to connect terminals, see the internal wiring diagram of the air conditioner.

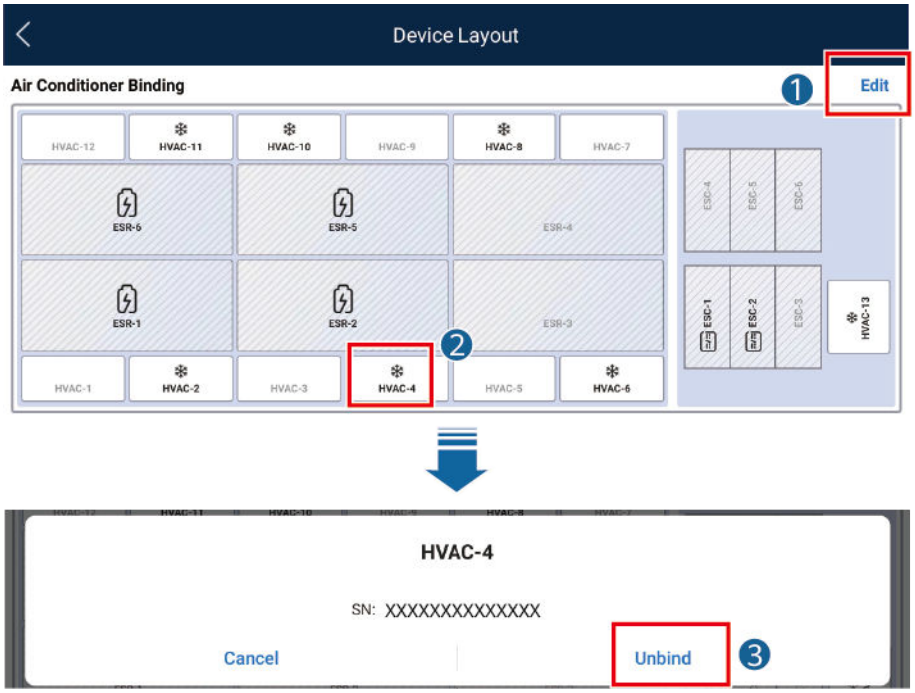
----End

Follow-up Procedure

Step 1 Power on the system. For details, see the system power-on section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Step 2 Log in to the CMU using the FusionSolar app, choose **Maintenance** > **Device Layout**, and unbind the old air conditioner.

Figure 6-81 Unbinding the old air conditioner

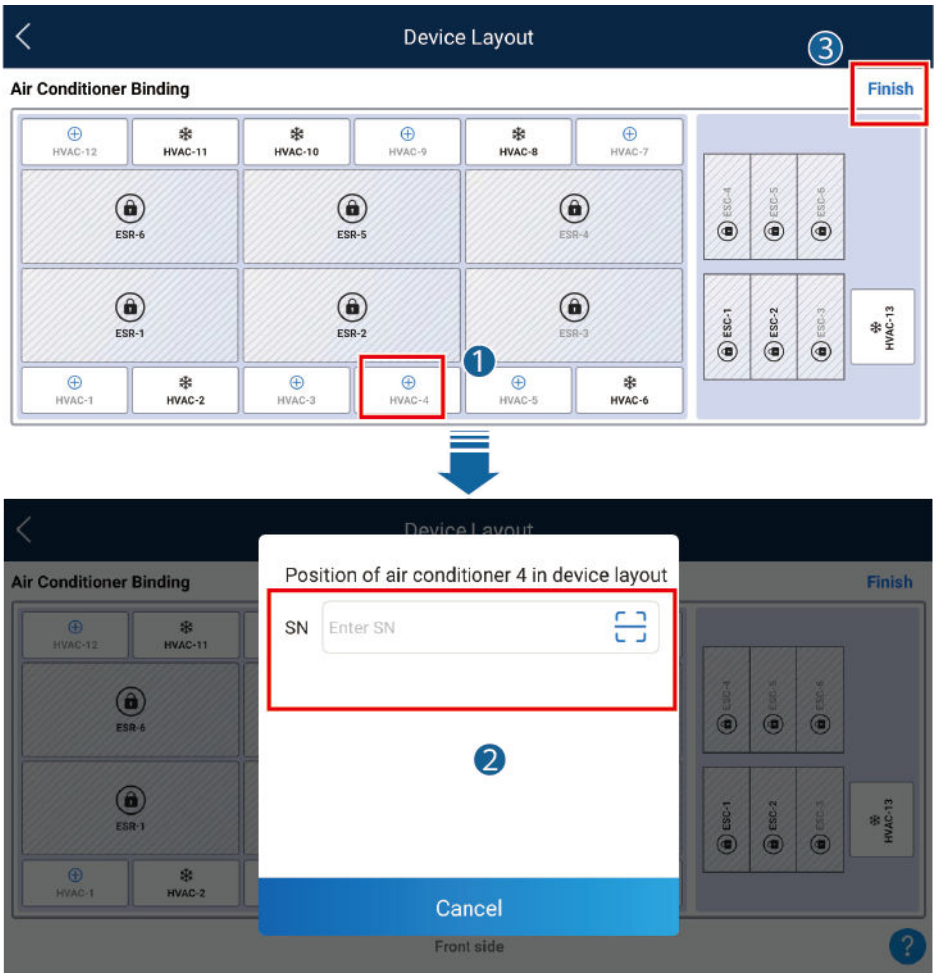


NOTE

- The app version used in this document is 6.21.10.129. The screenshots are for reference only.
- The following figure uses the HVAC-4 as an example.

Step 3 Add the new air conditioner.

Figure 6-82 Adding the new air conditioner



Step 4 Check whether the function is restored.

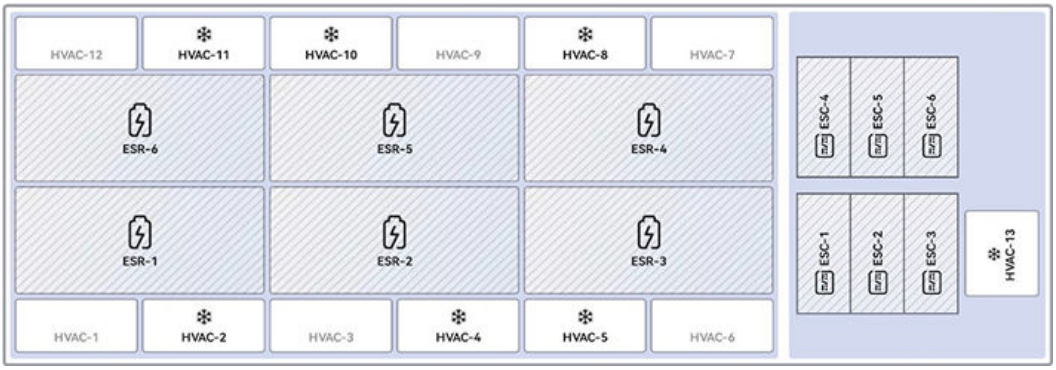
Check Item	Criteria
Alarm Information	No component communication alarm is generated.
Function	The functions are normal.
Running data	Air conditioner status: normal operation

----End

6.4.4 Replacing an Air Conditioner in the Battery Cabin

Prerequisites

Figure 6-83 Positions of air conditioners



- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tools: ladder, insulated flat-head/Phillips screwdriver, insulated torque wrench, adjustable wrench, open-end wrench, engineering installation kit, safety gloves, safety shoes, safety helmet, and safety rope

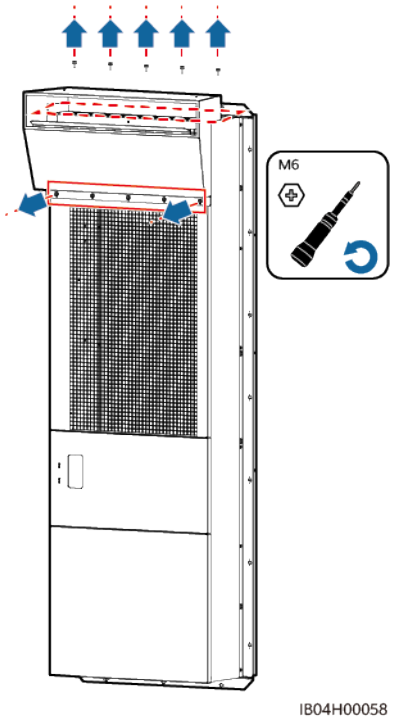
  NOTE

  - At least two ladders are required.
  - The personnel, tools, and environment must meet relevant safety requirements.
- The ESS has been powered off. For details, see the system power-off section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Remove the air duct.

Figure 6-84 Removing the air duct



Step 2 Remove the power supply protective cover.

Step 3 Remove cables from the air conditioner.

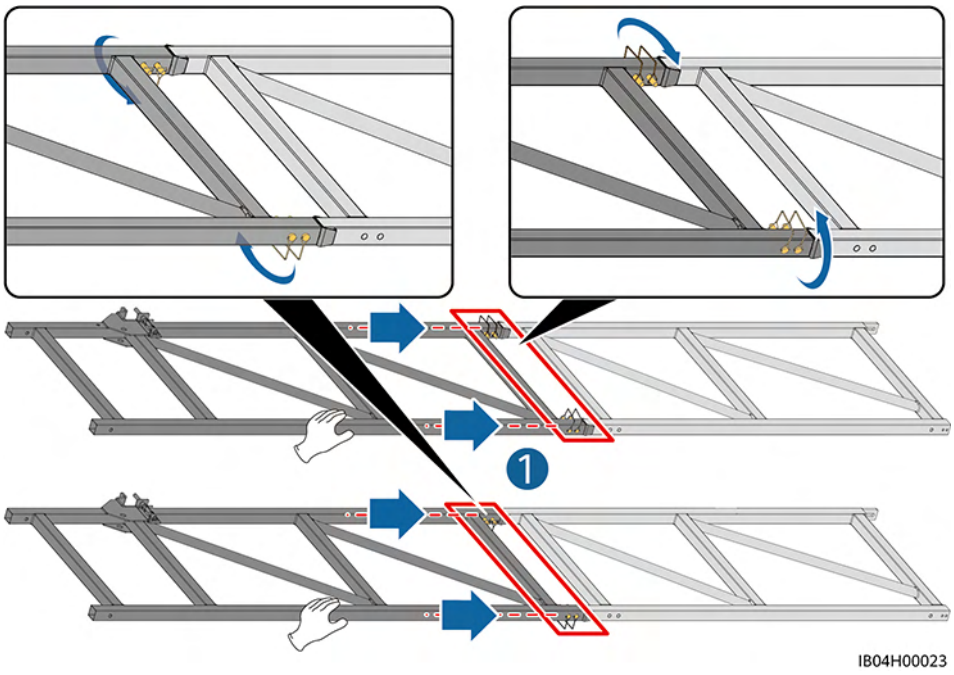
Step 4 Secure the engineering installation kit.

1. Place the trusses horizontally and assemble the upper and lower trusses together on the ground.

NOTICE

Ensure that the diagonal beams of the upper and lower trusses are in the same direction, and that the steel rope of the hasp pin is on the outer side.

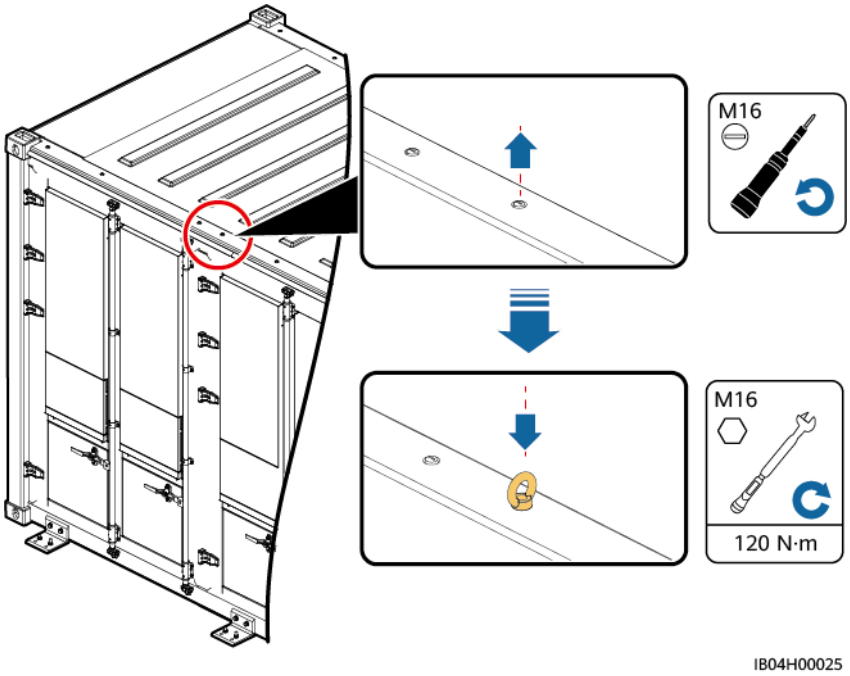
Figure 6-85 Assembling trusses



2. Remove the hole plug from the screw hole on the top of the ESS and install a lifting eye.

> ⚠ CAUTION
>
> Working at heights is involved. For details, see the relevant safety precautions.

Figure 6-86 Installing a lifting eye



3. The operator wears a safety rope that is secured to the lifting eye on the top of the ESS container.
4. Install the long top beam and the long bottom beam.

Figure 6-87 Installing the long top beam and the long bottom beam (scenario 1)

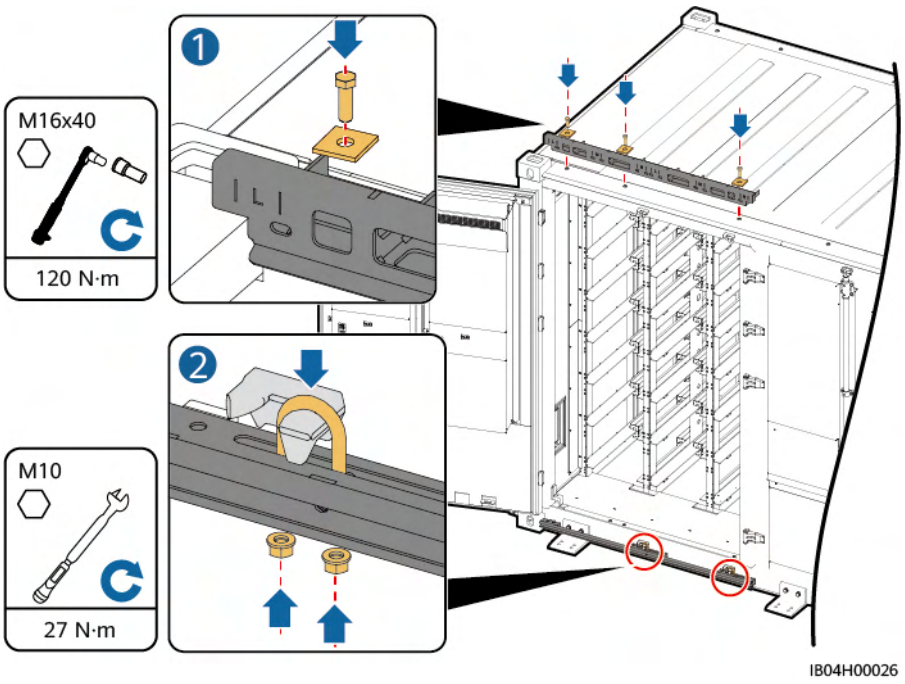


Figure 6-88 Installing the long top beam and the long bottom beam (scenario 2)

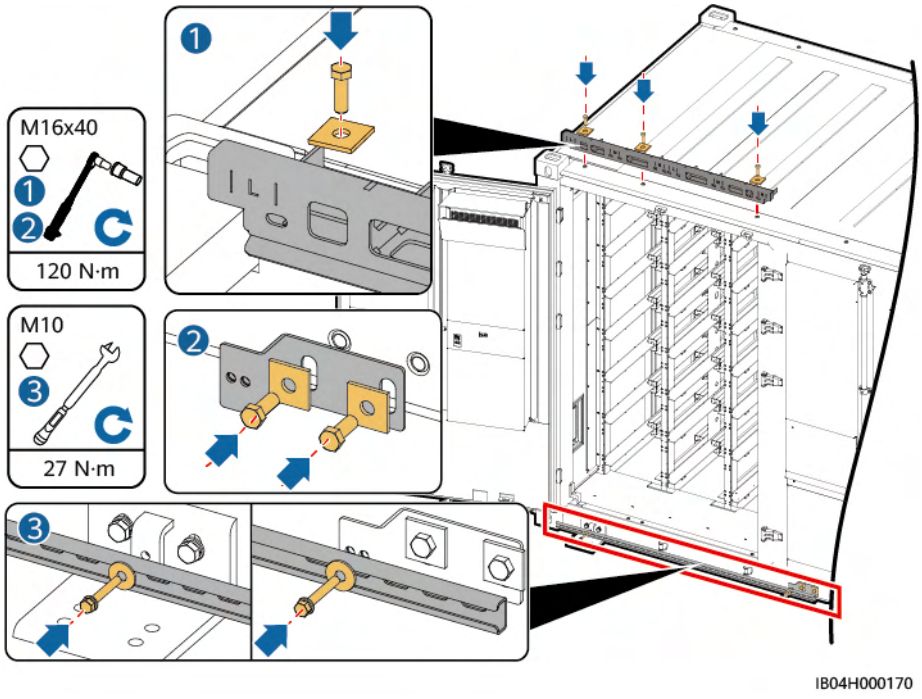
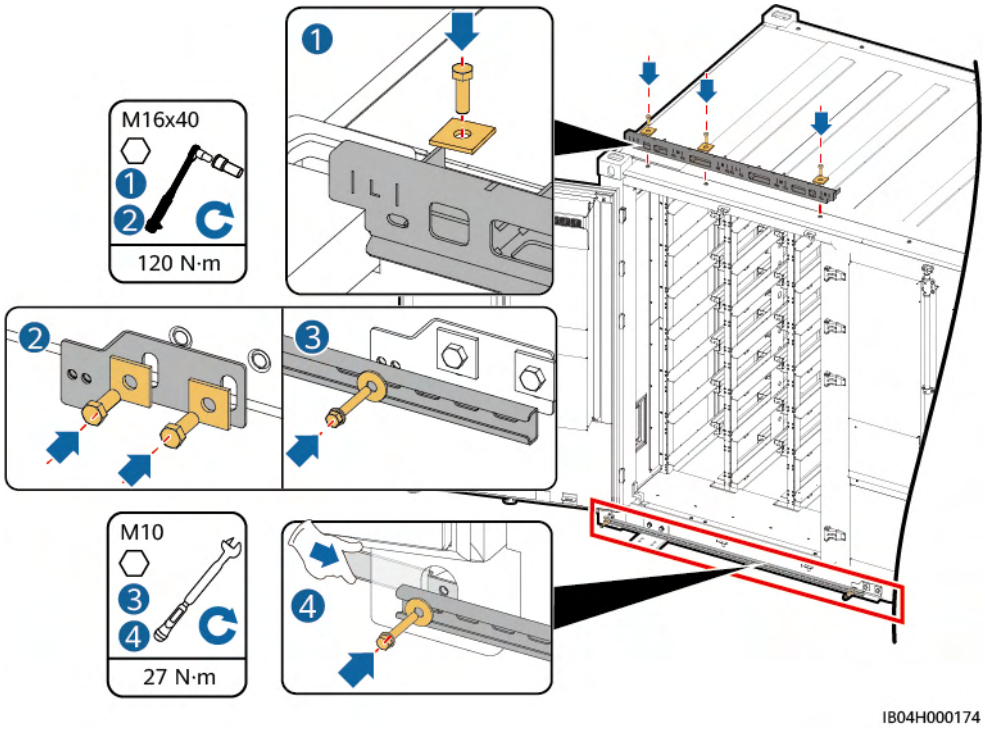


Figure 6-89 Installing the long top beam and the long bottom beam (scenario 3)



NOTE

When replacing devices in different battery cabins, the positions or directions of the long bottom beam vary. Refer to the following figures.

Figure 6-90 Long bottom beam installation position 1 (scenario 1)

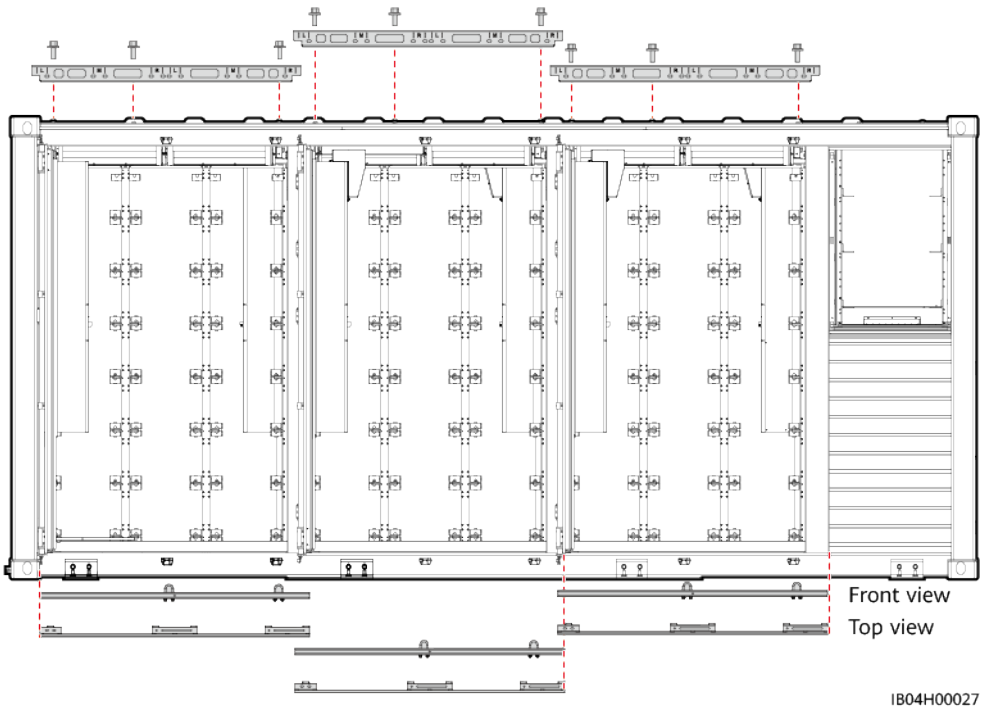


Figure 6-91 Long bottom beam installation position 2 (scenario 1)

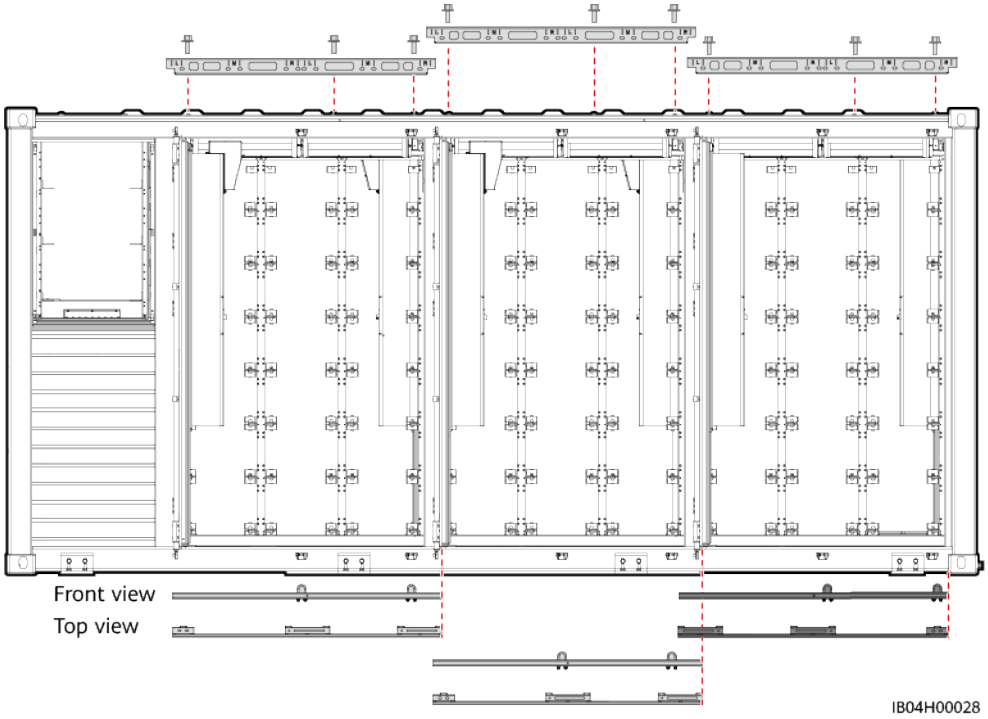


Figure 6-92 Long bottom beam installation position 1 (scenario 2)

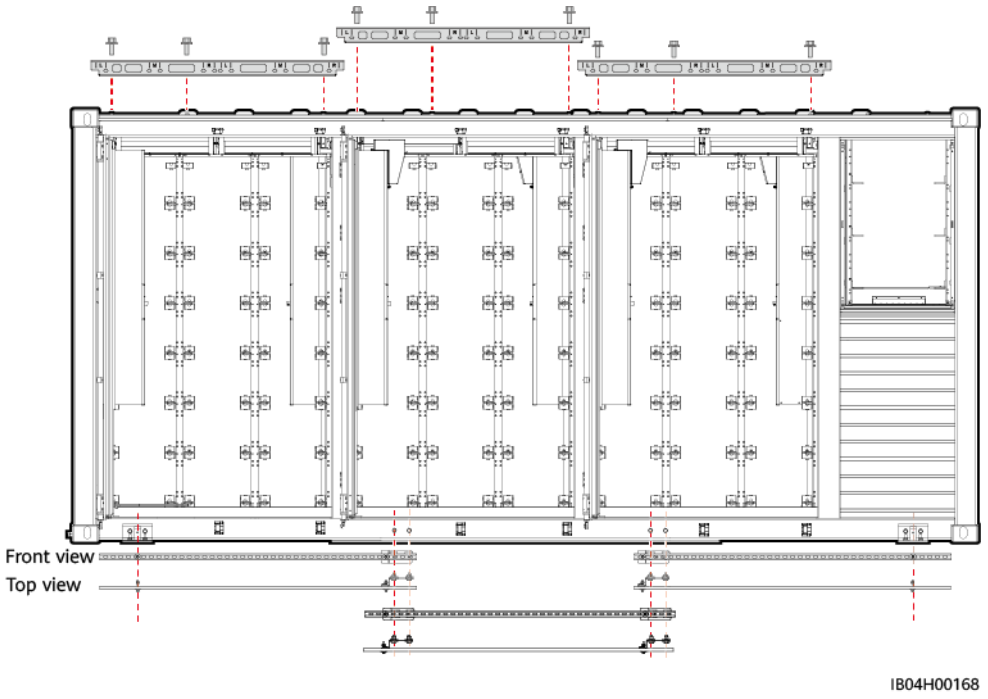


Figure 6-93 Long bottom beam installation position 2 (scenario 2)

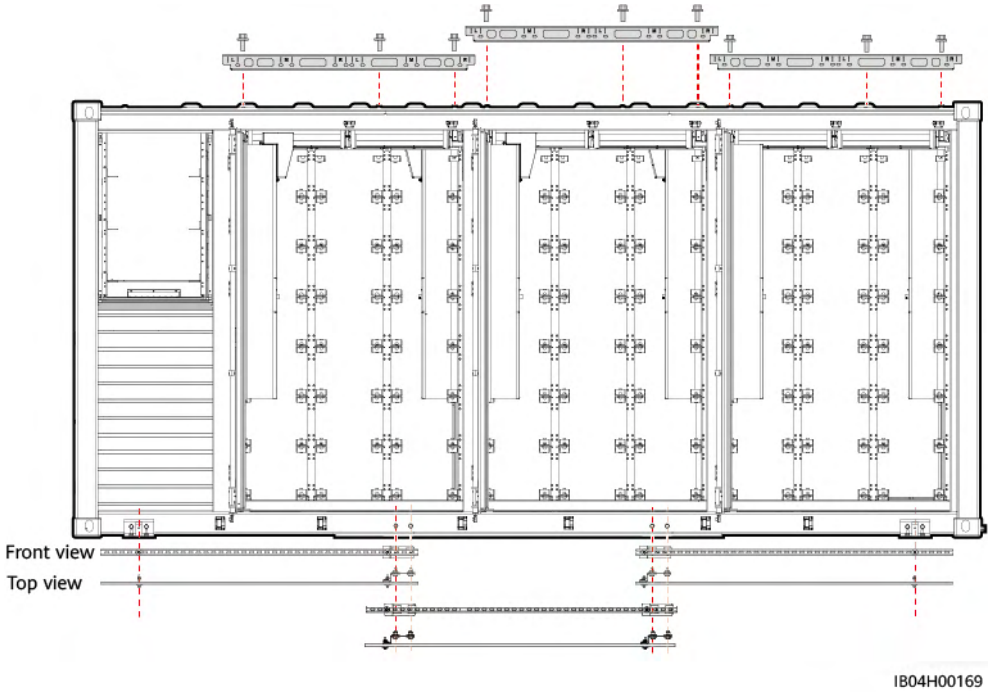


Figure 6-94 Long bottom beam installation position 1 (scenario 3)

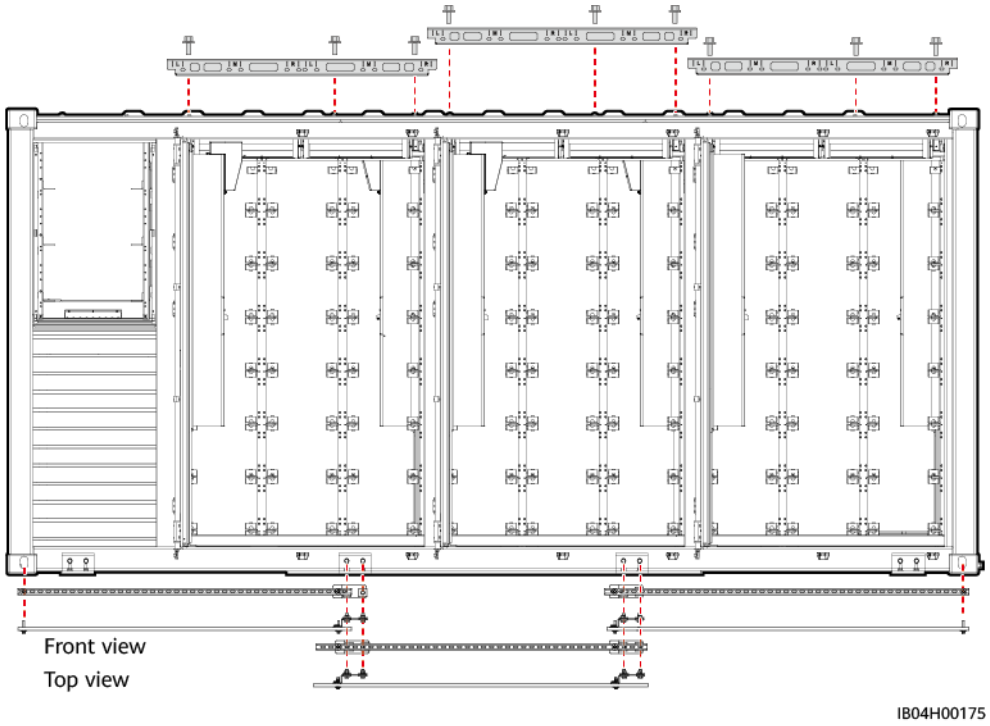
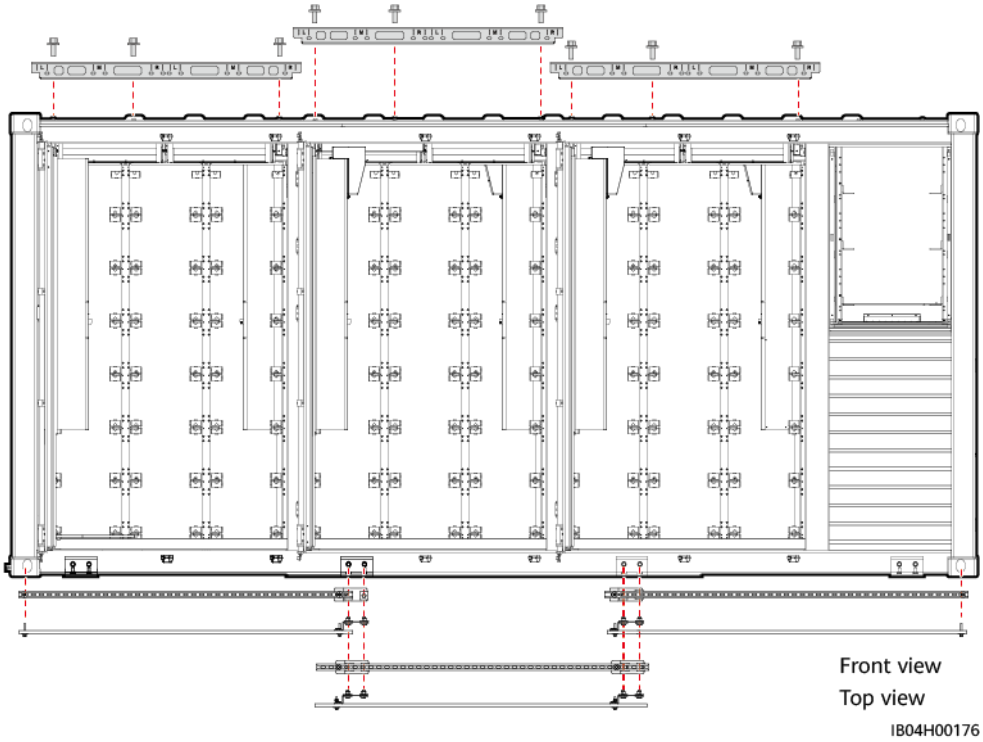


Figure 6-95 Long bottom beam installation position 2 (scenario 3)



5. Install trusses.

> **CAUTION**
>
> Multiple persons are required to install trusses. Prevent the trusses from tilting, which may cause equipment damage or personal injury.

Figure 6-96 Installing trusses (replacing the outer air conditioner)

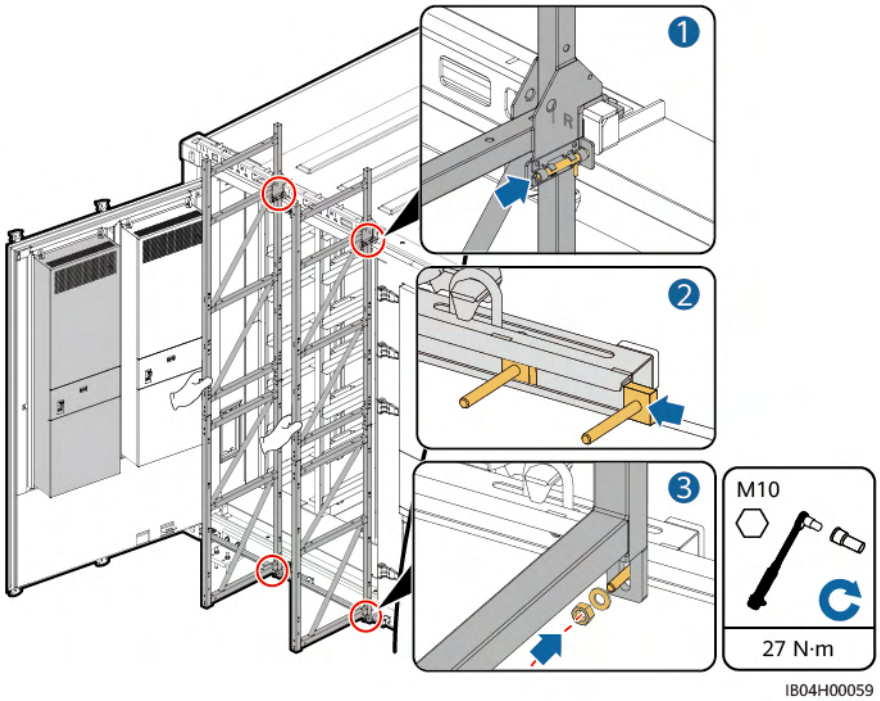


Figure 6-97 Installing trusses (replacing the inner air conditioner)

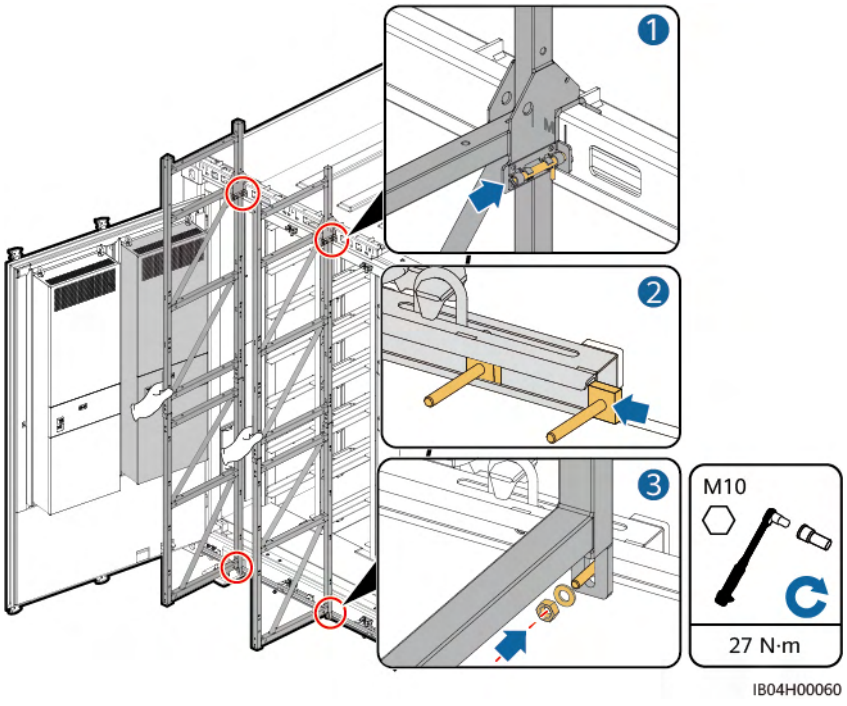


Table 6-3 Truss installation hole silkscreen

Air Conditioner Position	Truss Installation Hole Silkscreen
Outer side	R

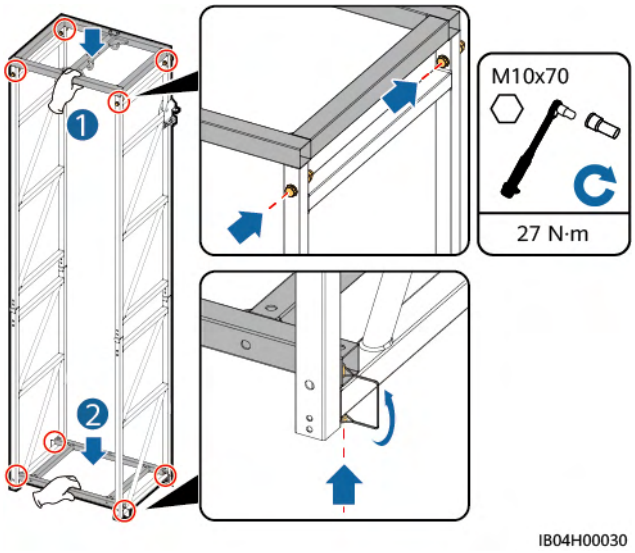
Air Conditioner Position	Truss Installation Hole Silkscreen
Inner side	M

6. Install the top and bottom supports.

NOTICE

Install the top support and then the bottom support. Prevent objects from falling off during the installation.

Figure 6-98 Installing supports



7. Install the air conditioner hanging truss, chain hoist, and air conditioner hanging beam.

NOTICE

Hold the battery cabin door to prevent it from rotating.

Figure 6-99 Installing the air conditioner hanging truss (replacing the outer air conditioner)

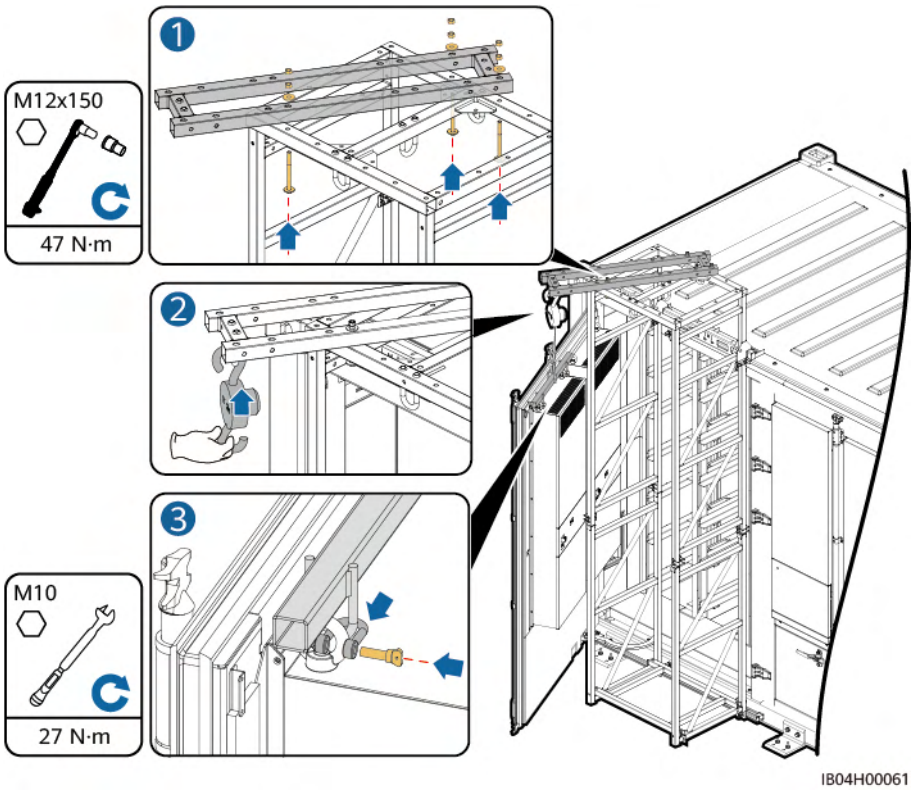
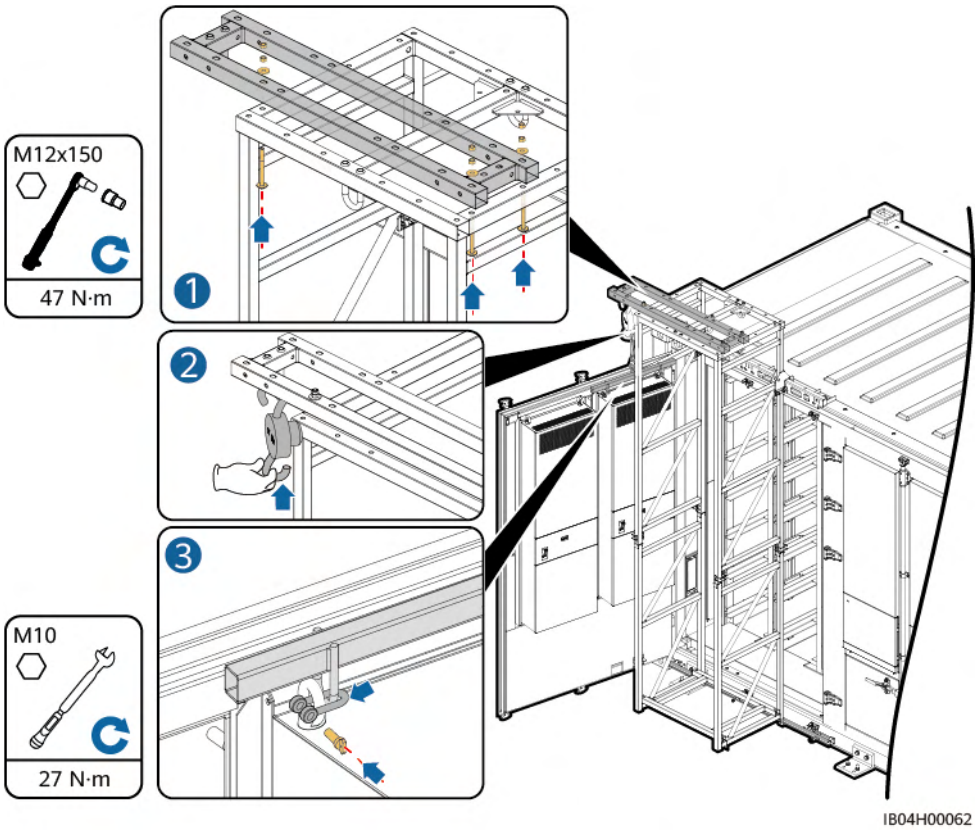


Figure 6-100 Installing the air conditioner hanging truss (replacing the inner air conditioner)



Step 5 Pull the chain hoist to ensure that the chains are tight.

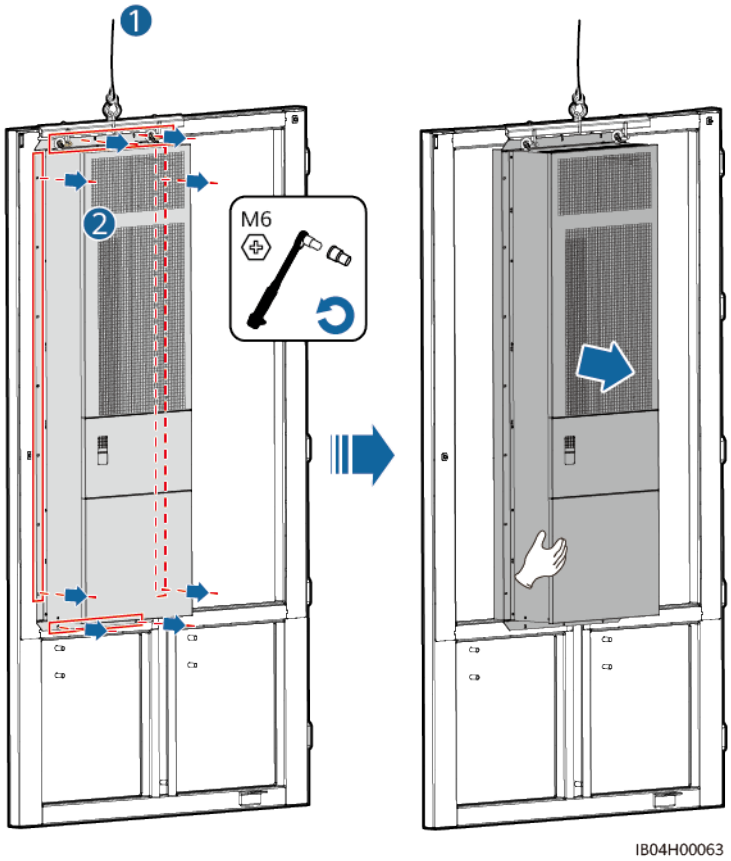
Step 6 Remove screws from the air conditioner.

Step 7 Hoist and remove the air conditioner.

CAUTION

Multiple persons are required to remove an air conditioner. Take protective measures to prevent device collision or personal injury.

Figure 6-101 Removing the old air conditioner

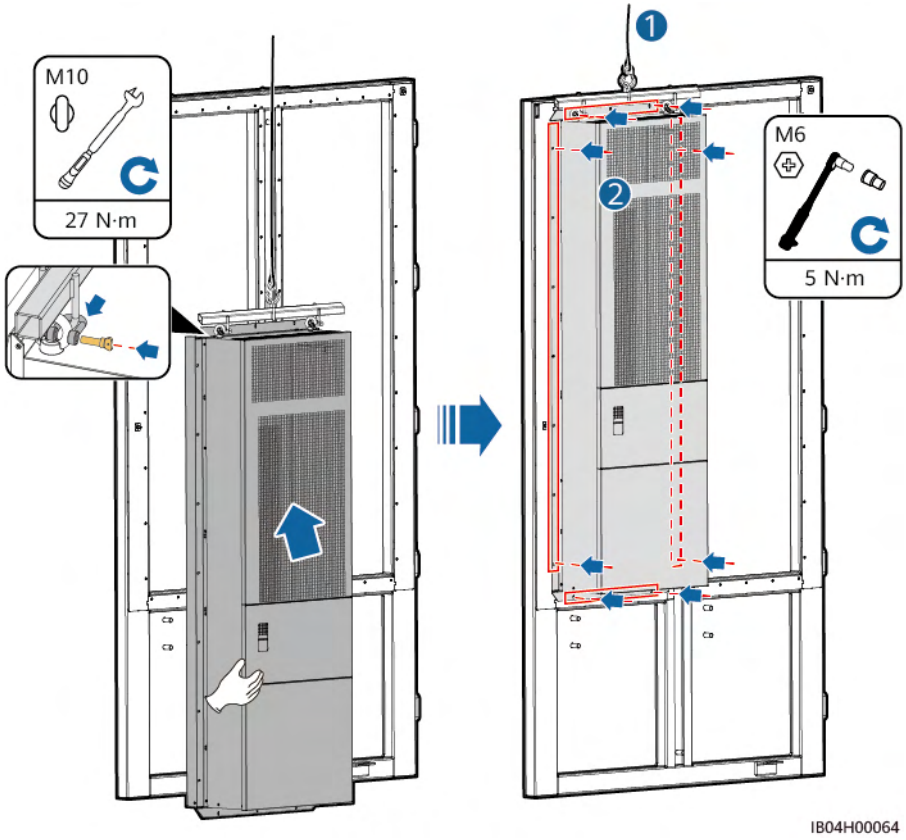


Step 8 Remove the remaining rubber strips from the door frame.

Step 9 Place the new air conditioner to the installation position.

Step 10 Secure the air conditioner to the door using screws.

Figure 6-102 Installing the new air conditioner



Step 11 Install air conditioner cables.

Step 12 Install the air conditioner power protective cover.

Step 13 Remove the engineering installation kits.

NOTICE

Multiple persons are required in the removal. Take protective measures to prevent collision.

Step 14 Install an air duct. Use an M6 Phillips screwdriver with a torque of 5 N·m.

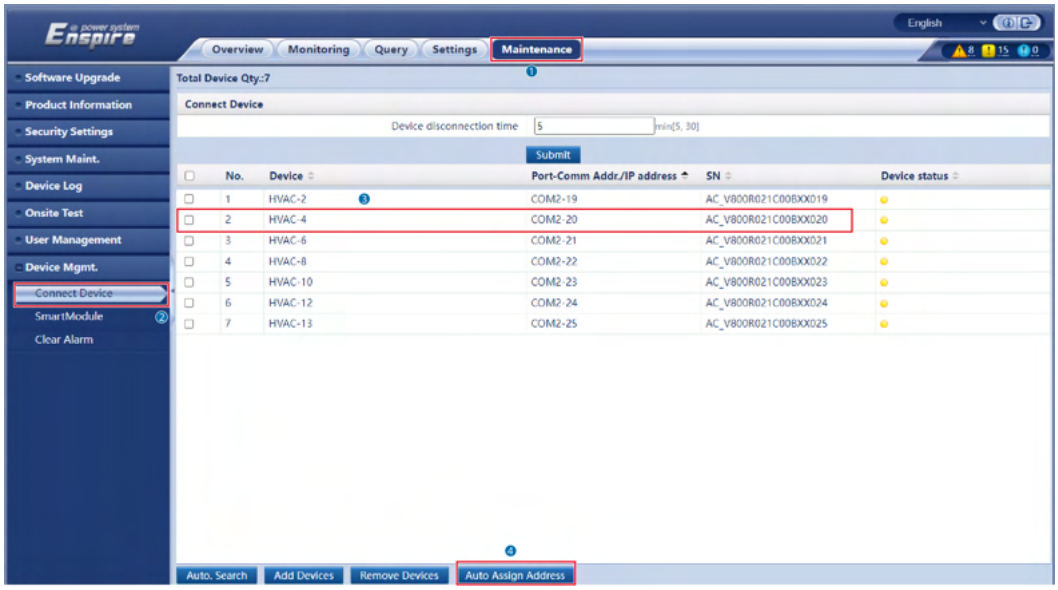
----End

Follow-up Procedure

Step 1 Power on the system. For details, see the system power-on section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Step 2 Log in to the CMU, choose **Maintenance** > **Connect Device** > **Remove Devices**, remove the old air conditioner, and record the communications address of the old air conditioner.

Figure 6-103 Removing the old air conditioner



Step 3 Click **Auto Assign Address**. The **Start to allocate addresses?** dialog box is displayed. Click **Yes**, set the communications address of the new air conditioner to be the same as that of the old air conditioner, and click **Address Adjustment**.

Figure 6-104 Address allocation

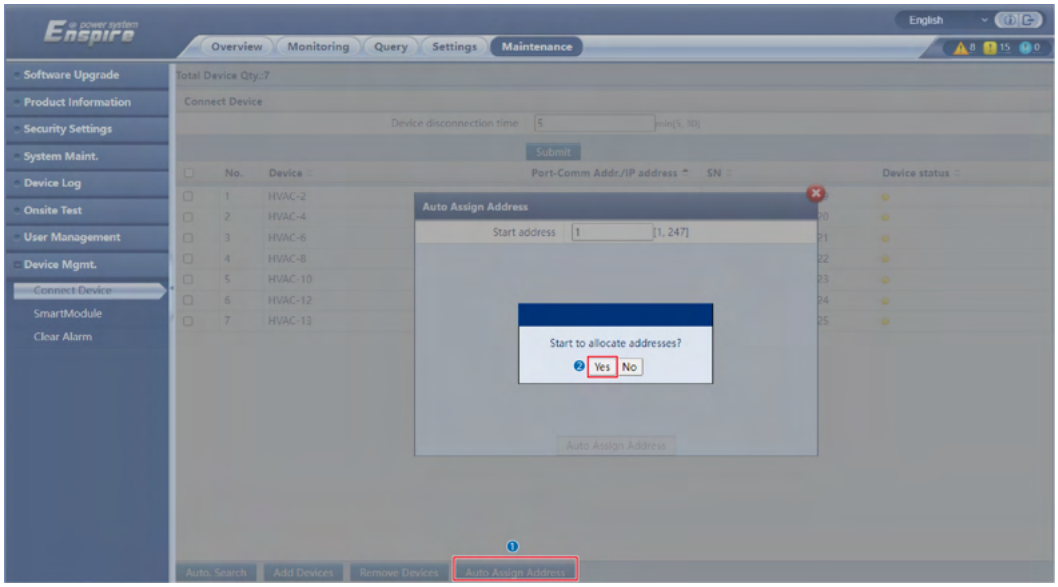
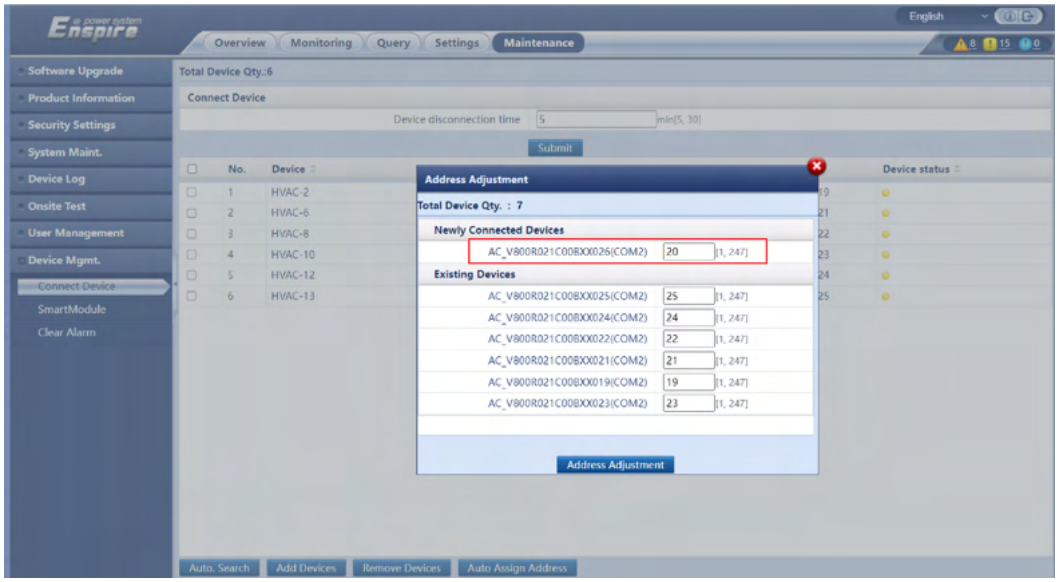


Figure 6-105 Address adjustment



Step 4 After the address is adjusted, the **Search again?** dialog box is displayed. Click **Yes** and ensure that the new air conditioner is added after the search.

Figure 6-106 Searching for devices

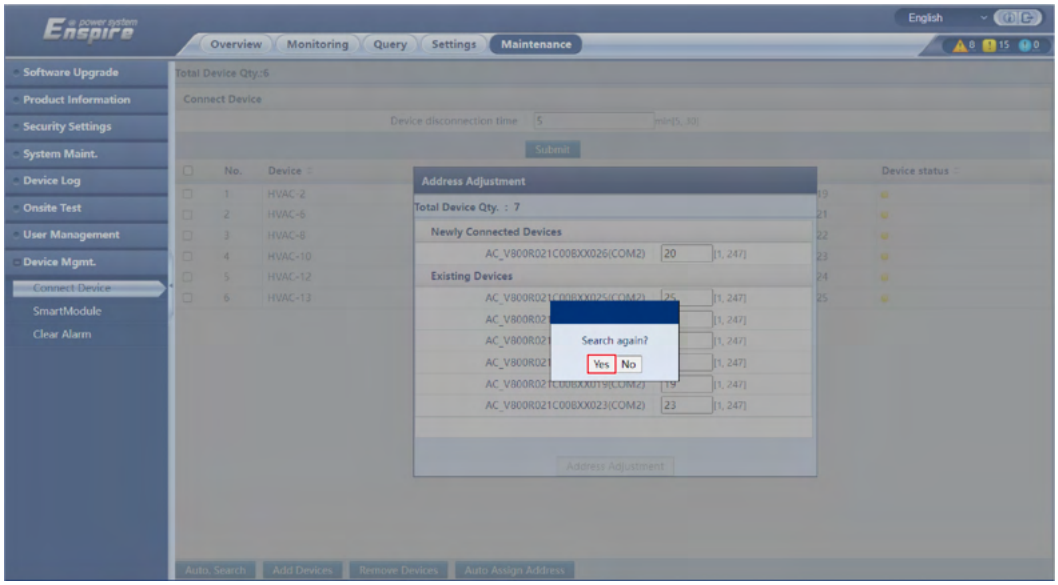
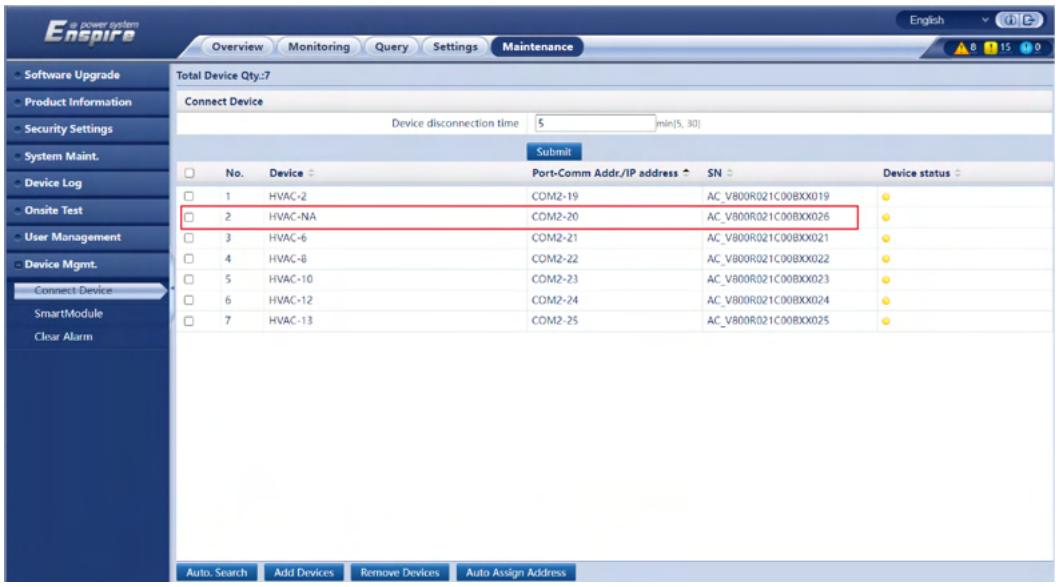
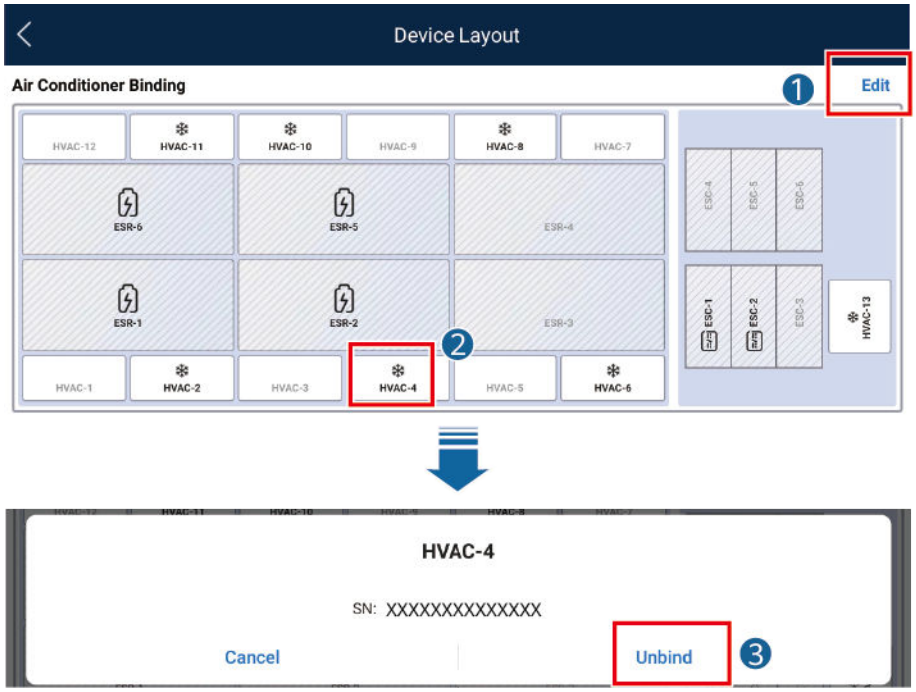


Figure 6-107 Adding the new air conditioner



Step 5 Log in to the CMU using the FusionSolar app, choose **Maintenance** > **Device Layout**, and unbind the old air conditioner.

Figure 6-108 Unbinding the old air conditioner

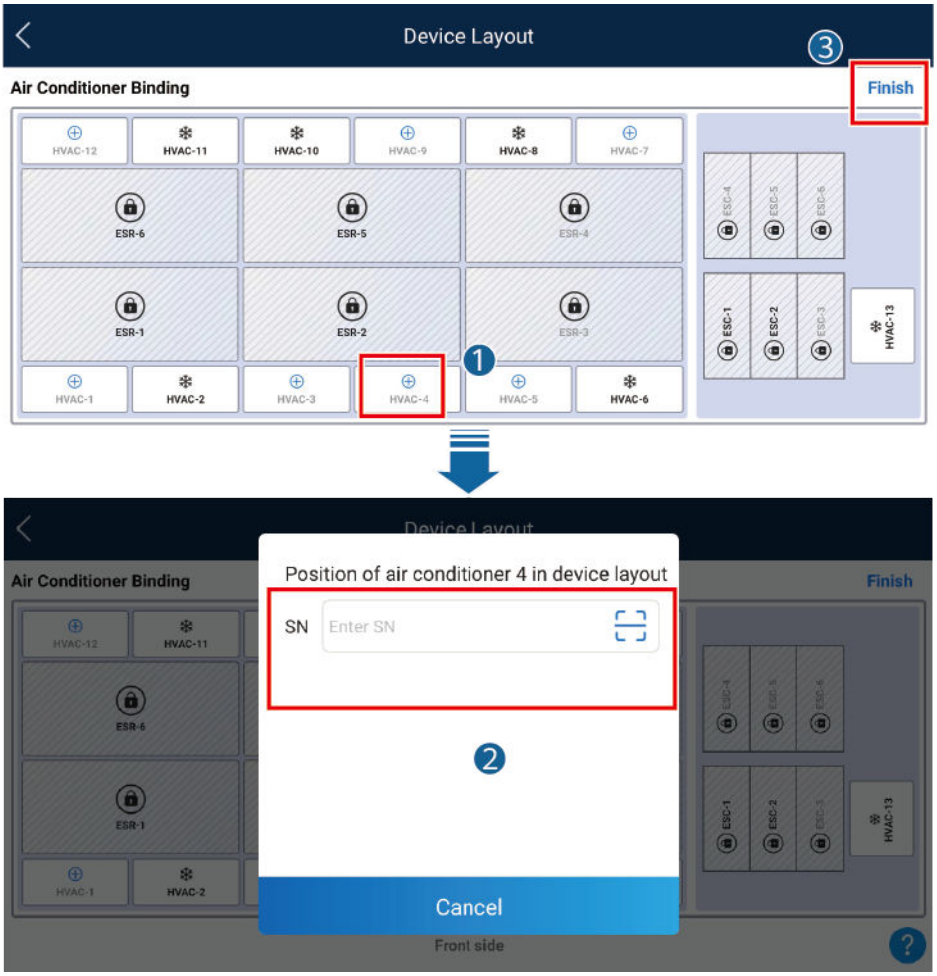


NOTE

- The app version used in this document is 6.21.10.129. The screenshots are for reference only.
- The following figure uses the HVAC-4 as an example.

Step 6 Add the new air conditioner.

Figure 6-109 Adding the new air conditioner



Step 7 Check whether the function is restored.

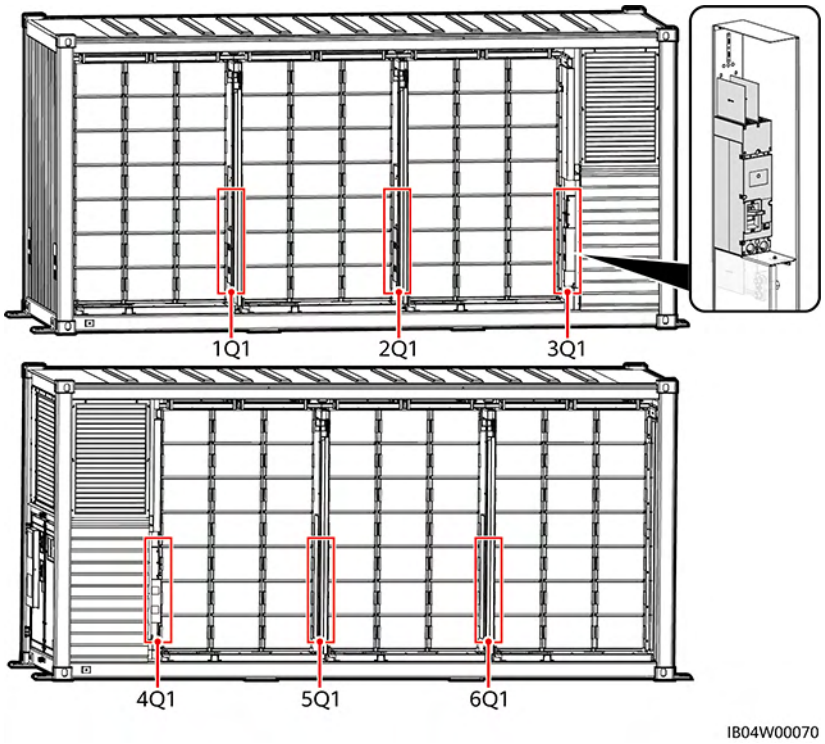
Check Item	Criteria
Alarm Information	No component communication alarm is generated.
Function	The functions are normal.
Running data	Air conditioner status: normal operation

----End

6.5 Replacing a Battery Rack Circuit Breaker in the Battery Cabin

Prerequisites

Figure 6-110 Positions of circuit breakers



- Fault locating:

Symptom	Possible Cause	Troubleshooting
A circuit breaker is faulty due to overcurrent or a short circuit.	1. The circuit breaker is in a position between ON and OFF. 2. The circuit breaker is faulty.	1. Set the circuit breaker to OFF and then to ON. 2. Replace the circuit breaker.

- Tools: flat-head or Phillips screwdriver, inner hexagon screwdriver, torque wrench
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

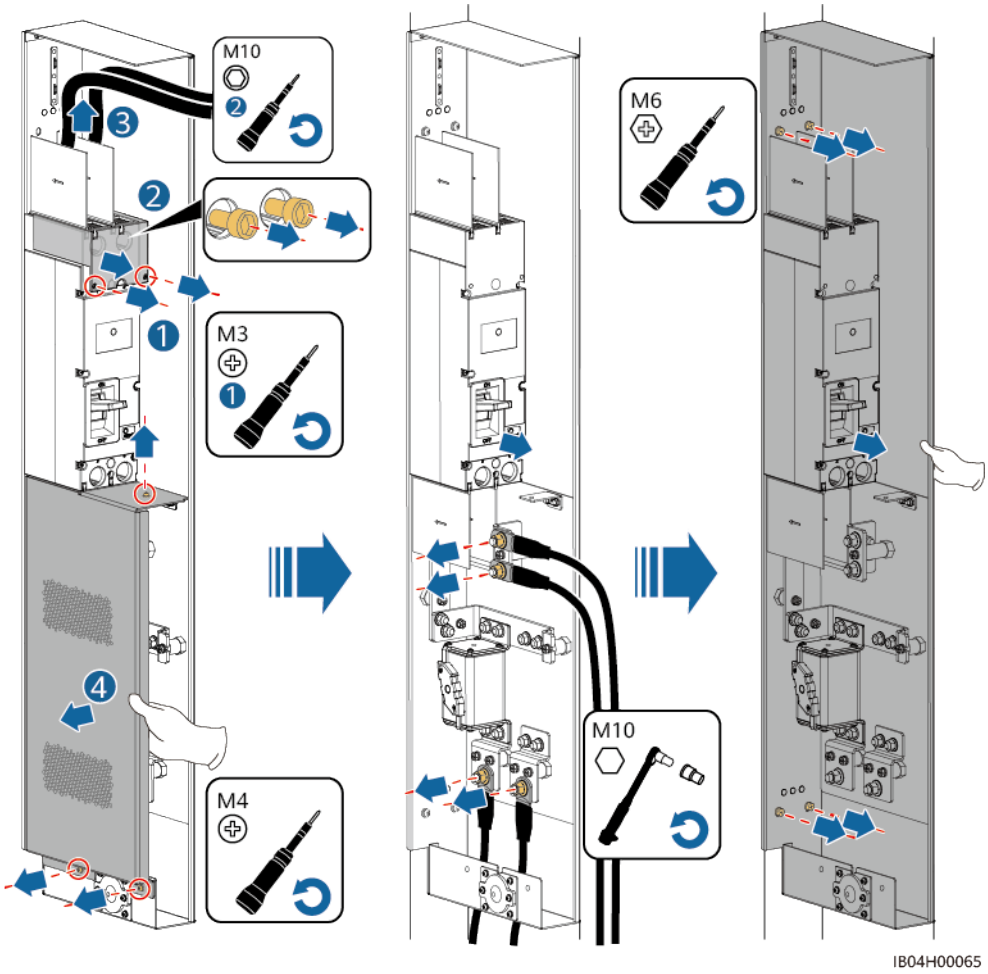
Procedure

NOTICE

The following procedure applies to replacing circuit breakers 1Q1, 2Q1, 5Q1, and 6Q1.

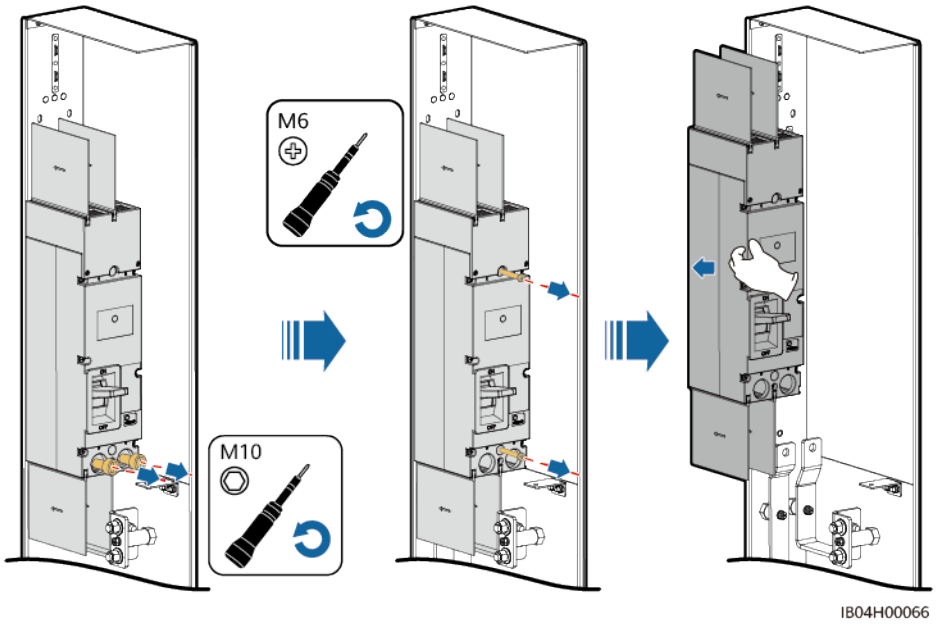
Step 1 Remove cables from the circuit breaker and fuse, and take out the tray.

Figure 6-111 Removing the tray



Step 2 Remove the circuit breaker.

Figure 6-112 Removing the circuit breaker

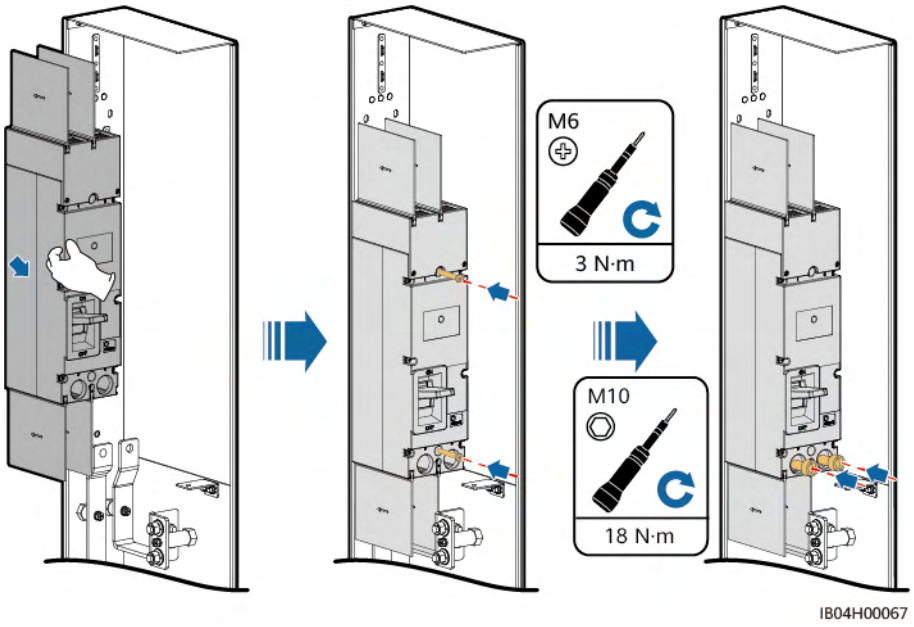


NOTE

Insulate the removed cables or copper bars.

Step 3 Install a new circuit breaker.

Figure 6-113 Installing a new circuit breaker



Step 4 Install the tray.

Step 5 Install the cables for the circuit breaker and fuse.

Step 6 Install the fuse cover. Use a M4 Phillips screwdriver with a torque of 1.2 N·m

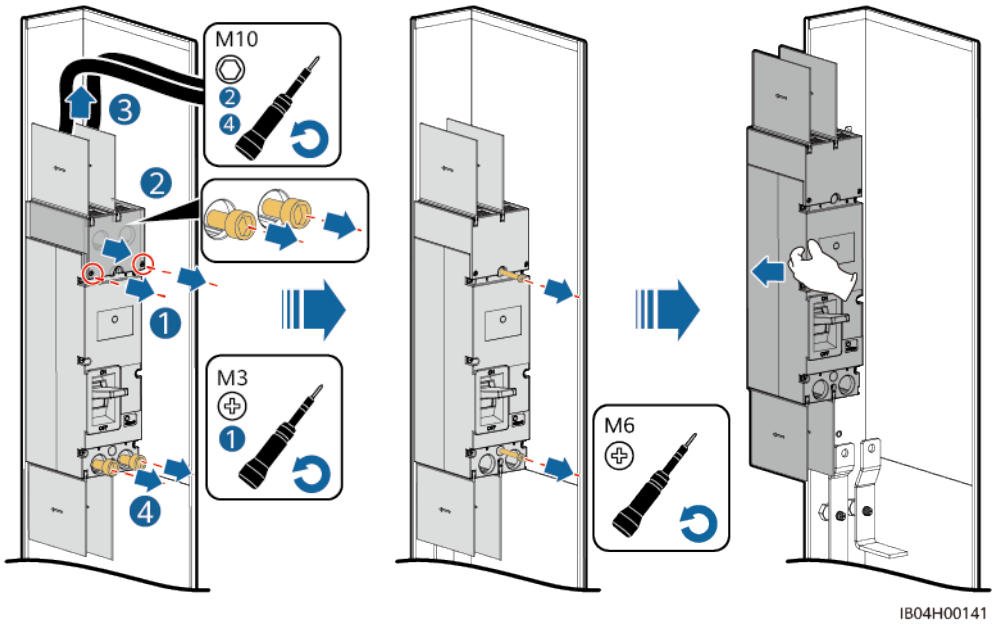
----End

NOTICE

The following procedure applies to replacing circuit breakers 3Q1 and 4Q1.

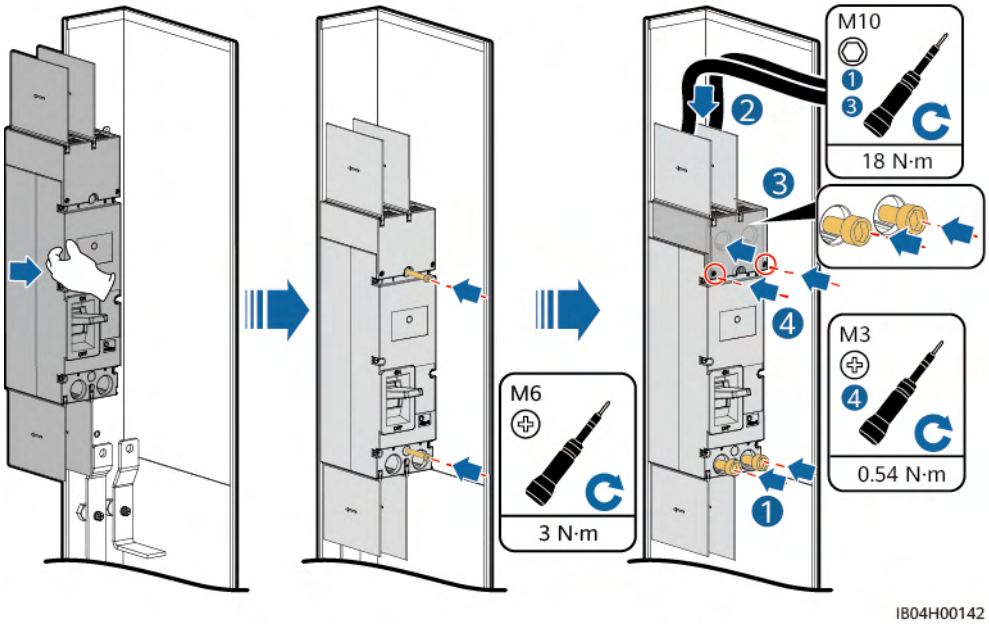
Step 1 Remove the faulty circuit breaker.

Figure 6-114 Removing the faulty circuit breaker



Step 2 Install a new circuit breaker.

Figure 6-115 Installing a new circuit breaker



----End

Follow-up Procedure

Step 1 Power on the system. For details, see the system power-on section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

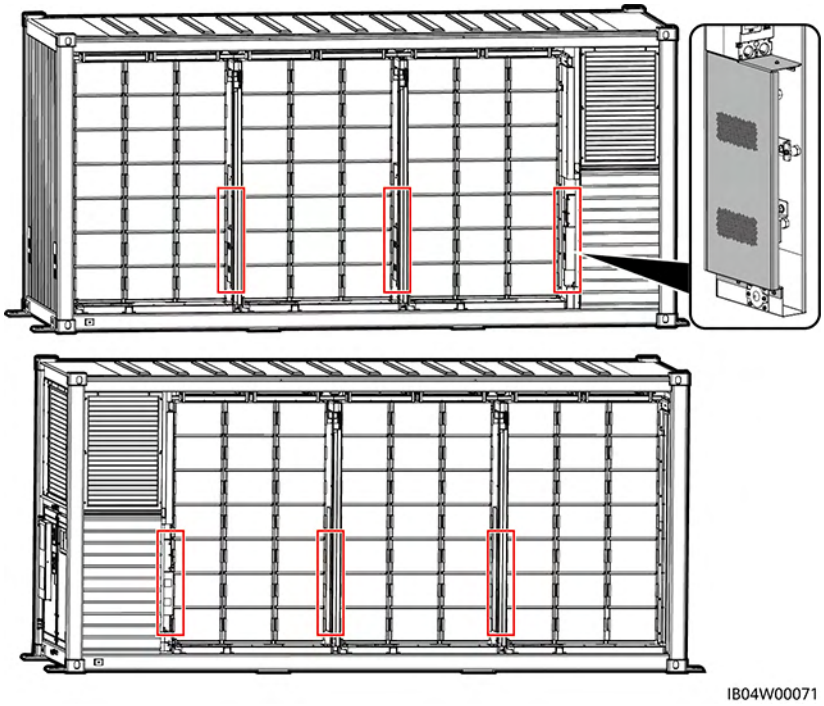
Step 2 Check the running status of the system and ensure that the functions are restored.

----End

6.6 Replacing a Fuse

Prerequisites

Figure 6-116 Fuse position



- Fault locating:

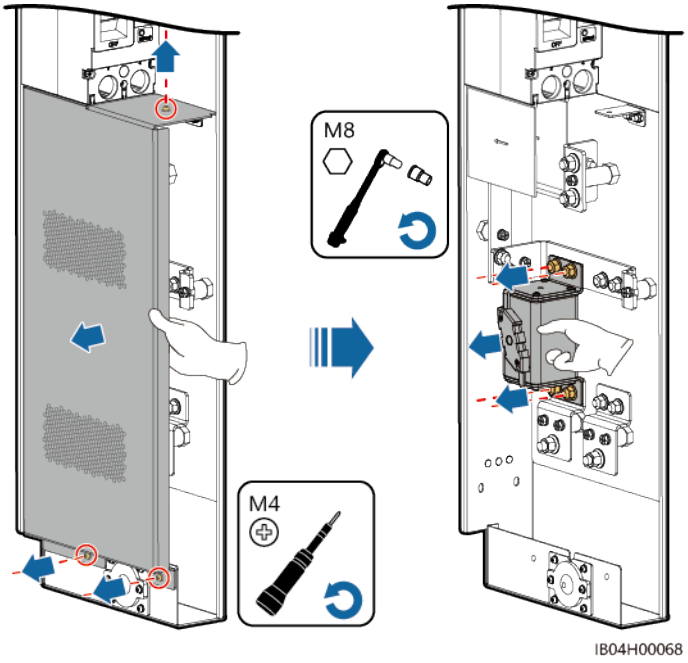
Symptom	Possible Cause	Troubleshooting
A circuit breaker is faulty due to overcurrent or a short circuit.	1. The circuit breaker is in a position between ON and OFF. 2. The circuit breaker is faulty.	1. Set the circuit breaker to OFF and then to ON. 2. Replace the circuit breaker.

- Tool: flat-head or Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

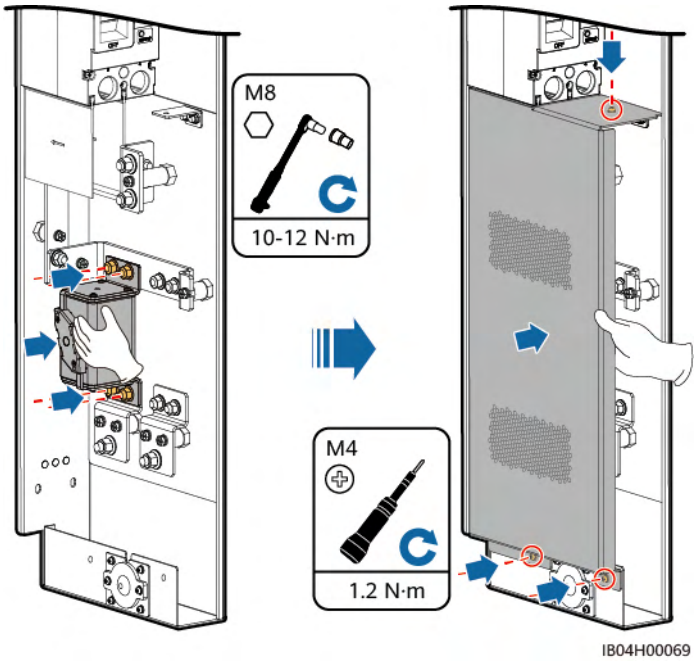
Step 1 Remove the fuse.

Figure 6-117 Removing the fuse



Step 2 Install a new fuse.

Figure 6-118 Installing a new fuse



----End

Follow-up Procedure

Step 1 Power on the system. For details, see the system power-on section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

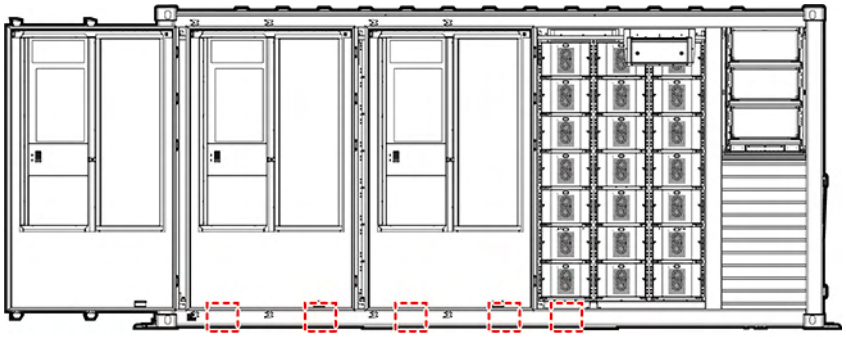
Step 2 Check the running status of the system and ensure that the functions are restored.

----End

6.7 Replacing an Airflow Fan

Prerequisites

Figure 6-119 Position of an airflow fan

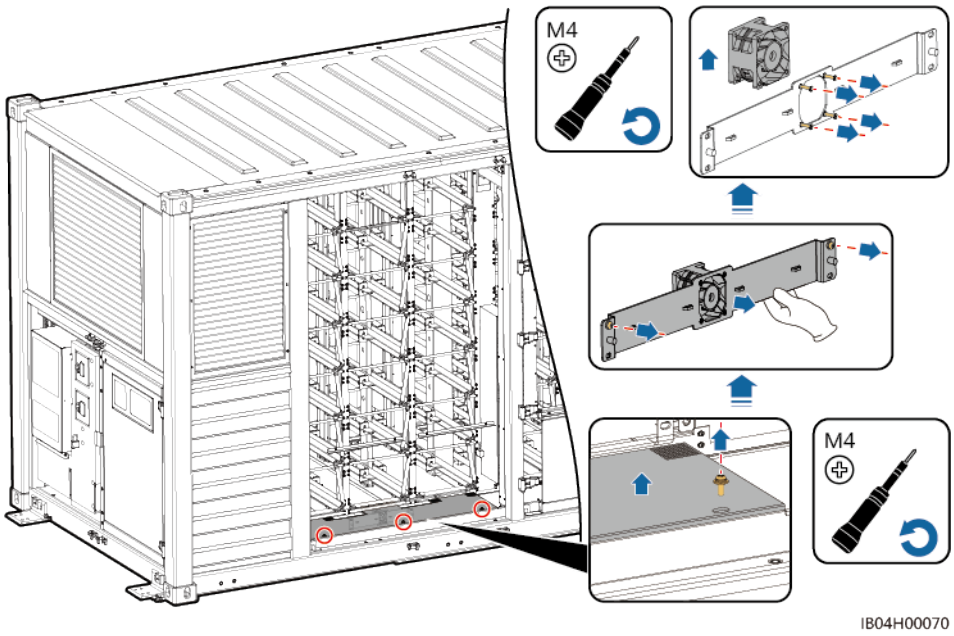


- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tool: flat-head or Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Remove the fan and disconnect the cables.

Figure 6-120 Removing the fan



Step 2 Install a new fan and connect the cables. Use a M4 Phillips screwdriver with a torque of 0.6 N·m.

NOTICE

Ensure that the fan is installed in the correct direction.

Step 3 Secure the fan tray and install the cover. Use a M4 Phillips screwdriver with a torque of 1.2 N·m

----End

Follow-up Procedure

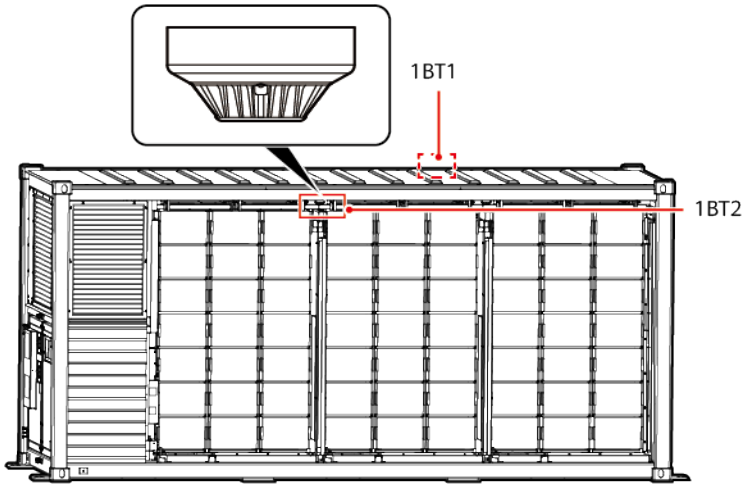
Step 1 Power on the system. For details, see the system power-on section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Step 2 Check the running status of the system and ensure that the functions are restored.

----End

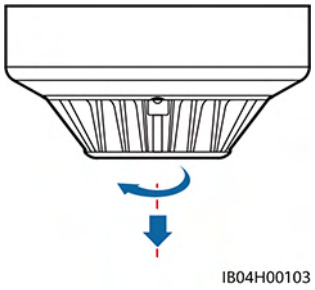
6.8 Replacing a Smoke Detector

Figure 6-121 Positions of smoke detectors



Step 1 Hold the smoke detector by hand, and rotate it counterclockwise to remove it from the base.

Figure 6-122 Removing the smoke detector



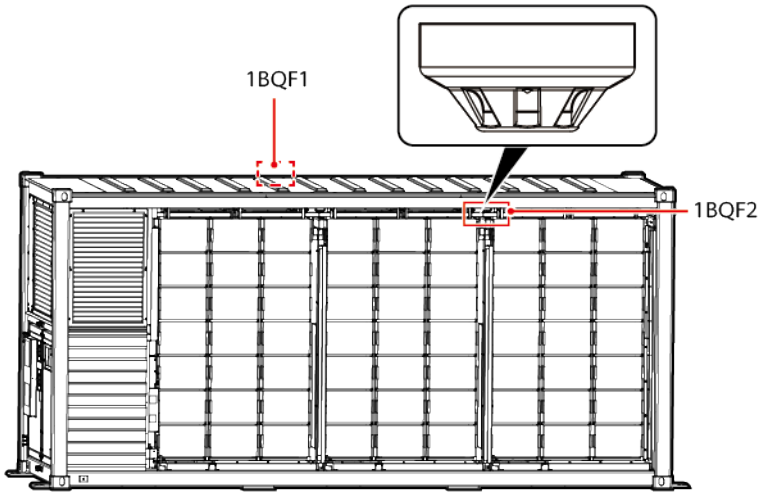
Step 2 Install a new smoke detector and rotate the detector clockwise until it locks into place.

Step 3 Ensure that no alarm is generated.

----End

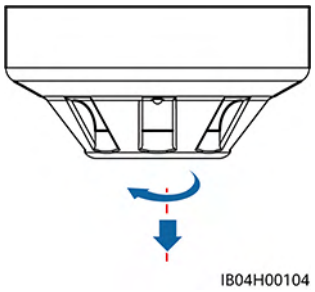
6.9 Replacing a Heat Detector

Figure 6-123 Positions of heat detectors



Step 1 Hold the heat detector by hand, and rotate it counterclockwise to remove it from the base.

Figure 6-124 Removing the heat detector



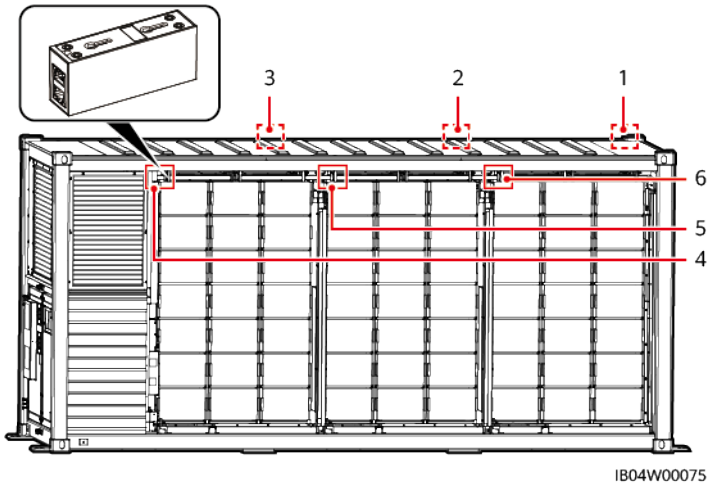
Step 2 Install a new heat detector and rotate the detector clockwise until it locks into place.

Step 3 Ensure that no alarm is generated.

----End

6.10 Replacing a CO Sensor

Figure 6-125 Positions of CO sensors



No.	Name on the SmartLogger WebUI	Component in the Electrical Diagram	DIP Switch Address
1	CO sensor-1	1B2	1
2	CO sensor-2	2B2	2
3	CO sensor-3	3B2	3
4	CO sensor-4	4B2	4
5	CO sensor-5	5B2	5
6	CO sensor-6	6B2	6

Procedure

Step 1 Record the DIP switch settings.

Step 2 Remove cables from the CO sensor.

Step 3 Remove the faulty CO sensor.

Step 4 Set the DIP switches for a new CO sensor based on the recorded setting information.

Step 5 Install the new CO sensor.

Step 6 Connect the cables.

Step 7 Ensure that no alarm is generated.

----End

6.11 Replacing a Temperature and Humidity Sensor (T/H Sensor)

Prerequisites

Fault locating:

1. Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/SmartPVMS to view alarm information.
2. Refer to the alarm handling suggestions in the alarm list.

Figure 6-126 Positions of T/H sensors (battery cabin)

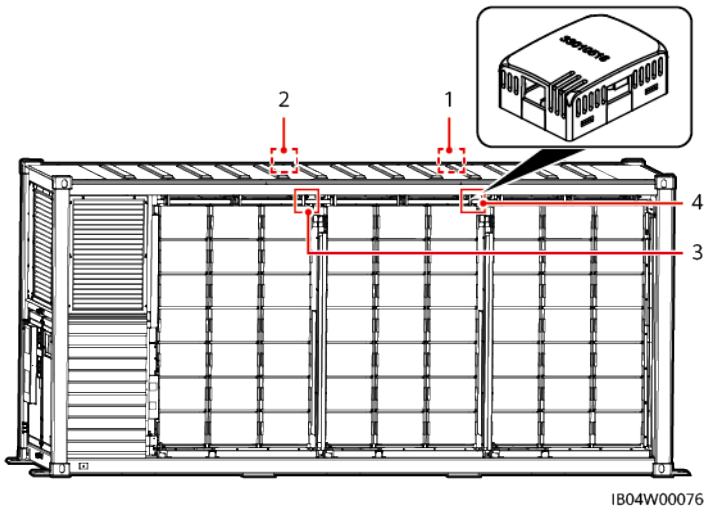
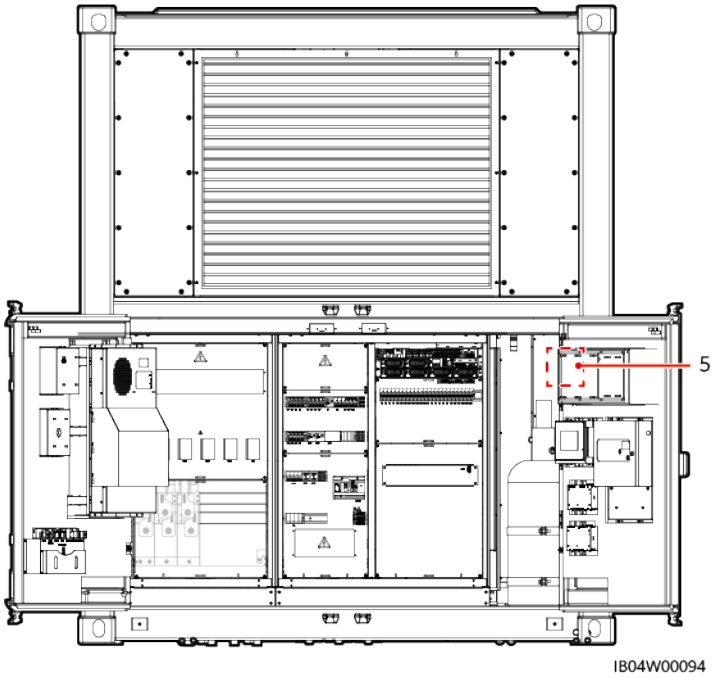


Figure 6-127 Position of a T/H sensor (control unit cabin)



No.	Name on the SmartLogger WebUI	Component in the Electrical Diagram	DIP Switch Address
1	T/H sensor-1	1B1	12
2	T/H sensor-2	2B1	13
3	T/H sensor-3	5B1	14
4	T/H sensor-4	6B1	15
5	T/H sensor-5	7B1	16

Procedure

Step 1 Record the DIP switch settings.

Step 2 Disconnect cables from the T/H sensor.

Step 3 Remove the faulty T/H sensor.

Step 4 Set the DIP switches for a new T/H sensor based on the recorded setting information.

Step 5 Install the new T/H sensor.

Step 6 Connect the cables.

Step 7 Ensure that no alarm is generated.

----End

7 Replacing Devices in the Control Unit Cabin

NOTICE

- Before maintaining the control unit cabin, ensure that the ESS is powered off.
- When maintaining and commissioning the control unit cabin of the ESS, route network cables through the gap at the bottom of the cabin door (without pressing the cables) and keep the cabin door open at the minimum angle.
- If the door must be open, open the door at the minimum angle and within the shortest time. Use sandproof and dustproof devices during maintenance. After the maintenance is complete, use devices such as vacuum cleaners to clean up sand and dust in the cabin. Once the cleaning is complete, close the cabin door.

7.1 Replacing Devices for the Air Conditioner in the Control Unit Cabin

7.1.1 Replacing an Air Conditioner Internal Fan in the Control Unit Cabin

Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tools: flat-head or Phillips screwdriver, socket screwdriver, and clamp meter.
- Power-off: Turn off the power switch for the air conditioner to be replaced in the control unit cabin.

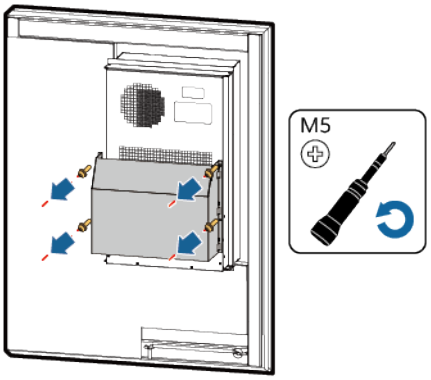
NOTE

The power loop of the ESS does not need to be powered off. You are advised to set the ESS in standby or shutdown mode during fan replacement.

Procedure

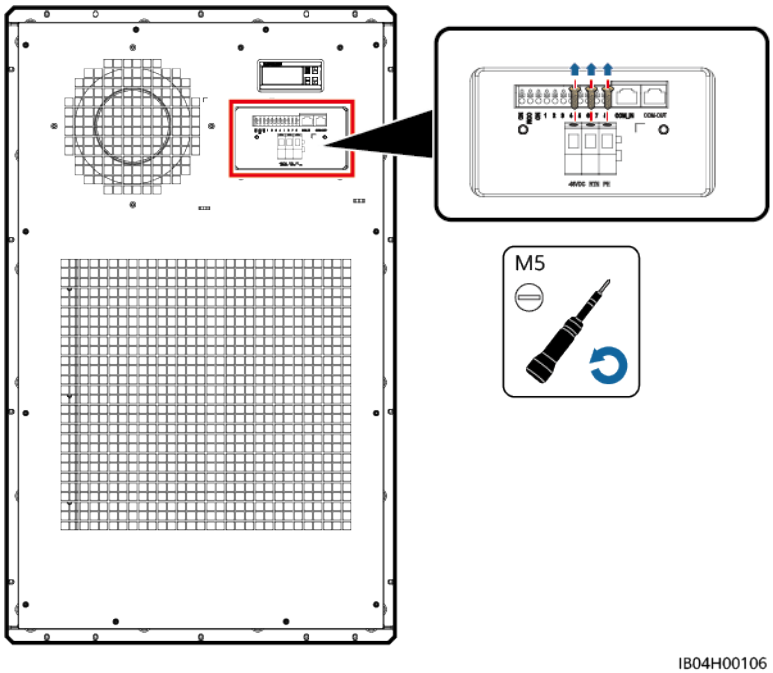
Step 1 Remove the air duct.

Figure 7-1 Removing the air duct



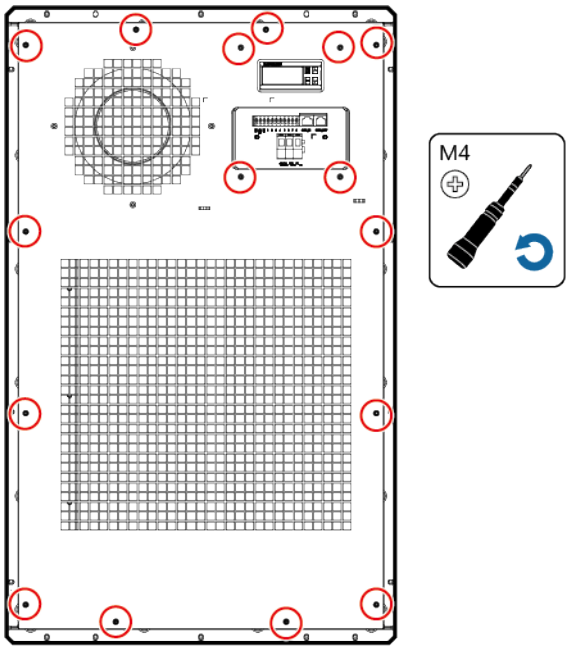
Step 2 Remove cables from the air conditioner.

Figure 7-2 Removing air conditioner cables



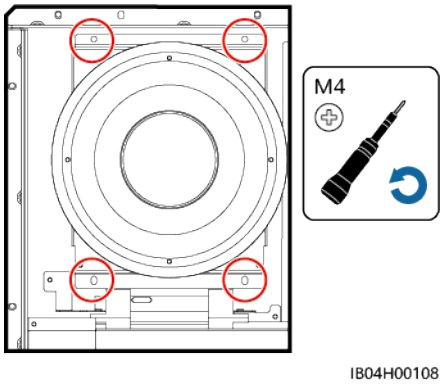
Step 3 Remove the front cover of the air conditioner.

Figure 7-3 Removing the front cover of the air conditioner



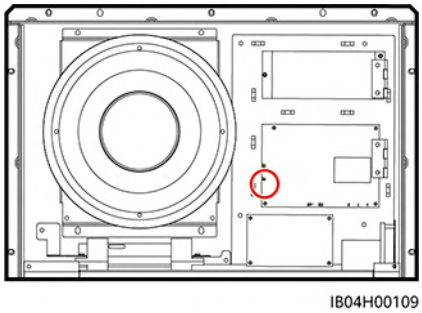
Step 4 Remove the screws from the fixing plate of the internal fan, and then remove the internal fan and the fixing plate.

Figure 7-4 Removing the internal fan and the fixing plate



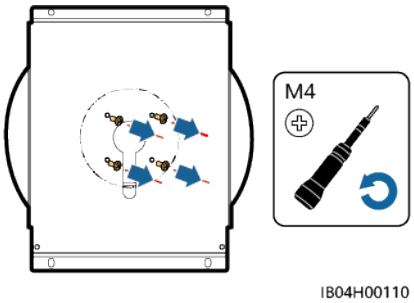
Step 5 Remove the internal fan cable from the main control board.

Figure 7-5 Removing the internal fan cable



Step 6 Remove the internal fan from the fixing plate.

Figure 7-6 Removing the internal fan



Step 7 Install a new internal fan on the fixing plate.

Step 8 Install the fixing plate.

Step 9 Connect and arrange the internal fan cable bundle to the main control board.

Step 10 Install the front cover.

Step 11 Install the air conditioner cables.

Step 12 Install an air duct.

----End

Follow-up Procedure

Step 1 Turn on the power switch for the replaced air conditioner in the control unit cabin.

Step 2 Check whether the function is restored.

Check Item	Criteria
Alarm Information	There is no alarm related to the internal fan.
Function	Low-speed operation in air supply mode and high-speed operation in cooling mode
Running data	Internal fan status: normal operation

----End

7.1.2 Replacing an Air Conditioner External Fan in the Control Unit Cabin

Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.

- Tools: flat-head or Phillips screwdriver, socket screwdriver, T20 anti-theft screwdriver, clamp meter, and utility knife
- Power-off: Turn off the power switch for the air conditioner to be replaced in the control unit cabin.

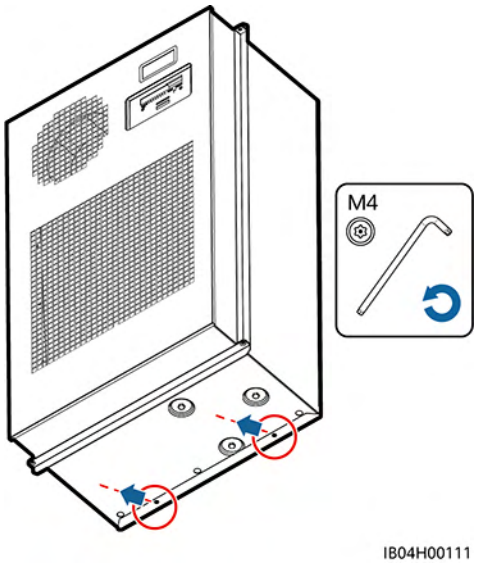
NOTE

The power loop of the ESS does not need to be powered off. You are advised to set the ESS in standby or shutdown mode during fan replacement.

Procedure

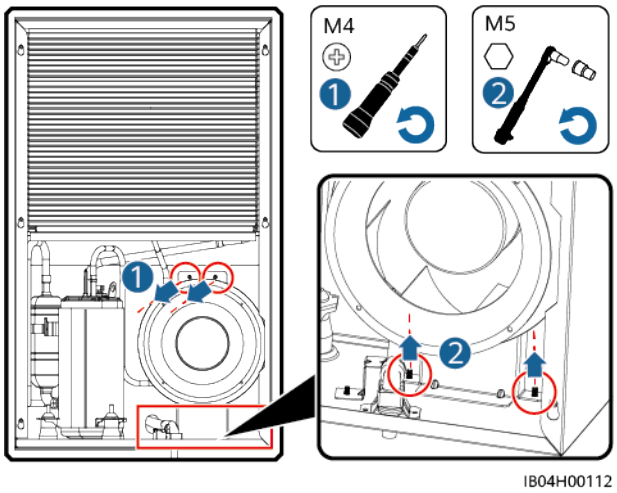
Step 1 Remove the rear cover of the air conditioner, and use a dedicated T20 anti-theft screwdriver to remove the two anti-theft screws from the bottom of the cabinet.

Figure 7-7 Removing anti-theft screws



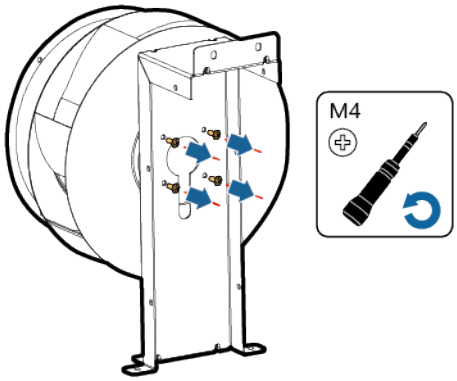
Step 2 Remove the two screws from the upper part of the external fan fixing plate and the two nuts from the lower part. Then, remove the external fan and the fixing plate.

Figure 7-8 Removing the external fan and the fixing plate



Step 3 Remove cables from the quick connect port of the external fan, and remove the external fan from the support.

Figure 7-9 Removing the external fan



Step 4 Install a new external fan.

Step 5 Connect and arrange the external fan cable bundle.

Step 6 Install the rear cover.

----End

Follow-up Procedure

Step 1 Turn on the power switch for the replaced air conditioner in the control unit cabin.

Step 2 Check whether the function is restored.

Check Item	Criteria
Alarm Information	There is no alarm related to the external fan.
Function	The rotation speed is adjusted automatically according to the condensing pressure.
Running data	External fan status: standby when no cooling is required, and normal when cooling is required.

----End

7.1.3 Replacing an Air Conditioner Main Control Board in the Control Unit Cabin

Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.

- Tools: flat-head or Phillips screwdriver and clamp meter
- Power-off: Turn off the power switch for the air conditioner to be replaced in the control unit cabin.

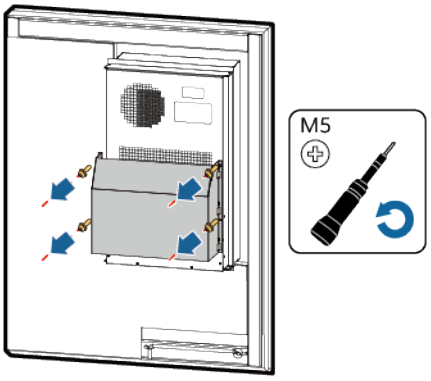
NOTE

The power loop of the ESS does not need to be powered off. You are advised to set the ESS in standby or shutdown mode during fan replacement.

Procedure

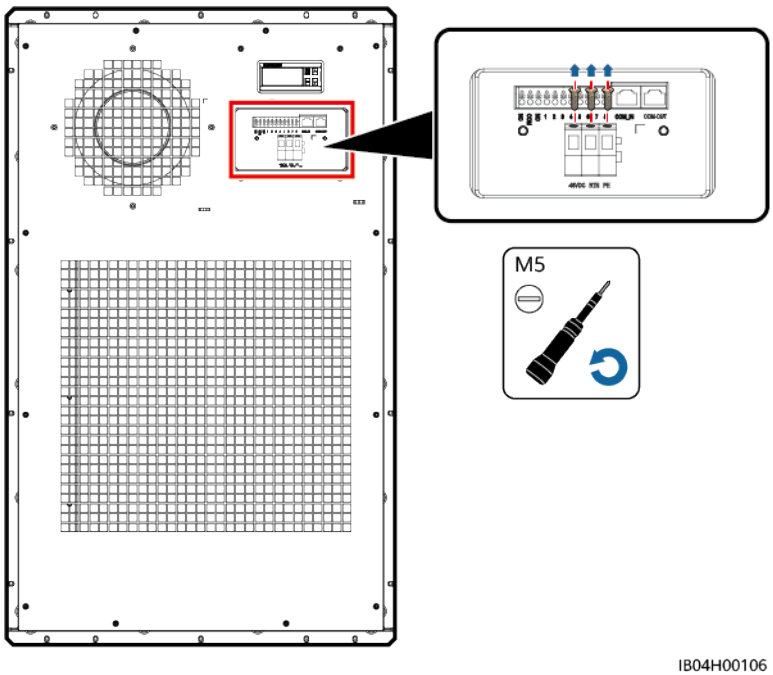
Step 1 Remove the air duct.

Figure 7-10 Removing the air duct



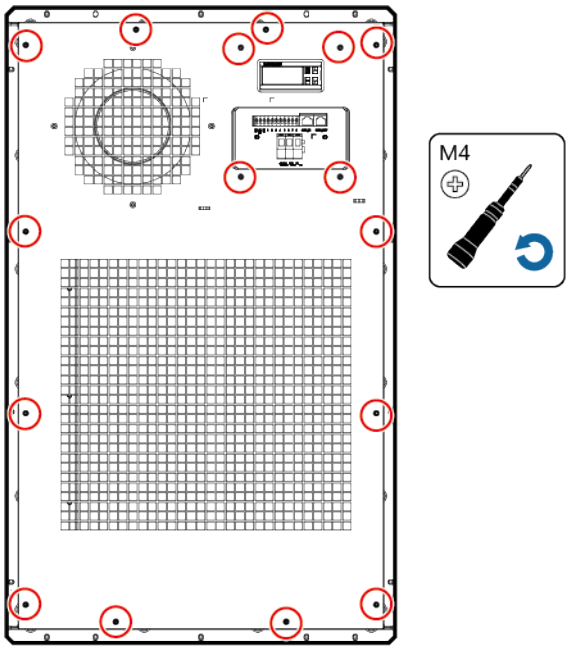
Step 2 Remove cables from the air conditioner.

Figure 7-11 Removing air conditioner cables



Step 3 Remove the front cover of the air conditioner.

Figure 7-12 Removing the front cover of the air conditioner



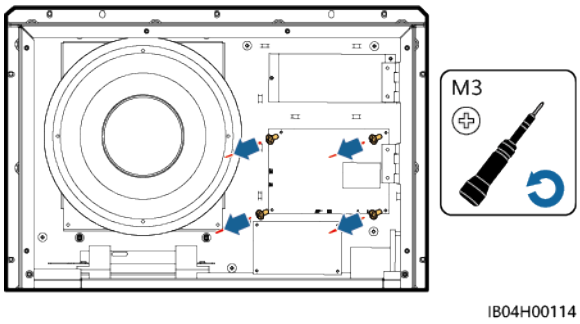
Step 4 Remove all cables from the main control board.

NOTE

As some terminal connectors on the main control board are secured with transparent adhesive, you need to use a utility knife to remove the transparent adhesive.

Step 5 Remove the main control board.

Figure 7-13 Removing the main control board



Step 6 Install a new main control board.

Step 7 Reinstall the cables of the main control board.

Step 8 Install the front cover.

Step 9 Connect the air conditioner cables.

Step 10 Install an air duct for the air conditioner.

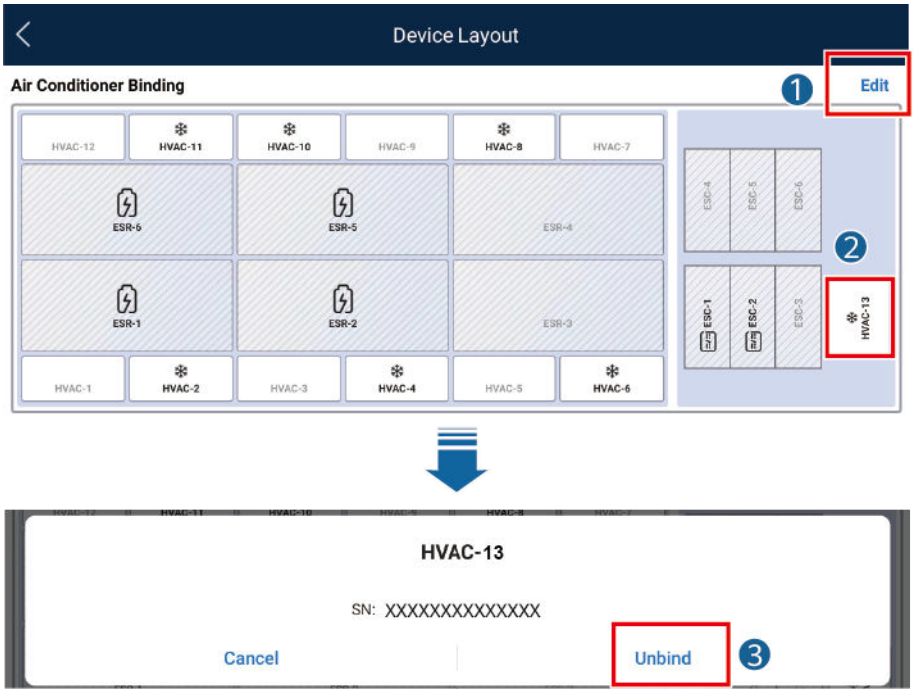
----End

Follow-up Procedure

Step 1 Turn on the power switch for the replaced air conditioner in the control unit cabin.

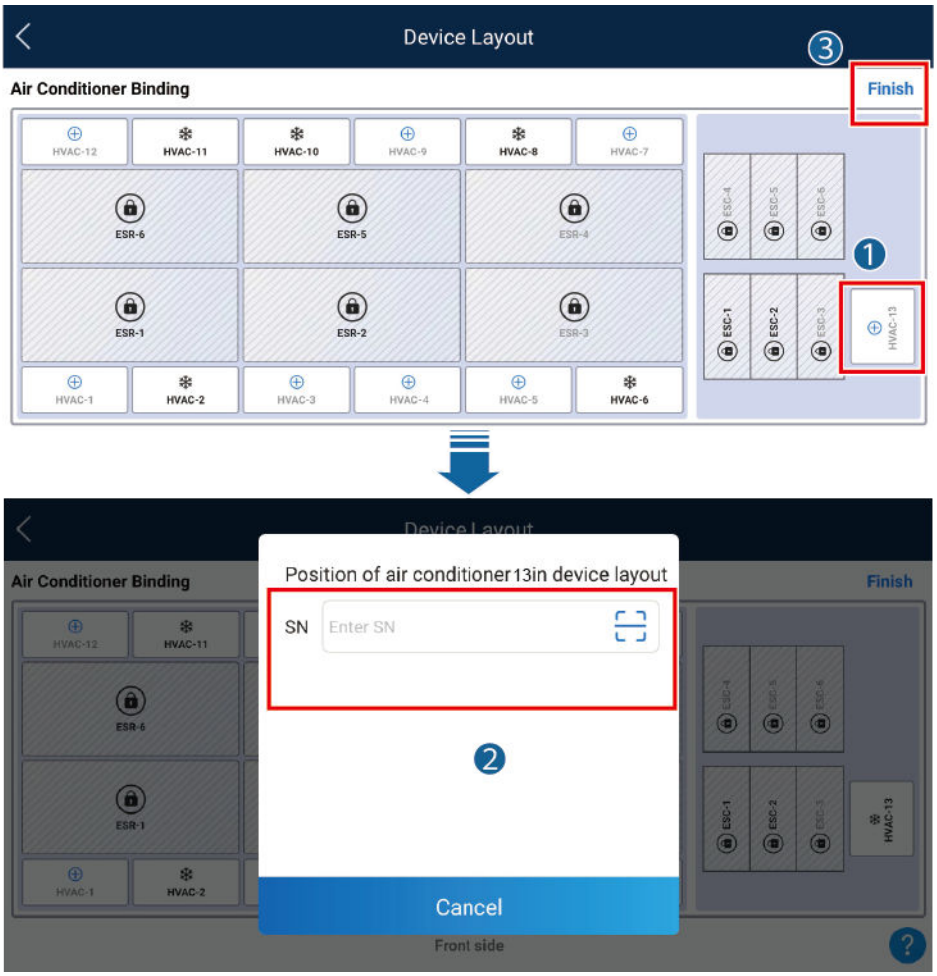
Step 2 Log in to the CMU using the FusionSolar app, choose **Maintenance** > **Device Layout**, and unbind the old air conditioner.

Figure 7-14 Unbinding the old air conditioner



Step 3 Add the new air conditioner.

Figure 7-15 Adding the new air conditioner



Step 4 Check whether the function is restored.

Check Item	Criteria
Alarm Information	No component communication alarm is generated.
Function	The functions are normal.
Running data	Air conditioner status: normal operation

----End

7.1.4 Replacing an Air Conditioner in the Control Unit Cabin

Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tools: flat-head or Phillips screwdriver and clamp meter

- Power-off: Turn off the power switch for the air conditioner to be replaced in the control unit cabin.

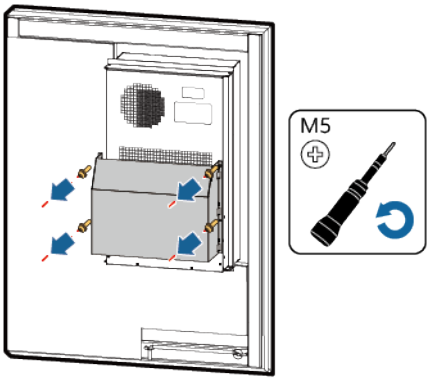
  NOTE

  The power loop of the ESS does not need to be powered off. You are advised to set the ESS in standby or shutdown mode during fan replacement.

Procedure

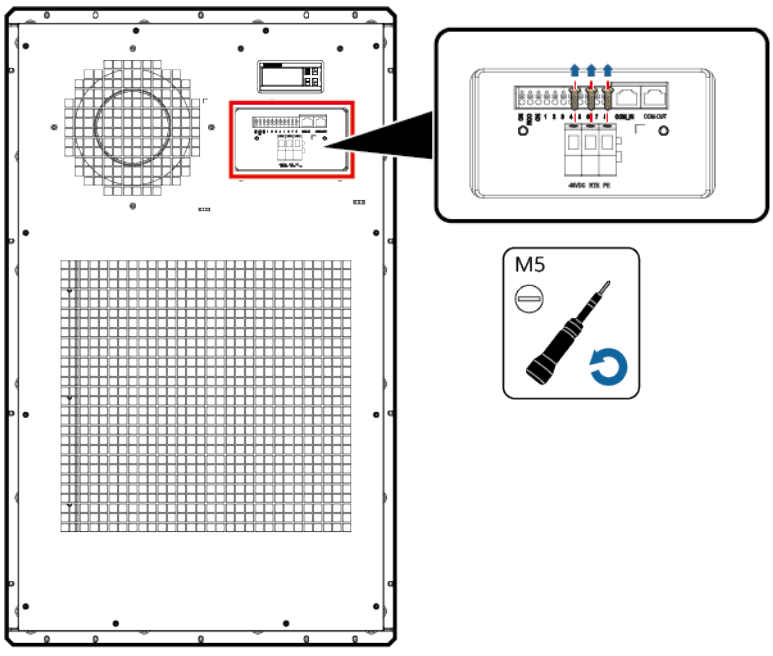
Step 1 Remove the air duct.

Figure 7-16 Removing the air duct



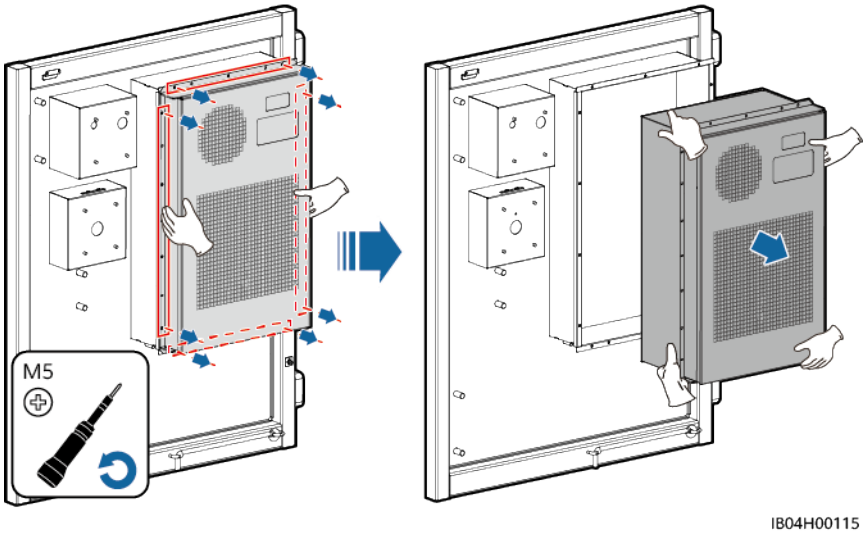
Step 2 Remove cables from the air conditioner.

Figure 7-17 Removing air conditioner cables



Step 3 Remove screws and sealing tapes, and then remove the old air conditioner.

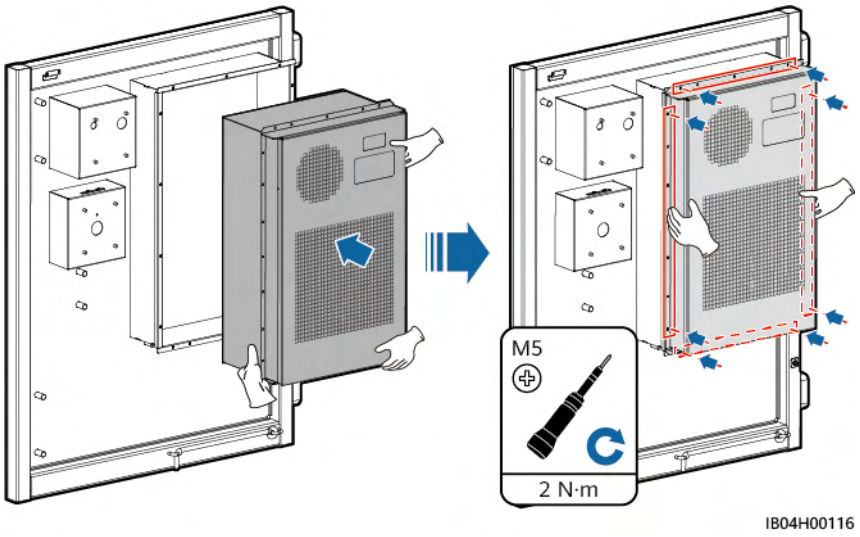
Figure 7-18 Removing the old air conditioner



Step 4 Remove the remaining sealing tapes from the door frame.

Step 5 Install a new air conditioner.

Figure 7-19 Installing a new air conditioner



Step 6 Connect the air conditioner cables.

Step 7 Install an air duct. Use an M5 Phillips screwdriver to tighten the screws to 3 N·m.

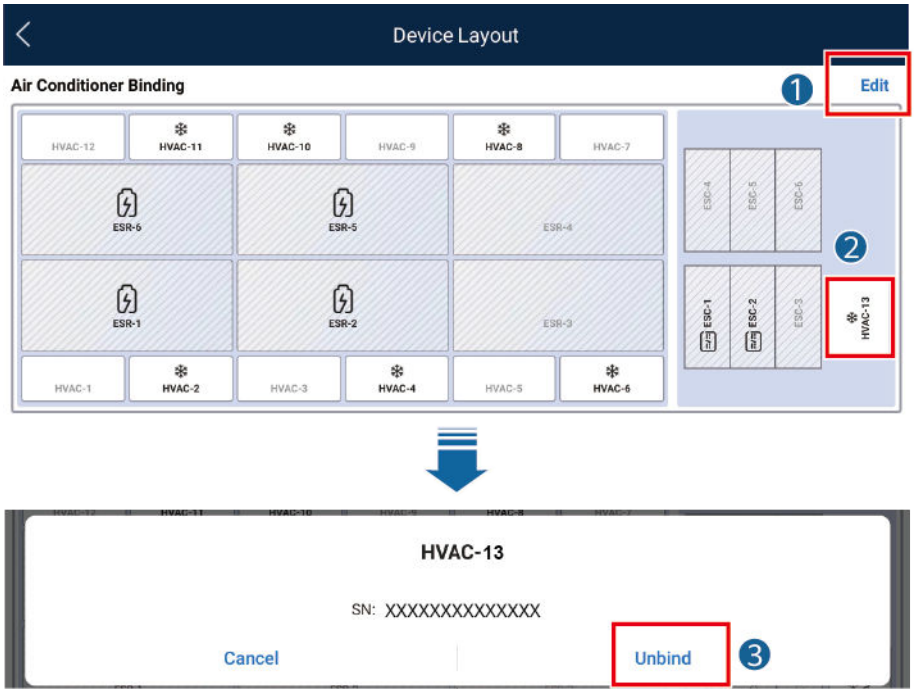
----End

Follow-up Procedure

Step 1 Turn on the power switch for the replaced air conditioner in the control unit cabin.

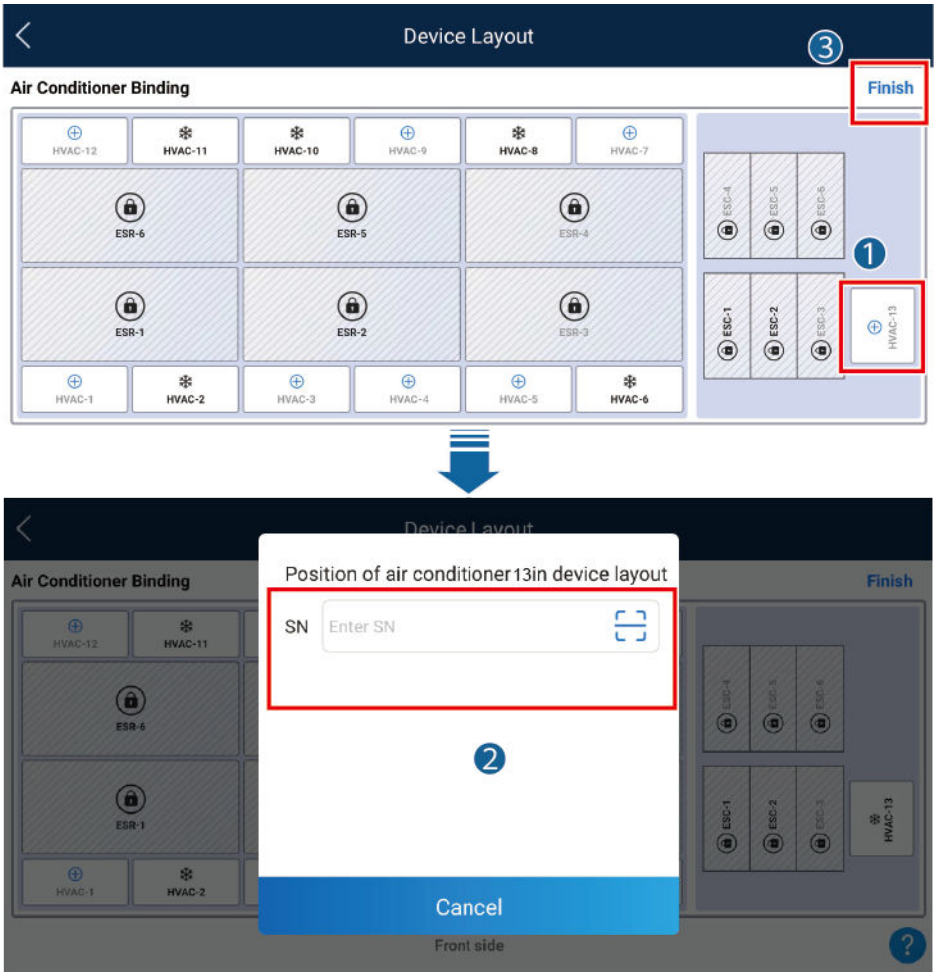
Step 2 Log in to the CMU using the FusionSolar app, choose **Maintenance** > **Device Layout**, and unbind the old air conditioner.

Figure 7-20 Unbinding the old air conditioner



Step 3 Add the new air conditioner.

Figure 7-21 Adding the new air conditioner



Step 4 Check whether the function is restored.

Check Item	Criteria
Alarm Information	No component communication alarm is generated.
Function	The functions are normal.
Running data	Air conditioner status: normal operation

----End

7.2 Replacing a CMU (Automatic Configuration File Backup)

Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.

b. Refer to the alarm handling suggestions in the alarm list.

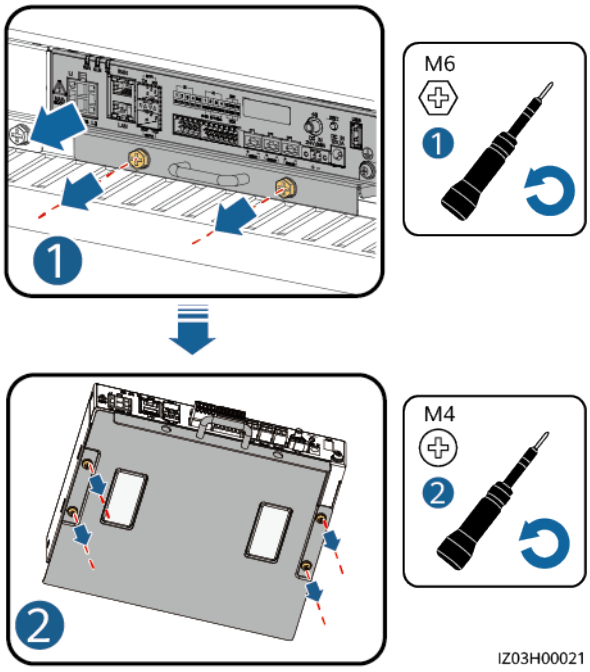
- The CMU configuration file has been automatically backed up. The automatic backup function is supported only when the LUNA2000C version is V100R023C00SPC110 or later and the SmartLogger version is V300R023C10 or later.
- Tool: Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Disconnect cables from the CMU and label them.

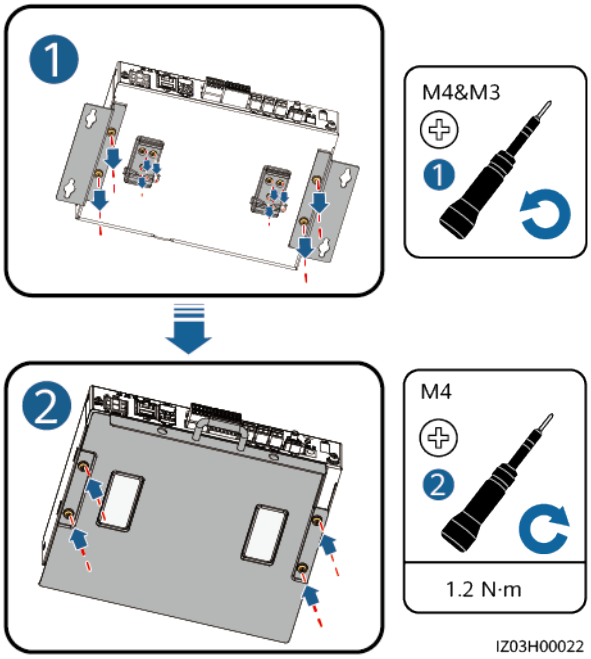
Step 2 Remove the faulty CMU and its cabinet-mounting brackets.

Figure 7-22 Removing the faulty CMU



Step 3 Remove the mounting ears and guide rail-mounting brackets from a new CMU, and install the cabinet-mounting brackets.

Figure 7-23 Replacing a CMU



Step 4 Install a new CMU in the cabinet.

Step 5 Connect the cables based on the labels.

----End

Follow-up Procedure

Step 1 Turn on the AC power switch for the CMU adapter in the control unit cabin.

Step 2 Switch on the DC auxiliary power circuit breaker of the Smart Rack Controller in the control unit cabin.

Step 3 Check that the communication is normal and no related alarm is generated on the SmartLogger WebUI/CMU WebUI.

Step 4 Switch on all battery rack output circuit breakers in the battery cabin.

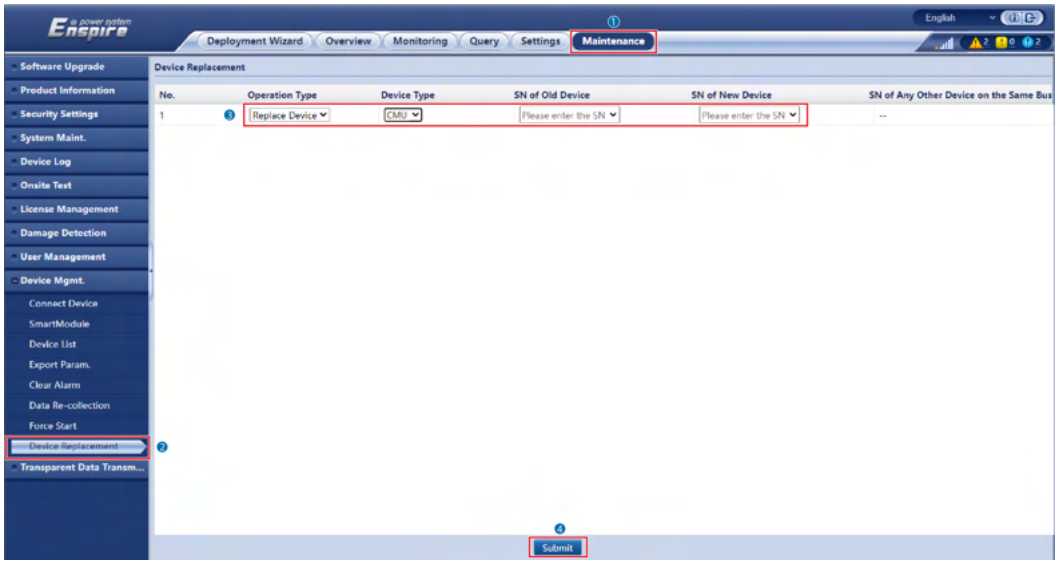
Step 5 Switch on all DC circuit breakers in the control unit cabin.

Step 6 Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/SmartPVMS and deliver a startup command to the Smart Rack Controller.

Step 7 Check the running status of the system and ensure that the functions are restored.

Step 8 Log in to the SmartLogger WebUI, enter the SNs of the old and new CMUs, and click **Submit** to load the CMU configuration file that is automatically backed up.

Figure 7-24 Replacing devices

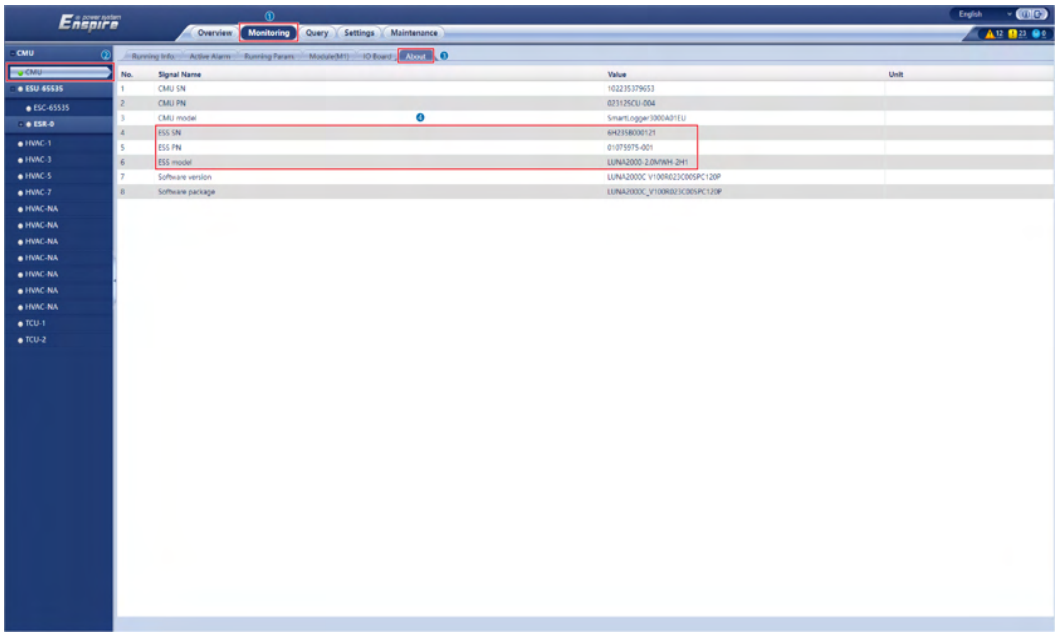


NOTE

Enter the correct SNs of the old and new CMUs. If the loaded configuration file is incorrect due to incorrect SNs, perform this step to load the configuration file again.

Step 9 Log in to the CMU WebUI and check that the values of **ESS SN**, **ESS PN**, and **ESS model** are consistent with the data on the ESS external label.

Figure 7-25 Checking the ESS information



----End

7.3 Replacing a CMU (Mannual Configuration File Backup)

Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Exporting the full configuration file:

  NOTE

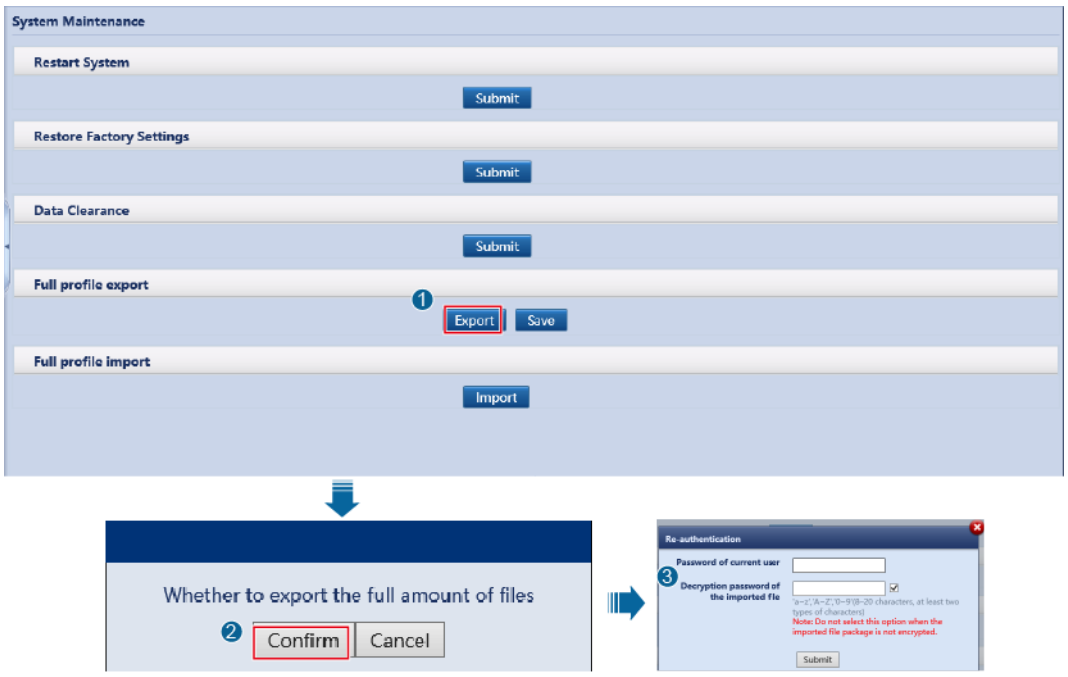
  If you cannot log in to the CMU because the CMU is damaged, skip this step. Set factory parameters after replacement.

  a. Choose **Maintenance** > **System Maint.** and click **Export** under **Full profile export**.

  NOTE

  In the **Re-authentication** dialog box, enter **Password of current user** and set **Encryption password of the exported file**.

  Figure 7-26 Exporting the full configuration file



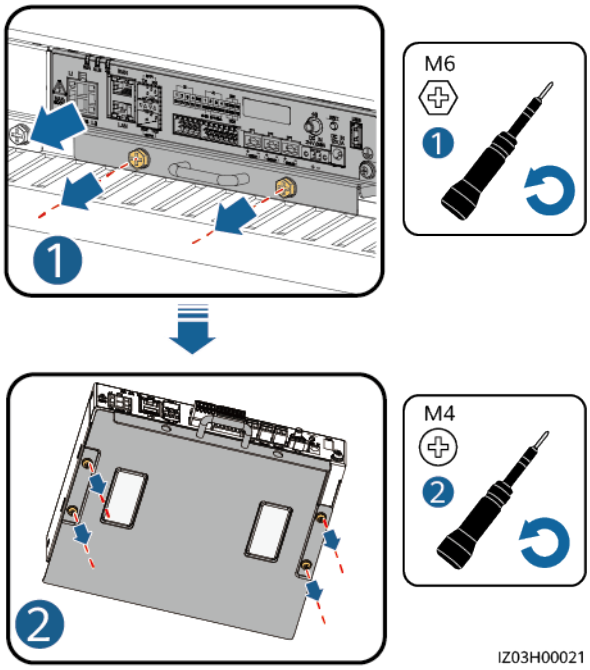
  b. After the export is successful, click **Confirm**. Click **Save** under **Full profile export** to save the full configuration file.
- Tool: Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Disconnect cables from the CMU and label them.

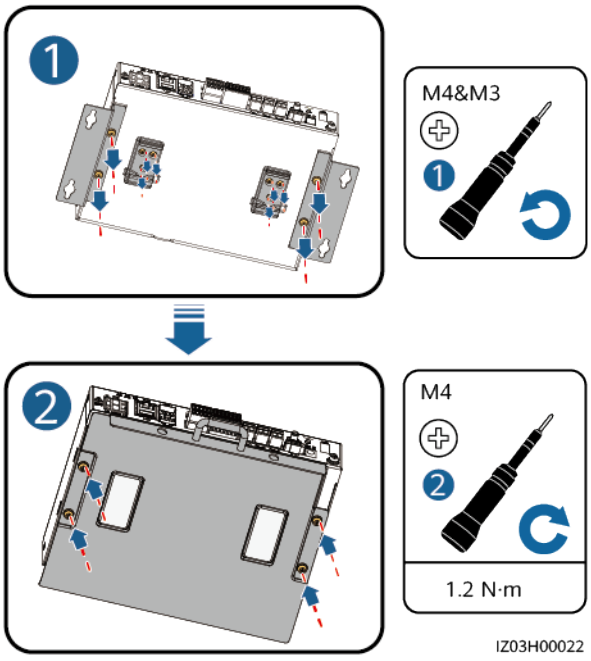
Step 2 Remove the faulty CMU and its cabinet-mounting brackets.

Figure 7-27 Removing the faulty CMU



Step 3 Remove the mounting ears and guide rail-mounting brackets from a new CMU, and install the cabinet-mounting brackets.

Figure 7-28 Replacing a CMU



Step 4 Install a new CMU in the cabinet.

Step 5 Connect the cables based on the labels.

----End

Follow-up Procedure

Step 1 Turn on the AC power switch for the CMU adapter in the control unit cabin.

Step 2 Switch on the DC auxiliary power circuit breaker of the Smart Rack Controller in the control unit cabin.

Step 3 Check that the communication is normal and no related alarm is generated on the SmartLogger WebUI/CMU WebUI.

Step 4 Switch on all battery rack output circuit breakers in the battery cabin.

Step 5 Switch on all DC circuit breakers in the control unit cabin.

Step 6 Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/SmartPVMS and deliver a startup command to the Smart Rack Controller.

Step 7 Check the running status of the system and ensure that the functions are restored.

Step 8 If the full configuration file is exported before device replacement, import the exported configuration file to the new device. Otherwise, go to **Step 9**

1. Choose **Maintenance** > **System Maint.** and click **Import** under **Full profile export**.

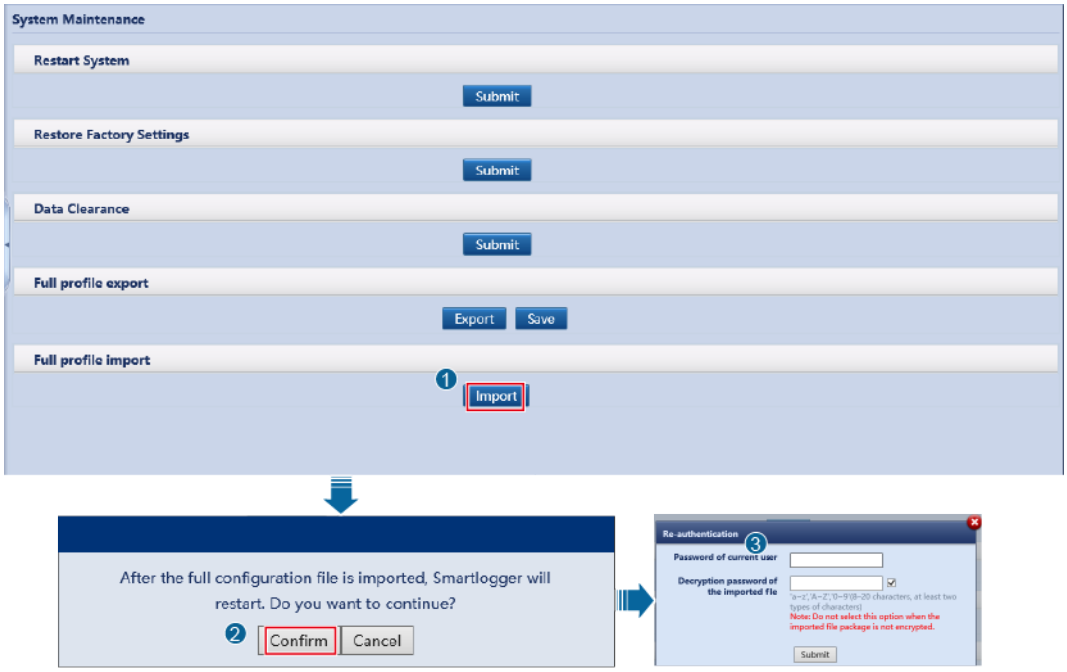
   NOTE

   In the **Re-authentication** dialog box, enter **Password of current user** and set **Decryption password of the exported file**.

NOTICE

To replace the CMU, export the full configuration file excluding certificate-related files. Then import the full configuration file to the new CMU. If a third-party certificate is used, you need to reload the certificate.

Figure 7-29 Importing the full configuration file



2. Click **Select File**, select the exported full configuration file, and then click **Import**.

Step 9 If the full configuration file is not exported before the device replacement, set the factory parameters of the CMU.

1. Log in to the CMU and choose **Maintenance** > **Device Mgmt.** > **Connect Device** > **Add Devices** to add a power meter, SMU, CO sensor, T/H sensor and exhaust controller.

Figure 7-30 Adding devices

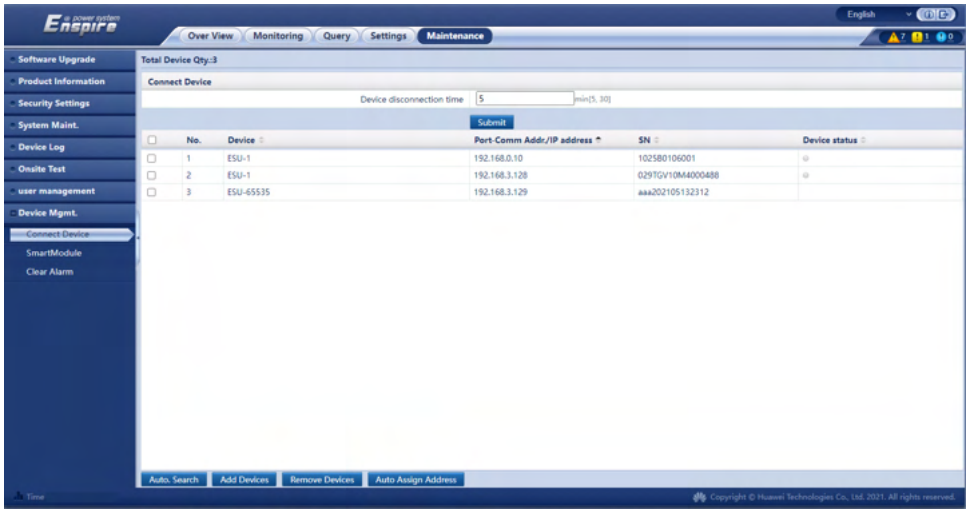


Table 7-1 Parameter settings

Device Type	Parameters Settings	Criteria for Determining Normal Communication
Meter	– Communications protocol: Modbus-RTU – Port Number: COM1 – Address: 11	Choose **Monitoring** > **Meter** from the navigation tree on the left. On the running information tab page, the device status is online, and the AB/BC/CA line voltage is the same as the AC power supply voltage.
SMU	– Access mode: COM1 – Address: 33	Choose **Monitoring** > **CMU** from the navigation tree on the left. On the running information tab page, locate the total output voltage of the rectifier module. The displayed value is within the range of 53±5 V. The number of rectifiers is 6. The fault, protection, communication failure, power failure, and output overvoltage of rectifiers 1 to 6 are set to no.
CO Sensor	Connect the six CO sensors respectively. – Access mode: COM3 – Address: 1–6 – Physical location: 1–6	-
Temperature and humidity monitoring module	Connect the five T/H sensors respectively. – Access mode: COM3 – Address 12–16 – Physical location: 1–5	-
Exhaust unit	Connect the two exhaust controllers respectively. – Access mode: COM1 – Address: 37–38 – Physical location: 1–2	-

2. Click **Auto Assign Address**, select **Adjust Address**, and search and add the air conditioner again.
3. Click **Device Monitoring** to check whether the battery rack has been connected.
   - For 0.5C, expand ESU-1 to view ESC-1, ESR-1, and ESR-6, expand ESU-2 to view ESC-2, ESR-2, and ESR-5, and expand ESU-3 to view ESC-3, ESR-3, and ESR-4. Click **ESR** > **Running Info** and verify that **Number of working battery modules** in each ESR is 21.
   - For 1C, expand ESU-1 to view ESC-1 and ESR-1, expand ESU-2 to view ESC-2 and ESR-2, expand ESU-3 to view ESC-3 and ESR-3, expand ESU-4 to view ESC-4 and ESR-4, expand ESU-5 to view ESC-5 and ESR-5, and

expand ESU-6 to view ESC-6 and ESR-6. Click **ESR** > **Running Info** and verify that **Number of working battery modules** in each ESR is 21.

----End

7.4 Replacing a SmartModule

Prerequisites

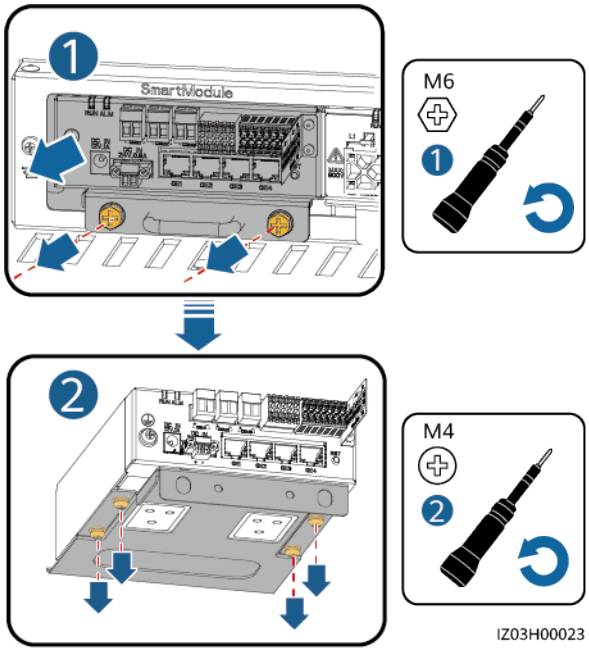
- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tool: Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Disconnect cables from the SmartModule and label them.

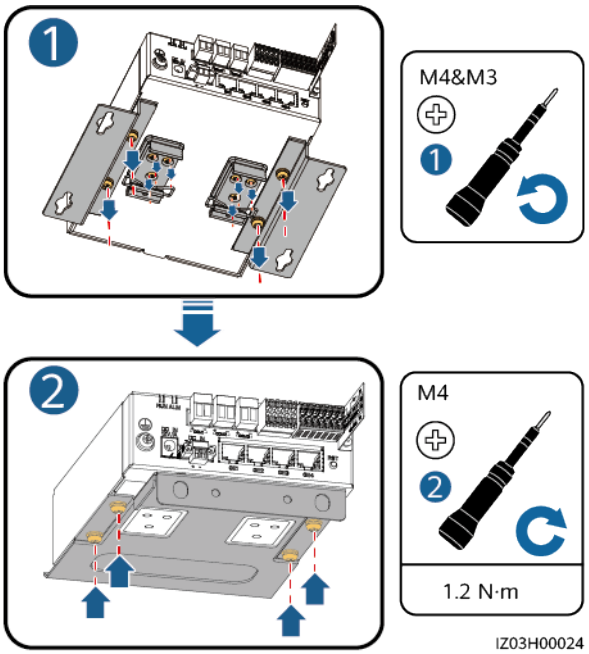
Step 2 Remove the faulty SmartModule and its cabinet-mounting kit.

Figure 7-31 Removing a faulty SmartModule



Step 3 Remove the mounting ears and guide rail-mounting kit from a new SmartModule, and install the cabinet-mounting kit.

Figure 7-32 Replacing a SmartModule



Step 4 Install the new SmartModule in the cabinet.

Step 5 Connect the cables based on the labels.

----End

Follow-up Procedure

Step 1 Turn on the AC power switch for the CMU adapter in the control unit cabin.

Step 2 Switch on the DC auxiliary power circuit breaker of the Smart Rack Controller in the control unit cabin.

Step 3 Check that the communication is normal and no related alarm is generated on the SmartLogger WebUI/CMU WebUI.

Step 4 Switch on all battery rack output circuit breakers in the battery cabin.

Step 5 Switch on all DC circuit breakers in the control unit cabin.

Step 6 Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/SmartPVMS and deliver a startup command to the Smart Rack Controller.

Step 7 Check the running status of the system and ensure that the functions are restored.

Step 8 Log in to the CMU and search for the new SmartModule and connected devices.

----End

7.5 Replacing a CMU Adapter

Prerequisites

- Fault locating:

a. Check the fault indicator.

Status Indication	Color	Indicator Status	Description
The power module is normal.	Green	Steady on	The power input and output are normal, and the power module is running properly.
The power module has no output.	Off	Off	The power module is faulty or has no output.
The power module is in hiccup protection mode.	Green	Blinking	Power modulehiccup protection

b. Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/ SmartPVMS to view alarm information.

c. Refer to the alarm handling suggestions in the alarm list.

- Tool: Phillips screwdriver
- Power-off: Turn off the AC power switch for the CMU adapter in the control unit cabin.

Procedure

Step 1 Disconnect cables from the adapter and label them.

Step 2 Remove the faulty adapter and its cabinet-mounting brackets.

Step 3 Install a new adapter in the cabinet.

Step 4 Connect the cables based on the labels.

----End

Follow-up Procedure

Step 1 Turn on the AC power switch for the CMU adapter in the control unit cabin.

Step 2 Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/SmartPVMS to check whether the communication is normal and whether door status alarms are properly displayed.

Step 3 Check the indicator status and verify that the function is restored.

----End

7.6 Replacing a PSU

Prerequisites

- Fault locating:

  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.

b. Refer to the alarm handling suggestions in the alarm list.

Table 7-2 PSU troubleshooting

Symptom	Possible Cause	Troubleshooting
The green indicator is off.	There is no AC input.	Check that the AC input voltage is normal.
	The input fuse is damaged.	Replace the PSU.
The yellow indicator is steady on.	Overtemperature occurs.	Ensure that the ventilation vent is unblocked.
	AC input overvoltage or undervoltage occurs.	Ensure that the AC power is properly supplied to the PSU.
	The PSU is hibernated. (The protection indicator is steady on when the PSU is hibernated and no alarm is generated.)	If the PSU enters the hibernation mode because system parameters are being set, this symptom is normal.
The red indicator is steady on.	Output overvoltage protection has been triggered.	Hot swap the PSU once. If there is still no output, replace the PSU.
	The fan is faulty.	Replace the PSU.
	The PSU powers off due to overtemperature.	Ensure that the ventilation vent is unblocked.
	The PSU generates no output due to internal faults.	Replace the PSU.

- Tools: protective gloves and cabinet door key

CAUTION

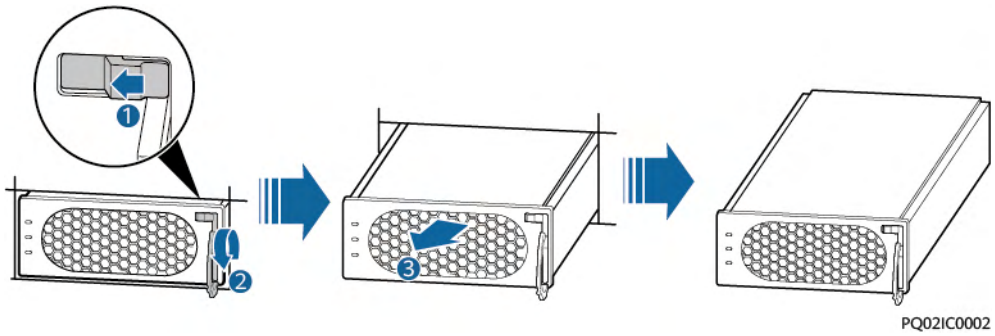
To prevent burns, exercise caution when holding a PSU as it may be hot during operation.

Procedure

Step 1 Push the locking latch on the right side of the PSU panel towards the left.

Step 2 Open the handle gently until the latch separates from the subrack, and then pull the PSU out of the subrack.

Figure 7-33 Pulling out the faulty PSU

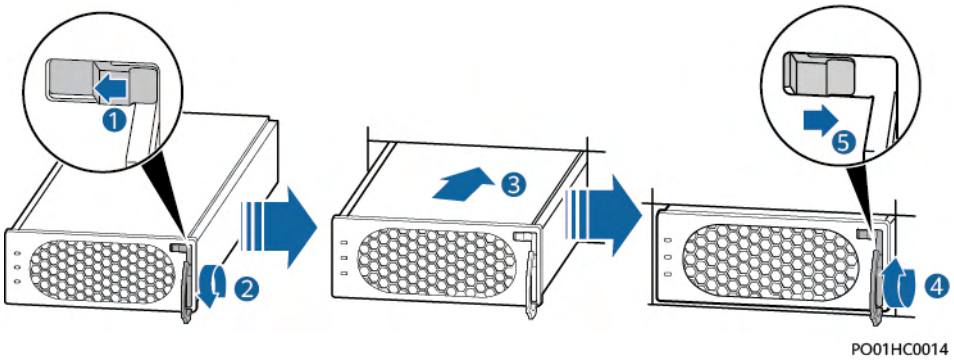


Step 3 Push the locking latch on the new PSU towards the left and pull out the handle of the PSU.

Step 4 Place the PSU in the correct slot.

Step 5 Gently push the handle along the guide rails until it is fully engaged, and push the locking latch rightward to lock the handle.

Figure 7-34 Installing the new PSU



----End

7.7 Replacing the ETP48400-C3B1

Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tool: Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

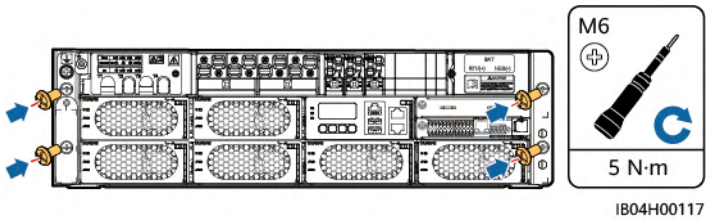
Procedure

Step 1 Remove cables from the power subrack and label them.

Step 2 Remove the faulty power subrack.

Step 3 Install a new power subrack.

Figure 7-35 Installing a power subrack



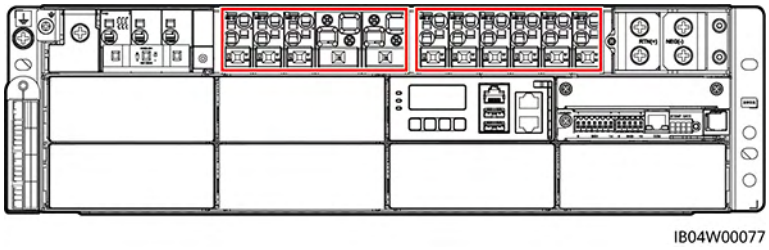
Step 4 Connect the cables based on the labels.

----End

7.8 Replacing an ETP48400-C3B1 Power Distribution Switch

Prerequisites

Figure 7-36 Positions of switches



- Fault locating:

Symptom	Possible Cause	Troubleshooting
A circuit breaker is faulty due to overcurrent or a short circuit.	1. The circuit breaker is in a position between ON and OFF. 2. The circuit breaker is faulty.	1. Set the circuit breaker to OFF and then to ON. 2. Replace the circuit breaker.

- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

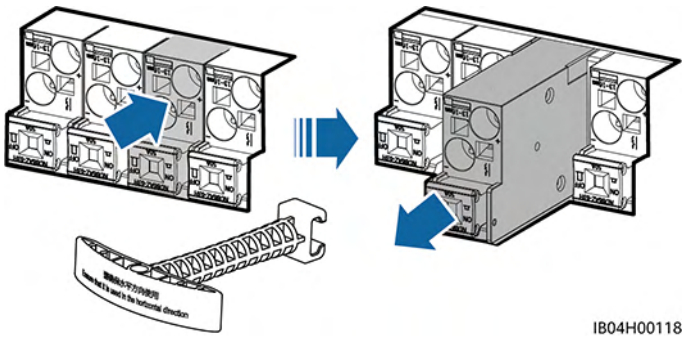
Procedure

Step 1 Set the switch to be replaced to OFF.

Step 2 Record the cable connections, remove the cables, and insulate them.

Step 3 Push the faulty switch in place along the guide rails and pull it out horizontally.

Figure 7-37 Removing the switch



Step 4 Place a new switch to the corresponding position and push it in place along the guide rails.

Step 5 Connect the cables to the switch based on the recorded cable information.

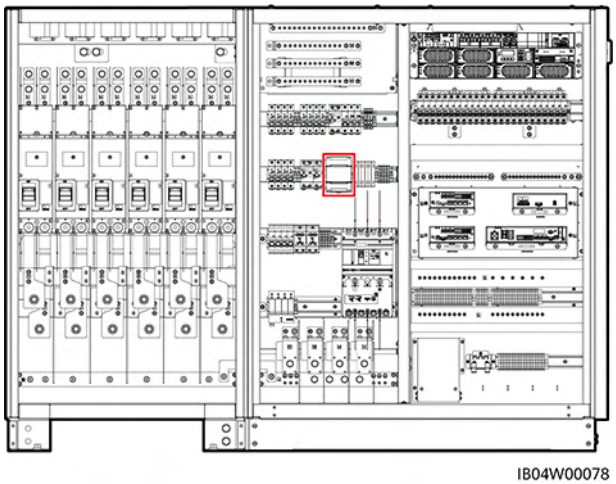
Step 6 Set the switch to ON.

----End

7.9 Replacing a Power Meter

Prerequisites

Figure 7-38 Meter location.

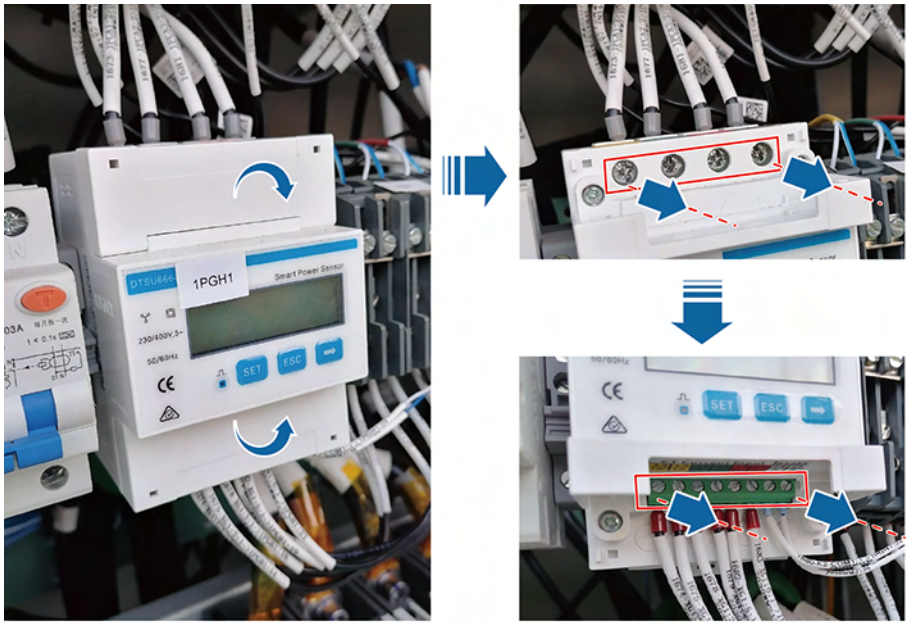


- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tool: flat-head or Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Disconnect cables from the meter and label them.

Figure 7-39 Disconnecting the meter cables



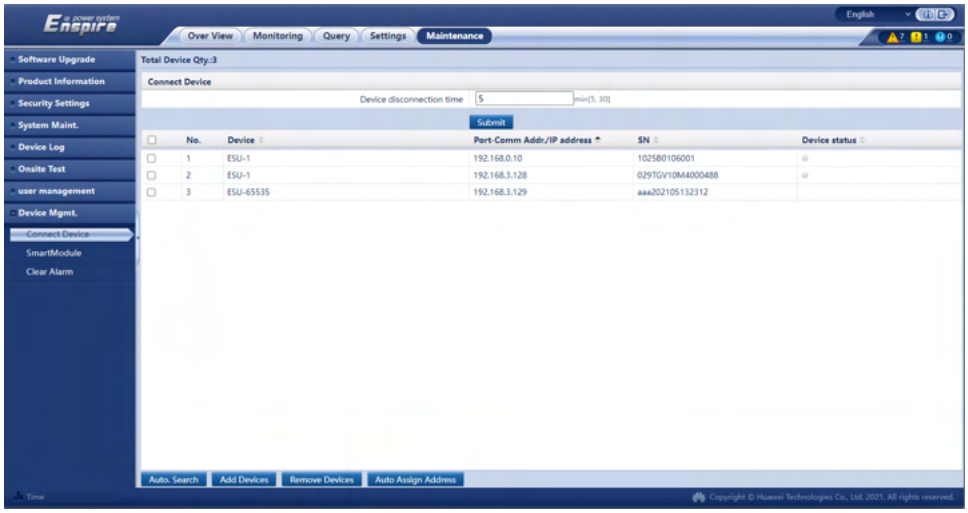
Step 2 Remove the faulty meter.

Step 3 Install a new power meter.

Step 4 Connect the cables based on the labels.

Step 5 Log in to the CMU, choose **Maintenance** > **Device Mgmt.** > **Connect Device** > **Add Devices**, add a meter, and set meter parameters.

Figure 7-40 Adding devices



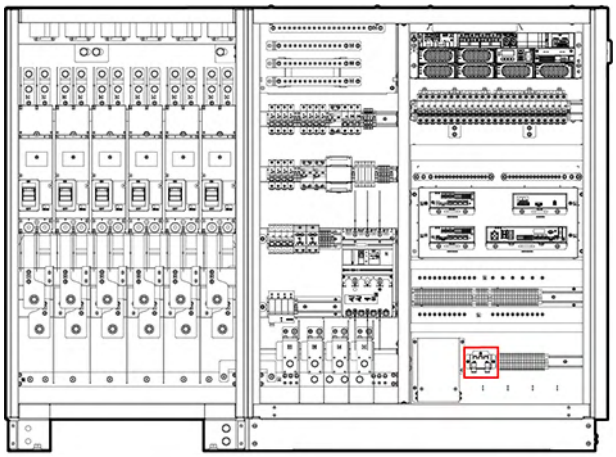
Device Type	Parameters Settings	Criteria for Determining Normal Communication
Meter	• Communications protocol: Modbus-RTU • Port Number: COM1 • Address: 11	Choose **Monitoring** > **Meter** from the navigation tree on the left. On the running information tab page, the device status is online, and the AB/BC/CA line voltage is the same as the AC power supply voltage.

----End

7.10 Replacing the Fiber Adapter

Prerequisites

Figure 7-41 Position of a fiber adapter



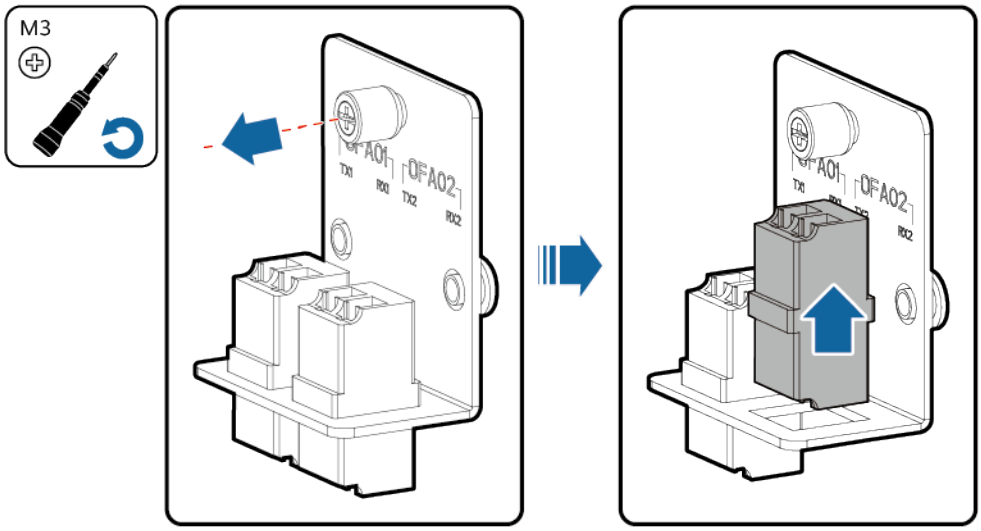
- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tool: Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Disconnect cables from the fiber adapter and label them.

Step 2 Remove the faulty fiber adapter.

Figure 7-42 Removing the fiber adapter



Step 3 Install a new fiber adapter.

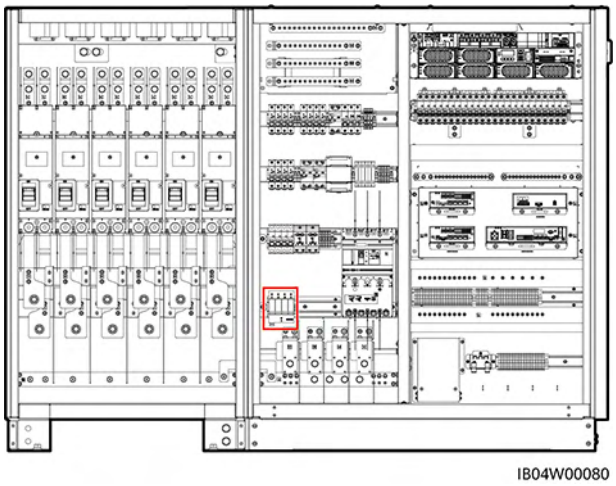
Step 4 Connect the cables based on the labels.

----End

7.11 Replacing an SPD

Prerequisites

Figure 7-43 Position of an SPD



- Fault locating: If an SPD is damaged or its indication window is displayed in red, the SPD is faulty and needs to be replaced.
- Tools: ESD wrist strap or gloves, ESD box or bag, cabinet door key, and removal and insertion tool.
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

DANGER

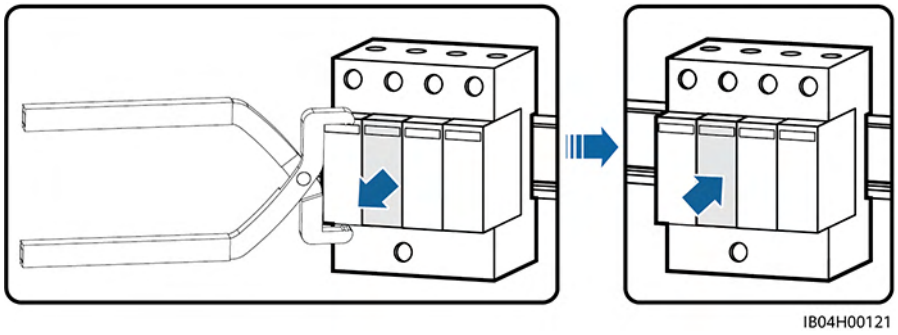
Do not replace an SPD during a thunderstorm.

Procedure

Step 1 Remove the faulty surge protection module from the SPD.

Step 2 Install a new surge protection module.

Figure 7-44 Replacing a surge protection module



----End

Follow-up Procedure

Check that the SPD alarm is cleared.

7.12 Replacing an ESS Abort Button

Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tool: Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Disconnect cables from the abort button, and remove the abort button.

Figure 7-45 Disconnecting cables from the abort button

Step 2 Install a new abort button panel in the same way.

----End

7.13 Replacing an Extinguishant Start/Abort Button

Prerequisites

- Tool: insulated flat-head or Phillips screwdriver.
- Power off the ESS. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Model 55100-001

Step 1 Press the middle button, insert the key, and pull down to open the red enclosure.

NOTE

The key can be obtained from the button compartment.

Step 2 Take out the card, remove the screws, and disconnect the cables.

Step 3 Install the new extinguishant start button: Connect cables (torque: 0.25 N·m; tool: flat-head screwdriver), tighten the screws on the enclosure (torque: 1.2 N·m), insert the card, and install the enclosure.

Figure 7-46 Connecting cables

----End

Model SC2900-001

Step 1 Remove the sticker, insert the key, turn it leftward, and remove the enclosure.

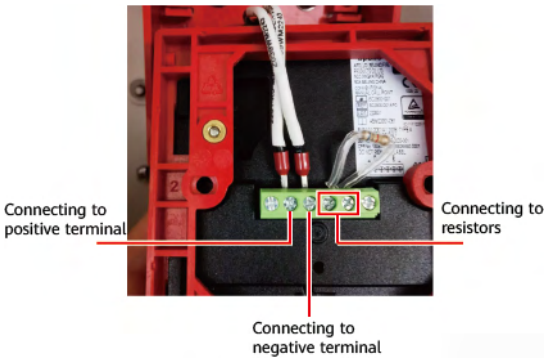
NOTE

The key can be obtained from the button compartment.

Step 2 Disconnect the cables.

Step 3 Install the new extinguishant start button: Connect cables (torque: 0.25 N·m; tool: Phillips screwdriver) and install the enclosure.

Figure 7-47 Connecting cables



----End

7.14 Replacing a Fire Alarm Horn/Strobe

Prerequisites

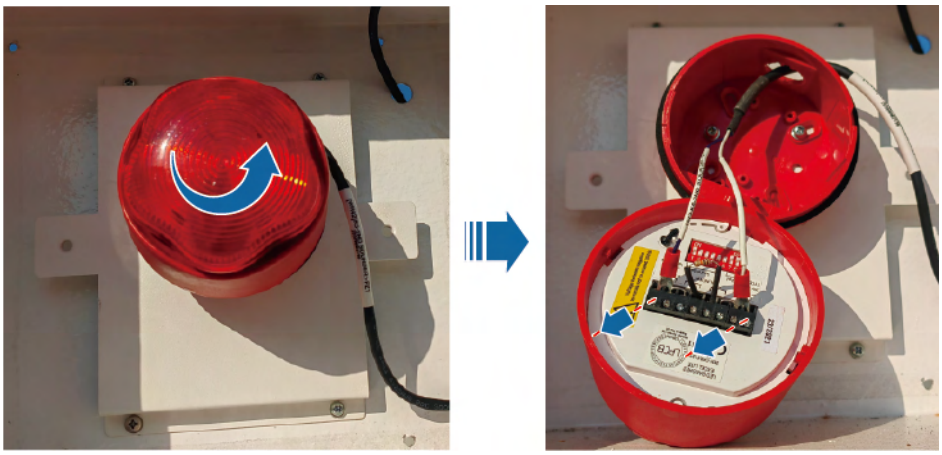
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Power off the extinguishant control panel.

Step 2 Remove the fire alarm horn/strobe from the base.

Figure 7-48 Removing the fire alarm horn/strobe



Step 3 Install a new fire alarm horn/strobe and secure it to the base.

----End

7.15 Replacing a Extinguishant Release Indicator

Prerequisites

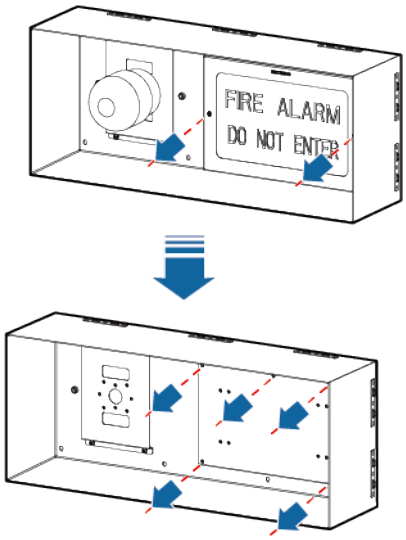
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Power off the extinguishant control panel.

Step 2 Disconnect the bus connection and structural installation with a screwdriver, and remove the faulty extinguishant release indicator.

Figure 7-49 Removing the extinguishant release indicator



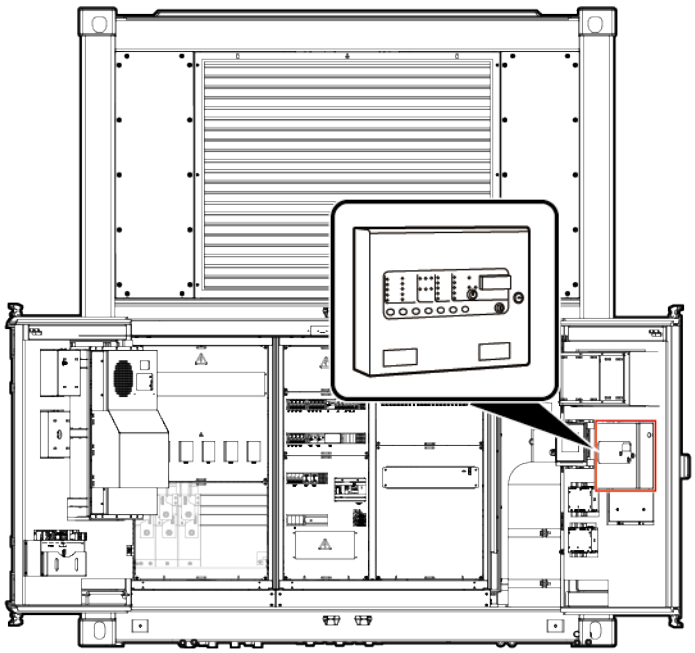
Step 3 Install a new extinguishant release indicator.

----End

7.16 Replacing an Extinguishant Control Panel (Model: K11031M2)

Prerequisites

Figure 7-50 Position of an extinguishant control panel



- Tool: flat-head or Phillips screwdriver
- Power-off:
  a. Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/ SmartPVMS and deliver a shutdown command to the Smart Rack Controller.
  b. Switch off all battery rack output circuit breakers in the battery cabin.
  c. Switch off all DC circuit breakers in the control unit cabin.
  d. Disconnect the AC main power supply and backup battery power supply of the extinguishant control panel.

Procedure

Step 1 Remove the cables between the extinguishant control panel and external components.

Step 2 Remove the extinguishant control panel using a screwdriver.

Step 3 Install a new extinguishant control panel, and connect cables between the main power supply, standby power supply, and external components according to the drawings.

Step 4 Set parameters for the extinguishant control panel.

1. (Optional) If **FU 1** is displayed on the screen, turn the key of Enable Access to the right, set the Write Enable switch to the right, and press Enter. Then, set the Write Enable switch to the left, and turn the key of Enable Access to the vertical position.
2. Turn the key of Enable Access to the right to unlock the extinguishant control panel. **Ad** is displayed on the screen.

3. Set the Write Enable switch to the right at the lower right corner of the extinguishant control panel to enter the commissioning mode. The screen displays letters and digits (for example, **U00**).

4. Press Mode (+10) on the keyboard until **C29** is displayed, press Enter, wait for 5 seconds, and then set the Write Enable switch to the left.

5. Set the Write Enable switch to the right to enter the commissioning mode. Press Mode (+10) on the keyboard until **C21** is displayed, press Enter, wait for 5 seconds, and then set the Write Enable switch to the left.

6. Set the Write Enable switch to the right to enter the commissioning mode. Press Mode (+10) on the keyboard until **C2A** is displayed, press Enter, wait for 5 seconds, and then set the Write Enable switch to the left.

7. Set the Write Enable switch to the right to enter the commissioning mode. Press Mode (+10) and Select (+1) on the keyboard until **C27** is displayed, press Enter, wait for 5 seconds, and then set the Write Enable switch to the left.

8. Check: Set the Write Enable switch to the right to enter the commissioning mode. Press Mode (+10) and Select (+1) on the keyboard until **C29**, **C21**, **C2A**, and **C27** are displayed. If there is a blinking dot on the lower right corner of the screen, the settings are successful.

9. Set the Write Enable switch to the left, and turn the key of Enable Access to the vertical position.

----End

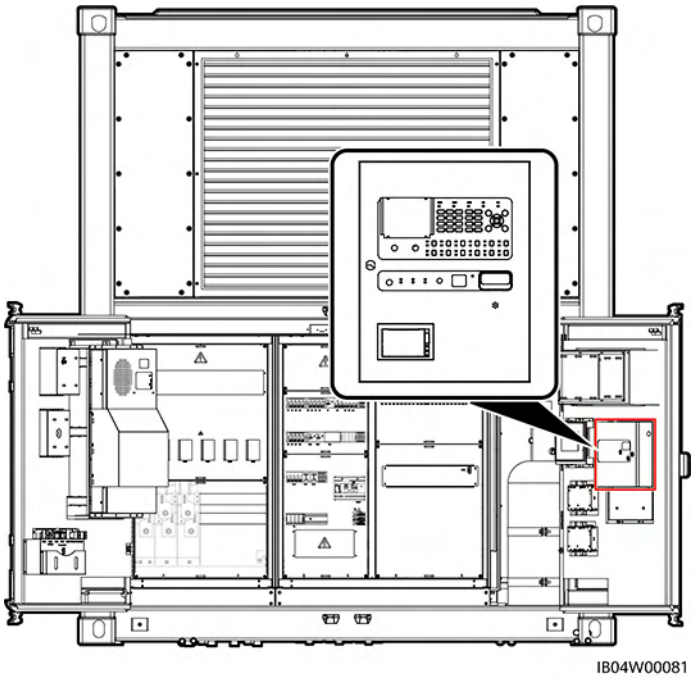
7.17 Replacing a Fuse for the Extinguishant Control Panel

NOTE

This section is applicable to a 40 L cabinet-type fire cylinder.

Prerequisites

Figure 7-51 Position of an extinguishant control panel



- Tools: heat gun and white adhesive
- Power-off:
  a. Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/ SmartPVMS and deliver a shutdown command to the Smart Rack Controller.
  b. Turn off all battery rack circuit breakers in battery cabins.
  c. Turn off all DC circuit breakers in the control unit cabin.
  d. Disconnect the active AC power supply and backup battery power supply of the extinguishant control panel.

Procedure

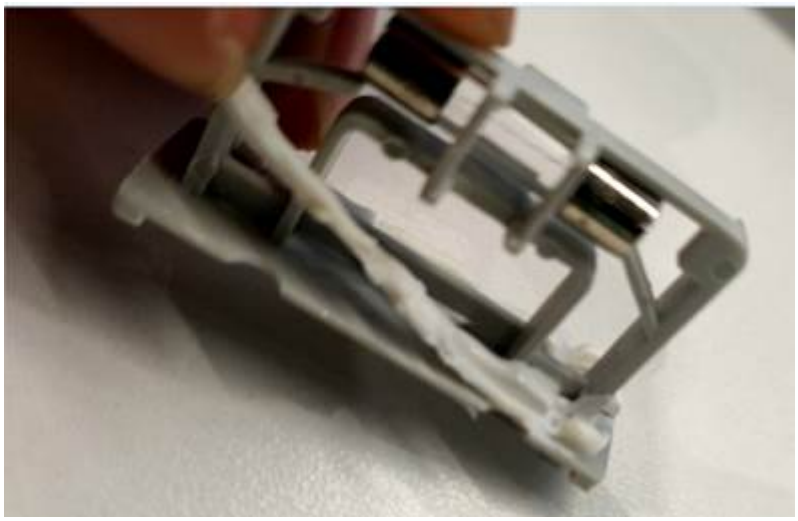
Step 1 Use a heat gun to blow the fuse box for about 20s.

Figure 7-52 Heat gun

Step 2 Take out the fuse box and replace the fuse.

Figure 7-53 Taking out the fuse box

Step 3 Remove the residual white adhesive from the fuse box.



Step 4 Apply white adhesive again.

NOTE

Recommended white adhesive model: TSE3854DS-W (Momentive) or LOCTITE 5699C (Loctite)

Figure 7-54 Applying white adhesive

Step 5 Install the fuse box.

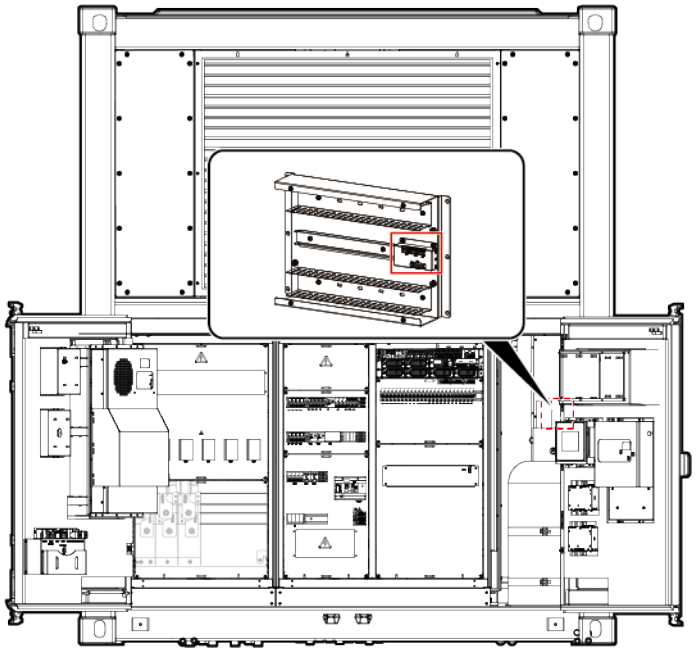
Figure 7-55 Installing the fuse box

----End

7.18 Replacing a Fire Signal Transfer Board

Prerequisites

Figure 7-56 Position of a fire signal transfer board



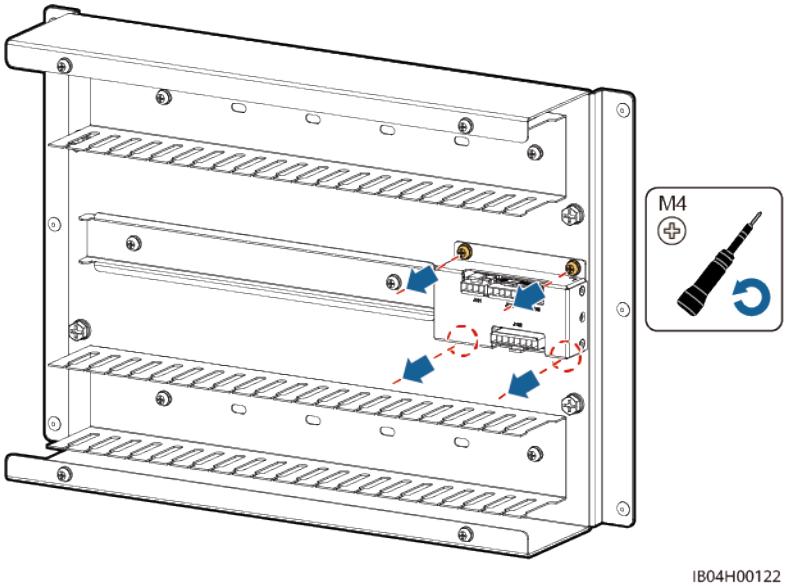
- Tool: Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.
- Applicable extinguishant control panel model: JB-QBL-QM210.

Procedure

Step 1 Remove cables from the fire signal transfer board.

Step 2 Remove the faulty fire signal transfer board.

Figure 7-57 Removing the fire signal transfer board



Step 3 Install a new fire signal transfer board in the cabinet. Use a M4 Phillips screwdriver with a torque of 1.2 N·m

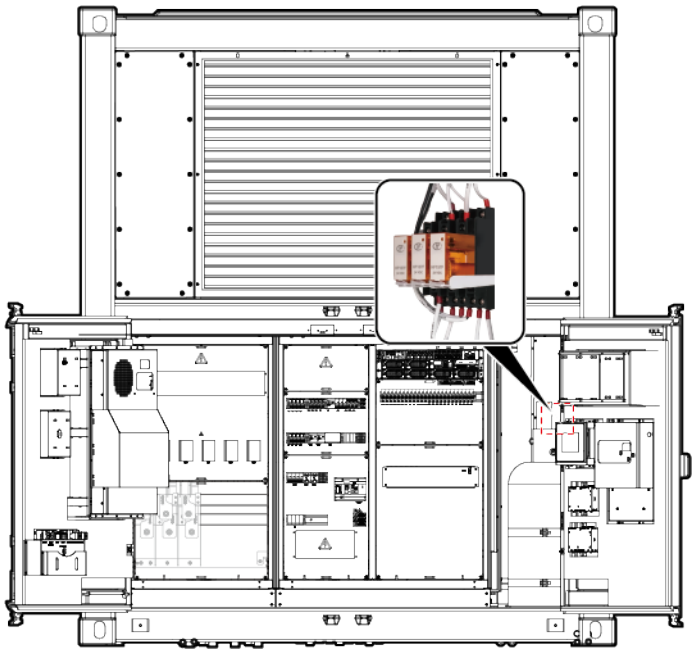
Step 4 Connect the cables.

----End

7.19 Replacing an Electromagnetic Relay

Prerequisites

Figure 7-58 Position of an electromagnetic relay



- Fault locating:
  a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.
  b. Refer to the alarm handling suggestions in the alarm list.
- Tool: flat-head or Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Remove the cover.

Step 2 Remove cables from the electromagnetic relay and label them.

Step 3 Remove the electromagnetic relay.

Step 4 Install a new electromagnetic relay.

Step 5 Connect the cables based on the labels.

Step 6 Reinstall the cover.

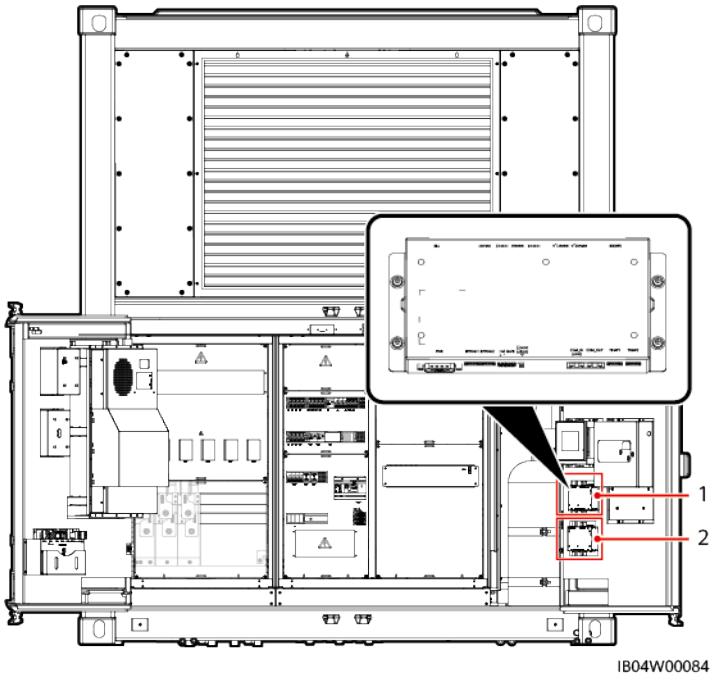
----End

7.20 Replacing an Exhaust Controller

Prerequisites

- Tool: Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Figure 7-59 Position of an exhaust controller (TCUE)



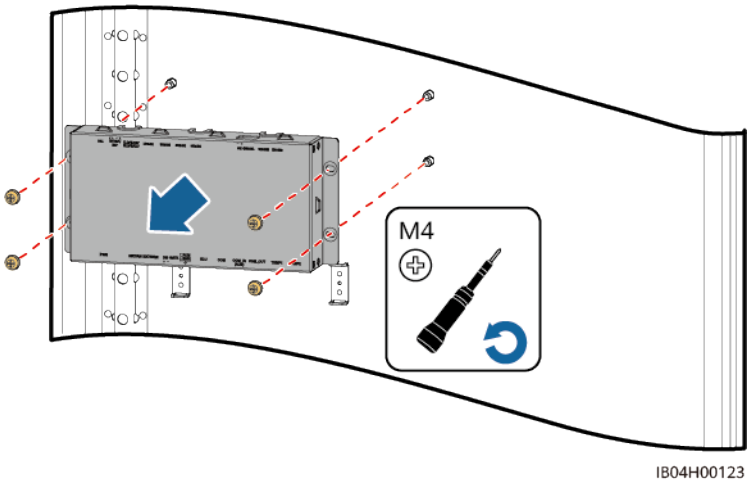
No.	Name on the SmartLogger WebUI	Component in the Electrical Diagram	DIP Switch Address
1	TCU-1	K6	37
2	TCU-2	K7	38

Procedure

Step 1 Record the cable connection positions on the TCUE, and disconnect the cables.

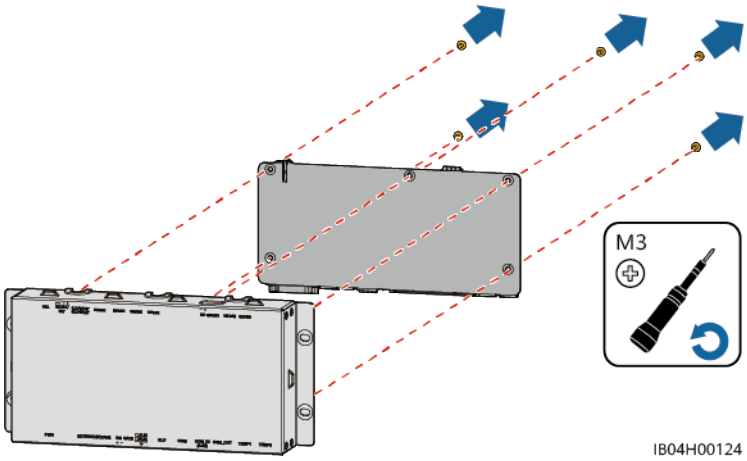
Step 2 Remove the TCUE.

Figure 7-60 Removing the TCUE



Step 3 Remove the faulty TCUE control board.

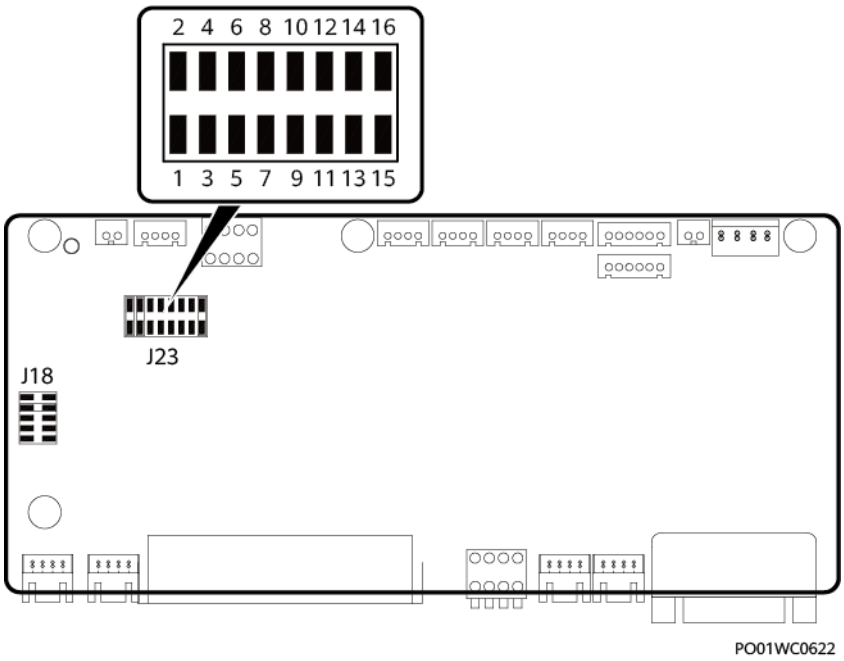
Figure 7-61 Removing the faulty TCUE control board



Step 4 Record the cable connection positions on the TCUE control board and disconnect the cables.

Step 5 Record the information about the jumper caps on the TCUE control board.

Figure 7-62 Position of the jumpers on the TCUE control board

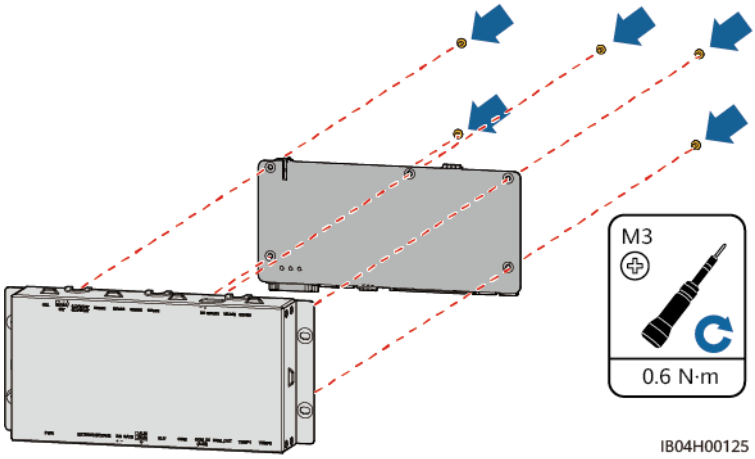


Step 6 Adjust the positions of the jumper caps on the new TCUE control board based on the recorded information.

Step 7 Connect cables to the new TCUE control board based on the recorded cable positions.

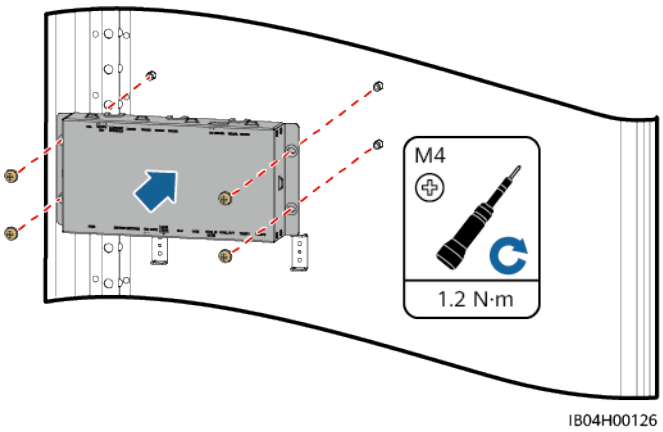
Step 8 Install the new TCUE control board in the TCUE.

Figure 7-63 Installing the new TCUE control board



Step 9 Reinstall the TCUE.

Figure 7-64 Reinstalling the TCUE



Step 10 Connect cables to the TCUE based on the recorded cable positions.

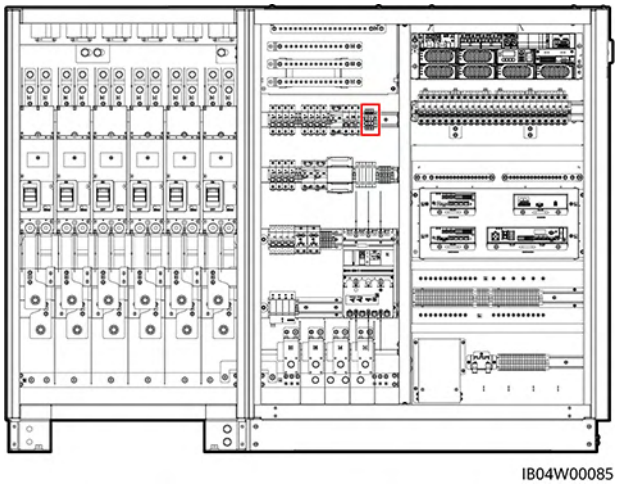
Step 11 Switch on the upstream power input circuit breaker for the TCUE.

----End

7.21 Replacing a Fuse Kit

Prerequisites

Figure 7-65 Position of a fuse kit



- Tools: protective gloves
- A new fuse kit of the same specifications is intact.
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

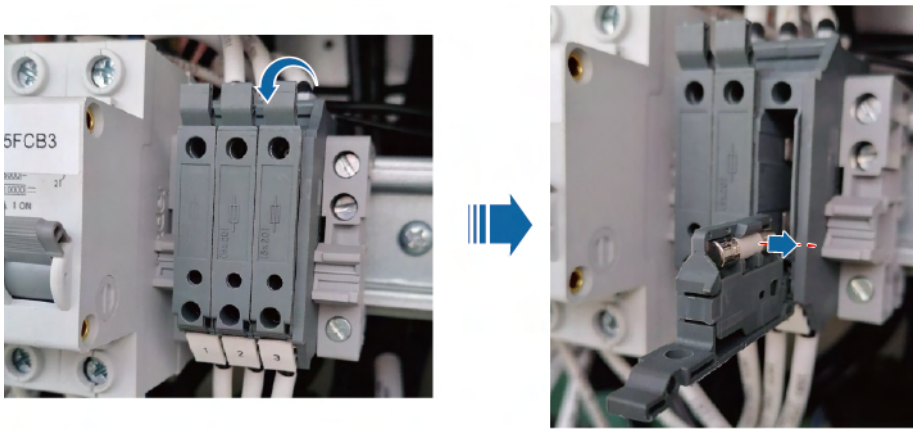
Procedure

Step 1 Put on protective gloves.

Step 2 Turn off the AC main switch.

Step 3 Open the cover of the terminal block and take out the fuse kit.

Figure 7-66 Taking out the fuse kit



Step 4 Install a new fuse kit and close the terminal block cover.

Step 5 Turn on the AC main switch.

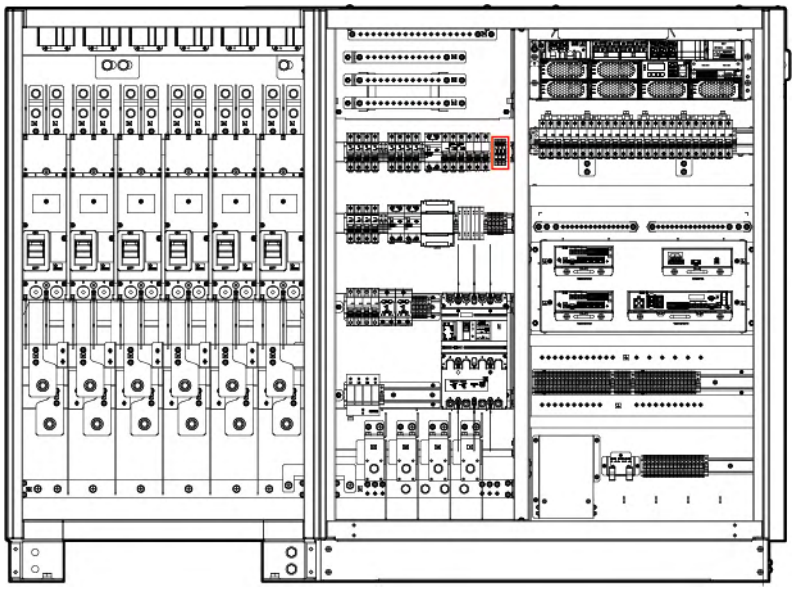
Step 6 Check the running status of the system and ensure that the functions are restored.

----End

7.22 Replacing a Terminal Block

Prerequisites

Figure 7-67 Position of a terminal block



DANGER

Before replacement, ensure that the auxiliary circuit is powered off.

- Prepare insulation tapes and other required tools.
- The new terminal block is intact and has the same specifications as the original one.
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

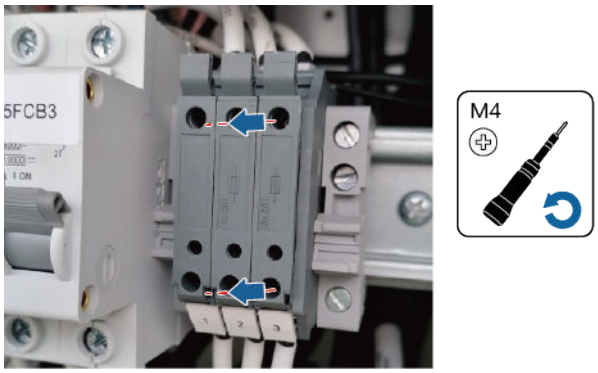
Procedure

Step 1 Loosen the screws and remove the cover from the front of the terminal block.

Step 2 Record the connection positions of the cables and signal cable terminals.

Step 3 Loosen the screw that secures the upper and lower ports of the terminal block with a Phillips screwdriver, and remove the cables and signal cable terminals. Wrap the cables and terminals with insulation tapes to prevent contact hazards.

Figure 7-68 Loosening the screws of the terminal block



Step 4 Remove the terminal block from the guide rails.

Step 5 Secure a new terminal block to the guide rails.

Step 6 Remove the insulation tapes from the cables and signal cable terminals. Connect the cables and signal cable terminals to the ports of the terminal block according to the recorded information and then tighten the screws.

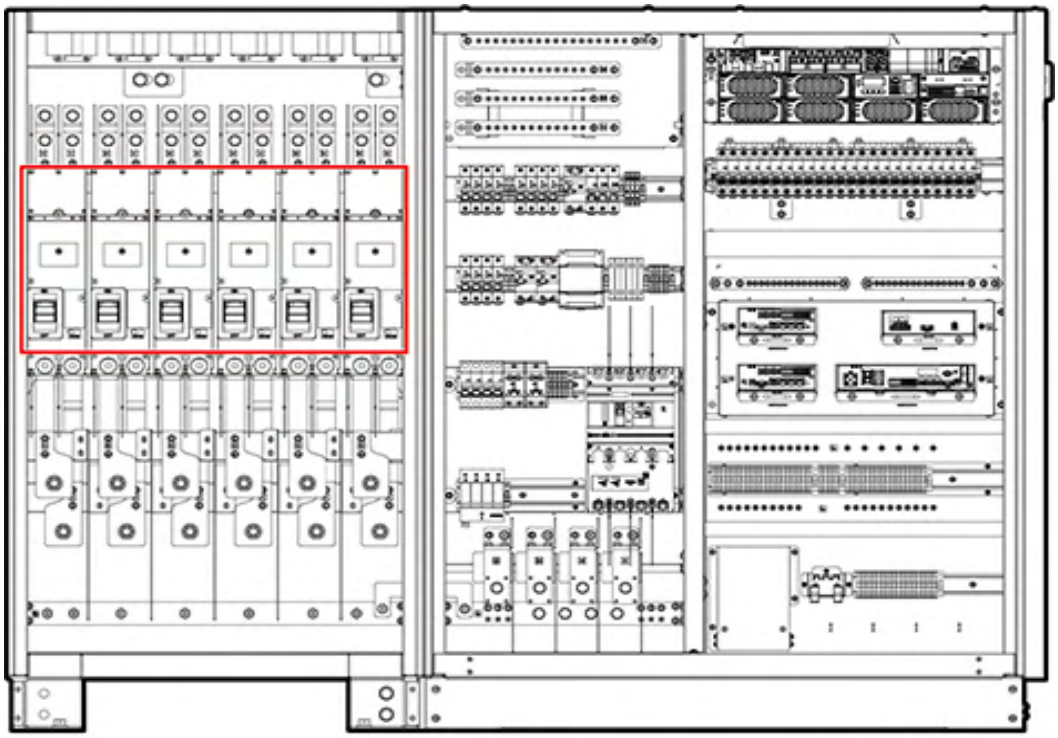
Step 7 Reinstall the cover and tighten the screws.

----End

7.23 Replacing a DC Circuit Breaker in the Control Unit Cabin

Prerequisites

Figure 7-69 Position of circuit breakers



- Fault locating:

Symptom	Possible Cause	Troubleshooting
A circuit breaker is faulty due to overcurrent or a short circuit.	1. The circuit breaker is in a position between ON and OFF. 2. The circuit breaker is faulty.	1. Set the circuit breaker to OFF and then to ON. 2. Replace the circuit breaker.

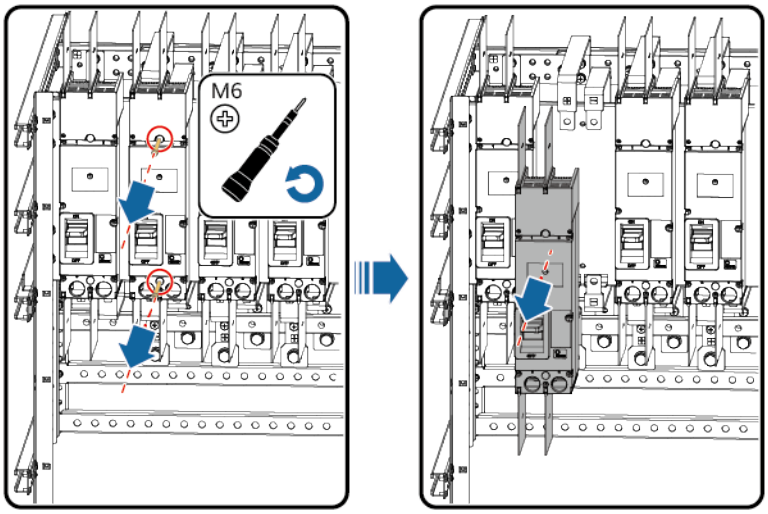
- Tool: flat-head or Phillips screwdriver
- Power off the DC LV Panel and the ESS. For details, see **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Remove cables from the circuit breaker and label them properly.

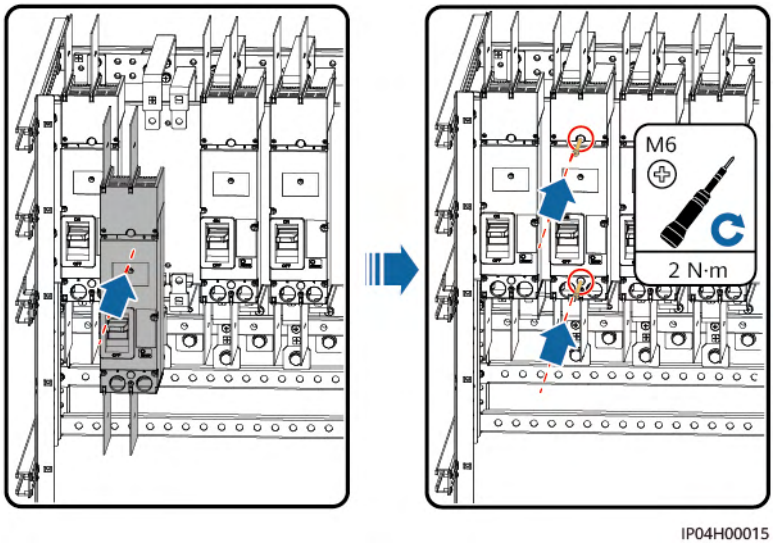
Step 2 Remove the faulty circuit breaker.

Figure 7-70 Removing the circuit breaker



Step 3 Install a new circuit breaker and reconnect the cables according to the labels.

Figure 7-71 Installing a new circuit breaker



----End

Follow-up Procedure

Step 1 Switch on all battery rack output circuit breakers in the battery cabin.

Step 2 Switch on all DC circuit breakers in the control unit cabin.

Step 3 Switch on the DC input switches of the ESS in the DC LV Panel.

Step 4 Check that the communication is normal and no related alarm is generated on the SmartLogger WebUI/CMU WebUI.

Step 5 Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/SmartPVMS and deliver a startup command to the Smart Rack Controller.

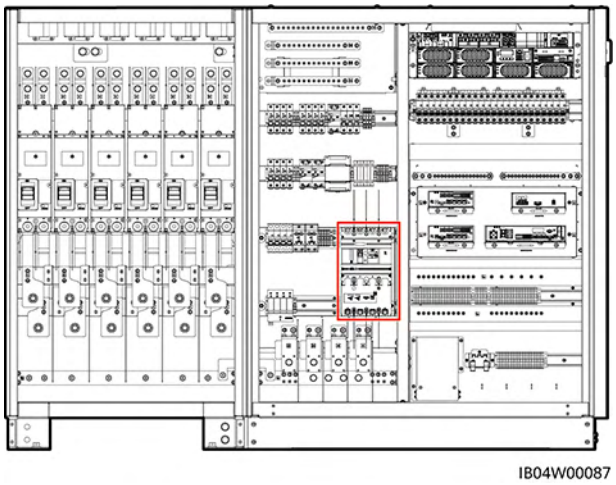
Step 6 Check the running status of the system and ensure that the functions are restored.

----End

7.24 Replacing an AC Main Switch

Prerequisites

Figure 7-72 Position of an AC main switch



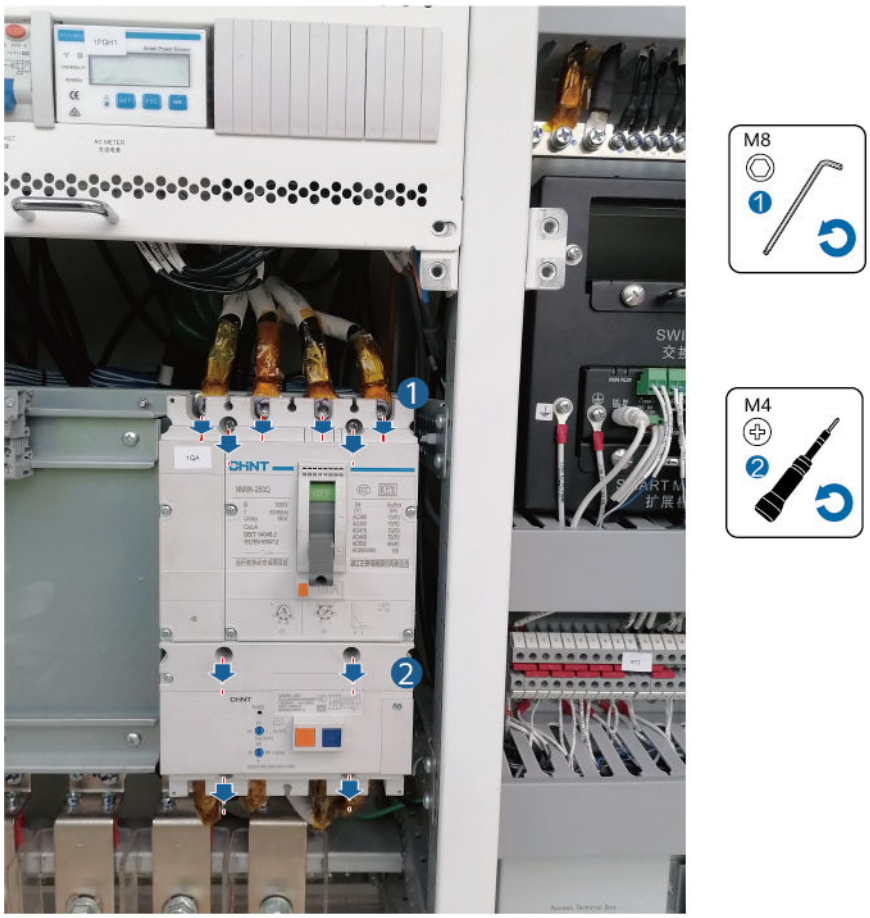
- Tool: flat-head or Phillips screwdriver
- Power off the ESS and the Distribution Transformer. For details, see **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Disconnect cables from the AC main switch and label them.

Step 2 Remove the faulty AC main switch.

Figure 7-73 Removing the AC main switch



Step 3 Install a new AC main switch.

Step 4 Connect the cables based on the labels.

----End

7.25 Replacing a Switch in the Control Unit Cabin

Prerequisites

DANGER

Before replacement, ensure that the auxiliary circuit is powered off.

- Tool: flat-head or Phillips screwdriver
- The new switch is intact and has the same specifications as the original one.

Procedure

Step 1 Loosen the screws and remove the cover from the front of the switch.

Step 2 Set the switch to be replaced to OFF.

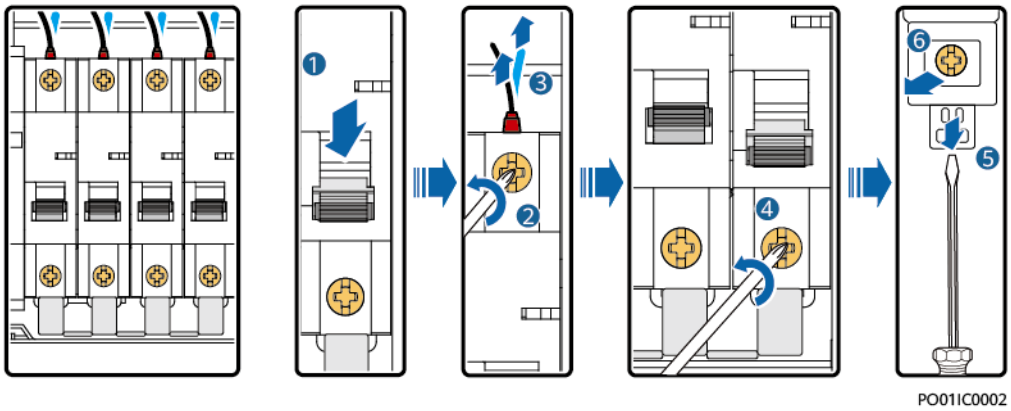
Step 3 Record the connection positions of the cables and signal cable terminals.

Step 4 Loosen the screw that secures the upper port of the switch with a Phillips screwdriver, and remove the cables and signal cable terminals. Wrap the cables and terminals with insulation tapes to prevent contact hazards.

Step 5 Loosen the screw that secures the lower port of the switch with a Phillips screwdriver, and loosen the buckle at the switch base with an insulated flat-head screwdriver.

Step 6 Remove the switch from guide rails.

Figure 7-74 Removing the switch



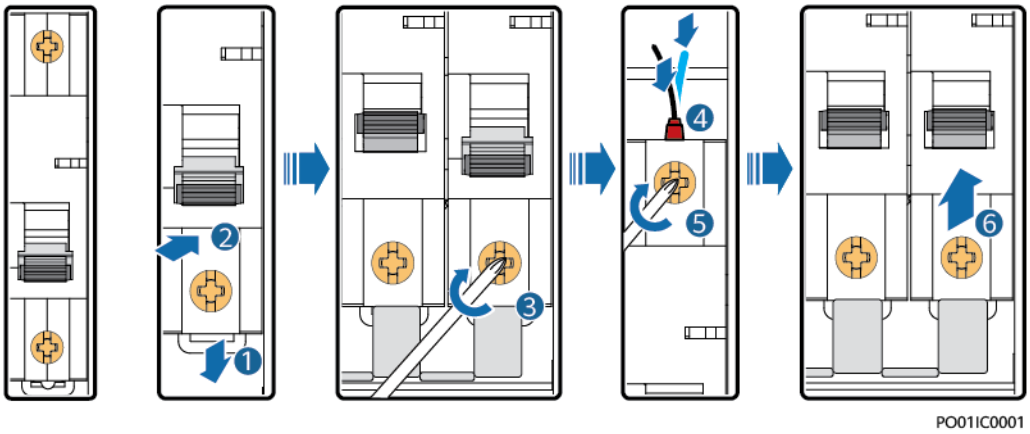
Step 7 Set the new switch to OFF. Press the buckle at the switch base with an insulated flat-head screwdriver and install the new switch. Then loosen the buckle and secure the switch to the guide rails.

Step 8 Tighten the screw that secures the lower port of the switch.

Step 9 Remove the insulation tapes from the cables and signal cable terminals. Connect the cables and signal cable terminals to the upper port of the switch according to the recorded information and then tighten the screws.

Step 10 Set the switch to ON.

Figure 7-75 Installing the switch



Step 11 Reinstall the cover and tighten the screws.

----End

7.26 Replacing a Light

Prerequisites

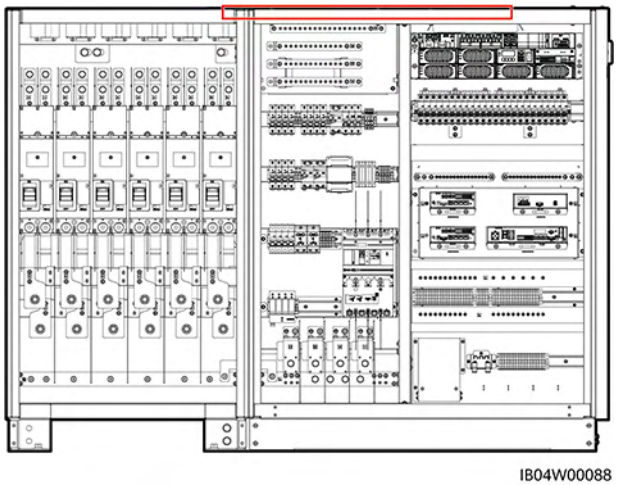
- Fault locating:
  - If a light does not work properly but the cables to the light are intact, the light is damaged and needs to be replaced.
  - If multiple adjacent lights do not work, the first light next to a working light is damaged.
- Power-off: Turn off the AC switch for the lighting system in the control unit cabin of the ESS.

  NOTE

  The LED light replacement involves opening the battery cabin and shutting down the power loop of the system. Therefore, you are advised to replace the LED light when the system is in standby or shut down mode.

Procedure

Figure 7-76 Position of a light



Step 1 Remove the faulty light.

CAUTION

During replacement, do not touch the ends of the light with bare hands. Otherwise, electric shock may occur.

Step 2 Install a new light in the original position.

----End

Follow-up Procedure

Step 1 Turn on the AC switch for the lighting system in the control unit cabin of the ESS.

Step 2 Check whether the lighting function is restored.

----End

7.27 Replacing a Water Sensor

Prerequisites

Figure 7-77 Position of a water sensor (in the control unit cabin)

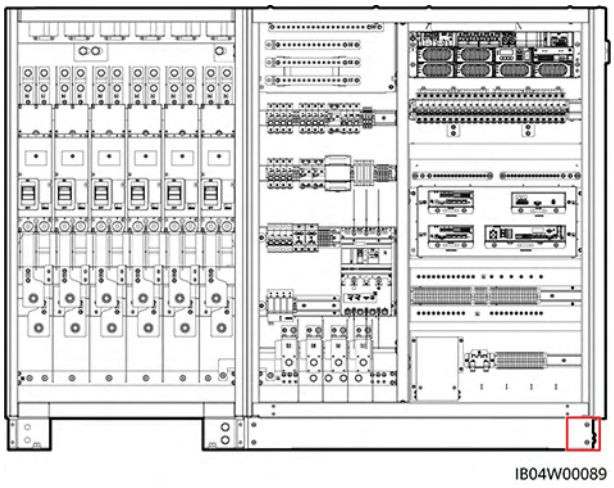
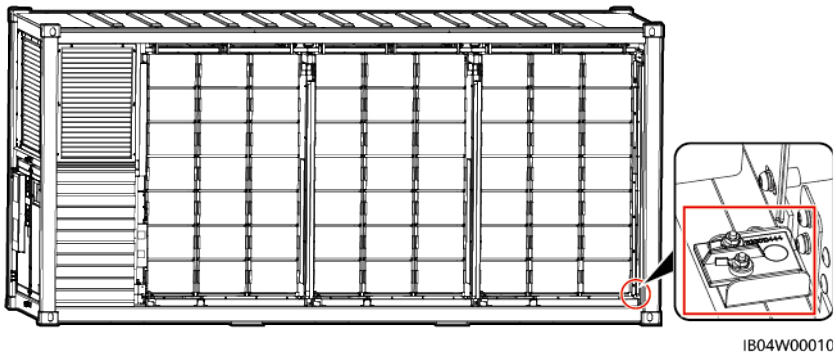


Figure 7-78 Position of a water sensor (in the battery cabin)



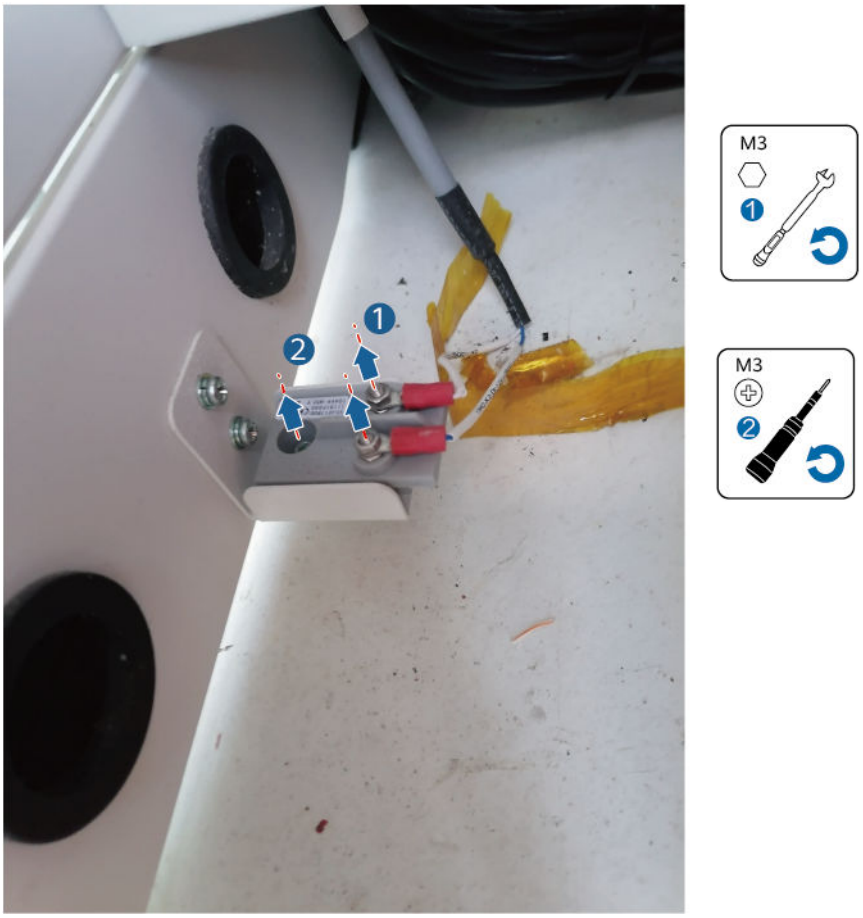
- Tools: flat-head or Phillips screwdriver and torque wrench

Procedure

Step 1 Remove cables from the water sensor.

Step 2 Remove the faulty water sensor.

Figure 7-79 Removing the water sensor



Step 3 Install a new water sensor.

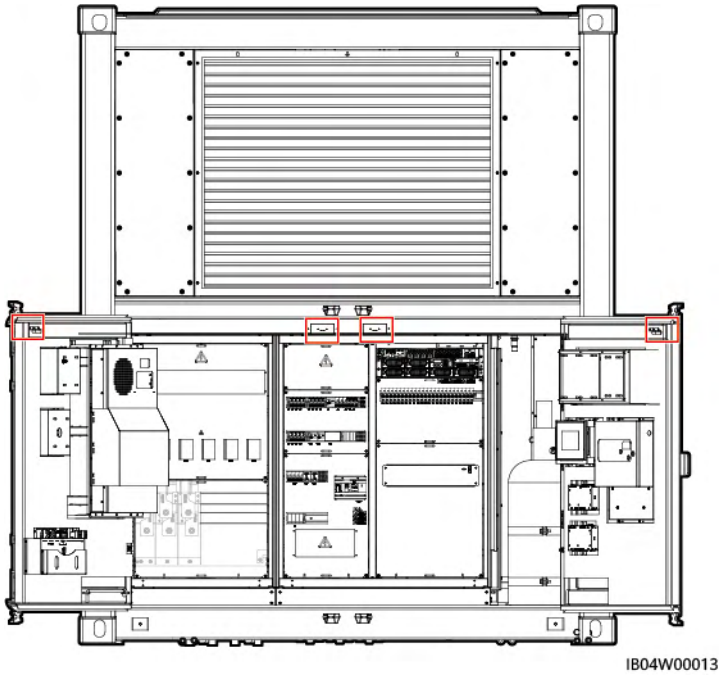
Step 4 Connect the cables.

----End

7.28 Replacing a Door Status Sensor

Prerequisites

Figure 7-80 Positions of door status sensors



- The new door status sensor is intact.
- Tool: flat-head or Phillips screwdriver

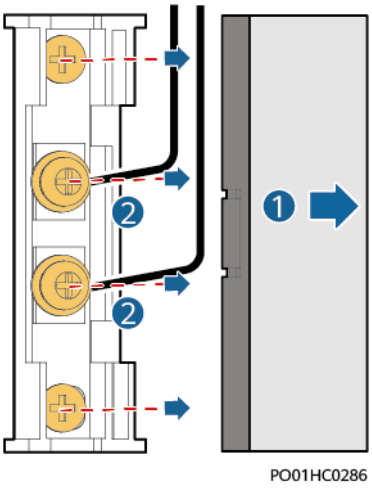
Procedure

Step 1 Remove the enclosure of the door status sensor.

Step 2 Unscrew and remove the alarm cables and mark the connection position.

Step 3 Unscrew and remove the door status sensor.

Figure 7-81 Removing the door status sensor



Step 4 Remove the enclosure of the new sensor, and then remove the screws from the alarm cables.

Step 5 Place the door status sensor to the installation position and tighten the screws.

Step 6 Connect the alarm cables in sequence and tighten the screws.

Step 7 Reinstall the enclosure of the door status sensor.

----End

Follow-up Procedure

Check that the door status alarm is cleared.

7.29 Replacing a Maintenance Socket

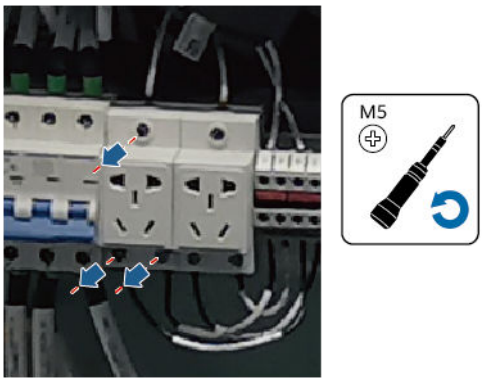
Prerequisites

- Tool: flat-head or Phillips screwdriver
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

Procedure

Step 1 Remove cables from the maintenance socket.

Figure 7-82 Removing cables



Step 2 Remove the faulty maintenance socket.

Step 3 Install a new maintenance socket.

Step 4 Connect the cables. M5 Phillips screwdriver with a torque of 2 N·m.

----End

7.30 Replacing the 227M38UFAA/SPS020-MS-032B-EN Fire Cylinder

Step 1 Insert the safety pin in the fire cylinder solenoid valve to prevent extinguishant release due to misoperations.

Step 2 Rotate the solenoid valve counterclockwise to remove it.

Figure 7-83 Removing the solenoid valve

Step 3 Loosen the fire extinguishing high-pressure hose by rotating it counterclockwise using a pipe wrench.

Figure 7-84 Loosening the fire extinguishing high-pressure hose

Step 4 Loosen the hose clamp that secures the fire cylinder using a screwdriver.

Figure 7-85 Loosening the hose clamp

Step 5 Remove the fire cylinder.

Step 6 Install a new fire cylinder, secure it with the hose clamp, tighten the fire extinguishing hose clockwise, install the solenoid valve, and remove the safety pin.

----End

8 Replacing Devices in the Smart Rack Controller Cabin

8.1 Replacing Devices for the Smart Rack Controller

8.1.1 Replacing an External Fan of the Smart Rack Controller

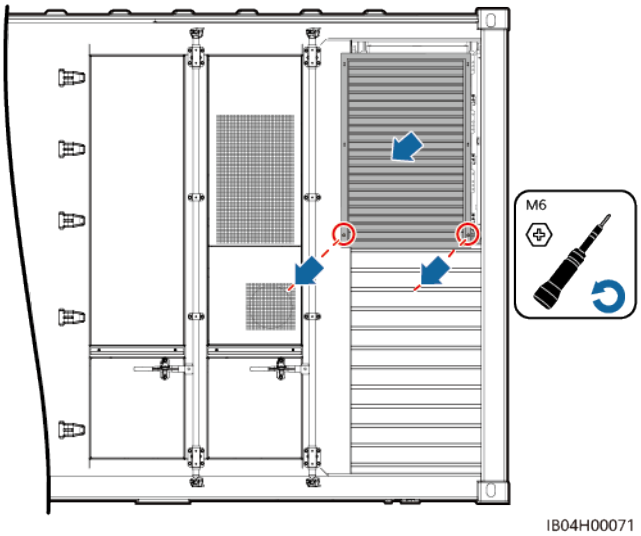
Prerequisites

- Fault locating:
  a. Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/ SmartPVMS and view alarm information. The Smart Rack Controller external fan alarm is generated.
  b. Rectify the fault according to the handling suggestions in the alarm list.
- Tools: Phillips screwdriver and torx screwdriver
- Power-off:
  a. Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/ SmartPVMS and deliver a shutdown command to the Smart Rack Controller.
  b. Switch off all battery rack output circuit breakers in the battery cabin.
  c. Switch off all DC circuit breakers in the control unit cabin.
  d. Switch off the DC auxiliary power circuit breaker of the Smart Rack Controller in the control unit cabin.

Procedure

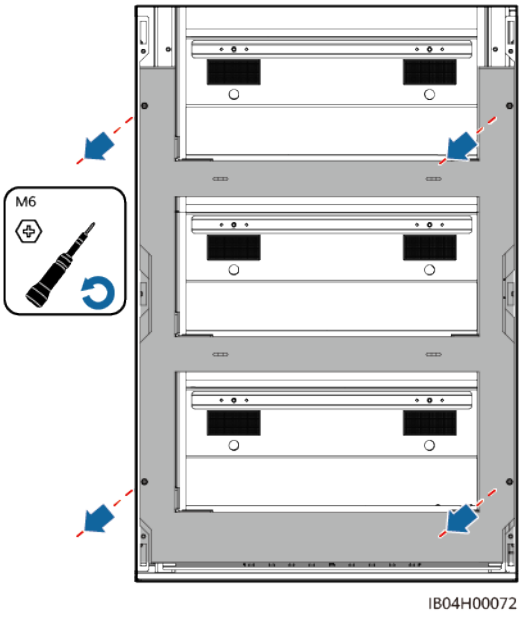
Step 1 Remove the Smart Rack Controller cabin louver.

Figure 8-1 Removing the Smart Rack Controller cabin louver



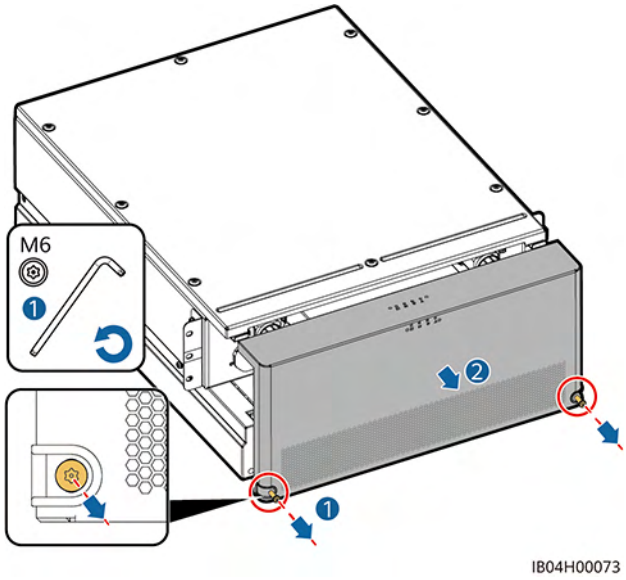
Step 2 Remove the air baffle.

Figure 8-2 Removing the air baffle



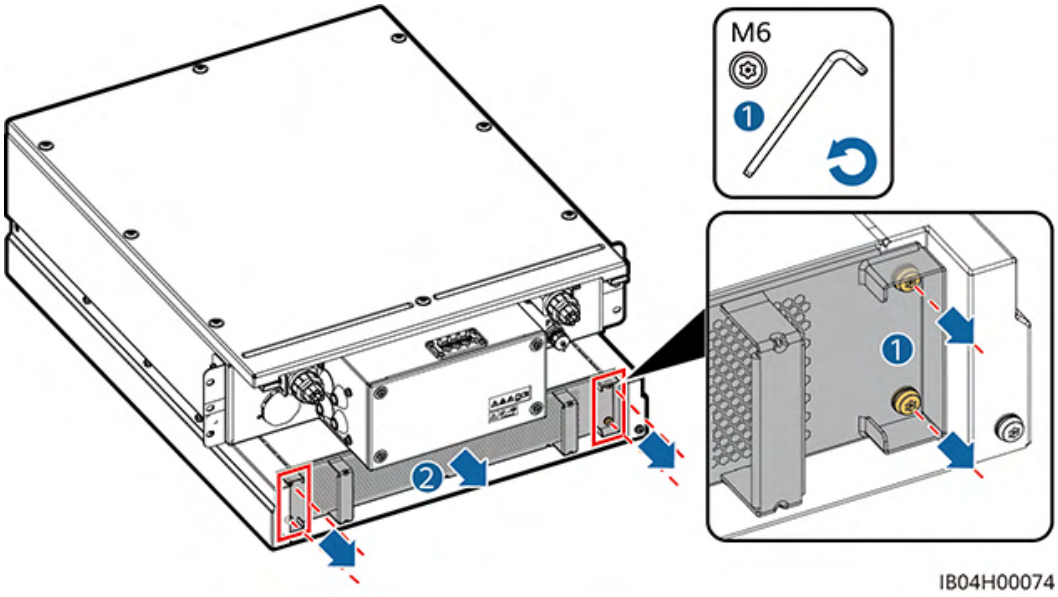
Step 3 Remove the decorative cover from the Smart Rack Controller.

Figure 8-3 Removing the decorative cover



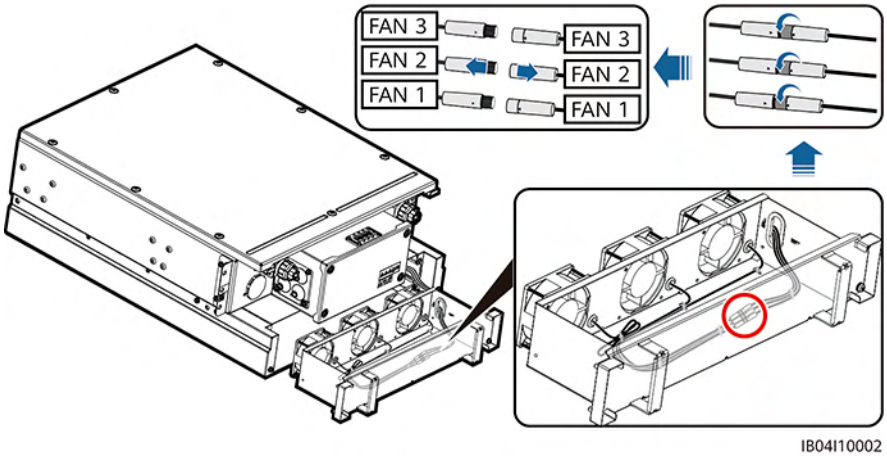
Step 4 Remove screws from the fan tray, and then pull it out.

Figure 8-4 Pulling out the fan tray



Step 5 Remove the cable ties around the cables, unscrew the connectors, and disconnect the cables.

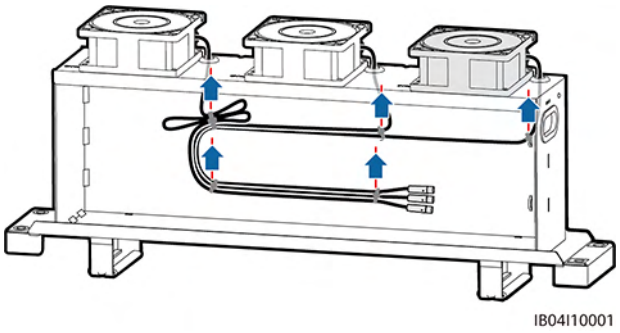
Figure 8-5 Disconnecting cables



Step 6 Remove cable ties from the faulty fan.

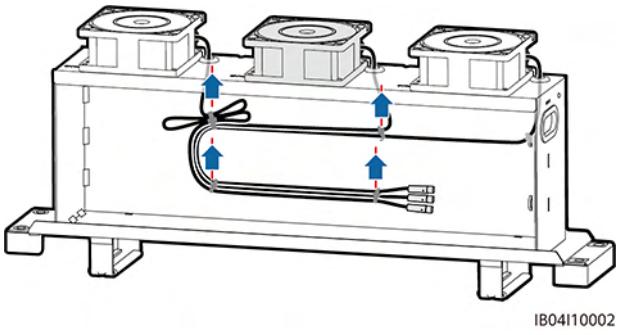
- Fan 1 is faulty.

  Figure 8-6 Removing the fan 1 cable ties

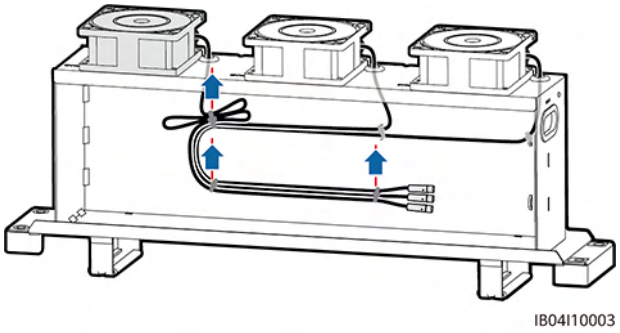
- Fan 2 is faulty.

  Figure 8-7 Removing the fan 2 cable ties

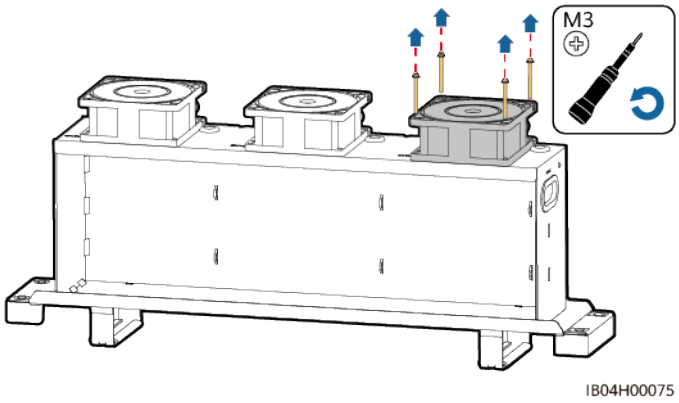
- Fan 3 is faulty.

Figure 8-8 Removing the fan 3 cable ties



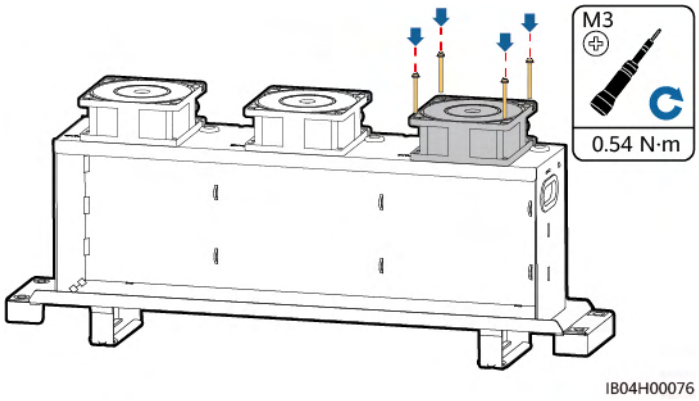
Step 7 Remove the faulty fan (fan 1 is used as an example).

Figure 8-9 Removing the fan



Step 8 Install a new fan (fan 1 is used as an example).

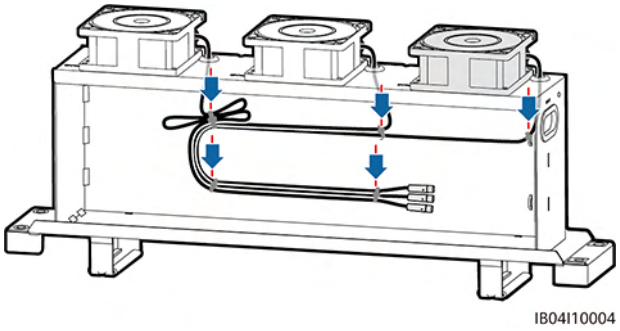
Figure 8-10 Installing the fan



Step 9 Bind the fan cables.

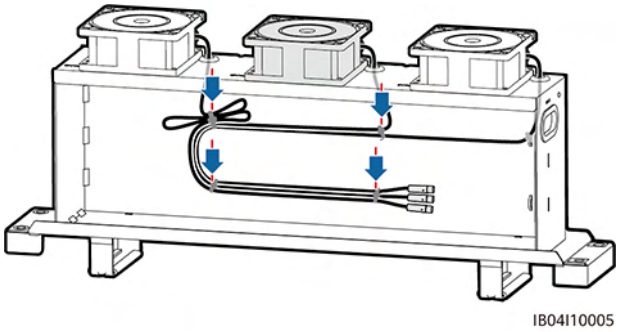
- Binding positions for fan 1

Figure 8-11 Binding the fan 1 cables



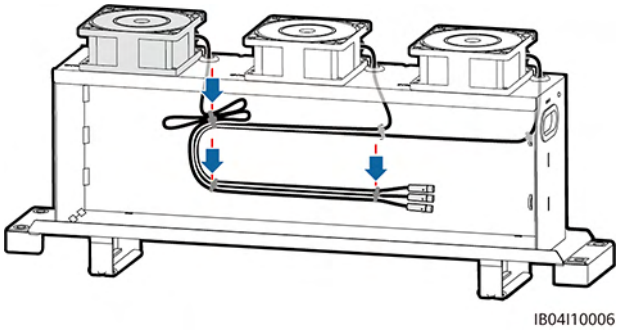
- Binding positions for fan 2

Figure 8-12 Binding the fan 2 cables



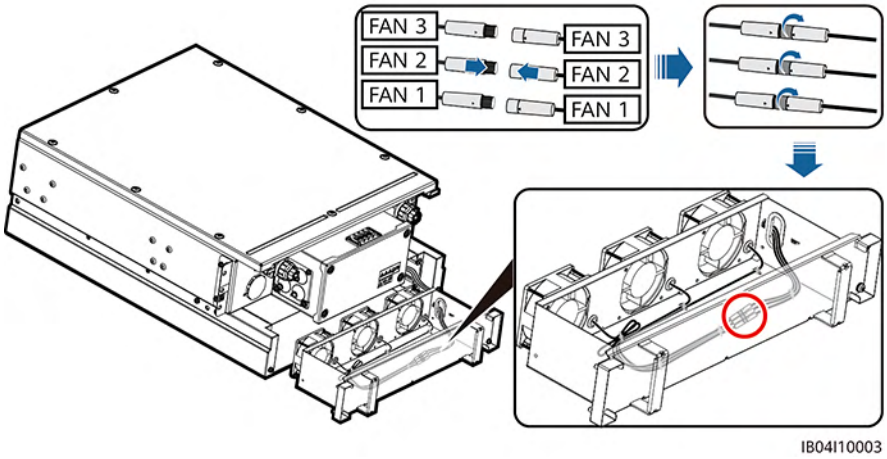
- Binding positions for fan 3

Figure 8-13 Binding the fan 3 cables



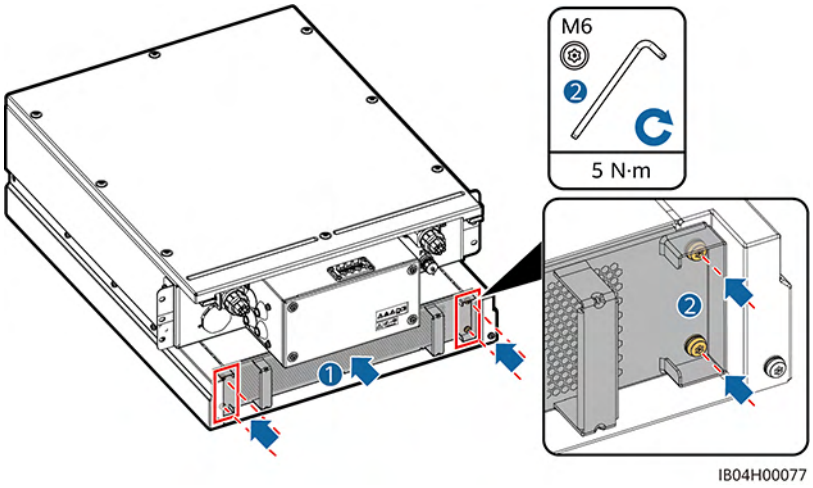
Step 10 Connect the cables correctly according to the cable labels and bind the cables.

Figure 8-14 Binding cables



Step 11 Push the fan tray into the slot and tighten the screws.

Figure 8-15 Reinstalling the fan tray



----End

Follow-up Procedure

Step 1 Switch on the DC auxiliary power circuit breaker of the Smart Rack Controller in the control unit cabin.

Step 2 Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/SmartPVMS and deliver a startup command to the Smart Rack Controller.

Step 3 Check whether the alarm is cleared.

Step 4 Switch on all battery rack output circuit breakers in the battery cabin.

Step 5 Switch on all DC circuit breakers in the control unit cabin.

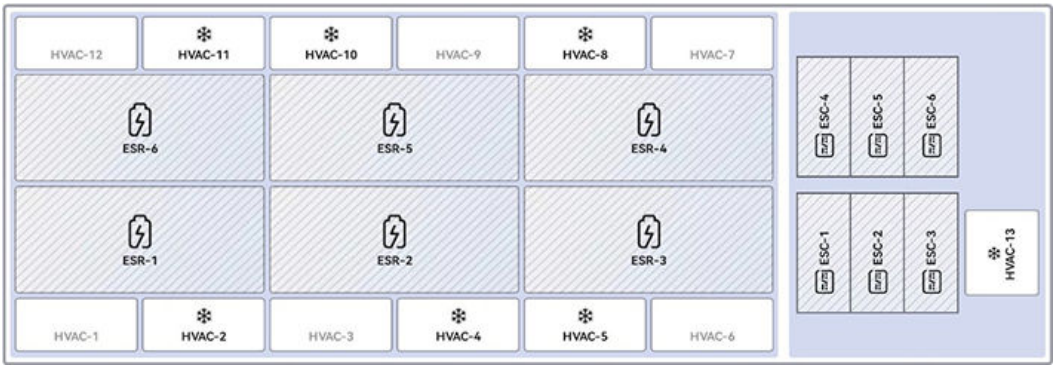
Step 6 Check the running status of the Smart Rack Controller and check whether it functions properly.

----End

8.1.2 Replacing a Smart Rack Controller (Using a Truss-based Kit)

Prerequisites

Figure 8-16 Positions of Smart Rack Controllers



- Fault locating:
  a. Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/ SmartPVMS to view alarm information.
  b. Open the louver of the Smart Rack Controller and check whether any indicator is red.

Table 8-1 LED indicators

Indicator	Status	Definition
LED1 Input Indication	Blinking red fast LED4 red	Environment-related fault on the input side of the Smart Rack Controller
	Steady green	Battery side powered on
	Blinking green slowly	Standby (topology detection)
	Off	Battery side not powered on
LED2 Output Indication	Blinking red fast LED4 red	Fault on the output side of the Smart Rack Controller
	Steady green	Normal charge and discharge
	Blinking green slowly	Standby/Shutdown
	Off	No power on the output side
LED3 Communication indication	Blinking green fast	Normal communication between the BCU and the CMU
	Off	-

Indicator	Status	Definition
LED4 Fault/Maintenance indication	Steady red	Alarm (Major)
	Blinking red fast	Alarm (Warning)
	Blinking red slowly	Alarm (Minor)
	Blinking green slowly	Commanded shutdown
	Off	No alarm is generated, and no local maintenance operations are performed.
If the input and output indicators blink red fast, replace parts or the entire device.		

- Tools: ladder, flat-head screwdriver, torx screwdriver, torque wrench, adjustable wrench, open-end wrench, engineering installation kit, safety gloves, safety shoes, safety helmet, and safety rope

  NOTE

  - At least two ladders are required.
  - The personnel, tools, and environment must meet relevant safety requirements.
- The ESS has been powered off. For details, see the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

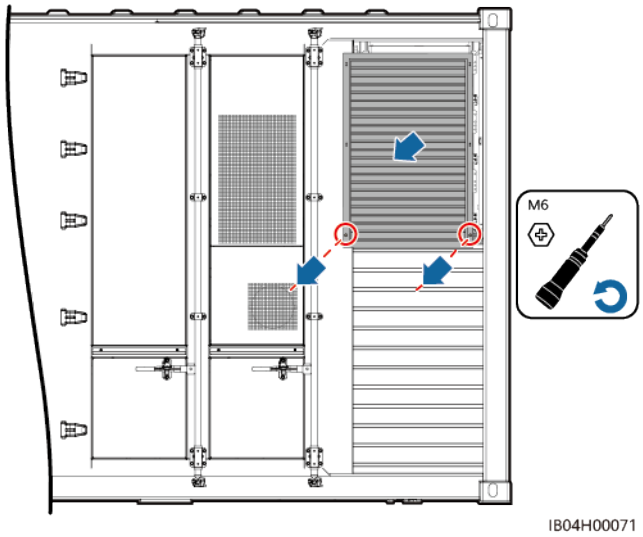
Removing the Faulty Smart Rack Controller

WARNING

After the ESS is powered off, the rack controllers remain energized and hot, which may cause electric shocks or burns. Therefore, wait for 15 minutes after the ESS is powered off. Wear protective gloves and then operate the rack controllers.

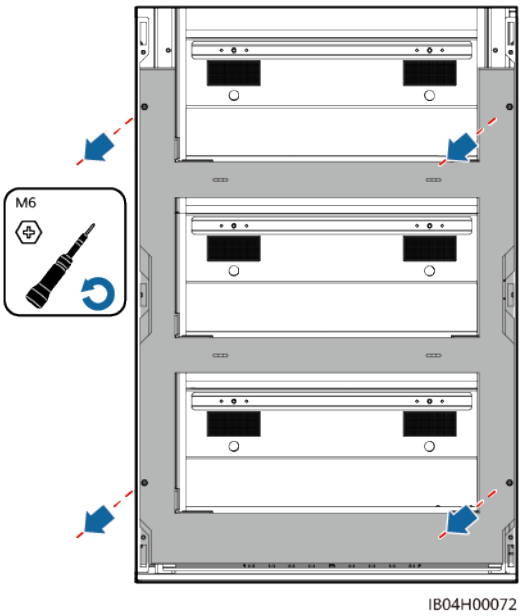
Step 1 Remove the Smart Rack Controller cabin louver.

Figure 8-17 Removing the Smart Rack Controller cabin louver



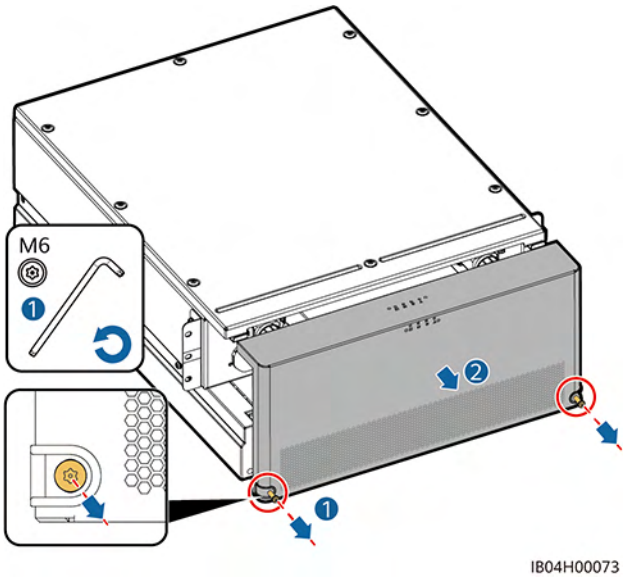
Step 2 Remove the air baffle.

Figure 8-18 Removing the air baffle



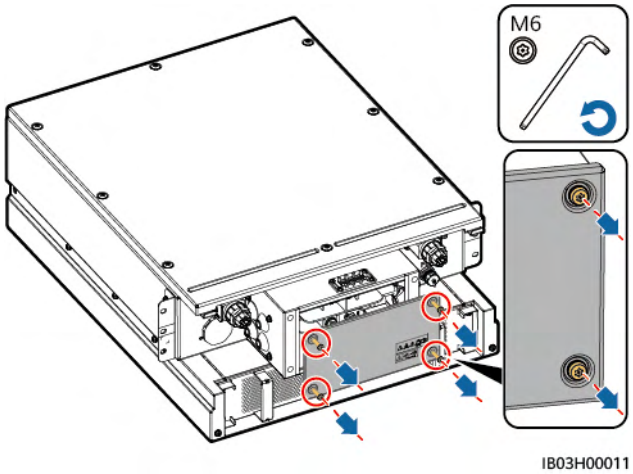
Step 3 Remove the decorative cover from the Smart Rack Controller.

Figure 8-19 Removing the decorative cover



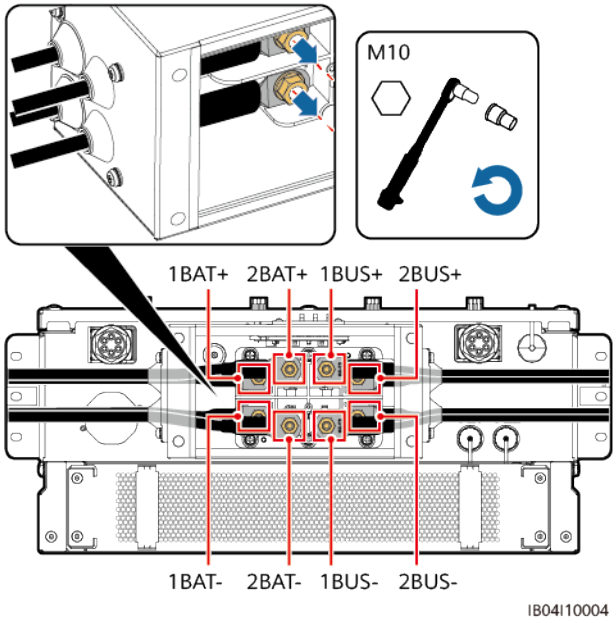
Step 4 Remove the maintenance compartment cover of the Smart Rack Controller.

Figure 8-20 Removing the maintenance compartment cover



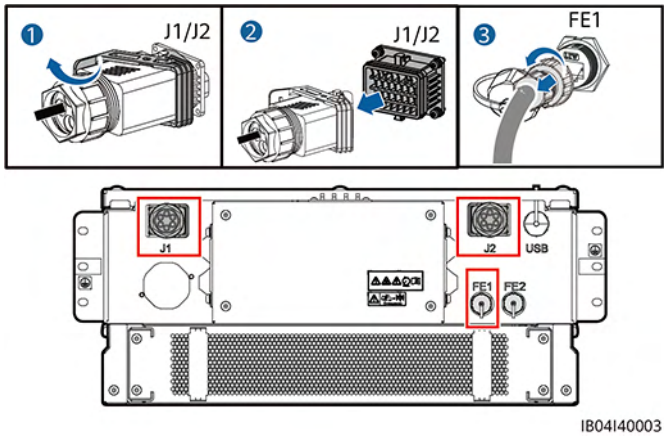
Step 5 Remove cables from the BAT/BUS terminals, and then wrap the exposed terminals.

Figure 8-21 Removing the BAT/BUS terminal cables



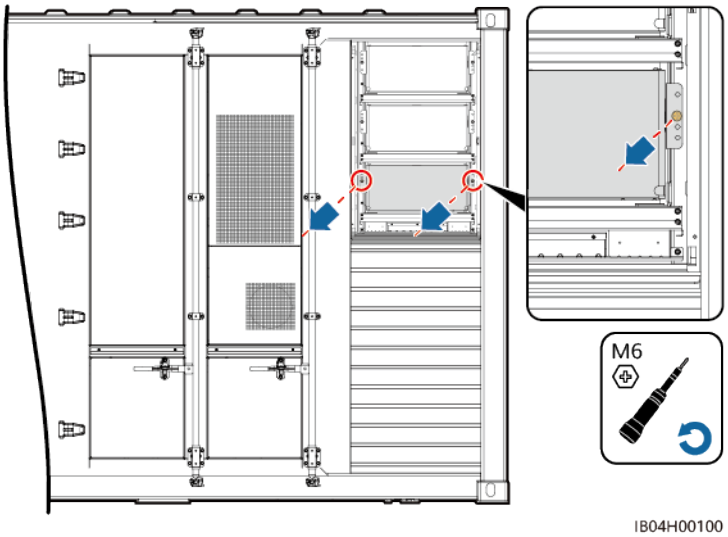
Step 6 Remove the J1 and J2 terminals, and the FE network cable.

Figure 8-22 Removing the J1 and J2 terminals, and the FE network cable



Step 7 Remove the ground screws on both sides of the Smart Rack Controller.

Figure 8-23 Removing the ground screws



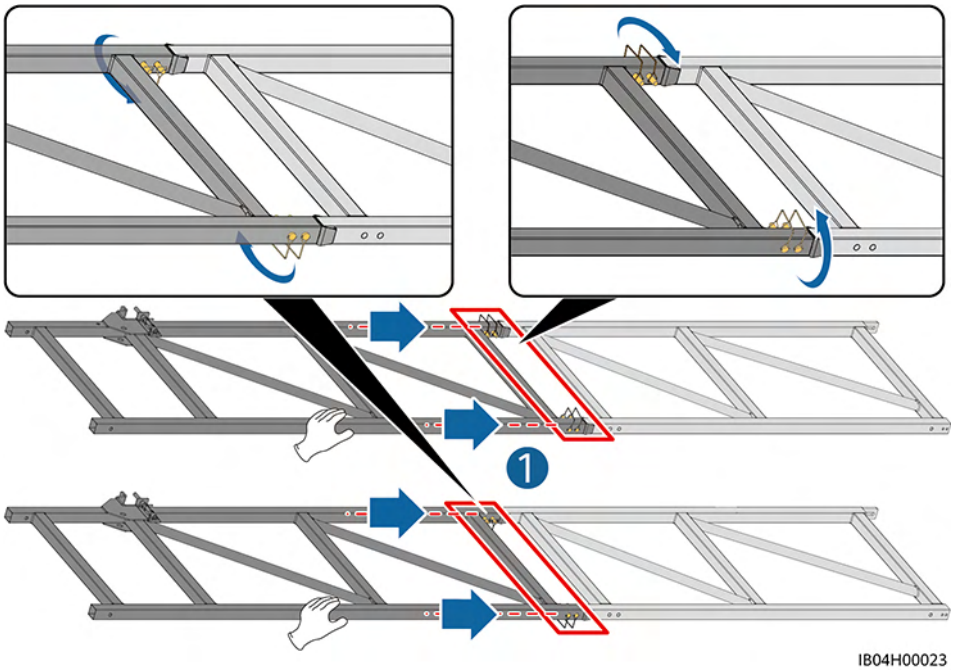
Step 8 Secure the engineering installation kit.

1. Place the trusses horizontally and assemble the upper and lower trusses together on the ground.

NOTICE

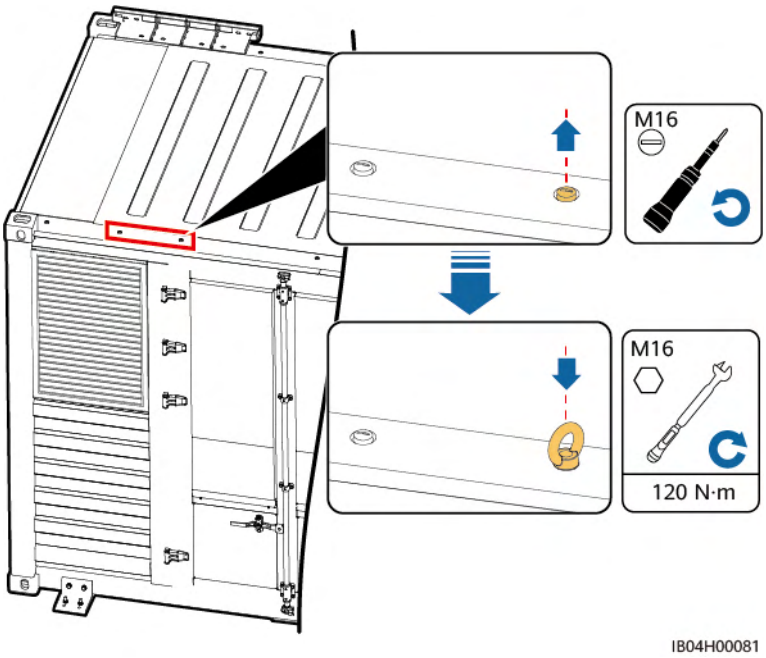
Ensure that the diagonal beams of the upper and lower trusses are in the same direction, and that the steel rope of the hasp pin is on the outer side.

Figure 8-24 Assembling trusses



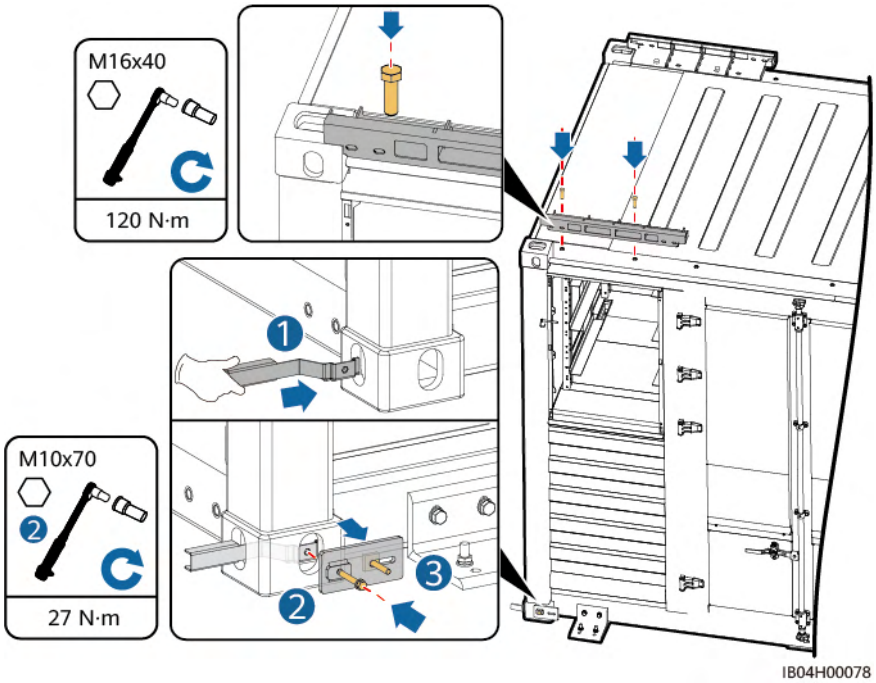
2. Remove the hole plug from the screw hole on the top of the ESS and install a lifting eye.

Figure 8-25 Installing a lifting eye



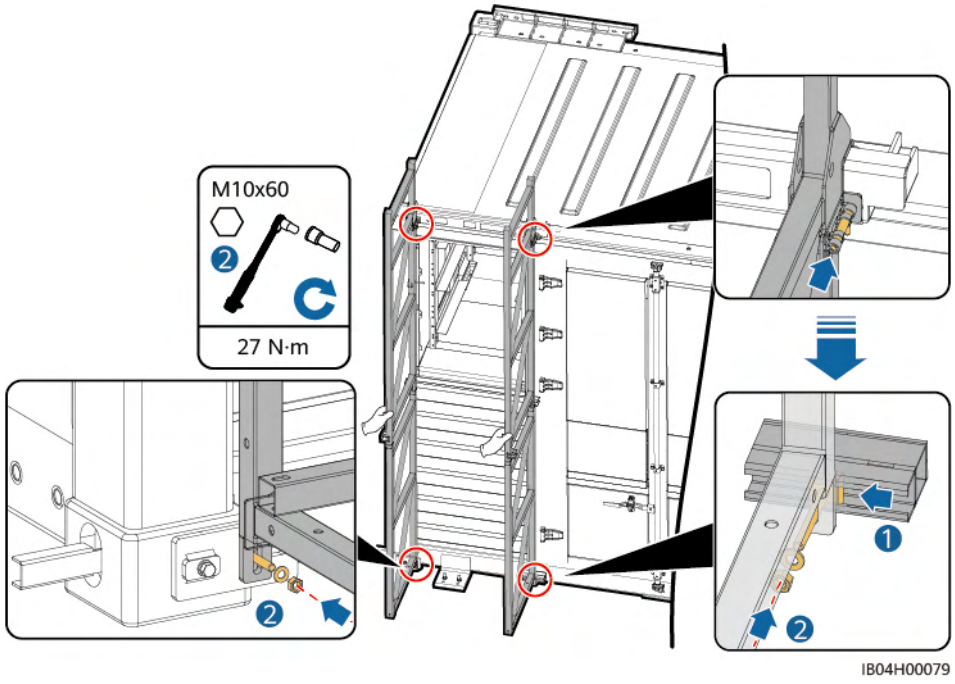
3. The operator wears a safety rope that is secured to the lifting eye on the top of the ESS container.
4. Install a short beam.

Figure 8-26 Installing a short beam



5. Install trusses.

Figure 8-27 Installing trusses

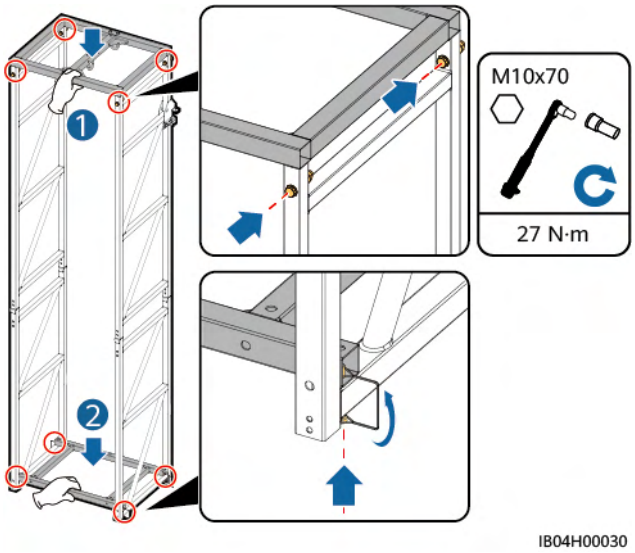


6. Install the top and bottom supports.

NOTICE

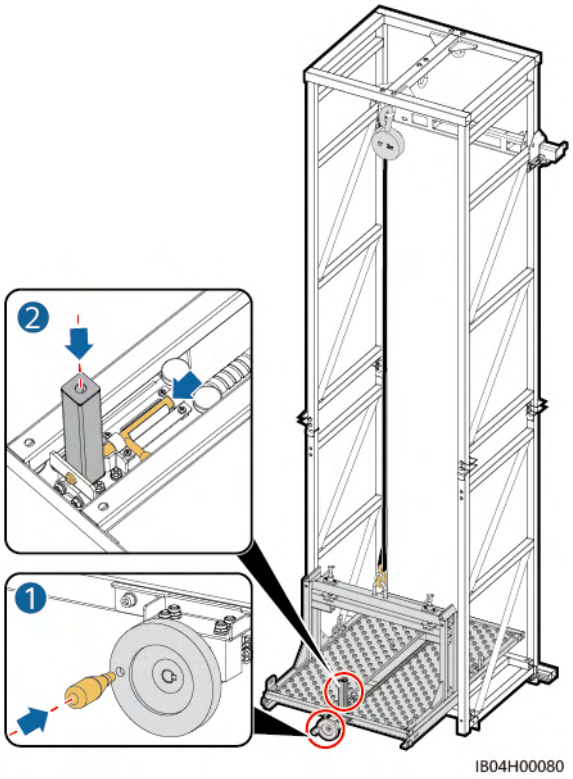
Install the top support and then the bottom support. Prevent objects from falling off during the installation.

Figure 8-28 Installing supports



7. Install the chain hoist and tray.

Figure 8-29 Installing the chain hoist and tray



NOTE

When replacing the Smart Rack Controller, hang the chain hoist to the hook on the outer side.

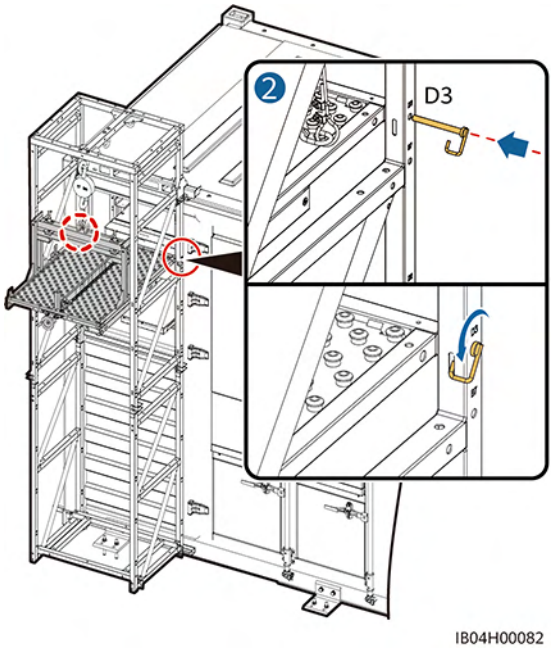
Step 9 Pull the chain hoist to the top and then lower it to the bottom. Ensure that the tray is secured and that the trusses are not loose or tilted.

Step 10 Raise the tray to the height of the Smart Rack Controller and secure the tray (a Smart Rack Controller on the third layer is used as an example).

Table 8-2 Tray securing hole silkscreen

Smart Rack Controller Location (From Bottom to Top)	Tray Securing Hole Silkscreen
Layer 1	D1
Layer 2	D2
Layer 3	D3

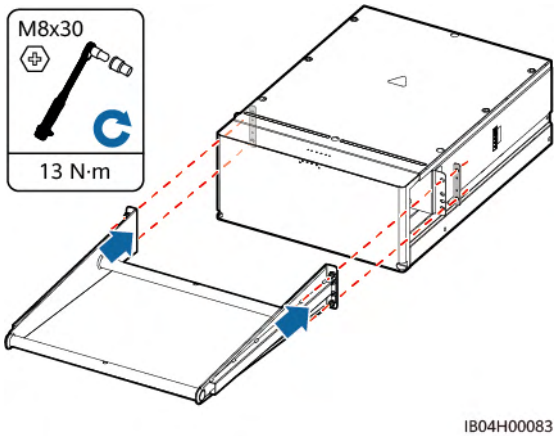
Figure 8-30 Securing the tray



Step 11 Pull the chain hoist to ensure that the chains are tight.

Step 12 Adjust the height of the tray through the chain hoist, pull the Smart Rack Controller half way out, and install an operating handle.

Figure 8-31 Installing an operating handle



Step 13 Pull out the Smart Rack Controller onto the tray.

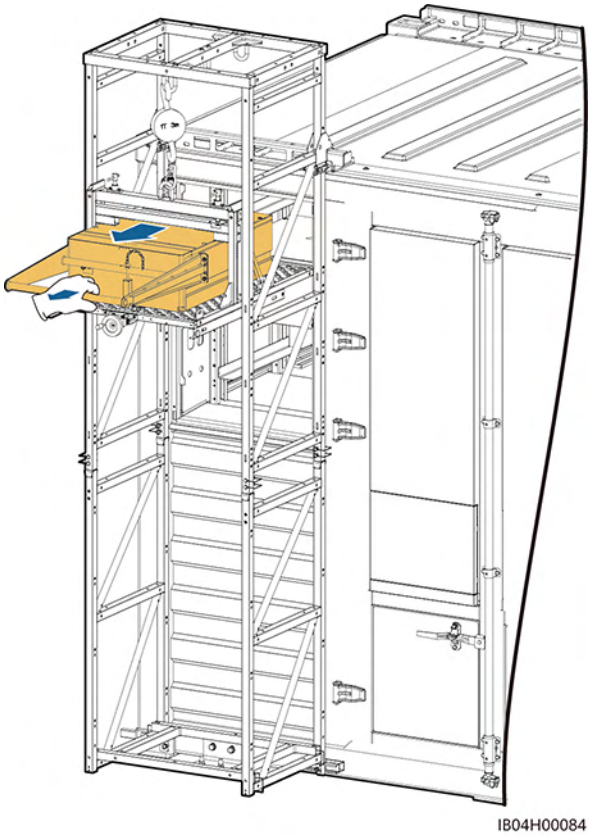
WARNING

- Do not remove the screws from the tray. Do not pull out the device when the tray is not secured.
- Do not stand under the tray.
- Do not put your head, hands, feet, or other body parts under the tray.
- If the device cannot be pulled out, contact technical support. Do not pull it out forcibly.

CAUTION

- When working at heights, the ladder must be held by personnel to prevent it from falling over. For details, see the requirements for working at heights.
- Do not climb on trusses.

Figure 8-32 Pulling out the Smart Rack Controller



Step 14 Insert the bolt, tightly press the Smart Rack Controller with the rod, and install the binding strap and protective ropes.

Figure 8-33 Securing the Smart Rack Controller

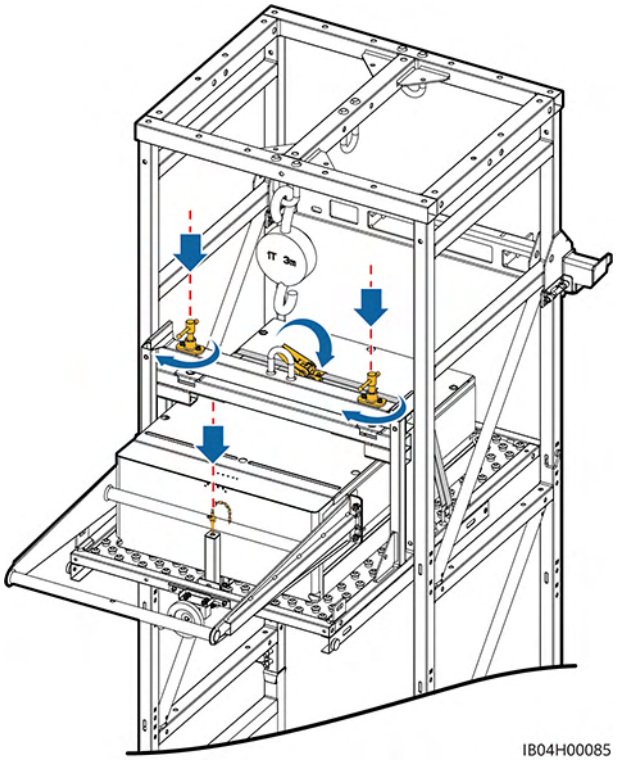
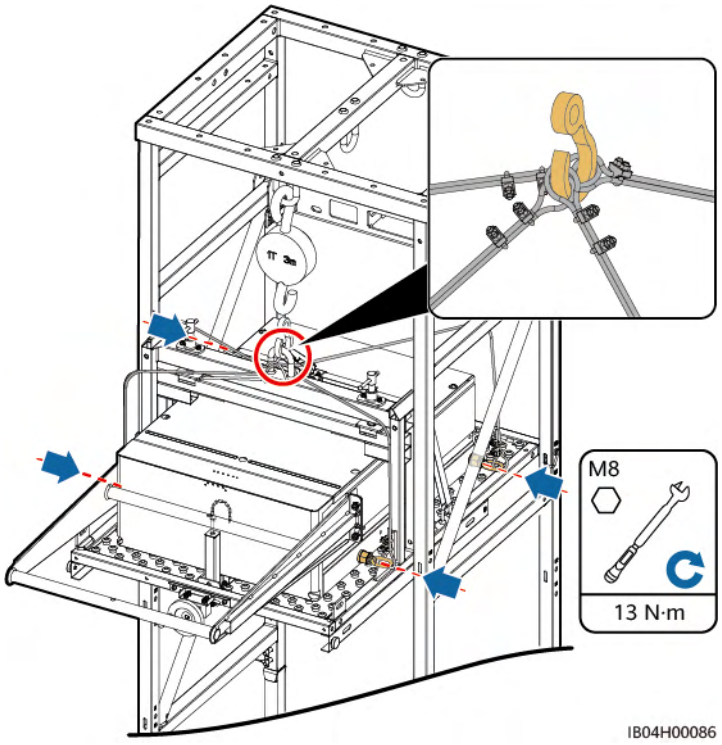
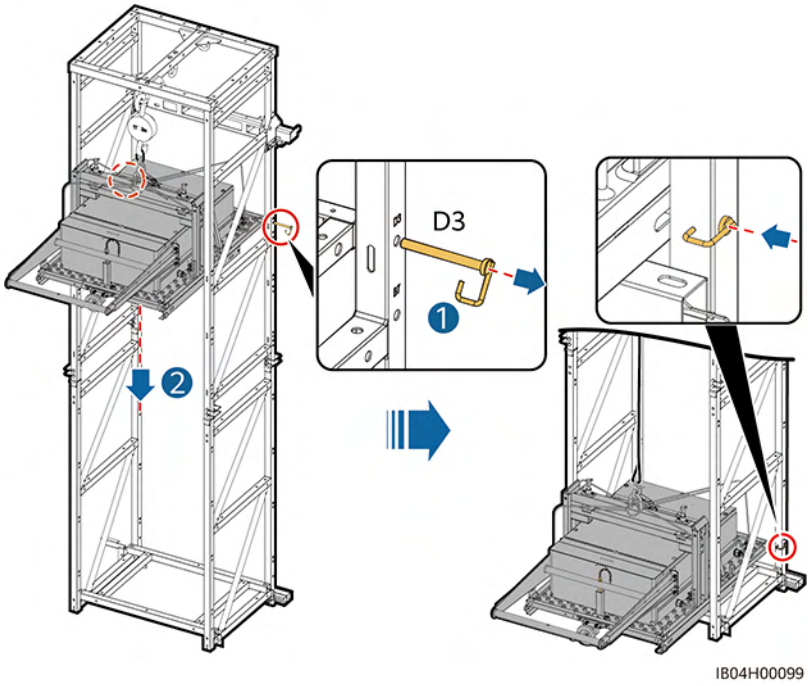


Figure 8-34 Installing protective ropes



Step 15 Remove the bolt from the tray and lower the Smart Rack Controller with the chain hoist.

Figure 8-35 Lowering the Smart Rack Controller



WARNING

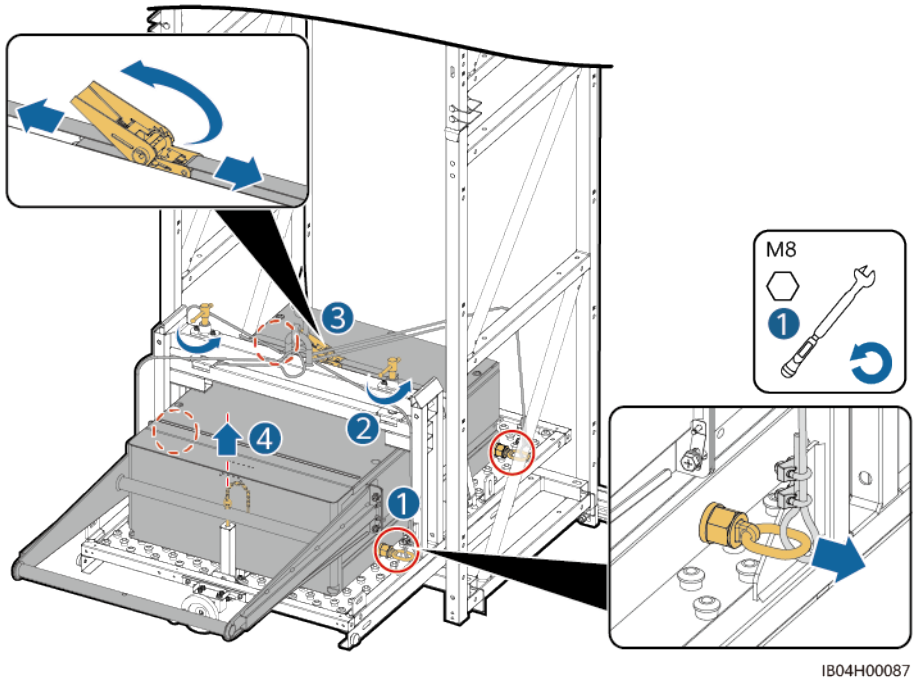
- When lowering the tray, do not stand under the tray.
- Do not pull the tray if the tray shakes when its screws are removed.

NOTE

If the chain hoist is stuck during lifting, pull back its chains and try again. Do not pull the chains forcibly.

Step 16 Remove the protective ropes from the Smart Rack Controller, loosen the rod, and remove the binding strap and bolt.

Figure 8-36 Loosening the Smart Rack Controller

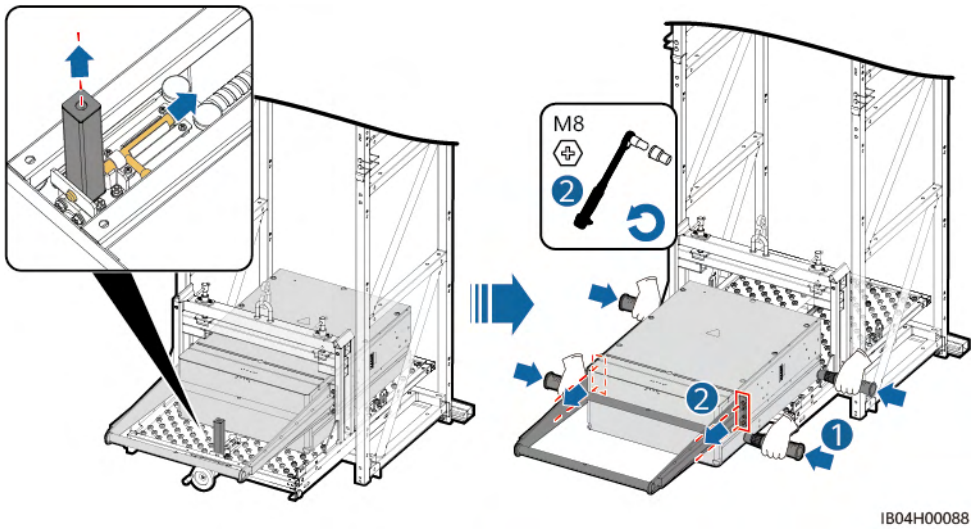


Step 17 Remove the tray column, install the lifting handles, remove the faulty Smart Rack Controller, and then remove the operating handle.

NOTICE

- At least four persons are required to move a battery pack.
- Use the lifting handles to move the battery pack. Do not use the handles on the battery pack.
- When installing the lifting handles, install the two on the front first. Move the battery pack slowly to the front of the tray and then install the other two lifting handles after the securing holes appear.
- After the lifting handles are secured (with the steel washers of the lifting handles closely fitted to the battery pack), grip the lifting handles near the ends that are closer to the battery pack to lift the battery pack. Do not lift the battery pack before the handles are secured.
- If the stud of a lifting handle is bent, replace the lifting handle in time.
- If the battery pack has been dropped, perform operations according to the emergency handling plan.

Figure 8-37 Removing the Smart Rack Controller



----End

Installing a New Smart Rack Controller

WARNING

- Do not stand under the tray.
- Do not put your head, hands, feet, or other body parts under the tray.

CAUTION

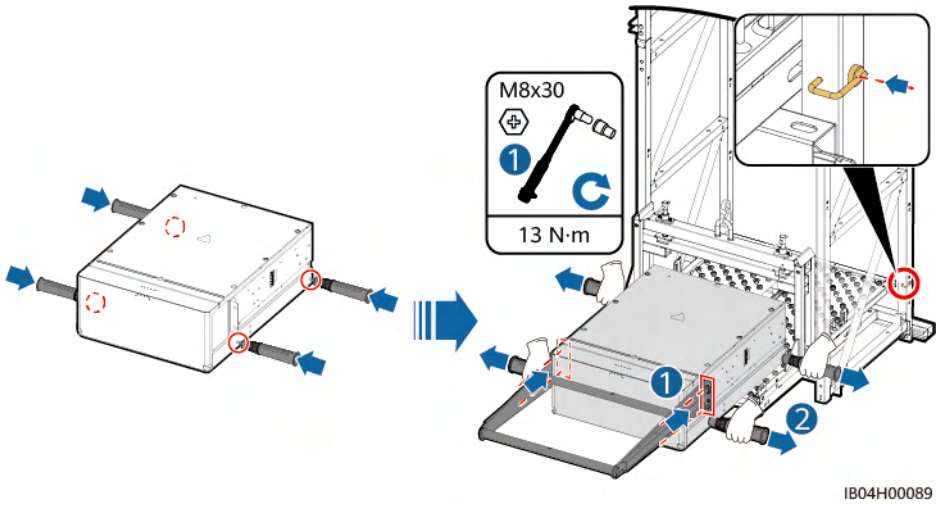
- Multiple persons are required in the operation. Take protective measures to prevent collision.
- When working at heights is involved, see the relevant safety precautions.

Step 1 Install the lifting handles and the operating handle of the Smart Rack Controller, and move the Smart Rack Controller onto the tray.

NOTICE

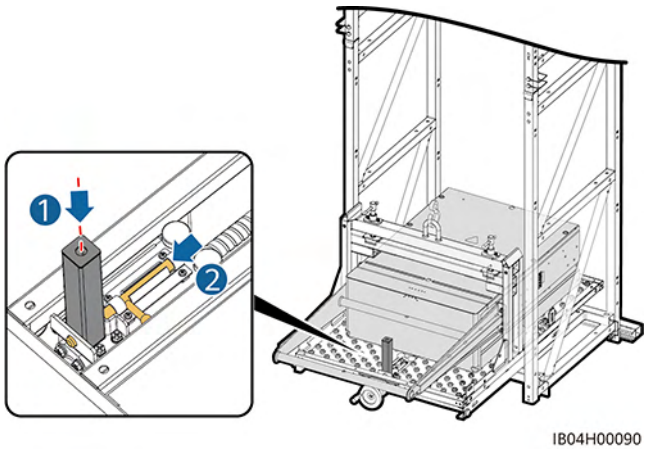
- At least four persons are required to move a battery pack.
- Use the lifting handles to move the battery pack. Do not use the handles on the battery pack.
- When installing the lifting handles, install the two on the front first. Move the battery pack slowly to the front of the tray and then install the other two lifting handles after the securing holes appear.
- After the lifting handles are secured (with the steel washers of the lifting handles closely fitted to the battery pack), grip the lifting handles near the ends that are closer to the battery pack to lift the battery pack. Do not lift the battery pack before the handles are secured.
- If the stud of a lifting handle is bent, replace the lifting handle in time.
- If the battery pack has been dropped, perform operations according to the emergency handling plan.

Figure 8-38 Moving the Smart Rack Controller onto the tray



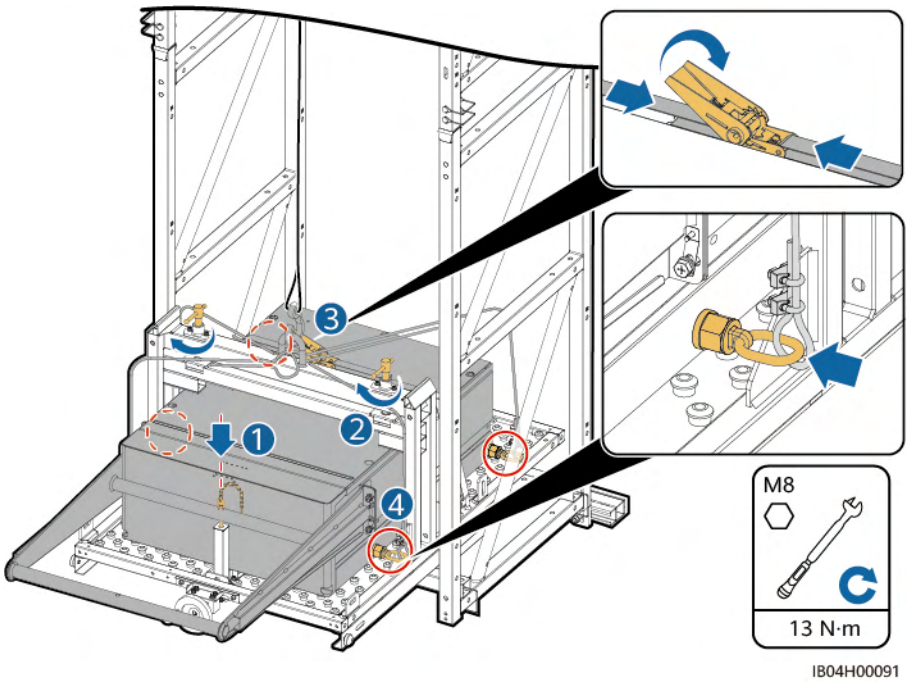
Step 2 Install the tray column.

Figure 8-39 Installing the tray column



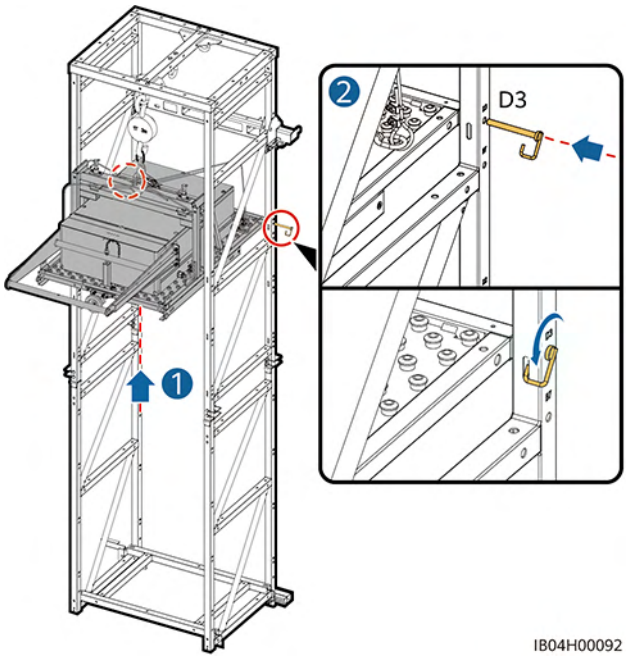
Step 3 Install the bolt, rod, binding strap, and protective ropes.

Figure 8-40 Securing the Smart Rack Controller



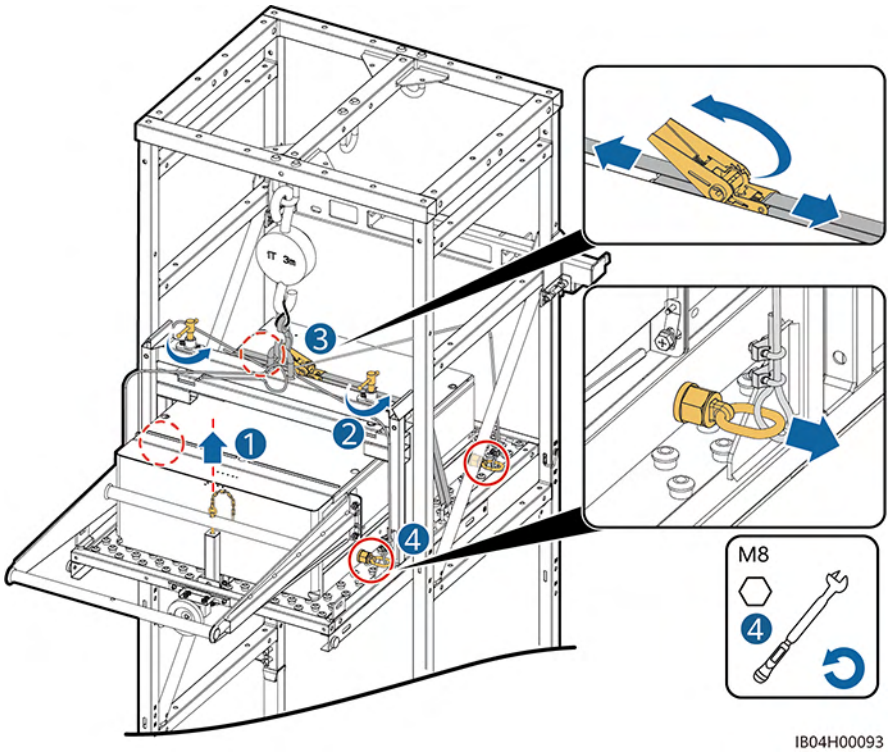
Step 4 Hoist the tray to the corresponding rail height and secure it.

Figure 8-41 Securing the tray



Step 5 Remove the bolt, loosen the rod, and remove the binding strap and protective ropes.

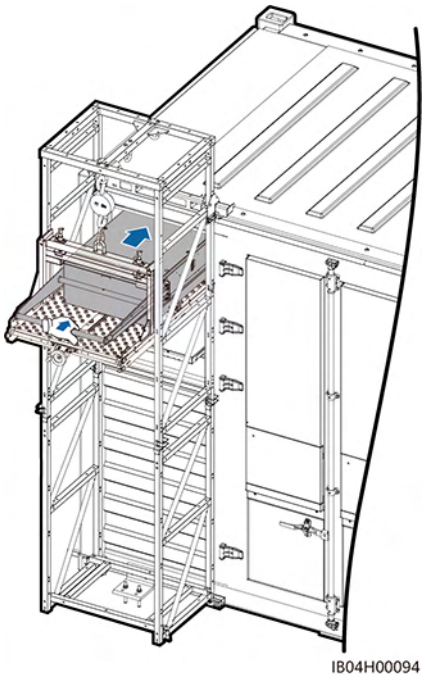
Figure 8-42 Loosening the Smart Rack Controller



Step 6 Adjust the tray height through the chain hoist to align the tray with the Smart Rack Controller rails.

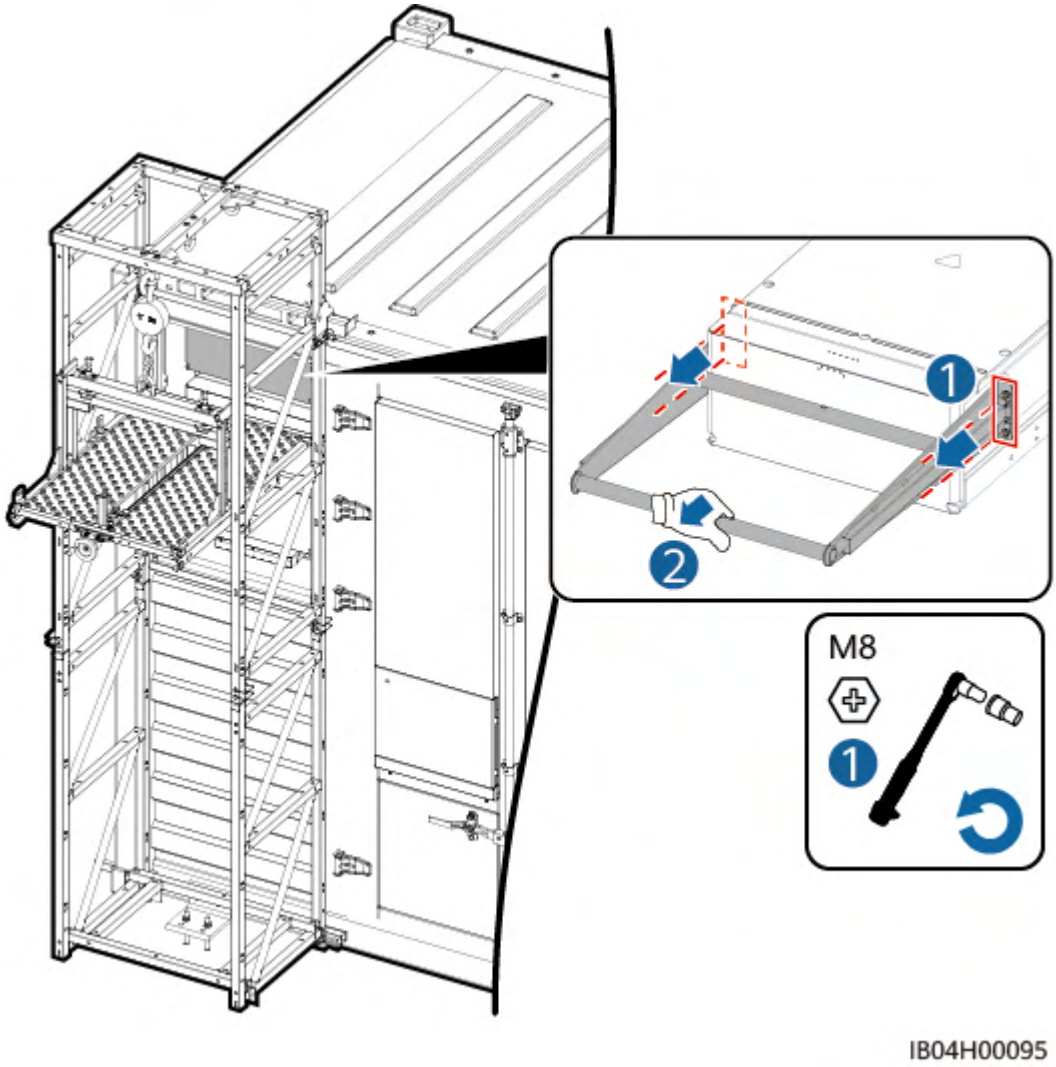
Step 7 Push the Smart Rack Controller onto the rails.

Figure 8-43 Pushing the Smart Rack Controller



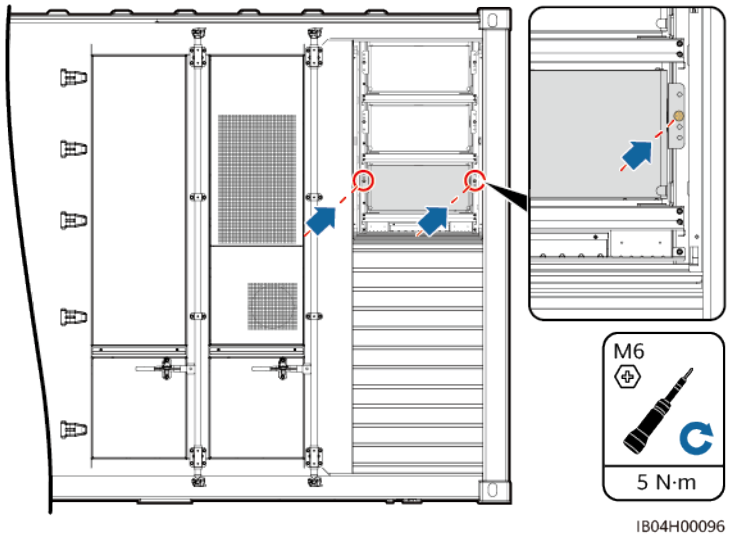
Step 8 Remove the operating handle.

Figure 8-44 Removing the operating handle



Step 9 Secure the Smart Rack Controller using screws.

Figure 8-45 Securing the Smart Rack Controller using screws



Step 10 Remove the engineering installation kits.

NOTICE

Multiple persons are required in the removal. Take protective measures to prevent collision.

Step 11 Install the Smart Rack Controller cables.

Figure 8-46 Installing cables (part 1)

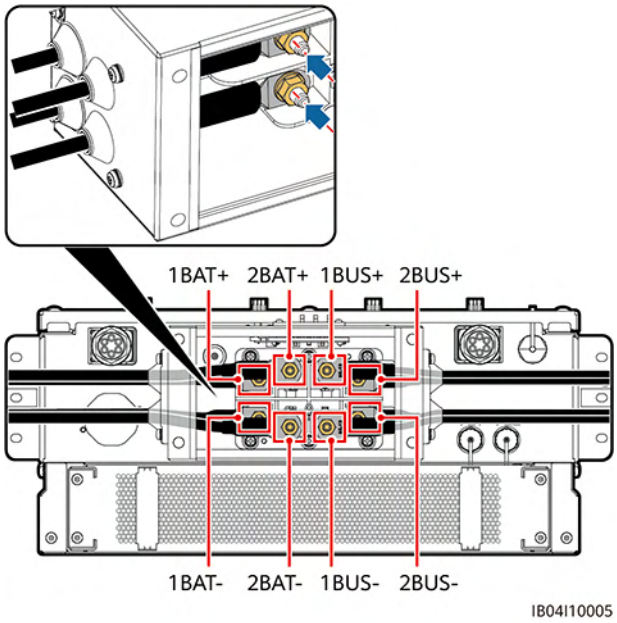
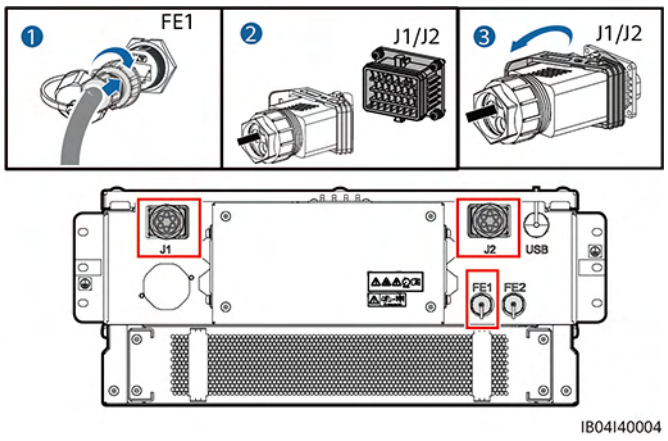
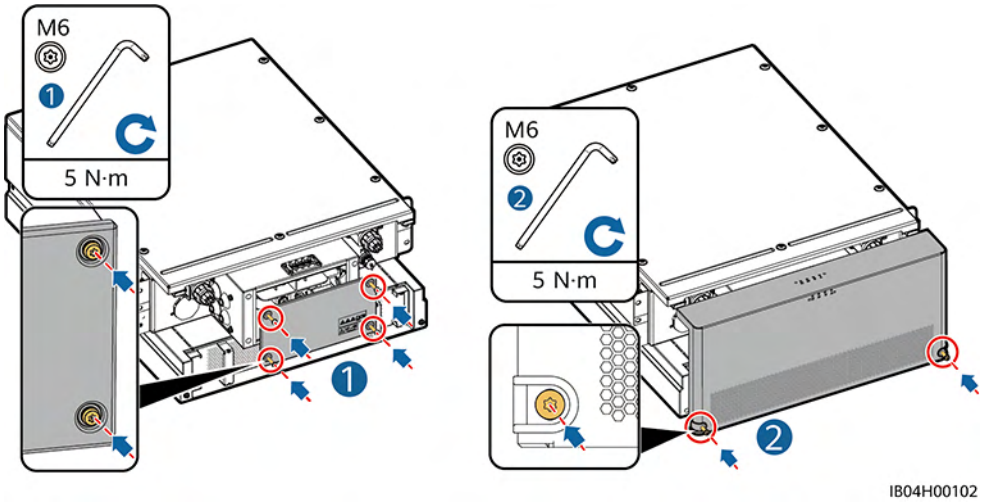


Figure 8-47 Installing cables (part 2)



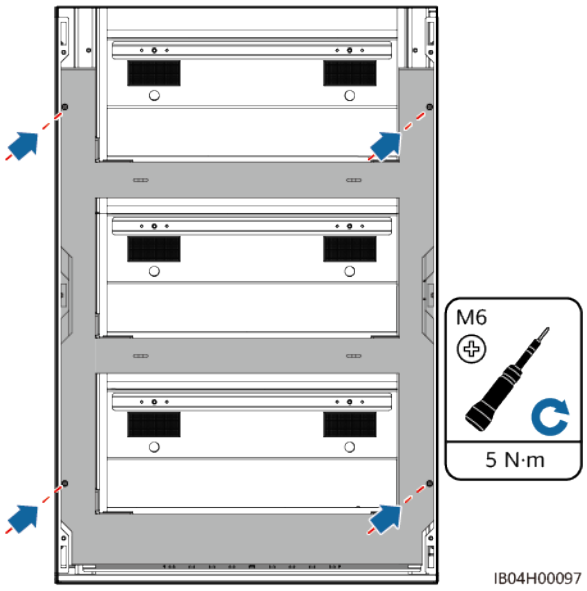
Step 12 Install the maintenance compartment cover and the decorative cover of the Smart Rack Controller.

Figure 8-48 Installing covers



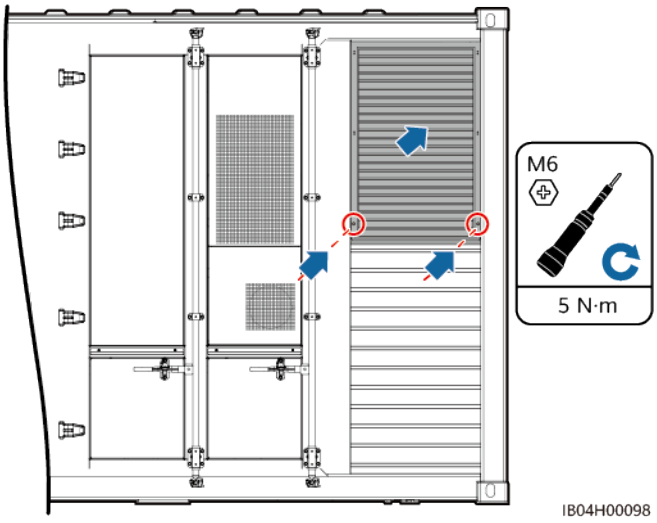
Step 13 Install the air baffle.

Figure 8-49 Installing the air baffle



Step 14 Install the Smart Rack Controller cabin louver.

Figure 8-50 Installing a louver

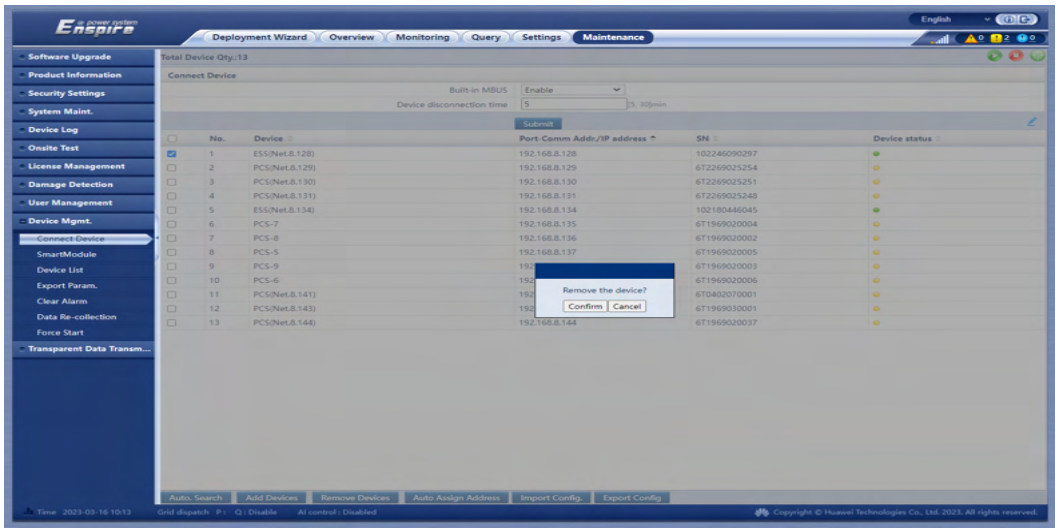


----End

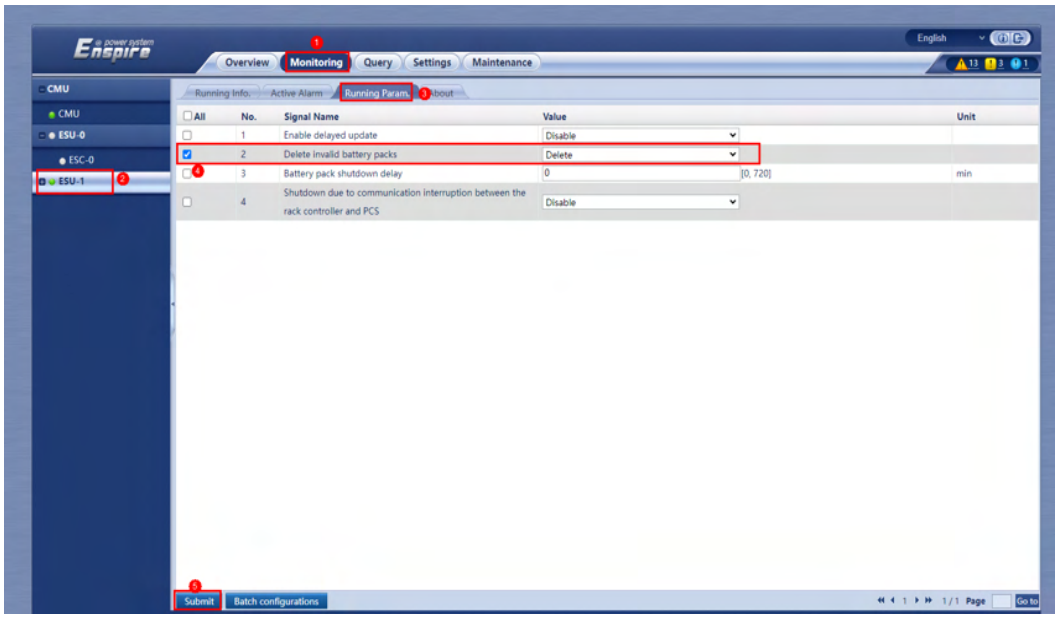
Follow-up Procedure

Step 1 Power on the system. For details, see the system power-on section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

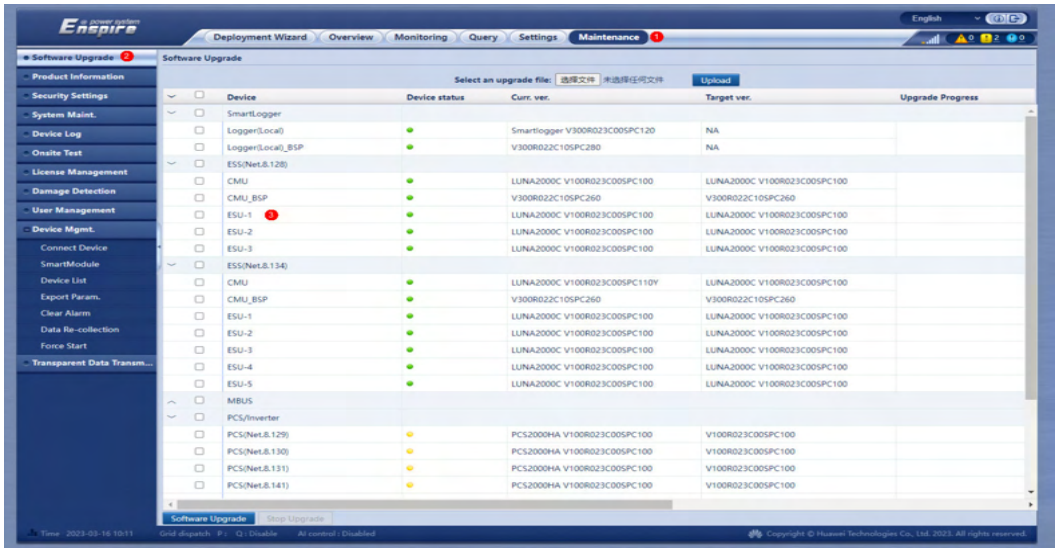
Step 2 To delete an old device, log in to the CMU, choose **Maintenance** > **Connect Device**, select the old device, and delete it.



Step 3 To delete invalid modules (**perform this step 2 minutes after the ESU is connected**), log in to the CMU, click **Monitoring**, and select the corresponding ESU. Click **Running Param.**, select **Delete invalid battery packs**, and click **Submit**.



Step 4 Update the software version of the new Smart Rack Controller.



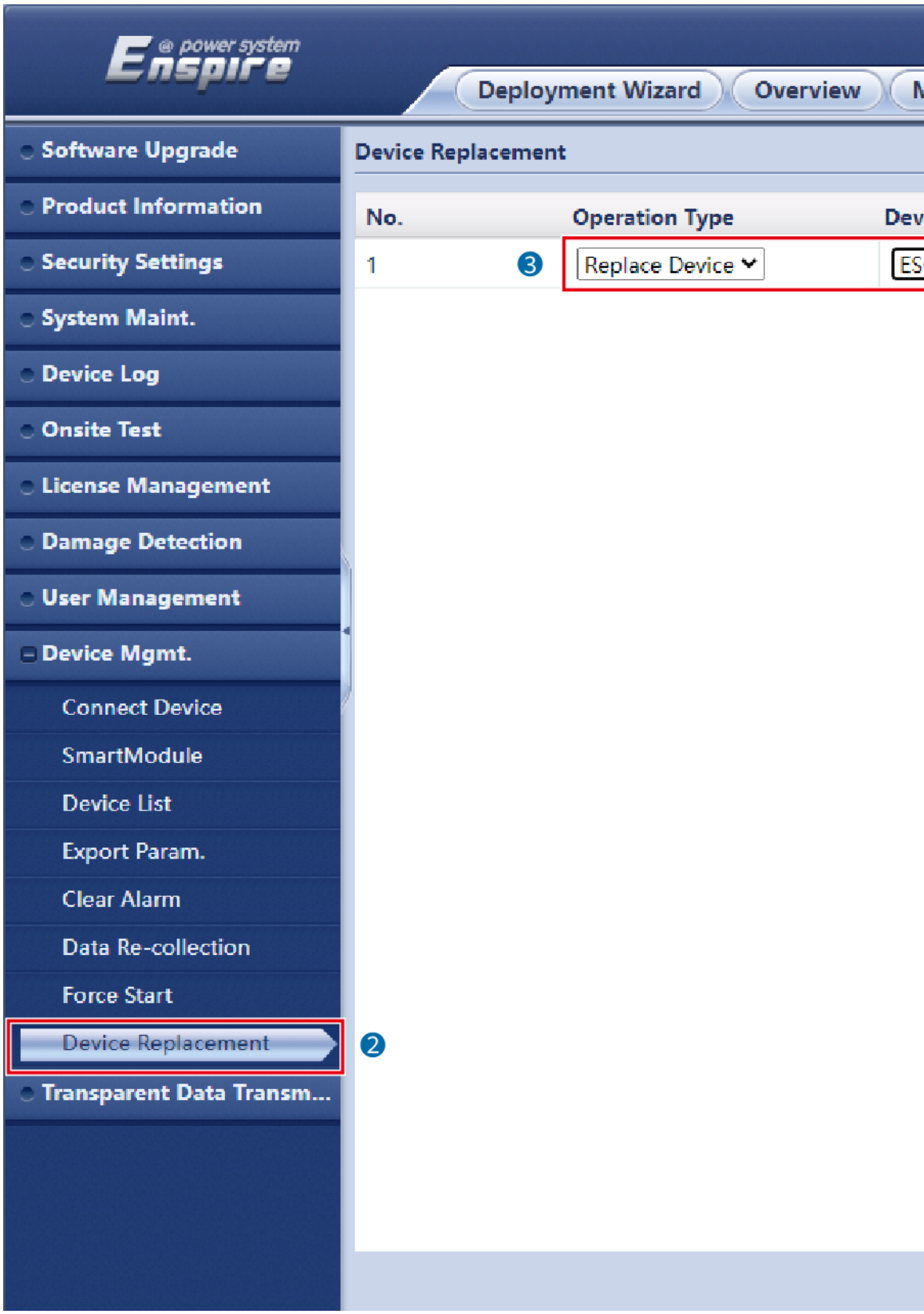
Step 5 Log in to the SmartLogger WebUI, delete the faulty ESS, and perform the search again.

Step 6 Click **Monitoring**, choose **Running Param.** > **Setting**, and set the ESS mode to no control and the active power control mode to no limit.

Step 7 Identify the topology.

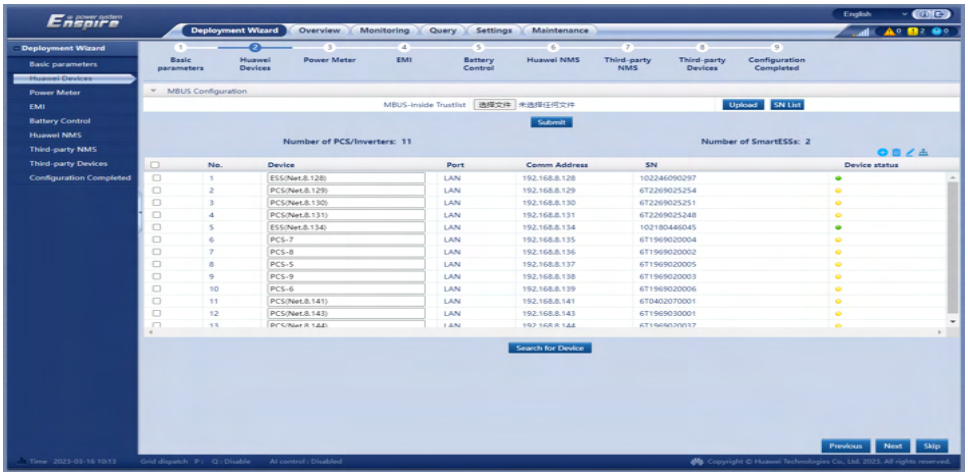
- For SmartLogger V300R023C10 and later versions, enter the SNs of the old and new devices and click **Submit**. The devices in the topology are automatically updated.

Figure 8-51 Replacing devices



- For versions earlier than SmartLogger V300R023C10, go to **Deployment Wizard** and click **Search for Device** to check cable connections and allocate addresses.

Figure 8-52 Searching for devices

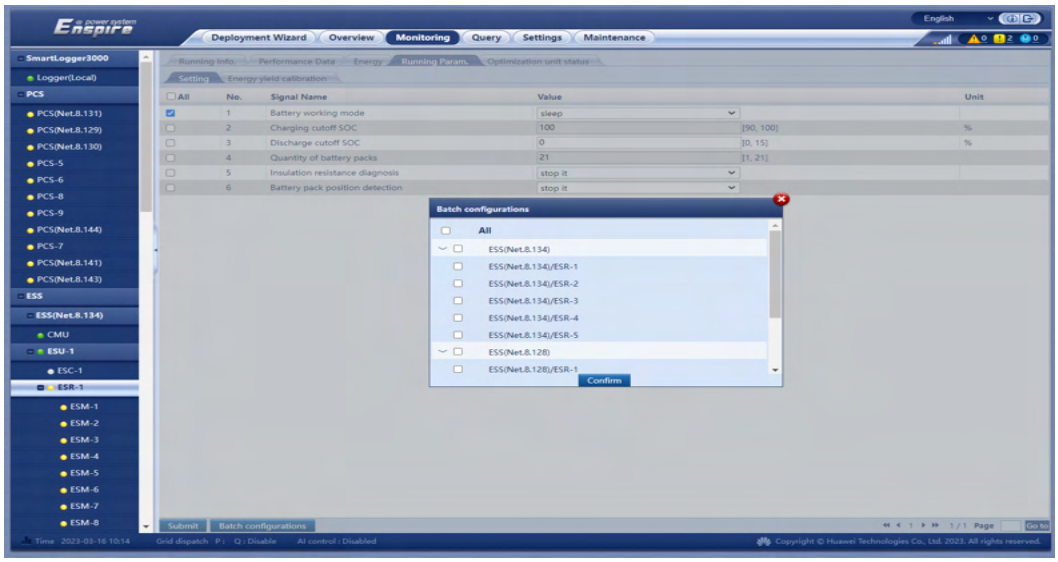


NOTE

- During the process of **Search for Device**, do not perform upgrade operations (such as upgrading through the app, management system, or WebUI).
- When you click **Search for Device**, cable connections (DC and AC) will be checked before device search (not applicable to third-party devices), and device addresses 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 connections 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 be updated.

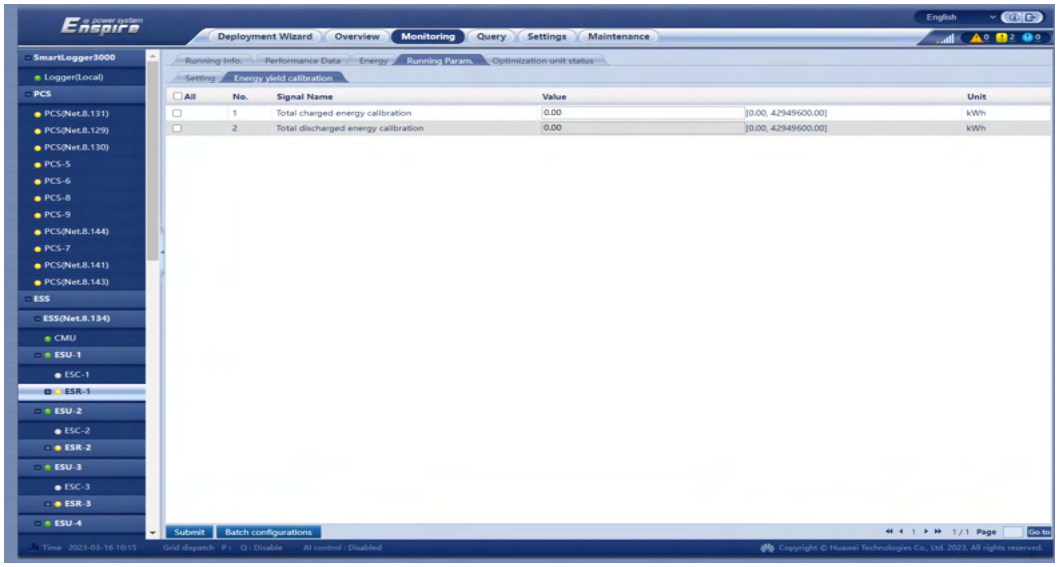
Step 8 Click **Monitoring**, select the old device, choose **Running Param.** > **Setting** > **All** > **Batch configurations**, select the new device, and click **Confirm** to synchronize data to the new device.

Figure 8-53 Batch configurations



Step 9 Click **Energy yield calibration** and set **Total charged energy calibration** and **Total discharged energy calibration** to be the same as those of the old device.

Figure 8-54 Energy yield calibration



Step 10 Check the running status of the Smart Rack Controller and check whether it functions properly.

----End

8.1.3 Replacing a Smart Rack Controller (Using a Forklift-based Kit)

Prerequisites

- Fault locating:

a. Log in to the SmartLogger WebUI, CMU WebUI, FusionSolar app, or management system to view alarm information.

b. Open the louver of the Smart Rack Controller and check whether any indicator is red.

Table 8-3 LED indicators

Indicator	Status	Definition
LED1 Input Indication	Blinking red fast LED4 red	Environment-related fault on the input side of the Smart Rack Controller
	Steady green	Battery side powered on
	Blinking green slowly	Standby (topology detection)
	Off	Battery side not powered on
LED2 Output Indication	Blinking red fast LED4 red	Fault on the output side of the Smart Rack Controller
	Steady green	Normal charge and discharge
	Blinking green slowly	Standby/Shutdown
	Off	No power on the output side
LED3 Communication indication	Blinking green fast	Normal communication between the BCU and the CMU
	Off	-
LED4 Fault/Maintenance indication	Steady red	Alarm (Major)
	Blinking red fast	Alarm (Warning)
	Blinking red slowly	Alarm (Minor)
	Blinking green slowly	Commanded shutdown
	Off	No alarm is generated, and no local maintenance operations are performed.
If the input and output indicators blink red fast, replace parts or the entire device.		

- Tools: One insulated torque socket wrench set, two M6 Phillips insulated screwdrivers, one M6 torx key, one M12 adjustable wrench, one multimeter (DC voltage range ≥ 1500 V DC), one insulation tape, two ladders, one forklift, four lifting handles, four safety helmets, four pairs of goggles, four pairs of insulated gloves, four sets of arc flash clothing, four reflective vests, and four pairs of insulated shoes

  NOTE

  - At least two ladders are required.
  - The personnel, tools, and environment must meet relevant safety requirements.

- The ESS has been powered off. For details, see the system power-off section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

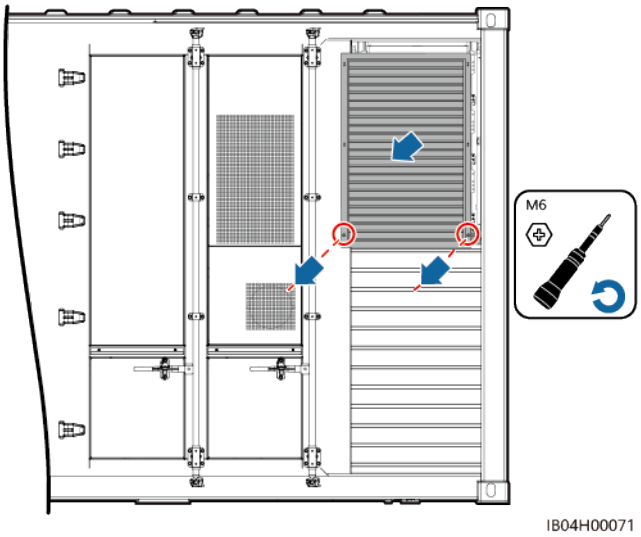
Removing the Faulty Smart Rack Controller

WARNING

After the ESS is powered off, the rack controllers remain energized and hot, which may cause electric shocks or burns. Therefore, wait for 15 minutes after the ESS is powered off. Wear protective gloves and then operate the rack controllers.

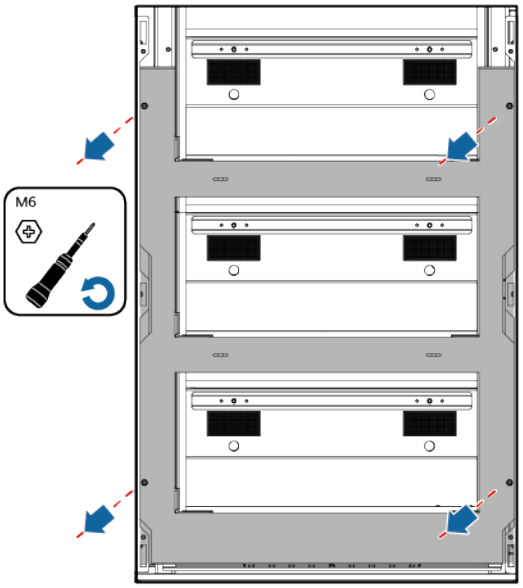
Step 1 Remove the Smart Rack Controller cabin louver.

Figure 8-55 Removing the Smart Rack Controller cabin louver



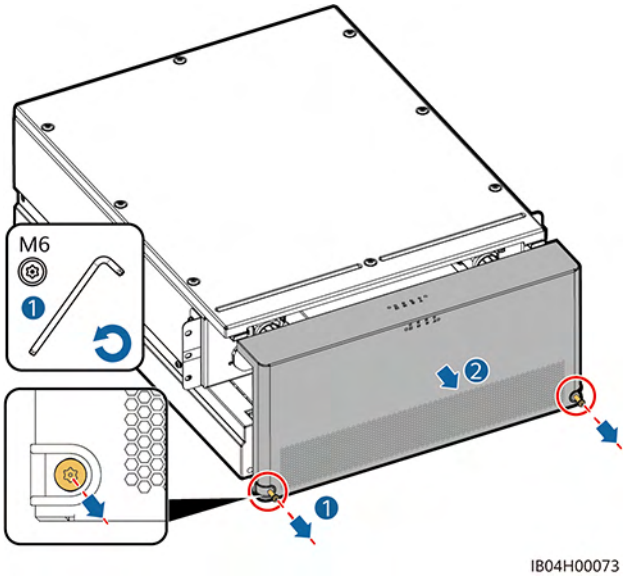
Step 2 (Optional) Remove the air baffle.

Figure 8-56 Removing the air baffle



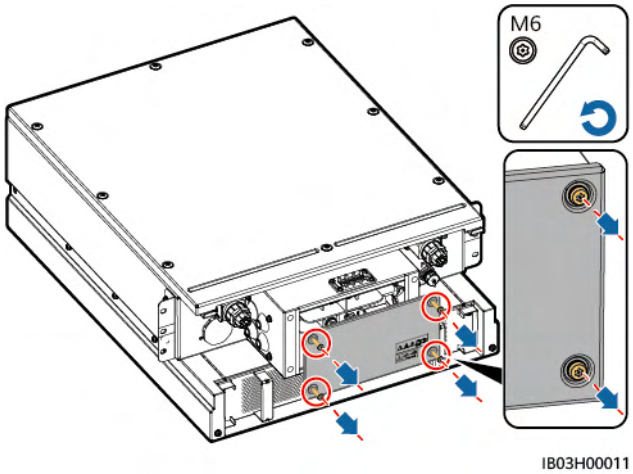
Step 3 Remove the decorative cover from the Smart Rack Controller.

Figure 8-57 Removing the decorative cover



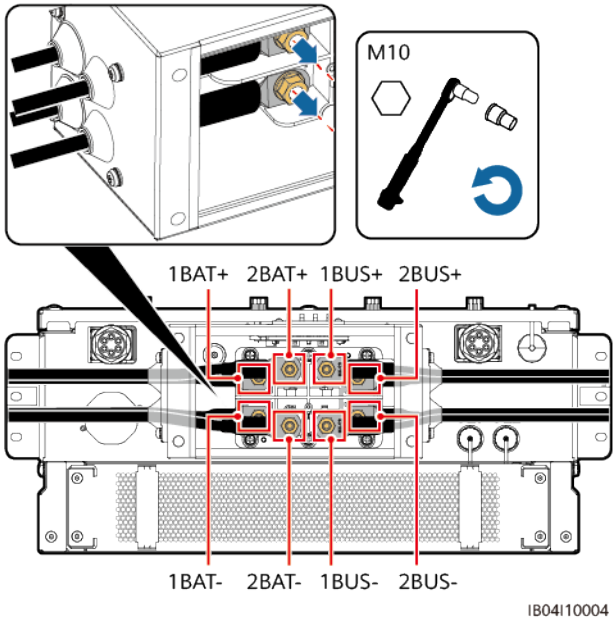
Step 4 Remove the maintenance compartment cover of the Smart Rack Controller.

Figure 8-58 Removing the maintenance compartment cover



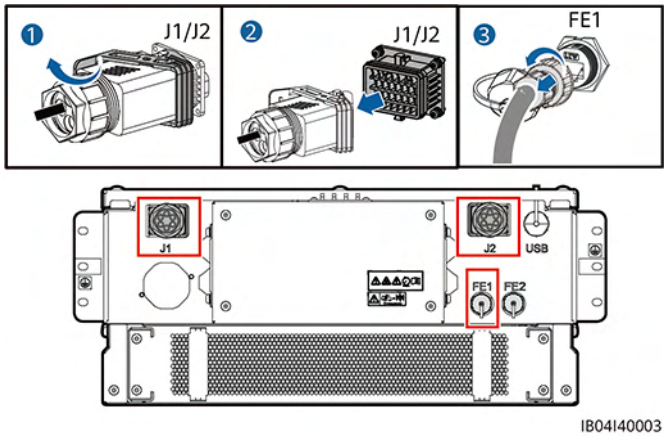
Step 5 Remove cables from the BAT/BUS terminals, and then wrap the exposed terminals.

Figure 8-59 Removing the BAT/BUS terminal cables



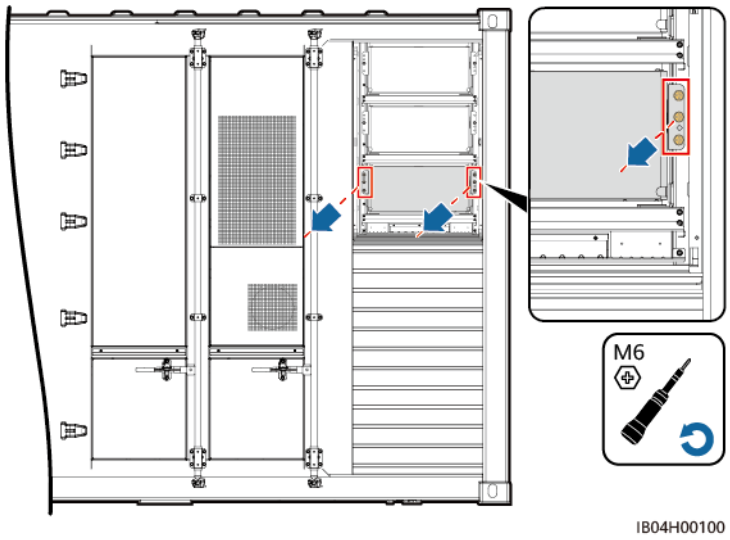
Step 6 Remove the J1 and J2 terminals, and the FE network cable.

Figure 8-60 Removing the J1 and J2 terminals, and the FE network cable



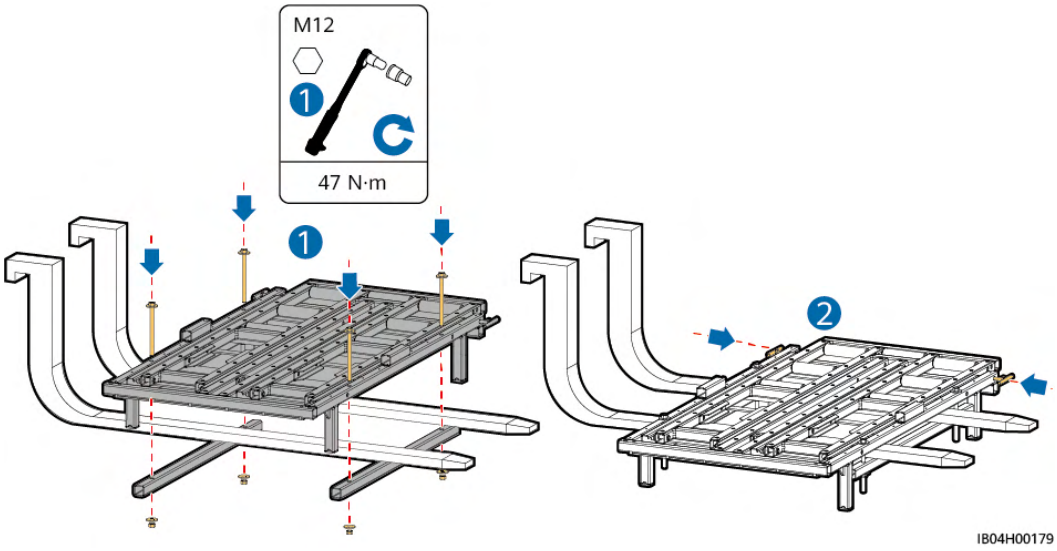
Step 7 Remove the ground and fastening screws on both sides of the Smart Rack Controller.

Figure 8-61 Removing the ground and fastening screws



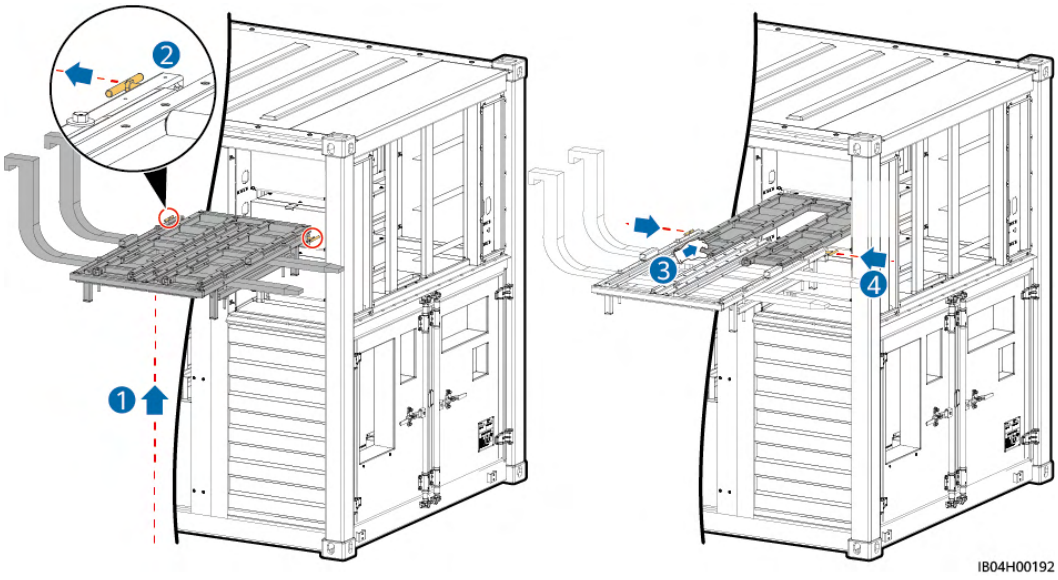
Step 8 Assemble the kit: Tighten the four screws and two handles.

Figure 8-62 Assembling the kit



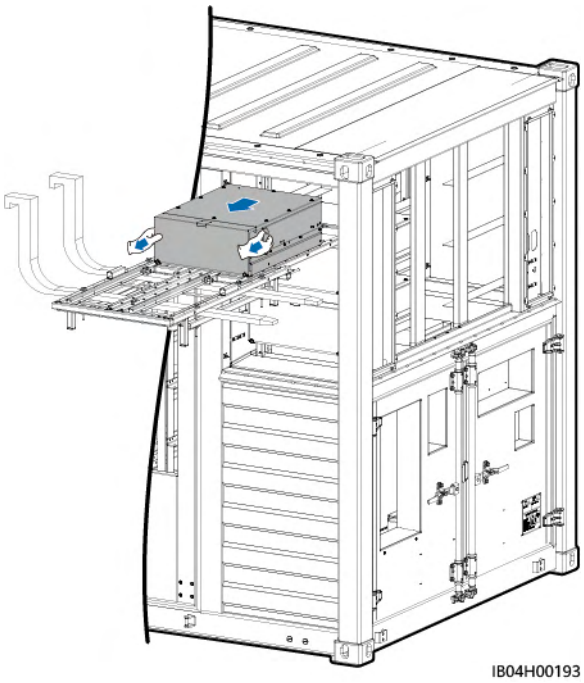
Step 9 Lift up the kit, and pull out the kit drawer: Loosen the two handles, pull out the drawer, and tighten the two handles.

Figure 8-63 Lifting up the kit



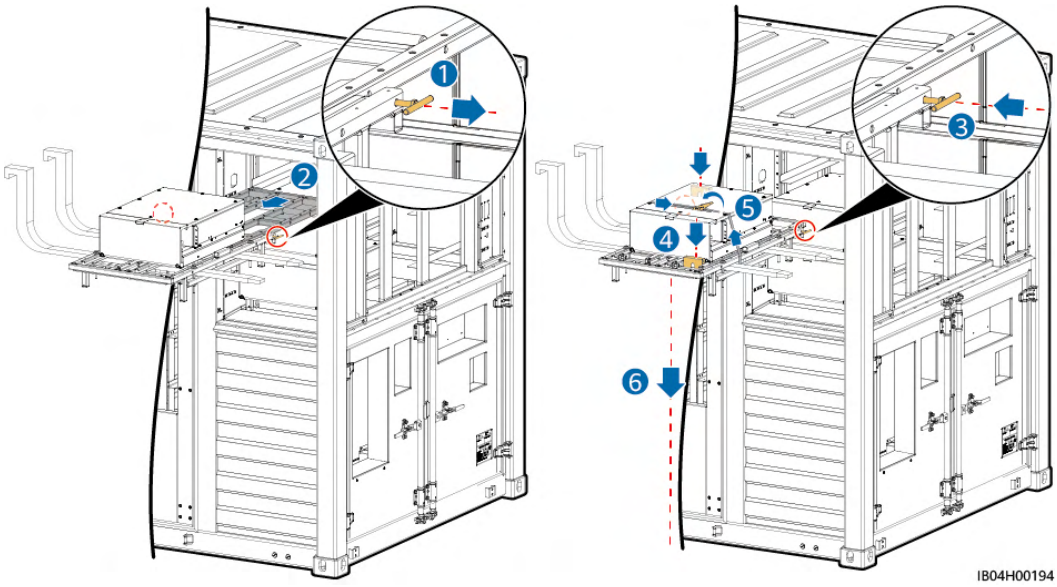
Step 10 Pull out the Smart Rack Controller onto the kit drawer.

Step 11 Adjust the kit to an appropriate position and move the Smart Rack Controller completely onto the kit base.

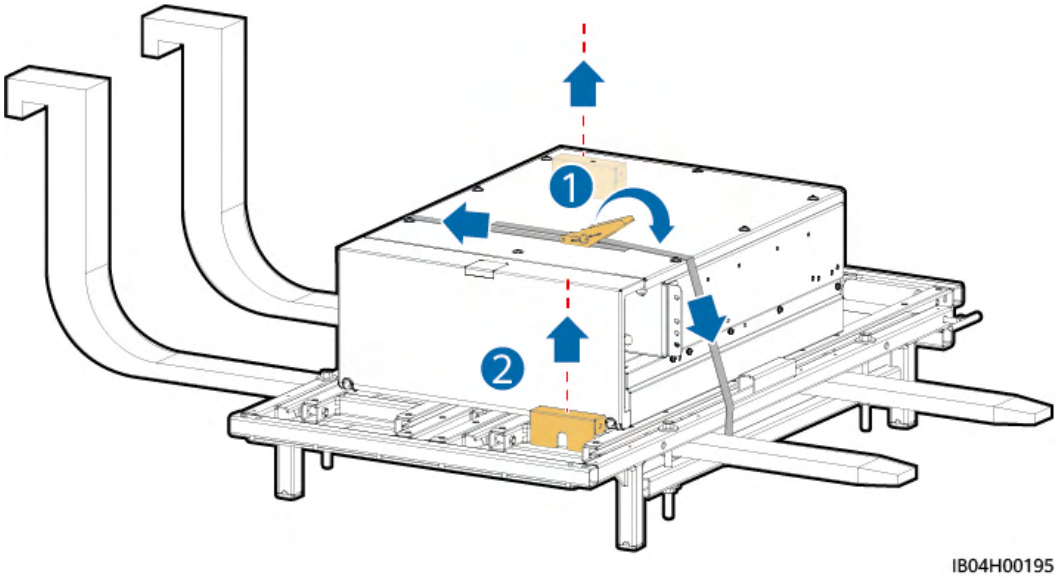


Step 12 Push in the kit drawer: Loosen the two handles, push in the drawer, and tighten the two handles.

Step 13 Install the distance blocks and binding straps, and lower the kit.



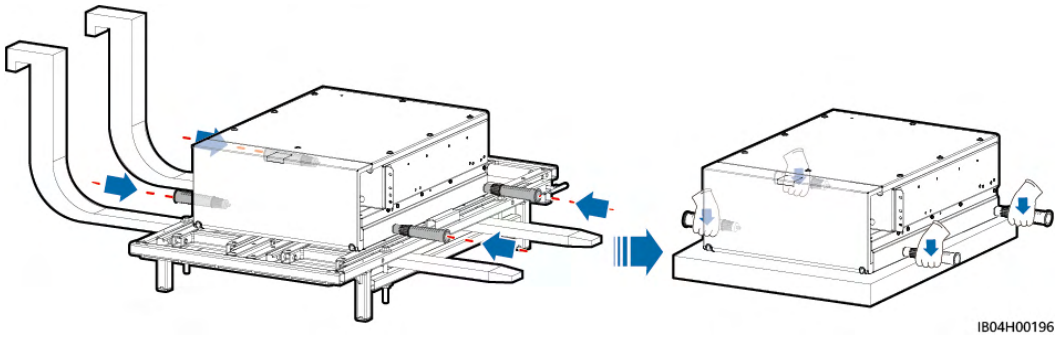
Step 14 Remove the binding straps and distance blocks.



Step 15 Install the lifting handles and remove the old Smart Rack Controller.

NOTICE

- At least four persons are required to move a battery pack.
- Use the lifting handles to move the battery pack. Do not use the handles on the battery pack.
- When installing the lifting handles, install the two on the front first. Move the battery pack slowly to the front of the tray and then install the other two lifting handles after the securing holes appear.
- After the lifting handles are secured (with the steel washers of the lifting handles closely fitted to the battery pack), grip the lifting handles near the ends that are closer to the battery pack to lift the battery pack. Do not lift the battery pack before the handles are secured.
- If the stud of a lifting handle is bent, replace the lifting handle in time.
- If the battery pack has been dropped, perform operations according to the emergency handling plan.



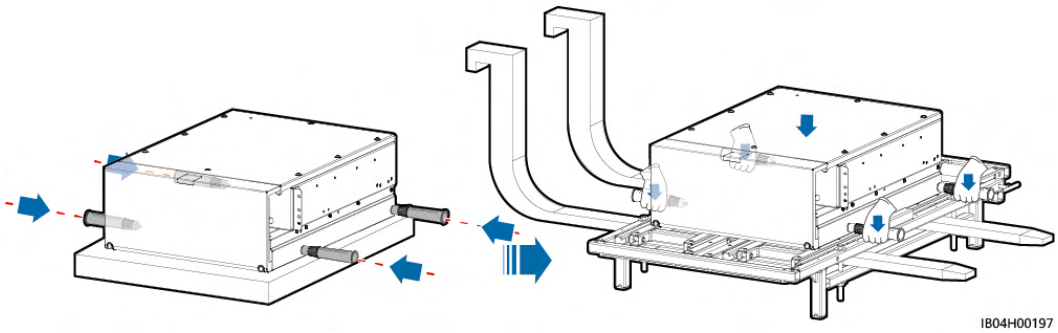
----End

Installing a New Smart Rack Controller

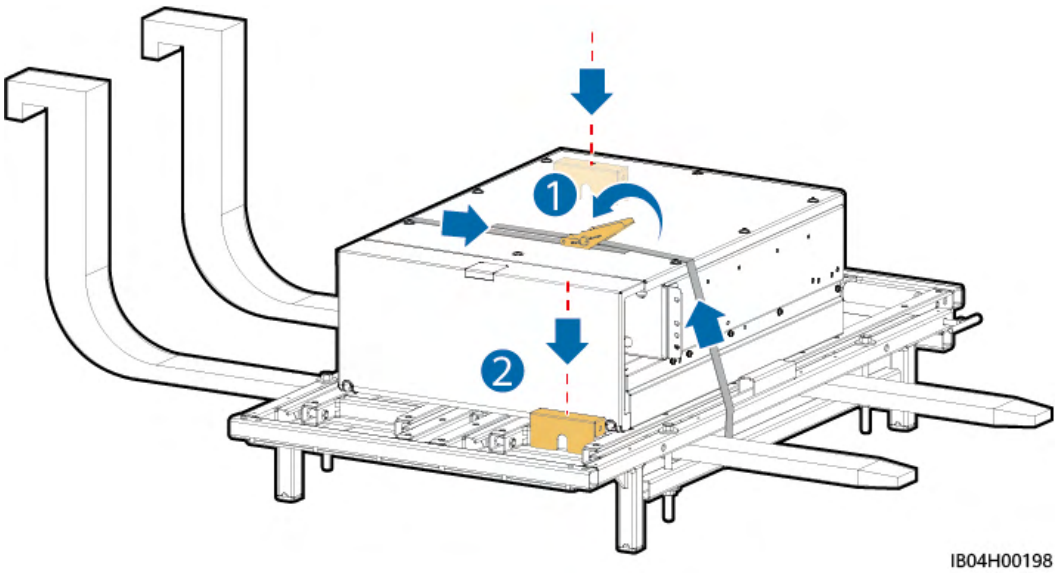
Step 1 Install the lifting handles, move the Smart Rack Controller onto the kit base, and remove the lifting handles.

NOTICE

- At least four persons are required to move a battery pack.
- Use the lifting handles to move the battery pack. Do not use the handles on the battery pack.
- When installing the lifting handles, install the two on the front first. Move the battery pack slowly to the front of the tray and then install the other two lifting handles after the securing holes appear.
- After the lifting handles are secured (with the steel washers of the lifting handles closely fitted to the battery pack), grip the lifting handles near the ends that are closer to the battery pack to lift the battery pack. Do not lift the battery pack before the handles are secured.
- If the stud of a lifting handle is bent, replace the lifting handle in time.
- If the battery pack has been dropped, perform operations according to the emergency handling plan.

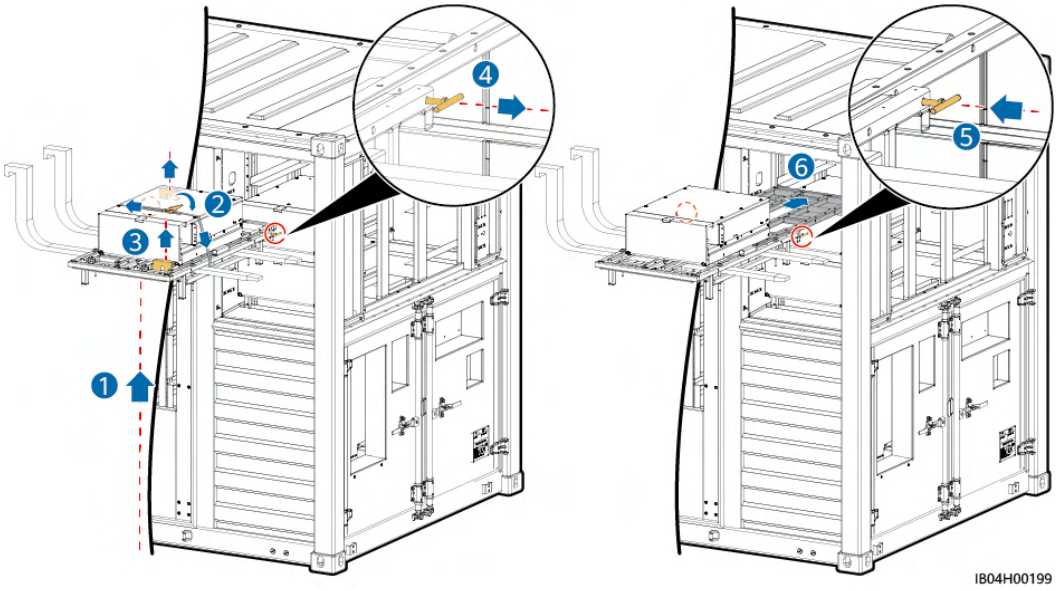


Step 2 Install the binding straps and distance blocks.

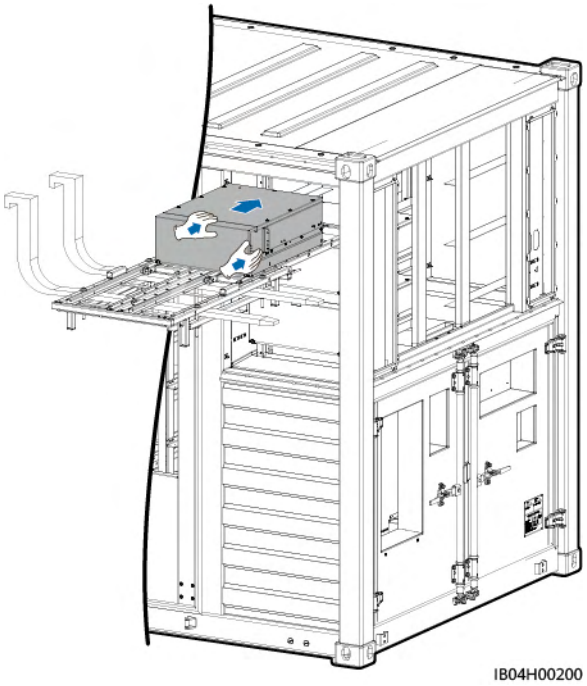


Step 3 Lift up the kit, and remove the binding straps and distance blocks.

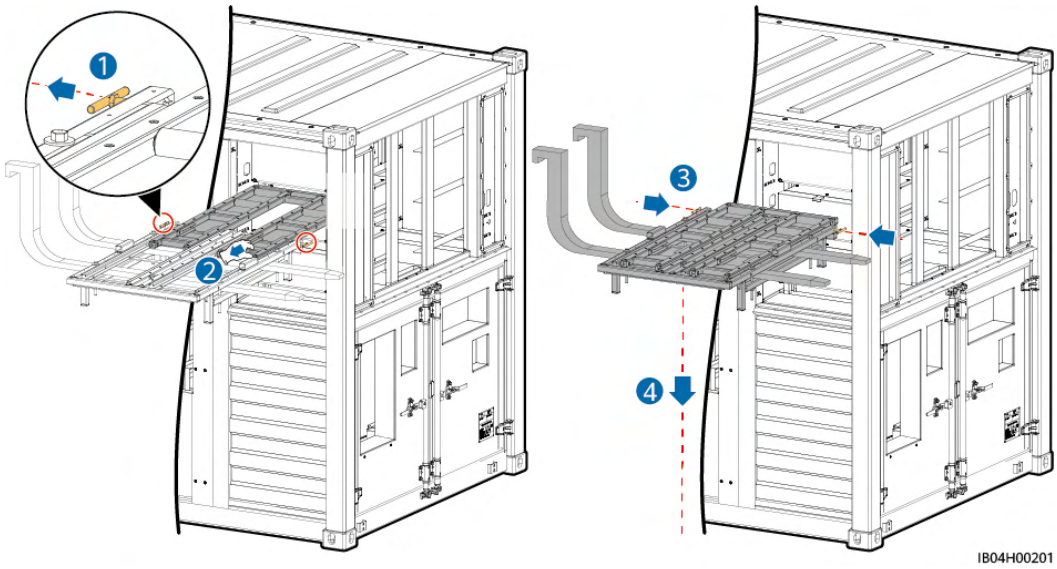
Step 4 Pull out the kit drawer: Loosen the two handles, pull out the drawer, and tighten the two handles.



Step 5 Move the Smart Rack Controller into the installation slot.

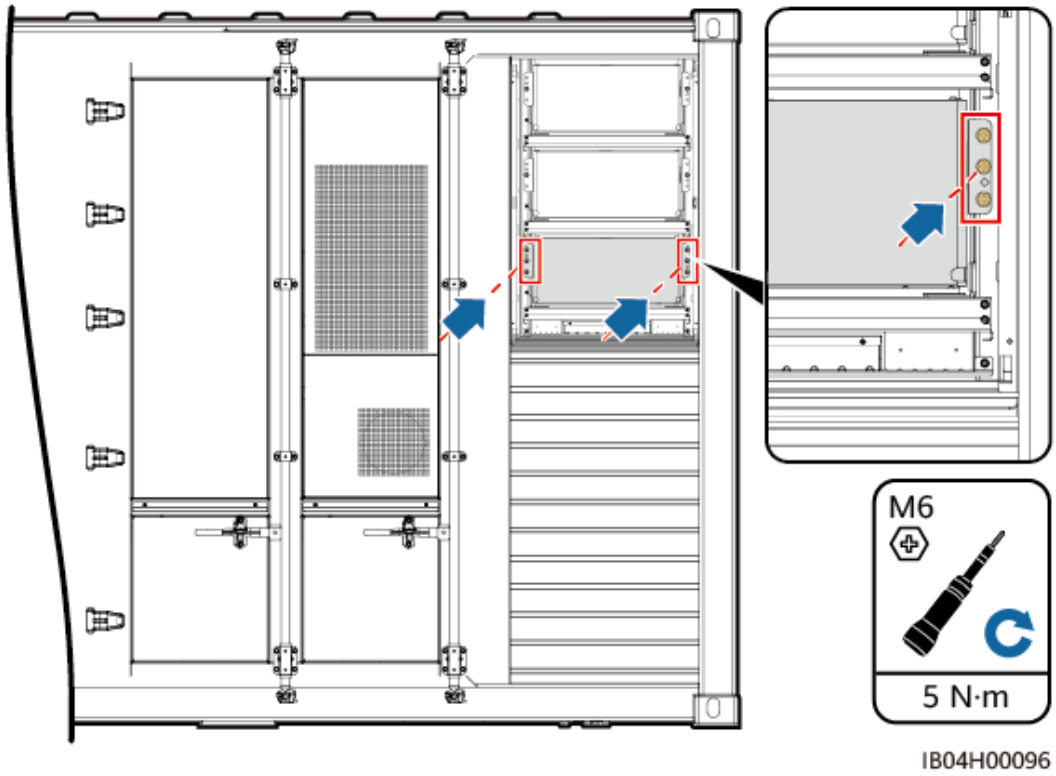


Step 6 Push in the kit drawer: Loosen the two handles, push in the drawer, and tighten the two handles. Then, lower the kit.



Step 7 Install the ground and fastening screws of the Smart Rack Controller.

Figure 8-64 Installing the ground and fastening screws of the Smart Rack Controller



Step 8 Install the Smart Rack Controller cables.

Figure 8-65 Installing cables (part 1)

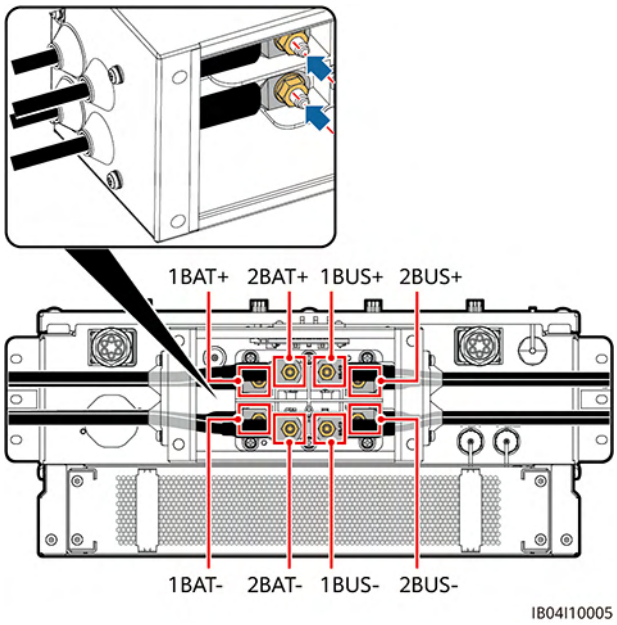
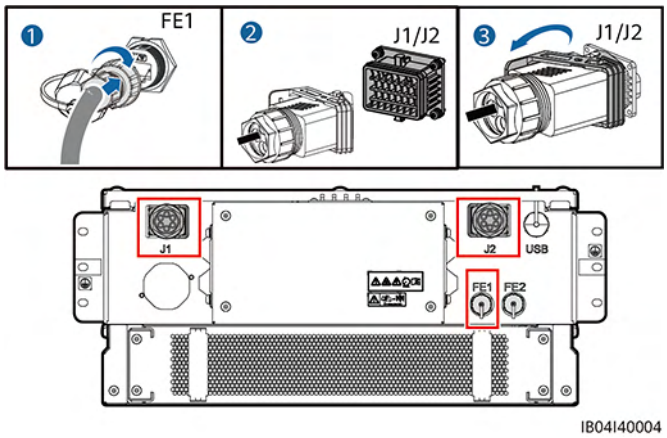


Figure 8-66 Installing cables (part 2)

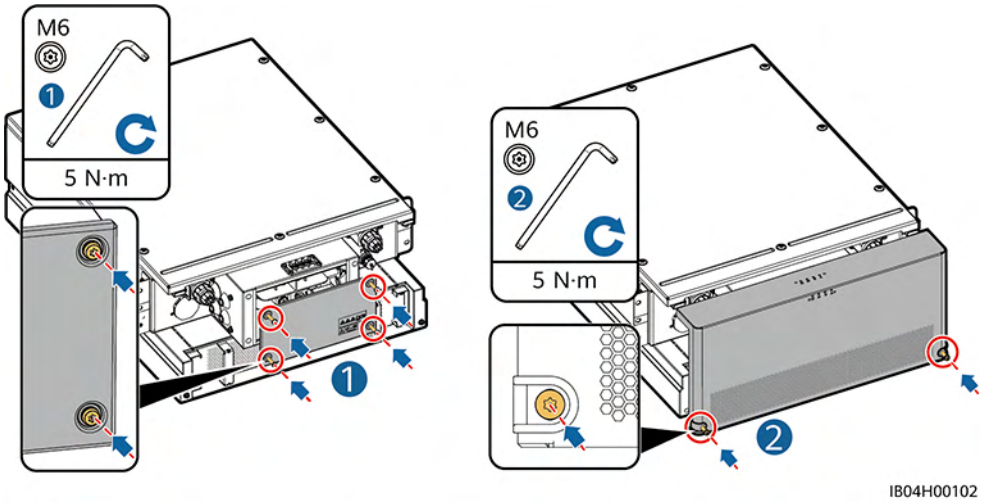


NOTE

Connect the cable to the FE port according to the actual application scenario.

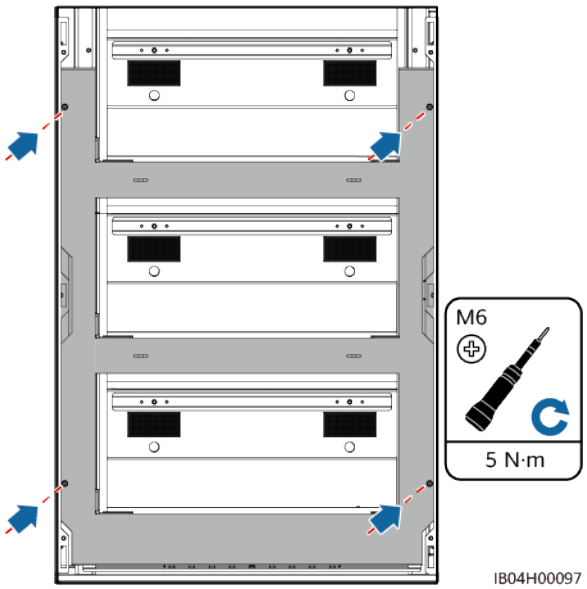
Step 9 Install the maintenance compartment cover and the decorative cover of the Smart Rack Controller.

Figure 8-67 Installing covers



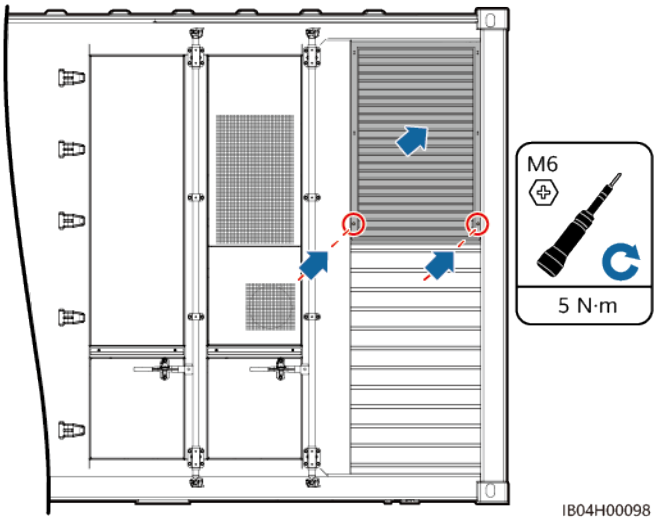
Step 10 (Optional) Install the air baffle.

Figure 8-68 Installing the air baffle



Step 11 Install the Smart Rack Controller cabin louver.

Figure 8-69 Installing the louver

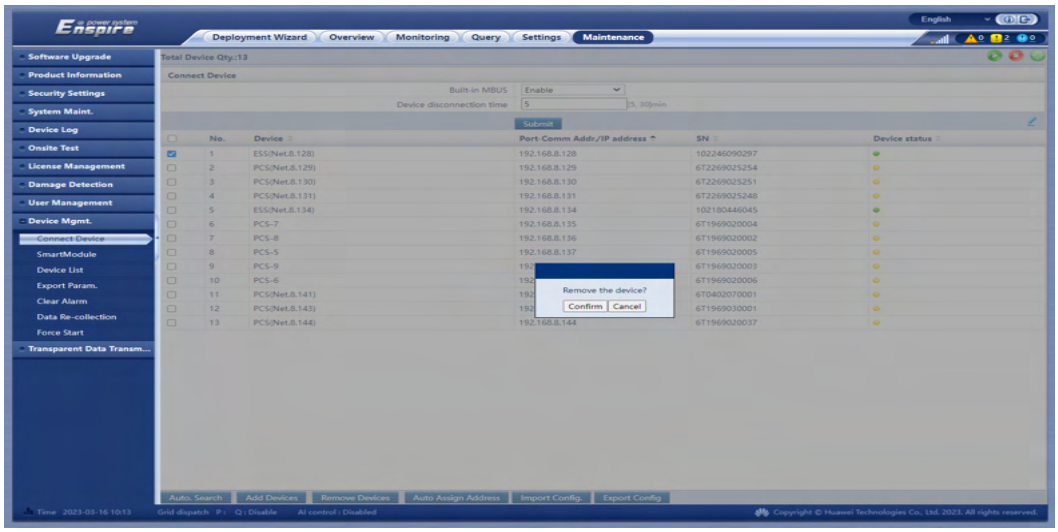


----End

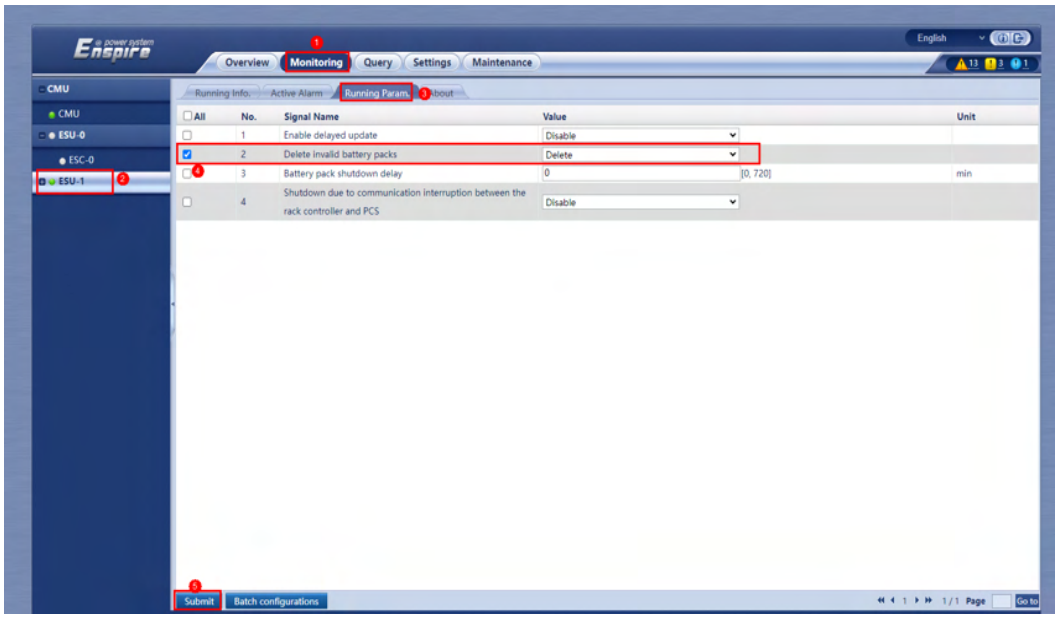
Follow-up Procedure

Step 1 Power on the system. For details, see the system power-on section in the **LUNA2000-2.0MWH Series Smart String ESS User Manual**.

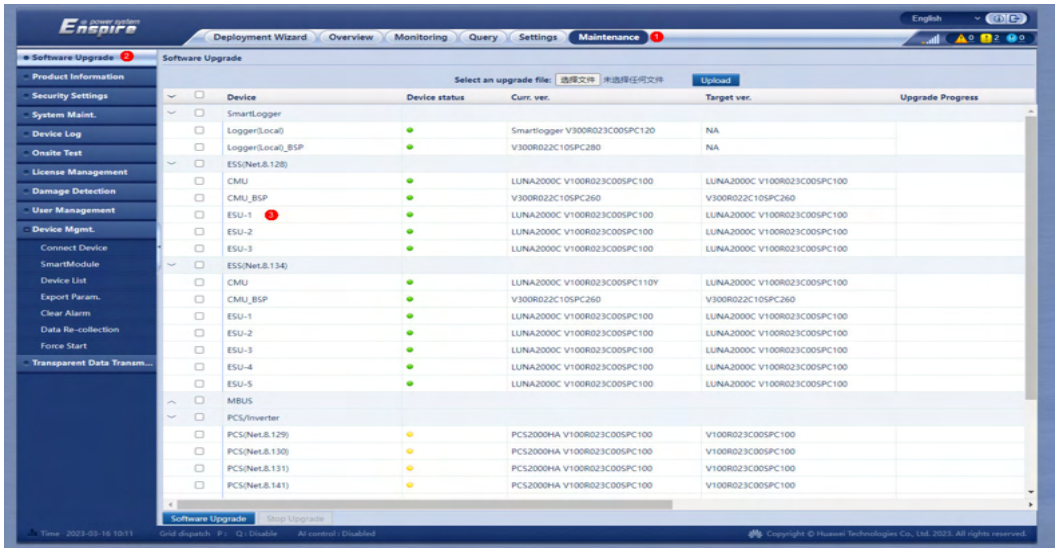
Step 2 To delete an old device, log in to the CMU, choose **Maintenance** > **Connect Device**, select the old device, and delete it.



Step 3 To delete invalid modules (**perform this step 2 minutes after the ESU is connected**), log in to the CMU, click **Monitoring**, and select the corresponding ESU. Click **Running Param.**, select **Delete invalid battery packs**, and click **Submit**.



Step 4 Update the software version of the new Smart Rack Controller.



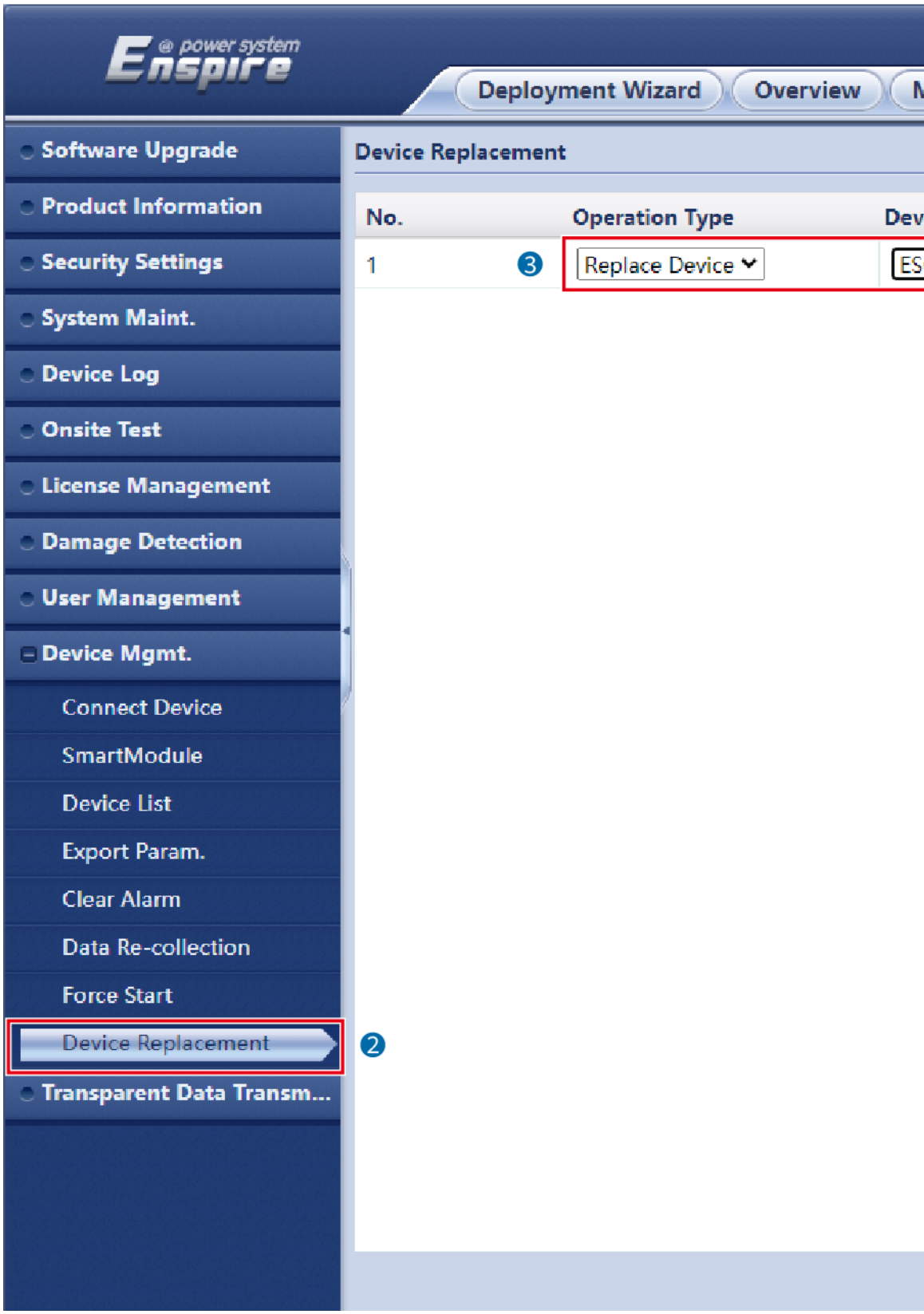
Step 5 Log in to the SmartLogger WebUI, delete the faulty ESS, and perform the search again.

Step 6 Click **Monitoring**, choose **Running Param.** > **Setting**, and set the ESS mode to no control and the active power control mode to no limit.

Step 7 Identify the topology.

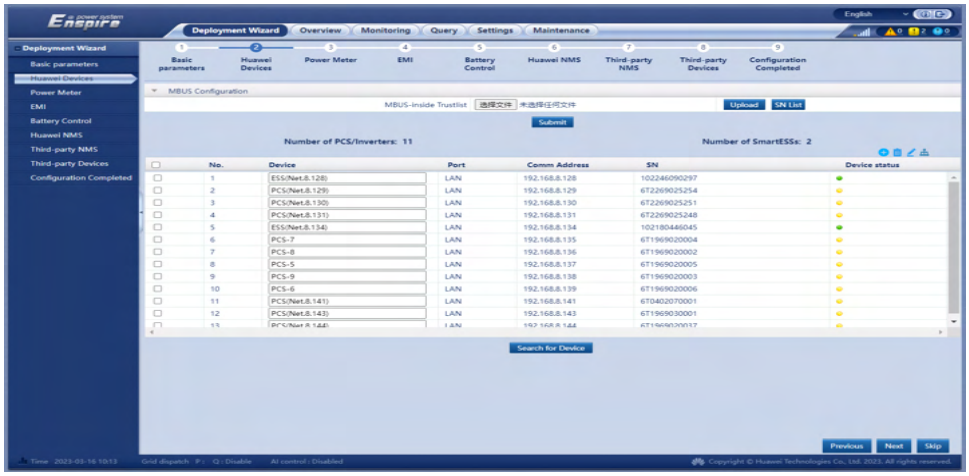
- For SmartLogger V300R023C10 and later versions, enter the SNs of the old and new devices and click **Submit**. The devices in the topology are automatically updated.

Figure 8-70 Replacing devices



- For versions earlier than SmartLogger V300R023C10, go to **Deployment Wizard** and click **Search for Device** to check cable connections and allocate addresses.

Figure 8-71 Searching for devices

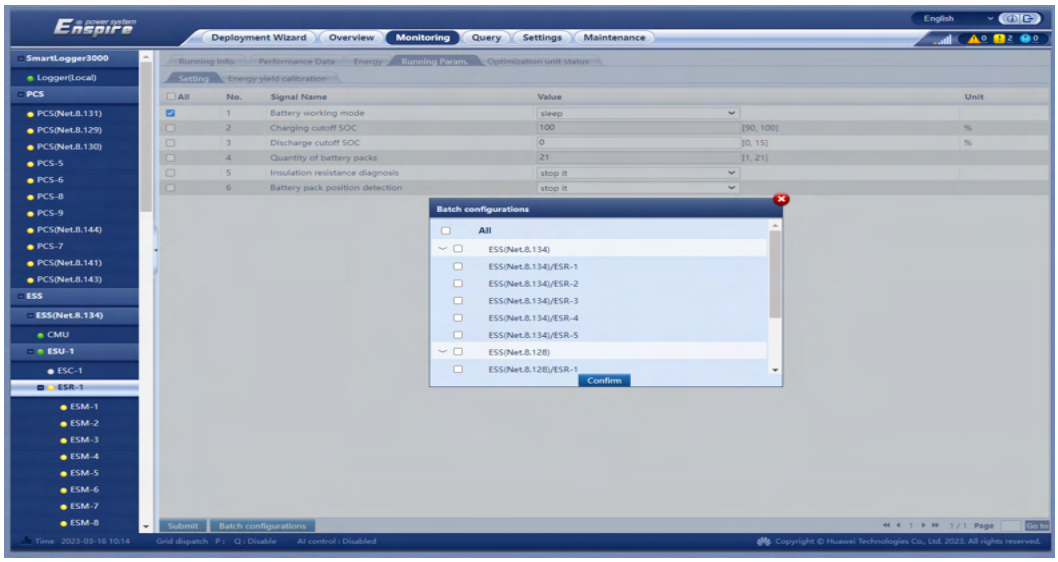


NOTE

- During the process of **Search for Device**, do not perform upgrade operations (such as upgrading through the app, management system, or WebUI).
- When you click **Search for Device**, cable connections (DC and AC) will be checked before device search (not applicable to third-party devices), and device addresses 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 connections 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 be updated.

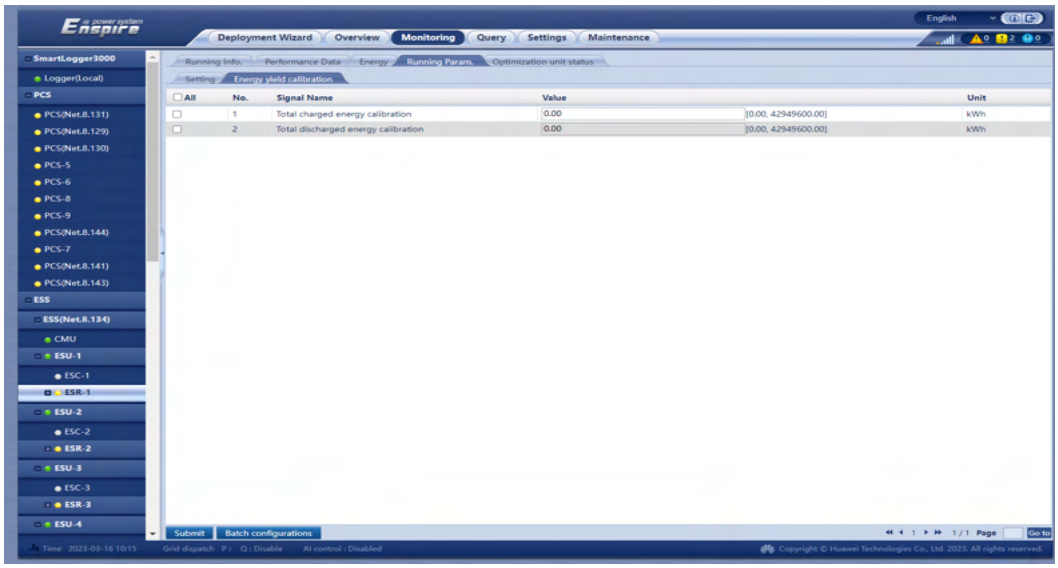
Step 8 Click **Monitoring**, select the old device, choose **Running Param.** > **Setting** > **All** > **Batch configurations**, select the new device, and click **Confirm** to synchronize data to the new device.

Figure 8-72 Batch configurations



Step 9 Click **Energy yield calibration** and set **Total charged energy calibration** and **Total discharged energy calibration** to be the same as those of the old device.

Figure 8-73 Energy yield calibration



Step 10 Check the running status of the Smart Rack Controller and check whether it functions properly.

----End

8.2 Replacing an Exhaust Fan

Prerequisites

- Fault locating:

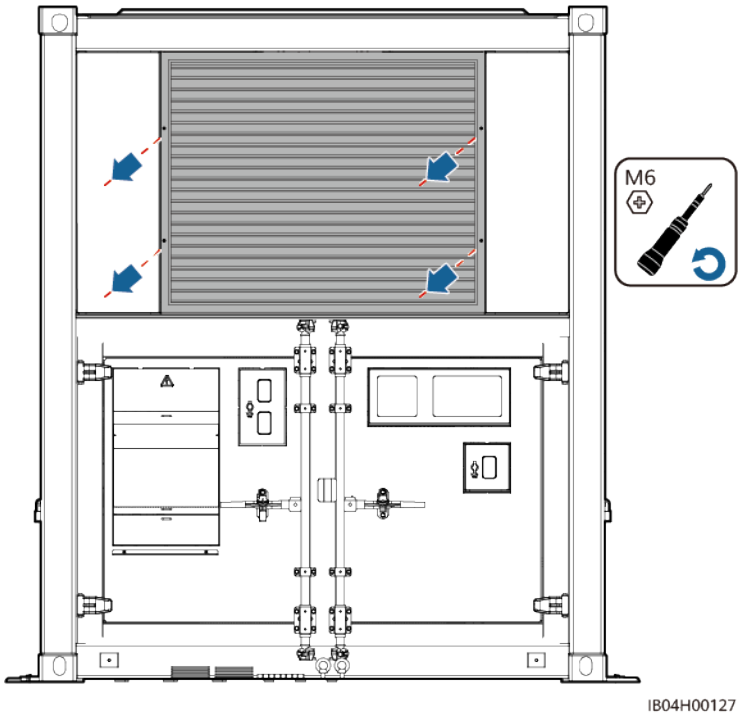
a. Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/ SmartPVMS and view alarm information. The Smart Rack Controller external fan alarm is generated.
b. Rectify the fault according to the handling suggestions in the alarm list.

- Tool: flat-head or Phillips screwdriver
- Power-off:
  a. Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/ SmartPVMS and deliver a shutdown command to the Smart Rack Controller.
  b. Switch off all battery rack output circuit breakers in battery cabins.
  c. Switch off all DC circuit breakers in the control unit cabin.
  d. Switch off the DC auxiliary power switch of the Smart Rack Controller in the control unit cabin.
  e. Turn off the DC switch of the exhaust fan controller power supply in the control unit cabin.

Procedure

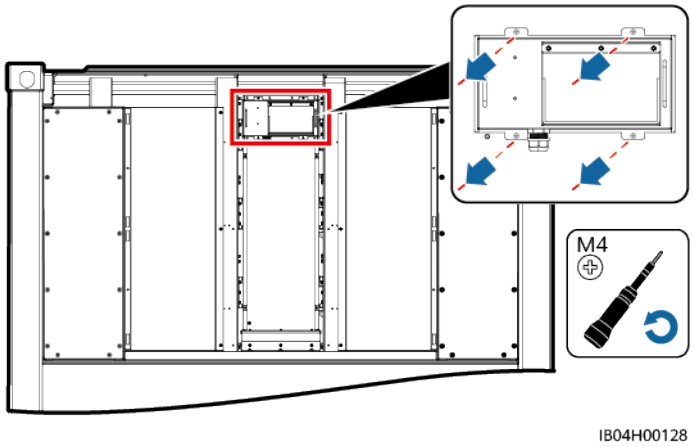
Step 1 Remove the Smart Rack Controller cabin louver.

Figure 8-74 Removing the Smart Rack Controller cabin louver



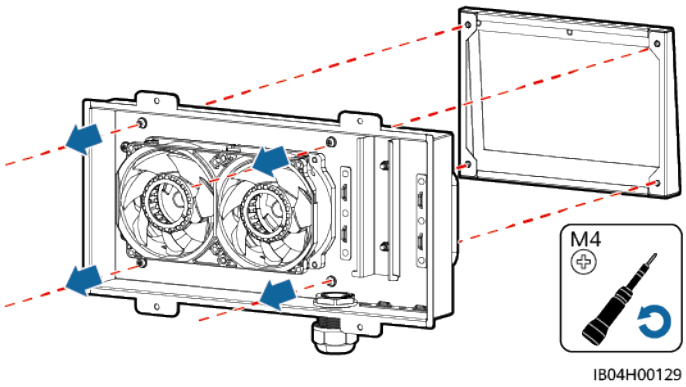
Step 2 Remove the fan frame.

Figure 8-75 Removing the fan frame



Step 3 Remove the fan baffle plate.

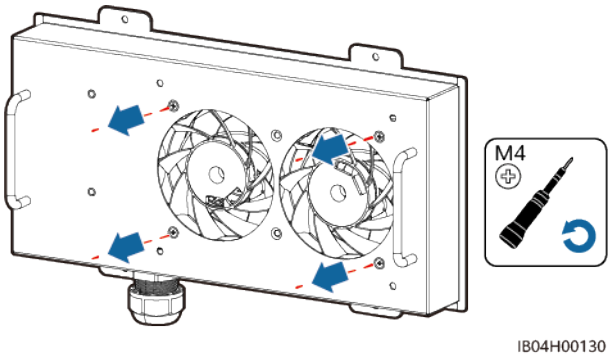
Figure 8-76 Removing the fan baffle plate



Step 4 Disconnect cables between the fan and the terminals.

Step 5 Unscrew and remove the fan.

Figure 8-77 Removing screws from the exhaust fan



Step 6 Install and secure a new exhaust fan to the installation position using screws.

Step 7 Connect the cables between the fan and the terminals.

Step 8 Secure the exhaust fan cover.

----End

Follow-up Procedure

Step 1 Turn on the DC switch of the exhaust fan controller power supply in the control unit cabin.

Step 2 Check whether the alarm is cleared.

Step 3 Log in to the SmartLogger WebUI/CMU WebUI/FusionSolar app/SmartPVMS and deliver a startup command to the Smart Rack Controller.

Step 4 Switch on all battery rack output circuit breakers in the battery cabin.

Step 5 Switch on all DC circuit breakers in the control unit cabin.

Step 6 Check whether the functions are restored.

Check Item	Criteria
Alarm information	No major or minor component alarms are generated.
Function	The power-on self-check function of the fan is normal.
Running data	The fan rotation speed is normal during the self-check in the monitoring backend.

----End

9 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 shall 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.

10 FAQ

10.1 How Do I Recycle Used Batteries?

NOTICE

- The Company does not recycle batteries. Contact local recycling agencies to handle batteries.
- If there are no such agencies in your area, you can contact the nearest foreign recycling agencies.

Step 1 Contact the nearest recycling agency.

Step 2 Recycling agencies assess the costs.

Step 3 Recycling agencies carry out recycling, which can be done in two ways:

- Onsite recycling: Recycling agencies can visit your sites to recycle lithium batteries, but the price depends on actual conditions such as the distance and transportation expenses.
- Centralized recycling: You can collect all lithium batteries to be recycled in one place for the recycling agencies to handle.

NOTE

You need to cover the related transportation expenses.

Step 4 Recycling companies handle recycling. The recycled lithium batteries are at the disposal of the recycling companies.

----End

10.2 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.

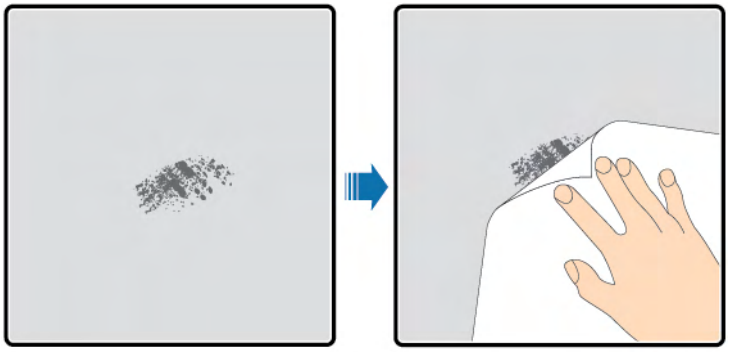
Table 10-1 Paint repair description

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 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.
Smudges and rust that cannot be removed			
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	
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

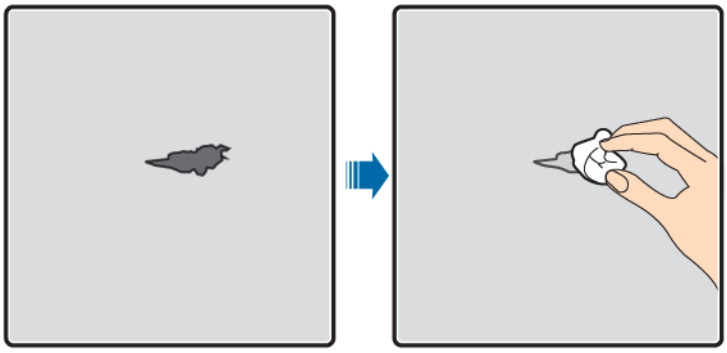
Step 1 Gently polish damaged areas using fine sandpaper to remove smudges or rust.

Figure 10-1 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 10-2 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

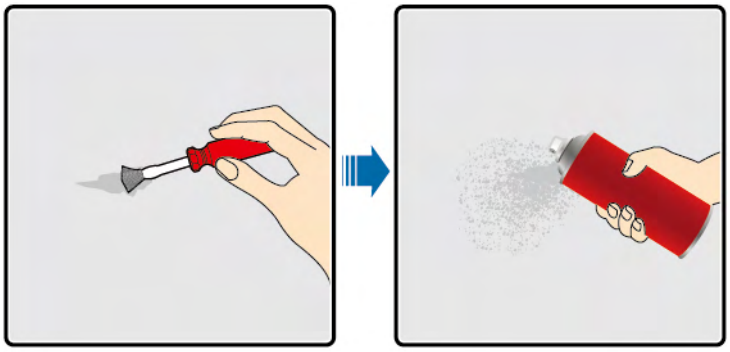
- If the base material is exposed in the area to be repaired, apply epoxy zinc-rich primer, wait until the paint has dried, and then apply acrylic acid top coat.
- Select epoxy zinc-rich primer or acrylic acid top coat with a color the same as the surface coating color of the equipment.

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 10-3 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 10-2 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

Item	Requirement
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

10.3 How Do I Use a CODER-F900B Encoder?

Figure 10-4 Connection diagram

NOTE

To encode the above devices, press the pound key (#) to switch the level of the encoder to 324.

10.3.1 Cable Connection Description for Encoding

- Transfer cable with an alligator clip: mainly used in address encoding for devices such as alarm button, fire hydrant button, electrical fire monitoring detector, fire power monitoring detector, and emergency evacuation light.
- Headset connector: inserted into a dedicated detector base and used in address encoding for devices such as point-type photoelectric smoke detector, point-type heat detector, and point-type smoke and heat detector.
- 5-pin connector: inserted into a dedicated detector base and used in address encoding for devices such as combustible gas detector.
- 4-pin connector: mainly used in address encoding for devices such as the input module, output module, and input/output module.

10.3.2 Operation Instructions

Startup and Shutdown

- When the device is powered off, press and hold the **ON/OFF** button for 1s. When the power and encoding indicators are on and the screen displays numbers, the device is powered on.

- When the device is working properly or in power saving mode, press the **ON/OFF** button to turn off the battery power supply, turn off all indicators and displays, and power off the device.
- When an external DC power supply is connected, the power indicator is steady on when the device is shut down. Press the **ON/OFF** button to restart the device.

Switching Operation Modes Between Different Terminals

- Press the pound key (#) to switch between different types of terminals.
- During switchover, you can determine the terminal type and operations that can be performed according to the status of the display screen and switchover indicator.

Level	Terminal Type	Allowed Operation	Switchover Indicator
324	9000 system terminal	Read/Write address	Off
108	Fire emergency light	Read/Write address	Steady on
99A	Electrical fire monitoring system terminal	Read/Write alarm value	Blinking
199	2100 system terminal	Read/Write address	Off

Checking the Battery Level

- Press and hold the asterisk key (*) to view the current battery level. There are 1 to 10 levels, displayed as  .
-  indicates that the battery is fully charged and can work continuously for about 10 hours.
-  indicates that the battery level is low and needs to be charged promptly. Meanwhile, the buzzer buzzes every 30 seconds.
-  indicates that the battery level is very low, and the system will soon automatically shut down and cannot be restarted even when you press the **ON/OFF** button.
- Charge the battery promptly to avoid overdischarge. The battery can be fully charged in five hours. When the battery is fully charged, the charging indicator turns off.

NOTE

The battery continuous working hours may vary. The values are for reference only.

Encoding Address

Step 1 Connect terminal devices with dedicated external cables, and switch to the corresponding mode according to the terminal type.

Step 2 The encoding indicator is steady on. Press the number keys to enter the address code to be encoded, and then press the **Run/Stop** key to encode the address code.

----End

NOTE

- If the encoding fails, **EFF** will be displayed on the screen and the buzzer will buzz three times. In this case, you can check the cable connection and the current terminal type, and then encode again.
- If an incorrect address is entered, press **Delete** to delete the address and enter the address to be encoded again.

Encoding Using the Address Auto-add 1 Mode

Step 1 Press and hold the function selection key for more than 2 seconds. When the encoding indicator blinks, the device enters the address auto-add 1 mode.

Step 2 Connect the terminal device to the encoder for automatic encoding. If the encoding is successful, the buzzer will buzz once and **P--** will be displayed on the screen.

Step 3 When the terminal device is removed, the address is automatically incremented by one and encoded accordingly.

----End

Reading Address Code

Step 1 Connect terminal devices with dedicated external cables, and select the corresponding system bus type according to the terminal type.

Step 2 If the reading indicator is steady on, press the **Run/Stop** key to read the device address. If the reading succeeds, the device address is displayed on the display screen with a buzzer sound.

NOTE

If the reading fails, **EFF** will be displayed on the screen and the buzzer will buzz three times. In this case, you can check the cable connection and the bus system mode, and then encode again.

Step 3 a. After reading the address value of the fire emergency light, press the number key 1 to turn on the currently connected light (the light is on for 10 seconds) . Then the fire emergency light turns off with a buzzer sound.

b. After reading the address value of the fire emergency marker light, press the number key 3 to turn on the fire emergency marker light. The fire emergency marker light blinks for 10 seconds. Then the fire emergency marker light turns off with a buzzer sound (the fire emergency light does not blink).

NOTE

Do not perform other operations when the fire emergency light is on or blinking.

----End

10.4 Storage and Recharge

10.4.1 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

- 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.
- After batteries are powered off, static power consumption and self-discharge loss may occur in internal modules, which may cause battery damage due to overdischarge. Do not store batteries in low SOC and charge batteries in a timely manner. Permanent battery faults caused by delayed charge are not covered by the warranty. Storing the batteries in low SOC occurs in scenarios including but not limited to the following:
  - The power cables or signal cables are not connected.
  - The batteries cannot be charged due to a system fault after discharge.
  - The batteries cannot be charged due to incorrect configurations in the system.
  - The batteries cannot be charged due to long-term mains failure.
  - The batteries cannot be charged because the switch of the Smart Rack Controller, Smart PCS, or main loop component is off.

CAUTION

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

- Packaging label description

Label	Description
	This way up: The package shall be vertically oriented during transport and storage.
	Fragile: The package contains fragile objects and shall be handled with care.
	Keep dry: The package shall be kept away from rain.
	Stacking limit by number: The packages shall 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 (0°C to 30°C are recommended. If batteries are stored at a temperature higher than 40°C for extended periods, the battery performance and service life may be deteriorated.)
  - 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 m 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 following table lists the maximum charge intervals for batteries delivered separately. Charge the batteries promptly and calibrate the SOC to at least 50%. Otherwise, the battery performance and service life may be deteriorated.

Storage Temperature (T)	Maximum Charge Interval[a]
–40°C < T ≤ +30°C	15 months
30°C < T ≤ 40°C	11 months
40°C < T < 60°C	7 months
Note a: The interval starts from the latest charge time labeled on the battery package.	

- The following table lists the maximum total storage and transportation time for batteries delivered with the ESS. Charge the batteries promptly and calibrate the SOC to at least 50%. Otherwise, the battery performance and service life may be deteriorated.

Storage Temperature (T)	Maximum Total Storage and Transportation Time[a]
–40°C < T ≤ +30°C	11 months
30°C < T ≤ 40°C	7 months
40°C < T < 60°C	3 months
Note a: The total time starts from the time when the product is shipped.	

- Do not unpack batteries. If charging is necessary, they must be charged by professionals as required and then returned to their original packaging after charging.
- The warehouse keeper shall collect battery storage information every month and periodically report the battery inventory information. The batteries in long-term storage shall 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.

- When stored in low SOC, the batteries must be charged within the maximum interval corresponding to the SOC when the batteries are powered off. If the batteries are not charged within the specified interval, they may be damaged due to overdischarge.

Power-Off SOC Before Storage	Maximum Charge Interval
SOC ≥ 50%	Refer to the charge intervals for batteries delivered separately.
5% ≤ SOC < 50%	20 days
SOC < 5%	48 hours

- For details about how to charge batteries, see **10.4.2 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 shall range from 0°C to 50°C and the humidity shall 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.

10.4.2 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.

Conditions for Determining Overdue Storage

- Do not store batteries for extended periods.
- The following table lists the maximum charge intervals for batteries delivered separately. Charge the batteries promptly and calibrate the SOC to at least 50%. Otherwise, the battery performance and service life may be deteriorated.

Storage Temperature (T)	Maximum Charge Interval[a]
–40°C < T ≤ +30°C	15 months
30°C < T ≤ 40°C	11 months
40°C < T < 60°C	7 months
Note a: The interval starts from the latest charge time labeled on the battery package.	

- The following table lists the maximum total storage and transportation time for batteries delivered with the ESS. Charge the batteries promptly and calibrate the SOC to at least 50%. Otherwise, the battery performance and service life may be deteriorated.

Storage Temperature (T)	Maximum Total Storage and Transportation Time[a]
–40°C < T ≤ +30°C	11 months
30°C < T ≤ 40°C	7 months
40°C < T < 60°C	3 months
Note a: The total time starts from the time when the product is shipped.	

- 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.
- Batteries can be charged for a maximum of three times during storage. 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.

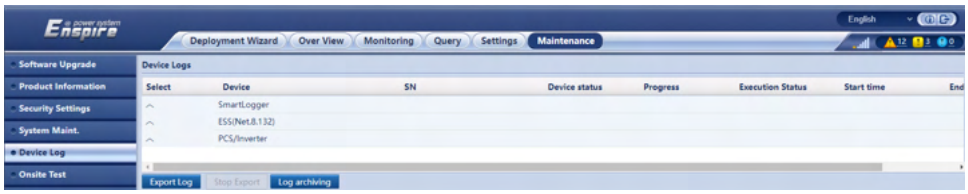
Step 7 After the discharge and charge are complete, wait until the fan in the charger keeps running for about 5 minutes to dissipate the residual heat, turn off the AC and DC circuit breakers, and remove the cables.

----End

10.5 How Can I Export Device Logs from the CMU/ SmartLogger3000?

Step 1 Access the device log page.

Figure 10-5 Exporting logs



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

NOTE

- Logs of two or more types of devices cannot be exported at a time. For example, you cannot select both **SUN2000** and **MBUS**.
- Logs can be exported for a maximum of six devices of the same type at a time.
- Battery Log: Select the device and click **Export Log**. On the Select Upload File Type dialog box that is displayed, select **Battery logs**. You can click the plus sign to select batteries.
- If the active power control mode is set to **Grid connection with limited power** or **Remote communication scheduling**, and the reactive power control mode is set to **Power factor closed-loop control** or the working mode of **Battery Control** is enabled, you are advised to export logs when inverters and Smart PCSs are disconnected from the grid. Otherwise, power control may be abnormal or the log export may fail.

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

10.6 How Do I Reset the Extinguishant Control Panel?

JB-QBL-QM210 Extinguishant Control Panel

Step 1 Press * to enter the password. (Initial password: 22222222)

Step 2 Press OK.

Step 3 Press the reset button to complete the reset.

----End

K11031M2 Extinguishant Control Panel

Step 1 Turn the key of Enable Control rightwards.

Step 2 Press the Reset button.

Step 3 Turn the key of Enable Control leftwards to the vertical position.

----End

A Acronyms or Abbreviations

B	
BCU	Battery Control Unit
BMU	Battery Monitoring Unit
C	
CMU	Central Monitoring Unit
E	
ETH	Ethernet
ESU	Energy Storage Unit
ESC	Smart Rack Controller
ESR	Battery Rack
ESM	Battery Pack
L	
LED	light emitting diode
LLVD	load low voltage disconnection

P

PSU	Power Supply Unit

S

SACU	Smart Array Controller
SMU	Site monitoring unit