LUNA2000-200KWH-2H1 Smart String ESS

User Manual

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About This Document

Purpose

This document describes the installation, electrical connections, commissioning, and troubleshooting of LUNA2000-200KWH-2H1 Smart String Energy Storage System (also referred to as ESS). Before installing and operating the ESS, ensure that you are familiar with the features, functions, and safety precautions provided in this document.

Intended Audience

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

Symbol Conventions

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

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

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue Draft (2022-10-30)

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

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1 Safety Information

1.1 General Safety

Statement

Before installing, operating, and maintaining the equipment, read this document and observe all the safety instructions on the equipment and in this document.

The information provided under the **NOTICE**, **CAUTION**, **WARNING**, and **DANGER** headings within this manual is not intended to cover all applicable safety policies, but instead acts as a supplement to the comprehensive safety information provided. The Company will not be liable for any consequences that may arise due to violations of general safety requirements or safety standards concerning the design, production, and usage of the equipment.

Ensure that the equipment is used in environments that meet its design specifications. Otherwise, the equipment may become faulty, and any resulting malfunction, component damage, personal injury, or property damage will not be covered under the warranty.

Follow local laws and regulations when installing, operating, or maintaining the equipment. The safety instructions in this document are only supplements to local laws and regulations.

The Company will not be liable for any consequences in the following circumstances:

- Installation or use in environments which are not specified in relevant international, national, or local standards
- Operation beyond the conditions specified in this document
- Unauthorized modifications to the product or software code or removal of the product
- Failure to follow the operation instructions or safety precautions on the product or in this document
- Equipment damage due to force majeure, such as earthquakes, fires, storms, floods, and debris flows
- Damage due to customer's failure to comply with transportation and installation requirements
- Storage conditions that do not meet the requirements specified in this document
- Damage to the hardware or data of the equipment due to customer's negligence, incorrect operation, or intentional damage

- System damage caused by operations of a third party or customer not in compliance with this document, including those in system transportation and installation, and adjustment, alteration, or removal of identification marks
- Defects, malfunctions or damage caused by acts, events, negligence, or accidents beyond the Company's reasonable control, including power outages or electrical failures, theft, wars, riots, civil disturbances, terrorism, and intentional or malicious damage, etc.

General Requirements

DANGER

Improper operations on high-voltage equipment may cause an electric shock or fire, which could result in death, serious injury, or serious property damage. Comply with the following precautions:

- Observe the operation procedures and safety precautions provided in this manual and other related documents.
- Observe the safety precautions specified in the warning signs and labels on the equipment.
- Use correct tools properly as required in this manual.
- Observe the safety regulations of the plant, such as the operation and work ticket mechanisms.
- Only personnel who need to work on the equipment are allowed to access the equipment. Install temporary warning signs or fences before working on the equipment.
- The warning signs and protection labels on the equipment must be clear and prominent. Do not alter, damage, or block them. Replace the signs and labels promptly if damaged.
- Do not perform installation, cable connection, maintenance, or replacement when the equipment is energized.
- Do not use water to clean electrical components in the equipment.
- Check the equipment for any damage, such as holes, dents, or other signs of internal damage.
- Check that the preinstalled cables are securely connected.
- Ensure that the components in the equipment are not displaced. Do not alter the equipment structure or installation procedures without permission.
- Do not power on the equipment before it is installed or confirmed by professionals.
- Wear appropriate protective clothing when powering on the system for the first time or operating the main loop with power on.
- Before handling a conductor surface or terminal, measure the contact point voltage, and ensure that the ground cables of the equipment or components are connected reliably and there is no risk of electric shock.
- If any liquid is detected inside the equipment, immediately press the emergency stop button and contact the onsite management personnel.
- Do not open the cabinet door when the system is running.

CAUTION

- Do not touch the equipment while it is in use, as the enclosure is hot.
- 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.
- Evacuate from the site immediately once the fire alarm horn/strobe is triggered.
- During the operation and maintenance of the equipment, if you need to leave temporarily, close and lock the cabinet doors.

NOTICE

- During transportation, transfer, installation, cable connection, and maintenance, comply with the national and local laws, regulations, and relevant standards.
- The materials and tools prepared by the customer must comply with the national and local laws, regulations, and relevant standards.
- Obtain approval from the national and local electric utility company before connecting the equipment to the grid.
- Before opening container 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 container to prevent foreign objects from falling into the container.

NOTE

- Do not perform reverse engineering, decompilation, disassembling, disassembly, adaptation, implantation, or other derivative operations on the equipment software. Do not study the internal implementation of the equipment, obtain the source code of the equipment software, steal intellectual property rights, or disclose any of the performance test results of the equipment software.
- You are advised to prepare a camera to record the installation, operation, and maintenance of the equipment.

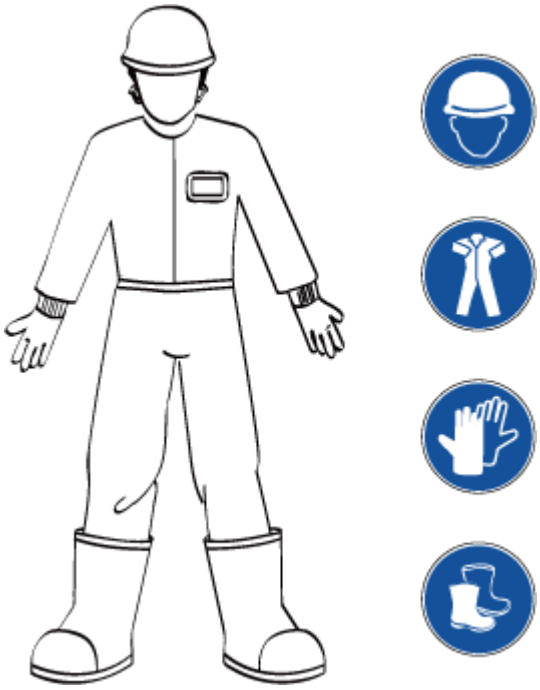
1.2 Personnel Requirements

- Only qualified personnel are allowed to operate the equipment, including transportation, transfer, installation, cable connection, and maintenance. Wear personal protective equipment (PPE) when operating the equipment.
- Operators must pass the Company's training and have professional knowledge of energy storage systems.

NOTE

For specific qualification requirements, see local laws, regulations, and industry standards.

Figure 1-1 Wearing PPE



- Before installing, operating, or maintaining the equipment, remove conductive objects such as watches, bracelets, bangles, rings, and necklaces to prevent electric shock.
- During transportation, transfer, installation, cable connection, and maintenance, comply with the national and local laws, regulations, and relevant standards.
- Personnel must be familiar with the structure and working principles of the entire ESS, and perform operations according to the manual.

1.3 Storage and Installation Environment Requirements

General Requirements

NOTE

- Proof that the product is stored according to the requirements must be kept properly, such as temperature and humidity log data, storage environment photos, and inspection reports.
- It is not recommended to store battery packs for extended periods. Long-term storage of lithium batteries may cause capacity loss. Generally, the irreversible capacity loss is 3% to 10% after the lithium batteries are stored at the recommended storage temperature range for 12 months.

- The storage environment must be clean and dry. The product must be protected from dust, moisture, rain, and water.
- The air must not contain corrosive or flammable gases.
- The ESS cannot be tilted or placed 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 (Excluding Battery Packs) Storage

- Do not unpack the ESS if it will be stored for a long time.
- The ESSs cannot be stacked.
- The ground surface is flat (long-term or temporary storage).
- The cabinet door is closed.
- Storage temperature: –40 ℃ to +60 ℃; humidity: 5%–95% RH

Battery Pack Storage and Maintenance Charge

1. Install battery packs in a dry, clean, and well-ventilated indoor environment that is free from sources of strong infrared radiation, organic solvents, and corrosive gases. Do not expose the battery packs to sunlight or water and keep them far away from sources of ignition.
2. The total storage and transportation time of the battery packs cannot exceed eight months (starting from delivery). If it exceeds eight months, charge the battery packs and calibrate the SOC to at least 50%. Otherwise, the battery performance and service life may be affected.
3. The warehouse keeper should collect battery pack storage information every month and periodically report the battery pack inventory information to the planning department. The battery packs that have been stored overdue should be recharged in a timely manner.
4. Battery packs should be delivered based on the "first in, first out" rule.

Conditions for Determining Overdue Storage of Battery Packs

Do not store batteries for extended periods. Comply with the following storage requirements.

Table 1-1 Lithium battery recharge interval

Required Storage Temperature	Actual Storage Temperature (T)	Recharge Interval (Overdue Storage Period)	Remarks
0–40 ℃	0°C ≤ T ≤ 30°C	12 months	Within the recharge interval: Use batteries as soon as possible. Reaching the time for recharge: Recharge the batteries.
	30°C < T ≤ 40 ℃	8 months	

1. If batteries have been stored overdue, promptly report the event to the department leader.
2. Dispose of deformed, damaged, or leaking batteries directly irrespective of how long they have been stored.
3. The storage duration starts from the latest charge time labeled on the battery package. If a battery is qualified after recharge, update the latest charge time and the next charge time (next charge time = latest charge time + recharge interval) on the label.
4. The maximum storage period is three years. Batteries can be recharged for three times at maximum within the three years. For example, it can be recharged every 8 months or every 12 months. Dispose of batteries if the maximum storage period and recharging times are exceeded.

5. Long-term storage of lithium batteries may cause capacity loss. Generally, the irreversible capacity loss is 3% to 10% after the lithium batteries are stored at the recommended storage temperature range for 12 months. Batteries may fail the discharge test acceptance tests when their capacity after storage is less than 100% of the rated capacity.

Storage Requirements for a Smart Rack Controller

If a 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: every three months). If any rodent bites are found, replace the packaging immediately. 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 ℃ to +70 ℃ (–40 ℉ to +158 ℉); humidity: 5%–95% RH
- Stack Smart Rack Controllers with caution to prevent them from falling over, which may result in personal injury or equipment damage.

Installation Environment

Comply with the following requirements during onsite installation:

- When installing the ESS, comply with the fireproof distance or firewall 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*.
- Do not expose the equipment to flammable or explosive gases or smoke. Do not perform any operation on the equipment in such environments.
- 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, and performing outdoor installation) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- 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.
- To prevent fire due to high temperatures, ensure that vents and heat dissipation systems are not obstructed while the equipment is running.
- Install the equipment in an area far away from liquids. Do not install it under areas prone to condensation, such as 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.
- Keep the equipment away from fire sources. Do not place any flammable or explosive materials around the equipment.
- If the equipment is installed in a place with dense vegetation, in addition to routine weeding, harden the ground under the equipment to prevent weeds from growing.
- The site must be a class C or higher environment but not a class D or E environment.

NOTE

- Class C environment: Outdoor areas more than 500 m away from the sea. If a site is near a pollution source, it must be 1500–3000 m away from heavy pollution sources, such as smelteries, coal mines, and thermal power plants; 1000–2000 m away from medium pollution sources such as chemicals, rubber, and galvanization; or 500–1000 m away from light pollution sources, such as packing houses, tanneries, boiler rooms, slaughterhouses, landfill sites, and sewage treatment plants.
- Class D environment: Sea environments or outdoor areas within 500 m away from the sea. If a site is near a pollution source, it is within 1500 m away from heavy pollution sources such as smelteries, coal mines, and thermal power plants, within 1000 m away from medium pollution sources such as chemical, rubber, and galvanization industries, or within 500 m away from light pollution sources such as packing houses, tanneries, boiler rooms, slaughterhouses, landfill sites, and sewage treatment plants.
- Class E environment: Special environments, such as underground or underwater environments.

Working at Heights

- Wear PPE such as safety helmet, safety belt, and waist rope fastened to a solid structure. Do not mount it on an insecure and moveable object or metal object with sharp edges. Make sure that the hooks will not slide off.
- Set a restricted area and put up prominent signs for working at heights. Only related personnel can enter the area.
- 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.
- Personnel involving working at heights are not allowed to throw objects from the height to the ground, or vice versa. Objects should be transported by ropes, hanging baskets, highline trolleys, or cranes.
- Inspect the scaffolding, springboards, and workbenches used for working at heights in advance to ensure that their structures are solid and not overloaded.
- Stop working at heights in rain and other hazardous situations. After the preceding conditions no longer exist, the safety director and relevant technical personnel must check the involved equipment. Operators can begin working only after obtaining approval.
- Set guard rails and warning signs at the edges and openings of the area involving working at heights to prevent falls.
- Carry the operating devices and tools carefully to prevent them from falling off.
- The site manager or safety supervisor must promptly point out any violations and the involved personnel must correct their operations. Personnel cannot proceed with the operations unless they comply with the requirements.

1.4 Loading/Unloading and Transportation Requirements

DANGER

The ESS must be loaded and unloaded in compliance with local laws, regulations, and industry standards. Reckless handling may cause short circuits or damage to battery packs in the container, which may result in electrolyte leakage, breakage, explosions, or fires.

NOTICE

The product passes the certifications of the *UN38.3 (UN38.3: Section 38.3 of the sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria)* and *SN/T 0370.2-2009 (Part 2: Performance Test of the Rules for the Inspection of Packaging for Exporting Dangerous Goods)*. This product belongs to Class 9 dangerous goods.

Before transportation:

- If battery packs collide, fall, generate smoke, or catch fires, perform operations according to the emergency handling plan. Otherwise, do not start transportation.
- Check the ESS and ensure that the container is intact, doors are closed and locked, and no foreign object exists, and there is no smoke or burning smell. Otherwise, do not start transportation.

NOTE

Handle the ESS with care during loading, unloading, and transportation with moisture-proof measures in place. The actual capacity may vary depending on the environment conditions, such as temperature, transportation conditions, and storage conditions.

During transportation:

- The ESS cannot be transported by rail or air.
- Maritime transport must comply with the *International Maritime Dangerous Goods Code* (IMDG Code).
- Road transport must comply with the *International Carriage of Dangerous Goods by Road* (ADR) or JT/T 617.
- Comply with the requirements of the transportation regulatory authorities in the countries of departure, route, and destination.
- Comply with the international regulations on the transport of dangerous goods and the requirements of the transport regulatory authorities of the respective countries.
- Monitor the entire transportation process.
- The load-bearing capacity of land transport vehicles must meet the following requirements: The weight of a single ESS (excluding battery packs) is about 900 kg.
- The speed limit for road transport is 80 km/h on flat roads and 60 km/h on rough roads. In the case of any conflict, comply with local traffic laws and regulations.
- Stacking is prohibited at ports and on ships.

During transportation, prevent the following situations:

- Falling into water
- Falling or mechanical impact
- Being upside-down or tilted

NOTE

If the preceding situation occurs, refer to the emergency handling plan.

1.5 Electrical Safety

Cabling

- Do not perform any improper operations, for example, dropping cables directly from a vehicle.
- Do not route cables through air intake or exhaust vents of the equipment.
- Bind cables of the same type together. 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 immediately with the sealing mud to prevent small animals from entry.
- 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.
- Select cables that comply with local laws and regulations.
- A fire suppression system is equipped. Do not press the extinguishant release button in non-emergency situations.
- The positions where cables are routed through pipes or holes must be protected to prevent the cables from being damaged by sharp edges or burrs.
- Ensure that the cables are properly connected and insulated, and meet specifications.
- After cables are connected, secure them 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.
- 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 ℃. 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.

Grounding Requirements

- Do not damage the ground conductor.
- Do not work on the equipment in the absence of a properly installed ground conductor.
- 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.
- The main grounding body of the equipment must be permanently connected to the grounding grid. Before working on the equipment, check its electrical connections to ensure that it is reliably grounded.
- The grounding impedance of the equipment meets the requirements of GB 50054 and local electrical standards.

AC and DC Power

- Before installing or removing a power cable, turn off the power switch.
- Before connecting a power cable, check that the label on the power cable is correct.
- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.

Safety Requirements in Maintenance and Repair

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

NOTICE

- Before connecting a cable, check that the labels on it are correct.
- If the equipment has multiple inputs, disconnect all the inputs before working on the equipment.

6. After the maintenance or repair is complete, remove the ground cable between the loop that has been repaired and the ground loop.

Electrostatic Discharge (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.

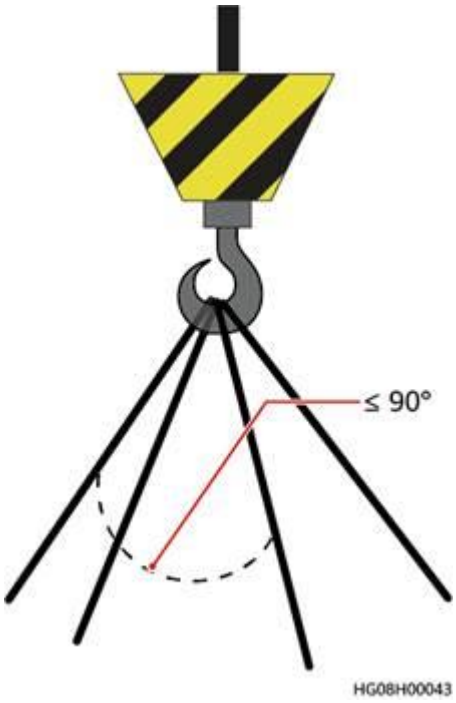
- Wear ESD gloves before touching a device or holding a board or PSU.
- When holding a board or PSU, hold its edge without touching any components. Do not touch the components with your bare hands.
- Package removed boards or PSUs with ESD packaging materials before storing or transporting them.

1.6 Mechanical Safety

Hoisting

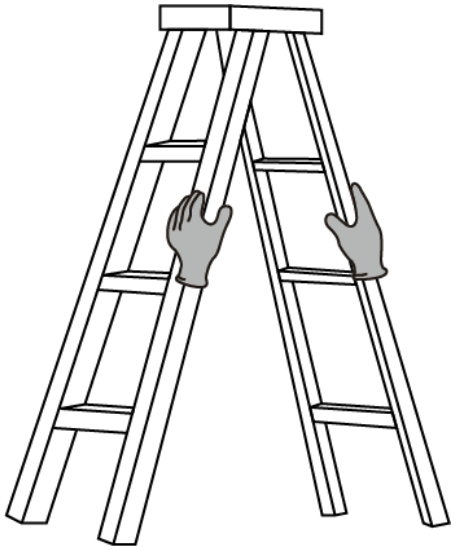
- The foundation where hoisting is performed must meet the load-bearing requirements.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a fixed object or wall that meets the load-bearing requirements.
- Do not drag steel ropes and hoisting tools or bump the hoisted objects against hard objects during hoisting.
- During hoisting, do not stand or walk under the crane or the hoisted objects.
- Install temporary warning signs or fences to isolate the hoisting area.

- Ensure that the angle between two hoisting ropes is no more than 90 degrees, as shown in the following figure.



Using Ladders

- Do not use a straight ladder.
- Before using a ladder, check that it is intact and confirm its load bearing capacity. Do not overload it.
- Use wooden or fiberglass ladders when you need to perform live-line working at heights.
- Platform ladders with protective rails are preferred. The ladder must be secured at the four feet and held by a person.
- When a step ladder is used, ensure that the pull ropes are secured and the ladder is held firm by a person.



- When climbing a ladder, take the following precautions to reduce risks and ensure safety:

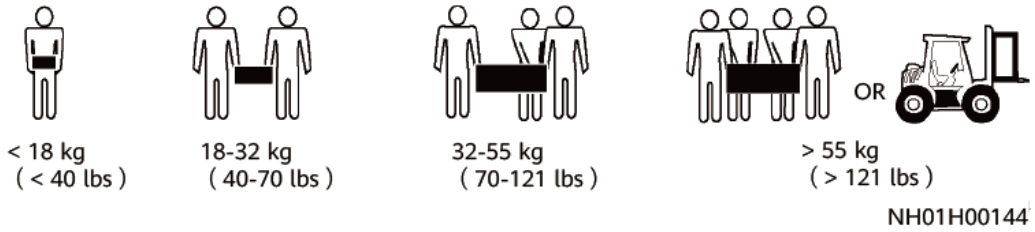
- Keep your body steady.
- Do not climb higher than the fourth rung of the ladder from the top.
- Keep your center of gravity between the side rails, and do not overreach to the sides.

Drilling Holes Nearby the Equipment

- Drill holes at proper positions to ensure that no short circuit is caused.
- Wear protective equipment such as safety goggles and protective gloves when drilling holes.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings.

Moving Heavy Objects

- When moving heavy objects, ensure that the number of operators meets the requirements as shown in the following figure and make proper preparations.



- Wear protective gloves and anti-smashing shoes when manually moving the equipment.
- Do not scratch the equipment surface or damage components or cables when moving the equipment.
- When transporting the equipment using a forklift truck, ensure that the forks are properly positioned so that the equipment does not topple. Before moving the equipment, secure it to the forklift truck using ropes. When moving the equipment, assign dedicated personnel to take care of it.
- Move the equipment with caution to prevent collision or fall.

1.7 Battery Safety

Statement

The Company shall not be liable for any damage to battery packs caused by the following reasons:

- The battery packs are not charged as required during storage, resulting in capacity loss or irreversible damage to the battery packs.
- Mechanical damage, leakage, and breakage result from improper operations or incorrect connection of battery packs.
- After being installed and connected to the system, the battery packs are not powered on in time, which causes damage to the battery packs due to overdischarge.
- Battery packs are damaged because they are not accepted in time due to reasons attributed to the customer.
- Battery pack running parameters are incorrectly set.

- The customer or a third party uses battery packs beyond the scenarios specified by the Company. For example, connect extra loads or use with other battery packs, including but not limited to battery packs of other brands or battery packs of different rated capacities.
- Damage is caused to battery packs because the battery operating environment or external power parameters do not meet environment requirements. For example, the actual operating temperature of battery packs is too high or too low.
- Battery packs are frequently overdischarged due to improper maintenance, capacity is incorrectly expanded, or the battery packs have not been fully charged for a long time.
- Battery packs are not maintained based on the operation guide, such as failure to check battery terminals regularly.
- Battery packs are stolen.
- The warranty period of battery packs has expired.

Basic Requirements

DANGER

- Do not expose battery packs at high temperatures or around heat-generating sources, such as sunlight, fire sources, transformers, and heaters. Overheating battery packs may cause fires or explosions.
- To prevent leakage, overheating, fires, or explosions, do not disassemble, alter, or damage battery packs (for example, insert foreign objects into battery packs or immerse battery packs in water or other liquids).
- The fire hazard of the lithium-ion/sodium-ion battery energy storage system is high. Consider the following safety risks before handling battery packs:
- Battery electrolyte is flammable, toxic, and volatile.
- Battery thermal runaway can generate flammable gases and harmful gases such as CO and HF.
- The accumulation of flammable gases generated from battery thermal runaway may cause deflagration and explosion.

- If a battery pack is accidentally exposed to water, do not use it. Move it to a safe place for isolation and apply for spare parts in a timely manner.
- Install battery packs in a dry, clean, and well-ventilated environment that is free from sources of strong infrared radiation, organic solvents, and corrosive gases. Do not expose the battery packs to direct sunlight or rain.
- Battery packs must be stored in a separate room and inside the packaging. Do not store battery packs together with other materials or in the open air. Do not stack battery packs too high. The site must be equipped with qualified fire suppression facilities, such as firefighting sands and fire extinguishers.
- Check the fire safety of the ESS regularly, at least once a month.
- Do not remove the battery pack packaging before use. Battery packs should be charged by professionals in accordance with the requirements. Put battery packs back to their packaging after charge during storage.
- In an outdoor scenario, you are advised to power on battery packs within 24 hours after unpacking. If the battery packs cannot be powered on in time, place them in a dry indoor environment without corrosive gases.

- Place battery packs according to the "this side up" sign or label on the packing case to prevent electrochemical cell leakage.
- The battery packs should be protected from impact.
- Move battery packs in the correct direction. Battery packs cannot be placed upside down or tilted.
- Use battery packs within the specified temperature range. When the ambient temperature of the battery packs is lower than the allowed range, do not charge the battery packs to prevent internal short circuits caused by crystallization during low-temperature charging.
- Dispose of waste battery packs in accordance with local laws and regulations. Do not dispose of battery packs as household waste. Improper disposal of battery packs may result in environmental pollution.
- Do not use damaged battery packs (dented on the enclosure or other damage). Damaged battery packs may cause the release of flammable gases. Do not store damaged battery packs near undamaged products.
- Do not store damaged battery packs with flammable materials. Keep non-professionals away from the storage area.
- Monitor damaged battery packs during storage for signs of smoke, flame, electrolyte leakage, or heat.

Charge Requirements

- If a battery pack has not been charged for more than eight months, charge the battery pack again. Otherwise, the battery pack performance and service life may be affected.
- You can obtain the battery pack production completion time by querying the delivery record based on the battery pack SN or consulting the Company's service engineers.

Battery Pack Installation Requirements

NOTE

Before installing battery packs, check whether the battery packs are abnormal. A battery pack is deemed abnormal when any of the following symptoms occurs:

- The enclosure of the battery pack is obviously deformed or damaged.
- The voltage between the positive and negative electrodes of the battery pack is far below the specified range.

- Use battery packs of specified models. Using battery packs of other models may cause damage.
- Before installing battery packs, check whether the packaging is intact. Do not use battery packs with damaged packaging.
- Place and secure battery packs horizontally.
- When installing battery packs, do not place installation tools or other objects on the battery packs.
- During installation, ensure that the positive and negative electrodes of battery packs are not short-circuited.
- During installation, ensure that the terminals are tightened properly using a torque wrench and check them regularly.

Battery Pack Short Circuit Protection

DANGER

Battery pack short circuits can generate high instantaneous currents and release a great amount of energy, which may cause equipment damage or personal injury.

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

Hazard and Toxicity Description

DANGER

- Hazard: Contact between battery pack terminals and other metal objects may cause heat or electrolyte leakage. The electrolyte is flammable. If the electrolyte leaks, move battery packs away from fire sources immediately.
- Toxicity: Steam produced by battery pack burning may irritate eyes, skin, and throat.

Battery Pack Troubleshooting Measures

DANGER

- Avoid contact with leaked liquids or gases in the case of electrolyte leakage or abnormal odor. Keep non-professionals away. Contact professionals immediately. Professionals must wear safety goggles, rubber gloves, gas masks, and protective clothing.
- Electrolyte is corrosive and can cause irritation and chemical burns. If you come into 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.

Dropped Battery Packs

- When a battery pack is dropped (with or without packaging) but 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 pack to an open and safe place by professionals using mechanical tools, and contact the Company's service engineers. Leave the battery pack for an hour and wait until the battery pack temperature is within room temperature ±10 ℃ before handling.
  - ESS onsite: Evacuate personnel, close the doors of the ESS, transfer the battery pack to an open and safe place by professionals using mechanical tools, and contact

the Company's service engineers. Leave the battery pack for an hour before handling.

- If a dropped battery pack has obvious damage, or abnormal odor, smoke, or a fire occurs, evacuate the personnel immediately, contact the professionals, and call emergency services. The professionals can use fire suppression facilities to extinguish the fire under safety protection.
- Do not use a dropped battery pack. Contact the Company's service engineers for evaluation.

1.8 Maintenance and Replacement

CAUTION

Before removing a component from the cabinet, ensure that other components on the cabinet are secure.

- During maintenance, the surrounding energized components in the equipment must be covered with insulation material.
- Do not open the container door in weather conditions such as rain, snow, lightning, dust storm, or fog.
- Do not touch a running fan with your fingers, components, screws, tools, or boards before the fan is powered off and stops running.
- Do not power on the equipment before a fault is rectified.
- 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.
- After the equipment is powered off, wait for 15 minutes and ensure that the equipment is not energized before operations.
- Attach a prominent label to the switch that needs to be turned off for maintenance.
- 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 maintenance and replacement, lock the cabinet door, secure the safety rope, and keep the keys properly.

1.9 Emergency Handling Plan

When 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.

Fire Alarm Horn/Strobe

When the alarm indicator on the equipment blinks or buzzes:

- Stay away immediately.
- Do not approach.
- Do not open the door.

- Remotely cut off the power supply.

Exhaust Air

- 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

DANGER

Suggestions for onsite O&M personnel:

1. In the case of a fire, immediately leave the building or the equipment area, activate the fire alarm, and call emergency services. 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.
2. 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.
3. 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.
4. 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.
5. After the fire is extinguished, the site must be handled by professionals according to local laws and regulations. Do not open the ESS doors without permission.
6. Post-disaster product maintenance: Contact the Company's service engineers for evaluation.

Suggestions for professional firefighters:

1. 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.
2. Do not open the doors of the ESS before it is deemed safe by professionals.
3. Follow local fire fighting regulations.

2 Product Description

2.1 Model Description

This document involves the following product model.

LUNA2000-200KWH-2H1

Figure 2-1 Model number (example)

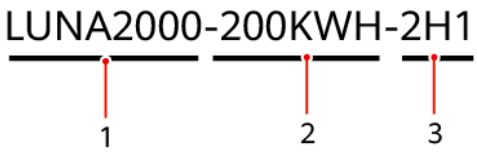


Table 2-1 Model number description

No.	Meaning	Description
1	Product family name	LUNA2000: Smart String Energy Storage System (ESS)
2	Capacity level	200KWH: nominal energy of 193.5 kWh
3	Backup power	2H1: Applies to scenarios where the backup duration is greater than or equal to 2 hour.

2.2 Functions and Features

Function

The ESS consists of a power control module and lithium battery modules. It stores and releases electricity controlled by the Smart Rack Controller (also referred to as rack controller). The input and output ports of the ESS are high-voltage direct current (HVDC) ports.

- Battery charge: The Smart Power Control System (also referred to as Smart PCS) is connected to the rack controller and send commands to charge batteries.
- Battery discharge: When the grid power is insufficient for the loads, the system controls the batteries to supply power to the loads through the Smart PCS.

Features

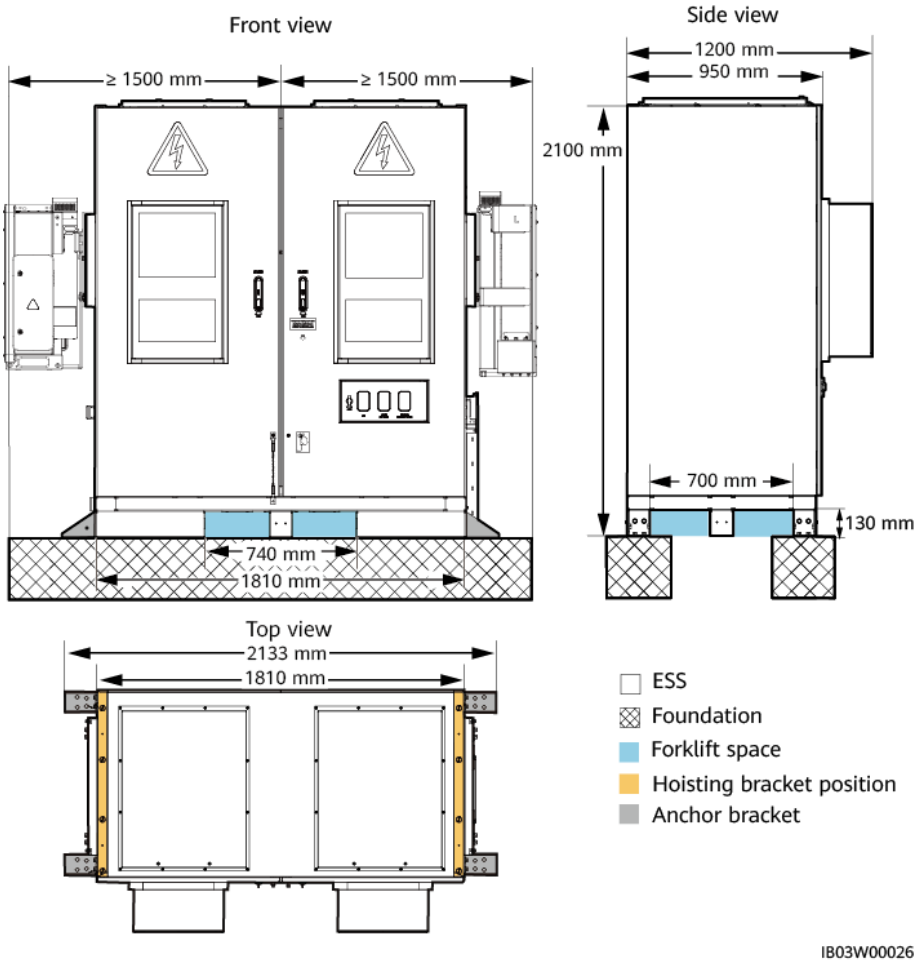
The ESS consists of the power supply and distribution system, monitoring system, environment control system, and fire suppression system. It features safety, reliability, fast deployment, low cost, high energy efficiency, and intelligent management.

Pack-level optimization

1. This design fully leverages the module capacity in the battery racks.
2. Battery packs can be directly replaced by onsite personnel without the need for professional technicians or manual SOC calibration, reducing the replacement time.

2.3 Appearance

Figure 2-2 Appearance and dimensions

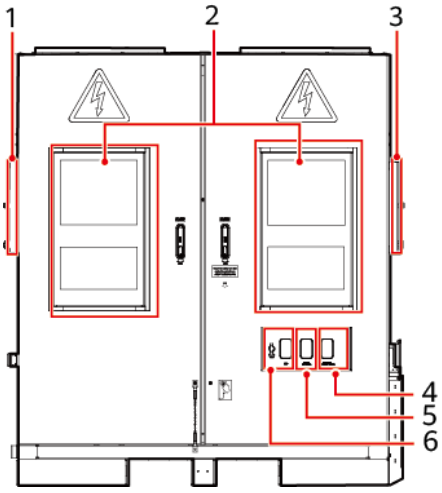


NOTE

The site foundation must be designed by professional technical personnel such as those from a design institute. The technical personnel can refer to the foundation drawings of the Company. Contact the product manager of the Company to obtain the drawings.

2.4 Components

Figure 2-3 Components (door closed)



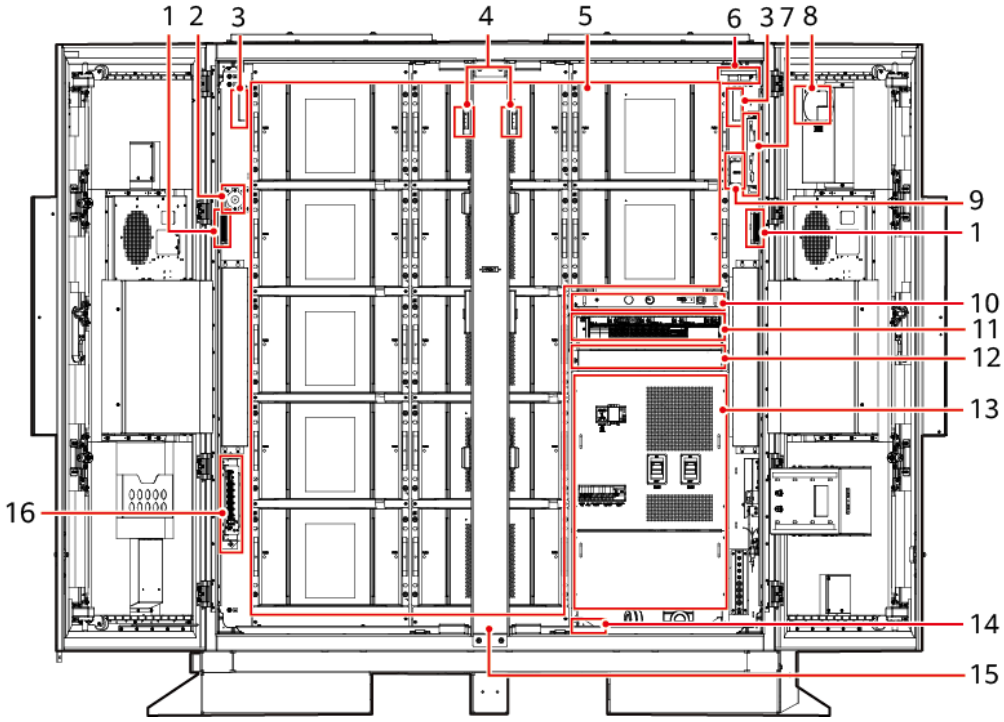
(1) Installation position of the Smart PCS
(2) Air conditioners
(3) Installation position of the rack controller
(4) Emergency stop switch
(5) Fire alarm horn/strobe
(6) USB port

Table 2-2 Component configuration

No.	Item	Maximum Quantity Configured for an ESS	Description
1	Installation position of the Smart PCS	1	Where the Smart PCS is installed.
2	Air conditioner	2	Air conditioners on the ESS cabinet door
3	Installation position of the rack controller	1	Where the rack controller is installed.
4	Emergency stop switch	1	Used for emergency stop of the rack controller.
5	Fire alarm/horn strobe	1	Generates alarms for

No.	Item	Maximum Quantity Configured for an ESS	Description
			internal devices when abnormal temperature or smoke occurs.
6	USB port	1	Where a smart USB-WLAN adapter (USB-Adapter2000-C) is installed for local maintenance.

Figure 2-4 Components (door opened)



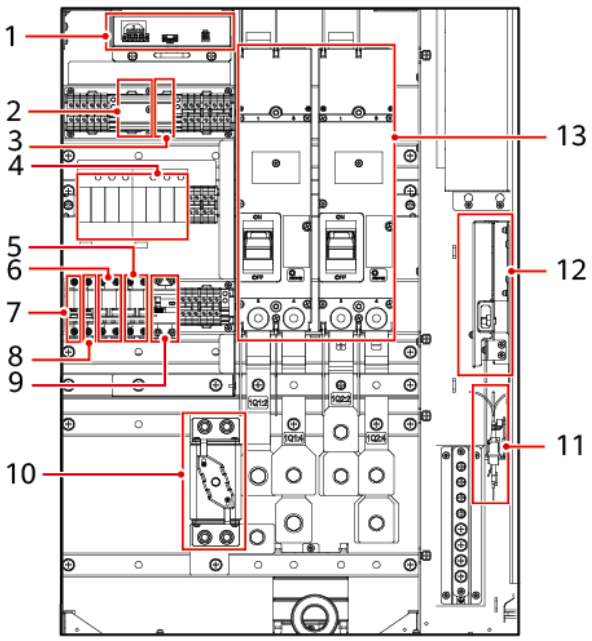
(1) Light	(2) Black start button	(3) CO sensor
(4) Door status sensors	(5) Installation position of battery packs	(6) Smoke detector
(7) Exhaust controller	(8) Exhaust module	(9) T/H sensor
(10) Installation position of the rack-mounted integrated gas fire extinguisher	(11) Embedded power subrack	(12) CMU and installation position of the SmartModule
(13) Power distribution area	(14) Water sensor	(15) Adjustable column
(16) I/O expansion board	-	-

Table 2-3 Component configuration 2

No.	Item	Maximum Quantity Configured for an ESS	Description
1	Light	2	Used for lighting inside the cabinet.
2	Black start button	1	Triggers the ESS black start.
3	CO sensor	2	Checks the concentration of CO in combustible gases.
4	Door status sensor	2	Monitors the door opening and closing status.
5	Battery pack	12	A battery pack is a combination of batteries connected in series and output through a pair of positive and negative terminals. It contains a battery management module. The battery management module consists of the battery management unit (BMU), battery optimization module, and module fan.
6	Smoke detector	1	Photoelectric smoke detector, used for smoke detection.
7	Exhaust controller	1	Works with the CO sensor and exhaust fan to control air exhaust.
8	Exhaust module	1	Exhausts combustible gases from the cabinet.
9	T/H sensor	1	Measures the real-time ambient temperature and humidity in the cabinet.
10	Rack-mounted integrated gas fire extinguisher	1	Used for fire alarm and automatic fire extinguishing control.
11	Embedded power subrack	1	Provides installation positions for components.
	Installation position of the PSU	5	Where the PSU is installed. The PSU converts AC input power into stable DC power.
	SMU11B	1	Collects PSU information and controls PSU output.
12	CMU	1	Converges interfaces, converts protocols, collects and stores data, centrally monitors

No.	Item	Maximum Quantity Configured for an ESS	Description
			and maintains devices in the ESS.
	Installation position of the SmartModule	1	Where the SmartModule is installed. The SmartModule aggregates interfaces, converts protocols, and collects data for devices in the ESS, and provides additional ports for the CMU.
13	Power distribution area	-	For details, see Figure 2-5.
14	Water sensor	1	Detects water based on the resistance change between both electrodes.
15	Adjustable column	1	Used to support the installation of the cabinet door.
16	I/O expansion board	1	Controls and monitors the door status sensor, sensors, and air conditioners in the ESS, connects cables to the fire suppression system, and black starts the system.

Figure 2-5 Components in the power distribution area



(1) 12 V adapter (1TB1)
(2) Installation position of the 220 V maintenance socket (1XD1)
(3) Installation position of the Smart Power Sensor

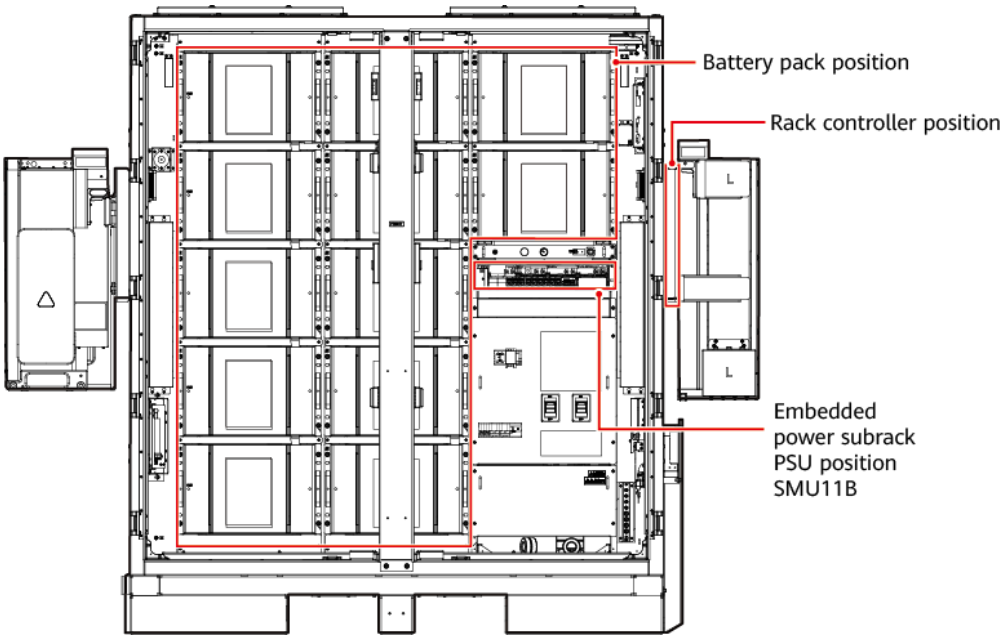
(4) AC surge protective device (SPD) (1FA1 and 1FA2)	(5) UPS switch (5FCB)	(6) AC main switch (1FCB)
(7) 12 V adapter switch (1FCB1)	(8) PSU switch (1FCB2)	(9) 220 V maintenance socket switch (1FB1)
(10) Fuse (1F1)	(11) Fiber adapter	(12) Fiber management tray
(13) DC switches (1Q1 and 1Q2)	-	-

Table 2-4 Component configuration 3

No.	Item	Maximum Quantity Configured for an ESS	Description
1	12 V adapter	1	Supplies power to the CMU and SmartModule.
2	(Optional) 220 V maintenance socket	1	Used to obtain power during maintenance.
3	(Optional) Smart Power Sensor	1	Measures the voltage and current of the 220 V AC auxiliary power supply.
4	AC SPD	2	Provides AC surge protection.
5	UPS switch	1	Switch of the UPS.
6	AC main switch	1	Main switch for AC power distribution.
7	12 V adapter switch	1	Switch of the 12 V adapter.
8	PSU switch	1	Switch of the PSU.
9	220 V maintenance socket switch	1	Switch of the maintenance socket.
10	Fuse	1	Provides short-circuit protection.
11	Fiber adapter	1	Used to connect optical fibers.
12	Fiber management tray	1	Holds optical fibers.
13	DC switch	2	Used to protect against short circuits and disconnect the DC bus.

2.4.1 Power Supply and Distribution System

Figure 2-6 Position of the power supply and distribution system



2.4.1.1 Battery pack

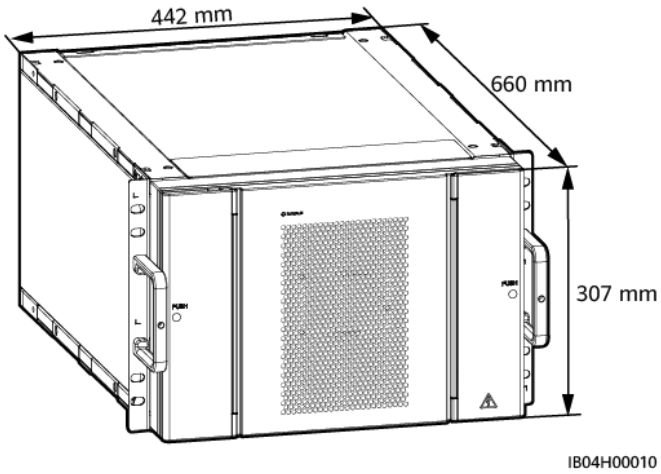


Table 2-5 Battery pack technical specifications

Item	Battery Pack (ESM51320AS1)	Battery Pack (ESM57280AS1)
Cell capacity	3.2 V/320 Ah	3.2 V/280 Ah
Cell material	Lithium iron phosphate	Lithium iron phosphate

Item	Battery Pack (ESM51320AS1)	Battery Pack (ESM57280AS1)
Combination mode	16S 1P	18S 1P
Rated voltage	51.2 V	57.6 V
Charge and discharge rate	≤ 1C	≤ 1C
Nominal capacity	16.38 kWh	16.13 kWh
Weight	≤ 140 kg	≤ 140 kg
Dimensions (H x W x D)	307 mm x 442 mm x 660 mm	307 mm x 442 mm x 660 mm
Cooling mode	Air cooling	Air cooling
IP rating	IP20+	IP20+
Storage temperature	0 ℃ to 40 ℃	0 ℃ to 40 ℃
Transportation temperature	–40 ℃ to +60 ℃	–40 ℃ to +60 ℃
Equalization mode	Passive cell equalization	Passive cell equalization
Communications port	CAN 2.0	CAN 2.0

2.4.1.2 Smart Rack Controller

Figure 2-7 Rack controller

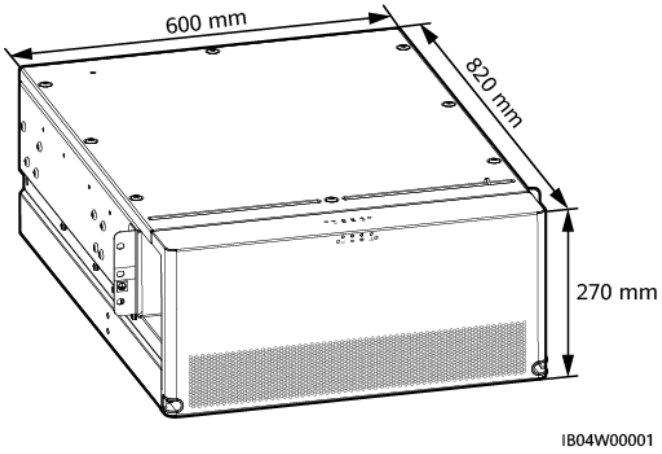


Table 2-6 Efficiency

Item	Rack Controller
Maximum efficiency	≥ 98.5%
Full-load efficiency	≥ 98.5%

Table 2-7 Battery Side

Item	Rack Controller
Number of battery racks	1
Rated operating voltage	614.4 V@320 Ah cell 691.2 V@280 Ah cell
Rated operating current of a single battery rack	80 A
Maximum operating current of a single battery rack	95 A
Operating voltage	40–1050 V
Constant power voltage range	655–760 V
Constant current voltage range	560V~655V
Minimum startup voltage	350 V
Rated power of a single battery rack	52 kW
Rated power of a rack controller	104 kW
Operating current of a single battery rack	80 A

Table 2-8 Bus Side

Item	Rack Controller
Number of battery racks connected to the bus	2
Maximum DC voltage	1100 V
Rated operating voltage	665 V
Full-load voltage range	595–810 V
Rated operating current of a single battery rack	76.3 A
Maximum operating current of a single battery rack	92 A

Table 2-9 Protection

Item	Rack Controller
Reverse connection protection	Supported

Item	Rack Controller
Surge protection	Supported (bus side)
Insulation resistance detection	Supported
Overtemperature protection	Supported
Overcurrent protection on the battery side	Supported
Short circuit protection on the battery side	Supported
Short circuit protection on the bus side	Supported

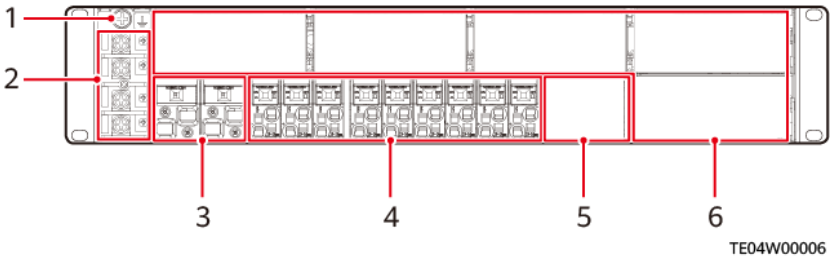
Table 2-10 General Specifications

Item	Rack Controller
Parallel mode	Two rack controllers connected in parallel on the battery side and two on the bus side
Power overload	Long-term running at 1.1 times the rated power
Overvoltage category	Bus side DC II
Dimensions (H x W x D)	270 mm x 600 mm x 820 mm
Weight	≤ 90 kg
DC surge protection on the bus side	Type II
Operating temperature range	–30 ℃ to +60 ℃ (The rack controller can be started at –40 ℃.)
Operating humidity range	0%–100%
Storage temperature	–40 ℃ to +70 ℃
Storage humidity	5%–95% RH
Cooling mode	Smart air cooling
IP rating	IP66
Maximum operating altitude	4000 m
Input and output terminals	OT terminals
Power response time (from no load to full load)	< 30 ms
Standby power consumption	7 W in shutdown mode, 48 V external power supply 30 W in shutdown mode, battery power supply, contactor not closed 70 W in standby mode, battery power supply, contactor closed

Item	Rack Controller
Environmental protection requirement	RoHS6
Communications port	CAN, RS485, FE

2.4.1.3 Embedded Power Subrack

Figure 2-8 Appearance

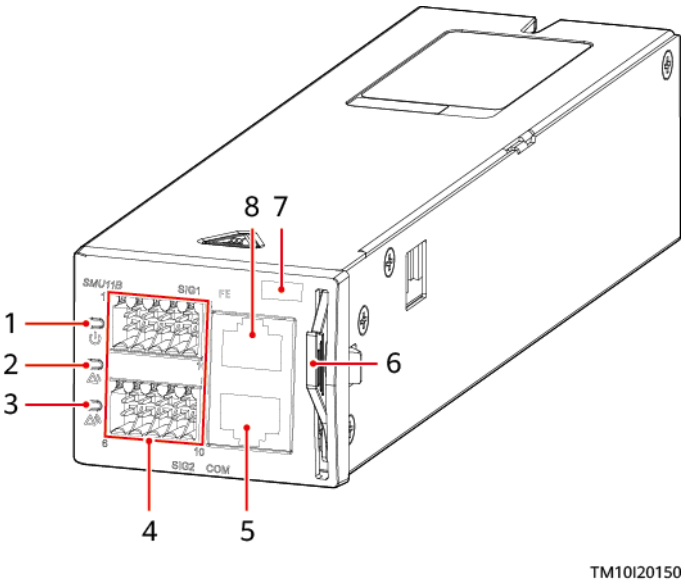


(1) Ground screw (2) Input terminals (3) Battery switches

(4) Load switches (5) Monitoring module (SMU11B) (6) PSU installation positions

2.4.1.4 Monitoring Module (SMU11B)

Figure 2-9 SMU11B



(1) Running indicator (2) Minor alarm indicator (3) Major alarm indicator

(4) Wiring terminals (5) COM port (6) Handle

(7) Position of the SN code (8) FE port

Table 2-11 Indicator description

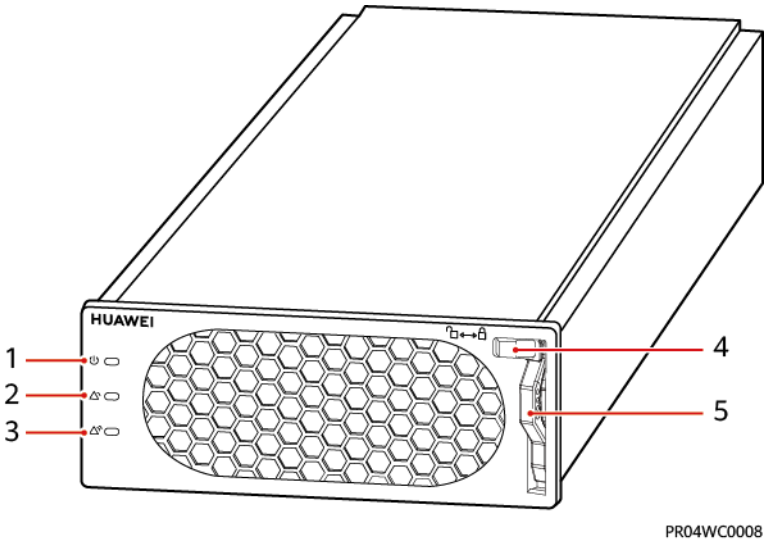
Indicator	Color	Status	Description
Running indicator	Green	Off	The SMU is faulty or has no power input.
		Blinking slowly (0.5 Hz)	The SMU is running properly and communicating with the host properly.
		Blinking fast (4 Hz)	The SMU is running properly but fails to communicate with the host.
Minor alarm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

2.4.1.5 PSU

The PSU (R4830G) converts AC input power into stable DC power.

Appearance

Figure 2-10 PSU



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

(4) Locking latch (5) Handle -

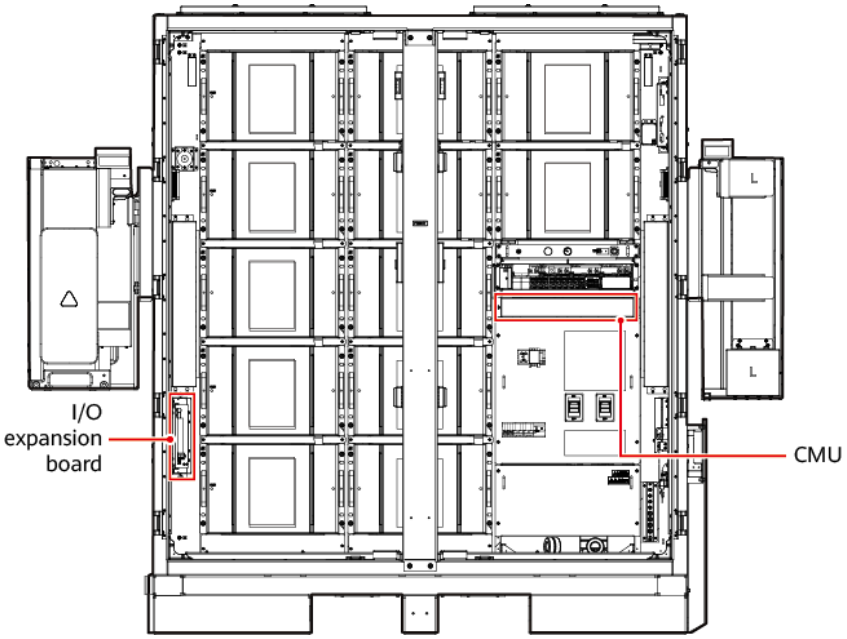
Indicators

Table 2-12 Indicator description

Indicator	Color	Status	Description
Power indicator	Green	Steady on	The PSU has AC input.
		Off	The PSU has no AC input.
			The PSU is damaged.
		Blinking (0.5 Hz)	Querying is in progress.
		Blinking (4 Hz)	The PSU is loading an application program.
Alarm indicator	Yellow	Off	The PSU has no protection alarm.
		Steady on	• A warning is generated due to ambient overtemperature. • A shutdown protection alarm is generated due to ambient overtemperature or undertemperature.
			AC input overvoltage or undervoltage protection is triggered.
			The PSU is hibernating.
		Blinking (0.5 Hz)	The communication between the PSU and an external device is interrupted.
Fault indicator	Red	Off	The PSU is normal.
		Steady on	The module locks out due to output overvoltage.
			The PSU has no output due to internal faults.

2.4.2 Monitoring System

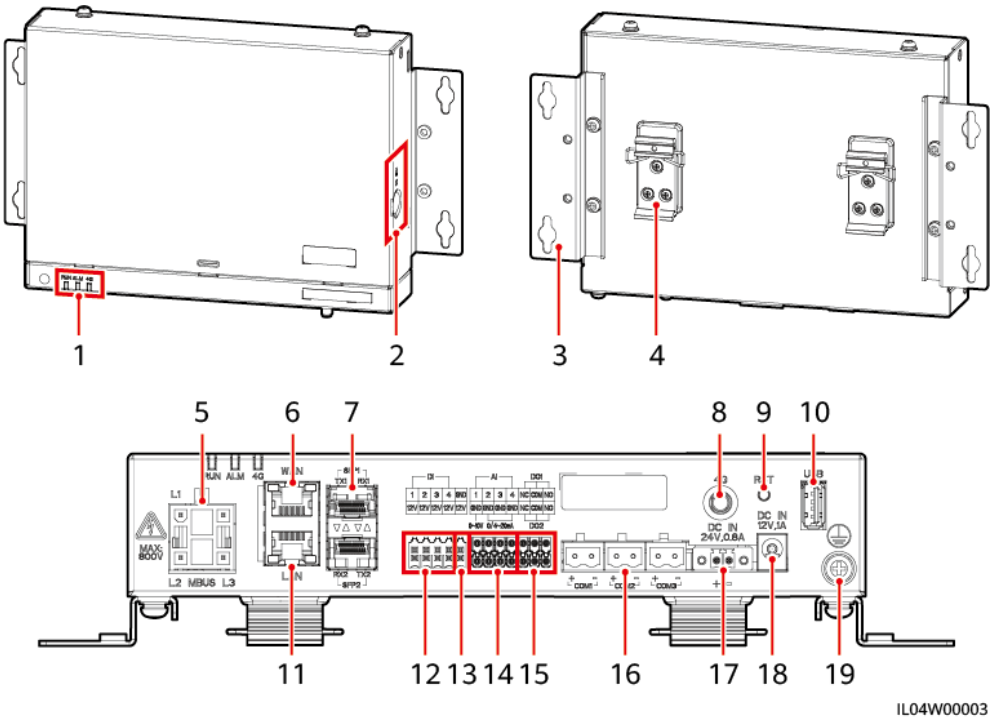
Figure 2-11 Position of the monitoring system



2.4.2.1 CMU

Appearance

Figure 2-12 Appearance



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

Indicators

Table 2-13 Indicators

Indicator	Status	Description
Running indicator (RUN)	Green off	Not powered on
	Blinking green slowly (on for 1s and then off for 1s)	The communication with the management system is normal.

Indicator	Status		Description
RUN 	Blinking green fast (on for 0.125s and then off for 0.125s)		The communication with the management system is interrupted.
Alarm/maintenance indicator (ALM) ALM 	Alarm status	Red off	No system alarm is generated.
		Blinking red slowly (on for 1s and then off for 4s)	The system raises a warning alarm.
		Blinking red fast (on for 0.5s and then off for 0.5s)	The system raises a minor alarm.
		Steady red	The system raises a major alarm.
	Maintenance status	Green off	No local maintenance is in progress.
		Blinking green slowly (on for 1s and then off for 1s)	Local maintenance is in progress.
		Blinking green fast (on for 0.125s and then off for 0.125s)	Local maintenance fails or the connection to the app is to be set up.
		Steady green	Local maintenance succeeded.

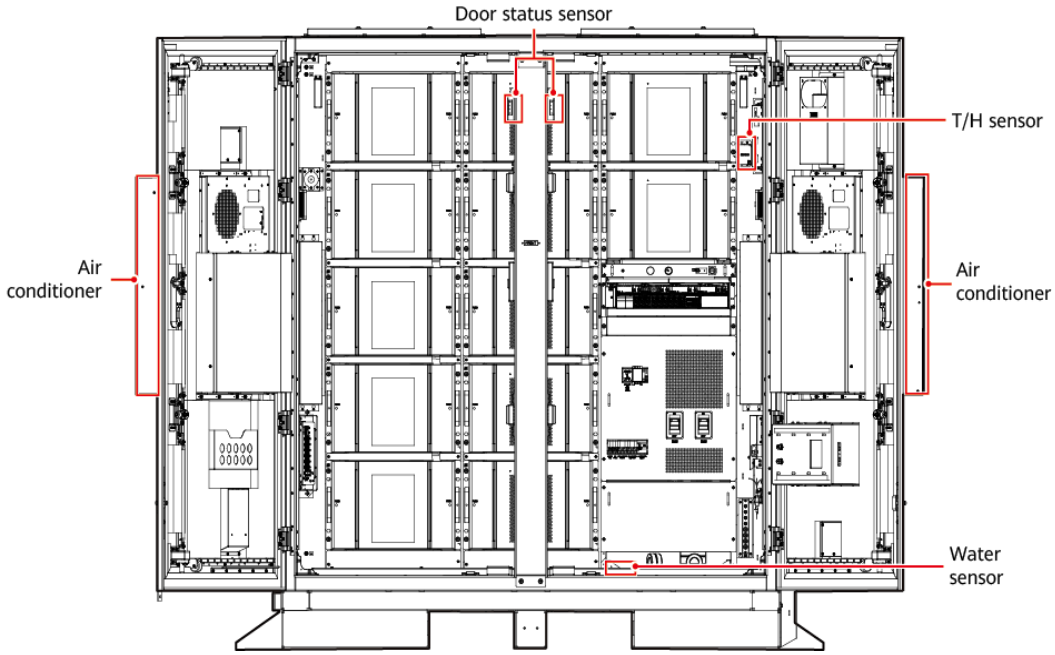
2.4.2.2 I/O Expansion Board

The I/O expansion board controls and monitors the door status sensor, sensors, and air conditioners in the ESS, connects cables to the fire suppression system, and black starts the system.

Item	I/O Expansion Board
Model	ENF1DETC
Operating voltage	220V AC/12V DC/24V DC
Operating Current	≤ 1 A
Operating temperature	–30 ℃ to +55 ℃
Humidity	≤ 95% RH (non-condensing)
Dimensions (H x W x D)	113.7 mm x 251 mm x 54.5 mm

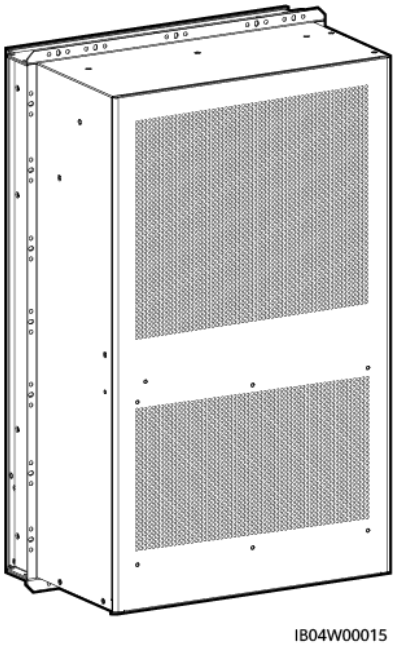
2.4.3 Environment Control System

Figure 2-13 Position of the environment control system



2.4.3.1 Air Conditioner

Figure 2-14 Appearance

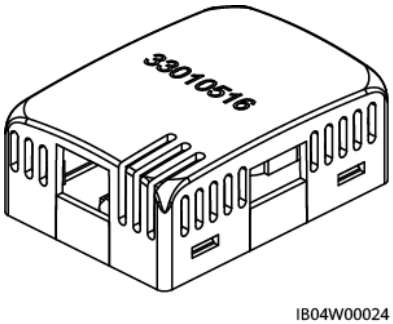


Item	Air Conditioner

Item	Air Conditioner
Power specifications	Operating voltage range: –42 V DC to –57 V DC; rated voltage: –48 V DC
Temperature control range	15 ℃ to 35 ℃
Temperature control precision	±1°C
Sensible cooling capacity (L25/45)	2000 W
Rated power	1050 W
Maximum power	1200 W
Air volume	700 m^3/h
Heating capacity	1200 W
Dimensions (H x W x D)	746 mm x 446 mm x 300 mm
Weight	70 kg
IP rating	IP55 (between the internal air circulation and the external air circulation)
Operating temperature range	–30 ℃ to 55 ℃
Refrigerant	R134a
Variable-frequency or not	Variable-frequency air conditioner

2.4.3.2 T/H sensor

Figure 2-15 Appearance



NOTE

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

Table 2-14 T/H sensor technical specifications

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

The T/H sensor uses an RJ45 connector.

Figure 2-16 Pins of an RJ45 connector

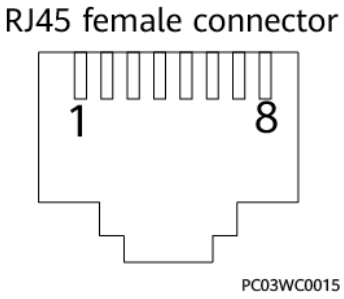
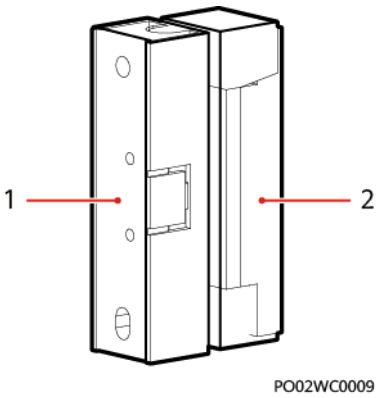


Table 2-15 Pin definitions of an RJ45 connector

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

2.4.3.3 Door Status Sensor

Figure 2-17 Appearance



(1) Switch (2) Magnet

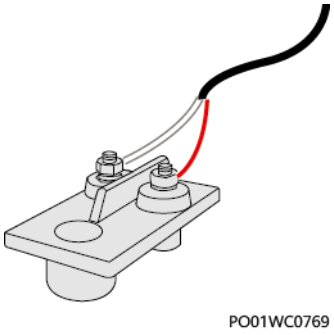
Technical Specifications	Door Status Sensor
Connection method	Wiring terminals
Rated current	500 mA
Startup distance	25–45 mm
Rated Power	10 W
Securing method	Screw
Hole spacing	40 ±0.8 mm
Switch voltage	100 V DC (Max)
Contact withstand voltage	150 V DC (Max)
Impedance	0.3 ohms
Switch status	Steady on
Outer material	White acrylonitrile butadiene styrene (ABS) engineering plastic

2.4.3.4 Electrode Water Sensor

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

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

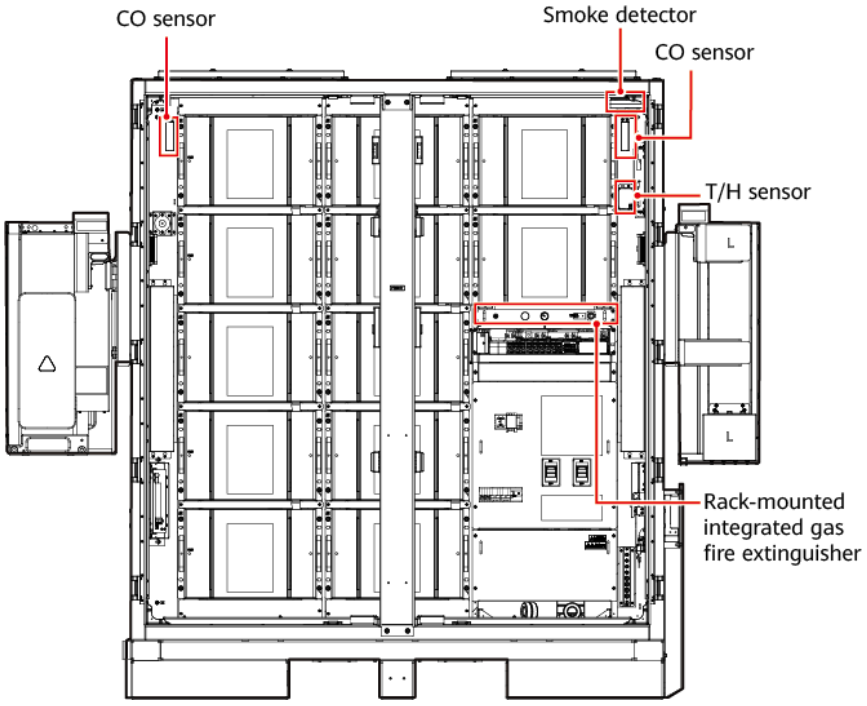
Figure 2-18 Appearance



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

2.4.4 Fire Suppression System

Figure 2-19 Position of the fire suppression system



2.4.4.1 Rack-mounted Integrated Gas Fire Extinguisher

1. The rack-mounted integrated gas fire extinguisher is pre-integrated in the cabinet.

2. The extinguishant is perfluorohexane which features high insulation, environment friendly, and quick fire extinguishing and cooling.

Working Principles

The rack-mounted integrated gas fire extinguisher adopts the thermo bulb and electric startup mode.

- When the temperature inside the cabinet is higher than the temperature of the thermo bulb for a certain period of time, the thermo bulb breaks to start the fire extinguisher.
- When the external fire suppression system detects a fire, it triggers the electric start signal of the fire extinguishing device and opens the storage device of the extinguishant. The extinguishant is released through the nozzle to cool down and put out the fire.

NOTE

- The thermo bulb can also work normally during electric startup.
- When a fire occurs, the thermo bulb can start the extinguisher even if the electric startup mode fails. This ensures that the fire extinguisher can be started reliably.

Figure 2-20 Front view

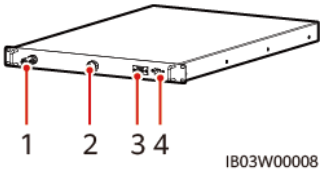
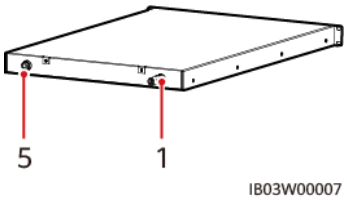


Figure 2-21 Rear view



(1) Thermo bulb (2) Pressure gauge (3) Wiring port for electric startup (4) Signal feedback (5) Extinguishant release nozzle assembly

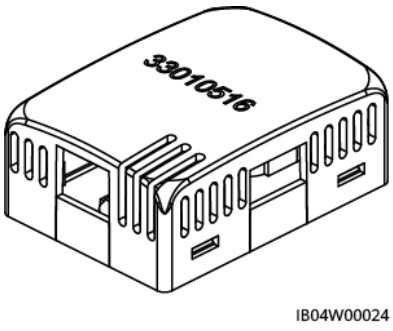
Table 2-16 Technical specifications

Item		Rack-mounted integrated gas fire extinguisher
Storage pressure (at 20 ℃)		1.6 MPa ±0.2 MPa
Startup mode (thermo bulb)		Startup at a constant temperature: 79 ℃ ±3 ℃
Startup mode (electric)		12 V external power supply, started by a solenoid valve
Alarming mode		Dry contact signal feedback
Operating	Safe	–30 ℃ to 55 ℃

Item		Rack-mounted integrated gas fire extinguisher
environment	operating temperature	
	Transportation temperature	–40 ℃ to 60 ℃
	Storage temperature	–40 ℃ to 60 ℃
	Relative humidity	≤ 97% RH (40 ℃, non-condensing)
Dimensions		≤ 1 U (height) x 700 mm (depth) x 482 mm±1 mm (width)

2.4.4.2 T/H sensor

Figure 2-22 Appearance



NOTE

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

Table 2-17 T/H sensor technical specifications

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

The T/H sensor uses an RJ45 connector.

Figure 2-23 Pins of an RJ45 connector

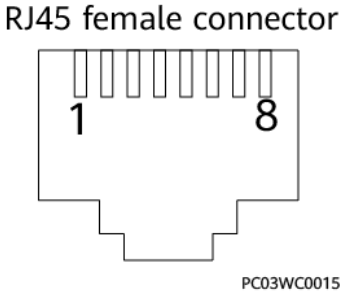


Table 2-18 Pin definitions of an RJ45 connector

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

2.4.4.3 CO Sensor

Figure 2-24 Appearance

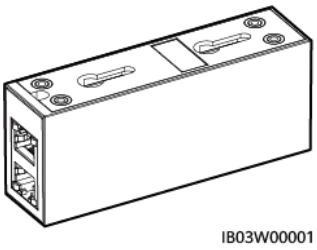


Table 2-19 Technical specifications of the CO sensor

Technical Specifications	CO Sensor
Dimensions (H x W x D)	40 mm x 97 mm x 25 mm
Operating voltage	8–30 V DC
Stability	≤ ±3% FS/year

Technical Specifications	CO Sensor
Precision	≤ ±10% FS
Power consumption	0.12 W
Output signal	RS485
Operating temperature	–25 ℃ to +55 ℃
Humidity	5%–95% RH (non-condensing)
Resolution	≤ 30 ppm
Response time	≤ 60s
Cabling mode	RJ45 network port
Installation mode	Gourd-shaped mounting hole/nut/magnet

Figure 2-25 Pins of an RJ45 connector

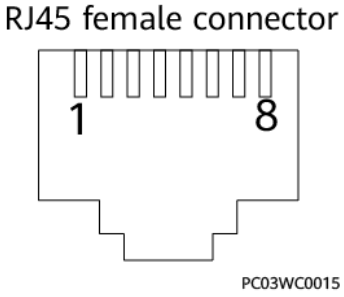


Table 2-20 Pin definitions of an RJ45 connector

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

2.4.4.4 Smoke Detector

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

Figure 2-26 Appearance

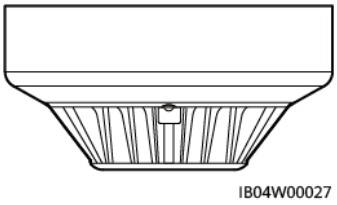


Table 2-21 Indicator description

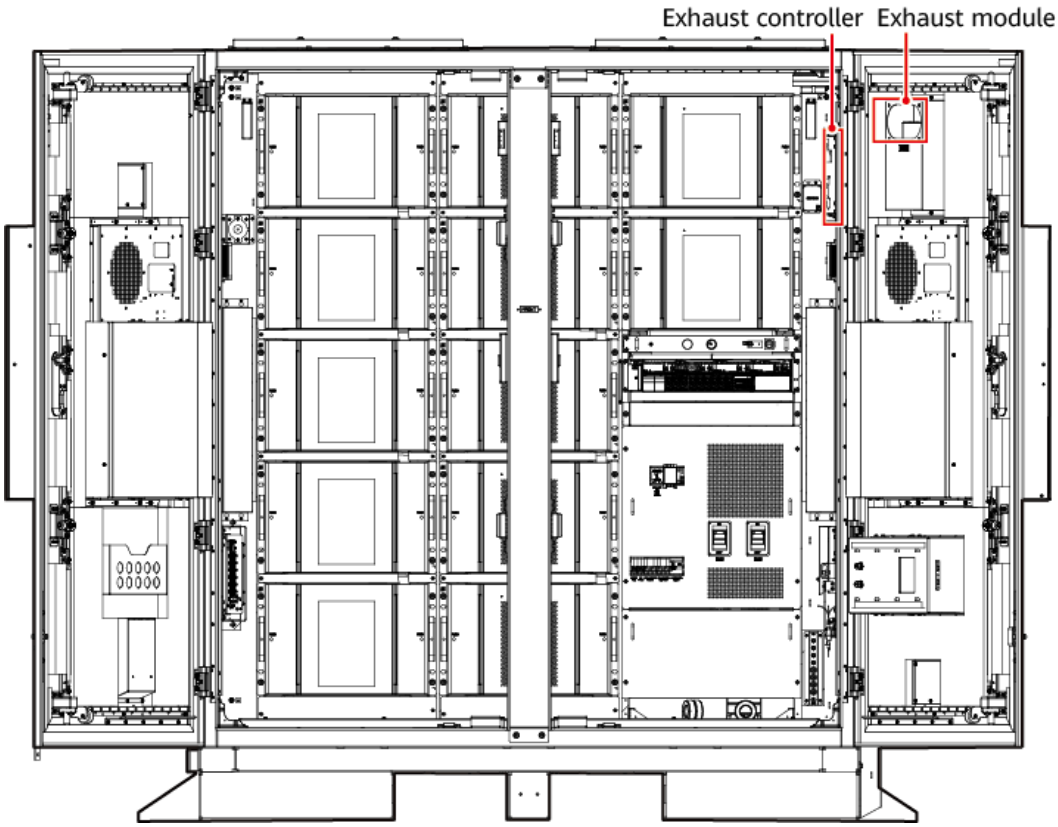
Name	Color	Status	Description
Indicator	Red	Steady on	The detector enters the alarm state.
		Blinking	The detector enters the monitoring state.

Table 2-22 Technical specifications

Item	Smoke Detector
Operating voltage	12 V (9–16 V DC)
Quiescent current	< 8 mA
Alarm current	< 35 mA
Output mode	Relay output
Polarity	None
Output contact capacity	3 A/120 V AC or 3 A/24 V AC
Operating temperature	–10 ℃ to +50 ℃
Ambient humidity	≤ 95% RH (non-condensing)

2.4.5 Exhaust System

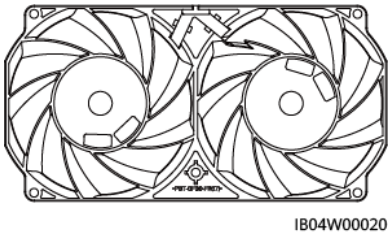
Figure 2-27 Position of the exhaust system



2.4.5.1 Air Exhaust Module

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

Figure 2-28 Appearance



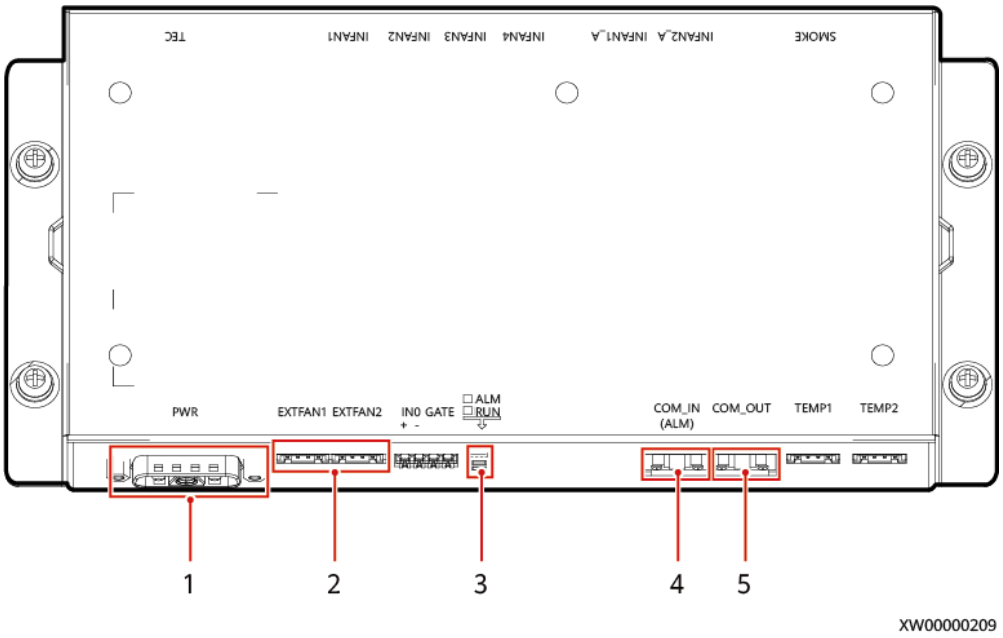
Technical Specifications	Air Exhaust Module
Dimensions (H x W x D)	38 mm x 194 mm x 99 mm
Operating voltage	36–72 V DC

Technical Specifications	Air Exhaust Module
Rated rotating speed	9500 ±10% RPM
Operating temperature	–25 ℃ to +70 ℃

2.4.5.2 Air Exhaust Controller

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

Figure 2-29 Appearance



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

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

Table 2-23 Indicator description

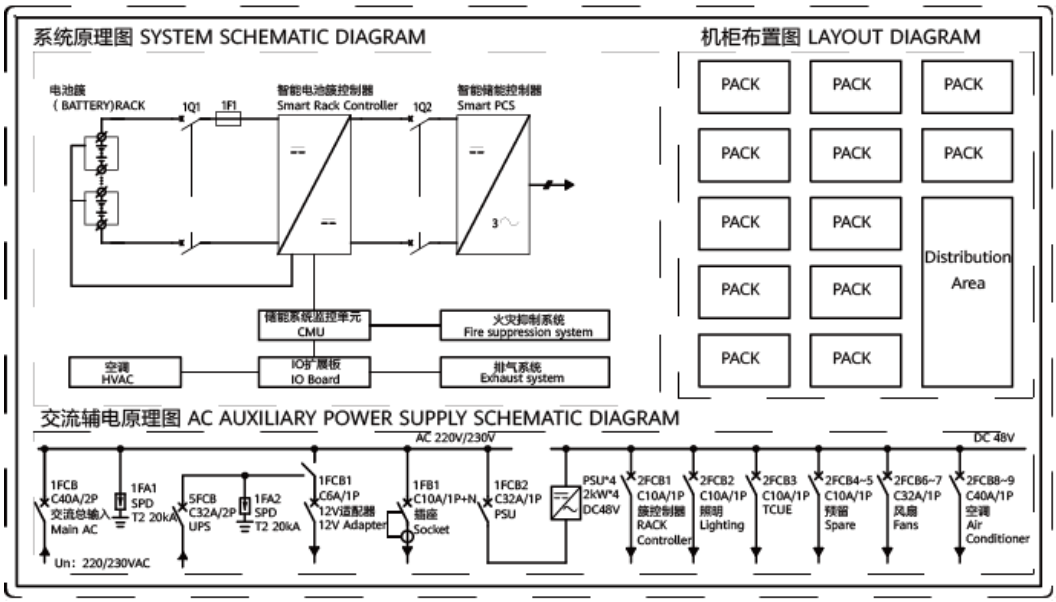
Silk Screen	Color	Status	Description
RUN	Green	Steady on	Power supply to the board is normal but no program is running.
		Blinking at 0.5 Hz	The system is running properly.
		Blinking at 4 Hz	Serial port communication is interrupted or the board is not registered.
		Off	The system is not powered on.

Silk Screen	Color	Status	Description
ALM	Red	Steady on	Power supply to the board is normal but no program is running.
		Blinking at 0.5 Hz	An alarm is generated.
		Off	No alarm is generated.

2.5 Working Principle

2.5.1 Circuit Diagram

Figure 2-30 Circuit diagram



2.5.2 Device Status

The ESS has six states: running, hibernating, self-checking, faulty, offline, and loading.

Table 2-24 Device status description

Status	Description
Running	The ESS is charging from an external DC source or discharging for external devices.
Hibernating	The ESS stops charging and discharging and shuts down the rack controllers. • In the running state, if the ESS receives a hibernation command, it

Status	Description
	enters the hibernation state. • In the hibernation state, if the ESS receives a running command, it enters the running state.
Self-checking	The ESS is in progress of a self-check.
Faulty	If a rack controller or battery pack is faulty, the system enters the faulty state.
Offline	A rack controller is disconnected from the CMU.
Loading	After the CMU starts, the system is waiting for battery packs to be connected.

2.6 Typical Application Scenario

Figure 2-31 Electrical connection diagram (components in the dotted box are optional)

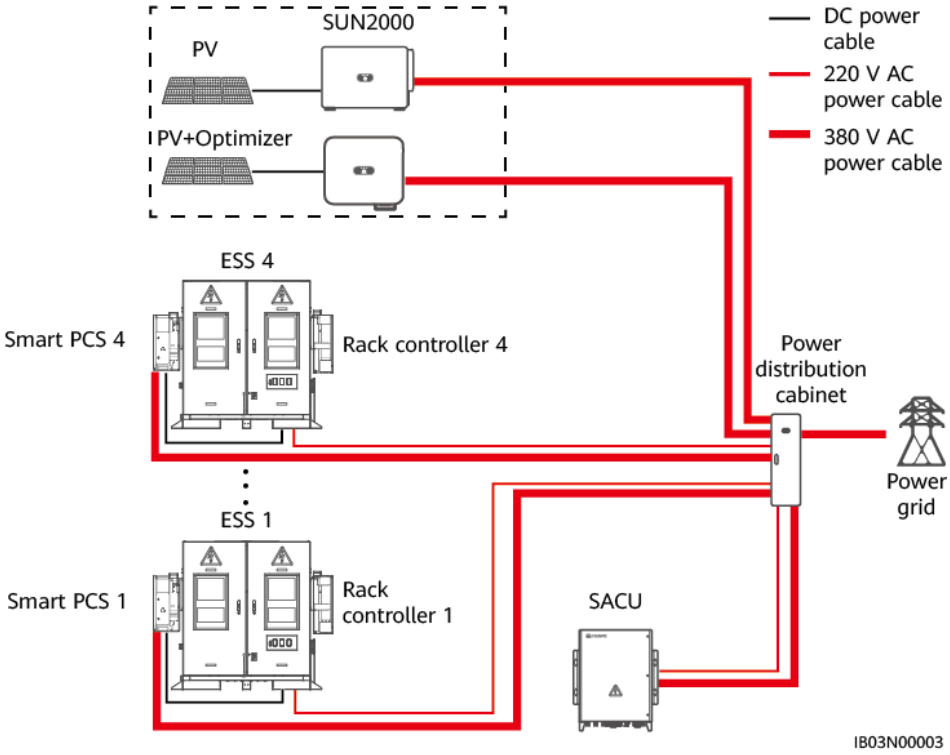


Table 2-25 0.8 MWh/400 kW standard configurations

No.	Item	Recommended Model/Specifications	Quantity	Source
1	ESS	LUNA2000-200KWH-2H1	4	Purchased

No.	Item	Recommended Model/Specifications	Quantity	Source
				from the Company
2	Smart PCS	LUNA2000-100KTL-M1	4	Purchased from the Company
3	Rack controller	-	4	Purchased from the Company
4	SACU	SmartACU2000D-D-00	1	Purchased from the Company
5	Power distribution cabinet	The specifications should comply with the Smart PCS specifications, auxiliary power supply specifications, actual application scenarios, and local laws and regulations.	1	Prepared by the customer
6	Inverter	Medium three-phase and V5	Configured based on the capacity requirements	Prepared by the customer

Figure 2-32 Communication networking diagram (FE)

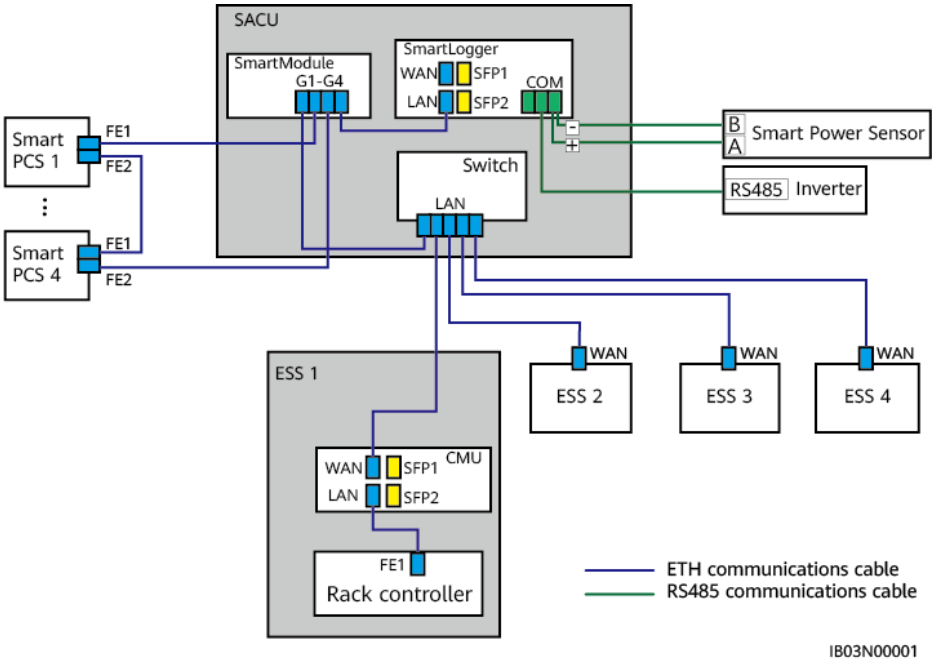
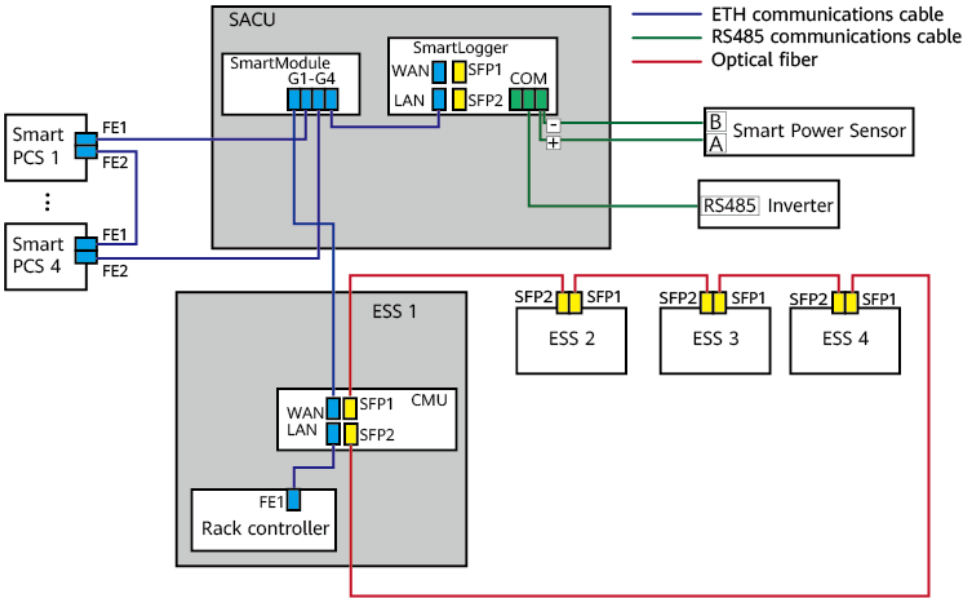


Figure 2-33 Communication networking diagram (fiber ring network)



2.7 Site Requirements

2.7.1 Site Selection Requirements

NOTICE

Site selection must comply with NFPA 855 *Standard for the Installation of Stationary Energy Storage Systems* and local regulations.

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

- The site should not be located in a low-lying land. The horizontal level of the site should be above the highest water level of that area.
- The site is at least 2 km away from any airports, landfills, and water areas.
- There must be no vegetation, especially flammable plants within 3 m of the ESS and the site to protect the ESS from possible fires.
- The site is an open area and at least 10 m away from any obstacles in all directions.
- The distance between the ESS and residential areas must be greater than or equal to 50 m to prevent noise pollution. The distance between the ESS and residential buildings, schools, and hospitals must be greater than 30.5 m to ensure safety. If the safety distance requirement cannot be met, fire walls with a 3-hour fire-resistance rating must be installed between the ESS and the buildings.
- The ESS and the site should be in an environment free from explosion risks.
- Transportation to the site is convenient and the site fire suppression system facilities are reliable.

NOTE

- When installing, commissioning, and operating the ESS, ensure that at least two gas fire extinguishers are provided near each unit to ensure fire safety.
- An automatic fire alarm system should be configured for an unattended ESS or energy storage plant to upload fire alarm signals to the remote monitoring center.
- The distance between the exhaust device of an ESS and the heating and ventilation vents, air intake vents of air conditioners, windows, doors, unloading platforms, and fire sources of other buildings or facilities must be greater than 4.6 m.
- An active exhaust ventilation system should be configured and linked with the fire alarm system. The ventilation capability should keep the flammable gas concentration under 25% LFL.
- Reserve sockets for the water fire suppression system at the ESS site.
- Outdoor fire hydrants should be installed around the plant. The distance between fire hydrants should be less than or equal to 60 m. The number of outdoor fire hydrants should be calculated based on the flow rate and protection radius of fire hydrants. The maximum protection radius should be less than or equal to 150 m, and the flow rate should be greater than or equal to 15 L/s.

- The site area must meet the requirement and there is space for capacity expansion.
- The site is in a well-ventilated place.
- Do not install the ESS in a salt-affected area, as this may corrode the equipment and cause fires. A salt-affected area refers to the region within 2 km from the coast or prone to sea breeze. The regions prone to sea breeze vary with weather conditions (such as typhoons and monsoons) or terrains (such as dams and hills).

NOTE

1. Reselect the site if the safety distance for a site cannot meet the requirements of relevant national standards.
2. If no more suitable site is available, you are advised to install firewalls that provide at least 3-hour protection. In addition, the space requirements for equipment transportation, installation, and maintenance must be considered.
3. According to T/CEC 373-2020, the length and height of the firewalls should exceed the outer contour of the ESS container by 1 m, respectively. According to NFPA 855-2020 *Standard for the Installation of Stationary Energy Storage Systems*, when there are independent firewalls that provide 1-hour protection, the distance can be 914 mm.

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

- Areas with sources of strong variation, loud noises, and strong electromagnetic interference
- Areas with dust, oil fumes, harmful gases, and corrosive gases
- Areas with corrosive, flammable, and explosive materials
- Areas with existing underground facilities
- Areas with adverse geological conditions such as rubbery soil and soft soil layer, or prone to waterlogging and land subsidence
- Under a reservoir, water landscape, and water room

NOTE

If areas prone to waterlogging cannot be avoided, install water blocking and drainage facilities or raise the ground.

- Areas prone to earthquakes
- Areas prone to debris flow, landslide, quicksand, karst caves, and other direct hazards
- Areas within the mining land subsidence (dislocation) zone
- Areas within the scope of blasting hazard
- Areas prone to flood due to a dam or levee failure
- Protection areas for important water supply sources
- Protection areas for historic relics
- Populated areas, high-rise buildings, and underground buildings
- Urban intersections and high traffic areas

Requirements for flood and waterlogging prevention in site selection:

- The site design elevation of a large-scale electrochemical energy storage system (power ≥ 100 MW) should be higher than the flood level with a probability of 1% or the historical highest waterlogging level.
- The site design elevation of a medium- or small-scale electrochemical energy storage system (power < 100 MW) should be higher than the flood level with a probability of 2% or the historical highest waterlogging level.
- If the site design elevation cannot meet the preceding requirements, change the site location or take different flood and waterlogging prevention measures based on the site requirements.
- For energy storage plants prone to wind and waves from rivers, lakes, and seas, the elevation of flood prevention facilities should consider the wind and wave height with a probability of 2% and an additional safety height of 0.5 m.

2.7.2 Forklift Requirements

- Do not move the ESS after battery packs are installed.
- Before using a forklift, ensure that the forklift has a load bearing capacity of at least 1 t.
- It is recommended that the length of the tynes be greater than or equal to 1.2 m, the width be 80 cm to 160 cm, and the thickness be 25 cm to 70 cm.

2.7.3 Hoisting requirements

- Before hoisting, ensure that the crane and hoisting ropes meet the load-bearing requirements.
- When installing or removing the hoisting equipment, do not drag it on the container to prevent scratches.
- Do not hoist or move the ESS after battery packs are installed.

Stage	Precautions
Before hoisting	Crane hoisting capacity > 1 t, working radius ≥ 2 m If the onsite environment does not meet the required working conditions, ask a professional to assess the conditions.
	Only trained and qualified personnel are allowed to perform hoisting operations.
	Check that hoisting tools are complete and in good condition.
	Ensure that the hoisting tools are secured to a load-bearing object or wall.
	The weather condition should be good without wind when the unit needs to be hoisted outdoors.
	Ensure that the crane and steel hoisting ropes provide the required bearing capacity.
	All doors of the equipment are closed and locked.
	Ensure that the steel hoisting ropes are securely connected.
	It is recommended that the container be hoisted from left to right or from right to left.
During hoisting	Do not allow any unauthorized person to enter the hoisting areas and do not stand under the crane arm.
	Ensure that the crane is properly located and avoid long-distance hoisting.
	Keep the container stable and horizontal during hoisting, and ensure that the diagonal gradient of the container is less than or equal to 5 degrees.
	Ensure that the angle between two ropes is less than or equal to 90 degrees.
	Lift and land the container slowly to prevent shock to equipment inside it.

Stage	Precautions
	Remove the ropes after ensuring that the container is placed evenly on the container bases.
	Do not drag steel ropes or lifting appliances. Do not collide with the equipment.
	Secure the unit you have hoisted before hoisting another unit.

2.8 Installation

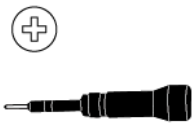
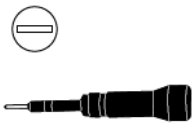
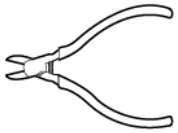
2.8.1 Installation Preparations

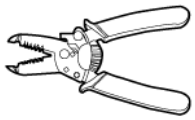
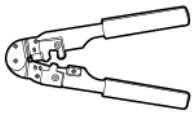
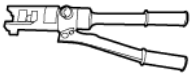
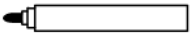
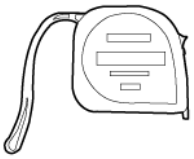
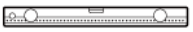
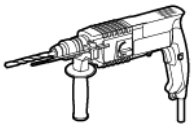
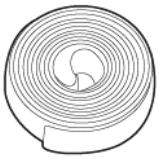
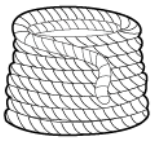
2.8.1.1 Preparing Tools

NOTE

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

Installation Tools

			
Phillips insulated torque screwdriver	Insulated torque socket wrench (including an extension bar) • Socket specifications: 7–19 mm • Socket depth ≥ 32 mm • The socket connector matches the torque wrench. • Torque range: 1.2–45 N·m	Flat-head insulated torque screwdriver	Diagonal pliers

 Wire stripper	 Cable cutter	 Rubber mallet	 Utility knife
 RJ45 crimping tool	 Hydraulic pliers	 Multimeter DC voltage measurement range ≥ 1500 V DC	 Marker
 Steel measuring tape	 Level	 Vacuum cleaner	 Hammer drill
 Hammer drill bit Φ16 mm	 Heat-shrink tubing	 Heat gun	 Cable tie
 Insulated ladder	 Crane	 Lifting rope Rope length ≥ 1845 mm x 4	 Electric forklift
	-	-	-

Pallet truck			

Personal Protective Equipment (PPE)

 Insulated gloves	 Protective gloves	 Goggles	 Dust mask
 Insulated shoes	 Reflective vest	 Safety helmet	 Safety harness

2.8.1.2 Pre-installation Check

Checking the Outer Packing

Before unpacking the equipment, check the outer packing for damage, such as holes and cracks, and check the equipment model. If any damage is found or the equipment model is not what you requested, do not unpack the product and contact your dealer as soon as possible.

NOTE

You are advised to remove the outer packing within 24 hours before installing the equipment.

WARNING

If the cabinet is higher than 2 m, take protective measures for working at heights during unpacking.

Checking Deliverables

After unpacking the equipment, check that the deliverables are intact and complete, and free from any obvious damage. If any item is missing or damaged, contact your dealer.

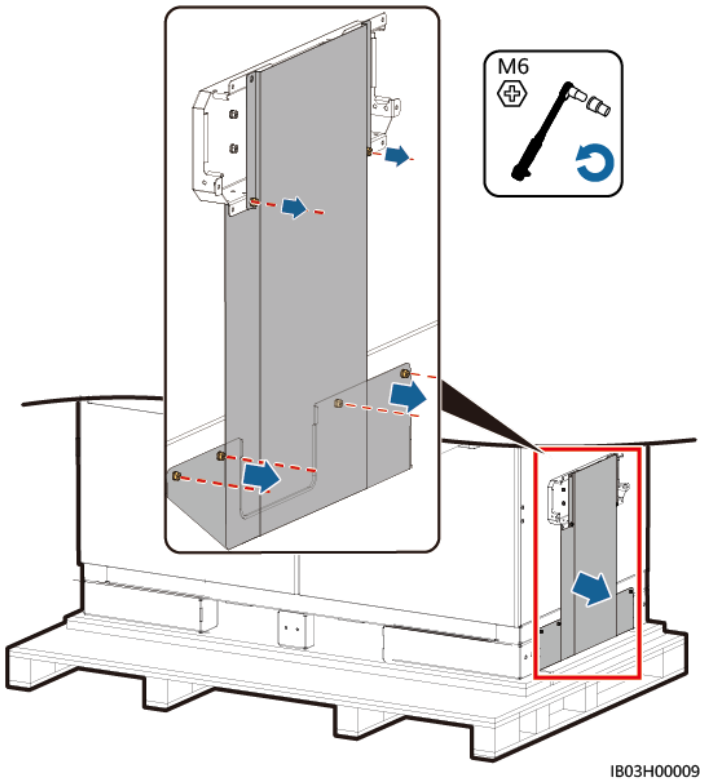
NOTE

For details about the number of accessories delivered with the equipment, see the *Packing List* in the packing case.

2.8.2 Installing the ESS

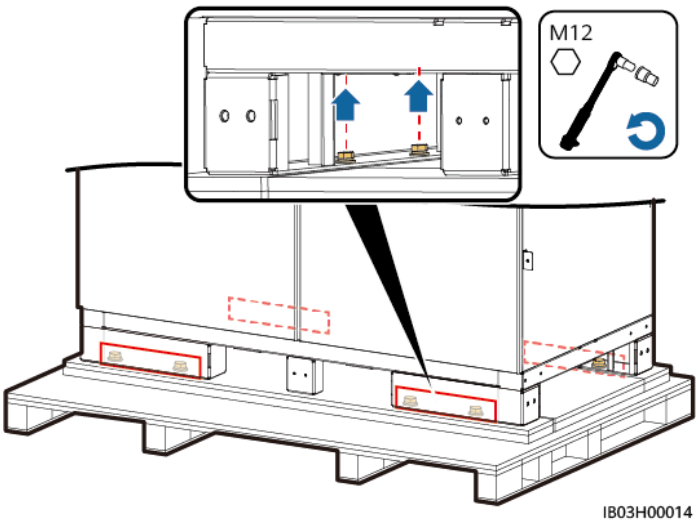
Step 1 Remove the baffle plate from the bottom of the ESS.

Figure 2-34 Removing the bottom baffle



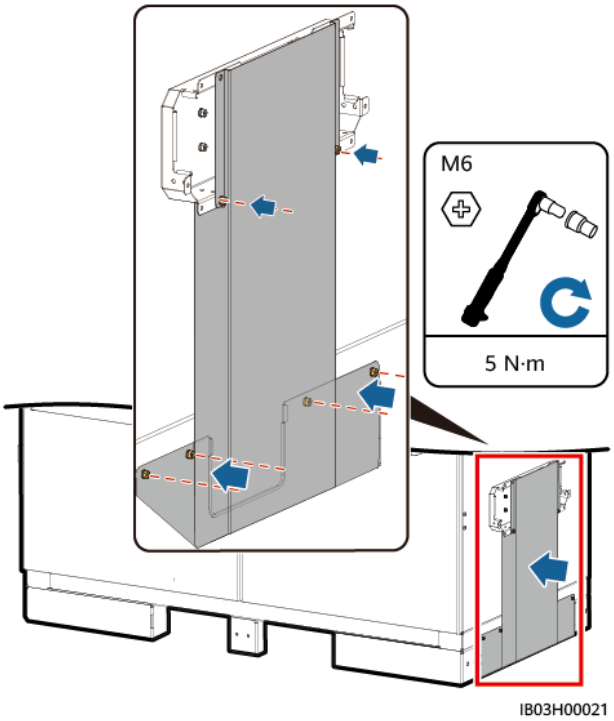
Step 2 Remove the pallets.

Figure 2-35 Removing the pallets



Step 3 Install the baffle plate at the bottom of the ESS.

Figure 2-36 Installing the baffle plate

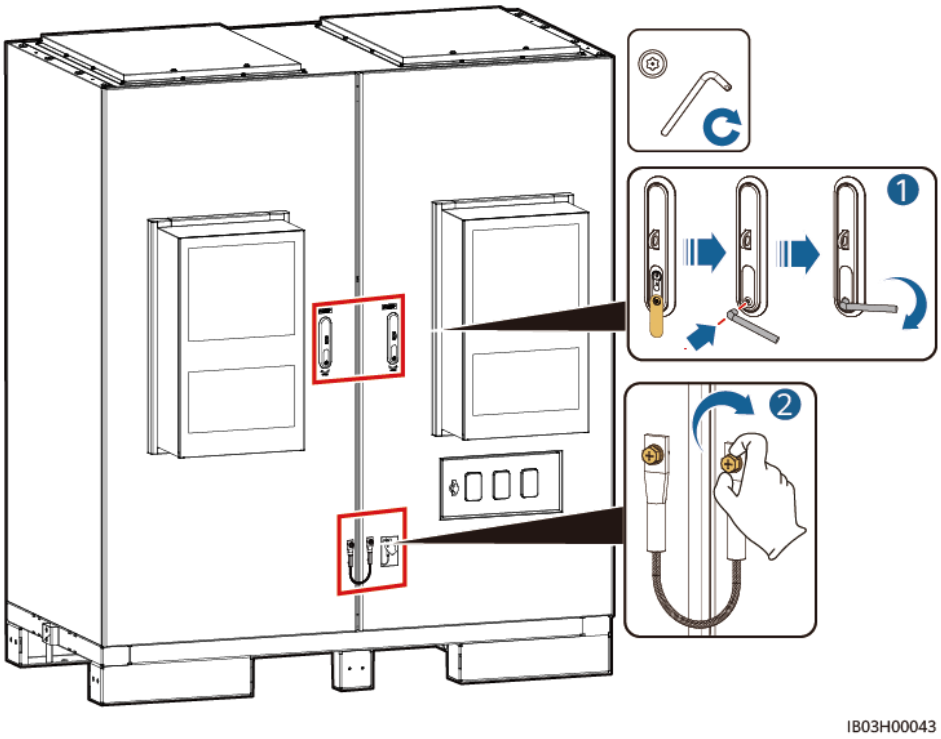


Step 4 Open the cabinet door.

NOTE

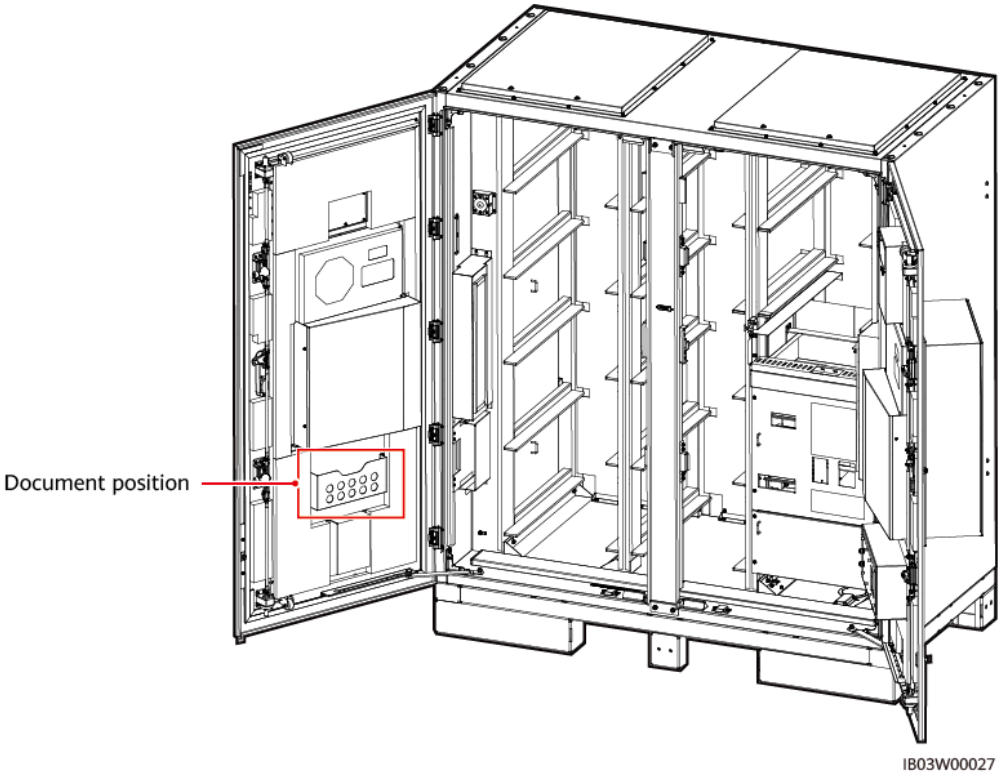
Keep the keys properly after use.

Figure 2-37 Opening the door



Step 5 Take out the delivered documents, such as the packing list.

Figure 2-38 Document position

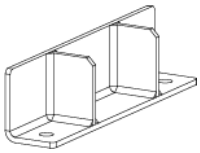
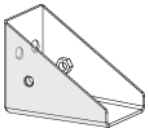


Step 6 Take out the mounting kits delivered with the product.

NOTE

After opening the door, check the number of deliverables based on the packing list. If any deliverable is missing, contact your dealer immediately.

Table 2-26 List of mounting kits

Hoisting conversion bracket and screw		Anchor bracket, anchor bracket screw, and expansion bolt			Leveling spacer
					

Step 7 After closing the cabinet door, move the ESS to the specified position.

NOTE

If a forklift cannot be used on the transport route (for example, there is a slope), use a crane to move the ESS.

Figure 2-39 Using a crane

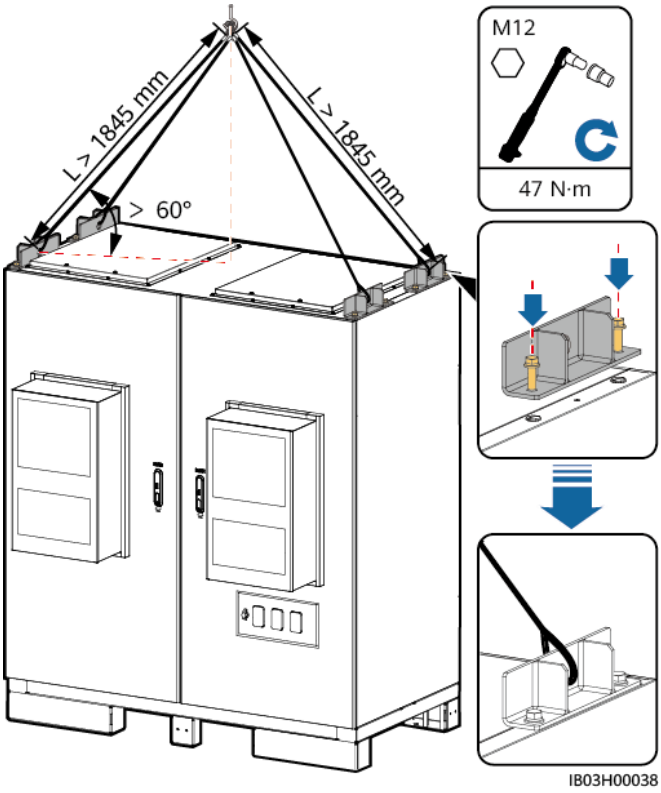
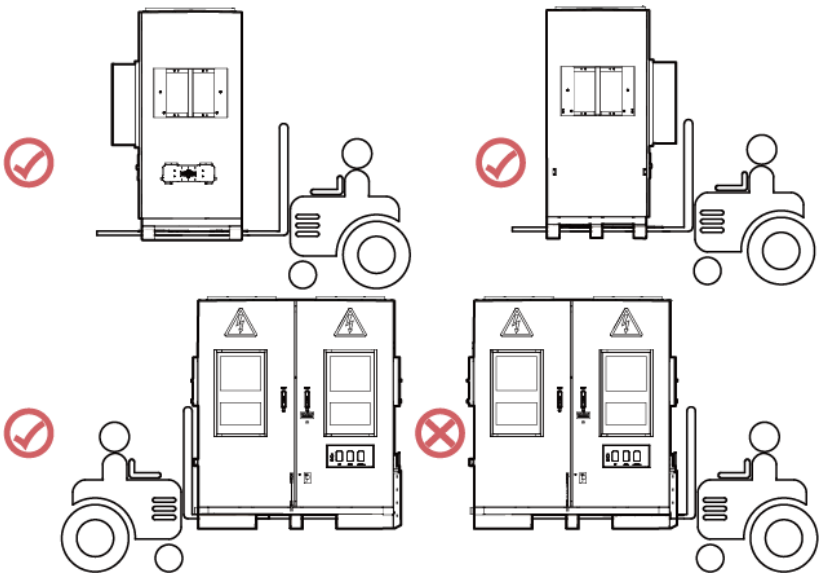


Figure 2-40 Using a forklift

NOTICE

When a forklift is used, bind and secure the ESS based on the site requirements to ensure there is no risk of falling.

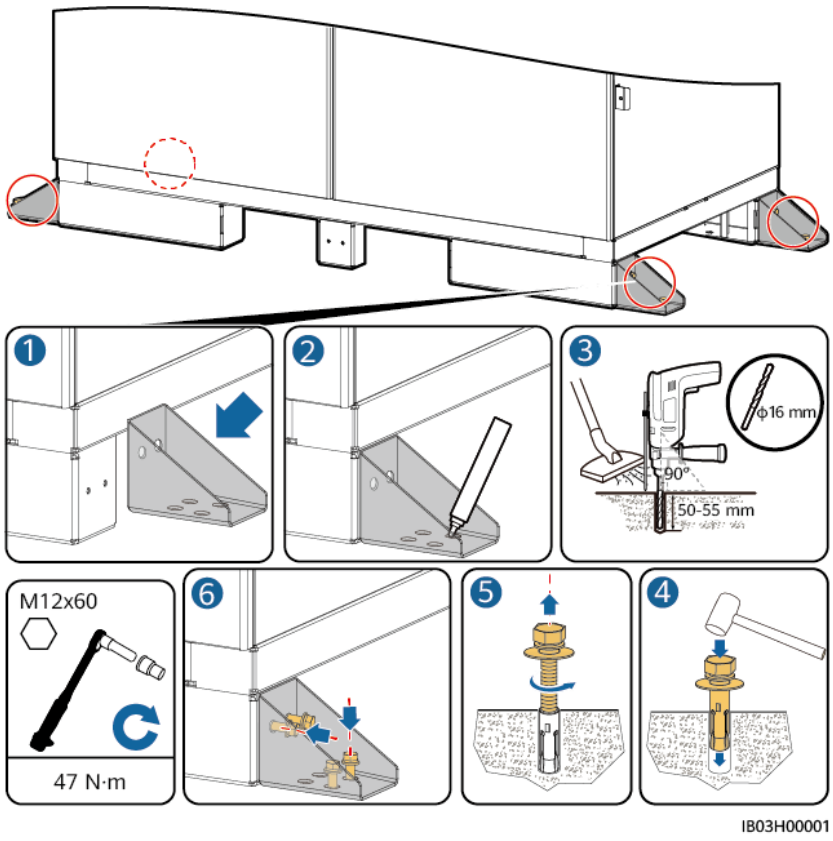


Step 8 Secure the ESS.

NOTE

If the ESS is not positioned stably, use a spacer to level the ESS before securing it.

Figure 2-41 Securing the ESS



----End

2.8.3 Connecting a PE Cable for the ESS

2.8.3.1 Inside the Cabinet

Prerequisites

For details about how to crimp OT/DT terminals, see Crimping an OT or DT Terminal.

Name	Type	Conductor Cross-Sectional Area	Outer Diameter	Terminal	Source
Ground cable	Single-core outdoor copper/copper-clad aluminum/aluminum alloy cable	25–50 mm^2	15–17.6 mm	M8 OT/DT terminal	Prepared by the customer

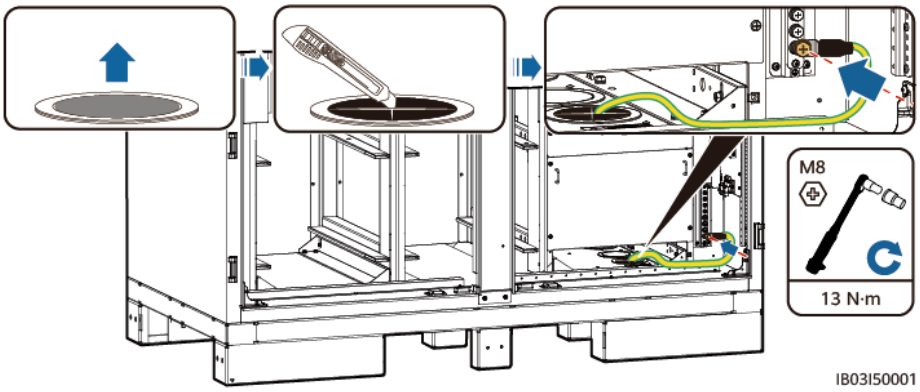
Name	Type	Conductor Cross-Sectional Area	Outer Diameter	Terminal	Source
The specifications of the PE cable are subject to this table or calculated according to IEC 60364-5-54.					

Procedure

Step 1 Open the ESS cabinet door.

Step 2 Connect the PE cable.

Figure 2-42 Connecting a PE cable



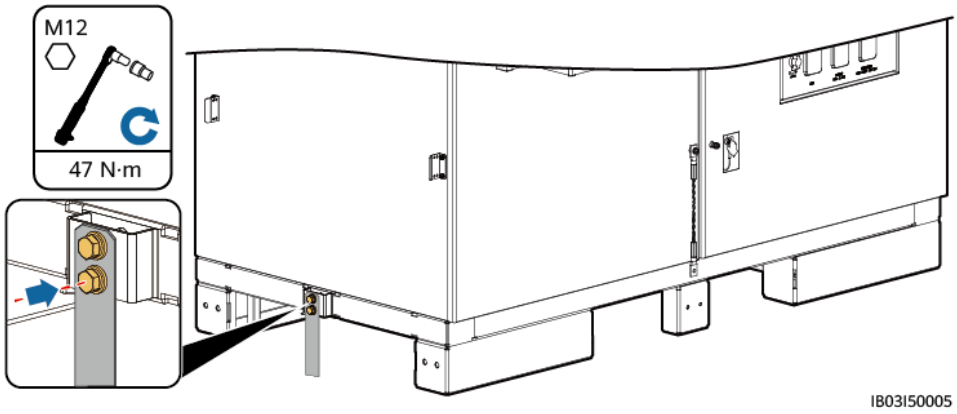
----End

2.8.3.2 (Optional) Outside the Cabinet

Using a Flat Steel Sheet

The hot-dip zinc-coated flat steel sheet needs to be prepared by the customer. The recommended specification is ≥ –40 x 4. The specific dimensions depend on the onsite fault current and are subject to the design of the design institute.

Figure 2-43 Connecting a ground flat steel sheet

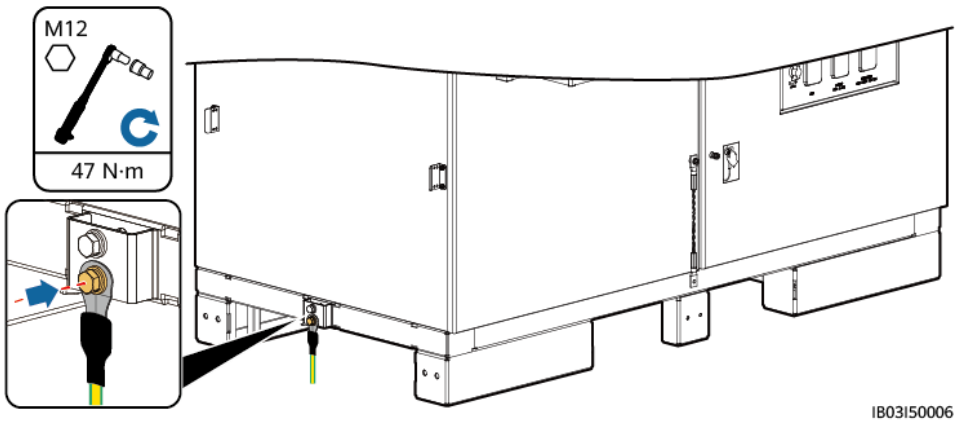


Using a PE Cable

For details about how to crimp OT/DT terminals, see Crimping an OT or DT Terminal.

Name	Type	Conductor Cross-Sectional Area	Outer Diameter	Terminal	Source
PE cable	Single-core outdoor copper/copper-clad aluminum/aluminum alloy cable	25–50 mm^2	15–17.6 mm	M12 OT/DT terminal	Prepared by the customer
The specifications of the PE cable are subject to this table or calculated according to IEC 60364-5-54.					

Figure 2-44 Connecting a PE cable



2.8.4 Installing Components

Table 2-27 Component installation list

Component	Installation Position	Quantity
Rack-mounted integrated gas fire extinguisher	Above the power distribution area in the ESS	1
Battery pack	Battery guide rails in the ESS	12
Rack controller	Right side of the ESS	1
Smart PCS	Left side of the ESS	1
(Optional) Maintenance socket	Power distribution area in the ESS	1
(Optional) Smart Power Sensor (DSU666-H)	Power distribution area in the ESS	1

NOTICE

Before installing components, ensure that the ESS is securely installed.

2.8.4.1 Installing the Rack-mounted Integrated Gas Fire Extinguisher

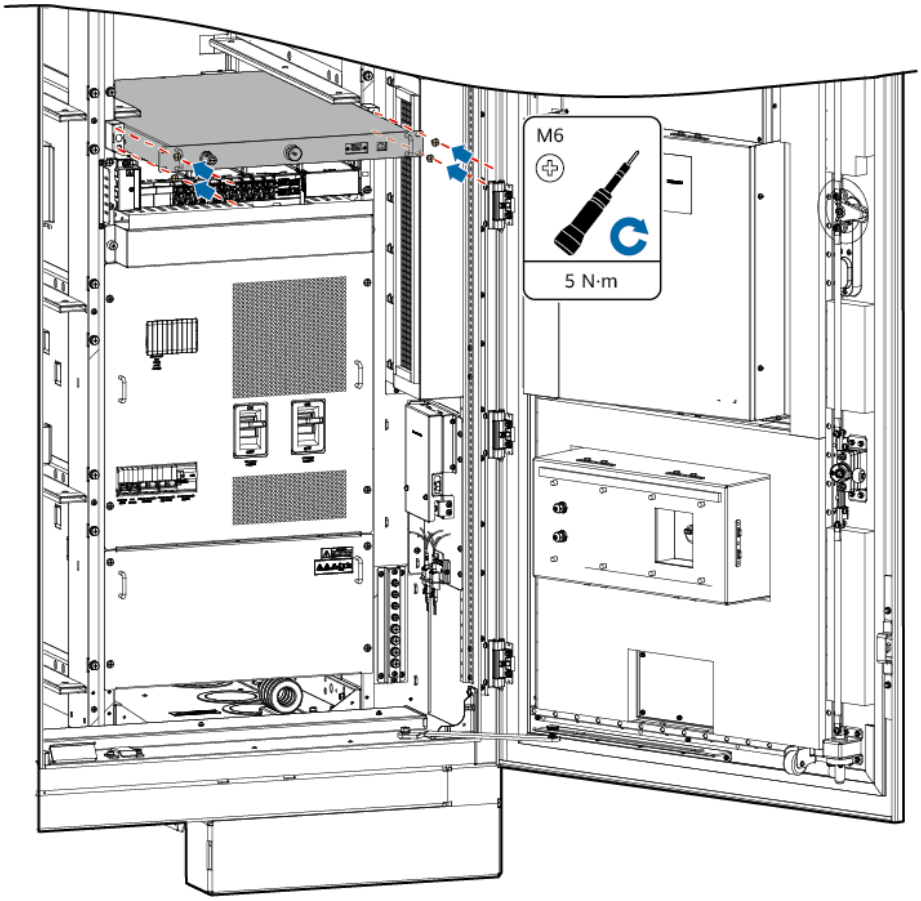
Prerequisites

- Ensure that the rack-mounted integrated gas fire extinguisher is intact.
- Before installation, read the documents delivered with the rack-mounted integrated gas fire extinguisher to understand the installation requirements and precautions.

Procedure

Install the rack-mounted integrated gas fire extinguisher.

Figure 2-45 Installing the component



2.8.4.2 Installing Battery Packs

Context

- You are advised to use a forklift and battery installation tray kit (installation kit for short) to install battery packs. The installation kit is not delivered with the product and needs to be purchased separately from the Company.
- The appearance of the battery pack installation kit in this document is for reference only.

WARNING

- Do not move or operate under the forklift arm.
- To prevent battery packs from falling off, start the forklift after confirming that battery packs are securely bound.
- Slowly push or move battery packs to prevent damage and collision.
- You can operate the battery pack installation kit only after the forklift stops moving.

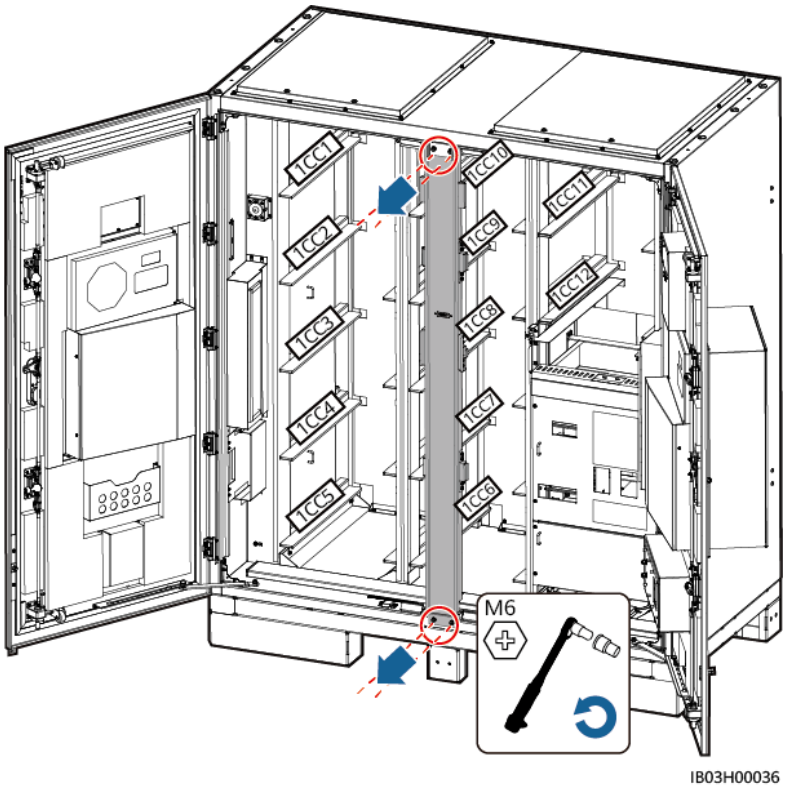
Procedure

NOTICE

- Before installation, ensure that battery packs are stored indoors and that other storage requirements specified in the user manual are met.
- Before installation, check the status of the battery packs. 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 water vapor or rain.

Step 1 Remove the column in the middle.

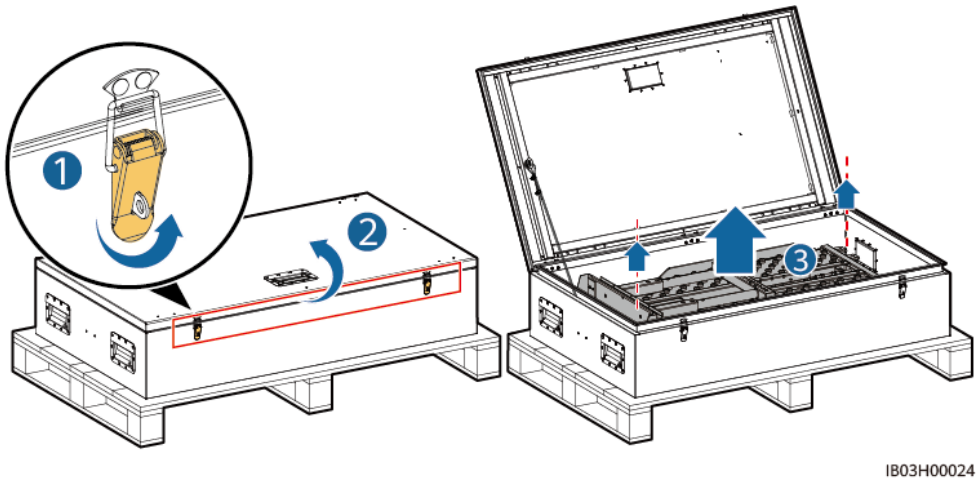
Figure 2-46 Removing the column



Step 2 Use a forklift to transport the installation kit to a place near the ESS.

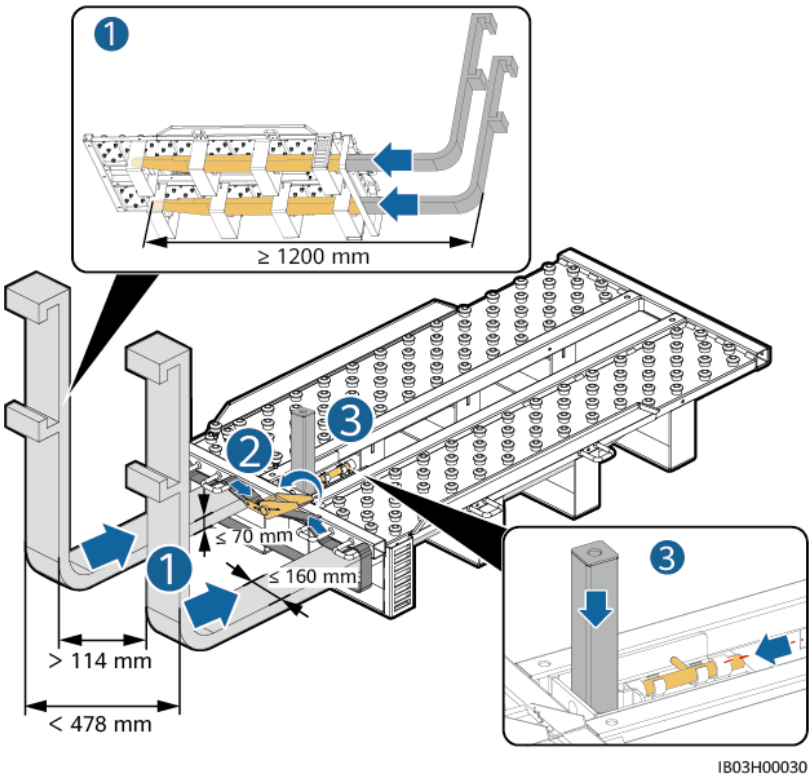
Step 3 Take out the installation kit.

Figure 2-47 Taking out the installation kit



Step 4 Insert, assemble, and secure the installation kit onto the forklift.

Figure 2-48 Assembling the installation kit

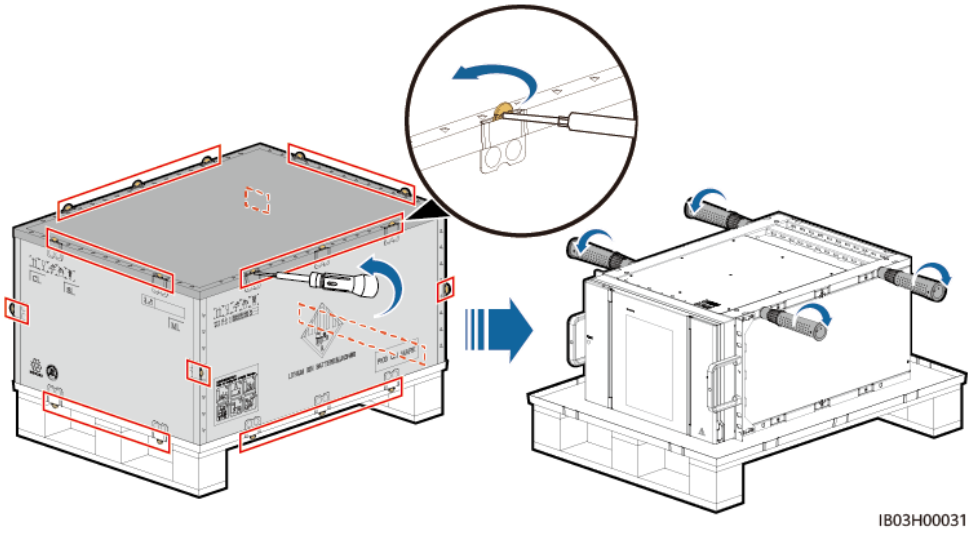


Step 5 Take out a battery pack.

NOTE

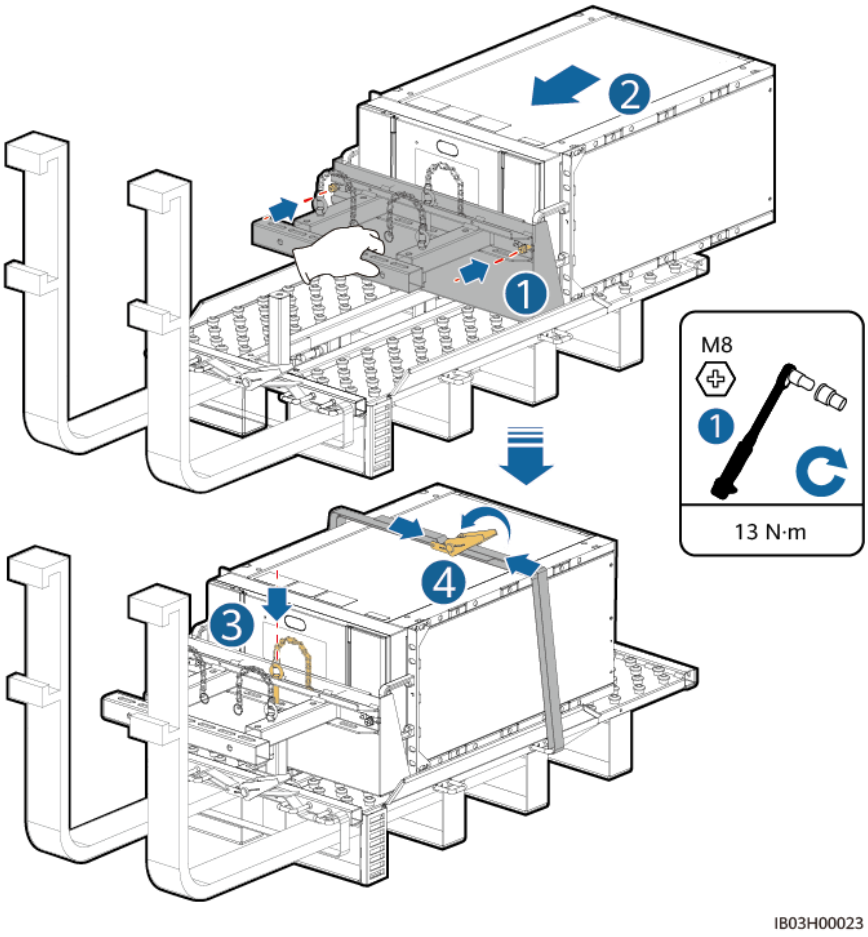
- At least four persons are required to move a battery pack.
- When using the lifting handles, hold the end closer to the device.

Figure 2-49 Taking out the battery pack



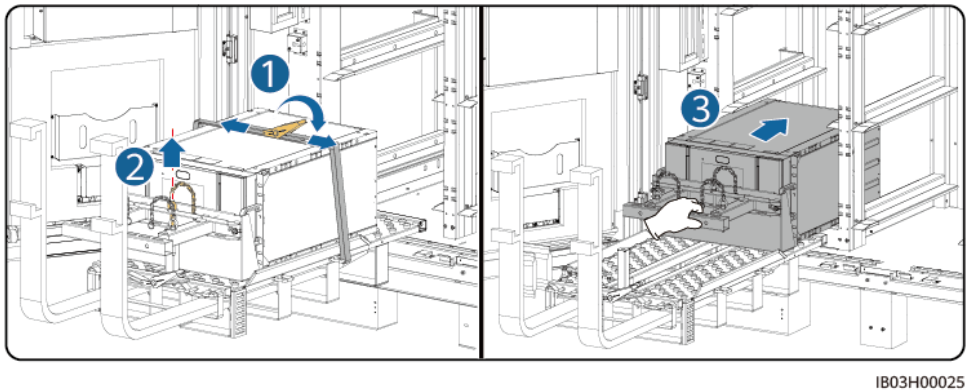
Step 6 Install the operating handle on the battery pack, place the battery pack on the installation kit, and secure the battery pack.

Figure 2-50 Securing the battery pack



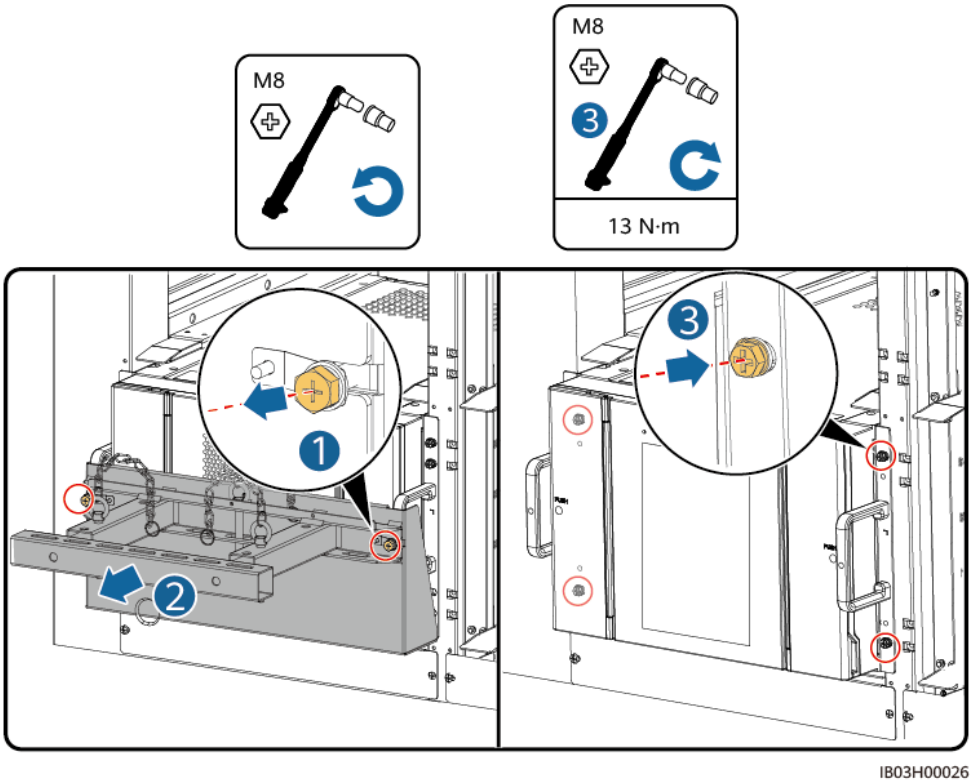
Step 7 Install the battery pack in the ESS.

Figure 2-51 Installing the battery pack in the ESS



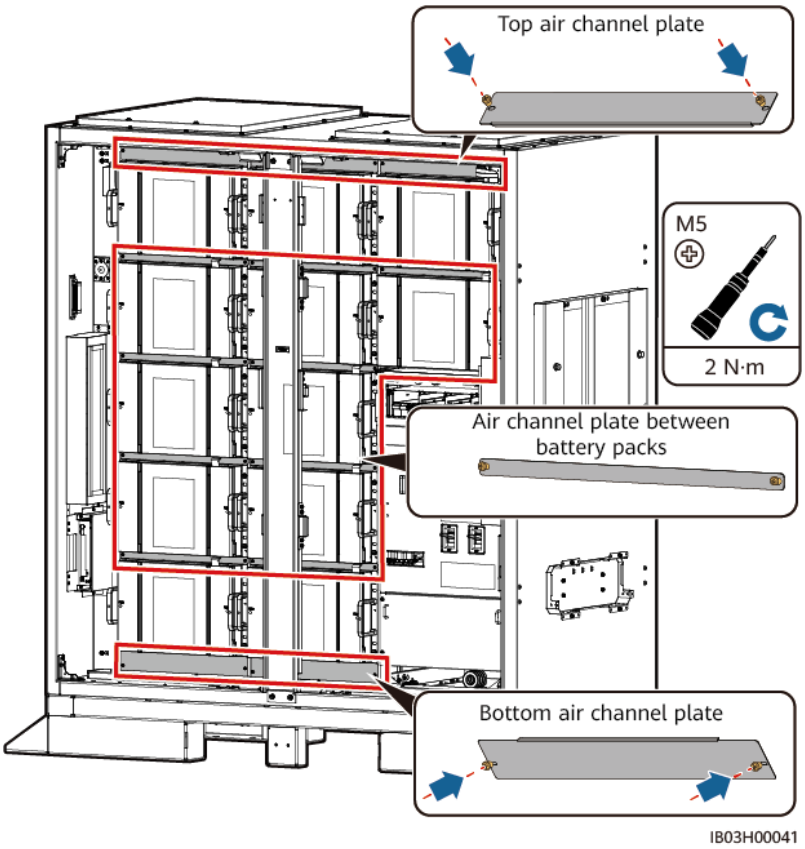
Step 8 Secure the battery pack.

Figure 2-52 Securing the battery pack



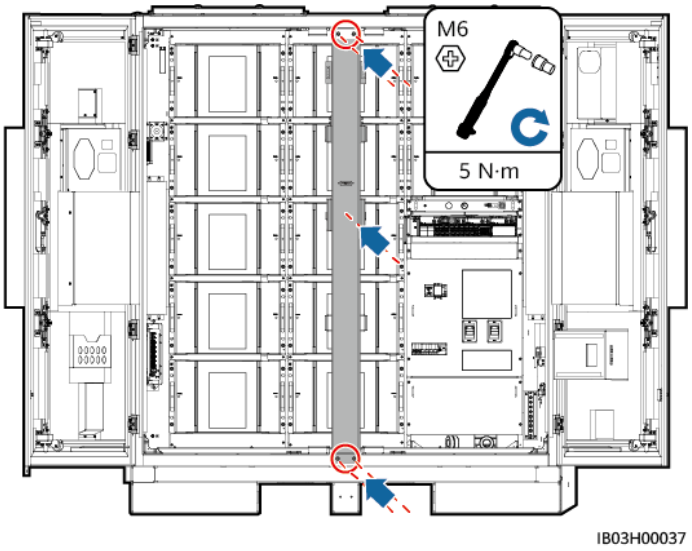
Step 9 Install air channel plates between battery packs based on the label on the air channel plates. The air channel plates are delivered with the container.

Figure 2-53 Installing air channel plates



Step 10 Install the column to the ESS.

Figure 2-54 Installing the column



----End

Follow-up Procedure

After using the installation kit, pack it back to the iron box and place it in a dry indoor place.

2.8.4.3 Installing the Smart Rack Controller

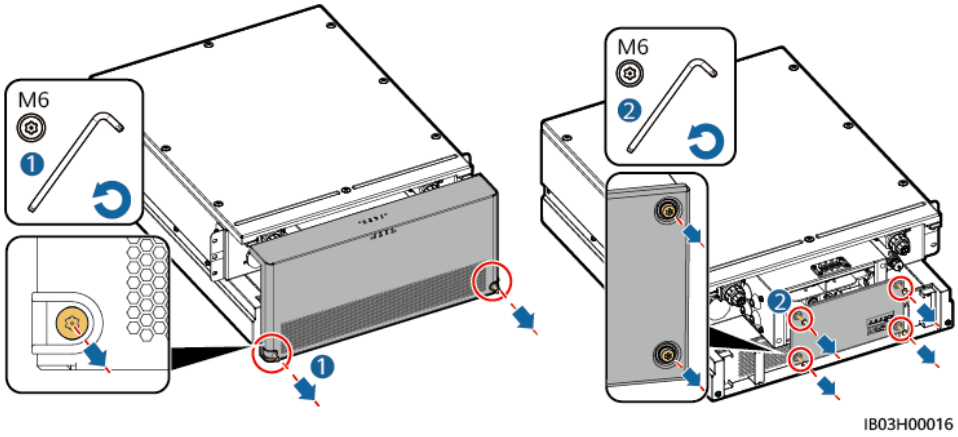
Prerequisites

Unpack and check the rack controller delivered to the site to ensure that it is intact.

Procedure

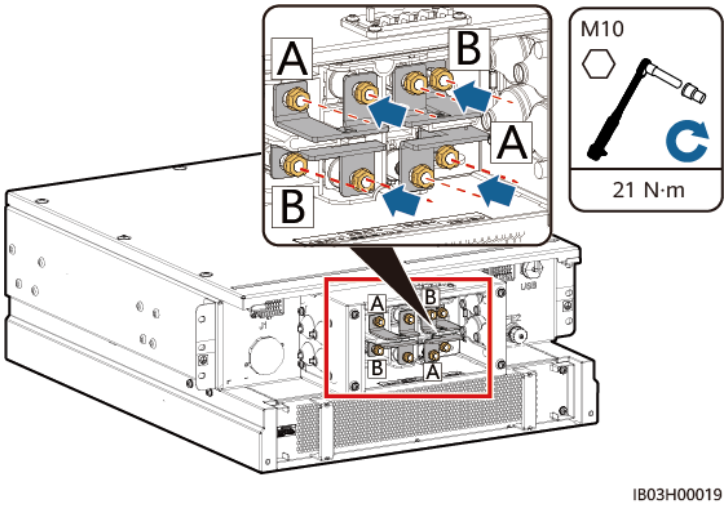
Step 1 Remove the decorative cover and maintenance compartment cover from the rack controller.

Figure 2-55 Removing covers



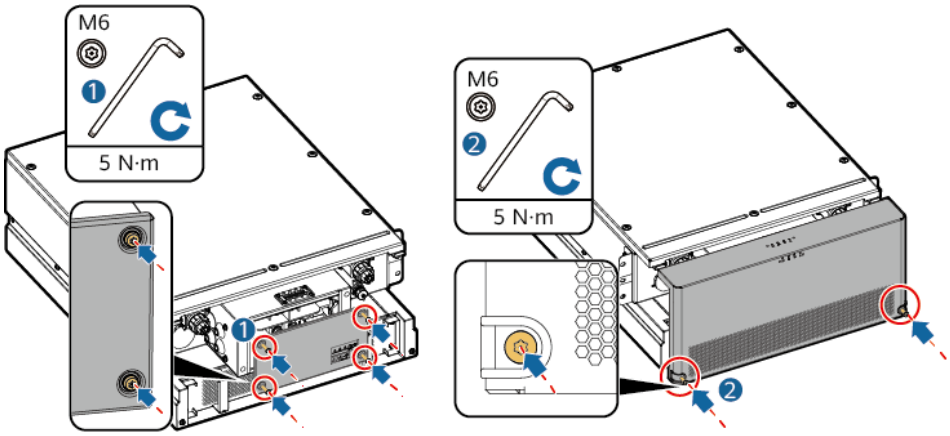
Step 2 Install short-circuiting copper bars that are delivered with the product.

Figure 2-56 Installing short-circuiting copper bars



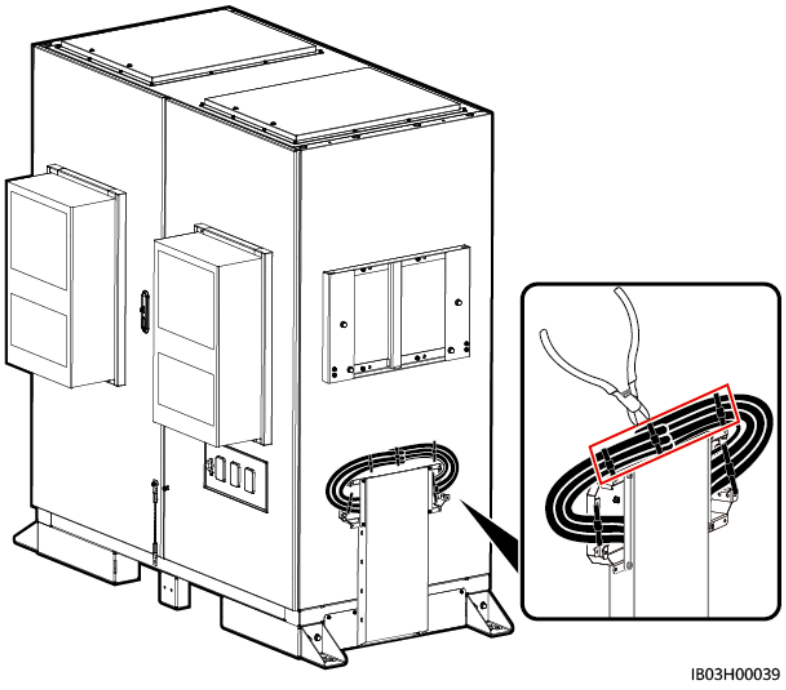
Step 3 Install the maintenance compartment cover and the decorative cover to the rack controller.

Figure 2-57 Installing covers



Step 4 Remove cables bound on the outside of the ESS.

Figure 2-58 Removing bound cables



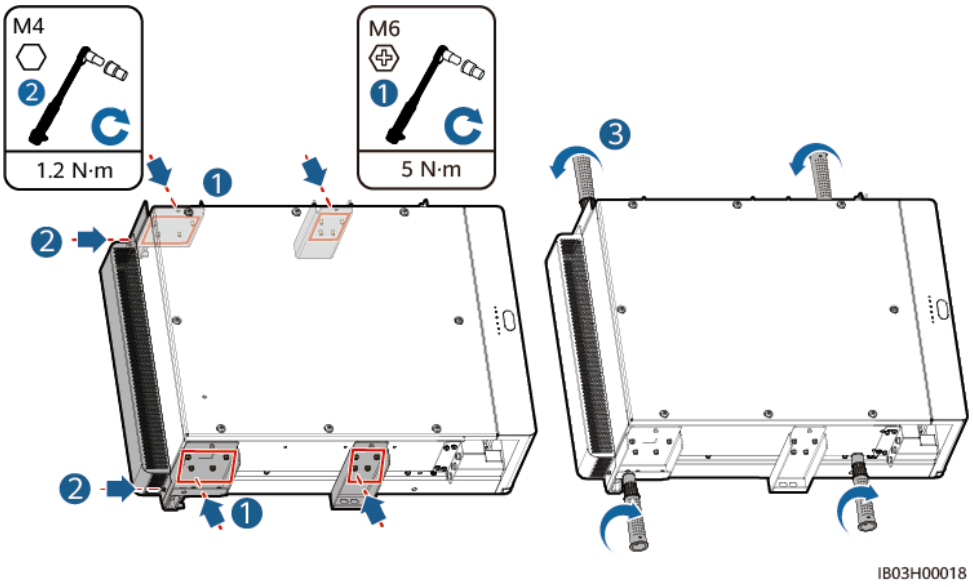
Step 5 Install the upper bracket, lower bracket, rainproof canopy, and lifting handles to the rack controller.

NOTE

- The upper bracket, lower bracket, rainproof canopy, and lifting handles are delivered with the product.
- The screws for securing the upper and lower brackets are preinstalled on the rack controller. Remove the screws before installing the upper and lower brackets.
- The screws for securing the rainproof canopy are preinstalled on the upper bracket. Remove the screws before installing the rainproof canopy.

- When using the lifting handles, hold the handle end closer to the device.

Figure 2-59 Installing mounting kits

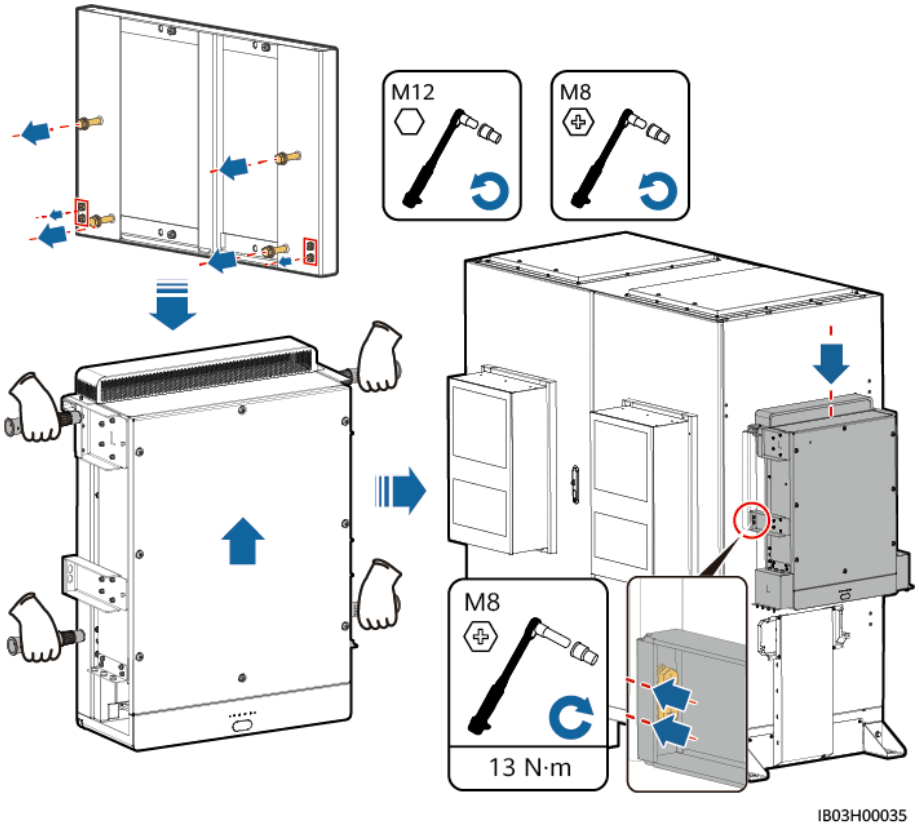


Step 6 Install the rack controller to the mounting bracket on the ESS.

NOTE

- The M8 screws are used to secure the rack controller. Keep them properly after removing them.
- At least three persons are required to install the rack controller.

Figure 2-60 Installing the Smart Rack Controller



----End

2.8.4.4 Installing the Smart PCS

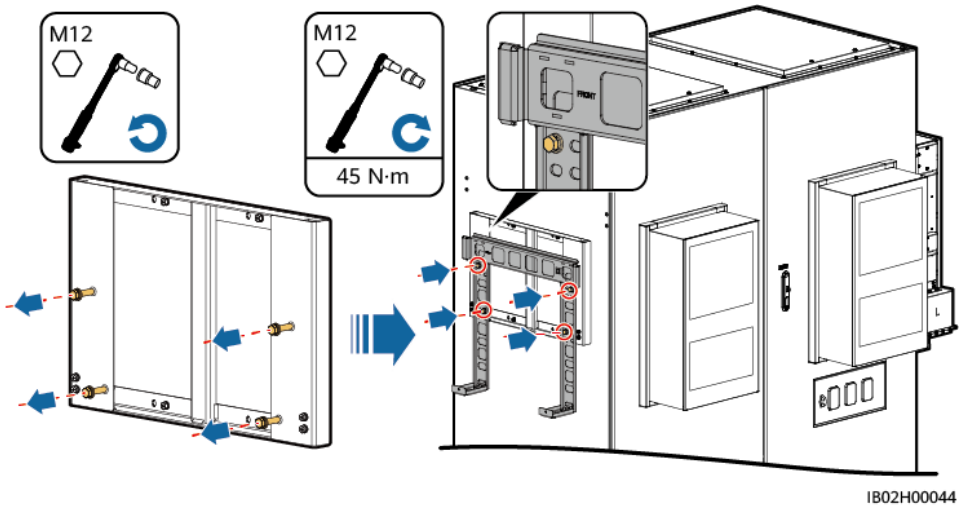
Prerequisites

Unpack and check the Smart PCS delivered to the site to ensure that the Smart PCS is complete and intact.

Procedure

Step 1 Install the mounting bracket. The mounting bracket is delivered with the Smart PCS.

Figure 2-61 Installing a mounting bracket

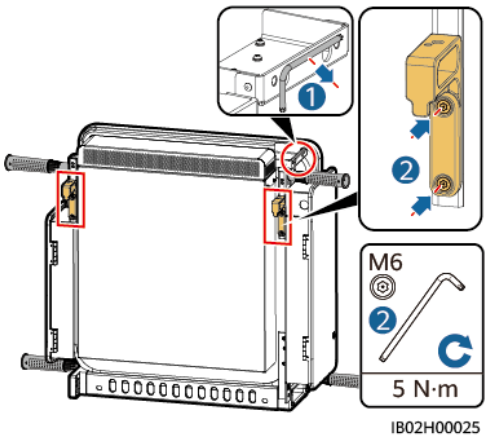


Step 2 Install mounting ears and lifting handles. The mounting ears are delivered with the Smart PCS, and the lifting handles are delivered with the ESS.

NOTE

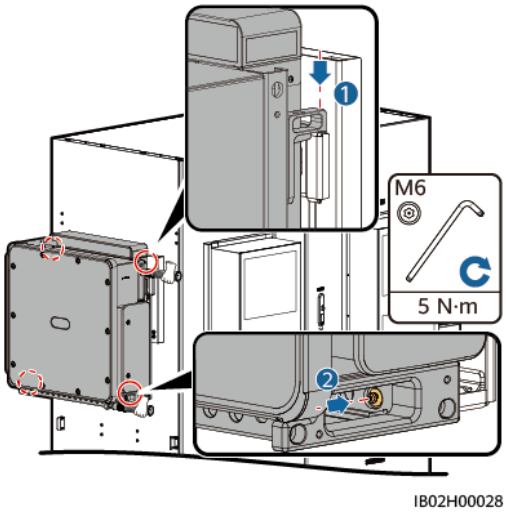
- At least four persons are required to install the Smart PCS.
- When using the lifting handles, hold the handle end closer to the device.

Figure 2-62 Installing mounting ears and lifting handles



Step 3 Secure the Smart PCS.

Figure 2-63 Securing the Smart PCS



----End

2.8.4.5 (Optional) Installing a Maintenance Socket

Context

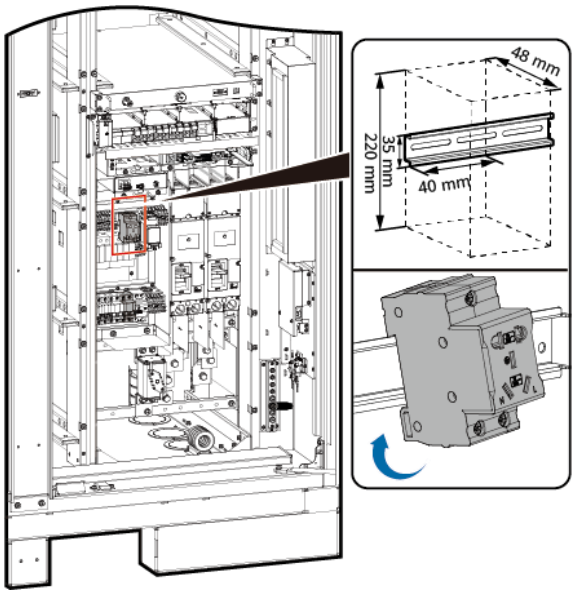
The maintenance socket needs to be prepared by the customer.

Procedure

Step 1 Remove the baffle plate in front of the power distribution area.

Step 2 Install the maintenance socket.

Figure 2-64 Installing the socket



----End

2.8.4.6 (Optional) DDSU666-H

Context

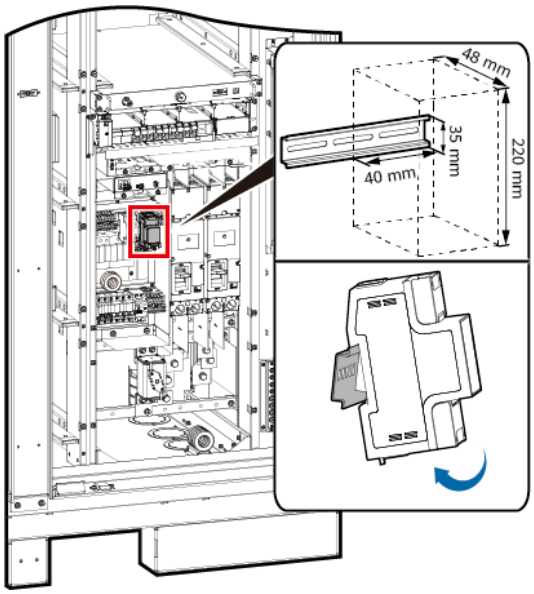
The DDSU666-H meter is purchased from the Company.

Procedure

Step 1 Remove the baffle plate in front of the power distribution area.

Step 2 Install the DDSU666-H.

Figure 2-65 Installing the DDSU666-H



----End

2.9 Installing Cables

Precautions

DANGER

- Before connecting cables, ensure that all ESS switches are **OFF.** Otherwise, the high voltage of the ESS may result in electric shocks.
- Before touching a conductor surface or terminal, measure the voltage at the contact point. Ensure that the equipment or components to be repaired are properly grounded to avoid electric shocks.

WARNING

- Device damage caused by incorrect cable connections is not covered under warranty.
- Only certified electricians are allowed to connect cables.
- Wear proper PPE at all time when connecting cables.

NOTE

The cable colors shown in the electrical connection diagrams provided in this section are for reference only. Select cables in accordance with local cable specifications. (Green-and-yellow cables are only used for protective grounding.)

2.9.1 Preparing Cables

NOTE

The cable diameter must comply with local cable standards. The factors that affect cable selection include the rated current, cable type, routing mode, ambient temperature, and maximum expected line loss.

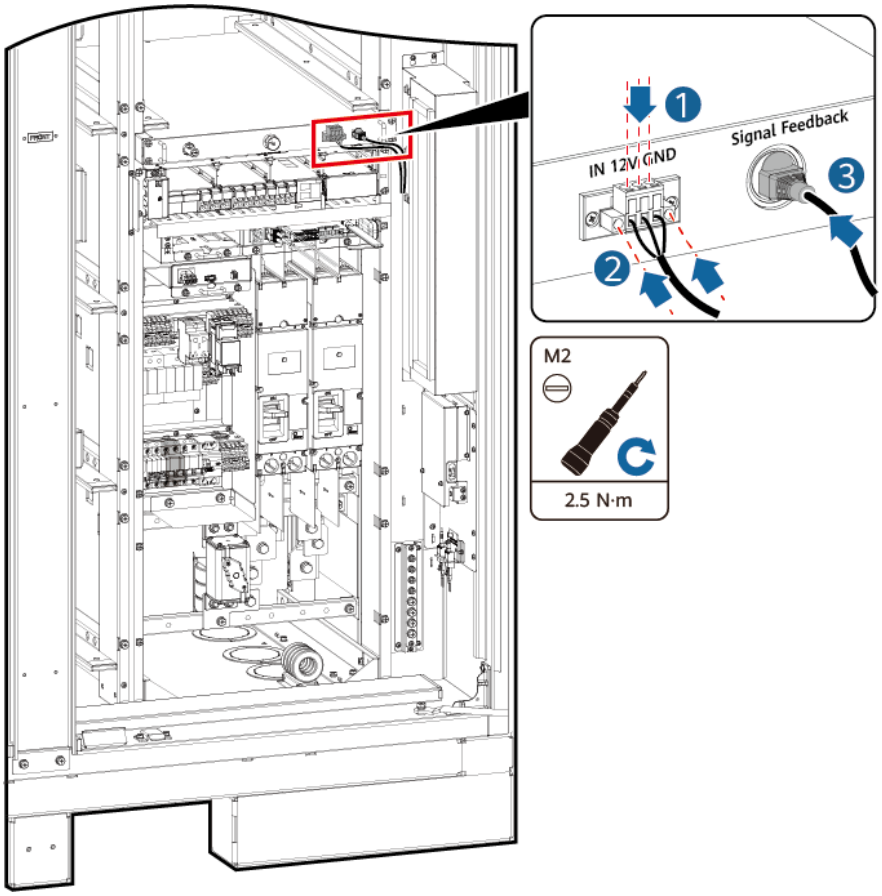
Name	Type	Conductor Cross-Sectional Area	Outer Diameter	Terminal	Source
PE cable for the rack controller	Single-core outdoor copper cable	≥ 25 mm^2	-	M6 OT/DT terminal	Prepared by the customer
DC power cable	Prefabricated DC power cable (with a corrugated pipe)	-	-	-	Delivered with the product
Auxiliary AC power cable (with external grid power supply)	Two-core (L, N)/Three-core (L, N, PE) outdoor copper/copper-clad aluminum/aluminum alloy cable	6–25 mm^2	12.7–27 mm	Cord end terminal with an insertion depth of 12 mm, M8 OT/DT terminal	Prepared by the customer
Single-phase AC input power cable (without external grid power supply)	Two-core/Three-core outdoor copper/copper-clad	6–25 mm^2	12.7–27 mm	Pin cord end terminal with an insertion depth of 12	Prepared by the customer

Name		Type	Conductor Cross-Sectional Area	Outer Diameter	Terminal	Source
		aluminum/aluminum alloy cable			mm	
Network cable		CAT 5E outdoor shielded network cable, internal resistance ≤ 1.5 ohms/10 m	-	≤ 9 mm	Shielded RJ45 connector	Prepared by the customer
Optical fiber cable		Supports the four-core or eight-core single-mode armored cable with the transmission wavelength of 1310 nm.	-	≤18mm	-	Prepared by the customer
(Optional) Cable to the DDSU666-H	RS485 communications cable, current transformer and cable and power cable	-	-	-	-	Delivered with the product
(Optional) Cable to the maintenance socket	Power cable and ground cable	-	-	-	-	Delivered with the product

2.9.2 Installing Cables for the Rack-mounted Integrated Gas Fire Extinguisher

Step 1 Take out the reserved cables and install them to the rack-mounted integrated gas fire extinguisher.

Figure 2-66 Connecting cables



----End

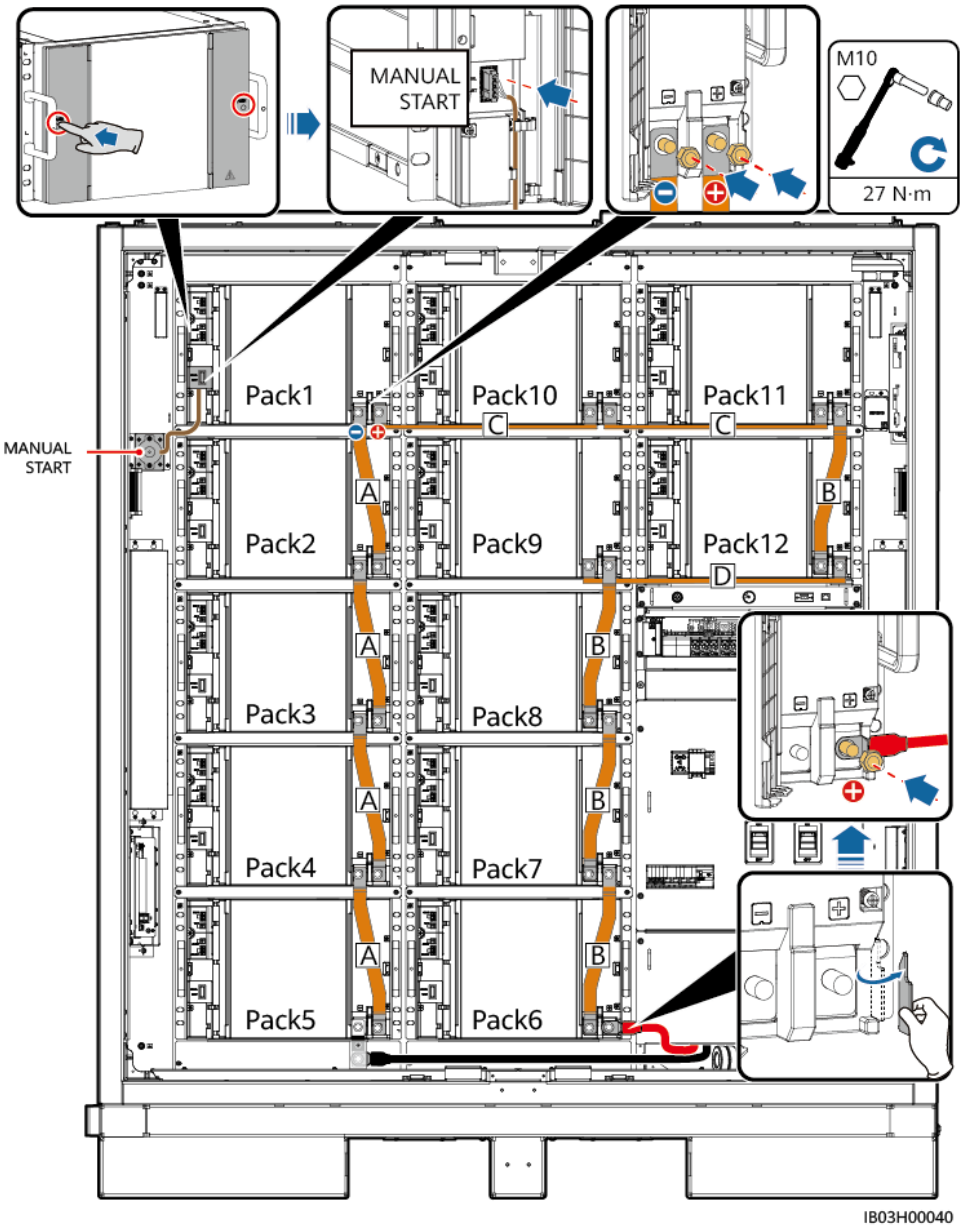
2.9.3 Installing Battery Pack Cables

Step 1 Install copper bars for battery packs, and connect the battery rack general output power cable and black start cable.

NOTE

- One ends of the battery rack general output power cable and black start cable are preinstalled before delivery.
- There are four types of copper bars delivered with the product: A, B, C, and D.
- Copper bar D must be installed before copper bar B.
- There are two types of M10 nuts for securing copper bars. Select a 15 mm or 16 mm socket based on the site requirements.
- When installing a nut, manually insert the nut into the screw plate, and then use a socket wrench to completely secure the nut in place. This prevents the screw thread from being stuck or stripped due to the deviation of the nut position.

Figure 2-67 Installing copper bars and cables

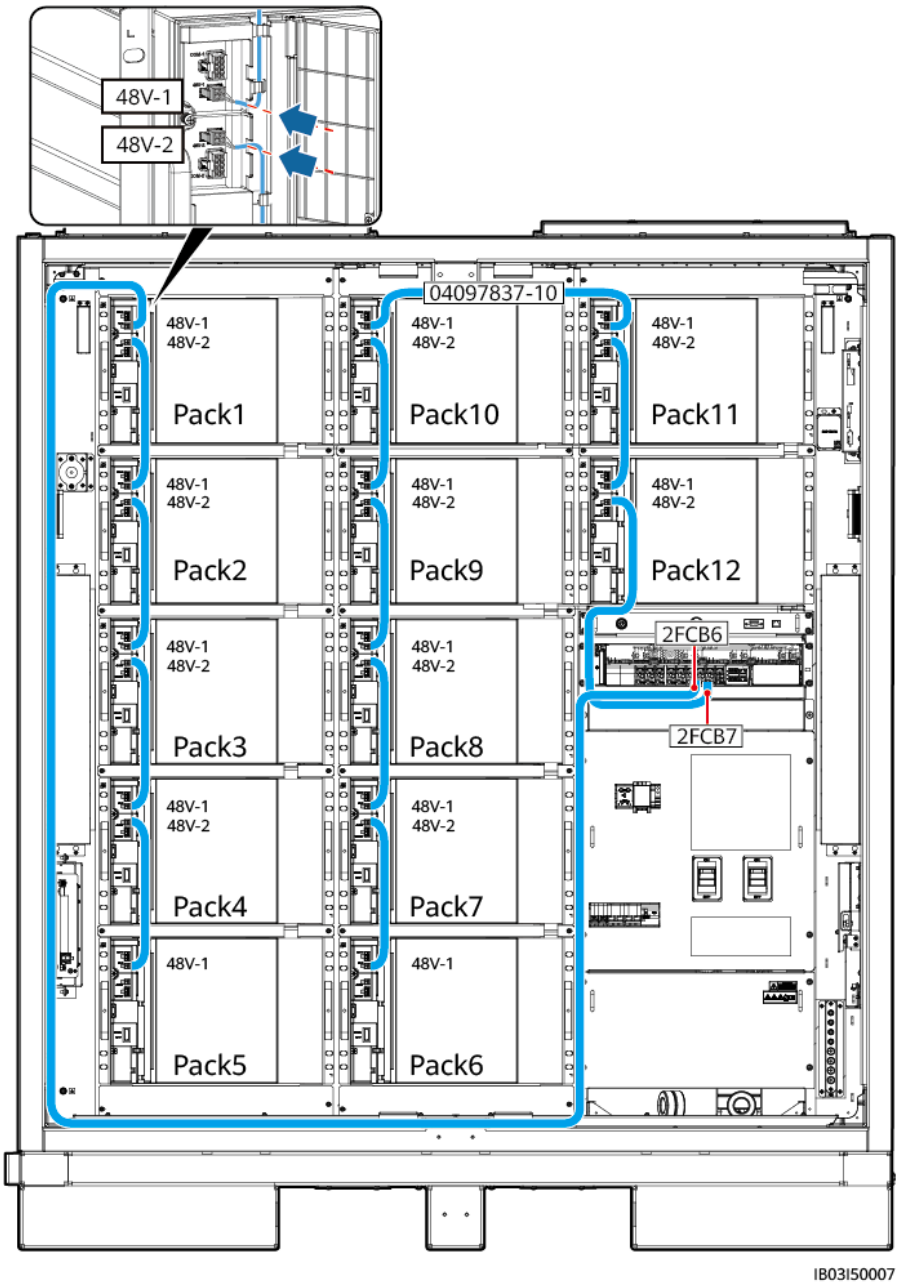


Step 2 Connect 48 V cables to the battery packs.

NOTE

- Cables to 2FCB6 and 2FCB7 are preinstalled before delivery.
- Other 48 V cables are delivered with the product.
- The cable between Pack10 and Pack11 is 04097837-10, and the other cables are 04097837-07.
- The cable sequence is as follows: 2FCB6-Pack1-2-3-4-5, 2FCB7-Pack12-11-10-9-8-7-6.

Figure 2-68 Connecting 48 V cables to battery packs

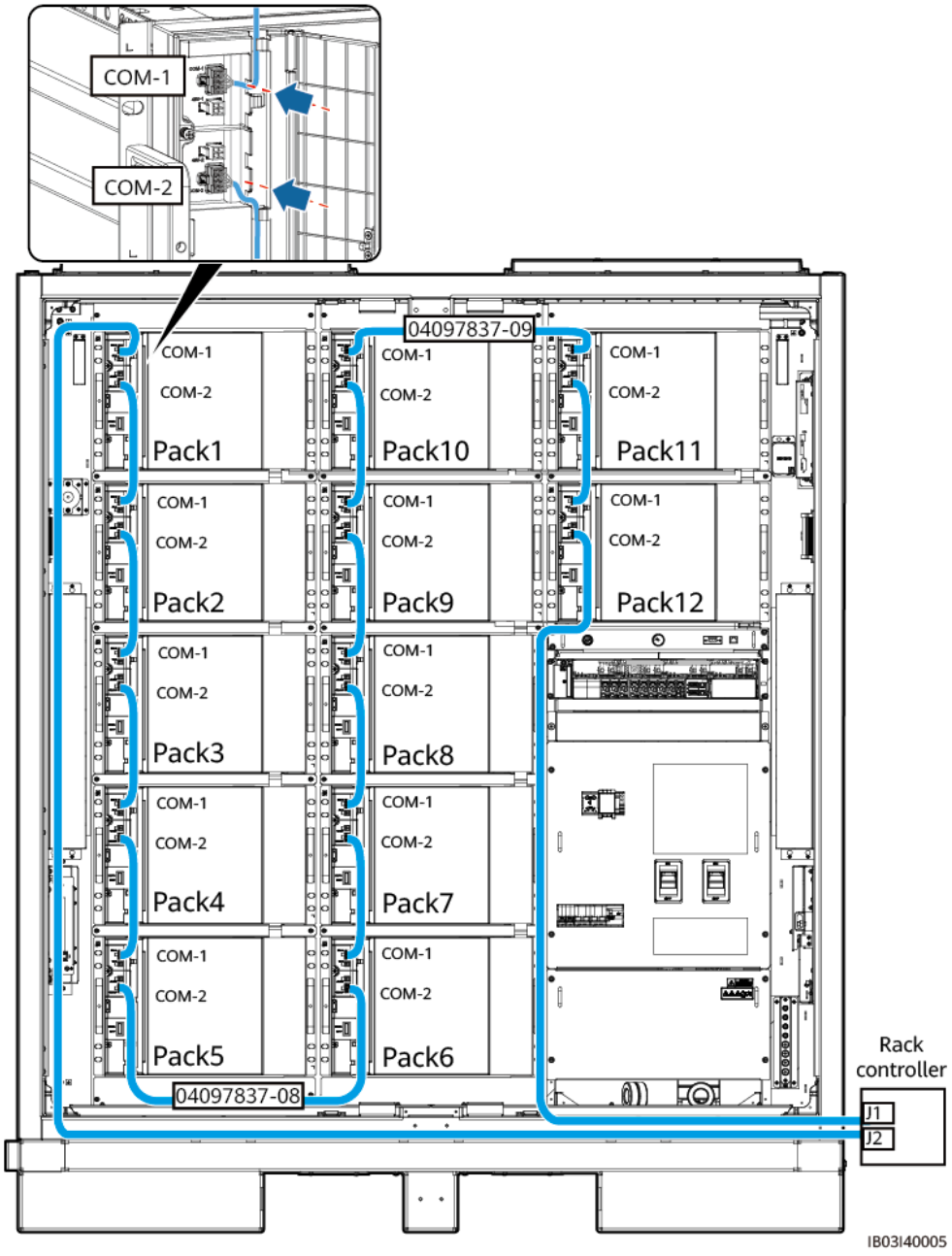


Step 3 Connect cables to the COM ports on the battery packs.

NOTE

- Cables to COM-1 on Pack1 and COM-2 on Pack12 are reserved before delivery. After connecting the cables to the battery packs, bind the cables inside the cabinet. Connect the other ends of the cables after installing the rack controller.
- Other COM port cables are delivered with the product.
- The cable sequence is as follows: Pack1-2-3-4-5-6-7-8-9-10-11-12.
- The cable between Pack5 and Pack6 is 04097837-08, the cable between Pack10 and Pack11 is 04097837-09, and the other cables are 04097837-06.

Figure 2-69 Connecting cables to the COM ports on the battery packs



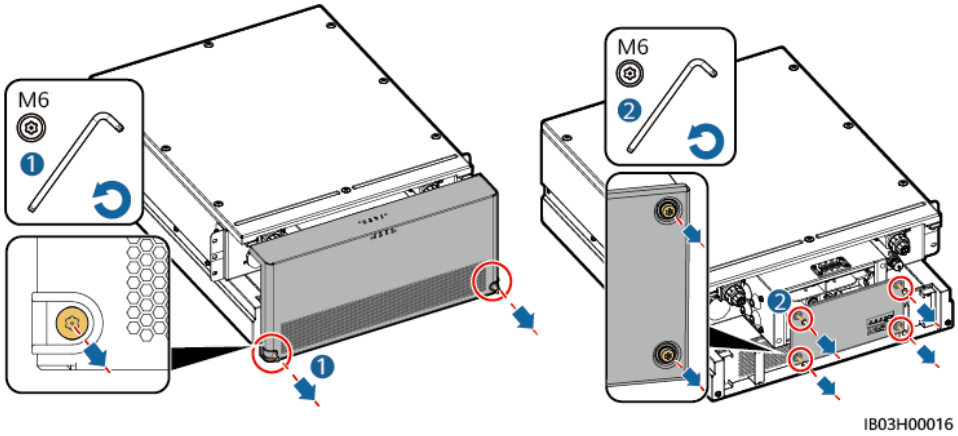
Step 4 Close the terminal covers of the battery packs.

----End

2.9.4 Installing Rack Controller Cables

Step 1 Remove the decorative cover and maintenance compartment cover from the rack controller.

Figure 2-70 Removing covers

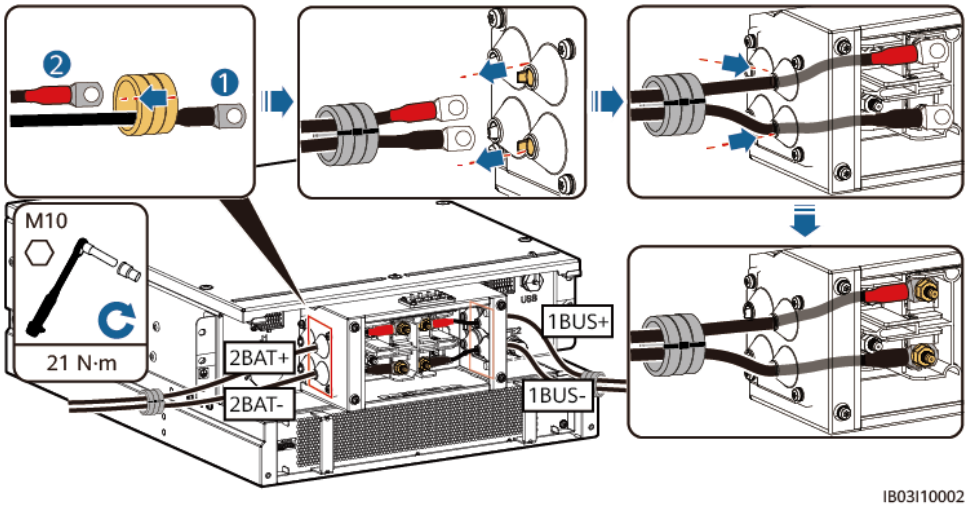


Step 2 Connect the preinstalled cable to the BAT/BUS ports. Magnetic rings are delivered with the product.

NOTICE

- The black magnetic ring is installed on the left side of the rack controller, and the green magnetic ring is installed on the right side of the rack controller.
- Do not remove the cover from an unused pagoda connector.

Figure 2-71 Connecting cables

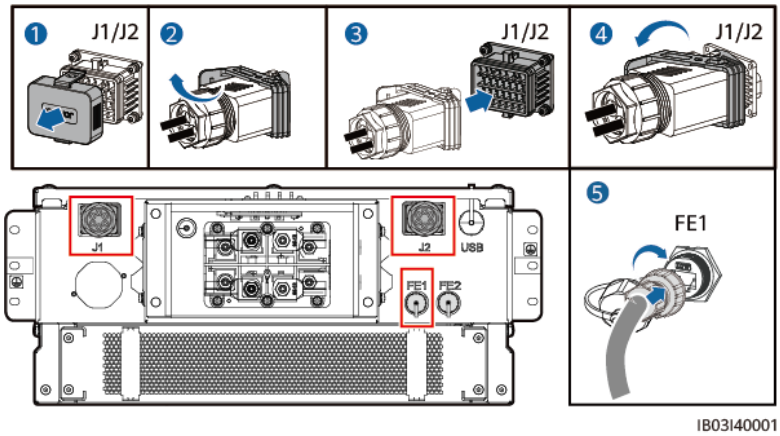


Cable Label	Wiring Terminal
107-1F1:2>TA1:2BAT+	2BAT+
108-1Q2:1>TA1:1BUS+	1BUS+

Cable Label	Wiring Terminal
109-1Q1:4>TA1:2BAT-	2BAT-
111-1Q2:3>TA1:1BUS-	1BUS-

Step 3 Connect the preinstalled cables to J1 (left), J2 (right), and FE1.

Figure 2-72 Connecting cables

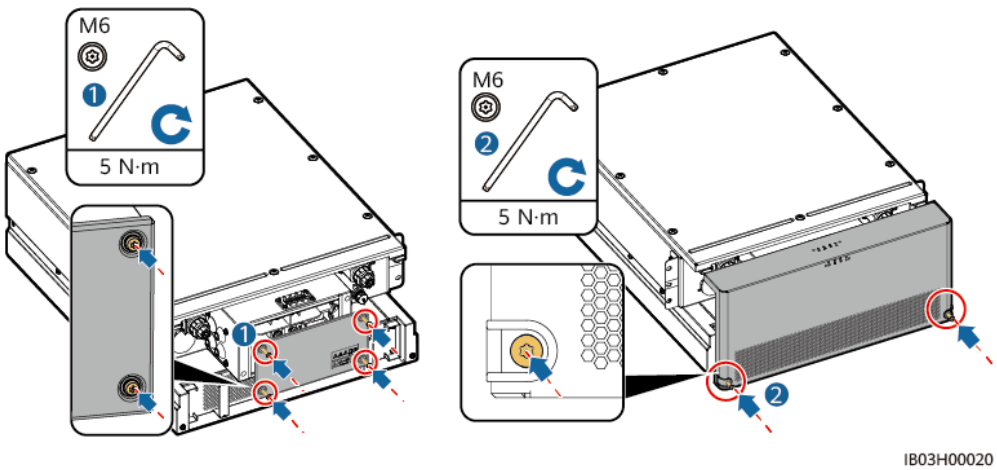


NOTE

- When securing the network cable (shown by ⑥ in the figure), hold the cable and align it with the FE network port. After the network cable is properly installed, do not release it. Use the other hand to tighten the nut of the RJ45 connector.
- After the network cable is installed, gently pull it down to check that it is properly installed.

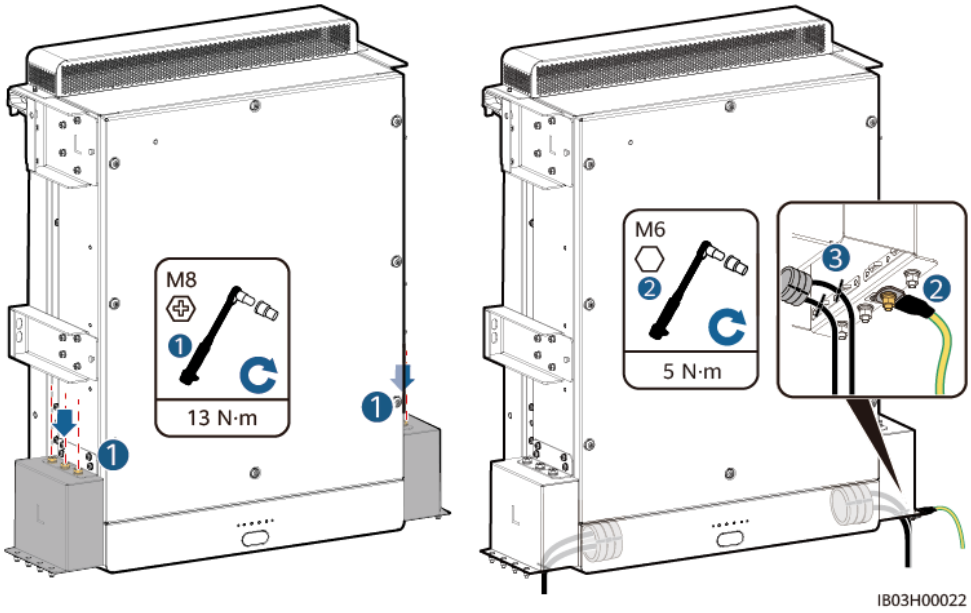
Step 4 Install the maintenance compartment cover and decorative cover of the rack controller, and place the magnetic rings.

Figure 2-73 Installing covers



Step 5 Install the protective cover delivered with the product, connect a PE cable to the protective cover on the left or right side, and bind the cable.

Figure 2-74 Connecting a PE cable



----End

2.9.5 Installing DC Power Cables

Prerequisites

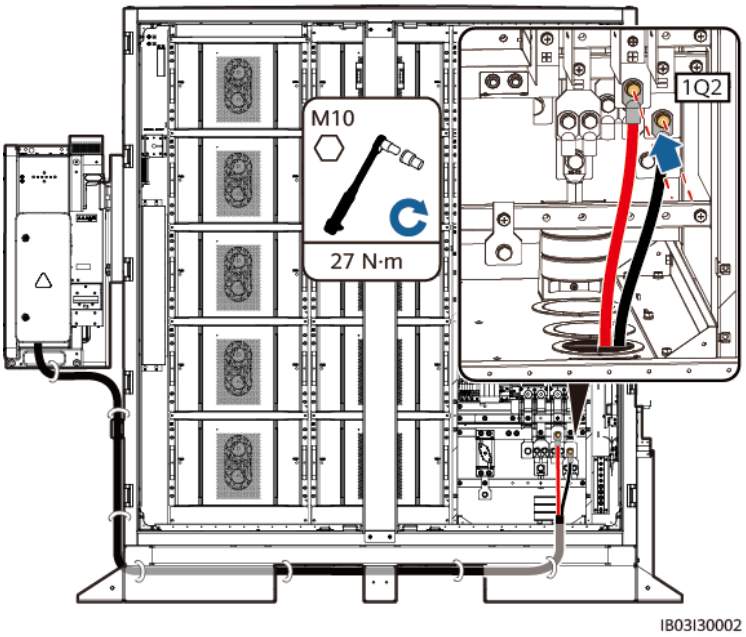
- The DC power cables have been pre-buried.
- The OT/DT terminals have been crimped. For details, see Crimping an OT or DT Terminal.

Procedure

Step 1 Remove the baffle plate in front of the power distribution area.

Step 2 Route the DC power cables through the cable hole at the bottom and connect the cables to the DC circuit breaker.

Figure 2-75 Connecting DC power cables



NOTE

- Reserve sufficient length of the cable and add angle steel in the middle of the foundation to support the cable and reduce the stress that the cable bears.
- For details about how to install other cables for the Smart PCS, see the corresponding quick guide.

----End

2.9.6 Auxiliary an AC Power Cable (with External Grid Power Supply)

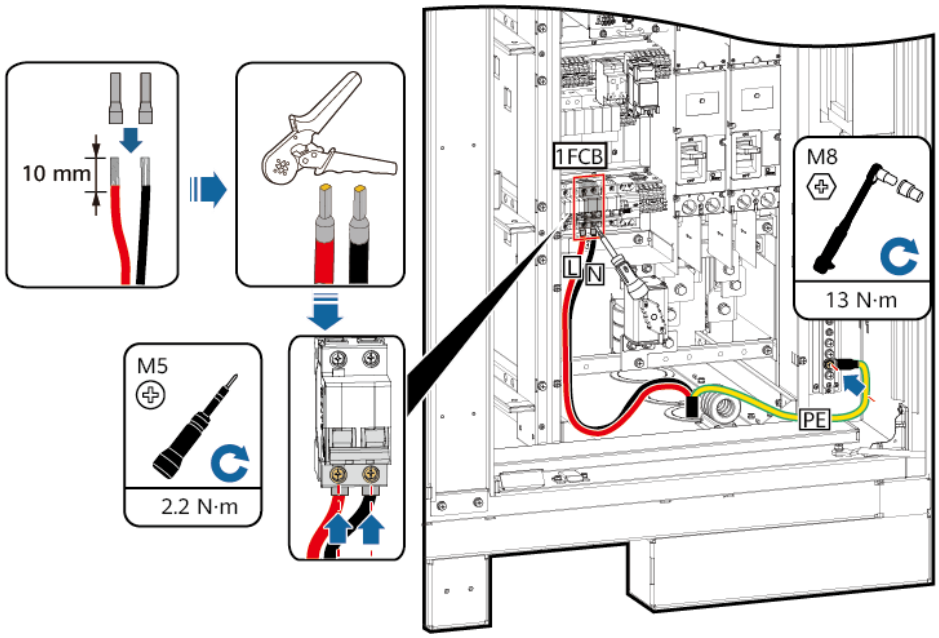
Prerequisites

The AC power cables have been pre-buried.

Procedure

Step 1 Route the AC power cables through the cable hole at the bottom and connect the cables to the MCB.

Figure 2-76 Connecting AC Power Cables



----End

2.9.7 Installing a Single-phase AC Input Power Cable (without External Grid Power Supply)

NOTE

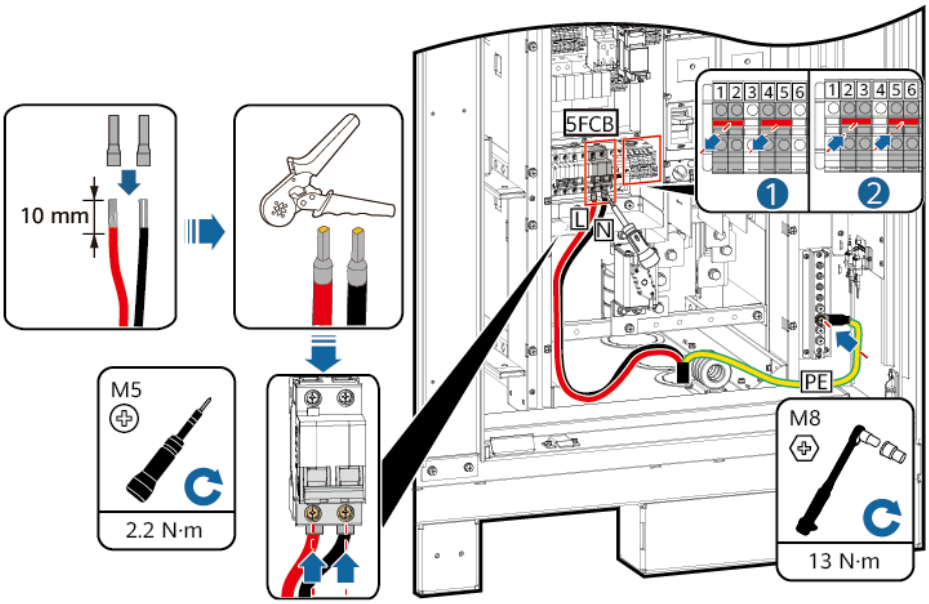
- If a UPS or other reliable backup power supply is used, perform the following steps to connect single-phase AC input power cables.
- Recommended UPS input switch specifications: 230/400 V AC 32 A/2P.

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

Step 2 Remove the short-circuiting bar from 4–5 and insert it to 5–6 on the XU terminal block.

Step 3 Connect the cable.

Figure 2-77 Connecting the cable



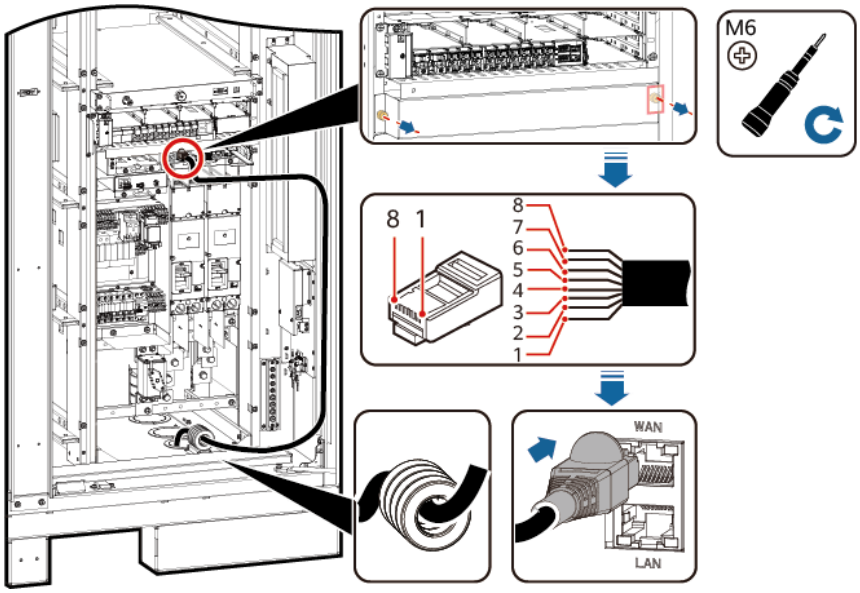
----End

2.9.8 Installing Communications Cables

2.9.8.1 Installing a FE Communications Cable

Step 1 Connect the FE communications cable to the **WAN** port on the CMU.

Figure 2-78 Connecting a FE communications cable



(1) White-and-orange (2) Orange (3) White-and-green (4) Blue

(5) White-and-blue (6) Green (7) White-and-brown (8) Brown

Step 2 Bind the cables.

----End

2.9.8.2 Installing Fiber Ring Network Communications Cables

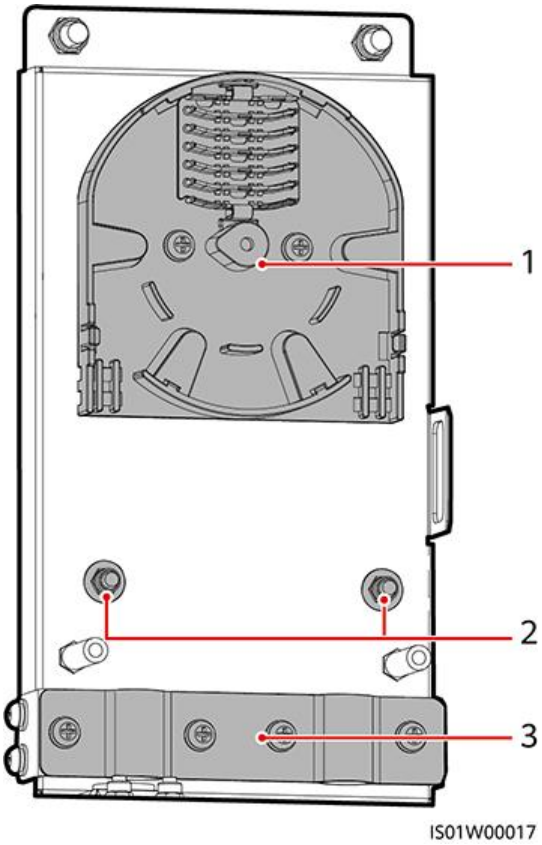
NOTICE

Only professionals are allowed to connect optical cables and splice fibers.

NOTE

In the optical fiber ring topology, two optical cables are required.

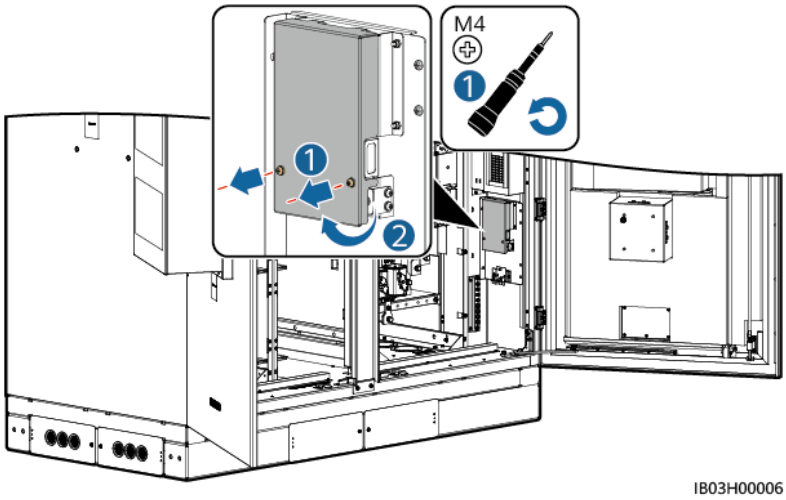
Figure 2-79 Access terminal box (ATB) interior



(1) Fiber spool (2) Fixing points for internal steel wires of optical cables (3) Cable clip

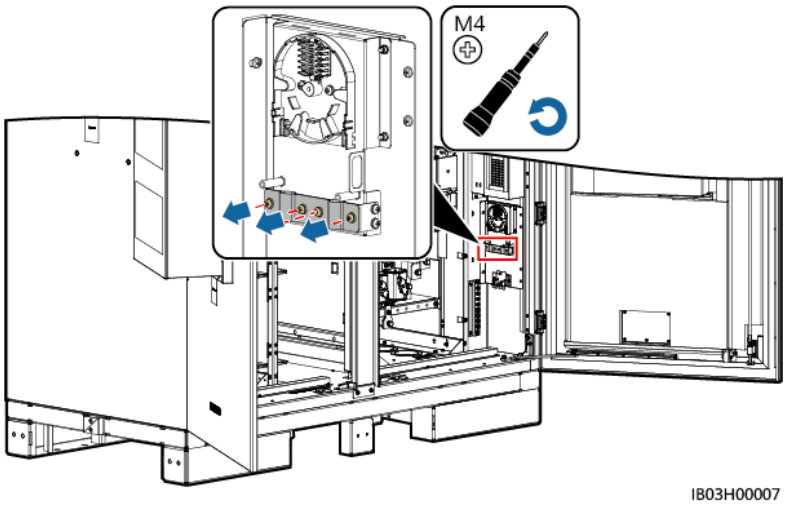
Step 1 Remove the external mechanical parts from the ATB.

Figure 2-80 Removing external mechanical parts



Step 2 Remove the optical cable fastener.

Figure 2-81 Removing a fastener

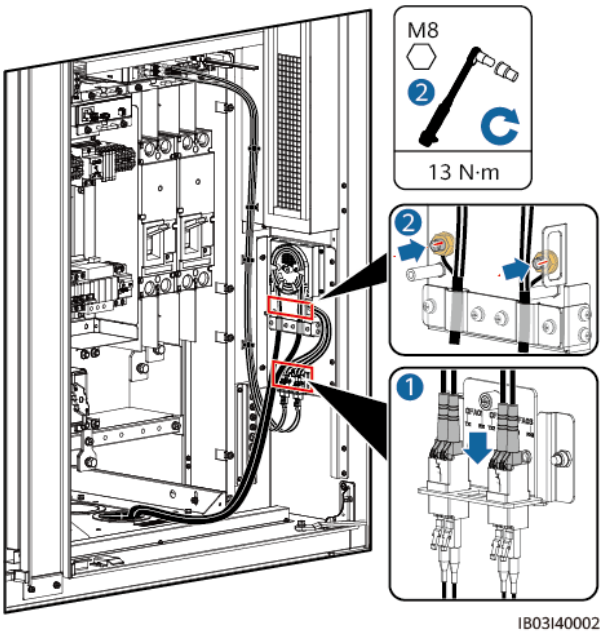


Step 3 Connect one end of the optical jumper to the fiber adapter.

Step 4 Route the other end of the optical jumper through the cable hole on the side of the ATB, and connect the cable to the ATB.

Step 5 Connect the peripheral optical cable to the ATB, splice the optical cable and the optical jumper, and then wind the spliced cable around the fiber spool on the ATB.

Figure 2-82 Connecting optical cables

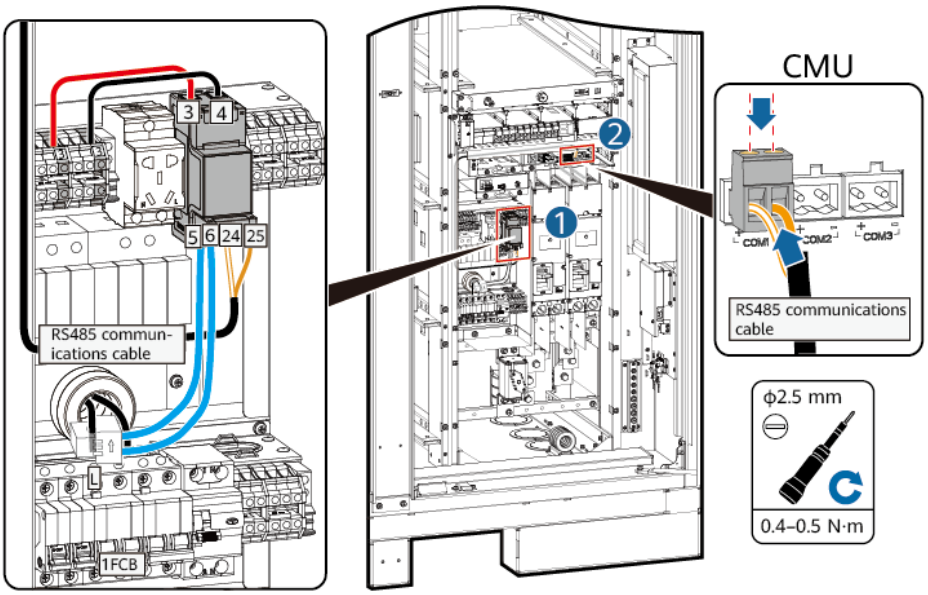


Step 6 Check that the cables are connected correctly and securely. Then reinstall the optical cable fastener and external mechanical parts.

----End

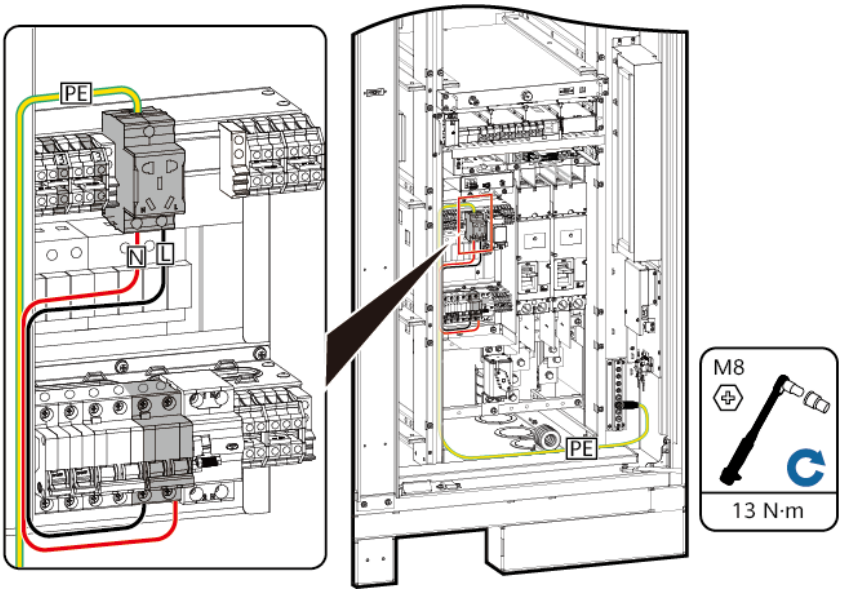
2.9.9 (Optional) Installing DDSU666-H Cables

Figure 2-83 Connecting cables



2.9.10 (Optional) Installing Maintenance Socket Cables

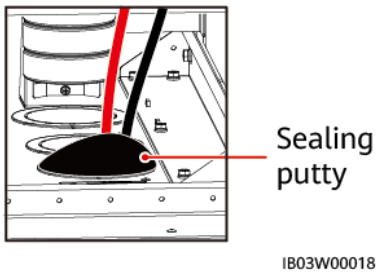
Figure 2-84 Connecting cables



2.9.11 Sealing Cable Holes

After cables are installed, seal the cable holes using the delivered sealing putty.

Figure 2-85 Sealing putty



3 System Power-On

3.1 Check Before Power-On

3.1.1 General Check

No.	Check Item	Expected Result
1	Appearance	• The equipment is intact and free from rust or paint flake-off. If paint flakes off, repaint the equipment. • The labels on the device are clear. Damaged labels must be replaced.
2	Cable appearance	• Cable sheathings are properly wrapped and not damaged. • Cable hoses are intact.
3	Cable connections	• Cables are connected in the designed positions. • Terminals are prepared as required and securely connected. • Labels on both ends of each cable are clear and specific, and attached in the same direction.
4	Cable routing	• Electrical and ELV cables are routed separately. • Cables are neat and tidy. • Cable tie joints are evenly cut without burrs. • Cables are placed properly and with slack at bending points to avoid stress. • Cables are routed neatly without twists or crossovers in the cabinets.
5	Battery pack copper bar	The copper bar is not deformed, and the plastic dip coating is not damaged.
6	Switch	• The DC LV Panel switch is set to OFF. • The battery rack switch is set to OFF.

3.1.2 ESS Installation Check

Enclosure

No.	Check Item	Expected Result
1	Installation	• The installation meets the design requirements. • The container is level, and each door opens normally.
2	Appearance	The container surface is free from cracks, dents, and scratches. If the paint flakes off, repaint the device.
3	Grounding	Each container has at least two ground points and is grounded securely with a ground resistance of 0.1 ohm or less.
4	Accessories	The number and positions of external accessories installed meet design requirements.
5	Labels	All labels are correct, clear, and complete.

Interior

No.	Check Item	Expected Result
1	Circuit breaker	The circuit breaker is in OFF.
2	Copper bar	The copper bars are not deformed, and no foreign objects are placed on the copper bars.
3	Cable	The bolts for installing the cables are tightened and the cables are not loose.
4	Cable hole sealing	Cable holes have been sealed.
5	Battery pack	The battery pack surface is intact.
6	Foreign object	Foreign objects such as tools and remaining materials are cleared.
7	Baffle plate for the power distribution area	The baffle plates in the power distribution area are free from cracks, dents, scratches, cracks, and looseness.
8	SPD	The SPD indicator is green.
9	Subcomponent (CMU, adapter, and rack-mounted integrated gas fire extinguisher)	All components are intact.

No.	Check Item	Expected Result
10	Grounding	The ground conductor is reliably connected to the ground terminal board or copper bar of the container.

3.1.3 Smart PCS Installation Check

Refer to the *LUNA2000-100KTL-M1 Smart Power Control System User Manual*.

Check Item	Expected Result
Installation	The Smart PCS is not deformed or damaged.
	The bottom is securely fixed.
	The Smart PCS is properly installed.
	The clearance around the Smart PCS meets requirements.
Electrical connection	Check that the upstream DC switch and downstream AC switch are **OFF**.
	All cables are intact and free from any damage or cracks.
	All ground cables are connected securely and reliably.
	All AC power cables are connected correctly and securely, and there is no open circuit or short circuit.
	All DC cables are connected securely in correct polarity, and there is no open circuit or short circuit.
	The communications cables are connected correctly and securely.
Others	The AC maintenance compartment is clean and tidy, without foreign matter.
	The DC maintenance compartment is clean and tidy, without foreign matter.
	The AC maintenance compartment door is closed and the screws on the door are tightened.
	The DC maintenance compartment door is closed and the screws on the door are tightened.
	The waterproof plugs on the unused USB and COM ports are secured.

3.1.4 SACU Installation Check

For details, see the SmartACU2000D Smart Array Controller User Manual (with No PID Module).

No.	Expected Result

No.	Expected Result
1	The cabinet and all components are installed properly.
2	All upstream switches for the cabinet and all switches inside the cabinet are OFF.
3	All cables are connected correctly and securely, without exposed metal.
4	Cables are bound neatly, and cable ties are secured evenly and properly in the same direction.
5	Routing for the power cables and signal cables meets the requirements for routing electrical and extra low voltage (ELV) cables and complies with the cable routing plan.
6	The locking caps of the used waterproof connectors are tightened and sealed. Idle waterproof connectors are plugged and the locking caps are tightened.
7	The cabinet interior is clean, without dust, dirt, or foreign matter.
8	The paint on the cabinet exterior is intact. Immediately repaint the part where paint has fallen off to prevent corrosion.

3.2 Installing the PSU

Prerequisites

PSUs are secured inside the ESS during transport and installed onsite.

NOTICE

- If a PSU is damaged, contact the local office.
- Do not put your hands into the PSU slot to avoid electric shock.
- In an outdoor scenario, you are advised to power on the PSU within 24 hours after unpacking. If the PSU cannot be powered on in time, place it in a dry indoor environment without corrosive gas.

Procedure

Step 1 Push the locking latch leftwards.

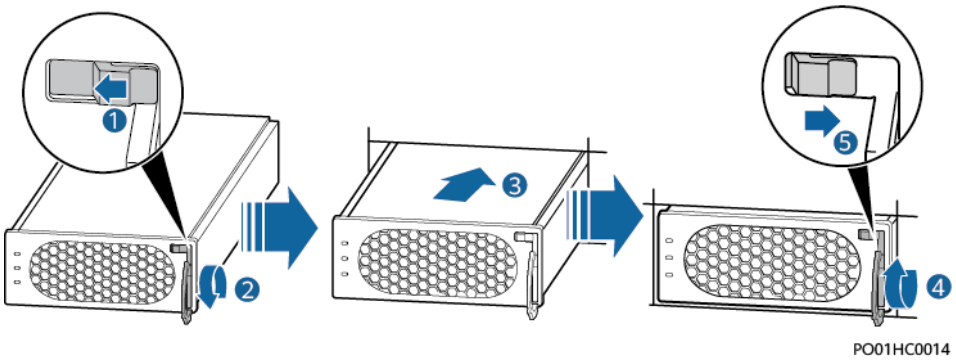
Step 2 Pull out the handle.

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

Step 4 Push the handle upwards.

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

Figure 3-1 Installing the PSU



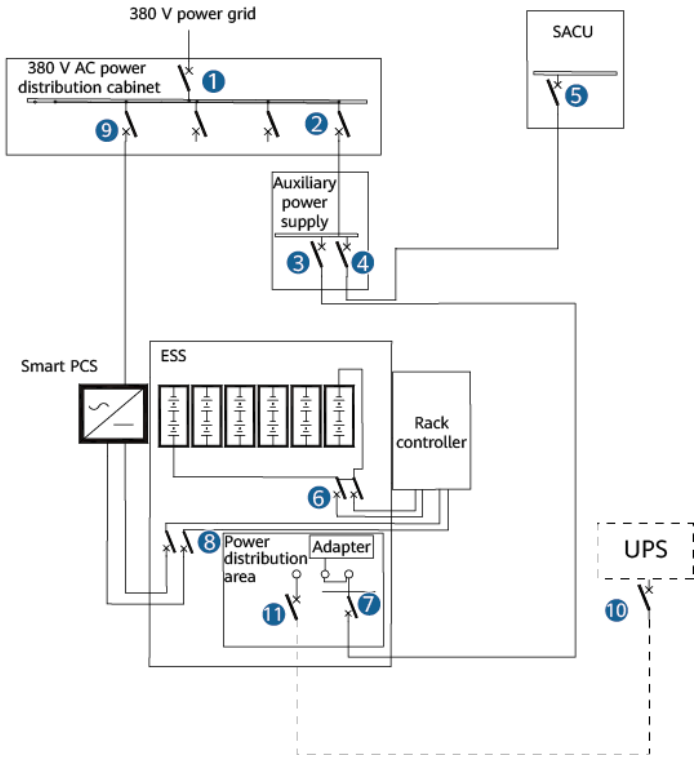
----End

3.3 Power-On Process

Table 3-1 Procedure

Step	Item		Remarks
1	Powering on the AC power distribution cabinet connected to the grid		As shown by (1) in Figure 3-2
2	Powering on the auxiliary power supply	(Optional) Powering on the UPS	As shown by (10) and (11) in 3.3 Power-On Process
		Powering on the 220 V AC auxiliary power supply	As shown by (2), (3), and (4) in Figure 3-2
3	Powering on the SACU		As shown by (5) in Figure 3-2
4	Powering on the ESS	Powering on the DC circuit breakers of battery racks	As shown by (6) in Figure 3-2
5		Powering on the auxiliary power supply (turning on the AC switches and then the DC switches)[a]	As shown by (7) in Figure 3-2
6		Powering on the output DC circuit breakers	As shown by (8) in Figure 3-2
7	Powering on the AC side of the Smart PCS	Powering on the battery side of the AC power distribution cabinet	As shown by (9) in Figure 3-2
Note a: Before turning on the internal switch of the ESS auxiliary power supply, check that the AC auxiliary power supply voltage is within the normal range (220 V ±10%).			

Figure 3-2 Power-on process



3.4 Powering on the SACU

Prerequisites

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

Procedure

Step 1 Turn on the single-phase power switch that controls the power supply from the remote transformer station to the SACU.

Step 2 Turn on the three-phase power switch that controls the power supply from the remote transformer station to the SACU.

- If the SACU supports the access of one MBUS route, turn on the corresponding three-phase power switch.
- If the SACU supports the access of two MBUS routes, turn on the corresponding three-phase power switches.

Step 3 Check that the input voltages of all switches of the SACU are within the operating voltage ranges using a multimeter.

Step 4 Turn on the **QF03** single-phase input switch in the SACU.

Step 5 Turn on the three-phase input switch on the SACU.

- If the SACU supports the access of one MBUS route, turn on the FU01 switch.
- If the SACU supports the access of two MBUS routes, turn on the FU01 and FU02 switches.

Step 6 Adjust the support bar, close the cabinet door, and tighten the screws.

NOTE

If a screw used for securing the cabinet door is lost, use the spare security torx screw included in the fitting bag.

----End

3.5 Powering On the Power Supply Loop of the AC Power Distribution Cabinet

Prerequisites

Before power-on, use a multimeter to check that the phase voltage of the AC power distribution cabinet power supply loop is within the normal range (220 V ±10%).

Procedure

Step 1 Turn on the switches between the AC power distribution cabinet and the SACU.

Step 2 Turn on the switches between the AC power distribution cabinet and the ESS.

----End

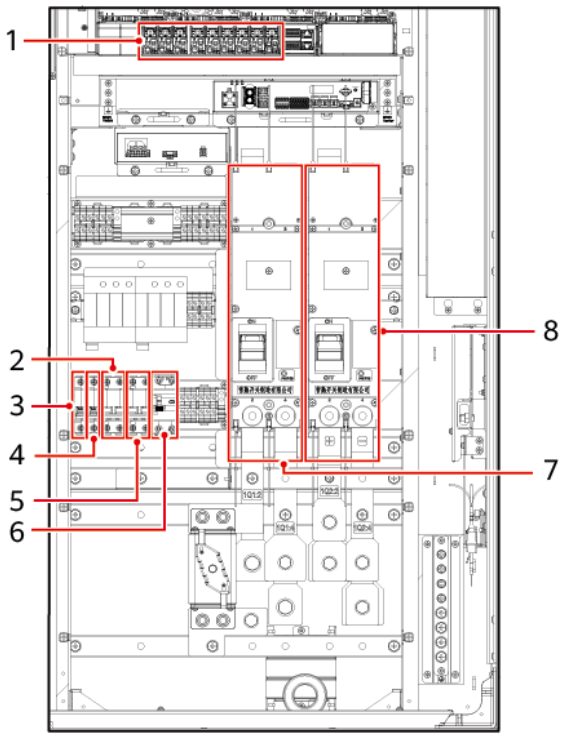
3.6 Powering On the ESS

NOTICE

If the ESS has not been used for six months or longer after being installed, it must be checked and tested by professionals before operation.

Procedure

Figure 3-3 Positions of switches



(1) 48 V DC power distribution switches	(2) AC main switch (1FCB)	(3) 12 V adapter switch (1FCB1)
(4) PSU switch (1FCB2)	(5) UPS switch (5FCB)	(6) 220 V maintenance socket switch (1FB1)
(6) DC switch (1Q1, on the battery rack side)	(7) DC switch (1Q2, on the Smart PCS DC side)	-

Step 1 Turn on the DC switch 1Q1. (As shown by 7 in Figure 3-3)

Step 2 Use a multimeter to check whether the AC voltage is within the allowed range (220 V ±10%). (As shown by 2 in Figure 3-3)

Step 3 Turn on the AC main switch 1FCB. (As shown by 2 in Figure 3-3)

Step 4 Turn on all switches in the power distribution system of the ESS.

1. Turn on the 12 V adapter switch 1FCB1. (As shown by 3 in Figure 3-3)
2. Turn on the PSU switch 1FCB2. (As shown by 4 in Figure 3-3)
3. Turn on the 220 V maintenance socket switch 1FB1. (As shown by 6 in Figure 3-3)
4. On the embedded power subrack (SK1), turn on the DC/DC switch 2FCB1, DC light power switch 2FCB2, TCUE power switch 2FCB3, fan 1 switch 2FCB6, and fan 2 switch 2FCB7, air conditioner 1 switch 2FCB8, and air conditioner 2 switch 2FCB9 in sequence.

NOTE

Use a multimeter to check that the output voltage at position 1 in the preceding figure is 53 V ±5 V.

Step 5 Turn on the DC switch 1Q2. (As shown by 8 in Figure 3-3)

----End

4 SmartLogger Web-based Deployment

Prerequisites

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

4.1 Preparations and WebUI Login

Prerequisites

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

Procedure

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

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

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

NOTE

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

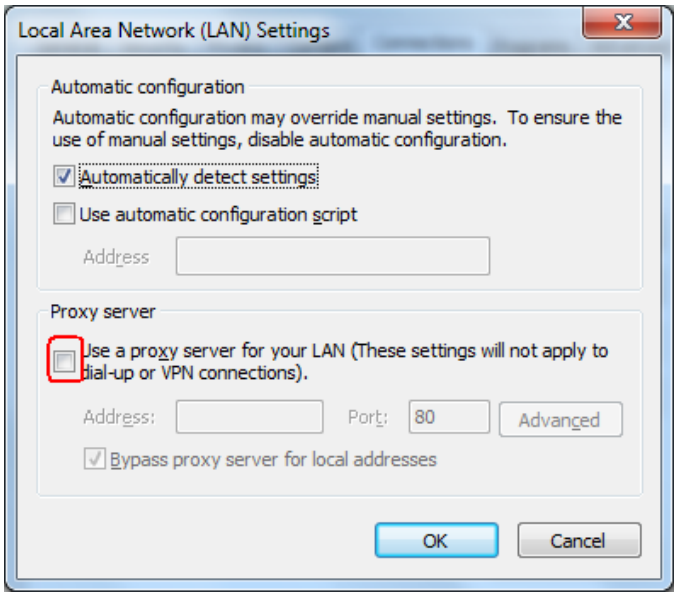
Step 3 Set LAN parameters.

NOTICE

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

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

Figure 4-1 LAN settings



5. Click **OK**.

Step 4 Log in to the SmartLogger WebUI.

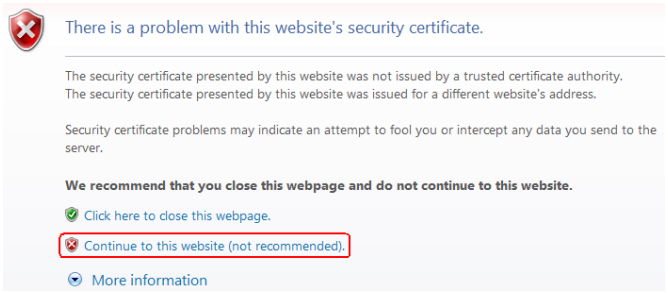
1. In the address box of a browser, enter https://XX.XX.XX.XX (XX.XX.XX.XX is the IP address of the SmartLogger) and press Enter. The login page is displayed. If you log in

to the WebUI for the first time, a security risk warning is displayed. Click **Continue to this website** to log in to the WebUI.

NOTE

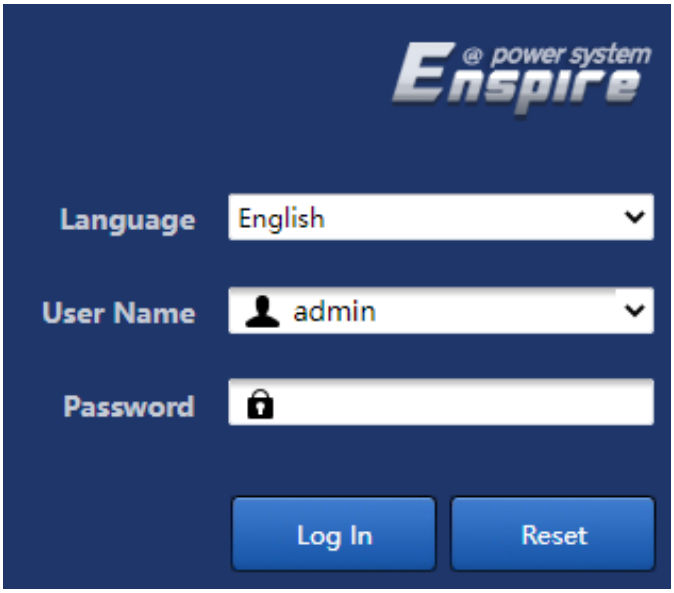
- It is recommended that users use their own certificates. If the certificate is not replaced, the security risk warning will be displayed during each login.
- After logging in to the WebUI, you can import a certificate under **Maintenance** > **Security Settings** > **Network Security Certificate**.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

Figure 4-2 Security risk warning



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

Figure 4-3 Login page (Initial login when the user name is displayed as admin)



NOTE

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

Parameter	Description
Language	Set this parameter as required.

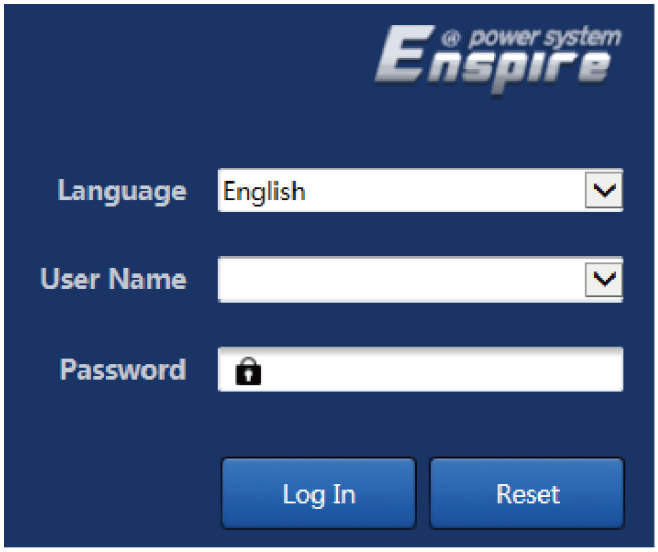
Parameter	Description
User Name	Default value: admin
Password	• The initial password is Changeme. • Use the initial password upon first power-on and change it immediately after login. Then, use the new password to log in again.

NOTE

Updating the SmartLogger to V800R021C10SPC020 or later:

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

Figure 4-4 Login page (Initial login when the user name is null)



IL03J00002

NOTE

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

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

NOTE

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

----End

Follow-up Procedure

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

4.2 Checking the SmartLogger Software Version

Choose **Monitoring** > **Logger (Local)** > **About** and check that the software version is FusionSolar V800R021C10SPC110 or later.

4.3 Upgrading the SmartLogger

NOTE

- If the SmartLogger software version is not FusionSolar V800R021C10SPC110 or later, upgrade the SmartLogger.
- Obtain the SmartLogger upgrade package from the Company.

Step 1 Choose **Maintenance** > **Software Upgrade**, upload the SmartLogger upgrade package, select the device, and upgrade the SmartLogger.

Step 2 After the software upgrade is complete, the SmartLogger automatically restarts. Log in to the SmartLogger WebUI again 2 minutes later.

----End

4.4 Setting Battery Modules

Step 1 Choose **Monitoring** > **ESR** > **Running Param.** > **Settings**, and set **Number of battery modules** to 12.

Step 2 Choose **Monitoring** > **ESU** > **Running Param.**, select **Delete invalid battery module**, and submit the settings.

Step 3 Choose **Monitoring** > **ESU** > **Running Param.**, click  in the upper right corner, and wait for 2 minutes.

Step 4 Choose **Monitoring** > **ESR**, click **+**, and verify that the ESM-1 to ESM-12 status indicators under the ESR are all green or yellow.

Step 5 Choose **Monitoring** > **ESM** > **About** and check the software versions of ESM-1 to ESM-12.

NOTE

- If the software version of ESM-1 to ESM-12 is not FusionSolar V800R021C10SPC110 or later, upgrade the ESU.
- Obtain the upgrade package from the Company.

Step 6 (Optional) Choose **Maintenance** > **Software Upgrade**, upload the upgrade package, select the device, and upgrade the ESU.

Step 7 Choose **Monitoring** > **ESU** > **Running Param.**, click  in the upper right corner, and wait for 2 minutes.

Step 8 Choose **Monitoring** > **ESM** and check  in the upper right corner to ensure that no major alarm is generated.

----End

4.5 Deployment Wizard

Procedure

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

Step 2 Set parameters following the deployment wizard. For details, see **Help** on the page.

NOTE

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

1. Set basic parameters.

   After setting the parameters, select a communication mode based on the site requirements.
2. After Huawei devices are connected, click **Search for Device** to check the cable connections and allocate addresses.

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 connection again.
- After the cable connection check and device search are complete, click  to view the corresponding topology information.
- After a device is added or deleted, you need to click **Search for Device** again. Otherwise, the system topology will not be updated.

3. If a meter is connected, set **Meter usage** to **Export+import meter**.
4. Connect to EMIs.
5. Set the battery working mode for battery control.

Working mode	Description
No control	SmartLogger directly delivers the external scheduling power limit. No other power scheduling control is performed. The power is automatically controlled by the device.
Maximum self-consumption	• It is applicable to the PV+ESS system to increase the self-consumption rate of PV power. • Excess PV energy is stored in batteries. When PV power is insufficient or no PV power is generated at night, batteries discharge to supply power to the loads, improving the self-consumption rate of the PV system and the self-sufficiency rate, and reducing electricity costs. • The SmartLogger performs battery scheduling based on the external scheduling power limit and the preceding policies.
TOU	• Applies to optical storage systems and pure storage systems with price differences between peak and off-peak hours. • You can manually set the charge and discharge time segments to lower the electricity cost. You need to enable **Fed to grid** in **Battery control**. When the electricity price is low at night, the power grid charges the batteries. When the electricity price is high, the batteries discharge to supply power to the loads. • Click **Add** to set the charge/discharge time. A maximum of 14 time segments are allowed. During the charging period, the power grid charges the batteries, and during the discharging period, the batteries discharge to supply power to the loads. In other time segments that are not set, the ESS does not discharge, and the PV modules and grid supply power to the loads. (In grid-tied/off-grid mode, if the grid fails, the ESS can discharge at any time.) • In some countries, the grid is not allowed to charge batteries. In such case, this mode cannot be used. • The SmartLogger performs battery scheduling based on the external scheduling power limit and the preceding policies.
Scheduled Charge/Discharge	• This mode applies to ground power plant scheduling scenarios. • In scheduled discharge, the AC output aims to reach the target value of the scheduled active power: PV power supply is prioritized. If the PV power is insufficient, the batteries supply power to loads; if the PV power is sufficient, the system outputs at the target value and the excess PV power is used to charge the batteries. • In scheduled charge, the AC output aims to reach the

Working mode	Description
	target value of the scheduled active power: If the battery power is insufficient or the Smart PCS is limiting power, the system gets power from the grid as much as possible; if the scheduling target is met and the battery has excessive power, the PV power is used to charge the batteries.

- The working mode is set to **Maximum self-consumption.**

Parameter	Description
Maximum grid power during battery discharge	Control the maximum target grid power when the grid-connection point has zero power.
Adjustment deadband	Allowed fluctuation of the target grid power for the grid-connection point
Automatic SOC calibration	• **Enabled**Automatic SOC calibration is enabled. If the total charge and discharge energy reaches the threshold or the calibration function has not been triggered for 30 days, the SOC automatic calibration is performed. The SOC automatic calibration is performed in battery racks. During calibration, the cut-off SOC settings will be ineffective. • **Disabled**Automatic SOC calibration is disabled.

- The working mode is set to**TOU.**。

Parameter	Description
Preferred use of surplus PV power	• **Charge:**When the PV energy is greater than the loads, excess PV energy is used to charge the ESS. After the maximum charge power is reached or the ESS is fully charged, the excess PV energy is fed to the grid. • **Fed to grid:**When the generated PV energy is greater than the loads, the excess PV energy is preferentially fed to the grid. When the maximum output power of the inverter/Smart PCS is reached, the excess energy is used to charge the batteries. This setting is applicable to the scenario where the feed-in tariff (FIT) is higher than the electricity price. The ESS is used only for backup power.
Maximum charge power of grid	Set the maximum power of the grid during battery charging.
Maximum grid power during battery discharge	Control the maximum target grid power when the grid-connection point has zero power.

Parameter	Description
Adjustment deadband	Allowed fluctuation of the target grid power for the grid-connection point
Automatic SOC calibration	• **Enabled**Automatic SOC calibration is enabled. If the total charge and discharge energy reaches the threshold or the calibration function has not been triggered for 30 days, the SOC automatic calibration is performed. During calibration, the cut-off SOC settings will be ineffective and the response of the charge/discharge power may be impacted temporarily. • **Disabled**Automatic SOC calibration is disabled.
Start time	Set the Charge/Discharge time. A maximum of 14 time segments can be set. You can set a cycle by week by clicking the buttons corresponding to Mon. through Sun. in the **Repeat** box. The buttons are blue by default, indicating selected. After you click it, the button turns gray.
To	
Charge/Discharge	
Repeated	

6. Connect to a Huawei network management system (NMS.)
7. Connect to a third-party management system. Select IEC104.
8. Connect to third-party devices.
9. The settings are complete.

----End

4.6 System Setup

Prerequisites

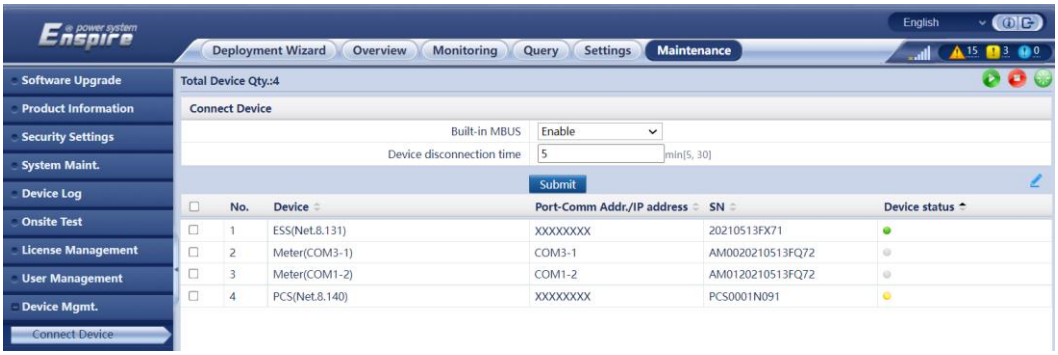
Start up the system when needed.

Procedure

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

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

Figure 4-5 System startup



----End

4.7 View Alarm

Step 1 Check whether an alarm is generated on the SmartLogger WebUI or CMU WebUI. If an alarm is generated, handle the alarm by referring to the handling suggestions in the alarm reference section.

NOTE

- You are advised to use the SmartLogger WebUI.
- If **Door Status Alarm** is generated, check whether the cabinet door is open. If yes, close the door.
- If **ESU Communication Failure** is generated, check whether communications cables are connected correctly and whether the power supply is normal.

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

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

After the alarm is cleared, choose **Monitoring** > **Running Param.** > **Fire Suppression** > **Start** on the SmartLogger WebUI or CMU WebUI.

Step 3 Check whether an alarm is generated for the Smart Rack Controller on the SmartLogger WebUI or CMU WebUI. If an alarm is generated, handle the alarm by referring to the handling suggestions in the alarm reference section.

----End

4.8 Setting Capacity Limit

Context

- Peak-valley arbitrage with capacity limit:

When the capacity limit is enabled in TOU mode, the charge/discharge time set in the TOU window must cover 24 hours of a day. Capacity limitation is not supported in non-charge/discharge time.

- Capacity limit:
  - If the capacity limit is met 24 hours a day, the ratio of the ESS/PCS to the load power must be properly set to ensure that the ESS/PCS have sufficient capacity to meet the capacity limit.
  - When the ESS is used only for capacity limit, you can set the charge time to 24 hours through the TOU setting. Do not set the discharge time and non-charge/discharge time.
  - The overload capability of transformers, power distribution switches, and cables must be greater than the sum of the maximum charge current and maximum load current of the ESS.

Procedure

Step 1 Choose **Settings > Battery Control > Capacity Limit** to set the capacity limit.

Parameter	Description
No control	If this parameter is set, the capacity of the grid-connection point is not limited. The inverter and Smart PCS run according to the preset control policy.
Active capacity limit	If this parameter is set, the active power of the grid-connection point for purchasing or feeding power cannot exceed the preset capacity limit.
Apparent capacity limit	If this parameter is set, the apparent power of the grid-connection point for purchasing or feeding power cannot exceed the preset capacity limit.

----End

Active capacity limit

Parameter	Description
Maximum active capacity	Set this parameter according to the charging capacity in the demand contract of the power grid company. Once set, the active power of the grid-connection point for purchasing or feeding power cannot exceed the preset value.
PV power limit when electricity meter fails	Specifies the active power limit of the inverter when the feed-in meter communication is abnormal. You can manually change the active power percentage of the inverter as required.
PCS power limit when electricity meter fails	Specifies the active power limit of the PCS when the feed-in meter communication is abnormal. You can manually change the active power percentage of the PCS as required.

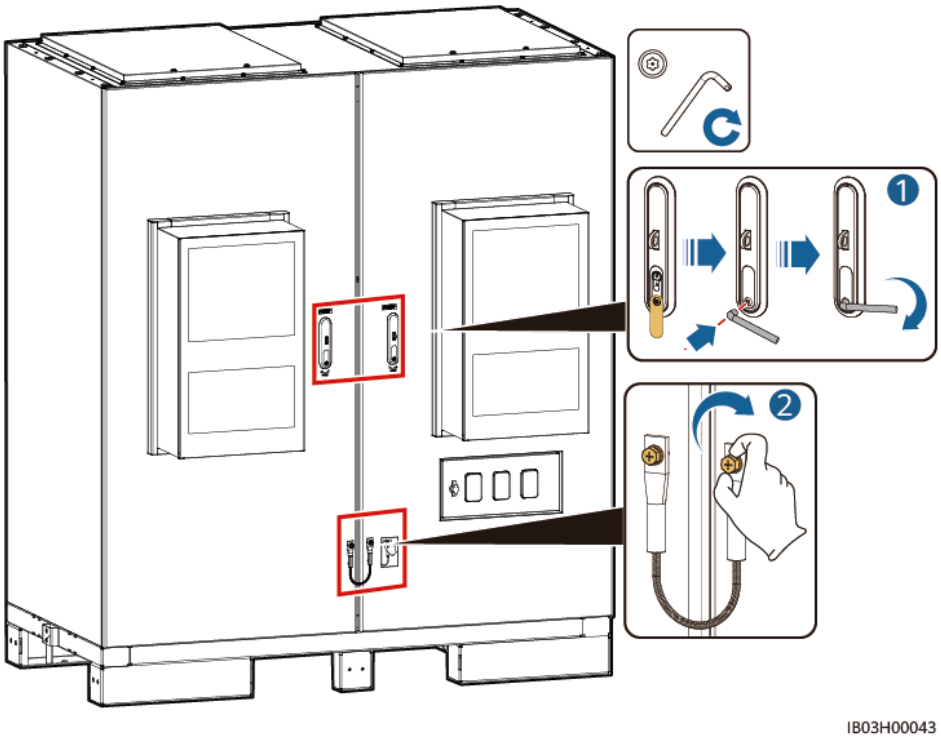
Apparent capacity limit

Parameter	Description
Maximum apparent capacity	Set this parameter according to the charging capacity in the demand contract of the power grid company. Once set, the apparent power of the grid-connection point for purchasing or feeding power cannot exceed the preset value.
PV power limit when electricity meter fails	Specifies the active power limit of the inverter when the feed-in meter communication is abnormal. You can manually change the active power percentage of the inverter as required.
PCS power limit when electricity meter fails	Specifies the active power limit of the PCS when the feed-in meter communication is abnormal. You can manually change the active power percentage of the PCS as required.

5 Closing the Cabinet Door

After the deployment commissioning is complete, close the cabinet door and secure the safety rope.

Figure 5-1 Closing the cabinet door



5.1 Delivering a Shutdown Command on the SmartLogger

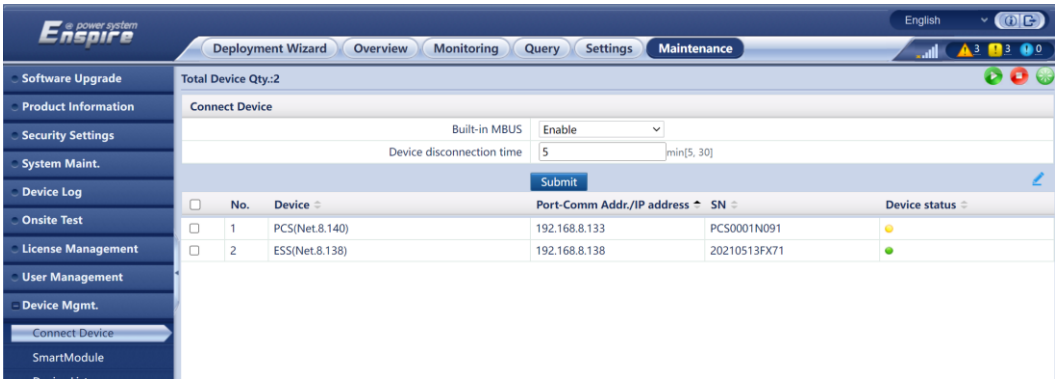
Prerequisites

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

Procedure

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

Figure 5-2 Shutdown command



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

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

----End

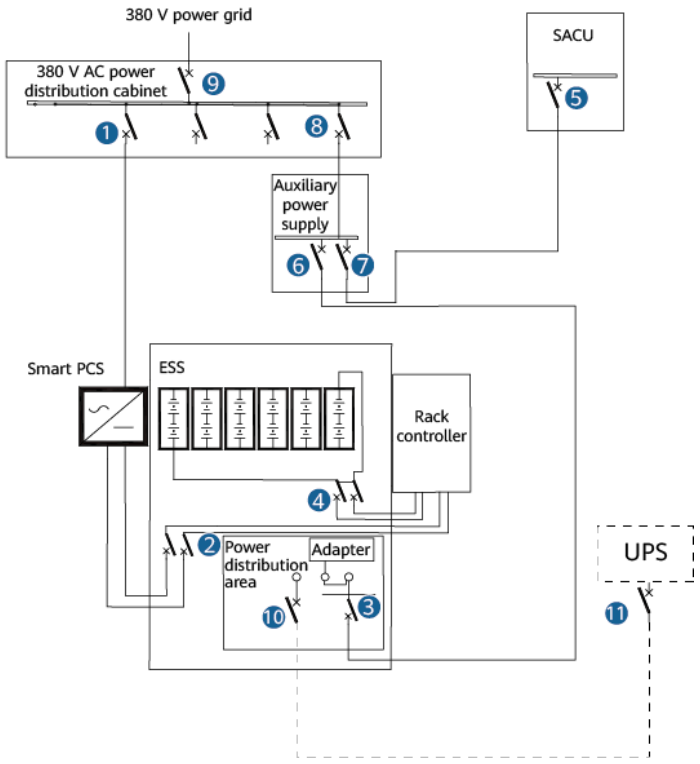
5.2 Power-Off Process

Table 5-1 Power-off procedure

Step	Item		Remarks
1	Powering off the AC side of the Smart PCS	Powering off the battery side of the AC power distribution cabinet	As shown by (1) in Figure 20221030LUNA2000-200KWH-2H1 Smart String ESS-2
2	Powering off the ESS	Powering off the output DC circuit breakers	As shown by (2) in Figure 20221030LUNA2000-200KWH-2H1 Smart String ESS-2

Step	Item		Remarks
3		Powering off the auxiliary power supply (turning off the AC switches and then the DC switches)	As shown by (3) in Figure 20221030LUNA2000-200KWH-2H1 Smart String ESS-2
4		Powering off the DC circuit breakers of battery racks	As shown by (4) in Figure 20221030LUNA2000-200KWH-2H1 Smart String ESS-2
5	Powering off the SACU		As shown by (5) in Figure 20221030LUNA2000-200KWH-2H1 Smart String ESS-2
6	Powering off the auxiliary power supply	Powering off the 220 V AC auxiliary power supply	As shown by (6), (7), and (8) in Figure 20221030LUNA2000-200KWH-2H1 Smart String ESS-2
7		(Optional) Powering off the UPS	As shown by (10) and (11) in .2 Power-Off Process
8	Powering off the AC power distribution cabinet connected to the grid		As shown by (9) in Figure 20221030LUNA2000-200KWH-2H1 Smart String ESS-2

Figure 5-3 Power-off process



5.3 Powering Off ESS Devices

Powering Off the Smart PCS

Step 1 Wear proper PPE.

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

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

Step 4 Turn off DC switch 1Q2 in the ESS.

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

----End

Powering off the ESS

Step 1 Turn off all switches in the power distribution system of the ESS.

1. On the embedded power subrack (SK1), turn off the DC/DC switch 2FCB1, DC light power switch 2FCB2, TCUE switch 2FCB3, fan 1 switch 2FCB6, fan 2 switch 2FCB7, air conditioner 1 switch 2FCB8, and air conditioner 2 switch 2FCB9 in sequence.
2. Turn off switch 1FB1 of the 220 V maintenance socket.
3. Turn off the PSU switch 1FCB2.
4. Turn off the 12 V adapter switch 1FCB1.

Step 2 Turn off the AC main switch 1FCB.

Step 3 Turn off the DC switch 1Q1.

----End

5.4 Powering Off the Power Supply Loop of the AC Power Distribution Cabinet

Step 1 Turn off the switches between the AC power distribution cabinet and the ESS.

Step 2 Turn off the switches between the AC power distribution cabinet and the SACU.

----End

6 Alarm Reference

Alarm severities are defined as follows:

- Major alarm: The device disconnects from the grid and stops generating power after a fault occurs.
- Minor: Some components of the device are faulty but the device can still connect to the grid and generate power.
- Warning: The device works properly. The output power decreases or some authorization functions fail due to external factors.

Table 6-1 Alarm List

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
3807	Air Conditioner Internal Fan Fault		Cause ID = 1–13 1. [HVAC-No] The cable of the fan is loose. 2. The fan is damaged.	1. Shut down the system at a proper time. 2. Power off the air conditioner, open the enclosure, and check whether the fan cable is loose. If yes, securely connect the cable. Check whether the fan is damaged or burnt. If yes, contact your technical support.
3808	Air Conditioner External Fan Fault		Cause ID = 1–13 1. [HVAC-No] The cable of the fan is loose. 2. The fan is damaged.	1. Shut down the system at a proper time. 2. Power off the air conditioner, open the enclosure, and check whether the fan cable is loose. If yes, securely connect the cable. Check whether the fan is damaged or burnt. If yes, contact your technical support.
3809	Air Conditioner Compressor Fault		Cause ID = 1–13 1. [HVAC-No] The cable of the compressor is loose. 2. The compressor is damaged.	1. Shut down the system at a proper time and take security protection measures. 2. Power off the air conditioner, open the enclosure, and check whether the compressor cable is loose. If yes, securely connect the cable. Check whether the compressor is damaged or burnt. If yes, contact your technical support.
3810	Air Conditioner		Cause ID = 1–13 1. [HVAC-No] The cable	1. Shut down the system at a proper time and take security protection measures.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
	Return Air Temperature Sensor Fault		of the return air temperature sensor is loose. 2. The sensor is damaged, open-circuited, or short-circuited.	2. Check whether any cable is loose. 3. Replace the return air temperature sensor.
3811	Air Conditioner Supply Air Temperature Sensor Fault		Cause ID = 1–13 1. [HVAC-No] The cable of the supply air temperature sensor is loose. 2. The sensor is damaged, open-circuited, or short-circuited.	1. Shut down the system at a proper time and take security protection measures. 2. Check whether any cable is loose. 3. Replace the supply air temperature sensor.
3812	Air Conditioner System High Pressure Alarm		Cause ID = 1–13 1. [HVAC-No] The outdoor heat exchanger is blocked or has scale. 2. The outdoor fan is faulty. 3. The air intake or exhaust vent of the outdoor fan is blocked.	1. Check whether the outdoor heat exchanger is blocked by dirt. If yes, clean it using a high-pressure water gun. 2. Check whether the outdoor fan is running properly. If not, replace it. 3. Check whether the air intake or exhaust vent of the outdoor fan is blocked. If yes, clean the air intake or exhaust vent. 4. If the fault persists, contact your technical support.
3813	Air Conditioner AC Overvoltage		Cause ID = 1–13 1. The auxiliary power cable is incorrectly connected. 2. [HVAC-No] The main control board is faulty. 3. The overvoltage alarm threshold is improper.	1. Measure the voltage of the air conditioner wiring terminal. If the voltage is approximately 380 V, the auxiliary power cable is incorrectly connected. Disconnect the auxiliary power supply and reconnect the cable correctly. 2. If the voltage is approximately 220 V, contact your technical support.
3814	Air Conditioner AC Undervoltage		Cause ID = 1–13 1. [HVAC-No] The power cable is loose. 2. The model of auxiliary power supply is incorrect. 3. The main control board is faulty. 4. The undervoltage alarm threshold is improper.	1. Measure the voltage of the air conditioner wiring terminal. If the voltage is approximately 110 V or 127 V, the auxiliary power supply does not meet the requirements. Disconnect the auxiliary power supply immediately and replace it with a 380 V power supply. 2. If the voltage is lower than 150 V, check whether the cable is loose. 3. If the voltage is approximately 220 V, contact your technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
3816	Air Conditioner Evaporator Temperature Sensor Fault	Minor	Cause ID = 1–13 1. [HVAC-No] The cable of the evaporator temperature sensor is loose. 2. The sensor is damaged, open-circuited, or short-circuited.	1. Shut down the system at a proper time and take security protection measures. 2. Check whether any cable is loose. 3. Replace the evaporator temperature sensor.
3817	Air Conditioner Condenser Temperature Sensor Fault	Minor	Cause ID = 1–13 1. [HVAC-No] The cable is not connected securely or correctly. 2. The sensor is damaged, open-circuited, or short-circuited.	1. Shut down the system at a proper time and take security protection measures. 2. Check whether any cable is loose. 3. Replace the condenser temperature sensor.
3818	Air Conditioner Ambient Temperature Sensor Fault	Minor	Cause ID = 1–13 1. [HVAC-No] The cable is not connected securely or correctly. 2. The sensor is damaged, open-circuited, or short-circuited.	1. Shut down the system at a proper time and take security protection measures. 2. Check whether any cable is loose. 3. Replace the ambient temperature sensor.
3819	Air Conditioner Evaporator Frozen	Minor	Cause ID = 1–13 1. [HVAC-No] The air intake or exhaust of the cabinet is blocked. 2. The indoor fan is faulty. 3. The cooling system cannot be shut down in a timely manner. 4. The evaporator temperature sensor is faulty.	1. Check whether the air intake or exhaust vent is blocked. If yes, clean it. 2. If the fault persists, contact your technical support.
3820	Frequent Air Conditioner System High Pressure Alarm		Cause ID = 1–13 1. [HVAC-No] The condenser is blocked or has scale. 2. The condenser fan is faulty. 3. The external air flow is short-circuited or	1. Check whether the outdoor heat exchanger is blocked by dirt. If yes, clean it using a high-pressure water gun. 2. Check whether the outdoor fan is running properly. If not, replace it. 3. Check whether the air intake or exhaust vent of the outdoor fan is blocked. If yes, clean the air intake or exhaust vent.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
			blocked.	4. If the fault persists, contact your technical support.
3821	Air Conditioner DC Overvoltage		Cause ID = 1–13 1. [HVAC-No] The input voltage is higher than the overvoltage threshold. 2. The overvoltage threshold setting is improper. 3. The voltage test device is faulty.	Measure the voltage of the air conditioner power supply, record it, and contact your technical support.
3822	Air Conditioner DC Undervoltage		Cause ID = 1–13 1. [HVAC-No] The input voltage is lower than the undervoltage threshold. 2. The undervoltage threshold setting is improper. 3. The voltage test device is faulty.	Measure the voltage of the air conditioner power supply, record it, and contact your technical support.
3825	UPS Alarm		Cause ID = 1 A UPS alarm has been generated.	Troubleshoot the fault by referring to the alarm troubleshooting section in the UPS user manual.
3826	Combustible Gas Alarm		Cause ID = 1 1. The safety valve of the lithium battery is open, and combustible gas is leaked. 2. Lithium battery thermal runaway occurs.	1. Monitor the ESS remotely for 30 minutes to check whether other exceptions (such as abnormal ambient temperature, battery voltage, battery temperature, and exhaust fan startup) occur. If yes, shut down the ESS. During remote monitoring, do not approach the battery cabin or open the cabin door. 2. If no exception is found during the remote monitoring, send trained personnel to the site and observe the system for 30 minutes from a safe distance. If there is smoke or fire, remotely power off the system, evacuate the onsite personnel as soon as possible, and call the fire emergency number. 3. If no exception is found during remote monitoring and onsite observation, manually clear the alarm. If the alarm clearance fails, contact your technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
3827	Ambient Temperature High		Cause ID = 1 The ambient temperature in the battery cabin is too high.	1. Check whether the air conditioners in the battery cabin are faulty. 2. Check whether the doors of the battery cabin are completely closed.
3828	Condensation Risk	Minor	Cause ID = 1 Condensation risk exists in the battery cabin.	1. This alarm indicates that the cabin needs to be dehumidified. Ensure that the cooling mode is set to automatic. 2. If the alarm persists for more than 30 minutes, check whether the air conditioner in the battery cabin is faulty or the cabin doors are completely closed.
3829	Temperature and Humidity Sensor Malfunction	Minor	Cause ID = 1 There are too many faulty temperature and humidity sensors in the battery cabin.	1. Repair the temperature and humidity sensor based on the alarm. 2. On the maintenance screen, check that the temperature and humidity sensor is correctly connected.
3830	Temperature and Humidity Control Malfunction		Cause ID = 1 There are too many faulty air conditioners in the battery cabin.	1. Troubleshoot the fault based on the corresponding troubleshooting suggestions. 2. On the maintenance screen, check that the air conditioner is correctly connected.
3831	The pressure of the fire suppression module is insufficient.	Minor	Cause ID = 1 The pressure of the fire suppression module is insufficient.	Check the fire suppression module and the pressure gauge, and replace the fire suppression module as soon as possible. Otherwise, the system will shut down automatically in three days.
3832	Fire Alarm		Cause ID = 1 Smoke or overheating is detected in the battery cabin. Cause ID = 2 A fire has been detected in the battery cabin.	Cause ID = 1 1. Monitor the ESS remotely for 30 minutes to check whether other exceptions (such as abnormal battery voltage, battery temperature, and combustible gas concentration) occur. If yes, shut down the ESS remotely. During remote monitoring, do not approach the battery cabin or open the cabin door. 2. If no exception is found during the remote monitoring, send trained personnel to the site and observe the system for 30 minutes from a safe distance. If there is smoke or fire, remotely power off the system,

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
				evacuate the onsite personnel as soon as possible, and call the fire emergency number. 3. If no exception is found during remote monitoring and onsite observation, manually clear the alarm remotely. If the alarm clearance fails, close the cabin doors and clear the alarm 20 minutes later. If the alarm persists, contact your technical support. Cause ID = 2 1. Do not open the cabin doors and evacuate onsite personnel. 2. For details, see **Emergency Handling Plan** in the maintenance manual. 3. Contact your technical support.
3833	Rectifier Fault		Cause ID = 1–6 The rectifier hardware is faulty.	1. Replace rectifier [Number]. 2. If the fault persists after the replacement, contact your technical support.
3834	Rectifier Protection		Cause ID = 1–6 1. The AC voltage is abnormal. 2. The ambient temperature is too high.	1. Check whether the AC input voltage is greater than 300 V. If yes, check the power supply. 2. Check whether the air vent of the faulty rectifier [Number] is blocked. If yes, clean the air vent. Check whether there is a heat source near the air vent. If yes, remove the heat source. Check whether the heat dissipation fan is damaged. If yes, replace the rectifier. 3. If the fault persists, contact your technical support.
3835	Rectifier Communication Failure		Cause ID = 1–6 1. The rectifier has been removed. 2. The rectifier is faulty and not working.	1. Turn off the AC input switch of the PSU. 2. Remove the rectifier [Number] and insert it again. 3. If the fault persists, replace the rectifier [Number] or monitoring module. 4. If the fault persists after the replacement, contact your technical support.
3836	Rectifier Power Failure		Cause ID = 1–6 The AC loop is disconnected.	1. Check whether the AC input voltage is less than 80 V. If yes, check the power supply. If not, replace the faulty rectifier [Number]. 2. If the fault persists after the replacement, contact your technical support.
3837	Rectifier Output Overvolt		Cause ID = 1–6 The PSU locks out due to output overvoltage.	1. Turn off the AC input switch of the PSU. 2. Remove the rectifier [Number] and insert it again.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
	age			3. If the fault persists, replace the rectifier [Number] or monitoring module. 4. If the fault persists after the replacement, contact your technical support.
3838	T/H Sensor Communication Failure	Minor	Cause ID = 1 T/H sensor-1 communication failed.	1. Check whether the communication cable is correctly connected to the device. If not, connect the cable correctly. 2. Check whether the power supply of the device is normal. If not, contact your technical support.
3839	Air Conditioner Communication Failure	Minor	Cause ID = 1 HVAC-1 communication failed. Cause ID = 2 HVAC-2 communication failed.	1. Check whether the communication cable is correctly connected to the device. If not, reconnect the cable properly. 2. Check whether the power cable of the device is loose. If yes, connect it securely. 3. If the fault persists, contact your technical support.
3840	CO Sensor Communication Failure	Minor	Cause ID = 1 CO sensor-1 communication failed. Cause ID = 2 CO sensor-2 communication failed.	1. Check whether the communication cable is correctly connected to the device. If not, connect the cable correctly. 2. Check whether the power supply of the device is normal. If not, contact your technical support.
3841	H_2 Sensor Communication Failure	Minor	Cause ID = 1 H_2 sensor-1 communication failed.	1. Check whether the communication cable is correctly connected to the device. If not, connect the cable correctly. 2. Check whether the power supply of the device is normal. If not, contact your technical support.
3842	ESC Communication Failure	Minor	Cause ID = 1 ESC-1 communication fails.	1. Check whether the communication cable is correctly connected to the device. If not, reconnect the cable properly. 2. Check whether the power cable of the device is loose. If yes, connect it securely. 3. If the fault persists, contact your technical support.
3843	TCU Communication Failure	Minor	Cause ID = 1 TCU-1 communication failed.	1. Turn off the TCU power switch. 2. Check whether the communication cable is correctly connected to the device. If not, connect the cable correctly. 3. Check whether the power supply of the device is normal. If not, contact your technical support.
3844	SMU Commun	Minor	Cause ID = 1 SMU communication	1. Check whether the communication cable is correctly connected to the device. If not,

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
	ication Failure		failed.	reconnect the cable properly. 2. Check whether the power cable of the device is loose. If yes, connect it securely. 3. If the fault persists, contact your technical support.
3845	SmartModule Communication Failure	Minor	Cause ID = 1 SmartModule communication failed.	1. Check whether the communication cable is correctly connected to the device. If not, reconnect the cable properly. 2. Check whether the power cable of the device is loose. If yes, connect it securely. 3. Check whether a certificate expiration alarm is displayed in the alarm list. If yes, contact your technical support. 4. If the fault persists, contact your technical support.
3846	CMU Communication Failure	Minor	Cause ID = 1 CMU communication failed.	1. Check whether the communication cable is correctly connected to the device. If not, reconnect the cable properly. 2. Check whether the power cable of the device is loose. If yes, connect it securely. 3. If the fault persists, contact your technical support.
3847	Fire Suppression Module Pressure Insufficient		Cause ID = 1 The gas pressure of the fire suppression module is insufficient for more than three days.	Check the fire suppression module and the pressure gauge, and replace the fire suppression module.
3048	T/H Control Mode: Manual	Minor	Cause ID = 1 The temperature and humidity control mode is set to manual.	After the commissioning is complete, set the temperature and humidity control mode to automatic.
3849	Air Exhaust Malfunction		Cause ID = 1 There are too many faulty exhaust fans. Cause ID = 2 There are too many faulty TCUs.	Cause ID = 1 Repair the exhaust fan based on the fault alarm. Cause ID = 2 1. Repair the TCU based on the fault alarm. 2. On the maintenance screen, check that the TCU is correctly connected.
3850	Combustible Gas Detection Malfunction		Cause ID = 1 There are too many faulty combustible gas sensors.	1. Repair the combustible gas sensor based on the fault alarm. 2. On the maintenance screen, check that the combustible gas sensor is correctly connected.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
3851	Exhaust Fan Fault	Minor	Cause ID = 1 Exhaust fan-1 is faulty. Cause ID = 2 Exhaust fan-2 is faulty.	1. Check whether the cable is loose. If yes, connect the cable securely. Check whether the fan is damaged or burnt. If yes, replace the fan. 2. Check whether the TCU connected to the exhaust fan works properly. 3. If the fault persists, contact your technical support.
3852	Ambient Temperature Low		Cause ID = 1 The ambient temperature in the battery cabin is too low.	1. Check whether the air conditioners in the battery cabin are faulty. 2. Check whether the doors of the battery cabin are completely closed.
3853	ESC Physical Location Failure	Minor	Cause ID = 1 ESC physical location failed.	1. Check whether the network cables between ESCs are connected properly. 2. Check whether the network cables between the first and last ESCs and the CMU are connected properly. 3. Check whether the RS485 cable between ESC-1 and the CMU is connected properly.
3856	Battery Fault Protection		Cause ID = 1 Some battery packs are severely faulty, causing the system to shut down. Cause ID = 2 The temperature of some battery packs is too low. As a result, charge capacity is not reached due to low temperature protection.	Maintain the battery pack based on the alarm and troubleshooting suggestions.
3857	Memory Abnormal	Minor	Cause ID = 1 1. The storage space is insufficient. 2. The memory is faulty.	Contact your technical support.

Table 6-2 PSU indicator status and troubleshooting

Indicator	Color	Status	Description	Suggestion
Power indicator 	Green	Steady on	The PSU has an AC input.	Normal.
		Off	The PSU has no AC input.	Check whether the input is normal. If yes, replace the

Indicator	Color	Status	Description	Suggestion
				PSU.
			The PSU is damaged.	Replace the PSU.
		Blinking at 0.5 Hz	Querying is in progress.	Normal.
		Blinking at 4 Hz	The PSU is loading the application program.	The PSU automatically recovers after the loading is finished, and no action is required.
Alarm indicator 	Yellow	Off	The PSU does not generate any protection alarm.	Normal.
		Steady on	• A warning is generated due to ambient overtemperature. • A shutdown protection alarm is generated due to ambient overtemperature or undertemperature.	Check that the air vent is not blocked and the ambient temperature is within the normal range.
			AC input overvoltage or undervoltage protection is triggered.	Check the power grid voltage.
			The PSU is hibernating.	Normal.
		Blinking at 0.5 Hz	The communication between the PSU and the monitoring module is interrupted.	Replace the PSU or monitoring module.
Fault indicator 	Red	Off	The PSU is normal.	Normal.
		Steady on	The PSU locks out due to output overvoltage or it is not properly inserted.	Remove the PSU and then insert it 1 minute later.

Indicator	Color	Status	Description	Suggestion
			The PSU has no output due to an internal fault.	Replace the PSU.

NOTE

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

Table 6-3 ESC/BCU common alarms and troubleshooting measures

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

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
	Overvoltage on Rack Controller		The battery side voltage exceeds the maximum operating voltage of the power module.	rack. If yes, clear the alarm by referring to the alarm handling suggestions. 2. If the alarm persists, contact your dealer or technical support.
3016	Battery Side Undervoltage on Rack Controller	Major	Cause ID = 1–3 The batteries are abnormal or not securely connected.	1. Determine the positions of the input and output circuit breakers associated with [ESC-No] and the AC input power switch of the PSU. 2. Issue a hibernation command to all ESRs. 3. Check whether the switch on the battery side is turned on. If not, turn on the switch and issue a running command. 4. If the switch on the battery side is ON, turn off the switch, the switch on the bus side, and the AC input power switch of the PSU. Then wait for 5 minutes. 5. Check the cable connections on the battery side of the power control module by referring to the maintenance manual of the product. 6. After checking that the battery power cable is correctly connected, turn on the AC input power switch of the PSU, the switch on the battery side, and the switch on the bus side in sequence, and issue a running command. 7. If the alarm persists, contact your dealer or technical support.
3017	Battery Side Short Circuit on Rack Controller	Major	Cause ID = 1–3 The battery cable is incorrectly connected.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check for voltage at both ends of the battery switch. If no voltage is detected, check whether the cable is short-circuited or grounded. 4. Check the cable connections on the battery side of the power control module by referring to the maintenance manual of the product. 5. After checking that the battery power cable is correctly connected, turn on the switch on the battery side and then

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
				the switch on the bus side, and issue a startup command. 6. If the alarm persists, contact your dealer or technical support.
3018	Battery Side Reverse Polarity on Rack Controller	Major	Cause ID = 1–3 Battery cables are connected in reverse polarity.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check whether the copper bars and cables on the battery side of the power control module are connected in reverse polarity by referring to the product maintenance manual. 4. After checking that the battery power cable is correctly connected, turn on the switch on the battery side and then the switch on the bus side, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3019	Bus Side Overvoltage on Rack Controller	Major	Cause ID = 1–3 The bus cable is not correctly connected, or the bus voltage exceeds the maximum operating voltage of the power module.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check the cable connections on the bus side of the power control module by referring to the maintenance manual of the product. 4. After checking that the battery power cable is correctly connected, turn on the switch on the battery side and then the switch on the bus side, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3020	Bus Side Reverse Polarity on Rack Controller	Major	Cause ID = 1–3 The bus is connected in reverse polarity.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check whether the cable between the copper bar on the bus side of the power control module and the DC LV Panel is connected in reverse polarity

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

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
			abnormal.	support.
3023	Battery Terminal Overtemperature on Rack Controller	Major	Cause ID = 1–3 The battery terminal is not securely connected.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check whether the torque of the bolts on the battery side of the power control module meets the requirements by referring to the DCDC replacement section in the maintenance manual of the product. 4. After checking that the battery power cable is correctly connected, turn on the switch on the battery side and then the switch on the bus side, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3024	Bus Terminal Overtemperature on Rack Controller	Major	Cause ID = 1–3 The bus terminal is not securely connected.	1. Determine the positions of the input and output circuit breakers associated with [ESC-No] and the AC input power switch of the PSU. 2. Issue a hibernation command to all ESRs, and turn off the switch on the battery side, the switch on the bus side, and the AC input power switch of the PSU. Then wait for 5 minutes. 3. Check whether the torque of the bolts on the bus side of the power control module meets the requirements by referring to the DCDC replacement section in the maintenance manual of the product. 4. After checking that the battery power cable is correctly connected, turn on the AC input power switch of the PSU, the switch on the battery side, and the switch on the bus side in sequence, and issue a running command. 5. If the alarm persists, contact your dealer or technical support.
3025	Rack Controller Version Mismatch	Minor	Cause ID = 1, 2 The update failed.	1. Version mismatch on [ESC-No]. Please update. 2. If the update fails multiple times, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3026	Internal Fan of Rack Controller Fault	Warning	Cause ID = 1, 2 The internal fan is short-circuited, the power supply is insufficient, or the fan is damaged.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Turn on the switch on the battery side and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.
3033	Communication Failure on Power Control Unit of Rack Controller	Major	Cause ID = 1 The internal communication of the rack controller has failed.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.
3034	Rack Controller Cable Connection Abnormal	Major	Cause ID = 1 The cable connection between the battery rack and the corresponding power module is incorrect.	If the system is in the array topology identification process, wait until the process is complete or exit the process. 1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the cable connection between battery rack and power module under [ESR-CabinetNo] is correct by referring to the DCDC replacement section in the maintenance manual of the product. 4. Check whether the auxiliary power supply of battery rack [ESR-CabinetNo] is normal and whether the auxiliary power supply switch is turned on by referring to the product maintenance manual. 5. Check that the power cable is securely connected. Turn on the AC power

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
				supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 6. If the alarm persists, contact your dealer or technical support.
			Cause ID = 2 The power-on self-test was terminated due to a system exception.	1. Check other active alarms of the device and rectify the faults based on the alarm handling suggestions. 2. If the alarm persists after the system is reset, contact your dealer or technical support.
3035	Battery Pack Positions of Rack Controller Abnormal	Major	Cause ID = 1 1. The actual number of battery packs is different from the configured value. 2. The system has not identified the battery pack address. 3. The battery pack has been replaced and the new address has not been identified. 4. Cables of the battery packs are not properly connected.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the communications cable between battery packs under [ESR-CabinetNo] are correctly connected and whether the configured number of battery packs matches the actual number by referring to the product maintenance manual. 4. After checking that the battery power cable is correctly connected, turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3040	Incorrect Bus Connection on Rack Controller	Major	Cause ID = 1 The output buses are not connected in parallel in the 1C scenario.	If the system is in the array topology identification process, wait until the process is complete or exit the process. 1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check whether the cable connection to the bus side of the power control module meets the 1C requirement by referring to the quick installation guide. 4. After checking that the battery power

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

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
				side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
			Cause ID = 3 The power-on self-test was terminated due to a system exception.	1. Check other active alarms of the device and rectify the faults based on the alarm handling suggestions. 2. If the alarm persists after the system is reset, contact your dealer or technical support.
3052	External DC Auxiliary Power Supply of Rack Controller Fault	Major	Cause ID = 1 1. The DC circuit breaker is OFF. 2. The PSU is faulty.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the PSU in the power distribution cabin reports a fault alarm. 4. Check whether the DC circuit breaker is ON. 5. After checking that the PSU is normal, turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence. 6. If the alarm persists, contact your dealer or technical support.
3053	External Fan of Rack Controller Fault	Warning	Cause ID = 1–3 The external fan is short-circuited or damaged, the power supply is insufficient, or the air channel is blocked.	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait for 5 minutes. 3. Check whether the fan blades are damaged. If yes, clear the foreign matter around the fan, and install a new fan. 4. Turn on the switch on the battery side and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3054	Rack Controller Temperature Abnormal	Warning	Cause ID = 1, 2 The NTC is short-circuited, open-circuited, or not	1. Locate the input and output circuit breakers associated with [ESC-No]. 2. Issue a shutdown command, turn off the switch on the battery side and then the switch on the bus side, and wait

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
			securely connected.	for 5 minutes. 3. Turn on the switch on the battery side and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.
3056	Emergency Power-Off	Major	Cause ID = 1 The emergency power-off (EPO) button is pressed down.	1. Troubleshoot system faults. 2. After the faults are rectified, pull up the EPO button. 3. Reset all battery racks in sequence.
3057	Version Inconsistent Between Rack Controller and Battery Packs	Warning	Cause ID = 1 1. The versions of the rack controller and battery packs are inconsistent. 2. The update failed. 3. The battery packs have been replaced.	1. The version of [ESC-No] is inconsistent with that of the battery packs. Although this does not affect the normal running of the system, you are advised to update the entire ESU. 2. If the update failed multiple times, contact your dealer or technical support.
3058	Version Incompatible Between Rack Controller and Battery Packs	Major	Cause ID = 1 1. The versions of the rack controller and battery packs are inconsistent. 2. The update failed. 3. The battery packs have been replaced.	1. The version of [ESC-No] is incompatible with that of the battery packs. Consequently, the functions are limited, affecting the normal running of the system. Please update the entire ESU. 2. If the update failed multiple times, contact your dealer or technical support.
3059	Communication Interruption Between the Rack Controller and PCS	Major	Cause ID = 1 1. The communications cable between the CMU and SmartLogger is abnormal. 2. The communications cable between the PCS and SmartLogger is abnormal.	1. Check whether the CMU status indicator on the WebUI indicates that the CMU is offline. If yes, check whether the communications link between the CMU and the SmartLogger is normal. 2. Check whether the PCS status indicator on the WebUI indicates that the PCS is offline. If yes, check whether the power supply to the PCS is normal. If the power supply is normal, issue a shutdown command to the PCS, turn off the circuit breaker on the AC side, and check whether the communication link between the PCS and the SmartLogger is normal. If the link is normal: a. Determine the positions of the input and output circuit breakers associated with [ESC-No] and the AC input power

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
				switch of the PSU. b. Issue a hibernation command to all ESRs, and turn off the switch on the battery side, the switch on the bus side, and the AC input power switch of the PSU. Then wait for 5 minutes. c. Turn on the AC input power switch of the PSU, the switch on the battery side, and the switch on the bus side in sequence, and issue a running command. d. If the alarm persists, contact your dealer or technical support.
3060	Incompatible ESM	Major	Cause ID = 1 The replacement ESM is incompatible with the system.	1. The model of [ESR-CabinetNo ESM-SlotNo] is incompatible with the system. Replace it with an ESM of the original model. 2. If the alarm persists, contact your dealer or technical support.

Table 6-4 BMU common alarms and troubleshooting measures

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

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
	Pack Abnormal		A major fault has occurred on the battery pack.	and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch. 3. Contact your dealer or technical support to replace the battery pack.
3029	Battery Pack Locked	Major	Cause ID = 1, 2 The battery pack has triggered the same fault for multiple times.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 24 hours. 3. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.
			Cause ID = 3–5 The battery pack has triggered the same fault for multiple times.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.
3030	Battery Module Fan Fault	Major	Cause ID = 1 1. The fan is short-circuited. 2. The power supply is insufficient. 3. The fan is damaged. 4. The fan is stuck.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Replace the fan if it is damaged, clear

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
				the foreign matter if there are any, and rectify power supply failure if any. 4. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3031	Battery Pack Temperature Imbalance	Minor	Cause ID = 1 Temperature imbalance occurs between cells in the battery pack.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether an air conditioner or battery pack fan has generated a fault alarm. Rectify the fault based on the alarm handling suggestions. 4. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3032	Battery Pack Overvoltage	Major	Cause ID = 1, 2 The voltage of the battery pack or its cell is too high.	1. The 3032-1 alarm (battery pack overvoltage protection) does not affect the running of other battery packs. 2. Check the alarm module associated with the corresponding ESC. 3. Issue a shutdown command and wait for 5 minutes. 4. If the alarm is cleared, issue a startup command. If the alarm persists for 20 minutes, contact your dealer or technical support.
3036	Optimization Unit of Battery Pack Abnormal	Major	Cause ID = 1–4 A major fault has occurred on the internal circuit of the optimization unit in the battery pack.	1. Determine the position of [ESR-CabinetNo ESM-SlotNo] and the positions of the input and output circuit breakers of the ESC. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
				3. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.
3037	Overtemperature on Optimization Unit of Battery Pack	Minor	Cause ID = 1–3 1. The installation position of the battery pack is not well ventilated. 2. The ambient temperature is too high. 3. The battery power control module is abnormal. 4. The optimization unit is abnormal.	1. Determine the position of [ESR-CabinetNo ESM-SlotNo] and the positions of the input and output circuit breakers of the corresponding ESC. 2. Check the ventilation and whether the ambient temperature of the battery exceeds the upper threshold. 3. If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation. 4. If the ventilation and ambient temperature meet requirements, contact your dealer or technical support.
3038	Overtemperature on Optimization Unit Terminal of Battery Pack	Major	Cause ID = 1 The terminal is not securely connected.	1. Determine the position of [ESR-CabinetNo ESM-SlotNo] and the positions of the corresponding input and output circuit breakers. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check the cable connections of the battery pack and optimization unit by referring to the product maintenance manual. 4. Check that the power cable is securely connected. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3039	Battery Pack Optimization Unit Version Mismatch	Major	Cause ID = 1, 2 The update failed.	1. The versions of optimization units in [ESR-CabinetNo ESM-SlotNo] do not match. Please update. 2. If the update fails multiple times, contact your dealer or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3041	Loose Connection of Battery Pack Copper Bar	Major	Cause ID = 1 The copper bar of the battery pack is loosely connected.	1. Determine the position of [ESR-CabinetNo ESM-SlotNo] and the positions of the input and output circuit breakers of the corresponding ESC. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the copper bar connection of battery pack meets the torque requirements by referring to the quick installation guide of the product. 4. Check that the power cable is securely connected. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3043	Battery Module SOH Low	Warning	Cause ID = 2 The battery module SOH is too low.	1. Determine the position of [ESR-CabinetNo ESM-SlotNo] and the positions of the input and output circuit breakers of the corresponding ESC. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Replace the battery pack by referring to the product maintenance manual. 4. Check that the power and monitoring cables are securely connected. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3044	Battery Module Overcurrent	Major	Cause ID = 1 The battery pack has been working beyond the maximum operating current for a long time.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
				power supply switch, and wait for 5 minutes. 3. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.
3045	Battery Pack Temperature High	Major	Cause ID = 1, 2 1. The installation position of the battery pack is not well ventilated. 2. The air conditioner is not running properly.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Check whether the installation position is well ventilated (If not, improve the ventilation and heat dissipation). Check whether the copper bar is securely connected and whether the air conditioner is running properly. 4. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
3046	Battery Pack Temperature Low	Major	Cause ID = 1, 2 The ambient temperature is too low, which triggers charge or discharge protection.	1. The 3046-1 alarm (low temperature protection during battery charge) does not affect the running of other battery packs. 2. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 3. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 4. Check whether the air conditioner is running properly. 5. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 6. If the alarm persists, contact your

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
				dealer or technical support.
3047	Battery Pack Undervoltage	Major	Cause ID = 1, 2 1. The voltage of the battery pack or its cell is too low. 2. The battery pack has been stored for a long period of time. 3. The battery pack has been idle for a long time after grid connection.	1. The 3047-1 (battery pack undervoltage protection) and 3047-2 (cell undervoltage protection) alarms do not affect the running of other battery packs. 2. Connect to the power grid and charge batteries in 48 hours. 3. If the alarm persists after the battery has been charged for one hour, contact your dealer or technical support.
			Cause ID = 4 1. The voltage of the battery pack or its cell is too low. 2. The battery pack has been stored for a long period of time. 3. The battery pack has been idle for a long time after grid connection.	1. Determine the positions of the input and output circuit breakers of the ESC corresponding to [ESR-CabinetNo ESM-SlotNo]. 2. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 3. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 4. If the alarm persists, contact your dealer or technical support.
3048	ESM Auxiliary Power Supply Fault	Warning	Cause ID = 1 The black start auxiliary power supply relay control is faulty.	1. System running is not affected. 2. Locate the input and output circuit breakers associated with [ESC-No]. 3. Issue a shutdown command, turn off the switch on the battery side, the switch on the bus side, and the AC power supply switch, and wait for 5 minutes. 4. Turn on the AC power supply switch, the switch on the battery side, and the switch on the bus side in sequence, and issue a startup command. 5. If the alarm persists, contact your dealer or technical support.
			Cause ID = 2 The black start button is faulty.	
			Cause ID = 3 The black start auxiliary power supply cannot be powered-off properly.	
			Cause ID = 4 The black start function cannot be enabled.	
			Cause ID = 5 The primary and secondary sources disabling function is faulty.	

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3055	Undertemperature on Optimization Unit of Battery Pack	Major	Cause ID = 1 The ambient temperature is excessively low.	1. Check whether the air conditioner is running properly. 2. If the alarm persists, contact your dealer or technical support.

7 Technical Specifications

Single-cabinet rack controller configuration	One rack controller
Single-cabinet battery configuration	12S1P
Single-cabinet battery rated capacity	193.5 kWh
Charge and discharge rate	≤ 0.5C
Intra-cabinet equalization mode	Battery pack-level active equalization
Cabinet dimensions (H x W x D)	2135 mm x 1810 mm x 950 mm
Cabinet dimensions (including rack controller and Smart PCS, H x W x D)	2135 mm x 2570 mm x 950 mm
Net weight (including battery packs)	≤ 2950 kg
Net weight (excluding battery packs)	≤ 1070 kg
IP rating	IP55
Operating temperature range	–30 ℃ to +55 ℃
Storage temperature range	–40 ℃ to +60 ℃
Operating humidity range	0%–100% (non-condensing)
DC surge protection	Type II
Maximum operating altitude	4000 m
Battery temperature control mode	Industrial air conditioning
Fire extinguishing system	1 U fire suppression module (perfluorohexanone)
Auxiliary power supply	220 V AC, ≤ 4.2 kVA
System communications port	Ethernet/Optical fiber
System communications protocol	Modbus TCP

Environmental protection requirements	RoHS6

A Crimping an OT or DT Terminal

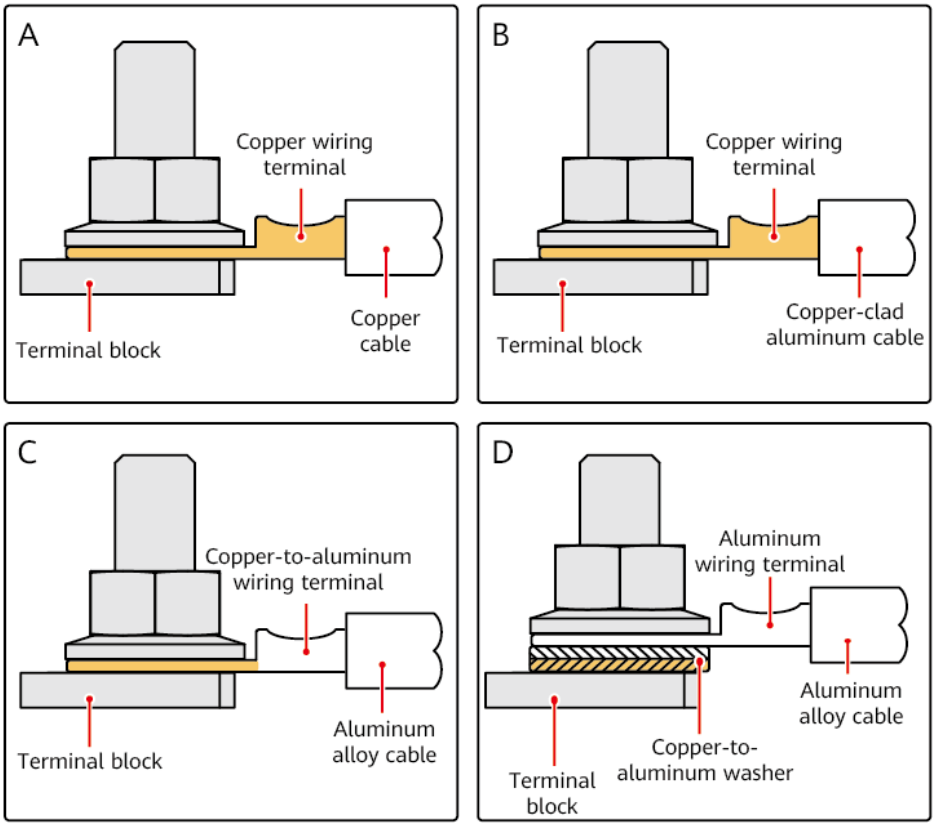
Requirements for OT/DT Terminals

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

NOTICE

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

Figure A-1 Requirements for OT/DT terminals

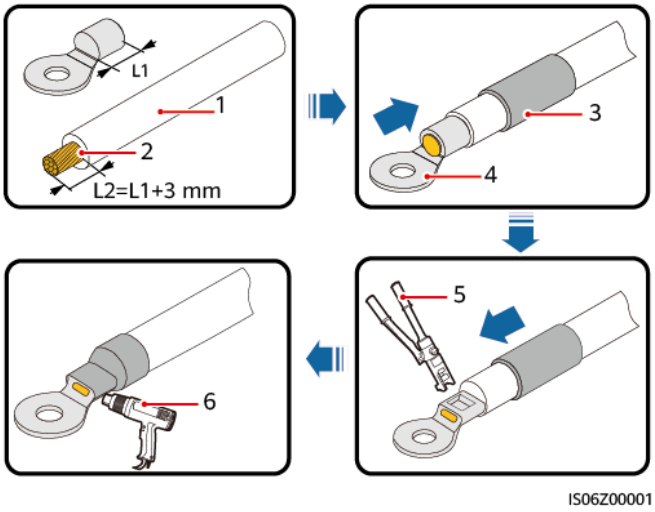


Crimping an OT or DT Terminal

NOTICE

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

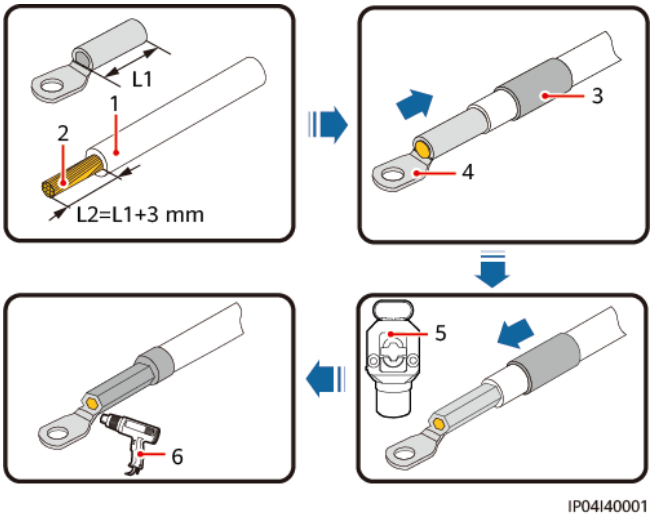
Figure A-2 Crimping an OT terminal



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

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

Figure A-3 Crimping a DT terminal



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

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

B Repainting the Equipment

Prerequisites

- Do not repaint the equipment under poor weather conditions, such as rain, snow, strong winds, and sandstorms, when there is no shelter outdoors.
- You have prepared the paint according to the color palette included with the equipment.

Repainting Description

The equipment should be intact. If the paint peels, repaint the area.

NOTE

Check the damaged area and prepare the appropriate tools and materials.

Table A-1 Repainting description

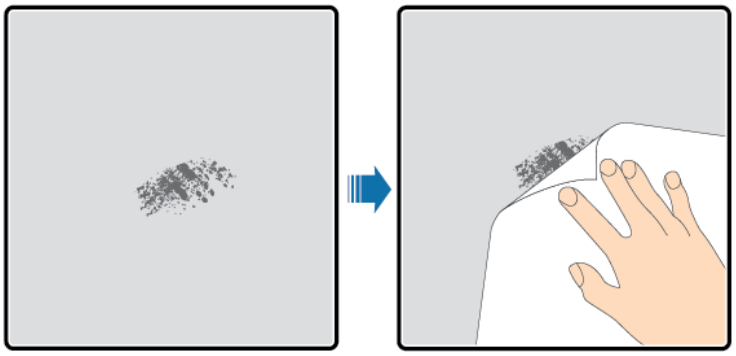
Paint Damage	Tools and Materials	Procedure	Description
Slight scratch (steel base material is intact)	Spray paint or paint, fine sandpaper, anhydrous alcohol, cotton cloth, and brush (required for repainting a small area) or paint gun (required for repainting a large area)	Steps 1, 2, 4, and 5	1. For the color of the finish coat (acrylic acid paint), see the included color palette and the Pantona number. 2. For a few smudges, scratches, or rust, manual paint spraying or brushing is recommended. 3. For many scratches or large-area smudges and rust, use a paint gun to spray
Smudges and rust that cannot be removed			
Deep scratch (primer damaged, steel base material exposed)	Spray paint or paint, zinc-rich primer, fine sandpaper, anhydrous alcohol, cotton cloth, and brush (required for repainting a small area) or paint gun (required for repainting a large	Steps 1, 2, 3, 4, and 5	

Paint Damage	Tools and Materials	Procedure	Description
	area)		paint the area. 4. The paint coating should be thin and even. The surface should be smooth. There must not be any paint drops on the coating. 5. Leave the repainted area for about 30 minutes before performing any further operation.
Logo and pattern damage	If a logo or pattern has been damaged, obtain the logo size and color number and contact a local advertisement coating supplier to formulate a repair solution based on the logo size, color, and damage.		
Dent	1. If a dent is less than 100 mm^2 in area and 3 mm in depth, fill the dent with Poly-Putty base and then perform the same operations as those for fixing deep scratches. 2. If a dent is greater than 100 mm^2 in area or greater than 3 mm in depth, contact the local supplier for an appropriate repainting solution.		

Procedure

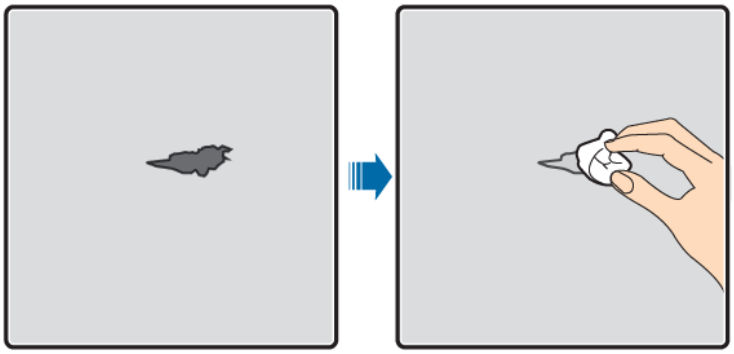
Step 1 Gently polish the damaged areas using fine sandpaper to remove smudges or rust.

Figure B-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 dirt or dust. Then wipe off the alcohol with a clean and dry cotton cloth.

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



Step 3 Paint zinc-rich primer on the damaged coat.

NOTICE

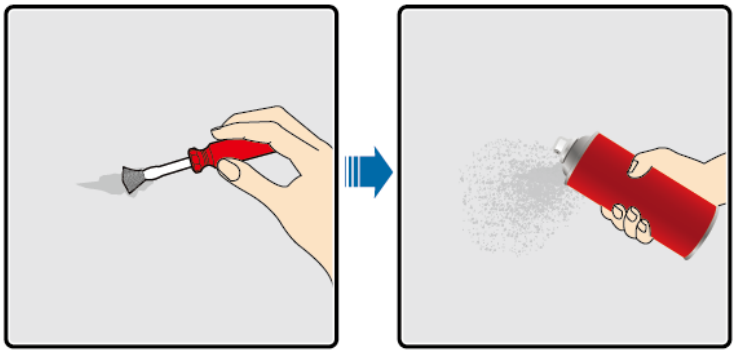
- If the base material is exposed, apply epoxy zinc-rich primer, wait until the paint has dried, and then apply an acrylic acid top coating.
- Select an epoxy zinc-rich primer or acrylic acid top coating with the same color as that of the equipment's surface coating.

Step 4 Apply paint evenly to the damaged area based on the damage degree until all damage traces are no longer visible.

NOTICE

- Ensure that the painting is thin, even, and smooth. There must not be any paint drops on the coating.
- 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 polluted during repainting, cover such areas using white paper and adhesive tape before repairing paint.

Figure B-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 (ΔE), which should be less than or equal to 3. If a colorimeter is unavailable, ensure that there is no visible edge between the repainted area and the surrounding area. The paint should also be free of bulges, scratches, peeling, 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 B-1 Painting requirements

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

NOTE

The following paint model list provided by Huawei is subject to change and for reference only. The price of paint and technical services are subject to local pricing.

Supplier	Location	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 painting	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 painting	Red: UNYMARINE SC MARKING RAL-3020 Black: UNYMARINE SC MARKING RAL-9005

C 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

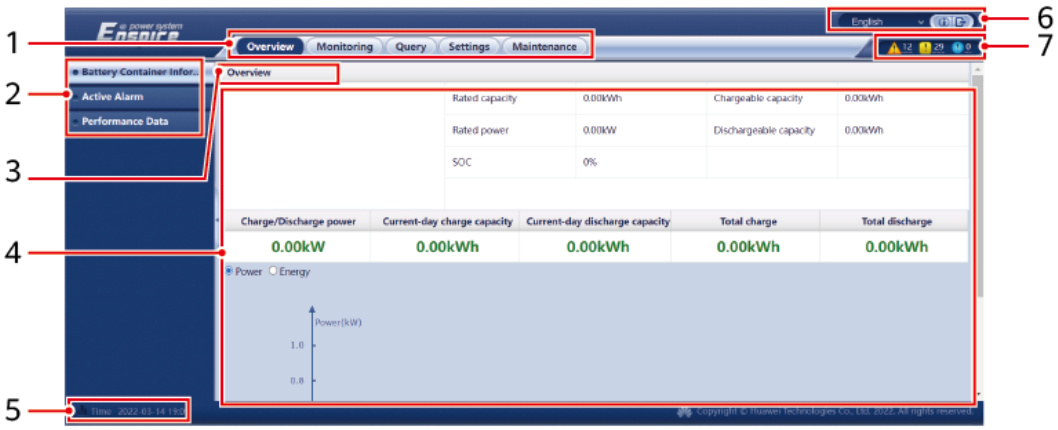
D CMU Commissioning

D.1 Operations on the CMU WebUI

D.1.1 CMU WebUI Operations

D.1.1.1 WebUI Layout

Figure D-1 WebUI layout



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

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

D.1.1.2 Icon Description

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

D.1.1.3 WebUI Menus

Table D-1 WebUI menus

Main Menu	Second-Level Menu	Third-Level Menu	Function
Overview	ESS information	-	Queries ESS information.
	Active Alarm	-	Queries active alarms.
	Performance Data	-	Queries or exports performance data.
Monitoring	CMU	Running Info.	Queries the running information.
		Active Alarm	Queries active alarms.
		Running Param.	Set running parameters.
		Module(M1)	Queries the expansion module.
		About	Queries the version and communication information.
Query	Alarm History	-	Query historical alarms.
	Operation Log	-	Queries operation logs.
	Export Data	-	Exports historical alarms, energy yield, operation logs, and power grid scheduling data.
Settings	User parameters	Date&Time	Sets the date and time.
	Comm. Param.	Wireless Network	• Sets parameters for the built-in WLAN. • Sets mobile data (4G/3G/2G) parameters.
		Wired Network	Sets wired network parameters.
		RS485	Sets RS485 parameters.
		Modbus TCP	Sets Modbus TCP parameters.
	Other parameters	-	-
Maintenance	Software Upgrade	-	Upgrades the CMU software.
	Product Information	-	Queries product information.
	Security Settings	-	• Changes the user password. • Sets the automatic logout time. • Upload a network security certificate. • Updates the key. • Sets web TLS1.0. • Sets digital signature verification.
	System Maint.	-	• Resets the system.

Main Menu	Second-Level Menu	Third-Level Menu	Function
			• Restore factory settings. • Clears data. • Exports all configuration files. • Imports all configuration files.
	Device Log	-	Exports device logs.
	Device Mgmt.	Connect Device	• Adds or removes a device. • Imports or exports configurations.
		SmartModule	• Removes the SmartModule. • Sets the authentication password.
		Clear Alarm	Clears device alarms.

D.1.2 Maintenance Operations

D.1.2.1 Preparations and WebUI Login

Prerequisites

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

Procedure

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

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

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

NOTE

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

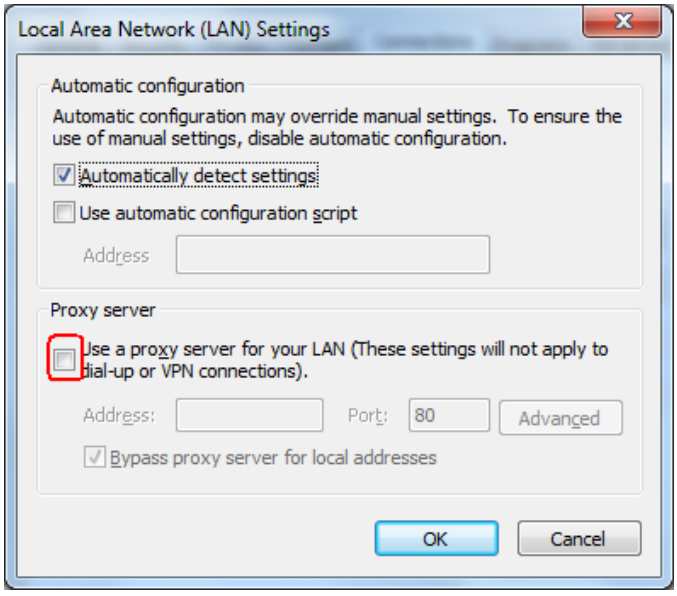
Step 3 Set LAN parameters.

NOTICE

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

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

Figure D-2 LAN settings



5. Click **OK**.

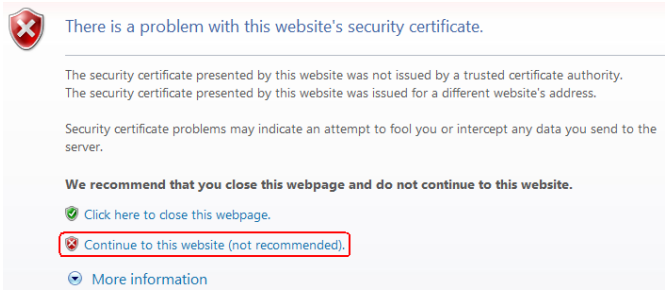
Step 4 Log in to the CMU WebUI.

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

NOTE

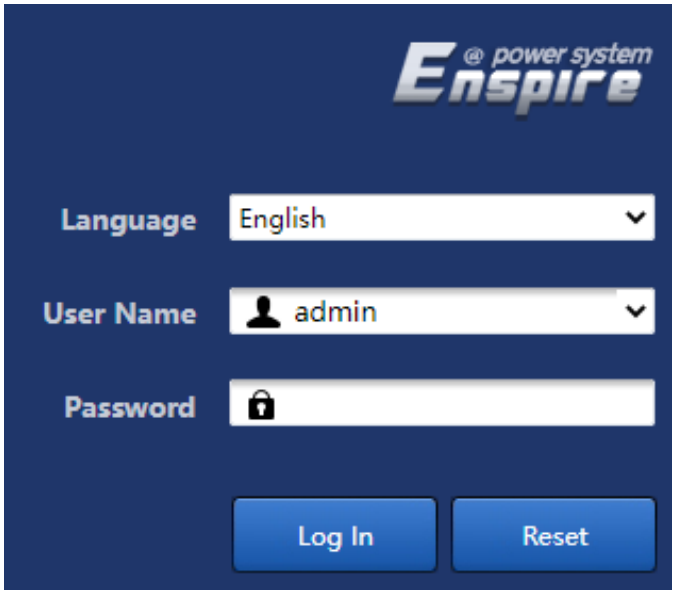
- It is recommended that users use their own certificates. If the certificate is not replaced, the security risk warning will be displayed during each login.
- After logging in to the WebUI, you can import a certificate under **Maintenance** > **Security Settings** > **Network Security Certificate**.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

Figure D-3 Security risk warning



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

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



NOTE

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

Parameter	Description
Language	Set this parameter as required.
User Name	Default value: admin

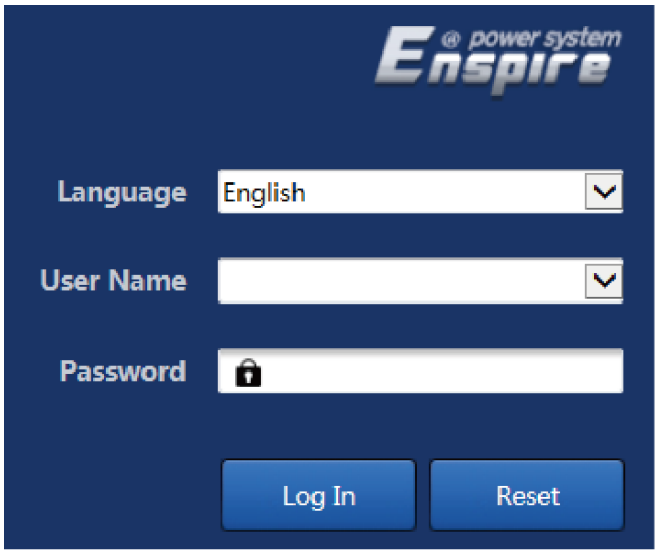
Parameter	Description
Password	• The initial password is **Changeme1234**. • Use the initial password upon first power-on and change it immediately after login. Then, use the new password to log in again.

NOTE

Updating the CMU to V800R021C10SPC020 or later:

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

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



IL03J00002

NOTE

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

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

NOTE

- Protect the password by changing it periodically, and keep it secure. If you lose the password, the device must be restored to its factory settings. Huawei will not be held liable for any losses resulting from improper password management.
- You will be locked out for 10 minutes after five failed password attempts in five minutes.

- A dialog box with recent login information is displayed after login. Click **OK**.

----End

Follow-up Procedure

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

D.1.2.2 Upgrading the Software Version

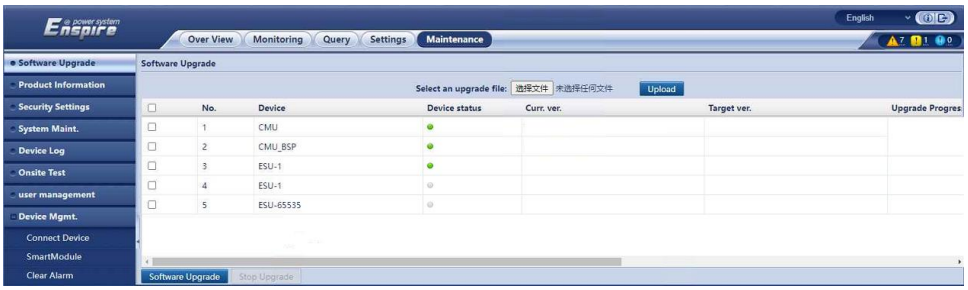
Prerequisites

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

Procedure

Step 1 Upgrade the software.

Figure D-6 Software upgrade



----End

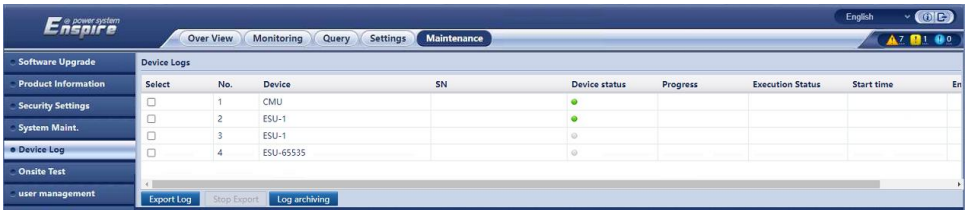
NOTE

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

D.1.2.3 Exporting Device Logs

Step 1 Access the device log page.

Figure D-7 Exporting logs



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

NOTE

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

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

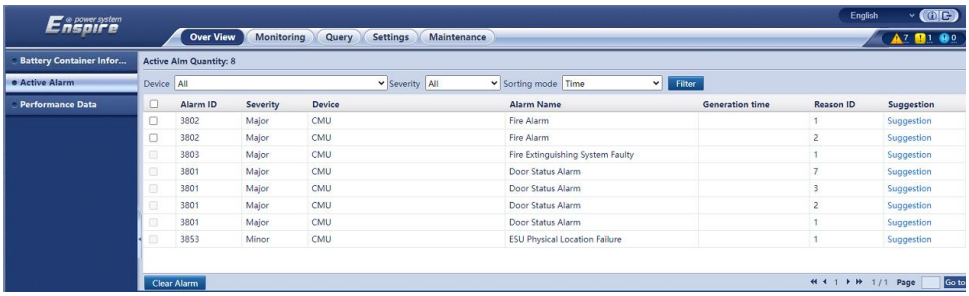
Step 4 After the export is successful, click **Log archiving** to save the logs.

----End

D.1.2.4 Checking Alarms

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

Figure D-8 Checking alarms



----End

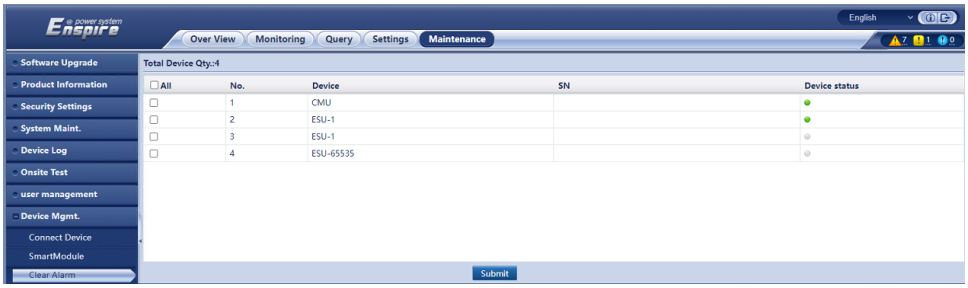
D.1.2.5 Clearing Alarms

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

Procedure

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

Figure D-9 Clearing alarms



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

----End

NOTE

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

D.2 App Operations

D.2.1 Downloading and Installing the App

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

QR code:

SUN2000

D.2.2 Logging In to the App

Prerequisites

- The CMU has been powered on.
- The WLAN function has been enabled on your phone.

- Keep the mobile phone within 5 m of the CMU. Otherwise, the communication signal quality between the app and the CMU will be affected.

Procedure

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

NOTE

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

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

NOTE

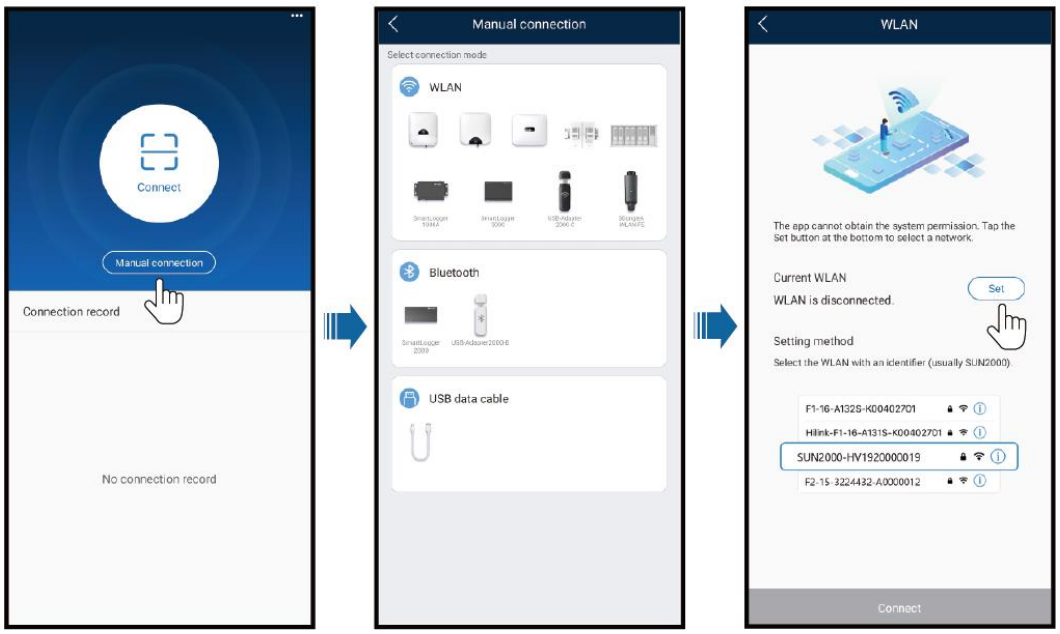
- The screenshots in this section correspond to the SUN2000 app 6.22.10.117 (Android).
- Use the initial password for the first login and change it immediately after login. To ensure account security, protect the password by changing it periodically, and keep it secure. Your password might be stolen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

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

NOTE

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

Figure D-10 Manual connection



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

NOTE

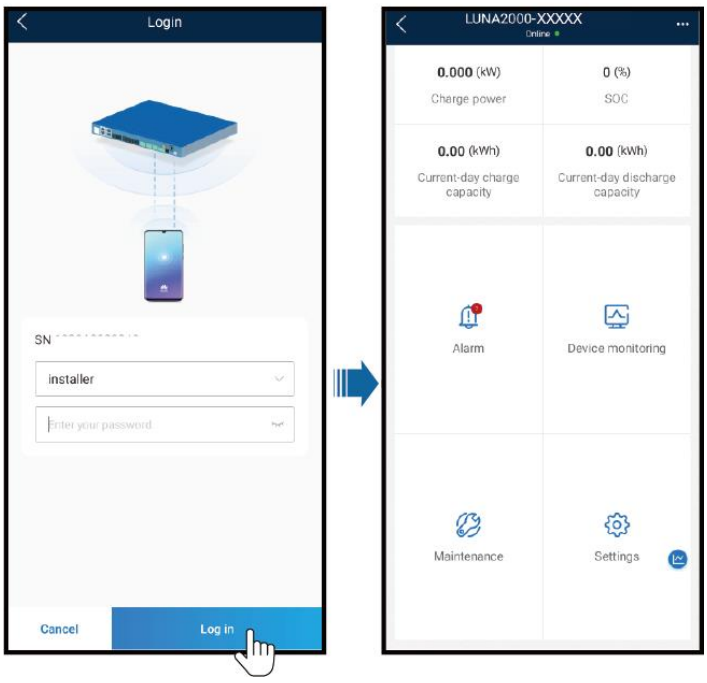
Products delivered earlier do not support connection by scanning the QR code. If you cannot connect to the product by scanning the QR code, manually connect the product.

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

NOTICE

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

Figure D-11 Login



----End

D.2.3 Change Password

Changing the WLAN Hotspot Password of a Device

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

Changing the Login Password of a User

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

E Contact Information

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

Table E-1 Customer Service Contact Information

Country	Email	Tel
China	solarservice@huawei.com	400-822-9999

F Acronym

A

APP	application

B

BMU	Battery Monitoring Unit

C

CAN	control area network
CMU	Central Monitoring Unit
COM	cluster communication port

E

ESC	Smart Rack Controller
ESM	Battery Pack
ESR	Battery Rack
ESU	energy storage unit

D

DC	direct current

F

FE	fast Ethernet

L

LAN	local area network
P	
PSU	Power Supply Unit
S	
SMU	Site monitoring unit
SOC	state of capacity
U	
UPS	uninterruptible power system